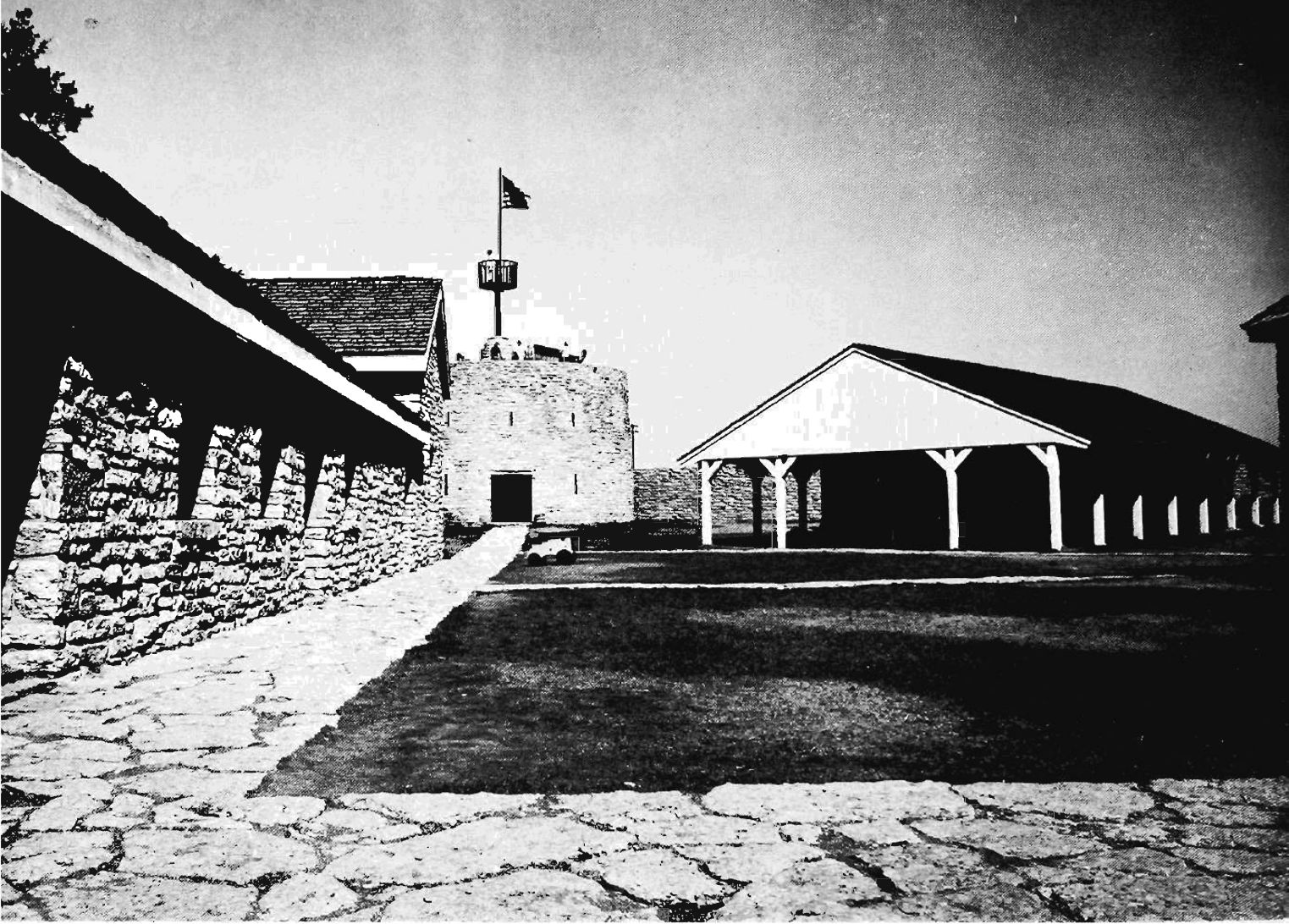


RECONSTRUCTING



OLD FORT SNELLING

Loren Johnson

THIS YEAR marks the sesquicentennial of the laying of the cornerstone of old Fort Snelling on September 10, 1820. The venerable fort's 150th birthday has been noted with much fanfare and many festivities, climaxed on September 13 (the Sunday nearest the actual anniversary) with a day-long program. Recently the issuance of a special commemorative postage stamp helped give the fort national prominence.

Such attention is appropriate, because the picturesque limestone citadel overlooking the junction of the Mississippi and Minnesota rivers is probably the state's most historic ground. It was the first military fort in this region and the hub of settlement for a large area, among other things, and has been called "perhaps the most significant landmark in the entire history of Minnesota and the Northwest."¹

Meanwhile, work has continued this summer on an integral part of the observance — the Minnesota Historical Society's enormous project to restore the diamond-shaped post to the way it looked during its peak years of 1824–48. On the following pages is an in-depth report on the restoration by the man who has directed the project much of the time since current work began in 1965. The report is the first of several features on Fort Snelling that comprise this issue of Minnesota History. — Ed.

ONE OF THE NATION'S most important and exacting restorations of an early military post is gradually taking shape on the high point of land above the junction of the Mississippi and Minnesota rivers on the

southern fringe of the Twin Cities. The restoration and reconstruction of old Fort Snelling, begun by the historic sites department of the Minnesota Historical Society in 1965, is now nearing the halfway point. Completed so far are the Round, Hexagonal, and Pentagonal towers, the guardroom complex, magazine, schoolhouse, sutler's store, wellhouse, and some seven hundred feet of wall. Still to be restored or reconstructed are the officers' quarters, the commandant's house, barracks, shops, hospital, and the semicircular battery.

In contrast to the jet planes overhead and the maze of automobiles rushing over highways nearby, the fort has the appearance of a nineteenth-century anachronism amidst twentieth-century confusion. But more and more "fugitives" from the freeways are finding in the fort a fascinating reminder of their frontier heritage, of the beginning of white settlement in the state. And as the restoration project progresses it promises to become an even greater tourist attraction than it is now, especially in conjunction with below-the-bluff recreation areas that also are a part of Fort Snelling State Park.

Now definitely on the map, old Fort Snelling was in danger of obliteration several times in the past. In 1895, for example, although there had been earlier recognition of Fort Snelling's deteriorating condition, the first specific proposal for its preservation was espoused by General Edwin C. Mason, then commandant. Speaking at a ceremony to commemorate the seventy-fifth anniversary of the post, Mason noted: "If the people of Minnesota would preserve Old Fort Snell-

Mr. Johnson is director of restoration for the Minnesota Historical Society.

¹ Russell W. Fridley, "Fort Snelling: From Military Post to Historic Site," in *Minnesota History*, 35:178 (December, 1956).

ing for coming generations, they should make haste, for sooner or later the buildings so dear to every Minnesotan will be torn down to make improvements. In the War Department, there is neither romance nor sympathy. In this old fort we have one of the most interesting places in the frontier history of our country. I suggest that either the Historical Society or the Twin Cities secure from the General Government the control of this place; having done this, restore the old wall and the demolished bastions . . . convert these buildings into storehouses for the display of such articles as may yet be collected, illustrating the way in which the Indians and the white man lived and traveled while this beautiful State was a wilderness. . . . Every year these things become more valuable and interesting. They should be collected now. In a few years, it will be impossible to find them. Such a museum, in the old fort, restored to its former state, would give us a place unique in its character. There would be nothing like it in the United States."²

The next day, an editorial in the *St. Paul Pioneer Press* commented that "The celebration . . . is a reminder that although we are in a habit of regarding Minnesota as a young state, she already begins to have a history in a really remote past. . . . The history of Fort Snelling, moreover, is by no means a commonplace one. . . ."

"In General Mason's address he made a suggestion . . . which is worthy of the attention of the people of the state, or at least of the two cities. The restoration of the Old Fort and its preservation as a museum would be a most excellent beginning toward conserving what we have of historical interest. . . . Few American cities are in possession of a spot at once so historic, so beautiful and so accessible. The advantages of securing it as an object of local interest would be incalculable."³

INTEREST IN the preservation and restoration of the fort fluctuated. Enthusiasm, quick to rise, as quickly subsided. In 1901, six years after the impassioned pleas of Mason and the *Pioneer Press*, the War Department ordered that the original officers' quarters be razed. A citizens' committee prevented their complete destruction only after considerable damage had been done. When plans for remodeling the post were announced in 1903, many people feared that what remained of the old fort would be completely wiped out. However, the *Pioneer Press* of July 19, 1903, assured Minnesotans that "Everything is being done to retain the historic view, rather than emphasize what is new. With this in mind, the new buildings are to be plastered on the exterior with a color suggestive of age — probably light yellow." In 1904, though, the post quar-

termaster had the Round Tower covered with smooth white stucco. This disfigurement caused such an outcry that it was removed within a year.

Concern about the fort declined again after 1905. In 1928 Willoughby Babcock, then curator of the Minnesota Historical Society museum, suggested that the Round Tower be used as a museum. This was not to transpire until the late 1930s when the joint efforts of the society, the Works Progress Administration (WPA), and the post command made it a reality. The WPA renovated the tower, which had been converted earlier to a residence. Its two-story interior was remodeled into a single, circular room with plastered walls, a skylight in the drop ceiling, and a terrazzo floor. The floor contained an inlaid map locating the fort at the junction of the two rivers and showing the buildings and parade grounds within the walled post as they were about 1840. In addition to this, Richard Haines painted a 6-foot-high mural that completely encircled the tower and depicted various scenes in the fort's history.

The post military command and the Minnesota Historical Society jointly administered the museum. The military provided building maintenance and a custodian, while the society furnished and installed suitable exhibits. This system worked well until 1946 when, on October 14, Fort Snelling was discontinued as a military reservation. The Veterans' Administration, which assumed custody of the buildings and area, was unable to furnish a custodian for the tower. As a result, the museum remained closed until 1964 when the historical society reopened it under the guidance of John Grossman, who served as tour guide and curator.

The long-term survival of the fort was again threatened early in 1956 when the Minnesota highway department announced plans to encircle the Round Tower with a new freeway system. The historical society led the opposition to this proposal, warning that the historic integrity of the area would be despoiled. Governor Orville Freeman, who mediated the dispute, suggested that a study be made of the feasibility of placing the highway in a tunnel under the area between the 1920s chapel and the Round Tower. Eventually this plan was accepted, and the highway was routed through a 450-foot tunnel.

With the approach of the state's one-hundredth birthday in 1958, the Statehood Centennial Commission granted the Minnesota Historical Society \$25,000 to undertake the archaeological investigation of the old fort. Under the direction of John M. Callender the project began in September, 1957, and extended over a period of sixteen months. Actual digging took nine

² *St. Paul Pioneer Press*, September 11, 1895, p. 12.

³ *St. Paul Pioneer Press*, September 11, 1895, p. 4.

months. Mr. Callender and his crew partially excavated the foundations of seven structures erected under the direction of Colonel Josiah Snelling. Because Mr. Callender's actual field notes were never filed with the historical society, and were not otherwise available, the greater portion of the archaeological work conducted at the post during the 1966 and 1967 seasons was a re-examination of the 1957-58 excavations.

INFORMATION for the restoration and reconstruction of Fort Snelling has come primarily from three sources: written, archaeological, and pictorial. Unfortunately, the written records rarely describe the individual structures in sufficient detail for restoration work. Thus, the restorationist must extrapolate the necessary information from pictorial sources, including paintings, drawings, engravings, and photographs, as well as from the archaeological evidence. This was necessary, for instance, in the reconstruction of the schoolhouse and sutler's store.

In March, 1835, Lieutenant John McClure submitted a report to army headquarters in Washington, D.C., regarding the function and physical condition of structures at Fort Snelling. He included a keyed map of the post buildings and floor plans identifying the rooms by use or occupant. Facade, or elevation, drawings of a number of the structures also accompanied the report. Information of this type would appear to be a godsend, except for a number of unaccountable discrepancies. McClure's map is one of the most accurate ground plans of the fort, and yet he shows hipped roofs on a number of structures that had shed-type roofs. His schoolhouse floor plan (identified as the sutler's store-room) locates the fireplace at the west end of the building. When the schoolhouse was excavated, however, the foundations of the fireplace were found at the east end. The archaeological evidence was confirmed by a wood engraving based on a sketch made by Adolf Hoeffler in 1852 and printed in *Harper's New Monthly Magazine* in July, 1853.⁴

McClure placed the fireplace in the sutler's store at the east end of the building. A large, centrally situated double fireplace was uncovered archaeologically. This location was also confirmed by the Hoeffler engraving and by a photograph of the interior of the fort made

for another army report in 1863. There was no archaeological indication of another chimney or fireplace in either building.

In some cases it has been necessary to fall back on a knowledge of standard building practices of the period. Books like Asher Benjamin's *American Builder's Companion* (6th edition, Boston, 1827; reprinted New York, 1969) were written as manuals or guides for carpenters. They enabled the small-town carpenter to build with a degree of style and sophistication that



CAREFUL EXCAVATION of the schoolhouse foundation revealed the location and horizontal dimensions of the fireplace which was laid at the east end of the structure (visible at the top of the picture).

might otherwise have been lacking. In addition to providing an aesthetic base, the *Builder's Companion* furnished information on various types of construction framing, roof and rafter framing, and supports:

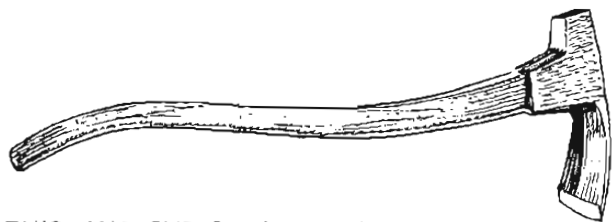
A thorough knowledge of the tools of the period, their use and limitations, is also essential to the restorationist. Most of these tools are unknown to the modern carpenter, yet there is no way to simulate their marks. Thus, it becomes necessary to obtain old tools or to make facsimiles, both of which have been done during the Fort Snelling restoration. In addition, it has been necessary to train craftsmen in the use and care of old tools. Fortunately, a number of our craftsmen enjoy the varied work at Fort Snelling so much that they volunteer to return year after year.⁵

The restorationist, having assimilated all of the information obtained from the various sources, may then,

⁴Lieutenant John McClure to Quartermaster General Thomas S. Jesup, March 1, 1835, National Archives Record Group (NARG) 92. The Minnesota Historical Society has photostatic copies of the report and the map.

⁵For descriptions and illustrations of tools in the late eighteenth and early nineteenth centuries, see Eric Sloane, *A Museum of Early American Tools* (New York, 1964) and Henry Mercer, *Ancient Carpenters' Tools* (Doylestown, Pennsylvania, 1960).

in co-operation with the architect, prepare the drawings necessary to restore or to recreate a given structure. It is at this time that more modern elements in the form of materials or methods are considered. How may a building be improved without altering its surface textures and appearance? How may modern technology be applied to this process? Restored sites are visited by people who may or may not be familiar with the limitations of original materials. What will a modern visitor say after brushing against a whitewashed wall? Can whitewash be simulated with the undesirable characteristic removed? Flat latex paint comes close in general appearance, and it will resemble whitewash even more closely if it is painted over a prepared base.



THIS ANCIENT hand tool, the adze, produced the rough-hewn look of beams used by soldier-builders on the frontier in the 1820s.

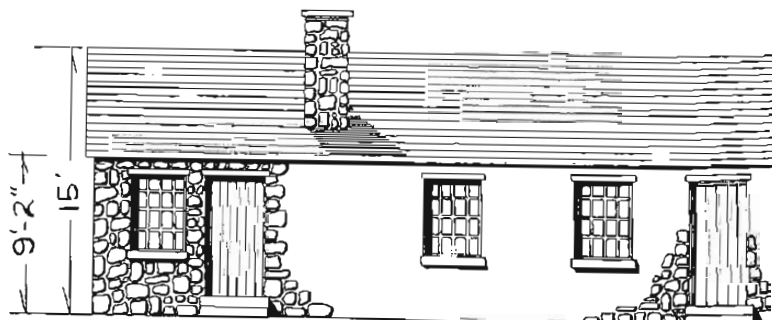
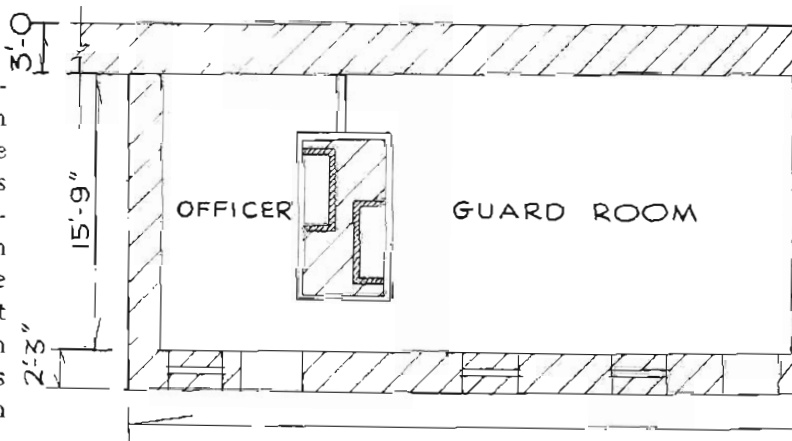
THE FIRST BUILDING to be examined archaeologically was the Round Tower. However, the wall with the adjacent guardroom complex was the first to be reconstructed. With the exception of two short stubs projecting from the Round Tower, the entire wall surrounding the fort had been pulled down by 1900. In June, 1966, 185 feet of the wall extending between the Round and Hexagonal towers were excavated. Except for several small breaks caused by modern storm sewers and electrical cables, the wall foundation was intact. It rested upon the bedrock where it had been laid 146 years before.

The dirt was removed from around the foundation stones and the bedrock cleaned preparatory to painting stripes on either side of the extant wall. These stripes provided controls to insure that the reconstructed wall would conform to any idiosyncrasy displayed in the original structure. A reinforced concrete footing was then laid in conformity to the painted lines. This footing, in turn, formed the base of a reinforced concrete spine, one foot thick, which forms the core of the rebuilt wall. The combined spine and footing resemble an inverted "T". The arms of the "T" provide a shelf for the limestone masonry facings which are fastened to the vertical core with metal masonry ties. This method of construction has proved quite durable. The 10-foot-high wall has not settled or developed cracks in four years.

Photogrammetry, the science of using photography to make surveys or maps, was employed to determine the proper range in height of the wall, as the recorded measurements vary widely. The wall, from the Round Tower eastward for a distance of 100 feet, was once surmounted by a low picket palisade, of which a small portion between the tower and the Civil War commissary-warehouse probably survived until a fire in 1869. When the wall was rebuilt, the cedar pickets were pressure-impregnated with chemicals to make them resistant to rot, insects, and fire. Cut to length, pointed, and notched for the tie rail, the pickets were then lag-bolted to a 2-by-12-inch plank, the tie rail was secured in place with oak treenails, and the whole unit was bolted in place on top of the concrete wall spine.

There is no evidence as to the original method used to place this picket line. The present technique, which is probably *not* the one used in 1820-24, simulates well

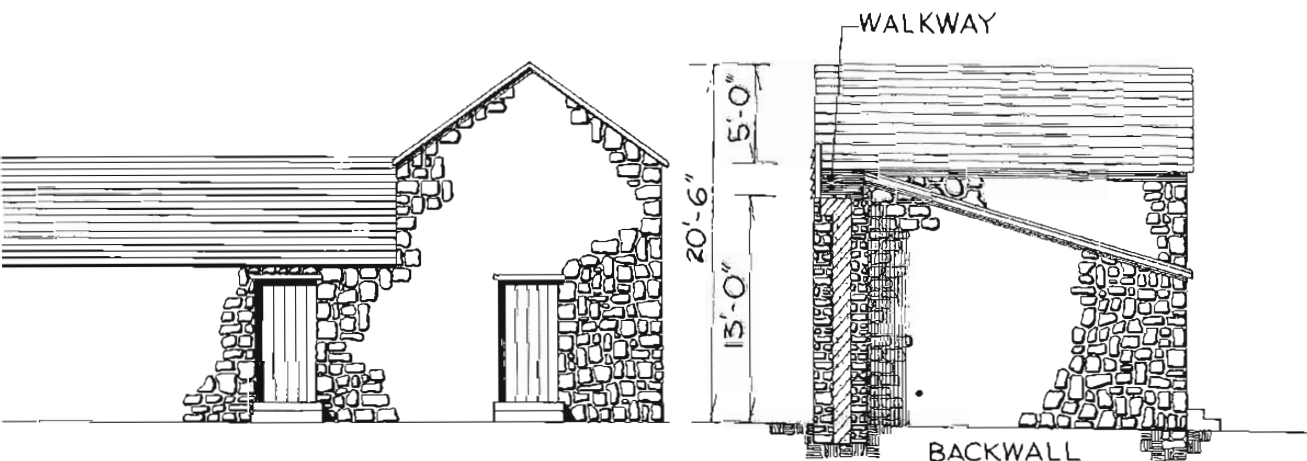
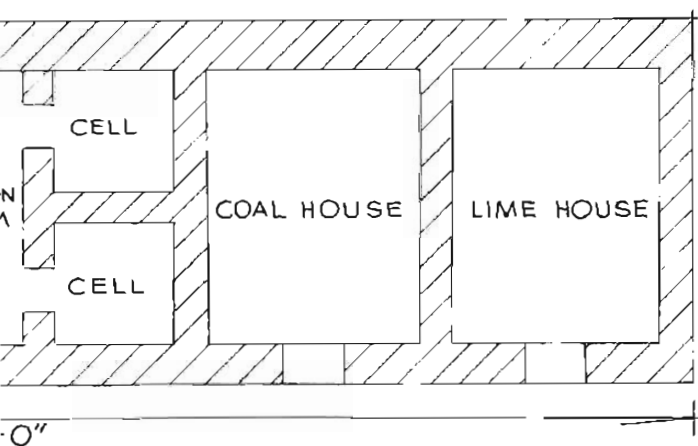
THE ARCHITECT DREW a floor plan and front and end elevations of the guardhouse. The end elevation reveals the outside wall's cement core and the raised walkway used by patrolling sentries.



GUARD HOUSE



INSIDE THE ROUND TOWER crews chipped off the plaster (including, unavoidably, the Richard Haines mural) and opened the long-blocked gun slits as a prelude to the actual restoration.



and facilitates wall maintenance and the replacement of damaged or rotted pickets. The wall between the Round and Pentagonal towers was rebuilt in 1968 and 1969 using the same procedure.

THE SECOND STRUCTURE to be restored in 1966 was the guardroom complex—a row of rooms attached to the wall of the fort. These chambers, as identified by McClure, were the officer of the guard's room (at the east end of the row next to the gate), guardroom, prison room, two cells, a coalhouse, and the limehouse. Manuscript dimensions for the complex vary widely, the length being given at anything between 67 feet and 81 feet in length. The width is uniformly given at 21 feet. Excavation of the officer of the guard's room, the guardroom, the prison room, and cells showed an initial length of 52 feet. The addition of the coalhouse brought the length to 69½ feet, and with the final excavation of the limehouse the extant foundations measured 81½ feet.

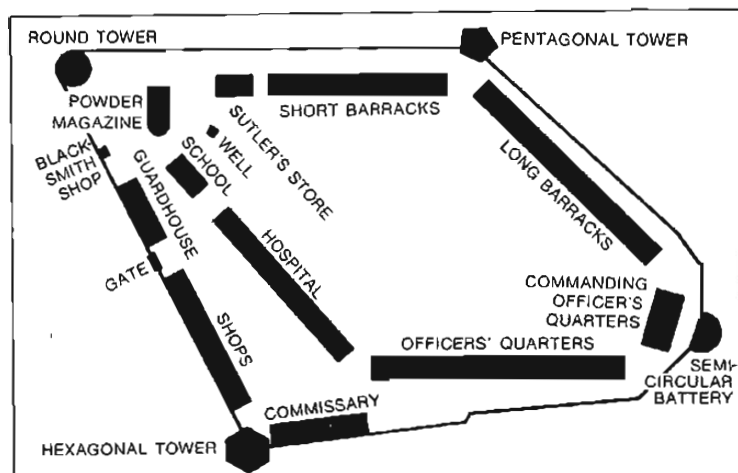
Mr. Callender had excavated the greater share of the guardroom complex previously and only the eastern end, containing the officer of the guard's room and the foundation of the double fireplace which had separated it from the guardroom, remained in relatively undisturbed condition. In his 1835 report McClure stated that there was a stove in the guardroom. Apparently, the original fireplace provided as little warmth as its replacement furnished during the 1968–69 winter when the building was used as an archaeological laboratory.

The guardroom complex is straightforward masonry construction of the random ashlar-rubble stone type that characterizes all of the Fort Snelling work.⁶ Wall

⁶ Ashlar refers to hewn or squared stone and in a somewhat narrower sense to squared and dressed stone for facing a wall of rubble or brick. Rubble refers to rough, broken, irregular stone.

thickness was based on the archaeological evidence. Placement of the interior doors, those for the main prison room and solitary cells, was based on the McClure drawings. An 1863 photograph of the post provided exterior door and window dimensions and placement as well as the number of lights (panes) in the window frames.

One of the ongoing problems for the restorationist is the dating of photographs. Rarely are they marked with the date, even the year, that they were taken, and it often becomes an exercise in deduction to place



THE IRREGULAR DIAMOND SHAPE of the fort fitted the terrain of the river bluff, while the towers overlooked the two rivers and the plains behind.

them within a known, dated reference frame. The writer was able to date one photograph of the Round Tower in the Minnesota Historical Society collection from having seen its duplicate in an old family photo album.

Some of the value judgments made by the restorationist are apparent in the guardroom complex. For instance, the floors are made of random-width oak planks, roughly hand-sawed to approximate rocker-frame saw marks. Although pine was probably used by Snelling's men when the fort was built, oak was selected for the reconstruction to extend the wear life of the flooring and reduce long-term maintenance costs. All wood used in the restoration is treated with a commercial preservative to lengthen its life. The decision to leave the flooring with the saw kerfs rather than adze marks was based on archaeological evidence.

Another decision was facilitated when a button was recovered from under the bottom block of the foundation in the northeast corner of the officer of the guard's room. The button, with its wire back loop broken, had

apparently been scraped from a soldier's coat as he was lowering the stone into position. This artifact enabled the restorationist to date the construction of the guardroom complex to either the fall of 1823 or the spring of 1824. The button is from a greatcoat and was not produced prior to 1820. Indeed, Scoville Manufacturing Company of Waterbury, Connecticut, sent samples to the army commissary for approval in April, 1820. If one allows for the production of both buttons and coats and for shipping time, first to St. Louis and then to Fort Snelling, he can see that it was unlikely that buttons of this pattern could have arrived before the summer of 1823. By that time the sawmill was producing planks for the post.⁷

We are fortunate in our period at Fort Snelling. If the fort had been built twenty years earlier, the cost of accuracy would have been many times multiplied. Nails are simple, inexpensive things when machine-made. There were two types in use when the fort was built. The first was "rosehead," a hand-made wrought iron nail, so named from the shape of the head. The second and more commonly used kind was a machine-made cut nail. Fortunately, a very similar cut nail is still made today. The rosehead variety is used in the restoration as it was originally, mostly for applying door hardware or in the applications where the nail must be "clinch" (driven through, bent over, and hammered down). Cut nails are brittle and will break if bent. All the rosehead nails and hardware used in the restored or reconstructed buildings were made in the temporary blacksmith shop by Jerome Rutoski or the writer. The hardware is manufactured from mild steel rather than wrought iron for economy and for identification as to its modern provenience. In general, the hardware conforms to types in use during the period of original construction. When we started to produce the hardware for the fort, the only examples that we had recovered archaeologically were two pintles and a latchkeeper. Since then the range of original samples has increased, happily bearing out the designs of the hardware already produced at the fort.

All of the window glass used at the fort has been manufactured by hand by the Blinka Art Glass Company of Milton, West Virginia. It duplicates fairly closely the glass of the Revolutionary War period and the years immediately following. However, a later glass of a character more nearly suited to our needs is not yet commercially available.

⁷The button is general service button pattern no. 256a in David F. Johnson's *Uniform Buttons: American Armed Forces, 1784-1948*, 2:plate no. 22 (Watkins Glen, New York, [1959]).

THE SCHOOLHOUSE was the third structure to be reconstructed. As already noted, the reconstruction drawings prepared from McClure's report had to be corrected after the archaeological examination revealed the true fireplace location.

An administrative decision was then made to replace one window on the north facade with a door, thus helping insure a good traffic flow while the structure is used as a museum and reception center. Unfortunately, the multiple role of the building has also resulted in objectionable overelectrification. Ultimately, however, it will revert to being interpretive of the school and chapel in the 1820–30 period. Another point of readily discernible difference from the original is the fireplace aperture which is lined with fire brick to conform with present-day safety regulations. The writer feels that all fireplaces in a restoration should be used. A great portion of restoration work is expended in establishing an historic milieu or atmosphere. A fireplace with fire or at least ashes and the smell of wood smoke is quite helpful to this end.

The fireplace was rebuilt in brick because samples of the original brick were recovered in the excavations. The dimensions of the fireplace aperture, or throat, were copied from an extant fireplace of the period located at Fort McHenry in Baltimore, Maryland. A photograph dating to the 1895–1900 period in the collection of Harold E. Vanderwater of Minneapolis, and also in the Minneapolis Public Library's Edward A. Bromley collection, shows the end wall of the commissary-warehouse (adjacent to the Hexagonal Tower) with its fireplace still intact. It confirms the proportions utilized in reconstructing the schoolhouse fireplace.

During the archaeological examination of the schoolhouse, the crew encountered quantities of sand-float, or rough sand, plaster which had been applied directly to the masonry on the interior of the building. (One lump of plaster bore no fewer than nine separate layers of whitewash!) This method of applying plaster directly to the masonry leads to continual maintenance problems in Minnesota and thus was not used in the reconstruction.

The writer had the stone in each wall reduced six inches in thickness. A balloon frame structure was built inside the stone, and wire lath was applied to it. When plaster was applied to the lath, the walls returned to their original thickness and appearance. The resulting air space not only keeps the plaster from flaking off the

walls as the masonry sweats and freezes in the spring and fall, but it also provides an insulating layer of air.

Before beginning quarrying operations, we scrutinized the old stones in the Round and Hexagonal towers. No stones in the two extant structures bore drill marks indicative of blasting during the quarrying process. It was concluded, erroneously, that blasting had not been used at Fort Snelling in the 1820s. We reasoned that the local Galena-Platteville limestone is so prone to spalling, or chipping, along its deposition lines that the builders of the fort realized quite early that blasting ruined the stone for construction use. This theory was disproved, however, when some stones excavated in the schoolhouse foundations were discovered with holes made with star drills to accommodate the blasting charge. Nonetheless, modern quarrying techniques have proved so efficient and economical without blasting that we have continued to use them. The city of St. Paul and the Webb Publishing Company have graciously allowed us to quarry stone on their property and thus have helped make the reconstruction of the fort economically feasible.

The eaves of the schoolhouse have been painted with exterior-grade latex paint to simulate whitewash or white lead which, mixed with linseed oil, was also used at the fort. The lintels above the doors and windows were planed and scored with ax and chisel to simulate broadax markings. This was not altogether successful, so all lintels have been adzed or broadaxed since 1967.

The soldiers who built Fort Snelling dug a well 24 feet deep. At that depth, Snelling reported, "the water rushes in through a fissure in the rock." In his 1835 report to the quartermaster general, McClure stated that the well could supply drinking water for 125 men at most seasons of the year. By 1863 the wellhouse was no longer extant. The surgeon general's report of 1870 stated that until recently the post had been supplied with water from the "spring half a mile above." The report noted that water was currently being pumped from the Minnesota River to a reservoir, but it contained too much rotting vegetable matter and was fit only for washing. Drinking water continued to be hauled in tank wagons from the Camp Coldwater spring.⁸

Unfortunately, the sole photograph of the well yet found dates only to 1860 when the Minnesota State Fair was held at the fort. The picture lacks sufficient detail to have been of real aid in redesigning the wellhouse. The first rebuilt wellhouse was too elaborate. It included much more detail in the eave soffit (underside) than would have been installed initially on such a utilitarian structure. In addition, lack of quality control led to the use of rough rotary-sawed lumber, which was not employed prior to the 1830s. The well-

⁸Josiah Snelling to Jesup, August 16, 1864 (copy in the society), and McClure to Jesup, March 1, 1835, both in NARG 92; War Department, Surgeon General's Office, *Report on Barracks and Hospitals with Descriptions of Military Posts*, circular no. 4, p. 369 (Washington, December 5, 1870).

house was revised in August, 1969, prior to a visit to the fort by people attending the annual meeting of the American Association for State and Local History in St. Paul. The structure's proportions were altered, and the exterior was remodeled into a more functional appearance. Cover doors were installed to keep out trash.

The prototypes for the remodeling were wellhouses in the Yorktown and Williamsburg, Virginia, areas, as well as those in a number of other restorations. As such, the wellhouse at Fort Snelling is a composite, based largely on wells of the Revolutionary War period to about 1810. The writer believes, however, that it is probably much closer to the original than the 1966 effort.

THE ROUND TOWER, which had been the first structure excavated at the post (in 1965), was the last building restored in the 1966 restoration-reconstruction program. If restoration work on the tower had not commenced when it did, it is possible that a large segment of the outer parapet might not have survived. Water from a leak in the roof had collected inside the wall. When it froze, it forcibly bulged a section almost to the break-out point. It was necessary to replace this section, although restoration was less damaging than the uncontrolled natural action would have been.

The Round Tower in the course of its 150-year existence has endured numerous modifications. Most of these have interfered with the structural integrity of the building, and in many respects we are fortunate in being able to count it among the four extant original structures. In 1862 the tower was modified by raising the parapet and installing a silo-type (conical) roof. The higher side walls created a usable third floor.

In December, 1869, a fire gutted the Round Tower and the adjacent Civil War commissary-warehouse and prompted a conscious effort to restore the badly damaged circular landmark. After the tower was thoroughly cleaned and inspected to determine whether it could be salvaged, it was remodeled about 1870 or 1871, and the roof again became a weather deck. This was a time when romanticism still flourished and Sir Walter Scott's *Ivanhoe* was popular. The engineer responsible for the remodeling pulled sections of the added parapet out to form the medieval-appearing embrasures, or crenels, which three generations of Minnesotans have associated with the Round Tower.

In 1938 and 1939 the WPA, in conjunction with the Minnesota Historical Society and the army, changed the Round Tower from a residence (the post electrician, Thomas Marcum, his wife, and family lived there and had to move) to a museum. This was the last remodeling of the tower until the 1966 enterprise.

Research for the present restoration included tracing back the numerous modifications to establish how the interior of the tower looked originally. While examining the walls for any additional structural information, the author discovered the burned ends of seven floor joists still in the original joist sockets. The beams were not original to the structure, as they were rotary-sawn. In 1835 McClure had recommended the replacement of roofs and floors in a number of the post buildings because of the poor state of preservation. A great deal of this work was done by 1845, including the rebuilding in stone of the officers' quarters and the long barracks. The original wood, being unseasoned, apparently deteriorated quite rapidly and had to be replaced after a time. The account books of carpenter William R. Brown for the Civil War period indicate that he worked installing new floors in the barracks at Fort Snelling.⁹ Close examination of the joist sockets showed that the beams had been installed in a radial pattern. The outer ends were on approximately 7-foot centers and the extant beam ends were 6 inches by 8 inches. The spacing indicated a total of 16 beams.

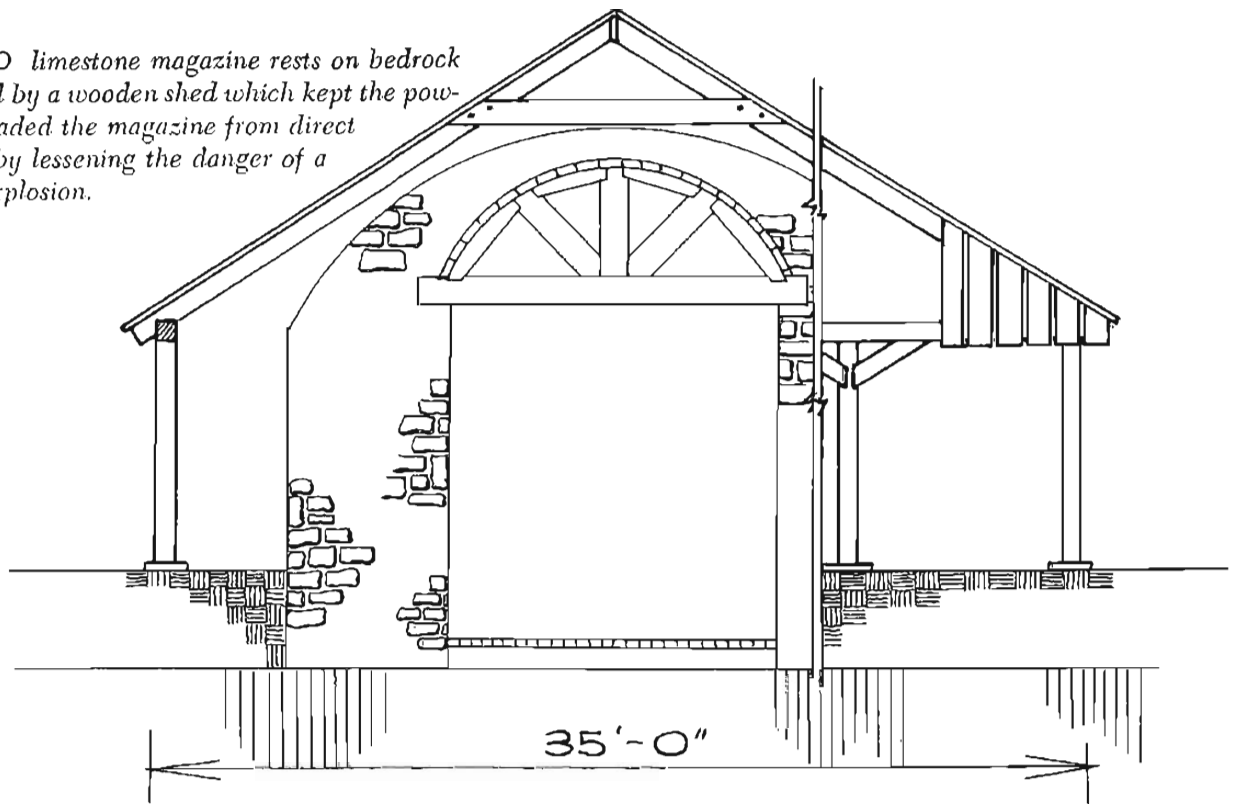
With that information it was possible to extrapolate the dimensions of the central column. A minimum di-



AFTER WORLD WAR I the Round Tower housed offices and quarters before it was converted into a beauty shop and family residence. The post electrician and his wife lived in full 1930s comfort within the curved walls.

⁹The Brown account books are in the possession of the author's mother, Mrs. Clarence H. Johnson of St. Paul. Brown, a great-great-uncle of the author, also was a pioneer farmer in the Red Rock area and left a diary that has been published. See Rodney C. Loehr, ed., *Minnesota Farmers' Diaries* (St. Paul, 1939).

THE VAULTED limestone magazine rests on bedrock and is sheltered by a wooden shed which kept the powder dry and shaded the magazine from direct sunlight, thereby lessening the danger of a spontaneous explosion.



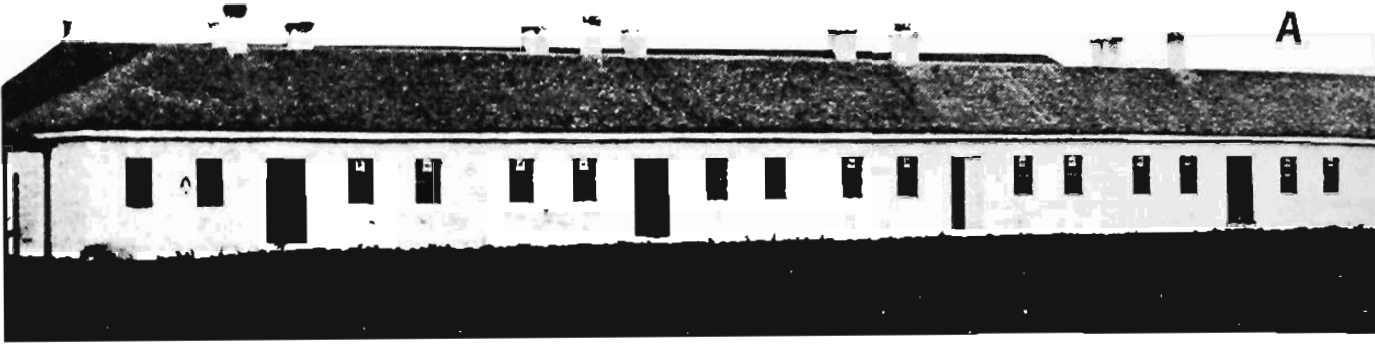
iameter of six feet was determined as necessary to support the floor and roof joists, as well as a flagstaff seen in historical photographs. The central column also supported the spiral staircase leading from the ground to the first floor. This staircase could not be installed from the second floor to the roof because of the difficulty in making a weather-tight scuttle (lidded opening) for the roof. For this reason a steep staircase and a low, ship's-type hatchway were erected on the roof. There is no pictorial or written confirmation of this design, but it does seem the only logical solution to the problem.

Photogrammetry was used to establish early exterior ground levels and the heights of the Round Tower and adjacent wall. One photograph, probably dating from the mid-1870s, was selected from the society's collection because of its clarity. A second photograph was taken from almost the same spot in the early spring of 1966. Measurements of two unaltered gun slits were made, as were measurements of several identifiable stones. Enlargements of the two photos were made and keyed together. With these pictures and the known dimensions of the slits and stones, it was a simple matter to calculate the height of the gun slits above grade (ground level). By coupling this information with further study of the tower's interior it was possible to determine the presence of a fire step around the circumference of the tower and its probable height and width.

RECONSTRUCTION of the magazine was undertaken in 1967. The structure had been completely excavated by John Callender, who reported his findings in a booklet, *New Light on Old Fort Snelling*: "One of the most curious structures unearthed . . . was the magazine which once housed all the post's major ordnance and related military supplies. The building was, throughout the course of excavation and research, something of an enigma.

"Only one photograph, dated 1863, showing the entire structure of the magazine has been found. Another taken from the top of the Round Tower about 1861, and a drawing dated 1855 made from the same point, show the roof of the magazine in the foreground, but from these we learn only that the building had a gabled roof covered with shingles. Maps indicated, and the excavations subsequently disclosed, that the magazine was rounded at the southeast end. No reason for this semicircular shape was discovered, and no conjectures will be offered.

"The foundations have a semibasement about thirty inches deep and twelve by twenty-four feet in size. What appears to be a short flight of irregular steps descends into the southeast end of the basement. Twelve square openings were found in its walls, probably for drainage. . . Only two musket balls were discovered within the magazine, but it is known that in 1834, the structure contained 7,749 musket flints, 1,825 pounds of musket powder, and 1,513 pounds of



THIS 1863 PHOTOGRAPH was used extensively in the restoration. Although the Round Tower (e) appears with a conical roof added during the Civil War, the hospital (a), guardhouse (b), schoolhouse (c), and sutler's store (f) were essentially unchanged. Included is the best existing view of the magazine (d).

rifle powder for the use of the infantry alone. . . ."¹⁰

As the 1966–67 excavations of the post progressed, it could be readily seen that some of Mr. Callender's observations and interpretations were open to revision. In the light of photogrammetry and evidence from digging the extreme easterly ends of the guardhouse and the schoolhouse, it became apparent that Mr. Callender had not allowed for the usual demolition practice of tearing foundations of building anywhere from a foot to two feet below grade level. In his excavations he had taken the top soil down to the level of the remaining foundation and called this "parade ground level." This led to a number of misconceptions, including his published interpretation of the magazine structure: "While the only existing pictures of the magazine show it standing on level ground, the excavations disclose that its northwest end had originally been cut into the rock formation. Thus the actual appearance of the powder magazine at old Fort Snelling must remain, perhaps forever, something of a mystery."¹¹

In fact, the square openings in the foundation walls were not drain holes, as Mr. Callender thought, as they provided no egress from the sunken area they supposedly drained. Their placement, when viewed with the steps, indicated that the holes were joist sockets. With the addition of two inches in height, they come out to a floor equal to the top of the lowest step.

Extensive research was done with photos and blueprints of existing magazine structures from the American Historic Building Survey Series. The writer visited a number of magazine structures on the East Coast and, although he found nothing similar to the construction of Fort Snelling, gathered a great deal of information. Coupled with Major Stephen H. Long's descrip-

tions of three extant magazines in 1817 — those at Fort Crawford in Prairie du Chien, Fort Armstrong in Rock Island, and Fort Bellefontaine in St. Louis — this material provided a great deal of insight into the building techniques utilized on the frontier.¹² In general, the points of difference between the frontier magazines described by Long and the Eastern examples were dictated by available materials. Two of the magazines Long examined had vaulted roofs, with the cribbing that was necessary to the original laying up of the vault left in place. The third was a small structure, six feet in amount of span. Such a small span does not require permanent cribbing.

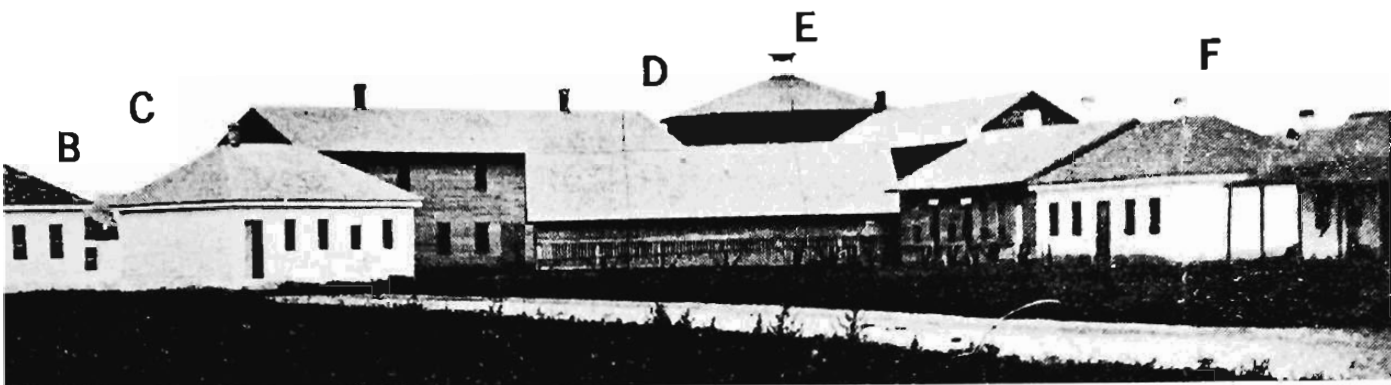
The barrel vault roof of the magazine at Fort Snelling is supported with timber cribbing. This corresponds to Long's descriptions of Fort Crawford and Fort Armstrong. Apparently this was the frontier practice, possibly necessitated by the use of rough stone and hand-fired mortar. In the more formal magazines in the East, where brick work was used, the vaults were commonly freestanding. (Fort Washington in Silesia, Maryland, is a fine example of this.)

The walls of the Fort Snelling magazine, which are six feet thick, are pierced with three paired ventilation ports. In brick magazines these are built on a straight, horizontal line through the thickness of the wall. In the middle, the air passage divides to pass on either side of a column which effectively blocks the straight passage through the wall. This is easily built with the use of uniformly sized building modules such as bricks. The zigzagged ventilation ports seem to have been more common when materials of irregular size and shape were used.

¹⁰ John M. Callender, *New Light on Old Fort Snelling: An Archaeological Exploration, 1957–58*, 34 (St. Paul, 1959).

¹¹ Callender, *New Light on Old Fort Snelling*, 35.

¹² Long recorded his observations in his 1817 journal, entitled "Journey from Prairie du Chien to the Falls of St. Anthony," Long Papers, in the Minnesota Historical Society.



The magazine at Fort Snelling was built of Platteville limestone in random ashlar-rubble stone, patterned after the stonework in the Hexagonal and Round towers. Perhaps the most interesting structure at the post, the magazine was designed to store gunpowder and other ordnance supplies. Black powder of the type once stored at Fort Snelling is a chemically unstable mixture that has to be kept dry and at as uniform a temperature as possible. The shed roof keeps the sun from beating on the stone building and, being raised above the structure, allows for free circulation of air for additional cooling.

As mentioned previously, the magazine's walls are six feet thick to support the barrel vault roof. At the center the vault is about eighteen inches thick. This is one of the safety features designed into the building, as is the small semicircular blast chamber through which one enters. If an explosion had occurred within the magazine, the first force of the explosion would have gone outward through the door, which is the weakest part of the building. It would then have been deflected upward by the semicircular wall which is covered only by the shed roof, some distance above the height of the wall. As the force of the explosion continued to build within the structure, the top of the vault, being thinner and weaker than the walls, would have been blown upwards. Thus, the main force of the explosion, having been contained by the thick walls, would have been forced to go straight up. This protected any soldiers in the open from the immediate blast effect, and presumably they could have put their hands over their heads and run for cover before things started coming down again.

The blast wall or semicircular chamber at the entrance is reflected in a number of the more formal magazine structures in the East, where deep earthenwork walls surrounding the entire magazine were erected to contain and direct upward the force of an explosion.

The magazine floor was made of oak planks, hand-adzed and secured to the floor beams with wooden

pegs. The pegs were both glued and press fit. No nails were used. This prevented sparks from being struck from the iron hobnails in the soldier's boot soles and heels. The interior of the structure was painted white to reflect any light coming through the doors. Because more than a ton of gunpowder was stored there, no one wanted lanterns or candles in the magazine.

At present the interior of the magazine remains unfinished. A large electrical conduit runs diagonally through it and furnishes power to the buildings occupied by the Veterans' Administration. Now that the state of Minnesota holds title to these properties, perhaps the cable can be rerouted in the foreseeable future. At the same time proper steps into the magazine interior may be constructed. Flooring may then be installed in the semicircular entry and a copper-clad door placed on the main structure.

EXCAVATIONS on the Round Tower-Pentagonal Tower wall axis commenced in April, 1968. Several straddle trenches were dug in the lawn area between Building No. 14 erected in the 1860s and Tower Avenue, dating from the late 1870s and now partly removed. A large backhoe removed the concrete and building block roadbed from the street and a small caterpillar-bulldozer was used to expose the wall foundations. At one point it appeared that the wall would intersect with Building No. 14. A slight curve in the foundations at a point 235 feet northeast of the Round Tower brought the wall roughly parallel to the front of Building No. 14 for the remainder of the 375 feet exposed in 1968.

This wall extension exhibited no abutting building foundations along its length. It is known, however, that a frame structure identified as a gunshed was located along the wall in the immediate area of the Round Tower. This site was not examined archaeologically as the shed was not one of the original structures within the fort. A second building, the rear enclosure of the sutler's store, probably abutted the fort wall at both 148 feet and 188 feet east of the Round Tower. The

presence of a large modern storm sewer, running inside the fort wall and parallel to it, has completely obliterated all trace of this.

The wall was restored using the same footing and concrete spine arrangement employed on the Round Tower gatehouse extension previously described. The wall was partially faced with limestone in 1968 and was completely faced during the 1969 construction season. Provision to place pickets along the top of this wall was made, although they have not yet been installed.

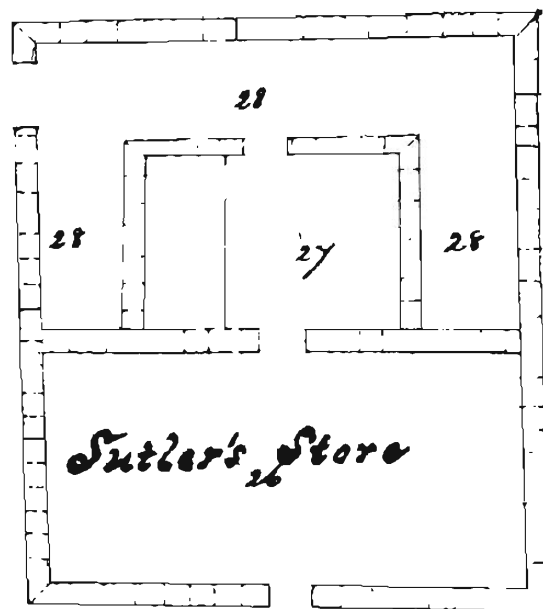
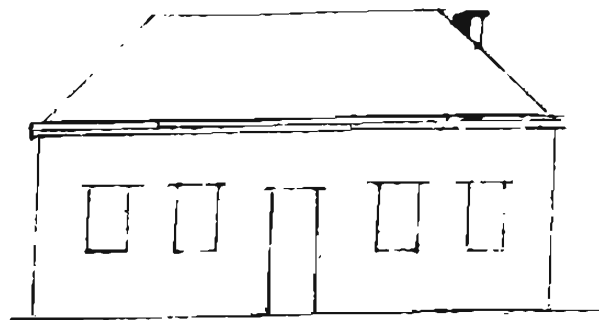
SNELLING DESCRIBED the sutler's store as similar in size and appearance to the schoolhouse. McClure's report contained both a floor plan and an elevation drawing of the store. The floor plan shows a lean-to butting against the back of the building, as well as two curtain walls, extending from the rear corners of the structure to the Round Tower-Pentagonal Tower wall extension. It is not clear when the lean-to and the rear enclosures were built. The writer believes they were added to the original main building sometime between 1824 and 1835.¹³

Photogrammetry, based on what is perhaps the best extant photograph of the sutler's store, yielded window, door, and over-all elevations and dimensions. The 1864 view indicates that the sutler's store and the schoolhouse had the same vertical elevations. The sutler's store was 11 feet from grade (ground level) to its eaves. Roof height, eaves to ridge, was an additional 8 feet (the foregoing figures are within 3 inches plus or minus). The roof was of the hipped variety, with a pitch of 1 foot vertical rise to 1.5 feet, horizontal extension. The eaves projected about 9 inches beyond the wall. Thus the length of the roof, over the end eaves, was approximately 41 feet, and the ridge length was approximately 17 feet 3 inches.

The archaeological excavations showed that the foundations were 39½ feet by 21½ feet in outside dimensions. The wall thickness below original grade ranged between 22 and 30 inches, with an average of approximately 24 inches.

Structurally, the sutler's store is the least sound of the buildings excavated to date. This observation is based on the fact that out of a total circumference of 102 feet, only 48 feet of the foundation rested on bedrock. The remaining 55 feet of wall foundation rested in black loamy soil as much as 2 feet above bedrock. The limestone caprock under the sutler's store has a 10-degree slope to the southeast.

A stone threshold approximately 3 feet by 6 feet was found centrally located along the facade of the building. This correlates with the door location as shown both by the McClure drawing and the afore-



THIS ELEVATION AND PLAN of the sutler's store were taken from McClure's 1835 report, which proved helpful despite the misplaced fireplace.

mentioned photograph. The facade bore a center door flanked by two windows to either side. The door opening appears to have been 3 feet 3 inches by 7 feet 3 inches, while the windows were approximately 3 feet by 4 feet 9 inches. Spacing appears to have been regular.

The stone walls of the structure were of the random ashlar-rubble stone construction typical at Fort Snelling. Inside the building a central H-shaped fireplace was located between the front and back doors. Its base was roughly 6 feet by 8 feet. Although the fireplace base had been torn down below hearth level, the concentration of artifacts recovered would appear to indicate a throat facing each end of the building.

Photographic evidence shows that there were no

¹³ Snelling to Jesup, August 16, 1824, and McClure to Jesup, March 1, 1835, both in NARG 92.

windows on the end walls of the store and, in the opinion of the writer, no windows on the back wall of the structure. There is no corroborating evidence for this opinion other than the construction of a lean-to against the store's back some time between 1824 and 1834. The writer thinks also that a blank back wall would have facilitated more shelving within the store and greater security for the sutler's goods.

The building interior seems to have been plastered or stuccoed with mortar and whitewashed many times. This was indicated by quantities of whitewashed mortar recovered during the excavations.

In order to save time, the structure was rebuilt from the construction drawings prepared for the schoolhouse. The modifications to this were the placement of the door, central fireplace, and the back door, as well as the exclusion of windows on the back wall. Other than these variations, the details in the frame structure and in other regards are the same as in the schoolhouse.

THE PENTAGONAL TOWER was reconstructed in the 1969 season. This structure had as little documentation as the magazine. There is only one close-up photograph of the tower in the historical society's collection. The picture was erroneously titled "Valley of Minnesota," as it was taken from a position just up the Mississippi River bluff from the Pentagonal Tower and only shows the Minnesota River confluence at the extreme downstream end of Pike Island. The picture does, however, yield much valuable information. It shows the outer part of the tower and reveals the following points: the cannon ports were not sited to provide anything but enfilade fire down the fort's walls; the two facades facing outward across the Mississippi were provided only with musket slits; the amount of batter or inward slope to the walls of the structure; the angle of pitch and amount of overhang in the roof; the appearance of the cave soffits; and the random ashlar-rubble stonework.

The area of the Pentagonal Tower had been virtually destroyed by a number of intrusive sewer and power line trenches which had been extended through it. We were fortunate enough to have uncovered segments of the foundations sufficient to indicate the widths of the base wall (containing door) and adjoining side walls and the angles of their joining. This enabled us to project the length of the base wall although only one intact corner of the structure remained. Our excavations also revealed the junction point of the Round Tower-Pentagonal Tower wall extension with the Pentagonal Tower and the base of the circular central column. A 12-foot section of the wall which ran between the Pentagonal Tower and the half-moon bat-

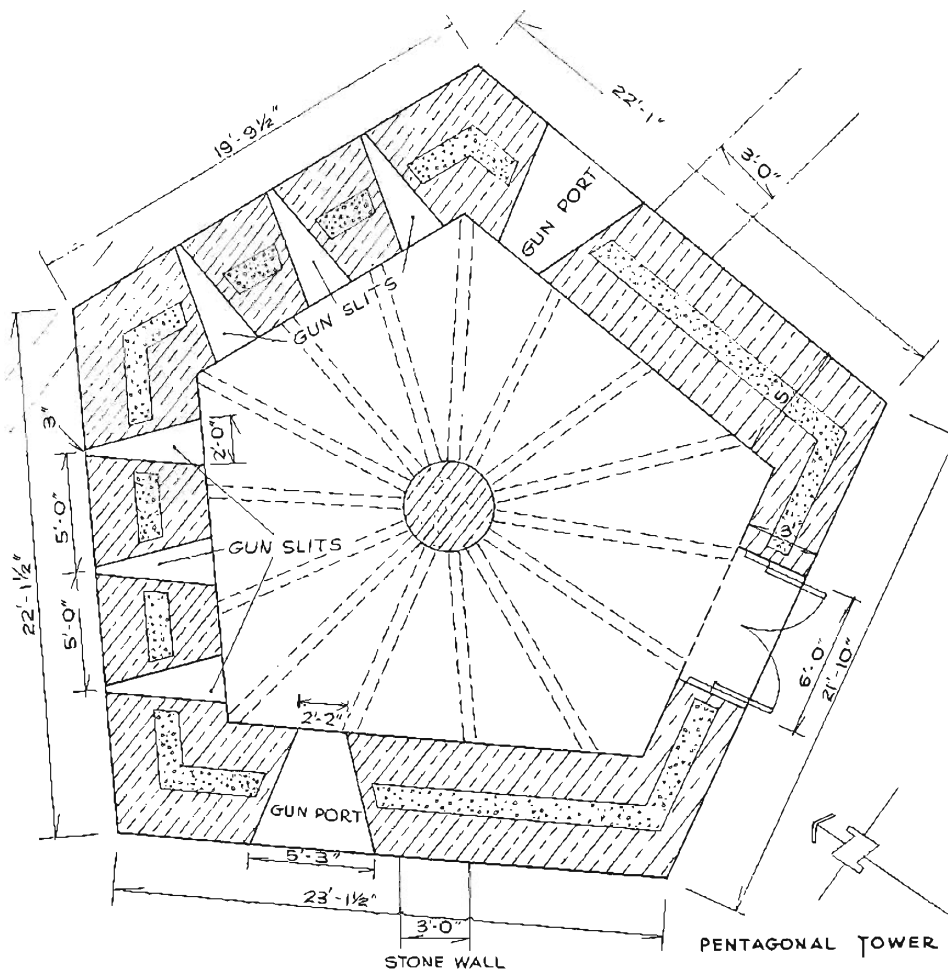


THIS NINETEENTH CENTURY scenic panorama, perhaps only incidentally including a close-up of the Pentagonal Tower, provided otherwise unknown information about roof pitch and placement of gun slits.

tery allowed us to project the junction point between this wall and the east side of the Pentagonal Tower.

This information, along with a copy of the archaeological field map, was given Brooks Cavin of Minneapolis, our consultant architect. Mr. Cavin proceeded to have construction drawings made in August, 1969.

Because the Mississippi River bluff had eroded a number of feet since the original tower had been built, Mr. Cavin provided massive reinforced concrete footings with a reinforced concrete central spine to furnish additional structural integrity to the building. The footings are the full width of the structure's walls, 5 feet, with the exception of the wall with the door open-



A PLAN of the Pentagonal Tower adapted from the architect's drawing

ing which was archaeologically verified as being only 3 feet thick. The concrete wall spine was heavily reinforced and firmly anchored to the footings.

As no photographs showing any detail of the gun ports in the Pentagonal Tower were available, they were rebuilt according to the pictorial evidence for the westward gun port in the Hexagonal Tower. The unique configuration of that gun port was dictated by its having been situated to fire out at a low height above the general grade level. The other four gun ports in the Hexagonal Tower were situated three stories above grade.

The reconstruction followed the specifications provided in the drawing of the Pentagonal Tower. The concrete wall spine was faced with stone; the gun port lintels were adzed to shape; and the floors were rebuilt of hand-adzed oak planks in random widths. Purlins in the roof were surface-treated with a chain saw to simulate pit-saw markings.

The roof of the structure is covered with cedar shakes, split and resawed, as are the other structures at Fort Snelling. Hinged gun port covers were installed during the spring of 1970. There is no specific informa-

tion about their installation and fastening, so "of the period" methods of application were employed. The gun port covers and doors are made of rough hand-sawed white cedar, glued and nailed on either side of a piece of $\frac{3}{8}$ -inch waterproofed plywood (the edge of the door has a wood "dutchman" glued in place to conceal the plywood edge). The doors appear to be two-layer planks but are very sturdy. Hardware was manufactured at our temporary blacksmith shop.

The outer point of the tower is now within a foot of the cliff as a result of erosion. To prevent anyone from attempting to walk along this narrow ledge, several sharpened iron bars were installed in the masonry with the points sloping downward at an angle sufficient to discourage their use as ladder rungs. These points or bars were hand-forged from mild steel to give them the appearance of being original to the tower.

THE HEXAGONAL TOWER is probably the least modified of the four remaining original structures at Fort Snelling. This is merely a statement of degree, for the original roof and floors were replaced between 1835 and 1845 and again about 1904. During the latter

remodeling the floors were not replaced on radial beams as they had been originally, and the roof was covered with slate. The gun ports were shuttered, and glass windows were installed in the musket slits. The entire structure, interior as well as exterior, was re-pointed with broad smears of portland cement and then trowel-struck to simulate coursing. Photographs of the structure taken just prior to this rejuvenation show the building in a state of disrepair. Even a stone lintel over the door had broken and sagged. In 1966 the structure was used by the Veterans' Administration to house an electrical transformer.

Considerable fill has been placed around the Hexagonal Tower. This alters its appearance and must be removed. The earth on the west and southwest faces was partially excavated in the summer of 1970 as workmen dug the shop complex and the remainder of the Round Tower-Hexagonal Tower wall extension (approximately 178 feet, excluding the gatehouse). The original grade on the western side was discovered 12 feet down. The fill along the east and northeast walls of the tower will be taken away when the historical society restores the 1820 commissary building.

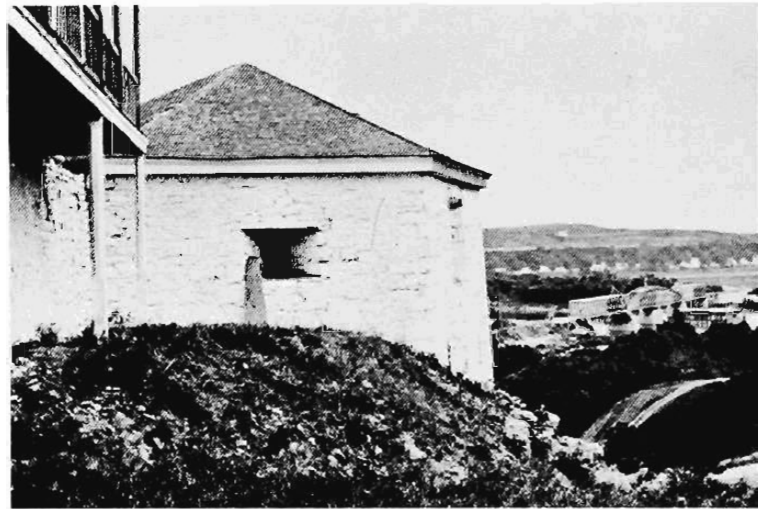
The Hexagonal Tower is a six-sided structure, three stories in height. The top floor (above grade on all faces) had five gun ports. The next two decks down had only musket slits, above which are lintels of what appears to be original lumber. These have been attacked by beetles in the past. Close examination of the lintels and of the stone walls on the interior revealed traces of whitewash, indicating that the entire inside had been whitewashed some time ago. The interior of the Hexagonal Tower revealed its later alterations more readily than did the exterior. The central column had been partially removed in 1904 when the army remodeled the building. The ground floor had been replaced with cement, and the second and top floors had been replaced with the beams in a rectilinear grid. The central column had been torn down to a point below the modern top floor where it served as a support post for the top floor. A quarter of the ground floor had been taken up with a room that housed the transformer. A wooden stairway descended along the northeast wall and obstructed the musket slits on that side, a condition that never would have been allowed originally. In addition, a small hand-operated elevator had been installed with an open shaft, protected only by guard rails, in front of the entrance on the top floor.

After the cement floor in the bottom of the tower was removed, archaeological investigations brought to light a number of things. The area beneath the ground floor had been used as a dump for obsolescent military stores and food remnants — probably from the officers' quarters. The latest materials recovered were from the

1890–1900 period, although much earlier material, including gunflints, was also recovered.

The joist sockets for the ground-floor level were uncovered in the base of the central column. Some of the sockets contained very rotted beams. As the excavations continued, it was found that the west, north, and north-east walls rested on bedrock which dropped off rapidly to the south. The southern three walls of the tower were built on a stone platform which extended outside the building on its south and southeast faces. The area immediately inside these faces had been open at one time. This was shown by whitewash traces on these faces to a depth of 4 feet below the floor level. The writer conjectures that this space probably constituted a small ready magazine of powder to serve the two twelve-pound cannon on the top floor. This space was probably accessible only through a trap door.

The smear-pointing was removed from the structure both inside and out. The original mortar was raked back quite deeply, and the entire structure tuck-pointed, inside and out, with a high lime content mor-



THE HEXAGONAL TOWER'S west gun port was copied for the Pentagonal Tower ports. It was constructed differently from the other ports because of the ground level over which it was to fire.

tar. This stabilization was necessary because the original mortar crumbles into loose sand when struck or even squeezed in the hand.

The lintel had to be removed from only one musket slit, which was in a state of semi-collapse. The floors in most of the musket slits had to be replaced because the limestone had rotted and scaled from water lying in them and freezing and thawing over the past 150 years.

When the broadly smeared portland pointing had been removed, the original beam sockets in the outer

walls became apparent. The wooden floors were replaced at the proper height and positioning. The mortar original to the building has a warm pinkish-brown cast that is readily distinguished from later modifications. This is one of the points of difference in the overall appearance of the restored or reconstructed buildings. The decision was made to use a high lime content mortar that dries to a whitish gray color rather than to attempt to color it artificially to a shade more nearly like that of the original. Influencing this decision was the virtual impossibility of achieving a reasonably uniform color in various mortar batches and of blending colors when repointing becomes necessary.

All early photographs of the Hexagonal Tower indicate that the gun port lintels were squared timbers. In 1969, while the building was being prepared for restoration and the installation of the roof, the discovery was made that the original timbers had been removed. The wooden lintels had been replaced with sections of railroad track that were covered with stucco. During replacement of the original lintels, the masonry above them had been torn out and supplanted and the one gun port on the west wall of the tower had been reconfigured to match the other four apertures. The gun ports have been rebuilt with wooden lintels adzed to the original configuration. The roof pitch and soffit treatment are patterned after photographs, which regrettably date after the first reroofing of the Hexagonal Tower. Because of an absence of earlier drawings or

paintings giving sufficient data to aid in restoration, it was necessary to work from the information in hand. Building techniques had not yet changed greatly, so it is reasonable to assume that the first reroofing strongly resembled the roof as originally built.

During the spring of 1970 the interior of the Hexagonal Tower was restored to its original configuration. And throughout the summer, while sesquicentennial events drew numerous visitors to the fort, archaeological excavation continued. So did other investigation — inquiry into proper furnishings for the buildings as well as broad-spectrum research into the history of the fort. Over-all planning for a full interpretative program at the fort also advanced. This backgrounding is essential for the considerable work still to be done before the entire fort crowns the bluff above Pike Island as it once did. It is to be hoped that, given continued legislative support and adequate staffing, smooth and steady progress can be made toward completion of the reconstruction of the fort advocated by General Mason seventy-five years ago.

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