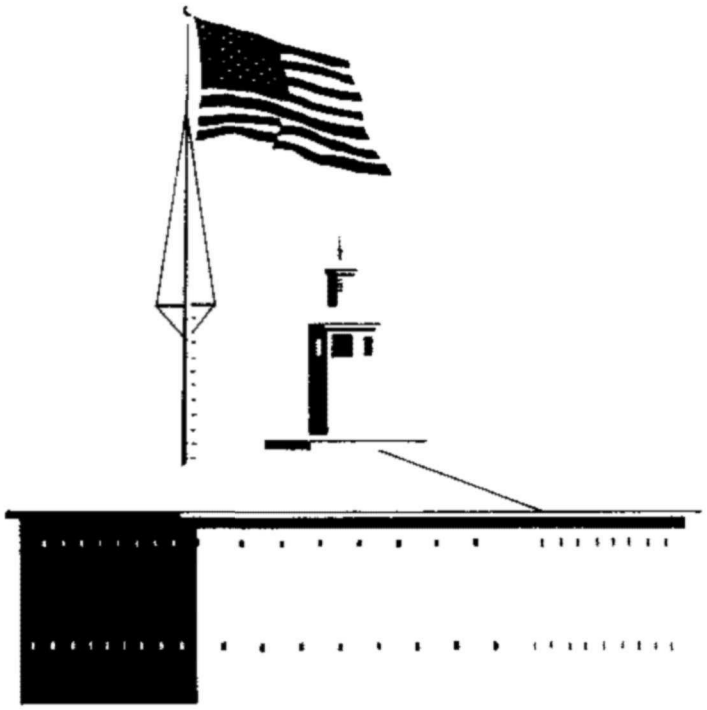
# HISTORIC STRUCTURE REPORT



# FORT LARNED
## NATIONAL HISTORIC SITE

## BLOCKHOUSE (HS-10)

-- National Park Service --
Midwest Regional Office, Office of Planning and Resource Preservation, Division of Cultural Resources Management and the Midwest Archeological Center

# HISTORIC STRUCTURE REPORT

# BLOCKHOUSE (HS-10)

# FORT LARNED NATIONAL HISTORIC SITE, PAWNEE COUNTY, KANSAS

## INTRODUCTION

## HISTORY AND SIGNIFICANCE

by
Ron Cockrell
Senior Research Historian

## ARCHITECTURAL DATA

by
Alan W. O'Bright
Historical Architect

## ARCHEOLOGICAL DATA

by
Janis L. Dial
Archeologist

United States Department of the Interior
National Park Service

Midwest Regional Office, Omaha, Nebraska
Office of Planning and Resource Preservation
Division of Cultural Resources Management
and
Midwest Archeological Center, Lincoln, Nebraska

1991

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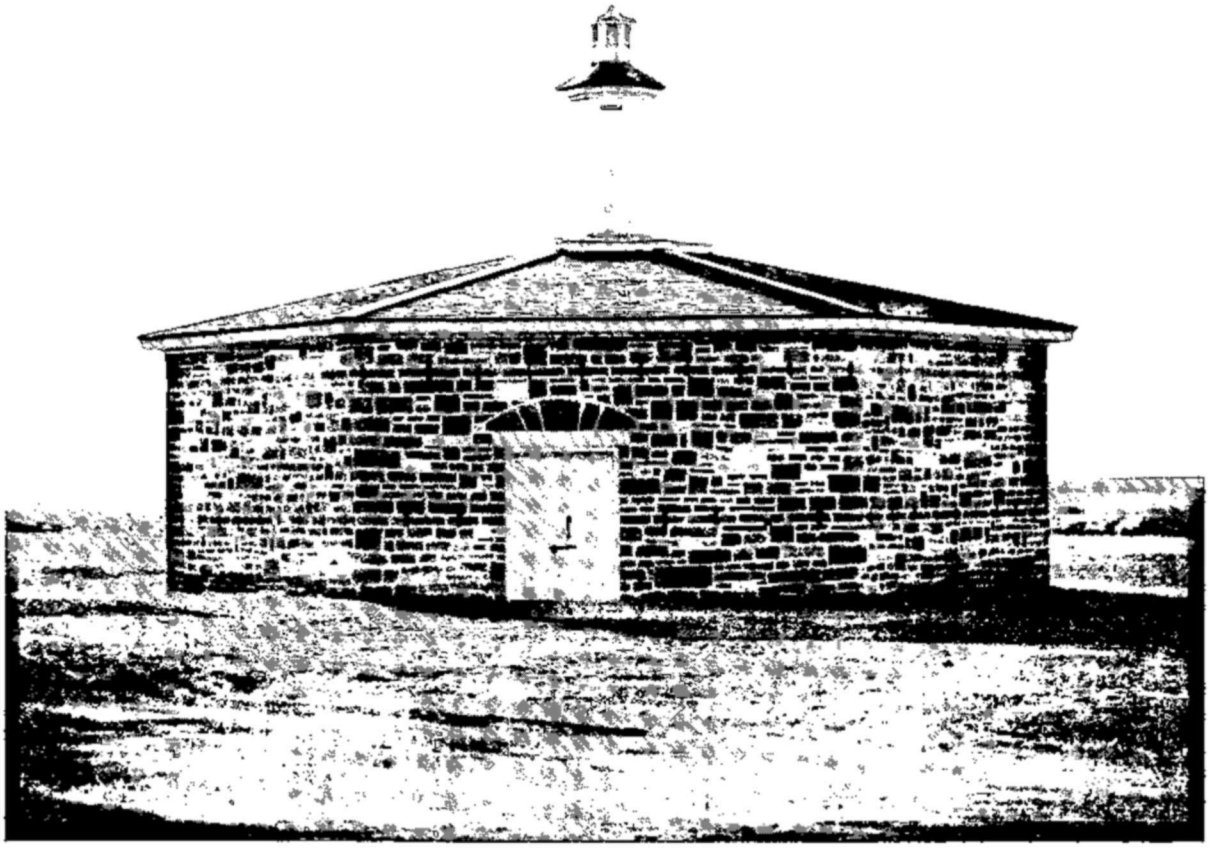
Steve Linderer — 8/20/91

Superintendent, Fort Larned National Historic Site — Date

APPROVED:

— 8/28/91

Regional ~~Director~~, Midwest Region — Date



Frontispiece. The Blockhouse (HS-10) at Fort Larned National Historic Site, Pawnee County, Kansas. Reconstructed in 1987. *Photograph by Clay Ward, Great Bend, Kansas.*

# FOREWORD

Fort Larned, located on the plains of south-central Kansas, is a frontier fort that survived with the major stone buildings of its quadrangle largely intact. The stone Blockhouse, the subject of this report, did not survive. It was torn down around 1900. The Blockhouse was the military center of the fort and all planning documents for the fort anticipated the reconstruction of this building. Two items held up carrying out the reconstruction plans: a lack of funding and inadequate information to accomplish the work within National Park Service Management Policies. In 1985, Congress appropriated money to reconstruct the Blockhouse, thus removing the funding constraint. A multidisciplinary research effort involving a historian, archeologists, and a historical architect produced information largely satisfying policy requirements.

After the fort passed into private hands in 1883, the owners modified the buildings to meet the needs of a ranching operation, some of the modifications being substantial. Due to the Blockhouse's poor condition, the owners of the fort removed it. As archeological investigation revealed, the Blockhouse had a very inadequate foundation and this condition created a structurally weak building. A goal of the National Park Service was to restore the fort to its appearance of about 1868. The plans for achieving this goal included restoring the buildings surrounding the quadrangle to their historical appearance and reconstructing the Blockhouse. The documentation for restoring the quadrangle buildings, especially their exteriors, was excellent. However, the documentation for the Blockhouse was not nearly as good as for the structures surrounding the quadrangle, and the only physical remains were archeological. The fort's master plan recognized evidence did not exist to meet policy requirements for reconstructing this building, but did call for its reconstruction should sufficient documentation be developed.

This was the situation holding when the Congress appropriated funds to reconstruct the Blockhouse. The challenge was to ensure the project carried out the direction of Congress while meeting, to the degree possible, accuracy standards required by National Park Service policies. To this end, the multidisciplinary research team engaged in archival research, research on similar buildings to develop comparative data, and archeological research of the Blockhouse site. The result of that research and analysis effort is contained in this report. This project is a textbook case of proper interdisciplinary methodology for the project research and planning. The end result was a well-researched, well-designed, and well-executed project that added a significant element to the fort setting.

F.A. Ketterson, Jr.
Chief, Division of Cultural Resources Management
Midwest Region

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# PART I

# HISTORIC STRUCTURE REPORT
# INTRODUCTION

## BLOCKHOUSE (HS - 10)

## FORT LARNED NATIONAL HISTORIC SITE,
## PAWNEE COUNTY, KANSAS

Janis L. Dial
Archeologist

Ron Cockrell
Senior Research Historian

and

Alan W. O'Bright
Historical Architect

# PART I:

# INTRODUCTION

## The Blockhouse at Fort Larned

The blockhouse which originally stood at the southeast corner of the Fort Larned parade ground is the only one of the stone buildings at that frontier military post which did not survive the test of time. Unlike the other nine stone buildings which still stand, this structure alone could only be imagined by visitors to this historic property. Perhaps that is the reason why local military history enthusiasts eventually lobbied for the modern reconstruction of the blockhouse. For some of these individuals there is clearly a romantic appeal in the symbolic role played by the blockhouse as the key defensive structure at the fort. The public has also had an ongoing fascination with the actual role of the blockhouse, that of a guardhouse for the confinement of military prisoners. In any event, long-term local sentiments to reconstruct the blockhouse on its original site eventually culminated in a National Park Service project designed to accomplish exactly that.

Fort Larned National Historic Site, 14PA305, is located in present-day Pawnee County, Kansas, 6 miles west of the town of Larned (Figure 1). Fort Larned is situated adjacent to the Pawnee Fork of the Arkansas River, and the main fort complex was built in an area bordered on the north and west by the river itself and on the east by an old meander scar. The southern exposure of the fort was open to the plains. While land away from the river would historically have supported a community of native grasses, scattered trees such as green ash, white elm, and hackberry would have grown along the banks of the river.[1]

Known simply as Camp on Pawnee Fork, the first Fort Larned was established by the U.S. Army in 1859 along the Pawnee River about 5 miles above its confluence with the Arkansas River.[2] The post was moved to its present location, about 3 miles west of the original site in 1860, at which time it was renamed Fort Larned. The initial mission of the fort was to protect the U.S. mail and civilian traffic along the Santa Fe Trail from Indian attack, but it was later to serve as a general base for frontier military operations, a distribution center for annuities to the Indians, and as an Indian agency. During the last years of Fort Larned's operation, its garrison also provided protection to railroad construction crews.

The first adobe and picket buildings at the fort were rather informally arranged around an open parade ground (Figure 2). Tents and dugouts were also used for various purposes during the early years at the fort when it was considered to be a temporary installation.[3] None of those early buildings stand today. The blockhouse was then constructed in 1864-1865 and is purported to

[1]Royal S. Kellogg, Forest Belts of Western Kansas and Nebraska (U.S. Department of Agriculture, Forest Service Bulletin No. 66, Washington, D.C., 1905), 26.

[2] Fort Larned National Historic Site, Kansas, National Park Service, U.S. Department of the Interior (Washington, D.C., 1976); Master Plan, Fort Larned National Historic Site, Kansas (Omaha: Midwest Regional Office, National Park Service, 1978), 9-10.

[3]Master Plan, Fort Larned, 13-14.

have been the first military structure at the fort to be built of locally available sandstone and limestone. The nine standing stone buildings at Fort Larned were constructed between 1866 and 1868 following an upgrade in the status of the fort to that of a permanent post. The new stone buildings served as replacements for most of the deteriorating and largely inadequate adobe and picket structures, and the quadrangle created by the new buildings was more tightly and formally organized within the perimeter of the old buildings.

A series of events during the summer of 1864 ultimately prompted the construction of the blockhouse at Fort Larned. Following a relatively peaceful winter, Native and Euro-American conflict intensified on the Great Plains during the spring of 1864. By the end of June, blockhouse construction had been initiated on the Smoky Hill River at what was to become Fort Ellsworth and on Walnut Creek at what would become Fort Zarah. That work was begun at the direction of Major T. I. McKenny, an Army Inspector General who was coincidentally enroute to Fort Larned in the late spring of 1864.[4] Construction of the Fort Larned blockhouse may also have begun at about this time at McKenny's recommendation, but there is apparently no written record to this effect.[5]

A party of Kiowa raided Fort Larned in the middle of July, 1864, escaping with much of the fort livestock. News of the raid traveled quickly and by the end of the month General Field Order No. 2 was issued by Headquarters, Department of Kansas at Fort Leavenworth directing that defensive enclosures be provided for both men and stock at frontier military posts in Kansas. In addition, Fort Larned was specifically reprimanded for having neither an enclosure for the animals nor a stone blockhouse.[6] Again, historic records do not indicate when work on the Fort Larned blockhouse actually began, but blockhouse construction was reported to be underway in February 1865.[7]

While historic sources provide conflicting information on the plan of the Fort Larned blockhouse,[8] archeological investigation at the site has now confirmed that it was hexagonal. A plan of the fort submitted August 3, 1866, by Lieutenant A. Kaiser, the assistant adjutant and quartermaster, included a brief written description of the blockhouse which provided a number of architectural details that are now of archeological interest. The walls of the building were reported to be 22 ft in length, while the foundation was 2 ft in width. The inside diameter of the building was reported to be 34 ft. The roof was said to be supported by a central post, and double entrance doors covered an opening 5 ft 2 in wide. Two tiers of loopholes were also provided around the building interior. The 1866 plan described a partial cellar below the blockhouse which measured 14 ft 6 in by 13 ft across and 6 ft deep. The document also indicated that the cellar was covered with 2-

[4] The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, Series I, Vol. 34, Part 4, 402-404, 575, and Vol. 48, Part 1, 1012. U.S. War Department (Washington, D.C.: U.S. Government Printing Office, 1880-1901). Cited in Louise Barry, "The Ranch at Walnut Creek Crossing" (Kansas Historical Quarterly, Vol. 37, No. 2 [1971], 121-147), 144.

[5] See Cockrell, History and Significance, this volume.

[6] U.S. Senate, Senate Executive Document No. 26, 39th Cong., 2nd Sess. (Washington, D.C., 1866-1867), 76. Cited in William E. Unrau, "The Story of Fort Larned" (Kansas Historical Quarterly, Vol. 23, No. 3 [1957], pp. 257-280), 263.

[7] See Cockrell, History and Significance, this volume.

[8] See Cockrell, History and Significance, this volume.

in thick pine flooring. A well located 14 ft outside the blockhouse was accessed via a covered passage leading from the blockhouse cellar, and the passageway itself was described as 6 ft deep and 3 ft 6 in wide and lined with 2-in thick pine boards.

While the blockhouse at Fort Larned was built to serve as a fortification in the event of Indian attack, it was soon converted for use as the post guardhouse, which remained its primary function for the duration of the military period at the site. Among the modifications made to the blockhouse to accommodate this change in function was the addition of a wooden guardroom along one exterior wall.[9]

Fort Larned was deactivated in 1878 and the Fort Larned military reservation was transferred to the General Land Office for sale in 1883.[10] The property subsequently served as the base for a series of commercial farm operations, during a portion of which time the blockhouse was apparently used to stable bulls.[11] The blockhouse was then dismantled prior to or shortly after the turn of the twentieth century.

## Legislative and Administrative History

One of the goals of the Fort Larned Historical Society, a private group which formed in the late 1950s to preserve and promote old Fort Larned, was the reconstruction of the post blockhouse.[12] To these early preservationists, the blockhouse represented a key "missing link" in an otherwise significantly intact site. The reconstruction of this dominating structure, therefore, was a vital component in the future restoration of Fort Larned.

In May 1962, the historical society's goal was first embraced by the National Park Service. In a Park Service report to Congress recommending the acquisition and administration of Fort Larned as a unit of the National Park System, the blockhouse reconstruction was offered along with restoration of the remaining nine sandstone buildings.[13]

In presenting the Department of the Interior's position to Congress the following spring, Assistant Secretary John A. Carver, Jr., also put forth the reconstruction of the blockhouse as a requirement for development and provided for it in the Department's funding estimates.[14] Similarly, the new unit's Master Plan, prepared in late 1964 and approved by the Assistant Director on August 30, 1966, placed the blockhouse reconstruction in the high priority category for Service program actions.[15]

Finally, Fort Larned's 1967 Interpretive Prospectus elaborated on this theme: "The to-be-rebuilt blockhouse will provide an excellent structure in which to tell the

[9] See Cockrell, History and Significance, this volume.

[10] Fort Larned National Historic Site, Kansas.

[11] See Cockrell, History and Significance, this volume.

[12] "Ft. Larned Prepares for 100th Birthday," Topeka Capital, August 10, 1958, found in Pawnee County Clippings, Vol. II, 1944-1962, 157, Kansas State Historical Society, Topeka.

[13] A Proposed Fort Larned National Historic Site (Omaha: Midwest Regional Office, National Park Service, 1962), 12.

[14] Assistant Secretary of the Interior John Carver, letter, April 5, 1963, in U.S. Congress, House, Committee on Interior and Insular Affairs, "Establishing Fort Larned as a National Historic Site," 88th Cong., 1st Sess., 1963, H. Rept. 997; and Senate, Committee on Interior and Insular Affairs, "Fort Larned National Historic Site," 88th Cong., 2d Sess., 1964, S. Rept. 1457, both in Legislative History of Fort Larned National Historic Site (Omaha: Midwest Regional Office, National Park Service, n.d.).

[15] Master Plan Brief for Fort Larned National Historic Site (Omaha: Midwest Regional Office, National Park Service, 1966), 17.

story of military law and the bringing of law and order to the west. To fully recreate the scene for this story, the wooden guardhouse should be rebuilt on the side of the blockhouse."[16]

Pursuant to advancements in the historic preservation movement, the decade of the 1970s saw a shift in National Park Service policy concerning reconstruction of historic structures. Included in the revised Fort Larned Master Plan of 1978, is a statement qualifying blockhouse reconstruction: "If sufficient data become available, and if the structure's significance is considered essential to the essence of Fort Larned, the blockhouse will be reconstructed."[17]

## Historic Structure Report Goals

The persistent desire to reconstruct the Blockhouse (HS-10) culminated in January 1986 with funding and direction from Congress to proceed. Senator Robert Dole (Republican-Kansas) introduced and championed the reconstruction appropriation for $262,000. In regard to Service policy established in Cultural Resources Management Guideline (NPS-28), the project is associated with the national historic site's primary theme, will be full scale on the original site, and is essential to public understanding.

William J. Wagner prepared a historic structure report for the national historic site in 1976. Wagner's brief study, an architectural data section, focused on Historic Structures 3, 4, 5, 7, 8, 9, and 10. Like the overall Wagner study, historical information presented for the Blockhouse (HS-10) lacks sufficient source documentation and is, therefore, inadequate. This combined historic structure report gathers archeological, historical, and architectural data required to permit an accurate reconstruction of both "mass and detail with a minimum of conjecture."[18]

A combined architectural and archeological site investigation concentrating on the blockhouse walls, cellar, and guardhouse began in April 1986. Soon after, a lengthy debate ensued over continued excavation or perpetual preservation of the tunnel and wellhouse remains outside the confines of the blockhouse walls. Cultural resources management specialists in the Midwest Regional Office asserted that the project would violate Service policy by destroying the intact tunnel through reconstruction, that it was not absolutely essential to the interpretation of the national historic site, and that it would constitute an unsafe hazard to visitors. Senator Robert Dole intervened and, in the Senate conferees conference report, stipulated that the entire reconstruction of the blockhouse complex continue and that cost overruns be satisfied by available funding sources.[19] Excavation resumed in November 1986.

Construction drawings and specifications for the reconstruction of the blockhouse, prepared by the Midwest Regional Office, were reviewed and approved in

[16]Paul F. McCrary, Interpretive Prospectus for Fort Larned National Historic Site (Omaha: Midwest Regional Office, National Park Service, 1967), 20.

[17]Master Plan, Fort Larned, 39.

[18]Cultural Resources Management Guideline, NPS-28, Release No. 3, August 1985, National Park Service, U.S. Department of the Interior (Washington, D.C.: U.S. Government Printing Office, 1985), Guideline Chapter 3, 10.

[19]"Senate floor debate between Senators James McClure and Robert Dole concerning Fort Larned National Historic Site," Congressional Record--Senate, September 16, 1986 (Washington, D.C.: U.S. Government Printing Office), S. 12614.

February 1987. In June, a construction contract by competitive bid went to Busboom and Rauh Construction Company of Salina, Kansas, and reconstruction work began in August 1987.

The following History and Significance section is compiled from archival sources at the National Archives of the United States, Washington, D.C.; Kansas Center for Historical Research/Kansas State Historical Society, Topeka; Fort Larned National Historic Site, Larned, Kansas; as well as the National Park Service, Midwest Regional Office, Omaha. Unfortunately, this intensive effort did not uncover any new historical evidence which would have a substantive effect on the reconstruction effort. The value of the following section is primarily to present all known historical documentation in a logical manner.

Our gratitude is extended to Chief Historian Ed Bearss and Fort Larned Ranger/Historian George Elmore for making this project challenging and enjoyable. Many thanks to Restoration Specialist Don LaDeaux who assisted with the stone survey, and Historical Architect Bill Harlow who assisted with the site investigation and construction drawing preparation. We also wish to thank Ruth Olson and Betsy Crawford of the Fort Larned Historical Society's Santa Fe Trail Center, Larned, Kansas, for allowing us liberal access to the very delicate magic lantern slide of the Blockhouse.

PART II

# HISTORIC STRUCTURE REPORT
# HISTORY AND SIGNIFICANCE

## BLOCKHOUSE (HS-10)

## FORT LARNED NATIONAL HISTORIC SITE,
## PAWNEE COUNTY, KANSAS

Ron Cockrell
Senior Research Historian

## PART II:

## HISTORY AND SIGNIFICANCE

United States Army Regulations

In 1839, the Engineer Department of the United States Army issued specifications and drawings (the latter no longer exist) for "a Block House designed for the defence of cantonments on the Western frontier." The plans apply coastal fortification requirements to the incompatible conditions of the continent's vast interior, a certain mismatch for few, if any, western military posts featured such grandiose blockhouses. When construction began on a blockhouse at Fort Larned, Kansas, twenty-six years later, there were few architectural details in common with the 1839 Washington planning directive.

The Army's model blockhouse, according to the 1839 guideline, should be built of stone and positioned at each angle of the cantonment to provide ideal security. Minimally, two blockhouses diagonally opposite each other were desirable within the cantonment enclosure, itself a wall of stone or brick or wood palisades. The blockhouse should be two stories, with each side of the square structure measuring forty feet. Exterior walls were two feet thick with foundation walls three feet thick, sunk to a depth of two-and-a-half feet below the surface of the ground. On the first floor was a magazine (six-foot square, lined with wood, and well-ventilated, including a subterranean cellar) and six store rooms. Loopholes for weapons appeared more than six feet above the foundation and were twelve inches wide by twenty-one inches high on the inside, tapering to smaller dimensions on the exterior wall. Specifications also called for a well or cistern to yield a ready supply of water. The second level design included two large rooms for ninety soldiers and two small rooms for officers. As for the blockhouse roof, the information is disappointingly scant:

> No particular instructions need be given as to the roof. It has been drawn with a steep slope because such a slope is best for shedding water--a very little additional expense would provide convenient store rooms for clothing and certain other articles in the garret. The roof should be covered with some metallic covering, or with slate, in order to be secure from fire.[1]

Army construction and material procurement was overseen by the Office of the Quartermaster General, and by extension, his local post representative.

The post quartermaster was not necessarily skilled in all the vagaries of construction matters, nor were there sufficient technicians (architects, engineers, etc.) or project supervisors to visit the scattered military posts of the western frontier. Appropriations from Congress to the Army were

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[1][Signature illegible], Engineer Department, U.S. Army, Washington, D.C., June 24, 1839, National Archives, Record Group 92--Records of the Office of the Quartermaster General, U.S. Army, Entry 225--Consolidated Correspondence File 1794-1915, Box 88--"Blockhouse." (Hereafter, National Archives and Record Group will be cited as NA and RG respectively.)

pitifully meager, a reality which forced the service to be thrifty and use local materials as well as the local labor force: the soldiers themselves.

This combination of inexperience and sparse funding brought predictable results: imperfect, yet innovative, construction practices as well as costly errors.[2]

Army regulations regarding the nature of post construction, permanent versus temporary, were clear. Military posts were established to encourage future settlement and cultivation of the American frontier. Therefore, western posts were conceived to be temporary and as such were they constructed. Wood was the favored building material while the use of stone was restricted. The Quartermaster General reiterated this regulation in an 1868 directive to the field:

> I wish also a General Order to forbid the erection of buildings of any other than a temporary character. I am informed that money has in some cases been wasted in the erection of cut stone buildings. The extreme wilderness where the existence of stone fit for building purposes favorably situated near a military post makes rough stone a cheaper material than sawed lumber, it is proper to use it, but it should always be used in the rough. All walls built with it should be rubble walls.
>
> The constructing officer should remember that the buildings are erected under an appropriation for huts only, and that the erection of permanent buildings is forbidden by regulation, and by express law, except when a special appropriation has been made by Congress for erection of such permanent buildings.
>
> It should be remembered that all the military posts are erected with the expectation and the hope that in a few years the country will be filled up by settlers that the people will not need the protection of the troops, who will move further into the interior, abandoning the post and its temporary buildings.
>
> Under such circumstances any expenditure of money in the costly work of stone cutting is manifestly waste and extravagance.[3]

Indian Unrest Prompts Blockhouse Construction

The U.S. Army grew alarmed when violence between various Indian tribes in 1864 threatened to escalate throughout the Great Plains, thus endangering civilian lives and property along the routes to the West. In

[2]David A. Clary, These Relics of Barbarism: A History of Furniture in Barracks and Guardhouses of the United States Army, 1800-1880 (Harpers Ferry Center, National Park Service, 1985), 107-8.

[3]Quartermaster General, "Memorandum, Military Buildings and Sites for Reservations," 16 October 1868, Entry 294--Letters Sent, 13 March 1867 to 12 August 1871, Miscellaneous Letters, NA, RG 92.

the vicinity of Fort Larned, a crude adobe post on the Pawnee Fork of the Arkansas River system in south-central Kansas, Kiowas and Comanches were at war with the U.S. Army. Inspector-General T. I. McKenney, charged with ensuring security along the Santa Fe Trail, ordered the erection of blockhouses at various strategic points. Because trees were prevalent locally, timber was used for the fortifications. Before arriving at Fort Larned on June 14, McKenney participated in the construction of a blockhouse at Smoky Fork Crossing and recommended one be built at Walnut Fork. At Fort Larned, McKenney reported that the troops, purportedly scouting for hostile Indians, turned up plenty of buffalo. He stated:

> Fort Larned is only a fort in name, as there are no defenses. An attempt has been made to throw up breastworks around it, or one-third of it, as the Pawnee Creek, on which it is built, defends the other two-thirds. I think the men's time could be much better employed in the erection of stone buildings, instead of going every few days on the fruitless scouts, as there is good building stone within 3 miles of the place.[4]

Following McKenney's visit, Kiowas raided the post on July 17. Plotting to infiltrate Fort Larned and massacre the garrison, the Kiowas were discovered and succeeded only in stealing 172 government animals. Troops pursued the band, but to no avail. There were no casualties.[5]

On July 31, 1864, the Army ordered that all posts in the western territories have stockades or blockhouses for their defense.[6] This action provided Fort Larned with an official mandate to erect non-earthen fortifications.

Although regional Indian unrest was a constant threat, the Kiowa raid dramatically demonstrated the immediate need for a blockhouse to protect the vulnerable post. Fort Larned's garrison, volunteers from Colorado and Kansas, were the only available laborers to build the sandstone blockhouse.

During construction, the sandstone quarry and the road to the fort were constantly harassed by Indians.[7]

2d Lt. James S. Cleveland, 2nd Colorado Cavalry ("L" company), came to Fort Larned accompanied by troop reinforcements to superintend the "erection of fortifications" on February 10, 1865. Two newly-hired civilian employees of the quartermaster's department, carpenters J. W. C. Peirce and John Meinhart, augmented Cleveland's expanding work force.[8] According to a sutler's store

[4] McKenney to Maj. C. S. Charlot, Assistant Adjutant-General, Department of Kansas, 15 June 1864, Official Reports File, Fort Larned, Letters Sent, RG 393--Records of the United States Army Continental Commands, 1821-1920.

[5] "Returns from U.S. Military Posts, 1800-1916," Microcopy No. 617, Roll 599, Fort Larned, Kansas, 31 July 1864 (Washington, D.C.: National Archives Microfilm Publications, 1965), NA, RG 94--Records of the Adjutant General's Office.

[6] Department of the Missouri, Field Order No. 2, 31 July 1864, U.S. Army, Sen. Ex. Doc. No. 26, 39th Cong., 2nd Session, 1866-1867.

[7] B. Z. Woods, "History of Fort Larned," The Aerend: A Kansas Quarterly, Fort Hays Kansas State College, Vol. V, No. 1 (Winter 1934), 4-5, Kansas State Historical Society, Topeka.

[8] "Returns from U.S. Military Posts, 1800-1916," Microcopy No. 617, Roll 599, Fort Larned, Kansas, February 1865 (Washington, D.C.: National Archives Microfilm Publications, 1965), NA, RG 94.

clerk's diary account, "Capt. [Thomas] Moses [, Jr., Company M, 2nd Colorado Volunteer Cavalry] began hauling stone for a block house."[9]

Ten days later, Col. James H. Ford of the 2nd Colorado Cavalry reported a large camp of Kiowas and Comanches 150 miles southwest of Fort Larned, but none to the east. Small war parties dotted the region, watching the Santa Fe Trail to attack "stragglers." Ford wrote: "I am having built at Fort Larned a stone fortification. I found that the earth-works were much cut up, and in places washed away by the constant rains of the rainy seasons. Also, at Fort Zarah the troops are erecting earth-works and a blockhouse."[10] The post sutler wrote on February 28, 1865: "Well Moses is still comd'g the 'mud fort' is hauling rock &c to build a couple of Blockhouses for defence in case of attack by hostile 'Salvages' which is a very good idea for I expect it will be rather hot out here when grass comes."[11]

In March 1865, the post quartermaster hired another carpenter, William Lawrence.[12] A March 5 entry in the sutler's store clerk's diary noted, "I with others took horseback ride north 6 miles to new stone quarry"[13]—undoubtedly being exploited for the new blockhouse. The Fort Larned blockhouse was completed during 1865. By the middle of the following year, significant numbers of civilians were employed at Fort Larned. In May 1866, commanding officer Maj. Cuvier Grover reported, "The building used as a magazine is hexagonal [sic], and has good walls of sandstone, but the roof is of the same character as all the other roofs.... It leaks, and is in other respects unreliable."[14] Post roofs consisted of poles set in the ground and covered with earth. The timbers were crooked and knotty and frequently broke from the weight of the earth. Severe prairie storms caused holes to open in the crude roofs and rain to cascade into the structures. Maj. Grover desired to end the squalid conditions which prompted the derisive title, "mud fort." He recommended Fort Larned be rebuilt with readily-available sandstone and for all roofs (including the blockhouse) to be wood framed and shingled.[15] The requisition of scarce wood for Major Grover's ambitious construction program was approved in Washington, D.C., on July 11, 1866.[16]

## The 1866 Plan

On August 3, 1866, the assistant adjutant and quartermaster at Fort Larned, Lt. A.

[9] Handwritten diary entry by J. W. Ladd, Clerk at Fort Larned sutler's store, 10 February 1865, transcript of 1865 diary photocopy from the Fort Larned National Historic Site files, Larned, Kansas.

[10] James H. Ford (Fort Riley) to Maj. Gen. G. M. Dodge, Headquarters, District of the Upper Arkansas, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, Part I: Reports, Correspondence, Etc., United States Army/Secretary of War, Series I, Vol. XLVIII (Washington, D.C.: U.S. Government Printing Office, 1896), 923, Kansas State Historical Society, Topeka

[11] Jesse Crane to Capt. Augustus W. Burton, Company H, 12th Kansas Volunteer Infantry, letter, 28 February 1865, Burton Papers, Kansas State Historical Society, Topeka.

[12] "Returns from U.S. Military Posts, 1800-1916," Microcopy No. 617, Roll 599, Fort Larned, Kansas, March 1865 (Washington, D.C.: National Archives Microfilm Publications, 1965), NA, RG 94.

[13] Handwritten diary entry by J. W. Ladd, Clerk at Fort Larned sutler's store, 10 February 1865, transcript of 1865 diary photocopy from the Fort Larned National Historic Site files, Larned, Kansas.

[14] Commanding Officer Maj. Cuvier Grover, "Report on Buildings at Fort Larned, Kansas" to the Supervising Quartermaster at Headquarters of the Military Division of Missouri, 10 May 1866, Consolidated Correspondence File, Quartermaster General's Office, NA, RG 92.

[15] Ibid., and Maj. Grover to the Inspector General, 27 May 1866, Letters Sent, United States Army Commands, NA, RG 98.

[16] Quartermaster General to Bvt. Brig. Gen. L. C. Easton, St. Louis, Missouri, 11 July 1866, Entry 1290--Abstracts of Letters Sent, 5th Division, Miscellaneous Press Copies, NA, RG 92.

Kaiser, submitted a plan of his post[17] (Figures 3 and 4). Titled "Fort Larned, Marion County, Kansas," the plan reveals a front elevation of the blockhouse with its earthen roof as well as a ground plan which erroneously shows a seven-sided structure with a center roof support pole. The description corrects this error by listing the blockhouse as a sexangular--or six-sided--structure. The plan variously refers to the structure as the round-house, magazine, or arsenal. An exact transcription of the description follows:

> Round House, or Magazine.--
> Material -- Stone. Covering -- Tim ber-poles, brush, hay, and earth.
> Form--Sexangular. Each face 22ft.
> Heighth -- 11ft. 6in - Walls - 2ft. thick to heighth of 3ft. from thence to top - 1ft. 6in.
> Diameter-inside -- 34ft.
> Roof supported by large post in centre.
> Two tiers loop-holes -- 50 in each tier.
> Cellar, -- 14ft. 6in. x 13ft. and 6ft. deep.
> Two inch pine floor over cellar
> Door-way arched -- entrance 5ft. 2in. in width.
> Double Pine [marked out] doors, Pine.
> Well--27ft. deep -- and 14ft. from house
> Covered way or passage from cellar to well -- 6ft. high x 3ft. 6in. in width.-- lined with pine boards, 2in. in thick ness.
> Built in A.D. 1865.[18]

[17]Kaiser to Gen. L. C. Easton, Chief Quartermaster, Department of the Missouri, St. Louis, 3 August 1866 [Received on August 10], General Land Office, Division K, Abandoned Military Reservation File, Box 47 Fort Larned, Kansas, NA, RG 49--Records of the Bureau of Land Management.

[18]Ibid., and Fort Larned National Historic Site files, Larned, Kansas.

Transition from Blockhouse to Guardhouse, 1867-1868

A special report by Fort Larned Quartermaster A. F. Rockwell covering post operations from July 1, 1867, to January 31, 1868, lists the materials used to repair the "Round house:" 1,100 feet of lumber, four pair of hinges, one gross of screws, twenty-five pounds of nails, and fifteen pounds of iron.[19] An October 19, 1867, report reveals a new roof and watchtower were added as a result of this construction activity, and that the blockhouse's use had changed: "An octagonal [sic] stone building, upon which is arranged a look-out tower, was in use as [a] store house for clothing. It has been probably vacated before this date, and can be used as [a] guard house or for other purposes."[20]

The suggestion of converting the blockhouse-turned-storehouse into a guardhouse subsequently became reality in late 1867. A medical history of Fort Larned written in the late fall of 1868, reveals that the old adobe guardhouse was abandoned in 1867 in favor of the more stable blockhouse.[21]

[19]A. F. Rockwell, report on operations at Fort Larned ca. 1868, Letters Received Consolidated File, NA microfilm Fort Larned files; and Bvt. Brig. Gen. James A. Ekin, Deputy Quartermaster General, to Bvt. Lt. Col. A. F. Rockwell, Fort Gibson, I.T., 18 June 1868, Entry 1038--Miscellaneous Letters and Referral Endorcements Sent Relating to Barracks and Quarters, 26 September 1867 to 26 April 1869, NA, RG 92.

[20]Maj. M. Ludington, Chief Quartermasters Office, District of New Mexico, to Maj. Gen. L. C. Easton, Chief Quartermaster, Department of the Missouri, 19 October 1867, Letters Received Consolidated File, NA microfilm Fort Larned files, RG 92.

[21]On November 1, 1867, an officer noted the construction activity at the fort in his diary and drew a rough sketch of the fort. He penned "G.H." beside the never-built guardhouse foundation and "Block H." beside a hexagon (with no attached structure) on the site of the blockhouse. See Extract from Diary of Capt. Albert Barnitz, 7th Cavalry, dated "Camp near Fort Larned, Kan., Nov. 1, 1867," from Yale University Library; Fort Larned National Historic Site files, Larned, Kansas.

## HISTORY AND SIGNIFICANCE

Plans called for a new forty-square-foot guardhouse, but the foundation, installed during the building boom period, was all the progress shown for the effort. This was because the blockhouse had yet to be used for the purpose for which it was built. With the fort relatively secure from Indian attack, the massive blockhouse could also be used for alternate purposes such as the post guardhouse.[22]

A panoramic sketch of Fort Larned by Ado Hunnius, Company "D", 3rd Infantry, dated December 7, 1867, shows the west front of the blockhouse. It appears from the pitch of the roof that the brush, hay, and earth covering has been replaced. A pointed watchtower is also prominently displayed (Figure 5).

Unfortunately, the blockhouse-turned-storehouse-turned- guardhouse was less than ideal. An officer in 1868 reported the facility was abysmal with a leaky roof, rough walls, and dirty prisoners:

> The prisoners were in bad condition and very unclean, the Guard house is a very bad one, the guard and prisoners being all in one room, the roof leaks and the walls are badly damaged, allowing the wind and rain to beat in on the guard and prisoners. Immediate steps should be taken to have another building erected for the purpose of a Guard house, for the present one is not fit for human beings to remain in, much less confined closely.[23]

The same year another report, indicating the shingle roof and watchtower were indeed in place, stated:

> The old adobe guardhouse was abandoned in 1867 and the guard and prisoners removed to the blockhouse which is still used as the guardhouse. It was built in 1864 after the Indian attack and was intended as a work of defense. It is of sandstone 16 feet high in the form of a hexagon with 21 1/2 foot sides. There are two rows of loopholes, one above the other around the building and it is now covered with a shingle roof, with a watch tower on the top....[24]

But the structure was altered to accommodate its new function. A simple wooden shed was attached to one side of the blockhouse for the guards. The same report cited above states: "there has been a small room built at the side out of rough lumber for the use of the guard, it stands at the southeast corner of the parade."[25] This is all the documented architectural information available on the guard room.

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[22]Assistant Surgeon W. H. Forwood, "Fort Larned Medical History," [n.d. but probably late fall 1868], NA, RG 94.

[23]Bvt. Lt. Col. J. Schuyler Crosby, aide-de-camp, 30 April 1868, "Inspection of the Posts of Fort Zarah, Larned and Dodge in Compliance with Special Order No. 76, dated Head Quarters Department of the Missouri, Fort Leavenworth, Kas., April 16, 1868," Entry 2601--Department of the Missouri, Letters Received, 1868, NA, RG 393.

[24]Assistant Surgeon W. H. Forwood, "Fort Larned Medical History," [n.d., but probably late fall 1868], Microcopy NNO 70-451, NA, RG 94.

[25]Ibid.

An 1867-1868 photograph of Fort Larned reveals the blockhouse/ guardhouse in the distance (the northeast facade) at the extreme left of the photograph. Some negatives of this scene have been "touched-up" to emphasize the pitch of the roof, giving the mistaken impression that it is under construction. An unaltered negative, however, reveals the shingle roof and watchtower in place (Figure 6).

Guardhouse Specifications

Some documentation on the contents of the sergeant of the guard's "small room" is extant. Furnishings included a toolbox,[26] a locked case containing the guard's clock,[27] a locking desk, and a 24- by 18-inch bulletin board. Bolts were also ordered to be made to secure the guardhouse doors.[28] A historic furnishings report stated:

> Although no mention is made of the interior arrangement of the guardhouse, it would have been divided into cells, furnished probably with chains and shackles. Otherwise, the security of the prisoners would have been in serious question.
>
> The "small room built at the side out of rough lumber" housed the sergeant of the guard and any of the sentinels he chose to allow there. The exact dimensions of the small room are not available, but it is doubtful that it was large enough to permit the guard to sleep there.
>
> A chair or two, a necessary amount of paper for guard rosters, as well as pens, pencils, inkwells, and a spittoon would complete the furnishings for this workroom, except for one item--a tool chest. The guard at Fort Larned supervised prisoners on various police and work details at the post, and their use of a tool chest appeared late in 1868.
>
> The roughness of the room implies an area that would have been drafty, cold, and dirty. Such a room would surely have needed, but certainly would not have rated, a stove. Because no mention of heating equipment is made in either the medical history or any other document, probably the guardroom did not have any. Lighting was by candle or lamp.[29]

A comparative study of U.S. Army guardhouses reveals composite specifications which sheds some light on the interior environment of such structures. The prison section consisted of two parts: a common prison chamber and a few cells for solitary

[26] Post Adjutant C. L. Umbstaetter, 1st Lieut., 3rd Infantry, to Acting Post Quartermaster Capt. G. T. Raulston, 10th Cavalry, 24 December 1868, Letters Received, Microcopy NNO 766 (319), Roll 2, NA, RG 92.

[27] Ibid., 7 February 1869.

[28] Ibid., 25 November 1868.

[29] John Albright and Douglas D. Scott, Historic Furnishings Study, Historical and Archeological Data, Fort Larned National Historic Site, Kansas (Denver: Denver Service Center, National Park Service, 1974), 123-4.

confinement of incorrigibles. Fixtures consisted of slop buckets and iron rings for shackles which protruded from floors and walls. The interior was kept dark and prisoners slept on the ground. With an increased awareness of sanitation requirements following the Civil War, most post surgeons encouraged having guardhouses kept clean by whitewashing and disinfecting with lime. The guard quarters were adjacent to the prison, providing security not only for the entire post, but primarily to ensure immediate security at the guardhouse. The room was furnished as an office for the guard the commander of which usually served as the officer of the day with specified documents to complete. The guard was on duty for twenty-four hours:

> When men of the guard were not absent at sentry posts or on other assignment, they were to remain in the guardroom, fully clothed (including shoes), their weapons close at hand, ready to respond to any call. Sentry assignments were rotated through the 24-hour period and supervised by the corporal. Men might also be detailed as messengers or for special assignments. All took their meals in the guardroom, something that would argue in favor of tables and benches.[30]

The Fort Larned guardhouse was whitewashed and renovated by order of the commanding officer in March 1871.[31] The extent of the 1871 renovations is not known, but possibly it was at this time that the lower level of loopholes was filled with plaster to prevent smuggling of liquor to inmates. Innovative means of smuggling alcohol in bottles and canteens continued even after the loopholes were closed.[32] That the upper level loopholes and watchtower remained is important evidence that the primary purpose for which the structure was built--defense--remained.

A June 1873 estimate for general repairs lists flooring materials for the guardhouse. Items requested included 1300 feet of two-inch thick planking, 50 two- by eight-inch joists, and a supply of four-inch spikes.[33]

Requisition approval was delayed until August 1874. With the material still unavailable two months later, Capt. William J. Lyster stressed the immediate need to improve the post prison. Lyster desired eventually to plank the entire floor. He declared:

> ...there is no prison room at this Post where a prisoner would be secure unless ironed, or confined in winter, without serious injury to his health; the building used for a Guardhouse is an octagonal [sic] stone block house of one room, 33 feet in diameter, 16 feet high in centre, is pierced for musketry, has an earth floor, and is cold and damp and utterly unfit for the

[30] Clary, These Relics of Barbarism, 308-09.

[31] Timothy A. Zwink, Fort Larned: Garrison on the Central Great Plains, dissertation, Oklahoma State University (Ann Arbor, Michigan: University Microfilms International, 1980), 43.

[32] Officer of the Day to Post Quartermaster, Fort Larned, 2 March 1871, Letters Sent, NA, RG 393.

[33] Estimate for repairs at Fort Larned, approved 9 June 1873, Post Commander G. Snyder, Capt., 5th Infantry, Microcopy Roll 1, NA, RG 92.

> purpose. The Guard occupy a shed room adjoining.[34]

A November 1873 sketch and description of Fort Larned shows the hexagonal guardhouse with the guard shack attached to the southwest segment of the structure (Figure 7). The dimensions of the building are fifty-seven by forty feet.[35]

The history of the blockhouse/guardhouse is not entirely without incident. Two prisoners escaped from the guardhouse on June 10, 1871, "by cutting their irons and breaking through the stone wall of their prison."[36]

Less than a month later, on July 2, 1871, several hours before dawn, more than a dozen Indians approached to within 150 yards of the guardhouse before the guards spotted them, opened fire, and chased them away.[37] Flood waters of the Pawnee Fork in the early 1870s claimed several buildings, including the guardhouse. These structures were "drained and put in good order" to restore "excellent sanitary condition[s]."[38]

## Abandonment, 1878-1884

On June 19, 1878, the Secretary of War declared the discontinuance of an active military post at Fort Larned, Kansas, having accomplished the goals for which it was established. A guard contingent was sent from Fort Dodge to protect government property. A recommendation to sell the post's sixteen-square-mile reservation and buildings was about to go to Congress when the proposal was reconsidered and delayed in mid-December. Intelligence reports indicated the possibility of renewed Indian problems which would make Fort Larned, near a depot of the Atchison, Topeka, and Santa Fe Railway, a strategic place to quarter troops. The hostilities did not materialize. In September 1879, department and division commanders recommended Fort Larned be dismantled, and the materials transferred to Fort Dodge. The Secretary of War opined that the "structures of stone should be left to follow the land, when its disposition is authorized by Congress."[39]

An inventory in September 1879 showed an appalling state of dilapidation following a year of abandonment at Fort Larned. Corrals and fences had been carried away and large trees along the Pawnee Fork were gone. The stolen government property was apparently the work of nearby settlers. If nothing was done in the next six months, the inspector concluded, nothing but the sandstone walls themselves would be left at the post.[40] By mid-October, the guardhouse fell victim to scavengers. The wooden guardroom, since used to store coal and wood, was carried off during the night when the two

[34] Capt. William J. Lyster to Adjutant General, Department of the Missouri, 22 October 1874, Letters Sent (microfilm), NA, RG 393.

[35] "Fort Larned, Kansas," Outline Descriptions of the Posts in the Military Division of the Missouri,. (Chicago: Headquarters Military Division of the Missouri, 1876), 130-1.

[36] Post commander, 15 June 1871, Letters Sent, NA, RG 393.

[37] Ibid., Maj. Dodge to Col., 4 July 1871.

[38] Albright and Scott, Historic Furnishings Study, 283.

[39] "Extract from Report of Adjutant General dated October 25, 1879, Relative to Abandoned Military Reservation," Abandoned Military Reservations File, Box 47--Fort Larned, Kansas, NA, RG 49.

[40] Ibid., 1st Lieut. 19th Infantry, Fort Leavenworth, Kansas, to Assistant Adjutant General, Department of the Missouri, 11 September, 1879.

guards on duty were absent, patrolling the creek in opposite directions.[41]

Before the settlers could carry off all portable government property, the Army ordered all Fort Larned material transported to Fort Dodge for use there.[42] The order was rescinded on December 2, 1879, by the Secretary of War who stated there would be no more moving of structures until Congress acted on the disposition of Fort Larned to the Department of the Interior.[43]

## The Fort Larned Ranch

It was not until March 30, 1883, that Henry Booth, Receiver and District Agent, U.S. General Land Office, Department of the Interior, took possession of Fort Larned.[44] A General Land Office survey map, compiled from detailed field survey notes dated May 1883, does not feature the blockhouse/guardhouse, but does reveal the fort's nine other sandstone buildings.[45]

One explanation for the surveyor's neglect to account for the tenth structure is that it may have been scavenged so severely (the wooden guardroom and possibly parts of the infrastructure) that the blockhouse/guardhouse was unusable (or, in governmental jargon, "not serviceable"). With these principal architectural elements missing, the government may have assigned little or no value to the remaining sandstone walls, thus accounting for the surveyor's deliberate omission.

The collection of fort buildings was sold as a unit to a ranching interest which converted the abandoned post into a stock farm called the "Pawnee Valley Stock Breeders Association, Limited." In June 1885, George Fell wrote a flowery article for the Larned Chronoscope discussing the transformation of the old fort and mentioned the blockhouse:

> Truly the prophecy of Isaiah wherein he says "Their swords shall be beaten into pruning hooks" is being fulfilled in the use of old Fort Larned. Even the old guard-house where in the early days the midnight cry of the sentinel, "12 o'clock and all's well," rang out on the frosty air, and the poor fellow with ball and chain slept the weary hours away has been transmogrified by the skillful hand of the peaceable mechanic into an abiding place for the long eared Spanish Jack, who makes the welken ring with his sonorous tone.[46]

Fell's article fails to specify how the "skillful hand of the peaceable mechanic" altered the structure to accommodate the bulls. The blockhouse/guardhouse did not

[41] Ibid., 1st Lieut. J. G. Leefe, 19th Infantry, Assistant Adjutant Quartermaster, Fort Dodge, to Post Adjutant, Fort Dodge, 18 October 1879.

[42] Ibid., Notice, 2 October 1879, approved by Quartermaster General and Commander, Department of the Missouri.

[43] Ibid., E. D. Townsend, Adjutant General, War Department, to Brig. Gen. John Pope, Commander, Department of the Missouri, Fort Leavenworth, telegram, 2 December 1879.

[44] Ibid., Henry Booth, Receiver and District Agent, U.S. Land Office, United States Department of the Interior, Larned, Kansas, 30 March 1883.

[45] Ibid., "Township No. 21 South Range No. 17 West on the 6th Principal Meridian," 15 June 1883, T. C. McFarland, Commissioner, General Land Office, Washington, D.C.

[46] George Fell, extracts from article, Chronoscope, 5 June 1885, Fort Larned National Historic Site files, Larned, Kansas.

long survive the beginning of the ranching period. Some local people claim the structure was razed shortly after the turn-of-the-century. The stones were used to repair other structures or to shore-up porches. A portion of these original stones has been recovered.

A photograph attributed to the year 1886, however, reveals the blockhouse exactly as depicted by earlier historical documentation (Figure 8). It is painted with whitewash and reveals the southern wall's stonework, the shingled roof and overhang, the watchtower and cupola, and upper level loopholes. The photograph was of valuable assistance in the determination of structural dimensions.[47]

An 1887 drawing of the Fort Larned Ranch shows the blockhouse with its roof and watchtower/cupola in place[48] (Figure 10). The drawing, however, is a promotional advertisement for the fort-turned-ranch and may only seek to project an ideal view of the property rather than an accurate one.

Historical Composite of the 1868 Blockhouse

Based on the preceding historical documentation, a rough outline of the configuration of the 1868 blockhouse can be seen. The structure was six-sided with each side measuring between twenty-one and twenty-two-and-a-half feet long and sixteen feet high. Wall thickness varied from two feet thick at the foundation level to the first three feet where the wall then tapered to one-and-one-half feet up to the top. The diameter of the interior was thirty-four feet with a large post in the center serving as support for the shingled roof and watchtower. The sandstone walls were pierced by fifty gun loopholes on the lower level and fifty on the second level. The presence of these upper-level loopholes suggests an elevated walkway to provide troop access.

Entrance to the blockhouse was via double pine doors measuring together five feet two inches wide. The doors were inset in an archway. On the side facing the Old Commissary (HS-05), or northwest, was a small room built from rough lumber and used as a guardroom. There is no historical documentation indicating an opening from the blockhouse to the guardroom. The shed may have been similar to other lean-to sheds at Fort Larned (HS-05, -07, -08, and -09) which also had no openings to the sandstone buildings. A cellar fourteen-and-a-half by thirteen feet in circumference and six feet deep was covered by pine floor boards two inches thick. On one wall of the cellar was an opening six feet high and three-and-a-half feet wide. The opening led to a subterranean passageway or tunnel connecting the blockhouse to a well fourteen feet away. The tunnel was lined with pine boards two inches thick. The well, which apparently had no opening at ground level, was twenty-seven feet deep.

Scant information about the structure's interior is extant. The floor, exclusive of the cellar area, was earthen. Natural light poured through the loophole openings. No evidence of whitewashing of the interior by 1868 is extant. Iron rings for prisoners' shackles protruded from the walls.

[47]Blockhouse magic latern slide, 1886, Santa Fe Trail Center, Larned, Kansas.

[48]Ibid., Drawing of Fort Larned Ranch, Pawnee Valley Stock Breeders Association, Limited, 1887.

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PART III

# HISTORIC STRUCTURE REPORT
# ARCHITECTURAL DATA

## BLOCKHOUSE (HS-10)

FORT LARNED NATIONAL HISTORIC SITE,
PAWNEE COUNTY, KANSAS

Alan W. O'Bright
Historical Architect

# PART III:

# ARCHITECTURAL DATA

## Introduction

The reader of Part III will no doubt encounter much information already covered in the historical and archeological narratives of this report. Because the blockhouse was torn down around 1900, there was no above-ground architectural evidence of the building left upon which to draw. Architectural investigative work on the blockhouse would have been impossible were it not for the accompanying historical research and archeological investigations. Through this interdisciplinary work, the blockhouse was realized in form, size, and general building materials, but details such as stone coursing, mortar joint tooling, hardware, and finish construction were very difficult to determine.

Details form a very important part of the character of any building just as the shape of a nose or color of hair distinguish an individual's face. Slightly change the shape of a nose, and the character of the face changes. Revise the tooling of mortar joints and the character of the masonry wall is drastically altered. Three very important information sources yielded some, but not all, of the blockhouse character details: archeological evidence, salvaged stone, and a circa 1884 glass slide. The remainder of the details had to be described based upon other original construction at Fort Larned unrelated to the blockhouse.

This author strongly recommends that anyone contemplating total reconstruction of historic structures in the future consider not only obvious features such as form, scale, fenestration, and materials, but also the accompanying details, prior to making the decision to reconstruct. Ultimately it is the goal of reconstruction to accurately and honestly portray the historic character of a building. However, if any feature is misunderstood or unknown, then the goal cannot be achieved.

## Historic Photograph Analysis

Photograph of Fort Larned
1867-1868

Figure 6

An enlargement of the blockhouse image in the circa 1867-1868 photograph reveals a faint blockhouse image consistent with later photographs of the blockhouse. The image shows Elevations 1, 2, and 3, (see Appendix C, Reconstruction Drawings, Sheet 2), and a silhouette of the tower, although no details can be seen. Faint shadows of loopholes can be seen in Elevation 2 of the upper loophole tier, although no definite loophole pattern or dimensions can be discerned. There are no images of loopholes or passageways in Elevation 1 nor of the barred window which shows in later photographs on Elevation 3. The exterior walls of the building do not appear to be whitewashed; no stone coursing is evident.

Perhaps the most important feature of this photograph is the roof image. A close examination of the roof reveals the tower existed at the time the photograph was taken.

## ARCHITECTURAL DATA

Earlier accounts of the blockhouse indicated a roof constructed of poles and sod (see Figures 3 and 4). If both sources of information are factual, then the original roof was replaced with more durable materials within eighteen to twenty-four months. One can only speculate the reason for the roof replacement. Perhaps the initial crude sod roof was intended to be temporary, incorporating indigenous materials until lumber supplies were delivered to Fort Larned. Undoubtedly the "soddy" roof leaked profusely, an undesirable trait for a structure intended to quarter precious gunpowder supplies.

Photograph of Fort Larned
circa 1876

Figure 11

This photograph obviously shows no portion of the blockhouse. However, one can assume that the photograph was taken from within or around the blockhouse lookout tower. In February 1986, scaffolding was erected in the general location of the tower. The location and height of a 35-millimeter camera was adjusted so that the view resembled the historic photo as closely as possible. The height from the existing ground surface to the focal point of the camera lens measured 21 feet, 5 inches plus or minus two inches. Although this dimension was not used in the reconstruction design of the blockhouse, it was used to verify the height of the tower platform. The platform in the reconstruction design is approximately five feet below the focal point of the camera used to take the historic photo; within reason for a tripod mounted camera typically used during the time period.

The image of the octagonal structure in the foreground of the photograph bears discussion. The structure, very similar in appearance to the blockhouse tower, was probably used as a checkpoint to shelter guards from the weather. If the primary reason for constructing the shelter was for protection from weather rather than for defense, then the same assumption can be made for the tower on the blockhouse as well. Stronger, heavier materials are expected to be used for a defensive structure. However, the thin appearance of the siding on both the ground shelter and blockhouse tower (Figure 8) suggest that these structures were intended to protect the guards from wind and rain rather than bullets. It is unfortunate that no interior details can be seen of the guard shelter in the photograph.

Magic Lantern Slide of Fort Larned
1886

Figure 8

A circa 1886 magic lantern slide[1] (a positive image over a thin glass plate) of Fort Larned gives the clearest known image of the historic blockhouse. The photograph was taken approximately 450 feet southeast of the blockhouse and shows Elevations 2, 3, and 4. Although the exterior walls of the blockhouse were whitewashed at the time the slide was taken, there is some evidence of the bonding and coursing pattern and size of stone in the image.

[1]Santa Fe Trail Center, Larned, Kansas. Because of the delicate condition of the magic lantern slide, a sharp reproduction for inclusion in this report was not feasible. Many details found within the slide cannot be seen in Figure 8. Observations and analysis of the slide were made by Historical Architect Alan W. O'Bright, National Park Service, Midwest Regional Office, Omaha, Nebraska.

The stonework is faced and squared, laid in a random pattern with sharp corners and flush plumb walls. The lower tier of loopholes had been infilled by the time the slide was taken, but there are some shadows of shallow indentations indicating the location of infilled loopholes. Upper-tier loopholes can be easily seen in Elevations 2 and 3, although some appear to have been filled in also.

Elevation 3 shows an opening at the top central portion of the wall, measuring approximately 2 1/2 feet high by 4 feet wide. The sill of the opening is level with the bottom exterior edge of the upper tier of loopholes. In the magic lantern slide, there appear to be four narrow vertical bars protecting the opening.

In the image, the primary roof of the blockhouse has a very shallow pitch (scaling to 3 inches of rise to 12 inches of run) and appears to be covered with wooden shingles. A consistent unbroken shadow line at the hips indicates that boards were used in lieu of shingle hip units. Like other structures in the park, boards were historically placed at the ridges. The hip boards, in combination with the shallow pitch, may explain frequent historic accounts of a leaky roof within the blockhouse. In scaling the 1886 photograph, the fascia extended approximately a foot beyond the face of the structure. The rafter tails were trimmed perpendicular to the ground plane and a fascia (approximately a 1-inch x 6-inch) fastened to the rafter tails. In the magic lantern slide, there is an image of a frieze board against the face of the walls. This would indicate that the soffit paralleled the pitch of the roof and was not boxed in perpendicular to the face of the wall.

Little is known about the structural framing of the roof, although in the photograph the roof structure appears to have been of inadequate design. The photograph shows very perceivable sagging in the hip rafters. In comparison, the Fort Hays, Kansas, blockhouse (built during the same time period) was constructed with double 2-inch by 6-inch hip rafters and spaced 2-inch by 6-inch rafters. If the Fort Larned blockhouse used a similar construction technique, this would have been structurally inadequate for the hip rafters' 20-foot span by today's standards.

In the 1886 photograph, the guard tower platform followed the same hexagonal pattern as the roof. The image of the platform is very flat and without texture, suggesting that sheet metal or perhaps just boards may have historically sheathed the platform. The shadow line on the platform fascia indicates that the sheathing extended slightly beyond the face board forming a drip line. The platform fascia board was painted or whitewashed a light color, probably white.

A number of interesting details of the guard tower can be seen. At the window edges the tower sheathing is very thin, suggesting that 1-inch thick material was used to cover the framework. In the magic lantern slide, four vertical boards sheathed each of the visible elevations of the tower. The boards nearest the corners appear to be wider than the two middle boards of each side, suggesting that 1-inch by 6-inch and 1-inch by 8-inch boards were used as a siding. There is no corner trim apparent. Elevation 3 of the tower sports the largest window opening. This opening faces the open prairie, opposite the fort's parade ground.

Smaller windows can be seen at Elevations 2 and 4, and a portion of the interior side of the small window at Elevation 6 can be seen through the Elevation 3 window. From the orientation of the historic photograph, no window can be seen at the interior of Elevation 5. If this is indeed true, the windows may not have been constructed on Elevations 2 and 5 for the reason that they overlooked the roofs of adjacent buildings. The jambs of the smaller windows follow the joint lines of the vertical sheathing boards which suggest that these windows are 12 inches wide. No exterior trim is evident on any of the windows. However, a sill-hinged shutter drapes from the sill of the large window at Elevation 3. It is unknown if there had been interior mounted shutters on the smaller windows.

The 1886 photograph (Figure 8) shows that the roof of the tower was scaled at a slope of 7 inches rise to 12 inches run. The photographic image shows a much darker shade and no texture for the roof material other than the primary wood shingle roof. This suggests that the tower roof was painted sheet metal. Another possibility is that the photograph of the tower roof was taken straight at the butt ends of wooden shingles so the image of the roof material would give an appearance of homogeneous shade and smooth texture. The rafter tails are cut perpendicular to the ground and are faced with what appears to be 1-inch by 4-inch trim. There is a frieze board band constructed over the tower sheathing which suggests the soffit paralleled the direction of the rafters. The rafters overhang approximately 5 inches from the face of the tower and there is a roof drip line of approximately 1 inch beyond the fascia surface.

The magic lantern slide shows the top half of the ventilation cupola contained louvers at each of the elevations displayed in the photograph. Boards approximately 2 inches in width were installed at the corners of the cupola. The louver vents appear to have a projecting sill. The roof of the cupola is the same shade and slope as the guard tower roof. The rafter tails appear to extend approximately 3 inches from the face of the cupola and the fascia is about 3 inches wide.

In the magic lantern slide, there is a very faint image of a finial topping the cupola roof. Like historic photographs of non-extant historic structures at Fort Larned, there was a propensity to place finials on hipped roofs. Although no details of the finial can be seen in the magic lantern slide, the image scales to about 2 feet in height, the approximate height of the finials on the other historic structures.

## Historic Maps and Drawing Analysis

Plan of Fort Larned

Assistant Adjutant and Quartermaster A. Kaiser
August 3, 1866

Figures 3 and 4

In this plan of Fort Larned, the "Front Elevation" and "Ground Plan" of the blockhouse can be seen in small drawings entitled "Round-house or Arsenal." There is no north orientation or scale given in the drawing; it is doubtful that the image was drawn to scale. Although the dimensional accuracy of the

drawings is questionable based upon current archeological evidence, there are drawing features and descriptive text on the map which bear discussion.

The ground floor plan depicted in the drawing sports seven rather than the six sides indicated by archeological evidence. At the center of the interior enclosed by the perimeter walls is a small circle which seemingly depicts the location of a center post for roof support. This correlates with archeological evidence and the map text. There is a single doorway in the plan placed at the center of one wall.

In the elevation drawing, the placement of the doorway does not correlate with the location of the doorway presented in the plan. The door in the elevation is somewhat shifted to left (east) of center which is concurrent with existing archeological evidence. To further reinforce the off-center doorway, the artist drew four lower-tier loopholes into the wall image to the left (east) of the door, and five lower-tier loopholes in the wall surface to the right (west) of the door. Whether the loophole depiction is accurate is unknown, although the loopholes are spaced quite evenly in the drawing.

The blockhouse description on the map indicates that the doorway was 5 feet 2 inches wide. Archeological evidence in comparison indicates that the rough opening of the door was 5 feet wide.

There are two very significant features of the door presented in the elevation which appear in no other known historic drawing or photograph of the blockhouse. The lintel over the doorway is shown in the drawing as a segmental stone arch of nine voussoirs (tapered stone segments). The map text indicates the doorway was arched. Below the drawing of the arch and just above the doorway is a heavy black infill. It is unknown what the infill represents, although the blockhouse door lintel construction depicted in the drawing can be compared to historic doorways on other early stone buildings within the fort.

A comparison can be made between the blockhouse door head depicted in the drawing and the existing double wide door heads on the Quartermaster Storehouse (HS-6), constructed in 1867. (The lintel of the door facing the parade ground is original; the door lintel on the opposite side of the building is a reconstruction.) The typical lintel construction on the storehouse is composed of stone segmental arches set directly over wooden lintels. The voussoirs are shaped so that the extrados (top of the arch stones) are arched and the intrados (bottom of the arch stones) are parallel to the ground plane, bearing directly on multiple wooden lintels. Each of the quartermaster storehouse door arches have key stones flanked by two voussoirs at each side. The spring voussoirs (the stones at the ends of the arch) are shouldered. Another important feature of the Quartermaster Storehouse building doorways is that the stone arches are veneer. That is, the voussoirs do not extend to the full depth of the masonry wall and provide only partial structural strength above the doorway.

The arch depicted in the 1866 drawing of the blockhouse is very similar to arches found on the Quartermaster Storehouse. Although there is a difference in the treatment of the intrados and the quantity of voussoirs in the arch depicted in the drawing as compared to the existing doorways, the

construction of the Quartermaster Storehouse doorway more than likely complimented the doorway found on the blockhouse.

The other important feature of the drawing of the blockhouse doorway is the door leaves. The doorway is broken into two door leaves, presumably hinged at the masonry jambs similar to other historic doors within the fort. The map text indicates only that there were double doors constructed of pine. The image on the surface of the doors in the drawing suggests that the doors were constructed of boards set into a chevron or herringbone pattern.

In the drawing, the boards are placed at an approximate angle of forty-five degrees with respect to the ground. This suggests the door was of batten-board construction similar to those hung on the commissary and storage buildings within the park. The difference between the door leaves in the drawing and those on other buildings within Fort Larned is that the two laminations of boards on the fort doors are set perpendicular to one another. The exterior door leaf pattern on the blockhouse may have been unique to the fort if the drawing of the blockhouse door is factual.

There is no hardware depicted in the drawing of the door, possibly because the drawing was too small for it to be shown. However, historic evidence of other double doors within Fort Larned indicates that the doors opened to the interior with T-hinges mounted on the interior surface of the door leaves and jambs. The method of bolting the blockhouse door is unknown, although it can be speculated that such a defensive structure would have used hardware more rugged than a simple box lock as was historically used on all of the other doors within the fort.

The laminations on salvaged historic doors are fastened using clinched nails with wood screws at the perimeter of each door leaf. Although there is no historical evidence as to the fastening method for the blockhouse doors, the fastening technique would probably have been similar to that found on other historic batten-board doors.

The most prominent feature of the drawing is of the shallow hipped roof. The graphic lines radiating from the peak to the eaves appears to represent a roof material of thatch or sod. The description of the blockhouse accompanying the 1866 map correlates the graphic depiction in that the roof "covering" was of timber-poles, brush, hay, and earth. If sheathed in these materials, the shallow roof undoubtedly leaked profusely. The absence of the roof mounted tower in the drawing reinforces historical accounts that the tower and wood shingles were added at a later date (see Historic Photograph Analysis, Photograph of Fort Larned, 1867-1868).

Loophole images depicted in the drawing were more than likely added at the artist's discretion. Once again this may be attributed to the small size of the drawing rather than a literal interpretation of the blockhouse. Based upon archeological evidence for the placement of the door and salvaged loophole stones, it would have been very difficult to place four loopholes to the left (east) of the doorway as indicated in the drawing (see Appendix C, Reconstruction Drawings, sheet 4). There would not have been enough wall space between the door jamb and the corner of the building, given the typical loophole construction technique (see Appendix B, Historic Stone Survey Analysis), for the wall to have been structurally sound. The map text indicates that there

were fifty loopholes in each tier. It is difficult to ascertain whether these numbers were accurately tabulated or estimated as the doorway would have broken any symmetry or regular pattern between the upper and lower tiers, assuming that the loopholes were laid evenly spaced. Since there were six elevations of even length, simple mathematics would dictate that the fifty loopholes to each tier would have been unevenly distributed to each of the walls.

In the elevation drawing, the loopholes are depicted in an irregular sequence. There is no image of corner loopholes as found in the salvaged stone (see Appendix B, Stone Survey Sheets 2 and 83). The upper tier is placed at the vertical midpoint of the roof eave line and the upper limits of the door arch. The lower tier is centered about mid-height of the door. It is doubtful that factual information on loophole placement and quantity can be gleaned from the drawing.

There was little apparent regard for correctly depicting materials, wall thicknesses and dimensions, and interior features by the drawing's artist, although the text is more specific. The map text reveals that the walls rose to a height of 11 feet 6 inches and each wall measured 22 feet in length. The indicated height correlates very closely with the scaled height found in the 1886 historic photograph. Each of the wall lengths averaged approximately 21 feet 6 inches based upon archeological evidence.

The text indicates that the walls measured 2 feet thick to a height of 3 feet, then 1 foot 6 inches for the remainder. Archeological evidence indicates the walls were at least 2 feet thick and in some cases were as much as 2 feet 8 inches thick at the base as at wall number six. It is unknown if the 3-foot height for the remainder of the wall thickness is accurate, although the placement of the lower tier of loopholes would suggest so. Through the stone survey, it was found that the loopholes were laid in a wall 18 inches thick. It is assumed that the lower tier of loopholes was placed nearly on top of the 2-foot-thick portion of the wall. It is unknown whether the 6-inch shelf created at the juncture of differing wall thicknesses was horizontal or sloped in stone or mortar.

The map description is not too specific on the cellar. The map indicates the cellar measured 14 feet 6 inches by 13 feet by 6 feet deep. These dimensions were verified by archeological evidence except in the case of cellar depth. An average depth of about 5 feet from the cellar floor to the under surface of the floor planks was calculated. The discrepancy of one foot cannot be accounted for in the map description. The map description also indicates that there was a 2-inch pine floor over the cellar. Archeological evidence of nail holes in the top of each of the cellar joists agrees with the map description.

The map indicates that the well is 27 feet deep and 14 feet from the "house" (presumably meaning the blockhouse). Although archeological evidence verifies this description, it is peculiar that there is no mention of the existing stone-lined wellhouse surrounding the well opening. Perhaps the wellhouse was considered integral with the well and did not have a descriptive title.

The map describes the tunnel leading from the cellar to the wellhouse as being 6 feet deep by 3 feet 6 inches wide lined with 2-inch thick pine boards. While archeology confirmed the latter two features of the tunnel, the depth could not be established. At

this time the composition of the tunnel and wellhouse ceiling support system is unknown.

Drawing of Fort Larned

Ado Hunnius, Company "D", 3rd Infantry
December 7, 1867

Figure 5

This crude perspective drawing of Fort Larned as viewed from the west toward the parade ground, indicates very few features on the blockhouse. However, by the date of the drawing, the tower had been added to the roof. The featureless door is the only other prominent feature visible facing the parade ground.

Sketch Plan of Fort Larned, Kansas

U.S. Army
November, 1873

Figure 6

The blockhouse drawing is in perimeter plan outline in this document. The significant feature is the guardhouse which appears on the southwest elevation (Elevation 5). According to the map's scale, the guardhouse structure measured approximately 15 feet square. There was no archeological evidence found to indicate that the guardhouse existed.

Lithograph of Fort Larned

Chicago Engraving Co. for the Pawnee Valley Stock Breeders Association 1886

Figure 9

This drawing is an aerial perspective viewed from the west. The blockhouse image is presented as a very simple multi-sided structure. Significant features include the door facing the parade ground and a flag topping the hipped roof peak. The tower is not shown, which is curious considering the amount of detail of other buildings in the drawing. Whether the tower was removed by the time the drawing was completed or the tower was deleted at the artist's discretion is speculative. There unfortunately appears to have been little regard for proportional scale in the representation of the blockhouse. It is unknown if the tower sported an actual flagstaff or one concocted by the drawing's artist.

Drawing of Fort Larned Ranch

Pawnee Valley Stock Breeders Association
1887

Figure 10

This drawing gives an overall aerial perspective view of the Fort Larned site from the northwest during its occupation as a ranch. The only significant blockhouse features depicted in the drawing are the presence of the tower, cupola, and the doorway situated roughly in the center of the wall facing north. The drawing's artist was more careful with proportional scale than in the previous lithograph, but the drawing is too small to be of use for details.

Stone Survey Analysis

In February 1986, a detailed survey was conducted on salvaged stone which

presumably came from the historic blockhouse. The goal of the survey was to determine which, if any, of the salvaged stone originally came from the blockhouse. The stone was rescued from beneath porches, floors, and demolished walls of existing historic structures under restoration by the National Park Service. Three stones were later salvaged from the rubble excavated during archeological work conducted during the spring of 1986 and one stone from a surface rubble pile during reconstruction work.

The survey did not take into account the foundation stones exposed during the archeological work. Of approximately 450 stones, fifty-three were identified as originating from the blockhouse (refer to Appendix B for the historic stone survey inventory sheets). The remainder of the stones may or may not have come from the blockhouse.

Results of the survey indicate that the exposed surfaces of the stone were chisel and saw faced. The salvaged stones were predominately rectangular at the exposed face. An average size taken of all stones showed that the lengths varied from 12 to 36 inches, the depth from 6 to 24 inches, and the thickness from 4 to 14 inches.

Dakota Sandstone was the predominant stone, approximately eighty-five to ninety percent of the total, with a very dense, hard white Lincoln Limestone from the Greenhorn formation[2] filling the remainder. The hardness and color of the salvage sandstone are in a range of a soft buff brown to a hard very dark brown.

Of the salvaged stone, fourteen corner stones were identified and thirty-seven loophole-related stones were found. Two additional stones were found with both a corner and loophole carved into them (Stone Survey Nos. 2 and 83). The corner stones were cut very sharply, each with a 120-degree corner. The loopholes appear to have been worked by many different masons. Tool marks indicate that stone saws and various sized toothed and flat chisels were used in shaping and facing the stone. Chisel marks tended to be parallel at consistent strike intervals running at various angles to the stone bed.

The dimensions of the loopholes varied, but an average width dimension of 3 inches at the exterior and 14 inches at the interior was determined. The height of the loopholes at the exterior face was determined to be about 6 inches at the exterior and 10 inches at the interior (see Appendix C, Reconstruction Drawings, Sheet 8, Detail 2). The exterior loophole openings were kept at a minimum size to present a difficult projectile target from the outside yet large enough to provide adequate sight lines for aiming armaments from the interior. The interior surfaces of the loopholes were splayed to provide greater sight lines and mobility of armaments through the 18-inch thick blockhouse walls.

Six loophole stones (Stone Survey Nos. 6, 53, 58, 73, 77, and 79) were found to be chiseled in limestone. Given the extreme hardness of the limestone, as evidenced by the relatively little facing work performed on the limestone, undoubtedly few loopholes were constructed of this type of stone.

Most of the salvaged stones are structurally sound and can be incorporated into

[2]Memorandum to George Elmore from David Grisafe, Kansas Geological Survey, 18 September 1986.

the reconstructed blockhouse. However, it is recommended that the best examples of salvaged loophole and corner stones be retained in the museum collection as physical documentation of the construction technique of the blockhouse.

In constructing the loopholes, the masons may have laid up the blockhouse walls to the sill level of each loophole tier similar to the construction technique seen at the south elevation loopholes of the Old Commissary (HS-5). At this point it is unknown precisely how the loopholes were incorporated into the blockhouse walls. Based upon the evidence exhibited by the salvaged stone and the construction techniques on HS-5, there are two possible alternatives:

1. After the blockhouse walls had been built to the loophole sill level, the location of each of the loopholes was marked off at the top of the wall and a slope was chiseled in place into the stone;

or

2. Pre-shaped loophole sill stones were set into place as the blockhouse walls were constructed.

From salvaged stone evidence, alternative two would be the most likely choice. A total of thirty-five sill and lintel stones were identified from the salvaged stone. Of the total, eighteen could have potentially functioned as lintel stones under the assumption that the lintel stones had spanned the entire breadth of the loophole openings with no bond break over the opening for the purpose of structural stability. The remainder of the salvaged loopholes, seventeen total, more than likely served as sill stones because it would have been structurally unwise to use them as lintel stones.

Two of the loophole stones (Stone Survey Nos. 2 and 83) have been identified as blockhouse stones because each have a 120-degree finished corner in addition to a loophole carving. There are no other known historic structures within Fort Larned which would have had such a combination.

Five other loophole stones (Stone Survey Nos. 37, 45, 51, 70, and 72) had letter graffiti scratched into the exterior finished surfaces. If the graffiti were added during the existence of the blockhouse, then these stones would have been located at the sill because the graffiti inscriptions can be read upright (assuming the graffiti artist wrote in an upright rather than an inverted position). Of course, the graffiti could have been added any time after the demolition of the blockhouse.

Of the twenty-four stones containing graffiti, only one can be verified as being from the historic period (Stone Survey No. 1). It is unknown if the stone came from the blockhouse.

Flakes of whitewash were found on many of the exposed surfaces of the stone. Thin natural deposits of calcium on some of the stone surfaces should not be confused with whitewash finish.

Historic Stone Quarry Sites

Approximately 3,000 cubic feet of finished stone went into the construction of the blockhouse. Approximately ninety percent of the stone consisted of native Dakota Sandstone and the remainder Lincoln Limestone. It is quite clear that, given the large amount of stone required for construction of the blockhouse, most if not all of it was quarried rather than picked up as surface stone.

The primary quarry site for sandstone at the inception of the Fort Larned stone building construction period was undoubtedly 2.6 miles directly east of Fort Larned on privately owned land. The historic quarry pits and spoil piles still remain. A natural ridge of sandstone extends southeast from the quarry site to a now exposed seventy-foot bluff at Jenkins Hill, property currently owned by the State of Kansas. It is unknown if any quarrying activity took place on Jenkins Hill. The site was more than likely suitable because of the relatively little labor required to strip the thin overburden from the desirable stone.

The precise location of the Lincoln Limestone quarry site is, as of this writing, a mystery. Testing of the salvaged limestone, almost certainly derived from the original blockhouse, indicates that the stone is composed of practically pure calcite.[3] Because of the stone's fine crystalline structure, the limestone sample is more of a poor grade of marble rather than the yellow cast Fencepost Limestone typically found in abundance in the region. Lincoln Limestone has been identified by the Kansas Geological Survey as occurring in the Greenhorn formation several miles north of Fort Larned beneath Fencepost and grey limestone strata. One historic account documented that a stone quarry was established six miles north of Fort Larned as early as March 1865.[4]

Although the type of stone was not specified in the diary account, the stone was more than likely limestone. Searches for the historic quarry site through an area six miles north of Fort Larned yielded numerous outcroppings of Fencepost and grey limestone but no Lincoln Limestone. Eroded soil probably conceals the historic quarry site.

Architectural Analysis of Archeological Features

Extensive archeological investigation was undertaken during April and May 1986, under the direction of the Midwest Archeological Center, National Park Service. The Blockhouse enclosure, cellar, and guardhouse were excavated in the spring of 1986, and the tunnel and wellhouse investigated during the fall of the same year. The following narrative is an interpretation of architectural elements uncovered during both digs. Refer to Part IV, Archeological Data for more specific information.

Blockhouse Walls

All blockhouse walls were excavated and found to be in a stable enough condition to be accurately recorded. The exterior dimensions of the six walls were relatively the same length: 21 feet by 6 feet plus or minus 4 inches. Thicknesses for each of the walls varied from 24 inches for Elevation 4 to

[3]Ibid.

[4]Diary of J. W. Ladd, 5 March 1865 entry. Copy in Fort Larned archives.

32 inches for Elevation 1 where evidence of the door opening was found. The wall thicknesses were found to be relatively uniform across each wall. The depth of the walls was historically very shallow (see Appendix C, Reconstruction Drawings, Sheet 5). Archeological evidence suggests that a shallow builders trench was excavated to a depth of about 12 inches below the historic grade line in preparation for the construction of the stone walls.

The excavated foundation stone was predominately sandstone with a small percentage of limestone. Most of the foundation stones were in poor condition. Size ranged from rubble to large base stones measuring 48 inches in length and 18 inches in width. Tool marks rivaled those found on the historic blockhouse stone salvaged in other structures around the site. Most of the existing foundation stones showed evidence of having been laid in a sand and lime mortar. Tests conducted by the National Park Service's North Atlantic Historic Preservation Center, North Atlantic Regional Office, confirmed a weak mortar mix of six-parts sand to one-part lime with a slight possibility of a trace amount of natural cement.

A test pit excavated at the exterior of blockhouse Elevation 3 indicated evidence of a drip line directly below what would have been the historic roof cornice. Measurements of the drip line indicated that the roof extended approximately 12 inches, plus or minus 2 inches, from the exterior face of the blockhouse.

Door

Prior to archeological excavations, the location of the blockhouse main entry door was unknown with respect to sill level and position on the elevation. It was suspected that the door was built into Elevations 5 or 6 because of their direct axis to the parade ground. Documentary evidence indicates the door was 5 feet 2 inches wide[5] and may have been off center with respect to the elevation (see Figure 3).

Archeological evidence suggests that the door was located at northwest Elevation 6. A section of Elevation 6 was relatively devoid of structural stone for a breadth of 5 feet and off center with respect to the elevation (see Figure 3). Additional archeological testing to compare the quantity of artifacts around the suspected entry at the exterior of Elevation 6 indicated a good possibility that the area was the primary access point.

Center Post

Historical documentation indicates that the blockhouse roof was supported in part by a center post. Previous known archeological investigations had not attempted to locate the center post. As excavation work progressed on the cellar during the 1986 investigation, it was clear that the center post was also used as an axis point for the cellar structural members. However, little evidence of the post was found other than an ill-defined post mold impression.

The post had apparently been salvaged during the demolition of the blockhouse. The post extended the full depth of the cellar to a large limestone footing set below the cellar floor level. The base stone measured roughly 32 inches square by 6 inches

[5]A. Kaiser, Assistant Adjutant and Quartermaster, Plan of Fort Larned, 3 August 1866.

thick. One small, thin, tapered stone measuring about 6 inches in diameter by 3/4 inches was found on top of the footing stone in the location where the center post base would have rested. The thin stone may have been used to shim the center post plumb or may have spalled from the larger footing stone. The average diameter of the post, determined by measurement of the post mold, was found to be about 16 to 17 inches in diameter at the base.

Since the blockhouse was not a true hexagon because of the various elevation lengths, there was no true center point within the blockhouse. The center point of the center post soil mold was 8 to 10 inches southwest of what could be considered the blockhouse central axis point relative to its walls. The displacement of the center post would have caused the roof structure to be slightly off center and thus each of the roof leaves to be at a comparatively slightly different slope.

Cellar

The archeological investigation uncovered a surprising amount of intact cellar structure. Before the cellar was backfilled sometime prior to 1900, only the deck over the cellar and perhaps the plank lining of Walls W-4 and W-5 had been removed for ease of backfilling and/or lumber salvage. Most everything else was left in place. The cellar was five sided, roughly the shape of a square in plan with the northeast corner clipped in order to avoid construction conflict with Elevation 1 (see Appendix C, Reconstruction Drawings, Sheet 1). The tunnel extended parallel with Wall W-5 beneath the blockhouse Elevation 1 and north to the wellhouse. The intersection of Walls W-4 and W-5 converged to the center post; the axis point for radially laid structural framing members to the cellar corners.

The blockhouse cellar wall construction can best be compared to artillery emplacements built during the Civil War when a quick, strong, and temporary construction was needed for defense. In the Civil War field fortifications, wooden posts were driven into the ground to retain horizontal plank or timber slipped between mounded or cut back earth and the posts. In this way the mounded earth formed a defensive rampart. Since Fort Larned's early commands were by veteran field officers of the Civil War, one could speculate that defensive techniques of the Civil War were carried over into some aspects of the blockhouse construction.

Based on archeological evidence, the construction sequence for the blockhouse cellar was as follows (see Appendix A, Cellar Chronology Drawings):

1. The cellar and tunnel were excavated by hand to a depth of approximately 6 feet below the historic grade. The earthen walls were trimmed plumb and the corners squared.

2. A hole was excavated at the intersection of walls W-4 and W-5 in preparation to receive the center post footing and center post for the blockhouse roof structure.

3. Holes were excavated at the corners of the cellar at the floor in preparation to receive

the cellar corner posts. Six-inch deep trenches were excavated from the center post footing to each of the corners of the cellar in preparation to receive subfloor wooden lateral braces. Trenches were also dug at the perimeter of the cellar and tunnel walls in preparation to receive wall planks.

4. The center post and its footing were installed in place.

5. Double 2-inch x 6-inch posts were set into each of the holes excavated at the cellar corners. A single 2-inch x 6-inch post was set into the corner of the intersection of Walls W-3 and W-4.

6. Double 2-inch x 6-inch lateral braces were laid on edge in builder's trenches radially from the butt end of the center post to each of the corner post bases. A single 2-inch x 6-inch board was installed along Wall W-4. The tops of the lateral braces were just below the soil floor level. No nails were used to fasten the lateral braces to the posts. Scrap iron and wooden stakes were driven on each side of lateral braces to temporarily stabilize them.

7. Single 2-inch x 6-inch toe boards were laid on edge at each side of the tunnel. Spreader boards of varying dimensions were laid between the toeboards in shallow trenches (see Figure 12).

8. Two vertical 2-inch x 16-inch boards were spiked to the center post at an approximate right angle to each other and the cellar walls. The butt ends of these boards rested on top of the 2-inch x 6-inch lateral braces. The 2-inch x 16-inch boards essentially served as posts to support floor joists.

9. Double 2-inch x 6-inch joists were laid out radially from the center post. One square cut end of each joist was set on top of the 2-inch x 16-inch posts, and the opposite notched ends were nailed to corresponding notched crowns of the cellar corner posts.

10. Planking of 1 1/2-inch thickness by variable widths of 14 to 18 inches were slipped horizontally between the corner posts and center post, and the earthen wall (see Figures 13 and 14). The bottom 2 to 3 inches of the lower planks were set into shallow trenches. As each section of plank was set in place, earth or rock was used to forcefully shim the wall planks tight against the backside of the posts. The top edge of the cellar walls were extended approximately 6 inches

above the top surface joists. No nails were used to fasten the horizontal wall planks to the posts.

11. Vertical wall planks, of similar dimensions to the cellar plank, were installed and braced in place in the tunnel.

12. Double 2-inch x 6-inch joists and headers were installed to frame the cellar hatch after placement of the horizontal wall planks. Nails were used to join the south end of joist J-4 to joist J-3 but the method used to join the north end of joist J-4 to the cellar plank wall is unknown as this area was completely deteriorated.

13. After placement of the wall plank, the narrow void between the plank and earthen wall was backfilled with soil. The builder's trenches in the cellar floor were backfilled to provide a level cellar floor.

14. The stairs were constructed and set into place. The square cut base ends of each stringer were anchored into the soil floor.

15. The 2-inch x 8-inch cellar decking[6] was nailed to the joists and the tops of the wall planking. The pattern of the decking placement is unknown. There was no evidence to indicate that a cellar hatch was installed over the stairwell opening.

Elevational measurements taken of the blockhouse historic floor during the archeological investigation revealed that the soil floor was far from level due predominately to farm period disturbance. The floor level along the interior of the stone walls may have been 3 to 5 inches higher than the exterior grade line along the perimeter of the building. From the walls, the floor level declined slightly toward the edges of the cellar. Then, within 3 to 4 feet of the edges of the cellar, the floor declined sharply to the top of the cellar walls, possibly a result of farm-era disturbance once again. The total elevational change from the blockhouse walls to the top of the cellar walls was about 12 inches.

The reason the cellar was set lower than the general blockhouse floor level may have been due to the cellar's association with the tunnel. In order for the tunnel to have been covered with soil to match the grade level at the exterior of the blockhouse, the roof of the tunnel would obviously have been constructed below grade. The exterior roof level may have been carried into the interior of the blockhouse where the tunnel roof functioned as floor decking. It did not appear that any attempt was made to raise the level of the interior tunnel and cellar floor deck to bring it even with the blockhouse's soil floor level. This method of laying out the tunnel and cellar produced very low headroom in each, about 5 feet 1 inch from the soil floor of the cellar and tunnel to the underside of the floor deck.

[6]Ibid.

The cellar stair stringers and one tread had survived demolition and for more than one century were entombed beneath the ground. Enough of the stringers were intact to enable documentation of slope, number of treads, and construction technique (see Appendix C, Reconstruction Drawings, Sheet 7). The stairs were constructed of seven 1-inch by 10-inch treads nailed over 1-inch by 1 1/2-inch ledgers fastened to the stringers with 3-inch cut nails. The average rise for each tread was about 7 1/2 inches and the average run about 5 inches. The west and east stringers were measured at 1 1/2 inches by 9 1/2 inches and 1 1/2 inches by 12 inches, respectively. The base ends of the stringers were square cut and had been buried 7 to 8 inches below the cellar floor. The distance between the interior faces of the stringers was 2 feet 6 inches. The stringers' method of connection to cellar Wall W-3 is unknown because of severe deterioration of the members.

A number of features were found in the cellar that were probably installed after the initial construction of the cellar. Indications are that three round posts were added beneath the cellar joists and deck for increased support of a sagging cellar ceiling. The 4-inch diameter posts were placed at the midspan of joist J-1, at the joining of joists J-3 and J-4, and one about 3 feet south of the latter mentioned post against Wall W-4.

There is evidence that the cellar posts predated the construction of decking on the cellar floor. The decking, approximately 1 inch in thickness and of variable width, was notched around the posts. The decking was nailed over four 2-inch by 4-inch sleepers laid roughly parallel to each other. The decking was laid in a crude manner suggesting hurried construction. The archeological investigation uncovered decking from below the bottom stair tread to cellar Wall W-5. The decking extended about 5 feet from cellar Wall W-4 (see Appendix C, Reconstruction Drawings, Sheet 1). The reason for the decking's installation is unknown.

It is doubtful whether the cellar could have been used for any function other than storage of nonperishables. If at any time water infiltrated the blockhouse (as must have happened frequently since there are many historical accounts of the roof leaking very badly), the blockhouse floor slope would have directed surface water into the cellar. No evidence was found to suggest that the cellar area was ventilated. If the cellar had not been ventilated, the moisture levels would have been high all year long considering there was an open well nearby. It is difficult to perceive that the moist blockhouse cellar could have been used by the military as long-term storage for precious gunpowder and ammunition.

Tunnel

The tunnel extends north parallel with cellar Wall W-5, beneath blockhouse Elevation 1, 12 feet outside the blockhouse walls, to the passage into the wellhouse (see Appendix C, Reconstruction Drawings, Sheet 1). The tunnel is 4 feet wide at its interface with the cellar and tapers to the width of the wellhouse passageway 3 feet 6 inches. The floor level slopes down approximately 6 inches from the cellar to the wellhouse.

The tunnel walls were constructed in a slightly different method than the cellar walls using vertical rather than horizontal

and relied on lateral support from the roof structure and spreader members buried just beneath the soil floor. The probable construction sequence of the tunnel is as follows:

1. The tunnel was excavated between the wellhouse and the cellar to a width of 4 feet prior to the laying of the foundation stones for blockhouse Elevation 6.

2. Trenches 4 to 6 inches deep were shoveled out at the base and entire length of each tunnel wall.

3. A toe board was laid on edge into each of the trenches; 2-inch x 6-inch boards near the cellar and 4-inch x 6-inch boards near the wellhouse end of the tunnel. The interior face of the base board was snug tight against the interior face of the trench.

4. Spreader boards were trenched into the tunnel floor between and perpendicular to the tunnel walls (see Figure 11). The spreaders relieved soil pressure developed at the base of the tunnel walls.

5. The bases of the vertical wall planks were inserted between the earthen wall and the base board. The base plate served to distribute the lateral thrust of the wall more evenly to the soil. No evidence was found that nails were used to fasten the vertical planks to the base plate.

There was no physical or documentary evidence for the tunnel roof construction (see Appendix C, Reconstruction Drawings, Sheet 8, Detail 1). Regardless of whether the roof was covered with planks, logs, or sod, it undoubtedly leaked profusely. An area of structural instability undoubtedly occurred at the blockhouse wall above the tunnel. The archeological investigation uncovered a rubble wall that had been constructed in the tunnel directly beneath the blockhouse wall. The remaining blockhouse foundation stones above the tunnel plug had settled by at least 6 inches (see Figure 15). The northwest blockhouse corner above the tunnel may have settled appreciably, requiring shoring prior to imminent collapse of the corner. The tunnel plug blocked access to the wellhouse from the cellar. The method of support of the blockhouse wall over the tunnel is unknown as there was no single lintel stone spanning the tunnel nor any physical evidence of posts or beams beneath the wall.

Archeological evidence was uncovered that more than one foot of soil covered the tunnel floor and the tunnel walls had broadened near the blockhouse foundation prior to the construction of the tunnel plug. The layer of soil beneath the plug contained fragments of adobe brick similar to that found in the cellar fill. It is difficult to speculate the series of events or time frame that the construction of the tunnel plug would have in relation to the filling of the tunnel and cellar. However, someone obviously perceived a structural problem with the blockhouse wall and attempted to correct it possibly during the ranch period immediately after Army occupation.

occupation.

There was no archeological evidence to indicate the detailing at the interface of the horizontal cellar wall plank with the vertical tunnel plank at Wall W-5 (see Appendix C, Reconstruction Drawings, Sheet 5). There was no indication of posts at the tunnel entry. One can only speculate that the tunnel vertical wall plank somehow laterally supported the ends of the horizontal plank along Wall W-4.

Wellhouse

The wellhouse is the most intact portion of the blockhouse. The interior dimensions of the stone-lined walls measure approximately 8 feet by 9 feet 4 inches. All of the walls are slightly out of square with each other. The walls measure 5 feet 9 inches from the bottom of the footing stones to the highest portion of the wall. The floor of the wellhouse is approximately 6 feet 6 inches below existing grade. The tunnel passage into the wellhouse is 3 feet 4 inches wide and extends the full height of the wall (see Figure 17). The stone lining the jambs of the passage are sharply cut.

The random-coursed walls are constructed of limestone and sandstone set into a clay or adobe mortar (see Figures 17, 18, and 19). There was no evidence of lime and sand mortar in any of the joints sampled. The exposed stone surfaces are a mix of rough chiseled and square sawn faces. The thickness of the walls measures from 12 to 16 inches in width at the exposed wall top and passage jambs. Wall thicknesses concealed by soil could not be determined. The ragged top surface of the existing wall indicates that a small quantity of stone is missing. The structural stability of the walls is in fair to poor condition. The historic backfilling of the wellhouse may, in fact, have preserved the stability of the wellhouse walls by producing a lateral counterforce to resist the surrounding soil pressure. The walls at the tunnel passage are in very poor condition, measuring as much as 7 inches out of plumb between the top and bottom of the walls (see Figure 20).

The obvious floor feature in the wellhouse is a soil and deteriorated wood stain of an outline of the well. The well appears to have been lined in wood set horizontally into a polygon between 7 feet 6 inches and 8 feet in diameter.

There was no evidence of floor decking nor of any apparatus to draw water from the well.

There was no evidence to indicate the wellhouse roof construction method. Speculation is that heavy timber or planks spanned the shortest distance across the wellhouse probably similar to the tunnel roof structure.

Gallery

No archeological evidence was found to substantiate the notion that the gallery serving the top tier of loopholes had any supportive structure constructed below the historic blockhouse floor level. However, in a July 1967 oral interview with Orlando Hiram Fell by former park superintendent Elbert Smith, Fell claimed that a gallery existed at

[1]Elbert Smith, oral interview of Orlando Hiram Fell, July 1967, transcript and tape, Fort Larned archives. Fell, approximately ninety years old at the time of the interview, resided at Fort Larned during its ranch period around the turn of the century. Although Smith's interview techniques were questionable in aiding Fell's memory recall in many portions of the interview, Fell appeared to speak freely of the blockhouse demolition.

Fell indicated that the roof had been removed from the blockhouse yet the gallery remained in place. With these pieces of information in mind, an assumption can be made that the gallery was neither supported from the roof structure nor tied directly to the ground (unless later ground disturbance destroyed any subgrade evidence, or the supporting structure to the blockhouse floor rested at ground level). It is possible that the gallery platform was anchored to the blockhouse walls with wooden brackets or cantilevered beams pocketed into the stone wall between loopholes. In other structures at the fort site, porch floor undercarriages and interior floor joists have been supported in this manner. The porch joist ends were dovetailed and constructed into the stone walls.

Guardhouse

The sketch plan of Fort Larned dated November 1873 (see Figure 7) graphically indicates that a structure was constructed at the southwest face, Elevation 5. No archeological evidence was found to support the documentary existence of the guardhouse. There is not enough documentary or physical evidence to determine the dimensions, construction method, and materials of the guardhouse at this time.

Artifacts

A wealth of information was gleaned on the lumber used in the construction of the cellar. Enough of the excavated lumber remained intact for measurement prior to its rapid drying and disintegration upon exposure to the air.

The United States Forest Products Laboratory, Madison, Wisconsin, conducted tests to determine the species of wood samples retrieved from the blockhouse excavation. In summary, they found practically all of the wood samples associated with the cellar structure to be Eastern White Pine (*Pinus strobus*). This finding correlates with historical documentation and physical evidence on other site structures that the majority of the lumber used in the construction of Fort Larned was freighted from the northern lumber producing states of Michigan or Wisconsin. The archeological remains of the cellar wood appeared to be of good quality, having a straight tight grain with very few knots. Surface mill marks could not be detected.

Most of the structural lumber was found to be 1 3/4 inches in thickness. Width measurements were somewhat difficult to determine because of deterioration and shrinkage but the majority of cellar joists and posts averaged between 5 1/2 to 6 inches in width.

The thickness of the vertical and horizontal wall planks averaged about 1 1/2 inches. Width measurements ranged between 14 and 18 inches, with 16 inches being the most common dimension.

A number of nails were found fastening the wooden cellar members together. All were common cut nails of 2 3/4-inch, 4-inch, and 5-inch lengths. All nails were too corroded to be able to determine machine marks as a result of manufacturing processes. No hardware or screws directly associated with the blockhouse were found during the archeological investigation.

PART IV

# HISTORIC STRUCTURE REPORT
# ARCHEOLOGICAL DATA

## BLOCKHOUSE (HS-10)

FORT LARNED NATIONAL HISTORIC SITE,
PAWNEE COUNTY, KANSAS

Janis L. Dial
Archeologist

# PART IV

# ARCHEOLOGICAL DATA: INTRODUCTION

The 1986 Midwest Archeological Center field investigations at Fort Larned National Historic Site were conducted in conjunction with a National Park Service project (FOLS Package 126) to reconstruct the blockhouse, or Historic Structure 10 (HS-10), on its original site. The archeological fieldwork for the project was ultimately conducted in two separate phases, an initial episode extending from April 15 through May 15 and a later investigation lasting from November 5 through November 16. Originally, only the superstructure of HS-10 was included in the reconstruction. The initial archeological investigations were therefore designed to include excavation of the HS-10 foundation, exposure of any evidence of the roof-supporting center post, supports for a possible elevated loophole walkway around the building interior, and any vestige of the wooden guardroom addition to the structure. Whatever information was collected archeologically regarding the original configuration of those elements was then to be used by the project historical architect in the design of the new building.

In addition, it was anticipated that ground disturbance associated with reconstruction activities would adversely affect other subsurface features within and immediately adjacent to the perimeter of HS-10, such as the partial cellar beneath the blockhouse. The initial phase of archeological work therefore also included investigation of the cellar, a limited portion of the subterranean passageway to the wellhouse, and many other archeological features ultimately identified within the construction zone. It was agreed in advance of fieldwork that no original fabric in the walls of HS-10 or other features within the structure or cellar would be preserved in place. However, the portion of the passageway outside the construction zone and the subterranean stone wellhouse identified by previous archeological investigation were to remain undisturbed.

In the fall of 1986 the decision was made to proceed with the reconstruction/restoration of the entire subterranean complex known to have been present at HS-10, which included the cellar, all of the underground passageway, and the wellhouse. The archeological remains of the cellar and the adjoining section of passageway had been investigated the previous spring, and architectural details derived from that study were already available for use in planning the reconstruction of those features. However, the expanded scope of the project necessitated a return to HS-10 in November to complete the excavation of the passageway and to investigate the subterranean wellhouse.

Of all of the blockhouse-related features which were identified during the course of the 1986 fieldwork, only the original subterranean wellhouse has been preserved. The combined processes of archeological excavation and subsequent reconstruction ultimately resulted in the destruction of all other original features at the site. While the blockhouse facsimile which now stands at Fort Larned may serve as a useful tool to enhance the Park's program of public interpretation, one significant cost of the project has been the loss of the original resource itself.

## ARCHEOLOGICAL DATA

The archeological investigations were planned and directed by this writer. The field crew during the spring of 1986 included Archeologists Herbert Beamer and Randall Farmer, Archeological Aid Rene Botts, Museum Specialist W.E. Sudderth, and Historical Architect Alan W. O'Bright. A number of volunteers participated in the fieldwork including Cleat Walters, Warren Kenyon, Margy and Harold Reed, Richard Crothers, Alan Swarts, Edward Burr, Jill York O'Bright, George and Audrey Dial, Lorene Gleason, Mark Berry, and Tom Owens. Cleat Walters contributed over 100 hours of work during the initial phase of the project, and Warren Kenyon volunteered 40 hours at the site. Park Resources Management Specialist George Elmore also assisted with the excavations.

The crew during the second phase of the project included Rene Botts and Randall Farmer together with Archeologists Steven DeVore, Cathie Masters, and Christopher Svec. They were assisted by Historical Architects O'Bright and Bill Harlow as well as volunteers Cleat Walters and Ricardo Leos.

Historical Architect O'Bright of the Midwest Regional Office was responsible for the architectural design of the reconstruction. The archeological fieldwork was consequently coordinated with O'Bright, who remained on-site to ensure that all relevant architectural data were recorded. To the great benefit of the project as a whole, O'Bright also participated as a member of the archeological field crew. He was thus made fully aware of the limitations of the archeological record to provide answers to certain architectural questions and was actively involved in the collection of data which were eventually incorporated into the construction specifications.

### Project Objectives

The scope of the archeological portion of the Package 126 project at Fort Larned National Historic Site was initially defined in a work plan authored by the writer early in 1986 and approved by the Regional Archeologist, Midwest Region. As indicated in the work plan, the rationale for conducting archeological investigations in advance of the HS-10 reconstruction was two-fold:

1. Fort Larned National Historic Site was nominated to the National Register of Historic Places on October 15, 1966. As therefore required by Section 106 of the National Historic Preservation Act of 1966 and National Park Service Cultural Resources Management Guidelines stated in NPS-28, it was necessary to mitigate the anticipated adverse effect of reconstruction on subsurface archeological remains at the site.

2. Historic documentation of the original structure was limited and in fact conflicting in several critical architectural areas. In accordance with NPS-28, it was therefore also imperative that specific architectural information relating to HS-10 be collected in order to facilitate an accurate reconstruction of the building.

Professional archeological excavations had been conducted at HS-10 on two previous occasions, first in 1967 (Moore 1967) and

later in 1973 (Scott 1973, 1974). The information accumulated for HS-10 as a result of those two episodes of research dealt primarily with the definition of building wall lines and corners, portions of the subterranean passageway leading from HS-10, and the well and wellhouse at the end of that passageway. Prior to the start of the 1986 archeological fieldwork, additional information on HS-10 became available as a result of extensive archival research conducted by NPS Historian Ron Cockrell, who prepared the History and Significance section of the Historic Structure Report. Nevertheless, a number of architectural questions still remained to be answered prior to reconstruction (Draft Task Directive for Pkg. 126), questions ultimately addressed during the archeological phase of the present project through the development and investigation of a series of specific archeological research domains. It was hoped that these questions could be resolved both through the verification of structural information collected during the earlier episodes of archeological and documentary research and through the collection of new data during the 1986 investigation.

The initial set of project objectives was developed with little prior knowledge of the nature and extent of in situ archeological remains at HS-10. Ultimately, a great deal more was learned about the structure than was initially anticipated simply because so many of the original structural features were found to be intact, particularly in the blockhouse cellar. As a consequence, the amount of archeological data collected during the field investigations far exceeded initial expectations. This disparity is clearly reflected in the limited scope of the original stated archeological objectives compared with the large amount of architectural detail ultimately recorded at the site which is described in such detail in the following section, Archeological and Architectural Results. The need to conduct a second unanticipated phase of fieldwork resulted in the development of several additional study areas.

The final set of archeological objectives for the project has been provided below. They include a number of very specific architecturally oriented research problems which relate to the physical appearance of the blockhouse during the military period at Fort Larned, together with a single more general objective related to historical land use changes at the site. The project objectives were as follows:

1. Identify and describe any roof-supporting center post and its footing;
2. Identify and describe the supports for a possible elevated loophole walkway around the interior of the structure;
3. Reidentify the structural corners of HS-10 and attempt to verify the overall dimensions of the structure as reported by Scott (1974);
4. Identify the exterior entrance to the building;
5. Define the limits of the cellar below HS-10 and determine both the means of entry into that feature and the means of floor support over it;
6. Define the alignment of the underground passageway or tunnel, verify the presence of vertically oriented wooden planking over the earthen walls of the tunnel, and determine how the tunnel was originally covered;

7. Expose the subterranean wellhouse and determine how it was originally covered, determine the depth of the earthen floor of the wellhouse relative to the earthen floor of the cellar, and define the original limits of the well itself;
8. Look for evidence of a possible guardroom addition outside HS-10;
9. Determine the elevation of military era grade inside and outside HS-10;
10. Assess archeological evidence which bears upon the functional history of HS-10 and Fort Larned, and relate that history to broad regional changes in land use over the past 150 years.

Field Methodology

The archeological field methods employed during the course of the blockhouse project were specifically selected to collect data relevant to the above research problems within the time and funding limitations of the project. The archeological field investigations were coordinated on-site with Historical Architect O'Bright to ensure that all architectural data relevant to the eventual reconstruction of HS-10 were recorded. The original field records for the project contain more detailed information on field methodology and will be curated at the Midwest Archeological Center, Lincoln.

Two strategies of artifact collection were implemented during the two phases of fieldwork at HS-10. First, the fill excavated from numerous features and other selected deposits at the site was screened through 1/4-inch hardware cloth. The artifactual residue in the screens was then bagged and returned to the Center for analysis. Frequently, only samples of actual structural debris such as sandstone fragments were collected from those proveniences. However, the bulk of the fill atop HS-10 and in the complex of subterranean features was not screened. Artifacts which were collected from the latter group of proveniences generally represented diagnostic objects fortuitously observed during the excavation. Of course, the collection strategies employed at HS-10 ultimately had implications for the interpretation of the archeological deposits, particularly those from which only limited samples of artifacts were collected. Information on those archeological materials from the site which have been retained at the Center is provided in Appendix H. Each provenience from which artifacts were collected is now associated with a three-part unique bag catalog number or code which was assigned in the field (for example, HS10-C-1). A description of those proveniences is provided in Appendix I.

Initial Phase of Archeological Investigation, April-May, 1986

Sometime during or after the 1973 excavations at HS-10 (Scott 1973, 1974), metal posts were placed near the outside corners of the blockhouse, primarily as an aid to on-site interpretation of the structure to Park visitors. Prior to the start of the 1986 research, those posts and an interpretive panel mounted atop a 4-in x 4-in wooden post provided the only visible indication of the blockhouse location. Moore (1967) had previously assigned numbers to the six corners of the blockhouse foundation, and his numbering system was employed in 1986 (Figure 21).

Walls were designated by the corners at each end (for example, wall 1/2 lay between corners 1 and 2).

A proton magnetometer survey of the site was undertaken by Center Supervisory Archeologist Robert Nickel, this writer, and Park Resources Management Specialist Elmore one week prior to the commencement of actual archeological excavations. The survey represented an attempt to determine the positions of significant subsurface features which might relate to HS-10. A 1-m grid system measuring 20 m x 22 m in extent was established across the presumed blockhouse area for survey purposes (Figure 21).

The equipment used for this work consisted of a pair of Geometrics Model G-856 proton precession magnetometers with a sensitivity of 0.1 gamma. The sensors were mounted at a height of 50 cm above the ground surface, and a difference mode of operation was used in which one magnetometer was moved from point to point across the grid, while the other instrument remained stationary to function in a reference capacity. The two magnetometers were operated simultaneously to control for diurnal fluctuations in the earth's magnetic field intensity. The value obtained at the reference sensor was then subtracted from the value obtained at the moving sensor at each grid point. Ultimately, the only magnetic anomaly detected which proved to reflect a subsurface feature associated with HS-10 lay in the area of the cellar and passageway beneath HS-10 and is now interpreted as the magnetic expression of fill in those features.

Stratigraphic Test 1 was a 1-m x 2-m unit placed midway between the staked locations of blockhouse corners 5 and 6 (Figure 21). Available documentation on both Scott's and Moore's work at HS-10 suggested that this particular location had not been previously excavated. Stratigraphic Test 1 was oriented so as to produce a vertical profile across the blockhouse wall and thus to define the stratigraphy both inside and outside the structure. The unit was excavated in a combination of arbitrary and natural levels below ground surface and its fill was screened. Depth measurements for excavation purposes used the ground surface around the unit as a reference. However, the ground surface at the northernmost corner of the unit was used as a reference level for measuring depth to specific points of interest, beginning with the horizontal plan diagram drawn at about 35 cm below the surface. The north corner lay 0.5 cm below vertical site Datum E1, which was established after excavation of Stratigraphic Test 1 was begun (see below). The unit was extended via a 3.5-m long, 0.5-m wide trench to the east in order to lengthen the vertical profile of the northeast wall.

The positioning of Stratigraphic Test 1 ultimately proved fortuitous, as that particular segment of wall 5/6 contained the largest remnant of the third course of stone in the entire wall perimeter. Fairly detailed documentation was thus obtained for this well-preserved section of the foundation and adjacent areas.

For most of the duration of the first phase of the project, horizontal provenience across the site was measured relative to a point designated Datum A which was established just outside the excavations (Figure 21). The angles to points in the excavation were measured in degrees and minutes east of a 0 baseline running from Datum A to the northeast corner of HS-5 (256 degrees east of magnetic north), and a theodolite placed over Datum A was used to measure the angles.

## ARCHEOLOGICAL DATA

Distances to points in the excavation were taped from Datum A using the metric system. Historical Architect O'Bright established several other separate reference points at the site to take measurements for design and siting purposes. While the metric system was used for recording archeological provenience during both phases of the project, measurement of architectural features was generally made in the English system which would have been employed by the builders of HS-10.

Vertical control was maintained using a line level and string attached to the top of a 2-in x 2-in wooden stake (designated Datum E1) placed near the center of the structure (Figure 21). Depth measurements below the top of E1 were made using the metric system. The true elevation of E1 was eventually calculated from a permanent bench mark near the fort complex and lay approximately 2,035 ft 4 1/2 in above mean sea level. The top of the E1 stake stood 9 cm above the ground surface immediately adjacent to the stake. However, the ground surface across the site varied somewhat in elevation and the relationship between the ground surface and the E1 level varied accordingly. A single line level was used for Datum E1 measurements from the second week of the HS-10 project until its conclusion in order to control for variation between readings made from individual line levels. The only depth measurements recorded at the site which were not tied directly to E1 were those within Stratigraphic Test 1.

Historic Structure 10 was divided into four quadrants for purposes of excavation and general record-keeping, the quadrant intersections arbitrarily aligned on magnetic north-south and east-west (Figure 21). The grass root layer in each quadrant was removed as a unit and discarded without further examination. Each quadrant was then skim shoveled to sterile subsoil in order to identify previous excavation units and expose any features relating to the blockhouse. Soil fill was not generally screened during this latter process, but potential features exposed during the excavation were examined closely. They were excavated by trowel, and feature fill was usually screened. The HS-10 wall lines were thus defined, and attempts were also made to delineate the inner and outer edges of the builders trenches for the blockhouse foundation. Investigation outside the walls of HS-10 was generally limited with three major exceptions: Stratigraphic Test 1; a block excavation in the area of the suspected entrance to HS-10; and the historically documented area of the guardroom addition to the blockhouse. Soil balks were left along the four quadrant intersections, and the vertical stratigraphy in three of the four balks was recorded.

Particular attention was given to defining the limits of the cellar and passageway during the excavation of the northwest (NW) and northeast (NE) quadrants. After the top of the cellar fill was identified in the NW Quadrant, the fill from about 32 - 61 cm below E1 along the east side of the quadrant was screened in an attempt to determine the temporal periods to which the artifactual contents might date. The tops of the floor joists over the cellar were exposed at 56 - 61 cm below E1. From the top of the joists down, the cellar was excavated without further reference to the quadrant system.

The remaining foundations of the building were exposed to determine construction techniques such as the depth and nature of the stone courses. In addition, two sections of the foundation were dismantled

in order to identify construction materials and determine the relationship of the stone to the bottom of the builders trench/top of sterile subsoil. The two areas so examined were the foundations exposed in Stratigraphic Test 1 and those immediately south of the probable doorway to HS-10.

Eight numbered excavation units were established in various locations around the site to facilitate collection of more detailed data than was practical using the quadrant and transit provenience methods (Figure 21). Excavation Unit 1 (1 m x 1.25 m) at the southeast corner of the NW Quadrant was established around a complex of soil stains designated Feature 1 which was initially believed to relate to the central roof-supporting post of the blockhouse. Excavation Unit 2 (1 m x 4 m) was placed atop a portion of wall 2/3 and its associated builders trench to facilitate a detailed map of those remains. A small block excavation ultimately consisting of Excavation Units (X) 3, 4, 6, and 7 was opened along wall 2/3 to search for and investigate features relating to the building entrance. Excavation Units 3 and 4 were 2-m squares placed so as to straddle wall 2/3. Those two units were excavated in three horizontal components: the blockhouse wall rubble and builders trench (large foundation stones were left in place); the building interior beginning at the inside edge of the builders trench; and the building exterior beginning at the outside edge of the builders trench. All excavated fill from X3 and X4 was screened. Excavation Units 6 and 7, each of which measured 1 m x 2 m, were established adjacent to the west sides of X3 and X4. Those units were excavated in natural stratigraphic levels and most of the fill excavated from within them was screened.

Excavation Unit 5 (roughly 1 m x 1.3 m) represented a test of the stratigraphy in the cellar immediately southeast of Scott's 1973 excavation into the passageway and cellar opening. Excavation in X5 began slightly above the top of Joist 1 (J1), which lay partially within the unit, and ended at the cellar floor. Excavation Unit 8 was an irregularly shaped unit which consisted of the remaining unexcavated wedge of soil between the south limits of X4 and X6 and the large guardroom excavation outside wall 1/2.

After the identification of Scott's excavation into the portion of the passageway within the blockhouse and the cellar opening, the backfilled soil from that work was removed. His excavation of the interior portion of the passageway appeared to have been complete except for a small amount of fill at the level of the cellar floor. As indicated previously, the original scope of the blockhouse reconstruction project did not necessitate disturbance of the historic wellhouse or passageway outside HS-10. Consequently, the only portion of the latter features which was examined during the spring of 1986 was a segment of the passageway beneath and immediately outside blockhouse wall 3/4, an area which was anticipated to be disturbed during construction of the new building's foundation. Seventy to eighty cm (2 ft 3 1/2 in - 2 ft 7 1/2 in) of the passageway outside the blockhouse wall was excavated during the first phase of the 1986 research at HS-10. Rock fill in the upper portion of the tunnel beneath and outside the blockhouse foundation was dismantled, and earthen fill beneath the rock was excavated and screened.

It was agreed prior to the commencement of the HS-10 fieldwork that no original fabric in the blockhouse walls or features

within the structure or cellar was to be preserved in place. However, Historical Architect O'Bright requested in advance that as much of the blockhouse foundation stone be left in place as possible. In any event, the original wooden features in the cellar and tunnel proved to be very fragile and began to deteriorate immediately upon exposure. Most of those features were removed in order to examine other features behind or below them.

General fill in the cellar was simply shoveled out to a level approximately 25 cm above the cellar floor (192 cm below E1), the primary exception being the area encompassed by X5, the stratigraphic test. Four areas of cellar fill were defined at the 25-cm level for separate excavation. Those represented different gross fill strata or, in one instance, fill within an architecturally defined space, the area of the stairwell. The fill from 25 cm above the floor down to the floor itself was screened. The fill in each builders trench which had been dug below the cellar's earthen floor for inset of wooden members was excavated and screened separately, as was fill removed from beneath a section of plank flooring.

Features such as floor joists, the center post area, walls, and stair remnants were carefully exposed and examined. Because of the quick warping and deterioration of wooden features, notes, photos, and drawings of such remains were generally made immediately upon their exposure. Wood samples from 25 features around the site were collected and ultimately submitted for identification by the Forest Products Laboratory, U.S.D.A., Forest Service (Christensen 1986a).

Finally, in searching for evidence of the guardroom addition to the blockhouse, an area of approximately 50 sq m along and outside wall 1/2 was initially stripped of the upper sod layer and then skim shoveled to subsoil (Figure 21). None of the fill from that area was screened.

Second Phase of Archeological Investigation, November, 1986

The E1 vertical datum stake used during the spring excavations at HS-10 had stood near the center of the site, but was removed at the end of the spring work when the pedestal of soil at its base was excavated. In November, a new vertical datum designated E2 was established southwest of the two primary target features, the subterranean passageway and the wellhouse (Figure 21). As before, the datum level was defined at the top of a 2-in x 2-in wooden stake. Depth measurements below the E2 level were made using the metric system. The elevation of E2 was calculated from a permanent bench mark located north of HS-3 and stood 2,035 ft 7 in above mean sea level, 2 1/2 in (approximately 6 cm) higher than Datum E1. The top of the E2 stake stood approximately 28 cm above the adjacent ground surface.

Upon return to the blockhouse in November, it was found that horizontal datum stake A was no longer present. While a new horizontal datum was needed in any event which was closer to the target features, there was ultimately a small measure of uncertainty about the position of the new horizontal Datum C relative to Datum A (Figure 21) on the order of $\pm$ 2-4 cm. Similar to the procedures followed during the spring field session, the angles to points in the fall excavation were measured in degrees and minutes east of a 0 baseline running from Datum C to the northeast corner of HS-5

(approximately 240 degrees east of magnetic north). A theodolite placed over Datum C was used to measure the angles. Distances to points in the excavation were taped from Datum C using the metric system.

The earthen floor of the tunnel was reidentified in the section of that feature examined during the spring. A clean vertical cut was then made through the tunnel fill 10 cm northwest of the limits of the spring excavation, and this vertical profile was recorded. Two slices of tunnel fill were then excavated behind (northwest of) the profile along the tunnel alignment, each of which was 2 ft deep. After removal of the root layer and underlying backfill from Scott's excavations, excavation proceeded by natural levels and fill was screened through 1/4-inch hardware cloth. The remainder of the undisturbed fill down the length of the tunnel (approximately 3 ft deep) was then removed one layer at a time but was not screened. At that time, soil balks were left along the tunnel walls and fill removal was stopped slightly above the level of the earthen tunnel floor.

The upper earthen wall lines of the tunnel were exposed in plan view to attempt to define the tunnel alignment. The locations of previous archeological excavation units were plotted whenever they were identified along the tunnel alignment. The balks along the tunnel walls were then carefully removed in order to search for evidence of a tunnel covering or roof support system, to examine the earthen tunnel walls, and to search for any remnants of in situ wooden wall planking.

Finally, the last few centimeters of tunnel fill were troweled to the level of the earthen tunnel floor. The initial effort in that regard was unsuccessful because of cold weather conditions. Based upon previous experience in the spring, the tunnel fill was expected to separate easily from the underlying hard-packed floor surface. Instead, however, the soil break occurred at the frost line which, in November, lay below the level of the tunnel floor. With the assistance of the Park staff, the excavation cavity was covered with sheet plastic and a propane heater was installed inside the tunnel. The Park staff, the historical architects, and the archeological crew also cooperated to construct a shelter of scaffolding, lumber, and plastic over the entire area of the tunnel and wellhouse excavation to provide a measure of protection from the wind and snow (Figure 22). Without those special accommodations, work on the blockhouse excavation could not have continued at that time.

In the area of the subterranean wellhouse, sod and fill deposits over the feature were skim shoveled until the tops of the stone wellhouse walls were exposed. Scott had excavated two units into the wellhouse fill, one into the north half and the other into the south half of the feature, separated by a narrow balk of original fill. In 1986 the backfill in those units was removed down to the base of Scott's north excavation at 119 - 120 cm below E2 (approximately 70 cm bs). The balk of original fill between the two units was also removed. At that level there was a visible distinction in plan view between additional backfill in the south half of the wellhouse and undisturbed fill in the north. Between two and four courses of stone were exposed at that depth along the north wellhouse wall. The remainder of Scott's backfill was then removed from the south half of the wellhouse and the tunnel opening into the wellhouse, with soil balks left along the stone walls in order to prevent their collapse.

## ARCHEOLOGICAL DATA

O'Bright was initially uncertain whether the stone wellhouse was stable enough in its present condition to ensure future public safety when viewing the feature. The wall at the wellhouse entry in particular appeared to have deflected significantly from its original position. Eventually, the entry wall was almost completely dismantled and rebuilt by contract labor during the reconstruction of the blockhouse in 1987.

A vertical profile of the undisturbed wellhouse fill was recorded and Excavation Unit 9, measuring 1 m x 1.5 m, was then established as a test into the north half of the wellhouse fill below the level of Scott's excavation (Figure 21). The unit was excavated in natural levels and the fill was screened. Again, soil balks were left along the stone walls. Shoring was then installed as the balks around the wellhouse were excavated. Eventually, the earthen floor of the wellhouse was identified together with the remains of a possible wooden well housing or cribbing at the same level. A small unnumbered test unit was placed into the north half of the well fill to better define the relationship between the wellhouse floor and the well.

Twelve additional wood samples from features identified during the fall excavation were also eventually submitted for identification to the Forest Products Laboratory (Christensen 1987), including a sample of the possible well housing.

### Previous Archeological Investigations at HS-10

The first professional archeological investigations at HS-10 were conducted in 1967 under the direction of National Park Service Archeologist Jackson W. Moore, Jr. (Moore 1967). The documentation of Moore's fieldwork in the area of HS-10 includes a collection of field photographs, and field notes and sketches. However, no formal project report was apparently written.

Moore's field records indicate that he excavated a series of test trenches around HS-10 and ultimately exposed all six corners of the blockhouse foundation, one entire wall line (wall 1/2), and portions of the other walls, thus eliminating any confusion which may previously have existed concerning the number of exterior walls in the building. The evidence for those features included sandstone blocks used in the construction of the foundation, sandstone rubble, and soil staining, and Moore observed that previous robbing of stone had produced gaps in the foundation. Moore also reported that he encountered a plank and a possible joist in a subsurface test within the perimeter of the building near corner 4. The former walls and floor of that particular excavation unit were identified in 1986 and found to be lined with tarpaper, presumably placed in the unit prior to its backfilling (Figure 23). The two wooden features which Moore described are now known to have been the top plank along cellar wall 2 and Joist 3 over the top of the cellar. Finally, Moore identified the subterranean wellhouse/passageway complex northwest of the HS-10 foundation.

A number of farm buildings and related developments which were eventually demolished by the Park were still standing when Moore conducted his investigations at HS-10. Field photographs taken at that time illustrate a large hog pen/chicken coop complex near the west edge of the HS-10 foundation (Figures 24 and 25). A series of

concrete post molds identified in the area in 1986 are believed to represent the remains of that farm complex. A gravel road also appeared in the Moore photographs which ran across the northwest portion of the site.

Subsequent archeological investigations were conducted at HS-10 in 1973 by the Department of Anthropology, University of Colorado, under the direction of Douglas D. Scott (Scott 1973, 1974). That work focused upon reidentification of the corners of the blockhouse for purposes of public interpretation, together with a detailed examination of portions of the underground passageway, well, and wellhouse (Scott 1974:289). Scott consequently reinvestigated areas previously explored by Moore and opened additional sections of the site. He additionally learned (Scott 1973:21) that testing for the HS-10 tunnel was conducted in 1968 by Earl Monger, a local avocational archeologist.

Scott reported that only a single course of stone remained at the three south corners of the blockhouse, buried from 3 to 12 in below the present ground surface (Scott 1974:289-290). The blocks were reportedly well dressed and varied from 2 ft to 2 ft 2 inches in width and from 2 to 3 ft in length. They measured 6 inches in thickness. Scott surmised that several of the blocks had been damaged as a result of exposure and vehicle traffic over the site. In contrast, he reported that dark soil stains constituted the only remaining evidence for the three north corners of the blockhouse. However, blocks similar in general appearance and dimension to those observed at the south corners were found along the north walls of the building between the corners. The wall which faced toward true north, the northeast wall as described in Scott's field notes (1973:40), was reported to be 19 ft in length from outside corner to outside corner, while the other walls were reported as 21 1/2 ft in length. The lowest course of stone around the building was found to be roughly level. However, Scott (1973:39, personal communication 1986) noted that differences in the depth to which the foundation was buried below the ground surface around the site were most likely due to general filling operations on the property conducted during the farming and National Park Service periods or to maintenance of a gravel farm road across a portion of the site.

Scott also exposed the north edge of a large dark soil stain within the perimeter of HS-10 which he interpreted as fill within the historic cellar beneath HS-10 (Scott 1974:290). He reported that the probable north cellar wall was 11 ft in length and oriented roughly east-west. The underground passageway or tunnel was found to extend north from the west end of the cellar a distance of approximately 17 ft to an 8-ft x 10-ft sandstone-lined subterranean structure which he presumed to represent the historic wellhouse. Scott reported that the section of tunnel within the blockhouse was 4 1/2 ft in length and 5 ft wide at its juncture with the cellar. He obtained a width measurement of 3 ft 5 in for the opposite end of the tunnel at the opening into the wellhouse, a dimension which is almost identical to the historically recorded tunnel width of 3 1/2 ft (see Cockrell, History and Significance, this volume).

The portion of the tunnel within the perimeter of the HS-10 foundation was excavated to what Scott believed to be its original floor, a compact sterile gray clay. The fill in the short section of tunnel beneath the blockhouse wall was reported to consist of

irregular limestone blocks to a depth of 4 ft with dirt fill beneath the limestone to the floor of the tunnel. The latter rock-and-earthen plug beneath the blockhouse wall was left intact (Scott, personal communication 1986). No shoring or other supports for the section of blockhouse wall over the tunnel were observed, with the sole possible exception of a 2-in x 6-in pine board on the floor of the tunnel a foot inside the blockhouse wall which was toenailed to the tunnel wall. Conversely, it was thought that the latter feature might represent a threshold.

Scott also removed the fill in the south half of the wellhouse and the adjoining 3 ft section of the tunnel down to the approximate level of the earthen floor of those features (Scott 1974:290-291). Measurements taken at either end of the tunnel indicated that it was 5 ft 9 in deep as measured below the top of the lowest course of stone in the blockhouse foundation and the top of the sandstone wellhouse. Historically, the tunnel was supposed to have been lined with 2-in thick pine boards (see Cockrell, History and Significance, this volume). While Scott's excavations were limited to an examination of 3 ft to 4 1/2 ft at the ends of the tunnel, he found no clear evidence of such a lining. However, bits of wood were observed pressed into the earthen tunnel walls near the wellhouse, and similar wood fragments were found within the fill at both ends of the tunnel. In addition, the earthen tunnel walls were about 2 1/2 in wider on each side than the stone-lined opening to the wellhouse and may indicate where a wooden lining previously existed (Scott 1973:22, personal communication 1986). On the other hand, Scott believed the north cellar wall to still be lined with horizontally laid pine boards, as indicated by the exposed ends of a vertical stack of boards at the juncture of the cellar and tunnel.

Scott observed that the four-sided wellhouse was constructed of well-dressed sandstone blocks. While no mortar was observed between the blocks, he raised the possibility that the walls were laid with adobe mortar (Scott 1973:22). He identified a 6-ft diameter earth-lined well within the floor of the wellhouse and excavated the south half of it to a depth of 4 ft. He also reported that two names were inscribed on the stone of the wellhouse, one facing toward the interior of the wellhouse and the other facing into the tunnel near the opening into the wellhouse.

A great deal of evidence of the previous archeological excavations was encountered during the 1986 investigations at HS-10. Most distinctively, it would appear that Moore lined portions of his units with tarpaper prior to backfilling, while Scott used sheet plastic for similar purposes. The positions of the prior excavations were plotted whenever they were recognized on the ground in 1986 (Figure 23). Clearly, the archeological data generated by the two previous field projects shed important light on various aspects of HS-10 and its associated features prior to the commencement of the 1986 fieldwork.

## ARCHEOLOGICAL AND ARCHITECTURAL RESULTS

### The Blockhouse Center Post

An early historic description of the blockhouse at Fort Larned which accompanied a plan of the fort dated 1866 indicates that roofing materials for the structure included wooden poles, brush, hay, and earth similar to that used in the roofs of other contemporaneous fort buildings (see Cockrell, History and Significance, this volume). The description indicates that the roof was supported by a large central post. Modifications made to the structure at about the time of its conversion to the post guardhouse included replacement of the earthen roof with a shingled one.

Early in the planning process for the HS-10 reconstruction, attention was drawn to the critical, but at that time unknown, relationship between the structure's center post and its partial cellar (Wagner 1976:30). When the position of the cellar was projected using the historically recorded cellar dimensions in combination with the 1973 archeological data on the north cellar wall, the cellar appeared to extend into the area where the center post would have stood. The cellar dimensions specified in the 1866 plan were 14 ft 6 in x 13 ft across x 6 ft deep (see Cockrell, History and Significance, this volume). Because this is very roughly the size of the cellar cavity defined during the 1986 work at HS-10, it may be concluded that the cellar was not enlarged after 1866. It is therefore highly likely that the configuration of the center post relative to the cellar was established early in the history of the structure and certainly by the late 1860s, the target period selected for the HS-10 reconstruction and interpretation. During the 1986 archeological investigations, it was determined that the center post originally stood in the south corner of the cellar and extended upward from the cellar floor.

Archeological evidence for the center post was closely associated with several other structural elements of the cellar. First, three primary floor joists over the cellar were ultimately found to radiate from the center post area at the southernmost cellar corner (Figure 26). Each of the joists was constructed of doubled 1 1/2-in x 6-in boards. Second, the south ends of the three joists rested atop the remains of two vertical boards which extended up from the cellar floor and behind which the center post stood (Figure 27). The dimensions of the westernmost upright board measured in the field were 1 3/4 in x 16 in, while the dimensions of the easternmost upright were 1 1/2 in x 16 in. The east board was butted against the east end of the southwest-facing surface of the west board. Mapping of the two boards at 85 cm below E1 indicated an angle of 72 to 73 degrees between them. However, the angle measured on a photograph of the center post area 220 cm below E1 and slightly below the level of the earthen cellar floor was approximately 90 degrees (Figure 28). The orientation of the two boards relative to each other was thus probably originally a right angle. Both the floor joists and the two vertical boards were fragile but largely intact when they were first exposed in 1986. The tops of the joists were uncovered at about 56 to 61 cm below E1. The archeological evidence for cellar walls 4 and 5, which converged at

the center post, is discussed elsewhere in this report.

Down to the level of 85 cm below E1 the fill behind the vertical boards, where the center post itself would have stood, consisted of loose soil mixed with manure, unquestionably a relic of farm-era activities. There was also evidence of fairly extensive rodent disturbance. A complex of soil disturbances evident for a considerable distance around the former center post location extended vertically from the ground surface (roughly 10 cm below E1) to 85 cm below E1. One source of that disturbance was the excavation for the interpretive sign post, which lay within 20 cm of the center post location and extended to a depth of 92 cm below E1.

Evidence for the center post itself consisted of a cylindrical soil stain 17 1/4 inches in diameter which was first observed immediately behind the vertical boards at 117 cm below E1 (Figure 27). The stain contained scattered bits of wood and charcoal, small fragments of sandstone, a chunk of mortar with adhering sandstone, bone, and historic artifacts including curved and flat glass and cut nails. All of this material lay in general disarray, suggesting that the post itself had been pulled and the resulting post hole subsequently filled with a variety of materials (bag catalog numbers HS10-C-29, HS10-C-64, HS10-C-65, HS10-C-66, HS10-C-68). A rodent burrow also extended down through the center of the stain.

However, a remnant arc of rotten wood fiber was observed around the edge of the stain, and a few vertical wood splinters were exposed at 147 cm below E1 and collected for identification (sample #20). Similar to the samples from other wooden features in the cellar, the splinters were identified as white pine (Christensen 1986a). It is unclear at this point whether the wood sample represented deteriorated fragments of the center post which detached when it was pulled or whether the sample related to separate fill deposited after the post was removed, as explained below. Certainly, however, it seems unlikely that a massive center post would have disintegrated in place while other cellar features of similar wood dating to the same era remained in good condition.

Of additional relevance to this question, Feature 40, an irregular pocket of charcoal- and ash-stained soil, was clearly intrusive to the center post stain (Figures 29 and 30). The feature contained a charred inverted tree branch, fragments of limestone and sandstone, three bone fragments, and a number of historic artifacts (HS10-40-1). Among the latter materials were three relatively thick aqua flat glass fragments with thickness measurements of 2.3, 2.4, and 2.7 mm. Feature 40 was roughly 90 cm in diameter and extended from the approximate middle of the center post hole stain southwest and outside the stain. Covered by later fill, F40 was first exposed at 66 cm below E1 and extended to a depth of 133 cm below E1. Yet a sample of the tree branch found in F40 has also been identified as white pine (sample #24), and the wood sample collected from the center post hole stain may somehow be associated with this later feature.

In addition to the center support for the blockhouse, a long wooden post served as the flagpole for Fort Larned during the military period. A portion of the flagpole was recovered in 1983 by Center Archeologist William Hunt which has also subsequently been identified as belonging to the white pine group (Christensen 1986b).

A probable post location, Feature 39, was also identified at the edge of the cellar near the center post hole stain (Figures 29 and 31). The remnants of a deteriorated piece of wood were found mixed with soil in an area about 18 cm in diameter at 67 cm below E1 and extended to a depth of 126 cm below E1. The post appeared to have been offset in a post hole excavated through cellar fill on at least one side. The feature therefore postdated the filling of the cellar. While the function of F39 is unknown, it was not apparently related to the center post or a support system for that element while the cellar was still in use.

A large pile of irregularly shaped rocks was exposed immediately behind (south of) the center post hole stain (Figures 32 and 33). The rocks extended from 157 to 213 cm below E1 and presumably served as support for and general fill around the center post. Additionally, two limestone slabs were exposed on the last day of the spring work immediately beneath the center post hole stain, undoubtedly representing the footings for the post (Figures 34 and 35). The uppermost limestone slab was triangular in outline and relatively small, measuring approximately 40 - 50 cm on a side and only 2 cm thick. The top of the lower stone lay 236 to 241 cm below E1 and was 15.5 cm thick. It measured approximately 85 cm x 75 to 85 cm across. Considerable excavation and mechanical assistance would have been required to remove the lower stone and it was consequently left in place. The two slabs had clearly been laid into a builders trench beneath the level of the earthen cellar floor, a trench which was subsequently found to connect with similar trenches for wooden braces which radiated from beneath the vertical boards at the center post toward the outer walls of the cellar.

In summary, the blockhouse center post may have been as large as 17 1/4 inches in diameter at the base, the post hole enlarging slightly when the post was pulled. The wood used for the post appears to have been white pine. The post itself rested on limestone slabs set into a builders trench below the level of the earthen floor in the extreme south corner of the cellar. The smaller of the two slabs may actually have functioned as a shim. A jumble of irregular rock approximately 56 cm (22 in) high buttressed the south side of the post at its base. Two 1 3/4-in x 16-in white pine boards stood vertically at a right angle to each other around the north side of the post, the side which would otherwise have been exposed within the cellar.

## The Interior Elevated Walkway Supports

While it may seem logical that some sort of elevated interior walkway would have provided access to the upper tier of rifle loopholes around HS-10, no written documentation has apparently survived to confirm that such a feature was ever actually constructed. A number of archeological features were identified within the perimeter of HS-10 in 1986 which are, speculatively, the types of physical remains to be expected from a walkway support system. Those included, most notably, the remains of several wooden posts. However, the positions of those features within the structure do not support their interpretation as walkway supports, and several may be linked with relative confidence to more recent land use. In short, no clear archeological evidence was found of a loophole walkway within HS-10. A review of the features which were identified in the search for walkway supports is presented below.

The remains of ten posts were identified within HS-10 which did not appear to be associated with the subterranean cellar complex. Seven of the ten were roughly aligned with two additional unnumbered features identified outside the foundation of HS-10 (Figure 29). Some of this linear pattern may simply be coincidental. However, Features 4, 7, 11, and possibly 12 were probably associated with a fence line which was coincidentally erected across the site of HS-10 sometime after the building was demolished.

Feature 4 consisted of the remains of a wooden post which measured 6 cm in diameter at the base and which was apparently set into an oval-shaped post hole. The feature was first exposed at 25 cm below E1 and was at least 39 cm deep. Artifactual associations were of limited assistance in evaluating F4. Artifacts recovered from the feature itself included a single curved glass fragment and two cut nails (HS10-4-1, HS10-4-2).

The post hole for F4 was originally dug through a shallow basin of burned soil which was designated F8 and clearly predated F4 (Figure 29). Among the materials recovered from the F8 fill was a fragment of whitewashed sandstone. The Fort Larned blockhouse was not apparently whitewashed on the exterior until 1871, and it is unknown if the building was ever whitewashed on the interior (Brown 1964:437; see Cockrell, History and Significance, this volume). Cockrell has indicated that interior whitewashing of guardhouses was typically undertaken as a sanitation measure. The blockhouse at Fort Larned was first used as a guardhouse in 1867, and if the whitewashed sandstone fragment recovered from F8 originated from HS-10, then F8 should date no earlier than 1867 or possibly 1871. In addition, two small concrete fragments containing portland cement were recovered from the F8 fill, and portland cement was not manufactured in the United States until 1871 (McKee 1973:69).

Feature 8 lay beneath a layer of manure which would have been deposited during the farm era when a bull was reportedly stabled in the blockhouse (Figure 29). The manure lay northwest of a line which may have represented the position of a livestock stall within HS-10, a line distinct from and oriented differently than the probable fence line defined by the posts. In conclusion, F8 appears to date to either the late military period or the early farm period at Fort Larned, and F4 dates sometime afterward.

The post hole component of F7 appeared to have been cut down through the sandstone foundation of the blockhouse along wall 5/6 (Figures 29 and 36). Fragments of deteriorated wood were initially exposed in a soft fine soil matrix at a depth 26 to 30 cm below E1. Feature 7 was subrectangular in plan view at that depth and measured approximately 18 cm x 25 cm. It consisted of a jumble of wood, sandstone fragments, and soil which exhibited evidence of rodent disturbance to a depth of 76 cm below E1. The wood/soil mix continued in a smaller column to a depth of approximately 95 cm below E1, while the post hole stain extended to a depth of 102 cm. The post appeared to have been a standard 2-in x 4-in board. Two railroad spikes were recovered from the feature fill at 70 and 72 cm below E1 (HS10-7-1).

Feature 11 appears to have been a cylindrical wooden post 7 to 8 cm in diameter (Figures 29 and 37). First exposed at 26 cm below E1, the feature was at least 59 cm

deep. No associated post hole stain was identified. Feature 12 was exposed at 34 cm below E1, less than 10 cm west of F11. Feature 12 most likely represented the remains of a wooden post set into a large post hole. However, F12 had been heavily disturbed by animal activity and in 1986 consisted largely of a mixture of rounded and squared wood fragments and soil at least 51 cm deep. Part of the area between F11 and F12 was also disturbed.

Two complete wire nails (8d and 9d) were recovered from the F12 fill (HS10-12-1). While wire nails were available in the 1850s, the use of large numbers of such nails in building construction probably did not occur until the 1880s (Fontana and Greenleaf 1962:47-48, 55; Nelson 1968; Priess 1973:90). In the 1890s, wire nails supplanted cut nails as the primary nail type. Given the extensive disturbance of this feature, the nails may possibly represent rodent introduction into the fill.

Informal test pits were placed at intervals of 4.4 to 4.6 m (roughly 14 1/2 to 15 ft) beyond F7 and F11 to determine whether those features could be tied to a larger alignment, perhaps a former fence line which might have continued outside the walls of the blockhouse. To the west, a large chunk of concrete was found set into the ground at the approximate corner of a hog pen/chicken coop which dated from the late farm era and which was razed by the Park (Figure 29). A photo taken by Moore during the 1967 investigations at HS-10 (Figure 24) illustrates the location of the hog pen/chicken coop relative to corner 2 of HS-10. The remains of another wooden post which was not assigned a feature number were found along the projected fence line to the east and outside the blockhouse perimeter (Figure 29).

The intervals between Features 4, 7, and 11, and the concrete and unnumbered post outside the perimeter of HS-10 ranged from roughly 14 to 15 1/2 ft. Again, the F4 and F11 posts were cylindrical, fairly small, and similar in size (6 to 8 cm in diameter). The F7 post appears to have been a 2-in x 4-in board.

Feature 18 probably represented the remains of a fence post from a different fence line. It consisted of the base of a 6 to 7 cm diameter wooden post which had been set into a 16-cm wide post hole (Figures 29 and 38). Exposed at the same approximate depth as the previously discussed features (25 cm below E1), F18 extended to a depth of at least 52 cm. While the main section of the post was vertical, two pieces of horizontally oriented wood lying adjacent to it were probably originally a part of the post. The vertical section of F18 stood within the horizontal limits of F19, a long shallow and largely linear stain 16.5 cm (6 1/2 in) wide which ran east-west across the SE Quadrant of the blockhouse and the remains of wall 5/6. While the F18 post hole stain clearly extended below the limits of F19, the fill within the two features was indistinguishable in plan view and cross section. The association between them may be coincidental, as no other post remains were found within F19.

A sample of the wood in the F18 post was submitted for identification (sample #18) and found to be a species of *Juniperus* [juniper] (Christensen 1986a). Because the sample appeared to have been derived from a small branch or trunk, it most likely came from a tree growing in the area of the fort. Eastern redcedar (*Juniperus virginiana*) is the only species of that genus which is native to Kansas (Little 1971:Maps 31-W, 31-E; Scott

1928:45). Because of its resistance to decay, redcedar has been used extensively for fence posts in Kansas and elsewhere (Forest Products Laboratory 1974:1-20; Scott 1928:45; Wylie and Gass 1973:9).

Two additional wooden posts, Features 13 and 14, were identified roughly 40 cm apart midway between the remains of wall 1/2 and the center post hole stain (Figure 29). Feature 14 lay roughly 6 1/2 ft from the blockhouse wall, while F13 was approximately 8 ft from the wall. In each case, the post remains were found to be rectangular in cross section, measuring 3 in x 4 to 4 1/4 in. However, the F13 post represented a single piece of wood, while the F14 post had been constructed of two 1 1/2-in x 4-in boards doubled with cut nails. Feature 13 was first exposed at 41 cm below E1 and extended to a depth of 83 cm below E1 (Figure 39). The upper remaining portion of the post was broken and fragmented, but a 16-cm long segment of the post base was intact, the bottom of the post having been sawn square. One side of a possible post hole stain was also identified at the edge of F13. Feature 14 was first identified at a depth of 48 cm below E1 and extended to a depth of 81 cm (Figure 40). This post had a ragged base and the suggestion of a post hole stain was observed along one side of it.

Wood samples from the latter two features were also collected and submitted for identification (samples #7 and #8). Both were identified as white pine (Christensen 1986a) and were thus similar to wood samples collected from probable military-era wooden features in the HS-10 cellar. Christensen (1986a) has indicated that several species of the white pine group are native to the United States. However, the most likely species represented in the cellar material is *Pinus strobus* (eastern white pine) based upon the size of such trees, the volume of that wood which was available, and its geographical proximity. However, eastern white pine remains an important commercial species in the U.S. (Forest Products Laboratory 1974:1-5, 1-16) and the identification of the white pine in F13 and F14 is consequently insufficient evidence alone to argue that the post features date to the military period. The fact that the F14 post was doubled is intriguing, however, since a number of the wooden support features in the cellar were similarly constructed.

Artifacts found in association with Features 13 and 14 provide only weak dating (HS10-13-1, HS10-14-1). A nineteenth-century origin for the two features may be indicated by the eleven cut nails and nail fragments recovered from feature fill. One headed fragment of an 8d cut nail was recovered in association with F14. The nail is bent at an angle greater than 90 degrees but is not ruptured, possibly indicating that the nail was annealed during manufacture. The annealing process, which slowly heated and cooled cut nails, toughened them against splitting, particularly when they were clinched (Fontana and Greenleaf 1962:53). The annealing process dates to about 1871 and it is therefore possible that the bent nail from F14 was manufactured after that date. The percentage of failure or rupture of pre-1871 nails is unknown, however, and it is consequently impossible to determine at this time whether the absence of rupture is a reliable indication of annealing.

The remains of two fairly large, deep cylindrical wooden posts (Features 3 and 39) were identified approximately 6 3/4 ft apart

within the blockhouse. Both lay along the same line as several other features which most likely represented part of an old fence line (Figure 29). Feature 39 consisted of the remains of a deteriorated piece of wood mixed with soil in an area about 18 cm (approximately 7 in) in diameter (Figure 31). First exposed at 67 cm below E1, the feature extended to a depth of 126 cm. The probable post had been offset in a post hole roughly 26 cm (10 and 1/4 in) wide which had been excavated through blockhouse cellar fill on at least one side. The feature, therefore, postdated the filling of the cellar.

Feature 3 proved to be a substantial cylindrical post base set deeply into the ground. Wood from the feature was first exposed at 35 cm below E1 and extended to a depth of 103 cm below E1 (Figure 41). The post was 16 cm (6 1/4 in) in diameter at the widest point and had been set into a post hole roughly 26 cm (10 1/4 in) in diameter. The post had been inverted into the hole as indicated by the direction of growth of several small branches which had been cut off close to the larger branch or trunk segment. A possible handmade brick fragment and a small slab of limestone apparently wedged the post in place. The remainder of the post hole was filled with loose soil which had been partially disturbed by rodents.

The final post remnant of relevance to this discussion was F17, the remains of a 4-in x 4-in wooden post set deeply into a 15 cm diameter post hole (Figure 42). Extending to a depth of 128 cm below E1, F17 was aligned with the several other features which may represent part of a fence that formerly crossed the site. Feature 17 was first identified at 55 cm below E1 within the lower fill of an extensive but shallow amorphous soil stain which was designated F16. A cluster of sandstone rocks lay along the east side of the post and its associated post hole stain at a depth of 55 cm. Feature 16 and the top of F17 had been extensively disturbed by rodent activity. One wire nail was recovered in association with F17 together with other material (HS10-17-1). However, the nail may represent a rodent introduction into the feature fill and cannot be used as a basis for interpretation of the feature. The edge of the F17 post hole stain lay 8 cm from the interior edge of wall 2/3, while the edge of the wooden post itself lay only 10 cm (4 in) from wall 2/3. The post was oriented with two sides paralleling the blockhouse wall.

Unlike the probable military-era wooden features in the blockhouse cellar, wood samples from Features 3 and 17 (samples #6 and #9) have been identified as pine (*Pinus*) belonging to the southern yellow pine group (Christensen 1986a). Although the natural distributions of species within this group lie primarily within the Gulf and South Atlantic states, shortleaf pine (*Pinus echinata*) has been mapped just outside the borders of Kansas in eastern Oklahoma, western and central Arkansas, and southern Missouri (Little 1971:Map 52-E; Preston 1976:4, 22). Old growth shortleaf pine forests were the focus of a thriving lumber industry in southern Missouri from 1887 to 1903 (Settergren and McDermott 1964:5), in concert with a general period of intense logging of pine forests throughout the South during the last quarter of the nineteenth century and the first quarter of the twentieth century (Maxwell and Baker 1983; Peattie 1966:13-14; Robbins 1982:3). Although the evidence is purely circumstantial, the two Fort Larned features of southern yellow pine may date to that period of peak southern pine

lumber production. If so, the two would not have been part of the original construction effort on the blockhouse, relating instead to later use of the building. Feature 39 would also date somewhat later in time given the fact that it postdated the filling of the HS-10 cellar. In any event, the positions of F3 and F39 are clearly wrong for their interpretation as walkway supports.

No stone footings for walkway support posts were found during the HS-10 excavation. However, two squared extensions of the interior edge of a soil stain thought to represent the builders trench for the foundation of wall 1/2 were examined as possible former footing locations (Figure 29). They ranged from 30 - 45 cm across and were found to be shallow (an average of 6 cm deep) with an irregular diffuse contact on the bottom with subsoil. No artifacts were recovered from the fill of the stains, and no other extensions of similar form and nature were defined elsewhere along the builders trenches for HS-10. The extensions may simply reflect variations in the shape of the builders trench. However, since the entire 1/2 wall line had been previously excavated once (Moore 1967) and in some places twice (Scott 1973, 1974), the extensions may alternatively represent byproducts of archeological excavation and subsequent backfill.

A dark shallow soil stain of a different configuration was identified along the 4/5 wall line (Figure 29). Only partially distinguishable from the builders trench for the HS-10 foundation in that area, it largely overlapped the latter stain, producing what initially appeared to be anomalous projections of the trench itself. The projections were otherwise unremarkable except for a few artifacts recovered from their fill. None of the artifacts have provided assistance with interpretation of the feature (HS10-NEQ-13). No post remains were identified within or beneath the fill. Much of this blockhouse wall foundation was previously robbed of stone, and the stain may relate to that activity. Although no known previous archeological excavation occurred along this section of wall 4/5 (Moore 1967; Scott 1973, 1974), the stain may somehow be associated with earlier investigations at HS-10.

In summary, the remains of a number of wooden posts were identified within HS-10 which may relate to use of that building during the military or farming periods, or to use of the land after the building was demolished. However, the features do not appear to have been remnants of an elevated loophole walkway support system.

## The Structural Corners and Dimensions of HS-10

The 1986 investigations at HS-10 completely exposed the remnants of the structure's builders trenches and foundations, of which the former had been excavated into the undisturbed prairie subsoil (Figures 43, 44 and 45). Dark soil staining, presumably representing builders trench fill, was noted in irregular outline along the outer and inner faces of the foundation stone. The staining was not visible in some areas and complicated by rodent burrowing and previous excavation in other areas. In the two locations where the foundation was completely dismantled during the 1986 work, the base of the foundation lay at the bottom of the builders trenches or was separated from the bottom by a thin layer of fill or mixed fill and rubble.

For several sections of that foundation, the 1986 excavations represented the third exposure in recent years resulting from archeological investigation. During his 1967 research, Moore (1967) verified that HS-10 had indeed been a six-sided structure, exposing all six blockhouse corners, the entire 1/2 wall line, and portions of the other walls. Scott (1973, 1974) reexposed the corners of HS-10 in 1973 and opened additional segments of the foundation, particularly along wall 3/4.

Scott (1974:289-290) reported that only a single course of stone remained at the three southern corners of the blockhouse, corners 1, 5, and 6. There was no stone at the three northern corners, 2, 3, and 4, only a dark stained soil which delineated the outline of the wall (Scott 1974:289). He further indicated that the wall which faced true north was 19 ft in length from outside corner to outside corner, while the remaining walls were 21 1/2 ft in length. With regard to the latter set of unequal length measurements for the blockhouse walls, he indicated the following in his field notes.

> No reason for the discrepancy [in the wall lengths] is apparent, except for the possibility that the excavated corners are not the real corners. The corners in this [northern] area have been robbed leaving only the outline. In all probability, the wall is really this short.

The remainder of this section will focus upon information on the HS-10 foundations which was collected in 1986. These data are somewhat contradictory to that previously reported by Scott, undoubtedly due in part to the broader scope of the 1986 investigations at the site and a difference in methodology.

Corners 1, 2, 5, and 6 were found to be well defined by an intact lowermost course of foundation stone (Figures 46-49). One block of sandstone remained near corner 3, but its orientation appeared to be askew for an in situ corner stone at that location. In addition, that stone lay immediately adjacent to the complex section of wall 3/4 which spanned the underground passageway and appeared to have been affected by settling (Figures 27 and 50). No stone remained at corner 4, and the faint irregular soil stain in that area which presumably represented builders trench fill did not align with either the inside or outside edges of the remaining stone along the two adjacent walls (Figure 51). In order to obtain measurements of the lengths of the walls adjacent to the latter two ambiguous corners, the positions of those corners were projected on-site by the intersection of lines defined by existing corner stones and the outside edges of the remaining foundation stone in each wall. The measurements thus obtained for the walls of HS-10, from outside corner to outside corner, are indicated in Figure 27 and are listed below:

| | | |
|---|---|---|
| Wall | 1/2 | 21 ft 5 1/2 in |
| | 2/3 | 21 ft 3 3/4 in |
| | 3/4 | 21 ft 7 in |
| | 4/5 | 21 ft 4 in |
| | 5/6 | 21 ft 1 3/4 in |
| | 6/1 | 21 ft 7 1/2 in |

The diameter of HS-10 was roughly 42 1/2 ft from outside corner to outside corner. The diameter of the building from inside corner to inside corner was roughly 37 ft. From exterior wall to exterior wall HS-10 was

36 1/2 to 37 ft in diameter, and from interior wall to interior wall, it was slightly over 32 ft in diameter.

The remaining foundation of HS-10 was generally 2 ft 2 - 3 in wide, although measurements as large as 2 ft 6 - 8 in were obtained along walls 1/2 and 2/3. Stone in the foundation was also generally two courses wide.

All of the rock rubble in the HS-10 wall lines was removed during the 1986 excavations in order to expose the remaining intact stone. Much if not all of that rubble was undoubtedly a result of the natural decomposition of stone in the foundation and crushing by subsequent vehicle traffic over the site. However, it is also possible that some of the original construction material for the foundation was in fact rubble.

Although robbing of even the lowest course of stone in the blockhouse foundation had occurred in some areas, a surprising amount was still in place (Figures 43, 46-52). The lowest course of stone, composed primarily of medium to large sandstone blocks, was still present in its entirety along walls 1/2, 6/1, 5/6, and the portion of wall 2/3 south of the probable HS-10 doorway. The lowest course was partially present along the other walls. A large limestone slab also appeared to be incorporated into that portion of the first wall course which spanned the underground passageway. Segments of the second course of foundation stone were present along all walls except wall 4/5. These were composed of small to large sandstone and small to medium-sized limestone blocks. Small sections of the third course were still present along walls 2/3, 5/6, and 6/1, composed of medium-sized blocks of sandstone and a small quantity of limestone.

The longest and best-preserved section contained three courses of stone and lay along the middle of wall 5/6. The lower two courses in this area were poorly defined and composed of irregularly shaped sandstone blocks. By contrast, the stone in the third course was more uniform in size and shape and had been placed in a well-defined layer, as would be expected at and above the historic ground surface. While most of the stone in all three courses of the 5/6 wall could be described as roughly dressed, there was clearly a difference in the treatment of the different courses with regard to the selection of stone for inclusion and placement. The top of the third course lay 20 cm below E1, the same depth as the top of undisturbed subsoil in the former building interior immediately adjacent to the stone. The bottom of the lowest course of stone lay 60 cm below E1. Consequently, it appeared that the foundation along this segment of wall 5/6 extended 40 cm below the historic ground surface.

In contrast, the subsurface foundation along wall 3/4 immediately adjacent to the subterranean passageway appears to have consisted of a single course of stone. The wall remains at this location included a broken loophole stone mortared to a large sandstone block. The latter formed part of the lowest course of stone in this wall line. The entire exterior surface of the loophole stone had been whitewashed but there was no trace of whitewash on the sandstone block. This suggests that the sandstone originally lay beneath the ground surface while the loophole stone was exposed above the ground surface. Unfortunately, those stones were not in their original vertical positions when exposed in 1986 due to the settling of wall 3/4 over and immediately adjacent to the passageway.

Depth measurements taken to the top of the first course of stone around the foundation varied from 29 - 53 cm below E1 (24 cm range). Walls 3/4, 4/5, and 5/6 were the highest in this regard, averaging approximately 32 cm below E1. Walls 1/2, 2/3, and 6/1 were somewhat lower, averaging 48-49 cm below E1. Segments of the foundation on opposing sides of HS-10 were completely dismantled at Stratigraphic Test 1 along wall 5/6 and south of the probable doorway along wall 2/3 (Figure 27). The bases of the lowest courses of stone in both locations lay at similar depths, 58-60 cm below E1.

The sandstone used in the construction of HS-10 undoubtedly came from a military-era quarry which has been identified 2.6 mi east of Fort Larned (see O'Bright, Architectural Data, this volume). The sandstone quarried at that location is part of the Dakota Formation. Two limestone samples recovered from the blockhouse foundation were submitted by Resources Management Specialist Elmore to the Kansas Geological Survey for identification and information on possible quarry sources (Grisafe 1986a, 1986b). However, the samples proved not comparable to any known source, outcrop, or quarry. Assuming that the material was obtained in the general vicinity of Fort Larned, two likely possibilities were identified. These were the Lincoln Limestone Member of the Greenhorn Formation or a granular calcite bed in the Pfeiffer Shale Member of the Greenhorn Formation.

No mortar was observed between blocks in that segment of the foundation which was completely dismantled south of the probable doorway along wall 2/3. However, the broken sandstone loophole block was mortared in place within the remains of wall 3/4 near the subterranean passageway or tunnel. This stone had been positioned too low in the wall to have actually functioned as a loophole, and instead probably represented rejectage which was incorporated elsewhere as a regular wall stone. In addition, mortar was observed between the second and third courses of stone in wall 5/6. Small quantities of very fine sand mortar were also exposed in an area of rock rubble immediately outside wall 1/2 which was designated F29. That feature probably represented rubble from the collapse or dismantlement of the wall. Because of the large size of some of the mortar fragments and the amount of surface area to which whitewash was applied, the variety of mortar from F29 and other proveniences at the site may possibly have been that used to fill the lower tier of loopholes around the blockhouse (Appendix F).

A detailed compositional analysis of four mortar samples collected at HS-10 was undertaken by the North Atlantic Historic Preservation Center, National Park Service, Boston for purposes of the reconstruction of HS-10 (Appendix G). Sample MO1 was recovered from an in situ position in the remains of the blockhouse foundation near corner 3. Sample MO2 was collected from a layer of sandstone rubble identified outside wall 5/6 in Stratigraphic Test 1 which has subsequently been interpreted as debris from the demolition of HS-10. The context for sample MO1 permits that mortar to be linked with HS-10 with a high degree of confidence. Because samples MO1 and MO2 contained similar ingredients which had been mixed in the same relative amounts, the applications represented by the two samples may have been contemporaneous (Appendix G).

In summary, the remains of the HS-10 foundation were completely exposed during the 1986 archeological investigations of the blockhouse. The building was six sided, and the measurements obtained for the lengths of its walls ranged from 21 ft 1 3/4 in for wall 5/6 to 21 ft 7 1/2 in for wall 6/1. Portions of up to three courses of stone were intact along the walls, composed of sandstone and limestone blocks. The stone was generally laid two courses wide with the resulting foundation 2 ft 2 - 3 in wide, although width measurements as large as 2 ft 6 - 8 in were also obtained. The foundation was set into a builders trench excavated below the historic ground surface by as much as 40 cm (nearly 16 in). The subsurface foundation of the building appears to have been rather casually constructed with rock of irregular size and shape placed into poorly defined courses. Both archeological evidence and historic photographs of HS-10 show that greater care was exercised in the construction of the walls at and above the ground surface. In that respect the stone was more uniformly dressed and placed into well-defined courses.

The Exterior Entrance to HS-10

Several historic documents provide clues to the nature and location of the exterior entrance to HS-10, information which may be compared to inferences drawn from the 1986 archeological data. First, a description of the blockhouse in 1866 indicated that double entrance doors covered an opening 5 ft 2 in wide (see Cockrell, History and Significance, this volume). An illustration of the front of the building (Figure 3) which accompanied the latter description further indicated that the doorway was located slightly off center in one wall, but there was no information concerning which wall that actually was. The historical accuracy of this particular source is questionable, as a plan of the blockhouse (Figure 3) included with the front elevation of the building incorrectly illustrated seven exterior walls.

Additionally, an 1867 sketch of Fort Larned by Ado Hunnius (Figure 5) illustrates the exterior doorway to the blockhouse facing the parade ground. The only two walls of the blockhouse which would have faced the parade were walls 1/2 and 2/3, and the doorway depicted in the Hunnius drawing appears to stand in the latter.

The blockhouse was also illustrated in an 1887 drawing of Fort Larned Ranch (Figure 10), the commercial operation established at the site of the fort following its military deauthorization and sale. While the historical accuracy of this latter drawing may be questionable (see Cockrell, History and Significance, this volume), the doorway to HS-10 appears to be illustrated in the same wall as that in the Hunnius sketch. Unfortunately, no historic photographs of either walls 1/2 or 2/3 are known to exist. However, photos of all remaining blockhouse walls confirm that the door was not located in any of them.

An early NPS planning document for the HS-10 reconstruction (Wagner 1976:24) speculates that both the guardroom addition to the blockhouse and the exterior blockhouse entrance may have been located along the same wall. An 1873 plan of Fort Larned (Figure 7) illustrates the guardroom addition along what would have been wall 1/2. However, archeological data collected during the 1986 investigations suggest that the doorway in fact lay along wall 2/3, consistent

with the 1867 Hunnius and the 1887 Fort Larned Ranch illustrations. Archeological evidence for the exterior entrance to HS-10 included a gap in the intact foundation stone along wall 2/3 together with a concentration of artifacts just outside and southwest of the gap which appears to have been a small farm-era dump.

The remains of wall 2/3 were first exposed 28 - 45 cm below E1 (Figure 53). They included a linear soil stain similar to that observed along the other wall lines which was interpreted as fill in the builders trench for the HS-10 foundation, as well as large sandstone rocks and rubble confined largely within the limits of the stain. The quantity of rubble decreased toward the north end of the wall line. The builders trench stain was continuous along the middle of the 2/3 wall line and included the section which ultimately proved to be free of large intact foundation stones.

A block exposure consisting of X 3, X4, X 6, and X7 was opened along the middle of wall 2/3 to uncover features which might relate to the building entrance. Upon completion of that excavation and removal of the wall rubble, a 5-ft wide gap remained in the large intact foundation stones. Most of the gap was offset to the north of the center of the wall (Figures 27 and 54), the direction of the offset the same as that illustrated in the 1866 drawing of the front of the blockhouse (Figure 3). While this gap was not the only one found in the HS-10 foundation, it clearly matches the general location of the doorway as indicated in two historic illustrations.

The intact stone on either side of the doorway appeared to be similar to that exposed along the other exterior walls of the blockhouse. A great deal of rubble covered the intact stone along the south portion of wall 2/3, undoubtedly reflecting vehicle traffic over the site. However, this condition was not unique to wall 2/3 and was in fact observed along the top sections of the other wall lines.

The presence of soil staining, presumably representing fill in a builders trench, was observed higher in the general fill than the tops of most of the remaining intact stones in wall 2/3. This would seem to confirm that the latter stones were originally placed below the historic ground surface as part of a foundation for the building. Evidence of a subsurface foundation for HS-10 was also observed elsewhere along walls 3/4 and 5/6. A sill stone may originally have been positioned in the gap in the 2/3 wall line but was subsequently removed. Such a sill would also have been laid into the builders trench with its upper face approximately flush with the historic ground surface.

A small dump dating to the subsequent farm period was identified immediately outside and southwest of the doorway. The trash deposit contained a mixture of military and farm-era artifacts in a hard blocky soil layer which lay between the overlying sod layer and undisturbed subsoil (Figures 27, 55-56). The quantity of both the artifacts and scattered pieces of small sandstone rubble increased with depth to the base of the blocky soil layer at its contact with the subsoil. Most of the artifacts were concentrated in a 3-cm thick layer at the latter contact.

In addition to sandstone rubble, a variety of building materials was recovered from the deposit (HS10-X4-2, HS10-X6-1, HS10-X7-1). Some of those materials may be associated with the construction, modification, or actual use of HS-10, while other

materials, particularly the numerous fragments of flat glass, do not so relate. Construction materials in the trash deposit included fragments of plaster, mortar, concrete, and brick, fragments of caulking or window putty, pieces of tarpaper, and both cut and wire nails.

Fragments of flat glass (n = 646) recovered from the deposit presumably represent broken window panes. Variation in the thickness of the fragments was analyzed for information regarding the time period during which the window panes may have been installed, regardless of the particular building(s) involved. While the specific results of that analysis are discussed in Appendix E, it may be concluded that the glass probably dates to the military period at Fort Larned.

Additional debris recovered from the trash deposit included coal fragments, curved glass fragments, whiteware sherds, mussel shell, bone, and several metal objects including a single early style general service uniform button (#129). There is disagreement as to the exact period during which this style of button was officially issued by the U.S. Army. Brinckerhoff (1972:5) has indicated that the period of issue was from 1855 to 1884, while Wyckoff (1984:88-89) has dated the style from circa 1847 to circa 1880.

The artifact deposit lay primarily in a shallow irregular basin which extended to a depth of 71 cm below E1 in the southwest corner of X7. The excavated portion of the basin measured a maximum of roughly 2.5 m across. The northeast boundary of the basin was fairly straight and steep and was actually undercut in one small area. The south boundary was irregular and sloped gradually upward. As mentioned previously, a few fragments of tarpaper were found in the basin fill. Given the association that has been established at the site between the presence of tarpaper and archeological units excavated in 1967, it is possible that the steep northeast edge of the basin is a product of previous excavation. However, no other evidence of an excavation unit was observed in this area.

Feature 20 appeared to be a relatively deep circular post hole from which the post had been removed (Figures 27 and 55). The feature was 25 cm in diameter and had straight sides and a flat bottom which lay 104 cm below E1. Horizontally, the feature was located at the edge of the basin which contained the concentration of mixed artifacts. In cross section at the west wall of X4 (Figure 55), F20 lay stratigraphically beneath the basin, the artifactual material in the basin therefore appearing to have been deposited after the probable post hole was filled. Behind (west of) the profile at the west wall of X4, there was a slight indication that F20 fill may have extended up into the basin, but this was uncertain because of animal disturbance. The function and dating of the post which would have stood at F20 are unknown.

A dump at this location, immediately outside the doorway to HS-10 and dating to the farm era, is entirely consistent with inferences by Perttula and Shaw (1980:91-92) concerning patterns of refuse disposal during the farm and military periods. The military-period pattern would have been characterized by trash disposal in areas outside the main fort compound and in privies. Few military artifacts may be expected archeologically in the military habitation and work areas because of the systematic policing of trash from those areas and discard elsewhere. By contrast, farm-period trash disposal

occurred in closer proximity to the locations where items were broken, etc. Disposal outside the entryways to buildings (e.g., Perttula and Shaw 1980:91; South 1977) would be one example of the latter type of disposal. However, it is anomalous that the dump contained so much flat glass, given the assumption that the glass represents architectural debris from structures other than HS-10.

In summary, there is archeological evidence to suggest that the exterior doorway to HS-10 stood in the north end of the 2/3 wall, a location which matches that indicated in two historic documents.

The Cellar

The 1866 plan of Fort Larned included a brief written description of the blockhouse which indicated that the structure had a partial cellar which measured 14 ft 6 in x 13 ft and was 6 ft deep (see Cockrell, History and Significance, this volume). That document also indicated that the cellar was covered with 2-in thick pine flooring. A well was reported to lie 14 ft outside the blockhouse, accessed via a covered passage leading from the cellar. The passageway to the wellhouse was described as 6 ft deep, 3 ft 6 in wide, and lined with 2-in thick pine boards.

The cellar cavity was completely excavated during the 1986 investigations at HS-10 and the remains of a number of wooden and other architectural features of the cellar were also exposed and examined. Far more was ultimately learned about the cellar than was anticipated prior to the start of fieldwork simply because of the large number of cellar features which were found intact. While certain details remain unknown, the understanding of cellar construction acquired as a result of the project has subsequently enabled an accurate reconstruction of the major structural elements of that room.

The original wooden features in the cellar, already in various stages of decomposition in the ground, began to deteriorate rapidly upon exposure to the open air during the 1986 excavations. As agreed prior to the start of fieldwork, no attempt was made to preserve these features in situ, and only a sample of the wood in each was collected for use in determining the tree species represented.

The blockhouse cellar lay beneath the north half of the building (Figure 27). Fan shaped in plan view, it had two long walls oriented at roughly a right angle to each other which converged at the central roof-supporting post. Its three remaining walls lay toward the perimeter of HS-10. The blockhouse center post originally extended down into the south corner of the cellar, and the passageway to the wellhouse led from the northwest corner of the cellar. The numerical designations for the cellar walls assigned during the 1986 fieldwork are indicated in Figure 27.

The earthen cellar cavity measured roughly 14 ft (wall 1 to wall 4) x 13 ft (wall 3 to wall 5), dimensions which are very similar to those reported in 1866. The depth of the cellar as determined from the 1986 archeological data may be calculated relative to either the dirt floor of the blockhouse or the projected wooden ceiling which extended over the cellar, the latter being slightly lower than the former. First, the difference in elevation between the earthen floor of

HS-10 and the earthen floor of the cellar was approximately 6 - 6 1/2 ft, a measurement consistent with the depth of 6 ft reported in the 1866 plan of Fort Larned. Second, while several wooden floor joists remained in place over the top of the cellar, the actual floor planking described in 1866 had been removed in its entirety. As a consequence, the original structure of the floor above the level of the joists is unknown. Based upon the assumption that the planking was originally laid directly atop the joists, the depth of the cellar calculated relative to the top surfaces of the joists as they were positioned in 1986 ranged from approximately 5 ft to 5 ft 4 in.

Two matters which clearly bear upon these data include the nature of the flooring which was originally installed over the joists and the relationship between the archeologically documented joist positions and their presumed original positions. These matters will be addressed in the discussion of the problem statement of military-era grade within HS-10.

A wooden framework of posts and horizontal braces had been constructed within the cellar cavity to support the wooden floor over the cellar and to hold a facing of wooden planks against the earthen cellar walls. The floor joists over the top of the cellar radiated outward from the area of the center post in the south corner of the cellar (Figure 27), a fan pattern paralleled at the bottom of the cellar by several wooden braces which lay in a network of shallow trenches excavated below the level of the earthen cellar floor (Figure 34). A short flight of wooden stairs in the northeast corner of the cellar was apparently accessed from the ground floor of HS-10 via a hatch in the wooden floor. In addition, a wooden floor was found to have covered at least a portion of the earthen cellar floor (Figure 32). This latter construction appeared to have largely floated on a thin bed of fill without significant attachment to other wooden features.

Much of the cellar construction was accomplished either completely without or with only limited use of nails for attachment purposes. Notable exceptions to this situation included the liberal use of nails to double several wooden members in the cellar and to construct the wooden floor at the bottom of the cellar. Of course, many nails were undoubtedly pulled along with much of the wood itself during the removal of such materials as the wooden planking over the cellar.

The lumber used for the wooden features which remained in the cellar all appeared originally to have been either 1-in or 2-in thick stock. Board widths were found to range from 4 in .to approximately 20 in. Most notably, several wooden members were constructed by nailing together two individual boards, each of which probably originally measured 2 in x 6 in. It should be noted that the dimensions reported in the following discussion of individual cellar features represent the actual measurements made during the fieldwork. Wood shrinkage probably resulted in a slight decrease in certain of the original dimensions over time, while the warping and splitting of some of the wood probably resulted in a few measurements which are actually greater than the original dimensions. Of course, some of the lumber may also have been cut to dimensions which were other than standard sizes.

Seventeen wood samples from features in the cellar were submitted to the Forest Products Laboratory, U.S. Department of Agriculture and in each case were identified as pine of the white pine group

(Christensen 1986a). Christensen indicated that several species of white pine are native to the United States. However, she suggested that the most likely of those species in this particular instance is eastern white pine (*Pinus strobus*) based upon factors which include tree size, volume of wood available, and closest geographical proximity of wood sources to the study area.

Within the United States, *Pinus strobus* is native to the Great Lakes region, the Northeast, and the Appalachians (Little 1971:Maps 73-N, 73-E). The volume of commercial eastern white pine lumber production varied within and between those regions over time, but records indicate that the states of Wisconsin, Pennsylvania, and New York led production in 1869, just four years after the completion of the blockhouse (Betts 1954:5). The actual source area for the HS-10 lumber remains unknown.

Eastern white pine has a number of characteristics including a uniform texture and a straight grain which make it particularly desirable for building construction. It is also subject to only minimal shrinkage during the drying process and is generally easy to work. The longitudinal shrinkage of white pine, or shrinkage along its wood grain, is comparable to that of other wood species, 0.1 percent - 0.2 percent from a green to oven-dried condition (Forest Products Laboratory 1974:3-7). A 5-ft length of white pine would therefore be expected to shrink up to 0.12 inch in length. The amount of radial shrinkage, across the annual growth rings, and tangential shrinkage, in the direction of the annual growth rings, varies between individual tree species. Eastern white pine has an extremely low percentage of radial and tangential shrinkage compared to other woods, with a maximum of 2.1 percent in the former and 6.1 percent in the latter direction (Forest Products Laboratory 1974:3-9). In the case of the lumber used in the construction of HS-10, the amount of shrinkage which may have occurred in those wooden features between the date of their construction and their exposure in 1986 would necessarily have been even less than that indicated above because of the time lag between the cutting of the timber and its arrival at Fort Larned.

By today's standards the lumber from the old growth forests, which would have been used in the HS-10 construction, was of superior quality largely because of its small number and size of knots that would have affected both the wood's strength and appearance (Betts 1954:3-4, 6; Forest Products Laboratory 1940:29, 1974:1-16, 4-26, 4-27, 6-3). Indeed, it was observed during the 1986 investigations that the wood used in the cellar construction was largely knot-free.

Wooden Features in the Cellar

Boards Supporting the South Ends of the Primary Joists. Two boards had been placed vertically along the northeast and northwest sides of the center post within the cellar (Figure 27). These functioned as supports for the south ends of the three primary floor joists over the cellar and stood approximately 5 ft tall from slightly below the level of the earthen cellar floor to the bottoms of the joists. The east board was 1 1/2 in thick and 16 in wide, while the west board measured 1 3/4 in x 16 in. The east board was butted against the east end of the southwest-facing surface of the west board, probably at a right angle. Transit plotting of the boards at 85 cm below E1 indicated an angle of 72 - 73 degrees between them. However, their angle was approximately 90 degrees when measured on a photograph of the center post area

taken at 220 cm below E1 and slightly below the level of the earthen cellar floor (Figure 28). Together, the boards would have screened the center post from view within the cellar. A sample of the east board was identified as white pine (sample #14).

The primary joists rested on and extended a short distance over the top of these two boards. Four wooden braces laid into builders trenches below the cellar's earthen floor extended beneath the two boards by distances which ranged from approximately 10 - 20 cm, the braces probably originally butting against the base of the center post. The positions for the joists and braces suggest that the center post originally stood slightly back from the interior surfaces of the two boards. However, two complete 20d (4 in) cut nails were recovered which had been driven through the boards, presumably into the center post (HS10-C-33).

Floor Joists over the Cellar. Three primary floor joists over the cellar, designated J1, J2, and J3, radiated from the center post to the outer cellar corners. In addition, a secondary joist (J4) originally ran from cellar wall 3 to a position midway along the east side of J3, where it had apparently been toenailed to that joist (Figures 27 and 57). However, J4 had broken away from J3 and dropped several cm. The north ends of the primary joists were still in place atop support posts, while their south ends were still supported by the vertical boards in front of the center post. No support post was found beneath the north end of J4 and it is unclear whether one ever existed, for the north end of J4 itself had rotted away leaving no clue as to what originally supported it. It is possible that J4 was toenailed directly to the wooden planking along cellar wall 3 and was never supported from below.

All of the floor joists were in a deteriorated condition when they were exposed in 1986. The plan view alignment of J1 was also notably bent, a condition probably attributable to post-burial shifting in its position. As a result, J1 was not aligned with the remains of a post (F23) which appeared to have originally provided additional support for that member.

All of the floor joists were constructed of doubled white pine boards, each of which originally measured about 2 in x 6 in (wood samples #2-#5 for J1-J4). The actual measurements obtained for these boards ranged from 1 1/2 - 1 3/4 inches in thickness and 6 - 6 1/2 inches in width. Each pair of boards was held together with 20d (4 in) common cut nails driven into both sides of the joists at irregular intervals. The joists were then positioned with the 6-in wide surfaces facing to the sides. It is assumed that wooden floor planking originally lay atop the joists but had been removed to facilitate the backfilling of the cellar cavity. Two 10d (3 in) common cut nails pulled from the top surfaces of J1 and J2 (HS10-NWQ-5, HS10-NWQ-6) may have been used to attach floor planking to the joists.

The south ends of the primary joists rested on vertical support boards with no notching or other visible modification to either the joists or supports at those joints. In contrast, the north ends of the joists and/or the north support posts were notched at their points of juncture. However, each of these north junctures was constructed somewhat differently. Both the north end of J1 and the support post beneath it had apparently been notched (Figure 58). While the upper notched end section of J1 still lay atop the post, the adjacent section of the joist which would

have included the lower part of the notch was missing and appeared to have rotted away. The intact end piece of J1 still retained three 20d common cut nails. One of those had been driven into the joist from the west and apparently functioned as a doubler or lamination nail, while two nails of uncertain function had been driven into the top of the joist. The joist had not been notched deeply enough along its length to allow the joist to extend completely to the cellar wall. A gap of 2 in therefore separated the end of the joist and the wooden cellar wall planking.

The post beneath J1 was constructed of two 2-in x 6-in boards. The westernmost board in the post was notched at the top to mate with the matching notch in the joist. While the upper end of the east board had been partially chewed by rodents, it did not appear to have been similarly notched. Instead, it appeared to have been chopped off rather roughly with an ax or hatchet at the same approximate level as the bottom of the notch in the west board. The carpentry of the juncture of J1 and its north support post therefore appeared to have been executed rather crudely.

The juncture of J2 and its north support post had also been disturbed by rodent activity. However, it was apparent that the support post for J2 was notched while the joist itself was not (Figure 59). The bottom of J2 simply rested in the notch in the post so that the upper surfaces of the two features were flush with each other.

The upper portion of J3 along most of its north half had been cut off during the prior excavation of an archeological unit which had been lined with tarpaper prior to backfilling. However, the north end of J3 was still intact and in fact represented the best preserved of the north joist/post junctures. Both J3 and its northern support post had been notched (Figure 60). However, rather than resting the bottom of the joist within the notch in the post, the notched surface of J3, which was only 1 1/2 in long, rested in the notch in the post. The notched surface thus became load-bearing. In addition, the two halves of the support post had been notched at different depths (2 in and 3 1/2 in below the top of the post). The joist itself was notched so deeply that it was probably susceptible to splitting along its length, particularly since the notched surface was load-bearing. The resulting floor support system thus would not have been very strong. Only two nails secured the notched end of J3 to the post, and overall this joist juncture appeared to reflect poor design and workmanship.

The secondary J4 joist originally extended at a right angle out from cellar wall 3 and parallel to wall 4. The rectangular space thus created in the northeast corner of the floor support system appears to have served as the location of a trap door opening into the cellar, for the remnants of a short flight of stairs into the cellar were exposed beneath that opening. In fact, the west stringer for the stairs originally lay flush against the east face of J4. Unfortunately, the north end of J4 had completely rotted away and little may be said about its appearance. The two boards used in the construction of J4 were cut at different lengths as part of the framing for a hatch opening. It is estimated that the westernmost board of J4 would have extended 8 ft in length from cellar wall 3 to J3. The east board of J4 would have extended 6 ft in length from cellar wall 3 to a position which probably represented the end of the hatch opening into the cellar. Two bent nails protruded from the west board immediately beyond the end of the east board, suggesting

that additional structural elements of the floor support/hatch system had been pulled.

The south end of the west board of J4 had been cut at an angle and was originally toenailed to the east side of J3. Two cut nails protruded from J3 at the presumed original point of juncture. However, these had been driven from west to east toward J4, in the opposite direction of that which would have been appropriate for toenailing, producing a very weak connection between the two features. Not surprisingly, J4 had broken away from J3.

North Support Posts for the Primary Joists. Support posts were positioned beneath the north ends of the primary joists. In addition to providing support for the joists, these posts also functioned to hold wooden planking against the north earthen cellar walls (walls 1-3). The wooden wall planking was stacked horizontally on edge behind the posts, and it appeared that this design simply relied upon the pressure of backfilled soil to hold the planking in position because no nails secured it to the posts (Figure 13). Because of the pressure thus also applied to the backs of the posts, a means of anchoring the post bases was clearly needed. This was provided by three additional wooden braces which butted against the front bases of the posts and against the base of the HS-10 center post. The braces were laid in builders trenches which had been excavated across the earthen cellar floor. The brace designated Nailer 4 (N4) was butted against the base of the post below J1. Nailer 1 (N1) functioned similarly for the post beneath J2, Nailer 2 (N2) for the post beneath J3. No nails were found which attached these braces to the posts, and in fact, the field designation of nailer ultimately proved to be a misnomer for the wooden flooring installed over these features actually floated in place atop a shallow bed of soil with little or no attachment to N1, N2, or N4.

The post beneath J1 was positioned at the southwest end of cellar wall 1, angled slightly to face toward the center post in order to permit J1 to rest squarely atop it. The posts beneath J2 and J3 were positioned at the corners defined by the intersections of cellar walls 1/2 and 2/3. In contrast to the post beneath J1, the back sides of the two posts beneath J2 and J3 appeared to have been cut or beveled to fit the corner angles.

The three posts were each constructed of two pieces of lumber joined together with 20d (4 in) cut nails. Wood samples collected from the posts beneath J2 (sample #16) and J3 (sample #17) have now been identified as white pine. The lumber used in the construction of the posts consistently measured 1 3/4 inches in thickness. However, their width measurements varied from 4 1/2 in to 6 in. Taking into consideration both wood shrinkage and possible variation in the original cut dimensions of the lumber, the posts were probably constructed from lumber which was roughly 2 in x 6 in. The doubled posts would then have measured 4 in x 6 in prior to beveling and other modifications.

As mentioned previously, the westernmost board used in the construction of the post beneath J1 was notched at the top while the east board appeared to have been chopped off with an ax or hatchet at the same approximate level as the bottom of the notch in the west board. The posts beneath J2 and J3 were also notched. However, the depth of the notching below the top of the post was different in each case: 2 in deep in the post at J1, 6 in deep in the post at J2, and 2 in and 3

1/2 in deep in the two halves of the post at J3. The upper ends of the posts beneath J1 and J2 appeared to have been partially chewed by small animals, as was the base of the post beneath J2.

Post at the Intersection of Cellar Walls 3 and 4. The badly deteriorated base of a vertical board was exposed at the intersection of cellar walls 3 and 4 immediately east of the east stringer for the stairs. While the entire upper section of this member was missing, it may originally have extended to the top of the cellar so that its northwest face would have been flush against the southeast face of the east stair stringer. The base of the board measured 1 1/2 inches in thickness and 6 1/2 inches in width. Its wide sides faced the east stringer and cellar wall 4, while its narrow northeast edge butted against the wooden planking along cellar wall 3. A sample of the board was identified as white pine (sample #13).

This board may originally have served two basic functions in the cellar construction which were comparable to those of the posts standing beneath the north ends of the primary joists. However, while the structural functions of these features may have been similar, they took slightly different forms. The post at the 3/4 cellar corner consisted of a single piece of lumber, while the other three support posts for the primary joists were each constructed of two boards doubled together with nails.

It appears that this element may have served to hold wooden planking against cellar walls 3 and 4. The stairs in turn would have held the board in place vertically against the wooden planking which is assumed to have been originally present along wall 4. Nailer 7 (N7) apparently served to hold the base of the vertical board in place against the planking along wall 3 (Figure 34). The other end of N7 originally butted against the base of the center post. Nailer 7 thus served as a brace between the vertical board and the center post in a manner similar to that previously described for N1, N2, and N4. The base of the vertical board and N7 had been set into a builders trench excavated along the base of wall 4. While the northeast end of N7 appeared to have originally butted against the base of the vertical board, that end of N7 was severely rotted and disturbed by animal activity. As a result, an 11-cm wide gap separated the board from solid wood in N7.

While a floor joist was not found which would have extended over the cellar parallel to and above N7, such a joist undoubtedly originally existed and was in part supported by the vertical corner board. Evidence to support this contention is provided by F38, the remains of a post which originally stood on N7 partway along its length. This feature has been interpreted as a secondary support post for a joist in the alignment described above, in large part because of its similarity to other posts identified elsewhere in the cellar. Feature 23, a post which rested on N4, probably provided additional support for J1 midway along the length of that feature. Feature 24, a post which originally rested on N2, apparently served as support for the juncture of J3 and J4.

Braces at the Cellar Floor. The four vertical posts at the outer corners of the cellar were held in position by four wooden braces laid into builders trenches across the earthen cellar floor (Figure 34). The braces appeared to have originally butted against the base of the center post, radiating outward to the bases of

the four posts. The braces extended beneath the two boards around the north sides of the center post a distance of approximately 10 - 20 cm, probably to the center post itself (Figure 61). When initially exposed in the field, these braces were each assigned a nailer designation. Thus from west to east, Nailer 4 (N4) butted against the post below the north end of J1; Nailer 1 (N1) butted against the post below the north end of J2; Nailer 2 (N2) butted against the post below the north end of J3; and Nailer 7 (N7) was originally butted against the post positioned at the corner defined by the intersection of cellar walls 3 and 4. Nailers 1, 2, and 4 were thus nearly 5 ft below and parallel to the floor joists J1, J2, and J3 over the top of the cellar. A sample of the wood in N4 (sample #27) proved to be white pine.

Nailers 1, 2, and 4 were each constructed of two boards nailed together. These doubled braces had then been placed on edge in the trenches so that their lamination nails were oriented horizontally. When these features were uncovered in 1986, many of the lamination nails were exposed at or near the top of the remaining solid wood, the upper portion of the nailers having rotted away.

The individual boards used in the construction of N1, N2, and N4 were 1 3/4 inches in thickness, with the result that the top and bottom surfaces of the double braces measured 3 1/2 in across. Because the upper portion of each feature had rotted away, only the lower 4 in of wood remained as measured from the base of each board to the exposed lamination nails. The boards may originally have measured 6 inches in width, the same width as the lumber used in other laminated features in the cellar. The builders trenches for those features were approximately 7 in deep and could easily have accommodated 6 in braces.

The nailers had been doubled with 20d (4 in) cut nails. Those in N1 had been driven into alternate sides of the brace at roughly 1, 2, or 3 ft intervals. Lamination nails had also been driven into both sides of N2 and N4, but not in the regular alternating pattern seen in N1. The spacing of nails in N2 and N4 was also not as regular as that in N1.

A single metal stake and three wooden ones were found driven into the soil immediately adjacent to the west sides of the braces, presumably to inhibit their lateral movement (Figure 34). These included a ferrous metal object tentatively identified as a brace fragment from a wagon bed (HS10-C-49) driven in along the west side of N1 approximately one-third of the distance from its south end. A wooden stake was found along the west side of N2 4 ft from the north end of that brace. Two other wooden stakes were driven in along the west side of N4 approximately one-third and two-thirds of the way along its length.

Nailer 7 had been laid into a trench along the base of cellar wall 4. While N7 also appeared to have functioned as a brace, it was constructed from a single board rather than from two boards nailed together. Nailer 7 measured 1 3/4 in x 6 in and had been placed on edge in the trench. In plan view, it had also been angled in the trench so that its northeast end lay toward the east side of the trench and its southwest end toward the west. It appeared as if the trench alignment was slightly skewed and the angling of N7 became necessary in order to butt its southwest end squarely against the center post. An

11-cm long section at the northeast end of N7 was badly rotted and also appeared to have been disturbed by small animal activities. A 25-cm long section at the southwest end of N7 was also badly deteriorated.

The base of the east stair stringer lay against the west side of N7. The area of contact between the two features appeared to have been disturbed by rodent activity. However, no nails were found in this area and it appears that the two features were not actually attached.

In addition to lamination nails, two other nails were driven into the top of N4. The N4 nails may originally have attached wooden subflooring to that brace. However, while both subflooring and decking remained in place over part of the cellar floor, no other nails were found driven into the tops of N1, N2, or N7. In any event, since only two such nails were found, the designation of N1, N2, N4, and N7 as nailers clearly does not accurately describe their primary function. Finally, posts interpreted as shoring for the floor joists over the cellar had also rested on these braces, F23 resting on N4, F24 on N2, and F38 on N7.

Sleepers in the Cellar. Three subflooring nailers or sleepers were exposed at the bottom of the cellar with floor boards still attached to them. These true nailers lay parallel to each other and angled across the south half of the cellar from northeast to southwest. From north to south (Figure 32), they were designated Nailer 3 (N3), Nailer 5 (N5), and Nailer 6 (N6). A thin layer of fill 1/4 - 1 1/4 inches in depth separated the sleepers from the earthen cellar floor. As noted previously, these sleepers and the decking attached to them largely floated on the fill without significant attachment to other features in the cellar, including the braces designated N1, N2, N4, and N7. As indicated previously, two nails were found driven into the top of N4 at distances of 9 in and 2 ft 10 1/2 in from the south end of the brace. These may originally have served to attach sleepers N5 and N6 to brace N4, but no other nails were found which may have served in similar capacities.

The boards used for N3, N5, and N6 were 1 1/4 in thick and 3 7/8 - 4 in wide and were laid flat, i.e., placed with wide faces up and down. Nailer 3 was the longest of the sleepers, extending from the base of cellar wall 5 to a position immediately northwest of the stairs. Nailers 5 and 6 extended from the base of cellar wall 5 to positions 6 in under the lowest tread in the stairs and behind (northeast of) the leading edge of the two stringers. A sample of the wood from N3 (sample #23) proved to be white pine.

Floor boards had been nailed to N3, N5, and N6 with their long dimensions perpendicular to cellar wall 4. The angle between the south edges of the sleepers and the east edges of the floor boards ranged between approximately 80 - 85 degrees. The decking was primarily attached to the sleepers with 8d (2 1/2 in) common cut nails. However, a single 16d (3 1/2 in) common cut nail was also recovered in a sample removed from the decking. These nails had been liberally used. In addition, nails still protruded 1 1/2 in above the top surfaces of the sleepers in areas which lacked decking, suggesting that some floor boards had been removed.

Decking in the Cellar. Several floor boards were still attached to sleepers N3, N5, and N6 in the south half of the cellar (Figures 32 and 62). The floor boards had been laid side by side from 6 in under the lowest tread of the stairs (3 ft 5 in from cellar wall 3) to within 2 in of the east vertical board adjacent to the center post. The extension of the decking beneath the lowest tread was coincident with the ends of N5 and N6. The boards were laid perpendicular to cellar wall 4, their cut ends aligned along its base. The other ends of the boards had been broken off at different lengths, the longest measuring roughly 5 ft in length. The boards were consistently 1 in thick but varied in width from approximately 8 - 12 in. They were primarily attached to the nailers with 8d (2 1/2 in) common cut nails (HS10-C-42). However, a single 16d (3 1/2 in) common cut nail was also recovered in a sample collected from the decking. When these nails were examined in the laboratory, wood fragments from both the decking and nailers were still adhering to them. Because those wooden features were oriented differently on the ground, the grain of the wood adhering to the nails was also oriented differently and therefore easily distinguishable. In addition, many of the nails were broken approximately 1/2 in below the juncture of the two feature types. It appears that the boards were nailed by an individual(s) with knowledge of basic carpentry techniques because the nails had been driven into the decking with the widest dimension of the nail point running cross-grain, a technique which helped to ensure that the wood did not split (Graham and Emery 1923:55, 58).

Measurements of the elevation of the top of the decking ranged between 205 and 213 cm below E1. The decking had been notched around two joist support posts which originally rested on the braces designated N2 (Feature 24) and N7 (Feature 38). These posts were 5 1/2 inches and 5 inches in diameter, respectively. A sample of the wood used for decking (sample #22) was identified as white pine.

As previously mentioned, probable decking attachment nails still protruded above the top surfaces of the sleepers in areas where no decking was present. This, together with the broken ends of some of the floor boards, suggests that the decking was originally more extensive than that found in 1986. However, the original extent of the decking is unknown. Because the entire wooden floor system in the cellar was largely unattached and floating on a shallow bed of soil, sections of that system could have been removed without leaving much evidence behind. However, since N3 ended at the stairs, decking probably never extended into that particular corner of the cellar.

Secondary Joist Support Posts. Features 23, 24, and 38 represented the remains of wooden posts in the cellar which appear to have supported the wooden floor over the cellar. The positions of the posts suggest that they may have been installed sometime after the initial cellar construction, perhaps when that floor began to sag. The three posts originally rested atop three braces which extended across the floor of the cellar, F23 on N4, F24 on N2, and F38 on N7 (Figure 34). At the time of the 1986 investigations, the lower sections of the posts were badly deteriorated but still identifiable within the cellar fill. The upper sections of the posts were completely gone but undoubtedly originally extended to the floor joists over the top of the cellar. The wood used in the construction of these features is unknown. If they do in fact represent a later

addition to the cellar, it is certainly possible that they were made of a wood other than white pine.

Feature 23 was found to extend from the top of N4 midway along its length at a depth of 224 cm below E1 to approximately 120 cm below E1, and probably originally extended to J1 above, providing additional support for that joist. Feature 23 measured 5 1/2 inches in diameter. At the time of the 1986 investigations, F23 stood close to but not directly under the warped alignment of J1.

The F24 post also measured 5 1/2 inches in diameter. It extended from the top of the wooden decking in the cellar 209 cm below E1 to 106 cm below E1 in the cellar fill. The area below this section of the decking was disturbed and no clear evidence of F24 itself was found below the decking. However, the floor boards had been notched to accommodate the post and N2 lay directly below the notch. It is therefore inferred that F24 originally rested on N2. The plan view positioning of F24 was almost exactly below the juncture of joists 3 and 4. As mentioned previously, J4 appeared originally to have been toenailed to the east side of J3. However, the toenails had been driven from west to east (from J3 into J4), making a weak connection between the two features. It is therefore not surprising that additional support may have been needed below this poorly constructed juncture.

Five cut nails and nail fragments were recovered from Features 23 and 24. Two cut nail fragments were recovered from F23 at 219 cm below E1 about 2 in above the base of the post (HS10-23-2). These may originally have served to attach the post to other wooden features at the cellar floor. In addition, a complete 10d (3 in) cut nail was recovered approximately 1 ft above the base of the F23 post (HS10-23-1). Cut nail fragments were recovered from F24 at 2 ft and 3 ft 7 1/4 in above the projected base of the feature, i.e., the top of N2 (HS10-C-8, HS10-24-1). The functions originally served by these other three nails are unknown.

The F38 post measured 5 inches in diameter and was positioned immediately adjacent to cellar wall 4. The feature was first identified in the cellar fill 107 cm below E1 and extended to a depth of 222 cm below E1. The latter position was immediately above N7 partway along the length of that brace. The feature originally extended below the wooden decking, which had been notched around the base of the post. While no joist was found above F38, such a member undoubtedly existed originally.

Cellar Wall Planking. The three outer walls of the cellar, walls 1-3, were still lined with wooden planking laid horizontally behind the four posts which supported the blockhouse floor joists (Figure 13). No nails were found which would have served to attach the wall boards to the posts and it therefore appears that the planking was held in place solely by the pressure of soil backfilled behind them. Four boards were used to cover each wall which ranged from 1 to 1 3/4 inches in thickness and from 10 to approximately 20 inches in width. All of the boards in each wall were cut to the same length and after their installation, the cut lengths of the boards defined the lengths of the walls themselves as follows: W1 - approximately 4 ft 10 in; W2 - 6 ft 6 in; W3 - 9 ft. Samples of wood used for the planking of walls 2 (sample #19) and 3 (sample #15) have been identified as white pine.

The top of the cellar wall planking was exposed at 49 - 57 cm below E1. At the base of the walls, both the joist support posts and the lowest course of wall planking rested in shallow trenches excavated below the level of the cellar's earthen floor. The posts rested in the north ends of the trenches which also contained wooden braces N1, N2, N4, and N7. These trenches were slightly deeper than the trenches along the bases of walls 1, 2, and 3 into which the wall boards had been set. As a result, the posts rested slightly deeper than the wall planking. For example, the base of the post beneath the north end of J3 rested 3 in lower than the lowest adjacent wall board.

In contrast, most of the planking was gone from cellar walls 4 and 5. A single possible wall board fragment remained in each case which was also oriented horizontally. Very little wood was observed in the cellar fill which could originally have been planking from these two walls and it therefore seems likely that this and other lumber from the cellar was scavenged for use elsewhere.

One possible wall board fragment was exposed in plan view along the top of wall 4 (Figure 27). Unfortunately, before this feature could be closely examined, the earthen wall behind the fragment collapsed into the cellar along with the fragment itself and the adjacent unexcavated balk of cellar fill. It is assumed that the planking along wall 4 was originally anchored on the northeast by the vertical board positioned at that corner of the cellar. On the southwest end, the planking would have run behind the east vertical board adjacent to the center post and was then undoubtedly anchored by the center post itself. Wall boards roughly 13 ft in length would have been required to span the entire length of wall 4. While an additional post (F38) was positioned against wall 4, it could not have helped to hold the wall planking in position because it was not braced at the base.

A horizontal plank fragment was also found along the top of cellar wall 5 near the western board adjacent to the center post (Figure 27). A builders trench along the base of the wall did not contain any wooden member although such may originally have been present (Figure 34). The builders trench was 5 - 5 1/2 in deep and aligned with the west builders trench in the tunnel and the toeboard which lay there. The two trenches were separated by a short undisturbed section of subsoil which sloped gradually down into the trench on the cellar side and dropped straight down into the trench on the tunnel side. There was a gap of 4 3/4 in between the end of the builders trench for the toeboard and the end of the toeboard itself. It is possible that a post originally stood in that gap to hold horizontal planking against wall 5. Alternatively, a post could have been positioned near the end of the builders trench along wall 5 itself. Such a post also undoubtedly supported the floor joist along the top of wall 5 which was missing in 1986. Unfortunately, no indication was found of the transition from horizontal planking along wall 5 to vertical planking in the tunnel. As suggested for the planking along wall 4, that along wall 5 was probably anchored at the other end by the center post.

Since only a single fragment of what is presumed to be a horizontal wall board was recovered along cellar wall 5, the possibility was considered that vertical planking stood along this wall. If such had been the case,

vertical planking would have run continuously along wall 5 and into the tunnel without the need for a transition between the two wall treatments.

If the planking along wall 5 was vertical, its support system at the floor level may have been similar to that observed in the tunnel. A board in the builders trench at the base of the wall would necessarily have functioned as a toeboard. In order to secure the toeboard itself, a brace would have been laid across the cellar floor which would have functioned in a manner similar to that of the braces in the floor of the tunnel. However, neither a brace nor a trench for such a brace was found. Further, the subsoil between the two builders trenches would have prevented the use of a brace in the tunnel to stabilize a toeboard along wall 5. The possibility of vertical planking over cellar wall 4 was also considered and rejected because N7 was not braced to serve as a toeboard.

Stair-related Features. Entry into the HS-10 cellar was made via a stairway in the northeast cellar corner. The remains of a set of wooden stairs in that corner included the two stringers angling from the cellar floor to the top of cellar wall 3, remnants of several ledgers still attached to the stringers, a single tread or step, a possible hatch stop, and a small board remnant of unknown function (Figure 63). The two stringers stood parallel to each other and 2 ft 6 - 6 1/2 in apart (inside dimensions). The upper ends of both stringers were badly deteriorated and the means by which they were attached to wall 3 is unknown. At the top of the stairs, the west face of the west stringer originally lay flush against the east face of J4. It appears that the east face of the east stringer originally rested against the upper end of the support post which stood at the intersection of cellar walls 3 and 4. However, as indicated previously, only the base of the latter post was found intact in 1986. The base of the east stringer lay against the west side of N7, but the two features were not actually nailed together. As with other wooden features in the cellar, the stringers were constructed from white pine (sample #10 from the west stringer and sample #11 from the east stringer).

The two stringers were constructed somewhat differently. First, they were cut from differently dimensioned lumber, the east stringer measuring 1 1/2 in x 12 in and the west stringer measuring 1 1/2 - 1 3/4 inches in thickness and 8 - 9 1/2 inches in width. In addition, the bases of the two stringers had been treated differently. The base of the west stringer had been cut square and then buried to a depth of nearly 7 inches in a small oblong hole dug in the cellar floor. In contrast, the base of the east stringer was sawn off at an angle in order to rest approximately flat within a shallow rounded extension of the builders trench for N7. The base of the east stringer was buried to a depth of 2 inches in that trench.

Many of the ledgers on which the stair treads originally rested were still nailed to the inside surfaces of the stringers (Figure 63). A typical ledger measured 1 in x 1 1/2 in x 11 in and was attached to a stringer by three, cut common 10d (3 in) nails spaced 3 in apart and 2 in from the front and back edges of the ledger. Based on the spacing of the surviving ledgers, the vertical distance between steps has been estimated to have been about 7 1/2 in. There were originally either 6 or 7 steps in the stairs, the angle of descent for which was roughly 50 - 60 degrees below the horizontal.

The lowest tread in the stairs remained in situ, nailed over ledgers attached to the two stringers (Figure 63). While the tread was originally 1 in thick, it had been worn to a thickness of only 1/4 inch in the middle, apparently through heavy use. The tread measured 10 - 10 1/4 in wide and 2 ft 6 in long. A sample of the tread (sample #21) was identified as white pine.

A piece of lumber nailed to the wall planking between the two stringers roughly 1 in below the top of wall 3 may have served as a stop for a hatch or trap door over the opening into the cellar. However, no actual hatch remains were ever identified. This feature was in extremely poor condition but appeared to measure 1 3/4 inches in thickness and perhaps 5 inches in width. It was positioned with a 5-in wide surface flush against cellar wall 3. A remnant of another board of unknown function was also situated between the two stringers 9 - 11 in below the top of cellar wall 3 and below the possible hatch stop. This board measured 1 in x 2 3/4 in with one of the 1-in thick surfaces flush against the wall.

Non-wooden Features of the Cellar

Center Post and Associated Supports. The military records of Fort Larned indicate that the roof of the blockhouse was supported by a large post which stood in the center of the building (see Cockrell, History and Significance, this volume). Archeological evidence uncovered in 1986 substantiated the location of the post and provided additional detail on its relationship to other structural elements of the building. The center post was found to have been removed at some time in the past. However, a cylindrical soil stain thought to indicate its former position was identified in the area immediately behind (south of) two vertical boards in the south corner of the cellar (Figure 32). At the time the post stood, it was apparently surrounded in part by soil held behind the two vertical boards. After the post was pulled, the resulting hole became filled with a mixture of soil, manure, bits of wood and charcoal, construction debris, and a variety of historic artifact materials. The resulting fill stain measured 17 1/4 inches in diameter at a depth of 117 cm below E1. The base of the post may also have measured 17 1/4 inches in diameter. Alternatively, the post may have been slightly smaller, the hole enlarging to the above measurement during the post removal.

In addition, a remnant arc of rotten wood fiber lay around the edges of the soil stain in several places. A few splinters of that wood were collected (sample #20) on the premise that the fibers represented deteriorated fragments of the center post itself. These have now been identified as white pine. However, F40, a farm-related deposit intrusive to the center post hole stain at the top of the cellar contained a white pine branch fragment (sample #24). As a result, it is somewhat unclear whether sample #20 actually related to the center post or to the separate fill of F40 which was deposited after the post was removed.

The total length of the center post was considerable since it presumably extended from the roof of HS-10 to a known depth of about 235 cm below E1, slightly below the earthen floor of the cellar. The post rested on footings which consisted of a pair of limestone slabs, a smaller one measuring 2 cm in thickness and 40 - 50 cm on a side atop a more massive stone 15.5 cm in thickness and 85 cm x 75 - 85 cm across (Figures 34 and 35). The

stone footings had been set into a builders trench which connected with the trenches for wooden braces N1, N2, N4, and N7 and the trench along the base of cellar wall 5. The braces themselves were positioned such that they appeared to have originally butted against the base of the center post. This would have provided the stability necessary for them to brace the posts at the outer cellar corners. A large pile of irregularly shaped rocks immediately behind (south of) the center post hole stain near the post base presumably served as support for and general fill around the post (Figures 32 and 33). The rock stood 22 in (56 cm) in height and extended from 157 - 213 cm below E1.

Earthen Cellar Floor. The earthen floor of the cellar was identified at depths of 213 - 220 cm below E1. This surface had an overall yellowish cast produced by a light amount of yellow- to orange-colored sandstone grit compacted into the earthen floor itself. The grit probably originated from construction activities for the standing stone walls of HS-10.

Builders Trenches within the Cellar. Structural elements at the bottom of the cellar, including a number of wooden features and the stone footings for the center post, were set into a network of connecting builders trenches excavated below the level of the earthen floor (Figure 34). The trenches ran along the base of each cellar wall as well as across the open cellar floor itself. After the wooden structural features were installed in the trenches, the excavations were backfilled to the level of the earthen floor.

The trenches functioned in several ways. First, the lateral movement of the structural features was limited by their installation in the trenches, thereby contributing to the overall stability of the construction. Even so, a concern for such movement within the trenches themselves apparently prompted the placement of stakes immediately adjacent to the west sides of N1, N2, and N4. With particular regard to the wooden braces laid across the floor of the cellar, the removal of those features from the actual floor surface would also have served to ease the movement of people in the cellar and allow for the maximum potential use of that space. The trenches were excavated to slightly different depths below the floor, which itself ranged in depth from 213 cm to 220 cm below E1. The trenches along walls 1 - 3 averaged 3 - 3 1/2 in deep (bottom at 221 - 229 cm below E1); the trench along wall 4 which contained N7 and the trench along wall 5 were 5 - 5 1/2 in deep (bottom at 230 cm below E1); the trenches for N1, N2, and N4 were 7 in deep (bottom at 233 - 235 cm below E1).

A surprising number of artifacts was recovered from the soil fill of the builders trenches, including flat and curved glass fragments, nails, bone, plaster, mortar, sandstone, limestone, charcoal, possible tin can fragments, a percussion cap (artifact #159, HS10-C-46), an unfired lead bullet (artifact #104, HS10-C-54), and a ball clay pipe fragment (artifact #94b, HS10-C-63). It was initially thought that this material related to trench excavation and might therefore provide data bearing on the sequence of construction events at HS-10. Indeed, some of the material undoubtedly relates to that activity. However, it was subsequently found that certain object fragments recovered from two of the builders trenches could be refitted with other fragments of the same objects which were recovered from the cellar fill. Specifically, a McCully bottle fragment (artifact #48) from

the builders trench for N1 (HS10-C-47) and the ball clay pipe fragment (artifact #94b) from the builders trench for N7 were refitted with sherds from the cellar fill. This suggests that some mixing of fill in the trenches and cellar had taken place. As a consequence, the builders trench artifacts may not be interpreted strictly to reflect the original construction activities at the blockhouse.

Conclusion

The HS-10 cellar was clearly intended for utilitarian purposes and was constructed without embellishment. While the overall design of the wooden cellar structure was basically sound, the actual carpentry work may be characterized as expedient. This is apparent, for example, in the use of differently dimensioned lumber for the two stair stringers. Beyond producing a crude appearance to elements of the structure, however, the obvious lack of quality workmanship in the blockhouse construction ultimately resulted in a weakening of the structure itself.

As mentioned previously, one of the boards used for the double post beneath J1 had been notched to fit a matching notch in the end of the joist. The other board in that post appeared instead to have been chopped off with a hatchet or ax at the level of the bottom of the notch in the adjacent board, thus providing an uneven base upon which to rest the joist. The J3/post juncture also reflected workmanship which may only be characterized as sloppy, with the two halves of the post notched at different depths, a notch in the joist which had been cut too deeply, and the use of the notched surface of the joist as load-bearing. As a consequence, J3 was undoubtedly subject to splitting along its length which, in turn, may have caused the overhead floor to sag. Such conditions could have prompted installation of the posts found midway along the length of the joists which have been interpreted as shoring. In addition, the toenails at the J3/J4 juncture were driven in the wrong direction, producing a weak connection which also apparently required subsequent support from below.

Certain evidence may reflect the participation of both skilled and unskilled labor in cellar construction. For instance, all three of the north joist/post junctures were constructed differently. Further, while the J1/post and J2/post junctures were well designed, the former was carelessly constructed. The J3/post juncture was both poorly designed and crudely constructed. In addition, the poor connection between J3 and J4 may be contrasted with the driving of cut nails in proper orientation to the wood grain in the cellar floor boards (however, the latter floor may postdate the original HS-10 construction episode). In addition, the ends of the stringers were cut quite differently.

As suggested above, the data support a sequence of construction events which began with the initial excavation of the cellar cavity and the erection of the main wooden framework and floor over the cellar. Secondary joist supports (e.g., F23, F24, F38) may have been installed sometime later in response to the sagging of that floor. A wooden floor was subsequently added at the bottom of the cellar for reasons which are presently unknown. However, the actual length of time which may have elapsed between each phase of construction is also unknown.

A layer of fill sealed between the earthen and wooden floors at the bottom of the cellar consisted of a mix of soil and numerous historic artifacts (HS10-C-40). The

sheer quantity of material which was contained within this fill would seem to argue against a gradual accumulation over a period of cellar use, particularly in an area directly in front of the base of the stairs which would have sustained fairly heavy foot traffic. Instead, it seems more likely that this fill was intentionally deposited on the earthen floor as a bed for the wooden floor construction. The fill material included fragments of lime, limestone, sandstone, charcoal, and curved glass, possible mirror fragments, a variety of metal objects including numerous nails, burned and unburned bone including elements of domestic chicken, duck, and large mammal (the latter exhibiting evidence of butchering), clay pipe fragments, leather fragments, pieces of a horn comb, and the base of a glass bottle manufactured by the McCully firm sometime between 1841 and 1886. Unfortunately, none of this material has proven useful in determining exactly when in the military period that deposition actually occurred.

Finally, after an extended use-life illustrated by the well-worn tread in the stairs, several wooden components of the cellar construction were removed. The planking along walls 4 and 5, a portion of the wooden flooring at the bottom of the cellar, and other wood may have been scavenged for use elsewhere. While the floor boards over the cellar may also have been reused, their removal would certainly have facilitated the eventual filling of the cellar cavity. As a consequence, many questions remain unanswered regarding the appearance of the cellar during the period of military tenure at the fort. These include the following:

1) How were the floor boards laid over the cellar? Did a layer of subflooring originally exist between the joists and the floor boards? How was the hatch opening constructed? Was the northern end of J4 supported from below by a wooden post or was the joist nailed directly to the wooden cellar wall?

2) How extensive was the wooden floor at the bottom of the cellar? Exactly when and why was it installed?

3) How were the stairs attached to cellar wall 3?

4) How was the shift from horizontal to vertical planking achieved at the juncture of cellar wall 5 and the west tunnel wall?

Nevertheless, the missing structural elements provide a mute testimony to events at the site subsequent to active use of the cellar which, in turn, reflect upon changes in the long-term historical use of the property.

## The Tunnel

The tunnel from HS-10 began at the northwest corner of the cellar and ended at the subterranean wellhouse 20 ft to the northwest (Figure 32). The section of the tunnel within the perimeter of the blockhouse was 4 1/2 ft in length as measured along the center

of the feature. That interior section and a 3-ft section at the other end of the tunnel had been previously investigated by Scott (1974).

The tunnel was found to taper slightly in width from the cellar to the wellhouse. Based upon the positions of the remnants of wooden planks which lined the tunnel walls, it appears that the tunnel opening at the cellar measured 4 ft wide (i.e., the distance between the wooden walls which originally faced into the tunnel). However, at the stone-lined opening into the wellhouse, the tunnel measured 3 ft 5 in wide, a dimension nearly identical to the historically recorded width of 3 ft 6 in.

The earthen tunnel walls and their upper edges were highly irregular in plan view and were therefore not particularly useful for defining the exact tunnel alignment. The alignment was ultimately determined from the remnants of several original wooden features at the tunnel floor. In plan view, the west tunnel wall appeared to represent a continuation of the line of cellar wall 5. However, it is believed that cellar wall 5 was originally lined with horizontal wooden planking, while planking along the tunnel walls stood vertically. As previously mentioned in the cellar discussion, it is not known exactly how the transition in wall treatment was handled architecturally.

The floor of the tunnel was excavated into a tight and slightly mottled gray clay and sloped 5 in down from the cellar to the wellhouse. However, most of the drop in the elevation of the floor occurred over the northwest half of the tunnel. The floor itself was not perfectly flat but exhibited small scale variation with small bumps and depressions. A few nails, bits of sandstone, and a carved bullet (HS10-T-18) were observed impressed into the tunnel floor.

Four toeboards were found along the tunnel floor immediately adjacent to the walls, set into shallow builders trenches in a manner similar to the wooden features in the cellar (Figure 34). However, the features in the tunnel functioned differently than those in the cellar because of the difference in wall treatment. The toeboards in the tunnel served to hold the bases of the vertical wall planks in position, and were in turn held in place by a series of wooden braces laid into shallow builders trenches across the tunnel floor. All of the wooden features in the tunnel consisted of single boards.

The two toeboards in the south half of the tunnel measured 1 1/2 - 1 3/4 inches in width while the toeboards in the north half were slightly wider, measuring 3 - 3 1/4 inches in width. All appeared to have been set on edge in builders trenches. The depth of the narrower toeboards measured 3 1/2 - 4 in, but the top portions of the wider toeboards had rotted completely away, making it impossible to determine the original depth of those members. The wide toeboard along the east wall of the tunnel was in particularly poor condition, and sections of both ends of the board were missing. In addition, several areas within and around the tunnel toeboards had been disturbed by animal burrowing.

The wide toeboards extended to the back edges of the stone at the opening into the wellhouse, while the narrow toeboards extended to the back edge of the wooden lining along cellar wall 1. The two east toeboards (narrow and wide) were separated

from each other by a gap of 3 3/4 in, while the west toeboards were separated from each other by a gap of 10 1/4 in. The distance between the toeboards on either side of the tunnel decreased along the length of the tunnel from the cellar to the wellhouse. Wood samples collected from the two toeboards on the east and the wide toeboard on the west (samples #51, #52, #54) have been identified as pine of the white pine group (Christensen 1987).

Three braces (B1, B2, and B3) were found to be largely intact within shallow builders trenches across the tunnel (Figure 34). A fourth empty builders trench was also identified (B4) which was 1 in deep, 2 3/4 - 3 1/4 in wide, and connected with the builders trenches for the toeboards on either side of the tunnel. A complete common 8d (2 1/2 in) cut nail was recovered from the east end of the B4 trench which was still angled down into the east toeboard (HS10-B4-2). Another complete 8d cut nail was recovered from the other end of the B4 trench, but was loose within the mixed soil and wood fill in that area (HS10-B4-1).

Brace 1 was 7 in wide and 3/4 in thick. It extended to the toeboard along the east side of the tunnel but was separated from the west toeboard by a gap of 3/4 in. Brace 2 was also 7 in wide but was 1 1/2 in thick. It was separated from the east toeboard by a gap of 1 in and from the west toeboard by a gap of 1 1/2 - 2 in. Brace 2 exhibited marks indicative of its having been hand sawn. Brace 3 measured 4 3/4 in wide and was very thin. The east end of B3 was butted directly against the toeboard, but the west end was separated from that toeboard by a gap of 3/4 in. A single 8d cut nail was recovered from each end of B3 which appeared to have been driven into the toeboards on either side of the tunnel (HS10-B3-1, HS10-B3-2). The wood used for B1 (sample #26) and B2 (sample #55) was identified as white pine (Christensen 1986a, 1987). The wood sample collected from B3 (sample #56) was badly degraded and could only be identified as a softwood, possibly pine.

Historically, the tunnel was reported to have been lined with pine boards which were 2 inches in thickness. While short splinters of wood oriented more or less vertically were found immediately behind the narrow toeboards in several areas along the tunnel, only one large in situ remnant of vertical wall planking was exposed, this standing along the west tunnel wall directly beneath blockhouse wall 3/4 (Figures 34 and 64). The latter measured 1 1/2 in thick and 16 1/2 in wide, and its base was wedged behind the west toeboard. The bottom of this fragment was cut straight and stood in the base of the builders trench for the toeboard. The board extended to a height of about 34 in, but its top was ragged and appeared to have been broken off. A sample of the wood from that feature (sample #25) was identified as white pine. No wood fragments were found behind the larger dimension toeboards along the north section of the tunnel. However, Scott reported that the earthen walls of the tunnel were about 2 1/2 in wider on each side than the stone-lined opening to the wellhouse and suggested that a wooden lining may originally have been positioned in those areas (Scott 1973:22).

No evidence was found to indicate how the tunnel was originally covered, and no posts were found anywhere along its length. Additionally, no significant quantity of wood was found in the lowest level of fill in the

tunnel which might possibly represent debris from a collapsed tunnel covering.

Further, there was no indication of how blockhouse wall 3/4 was originally supported over the tunnel. No single lintel stone was found spanning the top of the tunnel at blockhouse wall 3/4, nor were there any posts or other support features beneath the wall. However, a carefully laid and mortared stone wall had been constructed within the tunnel immediately below blockhouse wall 3/4 which served to completely block the tunnel opening (Figure 15). While the purpose of that construction may only be surmised, it may have been intended as support for the blockhouse wall overhead. As suggested in a later section, it may have been built during the early farm period in conjunction with the filling of the cellar cavity.

The Wellhouse

The interior surfaces and the top of the subterranean stone wellhouse were exposed in their entirety in 1986 (Figures 16-19, 27). Previously, Scott had excavated the original fill from the southern half of the wellhouse as well as the tunnel opening into the wellhouse down to the approximate level of its earthen floor. He also excavated the upper portion of the northern wellhouse fill. The base of Scott's northern unit was identified at 119 - 220 cm below E2, at which depth between two and four courses of stone were exposed along the walls. Almost the entire top of the wellhouse had thus been exposed, with the exception of segments along the middle of the east and west walls which lay within a soil balk left between Scott's north and south units (those were the only segments which were not covered with plastic). The west segment was 86 cm in length, while the east segment was approximately 30 cm in length (Figure 23). During the exposure of those two unexcavated sections in 1986, emphasis was placed upon evidence of the original wellhouse covering or its support system, none of which had been reported by Scott (1974:290). Likewise, no such evidence was found in 1986. During removal of the remainder of the original fill in the north half of the wellhouse, particular attention was paid to the wood found in the fill in the event that it represented roof fall debris. However, the only significant amount of wood in the fill, designated Feature 43, represented tree debris composed largely of bark rather than fragments of milled lumber.

The wellhouse was constructed primarily of sandstone blocks mixed with a small quantity of limestone. Some of the stone was clearly missing from the upper courses around the wellhouse, and the highest in situ wall stone ranged from 58 to 64 cm below E2 (52 to 58 cm below E1). The only opening in the wellhouse walls occurred at the juncture with the tunnel (Figure 16), the opening measuring 3 ft 5 in wide, identical to the measurement reported by Scott. The stone walls had been laid directly atop the earthen wellhouse floor and had not been set into any builders trenches. In plan view at the top, it appeared that the larger stones were laid one course wide while the smaller blocks appeared to be backed by rubble. Only the interior-facing surfaces of the rock seemed to have been dressed. The wellhouse walls ranged from 9 to 22 in wide at the top, with most sections measuring between 13 and 15 in wide. Interestingly, several courses of stone along a section of the east wall contained almost no staggered overlapping stones so that the joints between the blocks were nearly coincident

for several courses. No lime mortar was observed anywhere within the wellhouse construction, and it appeared instead that the stone was laid with clay or adobe mortar. At the floor, the wellhouse was slightly longer north-south (9 ft 4 - 6 in) than east-west (7 ft 10 in - 8 ft 1 in).

The two inscriptions on the wellhouse walls reported by Scott (1974:290) were the only such graffiti identified at HS-10. Both of those inscriptions seem to represent the names of individuals. One occurs on the tunnel face of the third stone above the floor in the west half of the entry wall. While the first part of that inscription is illegible, the last part reads MARK. The other inscription appears on the wellhouse face of the twelfth stone above the floor in the east half of the entry wall near the tunnel opening. Scott interpreted the latter to read H. W. MIDDAGH.

The floor of the wellhouse consisted of the same tight slightly mottled gray clay found along the tunnel floor. The average depth of the wellhouse floor was 234 cm below E2 (228 cm below E1). By comparison, the depth of the earthen cellar floor lay approximately 215 cm below E1, so that the floor of the wellhouse lay about 13 cm (5 in) lower than the floor of the cellar.

The well itself was identified in the center of the wellhouse floor. The south half of the well presumably contained backfill from Scott's previous excavation into that feature. In examining the perimeter of the well, wood was found in two areas pressed against the undisturbed clay outside the well, with the clearest example occurring immediately adjacent to the east wellhouse wall. In that area, the wood formed two very definite straight lines at an obtuse angle to each other (Figure 32). There were also two fairly well-defined corners. The grain of the wood ran horizontally, but the wood was too decomposed to determine if it had been milled. There was also some indication that the wood may have extended beyond the corners of the polygon and out a short distance into the wellhouse floor (Figure 32). Excavation of a 20 cm x 50 cm test trench out from the east wellhouse wall and into the fill of the well indicated that the wood extended vertically at least 20 cm down into the well.

The appearance of the wood, designated Feature 45, suggested a polygonal well housing or cribbing, and a sample of that wood (sample #64) has now been identified as a hardwood, possibly ash (Christensen 1987). The well appeared to extend to within 1 1/2 in of the east wellhouse wall and to within 2 in of the west wall. The north perimeter of the well lay 8 1/2 in from the north wellhouse wall. In contrast to Scott's measurement of 6 ft, the measurements obtained in 1986 for the diameter of the well opening ranged from 7 ft 4 in to 8 ft 3 in.

## The Guardroom Addition

While originally intended to serve as a defensive structure, the blockhouse at Fort Larned was used as the post guardhouse beginning in 1867. Alterations made to the blockhouse during this phase included the construction of a rough wooden addition along one exterior wall for use as office space by the guards (see Cockrell, History and Significance, this volume). The addition was apparently constructed in 1868, as the December 7, 1867 Hunnius sketch of Fort Larned (Figure 5) does not illustrate the addition, while the

completed guardroom was mentioned in a medical history of the fort written in 1868 (see Cockrell, History and Significance, this volume). An 1873 plan of the fort (Figure 7) illustrates what is assumed to be the guardroom addition attached to the southwest-facing wall of the blockhouse (wall 1/2). Although the exact dimensions of the addition are unknown, it is illustrated in the 1873 plan as a square structure with sides of the same dimension as the adjoining side of HS-10.

An area of approximately 50 sq m along and outside wall 1/2 was excavated during the 1986 archeological investigations at HS-10 in order to examine any features which might relate to the guardroom. The area immediately adjacent to wall 1/2 had been previously investigated on two occasions (Moore 1967; Scott 1974) and the positions of those excavations are indicated in Figure 23.

While a number of archeological features were identified in the purported area of the addition in 1986, none may be definitely associated with the guardroom addition. A number of post holes and post hole stains were identified which are clearly associated with the series of farm-era hog pens which formerly stood in the area. The hog pens were being demolished by the National Park Service when Moore conducted excavations at the site in 1967, as documented in his field photographs (e.g., Figure 25). The 1986 Features 26, 27, 28, 30, 31, and 34 (Figure 29) consisted of concrete poured into post holes, apparently around metal pipe used as posts. Although the pipe itself was absent in every case, the inside surfaces of the concrete post casts were stained with rust, and metal pipe used for posts in the hog pens is visible in the Moore photos. Most of the concrete post casts were 3 1/2 inches in diameter, while one was 4 1/2 inches in diameter. Ripples in the exterior surfaces of the concrete post casts suggest that the holes were excavated with a hand auger. The tops of the concrete features were exposed at depths of 42 - 81 cm below E1. Feature 31 lay only 76 cm from the remains of wall 1/2 (Figure 47).

Three additional features, F32, F33, and F35 (Figure 29), consisted of probable post hole stains approximately 8 inches in diameter. These were filled with light gray compacted soil instead of poured concrete. Since the latter features were not completely excavated, the remnants of concrete post hole fill may have been present at greater depths. Eight of those nine former post features in the guardroom area excavation were aligned in rows 8 ft apart. While F34 was aligned with F28 and F31, it was only 7 1/2 ft from F28.

One additional probable post hole feature (Feature 36) was identified near the southeast corner of the guardroom addition, as projected using the dimensions (21 ft 5 1/2 in on each side) inferred from the 1873 sketch plan of Fort Larned and the known length of wall 1/2 (Figure 29). The feature was first exposed at 73 cm below E1 as a dark circular soil stain 15 3/4 inches in diameter. In cross section, it appeared as a large irregular area of staining overlying a more restricted column of staining 6 inches in diameter. The latter is interpreted as a post hole from which the post had been removed. Fill in both components of the feature was identical and consisted of chunks of charcoal and mortar, concrete fragments containing portland cement, and plastic mixed with soil, indicating that the post was pulled during the farm period. It is unknown when the post was

set, for F36 did not align with the other post features which are associated with the farm-era hog pen complex. No other features were identified during excavations at the projected southwest corner of the guardroom addition.

An irregular area of sandstone and limestone rubble (Feature 29) lay immediately outside the 1/2 wall line (Figures 29 and 65). Mortar had been used to cement several of the rocks together, one of which, a broken sandstone block, had a rifle loophole cut into it. Sections of the rock near the center of the rubble and at the east end of the feature were undoubtedly removed during Scott's excavations, as those areas were lined with plastic. Charcoal, brick fragments, chunks of mortar, a wire nail, and thick fragments of flat glass were observed between and beneath the rubble. Feature 31, one of the probable hog pen post collars, lay beneath the smallest concentration of rubble at the west end of F29. Feature 29 probably represented debris from the collapse or dismantlement of wall 1/2 which may have been subsequently disturbed during construction and eventual demolition of the nearby farm building and attached hog pens.

Two zones of very compact soil (Features 25 and 37) were also identified in the area of the guardroom addition excavation. Feature 25 consisted of an area of hard-packed light brown soil exposed southwest of wall 1/2 at a depth of approximately 40 - 53 cm below E1 and just below the present sod layer. It abutted the southwest edge of the F29 rubble and may have extended to the west half of HS-10 wall 1/2. The excavated portion of the feature was almost 9 m in length, and the feature appeared to continue beyond the edge of the 1986 excavation. Figure 29 illustrates the horizontal extent of the feature at 50 - 60 cm below E1. The northwest-southeast-trending center of F25 was highest in elevation, the top of the feature sloping downward to the southwest and away from the blockhouse. Several pockets of softer soil were noted within the irregular edges of the stain, and artifacts observed but not collected from the feature fill included cut and wire nails and flat glass. Feature 25 is interpreted as a possible former roadbed.

Feature 37 consisted of an extremely compact zone of light gray soil with brown mottling which was exposed at 62 cm below E1 (Figure 29). The deposit appeared to lie in a shallow (approximately 15 cm deep) steep-sided basin with a relatively flat bottom. The maximum extent of the feature is unknown, as it continued beyond the limits of our excavation. Artifacts observed but not collected from the fill included cut and wire nails, a spark plug wire, a radiator hose, plastic, and fragments of concrete.

In summary, historic documentation indicates that a rough wooden addition was constructed outside wall 1/2 of the blockhouse in 1868 to serve as an office for on-duty guards. Despite nearly complete archeological excavation of this area in 1986, no features were identified which were clearly associated with such an addition. The area in question was heavily disturbed during the farm period by construction of a farm building with attached hog pens, and by activities which undoubtedly occurred around those developments. The guardroom addition was probably of relatively insubstantial construction to begin with, and subsurface remains of the addition appear to have been destroyed during the farm period.

## ARCHEOLOGICAL AND ARCHITECTURAL RESULTS

Military Era Grade at HS-10

Military Era Grade Inside HS-10

Until at least 1874, historic documentation indicates that most of the floor inside HS-10 was earthen with wooden planking laid over the cellar cavity (see Cockrell, History and Significance, this volume). It was proposed in the early 1870s to plank the entire blockhouse floor for the sake of the health of prisoners confined inside. However, there is no documentation that such flooring was ever installed, and no archeological evidence of it was observed. Archeological data were collected during the 1986 investigations at HS-10 which bear upon the elevations of the earthen and wooden cellar floor surfaces during the period of military occupancy of the structure. However, some of those data bear more directly upon the position of the ground surface during the subsequent farm use of the building. Inferences concerning the original military floor level must be drawn through the filter of subsequent farm-era disturbance. One such line of archeological evidence is represented by the levels of the uppermost sterile subsoil observed at several locations within HS-10.

Stratigraphic Test 1 was excavated midway between the approximate staked locations of blockhouse corners 5 and 6 because available records and reports from Scott's and Moore's investigations at HS-10 suggested that this particular area had not been previously excavated. The west end of the northeast wall profile for Stratigraphic Test 1 and its extension (Figure 44) illustrates a limited segment of stratigraphy within HS-10. Level 8 in the profile represents sterile subsoil, which consists of a fine tight brown sandy loam. The top of Level 8 lay 19 to 20 cm below E1. In addition, the remaining foundation stone in the area of Stratigraphic Test 1 was generally three courses deep. The lower two courses were ill-defined and composed of irregularly shaped sandstone rocks. In contrast, the stone in the uppermost course was more uniform in size and shape and had been placed in a well-defined layer, as would be expected at and above the historic ground surface. The top of the third course lay 20 cm below E1, the same elevation as the top of sterile subsoil in that area.

Sterile subsoil is illustrated in the east wall profile of the SW Quadrant as Level 10 (Figure 66). Partway between the illustrated cross section of wall 6/1 and the approximate center of HS-10, the top of Level 10 was fairly flat, ranging between 30 and 34 cm below E1. The top of Level 10 near the middle of the south wall profile of the NE Quadrant (Figure 45) ranged between 25 and 27 cm below E1. Much of the upper 4 - 5 cm of Level 10 in the latter profile was compacted and appeared to represent a former ground surface. The top of sterile subsoil in the south wall profile of the NW Quadrant (not illustrated) was similarly compacted. During excavation of the south portion of the NW Quadrant, the uppermost 1 to 5 cm of subsoil were observed to have a compacted, platy structure. Overall, a difference of 11 cm (4 1/4 in) is reflected in the uppermost levels of subsoil.

However, additional evidence at the site, as well as historic documentation, suggests that the earthen portion of the HS-10 floor, represented archeologically by the top of sterile subsoil, was undoubtedly a partial product of farm-era activities within the building, i.e., it represented farm-era grade. After

the conversion of Fort Larned into a private farming operation in the 1880s, the old blockhouse was apparently used to stable bulls (see Cockrell, History and Significance, this volume). Such use may have served to churn the soil inside the structure somewhat and ultimately lower the limits of the undisturbed subsoil stratum. Such subsequent use of the structure may also explain the differential compaction of the subsoil within HS-10. Historic grade during the military use of the blockhouse may therefore have been slightly higher and more level than the uneven earthen floor observed archeologically in 1986.

Evidence for another former ground surface was observed at HS-10, which is most certainly associated with the farm period, undoubtedly a continuation of the surface described above. One of the layers of fill over the cellar consisted of a light brownish gray silt loam (Level 6 in Figure 66), the top of which ranged from 50 - 57 cm below E1 and was distinct and compacted. A portion of the hard-packed top 2 - 5 cm of Level 6 contained and was underlain by very thin streaks of either lime or ash. This in turn was overlain by a layer of material (designated Level 5) which was composed primarily of manure. Level 6 was deposited after the blockhouse cellar was filled, and its exposure at the ground surface was probably contemporaneous with that of sterile subsoil elsewhere within HS-10 during the farm period. Given the manure which lay atop Level 6, the compaction of the top of that layer may have been due to trampling by livestock.

An HS-10 description which accompanied the 1866 Fort Larned plan indicated that the cellar within the blockhouse was covered with 2-in thick pine flooring (see Cockrell, History and Significance, this volume). While the latter planking was not found archeologically, the floor joists which would have supported such flooring over the cellar were still in place, although deteriorated, atop wooden support posts. The latter stood adjacent to the center post hole stain and at the outer walls (walls 1-3) of the cellar.

As mentioned elsewhere, the lengths of the supports and the widths of the joists would have been affected very little by wood shrinkage over time, and the archeological dimensions of those features were probably quite close to the original construction dimensions. Each of the joists was constructed of two 1 1/2 in x 6 in boards nailed together to form a member, the dimensions of which were 3 in x 6 in. The top of the joists were exposed during excavation at a depth of 56 - 61 cm below E1. The bottom of J1 lay approximately 77 cm below E1, while the bottom of J3 lay 75.5 cm below E1. Assuming that the wooden flooring was laid directly atop the joists, the level of the top of the floor over the cellar may be estimated by projecting upwards from the bottoms of the joists (six inches for the joists themselves and two inches for flooring), or projecting up from the tops. The resulting figures for the floor over the cellar range between 51 and 57 cm below E1.

The shallowest depth measurement for the top of the joists, that of 56 cm below E1, was obtained at the top north end of J3 in an area which was probably excavated by Moore based upon the presence of tarpaper adhering to the wood. The wooden features of the cellar dried and buckled soon after exposure to the air in 1986, resulting in an expansion of the wood. It is therefore possible that the depth measurement obtained for that section of the joist may in part reflect

a change in the condition of the wood as a result of previous exposure.

The figures reported above, which are based largely upon observations in 1986, suggest that the wooden floor over the cellar was lower in elevation than the earthen floor around it by approximately 8 - 15 in. Furthermore, while the wooden floor was probably originally flat, the earthen floor exposed in 1986 was quite uneven, a condition undoubtedly resulting in part from the postmilitary stabling of farm animals in the building. The highest elevation for the earthen floor was obtained adjacent to the interior wall perimeter of HS-10. The earthen floor then dropped in elevation toward the cellar. The possibility of two surfaces at different elevations raises at least two questions concerning the positions of the joists and the original construction of the floor over the cellar:

1. Were the vertical positions of the joists affected by settling over time or compression from above so that the positions recorded in 1986 were lower than the original positions of those features?

2. Assuming that the joists remained in/near their original vertical positions, perhaps a subflooring was originally installed between the joists and the wooden floor boards. Such a layer of subflooring would have had the effect of raising the level of the wooden floor to a position closer in elevation to that of the earthen floor.

As mentioned previously, the three primary joists were still in place atop vertical supports at both ends and thus were not merely "floating" unattached in the upper cellar fill. In addition, the lengths of those supports in particular would have been affected very little by wood shrinkage. The positions of the joists may also be evaluated by comparison with the positions of other components of the subterranean complex at HS-10. For example, if the 2-in thick wooden floor boards were originally nailed directly to the top of the joists, the projected top of that flooring would have lain at approximately 51 - 57 cm below E1. The top of the wooden cellar wall planking which had been inserted behind the vertical joist supports was exposed at 49 - 57 cm below E1, a depth roughly consistent with that of the projected top of the wooden floor.

In addition, the original covering or roof for the subterranean wellhouse was probably laid atop the stone walls of that structure, although it is unknown exactly how this was accomplished. No such covering or remnants were reported by Scott (1974:290) following exposure of most of the upper section of the wellhouse in 1973. During the 1986 investigations, the highest positions of in situ wall stone in the wellhouse were determined to be 58 - 64 cm below E2 (52 - 58 cm below E1). Again, by comparison, the top of the floor joists over the cellar were 56 - 62 cm below E1. The closeness of those two sets of measurements suggests that the wooden planking or other material used to cover the complex of subterranean features was laid at nearly the same elevation, a seemingly reasonable construction.

On the other hand, a compacted layer of fill which lay over the cellar has been interpreted as a former floor surface dating to the farm period. The activities which served to compact that soil may also have

compacted the underlying materials to a lesser extent, and pressed them downward into the cellar. Those materials would have included the floor joists.

In conclusion, while the positions of the joists in 1986 may have been slightly lower than their original positions, the majority of the evidence indicates that little change has taken place in their positions over the years. With regard to the possible original installation of subflooring between the joists over the cellar and the wooden floor planking, there was simply no archeological or written documentation of such materials. Without any supporting evidence, the decision was ultimately made by the architects not to include the reconstruction of an element which would have been purely conjectural.

The archeological data indicate that a former ground surface or earthen floor within HS-10, represented as the partially compacted top of the sterile subsoil stratum, ranged in part between 19 and 30 cm below E1 (approximately 2,034 ft 4 1/2-9 in above mean sea level). The contours and compaction of that surface were undoubtedly produced in part by subsequent farm-era activities within the building, and the grade associated with the military use of HS-10 may have been slightly different and less variable. The top of the wooden floor over the cellar was apparently somewhat lower, 51 - 57 cm below E1 (2,033 ft 6-8 1/2 in above mean sea level).

Military Era Grade Outside HS-10

Archeological data were also collected at the site which may be interpreted as evidence bearing on the elevation of the ground surface immediately outside HS-10 during the military period at Fort Larned. Again, those data concern the position of the top of undisturbed sterile subsoil around the site, and in this instance, they were collected on opposite sides of the building outside HS-10 walls 2/3 and 5/6. The top of the subsoil deposit in those areas was lower than that within the perimeter of the building foundation, suggesting that the outside ground surface was formerly slightly lower in elevation than the earthen floor within HS-10. However, as was the case inside the building perimeter, some of the data collected on the outside may bear more directly upon the position of the ground surface during the subsequent farm period.

Two vertical soil profiles were drawn at the site which illustrated the stratigraphy outside HS-10 wall 2/3 in proximity to the exterior entrance to the building. The highest positions of subsoil in the west wall of X7 ranged between 42 and 45 cm below E1 (Figure 56). The highest position of subsoil at the west wall of X4 was measured as 46 cm below E1 (Figure 55). The top of subsoil outside and immediately adjacent to HS-10 wall 5/6 was 42 cm below E1, as indicated in a profile illustration of the northeast wall of Stratigraphic Test 1 and Extension (Figure 44). The top of subsoil was positioned at about 35 cm below E1 at a distance of approximately 3 m outside that same wall.

Several factors may have contributed to this apparent difference in elevation of the ground surfaces inside and outside HS-10. A better understanding of the circumstances which resulted in this situation may be gained through careful assessment of the vertical profile for Stratigraphic Test 1, consideration of additional information recorded during the excavation of that unit, and a

review of a comparative compositional analysis of mortar samples collected around the site.

The deposit designated Level 4 in the profile illustration for Stratigraphic Test 1 consisted of a considerable amount of sandstone and limestone rubble mixed with fragments of mortar and sandy loam soil (Figure 44). The undisturbed sandy loam subsoil at the site is represented by Level 8 in the profile illustration. The contact between those two strata, designated Feature 2, dropped gradually in elevation beginning at a point 26 cm out from the HS-10 foundation stone. This downslope continued out to a distance of 65 cm from the foundation stone, at which point the contact became approximately level. At a distance of 2.25 m from the wall, the contact sloped abruptly back up in elevation.

The initial interpretation of the rubble in Level 4 was that it represented debris from the original HS-10 construction activities (e.g., on-site dressing of stone). However, a close examination of the walls of Stratigraphic Test 1 after excavation of that unit resulted in a reassessment of that interpretation. A possible former dripline for the roof of HS-10 was identified below the rubble deposit at the contact between Levels 4 and 8. In the southwest wall of the unit, a 2.5-cm (1 in) vertical drop in the contact between the two levels occurred 11 in out from the outer edge of the HS-10 foundation stone. In the northeast wall of the unit, as previously indicated, the gradual slope down in the contact began a distance of 26 cm (10 in) out from the foundation stone. A straightening or sharpening of the rubble/subsoil contact was also observed approximately 8 in out from the foundation in the latter profile. The contact therefore appeared to represent a former ground surface. The contours of that surface may have been produced by any of several factors including the purposeful stripping of sod and soil in order to channel water away from the building, heavy ground disturbance during the construction of HS-10, or deflation of soil by wind. Further, the original interpretation of the rubble layer itself as representing initial construction debris appears to have been incorrect. Instead, it appears that the rubble was deposited on that ground surface sometime after the HS-10 roof was in place.

There is a possibility that the rubble was intentionally placed in order to control erosion/deflation. However, a mortar sample collected from the rubble layer in Stratigraphic Test 1 proved similar in composition to a sample recovered from an in situ position in the remains of the blockhouse foundation near corner 3. That similarity suggests that the two mortar mixes were contemporaneous (Appendix G). That suggestion in turn supports an interpretation of the rubble layer as debris from the demolition of HS-10, an event which is believed to have occurred during the farm period.

Among the artifacts recovered from the rubble layer is a complete common 8d (2 1/2 in) cut nail which is ruptured (HS10-S1-11), strongly suggesting that it was manufactured prior to 1870 (Fontana and Greenleaf 1962:53). While the nail may not have entered the archeological record until many years after its manufacture, it clearly dates to the military era at Fort Larned. No artifacts dating strictly to the farm period were recovered from the deposit (HS10-S1-11, HS10-S1-14).

Historical Land Use at the Site

Three general patterns of historic land use have occurred at Fort Larned, patterns which mirror the broad regional changes in land use that evolved as the Euro-American frontier moved westward and eventually disappeared. The military occupation began at Fort Larned in 1860 and ended when the property was transferred to the General Land Office for sale in 1883. The military occupation occurred as a result of American economic and territorial expansion which ultimately placed the U.S. Army in conflict with the Native American inhabitants of the region. As the various Indian groups were subdued and Euro-American settlement proceeded, a military presence in the area was no longer required and Fort Larned was deactivated.

Upon private purchase in 1884, Fort Larned became the base for a series of commercial farm operations. The old stone military buildings were adapted for farm activities. That adaptive use and maintenance over the years served to protect most of the buildings from destruction, the sole major exception being the blockhouse itself.

Prompted by a growing public recognition of the historical significance of the property because of the role played by the U.S. Army operating out of Fort Larned, the old fort moved into the present period of management as an historical park. In 1957 while the property was still owned by a farm family, Fort Larned was opened by the Fort Larned Historical Society to visitation by the general public. It was designated a National Historic Landmark in 1961, and was authorized to become a National Historic Site in 1964. With the 1966 purchase of the property by the National Park Service, the fort passed into the present federal ownership.

An assessment of exactly how those general patterns of historic land use at Fort Larned were specifically manifested in the archeological record at HS-10 is presented in the following sections.

Military Construction and Use of HS-10

The blockhouse built at Fort Larned in 1864-1865 was originally intended to serve as a defensive fortification in the event of Indian attack, and its construction was therefore directly related to the struggle between the U.S. Army and the Native Americans of the region. A formal change occurred in the use of the blockhouse in 1867 when it became the post guardhouse in which military prisoners were confined. Historic records indicate that modifications were made to the building in order to better accommodate that new function.

For example, a wooden addition to the blockhouse was apparently constructed outside wall 1/2 for use by the guards (Figure 7). Unfortunately, later farm-related construction and subsequent NPS demolition activities in that particular area appeared to have destroyed most if not all of the archeological evidence of that addition. A single post hole feature (F36) was identified near the presumed southeast corner of the addition (Figure 29). Other than its position, however, there was no other evidence to link that particular feature to the HS-10 guardroom addition.

An equally tenuous connection with specific use of HS-10 as a guardhouse is provided by several fragments of a very fine

sand mortar recovered at the site. Those fragments exhibit relatively large surface areas which were smoothed during application and then whitewashed. As a purely speculative suggestion, perhaps that mortar was the material used to fill the lower tier of rifle loopholes around the HS-10 superstructure, a modification ostensibly made in order to stop the passage of liquor in to the prisoners (Appendix F). It is also tempting to think that the name inscriptions on the stone walls of the subterranean wellhouse and a whittled lead bullet found in the floor of the tunnel (HS10-T-18) reflect the activities of bored prisoners passing otherwise idle hours in confinement in the building.

Additional archeological evidence of the general military tenure at Fort Larned was discovered in the fill deposited in the HS-10 cellar cavity. Much of that material consisted of partially decomposed adobe brick believed to be debris from one or more of the early adobe buildings at the fort which was hauled to HS-10 to fill the cellar, and was therefore only secondarily associated with HS-10 itself. The actual cellar filling probably did not occur until the farm period. The military occupation at Fort Larned is also well represented in the collection of artifacts resulting from the 1986 investigations (Appendix H). For example, among those materials are a number of probable military issue items including ammunition, uniform buttons, shoes, a spur, sword scabbard fragments, and a sword-belt plate.

Two particularly intriguing features identified within the perimeter of the HS-10 foundation were adjacent hearth-like areas characterized by in situ burning immediately atop sterile subsoil. Feature 8 appeared as an irregular basin of burned red and black soil which measured roughly 130 cm north-south, 100 cm east-west, and 10 cm deep (Figure 29). The top of F8 sloped downward from south (33 cm below E1) to north (53 cm below E1), and the east and central sections of the feature had been disturbed by rodents. Among the artifacts recovered from the feature fill were two relatively thin fragments of flat glass (1.4 mm and 1.9 mm in thickness), a piece of sandstone with whitewash adhering to it, and two fragments of concrete which would date no earlier than 1871 (HS10-SEQ-5, HS10-8-1, HS10-8-3, HS10-8-4). Significantly, F8 was overlain by a deposit of manure which ended abruptly in a straight line and which may indicate the location of a livestock pen or stall within the blockhouse during the farm period. The manure in turn was overlain by a concentration of historic artifacts (F9) including fragments of flat glass which may date to the turn of the twentieth century (Appendix E). It is therefore possible that F8 related to use of the blockhouse during the last half of the military period, perhaps representing the remains of a small fire(s) built by military prisoners for warmth.

Feature 21 was a small basin of ash, charcoal, burned and unburned bone,and artifacts identified at a depth of 58 cm below E1 (Figure 29). The basin was nearly circular in plan view and measured 48 cm north-south, 40 cm east-west, and 10 cm deep. It appeared to have been intentionally excavated into sterile subsoil prior to the firing of the feature, and patches of subsoil around the basin had been burned to a reddish color. Several long thin scratches into the subsoil at the base of the basin which were filled with ash appeared to have been made by a stick or other pointed object used either to dig the basin or to rake through the feature fill.

Animal burrowing along the northern edge of the feature appeared to have displaced some feature fill in that area. The rodent disturbed portion of F21 lay 11 cm from the south edge of F8, and the F21 basin lay 20 cm from F8. Among the artifacts recovered from F21 was a five-cent coin minted in 1867 (#131).

Possible Farm Use of HS-10

The old military blockhouse was apparently converted to stable bulls during the initial years of the farm period at Fort Larned, as described in an 1885 article in the local newspaper (see Cockrell, History and Significance, this volume). The tangible archeological evidence of that use appeared to include the hard-packed top of a layer of fill over the cellar (Level 6) which in turn was overlain by a deposit (Level 5) composed primarily of manure (Figure 66). At a depth of 43 cm below E1 in the fill near the center of the site, a deposit of manure which probably represented a continuation of Level 5 was found to end abruptly in a straight line which ran approximately northeast to southwest (Figure 29). The manure lay northwest of that line and may indicate the position of a livestock stall within the building, although no posts or post holes were found in association with or oriented along the line. In addition, the top of the subsoil stratum elsewhere within the perimeter of HS-10 was found to be compacted, a condition which may have resulted from trampling by livestock in the building. It is also possible, of course, that those hard-packed surfaces and manure related instead to livestock moving over the site after the building was demolished.

A small dump identified immediately outside the probable exterior entrance to HS-10 may also have related to farm activities conducted while the building was standing (Figure 27). In addition, the cellar beneath HS-10 may have been filled prior to the stabling of a bull in the building, a possibility addressed in the following section.

Cellar and Tunnel Fill Containing Adobe. During the removal of fill from the cellar beneath HS-10 in 1986, it was discovered that much of that material consisted of partially decomposed adobe bricks. Adobe was also subsequently identified in the lowest fill component in the tunnel outside the perimeter of HS-10. The fill in both cases is believed to represent debris from an early adobe structure(s) at the fort which was hauled to HS-10 to fill the cellar cavity. While it appeared that adobe brick was present throughout the cellar deposits, variation in the fill around the feature was observed particularly with regard to soil color and structure, and charcoal, ash, sandstone, and manure content.

The process of filling the cellar appeared to have begun in the east cellar corner in the area of the stairs. The lowest fill component in that area (#2) contained large chunks of medium to dark brown adobe mixed with scattered wood fragments, charred wood, charcoal, and small pieces of sandstone. That component was overlain by a 5 to 10 cm thick layer of sandstone rubble, which in turn was overlain by adobe fill (#1) that was slightly lighter in color and more fragmented than the lowest adobe deposit. The upper fill also contained scattered sandstone fragments, wood fragments, charcoal, and ash. A concentrated pocket of charcoal and ash (#3) was identified immediately southwest of the stairs, and some of that material appeared to have filtered downward through the fill

beneath the pocket. Evidence of animal burrowing in the cellar fill was most apparent within and around the charcoal and ash. The area directly beneath the stairs (#4) was filled with a mixture of adobe (#2) and charcoal/charred wood/ash (#3), and also contained several roughly dressed sandstone fragments. In addition, cellar fill in the area of test unit X5 contained several lenses of manure. The lowest fill component in the tunnel outside HS-10, designated Level 4, also contained adobe and may in part represent spillage of fill from the cellar.

Since the military construction features of the cellar were the primary focus of the 1986 cellar investigations, assessment of the cellar fill was believed to be of secondary importance. Consequently, very little of that fill was screened upon excavation. However, the fill within X5 was screened together with material from between approximately 25 cm above the earthen cellar floor and the floor itself. The lowest fill component in the tunnel was also screened. Even so, construction debris such as stone was not systematically collected from those proveniences. Artifacts thought to be temporally diagnostic were collected from the unscreened cellar fill when such materials were incidentally observed during fill removal, with the result that the artifact sample from those deposits is clearly biased toward certain classes of artifacts.

Nevertheless, the cultural materials collected from 29 proveniences in the cellar and tunnel fill were analyzed with the following two questions in mind.

1. When was the HS-10 cellar cavity filled?

2. Which adobe building(s) were represented in the cellar fill? Are other buildings/ features also represented?

Certain of the proveniences in the cellar and tunnel were viewed as likely to contain materials deposited at a later time as a result of activities which may also have served to disturb the earlier fill deposits. As a result, the materials collected from those proveniences were excluded from this particular study. The proveniences in question included the upper portion of the cellar fill above, around, and immediately below the joists, fill adjacent to the former center post position, and two locations in the tunnel.

Dating. A number of artifacts recovered from the adobe fill may be associated, with considerable confidence, with the military period at Fort Larned. Other artifacts may relate to either the military or farm periods, but no artifacts were recovered from those 29 proveniences which were datable to the farm period alone. An unruptured clinched nail (HS10-C-48) and several other cut nails which are bent at angles greater than 90 degrees but are not ruptured suggest a filling date no earlier than 1871. However, additional data regarding the tunnel fill deposits stratigraphically above the Level 4 adobe also appear to be relevant to the discussion.

A series of sandstone and limestone blocks ranging in maximum dimension from 10 - 110 cm had been carefully laid and mortared into place in the section of the tunnel immediately beneath HS-10 wall 3/4, with a layer of soil fill underlying the basal course of rock (Figure 15). The southeast face of that stone wall was exposed by Scott during his excavation of the tunnel within the perimeter of the HS-10 foundation, but was left intact at that time. While it is possible to speculate regarding the reasons why the stone

wall was constructed in the tunnel, the actual rationale is unknown. Perhaps the tunnel wall provided support for blockhouse wall 3/4 overhead (which would indicate that the building was standing at the time), or was intended simply to contain the basement fill. As mentioned previously, the blockhouse is believed to have been demolished around the turn of the twentieth century.

The upper portion of the tunnel fill immediately outside HS-10 also contained many large rocks which were mortared into place, but the latter rock lay in general disorganization in marked contrast to the stone immediately beneath wall 3/4. Mortar samples collected from the two rock and mortar deposits (samples MO3 and MO4) were found to contain different sands, suggesting that two separate application episodes are probably represented (Appendix G).

As will be discussed in greater detail in a later section, artifacts recovered from the tunnel fill beneath the jumble of rock and mortar outside the perimeter of HS-10 and above the adobe fill indicate that those intermediate tunnel deposits dated to the second half of the twentieth century. In particular, two wads of probable acrylic string recovered from beneath the rock/mortar postdate about 1950 (Miller 1968:52). Excavation units associated with the two previous archeological projects at the site were identified above the jumbled rock and mortar, and those excavations could not therefore account for deposition of the acrylic.

In addition, a single torn fragment of low-density polythene film or sheet plastic was recovered from provenience HS10-T-3. Low-density polythene was introduced commercially in the U.S. in 1943 (Katz 1978:102-105). The plastic was recovered from a soil fill deposit in the section of the tunnel outside HS-10 wall 3/4 at a depth of 203 cm below E1 (10 cm above the tunnel floor). A dilemma is posed by that position because it is not known whether the plastic lay within Level 4, which had not been defined at the time the plastic was discovered. However, a short distance further along the tunnel to the northwest, the top of Level 4 ranged from approximately 180 - 190 cm below E1. No evidence of animal burrowing was recognized in the immediate area of the plastic, although such disturbance was observed throughout other portions of the site. The most likely explanation is that the plastic was originally associated with the twentieth century deposits above Level 4. It may then have become mixed into the top of the adobe deposit.

In conclusion, common sense suggests that the cellar cavity would have been filled before a bull was stabled in the building and no archeological evidence was found at HS-10 to discount that possibility. The artifacts recovered from the known adobe deposits suggest only that the fill was deposited post-1871. The carefully constructed rock wall in the tunnel immediately beneath blockhouse wall 3/4 was apparently built at a different time than the adjacent late jumbled rock deposit outside wall 3/4. It is therefore possible that the stone wall was built in conjunction with the filling of the cellar cavity.

Buildings Represented. Historic records indicate that several adobe brick buildings were constructed at Fort Larned in 1860 shortly after the post was relocated to the present site (Clary 1976; Stinson 1966:7). Those structures included a combination

commissary storehouse and barracks (HS-11), a combination quartermaster storehouse and barracks (HS-12), two laundress quarters (HS-13 and HS-14), a hospital (HS-15), a small meat house (HS-18), a bakery (HS-36), and several adobe shanties (HS-42). While the latter shanties were built on the far northeast side of the Pawnee River meander scar which lies adjacent to the fort, the other adobe buildings were located at the north end of the main fort complex (Figure 2). Still other early buildings at the fort were constructed of pickets plastered with adobe. Archeological investigation has also revealed the use of adobe brick in construction of a fireplace within a military-era dugout in the bank of the Pawnee River at the fort (Scott 1975:68-70), and is perhaps indicative of an even wider use of adobe brick which is as yet undocumented.

Historical summaries of Fort Larned provide conflicting information regarding the length of time that the various known adobe brick buildings were in use. It appears that a number of adobe and other temporary structures at the fort were demolished sometime during or immediately after the construction program of 1867-1868 which resulted in the erection of the stone buildings which stand on the property today (Oliva 1982:32; Sheire 1969:32; Stinson 1966:24-25). However, several of the adobe buildings continued to be used after that time. For instance, Stinson (1966:34, 94) indicated that the adobe hospital was modified for use as quarters for the ordnance sergeant in 1871 and its cellar converted into a magazine. Conversely, Brown (1964:437) has indicated that the adobe hospital was demolished in 1871, but noted that other adobe buildings continued to be occupied by the laundresses and ordnance sergeant until at least 1875 (Brown 1964:499, 501). Clary (1976) has suggested that the laundress quarters and hospital/ordnance sergeant's quarters were not demolished until the 1880s and thus may have been standing through the final years of the military tenure at the fort and into the early farm era.

The possible sources for the adobe brick fill in the cellar and tunnel of HS-10 are uncertain. The analysis of the data and cultural materials collected from those deposits was directed toward the identification of possible sources and involved grouping the artifacts into several general functional categories which included architectural debris, food related materials, personal possessions and clothing, possible horse tack and related materials, possible hospital related artifacts, and possible arms/ammunition storage. The materials assigned to each of those categories are listed and discussed below.

Architectural Debris

Unfired adobe bricks, some of which had been coated with whitewash
390 lime plaster fragments
27 fired brick fragments including two with a thick coating of whitewash
Sandstone (roughly dressed; splattered with whitewash)
Limestone
Wood fragments
54 probable window pane fragments
Numerous cut nails and nail fragments
3 possible hand wrought nails
Fragments of a brown glazed mineral door knob (#120 and #121)
1 heavy T-hinge
Additional possible fireplace debris (charcoal, charred wood, ash, burned bone, 2 heat-altered curved glass fragments)

The largest adobe brick fragment collected from the cellar fill at HS-10 measures approximately 3 1/4 inches in width, but the fragment is broken so that the length and

thickness of the original complete brick are unknown. The color of the fragment is relatively uniform inside and out, and matches most closely with a light grayish yellowish brown, 10YR6/2.5 (Kollmorgen Corporation 1973). Numerous grasslike impressions are visible on the exposed surfaces of the brick fragment but have no particular pattern of orientation. Some of the impressions extend into the brick itself and may indicate that grass was added to the adobe mixture as a binder.

A layer of mud plaster approximately 1/8 inch in thickness may be seen on three small adobe fragments recovered from the cellar fill, the mud plaster in turn coated with whitewash. A small quantity of lime mortar or lime plaster is adhering to one of those same adobe fragments. Numerous fragments of lime plaster were also recovered from the adobe fill in the cellar and the lowest level in the tunnel. The contours of the interior surfaces of those plaster fragments suggest application directly to stone or adobe rather than to wooden lathe (Appendix F), and as such lend support to the interpretation of that fill as debris from an adobe building(s).

Historic records indicate that locally available sandstone was used in the construction of foundations for several of the adobe structures at the fort (Brown 1964:65), and Scott (1975) exposed archeological evidence of the use of sandstone in the construction of fireplaces within the adobe shanties. Thus, the sandstone in the adobe deposits in the cellar and tunnel of HS-10 could conceivably have been associated with an adobe building. Fired brick was also apparently shipped to the fort during the military era and was used in construction there at least as early as 1867 (George Elmore, personal communication 1990). The results of an analysis of the probable window pane fragments recovered from the adobe fill are discussed at length in Appendix E. Briefly, those results suggested that two construction episodes or buildings may be represented in the sample.

Most of the cut nails recovered from the adobe deposits were in such poor condition that it was impossible to determine the type or size of nail represented. However, 36 common cut nails were identified in the sample as well as one 8d clinched nail and one 6d tack. In the following table, the sizes of the cut nails in the sample are indicated in those instances where a specific size could be determined.

| Pennywt. | Length (in) | No. of Nails |
|---|---|---|
| 3d | 1 1/4 | 3 |
| 4d | 1 1/2 | 13 |
| 5d | 1 3/4 | 9 |
| 6d | 2 | 11 |
| 7d | 2 1/4 | 2 |
| 8d | 2 1/2 | 26 |
| 9d | 2 3/4 | 11 |
| 10d | 3 | 9 |
| 12d | 3 1/4 | 1 |
| 16d | 3 1/2 | 2 |
| 20d | 4 | 5 |
| 30d | 4 1/2 | 1 |
| 50d | 5 1/2 | 2 |
| 60d+ | 6+ | 1 |

Two size ranges of cut nails, 4d through 6d, and 8d through 10d, are fairly well represented in the sample. However, at least three of the cut nails recovered from the fill appear to have come from the decking installed at the floor of the cellar (see note in Appendix H, HS10-C-38). The latter nails therefore appear to represent debris from HS-10 itself which became mixed into the cellar fill, and all but one of the sample nails collected directly from the decking were 8d in size.

Nevertheless, very few nails recovered from the adobe matrix would have been suitable for purposes of heavy framing (Blackall 1888:73 in Fontana and Greenleaf 1962:57; Blackall 1890:14; U.S. Army 1861 in Crouch 1978:110; Fontana and Greenleaf 1962:57-60), a pattern intuitively consistent with the requirements of historic adobe construction. Of course, such activities as the possible scavenging of heavier timbers in the adobes may have skewed the sample of nail sizes in the adobe deposits so that the larger sizes are underrepresented relative to the role that they may originally have played in construction.

Food Related Materials

Lea and Perrins Worcestershire Sauce glass bottle stopper (#174)
Tin can fragments
Sheet metal skillet fragments
1 incomplete bone-handled table utensil (#142)
1 stoneware sherd with a Bristol glaze
4 undecorated whiteware sherds including one fragment from a plate with an original diameter of 10 in
124 bones and bone fragments (both burned and unburned)

Both domestic cow and domestic chicken are represented in the faunal remains from the adobe deposits in the cellar and tunnel, and these were undoubtedly food related (Monk 1987). Cottontail, jack rabbit, turkey, duck, fish, frog, and mussel also appear to be represented, but no cut marks or other evidence of butchering was observed on those remains and they may not have been food related materials.

Personal Possessions and Clothing

5 probable mirror fragments
Glass bottle fragments including wine/sparkling wine/champagne bottles (at least 3 such bottles are represented in the sample; #51a, #51b, #52, #53b, #66), and a possible American eagle historical flask (#218)
Ball clay smoking pipe fragments (#83a, #83b, #89, #94a, and additional fragments from HS10-X5-7, HS10-C-38, and HS10-C-48)
1 smoking pipe ferrule (#124)
Possible playing card fragments (HS10-C-27)
Metal buttons
- General service uniform buttons (#109, #132, #152, #154)
- Infantry officer's uniform button (#144)
- New York Militia button (#151)
- Four-hole attachment button
- 1 possible fabric-covered ferrous metal button

Shell buttons
- 1 two-hole attachment salt water mother-of-pearl button
- 1 four-hole attachment fresh water shell button

Porcelain buttons
- 2 four-hole attachment white porcelain buttons
- 1 four-hole attachment piecrust style button of white porcelain (#16)

2 incomplete stacked leather boot or shoe heels
Numerous fragments of felt which may represent the remains of a hat (#39)
1 probable military hat emblem fragment (#125)
Distal portions of three sword scabbards (#114 and additional fragments from HS10-C-20 and HS10-C-22)
1 incomplete sword-belt plate (#173)
1 cuprous metal securing key for an epaulet or shoulder scale
2 cuprous metal epaulet or shoulder scale holders
1 decorative piece of copper

Possible Hospital Related Artifacts

2 refitted fragments of a glass bottle which originally contained essence of Jamaica ginger (#49)

Possible Horse Tack and Related Materials

Ferrous metal harness buckle fragments
1 headed fragment of a horseshoe nail
Leather fragments with sewing perforations
Manure lenses in the cellar fill in the area of X5

Arms and Ammunition Storage

5 percussion caps/cap fragments (#161, #162, #162a, and fragments from HS10-C-24 and HS10-X5-8)
2 unfired bullets (#103, #106)
3 unfired cartridges/cartridge fragments (#100, #101, #145)

In conclusion, all of the architectural debris in the sample could conceivably have originated from one or more of the adobe buildings at the fort. The artifacts were mixed within the adobe deposits and no patterning was observed in the distribution of materials assigned to the general functional categories. Of particular note, the relatively large sample of personal possessions and clothing items recovered from those deposits included several shell and porcelain buttons which reflect feminine apparel. That category of cultural material as a whole suggests that a domicile is represented, particularly one in which a woman lived.

The three adobe structures which apparently survived into the 1880s include the two laundress quarters and the ordnance sergeant's quarters and are possible sources of the HS-10 cellar fill based strictly upon the fact that they were apparently standing at the time the property passed into private ownership. Those buildings may have been viewed as unnecessary to farm operations, unsightly, and/or unsafe. If demolition of the adobe structures was already planned, they may then have been seen as a ready source of fill material for the cellar beneath the old blockhouse. The manure deposits in the cellar are somewhat problematical and may relate to the later use of HS-10 itself.

Demolition of HS-10

It is not known exactly when the blockhouse was demolished. Local sources suggest that demolition may have occurred either during the middle 1880s or shortly after the turn of the twentieth century (see Cockrell, History and Significance, this volume). Whatever the timing, the demolition process appeared to have resulted in deposition of sandstone and limestone rubble immediately outside the perimeter of the building. During the 1986 archeological investigations, some of that rubble was identified in Stratigraphic Test 1 outside blockhouse wall 5/6 and additionally outside wall 1/2 (F29). However, most of the stone in the superstructure of the building was apparently robbed for use elsewhere. For instance, stone which appears to have originated from the blockhouse has now been found elsewhere around the fort complex (see O'Bright, Architectural Data, this volume). It is also likely that the center post for the blockhouse was pulled at the same time that the demolition of the rest of the building occurred.

Farm Activities at the Site Following Demolition

One of the activities which probably occurred at HS-10 during the farm period

was the filling of the subterranean wellhouse cavity. The original fill in the north half of the wellhouse was differentiated into many strata and appeared to represent a series of short-term fill episodes. That fill contained a cartridge casing type first manufactured in 1890 (HS10-X9-1, #241), a glass bottle fragment which appears to date after the turn of the twentieth century (HS10-X9-2, #204), a complete shoofly flask which may date to the 1880s (HS10-W-3, #203), and two wire nails (HS10-X9-3 and HS10-X9-4). Together, those materials suggest that the wellhouse was filled during the middle to late farm period at the fort.

The property continued to function as a working ranch well into the twentieth century, and a photograph taken in the late 1940s or early 1950s shows cattle being driven over the former site of the blockhouse (Figure 67). Several post features aligned across the site and extending outside the remains of the HS-10 foundation (particularly Features 4, 7, 11, and 12, and two unnumbered features) undoubtedly represent the remains of a former fence line installed to confine or direct the movements of cattle on the ranch (Figure 29).

A long shallow and largely linear soil stain (Feature 19) was identified between 38 and 43 cm below E1 running across the SE Quadrant within the perimeter of HS-10 and cutting across the 5/6 wall stain (Figure 29). For most of its length, the F19 fill was confined within a rounded trough or channel ranging between 9 and 13 cm in depth and between 17 and 24 cm in width. At both the east end of the site outside the blockhouse perimeter and toward the west boundary of the quadrant, the F19 feature fill was spread out beyond the upper edges of the channel. While the origin of the feature is unknown, it clearly postdated the demolition of the building. A single post feature (F18) was identified within the horizontal limits of F19, an association which may be entirely coincidental.

Several additional wooden post features were identified inside and outside the perimeter of the building and it is not presently known if they related to farm or military activities at the site. However, the concrete-filled post holes and other post remains outside wall 1/2 (Features 26-28, 30-35) were clearly associated with the chicken coop/hog pen complex constructed adjacent to the site during the farm period and subsequently demolished by the Park (Figure 29). Two areas of extremely compacted soil identified outside wall 1/2 (Features 25 and 37) probably related to vehicle traffic over the site during the farm period and afterward (Figure 29).

Fort Larned as an Historical Park

The demolition of farm-related developments at Fort Larned following the establishment of the Park was part of an ongoing effort to restore the property, as nearly as practical, to its presumed appearance during the military period. The demolition of the chicken coop/hog pen complex constructed over the southwest portion of the site is clearly an example of such activity. In addition, the archeological investigations conducted at HS-10 and elsewhere at the fort during the Park period reflect upon continued efforts both to understand and define particular military features at the fort and provide an accurate interpretation of those features to the visiting public. During the 1986 investigations, a curious area of in

situ burning (F6) was ultimately found to lie above a tarpaper lined excavation unit within the perimeter of the HS-10 foundation (Figure 29). Because of the stratigraphic relationship between that feature and the previous archeological unit, the episode of burning occurred post-1967. The feature may relate to night time interpretive activities at the Park which occasionally involve the building of campfires around the compound, or perhaps to the burning of grass around the fort. Artifacts recovered from the feature fill included a possible ferrous metal can fragment (#136) and an unfired Civil War-era lead bullet (#105).

As discussed previously, the tunnel fill immediately beneath blockhouse wall 3/4 consisted of a number of limestone and sandstone blocks carefully mortared into place and resting atop a layer of soil fill which extended to the floor of the tunnel. A rifle loophole had been cut into one of the large slabs of limestone in the mortared rock wall in the tunnel, and several of the rocks had been whitewashed. The original tunnel fill in the section of the passageway within the perimeter of HS-10 was previously excavated by Scott and that area contained archeological backfill in 1986. Outside the perimeter of HS-10, the tunnel fill consisted of two major earthen fill components, a jumble of large rocks mortared into position, a discontinuous layer of sheet plastic and tarpaper, and archeological backfill. The lowest earthen fill component (Level 4) which lay directly atop the tunnel floor contained adobe brick fragments and may have been deposited at the same time as most of the fill in the HS-10 cellar cavity. The single large earthen fill component between that adobe fill and the mortared rock near the top of the tunnel appeared to represent a single massive fill episode.

The sample of cultural material recovered from the tunnel fill above Level 4 included two separate wads of probably acrylic string (HS10-T-7 and HS10-T-12). Significantly, the first acrylic fibers were produced commercially around 1950 (Miller 1968:52). The string/yarn from HS10-T-7 also had bits of probable wool fiber adhering to it. The acrylic lay beneath the tarpaper and plastic lined excavation units associated with the archeological projects conducted by Moore and Scott, and did not appear to have been deposited as a result of animal burrowing. It would therefore seem that the tunnel outside the perimeter of the HS-10 foundation was filled sometime between 1950, the earliest possible date for manufacture of the acrylic, and 1967, the year in which Moore conducted his archeological excavations at HS-10.

Despite this late time period for deposition, a mortar sample (MO4) collected from the tumbled mass of rock and mortar near the top of the tunnel was found to contain fines and sands very similar to those contained within two other mortar samples (MO1 and MO2) believed to represent original fabric from the construction of HS-10, although the mix of ingredients was slightly different (Appendix G). In assessing the origin of the rock and mortar fill in particular, it was also observed that the volume of mortar around the rocks was almost equal to the volume of rock itself in some places. In one area in particular, the rock appeared to have been thrown into a large puddle of wet mortar. Some of the rocks in the jumbled deposit had been dressed and some had been whitewashed. In conclusion, the tunnel cavity may have been filled during the historical park period at Fort Larned, and the rock and mortar fill outside the perimeter of HS-10 may represent debris from restoration activities conducted elsewhere around the fort.

## SUMMARY AND CONCLUSIONS

The construction of the blockhouse at Fort Larned was begun in 1864, either during the spring and early summer at the recommendation of a visiting Army Inspector General or during the late summer/fall in response to a general field order issued from Headquarters, Department of Kansas out of Fort Leavenworth. That field order was apparently prompted in part by an Indian raid on Fort Larned itself in July 1864 during which a party of Kiowa ran off many of the fort's horses and mules. Specifically, General Field Order No. 2 directed that stockades or other defensive enclosures be immediately provided at all posts in the Department of Kansas both for the livestock and for the troops. In addition, Fort Larned was singly reprimanded for having neither a stone blockhouse nor enclosures for the animals. The layout of the main compound at Fort Larned at the time of the Kiowa raid is illustrated in Figure 2.

The construction of blockhouses on the American frontiers was an almost automatic response by the U.S. Army to the threat of Indian raids. The blockhouse phenomenon was a well-known, traditional form of Western military architecture developed from collective warfare experiences dating back several thousand years but primarily involving defense of siege. Numerous military blockhouses were ultimately built across the United States from the east coast to the Pacific Northwest, and the construction of the blockhouse at Fort Larned was just one example of a general and culturally conditioned military response to potential or actual armed conflict.

Fortifications in general are an ancient form of architecture which Robinson (1977:203) defined as the "art of building works for defense or attack which, through their form and construction, enabled their occupants to resist assaults by superior forces for a considerable length of time." Changes in fortification styles occurred over the centuries in Western cultures in often belated response to advances in offensive military weaponry and tactics. For several hundred years, such tactics were oriented primarily toward the successful prosecution of siege, the persistent attempts by an army to conquer a fortified location by surrounding it and continually hammering at its defenses.

The blockhouse concept of military architecture originated directly from the defense of siege. While the specific origins of the blockhouse structural form are unclear, its concept is fundamental and its antecedents are obvious. The blockhouse provided a structure of final refuge which could be held against a superior force and from which the enemy might be harassed and killed.

One of the earliest forms of fortification was built in the Middle East prior to the Christian era and consisted of an enclosure constructed around a town or city which strictly controlled access to the interior space. Towers or other similar features built along the enclosure placed the defenders at a height above an attack, enabling them to shoot or throw objects down upon the enemy. Another early defensive structural type sharing similarities with the blockhouse was the broch, a pre-Roman fortification built in Scotland. This

structural type consisted of a tall circular tower of dry laid stone which apparently served as a place of refuge in the event of attack (Brice 1984:67-68; Forde-Johnston 1977:40-41; Kightly 1979:14-16).

The blockhouse concept of defense is clearly visible in medieval architecture. One form was the simple ninth century French keep, an early variety of castle built as a stronghold for the nobility and royalty of the area (Robinson 1977:5-6). Keeps were generally sited on natural or artificial mounds and were surrounded by one or more palisades. These walls enclosed additional interior structures and provided space and shelter for local rural peasants and their livestock in the event of an attack. The early keeps were square or rectangular in plan view but circular and polygonal designs eventually appeared which were believed less vulnerable to battering and undermining (Brice 1984:78; Forde-Johnston 1977:84, 92). This particular type of fortification system later became known as a "motte and bailey" and was eventually adapted to other areas of Europe under the influence of the Normans.

The first form of architecture which may actually be referred to as a blockhouse first appeared in England prior to the establishment of her colonies in the New World (Brice 1984:111). English colonists apparently carried this concept of defensive architecture with them to New England and Virginia, constructing blockhouses as part of their settlement defenses against the attacks of the Indians and the French (Forman 1948:12; Morrison 1952:75-79, 134, 136). The blockhouses of colonial New England were generally square in plan view, although pentagonal and octagonal forms are also known to have been built. Constructed of logs or a combination of logs and stone, they typically had an overhanging second story called a jetty. The jetty was a common feature in colonial New England architecture in general and was traceable to European medieval architectural styles (Morrison 1952:28-29).

Related structures known as redoubts were also constructed by the British in the New World in the 1700s. Five redoubts were constructed at Fort Pitt in western Pennsylvania in the early 1760s (Robinson 1977:49), at least one of which is known to have been two stories high and built of wood. It was five sided in plan view, three walls built at right angles and the other two constructed at an acute angle relative to each other. Rifle loopholes were cut into the walls on both stories of the building. The British army also constructed blockhouses as part of their Revolutionary War fortifications at Fort Mud on the Delaware River in Pennsylvania and at Fort Mackinac in Michigan (Robinson 1977:59, 61).

Blockhouses were also part of the architectural repertoire of the French colonial period and were illustrated in the original plans for the fortifications around New Orleans in the early 1700s (Villiers du Terrage 1903?:20 in Robinson 1977:43). French influence upon subsequent early American military architecture proved to be considerable. It stemmed largely from the ideas and influence of French military genius Sebastien Vauban, who designed a complex system of bastioned fortifications in France during the seventeenth century (Robinson 1977:11-12). At Vauban's urging, a corps of engineers was founded in France in 1690 and the highly regarded French Ecole Polytechnique incorporated the principles behind Vauban's

fortification system into its curriculum. A knowledge of French military architecture was eventually carried to the New World colonies and later to the United States by men who had served in the French corps of engineers, and the U.S. Military Academy at West Point ultimately adopted a program similar to that of Ecole Polytechnique. As a consequence, many French concepts of military architecture became institutionalized in America at an early time.

Following the Revolutionary War, the U.S. military expanded its system of seacoast defenses, particularly in areas adjacent to the major cities. Blockhouses constituted an integral part of those defenses, as indicated in the specifications which accompanied the 1794 Congressional authorization for the defenses (U.S. Congress 1832 in Robinson 1977:63). A textbook on fortification originally published in 1836 for use at the U.S. Military Academy described the blockhouse as a keep or place of retreat in a larger defensive work (Mahan 1968). It recommended that blockhouses be constructed of timber, generally square or rectangular in plan view, and either one or two stories high. In the latter case, the second story walls or corners were to overhang the first story walls. Loopholes were to be provided along the walls, and the whole structure was to be surrounded by a defensive ditch.

Specifications for blockhouses to be constructed on the Western frontier were issued by the Engineering Department of the U.S. Army, Washington in 1839 (see Cockrell, History and Significance, this volume). A minimum of two blockhouses was to be built at diagonal corners of any cantonment enclosure. They were to be constructed of stone, two stories high and square in plan view, with sides measuring 40 ft in length. Among a number of other features, blockhouses were to be provided with loopholes along the walls and a water well or cistern.

Blockhouses were relatively common military and civilian defensive structures on the frontier in the East, Midwest, and Southeast from the colonial period through the early 1800s (Forman 1948:12; Morrison 1952:75-79, 136; Robinson 1977:133-134). They were present among the various types of fortifications constructed in Missouri prior to and during the War of 1812 in anticipation of Indian hostilities instigated by the British. The local settlers of the region, the Missouri Rangers, and the U.S. Army all participated in that construction (Frazer 1965:70).

Blockhouses were subsequently built across the Great Plains as the frontier shifted westward (Figure 68). During the first half of the nineteenth century, blockhouses were built at such fur trading posts as Forts Berthold I and II in present day North Dakota, Fort Pierre in South Dakota, Forts William and John in eastern Wyoming, and Fort Lewis in north-central Montana (Hart 1963:67, 1967:138-139, 154; Peterson 1964:45, 47; Smith 1954:15). Blockhouses were also a defensive component of a large number of military posts established on the Plains during the third quarter of the nineteenth century. Those posts included Forts Rice, Abercrombie, Ranson, Yates, and McKeen in North Dakota; Forts Dakota, James, and Wadsworth, and the Whetstone and Cheyenne Indian Agency posts in South Dakota; Fort Phil Kearny in Wyoming; Fort Mitchell and Sidney Barracks in Nebraska; Forts Larned, Zarah, Ellsworth, Hays, and Lookout in Kansas; and Fort Gibson and Camp Supply in Oklahoma (Ellsworth 1878 in Mattes

1947:12-13; Ferris 1967:245; Hart 1963:59, 70, 86, 105, 108, 149, 155; Hart 1964:94-95, 153; Hart 1967:159, 162; Kansas State Historical Society 1926 in Garfield 1931-32:59; Oliva 1982:18; Robinson 1977:168, 173; U.S. Army, Headquarters, Military Division of the Missouri 1972:17, 58, 60-61; U.S. War Department 1880-1901 in Barry 1971:144). A blockhouse was also apparently built near Fort Sill, Oklahoma (Hart 1964:116).

In addition, blockhouses were constructed on the edge of the Plains at Forts Leavenworth and Scott in eastern Kansas. Fort Scott was established in 1842, abandoned by the military in 1853, and subsequently reactivated in 1861 during the Civil War (Arbogast 1976). The physical layout of that fort during the two episodes of military occupation was quite different, the second Fort Scott dispersed within and around the community of Fort Scott which had grown up around the original post (Reynolds 1983:7-8). Among the Civil War-era structures built at Fort Scott were three sets of outlying defensive earthworks with interior blockhouses called lunettes, a type of defensive work built extensively around both Union and Confederate cities during that war (Robinson 1977:130).

In summary, the general concept of retreating within a towerlike structure built to withstand siege is extremely old, and the later Euro-American blockhouse had an extended tradition at the time of the construction of HS-10 at Fort Larned. The establishment of blockhouses on the Plains was clearly an application of a familiar defensive technology which had proven effective at other times and in many other situations.

Curiously, however, the traditional warfare practices of the Native American groups encountered by the U.S. Army on the Plains during the nineteenth century did not typically involve siege of previously fortified positions as an offensive tactic for reasons related in large part to the Plains Indian objectives of warfare. In a recent review of cultural and ecological factors which contributed to hostilities among the Plains Indians, Biolsi (1984) made a major distinction between small and large scale warfare. Small scale warfare was directed primarily toward the raiding of horses from adjacent enemy groups; large scale warfare could involve up to several hundred men intent upon driving enemy hunting camps from their territory or seeking revenge for deaths which occurred during previous hostile encounters. The literature on Plains Indian warfare indicates that siegelike conditions occasionally developed when an enemy group was surrounded away from their encampment, and that same general pattern ultimately continued during the conflict between the Plains Indians and the U.S. Army. Importantly, however, when Indian groups did besiege contingents of the U.S. Army, they almost always did so when the soldiers were most vulnerable, in open country away from a fort.

With regard to the construction of U.S. military forts in New Mexico during the 1860s and 1870s, Bunting (1976:98-100) has written:

> Worth mentioning is the fact that these stations were fortified only to the extent that some corrals and supply yards were enclosed by buildings as a deterrent to theft. In only two

instances were earthen defense works constructed, at Fort Marcy and at Fort Union, both of which were erected in anticipation of an attack by Confederate troops. At Fort Union, when the larger, permanent, third fort was constructed in the late 1860s on a new site, most buildings were spaced around a large parade ground. The reason for this lack of defensive precautions was that the large installations were never subject to Indian assault. Most military engagements were fought in Indian territory.

A series of events in Minnesota in 1862 which are together known as the Sioux Uprising did include major assaults by the Santee Sioux on two U.S. military forts in the area, Fort Ridgely and Fort Abercrombie (Hart 1963:86, 119; Meyer 1967:119-120). In retrospect, however, the Sioux Uprising was anomalous in that respect. The soldiers stationed at Fort Larned in 1864 were undoubtedly aware of those earlier events, although the tribes represented in the immediate area of Fort Larned did not include the Santee Sioux. In addition to the Kiowa, the Indian groups who frequented the area of Fort Larned and the section of the Santa Fe Trail patrolled out of that fort included the Cheyenne, the Arapaho, the Kiowa-Apache, and the Comanche (Gunnerson and Gunnerson 1988:ix).

In summary, the military forts on the Plains were most likely to be the subjects of hit and run raids perpetrated by a small number of Indians in which the fort's horses would be stolen, and that is roughly what happened at Fort Larned on July 17, 1864. Various accounts of the events which transpired immediately before and during the raid on Fort Larned are conflicting with regard to the specific motives of the Kiowa. The original intent of the Kiowa was believed by the military to have been the killing of the soldiers at the fort (Brown 1964:196-197; see Cockrell, History and Significance, this volume), while a presumably Indian account of the raid (Grinnell 1956:147) indicates that the Kiowa objective from the outset was the capture of horses. Regardless of the intent of the Kiowa in perpetrating the raid, part of the military response to that and other incidents on the Southern Plains in 1864 was construction of the stone blockhouse at Fort Larned. Not surprisingly, the building was never used for its original defensive purpose because the fort was neither attacked nor raided after that date, and the blockhouse was quickly converted to a guardhouse to address military problems much more typical than Indian attack.

The 1986 archeological investigations at HS-10, the site of the Fort Larned blockhouse, confirmed that the superstructure of the building was six- sided in plan view. The remains of the stone foundations for the building were completely exposed and examined, and a gap in the foundation along wall 2/3 which faced toward the parade ground is believed to have been the location of the exterior entrance to the building. A sill stone may have previously been positioned in the entrance. The central roof-supporting post for the blockhouse had been pulled but appeared originally to have extended to the floor of a cellar within the perimeter of the building. A limestone footing had been provided for the center post, and a jumble of

irregular rock had apparently been used to buttress one side of the post. Although an elevated walkway of some sort would presumably have been required in order to gain access to the upper tier of rifle loopholes around the building, no archeological evidence was found of a support system for such a walkway. A great deal of information was collected regarding a subterranean complex beneath the blockhouse which included a partial cellar, an underground passageway or tunnel, and a stone wellhouse. However, no clear evidence of the rough wooden guardhouse addition to the blockhouse was found during those investigations.

Following the deauthorization of Fort Larned and the sale of the property in 1884, the old military reservation and fort buildings were adapted for farm use. During the early years of the farm period, the blockhouse was reportedly used as a stable for bulls, and such use of the building was reflected in the archeological record at HS-10. Although the building was undoubtedly demolished during the farm period, it is not known exactly when that occurred. However, a variety of other archeological features and fill deposits at the site related to farm activities which took place following the demolition of the building. With the establishment of Fort Larned National Historic Site, the property formally passed into the present era, which may be characterized by land use as an historical park.

A number of individuals contributed to the project from the initial fieldwork through report production. Bob Nickel initially encouraged the writer to undertake the project and provided support throughout its duration. Rene Botts participated enthusiastically in the fieldwork and the subsequent laboratory processing, identification, and analysis of artifacts. Al O'Bright participated as a member of the archeological crew, providing on-site architectural expertise and suffering cheerfully along with the rest of us in the sun, wind, and snow. Ed Sudderth generously shared his expertise on historic artifacts and allowed free access to his extensive personal library. Cleat Walters and Warren Kenyon contributed generously and enthusiastically to the project as volunteers and friends. Jack Arnold, George Elmore, Nick Koenigs, and the Park maintenance staff provided unqualified support during the conduct of the field investigations. In addition, George independently arranged for a source analysis of limestone used in the construction of the blockhouse, and promptly provided information, comparative samples, and other materials whenever they were requested by the writer. Assistance with artifact identification and access to reference materials was provided by Jeff Richner, Al O'Bright, Bruce Jones, Steve DeVore, and Virgil Noble. Additional reference materials were provided by John Reynolds, Tom Thiessen, Doug Scott, Pat Phillips, Bill Hunt, and Alan Osborn. Bruce Jones provided editorial comment on the manuscript, and the manuscript was strengthened in response to thoughtful review by Al O'Bright and the Park. Carrol Moxham lent her cartographic talents to the project through the preparation of illustrations for the final report. Carrol was assisted in the final camera work by Mary Johnson. Tom Thiessen and Judy Pace provided organizational and editorial recommendations on the entire Historic Structure Report. The final text was produced in Page Maker by Marie Johnson. The successful completion of the project may also be attributed to the leadership of Center Chief F.A. Calabrese. A heartfelt thanks to these individuals, the field crews, the volunteers, and others involved in the project.

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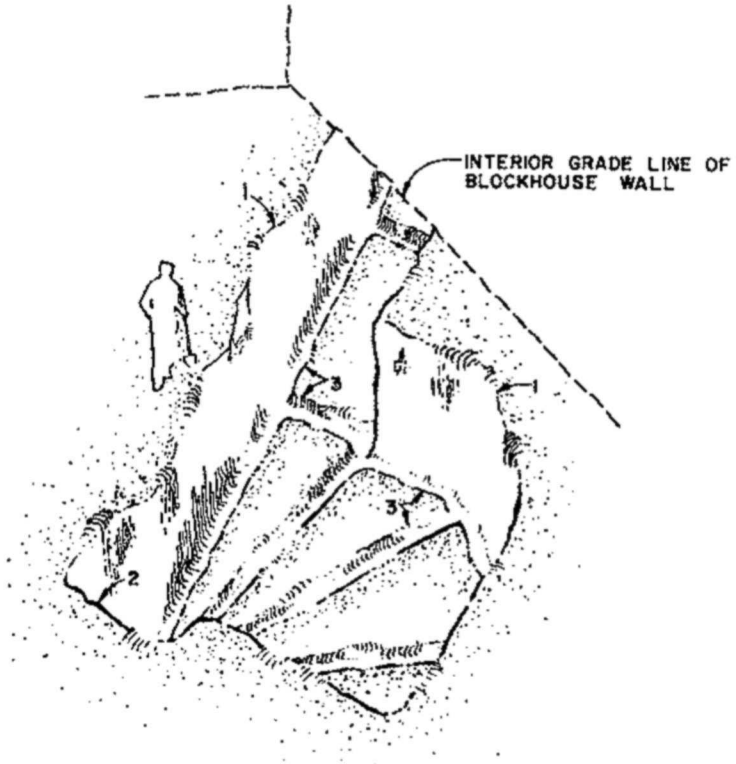
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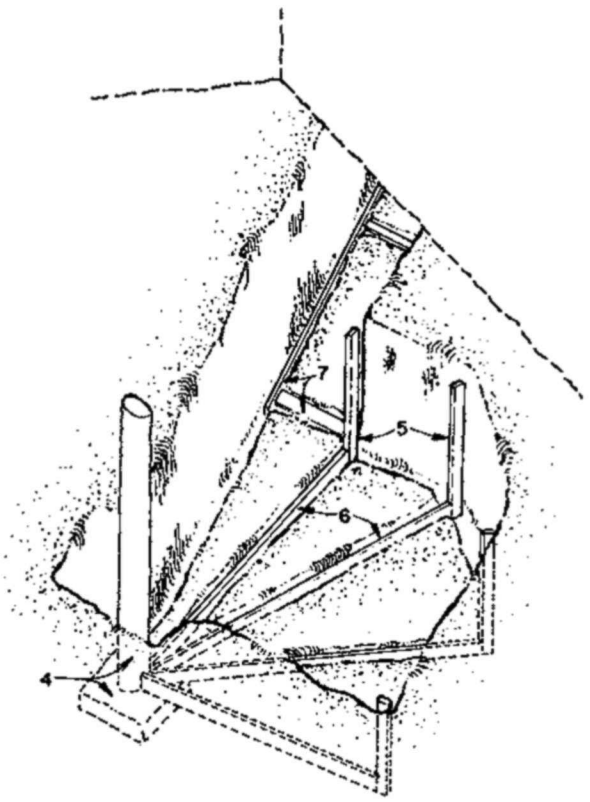
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# APPENDIX A

## Cellar Chronology Illustrations




1. Cellar and tunnel walls excavated to desired dimensions and approximate depth of six feet.

2. Excavation made to receive center post stone footing.

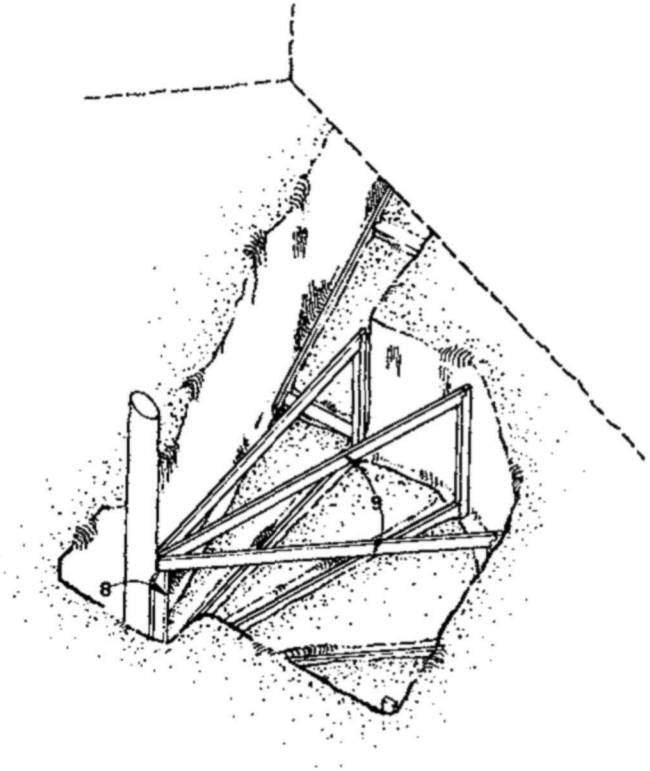
3. Shallow trenches excavated to receive plank walls and support structure beneath cellar floor level.

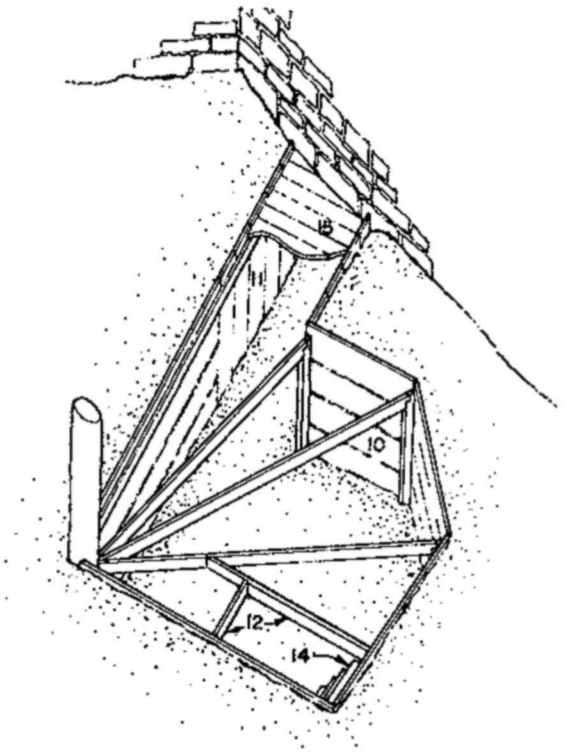
4. Center post limestone footing and temporarily braced center post installed.

5. Cellar wall posts braced in place.

6. Sub-floor lateral braces laid radially from center post to cellar wall posts.

7. Tunnel toe boards and spreader boards installed.




8. Vertical two-by-sixteen-inch planks snugged up at right angle to each other and nailed to center post with cut spikes. The base of the planks rest on the lateral braces.

9. Cellar deck joists installed. One end of each joist rests unfastened on the center post vertical planks and the opposite end was joined to the cellar wall posts.

10. Horizontal wall plank laid to form the cellar walls.

11. Vertical wall plank laid in tunnel walls.

12. Joist and header constructed to frame the cellar hatch.

13. All builder's trenches backfilled.

14. Stairs constructed.

15. Deck constructed over cellar and tunnel at the interior of the blockhouse.

# APPENDIX B

Stone Survey Sheets

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

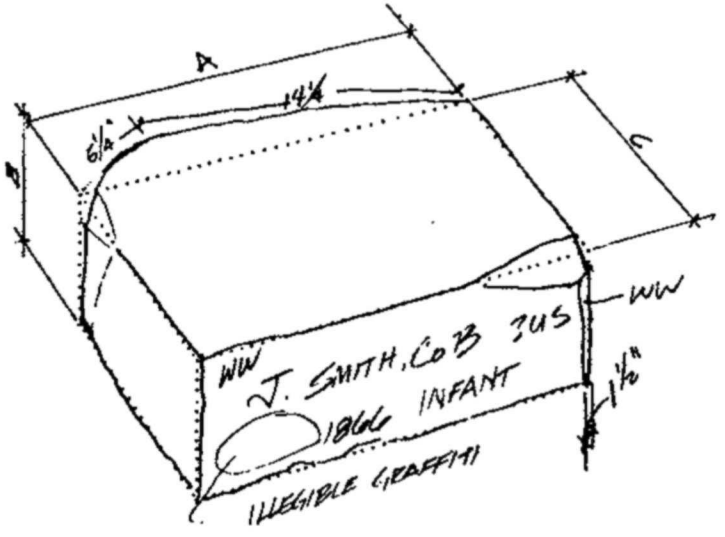
STONE NO.: 1
DATE: 2/25/86

STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☐ N ☐
GRAFFITI: Y ☒ N ☐
J. SMITH, CO B 3 US.
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WW = WHITEWASH

DIMENSIONS: A 1'-6 3/4" B 6 1/4" C 9 3/4"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___



BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

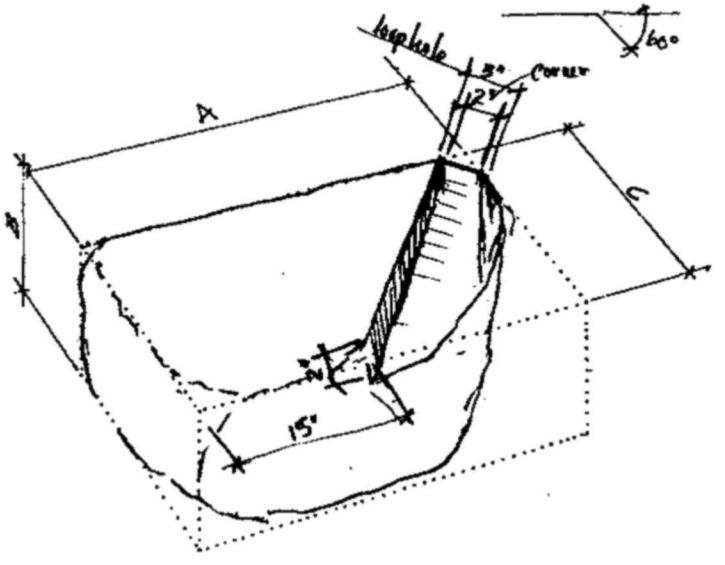
STONE NO.: 2
DATE: 2/25/86

STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Coarse stone w/ coarse loophole

DIMENSIONS: A 28 B 9 1/2 C 13 3/4




SURVEYOR AD PHOTO: ROLL ___ FRAME ___

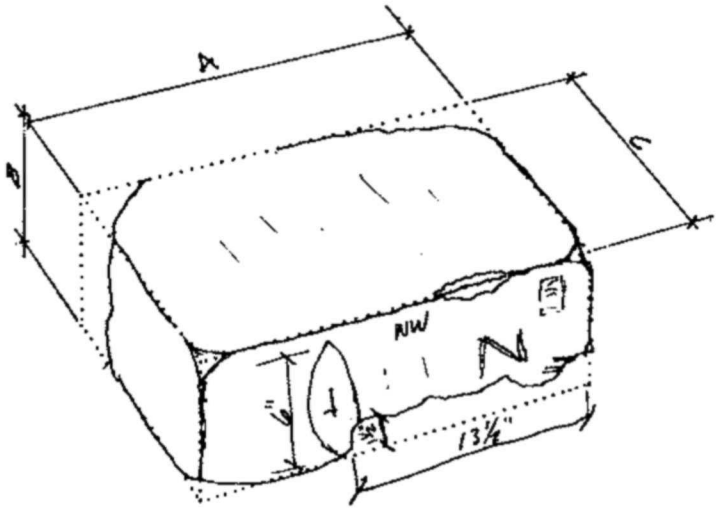
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 3
DATE: 2/25/86

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
(4) N
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WW-WHITEWASH

DIMENSIONS: A 19" B 6 3/4" C 13 1/4"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

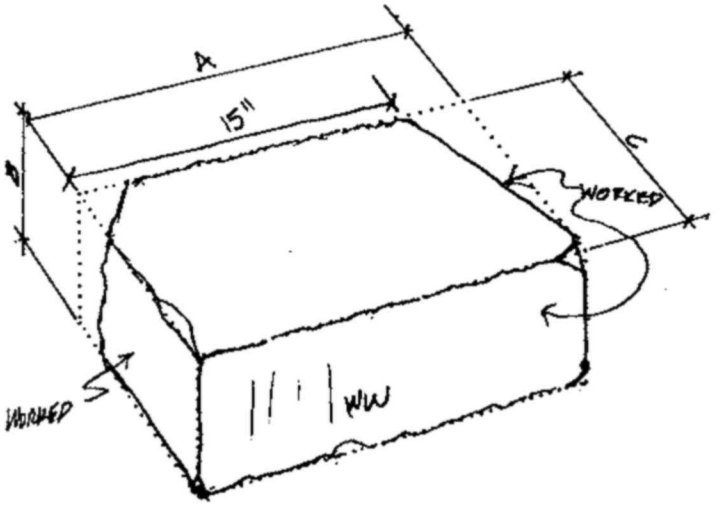
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 4
DATE: 2/25/86

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WW - SLIGHT REMNANTS OF WHITEWASH THROUGHOUT SURFACE

DIMENSIONS: A 17" B 4" C 9 3/4"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY — STONE NO.: 5

FORT LARNED NHS — DATE: 7/25/96

STONE TYPE: SANDSTONE — TOOL MARKS: Y ☐ N ☐

COLOR: MOTTLED ☒ SOLID ☐ — GRAFFITI: Y ☐ N ☐

BLACK ☐ — CONDITION G ☐ F ☒ P ☐

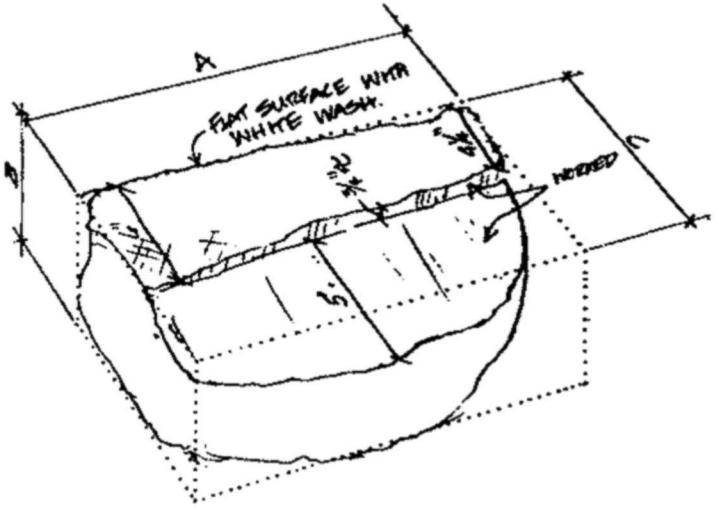
D. BROWN ☒ — STRUCTURALLY STABLE Y ☒ N ☐

BROWN ☐ — COMMENTS: possible loophole half

TAN ☐

WHITE ☐

DIMENSIONS: A 18 3/4" B 4" C 9 3/4"




SURVEYOR DL — PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY — STONE NO.: 6

FORT LARNED NHS — DATE: 7/25/96

STONE TYPE: limestone — TOOL MARKS: Y ☒ N ☐

COLOR: MOTTLED ☐ SOLID ☒ — GRAFFITI: Y ☐ N ☒

BLACK ☐ — CONDITION G ☒ F ☐ P ☐

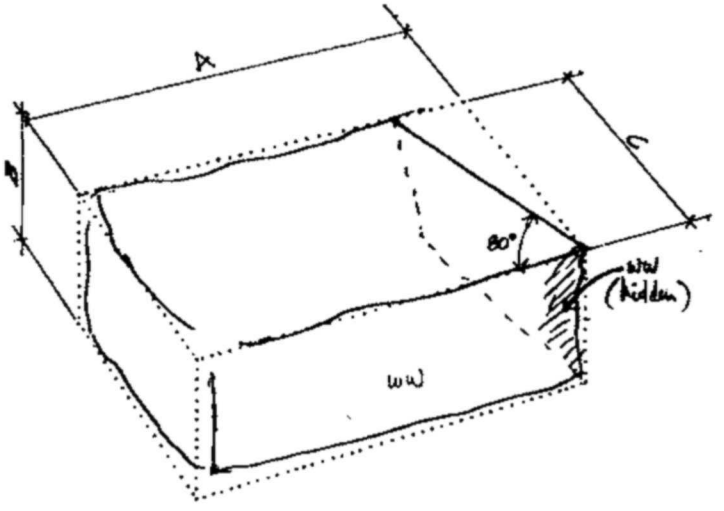
D. BROWN ☐ — STRUCTURALLY STABLE Y ☒ N ☐

BROWN ☐ — COMMENTS: may be loophole corner

TAN ☐

WHITE ☒

DIMENSIONS: A 31 B 4 1/2 C 13




SURVEYOR A.O — PHOTO: ROLL ___ FRAME ___

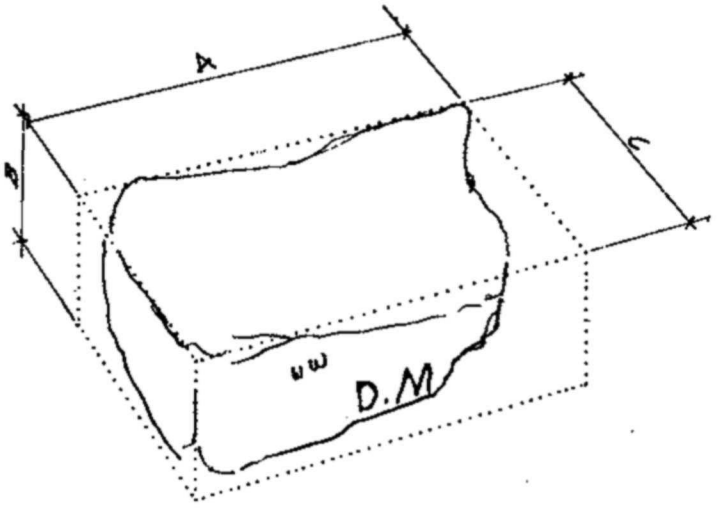
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 7
DATE: 2/22/96

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☑
BLACK ☐
D. BROWN ☐
BROWN ☑
TAN ☐
WHITE ☐

TOOL MARKS: Y ☐ N ☐
GRAFFITI: Y ☑ N ☐
"D.M"
CONDITION G ☐ F ☑ P ☐
STRUCTURALLY STABLE Y ☐ N ☑
COMMENTS:

DIMENSIONS: A 9½ B 2¾ C 9




SURVEYOR AD PHOTO: ROLL ___ FRAME ___

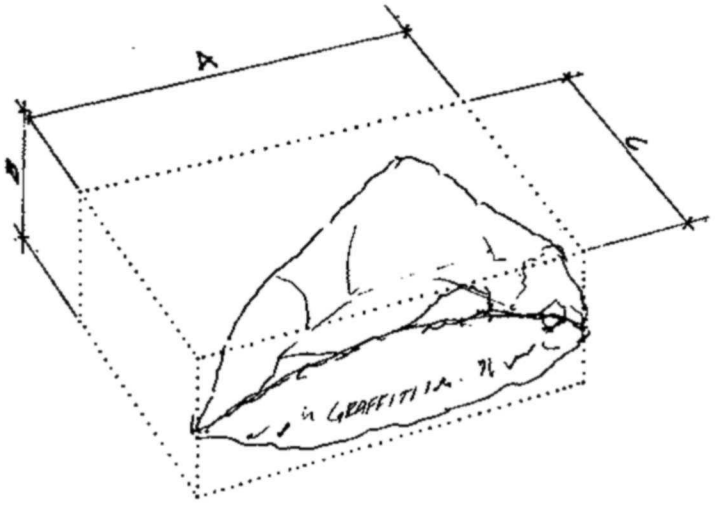
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 8
DATE: 2/22/96

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
ILLEGIBLE
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 11 B 3¾" C 7½"




SURVEYOR JV PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

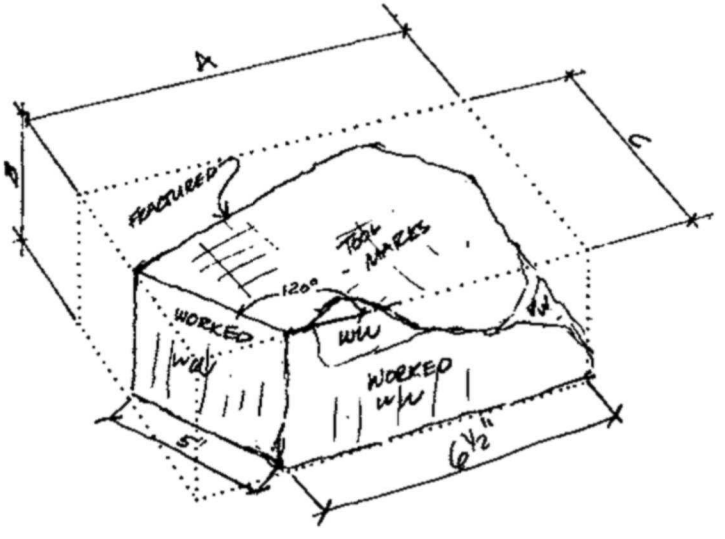
STONE NO.: 9
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED [X] SOLID [ ]
BLACK [ ]
D. BROWN [ ]
BROWN [ ]
TAN [X]
WHITE [ ]

TOOL MARKS: Y [X] N [ ]
GRAFFITI: Y [ ] N [X]

CONDITION G [ ] F [X] P [ ]
STRUCTURALLY STABLE Y [X] N [ ]
COMMENTS: WW

DIMENSIONS: A 9" B 2½" C 8"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

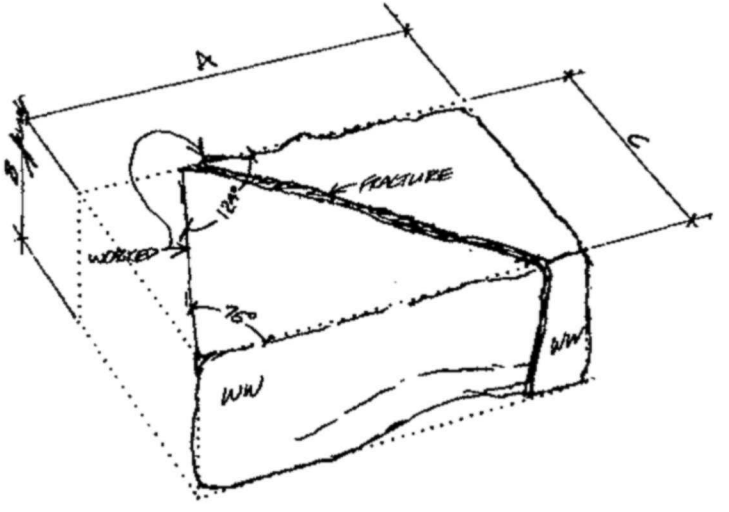
STONE NO.: 10
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED [ ] SOLID [X]
BLACK [ ]
D. BROWN [ ]
BROWN [ ]
TAN [X]
WHITE [ ]

TOOL MARKS: Y [X] N [ ]
GRAFFITI: Y [ ] N [X]

CONDITION G [X] F [ ] P [ ]
STRUCTURALLY STABLE Y [X] N [ ]
COMMENTS: BROKEN IN TWO. POSSIBLE LOWER STONE WITH GUN PORT.

DIMENSIONS: A 14¾" B 3¾" C 13"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 11
DATE: 2/25/86

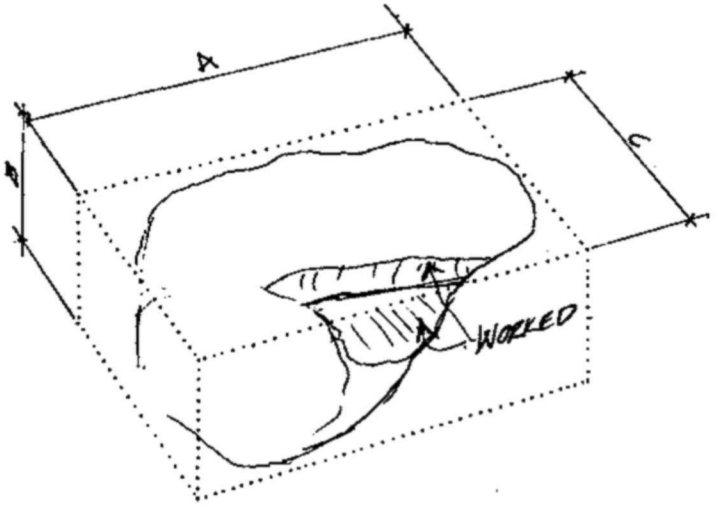
STONE TYPE: SANDSTONE

COLOR: MOTTLED [X] SOLID [ ]
BLACK [ ]
D. BROWN [ ]
BROWN [ ]
TAN [X]
WHITE [ ]

TOOL MARKS: Y [X] N [ ]
GRAFFITI: Y [ ] N [X]

CONDITION G [ ] F [X] P [ ]
STRUCTURALLY STABLE Y [X] N [ ]
COMMENTS: possible loophole

DIMENSIONS: A 9" B 4½" C 7¼"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 12
DATE: 2/25/86

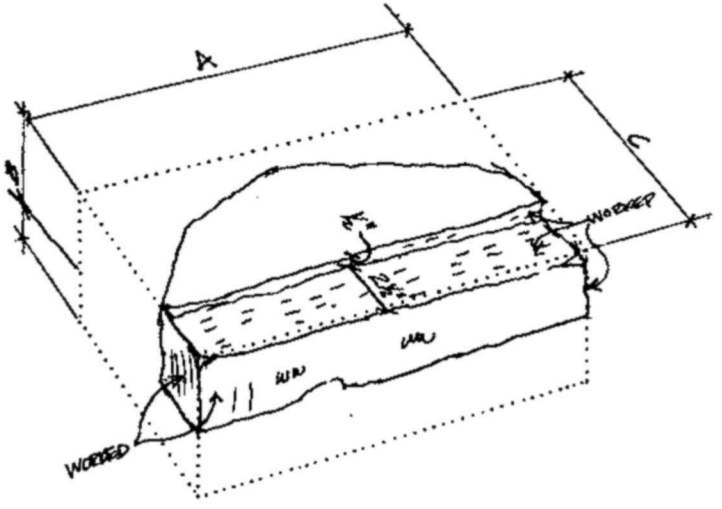
STONE TYPE: SANDSTONE

COLOR: MOTTLED [ ] SOLID [X]
BLACK [ ]
D. BROWN [ ]
BROWN [X]
TAN [ ]
WHITE [ ]

TOOL MARKS: Y [X] N [ ]
GRAFFITI: Y [ ] N [X]

CONDITION G [X] F [ ] P [ ]
STRUCTURALLY STABLE Y [X] N [ ]
COMMENTS: ___

DIMENSIONS: A 18½" B 3½" C 12"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

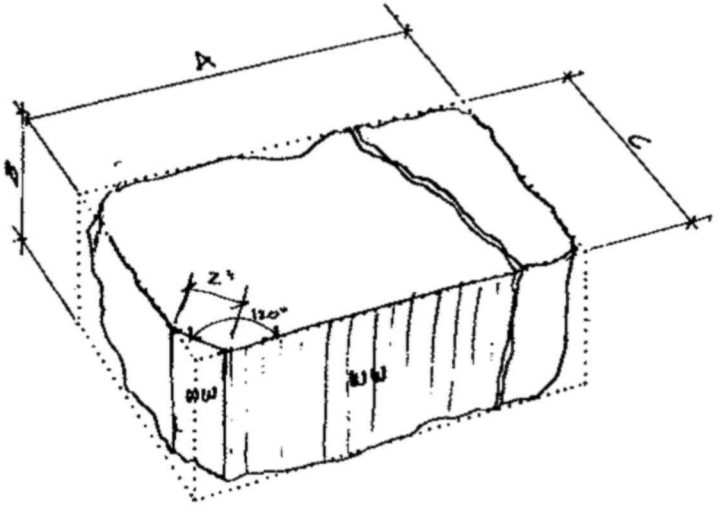
STONE NO.: 13
DATE: 2/25/96

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: corner stone / one stone broken into four

DIMENSIONS: A 26 B 5 1/2 C 11 1/2




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

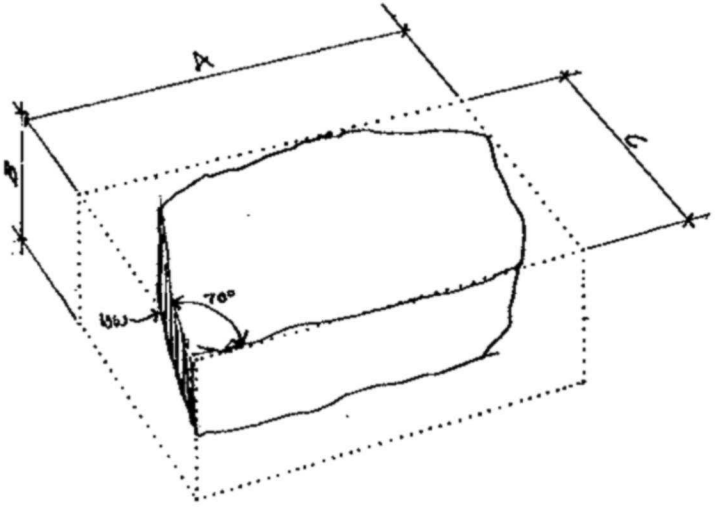
STONE NO.: 14
DATE: 2/25/96

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: corner to loop hole (?)

DIMENSIONS: A 14 B 11 C 3




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

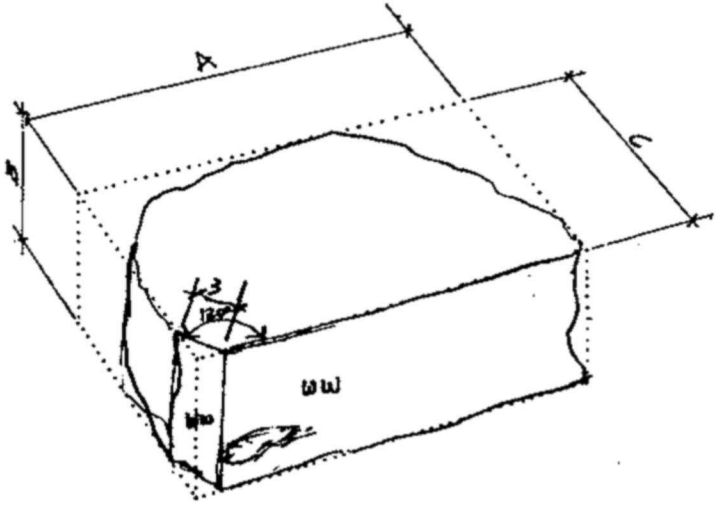
STONE NO.: 15
DATE: 2/25/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☑
BLACK ☐
D. BROWN ☐
BROWN ☑
TAN ☐
WHITE ☐

TOOL MARKS: Y ☑ N ☐
GRAFFITI: Y ☐ N ☑

CONDITION G ☑ F ☐ P ☐
STRUCTURALLY STABLE Y ☑ N ☐
COMMENTS: Coarse stone

DIMENSIONS: A 15½ B 11½ C 11




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___



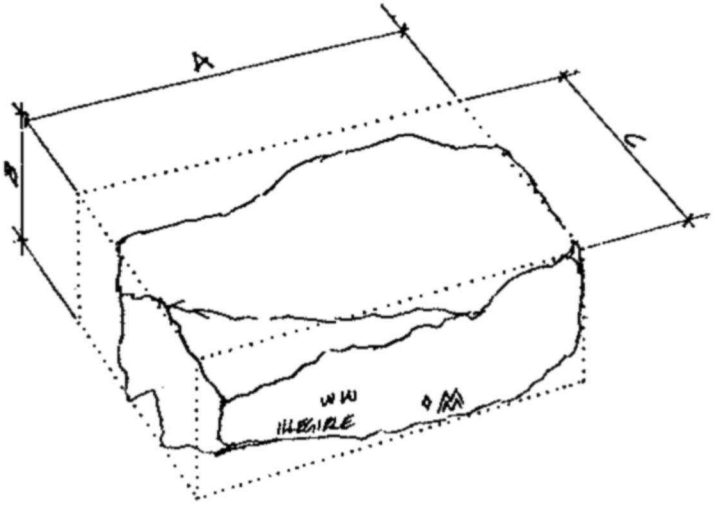
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 16
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
◊ M
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WW - WEATHERED WASH

DIMENSIONS: A 11" B 3¾" C 6"




SURVEYOR ___ PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

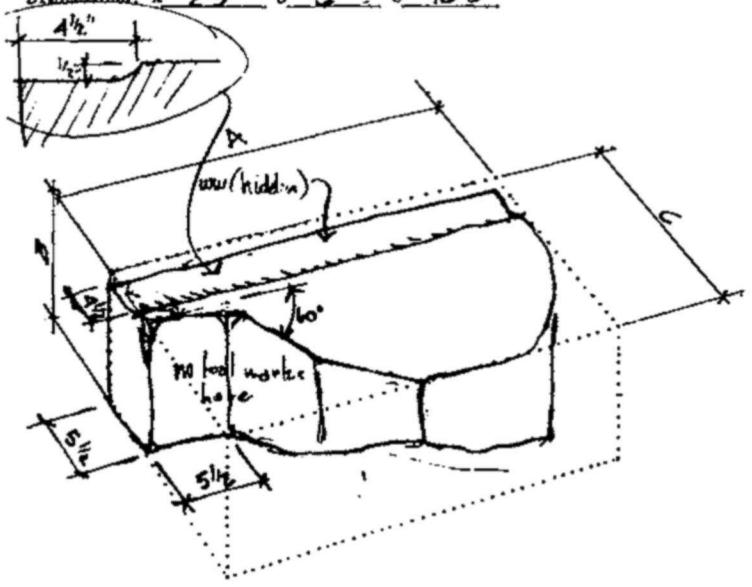
STONE NO.: 17
DATE: 2/25/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 23 B 15 C 12½




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

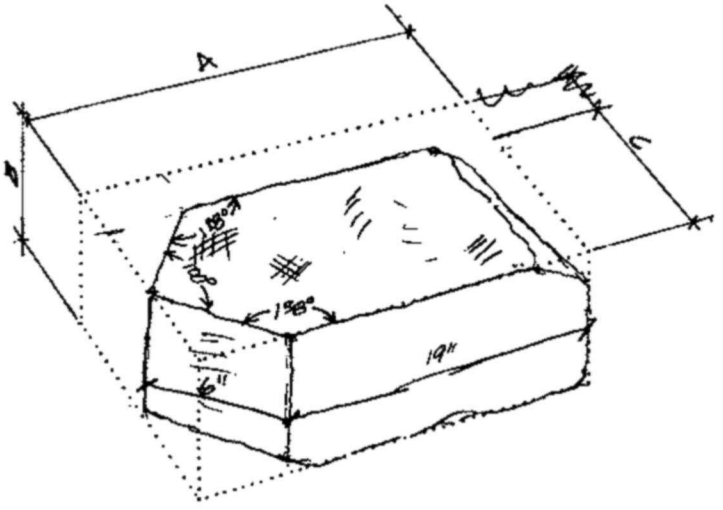
STONE NO.: 18
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 22¾" B 7½" C 8¾"




SURVEYOR JV PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

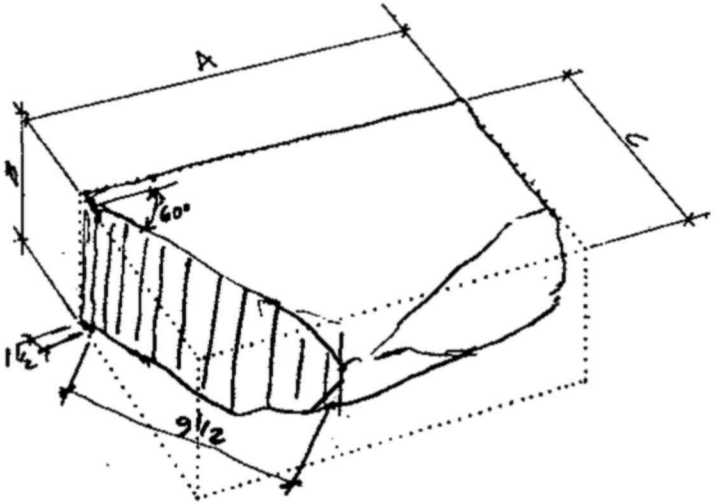
STONE NO.: 19
DATE: 2/25/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: loophole corner (?)

DIMENSIONS: A 16 B 4½ C 10




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

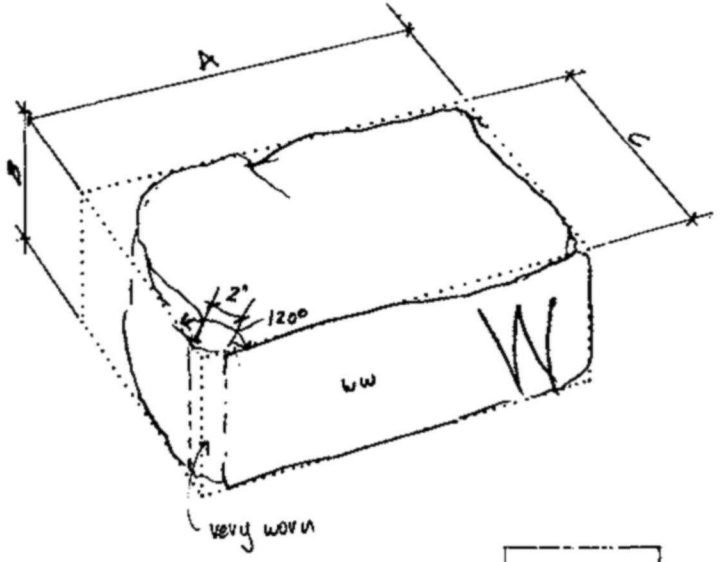
STONE NO.: 20
DATE: 2/25/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
"M" or "W"

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Corner stone

DIMENSIONS: A 25½ B 7½ C 15½




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 21
DATE: 2/25/86

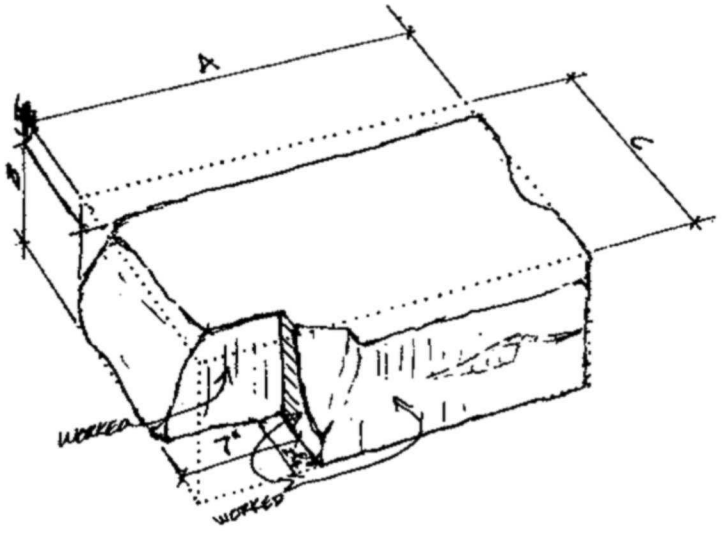
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
- BLACK ☐
- D. BROWN ☐
- BROWN ☒
- TAN ☐
- WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 25" B 6½" C 13¼"




SURVEYOR DP PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 22
DATE: 2/25/86

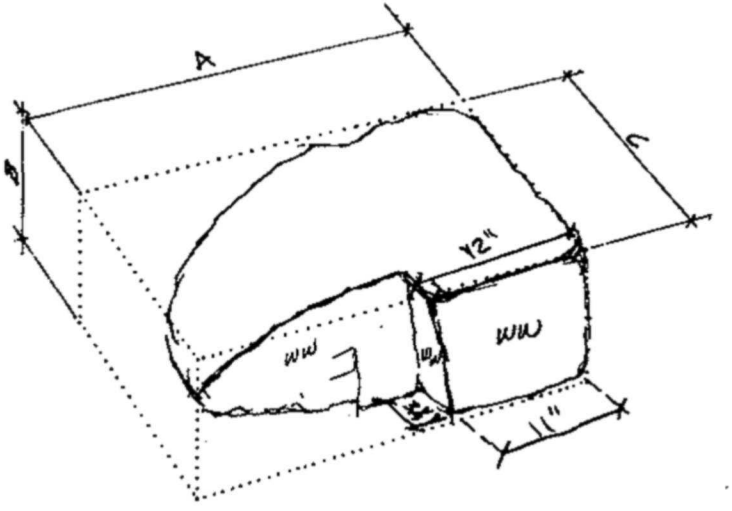
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
- BLACK ☐
- D. BROWN ☐
- BROWN ☐
- TAN ☒
- WHITE ☐

TOOL MARKS: Y ☐ N ☒
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 22" B 7" C 13½"




SURVEYOR DP PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 23
DATE: 2/25/86

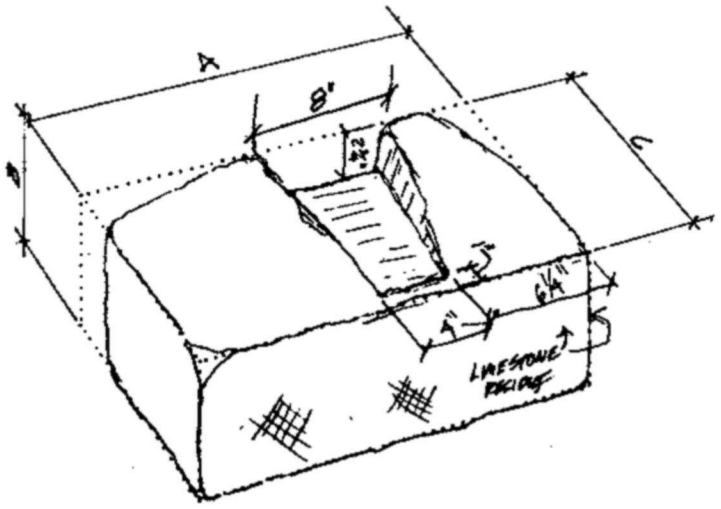
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
- BLACK ☐
- D. BROWN ☐
- BROWN ☒
- TAN ☐
- WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 22½" B 8" C 12½"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 24
DATE: 2/25/86

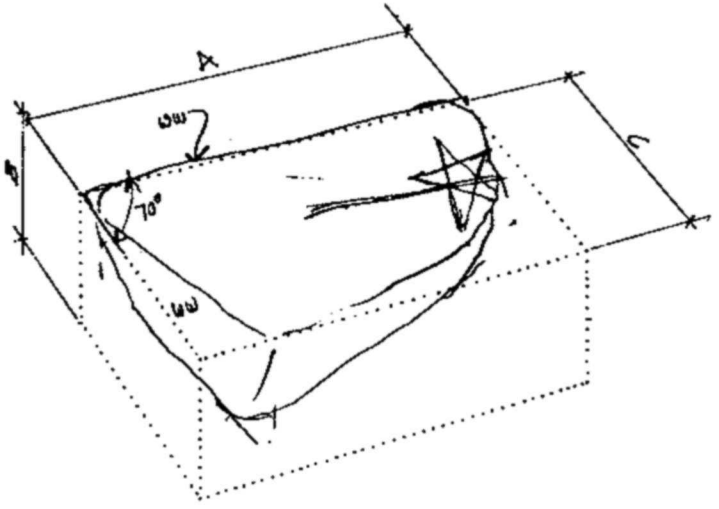
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☑
- BLACK ☐
- D. BROWN ☐
- BROWN ☐
- TAN ☑
- WRITE ☐

TOOL MARKS: Y ☑ N ☐
GRAFFITI: Y ☑ N ☐ "☆"

CONDITION G ☐ F ☑ P ☐
STRUCTURALLY STABLE Y ☑ N ☐
COMMENTS:

DIMENSIONS: A 16 B 3 C 10½




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY

FORT LARNED NHS

STONE NO.: 25

DATE: 2/25/06

STONE TYPE: sandstone

COLOR: MOTTLED ☐ SOLID ☒

BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐

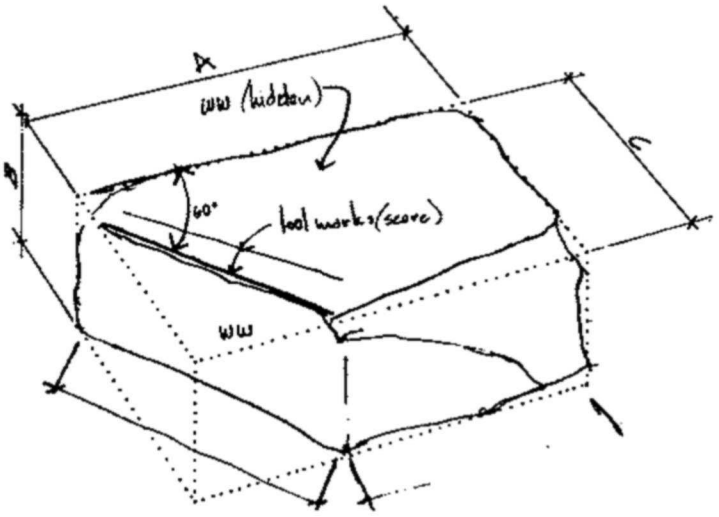
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐

STRUCTURALLY STABLE Y ☒ N ☐

COMMENTS: various score marks exist.

DIMENSIONS: A 18 1/2 B 5 1/2 C 12




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY

FORT LARNED NHS

STONE NO.: 26

DATE: 2/26/06

STONE TYPE: limestone

COLOR: MOTTLED ☐ SOLID ☒

BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐

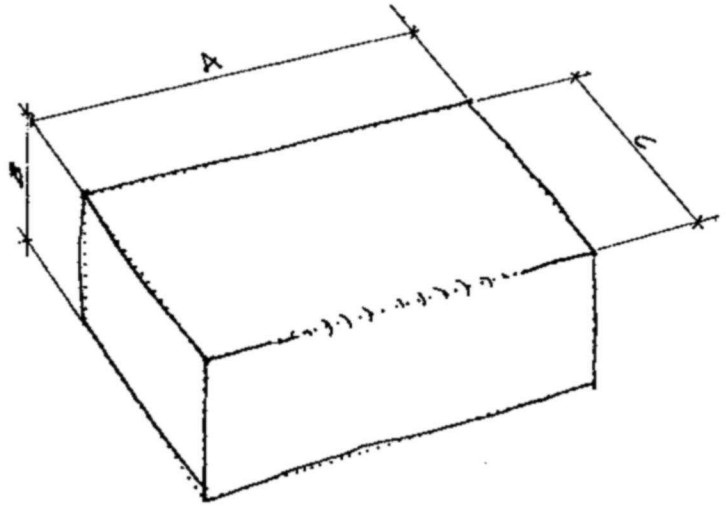
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐

STRUCTURALLY STABLE Y ☒ N ☐

COMMENTS: door sill stone.

DIMENSIONS: A 47 1/2 B 5 C 19 1/4




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 27
DATE: 2/25/86

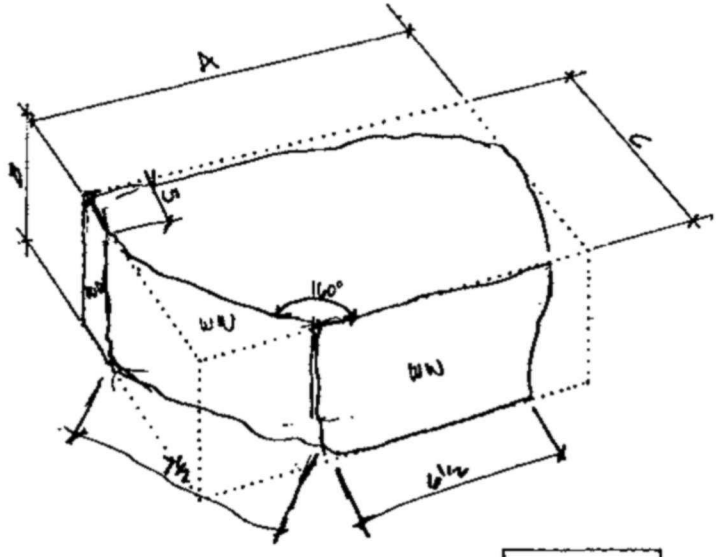
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☑
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Impact corner (?)

DIMENSIONS: A 12½ B 3¼ C 12½




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 28
DATE: 2/25/86

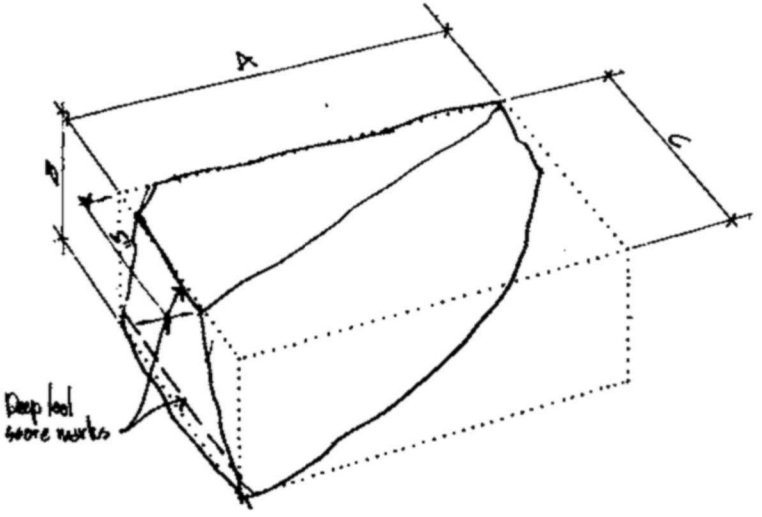
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☑
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 10¼ B 4 C 9




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

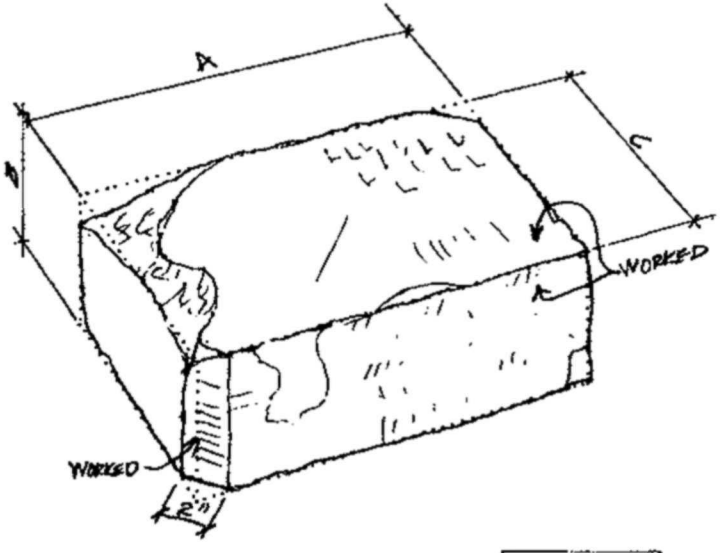
STONE NO.: 29
DATE: 2/05/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☐

CONDITION G ☐ F ☐ P ☐
STRUCTURALLY STABLE Y ☐ N ☐
COMMENTS: PARTIAL LOWER STONE

DIMENSIONS: A 24½" B 12½" C 13"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

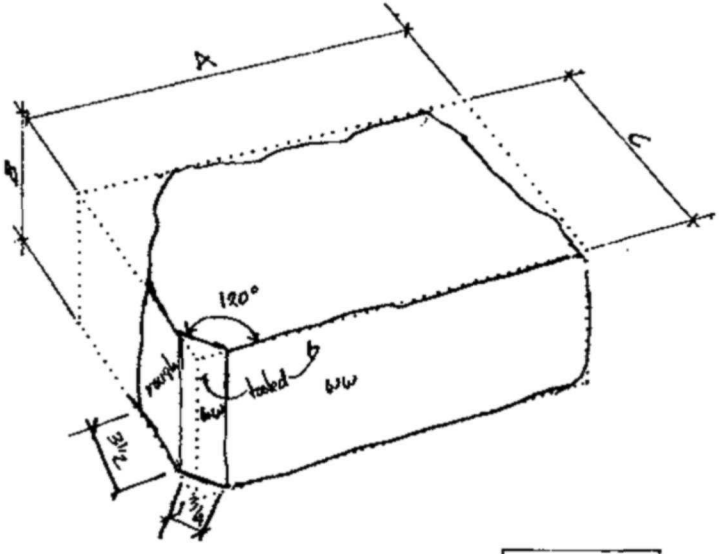
STONE NO.: 30
DATE: 2/25/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☐ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ P ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Corner Stone

DIMENSIONS: A 29 B 7½ C 11½




SURVEYOR A.D. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 31
DATE: 2/25/96

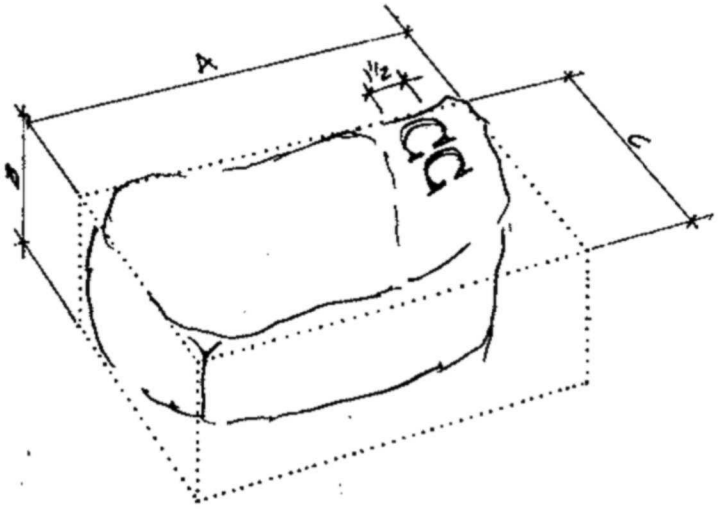
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☑
BLACK ☐
D. BROWN ☑
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☑ N ☐
GRAFFITI: Y ☑ N ☐
"GC"

CONDITION G ☑ F ☐ P ☐
STRUCTURALLY STABLE Y ☑ N ☐
COMMENTS:

DIMENSIONS: A 9½ B 4 C 8




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 32
DATE: 2/25/96

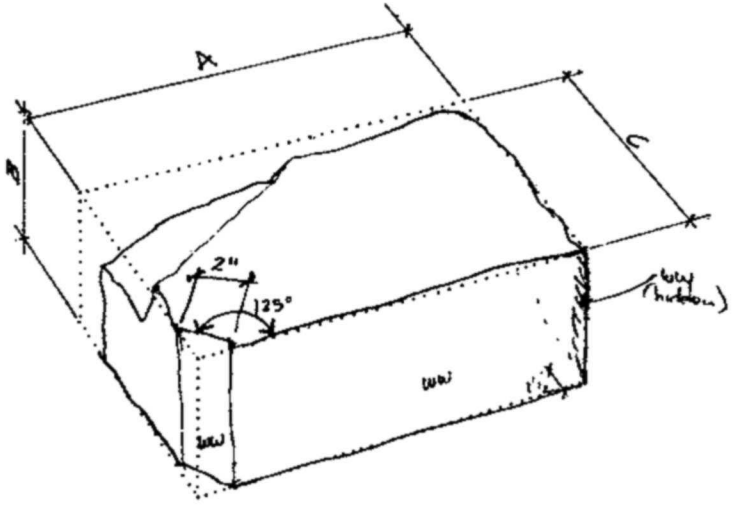
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☑
BLACK ☐
D. BROWN ☐
BROWN ☑
TAN ☐
WHITE ☐

TOOL MARKS: Y ☑ N ☐
GRAFFITI: Y ☐ N ☑

CONDITION G ☑ F ☐ P ☐
STRUCTURALLY STABLE Y ☑ N ☐
COMMENTS: Corner stone

DIMENSIONS: A 21½ B 10¼ C 9½




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

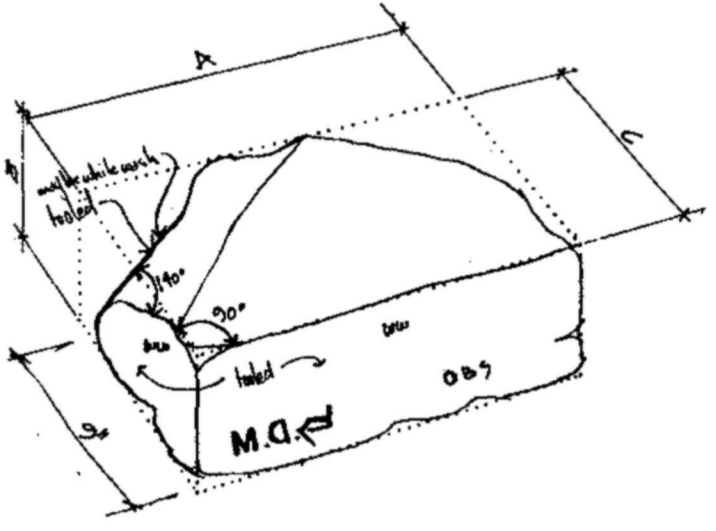
STONE NO.: 33
DATE: 2/26/96

STONE TYPE: sandstone

COLOR: MOTTLED ☒ SOLID ☐
- BLACK ☐
- D. BROWN ☒
- BROWN ☒
- TAN ☐
- WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐ "M.O.(?)" "OBS"
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: 20° curve stone whitewash in graffiti

DIMENSIONS: A 19 B 6 1/2 C 15 1/2




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___



BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

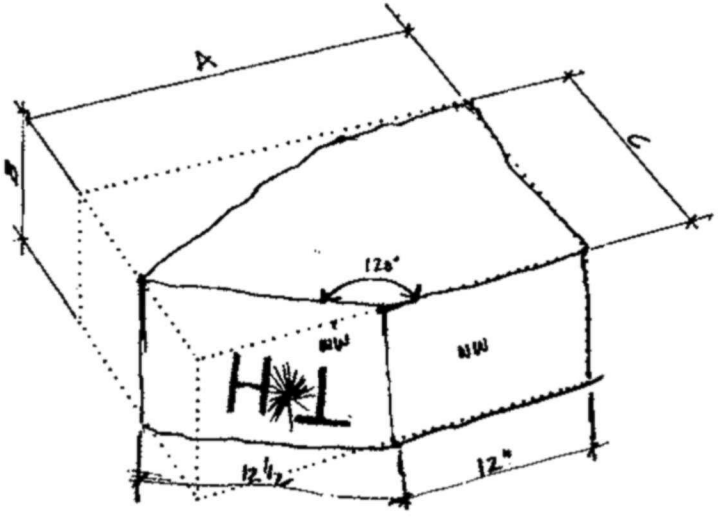
STONE NO.: 34
DATE: 2/25/96

STONE TYPE: sandstone

COLOR: MOTTLED ☐ SOLID ☒
- BLACK ☐
- D. BROWN ☐
- BROWN ☒
- TAN ☐
- WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐ "T H" whitewash in graffiti
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: concave stone

DIMENSIONS: A 18 1/2 B 5 1/2 C 18




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

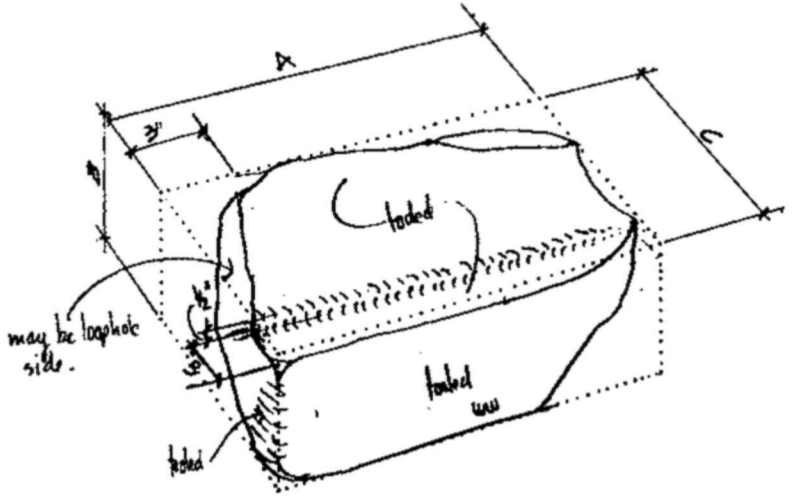
STONE NO.: 35
DATE: 2/26/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 26 B 7 C 12½




SURVEYOR A.O. ; PHOTO: ROLL ___ FRAME ___



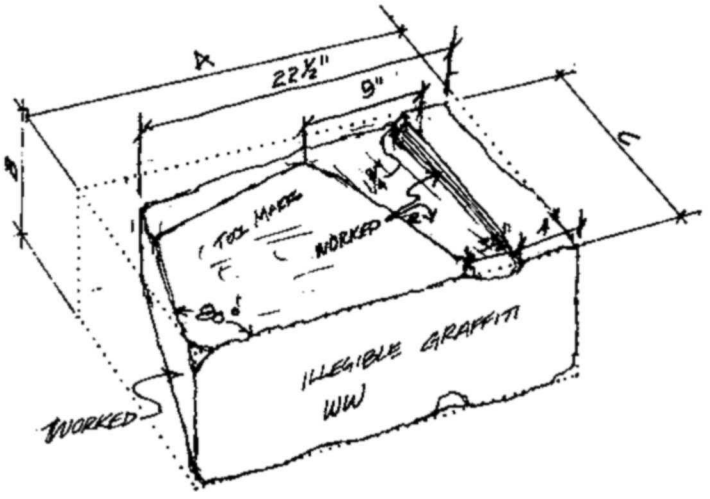
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 36
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
ILLEGIBLE
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WHITEWASH UNDER GRAFFITI. POSSIBLE GUN PORT.

DIMENSIONS: A 27" B 7½" C 18¾"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

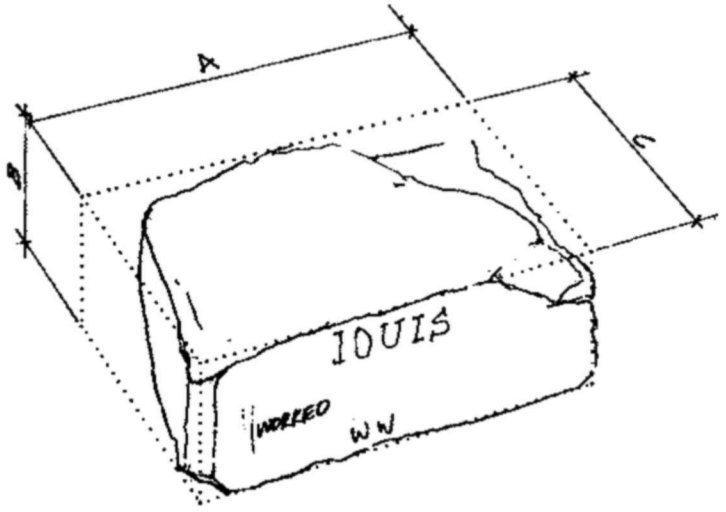
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 37
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
LOUIS
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WHITEWASH INSIDE THE GRAFFITI, POSSIBLE LOOSE/LOOSE SIDE

DIMENSIONS: A 16" B 6 1/4" C 9 1/4"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

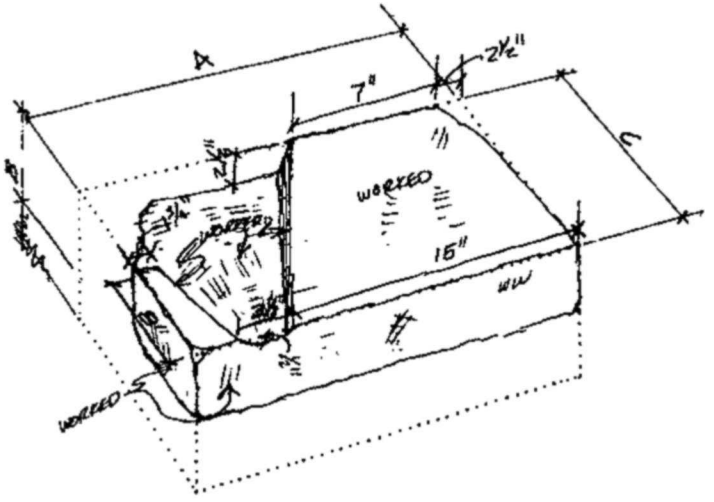
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 38
DATE: 2/25/06

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 22 1/2 B 5 1/2" C 18"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

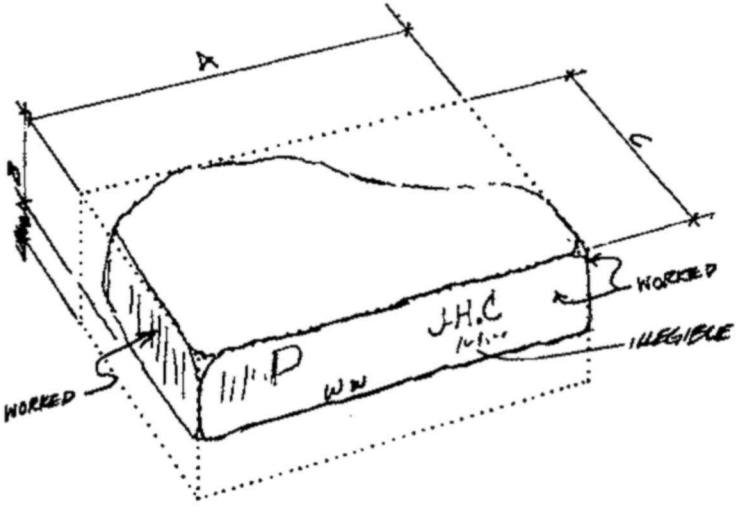
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 39
DATE: 2/25/86

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
P THC
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 23½" B 6" C 15½"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

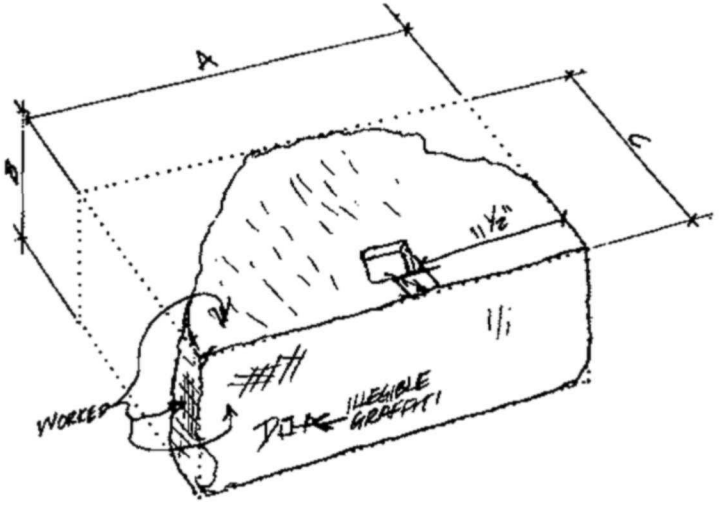
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 40
DATE: 2/25/86

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
ILLEGIBLE
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: SQUARE CUT INDENTATION ON TOP SURFACE: 1⅜ x 1¼ x 5/16" D

DIMENSIONS: A 25¼" B 8½" C 15¼"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

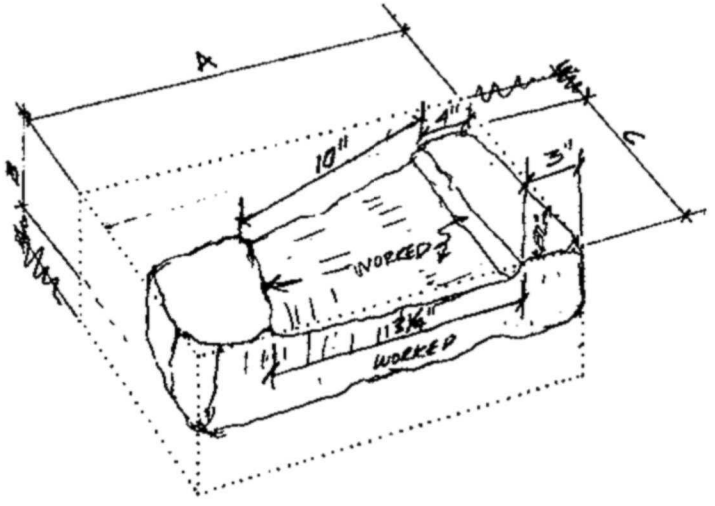
STONE NO.: 41
DATE: 2/25/87

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 20½" B 6½" C 9¾"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

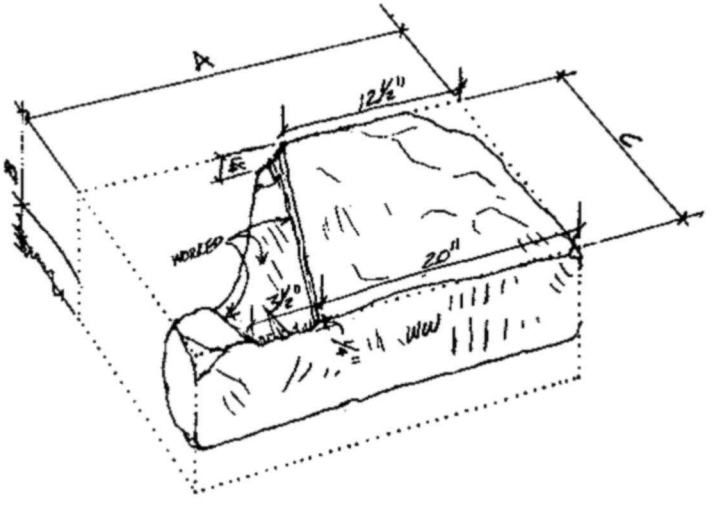
STONE NO.: 42
DATE: 2/26/87

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 29½" B 5¾" C 18½"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

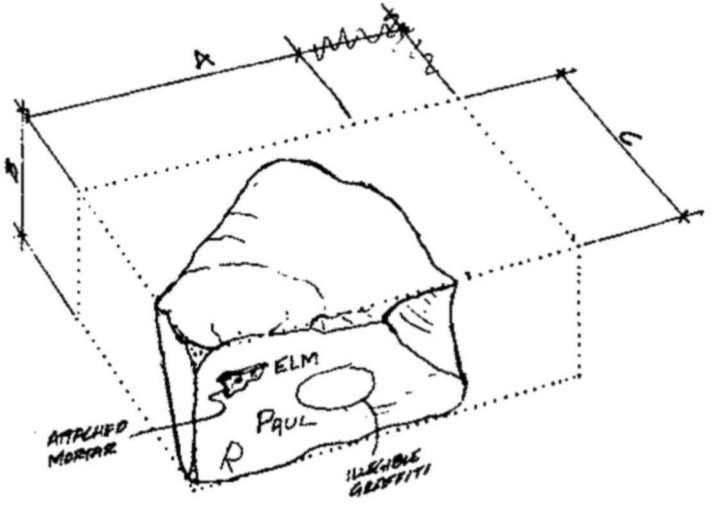
STONE NO.: 43
DATE: 2/26/06

STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
ELM PAUL R
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: NO WHITEWASH ON ANY SURFACE

DIMENSIONS: A 16 1/4" B 9" C 12"




SURVEYOR JL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

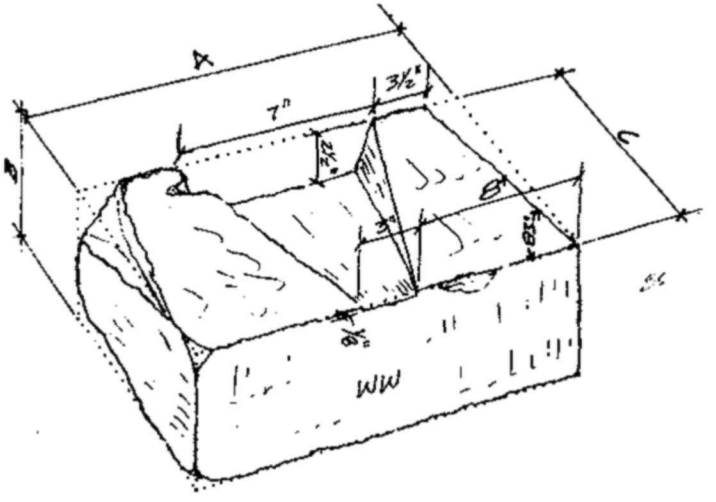
STONE NO.: 44
DATE: 2/26/06

STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 18" B 6" C 11"




SURVEYOR JL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

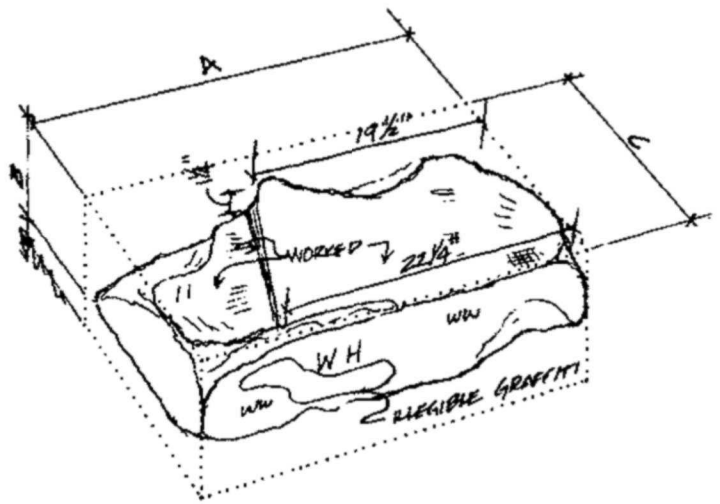
STONE NO.: 45
DATE: 2/26/86

STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
- BLACK ☐
- D. BROWN ☐
- BROWN ☐
- TAN ☐
- WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
WH
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WHITE WASH NOT IN GRAFFITI

DIMENSIONS: A 27½" B 5⅞" C 12½"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

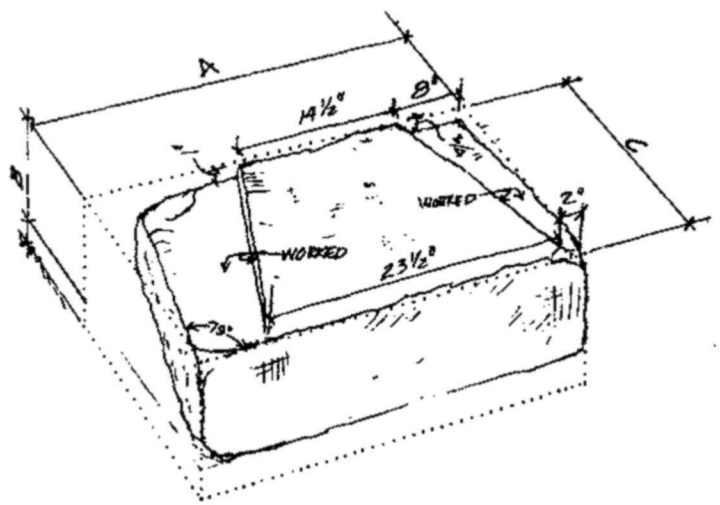
STONE NO.: 46
DATE: 2/26/86

STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
- BLACK ☐
- D. BROWN ☒
- BROWN ☐
- TAN ☐
- WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 32" B 6" C 14"




SURVEYOR DL PHOTO: ROLL ___ FRAME ___

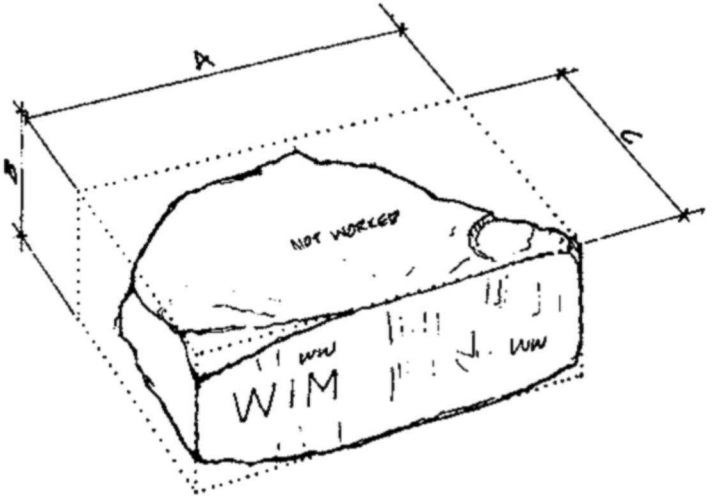
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 47
DATE: 2/26/96

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
WIM
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WHITEWASH INSIDE GRAFFITI

DIMENSIONS: A 22½" B 6¾" C 15¼"




SURVEYOR JV PHOTO: ROLL ___ FRAME ___

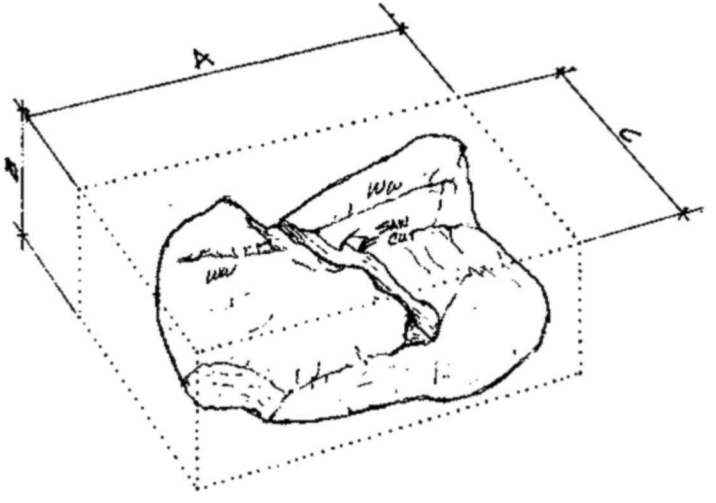
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 48
DATE: 2/26/96

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WW - SPLATTERS OF WHITEWASH. SAW CUT: 8" LONG, BY MAXIMUM 1½" DEEP

DIMENSIONS: A 11" B 3½" C 9"




SURVEYOR JV PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

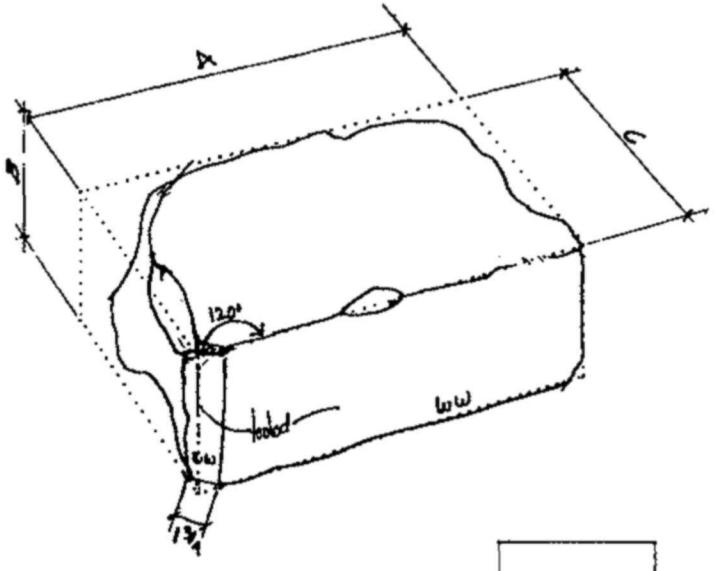
STONE NO.: 49
DATE: 2/26/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: low use stone

DIMENSIONS: A 27 B 11½ C 17




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

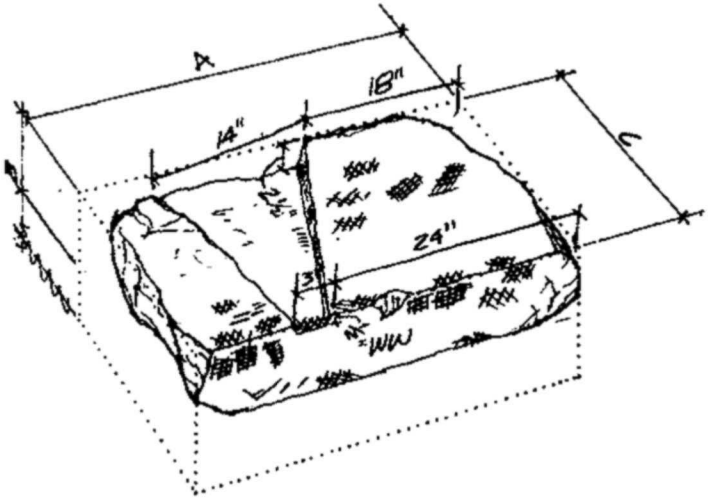
STONE NO.: 50
DATE: 2/26/86

STONE TYPE: SANDSTONE
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: CROSSHATCH TYPE TOOLWORK EVIDENCE

DIMENSIONS: A 30" B 7" C 19½"




SURVEYOR ___ PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 51
DATE: 2/26/86

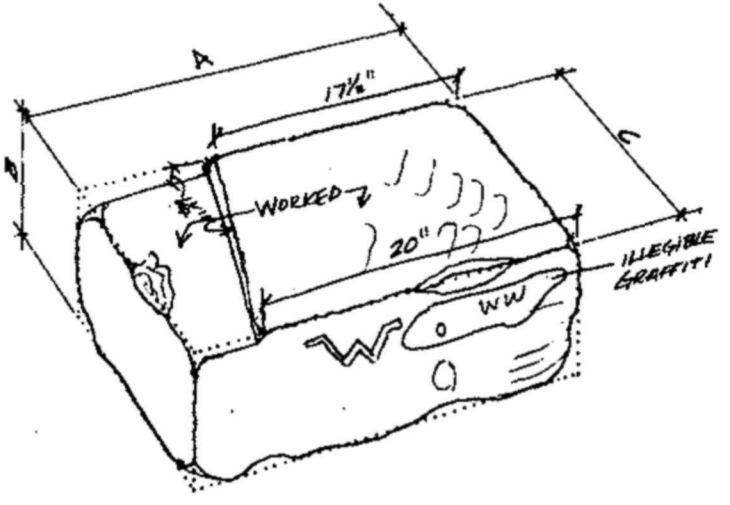
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
W

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: WHITEWASH INSIDE GRAFFITI. MOST TOOL MARKS WORN SMOOTH

DIMENSIONS: A 23½ B 7¼ C 10¼




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 52
DATE: 2/26/86

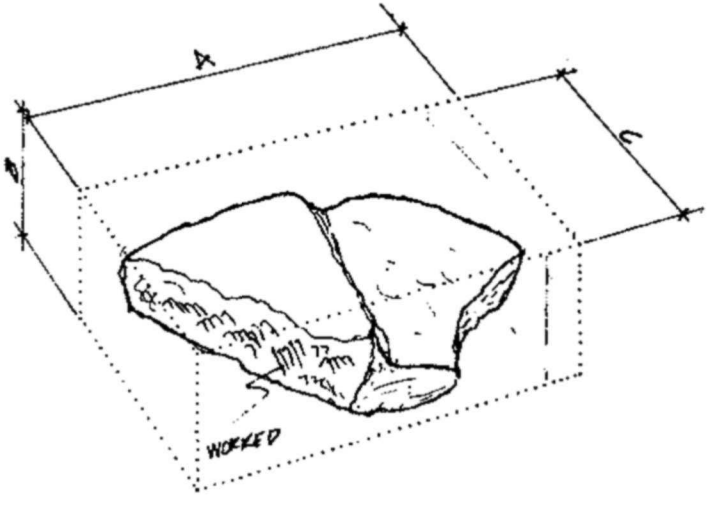
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 11½" B 2½" C 11"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 53
DATE: 2/26/86

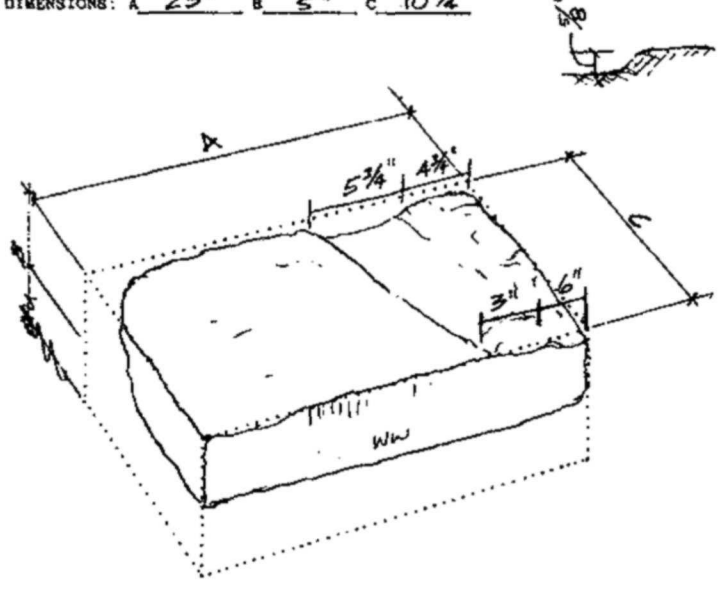
STONE TYPE: LIMESTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

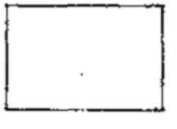
DIMENSIONS: A 23" B 5" C 10 3/4"







SURVEYOR DV PHOTO: ROLL ___ FRAME ___



BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 54
DATE: 2/26/86

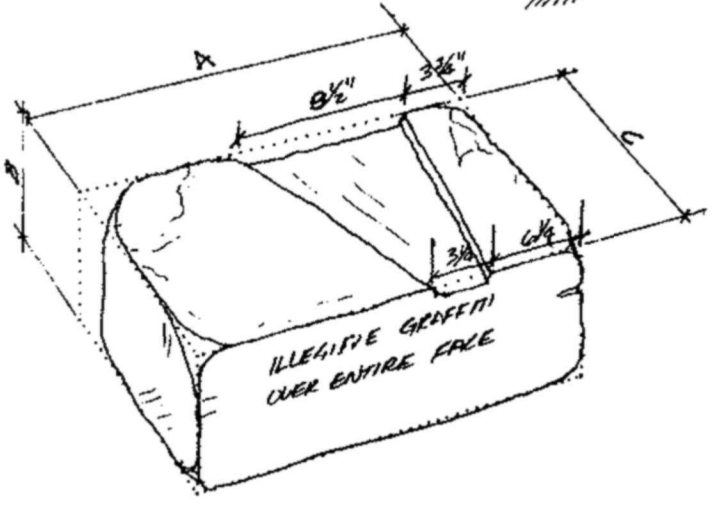
STONE TYPE: SANDSTONE

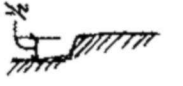
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
ILLEGIBLE

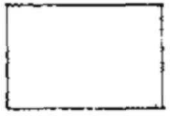
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: EXCEPT FOR WITHIN GRAFFITI, WHITEWASH WORN OFF. MOST TOOL MARKS WORN SMOOTH.

DIMENSIONS: A 19 3/4" B 6 3/4" C 10 3/4"




SURVEYOR DV PHOTO: ROLL ___ FRAME ___



BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 55
DATE: 2/26/96

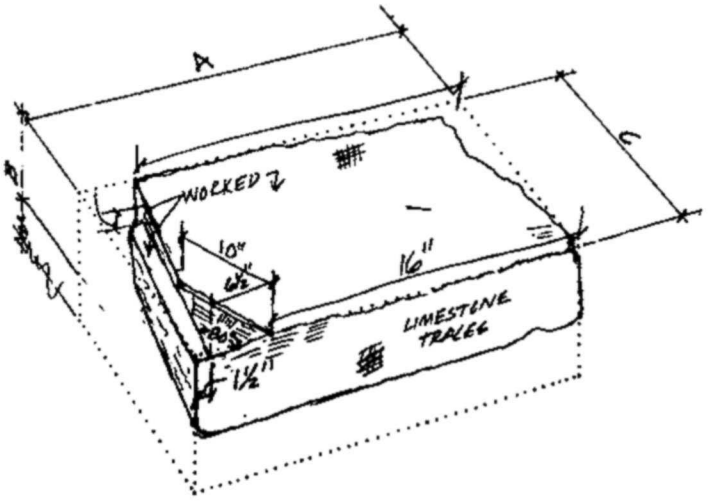
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 24" B 5¾" C 17¾"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 56
DATE: 2/26/96

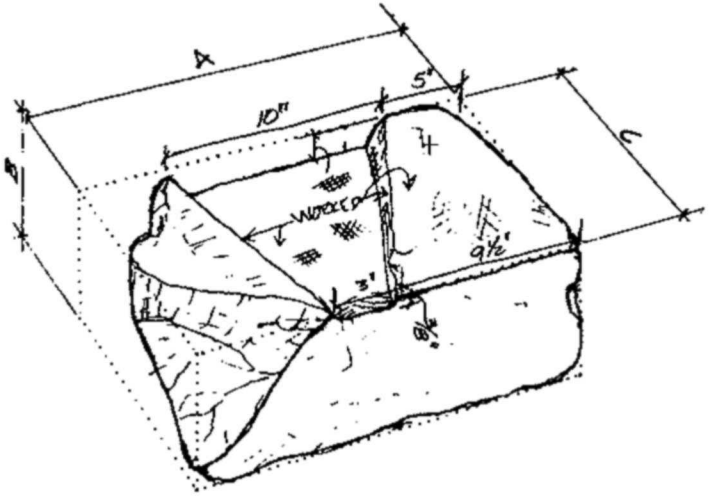
STONE TYPE: SANDSTONE

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 18½" B 5¾" C 11½"




SURVEYOR [illegible] PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

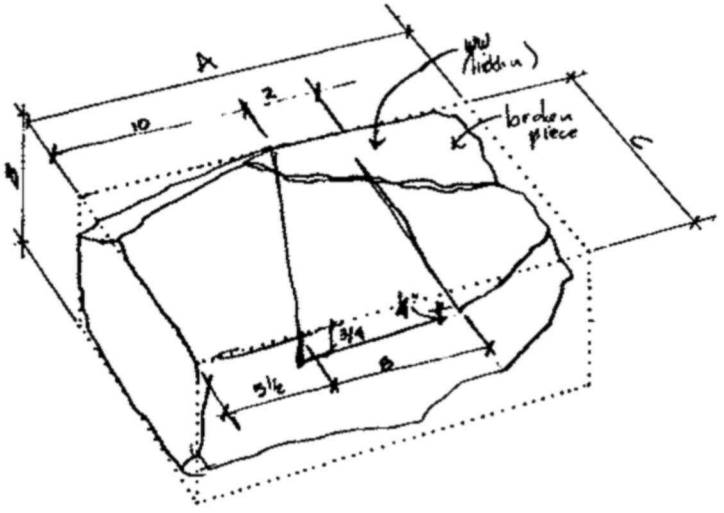
STONE NO.: 57
DATE: 2/25/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☑
BLACK ☐
D. BROWN ☐
BROWN ☑
TAN ☐
WHITE ☐

TOOL MARKS: Y ☑ N ☐
GRAFFITI: Y ☐ N ☑

CONDITION G ☐ F ☑ P ☐
STRUCTURALLY STABLE Y ☐ N ☑
COMMENTS: 1 mouse hole (on) / 2 broken corners

DIMENSIONS: A 18 1/2 B 4 1/2 C 12




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

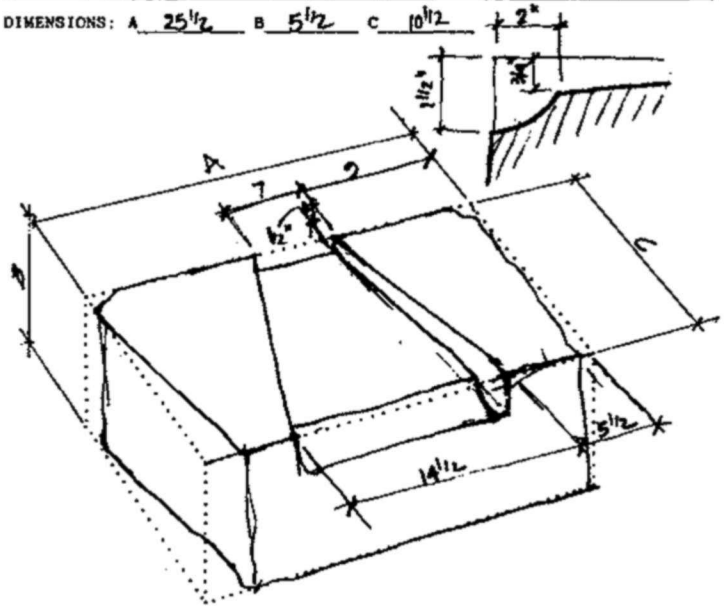
STONE NO.: 58
DATE: 2/25/86

STONE TYPE: limestone
COLOR: MOTTLED ☐ SOLID ☑
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☑

TOOL MARKS: Y ☑ N ☐
GRAFFITI: Y ☐ N ☑

CONDITION G ☑ F ☐ P ☐
STRUCTURALLY STABLE Y ☑ N ☐
COMMENTS: 1 mouse hole (interior)

DIMENSIONS: A 25 1/2 B 5 1/2 C 10 1/2




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 59
DATE: 2/25/86

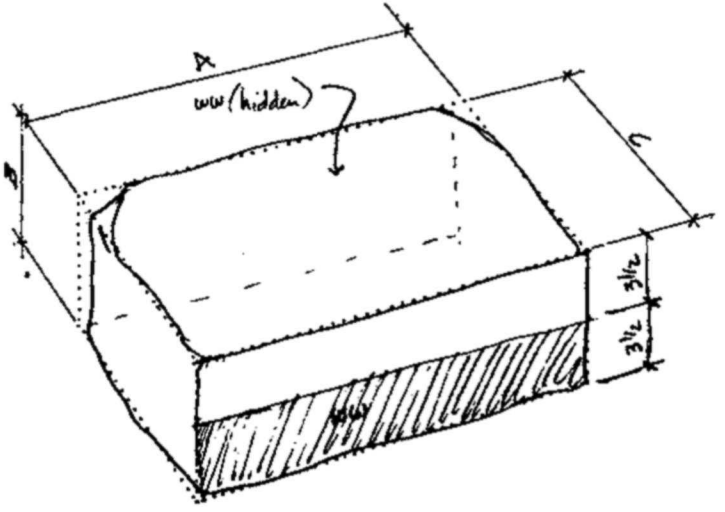
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: sharp edge of whitewash. may be top stone

DIMENSIONS: A 21½ B 7 C 17½




SURVEYOR A.D. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 60
DATE: 2/25/86

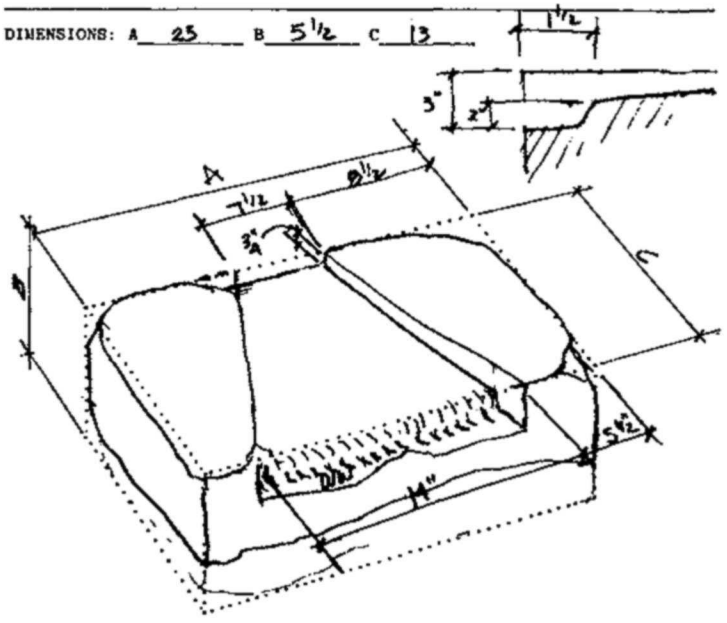
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: capstone (in). broken in half

DIMENSIONS: A 23 B 5½ C 13




SURVEYOR A.D. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

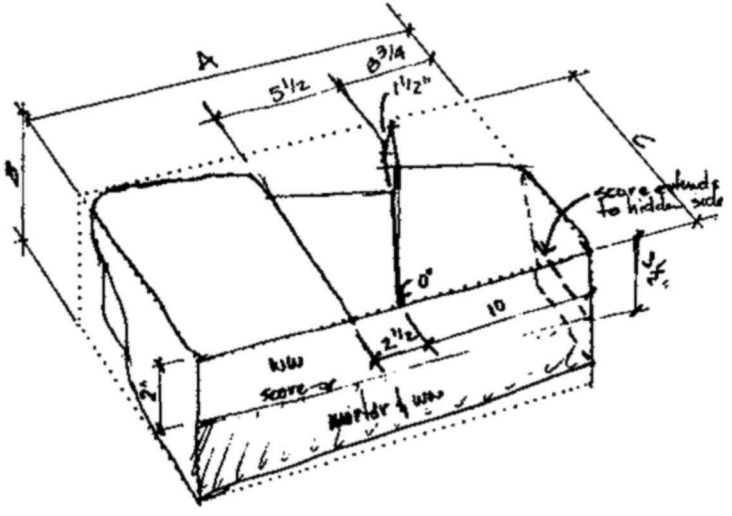
STONE NO.: 61
DATE: 2/25/86

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 22 B 6½ C 10




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

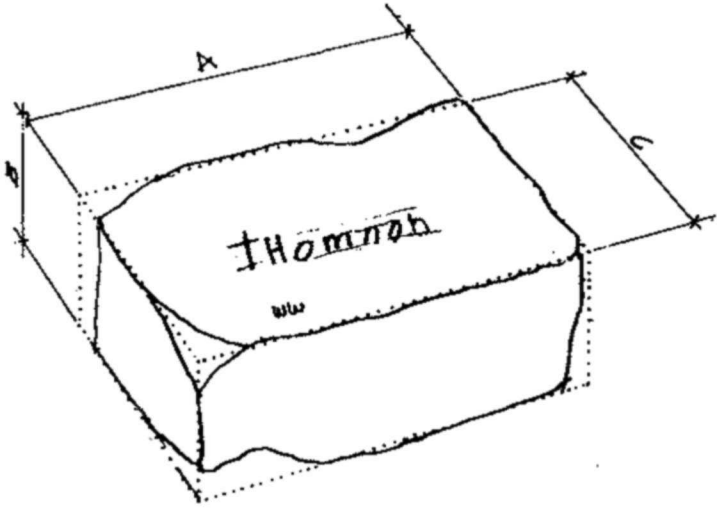
STONE NO.: 62
DATE: 2/25/86

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐
"THom(?)on"

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: likewise in graffiti

DIMENSIONS: A 26 B 7 C 16




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

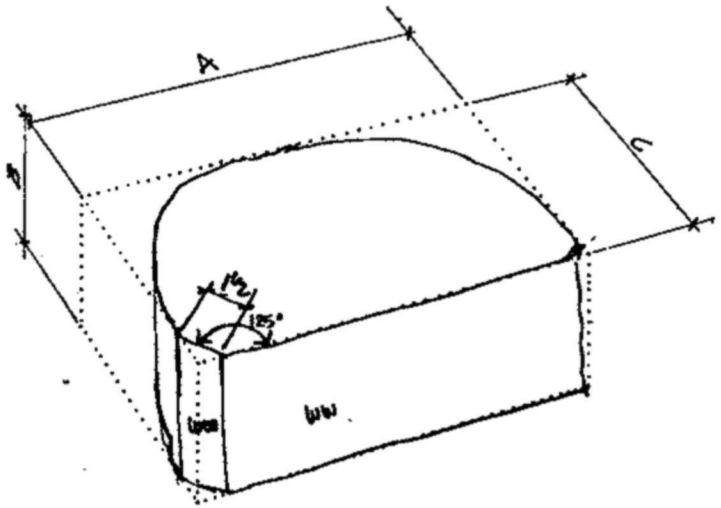
STONE NO.: 63
DATE: 2/25/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Cornerstone

DIMENSIONS: A 29 B 9 C 14½




SURVEYOR AO PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

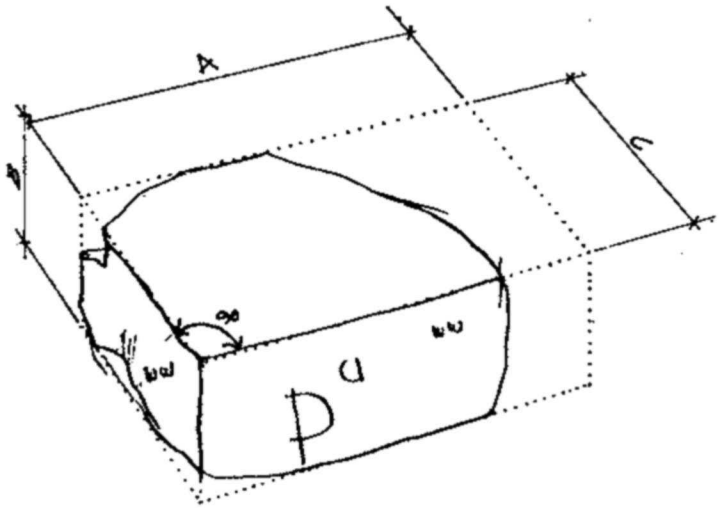
STONE NO.: 64
DATE: 2/25/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐ (Illegible)

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: May be portion of door surround stone / Mortar work on graffiti.

DIMENSIONS: A 7½ B 4 C ●




SURVEYOR AO PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

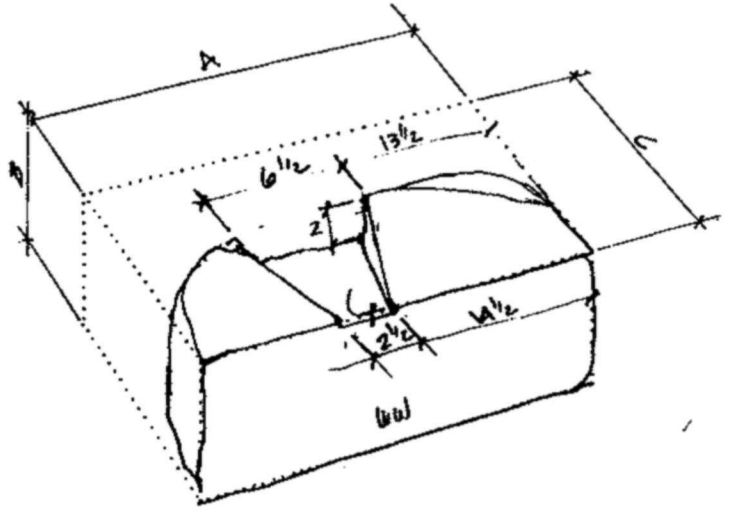
STONE NO.: 165
DATE: 2/25/86

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: inside

DIMENSIONS: A 26½ B 7 C 8½




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

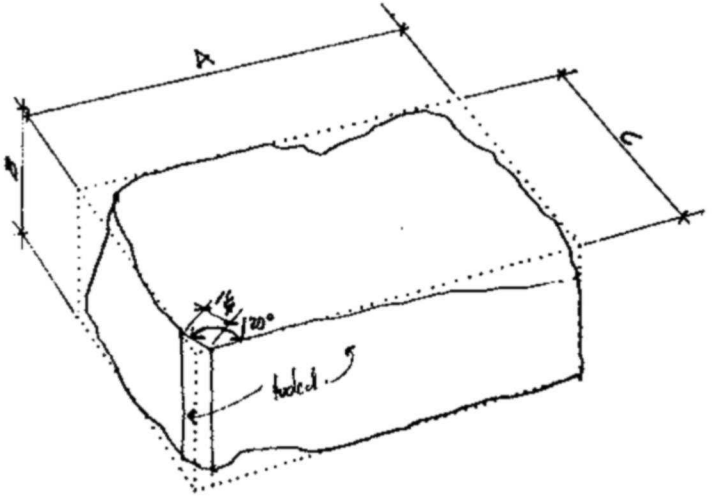
STONE NO.: 166
DATE: 2/24/86

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: convex stone

DIMENSIONS: A 29 B 12 C 14½




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY

FORT LARNED NHS

STONE NO.: 67

DATE: 2/25/06

STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒

BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐

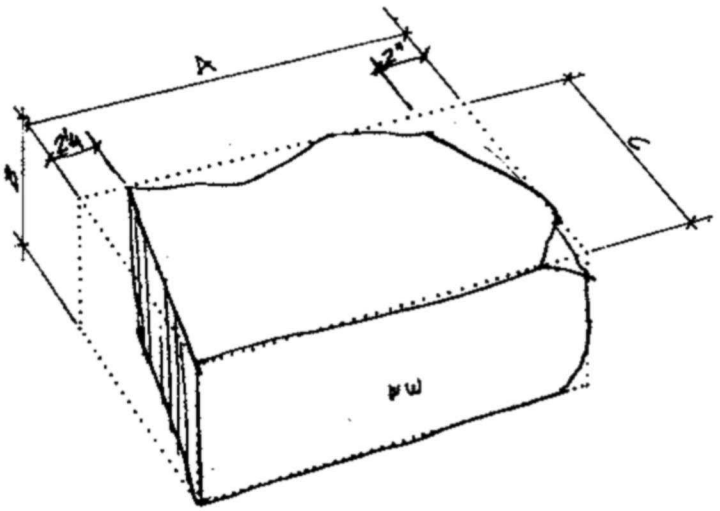
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐

STRUCTURALLY STABLE Y ☒ N ☐

COMMENTS: loophole slides on both ends.

DIMENSIONS: A 22 B 4 C 9




SURVEYOR A.D. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY

FORT LARNED NHS

STONE NO.: 68

DATE: 2/25/06

STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒

BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐

GRAFFITI: Y ☒ N ☐

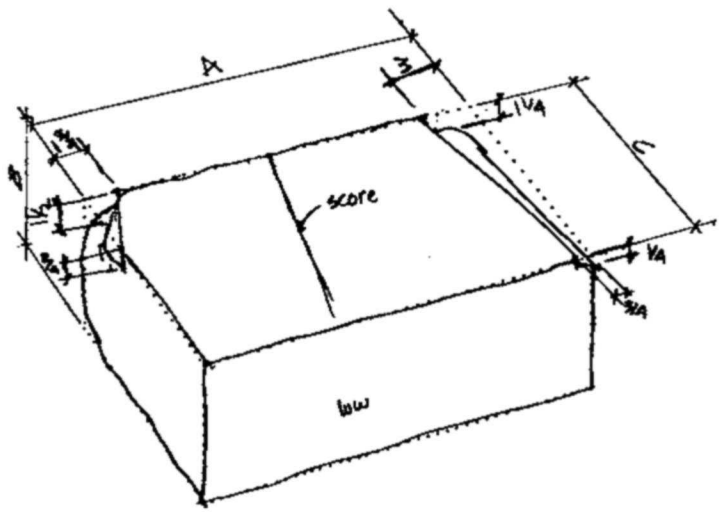
"W.W. [illegible]"

CONDITION G ☒ F ☐ P ☐

STRUCTURALLY STABLE Y ☒ N ☐

COMMENTS: loophole carvings at each end

DIMENSIONS: A 22 1/2 B 6 1/2 C 10




SURVEYOR A.D. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY

FORT LARNED NHS

STONE NO.: 69

DATE: 2/26/86

STONE TYPE: sandstone

COLOR: MOTTLED ☐ SOLID ☒

BLACK ☐

D. BROWN ☐

BROWN ☒

TAN ☐

WHITE ☐

TOOL MARKS: Y ☒ N ☐

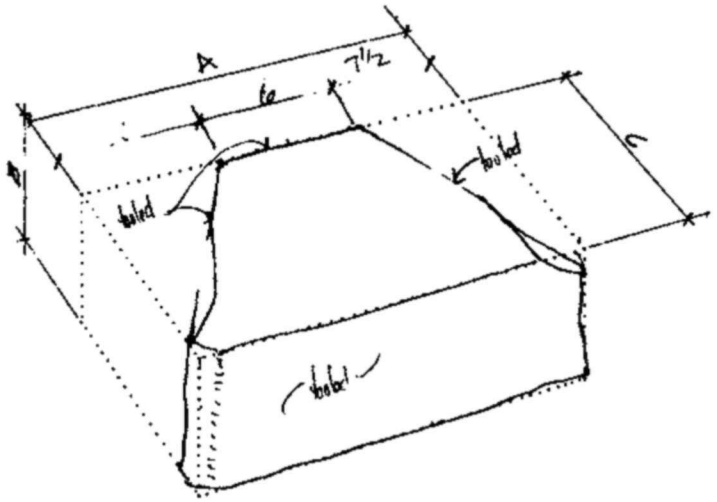
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐

STRUCTURALLY STABLE Y ☒ N ☐

COMMENTS: mated with stone no. 70
loophole side

DIMENSIONS: A 21 1/2 B 3 1/2 C 17 1/2




SURVEYOR A.D. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY

FORT LARNED NHS

STONE NO.: 70

DATE: 2/26/86

STONE TYPE: sandstone

COLOR: MOTTLED ☐ SOLID ☒

BLACK ☐

D. BROWN ☐

BROWN ☒

TAN ☐

WHITE ☐

TOOL MARKS: Y ☒ N ☐

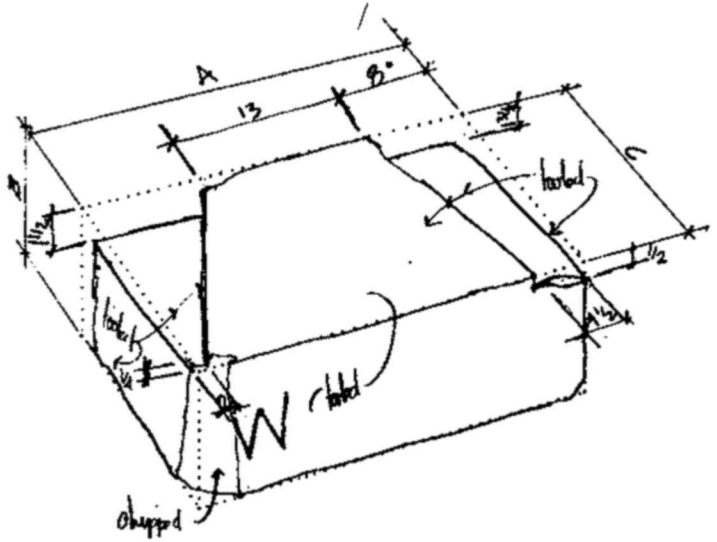
GRAFFITI: "W" Y ☒ N ☐

CONDITION G ☒ F ☐ P ☐

STRUCTURALLY STABLE Y ☒ N ☐

COMMENTS: mated w/ stone no. 69
loophole

DIMENSIONS: A 20 B 5 1/2 C 10 1/2




SURVEYOR A.D PHOTO: ROLL FRAME

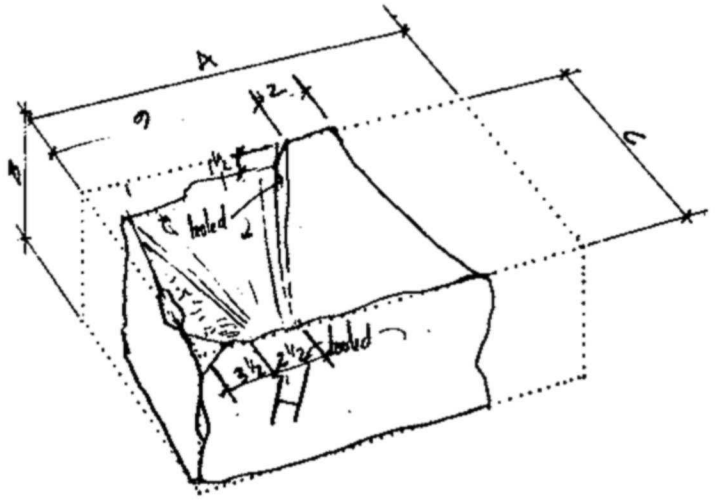
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 71
DATE: 2/26/96

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐ "H"
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: top eroded

DIMENSIONS: A 12 B 7 C 10 1/2




SURVEYOR A.O. PHOTO: ROLL FRAME

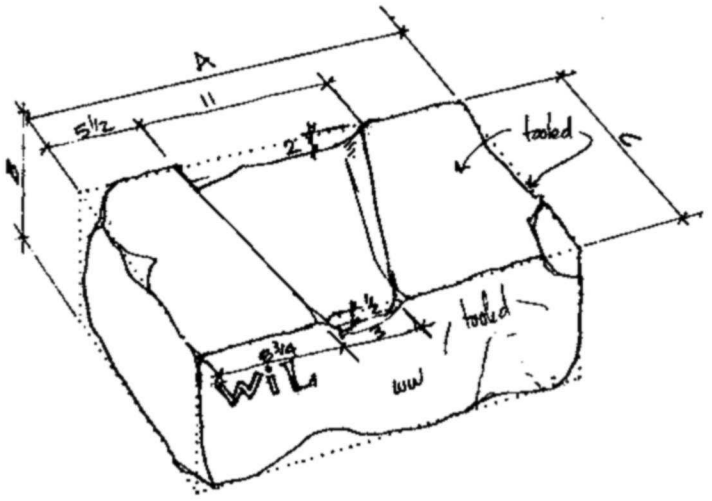
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 72
DATE: 2/26/96

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☒ N ☐ "WiL"
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: broken (ext)

DIMENSIONS: A 26 1/2 B 6 1/2 C 12 1/2




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 73
DATE: 2/26/86

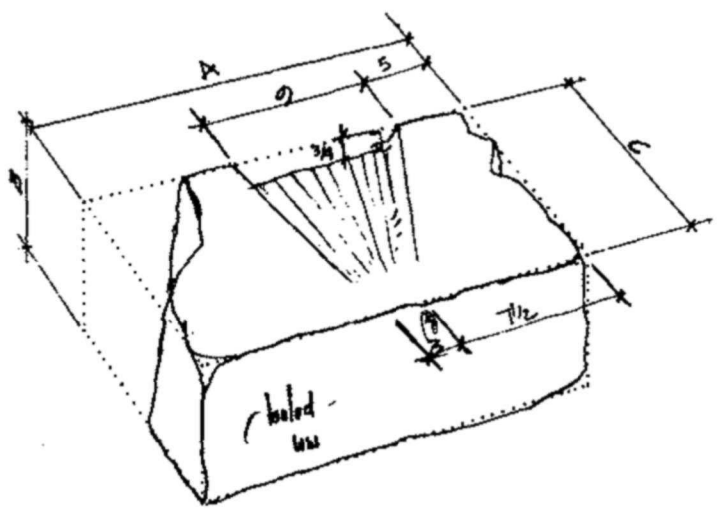
STONE TYPE: limestone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Implade (ext)

DIMENSIONS: A 12 B 6 1/2 C 9 1/2




SURVEYOR A.D PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 74
DATE: 2/26/86

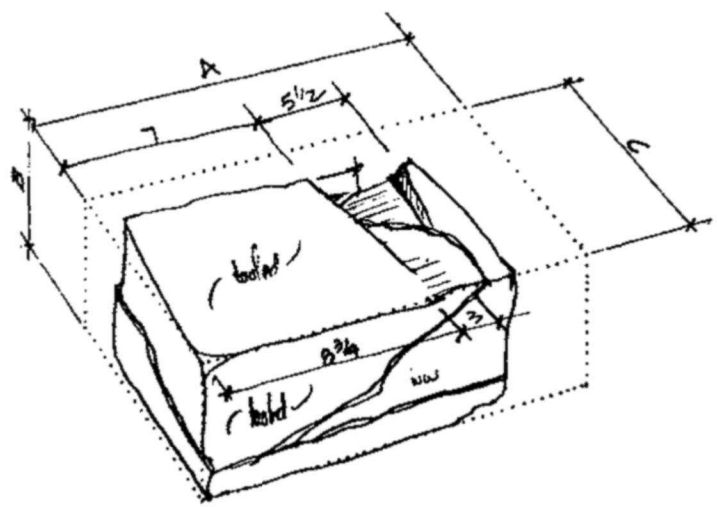
STONE TYPE: sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☐ P ☒
STRUCTURALLY STABLE Y ☐ N ☒
COMMENTS: split in 3 pieces
Implade (ext.

DIMENSIONS: A 14 B 7 C 8 1/2




SURVEYOR A.D. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 75
DATE: 2/26/96

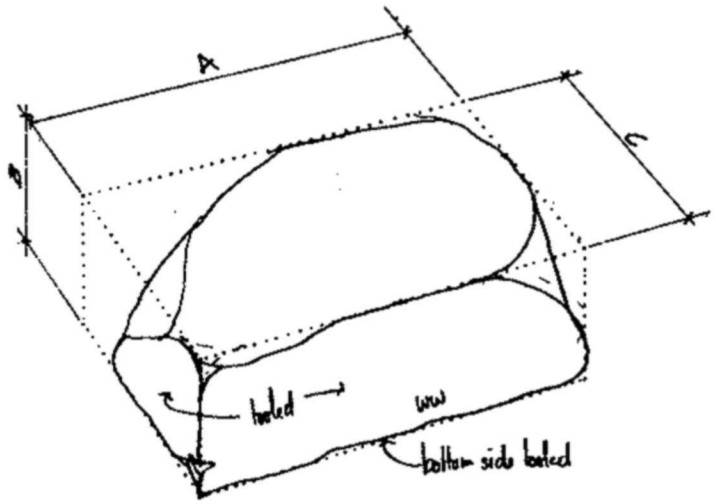
STONE TYPE: Sandstone

COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☒
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS:

DIMENSIONS: A 24 B 9 1/2 C 13 1/4




SURVETOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 76
DATE: 2/26/96

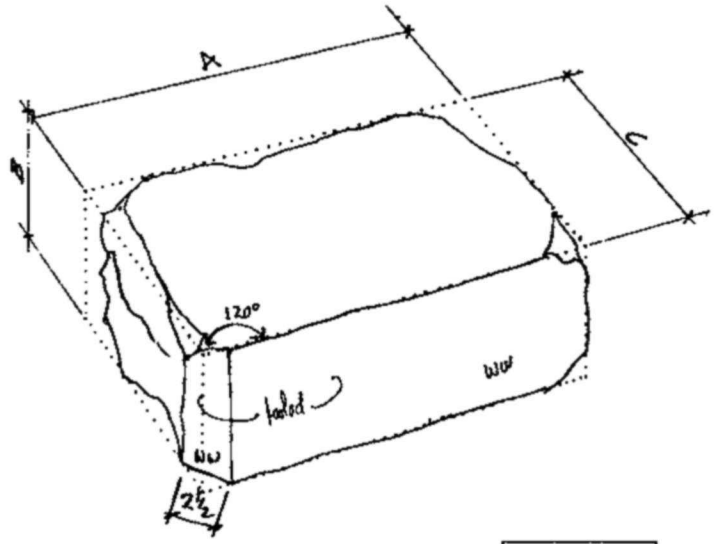
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Bottom stone

DIMENSIONS: A 33 B 9 1/2 C 19




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 77
DATE: 2/26/96

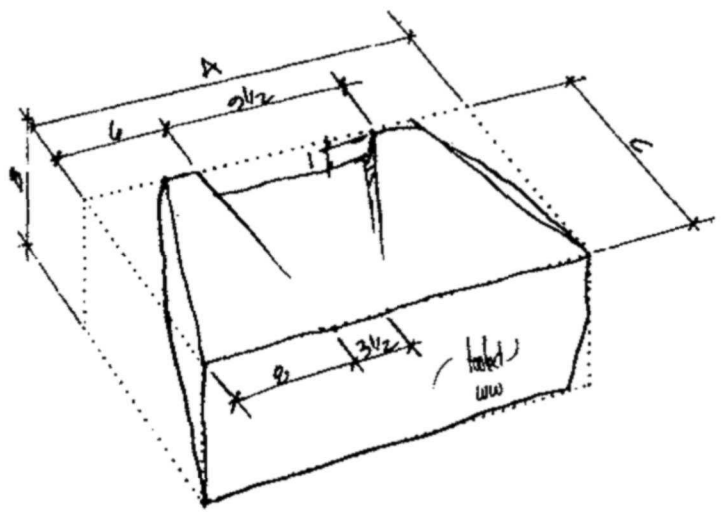
STONE TYPE: limestone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: lengthwise (ext.)

DIMENSIONS: A 21 B 6 C 11




SURVEYOR A.O. PHOTO: ROLL FRAME



BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 78
DATE: 2/26/96

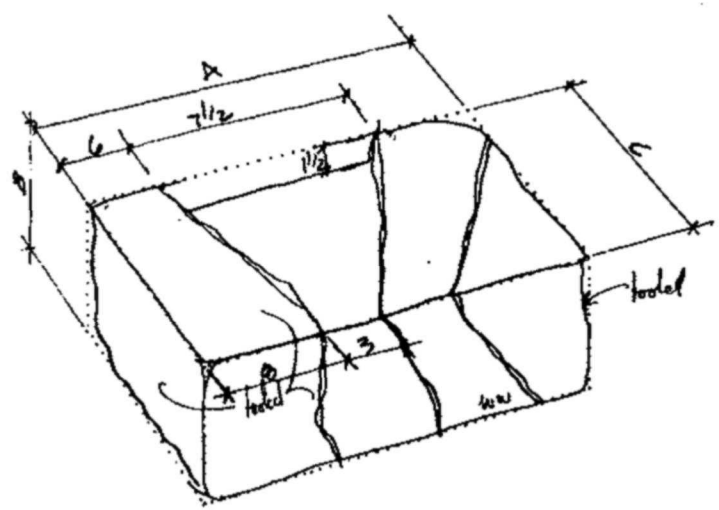
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☒
BROWN ☐
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☐ P ☒
STRUCTURALLY STABLE Y ☐ N ☒
COMMENTS: split in 4 pieces
lengthwise (ext.)

DIMENSIONS: A 9½ B 6 C 9½




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

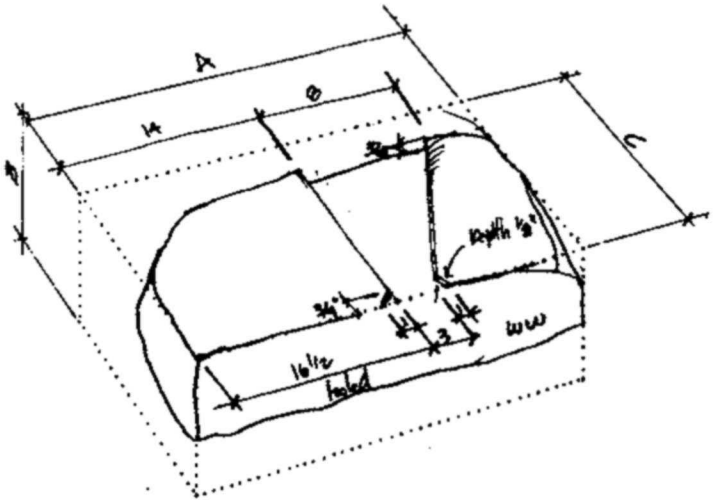
STONE NO.: 79
DATE: 2/26/86

STONE TYPE: limestone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Lapidale (ext.)

DIMENSIONS: A 30½ B 5½ C 9




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

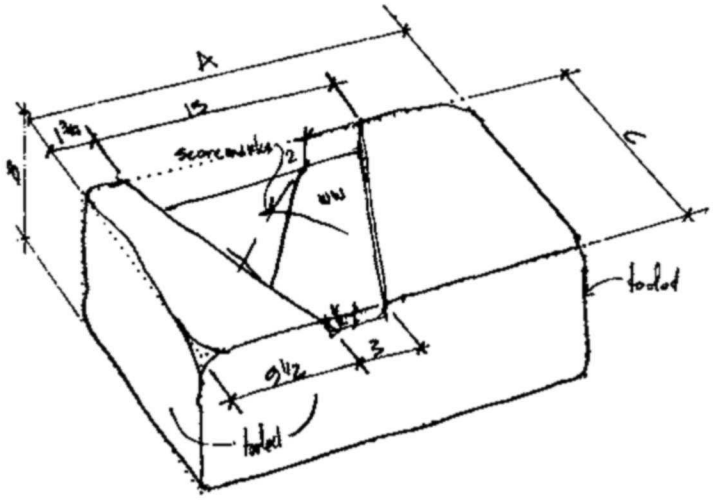
STONE NO.: 80
DATE: 2/26/86

STONE TYPE: sandstone
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☒
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: lapidale (ext.)

DIMENSIONS: A 26 B 7 C 18




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

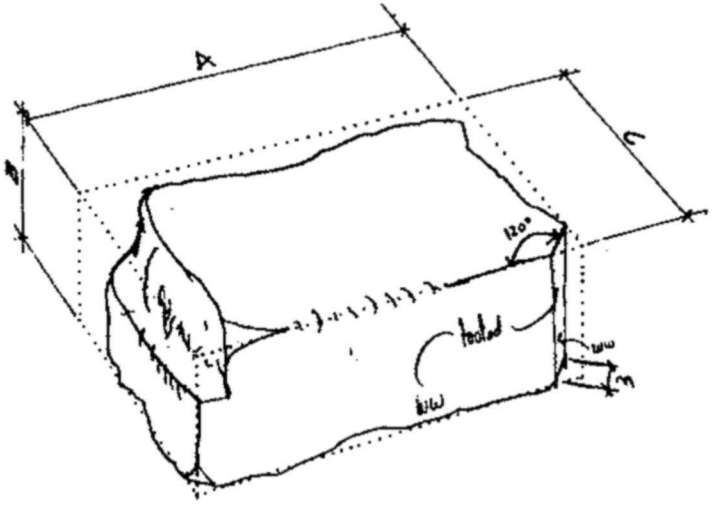
STONE NO.: 81
DATE: 2/26/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☒
D. BROWN ☒
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☒ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Cornerstone

DIMENSIONS: A 39 B 12 C 12 1/2




SURVEYOR A.O PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

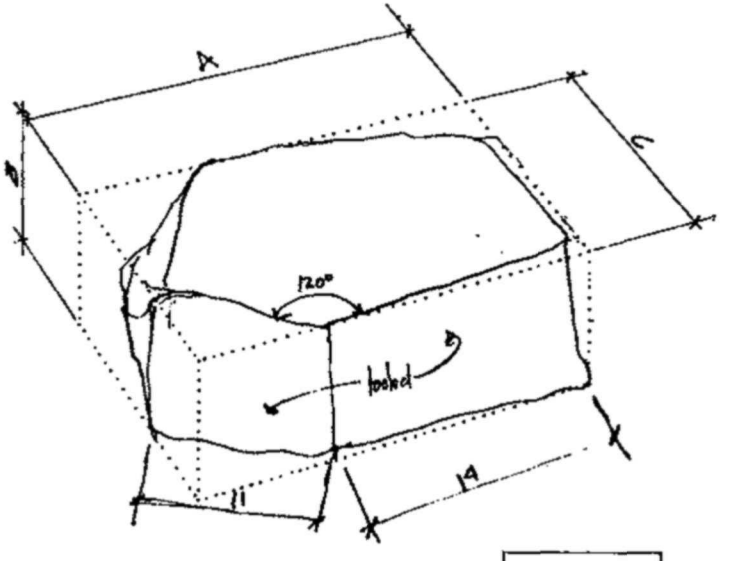
STONE NO.: 82
DATE: 2/25/06

STONE TYPE: limestone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: cornerstone

DIMENSIONS: A 19 B 5 C 18




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: B3
DATE: 2/26/86

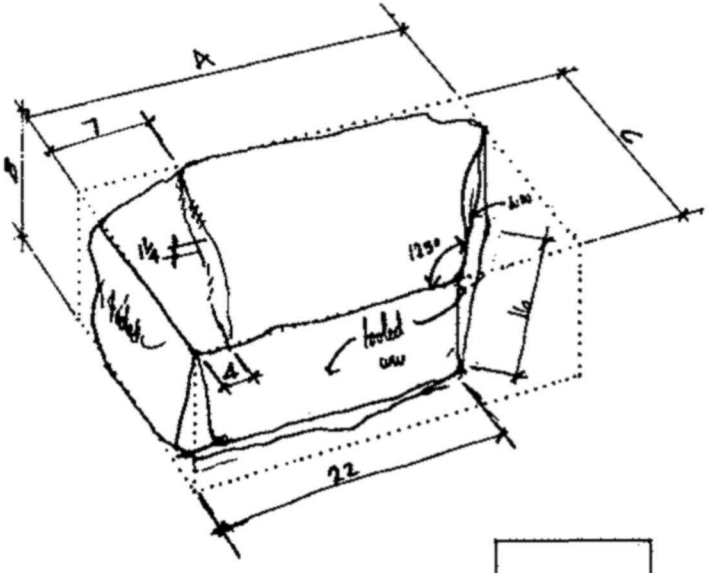
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Complete & workworkstone

DIMENSIONS: A 30 1/2 B 11 C 17




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: B4
DATE: 2/26/86

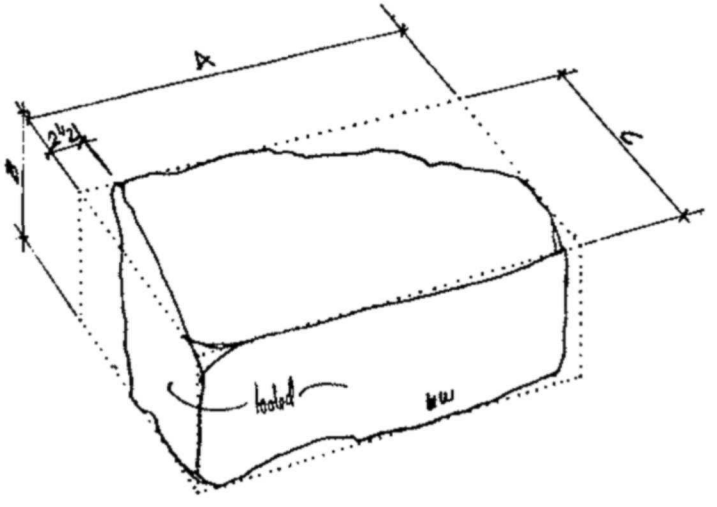
STONE TYPE: Sandstone

COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☒
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: longest side (?)

DIMENSIONS: A 15 1/2 B 4 1/4 C 11 1/2




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

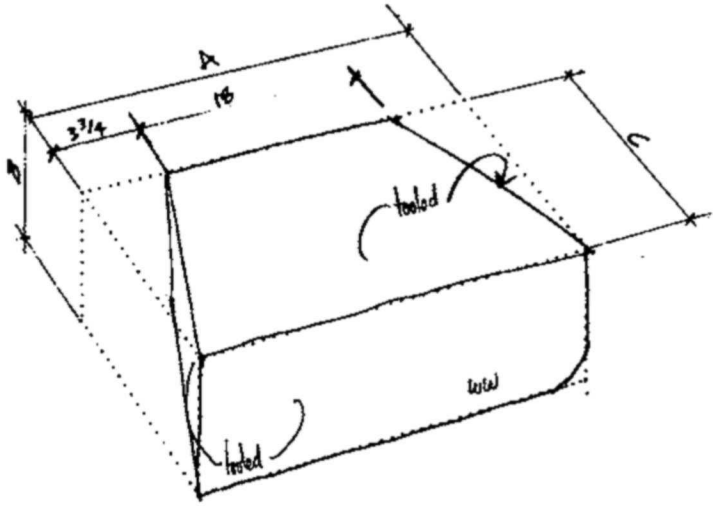
STONE NO.: 85
DATE: 2/26/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: ends forms sides for two loopholes

DIMENSIONS: A 26 B 4 C 14




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

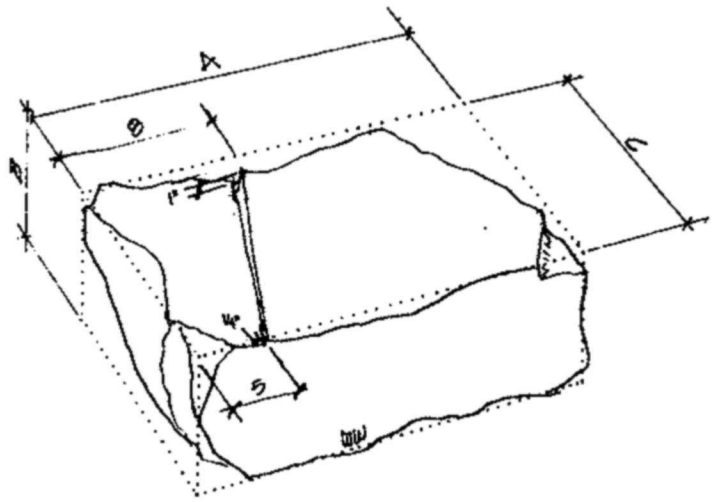
STONE NO.: 86
DATE: 2/26/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☒
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☐ P ☒
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: toppled.

DIMENSIONS: A 22 B 6 C 13




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

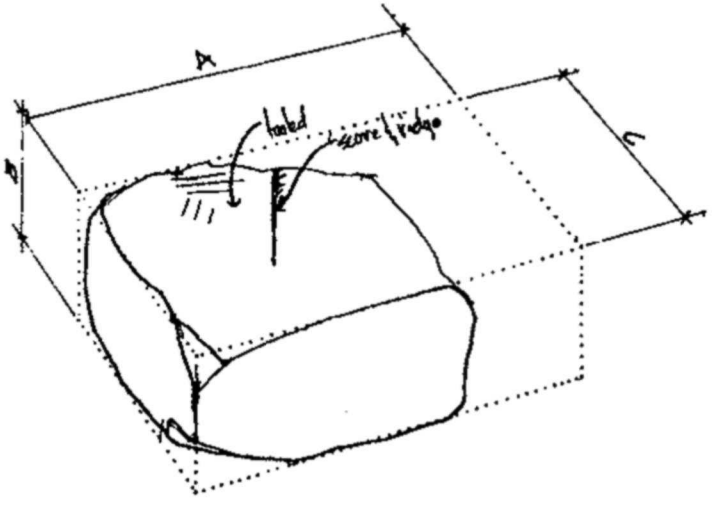
STONE NO.: 87
DATE: 2/26/86

STONE TYPE: Sandstone
COLOR: MOTTLED ☒ SOLID ☐
BLACK ☐
D. BROWN ☒
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☐

CONDITION G ☐ F ☐ P ☒
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Complete

DIMENSIONS: A 11 B 5 1/2 C 11 1/2




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

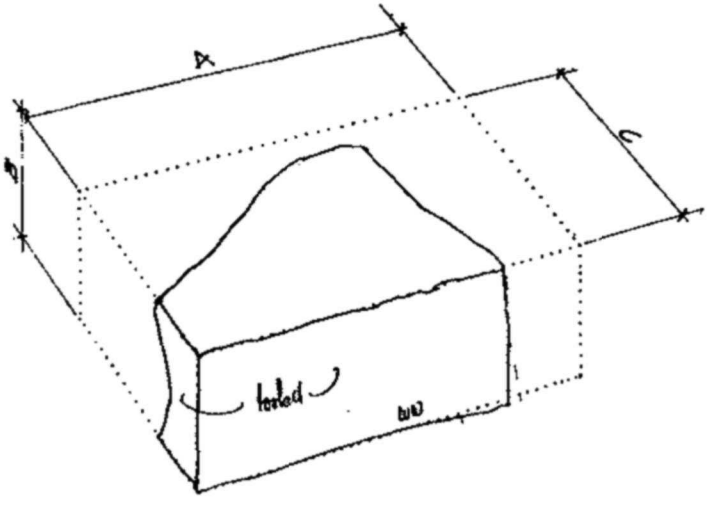
STONE NO.: 88
DATE: 2/26/86

STONE TYPE: sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: ___

DIMENSIONS: A 14 B 7 1/2 C 11




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

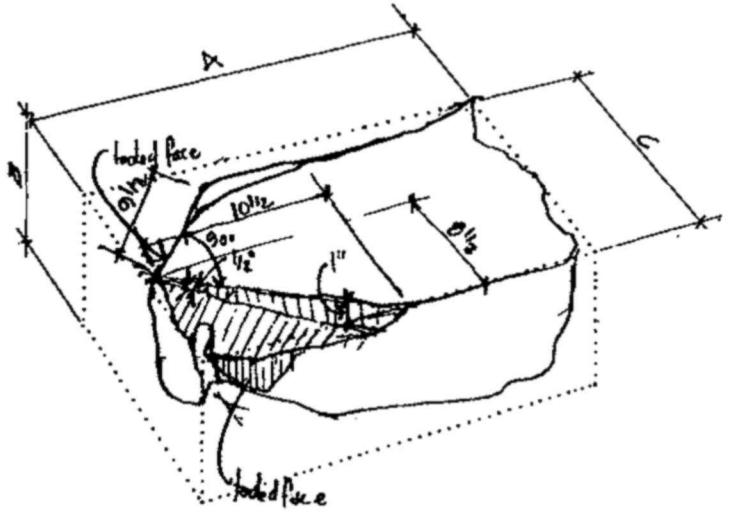
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 89
DATE:

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☐
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: loophole

DIMENSIONS: A 20 B 5 1/4 C 20




SURVEYOR A.O. PHOTO: ROLL FRAME

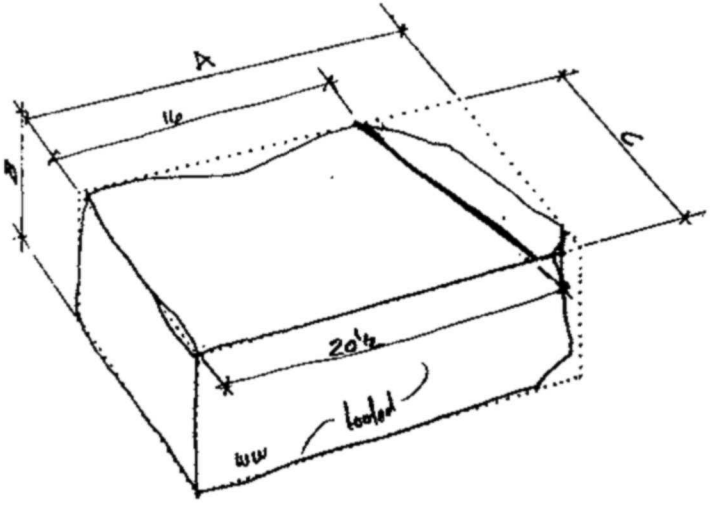
BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 90
DATE: 2/26/96

STONE TYPE: limestone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☐
WHITE ☒

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒
CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: arrow mark on face probably for loophole

DIMENSIONS: A 32 B 5 C 11 1/2




SURVEYOR A.O. PHOTO: ROLL FRAME

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

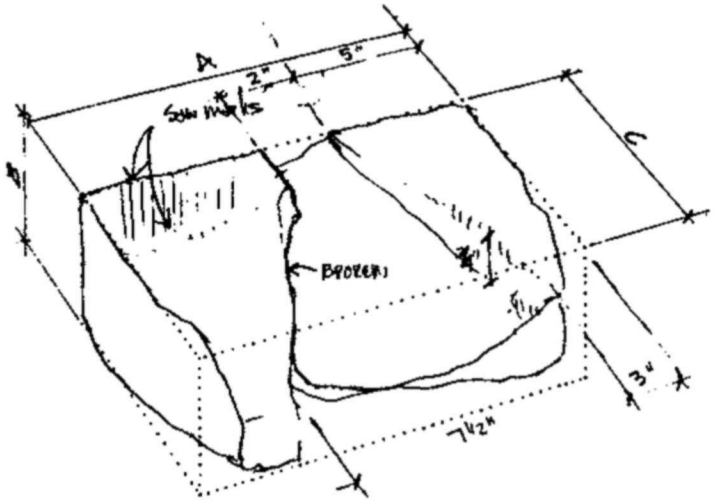
STONE NO.: 91
DATE: 5/14/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☐
TAN ☒
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☐ F ☐ P ☒
STRUCTURALLY STABLE Y ☐ N ☒
COMMENTS: Stone found in middle pile west of west wall during ditch/drainage work

DIMENSIONS: A 15½ B 6 C 7½




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

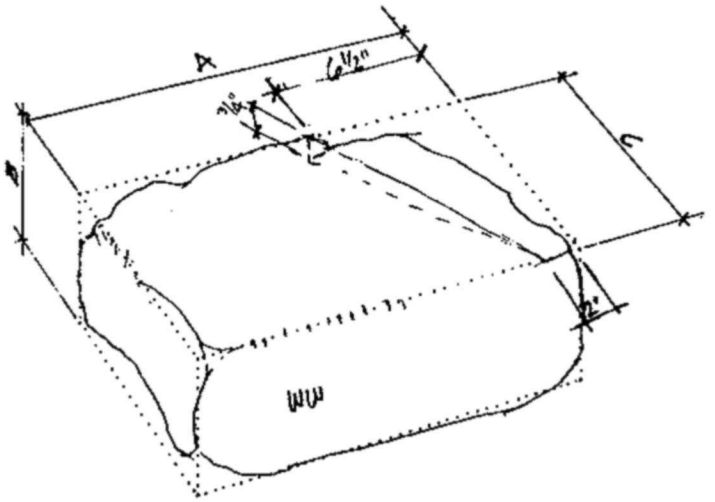
STONE NO.: 92
DATE: 5/14/06

STONE TYPE: Sandstone
COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Longitude stone found near unit 8a will ℄ corner of blockhouse during ditch/drainage work

DIMENSIONS: A 14 B 5½ C 9




SURVEYOR A.O PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 23
DATE: 5/14/86

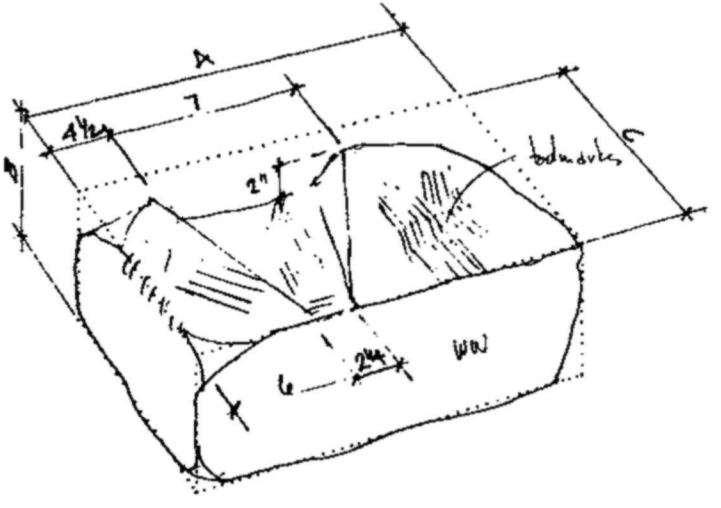
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Lodged stone found in tunnel 1 1/4 feet from exterior of blockhouse wall with short end about 4 1/2 feet below grade during archeological work

DIMENSIONS: A 20 1/2 B 4 1/4 C 9




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

BLOCKHOUSE (HS-10) STONE SURVEY
FORT LARNED NHS

STONE NO.: 24
DATE: 5/14/86

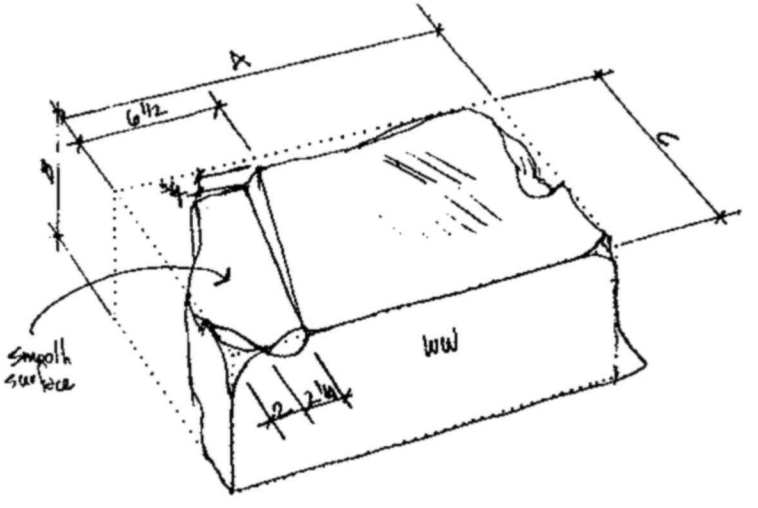
STONE TYPE: Sandstone

COLOR: MOTTLED ☐ SOLID ☒
BLACK ☐
D. BROWN ☐
BROWN ☒
TAN ☐
WHITE ☐

TOOL MARKS: Y ☒ N ☐
GRAFFITI: Y ☐ N ☒

CONDITION G ☒ F ☐ P ☐
STRUCTURALLY STABLE Y ☒ N ☐
COMMENTS: Lodged stone found in tunnel 1 foot from exterior of blockhouse wall and about 4 1/2 feet below grade during archeological work.

DIMENSIONS: A 12 1/2 B 5 1/4 C 8




SURVEYOR A.O. PHOTO: ROLL ___ FRAME ___

# APPENDIX C

## Blockhouse Reconstruction Drawings

WALL SCHEDULE
MARK
THICK.
LENGTH
1
2' - 4"
21' - 7"
2
2' -2"
21' - 4"
3
2'-2"
21'-1 3/4"
4
2'-0
21'-7 1/2"
5
2'-4"
21' - 5 1/2"
6
2'-8"
21'-3 3/4"
W-1
W-2
W-3
W-4
CELLAR
TUNNEL
WELLHOUSE
CENTERPOST FOOTING
LINE OF BLOCKHOUSE WALLS
1/1 CELLAR, TUNNEL, AND WELLHOUSE PLAN
BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS
CELLAR, TUNNEL, AND WELLHOUSE PLAN
1

2
BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS
GROUND LEVEL PLAN
GALLERY ABOVE
CENTERPOST
OUTLINE OF TUNNEL AND WELLHOUSE BELOW GRADE
1
2
3
4
5
6
1/5
1/5
1/2 GROUND LEVEL PLAN
0'
5'
10'

1/3 GALLERY LEVEL PLAN
0'
5'
10'
BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS
GALLERY LEVEL PLAN
3

BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS

ELEVATION NO. 6

4

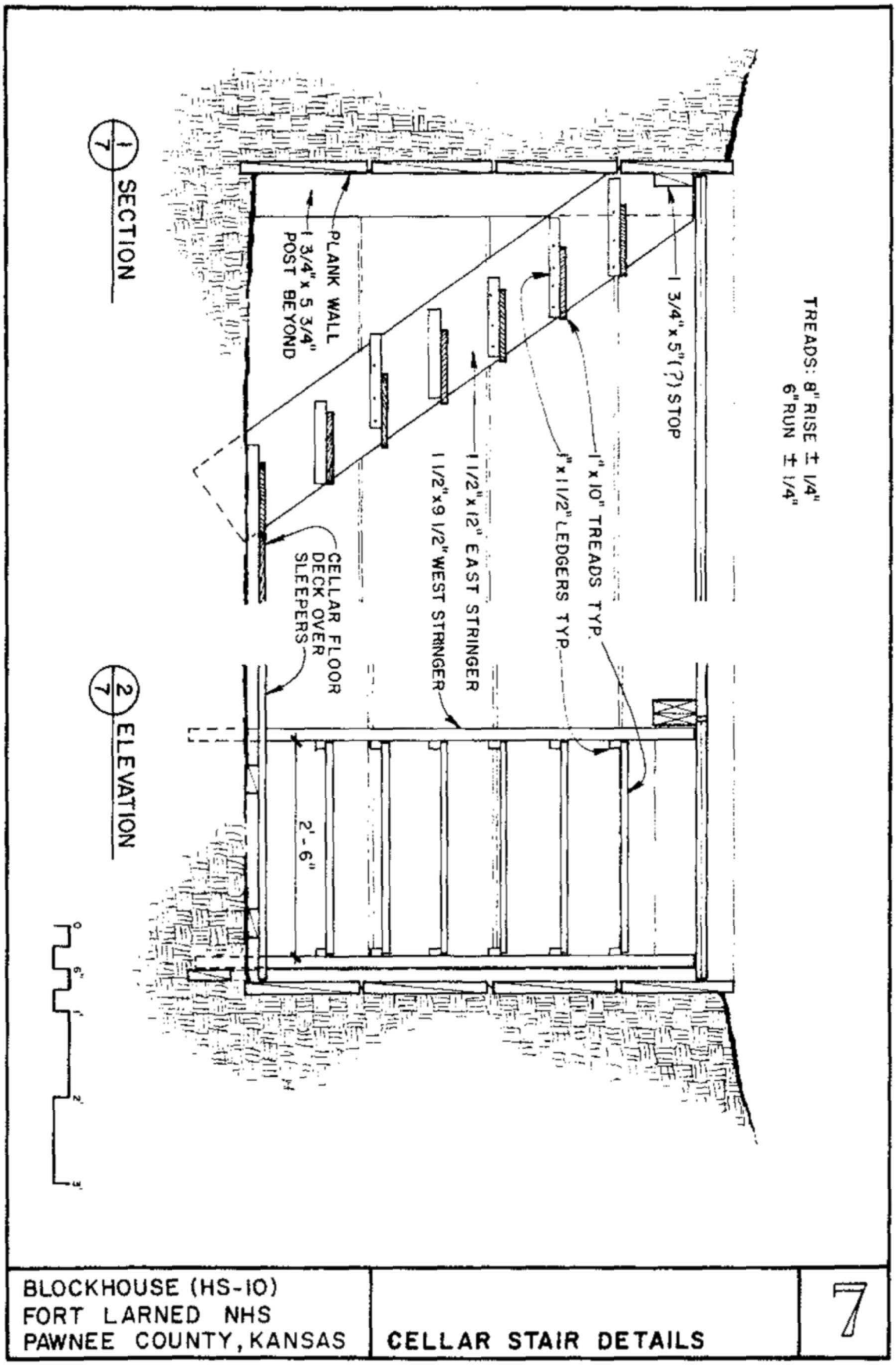
1/5 BUILDING SECTION
0'
5'
10'
BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS
BUILDING SECTION
5

1/6 CELLAR WALL SECTION

6

BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS

CELLAR WALL SECTION




| | | |
|---|---|---|
| BLOCKHOUSE (HS-10)<br>FORT LARNED NHS<br>PAWNEE COUNTY, KANSAS | CELLAR STAIR DETAILS | 7 |

1/8 TUNNEL WALL SECTION




DIMENSION TOLERANCE: ± 1/2"

2/8 LOOPHOLE DETAILS

0 6" 1' 2' 3'

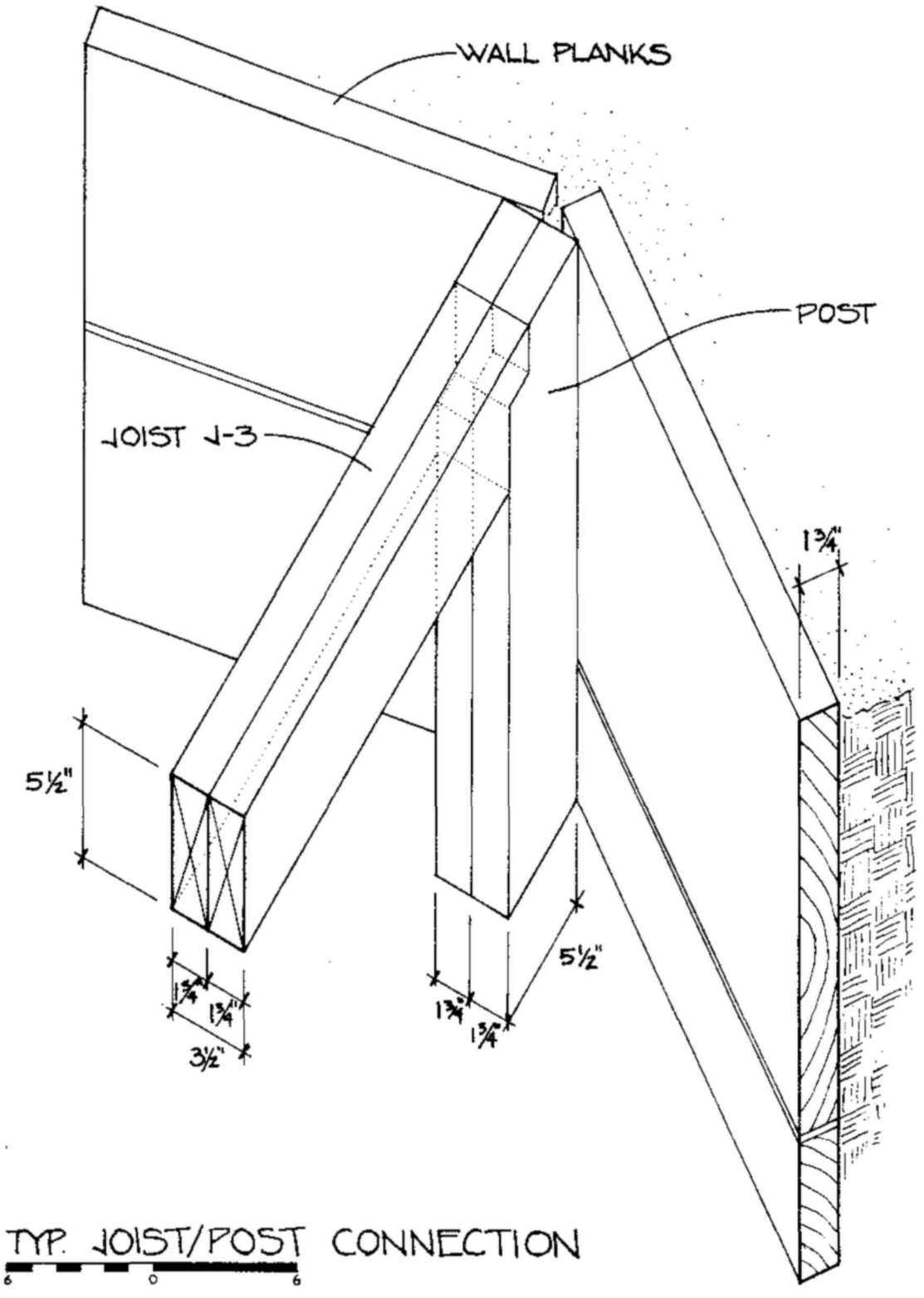
8

TUNNEL AND LOOPHOLE DETAILS

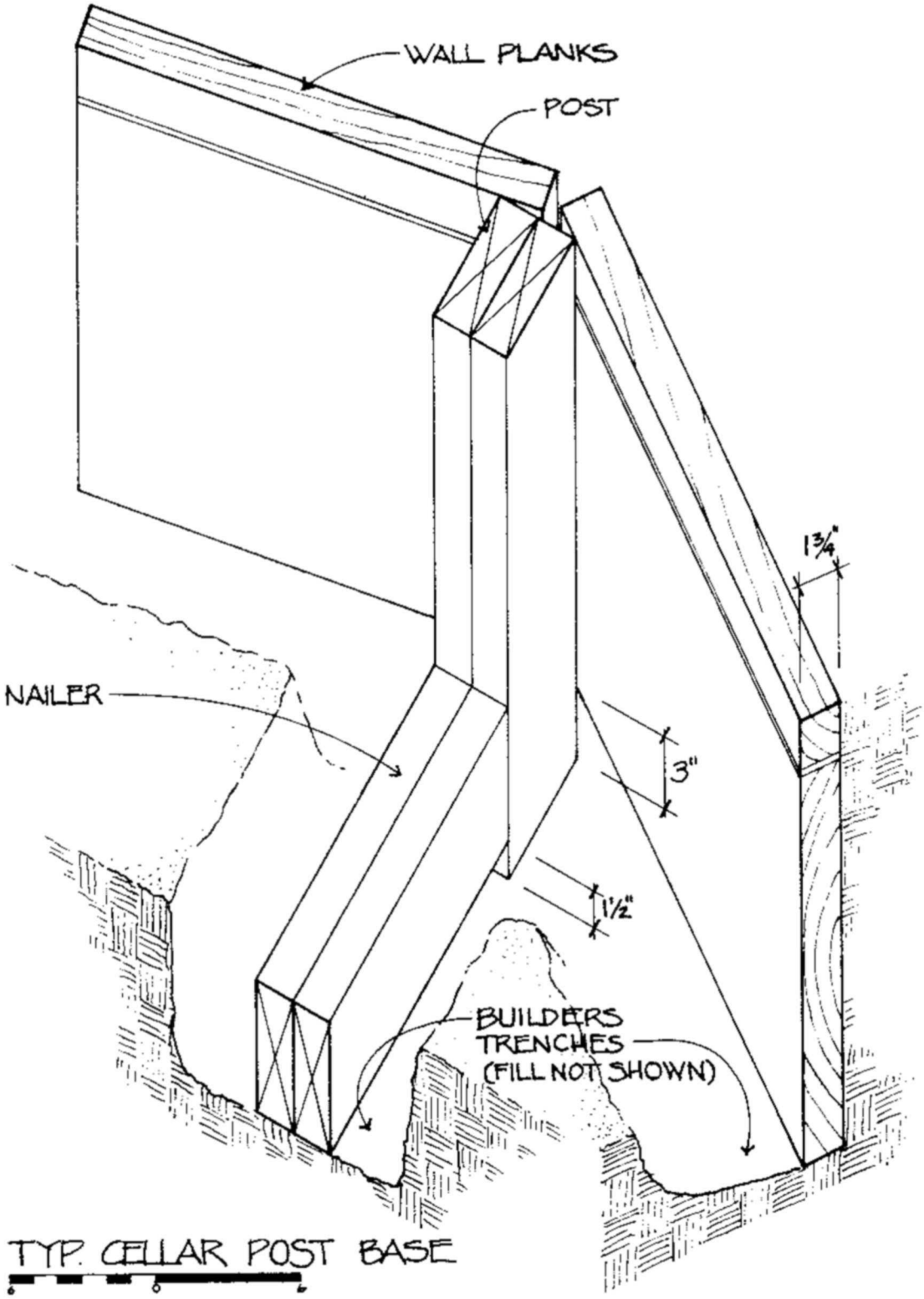
BLOCKHOUSE (HS-10)
FORT LARNED NHS
PAWNEE COUNTY, KANSAS

# APPENDIX D

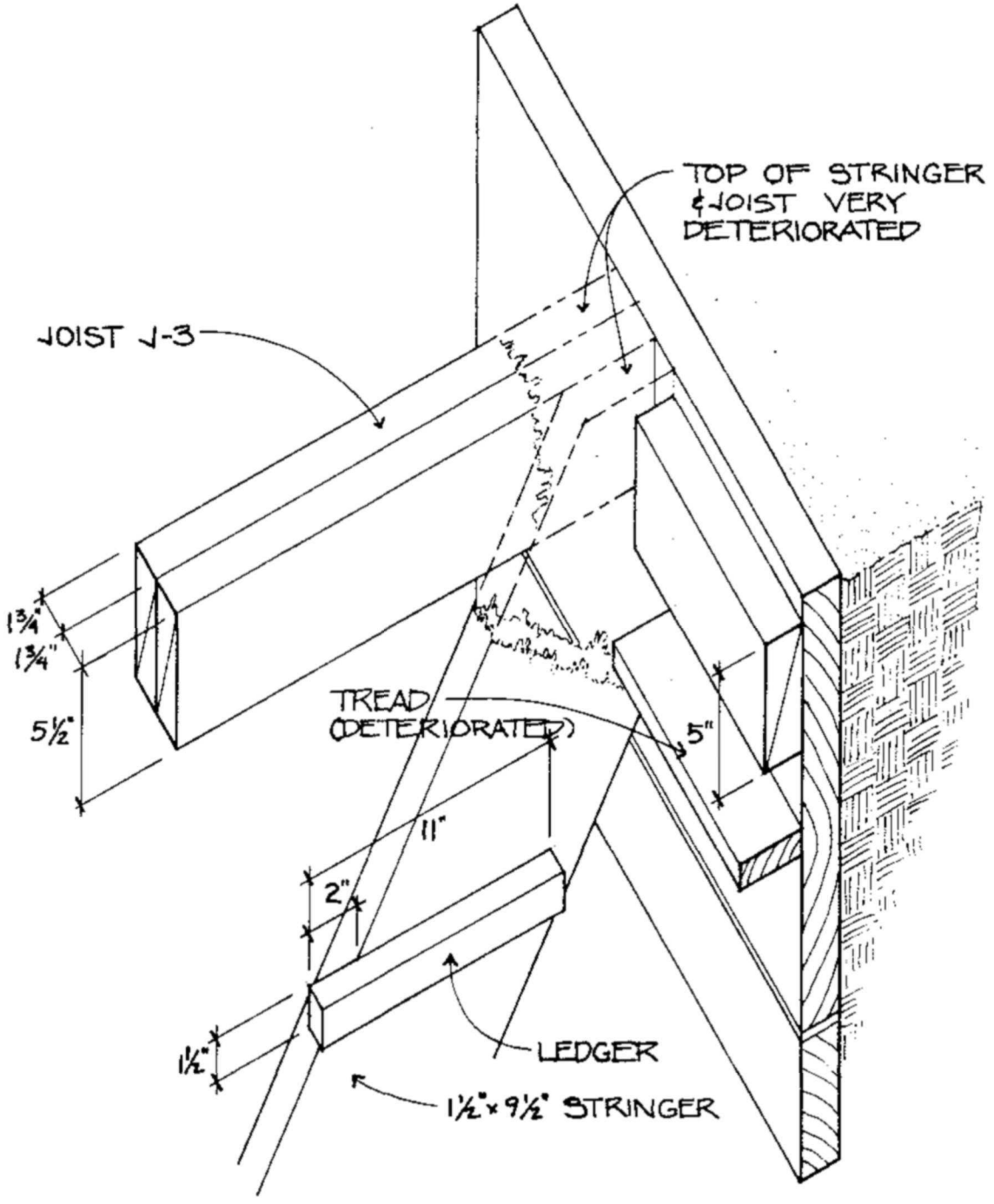
Cellar Structural Details



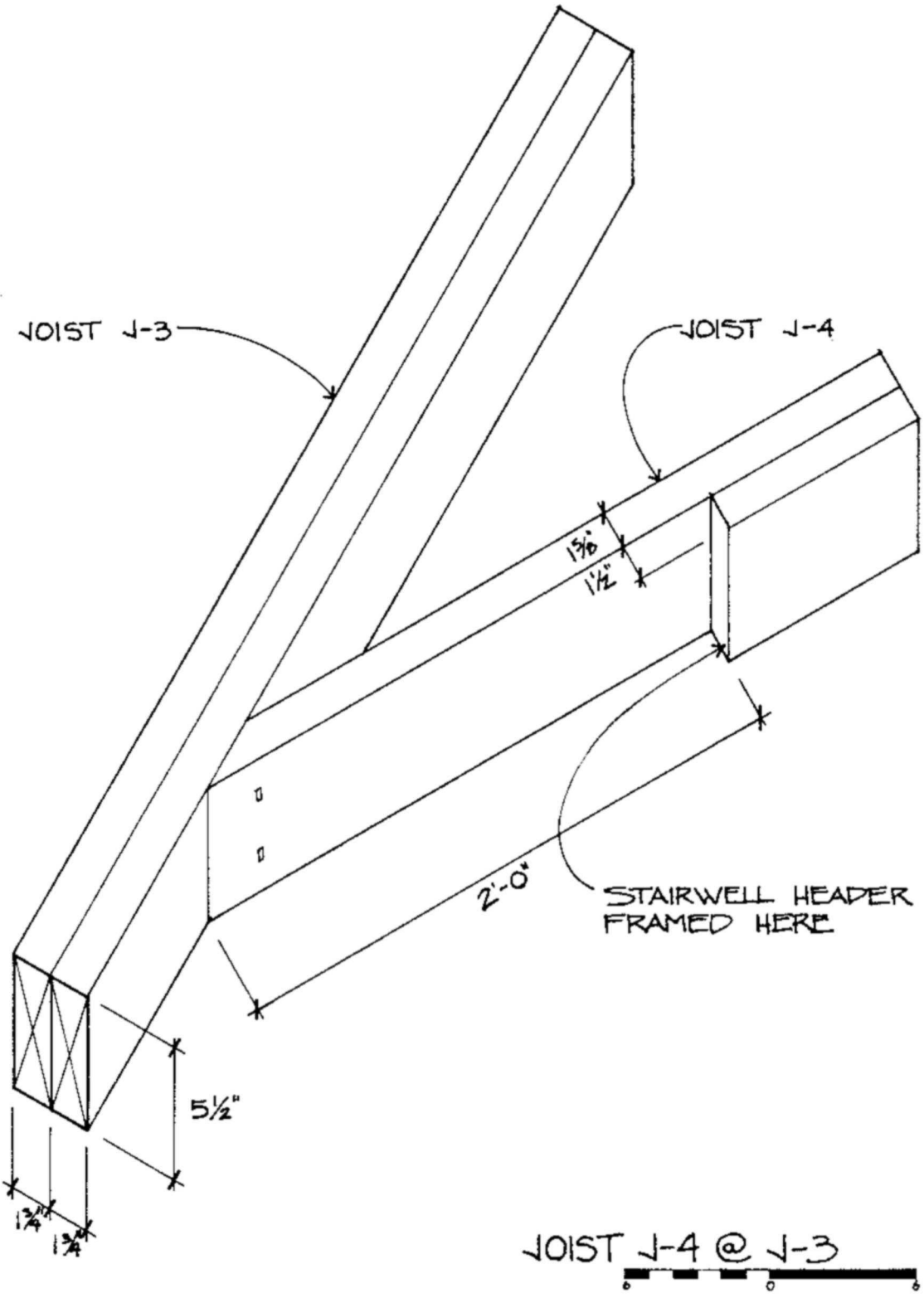

TYP. JOIST/POST CONNECTION




TYP. CELLAR POST BASE




CELLAR STAIR STRINGER @ JOIST J-4


JOIST J-3
JOIST J-4
1⅝"
1½"
2'-0"
STAIRWELL HEADER
FRAMED HERE
5½"
1¾"
1¾"
JOIST J-4 @ J-3

# APPENDIX E

## Flat Glass from the 1986 HS-10 Excavations

# APPENDIX E

Flat Glass from the 1986 HS-10 Excavations

by

Janis L. Dial

## Introduction

A total of 1,811 fragments of flat glass was recovered from 89 separate proveniences during the 1986 investigations at HS-10. Three of those fragments measure greater than 4.0 mm in thickness and may represent heavy plate glass (Moir 1982:17) typically produced for use in furniture construction or other applications. An additional 13 fragments have mirror backing, leaving a balance of 1,795 flat glass fragments which probably represent portions of broken window panes. The latter relatively large sample size from this site is noteworthy because window glass was not apparently used in the construction of HS-10 itself. The bulk of the flat glass in the collection therefore appears to represent architectural debris from structures at Fort Larned other than HS-10.

The goal of the window glass analysis was to supplement the interpretation of various features and fill components at the site with an emphasis on dating, regardless of the structure(s) in which the panes were originally installed. With regard to dating, the analytical emphasis was upon differentiation between proveniences related to the military period of occupancy at Fort Larned and proveniences related to the subsequent farm period at the fort. Some of the window panes which were installed originally in the extant sandstone buildings at the fort may not have been broken or replaced until the farm period. Therefore, the presence of early window glass in an archeological deposit at the fort may be indicative of breakage during either the military or farm periods. Only the presence of glass manufactured during the farm period was believed sufficient to differentiate between farm related and possible military proveniences on the basis of an analysis of window glass alone.

Relatively precise methods have been developed for dating nineteenth century window glass from the Plains and adjacent areas, all of which involve calculation of the mean thickness of window glass fragments (Schoen 1985; Moir 1982). Unfortunately for dating purposes at HS-10, those methods determine the initial date of construction/occupation of a building rather than any subsequent dates of building additions/renovations or the construction dates of other later buildings which may be represented in a sample. However, the study of modal distributions of window glass thickness may be useful for determining whether a sample contains glass from several construction episodes which occurred over time (Chance and Chance 1976 and Roenke 1978 in Schoen 1985:10-13).

## Background

The dating methods employed during the analysis of window glass from HS-10 are based upon measurement of the thickness of the glass fragments. Over the past two

decades, several studies in historical archeology have demonstrated that the thickness of window panes increased in a predictable manner during the nineteenth century with advances in window glass production methods. This phenomenon has had important implications for the dating of historic structures (Chance and Chance 1976, Moir 1982, Roenke 1978, and Walker 1971 in Schoen 1985:8-9). For example, Moir (1982) found a close correlation between the mean thickness of window pane fragments collected at 45 building sites in the South and Northeast and the initial dates of construction of those buildings. The sample structures represented lower to middle class dwellings in rural settings built between 1810 and 1920. The structures were also occupied for periods of less than 50 years each. Based on a linear regression analysis of the data, Moir developed the following equation to predict the ages of other historic structures with similar characteristics:

> ID = 84.22(TH) + 1712.7
> Where ID = the initial date of construction/occupation, and
> TH = the mean thickness of window glass to the nearest 0.01 mm (measurements of individual sherds made to the nearest 0.1 mm)

He further suggested that this formula may be appropriate for dating historic structures over a wide geographical area east of the Rocky Mountains, rather than simply in the South and Northeast sections of the country.

The accuracy of Moir's method of calculating an initial construction date is based in part upon the assumption that most window panes are installed when a building is first constructed. The introduction of numerous fragments of window glass associated with a later renovation or addition to a structure could potentially skew the analytical results of any sample by generating an "initial" construction date that is too late in time. Consequently, Moir cautioned against the application of the method in situations where structures were occupied for periods longer than 50 years. He also recommended that frequency distributions of the raw data be examined in order to determine whether multiple construction episodes were represented in a sample, reflected by the presence of several modal values for the sample. Modal distributions of sherd thickness have been successfully employed in the Pacific Northwest by Chance and Chance (1976) and Roenke (1978) to demonstrate the presence of window glass from several construction events. For small collections, Whelan (1985) has cautioned that bimodal distributions may reflect inadequate sample sizes rather than multiple periods of construction.

A concern for samples containing window glass from several periods of construction also led Moir to exclude from his study any flat glass collected from deposits which may have served the occupants of the property as dumps for the intentional disposal of architectural debris and other trash. Unfortunately, the proveniences at HS-10 at Fort Larned which ultimately produced the largest quantities of flat glass also appear to have served just that capacity. A discussion of the flat glass recovered from these deposits is presented later in this appendix.

An historic window glass analysis was recently conducted by Schoen (1985) using collections from ten nineteenth century frontier sites located in the Central and

Northern Plains in Nebraska, South Dakota, and North Dakota. The sites included in Schoen's sample are similar to HS-10 at Fort Larned in several respects including factors which would have affected the demand for and supply of goods such as window glass shipped from the East. Several military installations are represented in the sample, and the same broad geographical region and frontier setting are represented. As a consequence, the results of Schoen's analysis would seem to be particularly relevant to the investigations at HS-10.

Following Moir's example, Schoen developed a predictive model from linear regression analysis for dating the initial construction/occupation of historic sites on the Plains based upon the mean thickness of window pane fragments collected from the sites. The following is the regression equation developed by Schoen:

$$Y = 1725.7 + 1713.0(X)$$

Where Y = the date of initial construction/occupation, and
X = the mean thickness value in inches

Schoen's method of raw data collection involved taking three thickness measurements of each glass fragment which was greater than one inch in length. Measurements were made to the nearest 0.001 of an inch, and each set of three measurements was then averaged to determine the mean thickness of each sherd. The mean values for the sherds were subsequently used to calculate a mean thickness for the sample.

Lees (1986:97-99) applied the regression formulas developed by Moir (1982) and Schoen (1985) to a collection of flat glass from the site of the Jotham Meeker farmstead in Franklin County, Kansas, roughly 200 mi east of Fort Larned. Unfortunately, the initial dates of construction predicted by the two equations for the Meeker farmstead were too early in comparison to the known date of establishment, by 14 years in the case of Moir's equation and by 25 years in the case of Schoen's formula. Lees identified two factors which may have contributed to these inaccurate results including 1) the reuse of older buildings at the Meeker farmstead, and 2) Schoen's exclusion of sherds smaller than one inch in length in the development of his model, a procedure which may have biased his formula toward the thicker sherds from his sample of sites. Lees concluded that caution is appropriate in the application of this recent research concerned with the dating of historic window glass.

## Methods

The thickness of flat glass fragments in the 1986 HS-10 collection was measured in tenths of mm. The number of measurements taken on each sherd was dependent upon the size of the sherd as reflected in its maximum length:

| Number of Thickness Measurements | Maximum Sherd Length |
|---|---|
| 1 | 10 mm or less |
| 2 | 11-20 mm |
| 3 | 21 mm or more |

To ensure comparability with Schoen's results, the raw thickness values were averaged for each sherd in the HS-10 collection. The mean values were then averaged to obtain a mean thickness for the sample. When Schoen's formula was applied to subsets of the flat

glass from HS-10, only those data from fragments greater than 1 inch (25 mm) in maximum length were used in calculations of initial dates of construction/occupation. The thickness data for all sherds, regardless of size, were used in applications of Moir's formula.

The colors of sherds in the HS-10 collection were categorized as aqua, green, or colorless. The colors were determined by placing the fragments flat on a plain sheet of white paper and comparing the colors at the edges of the sherds. A wide range of pale greens and bluish greens are represented in the "aqua" category, matching colors described in the Munsell color charts as 10G9/1-2, 10G8/1-4, 2.5BG9/2, and 2.5BG8/2-4 (Kollmorgen Corporation 1973). Two sherds classified as "green" are a pale yellow green in color (10Y8.5/2). Over 90 percent of the flat glass from the site was characterized as aqua, approximately 9 percent was characterized as colorless, and only two sherds in the collection were classified as green.

An attempt was made to discover whether patterning existed in the thicknesses of sherds assigned to the two major color categories, aqua and colorless. Perttula and Shaw (1980:63-66) had previously observed that color (aqua and green) correlated with the mean thickness of sherds recovered during investigations at HS-3 at Fort Larned in 1979. Such a correlation suggested that color may itself be useful for very general dating purposes. The collection of flat glass from HS-3 was reexamined during the HS-10 analysis in order to learn how the green and aqua colors were defined by Perttula and Shaw, making comparable observations on the HS-10 material more controlled.

No clear patterning of thickness and color similar to that observed by Perttula and Shaw was found in the HS-10 window glass data. Frequency histograms were constructed of the thickness data on the aqua and colorless sherds, and in each case there was a single numerous modal value and the suggestion of additional smaller modes. Such distributions are not generally best described by summary measures of central tendency. Nevertheless, descriptive statistics for the two distributions are provided below. The colorless sherds are thicker on the average by only 0.12 mm, and the range of values for the colorless sherds is entirely contained within the range for the aqua sherds.

| | Aqua | Colorless |
|---|---|---|
| Mean | 1.95 mm | 2.07 mm |
| Mode | 1.80 mm | 2.10 mm |
| Minimum | 0.90 mm | 1.40 mm |
| Maximum | 3.10 mm | 2.80 mm |
| Range | 2.20 mm | 1.40 mm |

Trash Deposit outside HS-10

A total of 646 fragments of flat glass was recovered from a trash deposit outside and immediately adjacent to the probable exterior entrance to HS-10. The deposit lay largely within three excavation units (HS10-X4-2, HS10-X6-1, HS10-X7-1), the fill from which was screened through 1/4-in hardware cloth. As a result, it is believed that a high percentage of the window glass in the deposit was actually recovered in the field. The fragments are either aqua in color or are colorless, and they exhibit light to heavy patination.

As mentioned previously, Moir (1982) considered trash dumps a poor source of

window glass for the purpose of obtaining an initial construction date for a building. He judged such deposits to have a high potential for containing flat glass from sources other than window panes as well as window glass from construction which occurred after the initial episode for a building. He further recommended the use of frequency histograms to assist in the identification of samples with window glass from multiple construction events.

A frequency histogram was constructed using the thickness values obtained for probable window glass sherds recovered from the trash deposit outside the doorway to HS-10. While the upper half of the distribution was slightly uneven, there was no clear indication of a multi-modal distribution. Acknowledging Moir's cautionary note regarding trash deposits, the regression equations developed by Moir (1982) and Schoen (1985) were then applied to the HS-10 sample.

Only 56 of the fragments (11.5 percent) measured greater than 1 inch (25 mm) in maximum length. The mean thickness of this group of 56 sherds is 2.071 mm (.082 in). The minimum thickness value for the group is 1.0 mm and the maximum value is 2.5 mm. The initial date of construction/occupation obtained for this sample using Schoen's regression equation is 1866. The mean thickness value for the entire collection of 646 sherds is 1.938 mm with a minimum value of 1.0 mm and a maximum value of 3.1 mm. An initial construction/occupation date of 1876 was obtained when the latter mean was used to solve the regression equation developed by Moir. Despite the discrepancy between the two predicted dates, it may be noted that both dates fall within the military period at Fort Larned which extended from 1860 to 1883.

HS-10 Cellar and Tunnel Fill Containing Adobe

Fifty-four probable window pane fragments were recovered from those portions of the cellar and tunnel fill which consisted in large part of decomposed adobe brick. As discussed elsewhere, it appears that architectural and other debris from an adobe structure(s) at the fort was hauled to HS-10 to fill the cellar cavity. Very little of the cellar fill was screened during excavation. As a consequence, the sample of flat glass from this deposit is quite small. Forty-eight fragments of the 54 are aqua in color while 6 fragments are colorless.

A frequency histogram of the thickness data for this sample of flat glass appears in Figure 69. A bimodal distribution may be represented with a primary mode at 2.1 mm and a secondary mode at 1.6-1.7 mm. There is a possibility that this distribution is misleading because of an inadequate sample which is not representative of the population from which it was derived (e.g., Whelan 1985). On the other hand, it may be an accurate reflection of the thickness of panes which were installed in the adobe structure(s) represented in the fill. If so, there are several possible explanations for the presence of multiple thickness modes which include the following: 1) multiple structures are represented which were built at different times, 2) a single structure may be represented which underwent addition or repair, or 3) some of the panes installed in the adobe building were older stock possibly salvaged from another older building. A review of the range of glass thickness for each provenience in the HS-10 cellar fill indicated that fragments of varying thickness were mixed throughout the deposit.

## APPENDIX E

Feature 9

A total of 103 fragments of flat glass was recovered from F9, a concentration of historic artifacts which was identified relatively high in the fill near the center of the site (HS10-9-1 through HS10-9-4, HS10-SEQ-2). The flat glass fragments are believed to represent fragments of broken window panes. All but two of the fragments are aqua in color, and those two appear to be colorless.

A frequency histogram of the thickness data for the entire sample from F9 appears in Figure 70 and shows two distinct groupings. The regression equations developed by Schoen and Moir were applied to each of those groups with the following results:

| | Thickness Range (mm) | |
|---|---|---|
| | 1.4 - 1.9 | 2.1 - 3.0 |
| Schoen | | |
| No. Fragments | 21 | 6 |
| Mean Thickness | .064 in | .096 in |
| Initial Date | 1835 | 1890 |
| Moir | | |
| No.Fragments | 72 | 31 |
| Mean Thickness | 1.65 mm | 2.42 mm |
| Initial Date | 1852 | 1917 |

Despite the discrepancy between the specific dating results obtained using the two different regression equations, both sets of results suggest that the thicker fragments of glass in the sample date to the farm period at Fort Larned and provide support for the interpretation of F9 as a farm deposit.

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# APPENDIX F

## Mortar and Plaster from the 1986 HS-10 Excavations

# APPENDIX F

Mortar and Plaster from the 1986 HS-10 Excavations

by

Janis L. Dial

Fragments of lime mortar and lime plaster are among the architectural materials collected during the 1986 archeological investigations at HS-10. Lime mortar was used in the construction of the blockhouse and several of the recovered samples clearly relate to that activity. However, plaster was not apparently used in the blockhouse construction. A number of plaster fragments recovered from the adobe matrix in the cellar of HS-10 appear to have been derived from one or more of the early adobe structures at Fort Larned. Mortar and plaster fragments of unknown origin were recovered from other disturbed and secondary fill deposits at the site, and mortar is adhering to several fired brick fragments.

The following criteria were used to identify mortar in the HS-10 collection:

1. Mortar may contain poorly sorted sand.
2. Mortar is likely to contain visible lime inclusions.
3. Mortar may frequently occur in large chunks, the fragments irregular in overall shape.
4. Whitewash or paint may be present on small surface areas of the mortar fragments.

A visual examination of the mortar in the HS-10 collection indicates that there is considerable variation in its composition. Some of the fragments contain relatively large pebbles, but a more compact variety is also represented which is composed primarily of extremely fine sand. Large surface areas of several chunks of fine sand mortar recovered at the site were smoothed during application and then whitewashed. Because of the amount of surface area which was treated in this manner, it seems possible that this mortar was that used to block the lower tier of loopholes around the blockhouse, ostensibly to stop the passage of liquor to the prisoners confined inside (see Cockrell, History and Significance, this volume). Fine sand mortar was recovered from several mixed farm/military proveniences, including the collapsed and/or dismantled wall 1/2 rubble designated Feature 29.

At the request of Historical Architect Alan W. O'Bright, a compositional analysis was performed on four mortar samples collected at the site to obtain information for the HS-10 reconstruction. The results of that analysis are provided in Appendix G, and those results were discussed in earlier sections of the report.

Plaster was identified in the HS-10 collection on the basis of the following criteria:

1. Plaster generally contains fine well-sorted sand.
2. Plaster contains few visible lime fragments.
3. Plaster frequently occurs in fragments with approximately parallel interior and exterior surfaces.

4. Keys may be present on the interior surfaces of plaster fragments.
5. Whitewash/paint may cover considerable surface areas.

Because of the apparent similarity in the composition of some of the mortar and plaster in the HS-10 collection, there was ambiguity in the identification of the smallest fragments of composite sand and lime. This questionable material is described as "mortar or plaster" in the description of the collection provided in Appendix H.

Most of the plaster in the HS-10 collection appears to represent a single coat of application. Several small plaster fragments in the collection may represent a finish coat composed primarily of lime which separated from the underlying coat to which it was applied (Alan W. O'Bright, personal communication 1989). However, some of the latter fragments exhibit highly irregular interior surfaces which would be atypical for a finish coat of plaster. Alternatively, this material may represent a particularly thick coating of whitewash which was applied directly to a stone or adobe wall. Indeed, whitewash still adhered to a few intact adobe bricks identified in the HS-10 cellar fill. In addition, a single plaster fragment collected from the wellhouse fill appears to have been applied in three separate coats.

Most of the intact interior surfaces of the plaster fragments are either irregular or flat with occasional linear impressions. Low rounded linear or curving keys are also present on a few fragments. These characteristics of the interior surfaces suggest that the plaster was applied directly to either stone or adobe rather than to wood lathe. No keys typical of plaster application to lathe were identified in the collection. For those plaster fragments recovered from the cellar fill, such a suggestion is consistent with the interpretation of that fill as debris from an adobe building(s). A single plaster fragment recovered from the wellhouse fill has an impression reminiscent of saw marks on wood on the interior surface, suggesting that it was applied to wood.

Plaster in the HS-10 collection was also compared to samples of historic plaster from HS-4 and HS-7 at Fort Larned. The HS-10 material differs from the comparative samples in at least two important respects. First, the plaster in the HS-10 collection ranges in thickness from approximately 1/8 in to slightly over 1/2 in. While the samples from HS-4 and HS-7 also exhibit considerable variation in thickness, they are thicker than the plaster from HS-10 and were 5/8 in or more in thickness. In addition, the plaster samples from HS-4 and HS-7 contain hair as a binder. None of the plaster from the HS-10 excavations contains hair.

# APPENDIX G

Mortar Sample Analysis, HS-10, Fort Larned National Historic Site, Kansas

## APPENDIX G

Mortar Analysis
Fort Larned National Historic Site
Blockhouse (HS-10)

by

North Atlantic Historic Preservation Center,
National Park Service,
Boston

Four mortar samples from Fort Larned, Kansas, were sent to the North Atlantic Historic Preservation Center for analysis. Each sample was labeled with an identification number ranging from FOLS 10 MO1 through FOLS 10 MO4. Since one factor (filtrate color) in several of the samples was ambiguous, that factor was fed into the computer with both available options, producing two possible results in two of the samples (MO1 and MO4). The following is an account of the results, reflecting both results where applicable:

| SAMPLE | LOCATION | RESULTS | |
|---|---|---|---|
| FOLS 10 MO1 | Mortar from block-house foundation wall near corner 3. | Pts./Vol. Sand<br>Pts./Vol. Lime | 54<br>8<br>(6:1) |
| | | or | |
| | | Pts./Vol. Nat. Cement<br>Pts./Vol. Sand<br>Pts./Vol. Lime | 7<br>53<br>1<br>(1:6:trace) |
| FOLS 10 MO2 | Mortar from rubble layer outside block-house wall. Strat. Test 1, 22-51 cm bs. | Pts./Vol. Sand<br>Pts./Vol. Lime | 50<br>8<br>(6:1) |
| FOLS 10 MO3 | Mortar from tunnel wall, in fill. | Pts./Vol. Nat. Cement<br>Pts./Vol. Sand<br>Pts./Vol. Lime | 8<br>53<br>3<br>(1:6:trace) |

## APPENDIX G

| | | | |
|---|---|---|---|
| FOLS 10 MO4 | Mortar at top of level 2 in first 2 feet of tunnel fill from cellar side. | Pts./Vol. Nat. Cement | 7 |
| | | Pts./Vol. Sand | 48 |
| | | Pts./Vol. Lime | 6 |
| | | | (1:7:1) |
| | | or | |
| | | Pts./Vol. Sand | 49 |
| | | Pts./Vol. Lime | 13 |
| | | | (4:1) |

The fines in all four samples are very similar in color. The sands in samples MO1, MO2, and MO4 are also very similar, suggesting at least the same sand source if not contemporary sample installations. The similarities in resultant mixes, as well as sands and fines, of samples MO1 and MO2 do suggest contemporary applications. Sample MO2 was very soft compared to the other samples. Its softness may relate to a deteriorated state rather than its inherent strength. It, therefore, is probably from the same installation period as sample MO1. Although the fines and sands from sample MO4 are also similar to those of samples MO1 and MO2, the proportions of resultant mixes are slightly different. The difference in mix may have been purposely altered due to a different need of application, assuming the installation occurred at the same time as samples MO1 and MO2. This assumption is purely speculative. Due to the difference in sand, sample MO3 was most likely installed during a different time period than the other three samples.

The ambiguity of cement types found in samples MO1 and MO4 can only be resolved through documentary research. If entries are found for orders of natural cement which coincide to the same time frame as these tested samples, then one can assume that these samples are natural cements. If no such entries are found, or no references to a specific type of cement used in construction surface, then the ambiguities will remain unsolved.

# APPENDIX H

Archeological Materials from the 1986 investigations at HS-10

# APPENDIX H

Archeological Materials from the 1986 Investigations at HS-10

by
Janis L. Dial, W.E. Sudderth, and Rene Botts

A variety of cultural materials was collected during the course of the 1986 archeological investigations at HS-10, and this appendix provides information on those which have been retained. The specific proveniences from which the materials were recovered are indicated using the associated bag catalog numbers or codes assigned in the field. A description of those proveniences is then provided in Appendix I and is organized by bag catalog number.

This appendix details the results of the identification and laboratory analysis of the above materials as well as library research pertaining to them. The appendix is organized into two major sections. The first consists of a listing by provenience of all cultural materials in the collection, and the second provides additional information on selected artifacts and includes both more lengthy artifact descriptions where appropriate and analytical data with an emphasis on the dating of artifacts. In order to find the supplementary information on a particular artifact listed in the first section, one must know both the material from which the artifact was made (ceramic, glass, hide/hair, metal, rubber, shell, or combination of materials) and the arbitrary unique number assigned to the artifact during the laboratory analysis (those numbers are provided in section one).

An analysis of the vertebrate faunal remains from the site was conducted by Susan M. Monk, the results of which are fully described in a separate report (Monk 1987). The results specific to each provenience have been extracted from her report and are included in the first section of this appendix. Much of the faunal material was too fragmentary for specific taxonomic identification. However, a summary of the fauna determined to be represented in the collection (Monk 1987:5 Table 2) follows.

| Taxonomic Identification (common name) |
|---|
| *Bufo* sp. (indet. toad) |
| *Rana* sp. (indet. frog) |
| Serpentes (snakes) |
| Aves (bird) |
| *Anas* sp. (surface feeding duck) |
| cf. *Gallus gallus* (domestic chicken) |
| *Gallus gallus* (domestic chicken) |

## APPENDIX H

*Melagris gallopavo* (turkey)
*Sylvilagus* sp. (indet. cottontail)
*Lepus* sp. (indet. jack rabbit)
Cricetidae (New World rats and mice)
?*Peromyscus* sp. (mouse)
*Sus scrofa* (domestic pig)
cf. *Bos taurus* (domestic cow)
*Bos taurus* (domestic cow)
Sheep/Goat
Small Mammal
Medium Mammal
Large Mammal

Cultural Materials by Provenience

Note: The 29 proveniences used in the assessment of the adobe fill in the cellar and the tunnel included HS10-X5-3 through HS10-X5-9, HS10-C-16 through HS10-C-24, HS10-C-26, HS10-C-27, HS10-C-34, HS10-C-36 through HS10-C-39, HS10-C-41, HS10-C-48, HS10-C-67, HS10-T-9, HS10-T-14, and HS10-T-17.

HS10-S1-1

1 flat glass fragment
2 curved glass fragments
1 common cut nail (headed fragment)
1 small fragment of mortar or plaster
1 unidentified bone fragment
1 four-point round wire barb which is coiled three times around a single strand of round wire. At least two of the points are broken.

HS10-S1-2

10 flat glass fragments
5 curved glass fragments
1 ferrous metal unidentified
1 rubber washer
1 bone fragment: cf. *Gallus gallus* - coracoid, left proximal

HS10-S1-3

3 flat glass fragments
2 curved glass fragments
2 cut nails: 1 complete oval-headed tack, 1 shank fragment
1 cotter pin
2 unidentified bone fragments

HS10-S1-4

3 flat glass fragments
2 curved glass fragments, one of which is heat-altered
2 cut nails (headed fragments) including 1 common nail and 1 nail of indeterminate type
2 unidentified bone fragments

HS10-S1-5

6 flat glass fragments
2 curved glass fragments
2 cut nails: 1 complete 4d common nail, 1 shank fragment
1 fragment of mortar or plaster
1 small brick fragment
2 ferrous metal staples
1 unidentified burned bone fragment
1 probable unionid mussel shell fragment

HS10-S1-6

11 flat glass fragments
2 curved glass fragments
4 cut nails and nail fragments: 1 complete 7d possible finish nail, 1 headed fragment of a common nail, 2 shank fragments

HS10-S1-7

2 flat glass fragments
1 curved glass fragment
3 small fragments of mortar or plaster
4 probable unionid mussel shell fragments

HS10-S1-8

6 flat glass fragments
3 curved glass fragments, one of which is heat-altered
4 fragments of mortar or plaster
1 cinder
1 unidentified burned bone fragment

HS10-S1-9

11 flat glass fragments
1 curved glass fragment
2 complete common cut nails, 4d and 9d
3 small fragments of mortar or plaster
1 small brick fragment
1 unidentified bone fragment
4 probable unionid mussel shell fragments

## APPENDIX H

HS10-S1-10

48 flat glass fragments
8 curved glass fragments
8 cut nails and nail fragments: 4 complete common nails (3d, 4d, 4d, 8d), 3 headed fragments (common 8d, common 9d, indeterminate 6d), 1 shank fragment
2 mortar fragments
21 fragments of mortar or plaster
3 small brick fragments
1 ferrous metal strap fragment
1 unidentified bone fragment
1 glass bottle base fragment with a pontil mark (artifact #46)

HS10-S1-11

2 curved glass fragments
1 complete common 8d cut nail, ruptured
1 fragment of mortar or plaster

HS10-S1-12

1 flat glass fragment

HS10-S1-13

1 flat glass fragment
4 curved glass fragments

HS10-S1-14

11 flat glass fragments
4 curved glass fragments
2 cut nails: 1 complete common 10d nail, 1 shank fragment
1 small brick fragment
1 small coal fragment
1 unidentified bone fragment

HS10-S1-15

1 curved glass fragment

HS10-S1-16

2 flat glass fragments
1 curved glass fragment

HS10-S1-17

2 cut nails: 1 complete common 4d nail, 1 shank fragment

HS10-S1-18

2 flat glass fragments

HS10-S1-19

1 cast iron fragment

## APPENDIX H

HS10-NWQ-1

110 flat glass fragments including 1 possible mirror fragment
62 curved glass fragments
1 drain tile fragment
3 small fine sand mortar fragments
1 brick fragment
2 coal fragments
1 cinder
12 wire fragments
1 tin fragment
9 ferrous metal unidentified
12 wire nails: 6 complete nails (1 each of sizes 3d, 4d, 8d, and 9d; 2 6d nails), 6 common headed fragments (1 appears to be 6d in size)
294 cut nails and nail fragments: 233 complete nails including 7 3d (4 common, 3 indeterminate), 177 4d (143 common*, 34 indeterminate), 1 5d (indeterminate), 4 6d (all common), 22 8d (19 common*, 3 indeterminate*), 10 10d (8 common, 2 indeterminate), 2 20d (both common); 39 headed fragments including 1 3d (common), 11 4d (5 common, 6 indeterminate), 6 6d (5 common, 1 indeterminate), 3 8d (all common), 1 10d(common), 1 16d (common), 3 30d (2 common, 1 indeterminate), 1 60d (common), 12 of indeterminate size (1 common, 11 of indeterminate type); 32 shank fragments*
* Includes a nail shank bent greater than 90 degrees but not ruptured.
5 bone fragments: 1 large mammal (rib, butchered, carnivore gnawing), 1 Cricetidae (humerus, right distal, eroded, cut marks?, carnivore gnawing?), 3 unidentified bone fragments
A single strand of twisted oval wire with portions of four barbs attached. The barbs appear to have consisted of round wire with two points coiled twice around the oval wire. However, at least one point is broken from each barb. This may be a fragment of Glidden's Twist Oval barbed wire patented Aug. 22, 1876 by Joseph F. Glidden of DeKalb, Ill. (Clifton 1970:31). Patent No. 181433.
1 fragment of a tooled ring finish and neck of a glass bottle which may have contained wine, sparkling wine, or champagne (artifact #70)
1 probable Export beer bottle fragment (artifact #177)
1 leather fragment exhibiting sewing perforations

HS10-NWQ-2

1 four-hole atttachment button of ferrous metal measuring .73-.75 inch in diameter (29-30 lignes)

HS10-NWQ-3

27 flat glass fragments
29 curved glass fragments
4 plaster fragments
1 coal fragment
1 horse shoe
1 coil spring
3 ferrous metal unidentified
1 unidentified bone fragment
2 complete common wire nails (6d and 7d)
133 cut nails and nail fragments: 88 complete common nails including 4 3d, 77 4d, 3 8d, 1 9d, 2 10d, and 1 40d; 18 headed fragments including 1 3d (common), 6 4d (5 common, 1 indeterminate), 2 5d (both common), 1 6d (indeterminate), 4 9d (3 common,

1 indeterminate), 1 10d (indeterminate), 2 12d (both indeterminate), 1 40d (common); 27 shank fragments
1 cuprous metal hook and circular attachment fitting possibly from a military sword belt (e.g., Schuyler, Hartley, and Graham 1967:45-46). The shank of the hook is bent and the end has been cut off.
1 fragment of a laid-on ring finish of a glass bottle which may have contained wine, sparkling wine, or champagne (artifact #60)
1 general service uniform button (artifact #155)
1 tabbed red rubber ring gasket for a Mason type canning jar (artifact #12)

HS10-NWQ-4

1 glass bottle fragment refitted to a sherd from HS10-X5-4. Together they include the lipping tool finish and part of the neck of a bottle which may have contained champagne or sparkling wine (artifacts #53a and #53b).

HS10-NWQ-5

1 flat glass fragment
1 complete common 10d cut nail

HS10-NWQ-6

1 complete common 10d cut nail

HS10-NEQ-1

1 glass bottle fragment exhibiting a tooled finish (artifact #64)

HS10-NEQ-2

1 ferrous metal sprocket fragment

HS10-NEQ-3

1 fragment of the base, heel, and body of a glass flask (artifact #75)

HS10-NEQ-4

1 unfired lead bullet (artifact #178)

HS10-NEQ-5

1 ferrous metal strap fragment

HS10-NEQ-6

4 curved glass fragments
1 fragment of a glass bottle base, heel, and body (artifact #74)

HS10-NEQ-7

1 undecorated whiteware sherd

HS10-NEQ-8

1 wire nail (common 20d headed fragment)
1 cut nail (complete common 10d)

HS10-NEQ-9

1 Lea & Perrins Worcestershire Sauce glass bottle body fragment (artifact #69)

HS10-NEQ-11

8 flat glass fragments including 1 possible plate glass fragment
1 wire nail (complete common 8d)
7 cut nails and nail fragments:
2 complete common nails (3d and 6d), 3 common headed fragments (3d, 8d, 8d), 2 shank fragments
1 ferrous metal unidentified
1 unidentified bone fragment

HS10-NEQ-12

2 flat glass fragments
3 curved glass fragments
2 cut nails: 1 complete common 10d nail, and 1 3d headed fragment of indeterminate type
1 ferrous metal unidentified

HS10-NEQ-13

1 flat glass fragment
1 curved glass fragment
1 undecorated whiteware sherd
1 complete 4d cut nail
1 ferrous metal hardware fragment, blacksmith manufactured, round rod hammered to a rectangular cross section, bent, 3 punched holes

HS10-SWQ-1

1 four-hole attachment button of ferrous metal measuring .58 inch in diameter (approximately 23 lignes)

HS10-SEQ-1

1 fragment of a machine-made glass bottle (artifact #71)

HS10-SEQ-2

11 flat glass fragments
3 curved glass fragments
7 cut nails and nail fragments: 3 complete nails including 1 4d common, 1 8d indeterminate, 1 20d common; 2 headed fragments including 1 7d common and 1 16d common; 2 shank fragments
1 bolt
1 general service uniform button (artifact #133)

HS10-SEQ-3

5 cut nails and nail fragments: 1 complete common 40d nail, 1 common 16d headed fragment, and 3 shank fragments
1 bolt
1 bolt with nut and washer
1 fragment of the pushup of a glass bottle which may have contained wine, sparkling wine, or champagne (artifact #58)

HS10-SEQ-4

3 refitted sherds from the body and heel of a glass bottle which may have contained wine, sparkling wine, or champagne (artifact #59)

## APPENDIX H

HS10-SEQ-5

2 small concrete fragments

HS10-SEQ-6

26 possible tin can fragments

HS10-C-1

44 flat glass fragments including 1 possible mirror fragment
39 curved glass fragments
1 undecorated whiteware sherd
1 undecorated whiteware rim sherd from a mug or cup with an original diameter of 4 in
126 cut nails and nail fragments: 49 complete nails including 2 3d (1 common, 1 indeterminate), 33 4d (24 common*, 9 indeterminate), 2 6d (both common), 4 8d (2 common, 2 indeterminate), 5 10d (all indeterminate), 3 20d (1 common, 2 indeterminate); 48 headed fragments including 12 common, 1 spike, and 35 of indeterminate type; 29 shank fragments
* One nail is bent at an angle greater than 90 degrees but is not ruptured.
16 plaster fragments
1 piece of lime
2 brick fragments
1 U-bolt
1 probable lead seal
26 ferrous metal unidentified
6 bone fragments: 1 cf. *Bos taurus* (os coxae [innominate], left, immature, butchered), 5 unidentified fragments (3 burned, 2 unburned)
1 four-hole attachment button of white porcelain measuring .43 inch in diameter (approximately 17 lignes)
Clay smoking pipe fragments: 2 refitted unmarked and undecorated ball clay pipe bowl fragments, 1 unmarked and undecorated ball clay pipe stem fragment, 1 unmarked and undecorated terra cotta pipe bowl fragment, 1 decorated ball clay pipe stem fragment embossed PET... on one side and DORNI on the other side (artifact #84)
1 glass bottle fragment including the tooled ring finish, the neck, and a portion of the shoulder. The bottle from which this fragment originated may have contained champagne or sparkling wine (artifact #57).
1 fragment of the base, heel, and body of a glass bottle (artifact #176)

HS10-C-2

3 complete common 20d cut nails

HS10-C-3

3 bones: 1 *Sylvilagus* sp. (femur, left complete, carnivore gnawing), 1 *Sylvilagus* sp. (ulna, left complete), 1 *Sylvilagus* sp. (radius, left complete)

HS10-C-4

2 cut nails: 1 complete 20d nail, 1 shank fragment

HS10-C-5

1 curved glass fragment
1 glass bottle fragment including the pushup, heel, part of the body, and a small section of the shoulder. The bottle from which this sherd is derived may have contained champagne or sparkling wine (artifact #43).

HS10-C-6

1 possible hand wrought nail (headed fragment). The nail head may be larger than standard size for the diameter of the shank. However, the artifact is in very poor condition and the identification is tentative.
1 horse shoe

HS10-C-7

2 flat glass fragments
1 percussion cap (artifact #96)

HS10-C-8

1 cut nail (headed fragment)

HS10-C-9

3 flat glass fragments
8 curved glass fragments

HS10-C-10

5 cut nails and nail fragments: 2 complete 20d nails, 1 common headed fragment, 2 headed fragments of indeterminate type

HS10-C-11

1 glass bottle fragment which includes the pushup, the heel, and a portion of the body. The bottle from which this sherd is derived may have contained champagne or sparkling wine (artifact #65).
1 glass bottle base fragment with an improved pontil mark (artifact #47)

HS10-C-12

Shoe remnant (artifact #181)

HS10-C-13

Shoe remnant (artifact #180)

HS10-C-14

5 complete common 20d cut nails

HS10-C-15

2 complete common 20d cut nails

HS10-C-16

1 flat glass fragment
1 undecorated whiteware sherd
1 undecorated whiteware plate fragment with an original diameter of 10 in
1 complete 30d cut nail which is bent at an angle greater than 90 degrees but is not ruptured
4 pieces of adobe with mud plaster and whitewash (1 fragment also has lime mortar or lime plaster adhering to it)
Plaster sample consisting of 1 fragment
2 knife fragments
Sheet metal skillet fragments
1 heavy T-hinge

## APPENDIX H

1 decorative piece of copper
5 bone fragments (2 burned, 3 unburned)
1 four-hole attachment button of fresh water shell measuring .38 inch in diameter (approximately 15 lignes)
1 cuprous metal securing key for an epaulet or shoulder scale
2 cuprous metal epaulet or shoulder scale holders
2 ball clay smoking pipe fragments refitted to form most of the stem and spur of a pipe impressed with the words HENDERSON and MONTREAL (artifacts #83a and #83b)
1 Lea & Perrins Worcestershire Sauce glass bottle stopper (artifact #174)
1 glass bottle fragment which includes the finish, the neck, and a portion of the shoulder (artifact #67)
2 refitted fragments of a glass bottle base, heel, and body (artifact #49)
1 incomplete metallic cartridge of approximately .50 caliber (artifact #101)
1 rimfire metallic cartridge base (artifact #145)
1 unfired lead bullet (artifact #103)
Tin can fragments (artifact #111)
4 general service uniform buttons (artifacts #109, #132, #152, #154)
1 infantry officer's uniform button (artifact #144)
1 incomplete cuprous metal sword-belt plate (artifact #173)

HS10-C-17

11 flat glass fragments including 1 possible mirror fragment
8 curved glass fragments, one of which is heat-altered
1 undecorated whiteware sherd
30 cut nails and nail fragments: 4 complete nails including 1 5d (indeterminate), 2 8d (1 common, 1 indeterminate), 1 20d (indeterminate); 10 headed fragments (2 common, 8 indeterminate); 16 shank fragments
5 plaster fragments
1 piece of lime with grooves
1 brick fragment with a thick coating of whitewash on one face
1 possible cinder with plaster/whitewash adhering to it
1 ferrous metal screw
1 piece of hardware
4 ferrous metal unidentified
19 bones and bone fragments: 1 *Lepus* sp. (scapula, right distal), 1 *Gallus gallus* (vertebra,complete, immature), 1 *Melagris gallopavo* (phalanx 1 of digit 2, right complete, eroded), 1 cf. *Bos taurus* (tibia, right proximal, immature, cut marks), 15 unidentified fragments (7 burned, 8 unburned)
1 egg shell fragment
1 four-hole attachment button of ferrous metal measuring .7 inch in diameter (28 lignes)
1 unfired lead bullet (artifact #106)

HS10-C-18

4 flat glass fragments
7 curved glass fragments
1 undecorated whiteware sherd
32 cut nails and nail fragments: 4 complete nails including 1 5d (indeterminate), 1 6 oz tack (9/16 in), 2 8d (indeterminate); 16 headed fragments (3 common, 13indeterminate including one each in sizes 4d, 6d, and 8d); 12 shank fragments
6 plaster fragments
6 pieces of lime
1 brick fragment with a thick coating of whitewash on one face
2 ferrous metal strap fragments
1 ferrous metal screw
2 possible lead seal fragments
13 ferrous metal unidentified
16 bone fragments: 1 small mammal (femur, right proximal), 1 cf. *Bos taurus* (spinous process, charred spot), 1 cf. *Bos taurus* (rib section), 13 unidentified fragments (6 burned, 7 unburned)
1 broken four-hole attachment button of ferrous metal measuring .58 inch in diameter (approximately 23 lignes)
1 broken button of ferrous metal measuring .64 inch in diameter (approximately 25.5 lignes)
5 leather fragments, 4 of which exhibit perforations. A portion of a ferrous metal nail is still retained in one of the perforations.
Tin can fragments (artifact #116)

HS10-C-19

1 flat glass fragment
15 curved glass fragments
28 cut nails and nail fragments: 5 complete nails including one each of sizes 3d, 4d, 6d, 9d, and 10d; 14 headed fragments (2 common, 12 indeterminate); 9 shank fragments
1 plaster fragment
6 possible tin can fragments
11 ferrous metal unidentified
1 thin leather fragment with a line of stitching holes
18 bone fragments: 1 cf. *Gallus gallus* (pelvis), 1 *Gallus gallus* (vertebra), 1 *Anas* sp. (carpometacarpus, right proximal), 15 unidentified fragments (12 burned, 3 unburned)
1 four-hole attachment button of white porcelain measuring .42 inch in diameter (approximately 17 lignes)
1 incomplete four-hole attachment button of ferrous metal measuring .58 inch in diameter (approximately 23 lignes)
1 glass bottle fragment including a tooled ring finish and portions of the neck and shoulder. The bottle from which this fragment originated may have contained champagne or sparkling wine (artifact #66).

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1 glass bottle fragment refitted to a sherd from HS10-C-48. Together they include part of the tooled ring finish, the neck, and part of the shoulder of a bottle which may have contained wine, sparkling wine, or champagne (artifacts #51a and #51b).
5 amber glass sherds from a McCully bottle (artifact #56a). Refitted with sherds from HS10-C-37, HS10-C-39, and HS10-C-47.
1 amber glass sherd possibly from a McCully bottle (artifact #56b)
Numerous fragments of felt (artifact #39)
Heavily oxidized distal portion of a ferrous metal sword scabbard (artifact #114)

HS10-C-20

1 flat glass fragment
32 curved glass fragments (31 of the fragments appear to be from the same bottle)
7 cut nails and nail fragments: 1 complete 10d nail, 4 headed fragments, 2 shank fragments
5 tin can fragments (artifact #182)
1 ferrous metal unidentified
1 unidentified burned bone fragment
Heavily oxidized distal portion of a ferrous metal sword scabbard

HS10-C-21

4 curved glass fragments
10 cut nails and nail fragments: 3 complete nails including 1 4d (indeterminate), 2 8d (1 common, 1 indeterminate); 3 headed fragments; 4 shank fragments
1 plaster fragment
2 pieces of lime
7 ferrous metal unidentified
7 leather fragments, two of which exhibit perforations
12 bone fragments: 1 cf. *Gallus gallus* (pelvis), 11 unidentified fragments (7 burned, 4 unburned)
3 percussion caps (artifacts #161, #162, #162a)

HS10-C-22

1 flat glass fragment
6 curved glass fragments
1 brown glazed redware sherd (artifact #6)
28 cut nails and nail fragments: 3 complete nails including 2 8d (1 common, 1 indeterminate), 1 30d (common); 17 headed fragments including 1 common 8d nail, and 16 nails of indeterminate type (one nail each of sizes 6d and 9d, two each of sizes 8d and 10d, 10 of indeterminate size); 8 shank fragments
1 plaster fragment
1 piece of lime
2 copper/brass fragments
13 ferrous metal unidentified
2 perforated leather fragments

2 unidentified bone fragments
Heavily oxidized distal portion of a ferrous metal sword scabbard
1 amber glass sherd possibly from a McCully bottle (artifact #50b). Refitted with fragments from HS10-C-41 and HS10-C-48.

HS10-C-23

1 flat glass fragment
4 curved glass fragments
8 cut nails and nail fragments: 4 complete nails including 3 8d (indeterminate), 1 10d (common); 2 headed fragments; 2 shank fragments
3 plaster fragments
1 small brick fragment
1 ferrous metal unidentified
2 amber glass sherds possibly from a McCully bottle(s) (artifacts #54 and #55)

HS10-C-24

1 flat glass fragment
2 curved glass fragments
11 cut nail fragments including 6 headed fragments and 5 shank fragments
2 ferrous metal unidentified
4 bones and bone fragments: 1 *Bos taurus* (lumbar? vertebra, butchered, cut marks), 1 medium mammal (rib, eroded, cut marks), 1 *Gallus gallus* (humerus, left complete), 1 unidentified fragment
1 fragmentary percussion cap
1 four-hole attachment button of ferrous metal measuring .57-.59 inch in diameter (23-23.5 lignes)
Door knob shaft (artifact #120). Refitted to door knob fragments (artifact #121).
Brown glazed mineral door knob fragments (artifact #121). Refitted to door knob shaft (artifact #120).

HS10-C-25

13 cut nails and nail fragments: 1 complete 8d nail, 5 common 8d headed fragments, 7 shank fragments

HS10-C-26

2 flat glass fragments including 1 possible mirror fragment
2 curved glass fragments, one of which is heat-altered
18 cut nails and nail fragments: 3 complete nails including 1 4d (common), 1 6d (indeterminate), 1 10d (indeterminate); 8 headed fragments including 1 common 3d nail, and 7 fragments of indeterminate type (one each in sizes 6d and 16d, two each in sizes 8d and 9d, 1 of indeterminate size); 7 shank and unidentified fragments
5 tin can end fragments
24 ferrous metal unidentified
1 possible fabric covered ferrous metal button

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1 incomplete four-hole attachment button of ferrous metal
1 ball clay effigy smoking pipe bowl fragment (artifact #94a). Refitted with artifact #94b from HS10-C-63.
1 glass bottle fragment exhibiting a tooled finish (artifact #62)
1 four-hole attachment piecrust button of white porcelain (artifact #16)

HS10-C-28

4 cut nails and nail fragments: 2 complete common 10d nails, 2 unidentified nail fragments

HS10-C-29

3 cut nails and nail fragments: 1 complete 40d spike, 1 40d shank fragment, 1 common 20d headed fragment

HS10-C-30

1 glass bottle base with a pontil mark (artifact #61)

HS10-C-31

Metal cylinder crimped around a wooden shaft and a ferrous metal insert (artifact #165)

HS10-C-32

3 flat glass fragments
4 cut nails and nail fragments: 2 complete common nails (4d and 20d), 1 headed fragment, 1 shank fragment
1 ferrous metal bar fragment with a 90-degree bend
1 four-hole attachment button of ferrous metal measuring approximately .62 inch in diameter (approximately 25 lignes)

HS10-C-33

2 complete 20d cut nails

HS10-C-34

1 partial adobe brick collected as a sample

HS10-C-35

2 complete strap hinges which are 12 in and 14 3/4 in long, respectively

HS10-C-36

2 complete common cut nails (10d and 20d)
5 plaster fragments
1 ferrous metal unidentified

HS10-C-37

2 cut nails including 1 complete 5d common nail and 1 shank fragment
4 pieces of lime
1 brick fragment

3 bone fragments: 1 medium mammal (vertebra, thoracic, immature), 2 unidentified fragments
1 amber glass sherd from a McCully bottle (artifact #44). Refitted with sherds from HS10-C-19, HS10-C-39, and HS10-C-47.

HS10-C-38

3 flat glass fragments, all of which appear to be from a mirror
14 curved glass fragments
73 cut nails and nail fragments*: 11 complete nails including 4 4d (2 common, 2 indeterminate), 2 6d (indeterminate), 3 8d (1 clinched**, 2 indeterminate), 2 9d; 45 headed fragments (7 common, 38 indeterminate); 17 shank fragments
* At least three of the cut nails have wood from two different features adhering to them. The wood grains in the two features are nearly perpendicular to each other. This pattern is similar to that observed for nails from HS10-C-42 and suggests that some of these nails may relate to HS-10 itself rather than the adobe fill.
** The clinched nail is bent at an angle greater than 90 degrees but does not appear to be ruptured. All surfaces are heavily rusted.
1 horseshoe nail (headed fragment)
4 plaster fragments
1 brick fragment
47 ferrous metal unidentified
8 bones and bone fragments: 1 medium mammal (thoracic vertebra, immature), 1 *Anas* sp. (tibiotarsus, left distal, eroded), 5 fish elements, 1 unidentified fragment
1 unmarked and undecorated ball clay smoking pipe bowl fragment
1 undecorated ball clay smoking pipe stem fragment with a small portion of the bowl. It has an illegible makers mark (artifact #89).
10 leather fragments, 7 of which exhibit perforations
2 pieces of leather secured by a cuprous metal rivet
1 fragment of the base, heel, and body of a glass bottle (artifact #77)
Shell portion of a New York Militia staff button (artifact #151)
1 incomplete bone handled table utensil (artifact #142)
5 fragments of a highly oxidized ferrous metal harness buckle

HS10-C-39

4 curved glass fragments
2 cut nail fragments (1 6d headed fragment, 1 shank fragment)
1 incomplete stacked leather boot or shoe heel
1 amber glass sherd from a McCully bottle (artifact #73). Refitted with sherds from HS10-C-19, HS10-C-37, and HS10-C-47.

HS10-C-40

2 flat glass fragments, both of which appear to from a mirror
7 curved glass fragments

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48 cut nails and nail fragments: 9 complete nails including 2 4d (both indeterminate), 3 6d (all common), 2 8d (1 common, 1 indeterminate), 1 10d (indeterminate), 1 50d (spike); 18 headed fragments (2 common, 16 indeterminate); 21 shank fragments
21 pieces of lime
1 pintle
2 ferrous metal screws
23 ferrous metal unidentified
2 leather fragments
2 fragments of a fine toothed comb made of horn. The teeth of the comb were originally arranged on either side of a central spine.
33 bones and bone fragments: 1 *Gallus gallus* (humerus, right complete, distal cut marks?, rodent gnawing), 2 medium mammal (skull fragments), 1 large mammal (cervical vertebra, cut marks, immature), 1 large mammal (humerus, left proximal, butchered), 2 *Gallus gallus* (sacral vertebrae), 1 bird (sternum, rodent gnawing, broken), 1 bird (sternum), 1 *Anas* sp. (tibiotarsus, right distal), 1 *Anas* sp. (femur,right distal), 22 unidentified fragments (6 burned, 16 unburned)
1 unmarked and undecorated ball clay smoking pipe bowl fragment
1 unmarked and undecorated ball clay smoking pipe stem fragment
1 McCully glass bottle fragment which includes most of the base and a portion of the heel and body (artifact #175)

HS10-C-41

2 curved glass fragments
8 cut nails and nail fragments: 3 complete nails including 1 5d common nail, 1 7d nail of indeterminate type, and 1 9d nail of indeterminate type; 3 headed fragments including 1 5d (common and bent at an angle greater than 90 degrees but not ruptured), 1 16d (indeterminate type), 1 nail which is larger than 60d but the exact size is unknown (both the head and shank are fragmentary); 2 shank fragments
2 pieces of lime
3 ferrous metal unidentified
6 bone fragments: 1 *Bos taurus* (second phalange, distal, unsided, charred), 5 unidentified fragments (1 burned, 4 unburned)
1 amber glass bottle fragment possibly from a McCully bottle (artifact #50a). Refitted with fragments from HS10-C-22 and HS10-C-48.
1 complete .56-50 Spencer rimfire metallic cartridge (artifact #100)

HS10-C-42

27 cut nails and nail fragments*: 6 complete nails including 5 8d (1 common, 4 indeterminate), 1 16d (common); 17 8d headed fragments (8 common, 9 indeterminate); 4 shank fragments

* Wood from the decking and sleepers still adheres to these nails, and the wood grains of the two features are nearly perpendicular to each other. Many of the nails are broken approximately 1/2 in below the point of juncture of the two features.

HS10-C-43

7 cut nail fragments (2 headed fragments, 5 shank fragments)

HS10-C-46

2 flat glass fragments
1 curved glass fragment
1 common 20d cut nail (headed fragment)
1 piece of lime
1 copper fragment
3 bone fragments: 1 medium mammal (rib, distal, immature), 2 unidentified fragments (1 burned, 1 unburned)
1 percussion cap (artifact #159)

HS10-C-47

1 amber glass sherd from a McCully bottle (artifact #48). Refitted to sherds from HS10-C-19, HS10-C-37, and HS10-C-39.

HS10-C-48

1 flat glass fragment
1 curved glass fragment
1 possible hand wrought nail (complete 30d spike). Tentative identification is based on a larger than standard size head for the shank diameter.
28 cut nails and nail fragments: 2 complete nails including 1 5d (indeterminate type and bent greater than 90 degrees but not ruptured), 1 8d (common); 17 headed fragments including 1 5d common nail, 1 5d indeterminate nail, 3 common nails, 12 nails of indeterminate size and type; 9 shank fragments
1 piece of lime
1 lead fragment
1 ferrous metal button
13 ferrous metal unidentified
11 bone fragments: 1 cf. *Bos taurus* (rib head, immature), 1 medium mammal (thoracic vertebra, cut marks, immature), 1 medium mammal (rib head, immature), 1 medium mammal (femur, right proximal, immature, eroded), 7 unidentified fragments
1 probable unionid mussel shell fragment
1 unmarked and undecorated ball clay smoking pipe bowl fragment
1 two-hole attachment button of salt water mother-of-pearl measuring .54 inch in diameter (approximately 21.5 lignes)
5 leather fragments, 2 of which exhibit sewing perforations
1 glass bottle fragment refitted to a sherd from HS10-C-19. Together they include part of the tooled ring finish, the neck, and part of the shoulder of a bottle which may have contained wine, sparkling wine, or champagne (artifacts #51a and #51b).

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1 amber glass sherd possibly from a McCully bottle (artifact #50c). Refitted with sherds from HS10-C-22 and HS10-C-41.
1 amber glass sherd possibly from a McCully bottle (artifact #45)
1 stamped cuprous metal fragment which may be part of a military hat emblem (artifact #125)

HS10-C-49

1 possible brace fragment from a wagon bed

HS10-C-51

4 cut nails and nail fragments: 2 complete common nails (8d and 20d), 1 headed fragment (8d common), 1 shank fragment
5 plaster fragments

HS10-C-52

4 cut nails and nails fragments: 3 complete 20d nails (2 common, 1 indeterminate), 1 headed fragment (20d common)

HS10-C-53

1 curved glass fragment
2 complete common 20d cut nails
1 unidentified bone fragment

HS10-C-54

1 cut nail shank fragment
2 probable plaster fragments
2 possible tin can fragments
1 unfired lead bullet (artifact #104)

HS10-C-55

8 cut nails and nail fragments: 5 complete common 20d nails, 3 headed fragments (1 20d common, 2 8d nails of indeterminate type)
1 ferrous metal unidentified

HS10-C-56

5 cut nails and nail fragments: 3 complete 20d nails, 2 shank fragments (possibly 4d size)

HS10-C-57

5 cut nails and nail fragments: 4 complete 20d nails (2 common, 2 indeterminate), 1 headed fragment (20d common)

HS10-C-58

1 common cut nail (headed fragment)
1 fragment of mortar or plaster

HS10-C-59

2 small fragments of mortar or plaster

HS10-C-60

1 complete 50d cut spike
2 small fragments of mortar or plaster
1 piece of lime

HS10-C-61

1 curved glass fragment
1 cut nail shank fragment
1 plaster fragment
1 piece of lime
3 unidentified burned bone fragments

HS10-C-62

1 cut nail fragment
1 probable mortar fragment

HS10-C-63

2 cut nails including 1 complete common 6d nail, and 1 common 16d headed fragment
1 piece of lime
1 ball clay effigy smoking pipe bowl fragment (artifact #94b). Refitted with artifact #94a from HS10-C-26.

HS10-C-64

7 flat glass fragments
3 curved glass fragments
7 cut nails and nail fragments: 2 complete common nails (4d and 20d), 1 8d common headed fragment, 2 8d headed fragments of indeterminate type, 2 shank fragments
1 fine sand mortar fragment with sandstone adhering to it
2 pieces of lime
8 ferrous metal unidentified

HS10-C-65

7 flat glass fragments including 1 fragment of possible plate glass and 2 possible mirror fragments
2 curved glass fragments
4 cut nails and nail fragments: 2 complete common nails (4d and 8d), 1 headed spike fragment, 1 shank fragment
1 small fragment of mortar or plaster
2 bones and bone fragments: 1 *Bos taurus* (TC&4 [cuboid], cut marks, left complete), 1 unidentified burned bone fragment

## APPENDIX H

HS10-C-66

1 flat glass fragment
Collection of at least 8 cut nails rusted together (4 common 10d nails, 1 10d nail of indeterminate type, 1 8d nail of indeterminate type, 2 cut nail fragments of indeterminate size and type)
1 cut nail shank fragment

HS10-C-67

1 flat glass fragment
1 curved glass fragment
11 cut nails and nail fragments: 4 complete nails (1 common 8d nail*, 3 nails of indeterminate type in sizes 4d, 9d, 20d), 4 headed fragments (1 common, 3 indeterminate), 3 shank fragments
* This nail is bent at an angle greater than 90 degrees but is not ruptured.
1 small fragment of mortar or plaster
2 pieces of lime
2 ferrous metal screws
1 stake iron and 4 rivets
1 ferrous metal unidentified
1 leather fragment
1 incomplete stacked leather boot or shoe heel
2 bone fragments: 1 medium mammal (rib, cut marks, carnivore gnawing, eroded), 1 unidentified burned bone fragment

HS10-C-68

4 cut nails and nail fragments: 2 complete common 20d nails, 1 common 20d headed fragment, 1 4d headed fragment of indeterminate type
2 small fragments of mortar or plaster

HS10-C-69

1 cut nail shank fragment

HS10-T-1

Mortar sample consisting of 8 fragments

HS10-T-2

2 ferrous metal strap fragments
1 ferrous metal unidentified
1 glass bottle fragment including the tooled finish, the neck, and a small portion of the shoulder (artifact #169a)

HS10-T-3

18 flat glass fragments including 2 possible mirror fragments
35 curved glass fragments
37 cut nails and nail fragments: 15 complete nails including 4 4d (3 common, 1 indeterminate), 2 6d (both indeterminate, one nail has plaster adhering to it), 2 8d (1 common, 1 indeterminate), 1 9d (common, plaster adheres to the nail), 4 10d (1 common, 3 indeterminate including one nail which has wood adhering to it), 2 12d (1 common, 1 indeterminate); 11 headed fragments including 1 5d common, 2 6d (1 common, 1 indeterminate), 2 7d (1 common, 1 indeterminate), 4 9d (2 common, 2 indeterminate), 1 16d indeterminate, 1 of indeterminate size and type; 11 shank fragments
13 plaster fragments
1 mortar fragment
2 pieces of lime
1 brick fragment
Coal sample
2 cinders
2 tin can end fragments
4 ferrous metal unidentified
Broken half of a grinding wheel
15 bones and bone fragments: 1 cf. *Bos taurus* (rib, butchered, immature, eroded), 1 *Sus scrofa* (metapodial, immature, rodent gnawing), 1 *Bufo* sp. (femur, right complete), 1 *Bufo* sp. (femur, left complete), 1 *Rana* sp. (pelvis, broken, unsided), 3 *Rana* sp. (humerus, unsided, complete), 2 *Rana* sp. (radio-ulna, unsided, complete), 5 unidentified bone fragments
1 tooled glass bottle finish (artifact #170)
1 complete .56-56 Spencer rimfire metallic cartridge (artifact #167b)
1 incomplete metallic cartridge of about .50 caliber (artifact #167a)
1 general service uniform button (artifact #168)
1 wooden handled table knife (artifact #166)

HS10-T-4

5 curved glass fragments
1 cut nail shank fragment
2 fragments of mortar or plaster
2 pieces of lime
Coal sample
1 unidentified bone fragment

## APPENDIX H

HS10-T-5

13 flat glass fragments
1 cut nail (headed fragment)
5 fragments of mortar or plaster, 3 of which have brick fragments adhering to them
2 fragments of a single brick together comprising roughly half of a complete brick. Mortar adheres to two and possibly three faces of the brick. A thin coating of whitewash is present on one face.
1 small fragment of coal

HS10-T-6

75 flat glass fragments
3 curved glass fragments
2 complete 8d wire nails (1 common, 1 indeterminate)
16 cut nails and nail fragments: 6 complete nails including 2 4d indeterminate, 1 6d indeterminate, 1 7d indeterminate, 1 8d common, 1 10d common; 4 headed fragments; 6 shanks and other fragments
1 plaster fragment
1 fragment of mortar or plaster
Coal sample
1 unidentified bone fragment
1 general service uniform button (artifact #232)

HS10-T-7

54 flat glass fragments
14 curved glass fragments, two of which are heat-altered
1 porcelain sherd with cinder material adhering to it
1 undecorated whiteware sherd
1 possible hand wrought nail (headed fragment). Identification is based upon a larger than standard head size for the shank diameter.
26 cut nails and nail fragments: 8 complete nails including 2 4d common, 1 5d common, 2 6d common, 1 7d common, 2 8d indeterminate; 10 headed fragments (2 common, 8 indeterminate); 8 shank fragments
17 plaster fragments
1 mortar fragment
3 lime fragments
1 coal fragment
4 ferrous metal unidentified
3 unidentified bone fragments (1 burned, 2 unburned)
1 tooled glass bottle finish (artifact #205a)
1 blue-green sunglasses lens fragment
1 body sherd from a glass bottle which may have contained wine, sparkling wine, or champagne (artifact #205c)
2 tin can fragments (artifact #216)
Possible ferrous metal "throat" for a sword scabbard (artifact #236)

HS10-T-8

1 cut nail headed fragment

HS10-T-9

4 flat glass fragments
5 curved glass fragments
9 cut nails and nail fragments: 1 complete 8d nail, 2 headed fragments, 6 shank and other fragments
208 plaster fragments
5 lime fragments
2 ferrous metal unidentified
4 bones and bone fragments: 1 *Rana* sp. (radio-ulna, unsided, complete), 3 unidentified fragments
Portion of an American eagle historical flask. See also HS10-T-14 (artifact #218).

HS10-T-10

55 flat glass fragments
1 curved glass fragment
4 cut nails and nail fragments: 1 complete 4d nail, 1 common 3d headed fragment, 2 shank fragments
Mortar sample including 4 fragments, two of which have sandstone adhering to them
1 expended centerfire metallic cartridge casing (artifact #239)
1 general service uniform button (artifact #231)

HS10-T-11

93 flat glass fragments
6 curved glass fragments
4 cut nails and nail fragments: 1 complete common 4d nail, 1 common headed fragment, 2 cut nail fragments
2 mortar fragments
1 brick fragment
2 fragments of caulking or window putty
4 cinders
1 bone: *Sylvilagus* sp. (femur, left diaphysis unfused, immature)
1 egg shell fragment

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HS10-T-12

12 flat glass fragments
8 curved glass fragments, 7 of which are heat-altered
1 undecorated porcelain rim sherd
21 cut nails and nail fragments: 5 complete nails including 3 2d (all indeterminate), 1 4d common, 1 7d indeterminate; 7 headed fragments; 9 shank fragments
2 plaster fragments
3 pieces of lime
4 sulfurous coal fragments
30 cinders
1 possible cinder
1 ferrous metal unidentified
1 bone: *Sus scrofa* (metapodial, immature, unsided, unfused diaphysis)

HS10-T-13

1 flat glass fragment
1 undecorated porcelain rim sherd
14 plaster fragments
2 mortar fragments
1 lime fragment
1 cinder
6 bone fragments: 1 cf. *Bos taurus* (thoracic vertebra, butchered), 1 cf. *Bos taurus* (spinous process), 4 unidentified bone fragments (1 burned, 3 unburned)

HS10-T-14

2 flat glass fragments
7 curved glass fragments
9 cut nails and nail fragments: 3 complete nails (2 6d indeterminate, 1 50d common), 2 headed fragments, 4 shank fragments
104 plaster fragments
4 brick fragments
Portion of an American eagle historical flask. See also HS10-T-9 (artifact #218).

HS10-T-15

1 complete 8d cut nail

HS10-T-16

1 cinder
Numerous fragments of a probable lead seal
3 general service uniform buttons and 1 metal button back (artifact #234)

HS10-T-17

3 flat glass fragments
1 stoneware sherd with a Bristol type glaze
1 possible hand wrought nail (headed fragment). Identification is based upon a larger than standard head size for the shank diameter.
1 drill bit fragment
1 fragment of a down-tooled glass bottle finish (artifact #221)

HS10-T-18

Whittled lead bullet

HS10-T-19

1 unidentified bone fragment
1 metal uniform button back (artifact #233)

HS10-T-20

1 drain tile fragment

HS10-T-21

Ceramic doll head (artifact #230)

HS10-T-22

1 cut nail shank fragment

HS10-T-23

1 complete common 10d cut nail

HS10-W-1

1 unmarked and undecorated fragment of the stem, spur, and bowl of a ball clay smoking pipe

HS10-W-2

Tin can fragments (artifact #215)

HS10-W-3

1 flat glass fragment
2 cut nails including 1 complete 12d nail (bent greater than 90 degrees but not ruptured), and 1 headed fragment
Closed end wrench head for tightening square nuts measuring about 1 in
Complete shoofly flask (artifact #203)

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HS10-W-4

Coal sample (2 large chunks)

HS10-W-5

2 refitted glass tumbler fragments (artifact #201)

HS10-W-6

1 curved glass fragment
1 large brick fragment comprising more than half of a complete brick
4 ferrous metal unidentified
1 incomplete spur (artifact #235)

HS10-W-7

5 tin can fragments (artifact #217)

HS10-X3-1

12 flat glass fragments
3 curved glass fragments
1 cut nail (common 4d headed fragment)
3 small fragments of mortar or plaster
3 small brick fragments. A small patch of mortar continues to adhere to one of the fragments.
3 small coal fragments
4 ferrous metal unidentified
3 unidentified bone fragments

HS10-X3-2

2 flat glass fragments
2 cut nails including 1 complete common 4d nail, and 1 common 8d headed fragment
1 small coal fragment

HS10-X3-4

13 flat glass fragments
14 curved glass fragments
4 complete common wire nails (1 3d, 2 6d, 1 16d)
27 cut nails and nail fragments: 12 complete nails including 8 4d (7 common, 1 indeterminate), 1 5d common, 1 8d indeterminate, 2 10d common; 6 headed fragments including 2 4d (1 common, 1 indeterminate), 1 5d indeterminate, 3 of indeterminate size and type; 9 shank fragments
2 fragments of mortar or plaster
1 brick fragment
3 coal fragments
5 ferrous metal unidentified

1 wire fragment
1 decorated porcelain sherd (artifact #1)
1 green and white sherd of cased or overlay glass

HS10-X4-1

1 small fragment of mortar or plaster
1 small brick fragment

HS10-X4-2

55 flat glass fragments
2 curved glass fragments
1 wire nail (6d headed fragment)
10 cut nails and nail fragments: 2 complete nails (1 4d indeterminate, 1 8d common), 8 headed fragments
2 small fine sand mortar fragments
1 small brick fragment
4 concrete fragments
3 coal fragments
5 ferrous metal unidentified
1 non-ferrous metal unidentified
1 four-hole attachment button of ferrous metal measuring .76 inch in diameter (approximately 30.5 lignes)

HS10-X4-3

5 flat glass fragments
2 curved glass fragments
15 cut nails and nail fragments: 7 complete nails including 3 4d (1 common, 2 indeterminate), 2 8d (1 common, 1 indeterminate), 2 10d (common); 7 headed fragments including 1 4d indeterminate, 1 12d common, 5 of indeterminate size and type; 1 shank fragment
1 mortar fragment
1 small coal fragment
1 unidentified bone fragment
1 fragment of the base, heel, and body of a glass bottle (artifact #68)

HS10-X5-1

9 flat glass fragments
13 curved glass fragments
31 cut nails and nail fragments: 22 complete nails including 1 3d common, 20 4d (19 common, 1 possible finish), 1 5d indeterminate; 5 common headed fragments including 1 each of sizes 6d, 8d, and 9d, and 2 of 10d size; 4 shank fragments
23 plaster fragments
2 pieces of lime

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2 brick fragments, one of which comprises about half of a complete brick
1 ferrous metal staple
1 ferrous metal two-tine grip guide
4 bones and bone fragments: 1 *Sylvilagus* sp. (tibia, left distal), 3 unidentified fragments (1 burned, 2 unburned)
Base and partial body fragment of a glass bottle (artifact #63)

HS10-X5-2

1 complete common 20d cut nail

HS10-X5-3

5 flat glass fragments
3 curved glass fragments
7 cut nails and nail fragments: 3 complete common nails (4d, 6d, 10d), 3 headed fragments (2 common, 1 indeterminate), 1 shank fragment
19 plaster fragments
11 brick fragments, 3 of which exhibit a salt glaze
1 ferrous metal washer
4 ferrous metal unidentified
1 four-hole attachment button of ferrous metal measuring .69 inch in diameter (approximately 27.5 lignes)
1 four-hole attachment button of white porcelain measuring .67 inch in diameter (approximately 27 lignes)
1 copper/brass smoking pipe ferrule (artifact #124)
1 glass bottle fragment with a molded design (artifact #72)

HS10-X5-4

8 flat glass fragments
1 curved glass fragment
1 possible hand wrought nail (complete 8d size nail). Tentative identification as a wrought nail is based upon the taper of all four sides of the nail shank.
9 cut nails and nail fragments: 4 complete nails including 1 3d indeterminate, 1 4d common, 1 9d indeterminate, 1 50d common; 3 headed fragments; 2 shank fragments
18 plaster fragments
10 brick fragments, one of which has a salt glaze
1 ferrous metal unidentified
3 bone fragments: 1 large mammal (rib section, eroded, rodent and carnivore gnawing), 1 large mammal (rib section, cut marks, butchered, rodent and carnivore gnawing), 1 unidentified fragment
2 refitted sherds from a glass bottle which may have contained champagne or sparkling wine. Together these sherds form portions of the pushup, heel, and body (artifact #52).

1 glass bottle fragment refitted to a sherd from HS10-NWQ-4. Together they include the lipping tool finish and part of the neck of a bottle which may have contained champagne or sparkling wine (artifacts #53a and #53b).

HS10-X5-5

5 flat glass fragments
1 curved glass fragment
11 cut nails and nail fragments: 7 complete common nails (1 each of sizes 4d, 7d, 9d, 10d, and 12d; 2 of size 8d), 3 headed fragments (1 5d common, 1 8d common, 1 of indeter minate size and type), 1 shank fragment
1 plaster fragment
2 mortar fragments
1 small coal fragment
10 bones and bone fragments: 1 *Sylvilagus* sp. (calcaneum, left complete), 3 *Sylvilagus* sp. (metatarsal, complete, unsided), 1 *Sylvilagus* sp. (lumbar vertebra, sixth?), 1 *Sylvilagus* sp. (lumbar vertebra, seventh?), 1 *Sylvilagus* sp. (lumbar vertebra), 2 *Sylvilagus* sp. (lumbar vertebrae, nonspecific, broken), 1 unidentified fragment

HS10-X5-6

2 curved glass fragments
5 cut nails and nail fragments: 1 complete common 20d nail, 1 headed fragment (bent at an angle greater than 90 degrees but not ruptured), 3 shank fragments
6 plaster fragments
1 piece of lime
2 ferrous metal unidentified
1 fragment of the base, heel, and body of a glass bottle (artifact #169b)

HS10-X5-7

4 flat glass fragments
11 curved glass fragments
23 cut nails and nail fragments: 4 complete nails including 1 4d indeterminate, 1 8d common, 1 9d common, 1 20d common; 13 headed fragments (11 common, 2 indeterminate); 6 shank fragments
7 plaster fragments
3 ferrous metal unidentified
1 probable unionid mussel shell fragment
2 refitted unmarked and undecorated ball clay smoking pipe stem fragments

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HS10-X5-8

1 fragmentary percussion cap

HS10-X5-9

1 bent ferrous metal rod

HS10-X6-1

537 flat glass fragments (1 fragment with a thickness of 1.2 mm is embedded in a large chunk of fine sand mortar)
20 curved glass fragments including one fragment which is heat-altered and another fragment which is very worn
2 undecorated whiteware sherds
15 wire nails and nail fragments: 10 complete nails including 2 6d (1 common, 1 indeterminate), 1 7d (common), 2 8d (1 common, 1 indeterminate), 1 9d (common), 2 16d (common), 2 20d (common); 3 headed fragments including 1 7d indeterminate, 1 20d common, 1 of indeterminate size and type; 2 shank fragments
26 cut nails and nail fragments: 8 complete nails including 4 4d (3 common, 1 indeterminate), 1 8d common, 1 9d common, 2 10d common; 8 headed fragments including 1 6d common, 2 8d common, 3 9d (1 common, 1 possible finish, 1 indeterminate), 1 10d indeterminate, 1 16d common; 10 shank fragments
3 plaster fragments
1 large chunk of fine sand mortar with a fragment of flat glass embedded in it
1 brick fragment
2 concrete fragments
6 coal fragments
3 slate fragments
1 two-point barb attached to a single strand of round wire (badly corroded)
1 ferrous metal strap fragment
1 ferrous metal ring
20 wire fragments
51 ferrous metal unidentified
4 unidentified bone fragments
1 probable unionid mussel shell fragment
1 unionid mussel shell fragment with right valve (artifact #29)
1 general service uniform button (artifact #129)

HS10-X7-1

54 flat glass fragments
11 curved glass fragments
1 whiteware sherd with molded fluting
11 wire nails and nail fragments: 8 complete common nails including 1 4d, 2 6d, 4 8d, and 1 16d; 2 headed fragments including 1 3d common, 1 40d common; 1 shank fragment

41 cut nails and nail fragments: 22 complete nails including 1 3d common, 19 4d (11 common, 8 indeterminate), 1 8d common, 1 12d common; 8 headed fragments including 1 3d common, 1 6d indeterminate, 1 8d common, 1 12d common, 1 16d common, 3 of indeterminate size (1 common, 1 common brad or L-headed nail, 1 of indeterminate type); 11 shank fragments
3 concrete fragments. The largest fragment retains the partial impression of a cylindrical object, probably a metal pipe. Rust from the pipe adheres to the concrete. The outside diameter of the pipe was 1 3/8 in.
2 fragments of caulking or window putty
1 four-point round wire barb. All four points are broken. The barb was originally coiled four times around a single strand of round wire which is no longer attached.
1 wire fragment
2 ferrous metal washer fragments
5 ferrous metal unidentified

HS10-X8-1

9 flat glass fragments
3 curved glass fragments
5 complete common wire nails (1 9d, 2 10d, 2 20d)
6 cut nails and nail fragments: 3 complete common nails (1 8d, 110d, 1 20d), 1 8d headed fragment, 2 shank fragments
1 brick fragment
6 wire fragments
3 ferrous metal washer fragments
1 piece of hardware with coil spring
2 ferrous plate metal fragments
6 ferrous metal unidentified
1 unidentified bone fragment

HS10-X9-1

22 flat glass fragments
10 curved glass fragments
1 undecorated whiteware sherd
16 cut nails and nail fragments: 9 complete nails including 3 3d (1 common, 2 indeterminate), 1 4d common, 1 5d common, 2 8d (1 common, 1 casing nail or patent brad), 2 tacks; 3 headed fragments including 1 3d indeterminate, 2 of indeterminate size (1 common, 1 indeterminate type); 4 shank fragments
14 mortar fragments
6 brick fragments
4 wire fragments
1 ferrous metal rod fragment
1 ferrous metal unidentified
Possible tin can fragments

3 unidentified bone fragments
1 expended rimfire metallic cartridge casing (artifact #241)

HS10-X9-2

41 flat glass fragments
10 curved glass fragments
26 cut nails and nail fragments: 15 complete nails including 4 3d (1 common, 3 indeterminate), 4 4d (1 common, 3 indeterminate), 1 6d indeterminate, 1 7d indeterminate, 3 8d common, 2 10d common; 6 headed fragments (3 common, 3 indeterminate); 5 shank fragments
3 large mortar fragments
2 large brick fragments, each comprising roughly a third or slightly more of a complete brick
2 cinders
1 piece of sheet metal
5 ferrous metal unidentified
3 unidentified bone fragments
1 glass bottle ball neck fragment (artifact #204)
1 unfired lead bullet (artifact #243)
Tin can fragments (artifact #214)

HS10-X9-3

13 flat glass fragments
1 curved glass fragment
1 undecorated whiteware sherd
1 wire nail (complete common 6d)
11 cut nails and nail fragments: 7 complete nails including 1 3d common, 1 4d common, 3 8d (1 common, 2 indeterminate), 1 10d common, 1 20d common; 2 headed fragments including 1 3d nail of indeterminate type and 1 common nail of indeterminate size; 2 shank fragments
1 fragment of mortar or plaster
1 cinder
3 ferrous metal unidentified
8 tin can fragments (artifact #247)

HS10-X9-4

132 flat glass fragments
41 curved glass fragments
1 yellowware sherd with Rockingham type glaze
1 wire nail (complete common 8d)

65 cut nails and nail fragments: 25 complete nails including 8 3d (3 common, 5 indeterminate), 9 4d (5 common, 4 indeterminate), 1 5d (indeterminate), 2 6d (1 common, 1 indeterminate), 1 8d (common), 3 10d (2 common, 1 possible finish nail), 1 20d (common); 19 headed fragments (10 common, 9 indeterminate); 21 shank fragments
3 plaster fragments. One fragment appears to have been applied in three coats.
4 large mortar fragments
2 large brick fragments, each comprising half or more of a complete brick. Each has remnant patches of mortar adhering to it.
1 brick fragment with a salt glaze. A patch of mortar adheres to one of the glazed surfaces.
1 small coal fragment
1 cinder
1 bolt with nut
1 ferrous metal rod fragment
Half of a cuprous metal grommet measuring 9/16 inch in outside diameter
2 fragments of a multi-sided object of hard rubber
9 ferrous metal unidentified
5 bone fragments: 1 amphibian (frog?, radio-ulna?), 4 unidentified fragments
1 glass bottle stopper (artifact #202)
1 glass bottle shoulder fragment (artifact #208a)
1 tooled ring finish from a glass bottle (artifact #220)
1 amber glass sherd possibly from a McCully bottle (artifact #208b)

HS10-X9-5

25 flat glass fragments, one of which is heat-altered
6 curved glass fragments, two of which are heat-altered
1 whiteware sherd (burned)
1 yellow ware sherd
9 cut nails and nail fragments: 3 complete 6d nails, 1 headed fragment (common), 5 shank fragments
8 cinders
2 ferrous metal unidentified

HS10-X9-6

14 flat glass fragments
19 curved glass fragments
5 cut nails and nail fragments: 4 complete nails including 1 4d common (possibly ruptured), and 1 each in sizes 6d, 7d, 9d (all of indeterminate type); 1 shank fragment
1 mortar fragment with sandstone adhering to it
2 ferrous metal unidentified
4 unidentified bone fragments
1 unmarked and undecorated ball clay smoking pipe stem fragment
1 undecorated porcelain footring sherd refitted with a marli sherd from HS10-X9-7 (artifact #212)

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HS10-X9-7

12 flat glass fragments, 3 of which are heat-altered
32 curved glass fragments, 13 of which are heat-altered
42 cut nails and nail fragments: 8 complete nails including 1 7d indeterminate, 1 8d common*, 1 9d indeterminate, 3 12d (1 common, 2 indeterminate)*, 2 20d indeterminate; 17 headed fragments (5 common, 12 indeterminate); 17 shank and other fragments
* These nails are bent at an angle greater than 90 degrees but are not ruptured.
1 mortar fragment
1 brick fragment
1 ferrous metal button
1 heavy T-hinge
20 ferrous metal unidentified
3 unidentified bone fragments
2 unmarked and undecorated ball clay smoking pipe stem fragments
1 ball clay smoking pipe bowl and spur with the impressed letters TD (artifact #225)
1 undecorated porcelain marli sherd refitted with a footring sherd from HS10-X9-6 (artifact #212)

HS10-X9-8

2 curved glass fragments
10 cut nails and nail fragments: 4 complete nails including 1 2d common, 1 4d indeterminate, 2 5d indeterminate; 3 headed fragments (1 common, 2 indeterminate); 3 shank and other fragments
3 small brick fragments
2 ferrous metal unidentified
2 unidentified bone fragments
1 unfired lead bullet (artifact #240)

HS10-B3-1

1 complete common 8d cut nail

HS10-B3-2

1 complete 8d cut nail. This nail is broken into two pieces. The fragment consisting of the bottom 1/3 of the nail has lime/whitewash adhering to it. The top 2/3 of the nail has wood and corrosion adhering to it.

HS10-B4-1

1 complete 8d cut nail

HS10-B4-2

1 complete common 8d cut nail

HS10-3-1

1 cut nail shank fragment

HS10-3-2

1 large brick fragment. The brick fragments from HS10-3-2 and HS10-3-3 are from the same brick. That brick was extremely porous and the paste contained relatively large inclusions indicating that the clay was not screened in preparation for brick manufacture. The overall crudeness of the brick suggests that it may have been handmade.

HS10-3-3

3 fragments of the same brick as that represented by the fragment from HS10-3-2

HS10-4-1

1 curved glass fragment
1 complete common 3d cut nail

HS10-4-2

1 complete common 10d cut nail

HS10-6-1

1 unfired lead bullet (artifact #105)
Possible ferrous metal can fragment (artifact #136)

HS10-7-1

2 complete railroad spikes (5 in x 1/2 in, 5 1/2 in x 5/8 in)

HS10-8-1

1 flat glass fragment
1 curved glass fragment
1 brick fragment

HS10-8-2

3 cut nails and nail fragments including 1 complete 4d nail, 1 headed fragment, and 1 shank fragment

HS10-8-3

2 unidentified bone fragments

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HS10-8-4

1 flat glass fragment
1 curved glass fragment

HS10-9-1

3 flat glass fragments
2 curved glass fragments

HS10-9-2

21 cut nails and nail fragments: 13 complete nails including 9 4d common, 4 8d (3 common, 1 casing nail or patent brad); 5 headed common nail fragments (one each of sizes 4d, 6d, 8d, 9d, 30d); 3 shank fragments
1 ferrous metal unidentified

HS10-9-3

83 flat glass fragments
9 curved glass fragments
38 cut nails and nail fragments: 12 complete nails including 1 3d indeterminate, 5 4d common, 1 8d common, 4 10d (2 common, 1 possible clout nail, 1 possible casing nail), 1 20d common; 17 headed fragments (9 common, 8 indeterminate); 9 shank fragments
3 brick fragments
3 tin can end fragments
1 ferrous metal unidentified
2 leather fragments
5 bones and bone fragments: 1 *Melagris gallopavo* (radius, left complete, eroded, immature), 1 *Sylvilagus* sp. (ulna, left proximal), 1 *Peromyscus* sp. (femur, left complete), 2 unidentified fragments
1 general service uniform button (artifact #130)
1 five-cent coin minted in 1867 (artifact #172)

HS10-9-4

6 flat glass fragments
1 curved glass fragment
8 cut nails and nail fragments: 2 complete common nails (3d, 4d), 1 headed common nail fragment (4d), 5 shank fragments
1 possible lead bullet flattened upon impact after firing
1 ferrous metal unidentified
1 bone: Sheep/goat (first phalange, immature)

HS10-10-1

4 cut nail headed fragments (1 4d common, 1 6d indeterminate, 1 8d common, 1 10d common)

HS10-11-1

1 flat glass fragment
1 complete common 4d cut nail

HS10-12-1

2 complete common wire nails (8d, 9d)

HS10-13-1

7 cut nail shank fragments

HS10-14-1

1 flat glass fragment
2 curved glass fragments
4 cut nails and nail fragments: 2 complete common nails (1 20d, 1 40d with wood adhering to the shank), 1 headed fragment(8d with plaster adhering to the nail, bent at an angle greater than 90 degrees but not ruptured), 1 shank fragment
2 small coal fragments
1 probable lead seal fragment

HS10-15-1

3 flat glass fragments
1 curved glass fragment
1 cut nail (common 4d headed fragment)

HS10-16-1

6 flat glass fragments
3 curved glass fragments
2 wire nails including 1 complete 10d nail and 1 shank fragment
3 cut nails and nail fragments: 2 complete nails (2d, 4d), and 1 headed fragment (common 2d)
1 ferrous metal staple
1 unidentified bone fragment

HS10-17-1

2 flat glass fragments
2 curved glass fragments
1 wire nail (complete common 16d)
1 cut nail (complete common 4d)

HS10-19-1

8 flat glass fragments
4 curved glass fragments
3 cut nails and nail fragments: 2 complete common nails (4d, 8d), 1 shank fragment
3 small probable mortar fragments

13 fine sand mortar fragments
4 brick fragments, one of which has a salt glaze
4 cinders
2 ferrous metal unidentified
1 unidentified bone fragment

HS10-21-1

7 flat glass fragments including 1 possible fragment of plate glass
3 curved glass fragments
45 cut nails and nail fragments: 5 complete nails including 4 4d (3 common, 1 indeterminate), 1 20d indeterminate; 23 headed fragments (1 common, 22 indeterminate); 17 shank fragments
2 small fragments of mortar or plaster
2 small brick fragments (one fragment has a salt glaze on one face and mortar on another face)
1 small coal fragment
1 ferrous metal file
34 ferrous metal unidentified
17 unidentified bone fragments (15 burned, 2 unburned)
1 four-hole attachment button of ferrous metal measuring .72 inch in diameter (approximately 29 lignes)
1 four-hole attachment button of white porcelain measuring .42inch in diameter (approximately 17 lignes)
1 unmarked and undecorated ball clay smoking pipe stem fragment which is pink in color and may be slightly burned
1 five-cent coin minted in 1867 (artifact #131)

HS10-23-1

1 complete 10d cut nail

HS10-23-2

2 cut nails (headed fragments)

HS10-24-1

1 cut nail shank fragment

HS10-29-1

6 fine sand mortar fragments

HS10-39-1

2 common cut nail headed fragments (4d, indeterminate)

HS10-40-1

3 flat glass fragments
10 cut nails and nail fragments: 5 complete nails including 1 6d indeterminate, 1 8d indeterminate, 2 20d indeterminate, 1 40d common; 1 50d headed fragment; 4 shank fragments
2 small fragments of mortar or plaster
3 ferrous metal unidentified
Tin can fragments (artifact #117)
3 bone fragments: 1 *Gallus gallus* (scapula, right proximal), 1 *Sylvilagus* sp. (humerus, right complete, immature, eroded), 1 unidentified bone fragment

HS10-44-1

1 flat glass fragment
49 cut nails and nail fragments: 24 complete nails including 1 4d common, and 23 6d (4 common, 19 indeterminate); 13 headed fragments (4 common, 9 indeterminate); 12 shank fragments

HS10-44-2

10 small mortar fragments
3 lime fragments
1 cinder
1 bone: Serpentes (vertebra)

HS10-44-3

1 copper/brass smoking pipe ferrule (artifact #228)
4 ferrous metal unidentified

HS10-44-4

1 curved glass fragment
1 cut nail shank fragment
3 lime fragments
2 unidentified burned bone fragments

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No Catalog Number

Mortar sample from large mortar concentration, tunnel fill profile of 11/5/86, approximately 54 cm bs

No Catalog Number

Coal sample from large coal concentration, tunnel fill profile of 11/5/86, approximately 1 m bs

**APPENDIX H**

Additional Information on Selected Historic Artifacts

## CERAMIC ARTIFACTS

### Doll Fragment

Artifact #230 HS10-T-21

This small Parian Frozen Charlotte doll head has "self" hair and eyebrows which appear originally to have been painted blonde. The eyes are painted black. While the outline of the eyelids and the lips of the doll are russet in color now, they may have faded from an original color of red. The hairstyle is similar to that illustrated by White (1966:53) and dated ca. 1861.

### Porcelain Button

Artifact #16 HS10-C-26

This four-hole attachment piecrust style button of white porcelain measures .37 inch in diameter (approximately 15 lignes). This particular style of button has a molded edge design of fine lines which resembles the crust of a pie that has been pressed with a fork (Luscomb 1967:152). According to Luscomb (1967:183), most of the small porcelain buttons of this style were made in the 1860s.

### Porcelain Fragments

Artifact #1 HS10-X3-4

This porcelain sherd is decorated with a hand painted design over the glaze in a loosely executed Oriental style. The portion of the larger design which is present on this particular sherd appears to include a structure against a light blue background. The colors which were used include light blue, tan, russet, and gray, with gilt accents.

Artifact #212 HS10-X9-6 and HS10-X9-7

These two refitted undecorated porcelain sherds are from a dinner plate. Both sherds are discolored and have cinder material adhering to them.

### Redware Fragment

Artifact #6 HS10-C-22

This unrefined redware sherd is a fragment of the neck of a ceramic bottle. Based upon examination of the sherd, it appears that there was a ledge in the bore of the bottle 1/16 in below the lip which served as a closure stop. The exterior surface and

lip of the bottle were sealed with a brown glaze, while the interior surface below the closure stop was unglazed.

Smoking Pipe Fragments

Artifacts #83a and #83b HS10-C-16

Two ball clay smoking pipe fragments from provenience HS10-C-16 have been refitted to form most of the stem and spur of a pipe. One side of the stem is impressed with the name HENDERSON, while MONTREAL is impressed on the other side. Unfortunately, this information allows for only the most general conclusions regarding the origins of the pipe. The pipe manufacturing era in Montreal extended from 1847 to 1907 (Walker 1977:354-362). During that period of time, there were several Montreal pipemakers who were named Henderson.

Artifact #84 HS10-C-1

A stem fragment of a ball clay pipe was recovered from provenience HS10-C-1 at HS-10 which is embossed PET... DORNI in reference to Peter Dorni, a pipemaker in northern France who operated from ca. 1850 to 1875-1880 (Omwake 1965:129-130, 136; Walker 1977:296). At least one variety of Dorni pipes was embossed on the stem with ribbing and the pipemaker's name, and this variety was widely imitated by other pipemakers in Europe. Walker (1977:296) has reported that at least two pipemaking firms in Gouda, Holland and two firms in Germany produced pipes with different lettering on the stem but otherwise identical decoration to that of the Dorni pipes. In addition, it seems that some imitation pipes bearing the same lettering and decoration as genuine Dorni pipes may be distinguished on the basis of the quality of the embossment.

Specifically, Omwake (1965:130) has suggested that the crude embossment on the stems of some "Peter Dorni" pipes may indicate that these pipes are imitations rather than the genuine article. He has further suggested that "Peter Dorni" pipe stem fragments from the Mero site in Door County, Wisconsin probably represent such imitations, "the letters being unclear and smudged and the general tenor of the ornamentation being sloppy." Walker (1983:32-33) also noted a quality difference between the genuine Dorni pipes and some imitation pipes made in Great Britain. Specifically, he observed that the British imitations bear a coarse version of the denticulation around the bowl rim of the genuine pipes.

The pipe stem fragment recovered during the HS-10 excavations at Fort Larned was compared to two pipe fragments in the Center's archeological collections which are believed to represent genuine Peter Dorni pipes. The pipe fragments used for comparative purposes were recovered from 33CU314, the Locktender's House at Cuyahoga Valley National Recreation Area, Ohio (Richner n.d.a:Figure 58e), and the Old Munising townsite at Pictured Rocks National Lakeshore, Michigan (Rich-

ner n.d.b:Figure 47). The linear elements on the HS-10 pipe fragment are thicker than on the genuine Dorni pipe fragments, and by comparison, the hatchings and characters are crudely and imprecisely cast. While no verified Peter Dorni imitation was available for direct comparison to the example from HS-10, it appears that the latter fragment may be from an imitation pipe.

Artifact #89 HS10-C-38

There is an illegible maker's mark on the lower surface of this oval pipe stem fragment. The mark appears to have consisted of raised characters within a stamped rectangle ranging 4.2 - 4.5 mm in width. While breakage has largely destroyed one end of the rectangle, it appears to have been approximately 10 mm in length. The shape, dimensions, and placement of the mark compare favorably with those same features of pipes manufactured by the firm of Noel Freres of Lyons, France (Pfeiffer 1982:173-174, 182, Figure 28d; Walker 1977:294-295). That firm operated from 1808 to ca. 1920 (Jean-Leo 1971:26 in Walker 1977:294).

Artifacts #94a (HS10-C-26) and #94b (HS10-C-63)

Two pipe bowl fragments recovered from proveniences HS10-C-26 and HS10-C-63 have been refitted and together constitute approximately one-third of an effigy pipe bowl. The mold for this pipe was finely detailed and the pressing itself was well executed. Unfortunately, too little of the bowl is present to enable identification of the personage represented, if indeed a specific individual was intended. A number of pipemakers produced effigy head pipes.

Artifact #225 HS10-X9-7

Among the materials recovered from provenience HS10-X9-7 is the bowl and spur portion of a smoking pipe impressed with the letters TD. Pipes bearing the TD mark have been cast in the United States, Canada, Scotland, England, and Germany for over 200 years (Walker 1983:38; Wilson 1971:14-16). What or whom these characters originally stood for may never be established with any degree of certainty.

**APPENDIX H**

# GLASS ARTIFACTS

## Glass Bottle Stoppers without the Associated Bottles

Artifact #174 HS10-C-16

This complete light green glass stopper is embossed on the top of the finial LEA &. PERRINS. A slight depression occurs in the center of the top of the finial, and the edge of the top is bevelled. The stopper has a tapered shank with a crack-off at the distal end. This artifact may be classified as a club sauce type stopper (Jones and Sullivan 1985:152-153).

Lea & Perrins Worcestershire Sauce was originally marketed in England (Zumwalt 1980:269). It was first exported to the United States about 1838 to 1840, but was not made available for sale in locations west of the Mississippi River until 1849. The style of closure represented by the artifact from HS-10 consisting of a glass stopper fitted into a cork collar seated in the bottle bore was that used by Lea & Perrins until 1957. At that time, the company switched to a plastic insert drop dispenser and a screw cap.

Artifact #202 HS10-X9-4

This artifact may be identified as an aqua colored club sauce type glass bottle stopper (Jones and Sullivan 1985:152-153). The top of the finial is slightly domed. It is not embossed. The shank of the stopper is broken. According to Jones and Sullivan (1985:152), this stopper shape was often associated with sauce bottles but is also known to have been used on bottles containing toilet vinegar and Scotch whiskey.

## Glass Bottle Fragments - McCully/Possible McCully Bottle Fragments

Refitted group of 8 sherds with embossment:

Artifact #44 HS10-C-37

1 sherd which includes part of a bottle base, heel, and body in amber glass

Artifact #48 HS10-C-47

1 fragment which includes a portion of the base, heel, and body of an amber colored glass bottle

Artifact #56a HS10-C-19

3 base sherds and 2 body sherds of amber glass

Artifact #73 HS10-C-39

1 base fragment of amber glass

## APPENDIX H

Refitted group of 3 sherds with embossment:

Artifact #50a HS10-C-41

The finish, the neck, and a portion of the shoulder of an amber colored glass bottle are represented in this fragment. A lipping tool was used to form the brandy style finish (Putnam 1965:20).

Artifact #50b HS10-C-22

1 shoulder fragment of amber glass

Artifact #50c HS10-C-48

1 shoulder fragment of amber glass

Individual sherds which have not been refitted:

Artifact #45 HS10-C-48

1 sherd which includes a portion of the body and shoulder of an amber colored glass bottle

Artifact #54 HS10-C-23

1 embossed shoulder sherd in amber glass

Artifact #55 HS10-C-23

1 embossed shoulder sherd in amber glass

Artifact #56b HS10-C-19

1 sherd from the juncture of the neck and shoulder of an amber glass bottle

Artifact #175 HS10-C-40

1 sherd which includes most of the embossed base, and a portion of the heel and body of an amber colored glass bottle

Artifact #208b HS10-X9-4

1 base fragment of amber glass

General remarks on the McCully/possible McCully bottle fragments:

These amber glass sherds represent at least two bottles which were fabricated by the McCully glass houses of Pittsburgh, Pennsylvania. Portions of two embossed bottle bases were recovered during the HS-10 excavations at Fort Larned. One of those bases has been reconstructed from eight sherds recovered from four proveniences (HS10-C-19, HS10-C-37, HS10-C-39, and HS10-C-47) and is embossed

WMcCULLY & C(?) ... P(?)A. The other base recovered from provenience HS10-C-40 is embossed W.McCULLY & Co. PITTs. Both sets of embossment are positioned immediately adjacent to the heel of the bottle with the base of the lettering oriented toward the center of the bottle. The first base described above also exhibits three embossed concentric rings toward the center of the bottle, and a small mamelon at the center of the base. The other bottle base exhibits two concentric rings toward the center of the bottle. There is no mamelon on the latter example. The inclusion of "Co" in the firm title portion of the embossment implies a date of 1841-1886 for fabrication of the bottles (Toulouse 1971:351-353).

A separate reconstructed bottle finish, neck, and shoulder (3 sherds from HS10-C-22, HS10-C-41, and HS10-C-48) may also represent a McCully company product. It is embossed P...TENT along the shoulder 1/8 in above a slight enlargement in the diameter of the bottle as a consequence of mold fabrication. The enlargement occurs as an outward bulge in both the exterior and interior surfaces of the bottle around the entire circumference. It begins abruptly along its top edge and tapers off a short distance toward the base of the bottle. It appears to be similar to the bulge which sometimes occurred as a result of overblowing in a dip mold (i.e., blow-over mark). However, in this case, the bulge occurred toward the base rather than toward the finish of the bottle. In addition, vertical mold seams run continuously down opposite sides of the bottle fragment extending from the brandy style finish presumably originally to the base of the bottle. The vertical mold seams cross cut the horizontal bulge in the bottle diameter. One other body sherd in the HS-10 collection recovered from HS10-C-48 (artifact #45) also exhibits this pattern of bisecting mold fabrication marks.

A case of amber glass bottles manufactured by the McCully company was recovered from the wreck of the steamboat Bertrand and these bottles have been categorized by Switzer (1974:29, 32) as Class III bottles, Subtype 4c. The bases of the bottles from the Bertrand are embossed W.McCully & Co PITTSBURGH PA, and the bottle shoulders carry the word PATENTED.

Little is apparently known about the products which were packaged in the bottles manufactured by the McCully glass houses (McKearin and Wilson 1978:153). Although the bottles are of a style most often used to package ardent spirits, the fluids in the intact Bertrand bottles were analyzed and found to contain only 4 1/2 percent alcohol (Switzer 1974:29). In addition, the term "patent" which is embossed on the shoulder of the bottle fragment from HS-10 is not an adjective usually associated with intoxicants. The embossment may refer to either the contents of the bottles or the technique used in the production of the containers (e.g., Jones 1986:75).

## APPENDIX H

Glass Bottle Fragments - Wine/Sparkling Wine/Champagne Bottle Fragments

Wine/sparkling wine/champagne bottle fragments:

Artifacts #51a (HS10-C-19) and #51b (HS10-C-48)

These two sherds have been refitted to form the shoulder, neck, and a part of the tooled ring finish of a medium to dark green glass bottle. The lip is flat to slightly rounded and the remnants of a foil wrapper or sleeve still adhere to the neck. This bottle appears originally to have been more gracile in overall shape than the bottles represented by artifacts #57 and #66 described in the next section.

Artifact #58 HS10-SEQ-3

1 fragment of a pushup in dark green glass

Artifact #59 HS10-SEQ-4

These three refitted fragments of dark green glass together constitute part of a bottle heel and body. Most of the exposed surfaces are heavily patinated.

Artifact #60 HS10-NWQ-3

1 fragment of a laid-on ring finish with a rounded lip in medium green glass

Artifact #70 HS10-NWQ-1

1 dark green glass bottle fragment which includes a sheared lip, a crudely tooled ring finish, and a portion of the bottle neck

Artifact #205c HS10-T-7

1 dark green body sherd

Champagne/sparkling wine bottle fragments:

Artifact #43 HS10-C-5

This sherd includes the pushup, the heel, a part of the body, and a small section of the shoulder of a dark green glass bottle. A fairly large mamelon is present in the pushup, a feature which has been associated with champagne bottles (Jones and Sullivan 1985:87, 112).

Artifact #52 HS10-X5-4

These two dark green sherds have been refitted to form portions of the push-up, the heel, and the body of a glass bottle. A large mamelon is present in the pushup, a feature which Jones and Sullivan (1985:87, 112) have associated with champagne bottles.

Artifacts #53a (HS10-NWQ-4) and #53b (HS10-X5-4)

These two sherds of medium green glass have been refitted to form the finish and a small part of the neck of a glass bottle. The lip has a pronounced downward slope and the ring finish appears to have been formed with a lipping tool.

Artifact #57 HS10-C-1

This sherd includes the finish, the neck, and a portion of the shoulder of a dark green glass bottle. The bottle represented by this sherd possessed a downward sloping lip and a tooled ring finish. The remnants of a foil sleeve still adhere to the neck. The overall shape of the extant portion of the bottle is similar to that of champagne style bottles described by Schulz et al. (1980) from Old Sacramento.

Artifact #65 HS10-C-11

This sherd includes the pushup, the heel, and a portion of the body of a dark green glass bottle. A large mamelon is present in the pushup, a feature which has been associated with champagne bottles (Jones and Sullivan 1985:87, 112).

Artifact #66 HS10-C-19

This dark green bottle fragment includes a tooled ring finish, and portions of the bottle neck and shoulder. The form of the lip is varied from flat to downward sloping. The overall shape of the extant portion of the bottle is similar to that of champagne style bottles described by Schulz et al. (1980) from Old Sacramento. The remnants of a foil sleeve adhere to the neck.

General remarks on the wine/sparkling wine/champagne bottle fragments:

Most of the glass bottle fragments recovered during the 1986 HS-10 investigations which may have originated from containers of wine or champagne exhibit the typical characteristics of turn-mold fabrication such as a highly polished exterior surface, faint horizontal lines on the exterior surface, and an absence of mold seams (Jones and Sullivan 1985:30-31). However, three of the sherds and reconstructed bottle segments in the HS-10 collection (artifacts #53, #59, #60) are either too fragmentary or too heavily patinated to observe in this regard.

Munsey (1970:59) has indicated that the turn-mold process was widely used in the fabrication of various types of wine bottles from about 1880 to 1910. Jones and Sullivan (1985:31) have suggested a slightly broader time frame for the manufacture of turn-mold wine and other liquor bottles from the 1870s to the 1920s. However, turn molding was apparently practiced somewhat earlier in Europe, as reflected in

the turn-molded French champagne bottles included in the cargo of the steamboat Bertrand which sank in the Missouri River in 1865 (Switzer 1974).

Schulz et al. (1980:75-76) have suggested that the styles of bottles employed during the nineteenth century to package still wines, sparkling wines, and champagnes were somewhat different from each other, and that those styles remained relatively constant throughout the period. For instance, one of the differences observed by Schulz et al. (1980:76) between champagne bottles and Bordeaux wine bottles from Old Sacramento was the use of thicker glass for packaging champagne, a characteristic of such bottles which was undoubtedly functional and related to the effervescent character of the beverage. Champagne bottles from Old Sacramento also exhibited more gradually sloping shoulders, a lipping tool finish, and a darker green coloring in comparison to the Bordeaux wine bottles. In contrast, the Bordeaux style bottles had better defined shoulders, a lighter green coloring, and a casually applied laid-on ring finish. Both styles of bottles in the collection exhibited a high pushup in the base. However, Jones and Sullivan (1985:87, 112) have suggested that a large mamelon in the pushup is specifically diagnostic of champagne bottles. Unfortunately, the continued production of bottles along these stylistic lines over a relatively long period of time has made the bottles useful for only the most general of dating purposes. Specifically, lipping tool finishes occur on French champagne bottles which date quite early in the century, and the production of Bordeaux still wine bottles with "crude laid-on-ring finishes" continued to the end of the century (Schulz et al. 1980:2). In any event, this style dichotomy is not readily apparent in the collection of bottle fragments from HS-10 at Fort Larned which are believed to have originated from containers for wine, sparkling wine, or champagne.

Glass Bottles and Bottle Fragments - Miscellaneous

Artifacts #46 (HS10-S1-10) and #61 (HS10-C-30)

Artifact #46 is a bottle base in aqua glass which bears a blowpipe pontil mark. Artifact #61 consists of the base, the heel, and a part of the body of a cylindrical bottle in aqua glass and which also bears a blowpipe pontil mark. The base of the latter fragment measures 1 3/4 inches in diameter. Because a pontil was used to hold each of these bottles during the finishing process, they were most likely manufactured prior to about 1870 (Jones and Sullivan 1985:45). In addition, an unidentified maker's mark is present on the base of artifact #61. The mark resembles a backward number 7 within a circle.

Artifact #47 HS10-C-11

This square bottle base in aqua glass originally measured about 3 1/8 in across. It exhibits an indented dome in the base and a chamfered heel and corners (Jones and Sullivan 1985:85-86, 110, 113). Enough of the body is present to suggest a paneled configuration on at least one side of the bottle. The circular black ferric oxide

deposit in the basal dome is the unmistakable mark of an improved or bare iron pontil. This latter feature serves to date the manufacture of this particular bottle to the period from approximately 1845 to 1870 (Munsey 1970:48; Toulouse 1968:141-142 in Jones 1971:71-72).

Artifact #49 HS10-C-16

These two refitted fragments form part of the base, heel, and body of an aqua colored glass bottle. The body of the bottle was ovoid in horizontal cross section. The bottle was mouth-blown in a two-piece mold with a separate base part and may be dated on that basis from approximately 1850 to the middle 1920s (Jones and Sullivan 1985:28). The remnants of embossment on one side of the bottle fragment read as follows (the original complete legend as illustrated by Wilson and Wilson [1971:24] is indicated in parentheses):

... WN'S (F. BROWN'S)
... S OF (ESS OF)
... A GINGER (JAMAICA GINGER)
... LADA (PHILADA)

According to Wilson and Wilson (1971:108), the brand was originated in the 1820s by Frederick Brown, Sr. of Philadelphia, and was patented in 1858. By the turn of the twentieth century, Brown's was the largest selling brand of essence of Jamaica ginger. It was used as a medicine, and Wilson (1981:33-34) has indicated that ginger "was reputed to cure cholera, cholera morbus, cramps and pains, diarrhea and dysentery, dyspepsia, flatulence, want of tone and activity in the stomach and bowels, and to ameliorate health problems brought on by a change in climate, water, and food."

Artifact #62 HS10-C-26

This mold-blown bottle fragment in aqua glass includes the tooled finish, the neck, and a portion of the sloping bottle shoulder. The lip is similar in style to the patent lip defined by Jones and Sullivan (1985:81, 93) and the extract lip illustrated by Putnam (1965:20).

Artifact #63 HS10-X5-1

This artifact consists of the base and part of the body of a cylindrical bottle of aqua glass. The base of the bottle is 1 11/16 inches in diameter. The bottle was blown in a two-piece hinge bottom mold which was in use for glass bottle production between 1750 and 1880 (Jones and Sullivan 1985:26-27). Since a snap case rather than a pontil was used to hold the bottle while the finish was formed, a post-1850 date of fabrication is also likely (Jones and Sullivan 1985:45-47; McKearin and Wilson 1978:517; Munsey 1970:48).

## APPENDIX H

Artifact #64 HS10-NEQ-1

This artifact consists of the molded neck and tooled finish of a bottle in aqua glass. The finish exhibits what appears to be a folded-in lip which was tooled into a patent or extract shape (Jones and Sullivan 1985:81, 93; Putnam 1965:20). Jones and Sullivan (1985:80-81) have indicated that the technique of folding the lip inward was practiced from approximately 1800 until 1875.

Artifact #67 HS10-C-16

This mold blown aqua glass bottle fragment includes the neck, a portion of the sloping shoulder, and a possible lipping tool finish with a patent style of lip (Jones and Sullivan 1985:81, 93). Putnam (1965:20) has used the term extract to refer to this particular lip form. The remnants of the shoulder suggest that the body of the bottle may have had a plain oval shape (Putnam 1965:33). There may be an incomplete embossed letter on the shoulder.

Artifact #68 HS10-X4-3

This artifact consists of a portion of the base, heel, and body of an amber colored glass bottle fabricated in a cup bottom mold. Use of the cup bottom mold in glass bottle production began around 1850 and continues today (Jones and Sullivan 1985:45). However, because of problems associated with mold component alignment, the cup bottom was little used until the introduction of machine bottle blowing around the turn of the twentieth century (Miller and Sullivan 1981; Munsey 1970:39-40).

Artifact #69 HS10-NEQ-9

This light green tinted glass sherd is from the body of a Lea & Perrins Worcestershire Sauce bottle and is embossed ... EA & P ... . Zumwalt (1980:269) has indicated that this particular sauce was originally marketed in England. It was first exported to the United States about 1838-1840, but was not made available for sale in locations west of the Mississippi River until 1849. Zumwalt (1980:269) has also noted that the use of embossed bottles for the product continued until 1920-1921.

Artifact #71 HS10-SEQ-1

This bottle finish fragment in colorless glass may be from a homeopathic medicine vial. It was machine made, and most likely dates after 1904 when commercial production began on the Owens automatic bottle machine (Jones and Sullivan 1985:38-39; Miller and Sullivan 1981).

Artifact #72 HS10-X5-3

The molded design of this thin green glass fragment is reminiscent of the log cabin decorative motif used on bottles with such varying contents as bitters, liquor, syrup, and ink (e.g., McKearin and Wilson 1978:279, 309, 541, 607, 633, 707, 708).

Artifact #74 HS10-NEQ-6

This artifact consists of a part of the base, heel, and body of an aqua colored glass bottle which may have been a flask. The glass is quite thick. This bottle fragment is notably battered and chipped.

Artifact #75 HS10-NEQ-3

A flask presumably used for ardent spirits is represented by an incomplete base, heel, and body fragment of aqua glass. The bottle appears to have been mouth-blown in a two-piece hinge bottom mold, and on this technological basis may be dated broadly between 1750 and 1880 (Jones and Sullivan 1985:26-27). Since a snap case rather than a pontil was used to hold the bottle while it was finished, a fabrication date after 1850 is likely (Jones and Sullivan 1985:45-47; McKearin and Wilson 1978:517; Munsey 1970:48). The glass is thick and the flask was somewhat crudely executed. The mold seam on the base of the fragment is smeared.

The one end of the flask which remains partially intact exhibits a canteen-like strap blown into the glass. Jones and Sullivan (1985:84, 105) have indicated that the latter configuration is found on the relatively common "Union oval" and "Warrented flask." The heel on one side is also embellished with five amorphous blobs of increasing size which suggests that the fragment may have been part of a figured flask (McKearin and Wilson 1978:408). McKearin and Wilson (1978:412) have suggested that the strap feature described above in combination with a diagonal mold seam on the base of a flask, which also occurs on this example, serve to date it to the late 1860s. The diagonal mold seam resulted from the inclusion of one of the straps or panels in each half of the mold. The estimated original capacity of the flask represented by artifact #75 is one-half pint.

Artifacts #77 (HS10-C-38), #169b (HS10-X5-6), #176 (HS10-C-1)

Each of these fragments consists of a part of the base, heel, and body of what may have been plain oval bottles in aqua glass (Putnam 1965:33).

Artifact #169a HS10-T-2

The tooled finish, the neck, and a small portion of the shoulder remain intact on this fragment of an aqua glass bottle. Mold seams are present on the neck, and the sheared neck appears to have been folded into the bore of the bottle before the finish was tooled. The lip conforms to the patent type defined by Jones and Sullivan (1985:81, 93). The flattened sides of the lip extend down onto the neck in a style which Putnam (1965:20) has referred to as a packer lip.

Artifact #170 HS10-T-3

This artifact consists of the slightly irregular tooled finish and part of the molded ball neck of a light green glass bottle. After severance from the blowpipe, the lip

appears to have been fire polished and a fillet of "plastic"glass added to the upper 1/4 in of the neck. The finish was then tooled into shape from the applied fillet.

Artifact #177 HS10-NWQ-1

This amber glass fragment appears to represent a portion of an Export beer bottle (Putnam 1965:250; Wilson 1981:2-6). The fragment consists of a portion of a sloping bottle shoulder and a bulged neck.

Artifact #203 HS10-W-3

This complete shoofly flask with closure was exposed in an upright position in the HS-10 wellhouse fill and contained several ounces of an as yet unidentified liquid. The bottle is aqua to light green in color and was blown in a thicker style popular during the 1880s (Wilson and Wilson 1968:163). The bottle was blown in a post bottom mold and was subsequently held in a snap case or similar device during the finishing process. While such devices were developed as early as the seventeenth century in Europe, they were not commonly employed until the nineteenth century when the general production of glass containers in molds allowed for greater uniformity in bottle shapes (Schulz et al. 1980:3). Efficient use of such devices depended upon a predictably close fit between the device and the bottle. One such device referred to as a sabot may have been in use in France by the 1830s (Munsey 1970:48), and the snap was employed in English glass manufacture by at least 1849 (Jones and Sullivan 1985:46-47). Such holding devices were introduced in the United States sometime in the middle to late 1840s or 1850s (Jones and Sullivan 1985:45; McKearin and Wilson 1978:517; Munsey 1970:48). By approximately 1870, most glass bottles were produced using the snap case (Jones and Sullivan 1985:45; Munsey 1970:48). Two-piece post bottom molds were used for fabrication of mouth-blown bottles between 1850 and the middle 1920s (Jones and Sullivan 1985:28).

The ball neck and tooled finish of the bottle are nearly identical in appearance to those of artifact #170 recovered from provenience HS10-T-3. After removal from the blowpipe, a fillet of glass was added to the upper 1/4 in of the neck and tooled into a slightly irregular finish. Striations created during the finishing process appear only on the fillet itself and do not extend down onto the neck of the bottle. The original lip serves as a ledge designed to check the movement of a cork collar which is still present in the bottle. The stopper is of a club sauce type (Jones and Sullivan 1985:152-153) and appears similar to artifact #202 from provenience HS10-X9-4. The #203 stopper is complete and has a crack-off at the distal end of the tapered shank. The shank fits into the cork collar and effects a seal.

The original contents of the bottle are unknown. However,the flask configuration is typically associated with alcoholic beverages (Jones and Sullivan 1985:84). While most liquor bottles were closed with corks, glass stoppers such as that found in bottle

#203 provided a more useful closure for bottles such as flasks which were intended for reuse (Jones and Sullivan 1985:152). Putnam (1965:168-169) has illustrated several varieties of glass stoppered liquor flasks. Putnam (1965:178) has also illustrated an eagle flask for liquor which exhibits a ball neck similar to that on bottle #203. Conversely, glass bottles with a flask shape were occasionally used for products other than alcoholic beverages. For example, Zumwalt (1980:94) has illustrated a shoofly flask embossed PHOENIX BRAND PRODUCTS SPICES TEAS EXTRACTS, ETC. However, the latter bottle which was produced in an automatic bottle machine undoubtedly dates later than the flask from the HS-10 excavations.

The remnants of a paper label adhere to one face of bottle #203 but offer little help in determining the specific original contents of the bottle. One bunch of grapes with leaves is well defined, and parts of two other bunches of grapes may also be represented. The grapes and leaves are outlined in black and colored a medium brown within the perimeter. The label is too fragmentary to identify the other depictions.

Artifact #204 HS10-X9-2

This artifact is a light purple tinted fragment of a glass bottle with a ball neck (Jones and Sullivan 1985:82, 98). While the finish is missing from this bottle fragment, the striations on the surfaces of the upper portion of the neck suggest that the finish was formed with a lipping tool. Finishing or lipping tools were developed in Great Britain in the 1820s but may not have been introduced in American glass manufacture until about 1850 (Jones and Sullivan 1985:43; Munsey 1970:41). McKearin and Wilson (1978:217 Illustration 53B.) have illustrated an "improved" finishing type tool which was registered at the U.S. Patent Office in 1856. The use of finishing tools with hand bottle fabrication began to decline with the introduction of automatic bottle machines shortly after the turn of the twentieth century (Miller and Sullivan 1981). However, the use of lipping tools to finish hand-blown containers was continued by low volume and specialty bottlers into the 1930s.

The bottle represented by this fragment was produced from metal with an absence of bubbles. This suggests that the refining processes were rather advanced when the bottle was blown. Glass technology had not begun to reach that stage until about 1920 (Kendrick 1971:57-59). The light amethyst color of the sherd is diagnostic of solarized glass, a type of glass which was common during the last quarter of the nineteenth century and the early twentieth century untilWorld War I (Jones and Sullivan 1985:13).

Artifact #205a HS10-T-7

This artifact consists of the finish, neck, and a part of the shoulder of a colorless glass bottle. It exhibits an irregular hand tooled finish with a patent form of lip (Jones and Sullivan 1985:81, 93). Mold seams extend down the sides of the neck and onto the shoulder. The shoulder remnants intimate a cylindrical shape for the body of the bottle.

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Artifact #208a HS10-X9-4

This colorless glass sherd appears to represent a portion of the shoulder of a flat oval extract type bottle (Putnam 1965:51).

Artifact #218 HS10-T-9 and HS10-T-14

These three sherds appear to be from an American eagle historical flask in aqua glass. Two of the sherds are refitted. While the third sherd cannot be refitted with the other two sherds, it nevertheless appears to have originated from the same bottle. The eagle was a favored decorative element for historical flasks during the period ca. 1816 to the Civil War (McKearin and KcKearin 1948:456, 473). More than one hundred different molds for the fabrication of eagle flasks were in use prior to 1850 and about fifty were cut after that date (Ketchum 1975:65). This particular flask may have been fabricated prior to 1850 due to the delicacy and elegance of form it displays (KcKearin and Wilson 1978:412; Ketchum 1975:67-68; Munsey 1970:88).

Artifact #220 HS10-X9-4

This artifact consists of a tooled ring finish in aqua glass. The molded neck of the bottle was short, judging from the hint of a shoulder which is present on the fragment. Without the shoulder fragment, the neck and finish otherwise resemble those of a white wine bottle. Such a finish may also occur on flasks presumably used to package ardent spirits (e.g., McKearin and Wilson 1978:515-519; Wilson and Wilson 1968:162).

Artifact #221 HS10-T-17

This artifact consists of a portion of a down-tooled bottle finish in dark green glass (Jones and Sullivan 1985:81, 92).

Glass Tumbler Fragments

Artifact #201 HS10-W-5

These two colorless pressed glass sherds were part of a tumbler originally measuring 3 inches in diameter at the lip. The bas-relief decoration consists of vertical panels of three prisms alternated with columns of equal width. This decoration begins below a 7/8-in wide plain band adjacent to the lip.

**APPENDIX H**

# HIDE/HAIR ARTIFACTS

## Felt

Artifact #39 HS10-C-19

Among the materials recovered from provenience HS10-C-19 are numerous fragments of a fabric of matted fibers which appears to be felt. It is dark brown in color. Two fragments exhibit a single line of stitching holes slightly less than 1/4 in from a finished edge. Thread is no longer present in the holes, and there is no edge binding attached to the fragments.

These fragments may represent the remains of a felt hat. Felt hats were an Army issue item during the military period at Fort Larned which extended from 1860 to 1883, but most of the hats officially issued during that time period were black in color rather than brown (Howell 1975). A test distribution of drab colored felt campaign hats to posts in the Southwestern U.S. was made in 1882, with adoption of the drab hat for general distribution in 1883 (Howell 1975:59-60). However, a variety of non-issue hats were also used by Army personnel in general, particularly in the years prior to and during the Civil War. Fort Larned itself was partially manned by volunteer units during the Civil War, and civilian laborers were also employed at the fort during the military tenure. Thus, the probable felt hat represented in the cellar fill at HS-10 may relate to occupation of the area during either the military or early post-military periods.

Two felt fragments adhere to the heavily oxidized surface of a sword scabbard fragment (artifact #114) also recovered from provenience HS10-C-19. This association is thought to have occurred upon deposition of these materials in the ground adjacent to each other.

## Leather Shoes

Artifacts #180 (HS10-C-13) and #181 (HS10-C-12)

The shoe remnant recovered from provenience HS10-C-13 (artifact #180) includes the sole, most of the heel, and a portion of the upper leather at the back of the shoe. The shoe was lasted for a right foot and may therefore date no earlier than the middle 1860s (Brinckerhoff 1976:3). Measurement of the shoe in its present condition indicates a shoe size of 5A. However, some shrinkage of the leather has undoubtedly occurred since its removal from the cellar fill, and the original size of the shoe may have been slightly larger.

While the sole was originally sewn together rather than pegged or screwed, it is unclear if the sole was attached through hand or machine sewing. No thread remains in the stitching holes. The stacked heel retains ferrous metal nails. The upper back portion of the shoe was composed of a separate piece of leather which was attached to the upper front piece with stitching in the form of a rectangle approximately 1 1/2 inches in front of the heel and angled toward the front of the shoe. A separate line of stitching originally ran around the back of the shoe and ended approximately 1 1/2 in from the top of the rectangular stitching.

All of the features described above are consistent with those described and illustrated by Brinckerhoff (1976:2, 5) for Civil War era Army issue shoes referred to as brogans or bootees. However, the upper back piece of leather in the #180 shoe was cut above the back line of stitching, and it is unclear if this cut was integral to the original shoe design. If the cut was an original feature of the shoe, the style of the shoe would then be inconsistent with the Army issue style. The cut may instead represent a later dismantling or modification of an issue shoe.

A more fragmentary shoe remnant (#181) was recovered a short distance away from shoe #180 and at the same approximate depth within the cellar fill. The provenience of the second shoe was recorded as HS10-C-12. It appears to be the mate to the #180 shoe.

## METAL ARTIFACTS

### Ammunition - Expended Cartridge Casings

Artifact #239 HS10-T-10

This expended .45 Colt centerfire metallic cartridge casing is flattened at the neck opening. However, the rim of the casing measures approximately .516 inch in diameter, and the entire casing measures 1.31 inches in length. There is no headstamp.

The .45 Colt cartridge was introduced in 1873 as one of the cartridges for the Colt Peacemaker single action revolver (Barnes 1980:187). That revolver and cartridge were adopted by the U.S. Army for official use in 1875 and they continued to serve in that capacity until 1892. The Colt Peacemaker was also a popular handgun with the civilian population of that era, and a .45 Colt metallic cartridge is still loaded today with smokeless powder rather than the original black powder. As a consequence, the cartridge casing recovered at HS-10 may date from either the military or farm periods at Fort Larned.

Artifact #241 HS10-X9-1

This expended rimfire metallic cartridge casing is headstamped with an upper case H, the mark used on Winchester Repeating Arms rimfire cartridges (Logan 1959:190). This particular casing is from a .22 Winchester Rimfire (WRF) cartridge designed for the Winchester Model 1890 pump or slide action rifle (Barnes 1980:290). The .22 WRF was also used in arms produced by Remington, Stevens, and Colt, and is still loaded for commercial sale today.

Ammunition - Unfired Bullets

Artifact #103 HS10-C-16

This unfired lead bullet is still in good condition. It has three raised rings which increase in size from the top to the bottom of the bullet, and the grooves between the rings are squared. The bullet includes a tie ring at the bottom and is pointed at the nose. It compares most favorably in size and appearance to the sample bullet illustrated by McKee and Mason (1980:34 #189) for a .56 Sharps carbine - 1858. It would originally have been loaded in a paper cartridge.

Artifact #104 HS10-C-54

This unfired lead bullet has three raised rings separated by squared grooves. The height of the bottom ring is approximately twice that of the upper two rings. The cavity in the base of the bullet is conical in shape. While this bullet is in good condition overall, the nose has been cut off and the bullet has been disfigured along one side. It compares favorably with bullets illustrated by McKee and Mason (1980:35) for the Civil War-era .52 Sharps carbine. The latter projectiles were originally loaded in paper or skin cartridges.

Artifact #105 HS10-6-1

This particular unfired lead bullet is still in good condition and conforms closely to the dimensions and general appearance of a Civil War-era .52 Sharps carbine projectile illustrated by McKee and Mason (1980:35 #207). The specimen from HS-10 has two well-defined rings and the faint suggestion of a third upper ring. The base ring is greater in height than the other two rings. The grooves between the rings are squared, and the bottom groove is deeper and taller than the upper groove. The conical cavity in the base of the bullet is relatively shallow. The bullet illustrated by McKee and Mason would originally have been loaded in a skin cartridge.

Artifact #106 HS10-C-17

This unfired lead bullet with rebated base may have been designed for the .44 Colt Army revolver - early model used during the Civil War (McKee and Mason 1980:58-59 #492, 187). The early model revolver referred to by McKee and Mason is undoubtedly the .44 Colt Army Revolver, Model of 1860 which has been described as "the principal revolver of the Civil War" (Francis Bannerman Sons 1966:140). This

bullet would originally have been loaded in a paper cartridge. The projectile is still in good condition.

Artifact #178 HS10-NEQ-4

This well-preserved unfired lead bullet has three normal grooves (McKee and Mason 1980:20), a conical cavity in the base, and a pointed nose. The base ring and the rings between the grooves of the bullet are approximately equal in height and are notably small. This artifact probably represents a bullet of the type illustrated by McKee and Mason (1980:57 #459) which was cast for use by Union forces in a .54-caliber rifle. There is also a possibility that it instead represented ammunition for a .54-caliber rifle employed by Confederate forces (e.g., McKee and Mason 1980:54-55 #428). It would have been loaded in a paper cartridge.

Artifact #240 HS10-X9-8

While this particular unfired lead bullet has been slightly flattened toward the base, it is otherwise in excellent condition. Precise length and diameter measurements could not be obtained. However, its weight, approximately height and diameter, and appearance conform closely with those of artifact #178 recovered from provenience HS10-NEQ-4. It may therefore have been cast for use in a .54-caliber rifle.

Artifact #243 HS10-X9-2

The nose and base are missing from this unfired lead bullet, and the surface is partially eroded. Originally it had at least two squared grooves and was approximately .5 inch in diameter.

Ammunition - Unfired Cartridges

Artifact #100 HS10-C-41

This unfired .56-50 rimfire metallic cartridge with a tapered case is headstamped J.G.. While the casing on this particular cartridge is in good condition, the lead bullet is badly eroded.

The .56-50 cartridge was developed at the Springfield Armory in late 1864. It was intended to serve as the standard round for future Army issue carbines, and indeed, the Model 1865 Spencer carbine and rifle and the Burnside Model 1865 Spencer carbine were specifically chambered for .56-50 ammunition (Marcot 1983:186, 204). While the cartridge became known as the .56-50 Spencer, it was never actually marketed by the Spencer Repeating Rifle Company.

The headstamped initials on the cartridge recovered at HS-10 are those of Jacob Goldmark of Brooklyn, New York (Marcot 1983:200-201). Goldmark supplied over seven million rounds of .56-50 ammunition to the Army Ordinance Department between January 10, 1866 and December 13, 1866. Numerous complaints from

frontier commanders regarding the frequent misfiring of Goldmark ammunition ultimately resulted in the official recall of much of that ordnance.

Artifact #101 HS10-C-16

This artifact consists of the upper half of an apparently unfired metallic cartridge of about .50 caliber. The extant portion of the casing is flattened and the lead bullet itself is in very poor condition.

Artifact #145 HS10-C-16

This unfired rimfire metallic cartridge base has the same approximate rim diameter (.656 in) as the .56-50 cartridge recovered from provenience HS10-C-41 (#100) and the .56-56 cartridge recovered from HS10-T-3 (#167b).

Artifact #167a HS10-T-3

This incomplete metallic cartridge of about .50 caliber includes much of the upper portion of the case and the heavily eroded lead projectile.

Artifact #167b HS10-T-3

This .56-56 Spencer rimfire metallic cartridge is complete and unfired. It is not headstamped. Both the projectile and the casing are in poor condition.

This cartridge type was originally produced early in the Civil War for use in conjunction with the newly developed .52 Spencer repeating rifle (Marcot 1983:189-190). The first delivery of those rifles and ammunition to the federal government occurred in December 1862. The cartridge itself was designed and manufactured by Crittenden and Tibbals of South Coventry, Connecticut, but was first supplied to the U.S. Army through the Spencer Repeating Rifle Company. It was eventually manufactured by several ammunition companies. Known initially as the No. 56 Army cartridge, it was later identified as the No. 56 Navy and Infantry Size cartridge. Ultimately, it became commonly known as the .56-56 Spencer. This cartridge was loaded for commercial sale until 1920 (Barnes 1980:297).

Ammunition - Percussion Caps

Artifact #96 HS10-C-7

This unfired "top hat" percussion cap measures approximately .24 inch in both height and diameter.

Artifact #159 HS10-C-46

This unfired percussion cap measures .19 inch in diameter and .199 inch in height. The sides of the cap are ribbed.

## APPENDIX H

Artifact #161 HS10-C-21

This unfired percussion cap is similar to that described by Hunt (1986:45) as Type C, Patent. The side of the cap is smooth and the center of the head is domed. It measures approximately .28 inch in diameter and .32 inch in height.

Artifact #162 HS10-C-21

This small percussion cap fragment measures approximately .17 inch in diameter and .19 inch in height. The side of the cap is ribbed and the head is smooth.

Artifact #162a HS10-C-21

1 "top hat" percussion cap fragment

Buttons - General Service Uniform Buttons

A number of general service uniform buttons were recovered during the excavations at HS-10 which undoubtedly relate to the military tenure at Fort Larned. All of these buttons may be described as a Sanders type of button (Albert and Kent 1971:352) or a three-piece button (Wyckoff 1984:xvi, xix) in which the rim of the shell is bent over the back of the button and a shank is attached to the back. Most of the general service buttons from HS-10 are made of cuprous metal. However, one button (artifact #154) with a shell of cuprous metal and a ferrous metal back was also recovered. The decorative motif or device on the shell of the button in each case is an embossed spread eagle with a shield upon its breast. The absence of lettering on the shield permits the identification of the buttons as those on the standard issue uniform of enlisted men during the period of military occupancy at Fort Larned (Herskovitz 1978:39-40; Smithsonian Institution 1961:10-11).

Herskovitz (1978:38-39) has described two chronologically significant styles of general service uniform buttons in the collection of military buttons from Fort Bowie, Arizona. His stylistic classification and dating of the Fort Bowie materials were based upon the previous work of Brinckerhoff (1972). All of the general service buttons with intact shells from HS-10 at Fort Larned compare favorably with the early style of button described by Herskovitz and, according to Brinckerhoff (1972:5 in Herskovitz 1978:39), officially issued by the U.S. Army during the period from 1855 to 1884. In addition, two general sizes of buttons are represented for each style in the Fort Bowie collection (Herskovitz 1978:39). Those sizes consist of a large coat button which Army regulations stipulated should be 7/8 inch in outside diameter, and a smaller cuff, vest, or jacket button which was supposed to be 1/2 inch in diameter. However, Herskovitz (1978:39) found considerable variability in the actual diameters of the buttons recovered at Fort Bowie and which he attributed in part to the number of different contractors from whom the buttons were purchased. The same two general button sizes, coat and cuff, also appear to be represented in the collection of uniform buttons from HS-10 at Fort Larned, although the actual diameter measurements also vary somewhat from the Army specifications for these items.

According to Brinckerhoff (1972:5), the early style of button issued to all enlisted men from 1855 until 1884 bears an embossed eagle with long narrow wings pointed upward and a wide recessed lined shield on the breast of the eagle. The succeeding style of button issued from 1884 until 1902 may be distinguished from the earlier button by a smaller shield which is also slightly raised in relief. In addition, the wings of the eagle on the larger coat button of the later style are shorter and wider than the wings of the earlier style bird. However, cuff buttons were apparently produced during the later period with the form of the eagle's wings either long and narrow or short and wide. Further, a later style coat button illustrated by Herskovitz (1978:38 Fig. 12o) displays wings which are pointed down rather than up at the tip. Wyckoff (1984:91) has also indicated that the later style eagle is distinguished by a more erect head and neck. Both Brinckerhoff (1972:5) and Wyckoff (1984:91) have illustrated the later bird with an enlarged cap or crest on its head.

Wyckoff (1984:88-89, 91-92) has referred to the earlier style as a Symmetrical Spread Eagle, Lined Shield and the later style as the "Prussian" Eagle, Raised Lined Shield. Relying principally upon Campbell (1965), Wyckoff has dated the official use of the two button styles somewhat differently than Brinckerhoff (1972). He dates the earlier style from ca. 1847 to ca. 1880, and the later style from ca. 1880 to 1902. However, Wyckoff (1984:viii-ix, 89) also noted that obsolete style uniforms were typically used long after the official adoption of a different style, particularly at posts which were remote and perhaps viewed as somewhat less important.

A brief description of each general service uniform button from HS-10 at Fort Larned is provided below. These descriptions include information regarding the backstamps which are present on a few buttons. The outside diameter of buttons is provided when such measurements could be obtained. However, several buttons are flattened or otherwise damaged and the dimensions which were obtained are undoubtedly larger than the original. The latter measurements are nevertheless provided as an indication of the general button sizes which are represented (i.e., coat versus cuff).

Artifacts #109 (HS10-C-16), #129 (HS10-X6-1), #168 (HS10-T-3)

Three early style general service buttons with similar backstamps may be attributed to the Scovill Manufacturing Company of Waterbury, Connecticut which began operation under that name in 1850 (McGuinn and Bazelon 1988:90). Thecompany finally ceased making military uniform buttons in the early 1960s. All three of the buttons from HS-10 were originally of the large coat size described by Herskovitz (1978:38-39).

The button designated #109 is complete and intact but the shell is badly corroded. It measures .79 inch in diameter (approximately 32 lignes) and is embossed on the reverse side ... COVILL MFG ... WATERBURY. Button #168 has been completely

flattened and is missing most of the shank. Its flattened diameter is .83 inch (approximately 33 lignes) and it is embossed on the back SCOVILL MFG CO . WATERBURY . . This particular backstamp is similar but not identical in style to several backstamps for the Scovill Manufacturing Company illustrated by McGuinn and Bazelon (1988:87) and dated to the period from 1850 to 1870. Button #129 is also flattened and measures .80-.81 inch in diameter (approximately 32 lignes). The shank of the latter button is missing. It is backstamped SCOVI ... WATERBU ....

Artifact #130 HS10-9-3

The shell of this button is deteriorated but the decorative embossment appears to be similar to that described by Herskovitz (1978:38-39) and others for an early style of general service uniform button. The button is complete but slightly flattened and measures .57 inch in diameter (approximately 23 lignes). It therefore appears to represent a button of the smaller cuff size.

The reverse of the button is impressed with the lettering SCOVILLS & C . EXT ... . Herskovitz (1978:39) has discussed the discrepancy between the dates of operation of Scovills and Company (1840-1850), the firm to which this backstamp relates, and the known manufacturing date range for this style of button sometime between the authorizing regulations of 1854 and 1884. He concluded that a pre-1850 backplate die was probably reused by the company's successor, Scovill Manufacturing Company, which also supplied general service buttons to the Army using dies with its own backstamp designations (see discussion of buttons #109, #129, and #168).

Artifacts #132 (HS10-C-16) and #233 (HS10-T-19)

The button designated #132 is complete but slightly flattened. It measures .58 inch in diameter (approximately 23 lignes) and represents a cuff size button of the early general service style. The reverse of the button is impressed EXTRA * QUALI ... .

A nearly complete button back without a shell (#233) also recovered during the HS-10 investigations bears the following similar impressed backstamp: EXTRA * QUALITY * . This button back also appears to have come from a button of cuff size. However, since the button shell is no longer attached to the back, it is unknown if a general service or other branch button is actually represented. Herskovitz (1978:40) described military buttons with this backstamp in the Fort Bowie button collection.

McGuinn and Bazelon (1988:114-120) have provided back die listings which identify the customers of three button manufacturing companies in Waterbury, Connecticut including Scovill Manufacturing Company, Waterbury Button Company, and Steele and Johnson. The lists cover the period from 1875 into the early decades of the twentieth century. Those lists indicate that Extra Quality was a button dealer that purchased from all three of those manufacturing companies. In each case, Extra Quality is identified as a dealer that sold military buttons.

Artifact #133 HS10-SEQ-2

While this general service uniform button is complete, both the shell and back are dented. It measures .77 inch in diameter (approximately 31 lignes) and therefore falls within the range of size reported by Herskovitz (1978:39) for coat buttons. It is tentatively identified as an early style button. The reverse appears to be unmarked.

Artifact #152 HS10-C-16

The cuprous metal shell of this general service uniform button appears to be heavily worn and is dented. The spread eagle and shield design on the shell conforms stylistically to the device on early uniform buttons. The reverse of the button is coated with an opaque foreign substance so that details of the back are unknown. The button measures .58 inch in diameter (approximately 23 lignes) and therefore falls within the range of size for cuff buttons.

Artifact #154 HS10-C-16

The shell of this general service uniform button is made of cuprous metal while the back is made of ferrous metal. The back is heavily oxidized and it is impossible to determine if the shank of the button is still attached. In addition, only the embossed shield and right wing of the spread eagle are clearly discernible on the oxidized shell. The latter elements of the shell decoration are consistent with those same elements of the early style general service button described by Herskovitz (1978:38-39) and others. The button measures .58 inch in diameter (approximately 23 lignes) and falls within the reported range of size variation for cuff buttons (Herskovitz 1978:39).

Artifact #155 HS10-NWQ-3

This early style general service uniform button is complete. However, the unmarked button back has been pushed in and a short section of the shell rim has been torn and bent. It measures .75 inch in diameter (30 lignes) and undoubtedly represents a coat size button.

Artifacts #231 (HS10-T-10) and #232 (HS10-T-6)

These two complete buttons are similar in appearance to the early style general service uniform buttons described by Herskovitz (1978:38-39) and Wyckoff (1984:88-89, 91-92). Both also appear to be coat size buttons and measure .78 inch (#231) and .77 inch (#232) in diameter, or approximately 31 lignes in each case. The button designated #232 is undamaged and bears an <u>impressed</u> backstamp which reads WATERBURY BUTTON CO. **. The shell of button #231 appears to be heavily worn and is also dented. The back of the latter button has been buckled in. The reverse is <u>embossed</u> ... ATERBURY BUTTON CO. * ... . Both backstamps indicate manufacture by the Waterbury Button Company of Waterbury, Connecticut in operation under that name from 1849 to 1944 (Albert and Kent 1971:402; McGuinn and Bazelon 1988:107). In addition to differences in the backstamps on these buttons, different dies were apparently used to produce the button shells

because details of the embossed eagle design are different in each case. The backstamp on button #232 compares favorably with the Waterbury backstamp style illustrated by McGuinn and Bazelon (1988:108) and dated to the period from 1861 to 1865.

Artifact #234 HS10-T-16

Three complete general service uniform buttons and a fourth metal button back are included in this designation. Each of the complete buttons measures .58 inch in diameter (approximately 23 lignes) and therefore falls within the range of cuff size buttons. They are tentatively identified as early style general service buttons as described by Herskovitz (1978:38-39) and others. The separate button back came from a button of the same general size as the three complete buttons. Most of the shank has been broken from the separate button back. None of the four are backstamped.

Button - Infantry Officer's Uniform Button

Artifact #144 HS10-C-16

This complete Sanders three-piece cuprous metal uniform button (Albert and Kent 1971:352; Wyckoff 1984:xvi, xix) bears an embossed spread eagle with a shield upon its breast. The uppercase I which appears on the shield was a designation for the infantry branch of the Army. This particular spread eagle device has been referred to as a line eagle by Herskovitz (1978:39-40) and as a Symmetrical Spread Eagle, "I" on Recessed Shield, Three-Piece Gilt by Wyckoff (1984:27-28). It has been dated from 1851 to 1880 or 1884 (Brinckerhoff 1972:5 and Ludington 1889:36 in Herskovitz 1978:39-40; Wyckoff 1984:27). Beginning in 1854, the inclusion of the branch letter on the shield was a form officially reserved for the buttons of officers (Smithsonian Institution 1961:11; Wyckoff 1984:27).

The reverse of button #144 is unmarked. The button measures .57 inch in diameter (approximately 23 lignes) and therefore represents the smaller size uniform button specified by Army regulations and intended for use as a vest, cuff, or jacket button, or to attach the chin strap to the forage cap (Herskovitz 1978:39-40). The shank of button #144 is still attached to a fragment of leather.

Button - New York Militia Button

Artifact #151 HS10-C-38

The shell portion of a cuprous metal New York Militia staff button was recovered during the archeological investigations at HS-10. The button was a staff style or four-piece button in which the shell and back were held together with a separate rim and the shank was attached to the back (Albert and Kent 1971:352; Wyckoff

1984:xvi, xix). While the exterior surface of the shell is poorly preserved, the interior is still in remarkably good condition. Elements of the device included an eagle sitting atop a shield surrounded by stars and with the motto EXCELSIOR stamped below the shield. This compares favorably with a New York Militia staff button design described by Albert (1969:202-203) for which a number of different dies apparently existed. The earliest backmark on a button of this design indicates manufacture during the 1850s.

Records at Fort Larned National Historic Site list fifteen officers from New York State who served at the fort between 1859 and 1874 (Elmore 1986). Eleven of the fifteen officers had departed by 1869. It is also possible that additional officers from that state served during the early years at the fort which the less complete military records of those years have not revealed. The New York Militia button represented by the shell described above may have belonged to one of those officers.

Coins

Artifacts #131 (HS10-21-1) and #172 (HS10-9-3)

Two five-cent coins minted in 1867 were recovered during the 1986 excavations at HS-10, one each from the fill of Features 9 and 21. The first American five-cent coins were struck in 1866 and were composed of 75 parts copper and 25 parts nickel, an alloy still used for nickels today (Stack 1986:59-60). The initial Shield type design for the nickel was used until 1883, when it was replaced by the Liberty Head design. However, a modification to the Shield design was made sometime in 1867. The original design of the reverse side of the coin included a circle of thirteen stars, symbolizing the original thirteen American colonies, interspersed with rays. The rays were subsequently dropped from the design. Both of the coins recovered at HS-10 were struck in the later Shield style without the rays.

Hat Emblem Fragment

Artifact #125 HS10-C-48

This thin stamped cuprous metal fragment may be part of a military hat emblem. The image stamped into the fragment appears to include a portion of the left upright wing of an eagle and the line of feathers along the back of the eagle's neck. The eagle appears against a stippled background with three small embossed stars. The edge of a scroll may be represented above the head of the eagle. This fragmentary design compares well to that illustrated by Brinckerhoff (1972:14-15) and Campbell and Howell (1963:28-29) for a hat emblem first prescribed for enlisted personnel in the 1851 Army uniform regulations. Brinckerhoff has referred to the emblem as the Arms of the United States and Campbell and Howell have referred to it as the Pompon Eagle. According to Howell (1975:5, 7, 93), the Pompon Eagle emblem

was used on Army caps issued from 1851 to 1854. The Pompon Eagle design was then reused for the emblems for the 1858 Army hat and possibly the 1855 Cavalry hat, although the method of attachment of the different emblems varied with hat style. There is no indication of attachment method for the emblem fragment from HS-10. Brinckerhoff (1972:14) has indicated that the emblem was used on two styles of hat with a combined period of issue from 1851 to 1872.

Smoking Pipe Ferrules

Artifacts #124 (HS10-X5-3) and #228 (HS10-44-3)

Two identical smoking pipe ferrules were recovered during the excavations at HS-10 from proveniences HS10-X5-3 and HS10-44-3. Such ferrules were sometimes fitted to clay and brier pipe shanks and a detachable stem was then inserted into the ferrule (e.g., Sudbury 1986:10). The decorative elements of the ferrules from HS-10 consist of six large scallops, each of which is broken into three smaller scallops. The large central scallop in each trio is rounded at the top and is taller than the scallops which flank it. The smaller scallops are generally pointed at the top. There is a circular perforation below each scallop positioned so that each set of three perforations form the points of an equilateral triangle. The appearance of the design as a whole suggests a royal crown. An additional decorative element consists of a chain design encircling the base of the "crown" which is made up of ticks.

The ferrule from HS10-44-3 still retains its original shape, while the ferrule from HS10-X5-3 is flattened. The reed stem opening of the intact ferrule is 11 mm in diameter. The opening at the other end of the ferrule (i.e., at the top of the "crown") is 15 mm in diameter.

Spur Fragment

Artifact #235 HS10-W-6

Both heel bands are broken and the rowel is missing from this cuprous metal spur. It may have been standard issue during the military tenure at Fort Larned (Russell and Erwin Manufacturing Co. 1980:102 No. 9; Schuyler, Hartley and Graham 1967:153 No. 444). However, this style of spur was also apparently available for purchase by the general public.

Sword Scabbard Fragments

Artifact #114 HS10-C-19

This "drag" or distal portion of a scabbard is still recognizable despite heavy oxidation of the scabbard surface. The adherence of two felt fragments to the oxidation is thought to have occurred subsequent to the deposition of these materials in the ground adjacent to each other so that the association between them is believed to be

incidental. Additional information on the felt recovered from provenience HS10-C-19 may be found in the remarks specific to artifact #39. Two additional scabbards are represented in the HS-10 collection by distal fragments recovered from proveniences HS10-C-20 and HS10-C-22.

Artifact #236 HS10-T-7

This ferrous metal object may be the throat for a sword scabbard. Traces of cuprous metal plating remain on one side.

Sword-Belt Plate

Artifact #173 HS10-C-16

This cuprous metal sword-belt plate is of a style first prescribed by Army uniform regulations in 1851 (Campbell and Howell 1963:47-48). As the specifications were written, the buckle was to be "... gilt, rectangular, two inches wide, with a raised bright rim; a silver wreath of laurel encircling the 'Arms of the United States'; eagle, scroll, edge of cloud and rays bright. The motto, 'E Pluribus Unum,' in silver letters upon the scroll; stars also of silver ..." (U.S. Army 1851:Plate 21 in Campbell and Howell 1963:47). Many variations on this basic design were eventually produced, especially during the Civil War when accouterments were manufactured in quantity by a number of contractors.

The HS-10 example differs from the standard size by exceeding the width specification by 1/8 in. Traces of solder remain on the obverse side of the buckle where the silver laurel wreath was once attached. The head of the eagle on this particular buckle faces to the right.

This style of buckle was officially prescribed for all officers and enlisted personnel from 1851 until 1881, when it was discontinued as an item of enlisted equipment (Campbell and Howell 1963:47-48). It was retained for officers until 1941. However, Brinckerhoff (1972:23) has suggested that in reality officers alone wore this buckle between 1851 and 1861, and that it continued to be worn by mounted enlisted men for dress until the middle 1880s. The narrow tongue on the reverse side of the HS-10 buckle is an indication of manufacture between 1851 and the late 1870s (Brinckerhoff 1972:24).

Tin Can/Possible Tin Can Fragments

Artifact #111 HS10-C-16

A number of tin can fragments were recovered from this provenience. Five diagnostic fragments in the group indicate that a hole-in-cap can with lapped top and bottom seams is represented. As discussed in connection with tin can fragments recovered from HS10-T-7 (artifact #216), hole-in-cap cans were manufactured from about 1810 until the late 1930s and possibly later (Rock 1989:50).

## APPENDIX H

Artifacts #116 HS10-C-18

Fragments of at least two press-on tin can lids were recovered from this provenience and are included under the designation of artifact #116. One of the lids was similar in form to that represented in the Feature 40 fill (artifact #117). The side or lip of the lid was 1/2 inch in height and exhibited a slight fold which presumably originally extended around the entire circumference of the lid.

The remains of a second lid of somewhat different form were also recovered from HS10-C-18. The side of the second lid was approximately 7/16 inch in height. The side was indented slightly near the top where the 1/8 inch flange of the top piece was pinched onto the side band during manufacture. The otherwise straight lid side would have fit tightly over the outside surface of a cylindrical can.

Artifact #117 HS10-40-1

Fragments of a press-on tin can lid were recovered from Feature 40. The diameter of the lid was originally 3 5/8 in, and the side or lip was 1/2 inch in height. A single fold was pressed into the lip around its entire circumference creating a slight concavity on the interior surface and a slight ridge on the exterior surface.

Artifact #136 HS10-6-1

This artifact consists of a portion of a thin circular ferrous metal disk which was bent around the edges in order to be fitted upon a cylindrical object approximately 2 inches in diameter. It may represent a portion of the unattached end of a tin can or other container, or the removable insert from a tagger top can (Fontana and Greenleaf 1962:74).

Artifact #182 HS10-C-20

One of these five tin can fragments exhibits a short section of a lap side seam. Rock (1984:101-102, 105, 1989:37-38) has indicated that lap side seams were the primary side seam type on tin cans from the 1840s until 1888, when the double side seam was introduced into production. However, tin cans with lap side seams continued to be manufactured until sometime after the turn of the twentieth century.

Artifact #214 HS10-X9-2

Two of the numerous tin can fragments from this provenience exhibit overlapped or flanged top or bottom seams.

Artifact #215 HS10-W-2

Numerous tin can fragments were recovered from this provenience. A solder line on each of three fragments indicates that the top and bottom seams were overlapped or flanged.

Artifact #216 HS10-T-7

A single hole-in-cap can is presumably represented by two fragments of the top of the can including most of a cap and solder channel, and a vent hole solder dot which apparently rusted away from the rest of the can top. Production of hole-in-cap cans began around 1810. Improvements in the canning process coupled with extensive use of canned foods by soldiers during the Civil War helped to convince the general public that these products were safe to consume. The result was a postwar boom in the canning industry (Busch 1981:96-97). With the development of the sanitary can around the turn of the twentieth century, production of hole-in-cap cans began to decline (Fontana and Greenleaf 1962:73; Rock 1984:101, 105). Rock (1989:50) has suggested that hole-in-cap cans continued to be manufactured until the late 1930s and possibly later.

Artifact #217 HS10-W-7

These five tin can fragments together form a nearly complete tin can which was originally 3 1/16 inches in diameter and 4 11/16 inches in height without the lid. The lid itself was not recovered from this provenience. A fold in the metal near the top of the open end of the can would originally have served as a stop for a press-on friction held lid.

Artifact #247 HS10-X9-3

One of these eight tin can fragments exhibits a portion of a lap side seam. As indicated in the discussion of can fragments recovered from HS10-C-20 (#182), lap side seams appear on tin cans which were produced from around 1840 until sometime after the turn of the twentieth century (Rock 1984:101-102, 105, 1989:37-38).

## RUBBER ARTIFACTS

Ring Gasket

Artifact #12 HS10-NWQ-3

This tabbed red rubber ring gasket for a Mason type canning jar is in good condition. The purpose of the tab was to provide an easy method of breaking the vacuum in the jar in order to obtain access to the contents. The design patent for the tab (No. 45,601) was issued to John F. Griffen of New York City on December 27, 1864 (Toulouse 1969:116). Such gaskets may still be purchased today.

## APPENDIX H

### SHELL ARTIFACTS

Mussel Shell

Artifact #29 HS10-X6-1

The unionid mussel *Quadrula quadrula* Rafinesque may be represented by this shell fragment with a right valve. This tentative identification is based upon a general consideration of diagnostic features, size, and the modern distribution of unionid mussels in Kansas (Murray and Leonard 1962).

### ARTIFACTS COMPOSED OF A COMBINATION OF MATERIALS

Door Knob Fragments

Artifacts #120 and #121 HS10-C-24

Several fragments of a brown glazed mineral door knob were recovered from provenience HS10-C-24 and have subsequently been refitted (door knob shaft - #120; knob fragments - #121). The original door furniture on the extant permanent structures at Fort Larned consisted of a rim lock with brown glazed mineral knobs (George Elmore, personal communication 1986). However, mineral knobs were still offered for sale on the open market at least as late as 1897 (Israel 1968:90).

Possible Pen Stock

Artifact #165 HS10-C-31

This object consists of a nickel (?) cylinder crimped around the remnants of a wooden shaft broken flush at one end, and a highly oxidized ferrous metal insert at the other end. The end containing the wood is decorated with a single raised embossed band of repeated diamond elements, each of which bears a dot in the center. Ticking encircles the cylinder on either side of the band. The other end of the cylinder is cut in a broad V-shaped notch on one side and is rounded on the other. The lettering BLANZY POURE & C ... is centrally and longitudinally impressed in upper case on the notched side.

The artifact was originally thought to be a ferrule from a bamboo fishing rod. In an attempt to gain confirmation of this tentative identification, the object was sent to Mr. Martin J. Keane of Stockbridge, Massachusetts, an expert in modern and historic fishing rods and tackle. However, Keane (1986) discounted the possibility of

the artifact having been a fishing rod ferrule and suggested, among other things, that it might be the lower part of a pen stock.

Table Utensils

Artifacts #142 (HS10-C-38) and #166 (HS10-T-3)

Two table utensils are represented in the collection of artifacts resulting from the archeological investigations at HS-10 in 1986. An unidentified table utensil is represented by a portion of a carbon steel tongue which is still retained within a bone handle (artifact #142). A complete wooden handled table knife of carbon steel (artifact #166) was also recovered.

Bone and wood handled tableware was in production at least as early as 1865 (Russell and Erwin Manufacturing Co. 1980:350-352, 356-357). A distinct disadvantage of carbon steel for utensil blades was the disagreeable metallic taste which it imparted to food in reaction to oral acids. However, alternative metals were available by the first decade of the twentieth century as a result of innovative plating of utensils and the introduction of new alloys. Solid metal flatware utilizing nickel, silver, Britannia, and Alaska seem to have become quite competitive by 1908 as reflected in the offerings in the Sears, Roebuck and Company catalog of the day (Schroeder 1969:333-343, 766-767). The new materials and styles were so successful that they may have supplanted the carbon steel and organic (cocobolo, ebony, hard rubber, celluloid, bone, and stag) handled wares by 1923 (Schroeder 1973:411, 418). The earlier style utensils have enjoyed a recent resurgence in popularity but are now available with stainless steel blades.

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# APPENDIX I

Artifact Provenience by Bag Catalog Code

## APPENDIX I

Artifact Provenience by Bag Catalog Code

| Bag Catalog Code | Description of Provenience |
|---|---|
| HS10-S1-1 | Stratigraphic Test 1, 0-5 cm bs |
| HS10-S1-2 | Stratigraphic Test 1, 5-10 cm bs |
| HS10-S1-3 | Stratigraphic Test 1, 10-15 cm bs |
| HS10-S1-4 | Stratigraphic Test 1, 15-20 cm bs |
| HS10-S1-5 | Stratigraphic Test 1, ESE end, 20-24 cm bs |
| HS10-S1-6 | Stratigraphic Test 1, WNW end, 20-24 cm bs |
| HS10-S1-7 | Stratigraphic Test 1, trenching along NNE wall for profiling purposes, WNW end, inside HS-10 at wall 5/6, 24-29 cm bs |
| HS10-S1-8 | Stratigraphic Test 1, trenching along NNE wall for profiling purposes, ESE end, outside HS-10 at wall 5/6, 24-35 cm bs |
| HS10-S1-9 | Stratigraphic Test 1, trenching along NNE wall for profiling purposes, HS-10wall 5/6 rubble, 24-35 cm bs |
| HS10-S1-10 | Stratigraphic Test 1, combined HS-10 wall 5/6 rubble and ESE end of the unit outside HS-10, 24-35 cm bs |
| HS10-S1-11 | Stratigraphic Test 1, outside HS-10 at wall 5/6, 35-42 cm bs, rubble layer |
| HS10-S1-12 | Stratigraphic Test 1, outside HS-10 at wall 5/6, 42-62 cm bs |
| HS10-S1-13 | Stratigraphic Test 1, ESE end, 36-40 cm bs, above the rubble layer |

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|---|---|
| HS10-S1-14 | Stratigraphic Test 1, outside HS-10 at wall 5/6, 22-51 cm bs, rubble layer |
| HS10-S1-15 | Stratigraphic Test 1 Extension, 0-22 cm bs |
| HS10-S1-16 | Stratigraphic Test 1 Extension, 22-34 cm bs |
| HS10-S1-17 | Stratigraphic Test 1 Extension, 37 cm bs in the ESE profile |
| HS10-S1-18 | Stratigraphic Test 1 Extension, 44 cm bs in top of subsoil |
| HS10-S1-19 | Stratigraphic Test 1 Extension, 53 cm bs at base of rubble layer/top of subsoil |
| HS10-NWQ-1 | NW Quadrant, general site fill over cellar fill, 32-37 cm below E1 |
| HS10-NWQ-2 | NW Quadrant, cellar fill, 30-50 cm north of the pedestal unit for the center post hole, 50-80 cm from cellar wall 4, approx. 5 cm above wooden joists (56 cm below E1) |
| HS10-NWQ-3 | NW Quadrant, top of cellar fill down to level of wooden joists, 44-61 cm below E1 |
| HS10-NWQ-4 | NW Quadrant, HS-10 wall 2/3 rubble, approx. 40 cm below E1, see drawing of 4/23 for exact position |
| HS10-NWQ-5 | NW Quadrant, 52-60 cm below E1, nail in ghost of J2 |
| HS10-NWQ-6 | NW Quadrant, nail near the south end of J1, 52 degrees, 44 min., 9.88m from A |
| HS10-NEQ-1 | NE Quadrant, 81 degrees, 7 min., 6.66 m from A, 9 cm below E1 |
| HS10-NEQ-2 | NE Quadrant, 87 degrees, 6 min., 6.5 m from A, 25 cm below E1 |
| HS10-NEQ-3 | NE Quadrant, F1, 66 degrees, 43 min., 9.25 m from A, 30 cm below E1 |
| HS10-NEQ-4 | NE Quadrant, above F9, 1.5 m east and 0.4 m north of the 4-quad intersection, 32-34 cm below E1 |
| HS10-NEQ-5 | NE Quadrant, just above HS-10 wall 4/5, 83 degrees, 12 min., 11 m from A, 34 cm below E1 |

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|---|---|
| HS10-NEQ-6 | NE Quadrant, just above HS-10 wall 4/5, 83 degrees, 11 min., 10.55 m from A, 36 cm below E1 |
| HS10-NEQ-7 | NE Quadrant, 85 degrees, 32 min., 10.55 m from A, 39 cm below E1 |
| HS10-NEQ-8 | NE Quadrant, outside HS-10 at wall 5/6, 32 cm below E1 |
| HS10-NEQ-9 | NE Quadrant, at edge of rodent burrow in wall line 4/5, 83 degrees, 11 min., 10.08 m from A |
| HS10-NEQ-11 | NE Quadrant, F1, 29-42 cm below E1 |
| HS10-NEQ-12 | NE Quadrant, HS-10 wall 5/6 rubble, 32 cm below E1 |
| HS10-NEQ-13 | NE Quadrant, shallow stain inside HS-10 wall 4/5 |
| HS10-SWQ-1 | SW Quadrant, around F11 (not from the feature itself), 19-31 cm below E1 |
| HS10-SEQ-1 | SE Quadrant, immediately below sod |
| HS10-SEQ-2 | SE Quadrant, fill in central quadrant corner, possible extension of F9 |
| HS10-SEQ-3 | SE Quadrant, general fill |
| HS10-SEQ-4 | SE Quadrant, bordering F19, 57 degrees, 29 min., 4.57 m from A, 31 cm below E1 |
| HS10-SEQ-5 | SE Quadrant, F8, 36 cm below E1 |
| HS10-SEQ-6 | SE Quadrant, bottom course of HS-10 wall 1/2, central section |
| HS10-C-1 | Cellar fill, joist level |
| HS10-C-2 | Cellar, north end of J1 into vertical post |
| HS10-C-3 | Cellar, junction of J1 and cellar wall 1 |
| HS10-C-4 | Cellar, J3, nails removed from J3 at projected juncture with J4, nails were driven into J3 from W to E (toward J4) |
| HS10-C-5 | Cellar fill, between J2 and J3 |

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|---|---|
| HS10-C-6 | Cellar fill, bottom of J2 and J3 |
| HS10-C-7 | NE Quadrant, cellar fill, fill at bottom of joists, between J4 and cellar wall 4 |
| HS10-C-8 | NE Quadrant, cellar, F24, possible post, 60 degrees, 14 min., 10.18 m from A, 106 cm below E1 |
| HS10-C-9 | Cellar fill, joist level |
| HS10-C-10 | Cellar, J4 |
| HS10-C-11 | NE Quadrant, cellar fill between J4 and cellar wall 4, 70 degrees, 19 min., 9.65 m from A, 65 cm below E1 |
| HS10-C-12 | NE Quadrant, cellar fill between J4 and cellar wall 4, 61 degrees, 47 min., 9.33 m from A, 94 cm below E1 |
| HS10-C-13 | NE Quadrant, cellar fill at midpoint between J4 and cellar wall 4, 61 degrees, 38 min., 9.69 m from A, 93 cm below E1 |
| HS10-C-14 | Cellar, J3 |
| HS10-C-15 | Cellar, J3, nails used to laminate double joist |
| HS10-C-16 | Cellar fill down to 192 cm below E1 (above the level of screening) |
| HS10-C-17 | Cellar fill, Area 1, 192-195 cm below E1 |
| HS10-C-18 | Cellar fill, Area 1, 195-209 cm below E1 |
| HS10-C-19 | Cellar fill, Area 2, 192-209 cm below E1 |
| HS10-C-20 | Cellar fill, Area 2, 212-215 cm below E1, down to 2-3 cm above the cellar floor |
| HS10-C-21 | Cellar fill, Area 3, 200-209 cm below E1 |
| HS10-C-22 | Cellar fill, Area 1, 209-212 cm below E1, down to 2-3 cm above the cellar floor |
| HS10-C-23 | Cellar fill, Area 1, 209-212 cm below E1, down to 2-3 cm above the dirt floor |

| | |
|---|---|
| HS10-C-24 | Cellar fill, Area 2, 192-202 cm below E1 |
| HS10-C-25 | Cellar, N3 |
| HS10-C-26 | Cellar fill at stairway, Areas 2 and 3 (mixed soil), 194-206 cm below E1 (206 cm is approx. top of decking) |
| HS10-C-28 | Cellar, ledger and east stair stringer, nails used to join those features |
| HS10-C-29 | Cellar, center post area, south end of J1 and J2 (two smaller nails: 1) lamination nail, 2) vertical toenail), center post hole fill (largest spike) |
| HS10-C-30 | Cellar, north of and immediately adjacent to center post area, 95 cm below E1 |
| HS10-C-31 | Cellar, south of center post in rotten wood area, 105 cm below E1 |
| HS10-C-32 | Cellar, south of center post in area of rotten wood, 105-117 cm below E1 |
| HS10-C-33 | Cellar, center post area, joist support and center post, upper two nails attaching milled lumber to center post |
| HS10-C-34 | Cellar fill, adobe sample |
| HS10-C-35 | Cellar fill, west side of cellar wall 5, 80 cm below E1 |
| HS10-C-36 | Cellar fill, Area 1, 203-209 cm below E1, ca. 2-3 cm above dirt floor |
| HS10-C-37 | Cellar fill, Area 2, 205-215 cm below E1 |
| HS10-C-38 | Cellar fill by the center post, Area 1, 196-209 cm below E1, to top of decking and nailers |
| HS10-C-39 | Cellar fill, Area 2, 215-218 cm below E1, to top of dirt floor |
| HS10-C-40 | Cellar, Areas 1 and 3, 206-213 cm below E1, under the decking to top of dirt floor |
| HS10-C-41 | Cellar fill, Area 4, 206-214 cm below E1 |
| HS10-C-42 | Cellar, sample of decking nails |

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|---|---|
| HS10-C-43 | Cellar, east stringer and lowest ledger, nails from lowest tread, 191 cm below E1 |
| HS10-C-46 | Cellar, builders trench for cellar wall 4 |
| HS10-C-47 | Cellar, builders trench at north end of N1 on the east side, 209 cm below E1 |
| HS10-C-48 | Cellar fill, Area 4, 190-206 cm below E1 |
| HS10-C-49 | Cellar, stake driven in along the southwest side of N1, 57 degrees, 54 min., 10.75 m from A |
| HS10-C-51 | Cellar, builders trench for N1 |
| HS10-C-52 | Cellar, N1 |
| HS10-C-53 | Cellar, pressed into the dirt floor between N2 and N7 |
| HS10-C-54 | Cellar, builders trench along west side of N2 |
| HS10-C-55 | Cellar, N2, lamination nails |
| HS10-C-56 | Cellar, N2 and builders trench for N2 |
| HS10-C-57 | Cellar, N4, lamination nails |
| HS10-C-58 | Cellar, builders trench for N4 |
| HS10-C-59 | Cellar, builders trench for cellar wall 1 |
| HS10-C-60 | Cellar, builders trench for cellar wall 2 |
| HS10-C-61 | Cellar, builders trench for cellar wall 3 |
| HS10-C-62 | Cellar, builders trench for cellar wall 5 |
| HS10-C-63 | Cellar, builders trench for N7 |
| HS10-C-64 | Cellar, west half of center post area, 147-194 cm below E1 |
| HS10-C-65 | Cellar, center post area, 194-220 cm below E1 |

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|---|---|
| HS10-C-66 | Cellar, center post area, 220-232 cm below E1 |
| HS10-C-67 | Cellar, area around the center post, 220-225 cm below E1, to top of builders trench and top of nailers |
| HS10-C-68 | Cellar, center post area, 225-241 cm below E1 |
| HS10-C-69 | Cellar, NE board at center post supporting floor joists over the cellar, nail fragment embedded in the side of the board |
| HS10-T-1 | Mortar sample collected between upper rocks in HS-10 wall 3/4 over the tunnel |
| HS10-T-2 | Tunnel fill, rock fill |
| HS10-T-3 | Tunnel fill below and outside HS-10 wall 3/4, soil fill beneath rock fill, plastic fragment: 56 degrees, 51 min., 16.08 m from A, 2.03 m below E1 |
| HS10-T-4 | Tunnel, builders trench |
| HS10-T-5 | Tunnel fill, first 2 ft behind profile of 11/5, Level 2, upper part with l large rocks, artifacts in loose and solid mortar |
| HS10-T-6 | Tunnel fill, first 2 ft behind profile of 11/5, Level 2, upper part around large rocks, artifacts not in mortar |
| HS10-T-7 | Tunnel fill, first 2 ft behind profile of 11/5, Level 2, lower part below large rocks, general fill |
| HS10-T-8 | Tunnel fill, first 2 ft behind profile of 11/5, Level 3 |
| HS10-T-9 | Tunnel fill, first 2 ft behind profile of 11/5, Level 4, general fill |
| HS10-T-10 | Tunnel fill, second 2 ft behind profile of 11/5, Level 2, mortar fill |
| HS10-T-11 | Tunnel fill, second 2 ft behind profile of 11/5, Level 2, rock fill |
| HS10-T-12 | Tunnel fill, second 2 ft behind profile of 11/5, Level 2, earth fill |
| HS10-T-13 | Tunnel fill, second 2 ft behind profile of 11/5, Level 3 |
| HS10-T-14 | Tunnel fill, second 2 ft behind profile of 11/5, Level 4 |

## APPENDIX I

| | |
|---|---|
| HS10-T-15 | Tunnel fill, second 2 ft behind profile of 11/5, Level 4, F44, nail removed from wooden box remains |
| HS10-T-16 | Tunnel fill, northwest of second 2-ft segment, Level 2, earth fill |
| HS10-T-17 | Tunnel fill, northwest of second 2-ft segment, Level 4 |
| HS10-T-18 | Tunnel, pressed into tunnel floor west of F44 |
| HS10-T-19 | Tunnel fill, 2-3 cm above tunnel floor |
| HS10-T-20 | Tunnel fill, 5-10 cm above tunnel floor in Level 4 |
| HS10-T-21 | Tunnel fill, surface |
| HS10-T-22 | Tunnel, pressed into tunnel floor |
| HS10-T-23 | Tunnel, nail vertical in west toeboard, 33 cm from B3 |
| HS10-W-1 | Fill in northern half of wellhouse |
| HS10-W-2 | Fill in northern half of wellhouse, along west wall outside X9, Level 8 |
| HS10-W-3 | Fill in northern half of wellhouse outside X9, Level 8 |
| HS10-W-4 | Fill in northern half of wellhouse, along west wall outside X9, Level 9 |
| HS10-W-5 | Fill in northern half of wellhouse, Levels 8-9 interface, near F43, not touching wood but in same general fill |
| HS10-W-6 | Wellhouse fill, west corner, Level 10 |
| HS10-W-7 | Wellhouse fill, north corner, Level 10 |
| HS10-X3-1 | X3, inside HS-10 at wall 2/3, down to 57 cm below E1 |
| HS10-X3-2 | X3, outside HS-10 at wall 2/3, Level 1, 45-55 cm below E1 |
| HS10-X3-4 | X3, HS-10 wall 2/3 rubble and the builders trench |
| HS10-X4-1 | X4, inside HS-10 at wall 2/3 |
| HS10-X4-2 | X4, outside HS-10 at wall 2/3, Level 1, 45-55 cm below E1 |

| | |
|---|---|
| HS10-X4-3 | X4, HS-10 wall 2/3 rubble and the builders trench |
| HS10-X5-1 | X5, cellar fill, Level 1, 65-95 cm below E1 |
| HS10-X5-2 | X5, lamination nail near the north end of J1 |
| HS10-X5-3 | X5, cellar fill, Level 2, 95-125 cm below E1 |
| HS10-X5-4 | X5, cellar fill, Level 3, 125-155 cm below E1 |
| HS10-X5-5 | X5, cellar fill, Level 4, 155-170 cm below E1 |
| HS10-X5-6 | X5, cellar fill, Level 5, 170-191 cm below E1 |
| HS10-X5-7 | X5, cellar fill, Level 6, 191-223 cm below E1 |
| HS10-X5-8 | X5, cellar fill, 222 cm below E1 |
| HS10-X5-9 | X5, cellar fill, 225 cm below E1 |
| HS10-X6-1 | X6 |
| HS10-X7-1 | X7, below sod to subsoil |
| HS10-X8-1 | X8, surface to subsoil |
| HS10-X9-1 | X9, wellhouse fill, Level 1 |
| HS10-X9-2 | X9, wellhouse fill, Level 2 |
| HS10-X9-3 | X9, wellhouse fill, Level 3 |
| HS10-X9-4 | X9, wellhouse fill, Level 4 |
| HS10-X9-5 | X9, wellhouse fill, Level 5 |
| HS10-X9-6 | X9, wellhouse fill, Level 6 |
| HS10-X9-7 | X9, wellhouse fill, Level 7 |
| HS10-X9-8 | X9, wellhouse fill, Level 8 |

## APPENDIX I

| | |
|---|---|
| HS10-B3-1 | Tunnel, B3, west end, nail into toeboard from B3 |
| HS10-B3-2 | Tunnel, B3, east end, nail in the wood |
| HS10-B4-1 | Tunnel, B4, west end, nail in soil with wood fragments |
| HS10-B4-2 | Tunnel, B4, east end, nail in toeboard |
| HS10-3-1 | NE Quadrant, F3, 39 cm below E1, when the feature was first exposed |
| HS10-3-2 | NE Quadrant, F3, against post within post hole |
| HS10-3-3 | NE Quadrant, F3, post hole fill |
| HS10-4-1 | NE Quadrant, north part of F4, 42-54 cm below E1 |
| HS10-4-2 | NE Quadrant, F4 post hole fill, 61 cm below E1 |
| HS10-6-1 | NE Quadrant, F6, 43 cm below E1 |
| HS10-7-1 | NE Quadrant, F7 |
| HS10-8-1 | NE Quadrant, F8 |
| HS10-8-2 | NE Quadrant, 52-53 cm below E1, below manure and above F8 |
| HS10-8-3 | NE Quadrant, F8, between F4 and balk |
| HS10-8-4 | NE Quadrant, F8, 34 cm below E1, profile excavation |
| HS10-9-1 | NE Quadrant, F9, 37-40 cm below E1 |
| HS10-9-2 | NE Quadrant, north edge of F9, 38-42 cm below E1 |
| HS10-9-3 | NE Quadrant, south edge of F9, 39-45 cm below E1 |
| HS10-9-4 | SE Quadrant, F9 |
| HS10-10-1 | SW Quadrant, F10, artifacts collected from feature fill part way down through the deepest section of the feature |
| HS10-11-1 | SW Quadrant, F11 and F12 |
| HS10-12-1 | SW Quadrant, F12 |

| | |
|---|---|
| HS10-13-1 | SW Quadrant, F13 |
| HS10-14-1 | SW Quadrant, F14 |
| HS10-15-1 | SW Quadrant, F15 fill, 48-54 cm below E1 |
| HS10-16-1 | SW Quadrant, F16 and F17 |
| HS10-17-1 | SW Quadrant, F17 |
| HS10-19-1 | SE Quadrant, F19 fill |
| HS10-21-1 | SE Quadrant, F21 |
| HS10-23-1 | Cellar, F23, 192-195 cm below E1 |
| HS10-23-2 | Cellar, F23, 219 cm below E1 |
| HS10-24-1 | Cellar, F24, 155 cm below E1 |
| HS10-29-1 | Guardhouse area, F29 |
| HS10-39-1 | Cellar, F39 |
| HS10-40-1 | Cellar, F40 |
| HS10-44-1 | Tunnel fill, F44, nails in wooden box and flat glass from just outside box |
| HS10-44-2 | Tunnel fill, F44, inside the box |
| HS10-44-3 | Tunnel fill, F44, artifacts found at corner #2 near bottom of box |
| HS10-44-4 | Tunnel fill, beneath F44 |
| No catalog # | Mortar sample from large mortar concentration, tunnel fill profile of 11/5/86, approx. 54 cm bs |
| No catalog # | Coal sample from large coal concentration, tunnel fill profile of 11/5/86, approx. 1 m bs |

# FIGURES

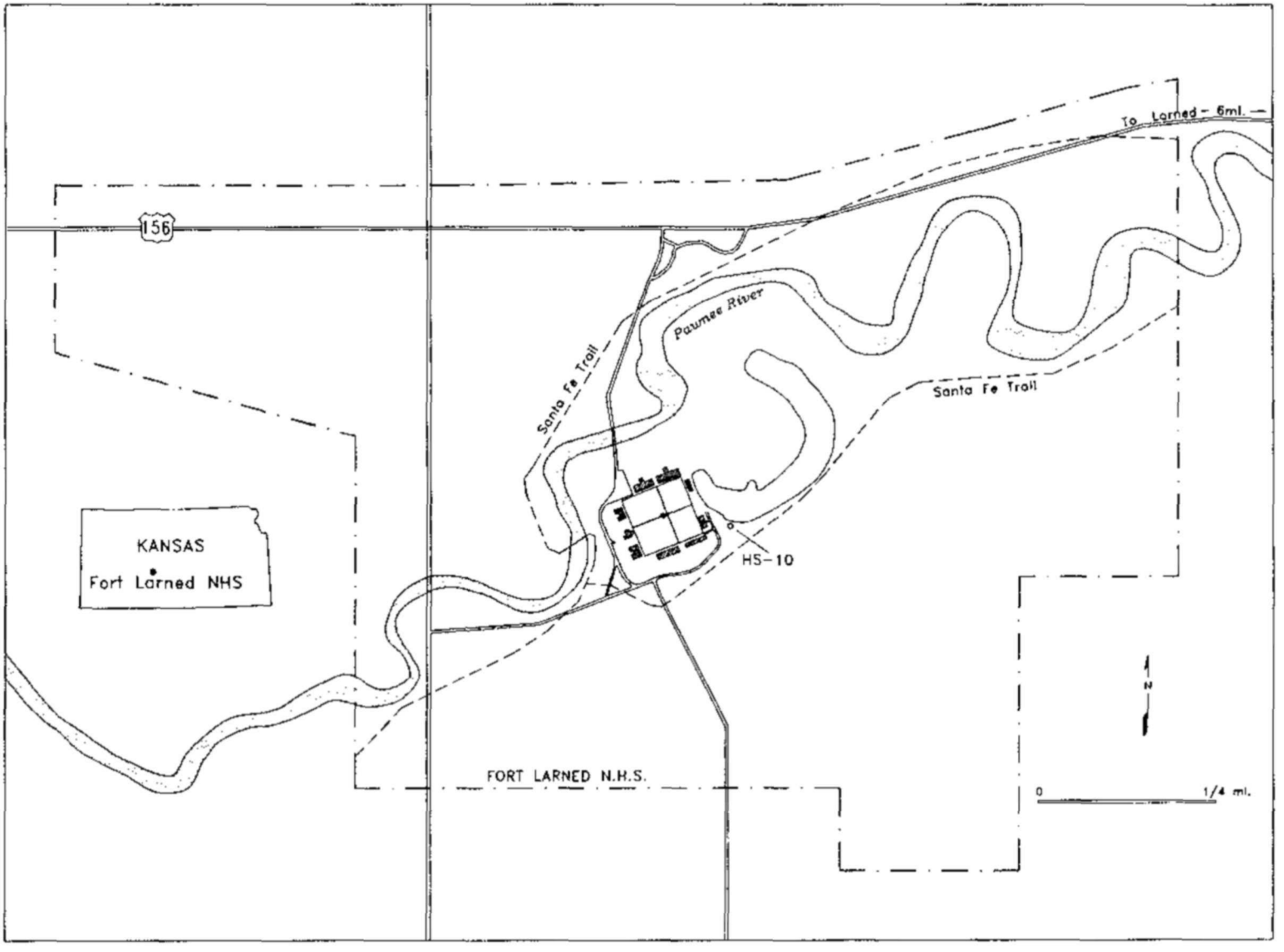
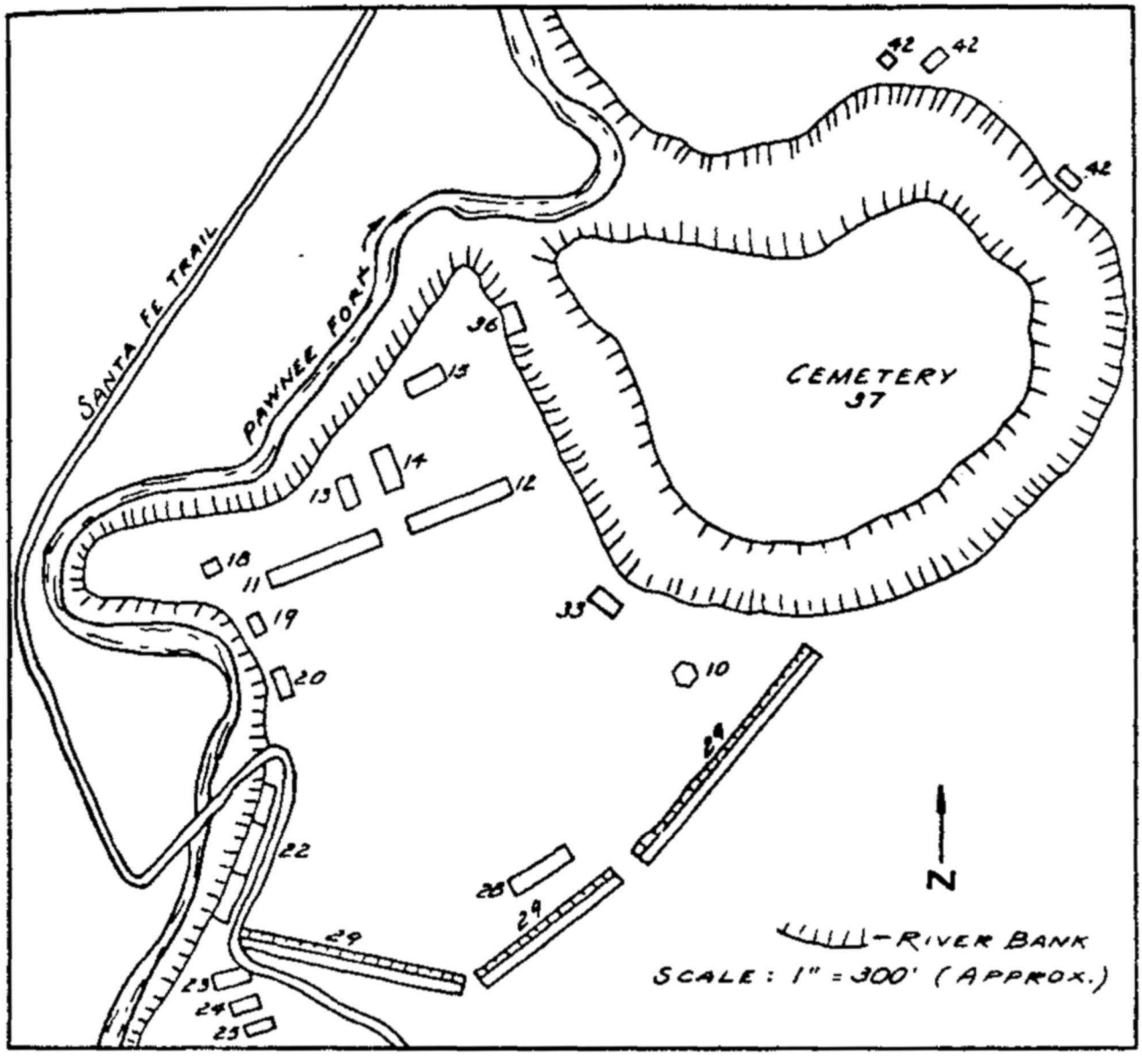



Figure 1. Fort Larned National Historic Site, Kansas.




FORT LARNED IN 1866

| | |
|---|---|
| 10. Blockhouse | 23. Sutler's Store |
| 11. CS Store and Barracks | 24. Sutler's Mess Room |
| 12. QM Store and Barracks | 25. Sutler's Residence |
| 13. Laundress Quarters | 28. Officer's Quarters |
| 14. Laundress Quarters | 29. Embankment and Trench |
| 15. Hospital | 33. Guard House |
| 18. Meat House | 36. Bake Shop |
| 19. Storehouse | 37. Cemetery |
| 20. Shops | 42. Adobe Shanties |
| 22. Sutler's Corral and Stable | |

Figure 2. Sketch map of Fort Larned as it appeared in 1866 (reproduced from David A. Clary, "National Register of Historic Places Inventory-Nomination Form for Fort Larned National Historic Site," 1976).

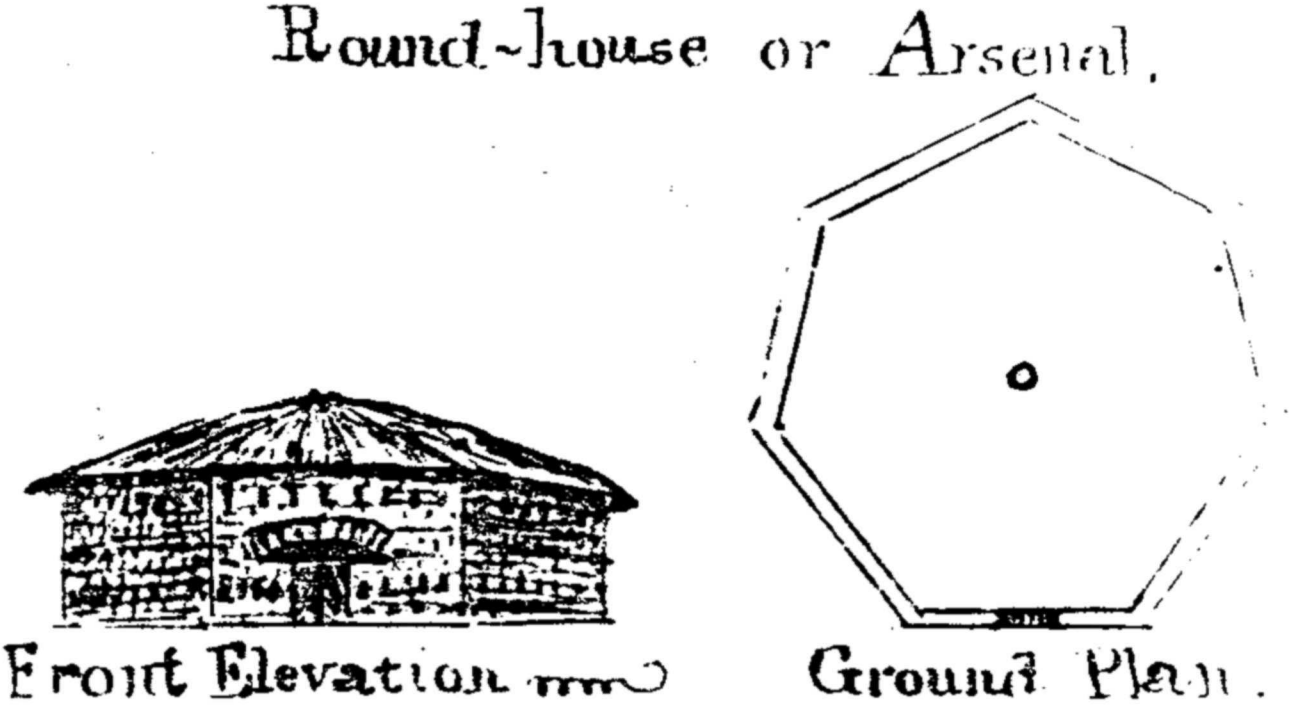



Figure 3. August 3, 1866, plan of Fort Larned, blockhouse view, submitted by Assistant Adjutant and Quartermaster A. Kaiser. National Archives and Fort Larned NHS files.

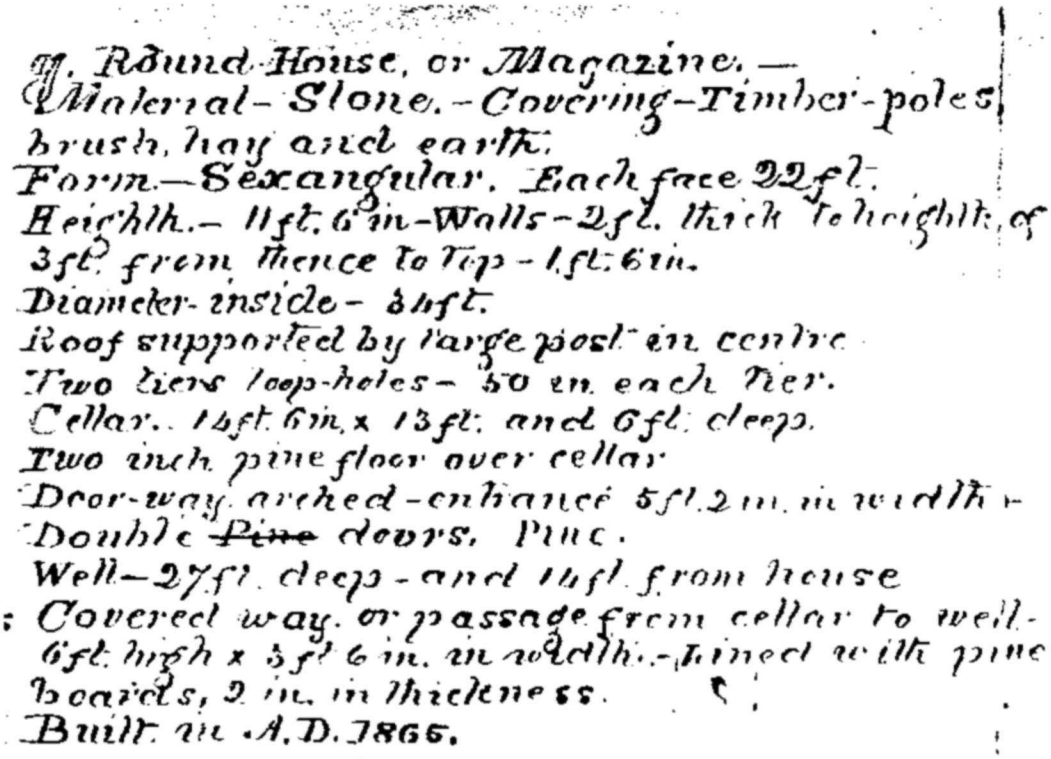



Figure 4. August 3, 1866, plan of Fort Larned, blockhouse description, submitted by Assistant Adjutant and Quartermaster A. Kaiser. National Archives and Fort Larned NHS files.




Figure 5. December 7, 1867, drawing of Fort Larned, blockhouse view, by Ado Hunnius, Company "D", 3rd Infantry. National Archives and Fort Larned NHS files.



Figure 6. 1867-1868 photograph of Fort Larned, view of blockhouse. Fort Larned NHS files.

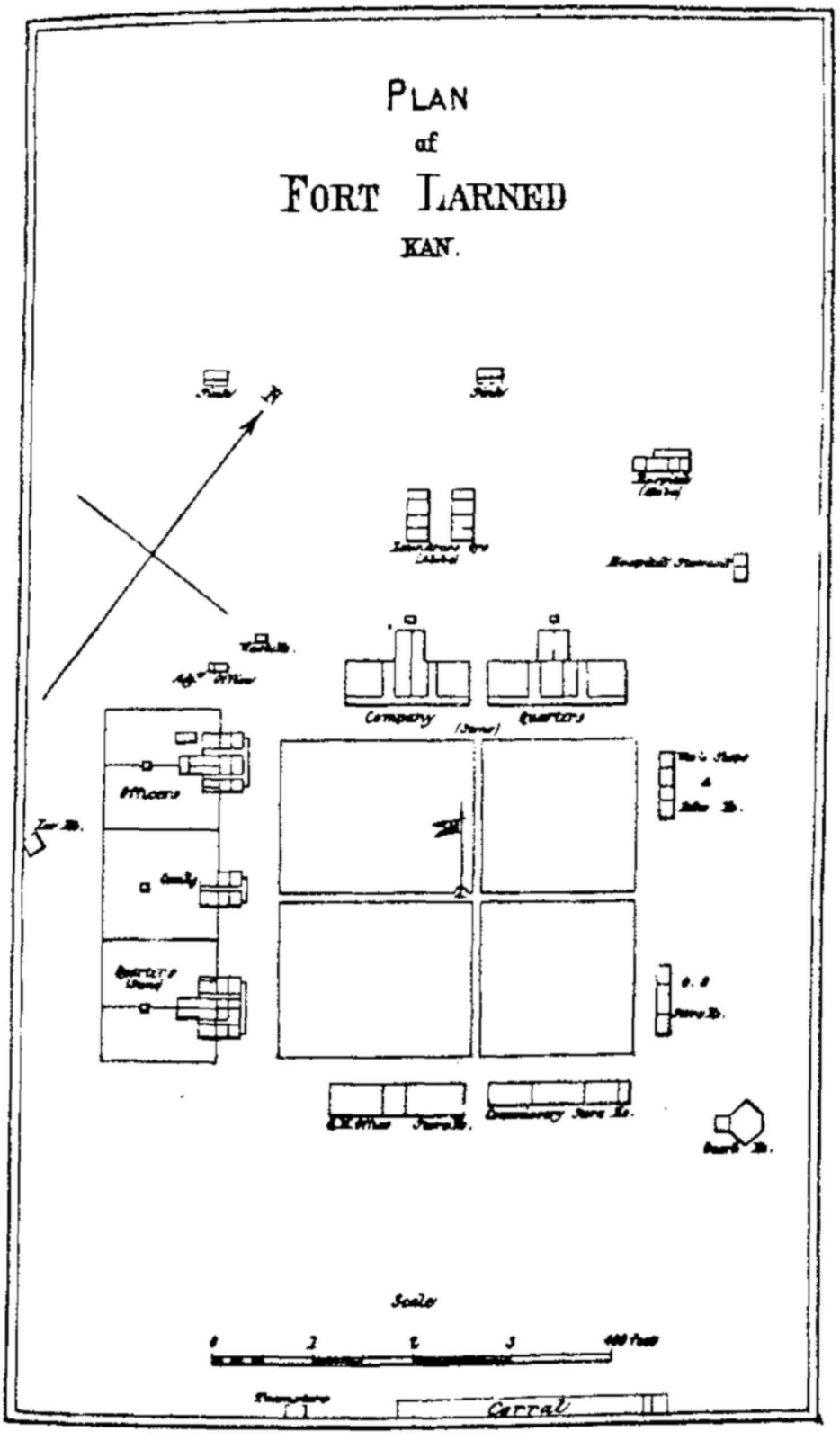



Figure 7. November 1873, sketch plan of Fort Larned, showing blockhouse. Plan courtesy of U.S. Army, Outline Descriptions of the Posts in the Military Division of the Missouri....(Chicago: Headquarters Military Division of the Missouri, 1876), p. 131.

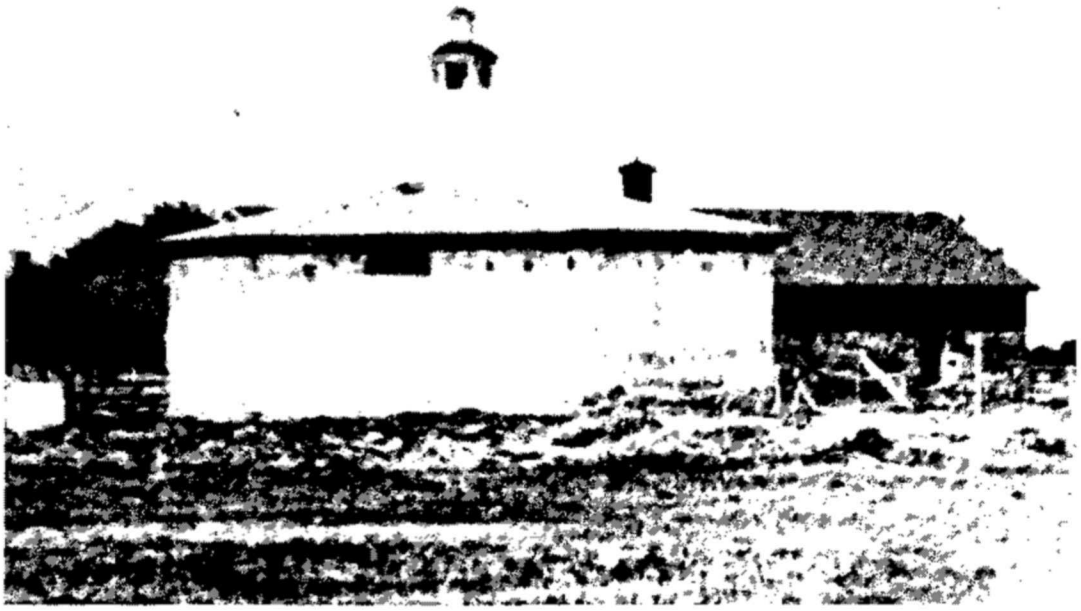


Figure 8. Photograph made from an 1886 magic lantern slide of Fort Larned, view of blockhouse. Santa Fe Trail Center, Larned, Kansas.

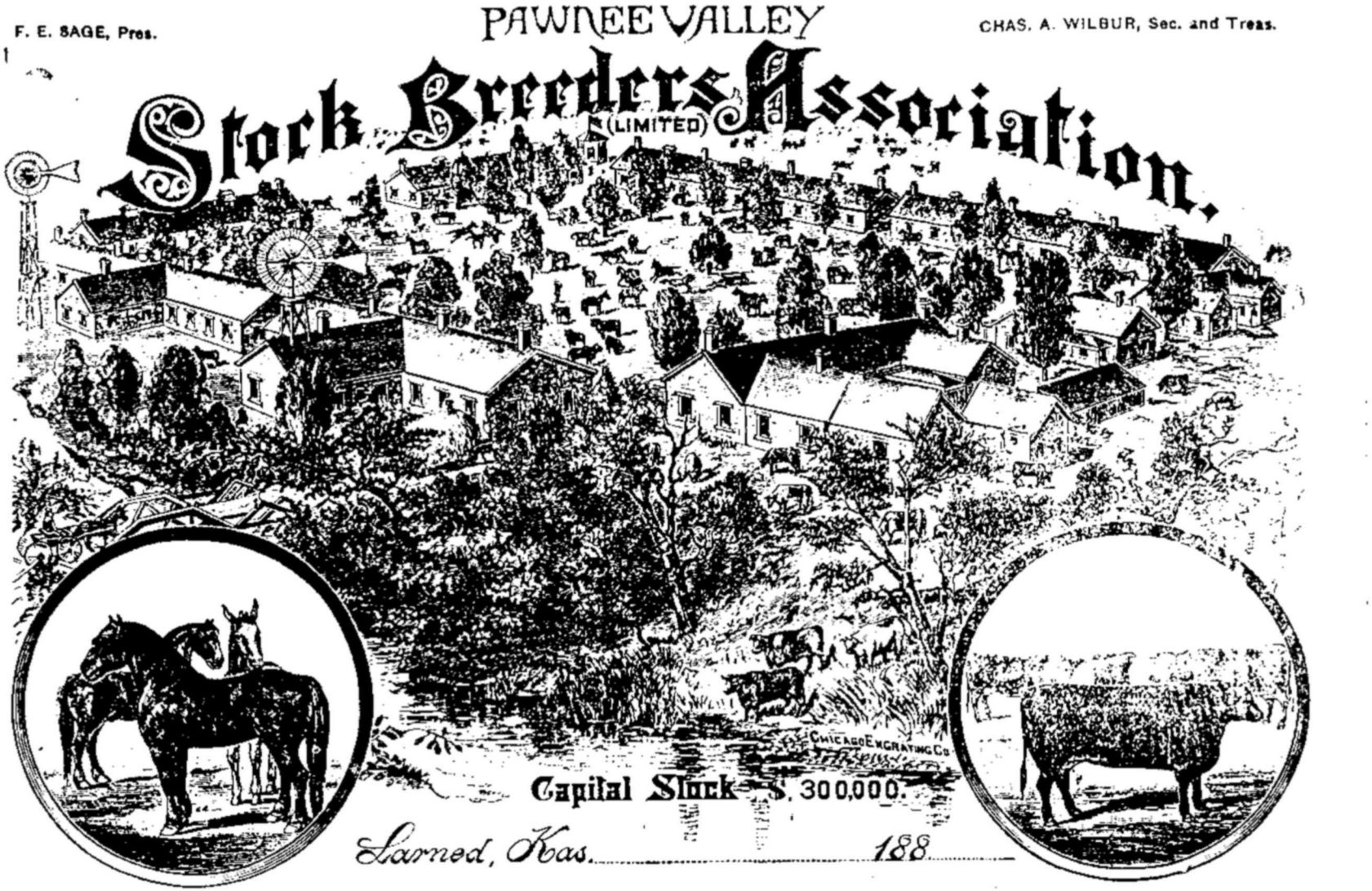



Figure 9. Circa 1886 lithograph of Fort Larned Ranch, Pawnee Valley Stock Breeders' Association, blockhouse view at center top (with flag). Chicago Engraving Company. Fort Larned NHS files.

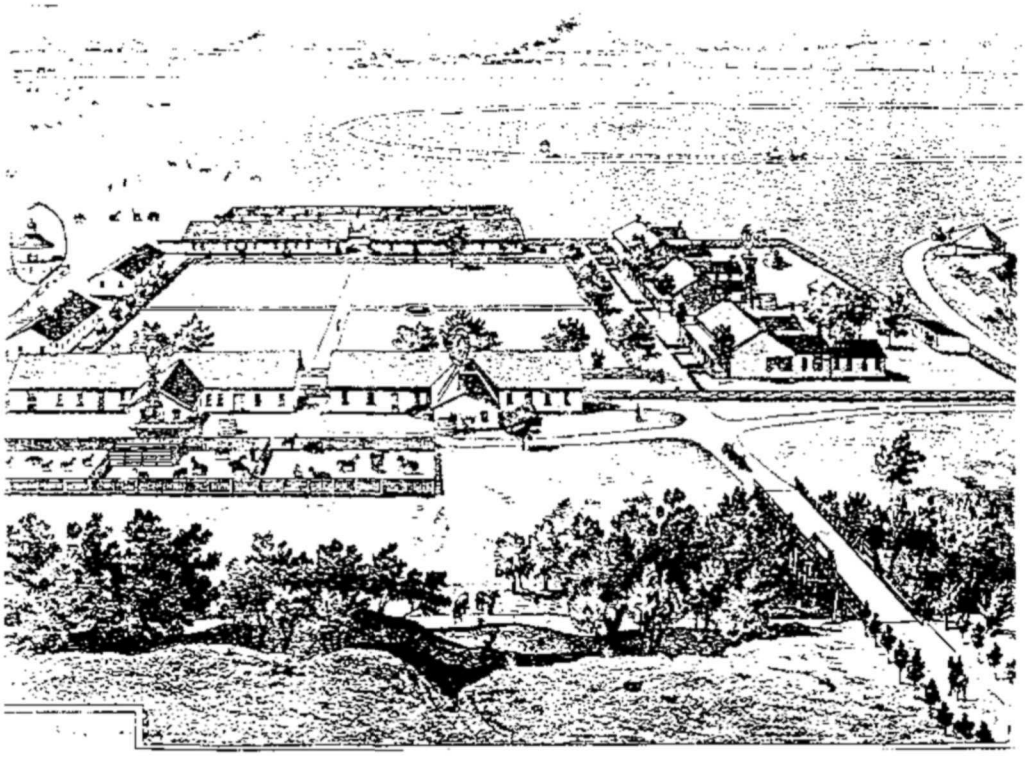


Figure 10. 1887 drawing of Fort Larned Ranch, Pawnee Valley Stock Breeders' Association, view of blockhouse. Fort Larned NHS files.

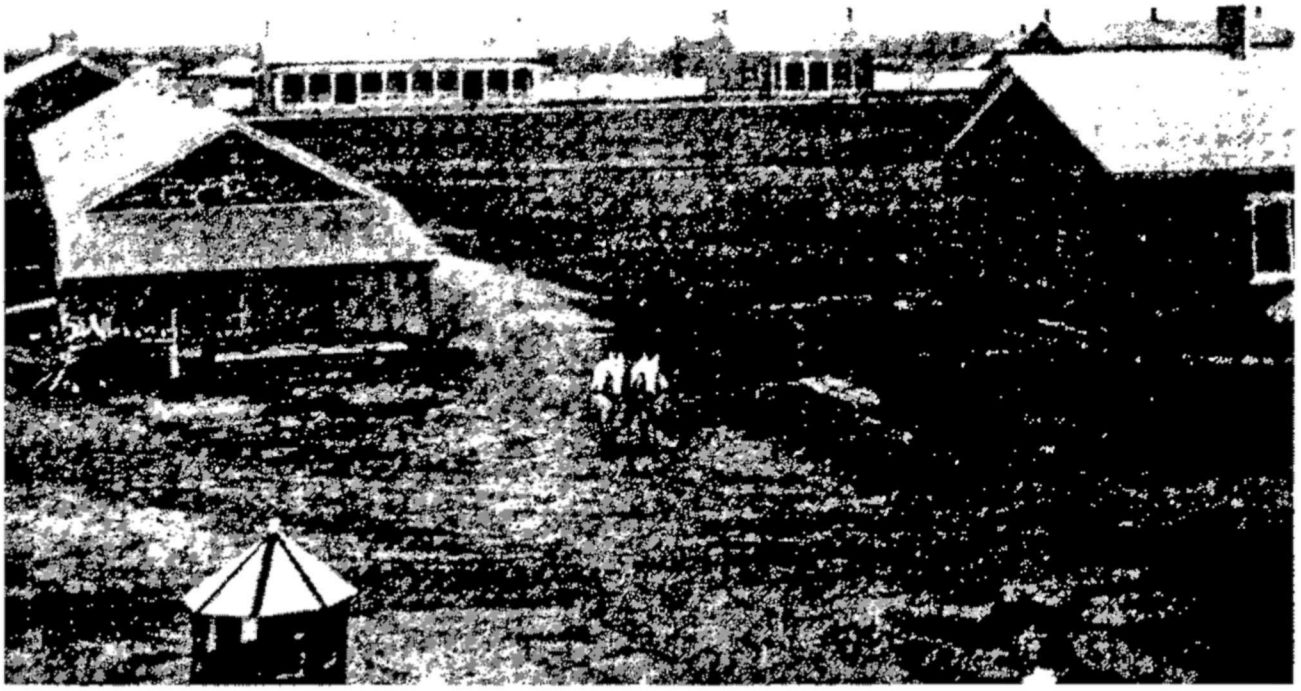


Figure 11. Photograph of Fort Larned, circa 1876, view toward the parade ground from the blockhouse tower.

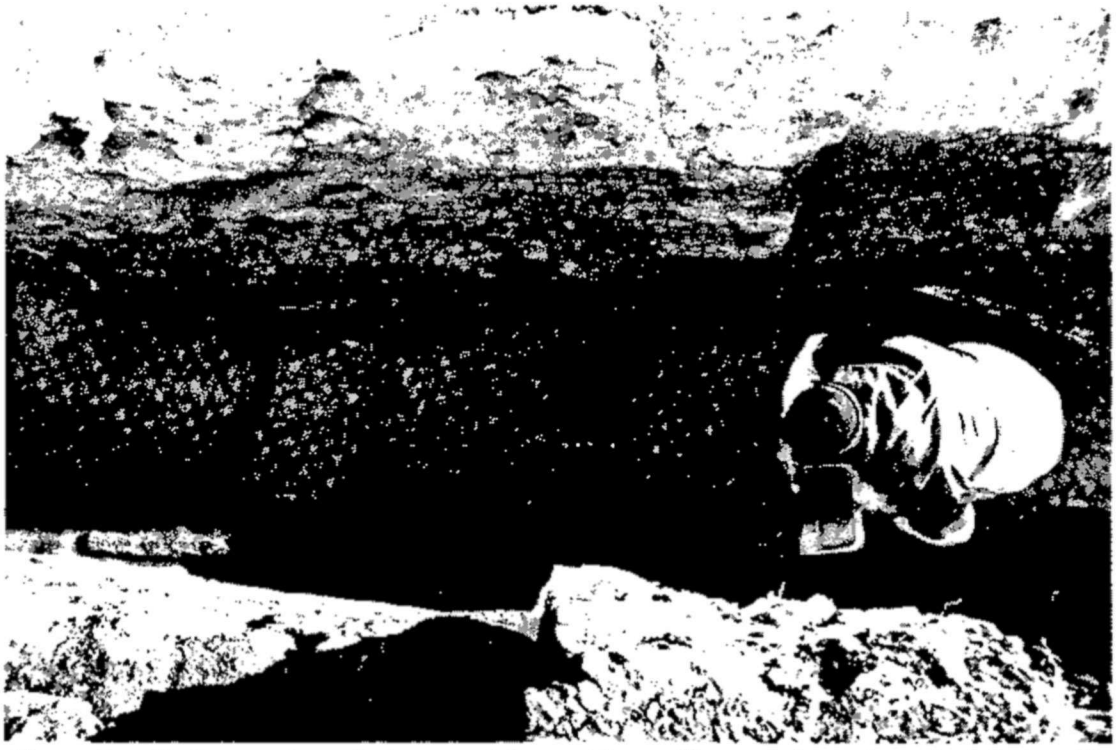


Figure 12. Bird's eye view of the tunnel floor. The wellhouse is located to the left (north) out of view in this photograph. Note the outline of the toe boards paralleling each of the tunnel walls and the spreader boards between them. William Harlow, Midwest Regional Office, Nov. 16, 1986, Neg. 17/2.



Figure 13. View to east showing cellar walls W-1, W-2, and W-3. At the exposure of this photograph the posts and horizontal wall plank were extant. Janis Dial, Midwest Archeological Center, May 12, 1986, Catalog No. 1103.

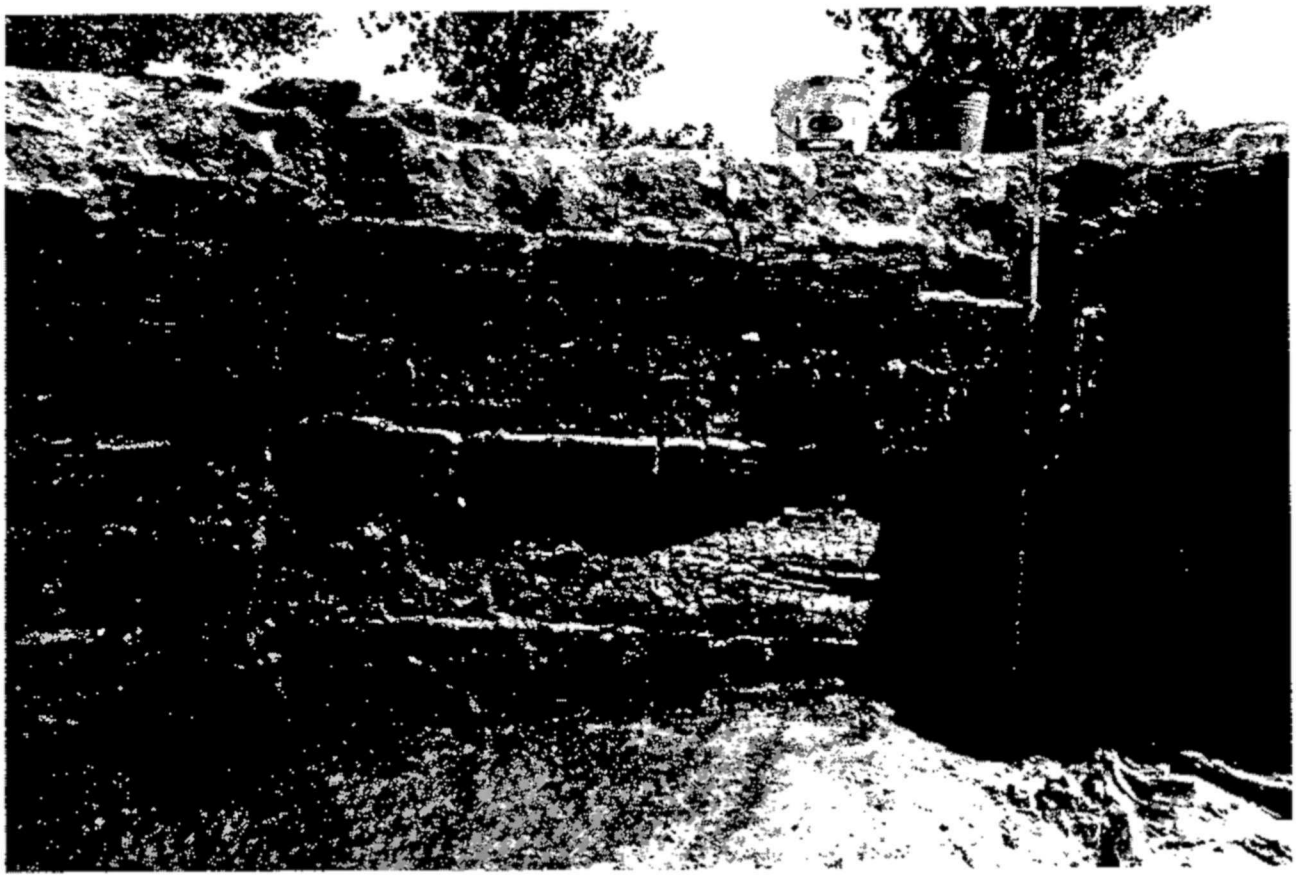


Figure 14. Cellar wall W-2 elevation clearly showing the wide horizontal plank and corner posts. Alan W. O'Bright, Midwest Regional Office, May 12, 1986, Neg. 14/16.

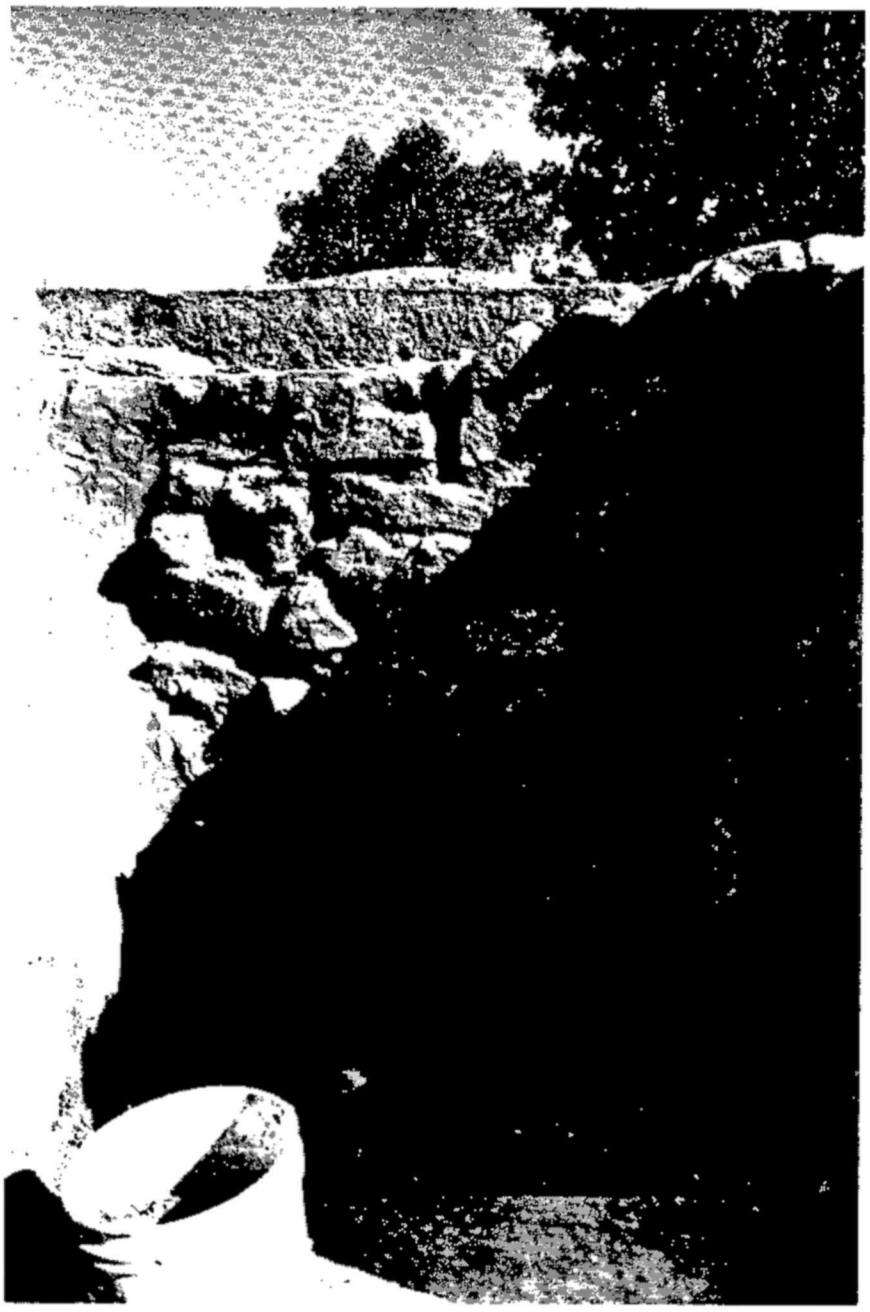


Figure 15. North elevation view of rubble wall in tunnel beneath the removed blockhouse wall. Alan W. O'Bright, Midwest Regional Office, May 12, 1986, Neg. 14/10.

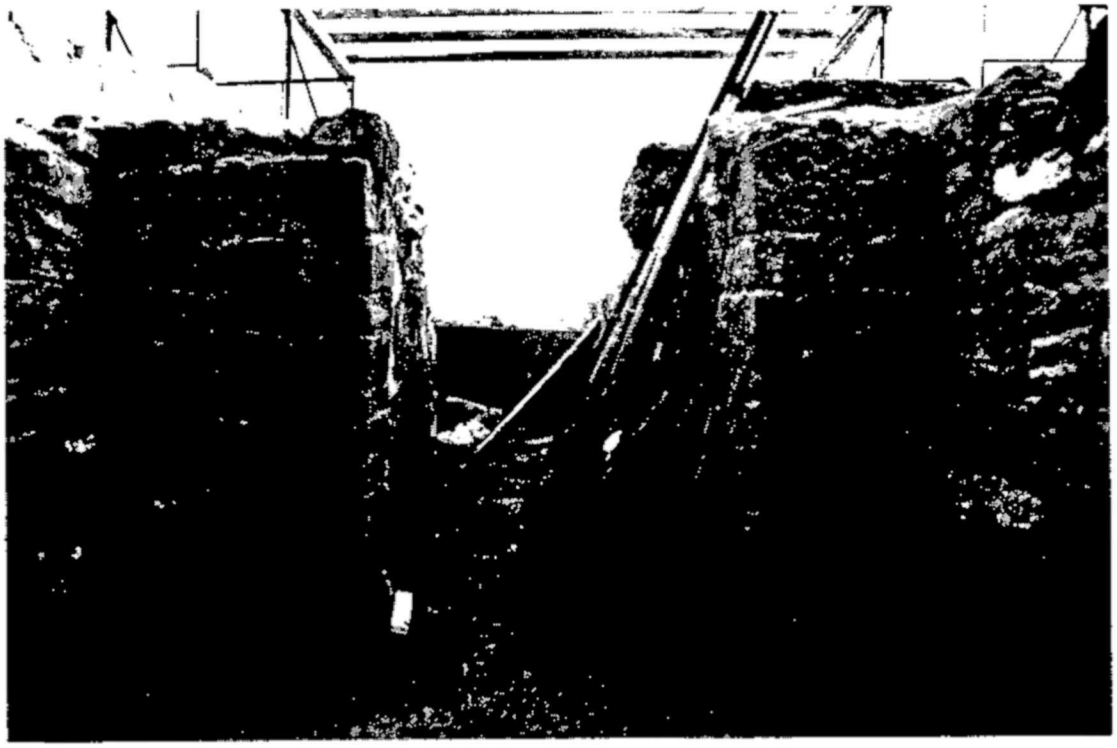


Figure 16. Wellhouse south interior elevation showing passageway into the tunnel. William Harlow, Midwest Regional Office, Nov. 16, 1986, Neg. 18/19.

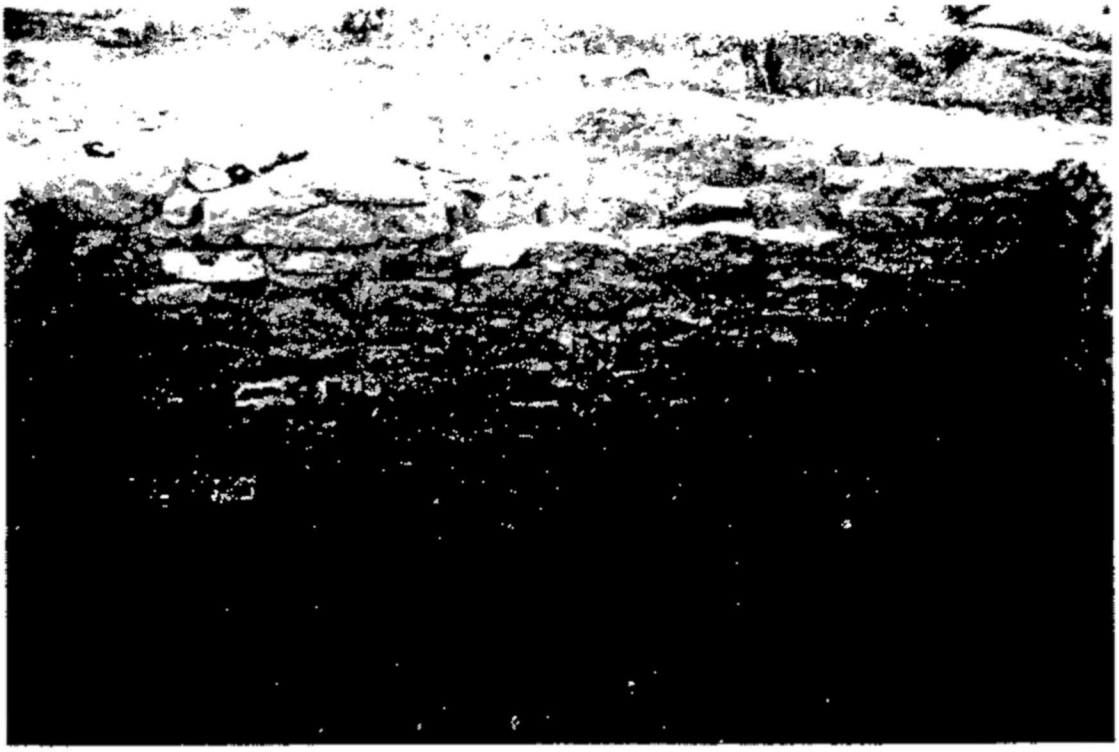


Figure 17. Wellhouse west interior elevation. William Harlow, Midwest Regional Office, Nov. 16, 1986, Neg. 18/15.

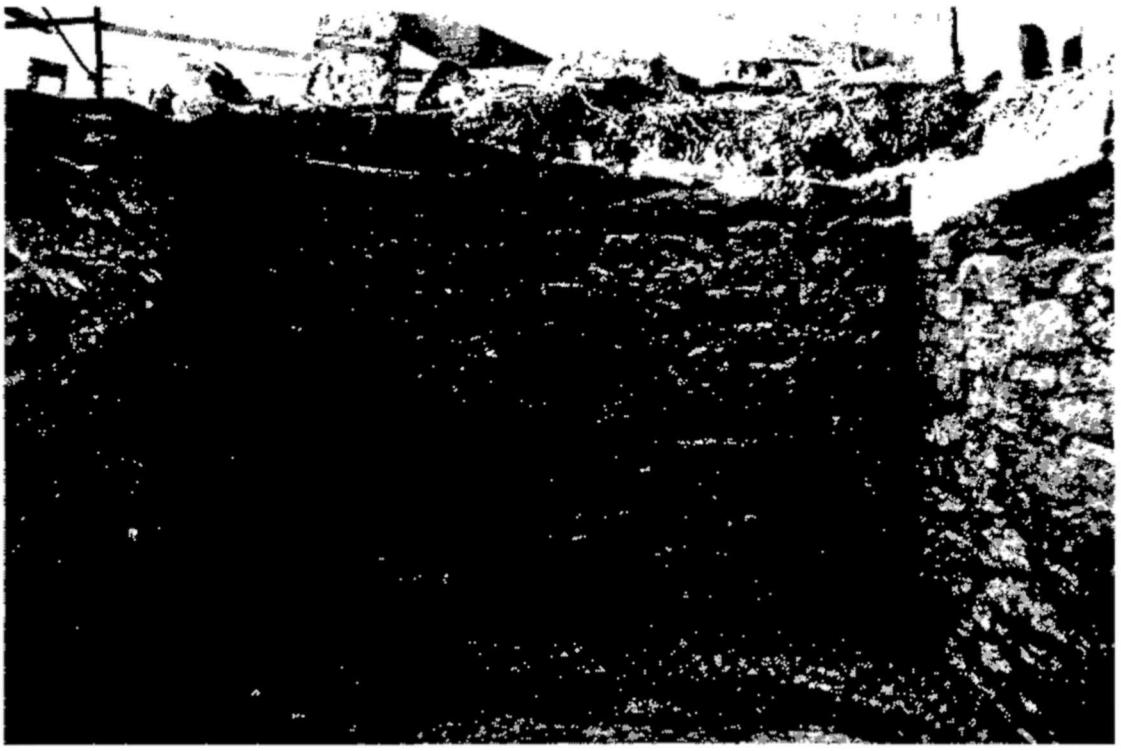


Figure 18. Wellhouse north interior elevation. William Harlow, Midwest Regional Office, Nov. 16, 1986, Neg. 18/17.

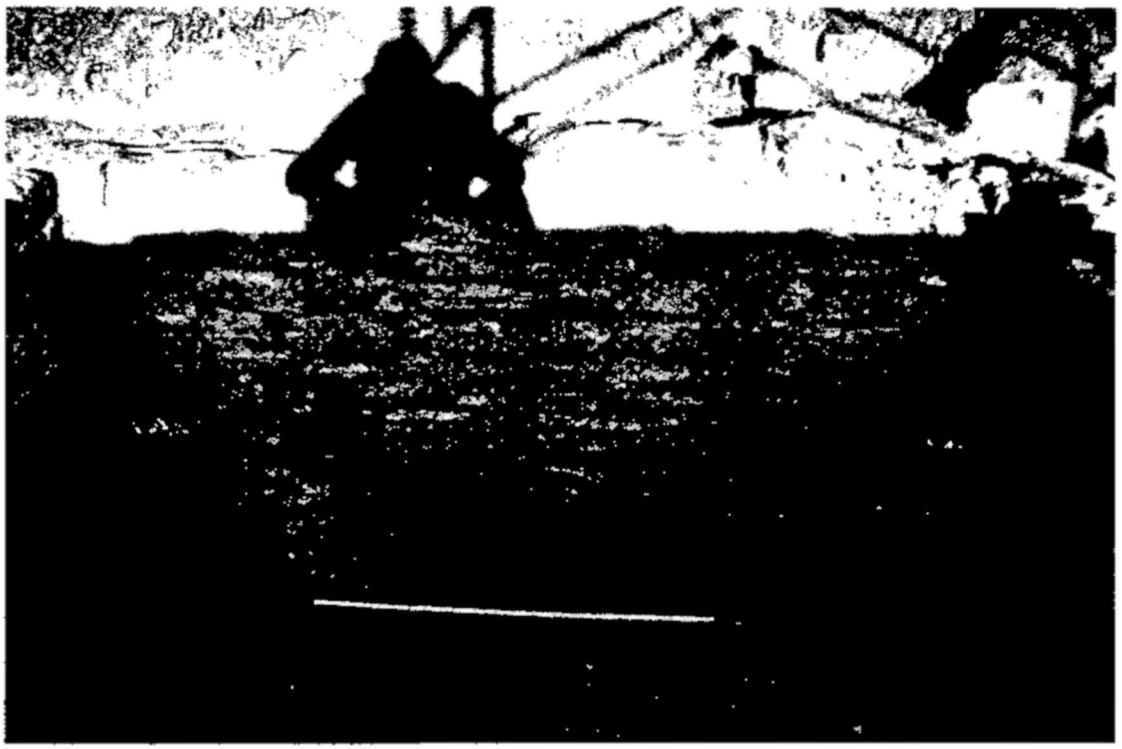


Figure 19. Wellhouse east interior elevation. William Harlow, Midwest Regional Office, Nov. 16, 1986, Neg. 18/13.



Figure 20. East jamb of wellhouse passageway. The top of the stone wall is seven inches out of plumb with the base of the wall in this photograph. The plastic sheeting just to the right (exterior) surface of the wall is from a previous archeological excavation. William Harlow, Midwest Regional Office, Nov. 16, 1986, Neg. 16/17.

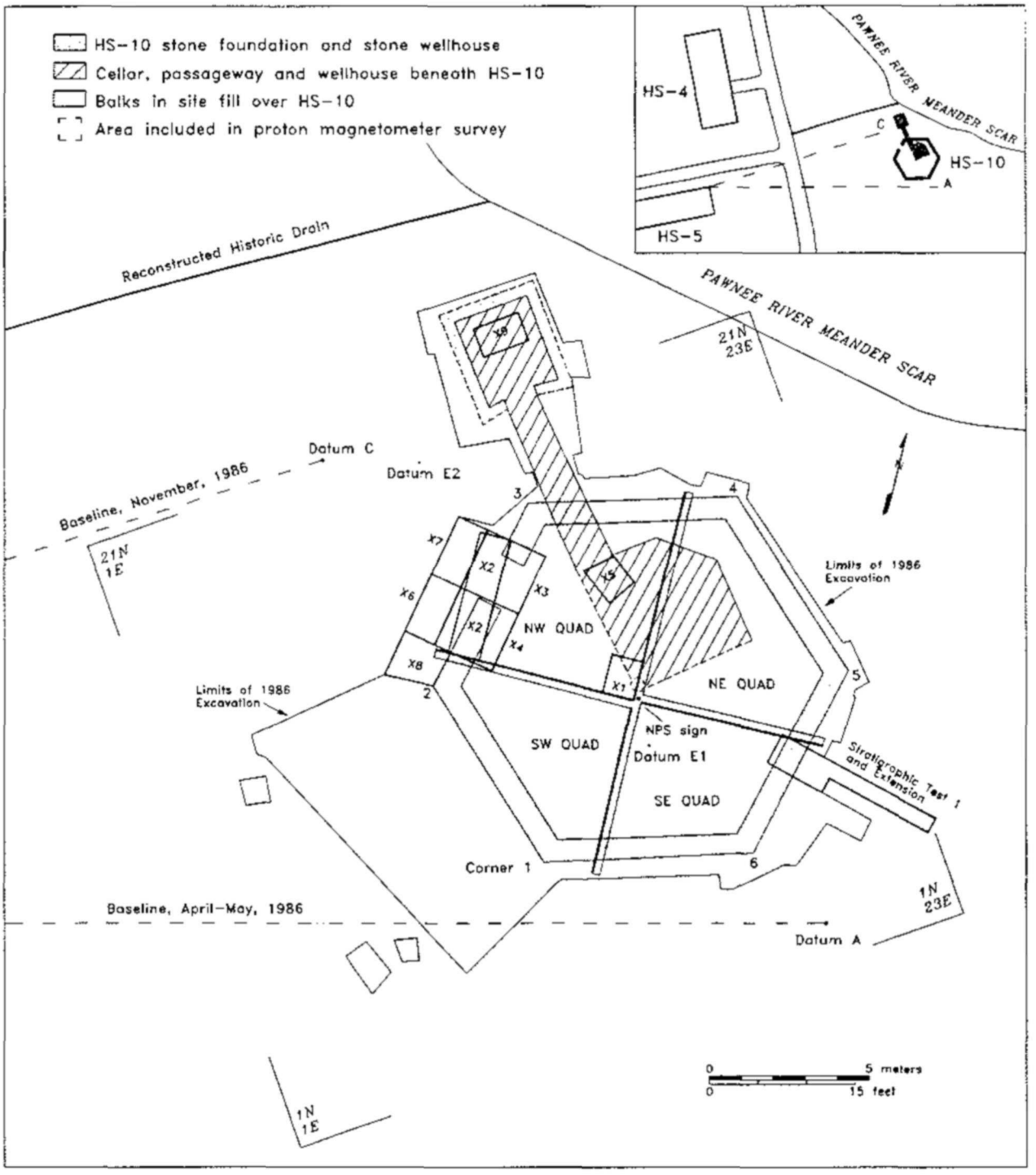



Figure 21. References for the 1986 archeological field methodology.



Figure 22. View west to the HS-10 site upon completion of the 1986 archeological investigations. A temporary shelter was erected over the tunnel and wellhouse to facilitate the excavations. HS-4 stands immediately behind HS-10.

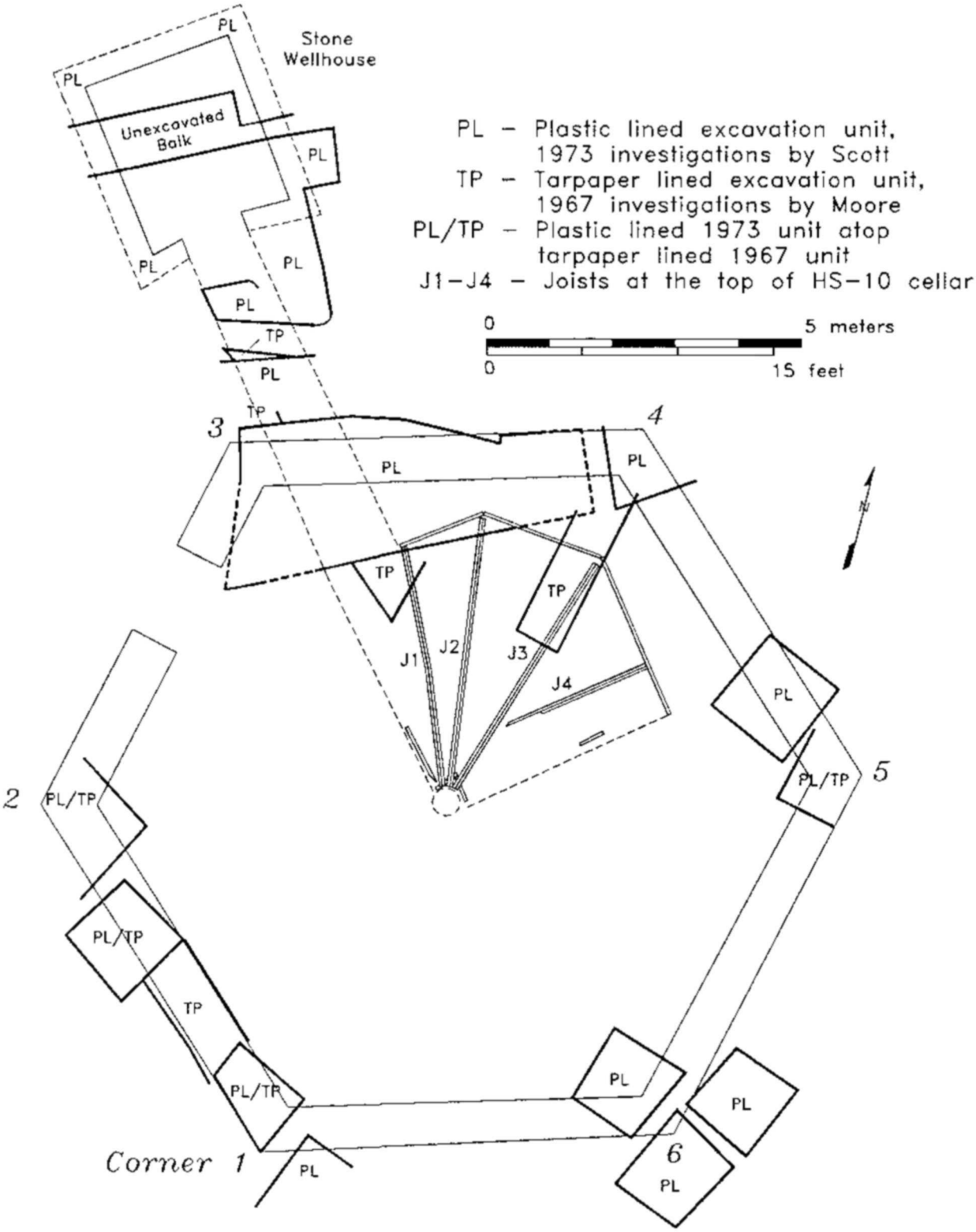



Figure 23. Plan view of previous archeological excavation units identified in 1986 at HS-10.



Figure 24. A hog pen/chicken coop stands immediately adjacent to the HS-10 foundation at corner 2 which was exposed by Earl Monger in 1967. View is to the northwest.



Figure 25. View west from HS-10 to the adjacent chicken coop/hog pens, HS-5, and HS-6 (right to left) as they appeared in 1967. Metal pipe was used in the construction of the hog pens, which appear partially demolished in the photo.

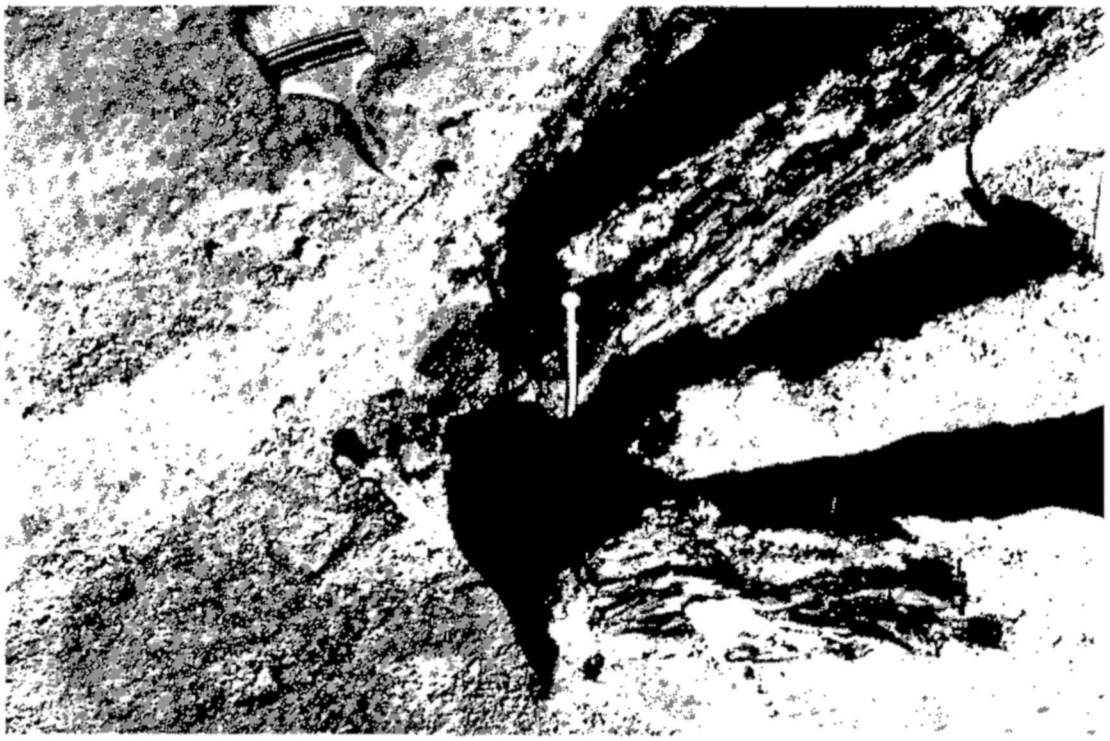


Figure 26. Floor joists over the cellar converging in the area of the HS-10 center post at a depth of 85 cm below E1.

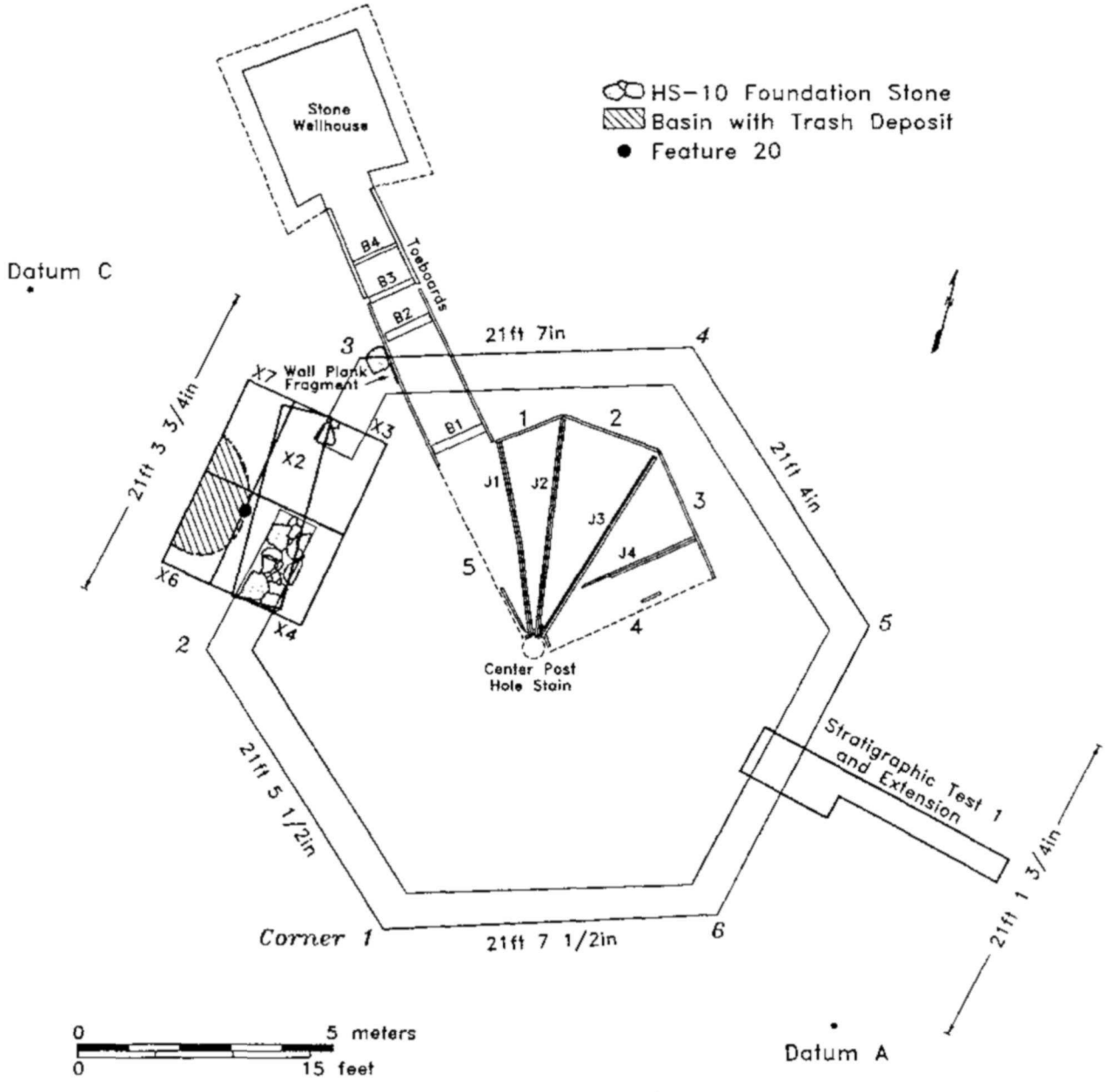



Figure 27. Plan view of archeological features exposed at the top of the cellar and in the area of the probable exterior entrance to HS-10.



Figure 28. Braces N4, N1, N2, and N7 (left to right) radiating from beneath the basal remnants of vertical boards around the center post hole stain at the bottom of the cellar, 220-225 cm below E1.

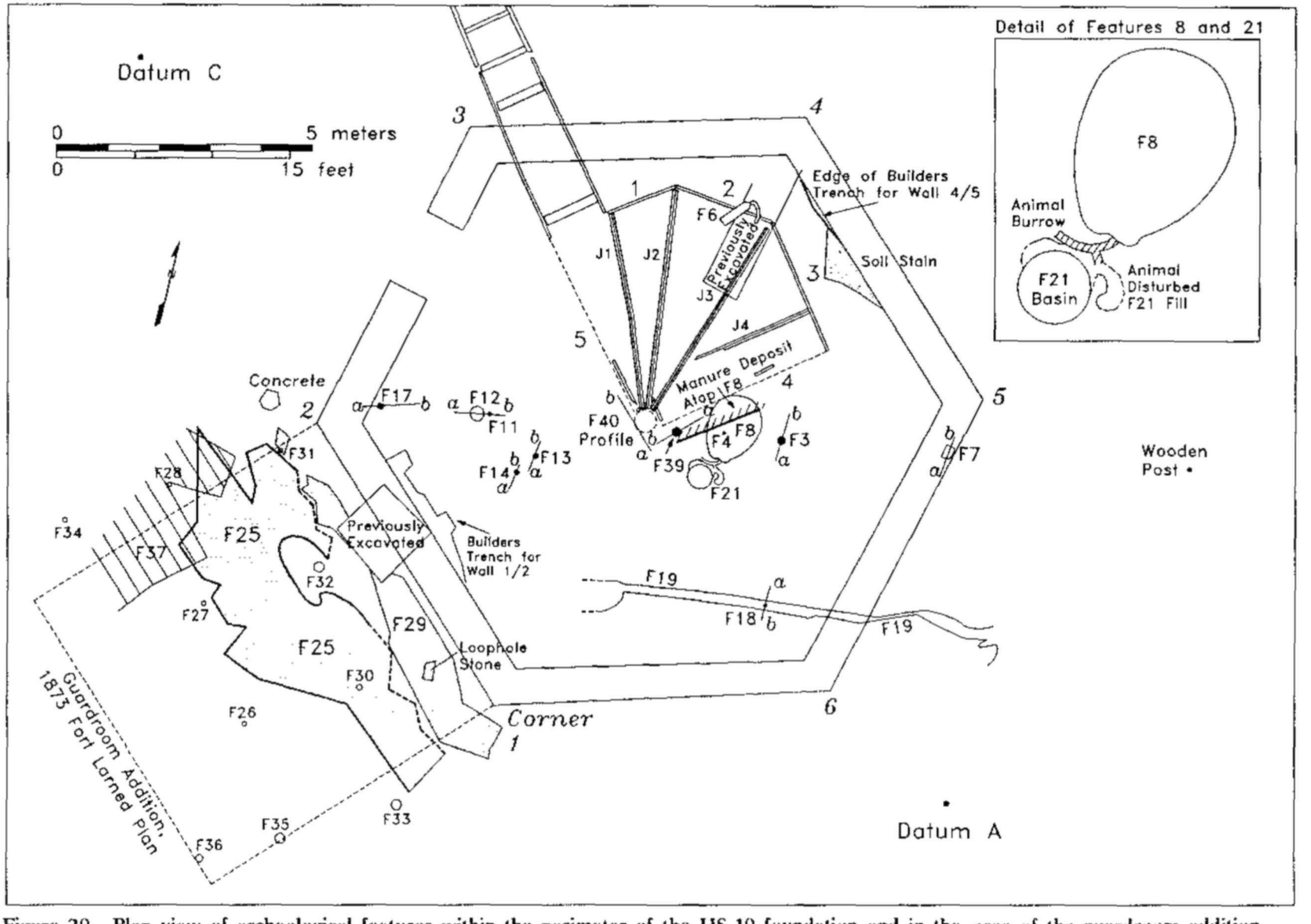



Figure 29. Plan view of archeological features within the perimeter of the HS-10 foundation and in the area of the guardroom addition.

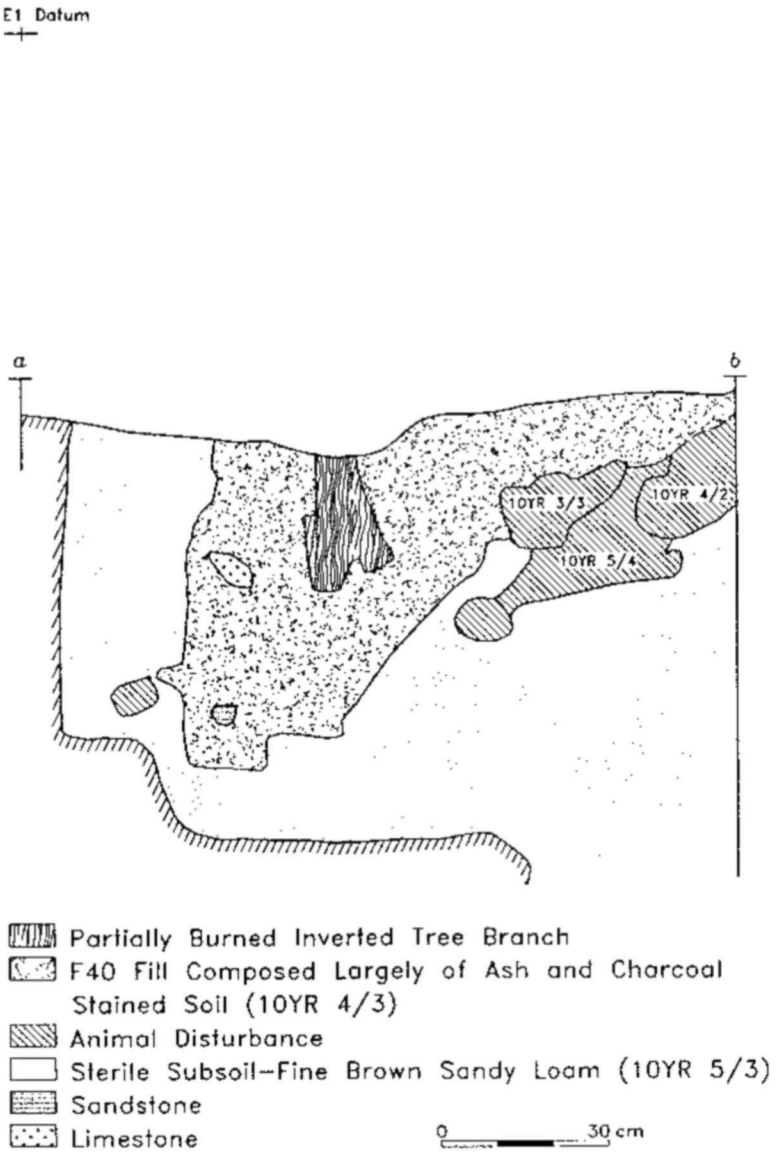



Figure 30. Vertical profile of Feature 40.

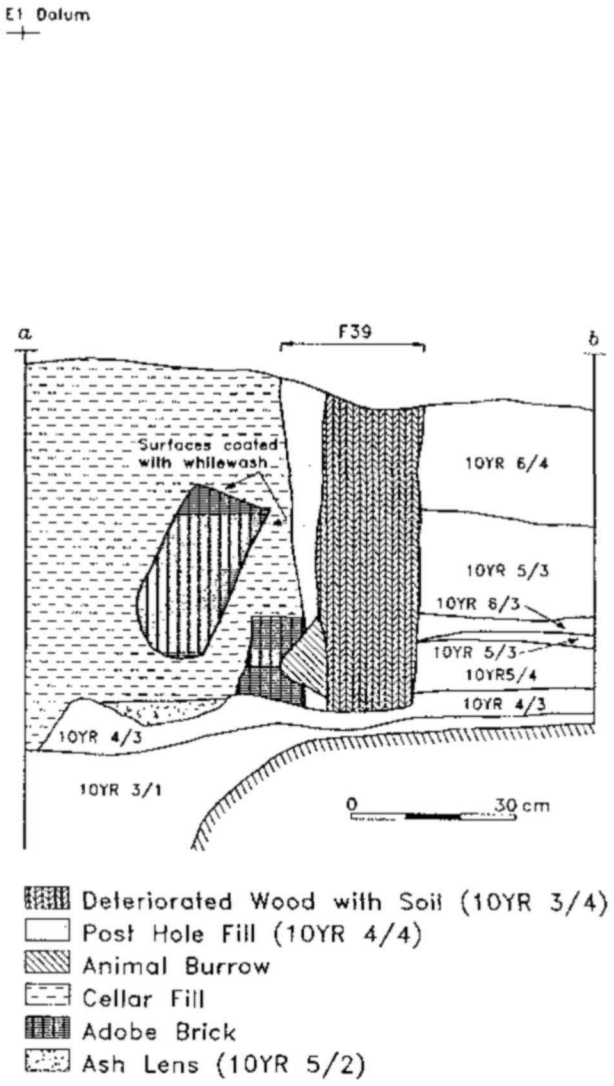



Figure 31. Vertical profile of Feature 39.

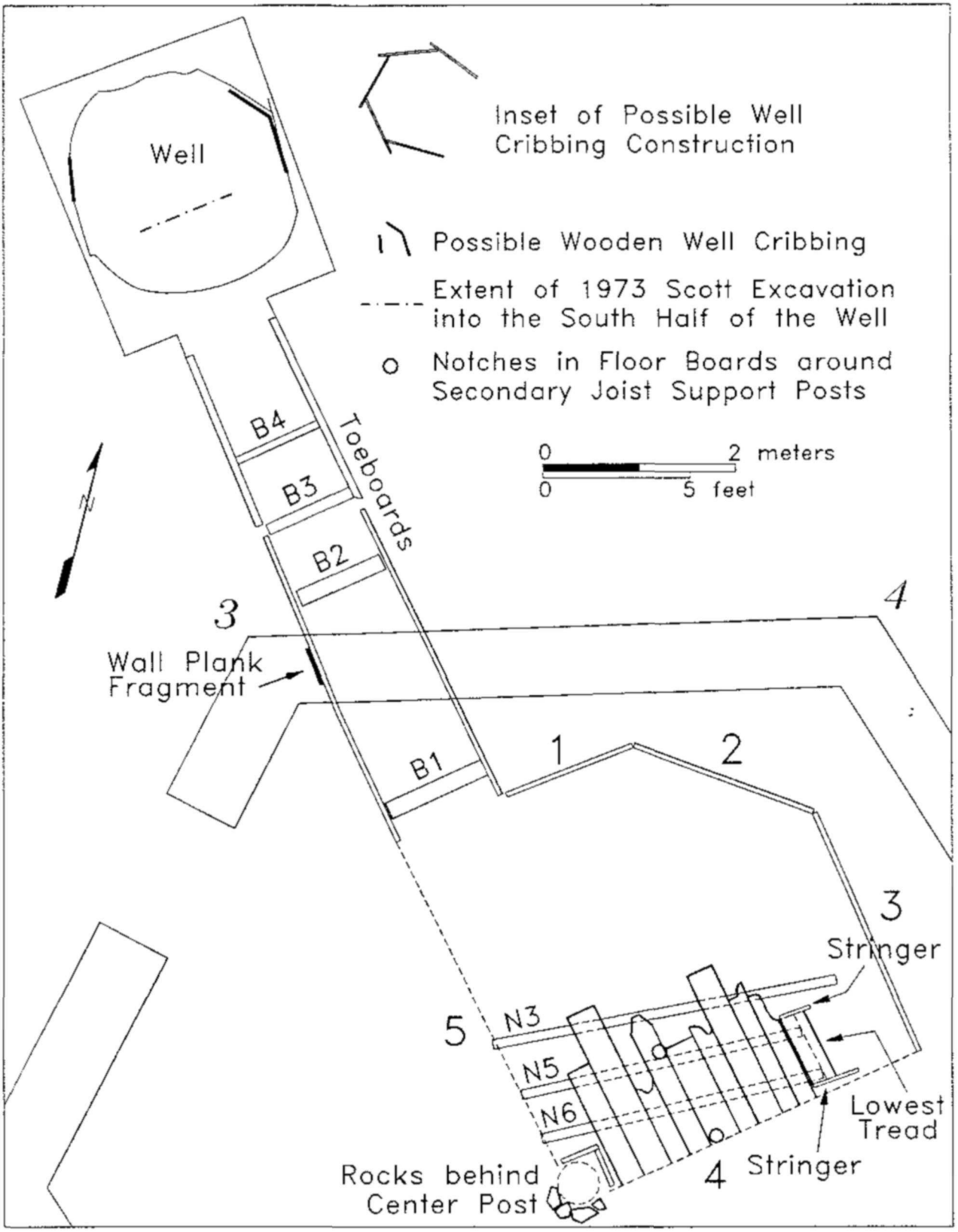



Figure 32. Plan view of archeological features at floor level in the HS-10 cellar, tunnel, and wellhouse.

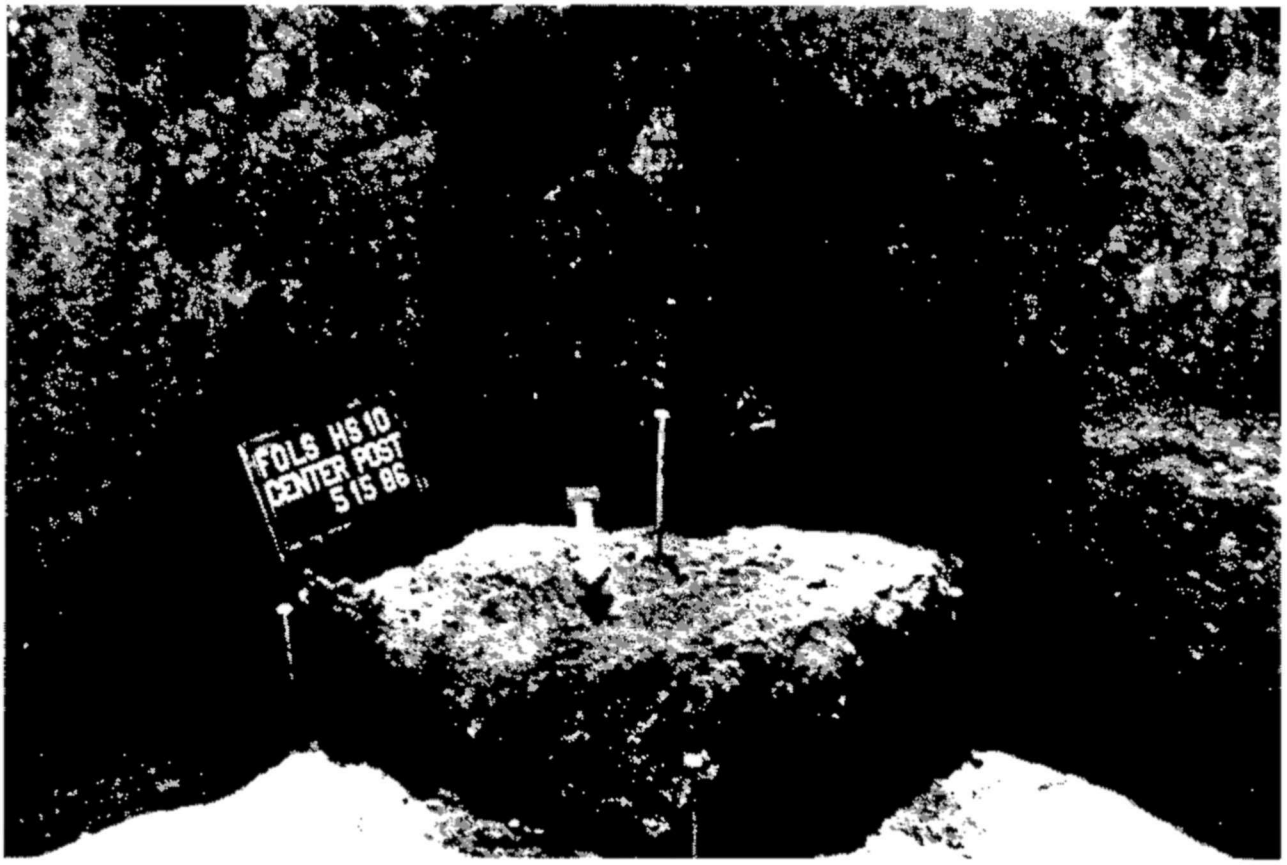



Figure 33. Center post area near the floor of the cellar, 201 cm below E1. The center of the post hole stain is marked with a pin. The basal remnants of vertical boards stand in front of the stain and a jumble of rock lies behind the stain. View is to the south.

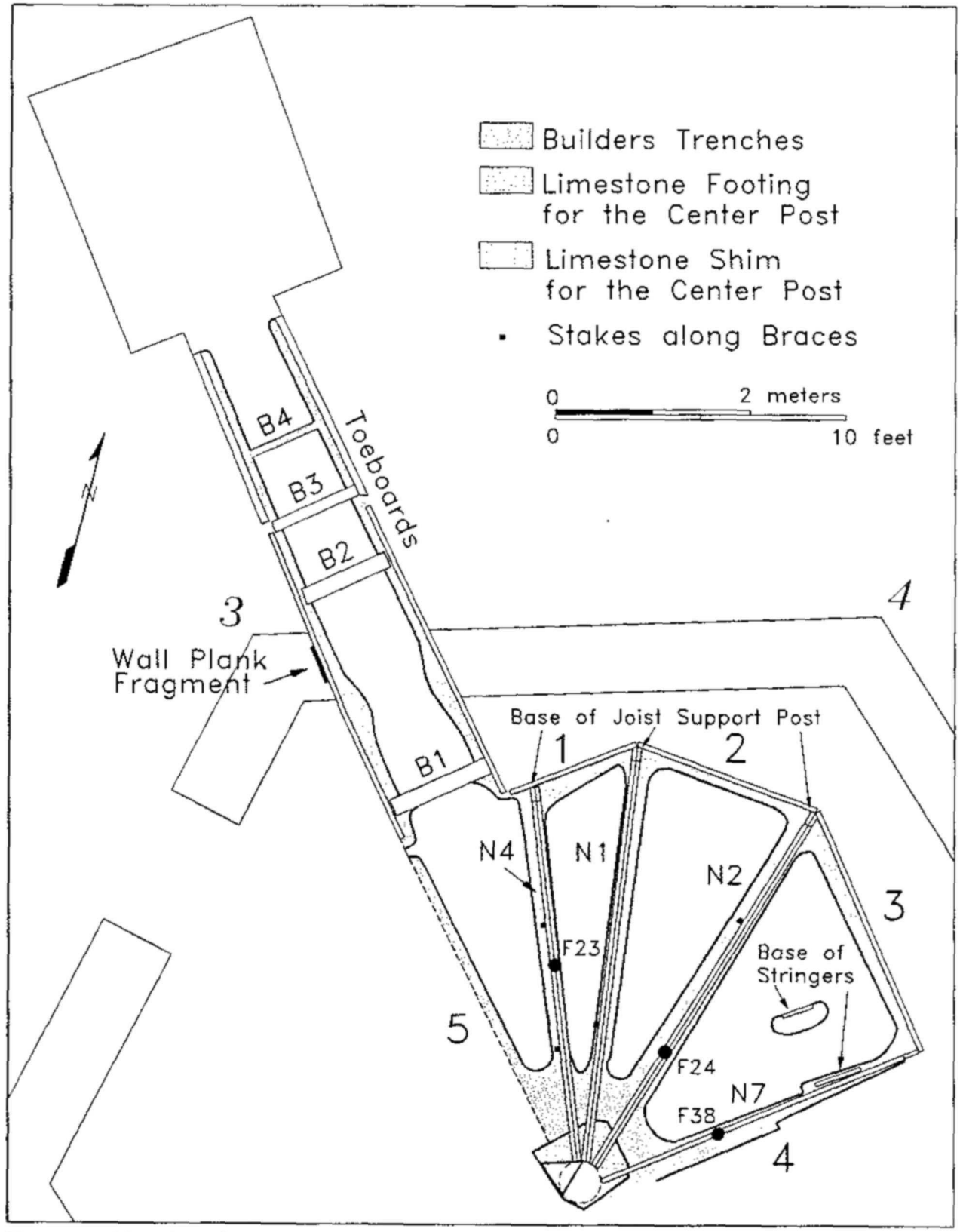



Figure 34. Plan view of archeological features beneath the earthen floor of the HS-10 cellar and tunnel.

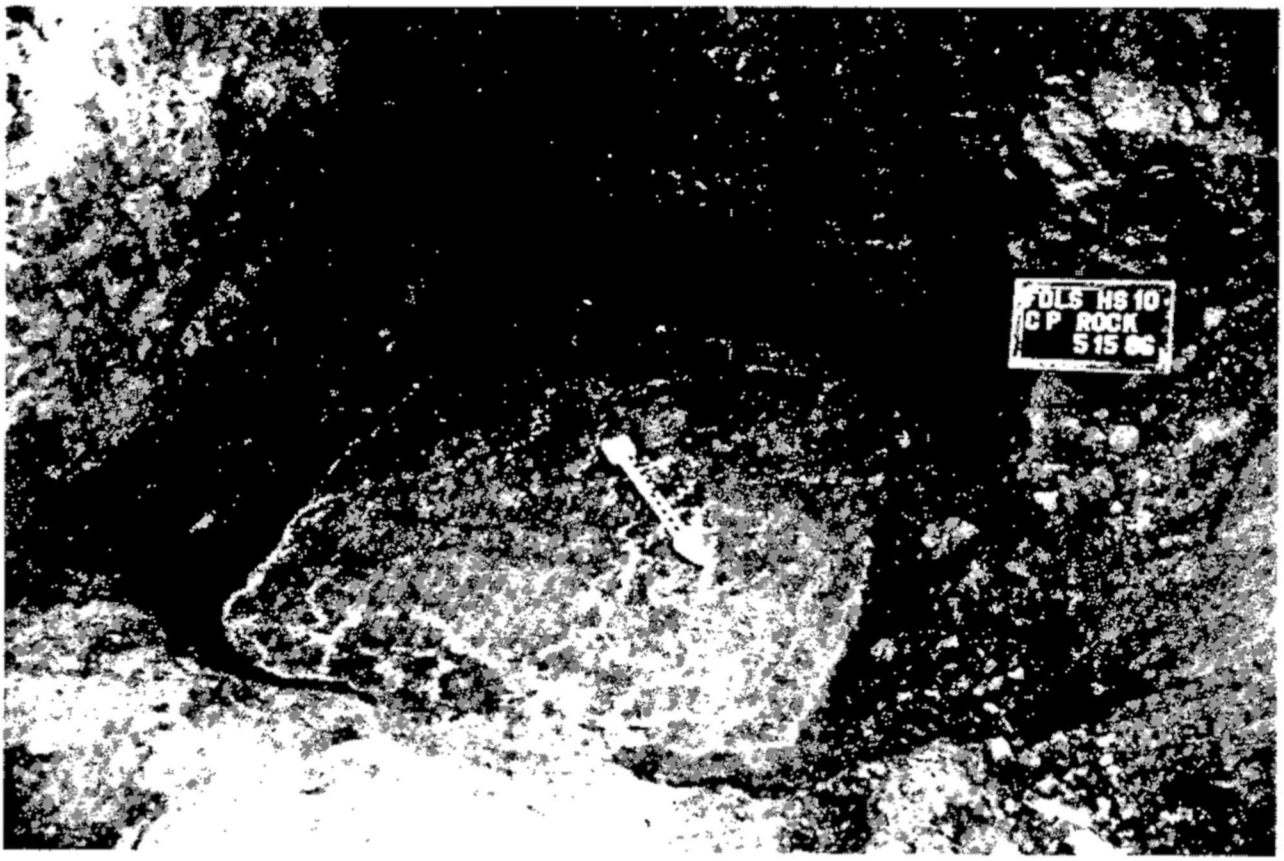


Figure 35. Limestone footing for the HS-10 center post, 236-241 cm below E1.

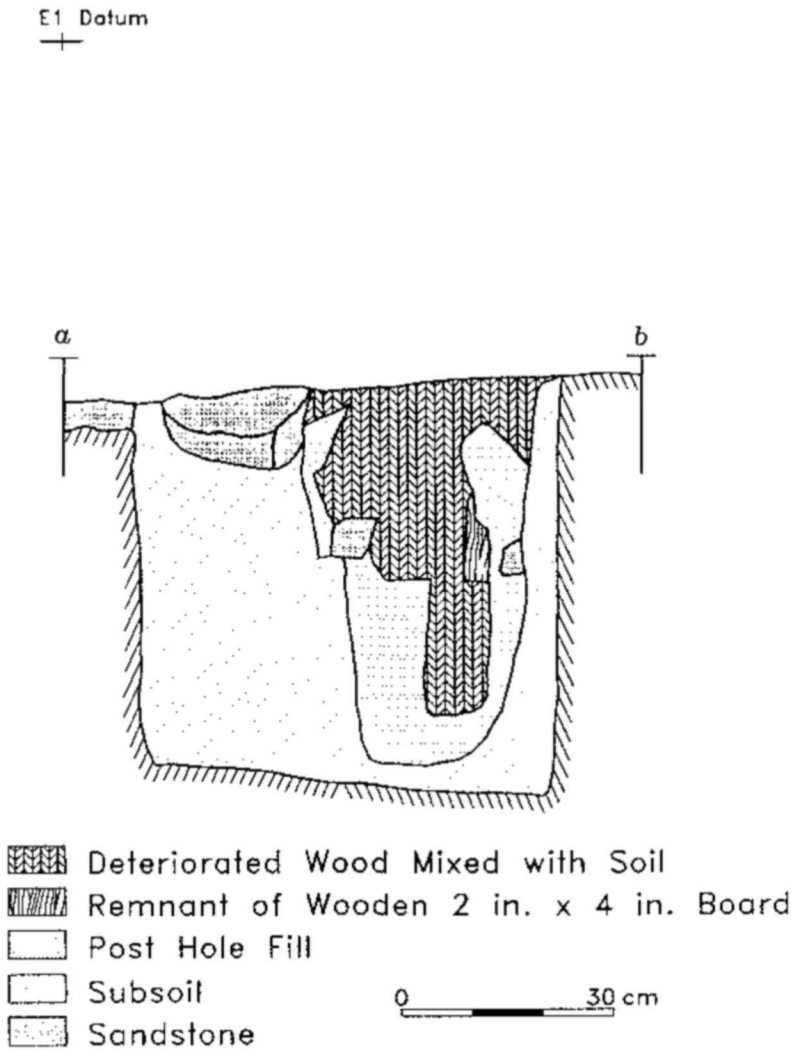



Figure 36. Vertical profile of Feature 7.

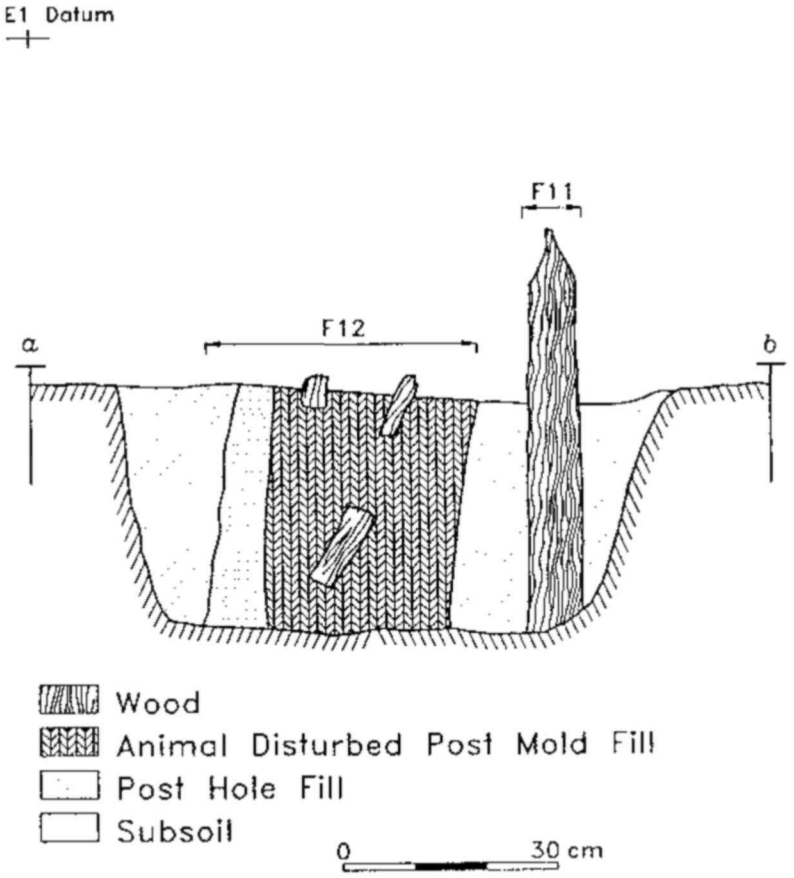



Figure 37. Vertical profile of Features 11 and 12.

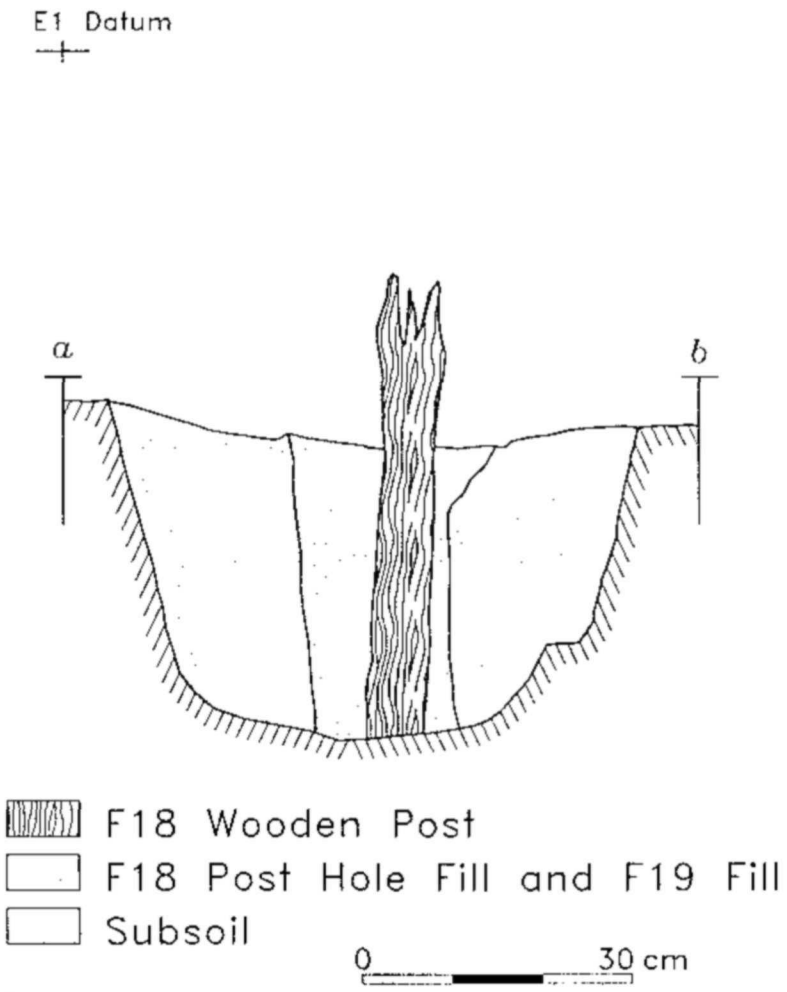



Figure 38. Vertical profile of Features 18 and 19.

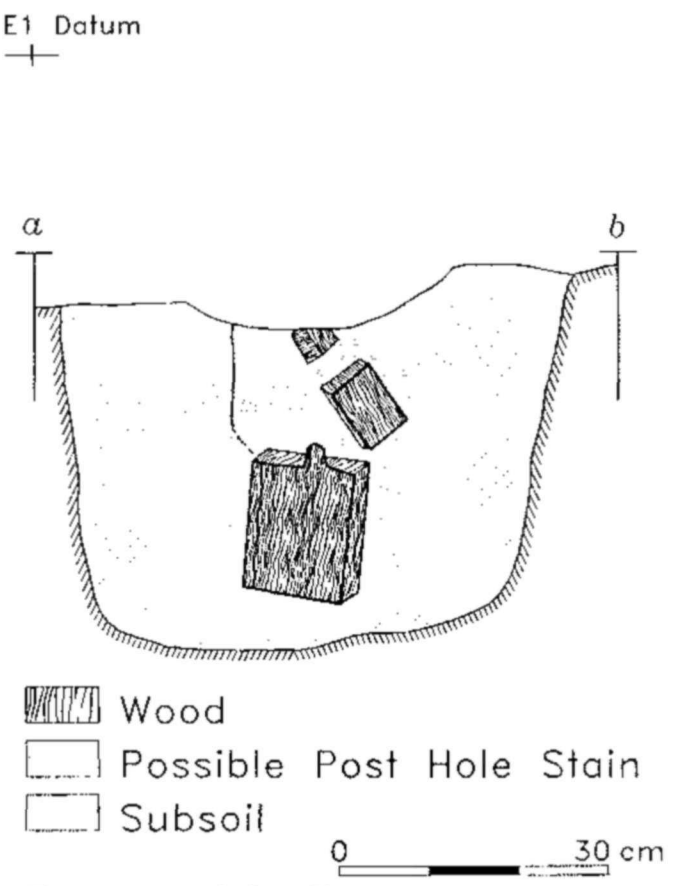



Figure 39. Vertical profile of Feature 13.

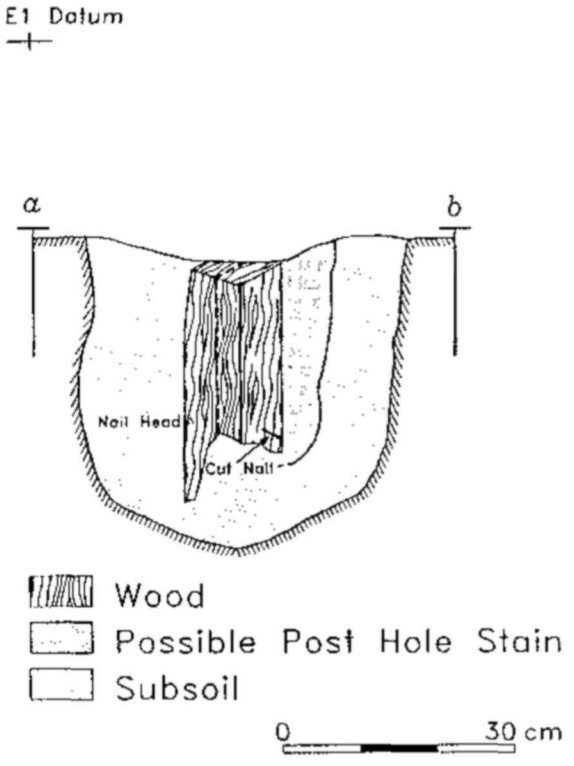



Figure 40. Vertical profile of Feature 14.

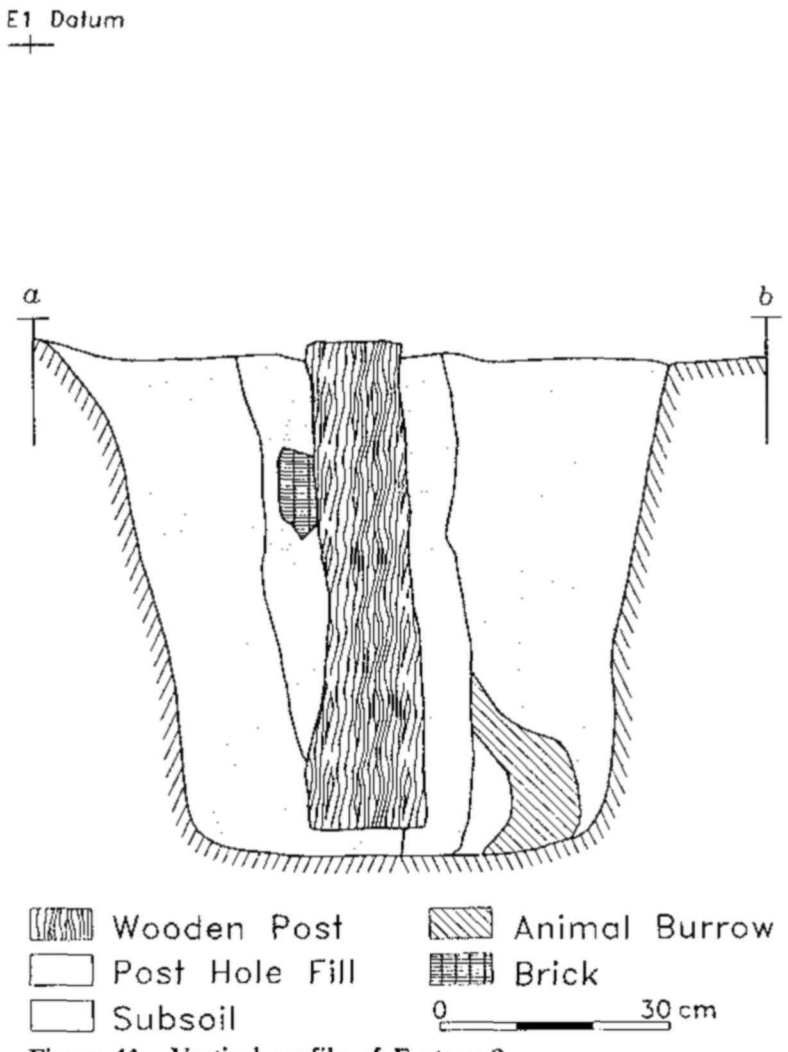



Figure 41. Vertical profile of Feature 3.

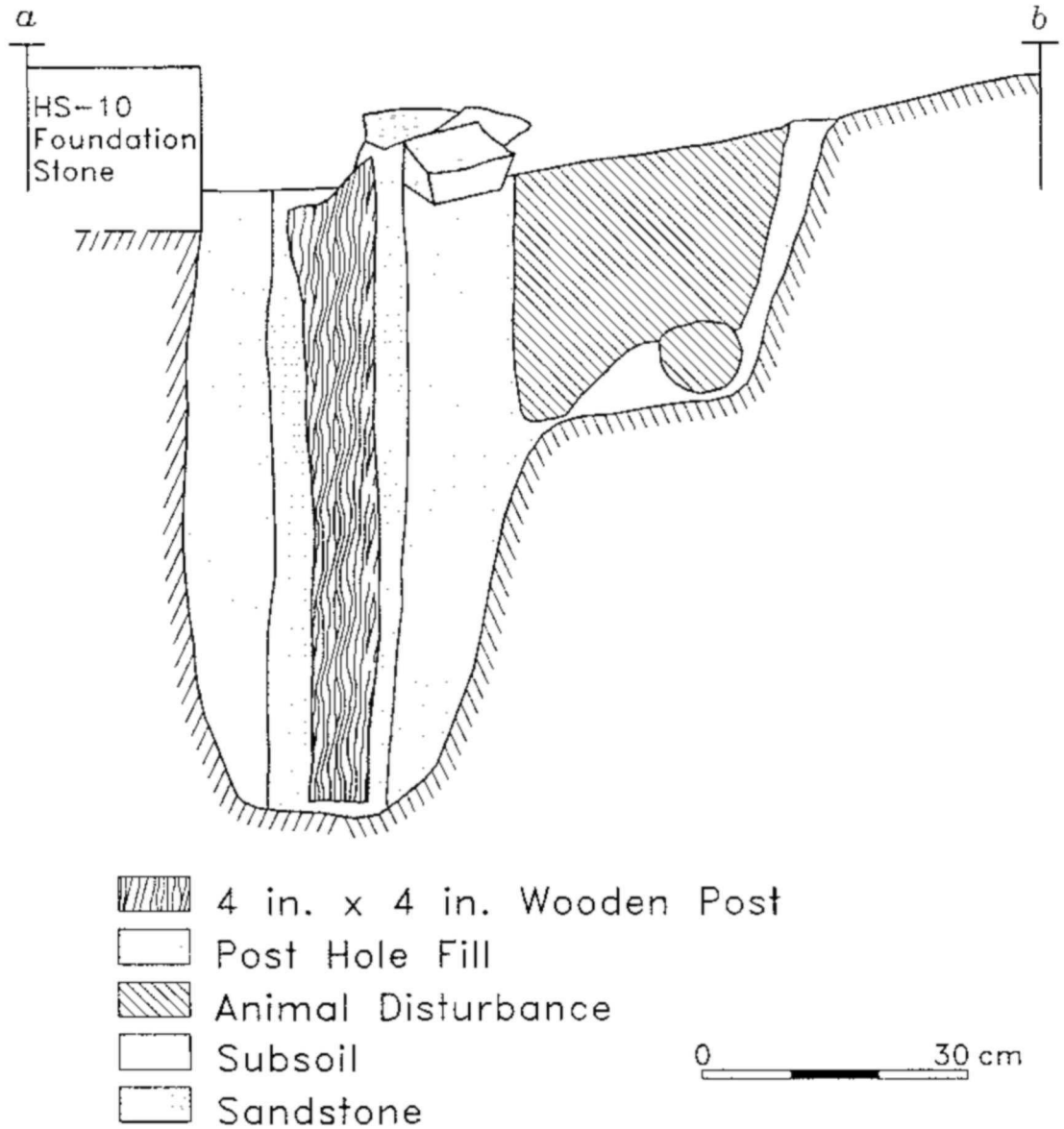



Figure 42. Vertical profile of Feature 17.



Figure 43. View northeast to the remains of the stone foundations for HS-10. The E1 datum pedestal stands near the center of the site. The trees immediately behind HS-10 grow along the near edge of the Pawnee River meander scar.

LEVELS

1A Gray silt loam with organic matter and roots (10YR5/1). Abrupt contact with underlying soil.

1B Gray silt loam (10YR5/1) . More porous than 1A.

2 Brown silt loam (10YR6/3) with dark gray mottling (7.5YR4/0).

3 Loose brown sandy loam (10YR5/3).

4 Rubble layer. Gray-brown sandy loam (10YR5/2) containing approximately 25% sandstone and limestone rubble, and mortar. Size and quantity of rubble decreased to the east.

5 Robbed wall trench. Sandstone rubble and mortar in a brown sandy loam (10YR5/3).

6 Decomposed sandstone rubble.

7 Builders trench. Dark brown fine sandy loam.

8 Sterile subsoil. Fine brown sandy loam (10YR5/2-3) with a few small (<2 cm dia.) sandstone and mortar fragments pressed into the top of the layer outside (east) of the wall.

Foundation stone.



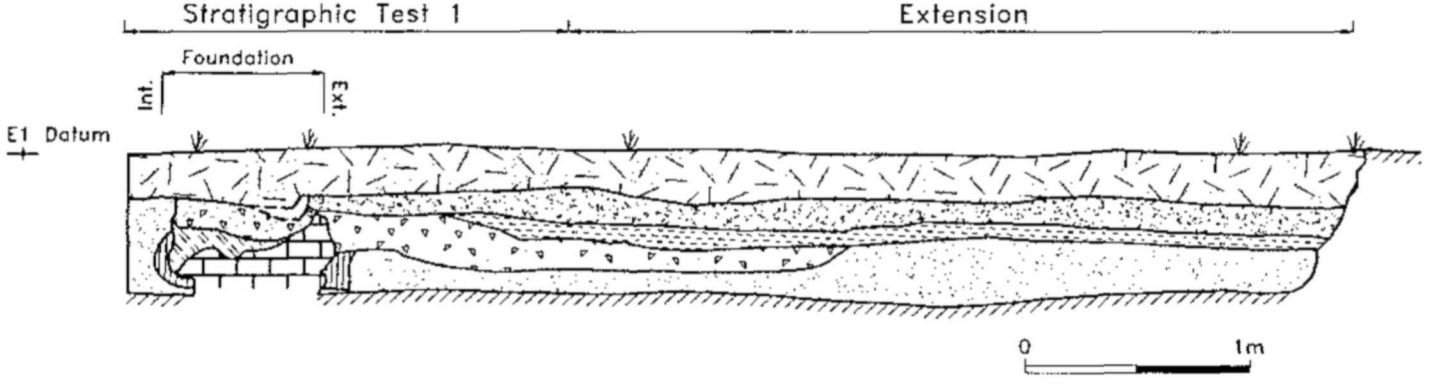



Figure 44. Stratigraphic Test 1 and Extension, northeast wall profile.

LEVELS

1 Dark gray silt loam with organic matter and roots (5YR 4/1).

9 Brown silt loam (10YR 4/3) with small dark gray mottling (7.5YR 4/0).

9A Brown silt loam (10YR 4/3) with numerous small pale brown mottles (10YR 7/4).

9B Dark grayish brown silt loam (10YR 4/2) with small dark gray mottling (7.5YR 4/0).

10 Sterile subsoil. Fine brown sandy loam (10YR 5/3).

10A Fine brown sandy loam (10YR 5/3) with numerous small to medium sized mottles which were very dark grayish brown in color (10YR 3/2). Contained many 4 inch cut nails.

10B Fine brown sandy loam (10YR 5/3) with numerous very dark gray mottles (10YR 3/1).

10C Sterile subsoil adjacent to and below the builders trench for the HS-10 foundation. Dark brown fine sandy loam (10YR 4/3). Slightly darker color was due to higher water content.

11 Compact gray silt loam (10YR 5/1) with very dark gray horizonal streaks of silt (7.5YR 3/0).

12 Pale brown silt loam (10YR 6/3) with dark gray mottling (7.5YR 4/0). Included small sandstone fragments.

13 Soil disturbance apparently related to the installation of an NPS interpretive sign post. Dark gray silt loam (10YR 4/1) with numerous small and a few medium sized pale brown mottles (10YR 7/4).

14 Soil disturbance apparently related to the installation of an NPS interpretive sign post. Pale brown silt loam (10YR 7/4) with numerous medium sized gray mottles (10YR 5/1).

F8 Feature 8 fill. Burned silt loam ranging in color from dark gray (10YR 4/1) to reddish brown and light red (2.5YR 4/4) to (2.5YR 6/8).

F9 Feature 9 fill. Dark yellowish brown silt loam (10YR 4/4) with a small amount of very dark gray mottling (10YR 3/1).

Fill of the builders trench for the HS-10 foundation. Brown silty/fine sandy loam (10YR 5/3).

Animal Burrow

NORTHEAST QUADRANT

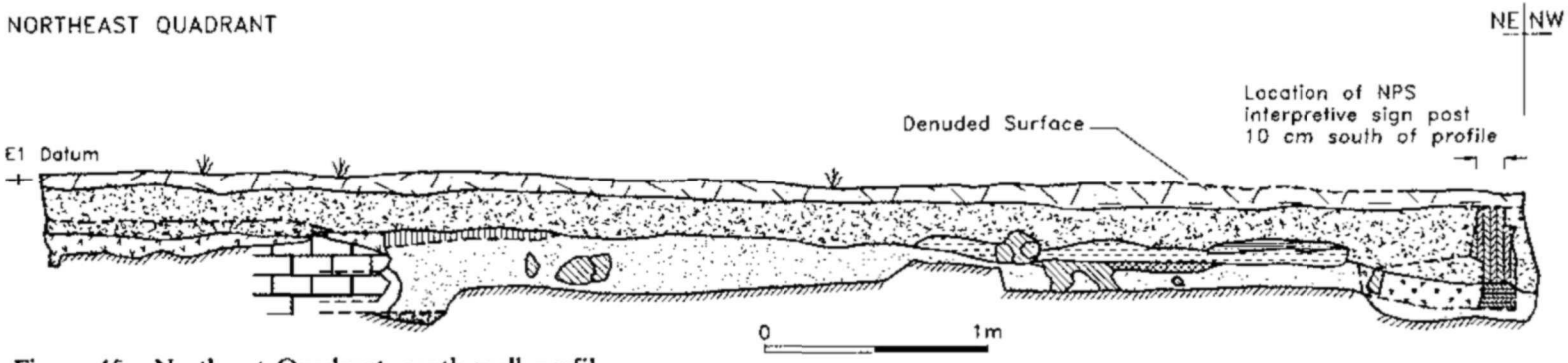



Figure 45. Northeast Quadrant, south wall profile.



Figure 46. HS-10 stone foundation along wall 6/1. Corner 1 appears in the foreground. View is to the east.

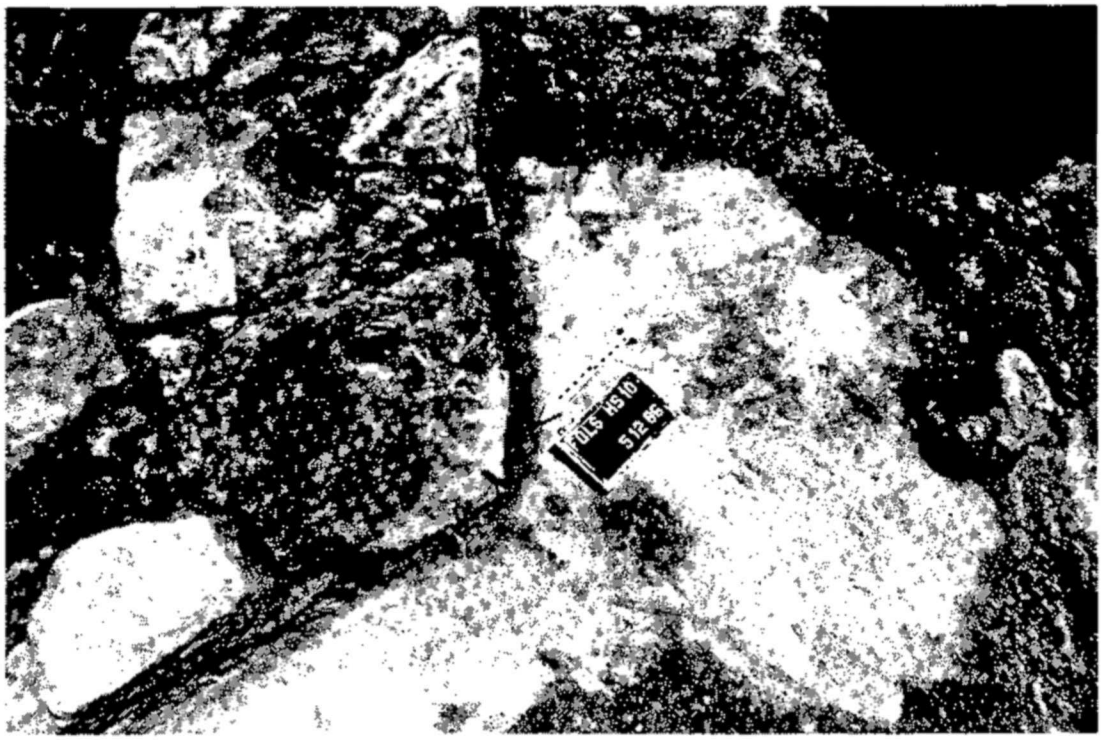



Figure 47. HS-10 stone foundation at corner 2. The remnants of a concrete collar for a metal post (designated Feature 31) lie 76 cm outside the foundation.

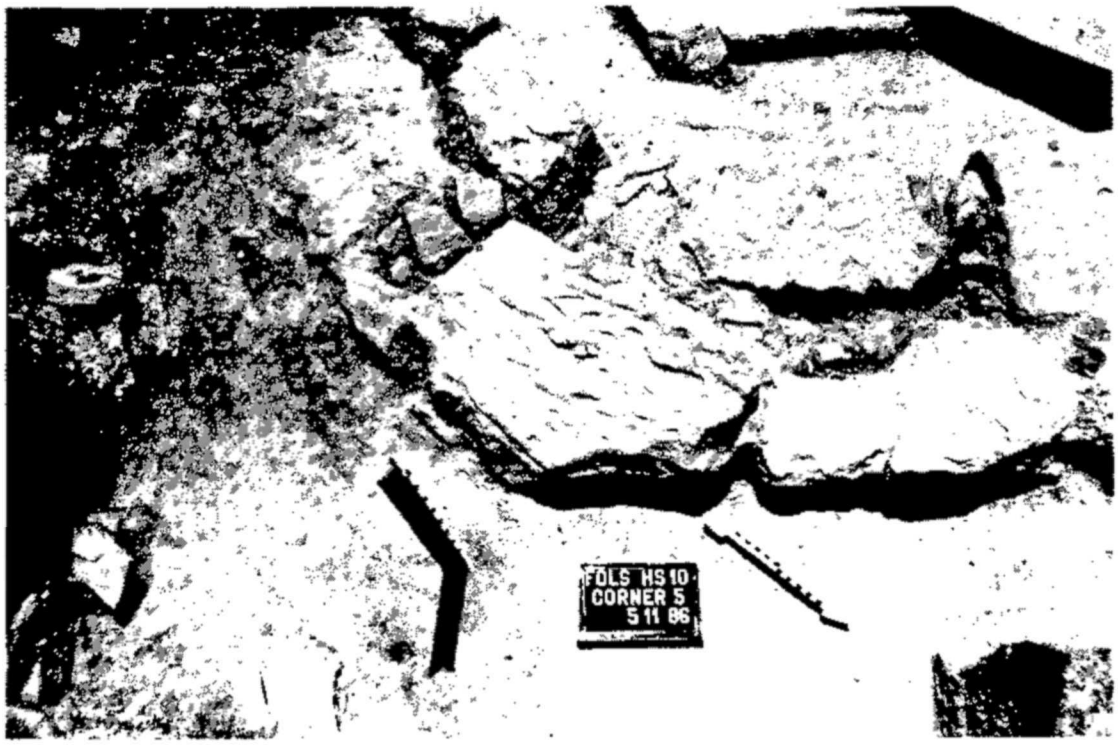



Figure 48. HS-10 stone foundation at corner 5.



Figure 49. HS-10 stone foundation along wall 5/6. Corner 6 appears in the foreground. Stratigraphic Test 1 lies at the right. View is to the northeast.



Figure 50. Rock fill in the tunnel beneath the remnants of HS-10 wall 3/4. The sandstone block at the left lies near the projected location of corner 3. View is to the north.



Figure 51. HS-10 stone foundation along wall 4/5. No stone remained at corner 4 (foreground). View is to the southeast.



Figure 52. HS-10 stone foundation along wall 1/2 and the south end of wall 2/3 (bottom of photo). The gap in the stone at lower left marks the probable exterior entrance to HS-10. View is to the southeast.

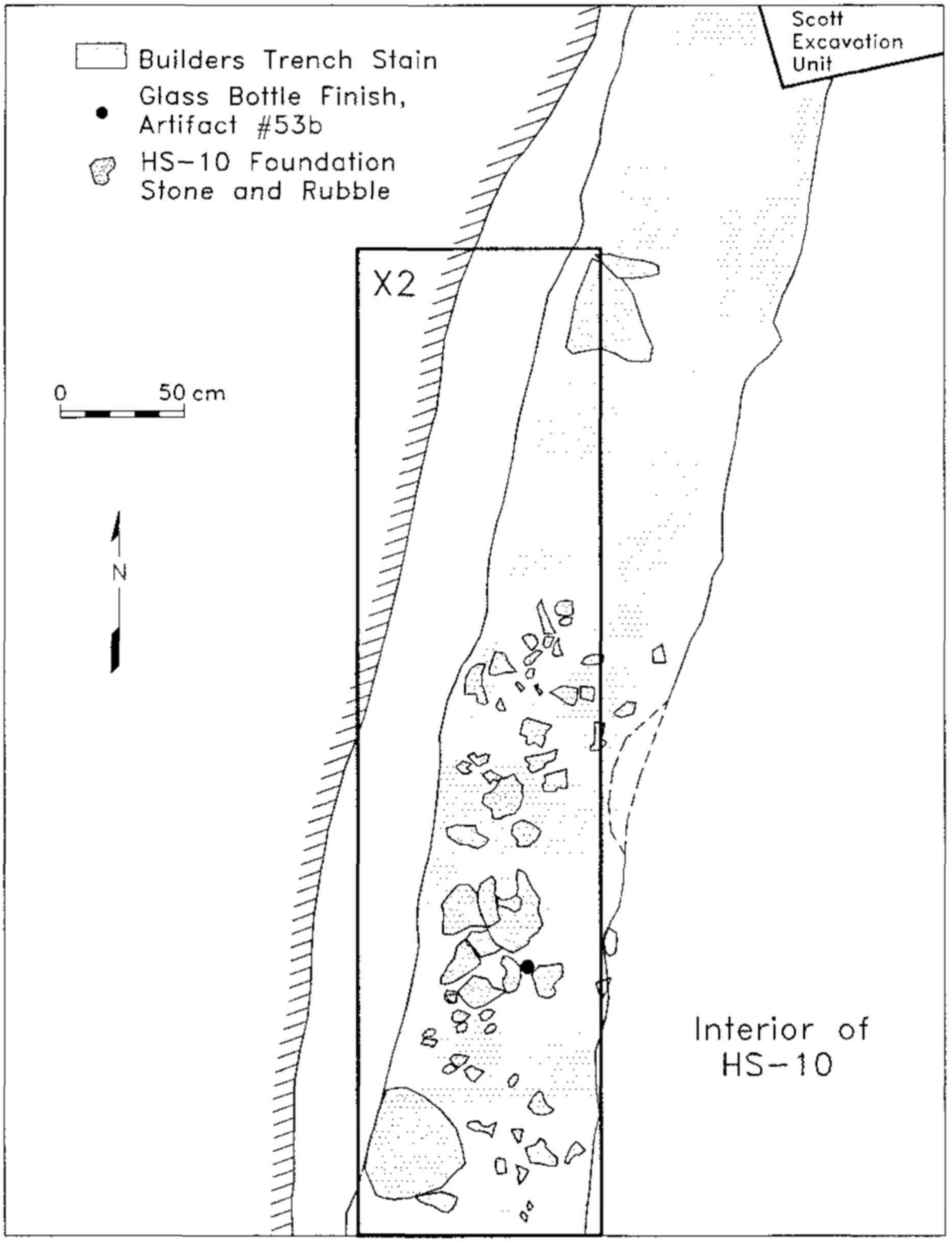



Figure 53. Plan view of the remains of HS-10 wall 2/3 when initially exposed in the NW Quadrant at 28-45 cm below E1.



Figure 54. Plan view of X3 and X4 showing a gap in the large foundation stone along wall 2/3. The gap is believed to have been filled originally with a sill stone, serving to identify the exterior entrance to the building. The top of the remaining stone lies 34-47 cm below E1.

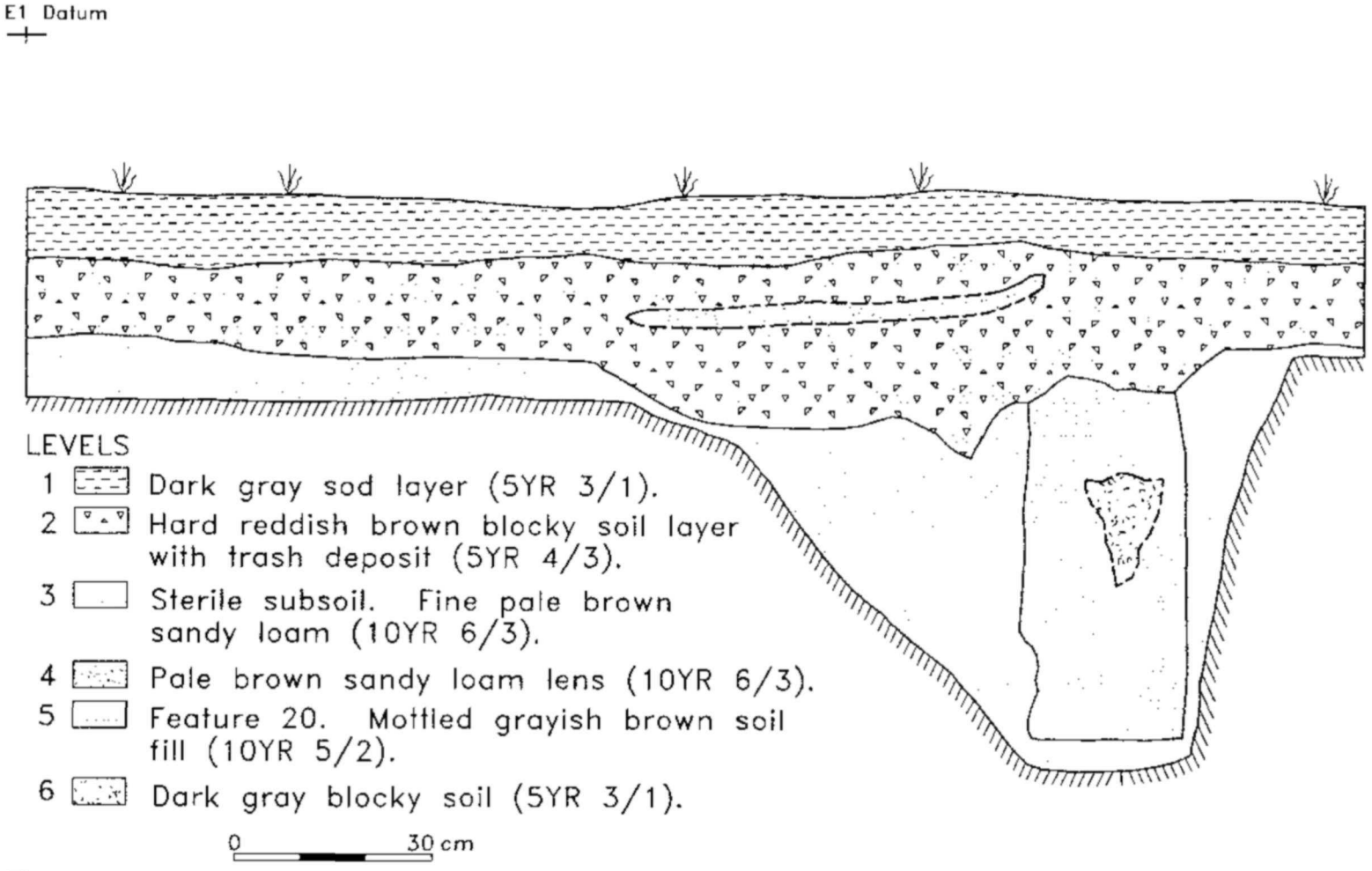



Figure 55. Vertical profile, west wall of X4 and Feature 20.

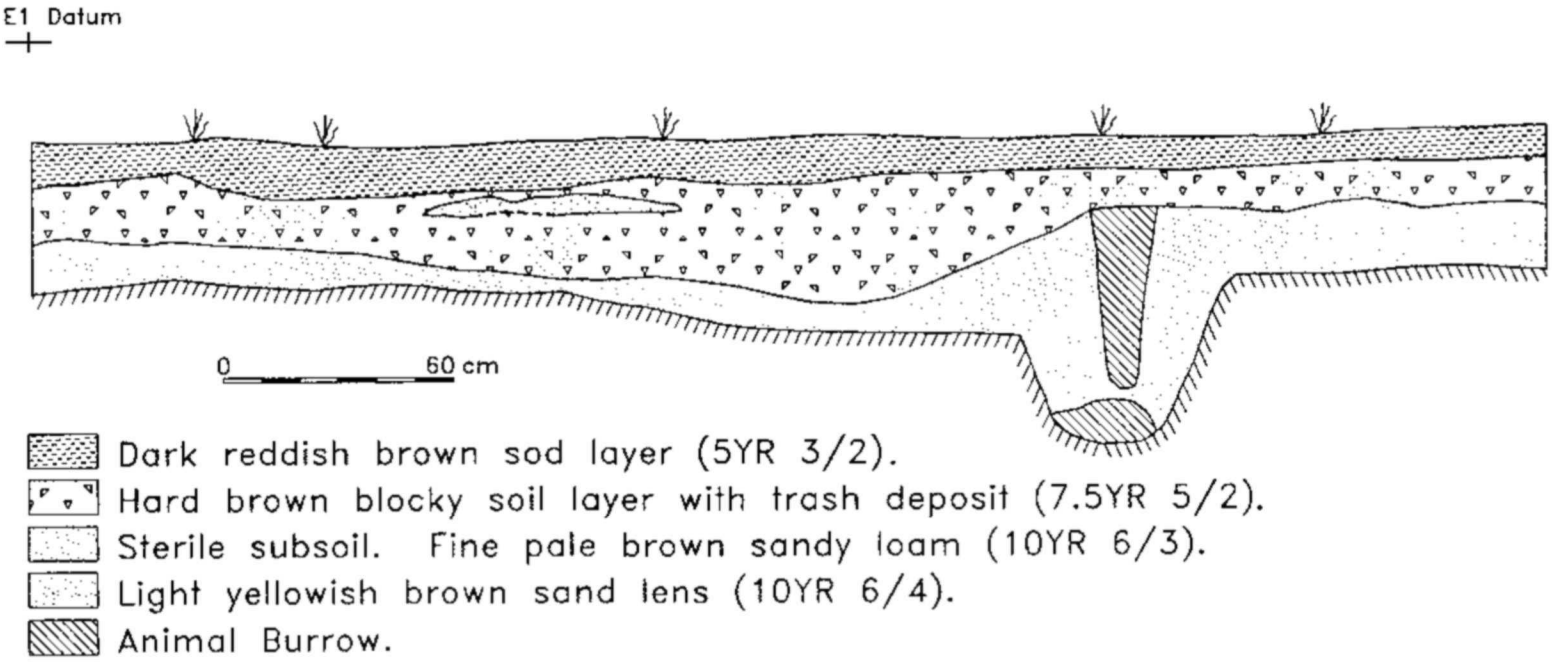



Figure 56. Vertical profile, west wall of X6 and X7.



Figure 57. Initial exposure of wooden features at the top of the HS-10 cellar. Radiating from the former position of the center post at the bottom of the photo (left to right): top of wooden planking along cellar wall 5, J1, J2, and J3. J4 extends from cellar wall 3 toward the middle of J3. View is to the north.

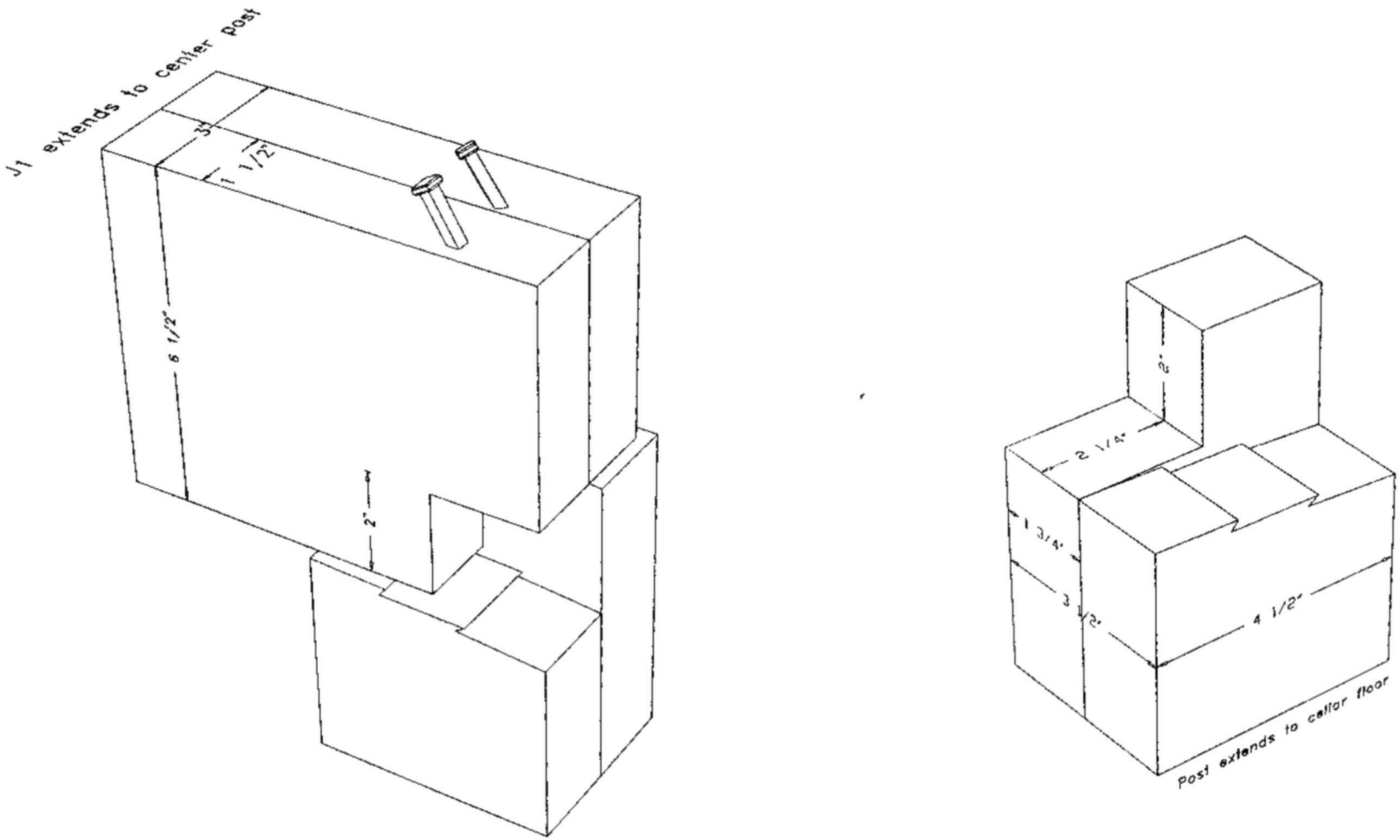



Figure 58. Archeological interpretation of the juncture of J1 and its north support post.

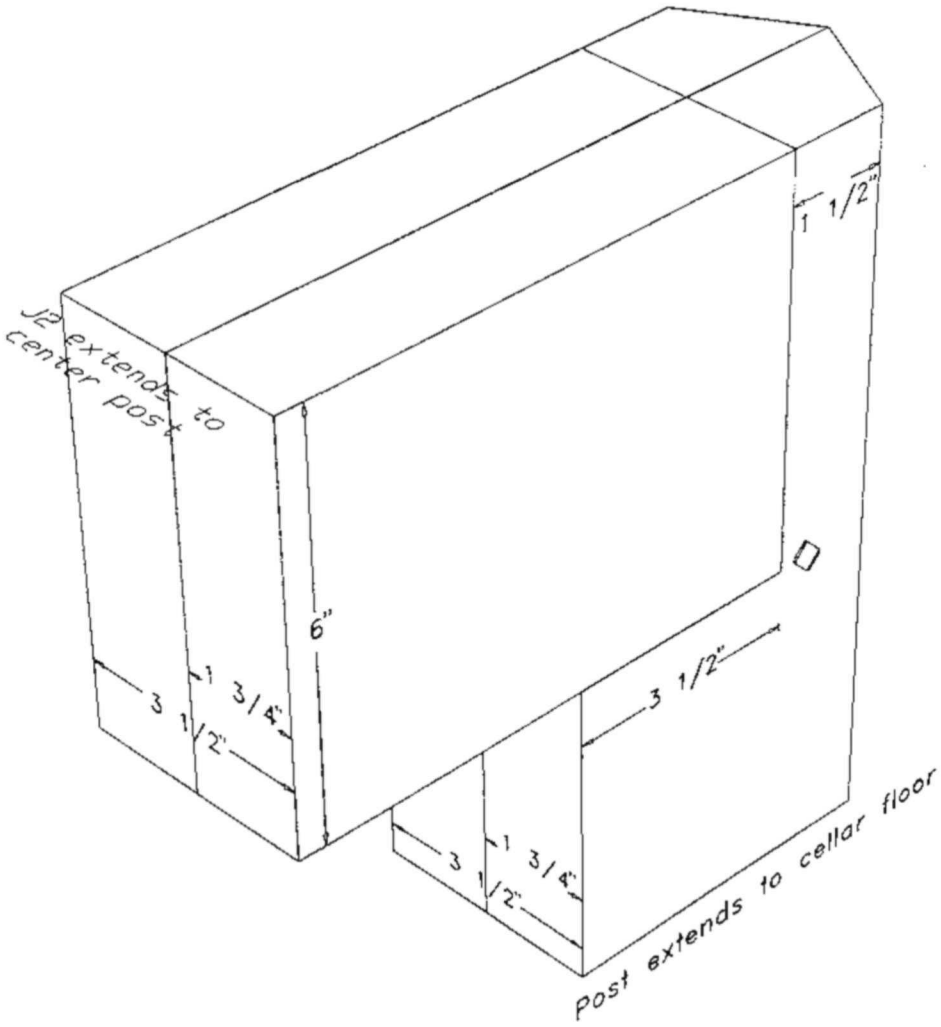



Figure 59. Archeological interpretation of the juncture of J2 and its north support post.

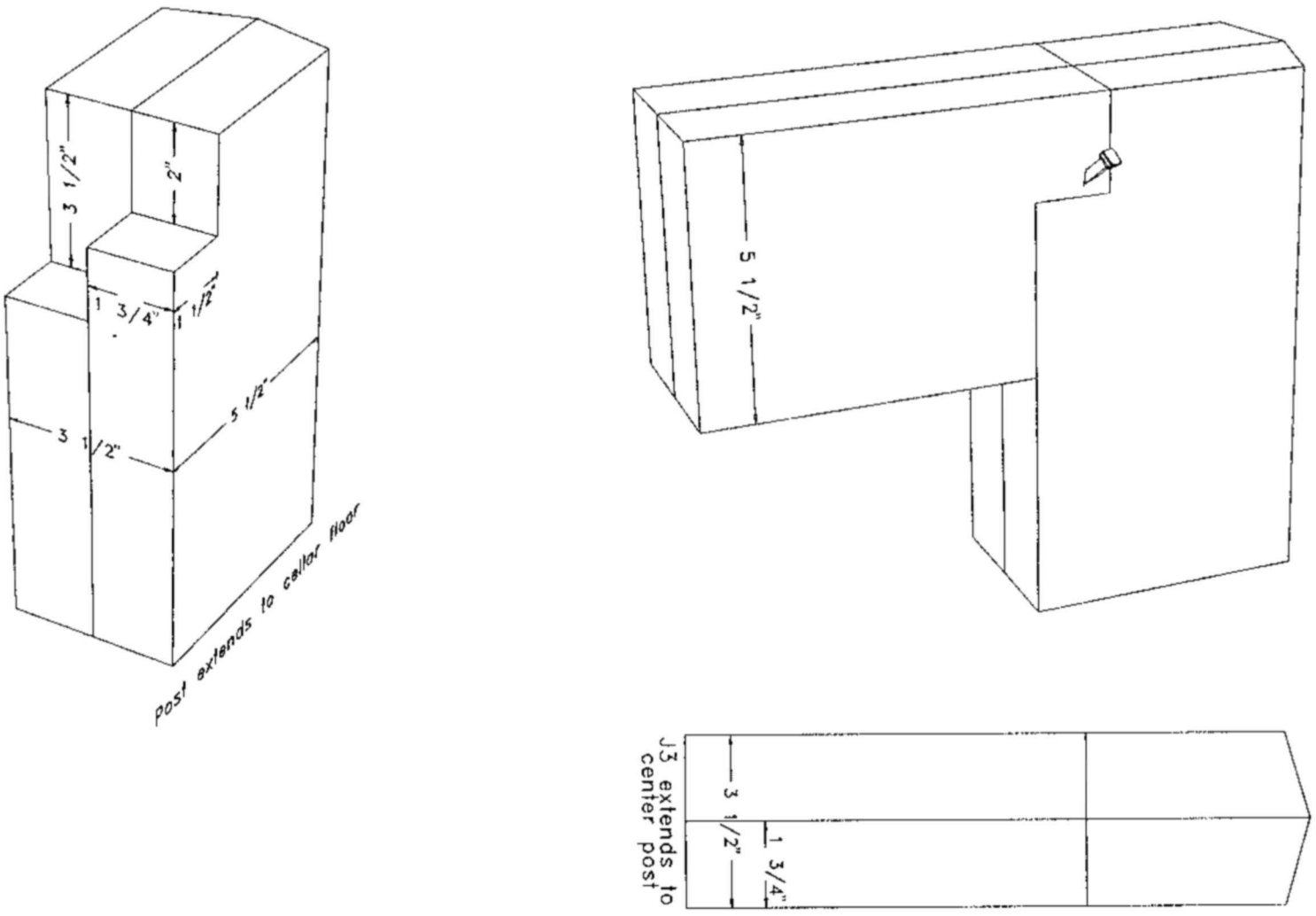



Figure 60. Archeological interpretation of the juncture of J3 and its north support post.

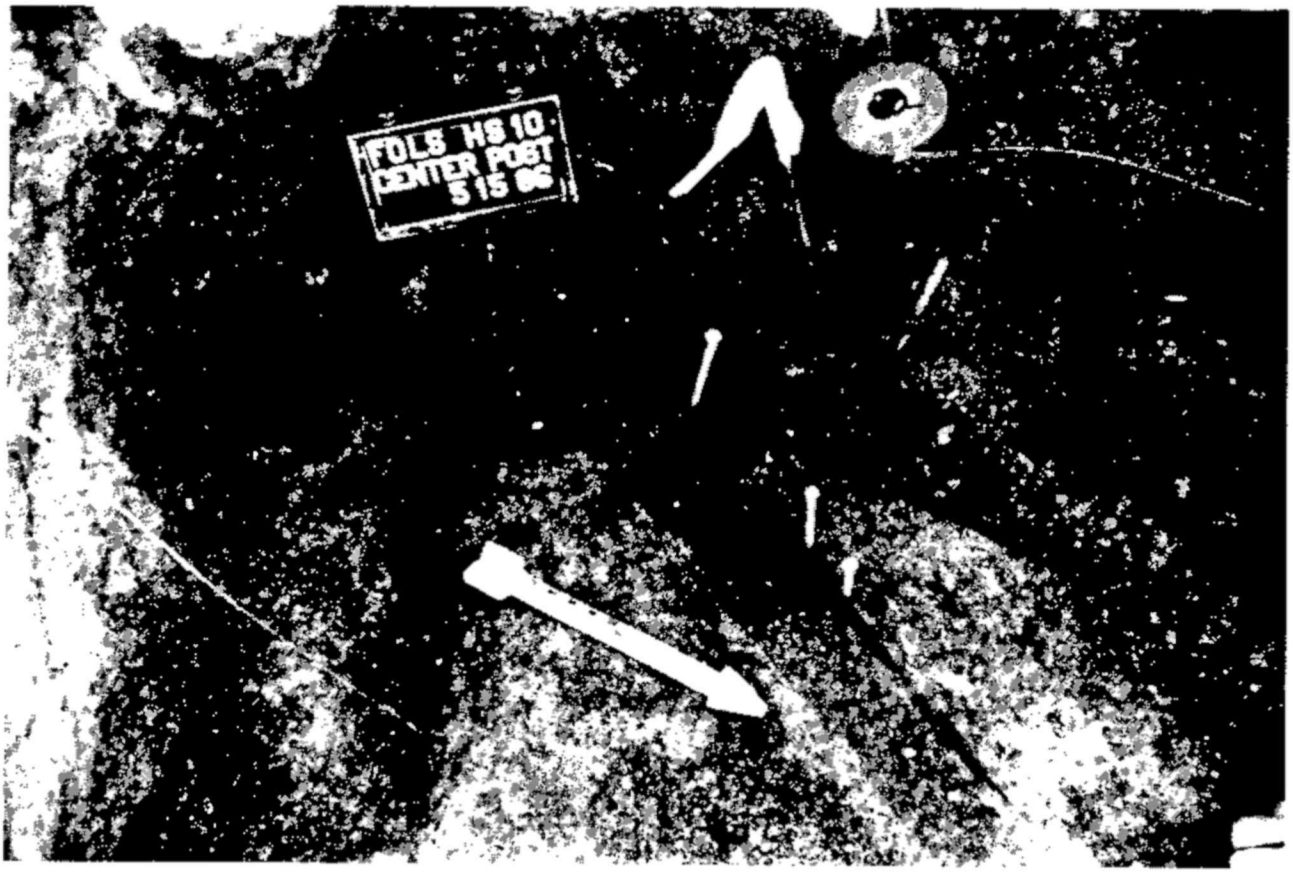



Figure 61. Braces N7, N2, N1, and N4 (left to right) extending to the former position of the center post base. The two vertical boards which stood adjacent to the center post had been removed at the time of the photo. The braces lie at a depth of about 225 cm below E1.



Figure 62. Wooden decking at the bottom of the cellar, 205-213 cm below E1. Sleepers N3, N5, and N6 (right to left) lie beneath the deteriorated decking. The lowest tread in the stairs and the base of the eastern stringer appear at the lower left. View is to the southwest.



Figure 63. Partially exposed remnants of wooden stairs leading into the cellar. Ledgers are visible attached to the east stringer. The lowest tread appears at the bottom of the photo. View is to the east.



Figure 64. The largest in situ remnant of vertical wall planking in the tunnel.



Figure 65. View northwest to Feature 29, rock rubble outside HS-10 wall 1/2. Sheet plastic was placed prior to backfilling in 1973.

LEVELS

1 Dark gray silt loam with organic matter and roots (5YR4/1). Abrupt contact with L2.

2 Brown silt loam (10YR5/3). Contact with L3 is faint and wavy. Contact with L9 is very diffuse.

3 Grayish brown silt loam (10YR5/2). Contact with L5 is faint and irregular.

4 Brown silt loam (10YR5/3). Contact with L5 is abrupt and smooth.

5 Layer composed largely of manure (7.5YR4/2).

6 Light brownish gray silt loam (10YR6/2). Top of layer is distinct, compact, and appears to represent a former ground surface.

7 Previous archeological backfill.

8 Dark gray (10YR4/0) to grayish brown (10YR4/2 to 5/2) compact silt loam.

9 Brown silt loam (10YR4/3) with small dark gray mottling (7.5YR4/0).

10 Sterile subsoil. Fine brown sandy loam (10YR5/3).

11 Silt loam with a mix of characteristics of adjacent soil layers. Animal disturbed.

Feature 19 fill. Brown (10YR4/3) silt loam with gray (10YR5/1) and light yellowish brown (10YR6/4) mottling. Upper contact is faint and smooth. Lower contact is abrupt and wavy to smooth.

Animal burrow.

Foundation stone.

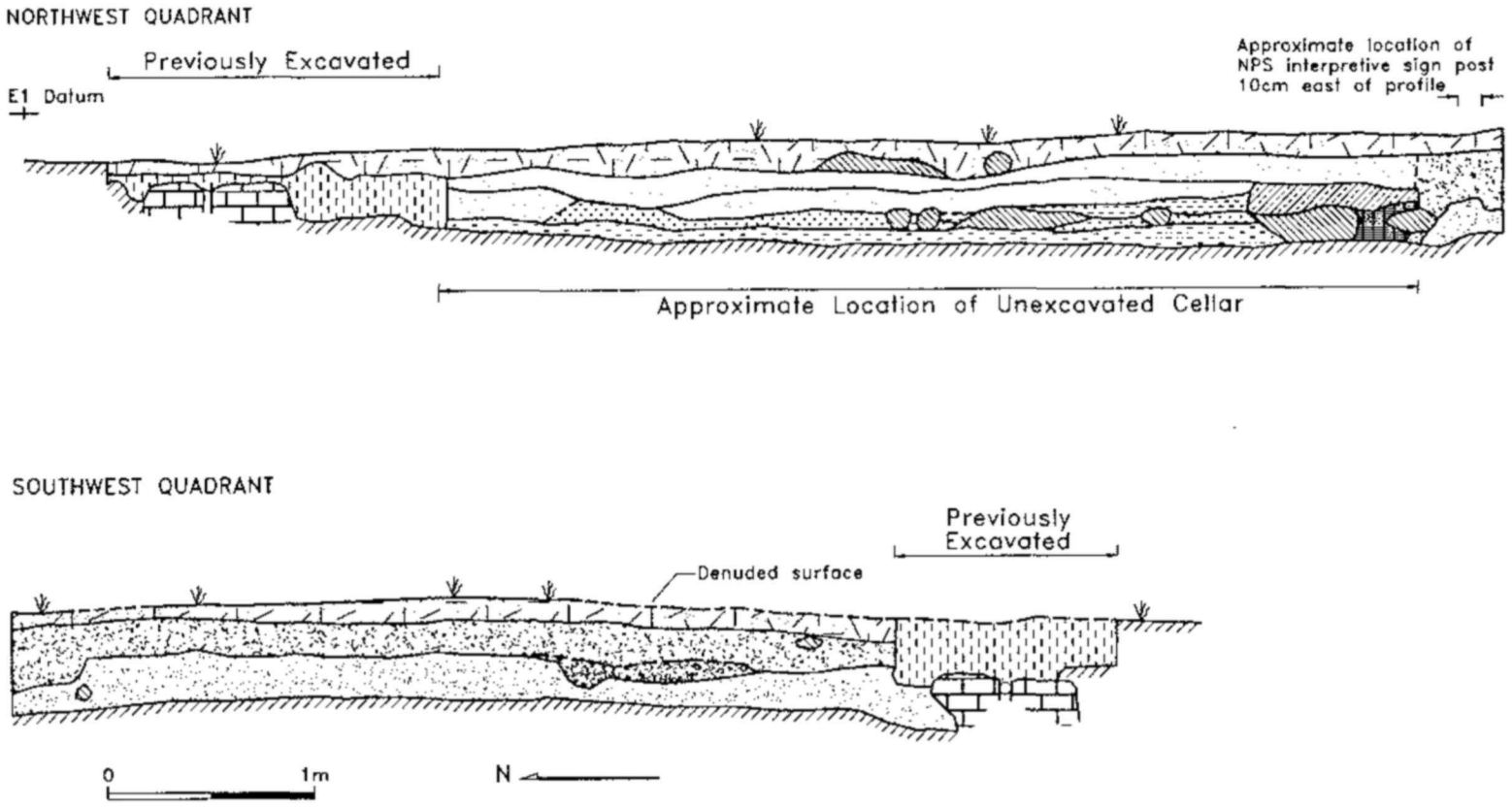



Figure 66. Northwest and Southwest Quadrants, east wall profile.

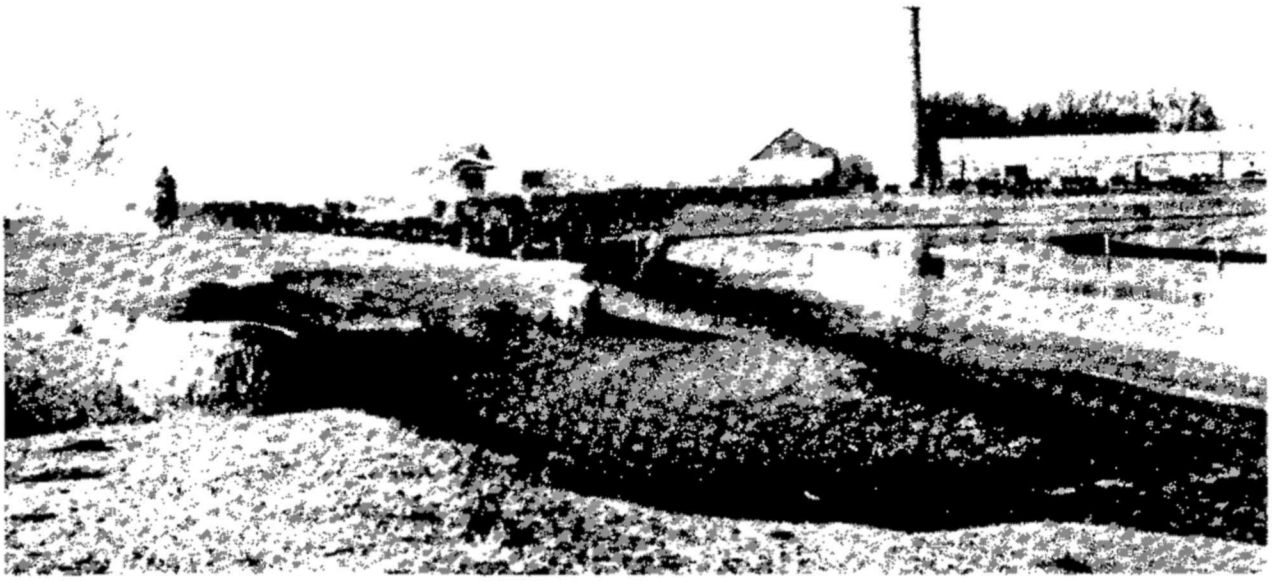


Figure 67. View southwest to the old fort in the late 1940s or early 1950s. Cattle are moving over the former site of the blockhouse near the center of the photo.

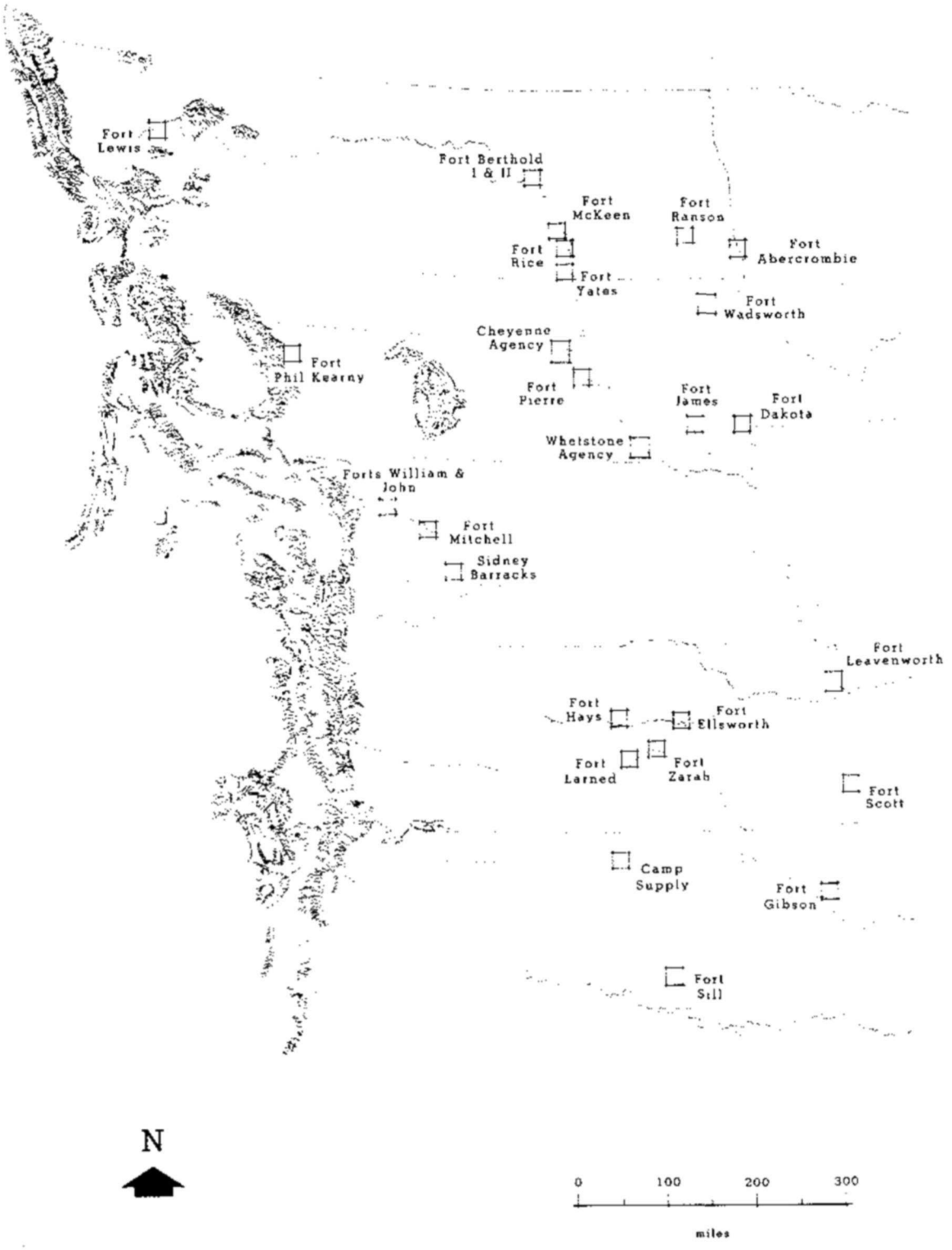



Figure 68. Nineteenth-century Plains fur trading posts and military posts with blockhouses.

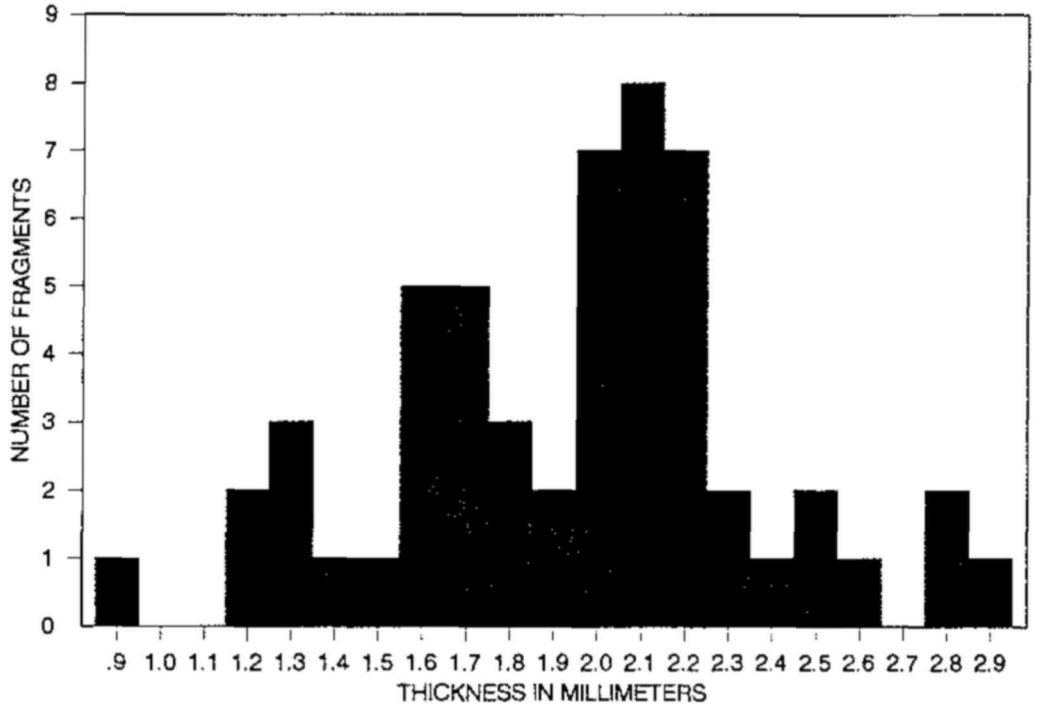



Figure 69. Thickness of window pane fragments from the adobe fill in the cellar and tunnel of HS-10.

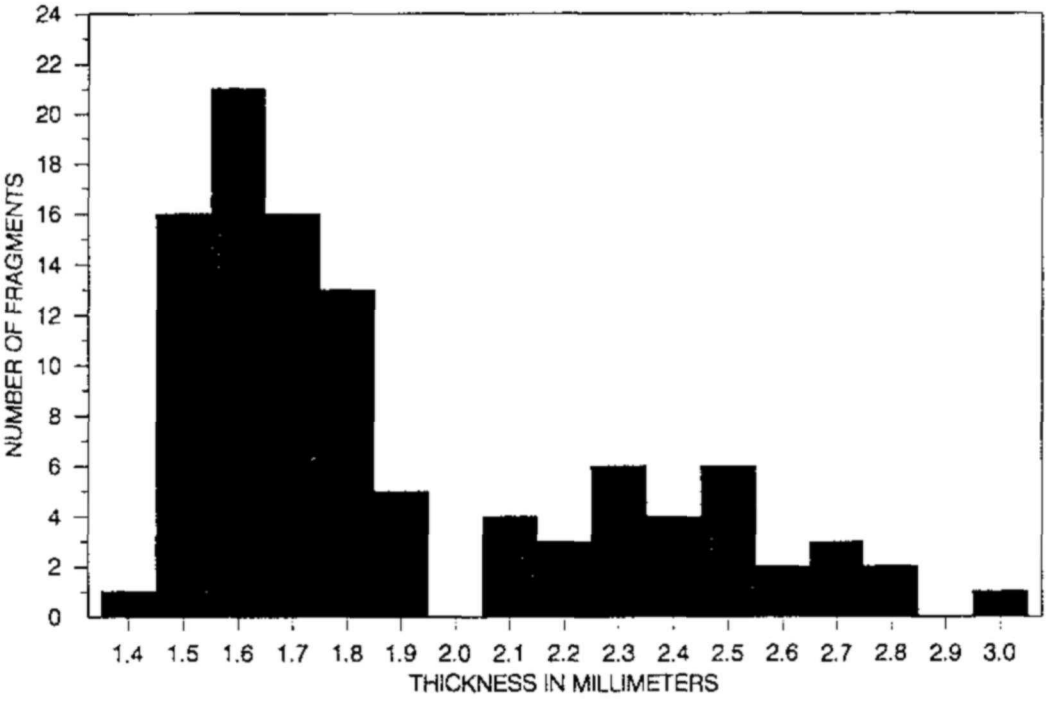



Figure 70. Thickness of window pane fragments from Feature 9 at HS-10.

# REPORT CERTIFICATION

I certify that "Historic Structure Report Blockhouse (HS-10), Fort Larned National Historic Site, Pawnee County, Kansas" by Ron Cockrell, Alan W. O'Bright and Janis L. Dial

has been reviewed against the criteria contained in 43 CFR Part 7(a)(1) and upon recommendation of the Regional Archeologist has been classified as available.

Regional Director

9/06/91
Date

Classification Key Words:

"Available"--Making the report available to the public meets the criteria of 43 CFR 7.18(a)(1).

"Available (deletions)"--Making the report available with selected information on site locations and/or site characteristics deleted meets the criteria of 43 CFR 7.18(a)(1). A list of pages, maps, paragraphs, etc. that must be deleted for each report in this category is attached.

"Not Available"--Making the report available does not meet the criteria of 43 CFR (a)(1).

*Cover Illustration By: Alan W. O'Bright*