Part 3

Discovering Engineer Cantonment and the Archeological Investigation

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Discovery of buried archeological ruins of Engineer Cantonment structures using mechanical trenching, April 2003. NSHS, State Archeology Office

How the Site Was Found

Finding Engineer Cantonment had long been recognized as an important goal among Nebraska archeologists and historians.[1] The Long Expedition is mentioned in early Nebraska histories and for nearly a century, finding the archeological remains of the cantonment had been viewed as critical in generating further studies and knowledge of the expedition and placing it in the context of broader scientific and national interests.

Knowledge of Engineer Cantonment's whereabouts was lost after its abandonment. In 1839, French scientist Joseph Nicollet visited the abandoned Lisa's Post and mentioned that

Engineer Cantonment was half a mile farther north, but did not specifically say that he visited it.[2] By the time Euroamerican settlement of the area began in the 1850s, much of the knowledge regarding its earlier history was lost. During the following century, historians and archeologists pondered the evidence and made limited unsuccessful field searches. The general belief came to be that commercial quarrying, flooding, or cutting by the Missouri River had destroyed Engineer Cantonment or altered the landscape so extensively that it would never be found.

Interest in finding the site was rekindled in 2002-03 when two NSHS archeology projects were implemented along the Missouri River bluffs and bottomland north of Omaha.[3] These projects were designed to learn more about the notoriously rich archeological record of the Ponca Hills district, and to discover specific sites in response to a proposed widening of a county road that runs along the base of the Missouri River bluffs. The road construction project had the potential to adversely impact Engineer Cantonment if it indeed still remained intact.

Engineer Cantonment was frequently referred to in the journals and official accounts of the Long Expedition, and its surroundings were the subject of illustrations by Peale. Additionally, a copy of a sketch map made by Lieutenant Andrew Talcott, engineer for the Missouri Expedition, indicates that it was drawn at a station in the rear of Engineer Cantonment. A comparison of Talcott's map with the modern U. S. Geological Survey topographic map for this vicinity indicates that there are a few locations that closely approximate that shown on the modern map. Information obtained from on-the-ground inspections of these areas plus the available documentary evidence reduced the search area to approximately one mile of bluff edge. According to James, the quarry that supplied limestone for Cantonment Missouri was about 90 m below (south of) Engineer Cantonment, which also fit well with one particular location.[4]

A clear view of the bluff edge was possible early in 2003 when the trees were still without leaves. One location close to the northern edge of a modern quarry was found to match the Peale sketches remarkably well. Peale's illustrations show a long section of the bluff line, as well as a distinct wide ravine descending from summit to base near the middle of the view. One two-room log building is depicted near the base of the ravine, and what appears to be a portion of a second building extends to the left behind the first structure. The front building is situated close to the bank of what is likely an oxbow cutoff of the Missouri River. The steamboat *Western Engineer* and several keelboats are shown anchored in the harbor in one version of the Peale artwork. The 2003 location was photographed and compared with the Peale sketches. This further strengthened initial field impressions.

In April 2003, a mechanical trenching machine (used for laying buried utility cable) was brought to the site. Several long trenches were placed through areas that appeared to most closely match the location of the cabin(s) depicted by Peale. A short distance northeast of a ravine mouth (matching that drawn by Peale), small fragments of burned and unburned limestone appeared in the backdirt and walls of the trench. This suggested the remains of a buried fireplace or foundation. The relationship between this location and the modern ravine to its rear corresponded remarkably well with the building locations and ravine as depicted in Peale's illustrations.

Next, archeologists took a sample of soil from the trench in the vicinity of the burned limestone and passed it through fine-mesh sifting screens. They found items including a plain flat brass button, glass trade beads, lead balls, an early 1800s trigger guard, animal bone fragments (some of

Detail of cabins from Engineer Cantonment with Deer in Foreground, by Titian R. Peale. See complete image on p.47

Detail of cabins from Engineer Cantonment (Missouri River) with *Western Engineer* in foreground by Titian Ramsay Peale. See complete image on p.13

Engineer Cantonment Structure 1 fireplace excavation in progress. From left, Tony Schommer, Amanda Davey Renner, and Erin Dempsey, 2004. NSHS, State Archeology Office

Serving platter on floor of Structure 1. The re-assembled platter is pictured on p. 43. NSHS, State Archeology Office

which were burned) and a bottle glass fragment. The most diagnostic items, the brass button and the trigger guard, were similar to specimens found during archeological excavations at Fort Atkinson (1820-1827).[5] The final preliminary field effort was a geophysical survey (ground-penetrating radar and magnetometry). The magnetometer produced a large structural signature with the limestone concentrations exposed by trenching near the center.[6] From this initial field evidence, it appeared that the site of Engineer Cantonment had at last been found.

Archeological Excavation

Archeologists completed systematic excavations intermittently during the 2003, 2004, and 2005 field seasons with limited follow-up work in 2012, 2013, and 2015.[7] The excavation program was under the direction of the NSHS State Archeology Office, with assistance from the University of Nebraska-Lincoln Archeological Field School, the University of Nebraska-Kearney, and many dedicated volunteers. The excavations focused on the one obvious cantonment structural

Engineer Cantonment Structure 1 fireplace excavation in progress. Karen Steinauer, 2003. NSHS, State Archeology Office

ruin (identified as Structure 1) recorded during the mechanical trenching and geophysical survey. Test excavations were also conducted in other portions of the site in search of additional Long Expedition-related buildings and features. A possible second building site and outside fireplaces were discovered.

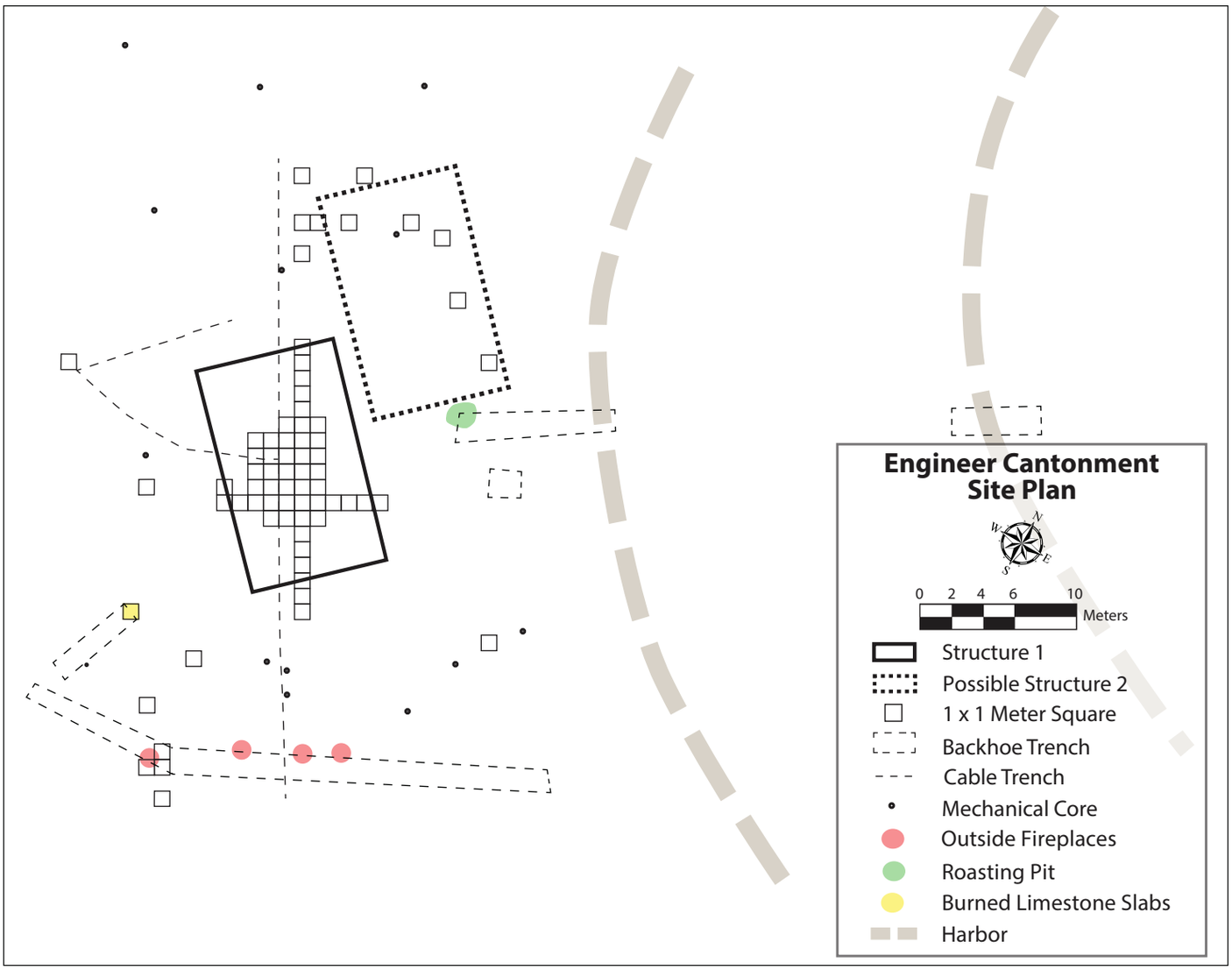
As with most modern archeological excavations, a grid of 1 x 1 m squares was imposed over the site as a horizontal provenience (or location) system and was tied to the county road and other cultural and natural features. Material from each one of these squares was collected separately. Vertical provenience was tracked by arbitrary 10 or 20 cm levels or natural soil zones. When archeological 'features' such as posts, hearths, walls, and pits were discovered, each was given a separate provenience. Soil was passed through ¼ inch and 1/6 inch screens, and recovered materials were bagged in the field by specific horizontal and vertical provenience. All materials were bagged with the exception of the large amount of limestone rubble, which was weighed by provenience in the field and discarded.

In addition to the 1 x 1 m excavation squares, a series of mechanical cores and backhoe trenches was excavated at various locations to gather information about the landscape and search for other archeological deposits related (and un-related) to Engineer Cantonment. The investigations included excavation of 70 1 x 1 m units, 18 mechanical cores, and 5 backhoe trenches. Although Engineer Cantonment was the focus of the investigations, evidence was uncovered related to a later farmstead above the cantonment ruins and an 800-year-old Native American camp buried about six feet below.

Much of the Engineer Cantonment archeological record remains preserved at the site. The site area covers about 3.5 acres (15,000 square meters); far less than 1 percent of that was excavated. Approximately 60 percent of Structure 1 is intact and presumably a large number of exterior hearths and activity areas also remain unexcavated.

General Site Layout

The Long Party arrived at their wintering site on September 19, 1819, ready to begin construction with plenty of time to erect at least two log structures before winter weather set in. Exactly how many buildings were constructed, how they were used, and how the twenty or more individuals being housed there were distributed among the buildings—in view of their varied military and civilian status—are matters not



Plan view of Engineer Cantonment excavations and discovered features. NSHS, State Archeology Office. Prepared by Courtney Ziska, John Swigart, and Tiffany Napier

well-addressed in any of the available archival materials. Placement of the winter encampment appears to have been carefully considered, taking into account available resources and expected over-winter conditions. The chosen site is adjacent to an oxbow harbor for the boats, where a slight rise in elevation at the base of the bluffs provided some protection against flooding. The selection of a slight rise to build the cabins on is the primary reason why the resultant archeological site was not washed away by frequent Missouri River down-cutting and channel shifting during flood events. The high bluff shielded the camp from the prevailing northwest winds of winter. A limestone quarry was nearby and ample timber was available for construction and firewood. Manuel Lisa's trading post and lime kiln were also in the immediate vicinity, providing access to goods, a connection to St. Louis, social interaction, and possibly, labor supplied by Lisa's employees.

Peale's images strongly hint at the presence of a second structure behind the prominent front building. We believe, based on all available archeological evidence, that this *rear* building is what became the focus of our investigation and is referred to as Structure 1. The single building illustrated in full view seems to be at slightly varying distances from the harbor in the several versions of this drawing, but is clearly not far from the oxbow cut bank. Indeed, one watercolor rendering (with a deer in foreground) shows the building's reflection in the water. Most importantly,

with respect to orientation, this building appears to be sited at least roughly parallel with the bluff face, and is placed near the mouth of the distinctive ravine cut in the bluff face—a feature that remains currently identifiable and was the basis for discovering the location of this site.

The search for the second building involved a strategy of systematic testing to the southwest and northeast of Structure 1. While the southwest test area produced some cantonment-era fireplaces, mortar, and sparse material culture, there were no discernible architectural features. The series of test units to the northeast of Structure 1 produced more interesting results. While clear wall lines and floor were not uncovered, abundant limestone and archeological debris potentially related to a cantonment-era structure was markedly more common in this area than to the southwest of Structure 1. This northeast test area is slightly lower in elevation than Structure 1 and appears to be damaged to a certain extent by farmyard activity. [8] If a second building is located in the northeastern test area as we believe, this structure would be the front building shown in Peale's illustrations.

Two important natural features remain extant at the site. Deep mechanical backhoe trenching discovered buried silt deposits that appear to relate to the old channel or 'harbor' depicted in the Peale paintings. A shallow curving swale with a vegetation change is also evident in the field across from the site area that almost certainly relates to this former channel. The ravine that is so prominent in Peale's work is also intact. If this ravine and the distinctive bluff line flanking it had been removed, very likely the site would not have been discovered.

Structure 1

The plan for how buildings were to be constructed at Cantonment Missouri provides a general characterization of the type of structures likely built at Engineer Cantonment.[9] The Cantonment Missouri buildings were of horizontal log construction with a board shed roof and interior double fireplace for two separate rooms. This shed roof structure is also broadly similar to what Peale seems to be depicting in his Engineer Cantonment renderings.

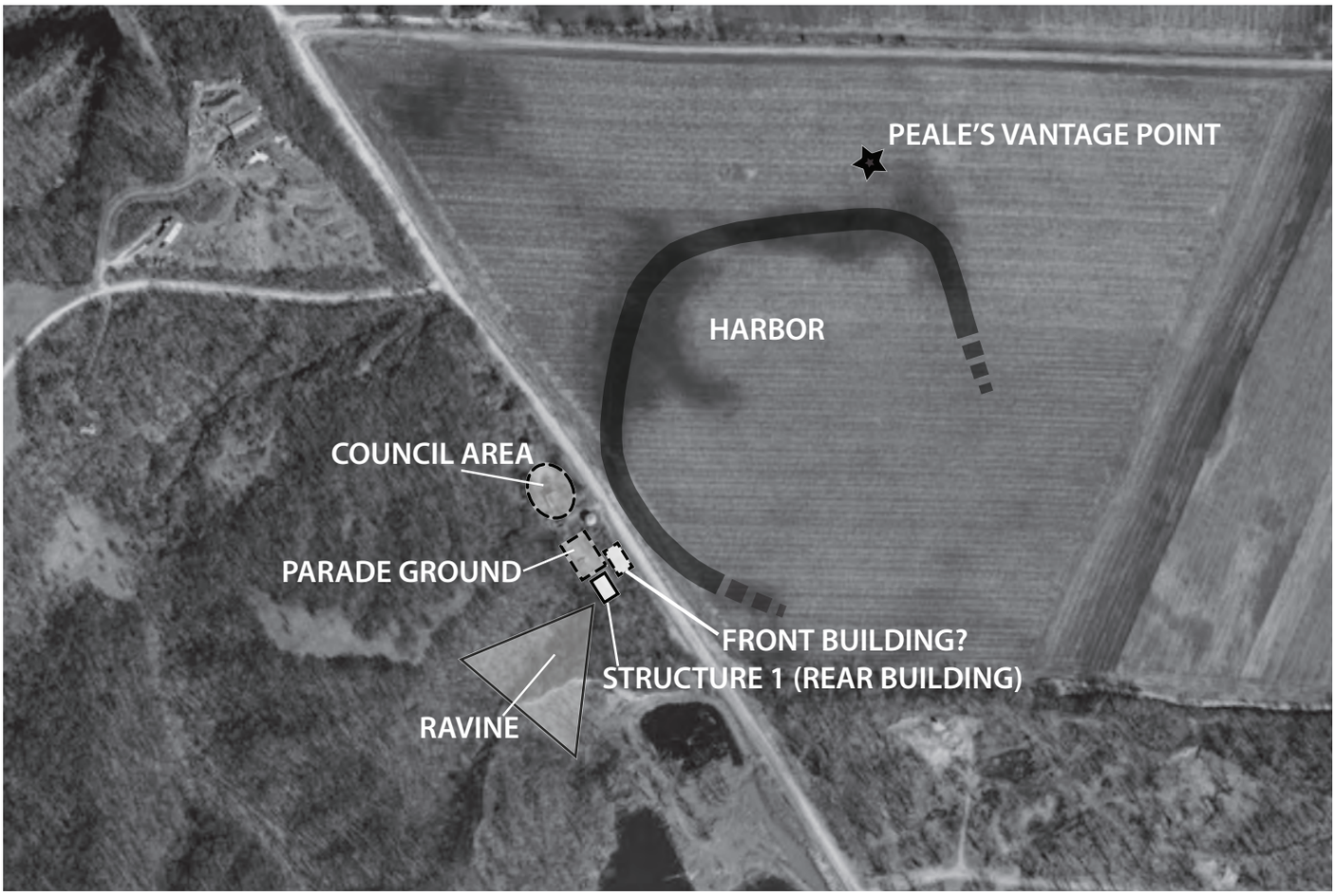
Two rooms are implied by the exterior fenestration visible in the façade of the front building shown in Peale's art, where each half of the building has its own door flanked by two small windows. A massive limestone debris field was uncovered that represents a dual fireplace that occupied the center of Structure 1, as it would in a double-pen (divided two-room) plan. A double-pen plan would have been useful in providing separate quarters to the various groups making up the Scientific Party, assuming there could have been an effort to maintain a separation between the civilian and military members of the expedition. Evidence for a wall between the two rooms was found in an excavation unit that is roughly aligned with the center line of the central fireplace. The wall is evident by the distinct absence of stone in a narrow vertical section of the excavation profile.[10]

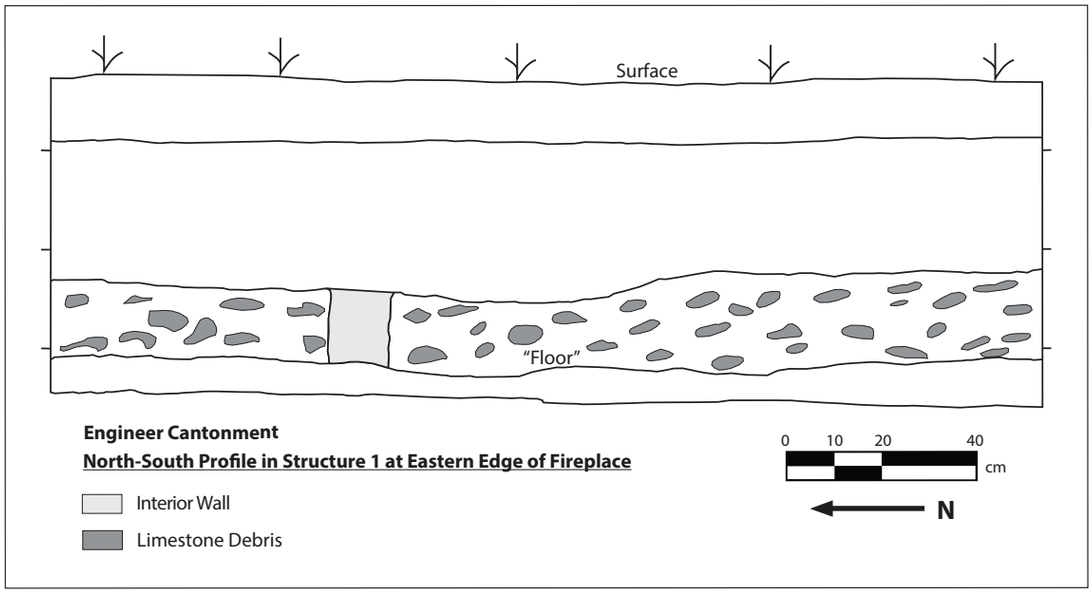
Peale's drawings suggest these rooms could have at least one dimension as large as 7.5 m, using the fenestration as a basis for scale. Based on the scale indicated by the spacing of the windows and doors, this façade probably has an overall length of at least 14-15 m. This would allow each room to have an interior dimension along this wall of around 7 m, and suggests the depth of these rooms would likely be of a similar dimension. Again, the scale implied by the Peale drawings provides a basis to estimate roughly the height of this wall to be around 3.6 m. This height would be adequate to accommodate at least a partial loft which could have provided storage space and perhaps a sleeping area. Current field evidence for Structure 1 substantiates these general dimensions. The total length of the structure was about 49 ft or 15 m. This would be similar in size to the two-room log house built for the interpreter at Fort Leavenworth in 1836 but substantially larger than the barracks rooms planned for Cantonment Missouri measured.[11]

Given the plain white surface of this building shown in Peale's renderings, it appears to have been constructed of logs faced with a whitewash or stucco of lime applied to at least the exterior surface. It is noteworthy, though, that the initial Peale sketch shows several parallel horizontal lines at the top of the structure, possibly representing logs. Whitewash or stucco would have been readily available from Manuel Lisa's nearby lime kiln. A treatment of this kind would not only improve the appearance of the structure, but also could serve several practical purposes, including protecting the structure from insects and weather-related damage, as well as helping to seal small cracks in the daubing.[12] A sample of what appears to be lime mortar was recovered archeologically.

The between-log spaces would have been filled with a readily available rigid material, which in this case is likely limestone. Cracks between this rigid filler would then be packed with a soft material, such as moss, clay, or dung, and the exterior

Engineer Cantonment (Missouri River), by Titian Ramsay Peale (original drawing, with ink stain).
Courtesy of American Philosophical Society, Philadelphia (APSimg4886)

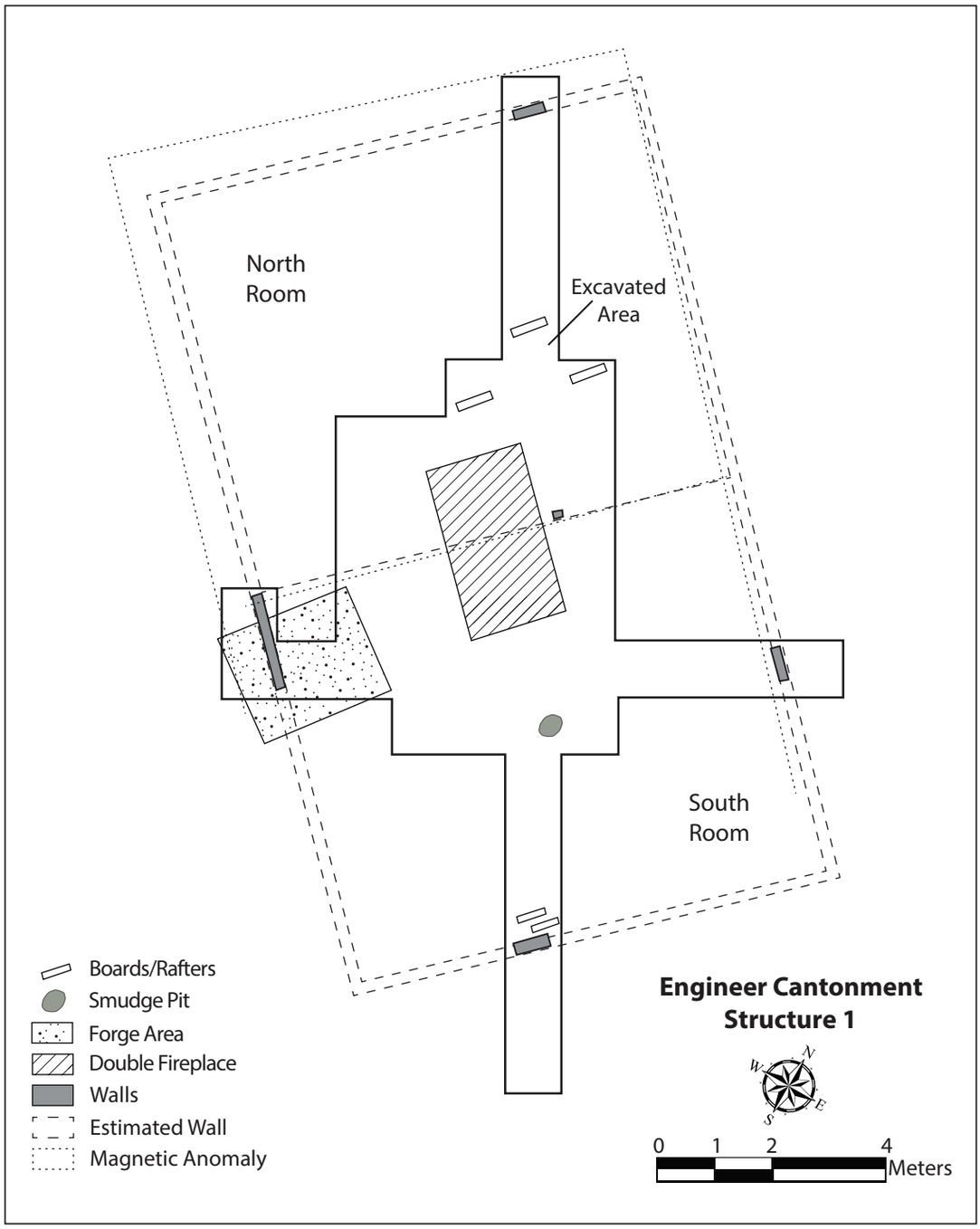


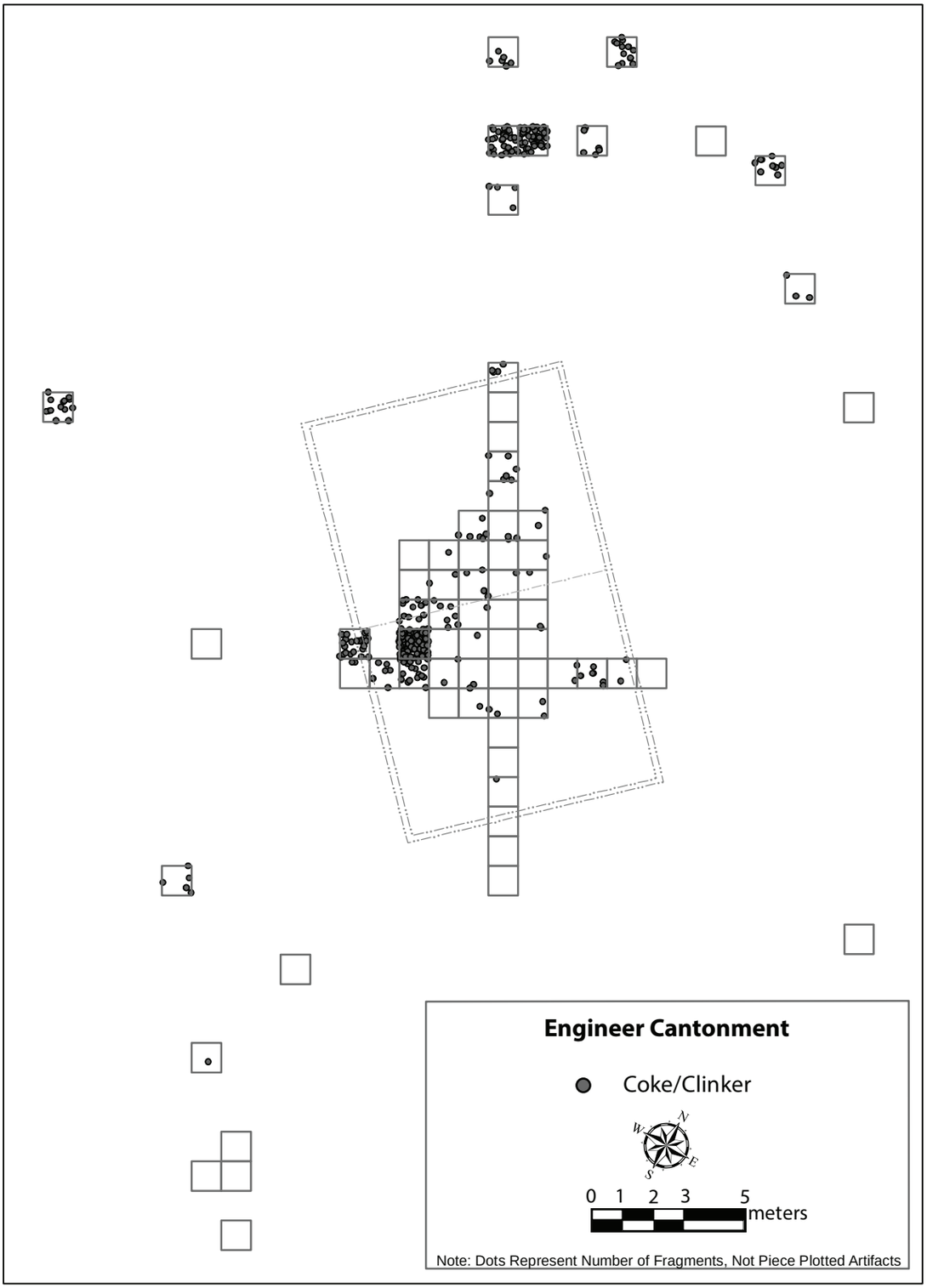


Above: Aerial view showing location of Engineer Cantonment features. NSHS, State Archeology Office. Prepared by Courtney Ziska

Left: Engineer Cantonment Structure 1 excavation profile. NSHS, State Archeology Office. Prepared by Courtney Ziska, John Swigart, and Tiffany Napier

Detail of Engineer Cantonment Structure 1 excavation. NSHS, State Archeology Office Prepared by Courtney Ziska, John Swigart, and Tiffany Napier





Distribution of materials related to blacksmith work discovered at Engineer Cantonment. This distinct distribution pattern demonstrates why it is important for archeologists to precisely record the location of finds. NSHS, State Archeology Office. Prepared by Courtney Ziska, John Swigart, and Tiffany Napier

surface would be sealed with a daubing material involving some type of mortar. This mortar could be a mix of lime and water, or could be some other available material—such as mud, clay, or dung—to which is added some sort of binder, such as straw, sand, animal hair, sawdust, or ashes.

Several linear bands of ash and charcoal are oriented to the east-west axis of the building. Several other vaguely linear "patches" of burned earth and charcoal were also recorded in excavation notes. This is the only possible evidence of structural burning, and could perhaps represent remnants of charred floor, or more likely, roof boards. Given that the building was intended to be temporary, it would seem most likely that it had a dirt floor, perhaps covered with grass, straw, thatch, hides, or some other type of matting. The very low frequency of nails compared to more permanent establishments like Fort Atkinson also argues against a substantial board floor.[13] Exterior walls are *tentatively* defined on the basis of faint evidence of material that might have underlain the exterior sill logs. No footings were expected, and none were identified. The most likely foundation would have simply involved a log sill underlying the log walls, although several small piles of limestone were found that appear to be 'shims' for leveling the wall lines.[14]

The structure had a large common double fireplace with two openings, one for the northern room and one for the southern room. The double fireplace would have had a single common chimney. The fireplace is represented by large, dense field of limestone debris covering over 12 square m of the interior of Structure 1. While it is evident that the fireplace proper was made of limestone blocks, the material comprising the common chimney is less evident. There was no brick recovered, eliminating this as the chimney construction material. More likely the chimney was made of limestone blocks or even wood. The fact that mortar was more common in the fireplace area may be suggestive of a wooden chimney, since historically these were lined with mortar or some type of clay or daub to prevent them from catching on fire.

Only two post holes were found. They are a pair, each about 20 cm in diameter and about 40 cm apart. They are not far from a *smudge pit* discussed below. The function of these posts is not clear but a wind break between the fireplace and the door is one possibility. The post pair may also be related to scientific work or placed to shore-up a sagging roof. While we have assumed that each room had its own external doorway, convincing evidence of them was not found, though two iron door-bolt keepers were recovered, one in each of the two rooms of Structure 1. One was near the eastern (front end) wall which is shown to have had two doors in Peale's depiction of the building, while the other was in the vicinity of the northern (side) wall which is not shown to have any fenestration. The Peale images suggest two front windows in each of the two rooms comprising cantonment buildings. The distribution of window glass fragments does not demonstrate any obvious pattern except that glass is not particularly common and is scattered randomly throughout the structure. Other possible building hardware was not common and includes several iron rings and rods recovered from both rooms, as well as the northeast test units.

Based on the distribution of certain artifact types, there seems to be at least a minimal basis for suggesting that food preparation might have been a principal function of the north room, although food consumption appears to have taken place in both rooms. If a cook was available to the camp as a whole, as appears to be implied in the discussion of a bison hump roast feast (see below), it is possible that food preparation, cooking, and dining might have been conducted on some more collective basis than being left to the responsibility of individual rooms or other subgroups.[15]

A small, circular, undercut pit filled with charred corncobs is located on the floor of the south room. This feature conforms in size, form, and content with what have been identified as *smudge pits*.[16] Ethnographic observations indicate widespread use of smoke generated by smoldering corn cobs, rotted wood, or fine wood chips and bark in small pits (ca. 6 to 18 inches wide and 6 to 24 inches deep) to complete the process of tanning hides and pelts. It is possible that the scientists might also have used this Native American method of hide smoking for their own purposes, including tanning hides for use as clothing and preparation of scientific specimens. Perhaps smoke from an interior smudge pit might also have been useful for pest control, both within the pelts of prepared specimens and within the cantonment building. The pair of closely-spaced post holes mentioned above was discovered about 1 m to the north of the smudge pit. These could indicate the presence of a rack(s) used for processing scientific specimens.

The presence of abundant "dust shot" and other small-diameter shot is uniquely indicative of the scientific work being conducted at Engineer Cantonment. The most likely purpose would be in

The U-shaped soil stain is outline of a roasting pit discovered at Engineer Cantonment. It is similar to one described by Thomas Say, which was used to prepare a bison hump meat feast, described on p. 20. NSHS, State Archeology Office

procuring small birds or other delicate specimens that could not be obtained by trapping or other means. The Engineer Cantonment lead shot and ball collection is dominated by small shot, and the majority of that was recovered from the north room. Larger military-type balls, like those common at Fort Atkinson, are rare from the Engineer Cantonment excavations. Larger lead balls would be specifically associated with the large military muskets, as opposed to the smaller smooth bores and smaller caliber rifles used by the civilian weapons most likely carried by the scientists.[17]

The small shot concentrations co-occur with two iron pegs that appear to be the same as one represented in Peale's drawing of a hawk hanging from a peg at Engineer Cantonment. This suggests that these were specimen processing areas or places where scientific hunting equipment was stored or prepared for use. Two such areas are indicated, one near the fireplace in the north room and the other at the south wall in the south room. In fact, if there is sufficient evidence to identify this as an area where specimens were hung for initial cleaning and processing, either for preservation or for cooking, it is at least possible that Peale's sketch was made at the south wall. While it is possible that these two co-occurrences are coincidental, the association in these two contexts, one in each room, is of notable potential interpretive value. Given that the two major concentrations of lump lead also occur in these two areas, production of lead shot would also seem to be a feasible activity in these two areas.

The distribution of gunflints and gunflint debris is generally scattered, but one concentration can be identified at the northernmost corner of the central fireplace where five squares contain nearly half of the total gunflints.[18] This concentration, which is fully within the north room, also produced a notable diversity of other artifactual materials, including pipe fragments, tableware, creamware, pearlware, stoneware, buttons, lump lead, strip lead, lead balls, shot, and—importantly—dust shot, which would indicate an association with the scientists. The greatest number and diversity of identifiable associated weapon types, most of which are rifle and pistol sizes, occur in the northern part of this structure.

Engineer Cantonment would have had need for blacksmithing and gunsmithing, as well as general repair facilities for maintaining the various types of gear. The archeological investigation produced potential evidence of a forge location between the estimated west wall and central fireplace of Structure 1. A concentration of coal, coke, and slag in an area of very darkly stained soil represents the probable location of a forge for smithing and other repair and maintenance activities.[19] Most

importantly, the potential presence of a facility for fabrication and repair in the south room of Structure 1 would seem more consistent with the suggestion above—that this room might have been used by the scientists for various work activities—than it would be with other potential functions, such as dining or sleeping. There also remains the possibility that the forge was outside and immediately west of the building. A second concentration of this forge-related debris occurs in the northeast test units where the second building is purported to be.

Outside Features and Activity Areas

In celebrating the successful bison hunt on the "Sioux River" by Titan Peale and John Dougherty, the scientists prepared a feast to which Manuel Lisa and his family were invited. This meal included a roasted bison hump among a variety of other meats. The hump roast was prepared in the native manner, which involved removing the entire hump from the vertebrae, taking out the spinal processes, sewing it into a cover of skin with the hair removed, and placing this football-shaped mass into a specially prepared hole in the ground for roasting.[20] This hole was heated by intense fires placed within and on top of it, prior to inserting the meat. Once the hump was in place, it was covered with approximately a foot of cinders and dirt upon which another large fire was built. A possible candidate for this pit was discovered archeologically in a backhoe trench (shown on p. 35). It is an exterior, steep basin or U-shaped pit located about 6 m east of the estimated eastern (front) façade of Structure 1, approximately in line with what would have been the general area of the door into the northern room of this building. It is also directly south of the most likely location for the second (front or eastern) building. This feature contained small amounts of charred wild grape, charred corn, oak charcoal, ash, burned earth, and a greasy organic soil residue that produced fatty acids typical of large herbivores (like bison), along with plants or bone marrow.[21]

Several small outside fireplaces were discovered in the walls of another backhoe trench about 20 m south of Structure 1.[22] They are at the same depth as cantonment era deposits. One feature contained trade beads and lead balls, but the others did not produce any diagnostic material. These hearths produced small amounts of ash and charcoal. They have straight to slightly sloping walls and basin-shaped bases. This cluster could be indicative of more intensive outdoor use of this southern area, or simply a product of more intensive investigation in this area. Presumably there are many more of these features scattered around the site area and are related to outside cooking and processing of scientific specimens.

An interesting feature is a one-meter-deep concentration of limestone blocks and slabs about 6.5 m west of the estimated southwest corner of Structure 1. The purpose of the limestone blocks is uncertain, but given the stone work associated with the cantonment and the depth of the material, it is possible, even likely, that this feature is also associated with the cantonment occupation, and could indicate a separate outdoor activity area.[23]

The other major outdoor place described by James involves the council grounds where meetings were held with local tribes during early October 1819. This place is also visually documented in watercolor paintings by Samuel Seymour. Based on the Seymour paintings, the councils were arranged in a semicircular fashion around a central area. These paintings also provide clues concerning the size and location of this place. Views both toward the harbor and the bluff at the back of the camp are shown in Seymour's paintings of the Oto/Missouria/Ioway council (view probably northwest toward bluff) and the meeting with the Pawnee (view probably northeast with the harbor in the background). Given these two views, it seems likely that the councils were held a short distance northwest of the cantonment cabins. The wooded, outdoor setting where these council meetings were held is likely the woods shown directly north of the cantonment in Peale's paintings. Any evidence of these council areas is likely to have been impacted to some extent by a former farmyard. Substantial field evidence of the council area would not be expected, and no cantonment-related materials were unearthed by the cable trenches throughout the general vicinity of this feature.

Other supporting features that were likely present, but not noted in any journals or illustrations, include latrines and garbage dumps, outdoor cooking facilities, and processing areas for both food and scientific specimens. A small parade ground for the military members would not be unexpected at the site. A flag is illustrated by Peale in his original sketch and also described by Bell in his initial description of the post. This flag is flying from a pole that seems to rise from the roof of the front building, but is perhaps more likely a tall pole planted in the space behind the building, possibly

even suggesting a small parade ground. Given that a military escort, along with two to four military members of the Scientific Party, were present at various times, some accommodation for military assembly at the cantonment would be expected.

NOTES

[1] Gayle F. Carlson, John R. Bozell, and Robert E. Pepperl, "The Search for Engineer Cantonment," *Explore Nebraska Archeology* 8, Archeology Division and State Historic Preservation Office (Lincoln: Nebraska State Historical Society, 2004).

[2] Nicollet, Joseph N., *Joseph N. Nicollet on the Plains and Prairies: The Expeditions of 1838-1839 With Journals, Letters, and Notes on the Dakota Indians*, Edmund C. Bray and Martha C. Bray, eds. (St. Paul: Minnesota Historical Society, 1976), 146.

[3] John R. Bozell, *Cultural Resources Investigation for the Ft. Calhoun Southeast County Roads Improvement, Washington County, Nebraska*. Prepared for the Nebraska Department of Roads (ms on file, Lincoln: Nebraska State Historical Society, State Archeology Office, 2001); John R. Bozell and Stanley M. Parks, *Data Recovery at 25WN50 and 25 WN46 in the Vicinity of the Territorial Town of Rockport.* Prepared for the Nebraska Department of Roads (ms on file, Lincoln: Nebraska State Historical Society, State Archeology Office, 2010); and Robert E. Pepperl, *Archeological Investigations at the Northern and Southern Margins of the Greater Omaha Metropolitan Area: Douglas, Sarpy, and Washington Counties, Nebraska*. Report Submitted to the Nebraska State Historic Preservation Office (ms on file, Lincoln: Nebraska State Historical Society, State Archeology Office, 2004).

[4] Edwin James, "Account of an Expedition from Pittsburgh to the Rocky Mountains Performed in the Years 1819 and 1820. By Order of the Hon. J. C. Calhoun, Secretary of War, Under the Command of Major Stephen H. Long, of the U.S. Topographical Engineers," In *Early Western Travels* Series (Vols. 14-17), Reuben Gold Thwaites, ed. (Cleveland, Ohio: Arthur H. Clark, 1905), 271.

[5] Gayle F. Carlson, "Archeological Investigations at Fort Atkinson (25WN9): Washington County, Nebraska, 1956-1971," *Publications in Anthropology* No. 8 (Lincoln: Nebraska State Historical Society, 1979), 52-67.

[6] Robert K. Nickel and Catherine A. Nickel, "Geophysical Survey," In "Archeological Investigations at Engineer Cantonment: Winter Quarters of the 1819-1820 Long Expedition, Eastern Nebraska," *Publications in Anthropology* No. 12, John R. Bozell, Gayle F. Carlson, and Robert E. Pepperl, eds. (Lincoln: Nebraska State Historical Society, 2018).

[7] John R. Bozell, Gayle F. Carlson, and Robert E. Pepperl, eds. "Archeological Investigations at Engineer Cantonment: Winter Quarters of the 1819-1820 Long Expedition, Eastern Nebraska," *Publications in Anthropology* No. 12, (Lincoln: Nebraska State Historical Society, 2018); Jeremy S. Dillon and John R. Bozell, "At the Intersection of Geology, Archaeology, History, and Art: Engineer Cantonment (1819-1820), Washington County, Nebraska," *Great Plains Research* 26, no. 1 (2016), 1-19.

[8] Herb and Gloria Gibreal owned the site at one time and had a farmyard there. The Gibreals indicated to the NSHS crew in 2003 that while no major buildings were in the vicinity of the buried cantonment ruins, gardens and hog pens were—particularly near where we speculate a second Engineer Cantonment building sat.

[9] Sally A. Johnson, "Cantonment Missouri, 1819-1820," *Nebraska History* 57 no.2 (1956): 131.

[10] See description of Feature 0321 in John R. Bozell and Jeremy S. Dillon, "Site Structure, Analytic Units, and Feature Descriptions," in *Publications in Anthropology* No. 12.

[11] Richard E. Jensen, "The Fontenelle and Cabanné Posts: The History and Archeology of Two Missouri River Sites, 1822-1838," *Publications in Anthropology* No. 11 (Lincoln: Nebraska State Historical Society, 1998), 16-17, and Johnson, "Cantonment Missouri," 123.

[12] Bruce D. Bomberger, "The Preservation and Repair of Historic Log Buildings," *Preservation Brief* 26 (Washington D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, Washington, D.C, 1991).

[13] The average nail count per one meter excavation square at Engineer Cantonment was about six. In contrast, the Council House at Fort Atkinson (which presumably had a wooden plank floor) yielded over 100 nails or nail fragments per 5-foot excavation square. See Gayle F. Carlson, "Archaeology and Reconstruction of the Fort Atkinson Council House," *Central Plains Archaeology* 2, no. 1 (1990):100-101, 112.

[14] Robert E. Pepperl, John R. Bozell, and Gayle F. Carlson, "Architecture and Activity Areas," in *Publications in Anthropology* No. 12.

[15] Edwin James, *Account of an Expedition from Pittsburgh to the Rocky Mountains, Performed in the Years 1819 and '20, by Order of the Hon. J. C. Calhoun, Sec'y of War: Under the Command of Major Stephen H. Long, from the notes of Major Long, Mr. T. Say, and Other Gentlemen of the Exploring Party* (Philadelphia: H. C. Carey and I. Lea, Volume I, 1966 [1822] Readex Microprint ed.), 192-93.

[16] Lewis R. Binford, "Smudge Pits and Hide Smoking: The Use of Analogy in Archaeological Reasoning," *American Antiquity* 32 no.1 (1967): 1-12.

[17] Steinauer Karen A. Steinauer, "Ammunition," in *Publications in Anthropology* No. 12.

[18] Robert E. Pepperl, John R. Bozell, and Gayle F. Carlson, "Structure 1 Architecture and Use of Space," in *Publications in Anthropology* No 12.

[19] Robert E. Pepperl, John R. Bozell, and Gayle F. Carlson, "Structure 1 Architecture and Use of Space," in *Publications in Anthropology* No 12.

[20] James, *Account,* 192-93.

[21] Mary E. Malainy, "Analysis of Fatty Acid Compositions, Feature 0306, in *Publications in Anthropology* No 12.

[22] Robert E. Pepperl, John R. Bozell, and Gayle F. Carlson, "Outside Features and Activity Areas," in *Publications in Anthropology* No 12.

[23] Robert E. Pepperl, John R. Bozell, and Gayle F. Carlson, "Outside Features and Activity Areas," in *Publications in Anthropology* No 12.