

**SPRINGFIELD ARMORY
NATIONAL HISTORIC SITE**

Springfield, Massachusetts

**BUILDING 19
HISTORIC STRUCTURE REPORT**

Volume I.

Text and Bibliography

DRAFT

By

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PREFACE

Historic structure reports are cultural resources planning documents required by the National Park Service's standard of operation (NPS-28), when any intervention is planned for an historic structure under Park Service jurisdiction. Although currently owned by the Commonwealth of Massachusetts and administered by Springfield Technical Community College (STCC), Building 19 is located within the boundaries of the National Historic Site (SPAR NHS) and it is therefore subject to NPS review and technical assistance through a 1978 cooperative agreement. STCC has proposed to rehabilitate the building into a technical/industrial education center. Funding to assess the feasibility of the college's proposal was obtained through a U. S. Congressional appropriation administered by the NPS. The research and preparation of the HSR, by the Cultural Resources Center of the North Atlantic Region (NPS), is the first step towards assessing the feasibility of Building 19's proposed reuse. The primary goal of the HSR has been to identify the character-defining features (CDFs) of Building 19. To accomplish this end, a survey of existing appearance and research into the building's historical evolution was required. A detailed description and inventory of those features identified as character-defining was mandated as well. The HSR of Building 19 includes four chapters with supporting illustrations, bibliography, and appendices. The four chapters are; Administrative Data, Architectural History, Architectural Description, and Character-defining Features with Recommendations. A few explanatory words about the draft report follows.

* * *

This report represents an unedited draft. It is considered a working document and notice of any corrections or additions would be appreciated by the authors. Like all HSRs, this report has had its share of complications impacting both the content and format of the draft.

Impacting the existing appearance survey of the building was the sheer size of the building, poor lighting conditions, inaccessibility to many areas because of debris, and hazardous physical conditions including large amounts of animal waste. Consequently, the report is uneven in content with some sections more detailed than others.

Impacting the format of was the difficulty in obtaining historic images and assistance with lighting for existing condition photographs until the final hours of the project. Time constraints did not allow an integration of the illustrations throughout the report. A second separate volume for illustrations was therefore created. As this preface is being written, some photographs remain outstanding and may require the use of contact sheet images in the report if they are not received by the time of transmittal.

In addition, the report was prepared on separate word processors with incompatible software and print styles. This fact complicated the project immeasurably, not only in added hours of work, but in the final appearance of the draft.

ACKNOWLEDGEMENTS

The authors of this historic structure report wish to express their appreciation to those individuals (and organizations) listed below who have given time and support toward the accomplishment of this end.

To Richard C. Crisson, our colleague at the Building Conservation Branch, for his collaboration on the Character-defining Features chapter and for his authorship of the Mechanical Systems section of the report.

To Barbara Aubrey, Dru Bronson-Geoffrey, and Stan Skarzynski members of the Springfield Armory Museum Collections staff at Springfield Armory National Historic Site (SPAR NHS). Their assistance in locating pertinent documents and in processing historic illustrations and drawings was invaluable. A special note of thanks goes to Dru for her photocopying of microfilm and endless retrieval of drawings and photographs.

To the administrative staff of SPAR NHS for kindnesses extended to us during our visits to the Armory, especially to the acting superintendents of the site during the project, Eleanor Pratt and Larry Lowenthal.

To the security staff of Springfield Technical Community College, under the direction of Chief Frank Peruse, for their generous cooperation in providing access to Building 19.

To Maggie Hamburston of the Connecticut Valley Historical Society for her prompt assistance in securing photographs of maps from the Society's collections.

I. ADMINISTRATIVE DATA

BRIEF ARCHITECTURAL DESCRIPTION

A. Setting

Building 19 is located in the northwest corner of Armory Square. Armory Square is one of several units that comprised the full Springfield Armory complex in Springfield, Massachusetts. Armory Square occupies a 57 acres hill-top site and is bounded by State, Federal, Pearl and Byers Streets. There are over 30 buildings in Armory Square, one third of these surround the 8.75 acres parade green. Originally, Building 19 formed the northern boundary of Armory Square as part of the "Hill Shops." Today, two modern structures lie between Building 19 and the northern edge of the grounds. Building 32 is located along the north elevation with Building 28 and 28a constructed partially on the northern slope of the hill-top site. The south elevation of Building 19 is dominated by an asphalt parking lot that has largely replaced any original green space around the building.

B. Exterior

Building 19 is a two-story timber and brick building with a partial basement beneath bays 109 - 116. The building measures 764 feet long by 55 feet wide. The building is oriented on an east/west axis with the principal entry through the west gable end. It was built of brick with sandstone details and presents a long, narrow, gable-ended, rectangular form. The low pitched roof is covered with slate and features four conical copper ventilators. The two-dimensional flatness of the walls is punctuated by the rhythmic simplicity of semi-circular arches on the first story and segmental arches on the second story. Decorative treatments are confined to the corbelled cornice, and to the surrounds of wall openings.

Stylistically, Building 19 exhibits both Greek Revival and Italianate characteristics while maintaining a utilitarianism appropriate to an industrial storehouse. Spare lines, symmetrical fenestration, and a gable-ended entrance are typical of Greek Revival buildings. The repeating arches of the first story, and the hierarchy of a semi-circular opening surmounted with a rectangular opening are typically Renaissance (Italianate) in design.

The walls are visually divided into bays of equal dimensions. North and south elevations each contain 58 bays. Bays consist of semi-circular arched openings on the first story surmounted by segmentally arched openings on the second story. Several of the original semi-circular arches have been altered and today contain rectangular openings. Treatment of semi-circular arches include either louvered blinds or wood panels surmounted by a glazed fan-light. First-story arches are visually tied on the exterior by the continuum of raised imposts at the springline of all arches. Modern rectangular openings on the first story are open or contain garage doors. Segmentally-arched openings are either filled with louvered blinds or double, fixed-sash windows with 40 lights. Second-story openings contain tooled sandstone sills. East and west elevations consist of 3 equally-dimensioned bays. All bays except the basement level at the east end feature semi-circular arches with glazed fanlights and either fixed sash windows or louvered blinds. On the east end, the basement level features three segmentally-arched openings now filled with brick. A metal door in the middle bay provides access into the basement.

C. Interior

The organization of the interior space of Building 19 mirrors the uniform, repetitive bay system of the exterior elevations. The longitudinal axis of the building is divided into 58 bays. The bays are not partitioned-off, but are defined by the exposed structural system. (Use of bay divisions within the plan adapted easily to a labeling system for bay identification.) Nine brick partition walls break up the interior space. On the first story, a center aisle runs the length of the building from the west end to bays 99/101, 100/102 where a vehicular passageway interrupts the plan. Bays 103-116 feature intermediary walls creating an arrangement of large and small rooms used for maintenance and machine shop work. Likewise, at the west end, the introduction of an electric substation (1954) and a radiographic laboratory (1960) chopped up the original space of bays 1-12 into smaller areas. On the second and loft stories, the center aisle runs uninterrupted from west to east ends of the building.

The structural system defining the bay organization of the plan consists of masonry load-bearing walls complemented by semi-circular arches with wood columns and posts supporting second-story and loft joists. A queen-post truss system frames the roof. On the first story, timber framing is augmented by a substantial structural steel system. Circulation within the building depends on stairways at bays 36 and 96 and freight elevators at bays 32, 60, and 97.

D. Function

The function of the building was well served by the organization of both the exterior and interior features. On the exterior, louvered blinds provided sufficient ventilation. Extensive glazing provided sufficient light for interring and retrieving materials. Limited access to the building through only the west end, and perhaps one or two doors on the south elevation, insured the security of the stored goods. The division of the interior space; a center aisle flanked by bays; maximized the storage capacity of the building and was well suited to a labelling system for inventory purposes. The queen-post truss was likewise well suited to the storage facility, as (in theory) it allowed the expanse of wide spaces with little or no secondary support. Large open areas were therefore the product of the truss framing.

The storage function of Building 19 continued up through the twentieth century as munitions needs demanded. Some modern improvements were introduced (i.e. electric light, elevators, structural steel reinforcement) and allowed for more efficient use of the building for storage purposes. As the nature of warfare and arms manufacturing changed, portions of Building 19 were adapted for use as research laboratories, workshops, garages, and the housing of mechanical systems (such as electric) for the Armory site.

The above description is strictly introductory. The material contained in this historic structure report more fully analyzes the construction history, the original appearance, and the existing appearance of Building 19. In addition, it briefly addresses the changing role of the Armory through the years of operation and the Long Storehouse's place within the historical context of the site.

*Space 19B1.

STATEMENT OF SIGNIFICANCE

A. Historical

This cultural resource takes its prime significance from its historical association with the Springfield Armory. Built as a storehouse for gun stocks and other pieces related to the military small arms manufacturing at the armory, Building 19 represents an important building type within the industrial complex. Its successive phases of construction, first during the 1840s and then in the 1860s, reflect the impact of national events upon the Armory facilities. For example, the Mexican War (1846-47), and the Civil War (1862-65), both escalated the demand for munitions. Correspondingly, more quality storage space was required. The core of Building 19 (Long Storehouse I and II) was erected during the Mexican War. The West Addition and the Stables were added at the outset of the Civil War. Throughout its history, changes and improvements to Building 19 reflect the changing fortunes of the whole Armory site as it was impacted by external events both regional and national. Building 19 continued to function as a storehouse well into the twentieth century, and though largely neglected, still functions in a storage capacity today.

It should be noted that Building 19 has been incorrectly identified in both historical reports and planning documents as a barracks that "may well be the finest remaining example of an American cavalry caserne." This building was never intended to, or ever did, serve as a barracks. Building 19 was conceived and built as a storage facility beginning in 1846, with the addition of stables on the east end in ca. 1862.

Because of the historical significance of Springfield Armory, the site as a whole has been listed as a Registered National Historic Landmark (1963), and as a National Historic Mechanical Engineering Landmark (1980). It was also listed on the National Register of Historic Places (1974).

B. Architectural

The architectural significance of Building 19 lies in its use of materials and in its distinctive stylistic elements. Stylistically, it is a transitional building featuring both Greek Revival and Italianate characteristics. Notable features include; the building's great length (764 feet) emphasizing the extensive use of brick; gable end orientation with west end entry; the repetitive rhythm of first-story semi-circular arched openings and second-story segmental arched openings on north and south elevations; corbelled cornice; low pitched slate roof; louvered wood blinds; and the use of sandstone foundation, water table and window sills. In addition, the building contains an early example of the use of truss framing. The queen-post truss of Building 19 allows for minimal secondary framing across the 55 foot width of the structure, thus, creating large open spaces ideal for storage purposes.

The simple, elegant lines, and the use of arched openings applied in the design of Building 19 mask the utilitarian function of the structure. Changes and improvements to the building reflect the continued use of the structure and do not detract from its architectural significance.

*Springfield Armory, Evaluation Under Provision of Historic Preservation Act 1966, by the Office of Archeology & Historic Preservation, August 17, 1967, p. 32.

MANAGEMENT HISTORY

A. Ownership

Building 19 is owned by the Commonwealth of Massachusetts under the jurisdiction of the Massachusetts Board of Regional Community Colleges (the Board). It lies within the Springfield Armory National Historic Site (SPAR NHS).

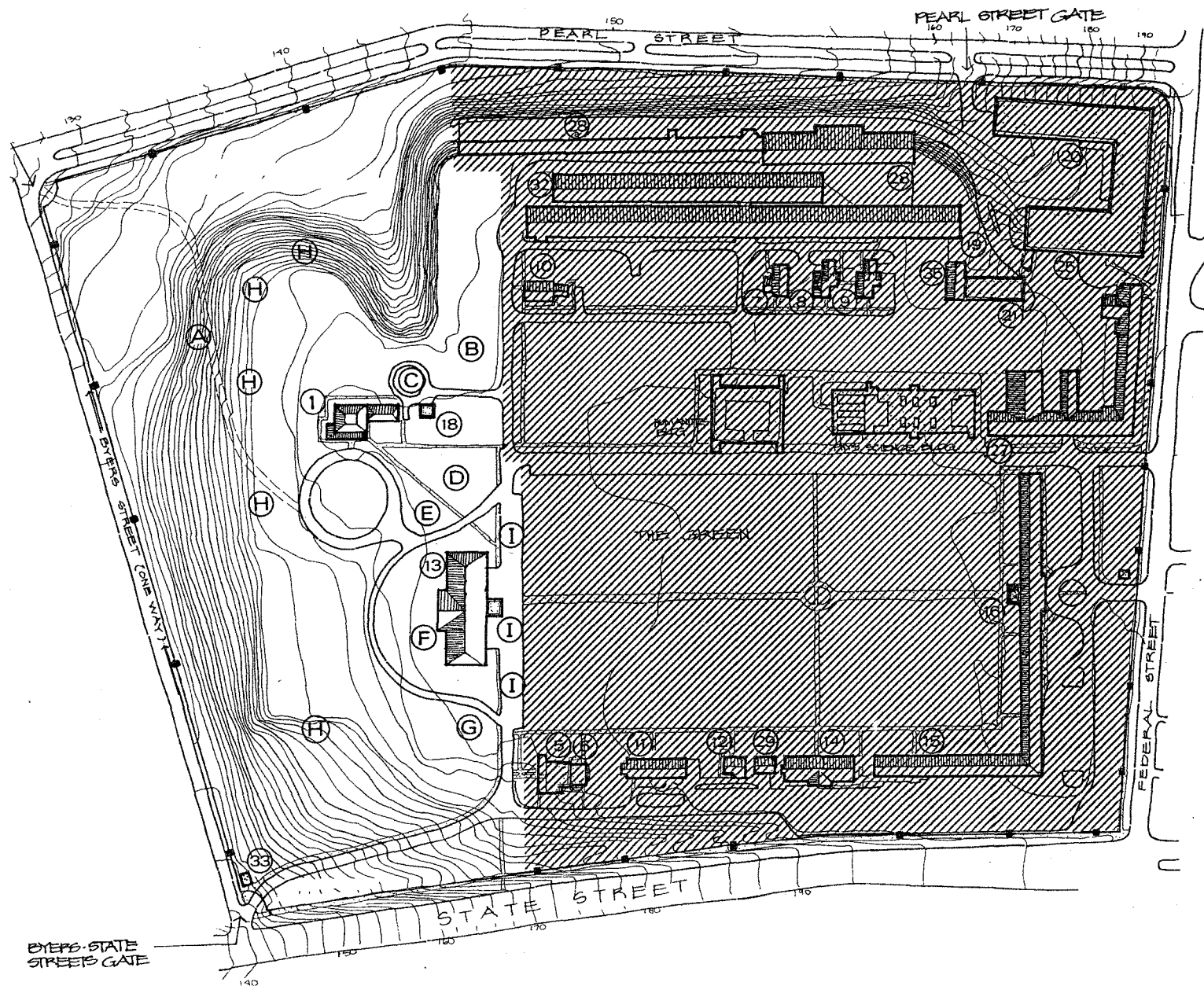
B. Management History

Springfield National Historic Site is jointly managed by the National Park Service and Springfield Technical Community College (STCC). Building 19 is currently the responsibility of STCC with the cooperation of the NPS. Because Building 19 is not a National Park Service property, it is not included on the List of Classified Structures (LCS) and has no NPS inventory number or management category. The highlights in the management history of the site as a whole are listed below. Little attention has previously been given to Building 19 as a contributing architectural feature of SPAR NHS, and it must therefore be examined within the context of information pertaining to the entire Armory Square site.

- | | |
|--------------------|---|
| March, 1963: | The Springfield Armory (Hill Shops, Water Shops, Federal Square, Railhead Area) was designated a Registered National Historic Landmark. |
| September 2, 1967: | Springfield Armory and Springfield Technical Institute (future STCC) entered into a Utilities Services Agreement and a formal Memorandum of Understanding for the Institute to take over 26 buildings in Armory Square. |
| September 2, 1967: | Springfield Technical Institute opened its doors with 800 enrolled students. |
| April, 1968: | Springfield Armory was officially deactivated. |
| October, 1974: | The establishment of Springfield Armory as a National Historic Site (SPAR NHS) approved by Congress. |
| March 27, 1978: | Cooperative Agreement made and entered into between the United States of America, National Park Service, and the Commonwealth of Massachusetts, Board of Regional Community Colleges concerning the administration of SPAR NHS. |

C. Jurisdiction

The Cooperative Agreement of March 27, 1978 between the NPS and Board explains that the site consists of two parts; one under the jurisdiction of the NPS, and one under the jurisdiction of the Board. The NPS area consists of 22.29 acres. The Board area (operating as a part of STCC) consists of 34.61 acres and constitutes a "Preservation Control Area." Building 19 lies within the "Preservation Control Area." (See the site plan on page 8.)



BUILDINGS

- 1 C.O.'S HOUSE
- 5 OFFICERS' QUARTERS
- 6 OFFICERS' QUARTERS
- 7 N.C.O. QUARTERS
- 8 N.C.O. QUARTERS
- 9 N.C.O. QUARTERS
- 10 MASTER ARMORER'S HOUSE
- 11 WEST ARSENAL
- 12 GUARDHOUSE
- 13 MAIN ARSENAL
- 14 MIDDLE ARSENAL
- 15 STOREHOUSE
- 16 ADMINISTRATION
- 18 C.O.'S GARAGE
- 19 LONG STOREHOUSE
- 20 INSPECTION & SHIPPING
- 21 MAINTENANCE
- 25 RESEARCH & ENGINEERING
- 27 SHOP
- 28 BALLISTICS
- 28a TEST RANGE
- 29 GARAGE
- 32 RESEARCH & ENGINEERING
- 33 GATEHOUSE
- 35 MAINTENANCE

SIGNIFICANT FEATURES

- A HAY ROAD
- B C.O.'S GARDENS
- C ROSE ARBOR SITE
- D BUILDING 10 SITE (BUILT 1833-MOVED 1835)
- E POOL & FOUNTAIN SITE
- F TENNIS COURT
- G BUILDING 17 SITE (BUILT 1833-MOVED 1871, DESTROYED 1968)
- H STEEPENED SLOPES
- I PARKING

- COLLEGE-ADMINISTERED AREA
- FENCE
- EXISTING CONTOURS
- NPS-ADMINISTERED AREA



existing conditions

SPRINGFIELD ARMORY
NATIONAL HISTORIC SITE
UNITED STATES DEPARTMENT OF THE INTERIOR /
NATIONAL PARK SERVICE
458 | 22,000,000
DEC | JULY 84

According to the Agreement, the Board is responsible for preserving the appearance of the exterior of all historic structures (as well as the parade green) within the Preservation Control Area. Specifically, the Board may undertake no construction, alteration, or repair that will change the historical integrity or historic appearance of the exterior of any of the historic structures. Historic structures within the area are identified on the National Register of Historic Places Nomination Form dated December 2, 1974. Any construction, alteration, or repair to the historic structures within the Preservation Control Area proposed by STCC or the Board are subject to the concurrence of the NPS. In return, the NPS agrees to cooperate with the Board in the preservation of the Control Area by providing technical advice and assistance.

Building 19 is classified as an historic structure on the 1974 National Register Nomination and is considered a "major element in the Armory Square Complex." Utilities and maintenance of the building are the responsibility of STCC. The technical assistance and research required for the rehabilitation of the building is being carried out under NPS administration in accordance with the cooperative agreement.

D. The NPS General Management Plan

The General Management Plan (GMP) is a document prepared for all NPS sites to establish long-range strategies for future programs, facility use, and management actions. It complies with the policies, regulations, executive orders, and laws affecting activities at the specific site and serves as both a manager's guide to established objectives and as a public statement of NPS intentions.

The GMP for SPAR NHS calls for preserving the NPS administered portion of Springfield Armory as it appeared in 1968 when it was deactivated as a military installation. It dictates that present NPS uses of buildings will continue, though "the existing landscape will be modified to more closely resemble its condition in 1968." Use and appearance of historic structures under STCC administration (including Building 19) are not addressed in the GMP^{*}, though it does outline the intent to interpret STCC structures and the parade ground through the use of a self-guiding tour booklet and wayside exhibits. Building 19, referred to as "the stables," is mentioned only as a feature included in these interpretive plans.

The selected treatment alternative identified for the NPS administered portion of the Springfield Armory in the GMP is Selective Restoration and Development. This alternative represents a blend of preservation, selective restoration/reconstruction and adaptive use of certain cultural resources, as well as the full development of interpretive programs both on the armory grounds and locally. No treatment is specified for structures within the Preservation Control Area administered by STCC.

^{*}Polly M. Rettig, National Register Nomination, 12/2/74.

^{**}However, the GMP draft was prepared by SPAR NHS staff with the help of the Administrative Services of STCC.

E. Current Use

The current use of Building 19 is primarily as a storage area for unused equipment and furniture belonging to STCC. Most storage utility is contained on the ground floor between bays 37-96 and on the second floor from bays 67 to 116. Secondly, the west end of the first story serves as classroom space for a Building Trades Training Center. The former Stables on the east end of the building house the maintenance headquarters for STCC. The third or loft floor is largely empty. In addition, Building 19 more and more frequently is used to house mechanical systems for the site. For example, the electric substation in bays 2 and 4 services the west end of Armory Square. A high voltage room was installed in bay 81, and the suspended conduit for a high temperature heating water (HTHW) system passes through the building severely impacting the structure.

It should be noted that the area immediately surrounding the building on the south elevation and portions of the north elevation are currently used as a parking facility and are heavily trafficked. In addition, bays 99-102 serve as a vehicular passageway facilitating circular traffic patterns through and around the building.

F. Current Condition

The condition of the building is stable but deteriorated. Years of deferred maintenance, and inattention to the building's historic integrity have led to several seriously detrimental conditions including; water infiltration problems, a detrimental pigeon population, illegal dumping, harsh weathering of materials, and vandalism (i.e. broken windows, graffiti). Authorized storage is also problematic.

Exterior brick suffers from several chronic problems. A severe case of rising damp effects the bottom brick courses. In some areas, the damp rises to the imposts of the first-story arches. At locations of former downspouts and conductor cables the problem has been exacerbated by running and trapped water on the surface of the brick. Dark stains, biological growth, loosened and missing mortar, efflorescence, and spalled and missing brick are the most obvious manifestations of water infiltration problems. The defunct gutter system, the introduction of an asphalt parking lot on the south, and the ineffective concrete drain on the north restrict sufficient water drainage. In addition, the close proximity of Building 32 on the north has created a strange pattern of pitting on the surface of the brick as wind currents travel down the narrow corridor between the buildings carrying abrasive particles.

Interior brick also suffers significant mortar loss and efflorescence due to water infiltration and freeze/thaw cycles. First-story wall areas are generally in worse condition than second-story wall areas. Extensive repointing of the walls and widespread powdering of mortar currently indicate that mortar loss was formerly a problem and will continue to occur in the future. Both mortar loss and efflorescence result from water infiltration in a number of forms including a chronic case of rising damp and leakage through open seams/joints at the roofline, windows, arches, and sills. In addition, portland cement repointing, spalling, broken brick, and patching are abundantly present on interior walls. Areas that show consistent patterns of deterioration include the bottom 25 courses of the piers between first-story arches, the face of the arch and the arch intrados on the first story. On the second story, the five courses below the window ledge, the face and intrados of the window arch and the brick directly below the timber plate show consistent patterns of deterioration from bay to bay. In addition, bays that contain partition walls usually show

heavily damage bricks and joints from sill to roofline at the seams of the partition walls and the north and south walls. The weathering of first-story interior walls is exacerbated by unprotected open arches at bays 52-94 on the south and bays 67-73 on the north.

The introduction of the structural steel system on the first story has caused some masonry stress cracks in the partition walls it passes through.

The elevators in bays 30 and 62 are non-operable. The elevator in bay 97 is in use.

The proximity of the parking lot along the entire south elevation has led to trauma to the brick piers from automobile contact.

Painted surfaces (i.e. louvered blinds, frames, fanlights, etc.) on the exterior are severely weathered.

The slate roof is in fair condition. However, raised, cracked, loose, and missing slates are abundantly evident especially along the eaves. Several leaks in the roof were found, particularly at each of the copper ventilators.

The lightning protection system is defunct.

The wooden floors and stairs are generally in good condition and appear quite stable. Deterioration may be attributed to hard use.

Despite the seemingly extensive deterioration, most situations can be rectified. A more detailed examination of conditions was conducted by the authors but is not included in this report. A thorough analysis of stress loads, strengths of bearing walls, strengths of principal timbers, etc. was not conducted and is essential to establish the overall stability of the building.

G. Proposed Treatment and Use

Rehabilitating Building 19 as the Western Massachusetts Center for Advanced Technology at STCC.

- adaptively use the interiors for educational spaces, exhibits, classrooms, laboratories etc., with attention to the Character-defining Features identified in this report.

- preserve, with limited restoration, to 1968, the exterior and interior elements with attention to the Character-defining Features identified in this report.

G. Extant NPS Planning Documents (arranged chronologically)

Springfield Armory. Evaluation Under Provision of Historic Preservation Act 1966, Staff of Office of Archaeology and Historic Preservation, August 1967.

Master Plan, Springfield Armory NHS (Draft), Staff, June 1971.

Collections Management Plan, Springfield Armory National Historic Site, Betsy Bradley, et al, March, 1977.

Historic Structure Report, Historical Data Section and Historical Base Map, Springfield Armory NHS, John Albright, May, 1978.

Material Condition Survey and Recommendations, Springfield Armory NHS, prepared for the NPS by Stull Associates, Inc., March 1979. (NPS buildings only.)

"Statement for Management, Springfield Armory NHS, U.S. Department of the Interior, National Park Service," Doug Lindsay, August 1979.

Archeological Survey of Proposed Electrical Line Corridor, Kathleen Fiero, April 1982.

Springfield Armory National Historic Site Land Protection Plan, SPAR NHS Staff, January 1984.

General Management Plan, Development Concept Plan, Environmental Assessment, Springfield Armory NHS, Staff, 1983.

Historic Structure Report - Architectural Data Section, Springfield Armory NHS, Robert Carper and Richard G. Turk, September, 1984. (NPS buildings only.)

A Variety of Proposed Actions Affecting Armory Square of Springfield, Staff, date?

"Annual Statement for Interpretation, Springfield Armory NHS," Staff, November 1990.

II. ARCHITECTURAL HISTORY

HISTORICAL CONTEXT

A. Introduction

The following discussion of the Historical Context of the site is intended to provide some background for the history of Building 19 in the larger context of the whole Armory. The discussion is largely based on John Albright's Historic Structure Report, Historical Data, Springfield Armory, supplemented by primary and secondary sources from SPAR NHS collections. The historical context is set out in terms of historically significant persons and events that impacted the growth of the Armory. More broadly, the historical context of Springfield Armory may be divided into developments of the nineteenth and twentieth centuries. Due to the nature of the research materials available for this report, the nineteenth century context described here, emphasizes the physical growth and improvements of the site including the building and landscaping campaigns of early superintendents. The twentieth century context emphasizes the productivity of the site and the demands of the munitions market. Physical improvements of the twentieth century are viewed in terms of their effect on the manufacturing process capabilities and products.

In 1968, when the Springfield Armory was deactivated, the site was comprised of three separate areas known as the Hill Shops, the Water Shops, and the Railhead Area. The Hillshops area was composed of two units, Armory Square and Federal Square, separated by Federal Street (fig. 16).^{*} They are located on a sandy plain a few blocks northeast of the central business district of Springfield. The plain ends in an abrupt bluff and is thus separated topographically from the rest of the city. Historically, the site was more easily defensible than any surrounding areas and was unwanted by farmers due to erosion and the poor quality of the soil. The Watershops were located a mile southwest of the Hillshops where Walnut Street crosses the Mill River. Buildings date from 1857 to World War II. The Railhead area was on Page Boulevard, 1 3/4 miles northeast of the Hill Shops. This area was established in the 1950s as a site of small arms testing facilities.¹

Today, the official Armory site has been reduced to some 57 acres. The area is currently bounded by Byers, Pearl, Federal, and State Streets. This area constituted the original Armory Square portion of the Hillshops. The Long Storehouse (Building 19) is located in the northwest corner of this area. Thus, the discussion of the historical context is restricted largely to the Armory Square portion of the former Hillshops.

B. The Establishment of a National Armory at Springfield

The history of the Springfield Armory begins with the Revolutionary War when the site first served the Continental Army as an arsenal and workshop. However, the operations of the armory were minimal and the number of buildings small until 1794. It was in 1794 that a National Armory was established under federal law "per Act of Congress." The munitions industry in the Connecticut Valley (arms manufacturing and gunsmithing) had grown considerably between 1776 and 1794 and Springfield's potential as a site for a national arms manufacturing center was recognized.²

^{*}Federal Square shops were phased out by 1967 and occupied under a lease from the federal government by General Electric. Today Federal Square is occupied by Digital Corporation.

The site was taken over by the federal government in 1801 when the town of Springfield conveyed "30 acres, 2 roods and 14 rods" to the United States.³ While under federal government administration, two superintendents were critical figures in the Armory's physical development. These were, Colonel Roswell Lee and Major James Ripley.⁴

A description of the site written in 1839 reveals that the configuration today was established quite early (fig. 1).

The principal U.S. Armory buildings are situated on the elevated table and eastward of the main village called "the Hill." From the village on the main street, there is a gradual ascent to the summit of the hill which is flanked on the north and south by a ravine. Most of the buildings connected with the armory, such as the arsenal or store houses for the preservasions of arms, the workshops, houses of the superintendent, &c., are situated on and around an area of several acres.⁵

Historian John Albright explains that "The hill site has been occupied constantly since 1777 by some sort of armory or arsenal activity. It has been a constant factor in the life of the city as well as the sole occupant of the site."⁶

C. Laying the Foundation for the Armory Complex. The First Superintendent - Colonel Roswell Lee (1815-1833)

In 1815 Colonel Roswell Lee was appointed superintendent of the small arms manufacturing center. Lee strove to transform Springfield Armory into a "Grand National Armory" that would reflect, through size and production, the evolving greatness of the nation. In order to carry out his plan for a model arsenal operation, it was necessary to establish a more formal organization and orientation of the landscape and to introduce a "handsome and regular appearance" to new and existing structures.⁷

He moved swiftly, and by 1820 the armory had become a major industrial site featuring at least 10 shop buildings and fourteen residences. Armory Square was already set out, with the main manufacturing facilities located at the northeast corner and military storehouses along the southern edge of the square. The central focus of the site was the flagpole located in the middle of Armory Square.⁸

An inspection report from 1823 reflects the success of Lee in his improvements to the site.

The aforesaid buildings are arranged northerly of the great State road leading to Boston, bordering on a large flat square piece of ground, fenced and set out with trees, around which is a road about 60 feet wide, leading to several dwelling houses occupied by the officers and workmen; the whole assuming a handsome and regular appearance.⁹

A fire in 1824 allowed Lee the opportunity to replace several frame buildings with brick. In addition, landscaping became a concern. A map of 1831 shows the implementation of a formal landscaping program consisting of a strong east/west orientation and the introduction of parallel and perpendicular rows of trees around a formal parade ground.¹⁰ As historian Albright described it;

Overall, the complex of buildings lacked the formality that they would obtain as new structures arose in the future. Yet the 1831 map reveals a "handsome and regular appearance," and, in the main, a balanced and formal regularity blending structures in straight lines and parallel rows of trees in straight lines.

Storehouses at this time were located along the southern perimeter of the Armory grounds. The northwest corner, the current site of the Long Storehouse, was occupied by worker's housing (both barracks and detached homes).¹¹ The concentration of industrial activity was found at the eastern end of the grounds where the milling and stocking shops, and the forge were located. Additional manufacturing took place in shops on the east side of Armory Street [Federal Square].

Little detailed information was examined to determine the nature of the manufactures during Lee's tenure. It is known that several kinds and models of small arms including flint-lock pistols and muskets were produced. In 1817, 14,000 muskets were manufactured. In 1836, 260 men were employed at the Armory, 13,520 guns were made, and 170,000 guns were stored.¹²

John Albright perceives that Roswell Lee's contribution to the Armory was in introducing the notion of a "Grand National Armory" and beginning to manifest that idea in the site development. Roswell Lee's plans, however, did not come to fruition until the tenure of Major James W. Ripley (1841-1854).

Colonel Roswell Lee died in 1833. He was succeeded by a political appointee of President Andrew Jackson; John Robb. Robb, like Lee, was a civilian superintendent. His seven-year tenure was unremarkable and largely characterized by routine maintenance. Apparently, Robb did not actively further Lee's intentions for the "Grand National Armory." However, an evaluation of the Springfield Armory made in 1840 reveals that he did expand the operation and production of the site. The dollar value of the Armory was quoted as \$209,161 with 87 buildings on the property including 46 shops, 8 storehouses, and 33 dwellings.¹³ In addition, Albright reports that, "Robb's administration saw a continued development of a tradition of excellence in arms manufacturing . . ."¹⁴

D. Implementing the Plan for a "Grand National Armory." Commanding Officer Major James Ripley (1841-1854)

Major James Ripley was selected as Superintendent of the Springfield Armory on April 16, 1841. At the time, he was a Major in the Ordnance Department and had been the commander of the Kennebec Arsenal for the previous eight years. He was the first (and only) military superintendent appointed to the Armory; an issue of dispute throughout his tenure.

Physical Improvements

Ripley brought with him a drive to further improve the appearance and productivity of the site. He is largely credited with the nineteenth-century appearance of the Armory. Among his more grandiose visions were the expansion of the grounds, extensive landscaping, a massive iron fence, a new Main Arsenal building and a new Commanding Officer's residence. He met with great success in fulfilling these visions as is evidenced on today's armory grounds. On a more prosaic level, a number of functional manufacturing structures were erected or improved

under Ripley's tenure as well (fig. 7). A report written in 1985 credits Ripley's superintendency as a period of "fairly sustained improvements in the manufacturing plants, organization of production processes, power sources, and power transmission."¹⁵ Improvements were made to the forging shop, welding shop, filing shop, grinding shop, and related machine shops with the addition of modern steam engines, new fixtures and tools. Considerable work was carried out at the Water Shops as well. Historian Albright concisely explains:

Ripley devised a grand concept of lands and buildings on a site already aesthetically organized by Roswell Lee. Thus, he built upon a visual concept created by his predecessor. In a sense, Ripley carried on Lee's work all the while expanding the magnitude of Lee's view and in constructing storehouses, shops, and dwellings created a stately and majestic federal establishment.¹⁶

The most active building years in Ripley's tenure were between 1845 and 1854. Increased expansion and production were directly related to the demands created by the Mexican War of 1846-1847. The construction of the new Main Arsenal (1846-1850) and the original phase of the new Storehouse (1846-1848) coincided with the years of the Mexican War. In addition, Major Ripley was breveted Lieutenant Colonel in 1848 specifically for "his role in increasing arms production at the armory to meet the demands of the Mexican War of 1846-47."¹⁷ The Mexican War therefore, had a significant impact on the development of the Armory.

Stylistically, Ripley chose both to follow the example set by Roswell Lee's brick Greek Revival buildings along the parade ground, as well as to utilize the increasingly popular Gothic Revival and Italianate styles. Regardless of style, all buildings were expected to answer Ripley's idea of a grand armory. One senses that style was less important than overall impression. This is reflected in the report of the Ordnance Inspector who lauded all of Ripley's changes at the Armory. He wrote,

In its plan, construction, and arrangement, it should be such, as to convey the impression of the power of the country to supply an important means for effective defence, independent of foreign, or private aid, and like other of our governmental constructs, it should possess both qualities, of permanency, and architectural perfection - Plans, looking to the future greatness, and consequently increased wants of the country should be adopted for this armory, and executed with skill, and liberal economy.¹⁸

It is clear that Ripley was striving for a "feeling" and not for stylistic purity.* He was more intent that all structures project a sense of solidity and presence. This is evident in the massive grandeur of the Main Arsenal as well as in the long simple lines of the Greek Revival Long Storehouse (Building 19) both built as a part of Ripley's improvement campaign.

An additional focus of his campaign was to enclose the Armory grounds with a cast iron fence. Ripley's tenure was fraught with disputes and court cases involving the extension of Armory lands into privately owned plots around the Armory site. As a result, there was a considerable amount of bad blood between Ripley and some of the population of Springfield.¹⁹

*The style of the structures at the Armory may simply be considered the chosen "military" style of the day. Research should be pursued to discover if military pattern books provided the basic stylistic choices found in any of the buildings at the Armory.

In order to protect the grounds, Ripley ambitiously embarked on building a cast iron fence to surround the Armory. Though begun in 1847, this project was not completed until 1864.

The fence may also be seen as an element in Ripley's general enthusiasm for grounds improvements. Improvements carried out under his tenure included forming embankments, filling ravines, grading and graveling roads, paving walks, laying sod, introducing formal gardens and planting trees.²⁰ A visitor to the Armory in 1852 described the scene greeting him and captured the essence of Ripley's intentions.

On reaching the summit of the ascent, the visitor finds himself upon an extended plain, with streets of beautiful rural residences on every hand, and in the center a vast public square occupied and surrounded by the buildings of the Armory. These buildings are spacious and elegant in their construction and are arranged in a very picturesque and symmetrical manner within the square, and along the streets that surround it. The grounds are shaded with trees; the dwellings are adorned with gardens and shrubbery. Broad and neatly kept walks, some graveled, others paved, extend across the green or along the line of the buildings, opening charming vistas in every direction. . . . Can it be possible, he asks, that such a scene of tranquility and loveliness can be the outward form and embodiment of a vast machinery incessantly employed in the production of engines of carnage and death?²¹

The aesthetics, as experienced by the contemporary visitor above, were of primary concern to Ripley as he sought to improve both the setting and the manufacturing functions of the Armory.* As historian Albright states,

Ripley had expanded on [Roswell] Lee's concept of buildings surrounding the open square, and not only reinforced that appreciation of the relationship of space, landscape vistas, and buildings but had improved the technical and manufacturing processes at the site as well.²²

Controversies During Major Ripley's Tenure

Despite his successes, controversies, disputes, and criticism plagued Ripley's administration as well. The first, (and ongoing), dispute involved the contentions between supporters of a civilian versus a military superintendence at federal armories. This was a controversy of national proportions. In April 1841 superintendence at armories changed from a civilian to military appointment. The decision was made by the administration in the name of economy. The feeling was that employing someone already on the government payroll (i.e. military) was more economical than hiring outside of the government. In addition, control of expenditures would be more easily monitored.

In Springfield, the factions were particularly incensed. Those in favor of civilian administrators were outraged. They felt that the 1841 decision was "harsh and ill-judged - unjust to, and oppressive upon the mechanics employed in the public service, and in no respect

*The campus-like appearance of the Armory relates quite closely to other early industrial sites that strove to disguise the dirt and sweat of industrial labors behind a bucolic setting. Further research should be carried out regarding this connection.

promotive of the interests of the government."²³ Theoretically, these contenders felt that military rule was completely unsuited to industrial production exclaiming that

Military discipline is proper and necessary among men trained for the purposes of war. It is wholly unsuited to a civil establishment, and is illy adapted to the tastes of our free-born mechanics.²⁴

It seems however, that the true agenda was simply resistance to a change in a beneficial situation that had developed over the years of civilian rule. One may well be skeptical of the productivity of a factory in which workers were reportedly,

unused to the rigid restraints of military life, and unaccustomed to the dialect of the camp, [they] feel a sense of degradation in submitting to restrictions, which however appropriate in the camp, are only productive of irritation in the civil employments of life.²⁵

The true concern of contenders to military superintendence was surely economic and political. They claimed to defend the expenditure of public money in passages such as the following.

No public officer can ever safely hold himself above accountability to the people. The money in the National Treasury belongs exclusively to the people; and they can always demand of every one who uses their money, how it is used and to what purposes it is applied.²⁶

However, it is more likely that they were desirous of maintaining the status quo; their own positions and contracts.

Supporters of the new order of military superintendents claimed that the armories, especially the Springfield Armory, had "long been under inefficient civil administration."²⁷ A current historical analysis explains that

Politics played a major role when the Armory was under civilian control. Many local political leaders looked at the Armory as a plum ready to be picked. Employees who gained their jobs through patronage considered it unnecessary to put in a day's work.²⁸

When Major Ripley arrived to begin his superintendency he found

. . . many poor work practices allowed by the former Superintendent. Men were working irregular hours, leaving the shop to work on their farms, and reading newspapers during working hours. . .²⁹

According to a nineteenth-century account, Major Ripley "vigorously began the herculean labor of cleansing this Augean stable of the mass of corrupting influences taxing the people and periling their safety."³⁰ Though highly biased and colorful, the biographical account of Ripley continued:

He banished idleness; ejected charlatans and demagogues; adjusted pay to production; rewarded merit with promotion; purchased new land; closed useless lands; graded, planted, and fenced the grounds; changed a desolate sandy plain into a beautiful landscape park; transformed a village of dilapidated shanties into one of the best built armories of the world;

doubled the value of the Government property, while correspondingly diminishing the cost of arms; introduced improved machinery making like parts of all weapons interchangeable, saved millions for the country by properly directing labor, adopting new inventions, and increasing the capacity of the works; . . .³¹

A second, and more local, controversy plagued Ripley and was closely linked with the larger issue of military superintendency. The second controversy involved the influx of Irish catholic workers who followed him from Kennebec Arsenal to Springfield. Already chafing from the appointment of a military superintendent and the dismantling of civilian dominance of the shops, the introduction of Catholic workers was not well accepted by protestant Springfield. The situation was exacerbated when Ripley closed the shops for repairs in 1842 and discharged 40 workers from previous civilian appointments. As Albright explains,

Ripley's action began a chain of events that brought a second protagonist into the action. A local real estate developer and builder, Charles Stearns, was developing land near the Armory, and when the houses of the workers fired by Ripley came up for sale, Stearns saw a potentially profitable market go into a mild depression.³²

Stearns became a virulent adversary and led numerous attempts to discredit Ripley and to thwart his plans for expansion of the Armory grounds. The feud continued during Ripley's entire tenure but astonishingly, had little effect upon the success of his building and landscaping campaigns. Albright exclaims that,

It is remarkable that James Ripley, living with the never-quiet dispute with Stearns, and conceiving and executing his design for grandeur at Springfield, could also manage to find the time and energy to increase the efficiency of the industrial plant as dramatically as he had changed the physical plant and terrain.³³

Despite Ripley's improvements, Congress voted in 1853 to return the federal armories to civilian administration.* Ripley turned command of the Armory over to his Master Armorer, Erskin S. Allin, in August of 1854 as instructed by the War Department. Ripley's successor was James Whitney with Erskin Allin remaining his second-in-command. Whitney was reportedly a man of high moral character who carried on Ripley's goals.³⁴

E. The Springfield Armory from 1854 to Its Deactivation in 1968

Changes that occurred at the Armory from the mid-nineteenth to early-twentieth centuries were related to the increasingly sophisticated technology of arms manufacture and the modernization of existing facilities and equipment. (See figures 8, 9, 10, 11, and 41.) Albright considers this subsequent history of the site as a "narration of minor changes which include the removal of the two buildings flanking the Main Arsenal, and the modernization and erection of outbuildings."³⁵ Physical changes were not profound. However, activity at the Armory was far from static as it became the undisputed leader of gunsmithing and small arms manufacture in the country.

*Democrat Franklin Pierce was elected President in 1852 changing the political orientation of Washington.

The Civil War Through the Philippine Insurrection (1854-1900)

Work throughout the late 1850s (James Whitney's term) was largely given over to developing the Water Shops area. The Lower Water Shops site was sold and the Middle Water Shops demolished. Site work was begun for new Upper Water Shops in 1856. By 1860 all of the Water Shop buildings, including a finishing shop, grinding shop, and forging shop, were in place. Likewise two turbines and a water wheel, furnaces and rolling mills, had been located here "for all the forging, welding, and barrel grinding now done at this Armory."³⁶

The years of the Civil War were naturally a busy time for the Armory, particularly after the other national armory at Harper's Ferry was destroyed. It is believed that a number of additions and improvements made in 1862-1863 were carried out in anticipation of the Civil War. Projects included the extension of the Long Storehouse on east and west ends, the construction of a steam stock drying house, a machine forging shop, a tempering and case hardening shop, and an engine room and boiler house. Production during the Civil War was escalated. Though Annual Reports for 1859-1865 were not located during research, a contemporary description of the Armory includes the following information concerning production.

When Fort Sumter was fired upon, about 1,000 guns per month was the production: three months after, the number was increased to 3,000 per month: and gradually the number was increased till, . . . , in 1864 the product for a day's work was 1,000: and many days the same number were boxed and shipped³⁷ to the quartermasters of the army in different parts of the country. . .

In addition, many Springfield arms were used in settling the western territories of the United States throughout the 1850s, 1860s, and 1870s.

The topographical map surveyed and drawn by the engineers Shedd and Edson in 1864 is an excellent reflection of the configuration of the site as it had developed thus far (fig. 7). Industrial functions continued to be concentrated to the southeast of the Long Storehouse where the water reservoir, machine forging shop, steam drying house, coal house, and milling and polishing shops were located. The regular, orderly planting of trees was augmented with the naturalistic scattering of dozens of new trees. The roads and walkways extant today were largely laid out by this time, including those around the parade green and those accessing quarters and shops located in the northern half of the Armory grounds. Grading and fencing appears to be complete.

Around this time, the area around the Armory began to develop as a fashionable residential area. "The developments bounded the Armory and reflected the careful mix of architectural and landscaping considerations evident in one form or another at Springfield Armory."³⁸ A local historian recounts that,

Styles were coordinated, trees planted, sidewalks and drains built, and other steps taken toward establishing ordered and unified neighborhoods.³⁹

Likewise, the area between the Armory (and the new residential neighborhoods) and the downtown area began to be marked with churches and public buildings taking on the character

it exhibits today. The development of surrounding land changed the nature of the Armory as a separate and remote facility, and tied it more closely to the lives of Springfield residents (fig. 40).

During the 1870s, within the Armory boundaries, changes were minimal. The main entry gate was changed from State Street to a gate at the corner of State and Byers Streets, and the Master Armorer's quarters were moved to the south west of the Long Storehouse (1879). The concentration of the manufacturing facilities remained in the northeast corner of the Hill Shops with a noticeable growth of facilities constructed on Federal Square on the east side of Armory Street.

It should be noted that the concept of a museum of small arms at the Springfield Armory dates to the 1870s. Indeed, the collection was begun as early as 1871 and greatly enlarged by the donation of approximately 700 guns displayed at the Centennial Exposition held in Philadelphia in 1876. As time went on, Springfield Armory became a clearing house for outdated or obsolete as well as rare rifles and small arms. The collection grew rapidly and by 1938 a historian was able to report,

many weapons of foreign manufacture, both modern and antique, have been added from time to time, and many other exhibits of related material have been collected, all of which, it is believed, constitute one of the most complete displays of small arms in the world.⁴⁰

Today the collection of arms is housed in the Main Arsenal.

During the 1890s Albright states that, ". . . the manufacturing and administrative process at the Armory rolled along, but the grounds and buildings, except for the Paymaster's Quarters, saw much more routine maintenance than modification."⁴¹ Arms manufacturing during this period was fueled by continued Indian wars with the Apache (1883) and the Sioux (1890), the Spanish-American War (1898) and the Philippine Insurrection (1899). As the only National Armory,* the demands upon Springfield's production were surely escalated.

The Early Twentieth Century and World War I

The first fifteen years of the twentieth century witnessed a great deal of modernization of the facilities and production processes at Springfield Armory. Numerous letters regarding the installation and modification of sewer, water, gas, fire sprinklers, and electric lines document these changes. Historian Albright records that:

By 1906 many of the buildings on the hill had most of the modern amenities. The "officers quarters, storehouses, barracks, Etc" were heated by a steam-plant. At the same time an "Electric Light Plant" and "Gas Generator" served the buildings lining Armory Square.⁴²

During the first years of World War I little expansion or construction at the Armory was embarked on. Annual reports at this time include mention of only exterior repairs and painting, the construction of new coal bins and coal-handling machinery, and the installation of fire

*The National Armory at Harper's Ferry was destroyed during the Civil War leaving Springfield as the sole federal Armory.

sprinkler systems.⁴³ It seems that energies at the Armory were concentrated on developing satisfactory modern designs for firearms fulfilling ordnance requirements. Basic requirements included: moderate bulk, good balance, sturdiness, usefulness in all weather conditions, simpleness in design, easy maintenance, effective range, and uniform accuracy.⁴⁴

An Annual Report for 1913 itemizes the production of the Armory in that year including 38,070 rifles, 40,609 bayonets, 11,668 bolos, 3,700 Hospital Corps knives, and 250 automatic machine rifles. In addition, an order for 20,000 Cavalry swords and 11,285 automatic pistols was begun. Experimental work included endurance testing and developing alterations for a number of automatic rifles, pistols and silencers. 3,801 rifles were cleaned and repaired. Despite the impressive production statistics reflected in the Annual Report, it was noted that the year's output actually represented "a decrease in the total amount of manufactures at this armory. . ."⁴⁵

Likewise, the Annual Report for 1916 reported that,

The volume of manufacturing and repair work performed at the armory during the past year was less even than during the year preceding.⁴⁶

At the same time it reported that,

Sales of arms, etc., have been far in excess of previous years. The material increase in this work is indicated by the fact that the value of sales for this year is \$59,907.12, as compared with \$26,845.78 for last year.⁴⁷

It is speculated that the seeming contradiction in the reports, producing less but selling more, was due to a loss of both laborers and managers to the war effort and to contracting out to other plants for finished products. The 1913 report indicates that manufactured articles were contracted to facilities in Hartford, Bridgeport and Worcester, and inspected by the staff at the Springfield Armory. In 1916, \$334,886.77 worth of articles were manufactured at Hartford, Bridgeport, Worcester, Lowell, and Utica while Springfield experienced "the additional handicap of a continual loss of experienced employees throughout the year and a reduction of one of the number of officers assigned to this establishment."⁴⁸ These circumstances would explain how a decrease in production in Springfield could be accompanied by an increase sales.

By 1918 however, it was reported ". . . manufacturing capacity of the armory had reached the highest point in its entire existence." With World War I fueling demands for increased production, Springfield Armory expanded its capacity for manufacturing to the fullest. As the Annual Report for 1918 recounts,

On November 1, 1917, an output of 1,000 rifles per day had been attained. At the close of the fiscal year components are being manufactured at the rate of 1,200 completed rifles . . . To accomplish this the force has been on two shifts throughout the year, and the plant has been in operation 110 hours per week. The number of employees has been more than doubled, and every effort is being made to train and mold the 5,129 employees now on the roll into a well balanced and efficient organization. Women are at work in the shops and their employment will be continued and extended wherever practicable.⁴⁹

The increased pace of production required substantial upgrading of existing equipment, facilities, and management (fig. 13). It is at this time that the process of transformation from

the nineteenth-century factory of the artisan to the twentieth-century industrial complex of the machine was begun. In 1918, \$450,000 of new machinery and equipment was purchased and installed. The Chief of Ordnance reported,

Obsolete and worn-out machinery has been replaced as rapidly as practicable, and many new machines have been added. Much work has been done in systematizing the various operations in the course of manufacture of the completed article.⁵⁰

A new metallurgical laboratory was built with an expanded staff in charge of all tests and heat-treating operations. Other technological expansion included modernizing the equipment of the hardening department and building facilities for the newly expanded experimental department. In recording improvements to *Grounds and Buildings*, the Chief of Ordnance wrote the following:

The increased production demanded has rendered necessary many additions and alterations to existing buildings, as well as an unusual amount of repair and maintenance work. The principal new constructions during the year are: A new power plant at the Hill Shops; a building to house the chemical laboratory and metallurgical section; an extension to the administration building connecting with storehouse No. 3; a building containing rest rooms for women employees; and cantonments for the accommodation of the troops guarding the armory.

Items manufactured during World War I included rifles, bayonets, automatic pistols, sabers, scabbards, pistol-cleaning kits, gun shrapnel heads, Colt's automatic machine guns, and magazine carbines. A motorcycle with side car and machine-gun mount was also developed and manufactured. A substantial amount of repairs and alterations to existing products were carried out.

The 1930s and the Contributions of the Works Project Administration

Following the swell of production around World War I, was a lull in activity at Springfield. During this lull, testing and experimentation continued in the expanded technological facilities of the Armory (fig. 47). It was at this time that chief engineer John C. Garand developed the M1 rifle; an event that "marked a new era there, the application of mass production principles." The M1 rifle was ready for production in 1936.⁵¹

Likewise, the next substantial amount of work and physical changes at the Armory took place during the late-1930s under the WPA administration. Up to 1,330 workers were employed and \$190,000 worth of repair, improvement, etc., projects carried out at the Armory. As a contemporary article in an ordnance journal reported,

Recent extensive appropriations made available for further modernization now are resulting in a transformation of the plant from the World War era to that of the present highly mechanized period. Soon the overhead countershaft drives, with their forests of belts throughout the plant, will be but a memory as individual electrically driven units will take their place in the shops.⁵²

A Springfield paper reported on the WPA work in February of 1937.

Since WPA entered the armory grounds there has been a steady improvement of roads, shops, living quarters and warehouses. Former dark machine plants, with bleak walls have been turned into places fitting the modern standards of high grade manufacturing and machine shop work.⁵³

The exact nature of the WPA work is made quite explicit in the following quote.

. . . there is 350,000 square feet of painting being done; 25,000 square yards of concrete flooring in shops; 20,000 square feet of wooden flooring in shops and houses; construction of three gatehouses where various signals and alarms and watchmen are housed; remodeling an old building into a seven-car garage; additions to and renovation of 15 of the housing and storage buildings and the reroofing of two old buildings with slate and copper roofs in addition to the rearranging and cleaning of approximately 1000 tons of stand-by machinery and the replacing of 7000 feet of steam, electric and gas underground mains.⁵⁴

An ordnance journal proudly exclaimed in 1939 that the "Springfield Armory carries on, without interruption, the manufacture of improved military rifles for our future armies."⁵⁵

World War II and the 1940s

The improvement enthusiasm generated by the WPA was given new impetus during the 1940s when the revitalization of the Armory through the World War II war effort allowed for additional extensive work at the Armory. According to a contemporary article, some 12,000 persons played a part in the "vital war work" at the Armory. Over half of these were women replacing the 3,200 men "now in uniform." The emphasis of production at Springfield was (almost exclusively) the manufacture of the M1 (Garand) rifle. The M1 rifle was the weapon of choice during World War II and Springfield Armory produced 90 percent of all M1 rifles used.⁵⁶ The large output of rifles was made possible by the automation of jobs previously requiring individual hand labor. As machines performed increasingly more jobs, the role of engineer and mechanic gained prominence in manufacturing at Springfield. As a contemporary explained,

The skill formerly employed to make hand-made weapons might be regarded as having been shifted to the making of machines which do the work.⁵⁷

Post-World War II to Deactivation of the Armory

During the 1950s technology and scientific research became priorities within the realm of military manufacture and several buildings were adapted to or added for communications technology, metals testing, radiographics, etc. The topography of the Armory remained largely unchanged except for the expansion of some paved surfaces for vehicular traffic (figs. 65, 66, 67, 68, and 69).

On March 22, 1963 the Springfield Armory was declared a National Historic Landmark. In 1964 the Secretary of Defense scheduled Springfield Armory for phase-out as a military installation by April 1968.

F. Post-Deactivation Years (1969-1991)

The Springfield Armory was officially deactivated in April 1968. Armory Square was ceded to the Commonwealth of Massachusetts for use as a campus for the [then] Springfield Technical Institute. The doors of the Institute opened in September, 1967 with an enrolled student body of 800. The Institute utilized buildings within the northeastern quadrant of Armory Square. The name of the institution was changed to Springfield Technical Community College in June of 1968. An act providing for the establishment of a national historic site at the Armory was passed October 26, 1974. The Secretary of the Interior established the Springfield Armory National Historic Site as a unit of the National Park System in 1978. The site was 57 acres in size. Under a Statement of Agreement between the Commonwealth and the National Park Service, 34.6 acres of the site remained under the ownership of the Commonwealth and the administration of Springfield Technical Community College (STCC). STCC was also responsible for the Parade Green, Officers' Quarters (Buildings 5 and 6), Master Armorer's House (Building 10), the Test Range (Building 28a), the Long Storehouse (Building 19), and Buildings 11 and 16. The National Park Service oversees the remaining 22.4 acres as well as the Main Arsenal, the Commandant's House, the Gatehouse (Building 33), and the Armory Fence.

A survey carried out by the National Park Service prior to deactivation (1967) included some written description and a valuable number of photographs of the site. The appearance at deactivation was one of industry and idyll, new and old. The parade green was the dominant center of Armory Square with the much expanded industrial facilities still restricted to the southeast corner and the perimeters of the grounds. New buildings had been introduced (i.e. 20, 28, 32) and original buildings expanded. However, green space dominated and much of the extensive tree planting of the nineteenth century was still in evidence. The Main Arsenal on the west, and Building 16 on the east ends of the parade green remained the unrivaled visual focus of the site. New roadways, driveways, walkways, and parking areas had been added to facilitate expanded vehicular use on the grounds. Their intrusion on the original landscape was modified by the retention of old trees, plantings, etc. that softened their effect.

A National Register Nomination was written in 1974 for the Armory Square section of the site. The nomination described the appearance of the site as follows.

Armory Square occupies a fifty-four acre hilltop site overlooking the original area of Springfield and several blocks northeast of the present City's central business district. The complex is notable for the spacious surroundings allotted to its buildings. Of the nearly thirty structures located here, half surround the 8.75 acre parade ground. . . . With three exceptions, the consistent scale and the restrained, functional style of the structures in Armory Square and the uniform use of sturdy brick construction, white trim and slate roofing create a cohesive district in which the whole is greater than the sum of its parts.⁵⁸

The nomination documented the introduction of three modern facilities on the parade green. Though constructed of brick, their size and stylistic presence is distinct from all other Armory buildings. They have dramatically impacted the site. Today, they dominate Armory Square.

In conclusion, Springfield Armory retained its nineteenth-century configuration and landscape at deactivation in 1968. Intrusions, demolitions and deferred maintenance in the 1970s and 1980s have caused the first major physical changes to the site, particularly in the area surrounding the parade green where original armory buildings have been replaced with inappropriately scaled modern structures. Likewise, the addition of parking lots has altered the nature of the landscape surrounding many of the armory buildings particularly around the Long Storehouse and Buildings 7, 8, 9, and 10. (See figure 71.)

NOTES

1. Springfield Armory, Evaluation Under Provision of Historic Preservation Act, Office of Archeology and Historic Preservation, National Park Service, August 17, 1967.
2. Ibid., p. 1-2.
3. John Albright. Historic Structure Report, Historical Data and Historical Base Map, Springfield Armory National Historic Site, Massachusetts (Denver, CO: NPS, Denver Service Center, May 1978), p. 2.
4. Superintendents (all civilian) prior to Roswell Lee were as follows:

David Ames -	1794-1802
Joseph Morgan -	1802-1805
Benjamin Prescott -	1805-1813
Henry Lechler -	1815-1815
5. NA, RG 94, AGO Reservation File 1800-1916, Box no. 102, 1839.
6. Albright, p. 1.
7. Ibid., p. 7.
8. Map entitled "Armory Hill About 1810," SPAR NHS Collections, reproduced in Albright's Historic Structure Report," p. 3, Map 1. Actual date, ca. 1815-1821.
9. Albright, p. 7. U.S., Congress, House, Committee on Military Affairs, Armory at Springfield, 17th Cong., 2nd sess., no. 246, March 23, 1823, pp. 538-39.
10. Ibid., p. 16.
11. Information gleaned from maps in the files of SPAR NHS Collections as reprinted in Albright's Historic Structure Report. 1) "Armory Hill About 1810", 2) "Springfield Armory, 1824", 3) "Armory Hill, ca. 1830" by Thomas Beasley Linnard.
12. Albert Harleigh Kirkham, "United States Armory," King's Handbook of Springfield, 1884, p. 252. (As reproduced in Albright's Historic Structure Report, Appendix B.)
13. Albright, p. viii.
14. Ibid.
15. "Chronology of Manufacturing and Testing Facilities at Springfield Armory," Springfield Armory Buildings Chronology, 11/6/85. SPAR NHS Collections.
16. Albright, p. 20.
17. "Major James W. Ripley, Commandant of the Springfield Armory," Springfield Journal. April 19, 1990. Volume 15, no. 20.

18. NA, RG 156, Entry 1003. Reports of Inspections of Arsenals and Depots, 1832-1869. Ordnance Inspector Report. October 3, 1853.
19. Albright, 28-29.
20. Ibid., p. 30-31.
21. Jacob Abbott, "The Armory at Springfield," Harper's New Monthly Magazine, Number XXVI, July 1853, vol. V, p. 146.
22. Albright, p. 46.
23. Ibid., p. 7.
24. Ibid., p. 9.
25. Ibid.
26. Ibid., p. 5.
27. Callum, Bvt. Major-General George W. Biographical Register of the Officers and Graduates of the U. S. Military Academy (Cambridge, MA: Riverside Press, 1891), p. 121.
28. Larry Gormally. "Major James W. Ripley, Commandant of the Springfield Armory," Springfield Journal, April 19, 1990. Volume 15, no. 20.
29. Ibid.
30. Callum, Biographical Register, p. 121.
31. Ibid., p. 121.
32. Albright, p. 22.
33. Ibid., 25.
34. Gormally, "Major James W. Ripley."
35. Albright, p. 46.
36. "Buildings Chronology," 1985, Ibid., p. 7
37. Kirkham, "United States Armory," p. 252-253.
38. Albright, p. 57.
39. Ibid., p. 59. Quote from, Michael Frisch, Town Into City: Springfield, Massachusetts, and the Meaning of Community, 1840-1880 (Cambridge, MA: Harvard University Press, 1972), p. 89.
40. Ibid., p. 15.

41. Albright, p. 75.
42. Ibid., p. 78.
43. Ibid.
44. Miller, "Springfield Arms," p. 17.
45. Annual Reports, War Department, "Report of the Chief of Ordnance to the Secretary of War, 1913." Washington D.C.: Government Printing Office, 1913.
46. War Department, Annual Reports, 1916, Volume I. Washington D.C.: Government Printing Office, 1916.
47. Ibid.
48. Ibid.
49. U.S. Ordnance Department, "Report of the Chief of Ordnance, 1918." Washington, D.C.: Government Printing Office, 1918, p. 1059-1060.
50. Ibid.
51. "Springfield Armory 1794-1943," The Pioneer, May 1944.
52. Clifford Miller, "Springfield Arms, 1794-1939," reprinted from July-August 1939 issue of Army Ordnance.
53. "Many Improvements Are Effected by WPA at Springfield Armory," Springfield Sunday Union and Republican, February 21, 1937. SPAR NHS Collections.
54. Ibid.
55. Miller, "Springfield Arms," p. 17.
56. The Pioneer, p. 20.
57. Ibid., p. 16.
58. Polly M. Rettig, National Register Nomination, "Armory Square, Springfield Armory," 1974.

CONSTRUCTION HISTORY

A. Introduction

The Long Storehouse (Building 19) was conceived as an element of Major James Ripley's improvement campaign for the Springfield Armory grounds and buildings. The Long Storehouse was to provide much needed storage space for musket stocks, box bands and other lumber accumulating in large quantities as production at the armory increased. (See figures 41 and 35.)

The Long Storehouse consists of four separately erected units presenting a uniform whole measuring 764 x 55 feet at completion. For clarity, this report refers to the four units as Long Storehouse I, Long Storehouse II, the Stables, and the West Addition. The construction history of the building may be divided into two major periods of work. The initial period of work saw the construction of Long Storehouse I and II in the 1840s. A second phase of building in the 1860s resulted in the erection of the Stables at the east end, the West Addition, and the ventilator towers on east and west ends. Slight variations in construction techniques and materials are evident at close analysis and subtly distinguish the four units comprising the building. For example, Long Storehouse I and II feature an extra strut in their roof truss framing (the West Addition and Stables have no struts). Likewise, the timbers of Long Storehouse I and II are vertical sawn, and timbers of the West Addition and the Stables are circular sawn. Finally, iron stirrups tie bottom chords to queen posts in the Long Storehouse I and II but are not found in east and west additions. Distinguishable differences reflect the two major phases of building; the 1840s and the 1860s. Known dates and lengths of the four building phases are listed below.

Long Storehouse I -	1846-47, 200 feet (bays 67-96)
Long Storehouse II -	1849, 200 feet (bays 37-66)
Stables -	1860-1861, 150 feet (bays 97-116)
West Addition -	1862-1863, 214 feet (bays 1-36)

Though some dates are less clear than others in the construction history, according to a topographical map of the Armory, the building had reached its present size and configuration by 1864.

Unfortunately, there is a serious lack of available documentation for the Long Storehouse. Very few specific references to the building were found in the course of the research. Only a few original drawings and one early estimate surfaced. No original plans or specifications were discovered. Information was gleaned through the examination of the more general information contained in Ordnance Department Inspection Reports, Annual Reports, and Appropriation Reports as well as through correspondence from Springfield Armory superintendents and Ordnance Department officials, maps, and photographs. There was a large amount of construction throughout the 1840s, 50s, and 60s, and it is likely that the same suppliers and construction practices were employed. If appropriate, assumptions were made

concerning materials and construction practices used in the Long Storehouse through an examination of available information on other buildings being erected simultaneously.

B. Design and Function

All written and illustrative documents indicate that the Long Storehouse was intended to be a long simple utilitarian building. Though no documentation was found indicating the origins of the building's design, it is suspected that plans and specifications were produced by either an architect or master builder. References to the employment of both are found in Armory records (especially for the later period of work). For example, in 1861, it was reported that,

. . . the plan and estimates [for new work shops] have been carefully prepared by Mr. Allin Master Armorer, and Mr. Briggs Architect, and are accompanied by their explanations [sic] in detail.¹

In 1862, "the Master Builder (Mr. Lord)" is noted, along with the Master Armorer and Commandant, as being in charge of the use of wood at the Armory.² Further evidence of the active role of the Master Builder in the construction of the Long Storehouse is found in 1863, when in looking to erect a storehouse at arsenals in Ohio, Indiana, and Illinois, the Springfield Commandant recommended the following,

I think that Mr. Lord could prepare drawings of a suitable building for each of the Arsenals, say about 150 by 50 feet. I would rely on his experience and judgement in such matters for the proper details of the store-houses, . . .³

This passage also indicates that there may have been some attempt to maintain similar storehouse building "types" amongst federal arsenals. The establishment of building types is further substantiated by a set of regulations entitled Regulations Concerning Barracks and Quarters for the Army of the United States and dated 1861. Though it cautions that the book had "never been adopted" and should only be used as "unofficial hints," it sets out extensive estimates and bills of materials and labor for barracks, quarters, guard houses, stables and storehouses.⁴ The War Department was moving towards a more standardized treatment of building types. The storehouse described and illustrated, however, does not resemble Springfield's Long Storehouse.

In addition to an architect and master builder, it is believed that an engineer was involved with the erection of the Storehouse. Though no specific references were discovered linking a specific engineer to the construction of the Long Storehouse, 261 "Engineers, Mechanics and Laborers" were at work at the Water Shops. In addition, a letter dated January 31, 1856, from the new superintendent James Whitney to Stewart Chase, civil engineer, reads as follows.

I believe that an engineer who can be obtained for six dollars per day for the time actually spent, or at five dollars per day, being allowed full time will be competent under myself to complete the engineering for the improvements now going forward at this Armory. . . . you will be employed commencing upon the first day of February next.⁵

Labor was provided by day laborers who were "active able bodied men".⁶ All plans and specifications were subject to the approval of the Secretary of War.

The general design concept of the Long Storehouse is largely one of form following function. The design of the storehouse was quite carefully conceived to answer storage needs. Fixed louver blinds on the first floor insured the security of stored materials as well as provided essential ventilation to the first floor. Gable end entrances allowed restricted access and adapted perfectly to the Greek Revival style prevalent in neighboring armory structures. Large multi-paned windows on the second floor and fanlights above first floor doorways provided a flood of light to the interior, a necessary feature in a storage building where artificial means of lighting (gas or open flame) would be a terrible fire hazard. Gaps between the floor and the side walls in the loft allowed light from second-story windows to illuminate the loft and therefore enabled utilization of the third floor for storage as well. The structural framing [queen post truss] was also chosen with the storage function of the building in mind. The system requires no secondary framing below the roof truss and is designed to span wide areas. Truss framing is ideal for storage spaces as it allows for wide open spaces without intervening posts and bearing walls (fig.??).

The predominant stylistic influence during the first phase of construction was the Greek Revival, characterized by the gable-end orientation of the building. The overall symmetry, two-dimensional quality, and simplicity of materials and surfaces were also hallmarks of this style. The low pitched roof, simple cornice, and returns (without pediment) were not fully articulated and may have reflected an industrial interpretation of the high-style Greek Revival. The second phase of construction in the 1860s brought elements from the Italianate style into the design program affecting the overall character of the building. A distinctly Italianate influence appeared in the flat-roofed ventilators and a paint scheme of contrasting colors visually linking the semi-circular arches on the first story.

The impressive size and elegant lines of the storehouse reflected the intention to create a "grand national armory" that would "convey the impression of the power of the country to supply an important means for effective defence [sic], independent of foreign, or private aid . . ." The construction and maintenance of a very large, solid storehouse for gun stocks and armory materials reflected the military might of the nation and stood as an impressive show of the United States' defensive preparedness. It is estimated that the Long Storehouse held up to 600,000 gun stocks at full capacity.

In addition, the storehouse was placed on the northern boundary of the armory grounds to serve as a barrier between the armory and the city of Springfield beyond. Its elongated bulk presented a unified front to a [then] sometimes hostile public.

Claims that the Long Storehouse was built as a cavalry "caserne" intended to house stables on the first floor and barracks on the second floor have been circulated since the 1960s. The outward appearance of the building does resemble in some ways nineteenth-century designs for casernes, especially in its length and the repetitive rhythm of arches surmounted by rectangular windows. However, the Long Storehouse was never intended to be anything but a storehouse with the exception of the 10 eastern bays added in ca. 1861 to house stables on the first floor.

Both storage and stable functions are reported in numerous annual reports and inspection reports and remained unchanged throughout the nineteenth century and into the early twentieth century. Reports generally read "In all the public storehouses the arms and other public property appear neatly arranged so as to secure their safety and preservation."⁸ A report to the Chief of Ordnance in 1872 makes specific reference to the Long Storehouse and its function.

Storehouses. One two-story, brick, 764 x 55, used for storing lumber, rough stocks, and material required in the manufactures of the post; 150 feet of the East end of this building is used as a stable, with stalls for 24 horses.⁹

Names assigned to Building 19 have varied slightly throughout its history. Below is a list of the different designations encountered in period documents from the nineteenth century. The storage function of the building was clearly its main function.

- 1846 - Store House
- 1847 - New Store House
- 1848 - Long Store House
- 1849 - Gun Stock House
- 1849 - New Store House
- 1850 - New Store-House
- 1862 - brick timber store house
- 1864 - Store House
- 1867 - brick timber store house
- 1875 - Store House
- 1879 - Long Store House

C. Construction Chronology

Long Storehouse I (1846-1848)

Prior to the construction of the Long Storehouse, "gun-stocks, box boards, and other lumber and condemned work" were stored in two lumber sheds of riven pine clapboards each 100 feet long, 25 feet wide, and two stories tall. The lumber sheds were located on the southern edge of the parade green. In ca. 1830, they were moved to the east square (present-day Federal Square) and replaced with "new brick arsenals." (See figure 1.)¹⁰ Superintendent James Ripley considered these wooden storage sheds "inconveniently situated, and so dilapidated, that it would not be expedient to make them good by repairs." He advocated "to erect a permanent storehouse, of two stories." To realize his plan, Ripley requested the sum of \$12,000 under the appropriations for 1846.¹¹

On August 4, 1846, a plan and estimate for a "building suitable for a storehouse" was transmitted to Washington D.C.¹² The building was to be 200 feet long, 55 feet wide, and two stories high. Construction costs were estimated at \$11,959.50. By August 13, the plan and elevation were approved by the Secretary of War and construction was begun by September 4 on a "storehouse for musket stocks box boards and other lumber".¹³ By June 30, 1847, the "New Store House, 200 x 55' [was] nearly finished." The Annual Report for 1847 (recorded September 18, 1848) included the accomplishment that, "The first half or section of the new Store House for Lumber, Stocks, etc. has been completed."¹⁴ Therefore, some time between June 30, 1847 and June 30, 1848 the first portion, Long Storehouse I, was completed.

The plan and elevation sent to the Secretary of War for approval unfortunately have not survived. The most important remaining document pertaining to this first phase of building is

⁹Ripley's swift success in acquiring appropriations and erecting the storehouse is due in part to the outbreak of the Mexican War (1846-47) and the ensuing munitions demands of the federal government.

the written estimate of materials needed for a "Store House, 200 ft. long, 55 feet wide, 2 stories high, as per plan." The estimate is transcribed in the following section (Appearance at Construction) of this report.

Long Storehouse II (1846-1849)

Long Storehouse II (bays 37-66) was a substantial addition mirroring the original Long Storehouse I in both dimensions and appearance. It was apparently planned as a part of the original structure. A note attached to the August 1846 building estimate read, "It will be perceived that the length contemplated in the estimate is but one half that described in the plan."¹⁵

The addition of Long Storehouse II commenced shortly after the completion of Long Storehouse I. On May 7, 1847, a letter expressed the need for additional stores; "request that measures may be taken immediately to provide the additional store room which is required."¹⁶ At this time, the first phase of work (Long Storehouse I) was nearly completed. The "additional store room required", is therefore understood to be a reference to the Long Storehouse II.

An estimate for appropriations for the year 1848 include as a top priority ". . . completing the new store-house according to the approved plan, \$12,000."¹⁷ Superintendent Ripley noted,

A large portion of the materials required for this building have been procured, and its early completion is very desirable, for the convenient storage of musket stocks, etc.¹⁸

A year later, the 1849 [June] inspection report indicates that work had progressed rapidly for it read,

An addition to the Gun Stock House is nearly completed that will make that building 400 feet long and capable of receiving all the Stocks, necessary to be kept in Depot . . . besides affording room for other materials -It is well built and judiciously located.¹⁹

An annual report, dated August 18, 1849, records the completion of Long Storehouse II reporting that "The walls of the remaining section or half of the New Storehouse have been erected and roofed ready for slating."²⁰ It is clear that at least the architectural shell of Long Storehouse I and II were complete at this time.

In records from 1850, one mention was found pertaining to the Long Storehouse concerning slating, blinds, paving and shutters. It is as follows:

The slating & blinds for the new Store-house have been completed - also inside - shutters for one half of the bldg. The ground floor throughout the entire length has been paved - . . .²¹

Apparently, the middle section of the current Building 19 was completed and nearly outfitted by 1850. A "Map of Springfield, Massachusetts" surveyed and drawn by Marcus Smith and H. A. Jones is dated to 1851 (figs. 2 and 3). It includes the Armory grounds and shows Long Storehouse I and II completed and forming a single 400 foot entity at the northern boundary of the grounds.²²

Stables

The additions on the east and west ends of this original core are less exactly documented. However, brief references to new stables at the armory are found in several records from 1860 and 1861.

Numerous annual reports and inspection reports note that there was a rather small number of horses kept at the Armory, usually no more than six or seven. For example in 1852, "The number of public horses kept at the Armory is six, and that number appears to be necessary."²³ In the same year requests for appropriations for new stables were encountered. Whether the old stables were no longer suitable, or a larger number of horses expected, is not indicated. In appropriation records in 1852 one finds a request for "Stables for the use of the Armory - -----\$3,500."²⁴ The request was apparently denied for in 1860 [June] an inspection report listed the appropriation of \$3,500 "For stables for the use of the Armory." As in 1852, the 1860 report further noted that "Six public animals are kept. Their services are required."²⁵

The construction of the Stables began sometime in late summer or early fall of 1860 as indicated by instructions to the master armorer to take note of stable designs in nearby locations. On August 3 the superintendent directed,

You [Mr. E. S. Allin, master armorer] will proceed to Worcester, Mass, and examine some new stables recently erected there, with a view to observing such improvements in plan and construction as may be useful to adopt in the new Stables about to be erected upon the Armory grounds.²⁶

A number of plans dating to the construction of the Stables addition have survived, including a floor plan of the foundation wall and three plans for the placement of stalls on the first floor. The number of stalls considered varied from 14, to 20, to 21. It is believed that the three plans with stall placement simply present various alternatives to stable organization considered by the builders, etc. in 1860.²⁷ The final choice, the original arrangement, is unknown. A reference in 1870 reports 24 stalls in the Stables, and later plans (i.e. 1909) exhibit an arrangement unlike any of those on early drawings.

The Stables were complete by October 1861. A note to an officer at the Armory dated October 30, 1861 refers to "lightning rods for new Stables."²⁸ In addition, a "Map of Springfield" dated 1860 does not show the Stables on the building (fig. 4), but a map included in a city directory dating to 1861-1862 includes the Stables addition intact on the east end of Long Storehouse I and II (fig. 6). (The West Addition is not constructed yet.)²⁹ Therefore, the Stables were begun sometime around September of 1860 and were completed by October 1861. In 1867, an ordinance report describes that "The present stables are in one end of the timber store house."

West Addition

Despite our predictions from Major Ripley's opponents in 1852 that the Long Storehouse "is not, nor has it been occupied to one half its capacity, nor will it ever be, for the purposes designed,"³⁰ a further addition was added to the west end of the building shortly after the Stables were erected. The capacity of the storehouse was apparently not large enough to keep pace with the production of the Armory. A need for more storage space was expressed in a letter dated August 2, 1862 in ordnance records.

The want of sufficient store room at the Springfield Armory is a serious inconvenience.

...

An addition was proposed as follows, "In my opinion an expeditious and economical method of providing for this want will be to build an addition of about 200 feet to the brick timber store house."³¹

A responding letter dating to August 4, 1862, informed the superintendent that the "... erection of the additional buildings, as proposed in your letter of the 2nd inst. has been approved by the Secretary of War."³² It is assumed that the Secretary of War considered the enlargement of the Long Storehouse in this approval.

Several drawings for the West Addition survive including a section of the west end wall (no date) and a drawing of the north elevation (August 20, 1862). (See figures 17 and 19.) According to these drawings and to existing conditions, the West Addition was 18 bays long and matched in design and materials the three earlier portions of the building.

The addition of Italianate ventilator towers on east and west ends of the roof were apparently constructed in conjunction with the West Addition. A drawing specifically for the ventilator towers is dated July 24, 1861, and includes two elevations illustrating dimensions and design (fig. 18).

Though no specific ordinance records were discovered following the progress of the West Addition construction, it is assumed that it followed a pattern similar to other building programs. The Superintendent most likely had a large hand in overseeing aesthetic considerations, and the actual building by day laborers was probably overseen by an architect, engineer, and master builder.

A single record of the actual construction of the West Addition was found documenting the completion of the addition. On November 8, 1862, the Springfield Daily Republican reported on new buildings in Springfield. Among the items recorded was the following,

On the hill an addition has been made to the storehouse of 230 feet making the entire length of the building 800 feet. This addition is not entirely completed yet, but will be in very few days.

A topographical plan of the Armory from April, 1864 shows the Long Storehouse with west and east additions complete and the ventilators in place on the roof (fig. 7). The Long Storehouse had achieved its full length (764 feet) by 1864.³³ A selection of additional historical maps and drawings were chosen for this report to illustrate the appearance of the completed storehouse. They may be found in Volume II, figures 7-10. A written description of the appearance of the Long Storehouse at construction is immediately following.

D. Appearance at Construction

The appearance of the Long Storehouse at construction is based on architectural evidence and limited surviving historical documentation. The most important document discovered for the consideration of the original appearance of the building is the estimate for materials submitted for approval in August of 1846. The estimate is specifically related to the Long Storehouse I and II. It is transcribed below, and though some of the materials and measures

do not match the current conditions of the storehouse, it provides a true reflection of original intentions.³⁴

Estimated cost of Store House, 200 ft. long 55 feet wide, 2 stories high, as per plan.

<i>5075 cubic ft. of Stone Foundation at 14c</i>	<i>710.50</i>
<i>322,000 Brick (laid) at \$9. per M [1,000]</i>	<i>2898.00</i>
<i>1600 ft. Hammered Stone at 25c</i>	<i>400.00</i>
<i>13,600 ft. Tin Roofing at 8c</i>	<i>1088.00</i>
<i>80,000 ft. Timber at \$20. per M [1,000]</i>	<i>1600.00</i>
<i>13,600 ft. Boarding Roof at 3c</i>	<i>408.00</i>
<i>Framing and Raising</i>	<i>500.00</i>
<i>10,000 ft. Floor (laid) at 6c</i>	<i>600.00</i>
<i>400 ft. Cornice at 40c</i>	<i>160.00</i>
<i>64 Circular Head Blinds & Doors at \$20</i>	<i>1280.00</i>
<i>62 Square Head Blinds and Doors at \$15</i>	<i>930.00</i>
<i>26 Cast Iron Columns at \$20</i>	<i>520.00</i>
<i>Iron Work for Roof Floors &c.</i>	<i>257.00</i>
<i>3600 ft. Garret Floor (laid) at 3c</i>	<i>108.00</i>
<i>Incidental Expenses, Superintendence</i>	
<i>&c &c</i>	<i><u>500.00</u></i>

Total Amount
\$11,959.50

James M. Ripley

By 1864 the Long Storehouse had assumed its current exterior dimensions of 764 feet long by 55 feet wide (including the 200 foot Long Storehouse I, 200 foot Long Storehouse II, 150 foot Stables, and the 214 foot West Addition). The building was a long, narrow, gable-ended rectangular form and stood two stories high with a garret (loft). In addition to the length, the shape of the building was characterized by the square, distinctly Italianate ventilator towers on west and east ends of the building. Each ventilator was articulated with ten arched windows and capped with a flat roof. The timber framed roof on which the ventilators rested was clad in wood sheathing and slates. Though the 1846 estimate called for "boarding roof" and "tin roofing" the actual covering material used at construction was slate. During the initial phases of construction the slate may have been supplied by Thomas L. Rayner & Co. who slated a roof at the Armory with "Lady slates 10 x 16 in." in April of 1847,³⁵ or by a Boston firm that

provided the 17 tons of slate to cover the New Arsenal.³⁶ Suppliers for the later phases of construction are unknown.

The exterior of the storehouse was defined by a repetitive rhythm of identical bays. The completed length of the building featured 58 bays on the south and 58 bays on the north elevations. The West Addition was 18 bays in length, Long Storehouse II was 15 bays, Long Storehouse I was 15 bays, and the Stables contained 10 bays. Each bay on the south and north consisted of semi-circular arched openings on the first story surmounted by segmentally arched rectangular openings on the second story.

The configuration of west and east gable ends of the building was distinct from the south and north elevations featuring a three bay facade. On the east end, three semi-circular arches were present on the first and second stories with three segmental arches at the basement level. According to a drawing of the west end (ca. 1861), three semi-circular arches were likewise present on the first and second stories of the west end, presumably with an operable doorway in the center bay of the first story (fig. 17).³⁷ No basement level existed at the west end.

All semi-circular and segmental arched openings contained a combination of glazed sash, glazed fanlights, solid wooden panels, or wooden louvered blinds. All openings were equipped with interior folding batten shutters.

At construction, the semi-circular arches on the north and south elevations were all equipped with glazed fanlights. Treatment below the fanlights was either wooden louvered blinds or fixed, wooden panels. Fixed panels were located at bays 16, 22, 28, 34, 35, 46, 92, 94, 96, and 110. It is possible, (though currently undetermined), that one or more of the solid panels were operable doors. On the east end elevation, semi-circular arches on the first story featured louvered blinds. On the second story, the center arch was louvered and flanked on either side with a glazed (40 lights) semi-circular arch. Treatment of the segmental arches at the basement level is unknown. On the west end elevation, the treatment of first-story arches is unknown, though it is suspected that an operable door occupied the center entrance bay flanked by louvered blinds on the north and south. Second-story arches of the west end matched treatment on the east with a center louvered arch flanked by a glazed (40 lights) arch on north and south.

At construction, second-story segmental arches were filled with either double fixed sash of 40 lights each, or with wooden louvered blinds. The treatment appears to have followed a distinct pattern. As determined, the pattern from west to east was:

West Addition - alternating glazed (G) and louvered (L), every other bay.

LSHII - G, G, L, G, L, G, L, G, G, L, G, L, G, L, G

LSHI - G, L, G, L, G, L, G, G, L, G, L, G, L, G, G
(The exact reverse arrangement of LSHI.)

Stables - alternating glazed and louvered blinds, every other bay.

The 1846 estimate clearly indicates that the building was intended to be divided into arched bays containing both semi-circular and square-headed openings, and that the treatment of the arches was to include both louvered blinds and interior shutters. It refers to "64 circular head blinds & doors" and "62 square head blinds & doors." (Because Long Storehouse I was only 15 bays long and required just 30 semi-circular and 30 segmental (square head) arches, it seems

that the estimate is covering costs for the blinds and shutters for both Long Storehouse I and II.)

The floor plan of the Long Storehouse was generally uniform and without great complexity (fig. 21). Though built in four sections, the plan, like the exterior design, varied little from end to end. The plan was largely dictated by the function of the building as a storehouse. This function required an open plan to facilitate easy deposit and retrieval of materials, minimal access to insure the security of stored materials, and substantial window openings to light the interior of the building without artificial means. The repetitive bay system composing the exterior elevations was mirrored on the interior plan, dividing the longitudinal axis of the building into 58 bays.

The plan of the first story (excluding the Stables) featured a center aisle as the primary circulation artery through the building. The uniform bay division on the first story was defined by the cast iron columns of the exposed structural system and by brick partition walls. The interior space of the first story (including the Stables) was physically divided cross-wise by nine partition walls (PW1-PW9). The four major phases of the building (Long Storehouse I, Long Storehouse II, Stables, and West Addition) were marked off by PW3, PW5, and PW7. PW3 and PW7 were original endwalls of the building as it evolved. PW5 was also an original endwall though it was not a finished endwall. At construction it featured three semi-circular arches on the first story with just truncated piers on the second story and no wall at all at the loft level. Some type of temporary wall or protective cover must have been used at this end (PW5) in the short time between the completion of Long Storehouse I and the construction of Long Storehouse II.

Each major phase of the building was further sub-divided on the first story into smaller sections as follows: the Long Storehouse I was divided in two by PW6; Long Storehouse II was divided in two by PW4; the Stables received two partition walls (PW8 and PW9) dividing it into three sections of 3, 3, and 4 bays; and the West Addition featured PW1 and PW2 dividing it into equal parts of 6 bays each. The partition walls were introduced in both a load-bearing capacity to carry the second-floor framing and as a space organizer for compartmentalizing the large open spaces of the building.

The plan of the second story was comprised of three large open areas separated by PW3 and PW7. No communication (openings) could be made through these solid partition walls. Each of the three open areas featured a center aisle flanked by bays on either side. Bays were defined by windows, truncated partition walls, and an exposed structural system. Solid partition walls besides being original end walls, were probably intended to serve as firebreaks.

The plan of the loft story was likewise comprised of three large open areas separated by PW3 and PW7. No communication could be made through these partition walls. Each of the loft's three open areas featured a center aisle flanked by bays on either side. Bays were defined by the exposed queen post truss system. As on the second story, solid partition walls were probably intended to serve as firebreaks.

The main means of circulation within the building included the primary entrance in the center bay of the west end, the center aisle on all levels, stairs at bay 36 serving the West

*The organization of the Stables was designed to accommodate stalls, hostlers room, tack room, etc. and therefore did not conform to the center aisle plan. The original plan of the Stables, however, is unknown.

Addition, stairs at bay 96 serving Long Storehouse I and II, and stairs at bay 110 serving the Stables. In addition, partition walls 1, 2, 4, and 5 featured open arches on both the south and north sides of the center arch possibly to facilitate movement along the south and north walls.*

In summary, the original plan reflected the vast length, narrow width, uniformity, and repetition visible on the exterior. Characteristic features were a by-product of the exposed structural system with posts and/or columns defining each bay and the central corridor, and the focus on the central corridor as the primary west/east artery through the building.

The Long Storehouse was a brick-walled, timber-framed building. Although the building was built in four phases, the structural system was similar throughout. It was an exposed structural system and was organized, (like the exterior and the floor plan), by bay units. Though the details of the structural system as it appeared at construction are as yet undetermined, historical research and architectural analysis of extant conditions suggests that the primary structural system consisted of masonry load-bearing walls and a queen post roof truss frame (see "Architectural Description, Framing" for illustration). The 1846 estimate for a 200 foot section of the building called for 322,000 brick (laid) and 80,000 feet of "Timber" as well as a \$500 charge for "Framing and Raising."

The main timbers of the queen post truss consisted of queen posts, bottom chords, truss rafters, collar tie-beams, purlins, and common rafters. Augmenting these elements were 6" x 8" struts bracing queen posts and rafters, and iron tie-rods running from roof peak through loft floor and complemented with an A-frame support.** Struts were used only in Long Storehouse I and II. Iron tie-rods were centered at each bay from end to end of the building. Mention of "Iron Work for Roof Floors" in the 1846 estimate referred to iron stirrups used to tie the queen posts and bottom chords.*** The bottom chords hung on the plate, but were partially carried by piers with wooden cushions found below the loft floor at the second story. A framing plan of the queen post truss was found on the reverse side of a drawing dated ca. 1866 and represents original configuration.³⁸

On the first story, cast iron columns carried the major cross beams supporting second-floor joists. The 1846 estimate called for 26 cast-iron columns that were arranged with 13 on each side of a center aisle. Additional materials noted in the estimate included "Stone Foundation," "Hammerd Stone [sic]" and "Floor (laid)." The stone was local sandstone presumably quarried in East Longmeadow. References for stone used in both the Commanding Officer's House and the Main Arsenal (built at the same time as the storehouse) identify the source of stone used in the following letter dated April 4, 1847.

The stone to be taken from the quarry at East Long Meadow, known as Luke Kibbe's North Quarry, and to be of the same kind and quality as those furnished by the said

*It is more likely that these side arches were related to the load-bearing capacity of the walls as it has been determined that they were bricked-in quite early in the evolution of the building.

**These additions indicate that engineers and architects were applying insurance to a structural system still new in function and design.

***As mentioned in the introduction, iron stirrups were used only in Long Storehouse I and II and not in the Stables or the West Addition.

Kibbe for the house lately wrought and fitted, ready for laying, with the faces rubbed, or polished in a workmanlike manner. . . .³⁹

The "Hammerd Stone" of the estimate was sandstone worked with a patent hammer as seen in the water table and window sills of the storehouse.

The "Floor (laid)" was probably white pine planks. As indicated by ordnance communications, "Timber" probably included white pine, maple, and chestnut. Suppliers may have been J. E. Chapman of Windsor Locks, CT, as an order dated 1847 from the master builder reads,

Mr. Lord's order for 100 sticks White Pine timber 23 ft long 3 x 6 is received . . . I shall presume it is wanted similar to the joists I have been sawing for the Store House & will put them through at once if I hear nothing further from you.⁴⁰

Hutchins, Wells & Co. of Bath, New Hampshire also supplied building materials to the Armory such as "35,000 ft. White Pine Plank, clear, 2 1/8 in. thick. 1,000 pieces Maple Joist, 12 ft. long, 5 in. square."⁴¹ Suppliers of timber for the later phases of construction are unknown.

Specific details of construction and how listed materials were used was largely gleaned from references to other buildings found in ordnance records. From these descriptions, it is evident that a consistency in building practice, and use of materials existed in the Armory buildings at this time. For example, a description of "the shops" in 1861 reflects what the Long Storehouse surely looked like at construction.

. . . The balance of the shops have flooring of timber and planking. The portion of the shops having more than one story, has iron columns for supporting the floors above excepting the upper stories. The roofs are all sustained upon the side walls without intermediate support . . . the buildings of one & 2 stories have 20 inch walls throughout. . . . The roofs are to be covered with best quality of slate. The buildings throughout are to be faced with pressed bricks.⁴²

A reference to the "North Shop" further describes building techniques.

. . . truss consisting of two strain beams connected by an iron rod, the upper beam being bolted to the king post, 32,000 lbs. In the whole floor are 14 trusses and 14 beams, alternating at intervals of 6' . . . It is proposed to give additional strength to the floors by supporting them with cast-iron columns 3" in diameter, one under each truss.⁴³

A material not included in the estimate but a characteristic of the appearance at construction was paint. The polychromatic painting of the exterior was applied in the early history of the building; perhaps as early as 1849. A line item in the appropriations report for that year included, "For finishing the interior of new Arsenal, putting up gun racks, and painting Arsenal, storehouse and other buildings . . . \$20,000."⁴⁴ Paint was again applied to "public buildings" in 1851.⁴⁵ Two years later in 1853, an Annual Report dated October 6 recorded that,

The painting of the Public Buildings has been continued and will be accomplished the pursuant season.⁴⁶

The "public buildings" were comprised of the "new Store House, Offices, the Superintendent's, Master Armorer's and Clerks' quarters."⁴⁷ The annual report from the following year (1854) stated;

The repainting of the Public Buildings on the Hill in progress at the time the last report was made was continued & completed during the last season.⁴⁸

Specifically it noted "Store house painted." Thus, Long Storehouse I and II were painted at least by 1854. The Stables and West Addition constructed in the 1860s were painted upon completion to match the existing appearance (figs. 40 and 41).

Judging from paint samples taken from an original endwall (PW3) the color scheme of the paint consisted of a rosy beige for walls and a dark brown for trim including window sash, window sills, panelled doors, and all louvers. All interior shutters were painted dark brown on the exterior and rosy beige on the interior. In addition, the segmental brick arch of the windows, the brick imposts, surrounds, and intrados of all semi-circular arches, and the brick cornice were painted dark brown. The color scheme was carried through the Italianate ventilators. Here, surrounds of the arched windows, the cornice, and the base were painted dark brown while the surface material (believed to be sheet metal) was painted rosy beige to match the painted brick walls.

POST-CONSTRUCTION EVOLUTION

A. Alterations to Building 19 (Proposed and Realized)

Nineteenth Century

Throughout the nineteenth century, after completion, the Long Storehouse remained largely unaltered. Changes prior to the twentieth century were generally maintenance in nature or related to the surrounding landscape. A proposed change of major significance was first submitted in 1866 and entailed raising the 22 middle bays of the storehouse to three stories and capping the new height with a pediment 6 bays wide on the north and south elevations (fig. 20). The proposal, as quoted below, carried a cost of \$2,800.

To raise the middle portion of the Timber store to three stories. . . . It is necessary for the storage of patterns and other light articles, and it will improve the present appearance of this building.⁴⁹

The alteration was still being considered in January of 1867 when it was included for appropriations as follows.

To raise the middle part of the timber store house to three stories with pediments front and rear. \$2800g . . . This addition will give a large amount of store room which is much needed, and will, it is thought, improve the appearance of this building with its long unbroken lines.⁵⁰

The need for extra storage may have been caused by an accelerated munitions output due to the Civil War. The aesthetics of the proposal reflect a change in popular taste. The quotes from ordinance records reflect a feeling that the proposal would improve the appearance of the building, particularly because it would elaborate its simple volumetric form. A drawing dating to ca. 1866 exhibits just how much the alteration was intended to change the appearance of the storehouse.⁵¹ In addition to raising the height of the building and introducing pediments at the roof line, the design called for quoins at the corners, eyebrow window lintels, a more ornate (Italianate) cornice, and a new cupola centered on the roof. References to the south and north elevations as the "front and rear" also indicate that the gable end orientation of the building was to be changed. Clearly, the penchant for clean, classical lines that fueled the Greek Revival had been replaced by a desire for more varied planes and ornamented surfaces. The proposal, however, was never realized.

An alteration that is believed to have been carried out was improvements in the Stables. Apparently, conditions had become quite abominable by 1873 and appropriations were asked for "Altering & improving stables. \$1000." Though the drawings have not been discovered one passage of explanation was found.

A drawing marked No. 1 shows the stalls on the main floor of the stable as they are now arranged. As the number of stalls is not sufficient for the wants of the post a portion of the horses are kept in the cellar below, a place not only inconvenient of access but filthy from the leaking of urine through the floor. It is proposed in making the alteration to transfer the feed and oestlers rooms to the present carriage room. The plan of alterations is shown in drawing No. 5. The estimated cost of all the alterations including new floor, the present one being much worn is about \$1000.⁵²

Presumably, a new floor was laid and the organization of stalls and service rooms were redesigned.

A third change to the storehouse may have included a change in the paint scheme. An article in the local newspaper in 1878 reported that,

Some of the buildings in the eastern part of the armory grounds, which have been of dark brown color are being repainted light yellow so as to be in harmony with the rest of the buildings. The work is being done by some of the soldiers who are painters by trade.³³

The Long Storehouse may have been one of the "rest of the buildings" that was painted light yellow. Unfortunately, it is impossible to document any yellow paint due to the sandblasting of the exterior in 1937. In addition, no period photographs provide any clear indication of a yellow finish. Though the photographs are black and white, the building appears to retain its original rosy beige and dark brown paint.

An alteration with long-ranging impact was the creation of a passageway through the building at bay 100/101 (fig. 50). The passageway was a single bay wide utilizing extant arches and was paved with granite block. The passageway may have been extant as early as 1882.³⁴ It facilitated patterns of new circulation around the building. (Due to the sharply sloping topography and the lack of an entrance at the first floor level, circulation around the east end of the building was not developed.)

No other documentation was found indicating alterations to the Long Storehouse during the nineteenth century.

Twentieth Century

As far as current research has identified, the evolutionary history of the Long Storehouse was largely static until the 1920s and 1930s when major alterations and additions were introduced substantially impacting the exterior. Projects between 1900 and 1920 were generally of a maintenance nature. For example, in 1915 painting of the exterior woodwork was undertaken. A contract instructed,

. . . furnish the necessary labor materials for painting all the exterior woodwork of the building known as Storehouse No. 8. [Building 19] for the sum of five hundred and fifty-three dollars. The above building to have two coats of Atlantic pure white lead and linseed oil; the color to be the same as at present. The window sash to have one coat of Venetian red in oil and all windows to be puttied where necessary. All blisters or scaly paint will be removed before the new paint is applied. . . . For colors, Reynold's Genuine will be used, ground in oil.³⁵

Maintenance, indeed self-preservation, was the motivation in the award of a contract to the Boston Lightning Co. on January 10, 1919. The company was to,

. . . furnish necessary labor and materials for grounding and repairing lightning rods on the buildings . . . Storehouse No. 8 and Stables: 1 New dormer rod and point, replace ground rod on northwest corner, repair broken ground rod on northwest corner, repair broken ground rod on northeast corner.³⁶

An exception to the maintenance oriented projects included the introduction of the first elevator to the building in 1918. The company Marcil & Arnold were contracted to "furnish and install one elevator in Storehouse 8 at the Springfield Armory, Mass." It was installed at bay 62, was capable of lifting 3000 pounds at a rate of 40 feet per minute, and served the first through the loft floors. The contract described it as,

A direct connected winding machine with an alternating current meter, electric brake, hatchway limit switches, wood car sling and platform, hand rope control, hand rope lock, platform about 6'9" postwise by 5'0" front to back, with wood sheathing on two sides of platform to height of 6'.⁵⁷

The gable-roofed elevator shaft pierced the roof on the south slope and resembled a dormer with a window facing south (fig. 48). The elevator altered the planes of both the roof and the south elevation.

A further alteration of the roofline occurred sometime around 1920 when four copper ventilators were installed on the roof ridge at bays 27/28, 47/48, 69/70, and 88/89.* Their conical, skirted profiles are distinctive, but blend rather harmoniously with the style and shape of the building (fig. 49).

The function of the building during the 1920s continued to be storage. In 1928, it was referred to as ". . . the Long Storehouse, which is now used to house large numbers of gun stock blanks, lumber and other supplies."⁵⁸ Though a proposal was made in 1923 for the city to acquire the armory property and use the site and buildings as a high school, the proposal was considered "A wild proposition," with "all the earmarks of being a foolish utopian dream."⁵⁹ Production must have been at a low ebb to consider adapting the Armory to another use. The 1923 proposition was never realized, but it is of especial interest considering the current use of the site of the Springfield Technical Community College (STCC).

The 1930s brought the Works Project Administration to the Springfield Armory. (See figures 23, 25, 26, 54, 55, 56.) Not surprisingly, the Long Storehouse experienced a number of WPA projects, several of which seriously impacted the exterior of the building. All projects undertaken during the WPA era may not actually have been carried out by WPA funds or crews. Known and suspected WPA jobs are chronicled below with a (WPA) following those jobs specifically credited to the WPA. Citations to the drawings, photographs, and contemporary newspaper articles used to compile the following information are generally found within the "Historic Sources" of the Architectural Description of this report. It should be noted, that the dates below often reflect the completion of the drawing for proposed work, and not necessarily the date that the work was performed.

- March 1935 Alterations to openings including the installation of 16-panel garage doors at bays 10, 12 on the south. (WPA)
- April 1935 2-ton freight elevator replaced earlier elevator at bay 62, larger loading platform constructed, and dormer elevator shaft replaced.
- Feb. 1937 Stables remodeled for garage. Arches on south elevation reconfigured. Two square-headed doors replaced bays 104/106 and 112/114. A metal

*The conical ventilators may have been added in 1918 when building 28 was erected. Building 28 sports identical roof ventilators.

roll-up door was installed in bay 104/106 opening. Sliding wooden doors were installed in bay 112/114 opening. (WPA)

- March 1937 Replacing 7" cast-iron columns and joists in basement with formed concrete columns and cross beams. New 6" concrete floor poured in Stables. (WPA)
- Relocation of stairs in Stables. Plan to remove existing stair and relocate on opposite side of PW9 after new concrete floor installed. No stairs in stables today. Probably removed but never replaced at this time. (WPA)
- April 1937 Wooden doors and louvers removed from arches and infilled with brick on the north at bays 103-115 and on the south at bays 108, 110, and 116. (Fanlights retained.) (WPA)
- Oct. 1937 Reroofing of slate roof. It is unknown what portions of the roof were reroofed though a photograph indicates that at least the Stables were recovered. (WPA)
- 1937 Painted walls sandblasted. Wood retained dark finish. "Brick buildings once painted with a sickly brown coating are being cleaned by sand blasting, thus restoring the beauty of the original brick."⁶⁰ (WPA)
- April 1938 Vehicular passage-way altered. Semi-circular arches removed at bays 99, 100, 101, and 102 to enlarge extant passage way through building. Replaced with rectangular opening with steel lintels and metal bumper guards. Granite block floor in passageway removed and concrete laid.
- June 1938 Appraised value, \$175,000. Steam heat. Electric light. Sewer connections. 3 Telephones.⁶¹
- ca. 1938 Italianate ventilators removed. Ventilators appear in photograph dated 1937 but disappear by 1944. It is suspected that their removal was a WPA job.
- ca. 1938 An additional project that may have been undertaken by WPA employees was the removal of the exterior louvered blinds on the second story. All louvered blinds were removed by 1944 on the south, though 16 windows retain the louvers on the north even today. The removal of louvered blinds from second-story windows coincided with the replacement in-kind of historic sash. In addition, 27 interior frames were replaced on the south and 10 on the north.⁶²
- April 1939 3 Water closets and a urinal trough added to bay 98 lavatory.⁶³

During the 1940s, the Long Storehouse experienced both major structural changes and numerous alterations related to updating and securing the facility. (See figures 17, 27, 28, 29, 30, and 60.) It was during this decade that the interior approached its current appearance regarding floor plan, exposed structural system, and interior walls. The obvious concern for the storehouse's structural stability and building security, (as reflected in the following list), may be a result of an escalation in arms manufacture at the Armory in anticipation of our involvement in World War II.

- March 1940 3 electric Rockwood heaters and 1 water fountain installed.⁶⁴
- Nov. 1940 Introduction of structural steel framing system for reinforcing second-story floor the length of the storehouse excepting the Stables. (i.e. Cast iron columns replaced with steel. Wood cross beams flanked with steel channel-beams.)
- All interior brick arches in partition walls infilled with brick. Brick pilasters added to infilled arches and piers added to ends of some partition walls at the center aisle to carry the west/east steel beams.
- May 1941 2 fire alarm boxes installed on interior. 2 Watchman guard station boxes installed. 2 outside fire alarm boxes. 8 flood lights installed.⁶⁵
- June 1941 51 electric light receptacles installed.
- Dec. 1941 Structural steel framing system introduced in bays 97-116 [Stables] for reinforcement of floor above.
- Jan. 1942 Fire doors installed at PW3, PW5, PW7 and bay 59 on north elevation. It is assumed that PW5 was extended into a fire wall from first through loft stories at this time.
- Four fire alarm boxes installed.
- 2-ton Bay State freight elevators installed, concrete loading platforms and brick elevator shafts constructed at bays 30 and 97.
- May 1942 Repairs and perhaps replacement of sections of the downspouts of the copper gutter system on the south elevation in conjunction with the extension of the sewer services.
- June 1942 2 Gamewell fire alarm gongs installed.

The history of the storehouse during the following decade is largely unknown (fig. 65). The few documented changes during the 1950s indicate that the building continued to be used for storage. Indeed, a photo dated September 1950 shows the first story of the building stacked with gun blanks from floor to ceiling (fig. 62). However, the introduction of an electric substation serving the west end of the Armory grounds presages a dominant trend of the future; using the building as a utility systems headquarters for the site. This suggests that the storage function of the building, though still its major function, was becoming less integral to the workings of the Armory as a whole.

- Nov. 1952 Installation of poured concrete floor with expansion joints, throughout the first level with the exception of the Stables to facilitate modern loading equipment (fig. 31).
- Jan. 1954 Brick infill of arches top to bottom, bays 2 and 4 due to the installation of electric sub-station serving the west end of the Armory grounds (fig. 32).

May 1955 Proposed renovation including enclosing stairs with rigid asbestos board. Fire protection measure. Present stair enclosures at bay 36 and 96 are of plywood, asbestos never installed.

In addition to cosmetic changes, alterations to the Long Storehouse during the 1960s reflected the evolving role of the Armory as a center for technological research and development within the munitions industry. (See figures 15, 16, 67, 68, 69, and 70.) Though the building was still largely used for storage, portions of the building were adapted (or considered) for use as research and development offices/laboratories.

Ca. 1960 All exterior wood; window sash, louvered blinds, fanlights, and panelled doors, were painted white changing the look of the exterior considerably.⁶⁶

June 1960 Brick infill of arches, top to bottom, at bays 1, 3, 5, 7, 9. Radiographic Inspection Lab created in West Addition (fig. 33).

Sept. 1960 Modification of basement area to configuration extant today (fig. 34).

Dec. 1963 Installation of Facilities Office, Engineering Branch, bays 109-116, basement and first levels. Reorganization of space. (Plan probably never realized.)

The continuum date for the Springfield Armory NHS and therefore for Building 19, is 1968. However, several changes to the building post-dating the continuum have had a significant impact and are therefore included here. For example, from 1981-1983 bays 37 to 50 were occupied by the horses of Springfield's mounted police. Hollow pipe and plywood partitions were built within each of the bays creating stalls. A number of the frames, doors and fanlights were removed from first-story arches leaving gaping openings in much of the south elevation. It is believed that the doors were removed in anticipation of the use of the building by the Springfield mounted police. They are only missing in the Long Storehouse I and II portions of the building where the police horses were stabled.*

A High Temperature Water System was installed in the building in 1983 resulting in an intrusive network of large white piping suspended from the ceiling irrespective of original structure and plan. Likewise, in 1986, the conversion of the site's electrical system from individual transformers to a new 13,800V main supply impacted Building 19. The new 13,800V supply is brought into the building to a high voltage room erected at bay 81 and is distributed from the high voltage room to west end areas of the STCC campus. As the 1988 "Comprehensive Facilities Plan" states, "Building 19 has become somewhat of a focal point in a large part of the campus electrical distribution system."⁶⁷

A Building Trades Training Center was introduced in the West Addition (bays 1-36) in ca. 1985. Reversible remodeling changes were made to the interior such as the installation of drywall and raised plywood floors.

On a less dramatic scale was the growing number of lights, signs, wires, fire alarms, etc. that were affixed to the exterior walls. The dates of installation are unknown, although it is suspected that many were in place by 1970.

*Today, 20 arches on the south and 4 on the north are open to the elements. Some of the removed parts survive stored in the building.

A number of changes to the building, determined largely through an examination of physical architectural evidence, have no dated documentation. Several of these changes are significant. Undated changes impacting the Long Storehouse include the following:

- 1) The installation of a fire sprinkler system. Documentation reveals that although other buildings at the Armory were equipped with sprinkler systems by 1911, the Long Storehouse was not. It was recommended that a system be installed at this time. The current system includes dry pipe valve sprinkler components patented in 1917, 1927, 1942, and 1954. Despite the patent dates, it is impossible to determine the date of installation without documentation. Most of the system today seems to be the Grinnel Co. dry pipe valve "Model E-2" dating to 1942. Sheds housing valve controls were erected in bays 24, 50, and 82. An exposed valve control is located at bay 106.
- 2) Variations were made to the interior walls and the treatment of second-story window frames in the West Addition, bays 1, 2, 4, and 6 at some point. The wall seems to be 8" thicker in these bays with the wall plate seeming recessed in bays 1, 2, and 4. In addition, the exterior cornice and corresponding interior brick work at these bays is laid differently. The frames of windows at these bays are completely inset into the segmental arch. Three of the frames are pegged, one is nailed. These inset frames are found nowhere else in the building. Square wood posts flanking the center aisle are larger in bays 1-6. It is unknown when these variations were introduced; it may have been shortly after construction. Framing alterations noted below in numbers
- 3) Openings were made in PW3 and PW7 at the second and loft levels for communication between formerly segregated sections of the building.
- 4) Square wooden posts and pads were introduced to the framing on the second floor, flanking the center aisle at each bay, augmenting support of the loft floor. (Nailed with wire nails.)
- 5) Loft floor was extended approx 7 1/2 feet on either side of original floor. Extension floor was of a single thickness, original floor was of double thickness. The change required the addition of new floor joists at either side.
- 6) Floor hatches originally located at bay 27, center aisle at PW4 and PW5, bay 91/92, and bay 102 were covered over at some time.
- 7) Snow guards were added to the eaves in places. Older style guards are present from bay 97 to the east end on the north slope of the roof. Modern snow guards (installed by STCC) are extant from bay 97 west to bay 81 on the north slope, and on from end to end on the south slope.
- 8) In the West Addition, the bottom chord at bay 2/4 is tied into the wall with metal tie rod or suspension. The bottom chord at bay 4/6 is heavily braced with a riveted metal plate.
- 9) Queen post repairs made in loft at bay 5/7 and 6/8. A new diagonal wood brace introduced at top of post. An iron strap ties the queen post, truss rafter, and collar tie-beam.
- 10) In the Stables, the bottom chord at bay 97/99 is heavily braced with a riveted metal plate.

- 11) The bottom chords at bays 90/92 and 92/94 have been significantly repaired with some replacement wood.

A final consideration in the construction evolution of the Long Storehouse is the variations found in twentieth-century references to the building. There are many more variations found than in the nineteenth century, many of which reflect the more mechanized, impersonal industrial nature of the modern Armory.

1904 - Building 20, Long Store House
1909 - Long Store House
1918 - Store House 8
1918 - Building 20 and 21, Long Store House and Stables
1937 - Building 19, Storehouse. Building 19A, Stables
1940 - Building 19, Building 19A (Stables)
1950 - Building 19
1952 - Building 19
1955 - Building 19, Long Store House
1967 - Building 19
1988 - Building 19

SITE HISTORY

A. Construction Era

The site surrounding the Long Storehouse has been impacted through the years as the Armory priorities developed. Always an industrial site, the landscape and built environment at Springfield Armory grew according to the visions of various commandants, to advancing technology and to national munitions needs. (See figures 1, 3, 7, and 8.) The Long Storehouse was sited on the bluff at the northern boundary of the Armory grounds and functioned as a physical barrier between the manufacturing center and the public beyond. Clearly, it was never intended to be a show case building, but rather, was a very utilitarian structure serving as a northern barrier as well as a storage facility (figs. 36, 37, 38, and 39).

Upon its completion in ca. 1864, the surroundings reflected the extensive landscaping projects initiated by Colonel Ripley including grading, planting, improving roads, and laying paved walks (fig. 7). Green spaces surrounded the building on its north, west, and south sides with an orchard and the superintendent's barn on the south. A more formal avenue of trees flanked a walkway the length of the north elevation. What appears to be more formal plots of cultivated land were located at the west end with brick-paved walkways marking-off rectangular plots.

Several passages from ordnance correspondence document the evolution of the landscape to its 1864 appearance. For example, an annual report for 1849 read,

The grading and embankments have been continued North of the New Store House and west of the New Arsenal. About 80,000 cubic yards of earth have been removed for filling ravines and forming embankments North of the New Store House . . . About 9000 superficial yards of sodding has been laid around the New Arsenal and on the embankments North of the New Store House.⁶⁸

Work continued the following year including more grading, sodding, and filling of ravines in the vicinity of the storehouse, as well as the introduction of fencing. The annual report for 1850 included the following passage.

About 46,000 cubic yards of earth have been removed for filling ravines north of the New Store House, & nearly 600 superficial yards of sodding have been laid. . . . A Picket fence, 40 rods in length, has been built for enclosing the yard in front of the New Store House, and 54 rods of high board fence, rebuilt & repaired on the north line.⁶⁹

At the east end of the building was a small circular reservoir. It is believed that work on the reservoir commenced and was completed in 1850. By August 30, 1850, the commandant was able to report to the Chief of Ordnance,

The Large Reservoir north of the machine shop is so far completed as to admit of being filled with water. It will contain over 700,000 Gallons, affording an abundant supply of water in case of fire.⁷⁰

The following year more improvements to the area around the storehouse and new reservoir were recorded.

The ground in the vicinity of the New Store House and around the large Reservoir have been graded & about 6000 sq. yds. of sodding laid.⁷¹

By October of 1853, the initial landscaping of the surrounds were complete. Initial landscaping being, "grading, terracing and turfing."⁷² In 1859, appropriation records reveal that,

The road on the north side of the Armory grounds, in part graded, stone and cement foundations for Iron Fence laid on Byers Street. Nearly 800 shade trees have been put out.⁷³

A topographical plan by the Master Armorer E. S. Allin dated 1859 shows some of these improvements (fig. 3). By 1860,

The street on the north side of the armory enclosure on the hill, alluded to in a former report has since been opened and the greater portion of the foundation for the fence to enclose the grounds on that side, besides the necessary culverts, has been laid.⁷⁴

The Stables and West Addition were built between 1860-1861 completing the building. The landscape as it had evolved was maintained. The new length of the building did not appear to change the nature of the site. Turfing, grading, and terracing were simply extended around the now complete building. A photograph [ca. 1870] clearly reveals grass, trees, shrubs, walks and roads as viewed from the northeast corner of the storehouse (fig. 40).

Access to the building was apparently only through the west end. Materials were transferred to the storehouse via an east/west road running between the storehouse and the parade green from the industrial complex located to the southeast of the building.

Officers' housing facing the parade green backed up on the green area bordering the south elevation of the storehouse (fig. 42). A gardener's house also facing the green was located in the orchard directly adjacent to the south elevation and a coal house stood at right angles to the southeast end of the building. The overall effect of the landscaping was of a rather rural, well planted but undeveloped space set apart from the formal parade ground by officers' housing and two east/west roads. It was likewise set apart from the manufacturing shops crowding the northeast corner of the grounds by dead space along the south elevation.

B. Post-Construction Evolution

As circumstances at the Armory changed, structures were added and demolished, traffic patterns altered, and plantings extended or cut back. (See figures 8, 10, 11, and 13.) Around the Long Storehouse there was an increasing emphasis on functional space (i.e. access roads, loading docks, and openings) and less concern for maintaining a landscape apron around the building.

The area adjacent to the southern elevation experienced numerous changes. In 1879, the Master Armorer's house (bldg. 10) was moved from beside the Main Arsenal to a site near the west end of the storehouse.⁷⁵ By 1897, the gardener's quarters were removed (though the orchard remained). In ca. 1890, buildings 7, 8, and 9, were added to the area adjacent to the south elevation. Their back yards nearly abutted the building itself. Rear driveways for buildings 7, 8, 9 were extended off the storehouse access road and a truck turn-around was carved out of the grassy area in front of the loading platform at bay 62. Between 1897 and 1904 a root cellar appeared towards the west end of the building, and several years later in

1910, railroad tracks appear along the south elevation (fig. 12). Both were removed by 1955. Sometime around 1960 a parking lot was created of the area fronting the Stables on the south. Today, the entire area along the south elevation has been paved with asphalt for a parking lot. This parking lot seriously impacts the aesthetics and condition of the building.

The north elevation changed forever when Building 32 was constructed along the north elevation with an enclosed passage at bay 59 joining Building 32 to Building 19 (1918-1922). Likewise, Building 28, erected in 1919 on the very crest of the northern hill, further altered the north side of the building as Building 19 no longer served as a barrier along this boundary. (See figures 14, 43, 57, and 59.)

The extension of the vehicular passageway at bays 100/101 in 1938 changed traffic patterns around the building encouraging through traffic (fig. 56). As a result, paved parking lots and roads eventually replaced most of the green space once stretching along the north elevation.

On the east, the reservoir is gone by 1965 replaced by new access roads, parking areas, and buildings (fig. 16). The original barnyard enclosed with a wood pale fence changed to an asphalt courtyard enclosed with a low masonry wall.

The west end of the building is the least altered and remains the main access to the building. This end has suffered some removal of trees and plantings but continues to have a large undeveloped green space to the west.

* * * * *

The brief examination of the landscape evolution of the Long Storehouse included in this report should be expanded. Significant documentation survives (and has not been fully explored), to produce a substantial Cultural Landscape Report.

NOTES

1. NA, RG 156, Entry 21, Ordnance Department, OCO Document File, 1797-1894 (select letters identified in register of Letters Received (RG 156, Entry 20).
2. July 8, 1862: "No one employed in the Armory will be allowed to carry off wood or shavings without the written permission of the Commanding Officer, the Master Armorer or the Master Builder (Mr. Lord). NA, RG 156, Entry 1362, Letters Received, July 8, 1862.
3. NA, RG 156, Entry 1365, Official Miscellaneous Letters Received. 1863.
4. Regulations Concerning Barracks and Quarters for the Army of the United States, 1860. (Washington: George W. Bowman, Printer, 1861). Found at the U.S. Army Military History Institute, Carlisle, PA.
5. NA, RG 156, Entry 1351. Letters sent 1835-1860.
6. NA, RG 256, Entry 1003, Reports of Inspection of Arsenal and Depots, 1832-1860. Ordnance Office. Inspection Report, October 1, 1857.
7. Ibid., Inspection Report, October 3, 1853.
8. Ibid., October 20, 1852, Inspection Report. "In all the public store houses the arms and others public property appear neatly arranged so as to secure their safety and preservation."
9. January 20, 1872: "Whittlesey's Notes" I. 44. - Outline and Description of United States Military Posts, in the year 1871, p. 161. Quartermaster General's Office. Government Printing Office 1872.
10. The National Armories, A Review of the System of Superintendency, Civil and Military, Particularly with Reference to Economy, and General Management at the Springfield Armory. (Springfield, MA: G. W. Wilson's Steam Power Presses, 1852), p. 27.
11. Ibid., p. 28.
12. NA, RG 156, Entry 21, 1846.
13. NA, RG 156, Entry 1365. Sept. 4, 1846.
14. NA, RG 156, Entry 1354, Letters sent to the Chief of Ordnance. Annual Report from 1847.
15. NA, RG 156, Entry 21. August 4, 1846.
16. NA, RG 156, Entry 1354. May 7, 1847.
17. The National Armories, A Review of the System, p. 31.
18. Ibid., p. 31.

19. NA, RG 156, Entry 1003.
20. NA, RG 156, Entry 1354. Annual Report, August 8, 1849.
21. Ibid., August 30, 1850.
22. "Map of Springfield, Massachusetts." Surveyed and drawn by Marcus Smith and H. A. Jones, published by M. Dripps. Springfield, MA, 1851. (Connecticut Valley Historical Society, Springfield, MA.)
23. NA, RG 156, Entry 1003. October 20, 1852.
24. NA, RG 156, Entry 1363, Official Letters Received, 1852. November 15, 1852.
25. NA, RG 156, Entry 1003. June 20, 1860.
26. NA, RG 156, Entry 1351. August 3, 1860.
27. Foundation Wall for Barn (August 20, 1860). NHSD 129, drawer 7, folder 2A, SPAR Library. *Floor plan.*

19A: Stalls in Stables in Long Storehouse (ca. 1860). SA 1455, small drawer 3, folder 4A, SPAR Library. *Floor plan.*

Stables in Long Storehouse (ca. 1860). SA 1455, small drawer 3, folder 4A, SPAR Library. *Floor plan.*

Stables; 19A (ca. 1860). SA 1455, small drawer 3, folder 4A, SPAR Library. *Floor plan.*
28. NA RG 156, Entry 1362, Miscellaneous Letters Received 1813-1897. October 30, 1861, William A. Orcutt to A. B. Dyer, Esq.
29. "Map of Springfield, Mass." Published by Samuel Bowles and Co., ca. 1861-1862. (Connecticut Valley Historical Society, Springfield, MA.) *Stables present on east end of Storehouse.*
30. The National Armories. A Review of the System, p. 32.
31. NA, RG 156, Entry 21. August 2, 1862.
32. NA, RG 1365. August 4, 1862.
33. Topographical Plan of the Springfield Armory, Springfield, Mass. April, 1864. SPAR Library, NHS D57, small drawer 1, folder 3. *West Addition present. Long Store House is shown final length.*
34. NA, RG 156, Entry 21. August 4, 1846, Roll 119.
35. NA, RG 156, Entry 1351. April 21, 1847.
36. NA, RG 156, Entry 1362. 1847.

37. Windows Long Storehouse, ca. 1861. Drawing, SA 1455, Drawer 3, Folder 4A, SPAR NHS Collections. Section of the west end wall of Long Storehouse I or II with dimensions.

38. Ink and water color drawing of the proposal to raise the height of the storehouse to three stories at the middle 22 bays. On the reverse is an excellent section of the queen post truss, ca. 1866. SPAR Library, SA 1455, small drawer 3, folder 4A.

39. NA, RG 156, Entry 1332, Series 1, Contracts for Ordnance Supplies and Construction, 1806-1918.

40. NA, RG 156, Entry 1365. March 6, 1849.

41. NA, RG 156, Entry 1351. October 15, 1847.

42. NA, RG 156, Entry 21, June 15, 1861.

43. NA, RG 156, Entry 1385, Reports to the Chief of Ordnance, 1867. February 6, 1867.

44. NA, RG 156, Entry 1365. March 17, 1849.

45. NA, RG 156, Entry 1354. September 16, 1851.

46. NA, RG 156, Entry 1354. October 6, 1853.

47. NA, RG 156, Entry 1354. August 15, 1854.

48. NA, RG 156, Entry 21, box 142, 1854 "R".
NA, RG 156, Entry 1354.

49. NA, RG 156, Entry 1014, box 92 "S", September 27, 1866.

50. Ibid., January 8, 1867.

51. Ink and water color drawing, south elevation, ca. 1866. SPAR Library, SA 1455, Small Drawer 3, Folder 4A.

52. NA, RG 156, Entry 1362. April 7, 1873.

53. Springfield Republican, April 16, 1878. News clipping from scrapbook at the SPAR Library.

54. An Atlas of Springfield City, Massachusetts published by George H. Walker and Son, 1882 (Connecticut Valley Historical Society) includes the configuration of the Springfield Armory. A road is shown entering the Long Store House at the present location of the passage way. It is possible that the road passed through the building at this time.

A "Plan of Main Grounds of Armory, May 2, 1904" (USNA E1003, File 95) shows dotted lines on the Long Store House at bay 100-101 conclusively indicating a passage way.

55. NA, RG 156, Entry 1382, Series 1, Contracts for Ordnance, Supplies & Construction, 1806-1918. August 16, 1915. *Contract*. Vining & Borrner, for painting exterior woodwork.

56. NA, RG156, Entry 1382. January 10, 1918. Contract with Boston Lightning Rod Co.
57. Ibid., April 1, 1918. Contract for elevator, Marcil & Arnold.
58. The Journal of the Army Ordnance Association, Vol IX, July-August, 1928, no. 49.
59. Newspaper clipping from Scrapbook no. 1, Roll 151, SPAR microfilm.
60. "Improvements Being Made by WPA at Springfield Armory," Springfield Sunday Union and Republican, February 21, 1937. (SPAR, MF Roll 151, Scrapbook no. 1, 1846-1941.)
61. "Springfield Armory, Massachusetts, Historical Record, Building No. 19, As of June 30, 1938." Springfield Armory Form MS-44. Form detailing description, dimensions, capacity, mechanical and fire systems from 1938 to 1942. SPAR Library, Building 19 Folder.
62. Photograph, drawer 1, neg. no. 4893-SA, November 10, 1944 (SPAR NHS Collections.)
63. Ibid.
64. "Historical Record, Springfield Armory."
65. Ibid.
66. An aerial photograph from 1958 shows dark brown paint on exterior wood. A photograph from 1961 shows white paint on exterior wood.
67. Crissman and Solomon. "Comprehensive Facilities Plan, Existing Facilities Condition Report," Springfield Technical Community College, 1988, p. 258
68. NA, RG 156, Entry 1354. Annual Report, August 18, 1849.
69. NA, RG 156, Entry 1354. Annual Report, August 30, 1850.
70. Ibid.
71. NA, RG 156, Entry 1354. Annual Report, August 30, 1851.
72. "The grading, terracing and turfing of the Armory Grounds on the West of the New Arsenal and north of the Store House, have been finished." NA, RG 156, Entry 1354. Annual Report, October 6 1853.
73. NA, RG 156, Entry 1354. Appropriations Report, September 20, 1859.
74. NA, RG 156, Entry 1003. Inspection Report, June 1860.
75. NA, RG 156, Entry 1382. October 27, 1879. Contract, "To remove the entire brick portion of the Master Armorers quarters at the National Armory-Springfield Mass: and place it on a new site near the west end of the Long Store-house at said Armory."

I. ARCHITECTURAL DESCRIPTION

INTRODUCTION

The "Architectural Description" chapter is organized into ten sections. The first four sections focus on the exterior and include the headings: The Site, Exterior Walls, Exterior Wall Openings, and Roof Covering and Features. The last six sections focus on the interior and include the headings: Floor Plan, Interior Walls, Partition Walls, Framing, Flooring, and Mechanical Systems.

Each individual section is organized into four parts that include the subheadings: Existing Appearance, Original Appearance (at construction), 1968 Appearance, and Historic Sources. The last three parts are not meant to provide definitive histories of the feature under discussion. Their overall intent is two-fold: first, to summarize what the feature may have looked like at a particular point in time based upon existing research; and secondly, to set the stage for additional historical and architectural analysis, if so required.

"Existing Appearance" describes the feature as it appeared when the architectural survey was performed between March and July 1991. Only an architectural description is provided, not pathology of materials nor maintenance conditions.

"Original Appearance" describes the feature as it appeared when the fourth phase of construction of the Long Storehouse and Stables (Building 19) was completed by ca. 1863.

"1968 Appearance" suggests what the feature looked like at the time of the Springfield Armory's deactivation. This is the chosen period of interpretation for the Springfield National Historic Site as noted in the Administrative Data chapter.

"Historic Sources" includes those historic drawings which provide specific information on the feature under discussion. The titles of the drawings have been underlined so that they may be easily scanned. The Mechanical Systems section includes additional types of historical data, since this is the only area of the report where the subject is discussed in any depth.

Several abbreviations are used in this chapter, as follows:

Long Storehouse I	-	LSHI
Long Storehouse II	-	LSHII
Partition Wall	-	PW

Compass designations are described from west to east or south to north enabling the building's primary facades (west and south) to be discussed first.

THE SITE

A. Existing Appearance

Building 19 is located on the campus of Springfield Technical Community College (STCC). The college campus occupies a portion of the former hill shop area of the Springfield Armory within the boundaries of the designated Springfield Armory National Historic Site. STCC shares the historic site with the National Park Service who owns and manages several buildings, and the land, at the west end of the campus. Below, the site will be referred to as Armory Square.

* * *

Armory Square

General Plan: Armory Square is situated on a hill, marked by a bluff, on its west and north sides. It is bordered on the east by Federal Street, on the south by State Street, on the west by Byers Street, and on the north by Pearl Street. The entire site is enclosed by a cast-iron fence that was completed about the same time the fourth and final phase of Building 19 was finished. The bluff continues to be essentially undeveloped, even today. The plain of the hill is where the concentration of buildings is located. This area is essentially square-shaped. The south half of the square represents the historic parade green, while the north half is occupied by numerous buildings with little green space. Building 19 is situated in the north half of the site.

Access: Vehicular access to the armory site may be made through two gates: a main entrance on Federal Street that is served by a STCC policed security-gate, 24 hours a day, and a second entrance on Pearl Street; the gate of the latter is locked at specified hours. Egress may be made through those gates or a third gate, just north of the main gate on Federal Street. Pedestrians may enter through the gates specified above and through a gate along State Street designed solely for pedestrian use.

* * *

Building 19 and Vicinity

Site Plan: As noted above, Building 19 is located in the northern half of the Armory site. It is surrounded on all sides by a combination of roads, parking lots, and buildings. Green spaces are extant beyond the roads and adjacent buildings to the west and north of Building 19. A small plot of grass currently used as a playground for a daycare center is situated north of the Stables.

Access to
Building 19:

Vehicular. From the main gate on Federal Street, access to Building 19 is obtained by traveling around the south and west sides of the parade green, continuing north to a parking lot that extends the length of Building 19 on its south or traveling around Building 19 and Building 32 to a parking lot at 19's east end.

From the entrance on Pearl Street, access to the east end of Building 19 may be obtained by traveling several hundred yards up the hill to Building 19 located west of the road.

Pedestrian. Only one specific area in the immediate vicinity of Building 19 has been designed solely for pedestrian use. From the north plaza, a sidewalk extends along the Stables commencing at bay 105. The concrete sidewalk is set-out from the building for approximately a dozen feet; green space separates it from the building. The sidewalk leads to a stairway built into the side of the hill. The stair leads down to the road on the east side of Building 19.

Buildings:

Two buildings impact Building 19 on its north: Building 32 and Building 28.

Building 32. Building 32 is located to the immediate north of Building 19, extending from Building 19's bay 7 to bay 81. Building 32 is a one-story brick building that is separated from Building 19 by only several feet creating an alley. A passageway between the two buildings is located at bay 59 of Building 19. This passageway separates into two the alley between the buildings. The alley floor consists of concrete embankments and a concrete drainage system. The concrete embankment extends from bay 1 to the vehicular passageway at bay 99, while the drainage system is extant only the length of Building 32.

The brick passageway, at bay 59, is laid with seven (7) stretcher courses followed by one (1) stretcher/header course. Its concrete foundation is exposed for 2' high and extends 2'9" long (the approximate width of the alley). At the flat roof of the passageway, copper flashing is visible.

The concrete drainage system is fitted with round cast-iron drains inserted every three bays. They sit at the bottom of the gutter. The concrete in the gutter exhibits larger aggregate than that used for the embankment wall.

Building 28. Building 28 is located to northeast of Building 32 and is separated from the same by a single lane road. Building 28 extends further east than Building 32,

creating a rectangular parking area between the three buildings--a plaza of sorts. The parking area commencing at bay 103 encompasses the vehicular passageway of Building 19.

Parking:

South. The entire south side of Building 19 is now utilized as parking for STCC; the east end from bay 108 through 116 is a parking area for maintenance vehicles. The latter area is enclosed by a chain-link fence. The asphalt cover of the parking lot continues directly up to the water-table of Building 19 and extends south to the buildings that face the west/east road that bisects the northern section of the site continuing in the same direction to the modern STCC buildings that face the parade green. Each of the historic buildings, south of the Building 19, is encircled by a small green space. Permitting parking immediately adjacent to Building 19 has been hazardous to the brick wall piers and sandstone water-table, as vehicles have caused damage to both through impact and vibration.

North. The plaza between Buildings 19, 28, and 32 is used for parking, as noted above. It is accessed from a single lane road from the west around the north of Building 19 and from the vehicular passageway at bays 99-102 in the Stables section of Building 19. At the west end, several parking spaces are extant to the west of Building 32 and adjacent to Building 19.

East. The courtyard in-front of the basement has been enclosed by a brick wall. It is now an asphalted parking lot.

B. Original Appearance of the Site

See Volume II, Figure 7, Topographical Plan of the Springfield Armory, Springfield, Mass. April 1864. A description of the topographical plan follows. The focus is on the area in the vicinity of Building 19.

Landscaping:

Green spaces surrounding the west, south, and north sides of the Long Storehouse. Orchard along south side with superintendent's barn. Formal avenue of trees flank walkway along north elevation. Walkway paved with brick. What appears to be more formal plots of cultivated land located at the west end (perhaps flower or produce gardens) with brick-paved walkways marking-off rectangular plots.

Roads:

A road flanked by an avenue of trees runs along the south side of the building between orchard and the parade green. Road parallel to main west/east road along parade green.

Said road joins main south/north armory road running along the west end of the parade. Main south/north road terminates in northwest corner, turning into the west end of the Long Storehouse.

Buildings: A row of four clerk's houses face the northwest corner of the parade green backing onto the above described west/east road along the south side of the building.

C. 1968 Appearance of the Site

See Volume II, Figure 16, General Site Map, Springfield Armory Hill Shop Area. June 1965, No. 10-02-101. The description below relies heavily on this site plan.

South Side: Main west/east road between the Building 19 and the parade green and the main south/north road running on the west end of the parade remained with modern intrusions and additions.

Two major changes were: the addition of a paved road immediately adjacent to the building along the south elevation; and the continuation of the south/north road around the west end of the building, extending along the north elevation, and passing through the building at an enlarged vehicular passageway at bays 99/102. Road through building joined asphalt parking area on the south.

Building 10 located on the south elevation at the west end of Building 19 (facing south/north road) having been moved from beside the Main Arsenal in 1879.

Buildings 7, 8, 9 were erected ca. 1890 on the green space in front of LSHI at the south elevation. Buildings faced the west/east road.

By 1968, driveways to buildings 7, 8, 9 led-off of access road that ran along the south elevation.

The access road along the south elevation also served new 2-ton freight elevators at bays 30 (ca. 1935) and 62 (ca. 1942) with vehicular turn-arounds as well as a connector road from bay 62 to the west/east road.

Changes to the area between the west/east road and the parade green included: the addition of a sidewalk along the length of the west/east road and the installation of an in-ground pool centered behind buildings 7, 8, 9 (Officers' Quarters) with access from the west/east road.

The area to the southeast of Building 19 maintained its industrial character, changing in accordance with evolving technology and modern needs.

East Side: The reservoir was filled-in December 1918, replaced over the succeeding decades with new access roads, parking areas, and buildings.

Original barnyard enclosed with a wood pale fence changed to a paved courtyard enclosed with a low brick wall. Courtyard was accessible from new roads on east.

North Side: Landscaped green space including an avenue of trees, walks, etc. that was extant at original construction disappeared as a result of the development of the north side of Building 19.

Building 32 erected in 1918-1922 for Research and Development facilities along the north elevation from bays 7 to 81.

Building 28 (Ballistics and Woodshop and Shooting Range) erected on the northern boundary of the grounds, 1919 Building 28 now the barrier on the north between the Armory grounds and the local community. Building 19 no longer served as northern terminus of the site.

Parking area located in the plaza at northeast end defined by Buildings 28, 32, and 19.

Parking area located along the northern slope of the grounds below Building 28.

West Side: General configuration the same with difference in plantings and the removal of trees.

South/north road no longer terminated at west end, but followed around to the north running between Building 32 and 28 and through Building 19 at bays 99/102.

D. Historic Sources for the Site

See the illustrations included in Volume II under the heading "Site Plans," Figures 1-16. There are numerous other drawings related to the site in the SPAR Collections. Since the primary focus of this report was Building 19, a complete inventory of site plans was not made.

EXTERIOR WALLS

(See Volume II, "Exterior Walls," Figures 72-87.)

A. Existing Appearance

The description of the exterior design of the load-bearing walls of Building 19 begins with the end walls (west and east elevations) and continues to the south elevation followed by the north elevation. Discussion of the south and the north elevations moves in a west to east direction and deals only with the actual walls themselves forming the shell of the building. The openings in the walls and their respective infill, doors or windows including elements affixed to the features, are described in detail in the "Exterior Wall Openings" section that follows and Appendices A through D. Also, when speaking of the particular elevation within this section, one should keep in mind that it is only the exterior, two-dimensional quality of the wall that is being discussed.

Brick: The brickwork is laid in stretcher bond. The joints of the brickwork appear not to be tooled in a decorative manner. They are flush with the brickwork. The joints are 1/4" to 1/2" wide.

Sandstone Foundation: Building 19 is constructed on a foundation of sandstone. This sandstone is visible in the basement's perimeter walls. A description of a section of foundation that is visible is included in the section "Interior Walls" under "East Wall, Basement."

Sandstone Water-Table: The sandstone water-table is tooled, presumably performed with a patent hammer that produced (5) striations per inch. The height of exposure varies throughout the structure. The stones are generally 1' high x 8" wide. The stones at the piers are approximately 4'5-1/2" long and at the openings are 9' long.

Sandstone Window Sills: The second-story arches on all elevations and the first-story arches on the east elevation feature a sill. The sill is of patent-hammered sandstone and projects from the wall plane. Whether the sill is composed of one or two stones varies on the south and north elevations.

Arches: The walls are decorated with two types of arches: semi-circular and segmental. Their configuration and details are discussed under the section "Exterior Wall Openings" that follows.

Cornice: The cornice of Building 19 is a continuous decorative brick cornice consisting of two major designs. One design is found on the raking slopes of the west and east elevations, while the other is found stretching across the upper wall on the south and north elevations.

* * *

West Elevation

Material: The wall is constructed of brick, laid in stretcher bond.

Dimensions: Brick
length - 7-1/4" to 7-3/4"
height - 2-1/4"
depth - 3-3/4"

Composition: The west elevation is two-stories high by three-bays wide. The three-bay composition consists of the following: on the first story, a rectangular doorway occupies the center bay while the south and north bays feature semi-circular arches; on the second story, three semi-circular arches are in line with the arches and doorway opening of the first story. The arch of the second-story's center bay, however, is eight (8) brick courses taller than its flanking arches.

Sandstone
Water-Table: At the base of the wall, a sandstone water-table is visible. This water table is exposed above grade for 8" on the south and 9" on the north. A concrete ramp at the center entry obscures the water table in the center bay and immediate area.

Rectangular
Opening: A rectangular opening is extant at the center bay, replacing a former semi-circular archway. New brick (brownish in tone) is evident at the opening and is keyed into the original wall at the top and sides. Six large iron nuts and bolts, securing interior tie rods are visible at the top and north sides of this opening. See Appendix B for a detailed discussion of the treatment of this opening.

Cornice: A decorative stepped raking-cornice highlights the upper end of the wall, running from the eaves to peak on both the south and north slopes. This cornice is laid in stretcher bond and rests at the eaves upon a sandstone block return.

The cornice projects approximately one brick width from the wall surface and is four stretchers wide. The outside stretcher (at the slope of the roof) is partially obscured by a wooden raking-board approximately 5" wide running from

the eaves to the peak on the south and north slopes. The raking board is in two pieces on the south slope and three pieces on the north slope.

The stepped design of the rake is accomplished by placing a wedged stretcher on the inside of each course of the raking cornice. The top five (5) courses of the cornice (at the peak of the gable) consist of stretcher bond with a single header key brick where the wedged inner bricks meet.

Elements Affixed
To Wall:

Several elements are affixed to the wall, as follows:

Electrical System Box

First story, south bay, at south impost of arch.

(2) Iron Pipes with (2) Metal Ties

Lead from the bottom of the electrical box into the ground.

Blue Globe Lamp with Metal Lamp Guard

First story, north bay, above the south impost.

Rectangular Florescent Light Unit

Second story, between the south and center bays, at the window sill level.

Iron Box

First story, center bay, north side - features button for "open," "close," or "stop" that presumably operated door or gates at entry.

Metal Anchors (use unknown)

First story, center bay, south side.

* * *

East Elevation

Material: The wall material is brick, laid in stretcher bond.

Dimensions: Wall Brick
length - 7-1/2" to 7-3/4"
Height - 2-1/4"
Depth - 3-1/2"

Composition: The east elevation is a three-story, three-bay composition. The ground story is actually below grade, fronting a basement that lies behind. (The basement was constructed only beneath bays 109-116, in the Stables section of the building.) Sandstone retaining walls abut the east

elevation wall at the basement level on the south and north (see description for "retaining wall" below).

The three-bay composition of the basement story consists of three segmental arches. The arches are filled with various treatments. The south and north arched units are recessed 8" on a plane with the recessed infill of arches above on the first story. The center segmental arch is further recessed (2') and contains a metal entry door.

The basement and first stories are separated by a 1' high belt-course of sandstone. (On the north, south, and west elevations, the sandstone belt serves as the water table.) The three bays of the first story consist of identical semi-circular arches with projecting imposts. The arches feature fanlights with brick below.

Second-story bays likewise consist of three semi-circular arches with projecting imposts. However, as on the west elevation, the center arch is eight (8) brick courses taller than the flanking south and north arches.

Retaining Walls:

The north retaining wall runs west/east and is six (6) courses tall with a single course cap/coping. The south retaining wall runs south/north and originally sloped from six (6) courses (against the building) to four (4) courses with a single course cap/coping. Today, several courses of random laid sandstone and a brick wall with concrete coping have been added on top of the original north retaining wall. The brick construction at the south and north corners extends slightly (approximately 7") beyond the south and north wall planes in order to meet the retaining walls. Thus, at the juncture of the east elevation wall and the retaining walls, the brick presents an uneven seam between dissimilar materials. These corner seams appear to have caused considerable damage to the wall.

Sandstone Belt-Course:

A sandstone belt-course stretches across the elevation separating the basement from the first story, as previously noted. This belt course projects from the wall surface by 3" at the top and 1" at the bottom. It is approximately 1' high.

Cornice:

The design and materials of the cornice on the east elevation are identical to that on the west elevation described above.

The raking boards are in two pieces per slope. The boards do not meet at the peak. The boards are cut to flank brick.

Elements Affixed
To Wall:

A number of items are affixed to the wall at the basement level, including miscellaneous signage, vents, lights, and systems.

Camewell Fire Alarm Box

Extant to the south of the center segmental arch.

Red Globe Lamp with Metal Lamp Guard

Affixed to the wall adjacent to the fire alarm box.

Springfield Armory Guard Signal System Control Box

Located inside the south jamb of the center segmental arch.

Clear Globe Lamp with Metal Lamp Guard

Affixed to the south jamb of the recessed center bay, above control box.

Rectangular Flourescent Light Unit

Affixed above the center segmental arch at the basement level.

Signs

"19" designates the building number directly above the sandstone belt-course and between the center and north bays.

"Parking G Faculty & Staff Only" - below the sandstone belt-course at the basement level, affixed at the south end of the wall.

"19" - below and to the south of the sign noted directly above.

"Reserved Parking" (for handicap access)- secured to the radial brickwork of the south basement level segmental arch.

* * *

South Elevation

Material:

Brick, laid in stretcher bond. Despite four different construction campaigns, the bricks of the wall are relatively uniform. The known divisions between the West Addition and the LSHII (bays 36/38), LSHII and LSHI (bays 66/68), and LSHII and the Stables (bays 96/98) are nearly indistinguishable in the brickwork. The brick of the West Addition is of a slightly different color. Otherwise, the

brickwork, including joints, is similar in surface appearance throughout.

Dimensions:

West Addition

Length - 7-3/4"
Height - 2-1/4"
Depth - 3-3/4"

Long Storehouse II

Length - 7-1/2" to 7-3/4"
Height - 2-1/4"
Depth - 3-3/4"

Long Storehouse I

Length - 7-1/2" to 7-3/4"
Height - 2-1/4"
Depth - 3-3/4"

Stables

Length - 7-3/4" to 8"
Height - 2-1/4"
Depth - 3-1/2" to 3-3/4"

Composition:

The south elevation is two-stories high and fifty-eight (58) bays long. The wall composition of each bay consists of arch/pier construction on the first story with a semi-circular arch with imposts, and on the second story, a rectangular window opening with segmental arch. Imposts of adjacent arches on the first story generally meet (except at downspout locations), creating a continuous raised belt-course across the elevation at the spring line of the arches. The wall rests on a sandstone water-table that is largely submerged below the asphalt grade. A continuous, decorative corbelled cornice surmounts the wall and is described below.

Design

Variations:

The pattern of semi-circular arches on the first story of the south elevation is interrupted where rectangular openings exist in bays 100-102, 104-106, and 112-114. See the "Exterior Wall Openings" section and Appendix B for a more detailed description of these features.

Bays 100 and 102

Containing an opening to a vehicular passageway.

Bays 104 and 106

Featuring a rectangular opening for a garage.

Bays 112 and 114

Featuring a rectangular opening with an inset doorway.

The walls have been impacted at bays 30 and 62 by freight elevator platforms. (See Appendix B for a discussion of how the walls have been impacted by the elevator platforms.)

Sandstone
Water-Table:

The sandstone water-table is visible along the lower edge of the wall. It is flush with the ground level at the east end of the building and gradually becomes more exposed moving toward the west end. At the west corner, the water table is exposed for 7".

Sandstone
Window Sill:

Segmentally-arched second-story windows feature a sandstone sill. The sandstone sill varies in construction from two to one stones per sill, as follows: Long Storehouse I and II both contain two stones per sill, with a seam at the center point of the opening, while the Stables and West Addition both feature single-stone sills.

Cornice:

The cornice of this elevation is decorative and consists of six (6) corbelled courses of brick. Describing from the bottom course to the top course, the design is as follows:

Course 1, 2

Corbelled approximately 2" from the wall surface; stretcher bond except at bays 2-6 and 98-116 where course 1 is header brick.

Course 3

Header course; corbelled out approximately 2" from courses below.

Course 4

Dog-tooth course (formed by bricks laid at 45 degree angle); corbelled out approximately 2" from course below.

Course 5

Stretcher course; slightly corbelled out from dog-tooth course below.

Course 6

Header course in bays 2-36, 38-66 (West Addition and LSHII); stretcher course in bays 68-94 (LSHI); header course in bays 96-116 (Stables).

Elements Affixed
To Wall:

Several elements are affixed to the wall, including wires, hooks, signs, lights, and system control boxes. Below is a list of locations.

Wires

Wires crossing to Building 19 from adjacent building - bay 58, west of window.

Metal Fixtures

Iron tie-rod bolts (2) - west of bay 2 at the upper height of semi-circular arch and below cornice.

Eye hooks - bay 42, west of window; bay 86, at cornice; bay 92, west of window; bay 96, east of window and west of arch; bay 108, east of window.

Iron-angle bumpers - all on east and west jambs of archway; bays 58, 100, 102, 104, 106, 114.

Protective angle beam - bay 58, east arch jamb.

Signs

"1" - bay 22.

"19" - bays west corner/2, 100.

"One Way" - bays west corner/2, 22/24, 32/34, 58/60.

"Compact Cars Only" - bay 4/6, 8/10, 60/62, 66/68, 72/74, 78/80, 84/84, 90/92, 96/98.

"Stop" - bay 102/104.

"Cars Parked Will Be Towed..." - bay 106/108.

Lights

Rectangular fluorescent unit - bay 102, above arch.

Fire Alarms (stamped "Rockwood, Worcester, MA")

Bays 24, 50, 82, 108.

Systems

Telephone service box with pipe conduits to ground ("Rohm Cable only" noted on box) - bay 106/108, at pier.

Perhaps the most important elements that were affixed to the south elevation were the downspout system and the conductor cables for the lightning protection system. Both systems are defunct today and only a few remnants, including metal brackets from downspouts and metal ties

from cables, are extant. Occasionally a length of downspout remains (i.e. bays 60/62, 66/68, 78/80, 102/104, and 116). The path of both systems is evident from deterioration in the masonry. For more detailed information on these systems, see "Roof Covering and Features" section. Locations of downspouts and conductor cables were as follows:

Downspouts (apparently there were (3) bays between each downspout, amounting to (20) on this elevation)

Between bays - west corner/2, 6/8, 12/14, 18/20, 24/26, 30/32, 36/38, 42/44, 48/50, 54/56, 60/62, 66/68, 72/74, 78/80, 84/86, 90/92, 96/98, 102/104, 108/110, 116/east corner.

Lightning Conductor Cables (evidence for 15)

Between bays - west corner/2, 8/10, 12/14, 24/26, 26/28, 38/40, 44/46, 52/54, 62/64, 68/70, 74/76, 84/86, 90/92, 98/100, 116/east corner (partially intact).

* * *

North Elevation

- Material:** The wall is brick, laid in stretcher bond. It matches the brick of the south elevation in size and appearance.
- Dimensions:** See previous description of south elevation for brick dimensions.
- Composition:** The design and materials of the north elevation are identical to those of the south elevation, consisting of 58, two-storied bays. Similarly, each bay contains a semi-circular arched opening with imposts on the first story and an essentially rectangular window opening with segmental arch above at the second story. As on the south, imposts of the first-story arches abut--for the most part--one another creating a continuous belt-course.
- Design Variations:** The pattern of semi-circular arches on the first story are impacted by several features, as follows:

Bays 99-101

These bays have had their first-story semi-circular arches removed and replaced with a rectangular opening, providing for a vehicular passageway. The asphalt of the parking lot is raised to a gentle slope at the entrance to the passageway forming a ramp. The sandstone water-

table is thus obscured across bays 99 and 101.

Bay 97

The introduction of an elevator at this bay caused the replacement of the original second-story window and segmental arch with a much smaller sixteen-light steel frame window, lighting the elevator shaft. Brick surrounding the new window is distinctly different. In addition, a concrete platform abuts the jambs of the first-story arch in bay 97 where the elevator door was installed in the arch infill.

Bay 59

A third intervention in the north wall is the brick passageway joining Building 19 to Building 32 at bay 59. The passage encloses the first-story arch and has a flat roof. The condition of the seams of the passageway walls and the north elevation indicate serious water infiltration problems. The flat roof is clearly a factor in the deterioration of brick and mortar in the area.

Sandstone

Water-Table:

The wall rests on a sandstone water-table. Unlike the south elevation, the water table is generously exposed measuring 8" high. The water table at bays 1-99 rests on a concrete embankment that slopes down to a concrete-lined drain running the length of the elevation.

Cornice:

The design and materials of the north elevation cornice are identical to that of the south elevation described above.

Elements Affixed

To Wall:

Several elements are affixed to the wall including pipes, tie-rod anchors, light units, and signs.

Electric Board with Insulators and Wires

Leading to metal pipe projecting from window frame of bay 1, second story. Wires are cut-off at the insulators.

Pipes

Bay 7/9, 23, 57, 61 (three (3) pipes connect Building 19 and 32, piercing the wall between the second-story segmental arch and window sill), east corner/115 (two pipes for hand-railing).

Tie Rod Anchors

Bays 1, 57, 61.

Rectangular Fluorescent Light Fixture

Bay 115, at edge of building.

Bay 99/101, above rectangular opening.

Gamewell Fire Alarm Station (with tin hood)

Bay 101/103, east jamb of sally port.

(Since removed to the west side of PW8.)

Signs

"19" - bay 1, at west corner of building.

Large red corroded sign - above "19" sign.

"1" - bay 99/101, above sally port.

As on the south elevation, essential elements formerly affixed to the wall, downspouts and lightning conductor cables, are largely missing today. Former locations of these elements were determined by observing the wall for stains and fasteners.

Downspouts (there were generally three (3) bays between each downspout, amounting to twenty-one (21) on this elevation)

Between bays - east corner/1, 5/7, 11/13, 17/19, 23/25, 29/31, 35/37, 41/43, 47/49, 53/55, 59/61, 65/67, 71/73, 77/79, 81/83, 83/85, 89/91, 95/97, 101/103, 107/109, east corner/115.

Conductor Cables (evidence for 16)

Between bays - west corner/1, 11/13, 17/19, 23/25, 35/37, 37/39, 51/53, 59/61, 65/67, 67/69, 73/75, 81/83, 83/85, 95/97, 107/109, 115/east corner.

Portions of downspouts are extant between bays 83/85, 89/91 (complete), 101/103, 107/109, and 115 (complete). Remnants of the lightning conductor cables are extant in-between bays 17/19, 35/37, 51/53, and 65/67.

B. Original Appearance of Exterior Walls

Materials: Brick; sandstone.

Design: The design has remained essentially the same throughout the building's history, therefore a detailed description is not provided here.

Finishes: Brick walls - light brown (rosy beige).

Brick cornice; semi-circular arch surrounds, imposts; and intrados; segmental arches; sandstone segmental-arch window sills; and wood frames, louvers, sash, solid panels (doors)- all painted dark brown.

C. 1968 Appearance of Exterior Walls

Materials: No significant changes, except for the introduction of rectangular openings described in "Exterior Wall Openings" that follows.

Finishes: Brick walls and sandstone - unpainted (sandblasted in 1938 under WPA work).

Wood frames, louvers, sash, solid panels (doors) - all painted white.

D. Historic Sources for Exterior Walls

no date Drawing. Windows, Long Storehouse (No. SA 1455). (See Volume
ca. 1861 II, Figure 17.)

Aug. 20, 1862 Drawing. Addition to West End of Storehouse (No. NHSD 128).
(See Volume II, Figure 19.)

no date Drawing. No title (NHSD 128). Proposed alteration to Long ca.
1866 Storehouse raising middle bays on the south elevation one story.
(See Volume II, Figure 20.)

EXTERIOR WALL OPENINGS

(See Volume II, "Exterior Wall Openings," Figures 88-97.)

A. Existing Appearance

The exterior wall openings consist of three types, as follows: semi-circular arches; segmental arches; and rectangular openings. The openings feature a variety of treatments. Because the treatment-type list is so extensive, a detailed inventory is provided. The appendices includes an inventory of treatments by elevation and bay location; an inventory by treatment type; and a more detailed description of the typical louvered blind, solid panel, and sash treatments. See Appendices A through D for this more specific data. The discussion below simply summarizes the exterior wall opening data found in the appendices.

* * *

Semi-Circular Arches

Quantity: One hundred and nineteen (119) semi-circular arches are found extant on the exterior walls today, distributed as follows among the different elevations:

West Elevation	-	(2) at the first story
		(3) at the second story
East Elevation	-	(3) at the first story
		(3) at the second story
South Elevation	-	(52) at the first story
North Elevation	-	(56) at the first story.

Design: Face (exterior). The semi-circular brick arches sit on piers thirty-seven (37) courses in height x 4' wide x 8" deep. The arch face is flush with the wall plane and features imposts, raised 1" from the wall surface. The imposts measure 2' long x 7-1/2" wide or three (3) brick-courses high by three (3) brick-stretchers long). The arch consists of seventy-three (73) courses of brick laid-up radially. Each radial course (11-1/2" high) is composed of alternating rowlock and soldier brick.

Back (interior). The interior pier is forty (40) courses high because there are no imposts extant. The piers are 3'3-1/2" wide x 1'8-1/2" deep. The interior dimension of the typical semi-circular arch, from the arch threshold to the crown and between pier abutments, is 13'4" high x 9'8" wide. The design of the arch back is similar to its face, except for the number of courses of brick which are laid-up radially. On the interior, it consists of seventy-six (76) courses.

Infill

Treatments:

The treatments of the semi-circular arch openings have been classified into fifteen (15) types. Of these types, three (3) types include wood frames and feature fanlights (i.e. they consist of louvered blinds, solid panels, and glazed sash); six (6) types are filled with brick; and five (5) types feature operable doors; and one (1) type is open, void of any fill.

The wood frame types appear to be original to the building's construction period, therefore they have been described in more detail in this report. See Appendix C entitled "Louvered Blind, Solid Panel, and Sash Treatments" for this more specific data. Wooden frames are recessed from the interior wall surface between 15" and 17".

* * *

Segmental Arches

Quantity:

One hundred and nineteen (119) segmental arches also are found extant on the exterior walls today, distributed as follows among the different elevations:

West Elevation - none
East Elevation - (3) at the basement level
South Elevation - (58) at the second story
North Elevation - (58) at the second story

Design:

Face (exterior). The typical segmental arch face is flush with the wall plane. The opening from crown to exterior jamb is 7'3" high x 9'4" wide. (Exterior measurements are estimated.) From the upper opening corner to the sill line is approximately thirty-two (32) courses high. The arch span consists of forty-five (45) courses of brick laid-up radially. The radial courses alternate between a single soldier brick and two rowlocks stacked one upon another. The sill consists of patent-hammered sandstone. LSHI and LSHII both contain two stones per sill, while the Stables and West Addition both feature single-stone sills. The wooden sash and louvered blind frames are recessed from the wall plane.

Back (interior). The interior dimension of the opening from the sill to the crown and pier abutments is 7'3" high x 9'9" wide. The interior width is determined by piers not window jambs. Wooden frames for the segmental window treatments are recessed approximately 12" from the interior wall plane. The design of the segmental arches back is slightly different from its front. Although, flush with the wall plane its arch span consists of two rows of

rowlock brick. There are forty-four (44) to forty-five (45) bricks per row. The arch is flush with the wall plane.

Infill

Treatments:

The segmental arches are filled with three broad classes of treatments including brick infill, glazing, and louvered blinds. The brick infill is found at the basement level of the east elevation. The glazing is found on the second story, south and north elevations. Louvered blinds are extant only on the north elevation of the second story. The glazed sash consists of four types, as follows:

- o a flush sash which sets into the segmental arch and is flush with the interior arch face
- o raised sash which presumably was pre-assembled and set in-place in front of the arch, raised from the wall surface; this raised sash is further divided into two types according to the fastener employed, whether nails or pegs
- o metal sash which has been inset in brick infill

* * *

Rectangular Openings

Quantity:

Five (5) rectangular openings punctuate the exterior walls today, distributed as follows among the different elevations:

West Elevation - (1) at the first story
East Elevation - none
South Elevation - (3) at the first story
North Elevation - (1) at the first story.

Design:

There is no typical rectangular opening, although they do have several elements in common. The five rectangular openings were all introduced in the twentieth century and exist in locations of former semi-circular arches. On the west elevation, the one extant rectangular opening is one-bay wide replacing one semi-circular arch. On the south and north elevations, the openings are two-bays wide replacing two semi-circular arches each. In all cases, the modification of the openings required the introduction of new brick and steel lintels.

Infill

Treatments:

Two of the rectangular openings do not feature any infill. They are located at the vehicular passageway at bays 100/102 and 99/101. The remaining three all contain operable doors which vary in design and dimension. See Appendix B for a more detailed description of these openings.

B. Original Appearance of Exterior Wall Openings

All semi-circular and segmental arched-openings contained glazed sash, solid panels, or louvered blinds. All had interior folding batten-shutters.

First Story:

General configuration consisted of a fanlight in top of semi-circular arch with double wood-louvers (fixed) below.

Fixed, solid, four-panelled doors instead of louvered blinds were located at bays 16, 22, 28, 34, 46, 92, 94, 96, and 110 on the south and bay 35 on the north. It is possible that one or more of the solid panels were operable doors (particularly at bay 96 and 110), however, it has not been possible to determine. There may have been more than the above noted panelled doors as well.

It is presumed that openings at bays 102 (currently a portion of the vehicular passageway) and 104 provided access in-and-out of the Stables on the south elevation by 1882. Openings may, in fact, have been an original configuration, dating to the Stables addition.

Second Story:

General configuration consisted of double fixed-sash windows with 20 lights in each half. Fixed louvered-blinds on exterior of the majority of windows. Louvered blinds alternate with glazed sash in a fixed pattern. Pattern included, from west to east:

West Addition - alternating glazed (G) and louvered (L).

LSHII - G, G, L, G, L, G, L, G, G, L, G, L, G, L, G.

LSHI - G, L, G, L, G, L, G, G, L, G, L, G, L, G, G.
(reverse of LSHII)

Stables - alternating glazed and louvered blinds.

Interior:

All arched openings feature folding batten-shutters on the inside.

West Elevation: Semi-circular arches on first and second stories (no basement here).

First story, unknown, but presumably featured an operable door at the center.

Second story, glazed sash on north and south with louvered blinds at center arch.

East Elevation: Semi-circular arches on first and second story, segmental arches at basement level.

Basement had recessed doors with double outward-swinging doors with glazing band at the top.

First story, all louvered blinds.

Second story, glazed sash on north and south with louvered blinds at center arch.

Finishes: Glazed sash - painted dark brown on exterior

Solid panels - painted dark brown on exterior.

Louvered blinds - painted dark brown on exterior.

Interior batten-shutters - painted light brown (rosy beige).

C. 1968 Appearance of Exterior Wall Openings

Substantial changes to openings had been carried out by 1968, however, open arches were not the dominant reality they are today.

North/South
Elevations:

Bays 32 and 102 removed and replaced with matchboard siding-door, ca. 1920.

According to photographs of the south elevation, dating to 1932, a number of louvered blinds of the first story were removed leaving interior folding batten-shutters exposed. Blinds presumably removed for access. Whether these were put back completely by 1968 is unknown.

Semi-circular arches on first story filled with brick or altered to rectangular openings:

Ca. 1935 - Bay 62 for 2-ton freight elevator.

Ca. 1937 - Bays 103-115 on north, Bays 108, 110, and 116 on south. WPA project.

Ca. 1937 - Bays 112-114 and 104-106 for rectangular garage door opening, WPA project.

Ca. 1938 - Bays 100-102 and 99-101 openings enlarged for rectangular opening, WPA project.

Ca. 1942 - Bays 30 and 97 for 2-ton freight elevator.

Ca. 1954 - Bays 2, 4, 6, and 8 for the installation of an electric substation.

Ca. 1960 - Bays 1, 3, 5, 7, and 9 were bricked in for the installation of a Radiographic Lab.

19?? - Bays 10 and 12 louvers removed and replaced with rectangular openings with panelled garage doors.

All exterior louvered blinds on the second story (south elevation) are gone by 1961 and replaced with glazed sash. Possibly this work was undertaken during the late 1930s or early 1940s.

On the north elevation louvered blinds on the second story replaced with glazed sash in West Addition, LSHI (except bays 69 and 77), and in the Stables. LSHII seems to retain historic configuration with the possible relocation of the louvered blind in bay 3 to bay 9.

West Elevation:

First story, rectangular center door, semi-circular arches filled with brick. (Center access door has probably changed a number of times in the history of the building and additional access on the west end may have been through flanking semi-circular arches on the first story or through bay 1 on the north elevation).

Second story, glazed sash at south and north, louvered blind at center arch.

East Elevation:

Basement, segmental arches infilled with brick with center entry door punched through center arch.

First story, semi-circular arches infilled with brick (ca. 1937).

Second story, glazed sash at north and south, louvered blind at center arch presumed to have been removed by 1968.

Finishes:

Glazed sash - painted white on exterior; painted black or dark brown on interior; (modern raised sash features black

paint).

Solid panels - painted white on exterior; painted dark brown on interior.

Louvered blinds - painted white on exterior; painted dark brown on interior.

Interior batten-shutters - painted light brown (rosy beige).

D. Historic Sources for Exterior Wall Openings

no date (ca. 1860)	Drawing. <u>Windows Long Storehouse</u> (No. SA 1455). Section with dimensions of the west end wall of LSHI or LSHII. (See Volume II, Figure 17.)
Aug. 20, 1862	Drawing. <u>Addition to West End of Storehouse</u> (NHSD 128). Shows hierarchy of arch treatments. (See Volume II, Figure 18.)
April 20, 1909	Drawing. <u>Floor Plans, Long Storehouse</u> (No. SA 268). Includes location of openings on west, south, and north elevations. (See Volume II, Figure 21.)
March 15, 1935 (revised 1937)	Drawing. <u>Alterations to Floor and Doorways; Stables; Building No. 19A</u> (No. SA 10004; SA 10004A). Bays 112 and 114.
July 31, 1936	Drawing. <u>Floor Plans, Buildings 19 and 19A, Springfield Armory, U.S.A.</u> (No. SA 6085). Includes locations of openings on west, south, and north elevations. (See Volume II, Figure 24.)
Feb. 15, 1937	Drawing. <u>Sliding Doors for Building No. 19A; Hill Shops</u> (No. SA 10148). Bays 112 and 114 (no longer extant).
April 26, 1938	Drawing. <u>Alterations to Salaporte; Building 19; Space B99; Hill Shops</u> (No. SA 10220). Floor plan, section, elevation. Vehicular passageway extended into bays 99 and 100, louvered blinds and brick pier, and granite block floor removed, rectangular opening built, new concrete drive poured. (See Volume II, Figure 26.)
April 26, 1938	Drawing. <u>Steel Lintel; Alterations to Salaporte; Building 19; Space B99; Hill Shops</u> (No. SA 10221). Elevation with installation of steel lintel in extended vehicular passageway at bays 99-102.

Dec. 29, 1941 Drawing. Structural Steel for Reinforcing of Floor Above Spaces 19A-B1, 19A-B9 and 19A-B15; Building No. 19; Hill Shops (No. SA 13390). Semi-circular arches at bays 103-115 on the north, and bays 108, 110, and 116 on the south.

Jan. 1, 1942 Drawing. Alteration to Doors, Building 19, Hill Shops (No. SA 13397). Includes locations of openings on the west, south, and north elevations. (See Volume II, Figure 29.)

Jan. 4, 1954 Drawing. Alterations to West End of Building No. 19 for Electric Sub-Station Enclosure, Armory Square (No. PM 585). Bays 2 and 4 filled with brick. (See Volume II, Figure 32.)

June 1960 Drawing. Radiographic Inspection Lab; Building No. 19; Architectural Plans, Elevations, Sections, and Details (No. 35-51-01). Bays 1, 3, 5, 7, 9 filled with brick. "...block up entire opening with 2'0" solid brick. Fill all voids within new wall solid with mortar." New window in bay 7. West end, north bay, first story-new 0'4" thick brick veneer. (See Volume II, Figure 33.)

Sept. 30, 1960 Drawing. Modification of Basement Area, Building 19, Springfield Armory (No. P.M. 814). Includes opening in basement. (See Volume II, Figure 34.)

Also see drawings referenced for the elevator installations under "Vertical Circulation, Historic Sources." These drawings provide information on the openings at elevator shafts.

ROOF COVERING AND FEATURES

(See Volume II, "Roof Covering and Features," Figures 98-103.)

A. Existing Appearance

The roof covering and features were surveyed from the ground with the exception of the sheathing which was surveyed from inside the loft. Details of construction, in some instances, were not recorded due to the lack of close-up observation. (A more detailed field survey at the roof level should be performed and should supercede the ground-level observations recorded in this report.)

The discussion that follows describes those aspects of the roof covering which are designed to cover the roof and keep it weathertight: the ridge cap, slate shingles, and sheathing. Also included are related features: ventilators, elevator sheds, water-shedding system (gutters and downspouts), lightning protection system, snow guards, and miscellaneous pipes.

* * *

Ridge Cap

Location: Stretches west/east along the roof peak for the length of the building, approximately 764'.

Material: Copper-clad wood.

Dimension: Appears to be in approximate 5' sections.

Design: The rolled ridge cap has overlapping seam sections with fasteners approximately 1' apart.

* * *

Covering

Location: The south and north slopes of the gabled roof are covered with slate shingles.

Material: Slate shingles are varying shades of dark gray; replaced shingles are two distinct lighter shades of gray. The south slope of the Stables features shingles varying in color and coursing from the remainder of the roof.

Dimensions: Length and width were not recorded; slate thickness is 3/8".

Coursing: The slate is laid in 43 courses per slope. The vertical seams of every other course are generally aligned. The

coursing of the Stables slate is not as regular or evenly aligned as that of the rest.

Fasteners: Not determined.

* * *

Sheathing

General: The sheathing consists of wood boards, laid horizontally, along the south and north slopes of the roof rafters from peak to eave. The sheathing varies between the different construction phases of the building, as noted below.

West Addition (bays 1-36) SPACE 19D1

Boards: The smooth planed boards are dimensioned, as follows: 8-1/2" to 9" wide x 1-1/4" thick. The boards extend between four to five rafters in length.

Design: The sheathing boards are laid horizontally in approximately forty-two courses per slope. The seams are tongue-and-groove. Black roofing paper is apparent between the shingles and sheathing.

Variations
in Design: Between Trusses 19D7 and 19D11 (south and north slopes, only extends to second rafter between Trusses 19D9-19D11. Eleven new sheathing boards were introduced on the south and north slopes due to the removal of the original ventilator.

Between Trusses 19D27 and 19D29 (south and north slopes). A modern ventilator, straddling the roof, was installed in this location; it is framed with four timbers secured to two rafters and four courses of sheathing were removed to accommodate the ventilator.

Between Trusses 19D29 and 19D31 (south slope). A modern elevator was installed at this location; several courses of sheathing and the rafters below the upper purlin were removed at that time.

Long Storehouse II (bays 37-66) SPACE 19D37

Boards: The sheathing boards appear more random dimensionally and generally wider than those of the West Addition. The

random widths are from 8" to 17". The boards are 1" thick. The boards are vertically sawn with some boards significantly rougher than others. The boards span up to eight rafters in length.

Design: The boards are laid horizontally and feature tongue-and-groove seams.

Variations
in Design: Between Trusses 19D47 and 19D49 (south and north slope). The sheathing boards in these bays were partially removed when the modern ventilator was installed.

Between Trusses 19D59 and 19D61, (south slope). The boards of this bay are narrower, generally 7" wide.

Between Trusses 19D61 and 19D63 (south slope). The sheathing was removed below the upper purlin in this bay when the modern elevator was installed at this location.

Long Storehouse I (bays 67-96)

SPACE 19D67

Boards: The boards are darker than the previous. The boards are of random widths, between 7" to 17". They are 1" thick. There are not as many wide boards as found in LSHII, generally the boards are of medium widths between 10" and 11". They span approximately six to seven rafters in length. The boards are rough and vertically sawn.

Design: The sheathing boards are laid horizontally. They are covered with black roofing paper. The boards feature tongue-and-groove seams.

Variations
in Design: Between Trusses 19D67 and 19D69 (south slope). There is one replaced sheathing board between the plate and lower purlin.

Between Trusses 19D69 and 19D71 (south and north slopes). When a modern ventilator was installed, three courses of sheathing were removed to accommodate the opening.

Between Trusses 19D89 and 19D91 (south and north slopes). When a modern ventilator was installed, two-and-one-half courses of sheathing were removed.

Between Trusses 19D91 AND 19D93 (south slope). There are two replaced sheathing boards between the plate and lower purlin at this bay.

Between Trusses 19D95 and 19D97 (south and north slopes).
Narrow sheathing boards are extant adjacent to the wall (PW7) and spanning a distance of two rafters.

Stables (bays 97-116)

SPACE 19A-D1

Boards: The sheathing boards appear to be of more consistent widths than those found in the other parts of the building. The smooth-planed boards average between 6" to 9" wide and are 1" thick, spanning between six or seven rafters in length. They appear to be most similar to those found in the West Addition.

Design: The sheathing boards are laid horizontally. They feature tongue-and-groove seams.

Variations in Design: Between Trusses Sec. 109 and Sec. 111 (south slope). With the removal of the original ventilator, eleven (11) courses of sheathing were installed. The rafters were altered in this location, as well.

* * *

Ventilators

Location: The four ventilators are located as follows:

West Addition

Between Trusses 19D27 and 19D29 (bays 27 and 28).

Long Storehouse II

Between Trusses 19D47 and 19D49 (bays 47 and 48).

Long Storehouse I

Between Trusses 19D69 and 19D71 (bays 69 and 70).

Between Trusses 19D89 and 19D91 (bays 89 and 90).

Material: Sheet-copper on a timber frame.

Design: Four large, sheet-copper, circulator ventilator stacks straddle the roof. The identical ventilators sit on box frame sheathed in sheet-copper. The ventilators consist of a cylindrical core. Around the upper end of the core and projecting from its circumference in a sheet-copper band. A conical lid tops the ventilator core.

Interior Framing. A square hole is cut in the roof (rafters and ridge pole are left in place). Sheathing

boards are removed on both sides of the ridge. A frame is built and placed on top of the cut-out. A round hole is cut from the top of the box and the round metal ventilator with conical lid is set into the hole. The ventilator is fastened to the sides of the hole, to the box, and to the rafters with four metal strap fasteners screwed to the inside. Four 2" x 4" boards are located at each corner of the box and to the box platform. The sides and corners of the wood box support and brace the weight of the ventilator. An extra wood support is built under the vent box and consists of a square frame with corner braces (except, in bay 27-28). The construction of the frame is roughly constructed. The seams between the roof and box are not caulked. The frame of the support system is butted and overlapped at right angles. The ventilators apparently have not been altered since their installation.

Variations
in Design:

Bays 27 and 28. The ventilator box differs from the others; there is no supporting frame. A box has been made, apparently from reused sheathing boards. The box has corner studs and studs at the midpoint of the south and north sides. The studs connect with wood pieces on the underside of the box. The sheet-copper ventilator sits on this box and is of the same design as the previous.

* * *

Elevator Sheds

Location:

Elevator sheds are located as follows:

West Addition
Bay 30

Long Storehouse II
Bay 62

Stables
Bay 97

Brick Shafts:

The three brick shafts project through the roof. The shafts are flat-roofed with a tar-and-gravel roof (according to historic documentation, not observation). Copper flashing is used around the perimeter of the flat roofs and around the shafts where they project from the roof. The shafts are laid with seven (7) stretcher courses followed by one (1) header/stretcher course. The shafts project approximately 90 ± brick courses above the eaves.

Windows:

A single window, with 9-light sash, and a concrete sill is

found at the top of each shaft. The window is located on the south wall of the shafts at bays 30 and 62 and on the north wall at bay 97. The purpose of the window is to illuminate the motor room.

Crickets:

Between the roof and the brick shaft are crickets; they are behind each brick shaft and effectively enclose the rear elevation of the brick shafts. Each cricket features a shed-roof sloped slightly upward, toward the roof ridge, and slate shingles. The east and west elevations of the crickets are covered with vertical raised-seam metal. The metal type appears to vary between the shafts. The underlayment consists of diagonal board sheathing. At bay 30, the west side of the vertical raised-seam metal is missing, exposing black roofing paper and the diagonal board sheathing.

* * *

Water-Shedding System

The water-shedding system consists of metal gutters hung from the eaves along the south and north slopes and metal downspouts extending from the gutters to the ground at three-bay intervals.

Gutters

Material:

Copper.

Design:

The square-shaped gutter appears to be constructed in sections approximately equal to one bay in length (may be longer; difficult to determine from the ground). It is hung from the eave of the roof with straps secured to the roof sheathing, spaced every 1' to 1-1/2'. They span the gutter's width and are screwed to the gutter's outside face and to the roof.

Downspouts

Location:

The round downspouts are positioned generally three-bays apart, along the south and north elevations. Although only remnants of the system remains, evidence of where they were extant is found on the walls and gutters, as follows:

South Elevation (20 total)

Between bays - west corner/2, 6/8, 12/14, 18/20, 24/26, 30/32, 36/38, 42/44, 48/50, 54/56, 60/62 (partially intact at upper wall), 66/68 (partially intact at upper wall), 72/74, 78/80 (partially intact), 84/86, 90/92, 96/98, 102/104 (intact), 108/110, 116/east corner (intact).

North Elevation (21 total)

Between bays 1/east corner, 5/7, 11/13, 17/19, 23/25, 29/31, 35/37, 41/43, 47/49, 53/55, 59/61, 65/67, 71/73, 77/79, 81/83, 83/85 (partially intact), 89/91 (complete), 95/97, 101/103 (partially intact), 107/109, east corner/115 (intact).

Material: 16 oz. corrugated, ribbed copper; 9-1/2" circumference; with a soldered vertical-seam along the back side and a soldered horizontal-seam at intervals along the conduits length.

Design: The downspouts connect with the gutters at the eave line and extend to the ground. Since the downspouts are generally missing, an intact downspout (at bay 102/104) was chosen to describe. This downspout consists of five sections. From the gutter extends, a 1' section of pipe (sleeve); the second section is an S-shaped elbow; the remaining three sections are immediately adjacent to the building (the semi-circular arch imposts are broken at downspout locations); and the ground-level section is bent outward to conduct the water away from the building. The pipe is secured to the wall by five brackets. At least two types of brackets have been identified on the building, as follows:

A one piece horseshoe shaped bracket. The downspout is set into the horseshoe and copper wire is used to close the bracket and secure it to the wall.

A two piece, hinged bracket. This type was found at the Stables, east of the vehicular passageway.

* * *

Lightning Protection System

Location: Below is the inventory of lightning cable locations on the south and north elevations; most cables are no longer extant.

South Elevation (15 total)

Between bays - west corner/2, 8/10, 12/14, 24/26, 26/28, 38/40, 44/46, 52/54, 62/64, 68/70, 74/76, 84/86, 90/92, 98/100, 116/east corner (partially intact).

North Elevation (16 total)

Between bays - west corner/1, 11/13, 17/19

(partially intact), 23/25, 35/37 (complete), 37/39, 51/53 (complete), 59/61 (possibly), 65/67 (partially intact), 67/69, 73/75 (possibly), 81/83, 83/85, 95/97 (possibly), 107/109, 115/east corner.

Elevators

Lightning conductor rods are found on the northwest and northeast corners of bay 30 and 62 shafts and on the southwest and southeast corners of the shaft of bay 97.

Cables are still visible extending from the ridge cap to the eaves, in the following locations:

South Slope

bays 8/10

North Slope

bays 17/19, 107/109 (partially intact)

bays 35/37, 95/97 (complete)

Cable is visible at the gable end, hanging loosely at the west elevation and secured to the rake board at the east elevation.

Design:

Rods project into the air at the roof cap. They appear to be about 1-1/2' long and presumably are clamped to the ridge cap. One rod is extant for approximately every two bays, except where the elevator shaft or ventilators have intervened. Twenty-three (23) rods are currently extant along the ridge, with additional rods the elevator shafts. It is unclear how the lightning rod system was designed to operate due to the limited remains and the time for research and analysis. However, the path of the cable appears to have been from the ridge to eave, around the gutter, and down the wall to the ground.

Misc. Features & Dimensions:

Details of possibly several lightning protection systems were identified at bays 35/37, 51/53, and 107/109. They are included below to assist in future research.

Braided Cable

1-1/2" circumference.

Insulator

6" high.

Wall Ties

Metal (type unidentified)- 5/8" high, screwed into the wall every 1 1/2'; ceramic - older type, visible 3 1/2' to 4' apart; copper - details unrecorded.

Clay Tubing

At ground; one extant at bay 107/109.

* * *

Snow Guards

Location: On the south elevation along the eave of the roof and on the north elevation in the same position but only from bay 81 eastward (guards cease at the junction of Bldg 32). The elevator shafts interrupt the continuity of the snow guards.

Material: Metal; unclear as to type.

Design: There appears to be two separate designs for the snowguards, as follows:

One system is located on the north slope from the elevator (bay 97), eastward. It consists of three pipes held in rectangular brackets. The brackets are designed with holes for the pipe to be continuous. An iron-strap brace, between every other set of brackets, wraps around the top rails, and is eventually secured to the roof. The pipe ends are left uncapped.

A second, newer system (introduced by STCC) is extant along the south slope and from the elevator (at bay 97) to bay 81 on the north slope. This system consists of three pipes held by brackets with a built-in brace system. The brackets are set approximately 3' apart. They are secured with a metal plate to the roof sheathing. The pipe ends are capped.

* * *

Miscellaneous Pipes

Location: Vent pipes project through the roof in two locations on the south slope (bays 98 and 116) and two locations on the north slope (bays 3-4 and 7). The function of the pipe at bays 3-4 is unknown.

Bay 98: This pipe vent is approximately 4' tall and vents the lavatory in bay 98 of the Stables.

Bay 116: Located midway between the ridge and the eave, it has a copper base and a pipe several feet tall. Presumably, it is a vent pipe for the lavatory in the Stables basement.

- Bay 3-4: This pipe projects through the roof at the ridge and is tapered upward. It appears to be of wood, with a copper cap. As noted above, its use is undetermined.
- Bay 7: The pipe vent for the lavatory at this location consists of a metal pipe covered with a fabric-type material.

B. Original Appearance of Roof Covering and Features

- Covering: Timber-framed roof, clad with wood sheathing and slate shingles.
- Ventilators: Square, Italianate, flat-roofed ventilators located at east and west ends (bays 7-8 and 109-110), straddling the roof line. Base of ventilators may have been vertical metal cladding with tongue-and-groove boards simulating ashlar stone. Ventilators had flat roofs and projecting molded cornices. Ten (10) semi-circular arched windows per ventilator (2 on west and east) 3 on south and north) with four (4) lights below and modified fanlight above. Window arches were treated with raised frames and imposts.
- Water-Shedding System: Hung metal gutters along eaves of the south and north slopes of the roof with downspouts every three (3) bays.

C. 1968 Appearance of Roof Covering and Features

- Covering: Slate shingles. It is unknown what portions of the slate roof might have been original in 1968. Extensive repairs were known to have been carried out including reroofing of the Stables in 1937. (See Volume II, Figure 54.) Other areas may have been repaired as well. Historic photographs, particularly aerial views, show distinct differences in the roof surface corresponding to different construction phases. (See Volume II, Figures 61, 65, and 68.)
- Ventilators: Four, modern copper ventilators. Original ventilators were removed ca. 1937-1941. Copper ventilators were introduced at bays 27-28, 47-48, 69-70, and 89-90. Exact date is unknown, but they were in place before the removal of the Italianate ventilators had taken place.
- Elevator Shafts: Three brick elevator shafts. Brick elevator shafts projected through the roof at bay 30 by ca. 1942, bay 62 by ca. 1935, and bay 97 by ca. 1942.

Water Shedding
System:

Hung metal gutter system along eave at south and north slopes of roof with downspouts every three (3) bays. Probably a replacement, but extant in 1968.

Lightning
Protection System:

Lightning protection system extant in 1968, age unknown.

Snow Guards:

Snow guards located above garage opening at bays 112-114 and above vehicular passageway at bays 99-102.

Vent Pipes:

Three vent pipes. Vent pipes from lavatories pierce the roof at bays 7, 98, and 116. A miscellaneous pipe is extant at the ridge at bays 3-4.

D. Historic Sources for the Roof Covering and Features

- July 24, 1861 Drawing. Stables and Long Storehouse Ventilator for Barn (No. SA 1455). Two elevations of Italianate ventilators. (See Volume II, Figure 18.)
- Aug. 20, 1862 Drawing. Addition to West End of Storehouse (No. NHSD 128). Includes ventilators. (See Volume II, Figure 19.)
- May 23, 1942 Drawing. Connections of Downspouts; South Side; Building No. 19; to Extensions of Sewers; Armory Square; Hill Shops (No. SA 13468).

FLOOR PLAN AND USE

(See Volume II, "Floor Plan," Figures 104-117.)

A. Existing Appearance

The building is divided vertically into stories and horizontally into bays and spaces. At some point, a numbering system was assumed to aid in the easy identification of stories, bays, and spaces. It appears that there has been more than one system employed throughout the building's history. The system described below is that most visible in the building today and may be a composite of more than one historic numbering systems. Number assignments are stencilled on the masonry walls and framing elements throughout. It is recommended that anyone studying the building become familiar with the numbering system described below. Knowledge of the system will provide an efficient framework for recording information on this building characterized by such length and repetition.

Building No.: The Stables was segregated from the remainder of the building in the Armory's numbering system.

West Addition, LSHII, LSHI . . . 19
Stables. 19A

Stories: Each story is identified by a letter designation, as follows:

Basement. A
First Story B
Second Story. C
Loft. D

Bays: On the first and second stories, bays are numbered in a zig-zag fashion from west to east beginning with the first bay on the north side (bay 1) of the building and moving to the first bay on the south side (bay 2) and so on. Moving back and forth in this manner, bays on the north are assigned odd numbers and bays on the south even numbers.

South Elevation. . . . Bays 2 - 116 (even)
North Elevation. . . . Bays 1 - 115 (odd)

First Story. On the first story, the bay designations are stencilled on the channel-beam facing the center aisle. The bays are identified, as follows:

West Addition Sec. 13 - Sec. 36
(commences at PW1)
LSHII Sec. 37 - Sec. 66
LSHI. Sec. 67 - Sec. 96
Stables no signage extant

(A second, older system, is stencilled on a wood mount hung from the channel-beam.)

Second Story. The second story features the following bay designations stencilled at both sides of the center aisle on joists, identifying the respective bay. The number for each bay includes the building number, story number, and specific bay number, as follows:

West Addition	19C1 - 19C36
LSHII	19C37 - 19C66
LSHI.	19C67 - 19C96

(A second, older system, is extant at this story in the West Addition, LSHII, and LSHI. Numbers are stencilled on wood blocks hung from the framing at either side of the center aisle.)

The Stables features only one numbering system. The older system of numbers stencilled in black to cardboard and stapled to the west side of the posts at eye level, except at bays 105/106 where a conduit is in the way (here they are stapled to the south/north sides of the posts).

Stables	1C097A - 1C116A
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Loft. The bay designations for the loft level correspond with the queen-post truss system. Each truss along the central corridor is given a consecutive odd number, from 1 to 113. Specifically, the truss designation is stencilled in white on the west side of the collar tie-beam at the south end. Except in the Stables, the stencilling is slightly off-center towards the north on the collar tie-beam. The truss numbers include the building number, story number, and specific truss number; in the Stables only the truss number is included, preceded by the abbreviation "Sec.".

West Addition	19D1 - 19D33
LSHII	19D37 - 19D63
LSHI.	19D67 - 19D95
Stables	Sec. 97 - Sec. 113

Spaces:

Spaces are most like rooms. They are defined crosswise by the load-bearing partition walls (PWs 1-9). The space numbering system relates to the bay system in that the first west bay between specific PWs becomes the space identification. Space designations are generally stencilled on the respective PWs. The space numbers are prefixed with the word "SPACE" followed by the building number, story number, and specific space number.

West Addition

First Story

Bays 1-12 (West to PW1). SPACE 19B1
Bays 13-24 (PW1-PW2) SPACE 19B13
Bays 25-36 (PW2-PW3) SPACE 19B25

Second Story

Bays 1-36 (West to PW3). SPACE 19C1

Loft

Bays 1-36 (West to PW3). SPACE 19D1

Long Storehouse II

First Story

Bays 37-50 (PW3-PW4) SPACE 19B37
Bays 51-66 (PW4-PW5) SPACE 19B51

Second Story

Bays 37-66 (PW3-PW5) SPACE 19C37

Loft

Bays 37-66 (PW3-PW5) SPACE 19D37

Long Storehouse I

First Story

Bays 67-82 (PW5-PW6) SPACE 19B67
Bays 83-96 (PW6-PW7) SPACE 19B83

Second Story

Bays 67-96 (PW5-PW7). SPACE 19C67

Loft

Bays 67-96 (PW5-PW7). SPACE 19D67

At the Stables (Building 19A), the space designations commence a new numbering system from east to west, as follows:

Stables

First Story

Bays 109-116 (East to PW9) . . . SPACE 19A-B1
Bays 103-108 (PW9-PW8) SPACE 19A-B9
Bays 97-108 (PW8-PW7). SPACE 19A-B15

Second Story

Bays 116-97 (East to PW7). . . . SPACE 19A-C1

Loft

Bays 116-97 (East to PW7). . . . SPACE 19A-D1

The following discussion of the floor plan is organized according to story. Within each story, the descriptive narrative proceeds from west to east by construction phase (West Addition, Long Storehouse II, Long Storehouse I, and Stables). Each section is subsequently broken down into general plan, access, use, and variations to the plan.

* * *

First Story

General Plan: Currently, the first-story plan consists of a generally continuous space divided into 58 bays. A center aisle runs the length of the building from west to east up to bay 98 where the organization of the Stables is somewhat different and is segregated from the rest of the building, as noted previously. Up to the Stables, the bays are divided both by structural steel beams and by seven brick partition walls. A double rank of steel beams on the south and the north of the center aisle marks-off the bay divisions.

Dimensions: Interior - 50' wide.
Center Aisle - 16'4" wide (on-center, between columns).
Bay - 17' wide x 12'8" long.

West Addition (bays 1-36), First Story SPACE 19D1, SPACE 19D13, SPACE 19D25

General Plan: Partition walls 1-3 divide the West Addition into three spaces (PW3 being an original endwall). SPACE 19D1 is 78' long; SPACE 19D13 is 77' long; and SPACE 19D25 is 76-1/2' long. SPACE 19D1 is sub-divided into many rooms. These rooms have been given specific space numbers, but for ease in discussion herein the entire area is specified SPACE 19D1.

Access: Exterior Access
Center bay, west elevation.
Bays 10 and 12, garage doors.
Bay 11, door.
Bay 24, door.
Bay 30, elevator.
Bay 32, sliding door.

Interior Access
Bay 36, stairway from second story.
PW3 from LSHII.

Use: The first story of the West Addition is currently used as classrooms and workshop space for the Building Trades Training Center. An electrical sub-station serving the west end of the campus is located here, as well.

SPACE 19D1 - the rooms reside on the south and north sides of a hallway which stretches the length of the space; specialized rooms include the following:

North Side.

Bay 1 and 3 - classroom.

Bay 5 - hallway.
Bay 7 and 9 - lavatories and kitchen.
Bay 11 - tool room.

South Side.

Bay 2 and 4 - electrical sub-station and office.
Bay 6 and 8 - classroom.
Bay 10 and 12 - garage.

SPACE 19D13 and SPACE 19D25 - used collectively as workshop area for the center. Several bays, however, have special uses as follows:

Bays 13 and 14 - offices built by the building trades class.
Bay 24 - shed, housing the sprinkler system controls.
Bays 26 and 28 - storage cage.
Bay 30 - 2-ton freight elevator.
Bay 36 - stairway.

Variations
in Plan:

SPACE 19D1 has been significantly altered, as follows:

Bays 1 and 3 - modern partition wall, sheet rock with baseboards (masonry wall?).
Bays 2 and 4 - floor-to-ceiling brick walls defining the east and north boundary of the room; laid in American bond, (5) stretcher courses to (1) header course.
Bays 6 and 8 - modern partition walls.
Bays 7 and 9 - masonry block walls for the kitchen and lavatories; in the lavatories a tile block wainscot on the north wall is extant (women's at Bay 7 - blue tile; men's at Bay 9 - beige tile).
Bay 11 - masonry block west wall, east wall is PW1.
Bays 10 and 12 - modern partition walls.

SPACE 19D13 and SPACE 19D25 retain their original configuration with several elements dropped into certain bays.

Bays 13 and 14 - 10'6" high sheet-rock partitions enclose the bay, but stop short of the existing ceiling.
Bay 24 - shed is constructed of vertical matchboard tongue-and-groove boards (6'11" long x 6'4" wide x 7'11" high).
Bays 26 and 28 - these bays are enclosed with a plywood and wire-mesh cage, from floor to ceiling. (inaccessible during the survey).
Bay 30 - the bay is partially filled with a brick elevator shaft and a 2-ton freight elevator; the

shaft's dimensions are 10'5" long x 11' wide.

Bay 36 - features a plywood partition enclosing the stairway.

Long Storehouse II (bays 37-66), First Story
SPACE 19B37, SPACE 19B51

General Plan: The end walls of LSHII are marked by PW3 and PW5. PW4 divides the area into two spaces, SPACE 19B37 and SPACE 19B51. The floor plan is unchanged from the original, with bays flanking a center aisle. SPACE 19B37 is 89-1/2' long, while SPACE 19D51 is 103' long. SPACE 19B37 is seven bays long with six rows of double steel columns marking-off the bays. SPACE 19D51 is eight bays long with seven rows of double steel columns marking-off the bays. A padlocked wire gate at PW4 separates the two spaces. The semi-circular archways are missing their infill treatments (fanlights, louvered blinds or solid panels) in bays 52, 54, 56, 58, 60, 64, and 66 on the south elevation allowing free access to that portion of the building. Vandalism and illegal dumping are a problem due to the lack of barriers in this area.

Access: Exterior Access
Bay 62, elevator.
Open archways, as noted above.

Interior Access
PW3 from West Addition.
Bay 59, from Building 32 through enclosed passageway.
PW5 from LSHI.

Use: LSHII currently serves as a storage area for STCC. It is filled with discarded theater props and scenery.

Several bays have specific uses, as follows:

Bays 47, 49, 51, and 53 - have been collectively enclosed for storage purposes.
Bay 50 - shed, housing the sprinkler system controls.
Bay 62 - 2-ton freight elevator.

**Variations
in Plan:**

The interior of LSHII remains unimproved, though several later elements were added to certain bays.

SPACE 19B37 was adapted in ca. 1981-1983 to house the horses of the Springfield mounted police. Plywood and pipe partitions were built between bays in order to create stalls flanking the center aisle. Remnants of the stall system are abundantly evident.

The stalls consisted of a bottom rail (flat on the floor), a middle rail (3'9" from the floor), and a top rail (6'9" above the floor). Top and middle rails had 1" diameter holes every 4" into which fit metal pipes forming a grill. The bottom half of the stall partition was originally covered by plywood nailed to 2 x 4 boards. Only portions of the stalls exist in bays 37-48.

Other alterations to the typical plan, include:

Bays 47, 49, 51, and 53 - have been enclosed with floor-to-ceiling wire mesh, fitted with a sliding door at bay 51.

Bay 50 - features vertical matchboard tongue-and-groove board partitions which form a shed (5'2" long x 7'1" wide) housing the sprinkler system valves.

Bay 62 - the bay is partially filled with a brick elevator shaft and a 2-ton freight elevator.

Long Storehouse I (bays 67-96), First Story
SPACE 19B67, SPACE 19B83

General Plan:

LSHI is defined by PW5 and PW7 and is divided in two by PW6. The floor plan is unchanged from the original with rectangular bays flanking a center aisle. As in the West Addition and LSHII, bays are marked-off by two steel beams on the south and north sides of the center aisle.

LSHI consists of two spaces, SPACE 19B67 and SPACE 19B83. SPACE 19B67 is eight bays long (103") to the west of PW6 and SPACE 19B83 is seven bays long (89-1/2") to the east. There is a total of 28 steel beams each side of the center aisle. The interior of LSHI remains unimproved.

As in the remainder of the building, open archways on the north and south elevations were originally filled with assorted treatments. Today, open archways are found at bays 68, 70, 72, 74, 76, 78, 80, 84, 88, 90, 92, and 94 on the south and bays 67, 69, 71, and 73 on the north.

Access:

Exterior Access

Open archways, noted above.

Bay 81, door to high voltage room.

PW7 from vehicular passageway.

Interior Access

PW5 from LSHII.

Bay 96, stairway from second story.

Use: LSHI is used as a storage area for STCC. Unfortunately, due to easy access, a significant amount of unauthorized debris has been dumped inside the building. Specific uses, other than storage, include the following:

Bay 81 - high voltage room (transformer room).
Bay 82 - shed, housing the sprinkler system controls.
Bays 91, 93, 95 - storage for maintenance equipment.
Bay 96 - stairway to second story.

Variations
in Plan:

Several areas deviate from the typical plan, as follows:

Bay 81 - borders PW6 on the east; and is wall board on a concrete sill (wall interior not surveyed.)
Bay 82 - shed exhibits a vertical matchboard tongue-and-groove board partition (6'1" long x 7'1" wide x 7'11" high).
Bays 91, 93, 95 - are enclosed by a 9'2" high chain-link cage.
Bay 96 - features a plywood partition, enclosing the stairway.

Stables (bays 96-116), First Story
SPACE 19A-B15, SPACE 19A-B9, SPACE 19A-B1

General Plan:

The floor plan of the Stables was originally divided by PW8 and PW9 into three spaces measuring (from west to east) SPACE 19A-B15 (36'6" long), SPACE 19A-B9 (36'9" long), and SPACE 19A-B1 (53'4" long). Partition walls are still extant today, though the division and function of the spaces has been altered. Originally, the center-aisle arrangement was carried through the Stable addition with bays 109-116 containing horse stalls (8 on the south, 10 on the north). Today, PW8 has been filled-in forming a solid barrier between the west and middle areas of the stable addition. PW9 features one opening at its center. At one time, it had a second opening at its south end. The eastern portion of the Stable addition (bays 109-116) is divided into five rooms. No evidence of the previous 18 horse stalls is visible.

Access:

Exterior Access

Bay 97, elevator.
Bays 90-102, vehicular passageway.
Bays 104-106, garage doors.
Bay 111, door.
Bays 112-114, door.

Interior Access

None.

Use:

The following list describes the current use of the bays in the Stables addition.

Bay 97 - 2-ton freight elevator.

Bay 98 - lavatory.

Bays 99-102 - vehicular passageway.

Bays 103-108 - garage with modern garage door at bays 104-106.

Bay 109 - mechanics office.

Bay 110 - tool room.

Bays 111-112 - hallway.

Bays 113-115 - gardener's equipment room.

Bays 114-116 - gardener's tool room.

Variations in Plan:

The rooms in the Stables are formed by modern floor-to-ceiling partition walls with the exception of the elevator at bay 97 and the lavatory at bay 98.

Bay 97 - is partially filled with a 2-ton freight elevator and brick shaft; the shaft's dimensions are 10'11" long x 9'3" wide.

Bay 98 - exhibits wood, matchboard panelling.

Bays 103-116 - all the modern partitions in these rooms are constructed of gypsum board on studs.

* * *

Second Story

General Plan:

The second-story floor plan of Building 19 is very similar to that of the first story, consisting of a continuous space divided into symmetrical rectangular bays flanking a center aisle. Bays are marked-off by square wooden posts at each side of the center aisle. Secondary partition walls (PW1, PW2, PW4, and PW6) are truncated, projecting only 5' from the south and north walls.

Very little has changed on the second-story floor plans from initial construction, except the installation of freight elevators, the addition of fire doors at PW3, PW5, and PW7, and the removal of floor hatches at several locations.

West Addition (bays 1-36), Second Story
SPACE 19C1

General Plan: The West Addition is one open space because PW1 and PW2 are truncated--SPACE 19C1. The west/east boundaries are defined by the west end wall of Building 19 on the west and PW3 on the east. PW3 was an original end wall for LSHII. The bays are delineated by thirty-four (34) square wooden posts which flank the center aisle supporting the south/north truss system bottom chords. There are seventeen (17) posts to each side of the aisle. Access is made via a stairway in bay 36 or through the opening in PW3.

Access: Exterior Access
Bay 30, elevator.

Interior Access
Bay 36, stairway from first story and loft.
PW3 from LSHII.

Dimensions: Measurements taken from walls to posts and between posts.
South Bay - 17'8" wide.
Center Bay - 15'8" wide.
North Bay - 17'8" wide.

Use: Storage, though mostly empty at present.

Variations
in Plan: Bay 30 - 2-ton freight elevator and brick shaft.
Bay 36 - wooden stairway.

Hatches: Center of aisle at PW1 and PW2. Removed.

Long Storehouse II (bays 37-66), Second Story
SPACE 19C37

General Plan: LSHII is one open space which is defined by PW3 and PW5--SPACE 19C37. (PW3 is the original end wall of LSHII while PW5 is the original end wall of LSHI.) The bays are defined by twenty-eight (28) wooden posts which flank the center aisle and they assist in supporting the truss straining beam. There are fourteen (14) posts on each side of the aisle. PW4 is truncated, as noted above. PW5 originally truncated, presently extends to center aisle from south to north with a rectangular opening.

Access: Exterior Access
Bay 62, elevator.

Interior Access.

PW3 from West Addition.

PW5 from LSHI.

Dimensions: Measurements taken from walls to posts and between posts.
South Bay - 17'10" wide.
Center Bay - 16' wide.
North Bay - 17'9" wide.

Use: Storage.

Variations
in Plan: Bay 62 - 2-ton freight elevator and brick shaft.

Hatches: Center of aisle at PW4 and PW5. Removed.

Long Storehouse I (bays 67-96), Second Story
SPACE 19C67

General Plan: LSHI is one open space--SPACE 19C67. It is defined on the west by PW5 and on the east by PW7. (PW5 and PW7 are original end walls for LSHI.) LSHI is fifteen (15) bays long. The bays are defined by wooden posts which flank the center aisle. There are twenty-eight (27) total; fourteen (14) on the south and only thirteen (13) on the north (one post missing). These posts assist in supporting the loft floor. PW6 is truncated.

Access: Exterior Access.
None.

Interior Access.

PW5 from LSHII.

Bay 96, stairway from first story and loft.

PW7 from Stables.

Dimensions: Measurements taken from walls to posts and between posts.
South Bay - 17'4" wide.
Center Bay - 16'3" wide.
North Bay - 17'4" wide.

Use: Storage.

Variations
in Plan: Bay 96 - wooden stairway.

Hatches: Center of aisle at bay 92. Removed or obscured by new flooring.

Stables (bays 96-116), Second Story
SPACE 19A-C1

General Plan: The Stables is ten (10) bays long. The bays are defined by ten (10) wooden posts. Posts are not all aligned. At the southwest end of the Stables are partitioned rooms, 16' wide with their northern boundary at the north side of the south posts aligning the center aisle. On the east side of the posts between bays 98/100 and 97/99, commencing from the partitioned room at bay 98/100, is a wire-mesh wall which runs south/north. This wall has a padlocked sliding-door in line with the center aisle. The wall and locked door prevent free access to the space beyond.

Access: Exterior Access
Bay 97, elevator.

Interior Access
PW7 from LSHI.

Dimensions: Measurements taken from walls to posts and between posts.
South Bay - 17'10" wide.
Center Bay - 16'3" wide.
North Bay - 16' wide.

Use: Storage (Receiving area for STCC.)
Bay 97 - 2-ton freight elevator.

Variations in Plan: Bay 97 - the bay is partially filled with a brick elevator shaft and a 2-ton freight elevator.
Bays 98-100 - wood and glass partitioned room.
Bay 102 - wire-mesh cage abutting the wood and glass partitioned room.

* * *

Loft

General: The floor plan of the third level consists of four open spaces located beneath the slope of the roof. Each open space is organized around a center aisle, with bays of equal dimensions at either side. Wooden posts define the bays at this level. These posts are the queen posts of the truss system. The posts do not flank the center aisle as closely as on the lower floors. Iron tie-rods are located in the center of the aisle at each truss and extend from the A-frame support to the bottom chord.

The floor is suspended by the truss and does not extend to the south and north walls. A gap generally between 7' and

9' exists at the south and north sides, continuously from west to east. These floor-to-wall gaps are described in more detail in the "Framing" and "Flooring" sections of this report.

Only three of the nine (9) partition walls extend up through the loft (PW3, PW5, PW7). PW3 and PW7 represent the original end walls of the Long Storehouse I and II

Dimensions: Center Bay - 18' wide.
Length Between Posts - 12'1/2" long.

West Addition (bays 1-36), Loft
SPACE 19D1

General Plan: The loft of the West Addition is organized around seventeen (17) trusses. The queen posts delineate eighteen (18) bays and provide the boundary for the center aisle. There are seventeen (17) iron tie- rods which bisect the center aisle.

Access: Exterior Access
Bay 30, elevator.

Interior Access
Bay 36, stairway from second story.
PW3 from LSHII.

Use: Essentially unused.

Variations
to the Plan: Bay 30 - 2-ton freight elevator.
Bay 36 - wooden stairway from second story.

Long Storehouse II (bays 37-66), Loft
SPACE 19D37

General Plan: LSHII's center aisle is defined by fifteen (15) queen posts which also define the fifteen (15) bays. There are fifteen (15) iron tie-rods which bisect the center aisle.

Access: Exterior Access
Bay 62, elevator.

Interior Access
PW3 from West Addition.
PW5 from LSHI.

Use: Essentially unused.

Variations
to the Plan: Bay 62 - 2-ton freight elevator and brick shaft.

Long Storehouse I (bays 67-96), Loft
SPACE 19D67

General Plan: LSHI's center aisle is defined by fifteen (15) queen posts which also define the fifteen (15) bays. There are fifteen (15) iron tie-rods which bisect the center aisle.

Access: Exterior Access
None.

Interior Access
PW5 from LSHII.
Bay 96, stairway from second story.
PW7 from Stables.

Use: Essentially unused.

Variations
to the Plan: Bay 96 - wooden stairway from the second story.

Stables (97-116), Loft
SPACE 19A-D1

General Plan: Nine (9) queen posts flank a center aisle and divide the space into ten (10) bays. Nine (9) iron tie-rods punctuate the center aisle in line with the posts. The floor extends to the south and north walls at the first three western bays on the south (bays 98, 100, 102); otherwise there is a gap on either side between floor and wall.

A wire-mesh enclosure is extant along the length of the space on the south and north sides to keep out birds. The frame for the wire mesh extends from the floor to the lower purlin of the roof framing system.

Access: Exterior Access
Bay 97, elevator.

Interior Access
PW7 from LSHI.

Use: Essentially unused.

Variations
to the Plan: Bay 97 - 2-ton freight elevator and brick shaft; the shaft is 94" long, width dimension was unobtainable.

* * *

Basement

General: The basement currently consists of five spaces (unnumbered or unidentified by use), including an entry hall at the center bay; a northeast room which extends two-thirds of the length of the basement, along its north side, with access from the entry hall; a lavatory to the south of the entry hall; a larger room to the south and west of the lavatory and connecting hallway; and a room that stretches across the entire west end of the basement and includes the remaining third of the area on the east (not occupied by the northeast room). Access to the west room is through the south center room.

Access: Exterior Access
Center bay, east elevation.

Interior Access
None.

Use: Essentially unused. Most recent use was as a gym.

Interior

Partitions: The basement features modern partition walls of masonry block, wood panelling, wall board of various types, and tile wainscoting in the lavatory.

B. Original Appearance of Floor Plan

Although constructed in four phases, the LSHI and LSHII structurally became a single unit at the second and loft stories. This created a division into three open areas at each story including the West Addition, the combined LSHII and LSHI, and the Stables. The four phases of construction were evident only on the first story where original endwalls (PW3 and PW7) and PW5 mark-offed divisions between the West Addition, LSHII, LSHI, and the Stables.

Circulation: Primary access at the center bay of the west end of the building. May have been secondary access through some of the panelled doors on the south and north elevations, however, available plans and extant conditions do not enlighten this puzzle.

Stairs at bay 36 served the West Addition. Stairs at bay 96 served LSHI and LSHII. Stairs at bay 110 served the Stables. All stairs ran from the first to the loft stories. The Stables stairs continued to the basement.

First Story: West Addition, LSHI, and LSHII. Open center-aisle from end-to-end. Nine partition walls. Uniform bay division defined by arches and structural posts.

Stables different organization. Bay 97-102, open room. Bays 103-108 between PW8 and PW9 largely open with lockers on north wall and small tack (?) room on south wall. Bays 109-116 contained 8 stalls on the south wall and 10 stalls on north wall. This is according to the 1916 plan; the original configuration is not known. Opening for horses to exit at bays 102 and 104 on either side of PW8. (Stable organization assumed from 1909 floor plan, Drwg. No. SA 1455).

Second Story: Three, large, open areas separated by PW3 and PW7. Uniform bay division defined by windows and truncated partition walls. Hatches located in floor at PW1, PW2, PW4, PW5, bays 91/92 and 101/102 generally measuring 5' x 5' and providing additional means for loading and unloading. Air shaft at bay 109/110 and three grain shutes at bays 111-114.

Loft: Three, large, open areas separated by PW3 and PW7 with no communication between areas (no doors in partition walls).

Uniform bay division defined by queen-post structural system and iron tie-rods running one per bay down the center from end-to-end.

C. 1968 Appearance of Floor Plan

Circulation: Primary entrance still through center arch at west end of building.

Secondary entrances or exterior access at bay 10 and 12 (garage doors), bays 32 and 58 (matchboard sliding-doors), bays 100/102 (vehicular passageway), bays 104/106 (metal rolled door), bays 112/114 (double-sliding garage-doors). Also an opening to a passageway to Building 32 at bay 59.

Stairs in Stables gone by 1961 (according to revised floor plan).

Introduction of elevators at bays 30 (ca. 1942), 62 (ca. 1935), and 97 (ca. 1942) provide new corridors of vertical access to first, second, and loft stories. Exterior access from elevator loading platforms tied to the exterior walls.

Vehicular passageway for travel through the building (bays 99/102) with entry into LSHII at PW7.

Original center arch in PW8 filled with brick creating a solid wall. (No interior communication with Stables on first floor).

Basement: Reorganization of space (ca. 1960). Exact configuration unknown.

First Story: Defined by structural steel system. Retains the open center aisle and uniform bay division. Major changes in plan at the west end (SPACE 19B1; bays 1-12) and in the Stables (SPACE 19A-B1, -B9, -B15; bays 98-116).

Sprinkler system valve rooms at bays 24, 50, 82, and at bay 106 only equipment present behind wire-mesh cage, no shed.

Second Story: Center aisle open from end-to-end by 1968 and defined by bay division and wood posts flanking the center aisle. Posts assist in supporting the bottom chords of the truss system. Unknown date of introduction.

PW5, originally truncated, now a fire wall extending through the second and loft levels (ca. 1942) dividing area into four original construction phases.

Hatches in center aisle may have been covered by this date.

Loft: Center aisle open from end-to-end (openings with fire doors made in PW3 and PW7). Otherwise, original configuration.

PW5, a firewall with fire door at center built by 1968 in loft.

D. Historic Sources for Floor Plan

Aug. 20, 1860 Drawing. Foundation Wall for Barn (No. NHSD 129). Floor plan of basement level of the Stables.

April 20, 1909 Drawing. Long Store House Floor Plan...Storage Rooms, 51 to 59 (No. SA 268). (See Volume II, Figure 21.)

Oct. 9, 1916 Drawing. Long Storage House Floor Plans (No. SA 1675). (See Volume II, Figure 22.)

March 15, 1935 Drawing (revised 1937). Alterations to Floors and Doorways; Stables; Building No. 19A; Hill Shops (No. 10004). Plot plan, basement plan, first floor plan. Replacing cast iron columns in basement with formed concrete.

July 31, 1936 Drawing. Floor Plans Building Nos. 19 and 19A; Hill Shops (No. 6085, superseded by SA 13305). (See Volume II, Figure 24.)

March 4, 1937 Drawing. Relocation of Stairs in Stable; Building No. 19A; Hill Shops (No. SA 10150). Plan of first floor of Stables.

Dec. 29, 1941 Drawing. Structural Steel for Reinforcing of Floor Above Spaces 19A-B1, 19A-B9 and 19A-B15; Building No. 19; Hill Shops (No. 13390). Plan of bays 97 through 116 showing introduction of steel columns.

Nov. 28, 1952 Drawing. New Floor Construction, Building No. 19 (No. 33-01-03). Installation of poured concrete floor with expansion joints. Includes floor plan West Addition, LSHI, LSHII. (See Volume II, Figure 31.)

Jan. 4, 1954 Drawing. Alterations to West End of Building No. 19 for Electric Sub-Station Enclosure, Armory Square (No. PM 585). Includes plan of bays 2 and 4 on the south. (See Volume II, Figure 32.)

1943 to 1955 Drawing. Building 19, All Floors (No. SA 13305). Floor plans for all levels. Last revision, 8-31-55. (See Volume II, Figure 35.)

May 10, 1955 Drawing. Preliminary Sketch, Proposed Renovation and Rehabilitation of Building 19 for Property Division, Armory Square (No. PM 666). Includes good site plan and building plan. Details proposed changes; many not carried out.

June 1960 Drawing. Radiographic Inspection Lab; Building No. 19; Architectural Plans, Elevations, Sections, and Details (No. 35-51-01). Includes plan, elevations, and section. New organization of space in bays 1, 3, 5, 7, and 9 on the north side of the building.

Bay 103, x-ray room. Bay 5, ante-room. Bays 7-9 viewing room, dark room, toilet. Bay 11, AC equipment space.

(See Volume II, Figure 33.)

Sept. 30, 1960 Drawing. Modification of Basement Area; Building No. 19 (No. PM 814). Plan, elevation, and section. Reorganization of basement space in Stables. Walls changed; mechanical systems changed; wall, floor and ceiling finishes changed. (See Volume II, Figure 34.)

Dec. 31, 1963 Drawing. Installation - Facilities; Office - Facilities Engineering Branch; Location - Building 19; Lower and Upper "A" Floor Communication Facilities (No. PM 909). Floor

plan of changes to bays 109-116. Extent proposal carried-out is questioned.

First floor to have PBX Operation Center and Signal Administration including: lobby; 2 toilets; Signal Administration office; stairs to basement; storage and maintenance shop; switchboard room; operator's lounge; and a/c unit room.

Basement to house Communication Center including vault area, message center, maintenance area, toilet, supply storage, and autodin compound terminal.

Ca. 1963

Drawing; no date. Plant Facilities Office; Project and Plans Branch; Building No. 19; Proposed Metallurgical (Powdered) Lab (No. PM 882). Floor plans of bays 1-11 including electric substation in bays 2 and 4 and Radiographic Laboratory in bays 1, 3, 5, 7, 9, and 11.

INTERIOR WALLS

(See Volume II, "Interior Walls," Figures 118-123.)

A. Existing Appearance

The design of the interior load-bearing walls--representing the shell of the building--reflect the exterior appearance with a continuum of like bays consisting of semi-circular and segmental arched openings. The description of the interior walls follows the pattern of discussion already established for the exterior walls; i.e. the end walls are described first, followed by the south and north walls respectively. Archway treatments will not be discussed in this section either. See "Exterior Wall Openings" and Appendices A through D for a discussion of this feature. In addition, several elements unique to the interior walls relate to the floor and roof framing. Framing units necessarily must join with, or set into, major load-bearing walls. Framing systems are described in detail in the "Framing" section of this report. However, elements on the interior of the walls facilitating framing systems will be briefly described in this section as part of the design of the interior walls. Mechanical systems and signs impacting walls are not included in the following discussion.

Wall Thickness: The walls are 2'4" thick with the exterior wall being 7-3/4" thick and the interior pier 1'8-1/4" thick.

Brick: The brickwork is generally laid in American bond with seven (7) stretchers to one (1) header. This pattern is not consistent throughout. There is some minor variation in the number of stretcher courses between header courses. The brick exhibits flush mortar joints.

Arches: The semi-circular and segmental arches are an integral feature of the load-bearing walls, and thus, are an important design component on the interior. The arches essentially mirror those on the exterior. See "Exterior Wall Openings" for a more detailed description of the arches which punctuate the walls.

Finishes: Unpainted except for those areas impacted by modern partitions at the first-story center bay and north bay.

* * *

West Wall

Brick
Dimensions: The wall is composed of brick with the following dimensions:

length - 7-1/2"
height - 2-1/4"
depth - 3-1/2" to 3-3/4"

Composition: This wall is two-stories high and three-bays wide (south, center, north). The exterior arch-arrangement does not correspond exactly to the interior floor-arrangement in that the semi-circular arches of the second story are intersected by the loft framing.

The center and north bays of the first-story brick walls are obscured by modern wall coverings. Visible on the interior is the first-story south bay's semi-circular arch. Extant from the second to the loft stories are three semi-circular arches. The center-bay arch of these stories is taller than the two sides arches.

West Wall, First Story (only the south bay is discussed below)

General: As noted above, only the south bay of the exposed brick wall is visible on the interior and it is of one plane. The semi-circular arch is filled with brick that is flush with the wall plane. The brick is keyed to the wall. The arch does not feature imposts.

Structural: Two beams travel into the wall, as follows:

An I-beam travels into the south bay's semi-circular arch at the crown.

A channel-beam defines the center aisle of SPACE 19B1, piercing the west wall. It represents the boundary of the north partition wall.

West Wall, Second Story

General: The wall is three-bays wide (south, center, north). The bays are marked by the three semi-circular arches. The wall is of a single plane. The arches do not feature imposts.

Archway Sill: The sill is six (6) courses of brick high. The upper and lower courses are header bond, while the other four (4) courses are stretcher bond.

Structural: The two (2) structural elements identified below do not travel through the wall, but visually impact it by abutting its surface.

An iron tie-rod ties the south and north walls,

piercing the brick piers at the south and north corners of the west wall. The tie-rod is positioned 8'10" from the floor. It travels through both piers and is bolted to the exterior surface of the south and walls.

The center and south arches are partially covered by four posts that help to support the loft floor. The posts flank the south- and center-bay arches. Those joists which are not in-line with the beam supported by the posts, proceed directly into the west wall.

West Wall, Loft

General: A common rafter abuts the raking edges of the wall. A decorative cornice is not extant on the raking slopes. The south and north arches that commence at the second-story level, extend into the loft level for 2'2" and the center arch for 3'9-1/2". Twenty-three (23) brick courses above the loft floor, the wall is recessed for 4" creating a ledge. The top course of the ledge is a header course.

Structural: Only the roof framing purlins and ridge pole impact the wall at this level. A wood beam is located off-center to the south and it sits on top of the ledge without piercing the wall. The beam extends from the collar tie-beam of the truss system.

* * *

East Wall

Brick: The wall is laid in the typical interior wall bond. At the loft level, however, there is some variation in the wall bond at the ledge's upper coursing. The top course of the ledge at the side bays is stretcher bond, while at the center bay it is header bond.

Brick

Dimensions:

The wall features brick of variable dimensions, as follows:
length - 7-3/4" to 8"
width - 2" to 2-1/4"
depth - 3-3/4"

Composition:

This wall is three-stories high (basement, first and second) and three-bays wide (south, center, north). As in the west wall, the exterior arch-arrangement does not correspond exactly to the interior framing-arrangement in that the semi-circular arches of the second story rise above the loft framing.

The basement portion of the wall, also considered the foundation for the brick wall above, is constructed of large sandstone blocks. (It is faced on the exterior with brick.)

The wall is punctuated by three segmental arches at the basement level, three semi-circular arches at the first- and second-story levels. As noted above, the second-story arches extend into the loft space. The second-story center arch is seven (7) courses taller than the south and north second-story arches.

East Wall, Basement

General: The sandstone is of random dimensions, averaging between 1' and 2' high x 5' to 6' long. The depth of the stone was not measured. The wall consists of approximately six (6) courses of stone, random laid. The upper course of the stone foundation on this wall is finished level, so that the brick wall above could sit. The sandstone exhibits a rough surface with squared edges. The mortar joints are approximately 2" thick and flush. They are pointed with a grey mortar which may represent a repointing.

East Wall, First Story

General: At the center bay, a partition wall bisects the brick-filled arch and is nailed to its fanlight. This partition divides the space into two rooms at the east end of the Stables.

Structural: Steel channel-beams travel through the wall at the center of the piers between arches, at the ceiling level.

East Wall, Second Story

General: The upper portion of the arches fanlights are obscured from vision by the loft floor.

Archway Sill: The sill for the three arches consist of five (5) courses of brick. The bond arrangement is as follows: floor; stretcher; header; (2) stretchers; header.

Structural: Floor joists are not set into the wall, but rest on a south/north beam which is adjacent to the wall. Two posts are in line with the center-aisle posts and they support the beam.

East Wall, Loft

General: The wall continues from the second story for several feet at the same thickness then is recessed for 8" (one brick length), extending to the roof line at the recessed dimension. At the south and north bays, the wall plane continues 3'2" from the floor level before it is recessed. In the center bay which is 17'8" wide, the wall plane continues for 4'8" from the floor level before it is recessed. The ledge is one brick length deep.

Structural: Only the roof framing purlins and ridge pole enter the wall.

* * *

South and North Walls

Brick Dimensions: The wall features brick of variable dimensions, as follows:

West Addition

length - 7-3/4" to 8"
height - 2-1/4"
depth - 3-3/4" to 4"

LSHII

length - 7-1/2" to 7-3/4"
height - 2"
depth - 3-3/4"

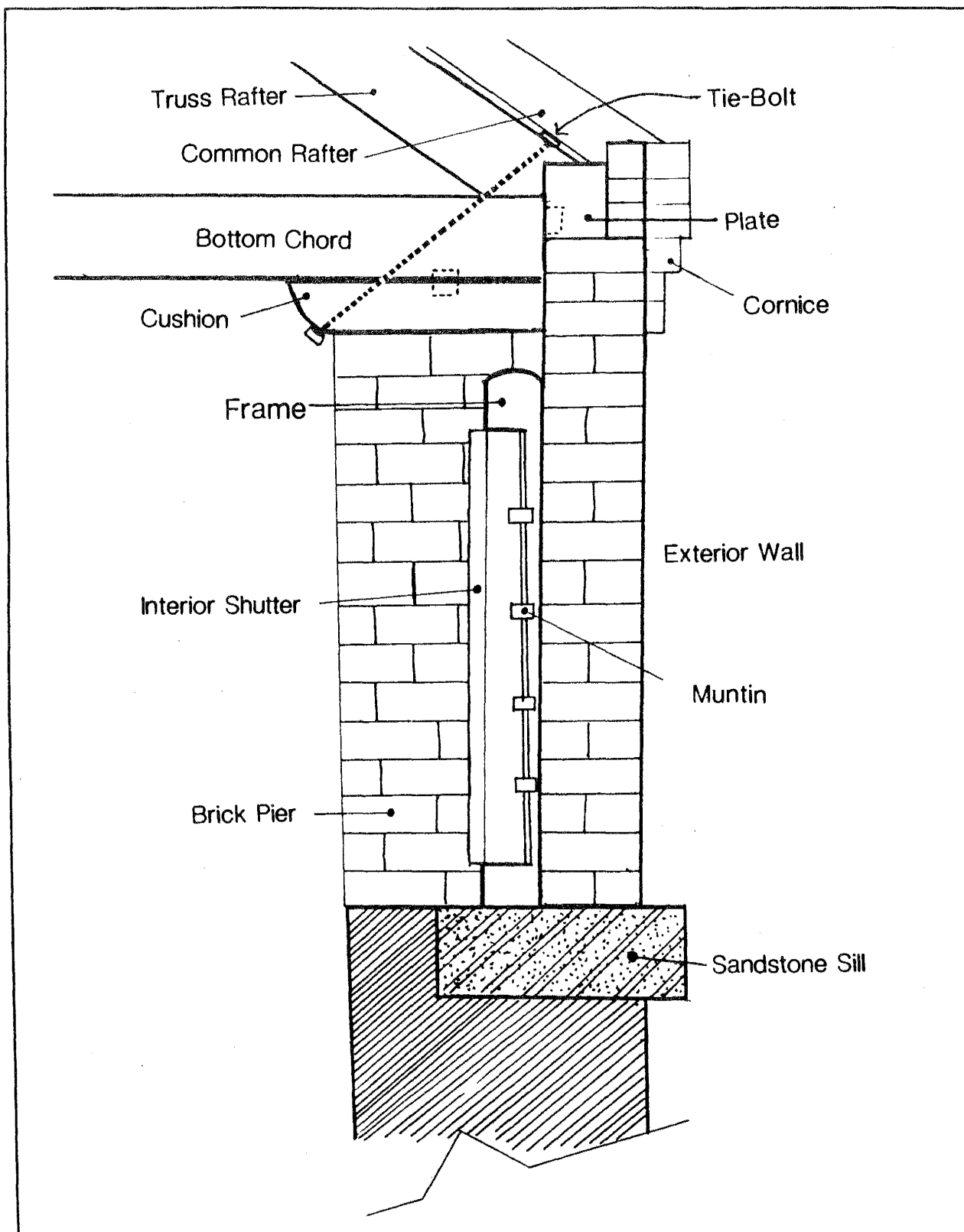
LSHI

length - 7-3/4" to 8"
height - 2-1/8"
depth - 3-1/2" to 4"

Stables

length - 7" to 8"
height - 2" to 2-1/4"
depth - 3-1/2" to 3-3/4"

Composition: The first story features a semi-circular arch/pier configuration per bay, surmounted on the second story by a segmental arch set between piers which assist in supporting the truss. Most of the first-story interior south and north walls in the West Addition are obscured by drywall and plywood partitions.



Section looking west, window at bay 21, West Addition. (Schematic drawing by J. Quinn, 1991.)

Finishes: The interior walls of the West Addition, LSHII, and LSHI are unfinished. Miscellaneous graffiti is sprinkled throughout. The interior walls of the Stables feature paint. This paint was not inventoried.

South/North Walls, First Story

General: The design of the interior wall on the first story is essentially consistent from the west to the east end. It consists of a single plane wall, pierced at each bay by a semi-circular arch. The wall is seventy (70) courses high. The arch piers are forty (40) courses high from the floor to the spring line of the arch and 3'3-1/2" wide between abutments. A header course surmounts the semi-circular arch crown. The wall is recessed beyond this course to create a ledge for the south/north joists to ride upon. Also on the ledge (set back approximately 6" between joists) are brick spacers four (4) or five (5) courses high. They form a series of large pockets for the joists and support the wall above.

South/North Walls, Second Story

General: The second-story of the south and north interior walls is consistent throughout the length of the building with only some slight variation. The walls are composed of brick piers which define the window openings and support the bottom chords of the roof truss system. (See illustration on page 130.) Each bay is finished with a segmentally-arched opening, recessed from the piers. The wall above the arch is flush with the arch and continues for four courses beyond the pier height, providing a ledge for the wall plate to rest upon. The pre-assembled window frames fit snugly between the pier abutments. The frames generally obscure the arch brickwork.

Window Sill: The window sill is of brick (on the interior) and sandstone (on the exterior). On the interior, it is basically a shelf recessed from the wall/pier plane. The number of courses and bonding varies. The sill depth to the window frame averages between 1' and 1'4". The sill averages around 1'+ high. The upper course of the sill is a header course. The exterior sandstone sill is visible on the inside of the window sill for 2". The seam between the sandstone sill and the brick header course is parged. Below, the number of sill courses and their bond is included for each section of the building.

West Addition

The sill is six (6) courses high, featuring the

following brick coursing from the floor upward: header, (4) stretcher, header. Pressed brick is visible in some sills.

LSHII

The sill is five (5) courses high, featuring the following brick coursing from the floor upward: (4) stretcher to (1) header.

LSHI

The sill is five-and-a-half (5-1/2) courses high, featuring the following brick coursing from the floor upward: (2) stretcher, header, (2) stretcher, header.

Stables

The sill is five (5) courses high, featuring the following brick coursing from the floor upward: stretcher, header, (2) stretcher, header.

Wall Pier:

The wall piers located between the windows are raised from the arch wall plane. They support the bottom chords for the truss system. A wood cushion and an end of the bottom chord beam rest on the pier. They are generally 3'3" to 3'4" wide x 1' deep x 9'3" to 9'4" high (or 43 to 45 courses high from the finished floor level). The coursing varies somewhat with at least one header course interspersed. The piers stop four (4) courses short of the wall plate. Below, the number of piers found on each wall and the number of pier courses are included for each section of the building.

West Addition

Eighteen (18) brick piers.

The pier is forty-four and a-half (44-1/2) courses high.

LSHII

Fifteen (15) brick piers.

The pier is forty-three (43) courses high.

LSHI

Fifteen (15) brick piers.

The pier is forty-four and a-half (44-1/2) courses high.

Stables

Ten (10) brick piers.

The pier is forty-four (44) courses high.

Wall Above Arch/
Wall Plate:

The wall plate sits on the upper ledge of the brick wall. Its positioning in relation to the wall plane varies throughout. It may be flush, protude beyond, or be recessed from the wall plane. The wall extends four (4) or five (5) courses beyond the pier ledge. The bond is not consistent for the wall above the arch. It is stretcher with the upper brick course laid with its bedding side exposed, except where noted below.

West Addition

The wall protrudes inward at bays 1, 2, 4, and 6. The distance to the wall above the pier is 8" in these bays, while in the other bays it is 16". The wall plate is recessed from the wall plane in bays 1, 2, and 4; otherwise, it protrudes beyond the wall plane by 2" to 3". At bays 1 and 2 the top course is a header, otherwise the courses for the wall above the arch are stretcher.

LSHII

The wall plate is recessed from the wall plane or is more or less flush with the wall. The mortar bedding is visible in some areas. On the south wall, bay 38-50 the bricks are laid with their bedding side exposed at the upper course; while from bays 52-66 (east of PW4) the bricks are only stretcher above the arch. To accommodate the differences in bonding, a thick layer of bedding mortar was employed in the latter locations. On the north wall, the stretcher brick is turned with its bedding side exposed at bays 37, 39, 43, 45, 57-65; with a flat stretcher at bays 47, 49, 51, 55; and with a header course at bays 33, 41, 53.

LSHI

All stretcher courses are extant on the wall above the pier/arch. There is a thick bedding mortar between the wall and the wall plate. The wall plate is generally flush, but does protrude slightly in some areas--particularly at the west end of the south wall.

Stables

The bond of the wall above the arch is generally stretcher, (2) header, stretcher. At bay 103, the bond is (2) stretcher, header, stretcher. The wall plate protrudes beyond the wall plate between 1" and 3".

B. Original Appearance of Interior Walls

Material: Brick. American bond, generally laid (7) stretcher courses to (1) header course. Flush mortar joints. Variable brick in color and size corresponding to different construction phases.

Design: Design of the walls reflected the exterior configuration of arches on the first and second stories. The design has remained essentially the same throughout the building's history, therefore a detailed description is not provided here.

Finishes: Bare, exposed brick walls.

Originally, endwalls (PW3 and PW7) painted with exterior finish schedule.

C. 1968 Appearance of Interior Walls

General: No significant changes.

Internal arrangement of space and the addition of concrete masonry unit partition walls in the east end (Stables) and West Addition obscure parts of the interior wall.

Modern systems (conduits, pipes, etc.) run along interior walls in some areas and pass through the walls in others, particularly at bay 59.

Finishes: Bare, exposed brick walls.

D. Historic Sources for Interior Walls

Jan. 4, 1954 Drawing. Alterations to West End of Building No. 19 for Electric Sub-Station Enclosure, Armory Square (No. PM 585). (See Volume II, Figure 32.)

June 1960 Drawing. Radiographic Inspection Lab; Building No. 19; Architectural Plans, Elevations, Sections, and Details Partition Walls (No. 35-51-01, Sheet 1 of 3). Bays 1-9 on north side of building. (See Volume II, Figure 33.)

Drawing. Radiographic Inspection Lab; Building No. 19; Mechanical Plumbing, Heating, Ventilating, and Air Conditioning Plans (No. 35-51-01, Sheet 2 of 3). Bays 109 on north side of building.

Drawing. Radiographic Inspection Lab; Building No. 19;
Electrical Plans (No. 35-51-01, Sheet 3 of 3). Bays 1-9
on north side of building.

Dec. 31, 1963

Drawing. Installation Facilities Office Facilities
Engineering Branch Location Building 19; Lower and Upper
"A" Floor Communications Facilities (No. PM 909). Bays
109-116.

PARTITION WALLS

(See Volume II, "Partition Walls," Figures 124-143.)

A. Existing Appearance

This section includes a discussion of those load-bearing interior masonry walls that divide the building crosswise. There are nine such walls of varying heights and dimensions. These walls have been called collectively "partition walls," although they are of various types including fire walls, former party walls, and former end walls. For ease in discussion, these walls have been numbered consecutively beginning with the first partition wall on the west and traveling eastward, i.e. the westernmost partition wall is PW1, while the easternmost is PW9 ("PW" represents "partition wall").

Brick Bond: All the walls are brick. They are generally laid in American bond, except for those sides of walls that were exterior walls at one time (PW3, west side; PW7, east side). The former exterior walls are laid in stretcher bond. The configuration of American bond consists of seven (7) stretcher to one (1) header course, although there is some variation in the number of stretchers between header courses. In fact, the piers and pilasters which are twentieth century features are laid with as many as twelve (12) to thirteen (13) stretcher courses between header courses.

Wall Heights: PW1, PW2, PW4, PW6 are floor to ceiling walls on the first story and truncated on the second story.

PW3, PW5, PW7 are two stories (including the loft) in height and serve as fire walls. They were former end/party walls.

PW8, PW9 are one story in height.

Arches: Semi-circular arches are extant in the following locations.

First Story

South/North Bays, PW1 through PW7
Center Bay, PW8 and PW9

Second Story

South/North Bays PWs 3 and 7

All south/north bay arches and the center bay arch of PW8 have been filled with brick. The center-bay semi-circular arches have been converted to rectangular openings at all stories for PWs 3 and 7, and the first story of PW9.

Piers/
Pilasters:

Piers and/or pilasters were added to first-story walls to assist in supporting the steel structural system introduced during the 1940's. The piers are engaged to the wall and flank its opening. The brickwork of the piers stops approximately six (6) courses short of the wall height so that the channel-beam system at the center aisle may sit upon and be supported by them. The piers are consistently 2' square. The pilasters carry the side I-beams and thus have been designed into the south and north arches.

The discussion, below, describes both the design of each partition wall (west and east sides) and the impact of structural systems. General comments on the two-dimensional appearance of the wall are first provided, followed by a description at each story. Not included in this survey is the placement on or through the walls of mechanical systems and the placement of locational signs stencilled on the wall surfaces.

* * *

Partition Wall 1 - PW1

Location: First and Second Stories; Truncated at the Second Story. West Addition.
Abuts the South/North Walls between Bays 12/14 and 11/13. Separates SPACE 19B1 and 19B13.

First Story. The east side is obscured by offices which have been introduced by the Building Trades Training Center. The west side is partially hidden by school supplies stored in the adjacent rooms.

Material: The wall is constructed of brick.

Wall Thickness: The wall is 1'4" thick.

General: PW1 extends to the second story, but it is severely truncated at both its south and north ends.

First Story. On the the first story, the wall consists of two separate sections: a south section and a north section (18'3" long) linked together by a modern partition wall and glazed double-doors. Each section of the wall features a semi-circular arch which has been filled with brick. The infill is flush with the wall plane. Flanking the center aisle are two piers which engage and become part of the wall. These piers carry steel beams. The wall is of a single plane, except for raised imposts of the arches and piers that flank the center aisle.

Second Story. At the second-story level, the wall has been severely truncated at its south and north ends. Each section abuts the respective exterior wall and is 5' long x 16" thick x 9'3" high. The height corresponds to the height of the south/north wall piers. The wall is without embellishment.

Finishes:

The second-story wall is unpainted, while the finishes of the first-story wall vary from the west to the east side of the wall, as follows:

West Side

The south end of the wall is unfinished, while the north end (enclosed in the tool room closet) is painted light green with a medium green wainscot.

East Side

The east side of the wall is unfinished.

PW1, First Story

Opening:

The opening in the masonry is floor to ceiling, extending the approximate width of the center aisle (15'5" high x 14' wide, from pier to pier). The opening is flanked on either side by a brick pier. The opening is currently finished with a glazed double-door with full-length side lights. The door is 7'5" high x 4'11" wide. The opening features an aluminum threshold and Kalamein doors. The frame is 11'8" wide and positioned 2'2" from the south pier and flush with the north pier. On the south and above the door frame, the opening is finished with plaster board. The door frame is stained wood.

Structural:

The center channel-beam system sits off-center on the south and north 2' square piers. The side I-beams extend into the wall at the arch level. No additional support has been provided for the side I-beams.

* * *

Partition Wall 2 - PW2

Location:

First and Second Stories, Truncated at the Second Story.
West Addition.
Abuts the South/North Walls between Bays 24/26 and 23/25.
Separates SPACE 19B13 and SPACE 19B25.

First Story. The south end of the east side of the wall is obscured by a locked wood and wire cage. It was inaccessible during the survey work. The south end of the west side of the wall is partially obscured by a shed for the sprinkler system. The upper portion of the same wall is not visible in areas because of hanging wood models from the carpenter training classes of the Building Trades Training Center.

Material: The wall is constructed of brick.

Wall Thickness: The wall is 1'4" thick.

General: PW2 extends to the second story, but it is dramatically truncated at both its south and north ends like PW1.

First Story. On the first story, the wall consists of two separate sections: a south section and a north section which flank the open center aisle. Each section features a semi-circular arch which has been filled with brick, flush with the wall plane. The infill for the west side, south arch and east side, north arch are keyed into the existing wall. The west side, north arch is not keyed. The east side, south arch was not accessible. A pier finishes each section of the wall at the center aisle. The wall is of a single plane except for projecting impostes of the arches and piers that flank the center aisle.

Second Story. Each section of the truncated wall on this story is 5' wide x 16" thick x 9'3" high. It is similar to the second-story wall treatment of PW1.

Finishes: No painted finishes are extant on this wall at either story.

PW2, First Story

Opening: The opening in the masonry is floor to ceiling, extending the approximate width of the center aisle (14'). It is flanked on either side by a brick pier.

Structural: The center-aisle channel-beam system sits off-center on the 2' square piers which flank the center aisle. The side I-beams enter the wall at the arch level. The introduction of these I-beams required some reworking of the arch brickwork. No additional support has been provided for the I-beams.

* * *

Partition Wall 3 - PW3
(an original end wall and currently a fire wall)

Location: First, Second, and Loft Stories.
West Wall of Long Storehouse II.
East Wall of the West Addition.
Abuts South/North Walls between Bays 36/38 and 35/37.
First Story. Separates SPACE 19B25 and SPACE 19B37.
Second Story. Separates SPACE 19C1 and SPACE 19C37.
Loft. Separates SPACE 19D1 and SPACE 19D37.

Material: The wall is constructed of brick with sandstone sills for the south and north semi-circular arches. Concrete thresholds are extant at the fire-door openings.

Brick: Wall. The west side of the wall is laid in stretcher bond. It was an original end wall. The east side of the wall is American bond, generally seven (7) stretchers to one (1) header.

General: The wall is two-stories high and three-bays wide. It is the original end wall for LSHII. The bays include the following: semi-circular arches at the south and north bays on the first and second stories; and a rectangular opening at the center bay on the first, second and loft stories. The second-story arches, however, do not correspond to the current floor height as they extend into the loft space. The semi-circular arches on the west side of the wall feature projecting imposts, while those on the east side do not. The imposts are three (3) brick-courses high x three (3) brick-stretchers long.

The wall is of a single plane except for the following: at the semi-circular side arches where the infill is recessed in varying depths; and, at the loft level, where the wall is recessed at two (2) courses above the top of the south and north arches, one brick length in depth.

Finishes: The east side of the wall and the infills are not painted. The west side, as noted above, was originally an exterior wall. It features paint from the period in which it was an exterior wall. Currently, the wall exhibits a light brown painted finish while the arches and imposts feature a dark brown painted finish. The imposts were not raised for the former center semi-circular arch, but were painted dark brown to stand out from the light brown wall paint. The face and the intrados of the arch and abutment jambs were also painted dark brown.

PW3, First Story

Wall Thickness: The wall is 2'4" thick.

Opening: There is one opening in the wall at this level. It is located in the center bay and is rectangular in design. The semi-circular arch which originally was featured in this bay was replaced with the current opening. Today, the opening features a sliding fire-door which is mounted on the east side of the wall and opens from north to south. (See Appendix E for a description of the fire door.) The current masonry opening is 11'2" high x 10'1" wide.

Arches: Imposts. As noted above, the original exterior wall (west side of the PW) exhibits impost, while the east side does not.

South Bay. This arch has been filled with brick. The new brickwork is recessed 8" from the arch face. A stairway at bay 36 partially obscures the arch on the west side of the wall. The east side of the arch features a pilaster.

Center Bay. The semi-circular arch was replaced by a rectangular opening. On both the west and east sides of the wall, the new brickwork for the rectangular opening was keyed sloppily into the original walls to form new jambs for the opening.

North Bay. This semi-circular arch has been filled with brick and features pilasters on its west and east sides.

Structural: Steel beams enter the wall at this level, as follows: the channel-beam system on either side of the center bay; and, an I-beam at the center of the south and north arches. The I-beams are supported by pilasters. The I-beam at the stairway (bay 36) has been severed at the stairway partition. It does not travel to the semi-circular arch, therefore a pilaster on this (east) side of the arch was not necessary.

The pilasters are 3' wide x 8-1/2" deep. They are located in the center of each arch and stretch from floor to ceiling. An additional brick reinforcement element has been added to the south arch, east side of the wall. Located at the north intrados of the arch, it is joined to the infill and is seven (7) courses in height.

PW3, Second Story

Wall Thickness: The wall at this level is 2' thick. The opening configuration is as follows: the east side is of a single

plane, while the west side is L-shaped (12" thick, recessed at the jamb for 8", then 2' thick.)

Opening:

There is one opening in the wall at the second story. It is located in the center bay and is rectangular in design. The masonry opening is 8' high x 7'9" wide. The semi-circular arch which originally was featured in this bay was partially filled and redesigned to feature the rectangular opening. The opening exhibits a sliding fire- door which is mounted on the east side of the wall. The fire door opens from south to north and is described, along with the lintel and threshold, in Appendix E.

Arches:

Sandstone Sills. The south and north bay arches feature tooled sandstone sills. These sills are visible on the west side of the wall and are 6" high x 10" deep. In addition, they are raised from the wall plane between 1-3/4" and 2". They are each in two sections with a seam at the centerpoint of the arch.

Imposts. Imposts are extant on the west side of the wall, not the east.

South Bay. The arch extends up to the loft level. The west side of the arch is partially obscured by the stairway which runs to the loft along the wall at bay 36. The north impost is visible from the second story, while the south impost and arch are visible only in the stairwell. The stairway railing is set at a diagonal in the archway. The handrailing is secured in three places; two on the wall and one on the infill. The east side of the arch has brick infill which is recessed for 3-3/4".

Center Bay. The arch extends up to the loft level and is partially obscured by the loft floor. Only the impost (on the west side) and the lower five (5) springing courses are visible from the second-story level. The infill is flush with the wall plane and keyed-in to the original wall.

North Bay. The arch extends up to the loft level. Its width from jamb to jamb is 9'1". The west-side brick infill is recessed for 8-1/4", while the east-side brick infill is recessed for 4" from the wall plane.

Cornice:

A decorative raking-cornice is visible on the north and south slopes.

Structural:

Joists enter the wall on both sides, as follows:

West Side

The joists at the center bay arch do not enter or rest on the wall, but are toenailed to a

south/north beam which runs adjacent to the wall, across the center arch. The other joists of this bay are set into the wall. The four (4) joists at the north bay are set into the brick infill. They appear to have been set in place after the arch was filled.

East Side

The joists are set into the bottom chord for the truss which stretches from south/north across the space directly in front of the wall.

PW3, Loft

Wall Thickness:

The wall is 2'1/2" thick. At 8" from the opening's jamb and 3'2" from the floor level, the wall thickness is reduced to 1'4". On the east side of the wall, 2'11" south of the opening, the wall is extended for six (6) courses above the 3'2" height. The upper course is partially missing; therefore the recessed portion of the wall commenced at the 7th course. North of the opening at 9'1-1/2", the wall is recessed above the 7th course. The coursing consists of six (6) stretcher and one (1) header (top course). Two upper headers are missing at the north end.

Opening:

An opening is located off-center to the south of the peak, i.e. its north jamb is in line with the roof peak. The masonry opening is 7'9-1/2" high x 6'1" wide. A sliding fire-door highlights the opening. It is mounted on the west side of the wall and opens from south to north. (See Appendix E for a discussion of the fire door details.)

Arches:

South and North Bays. Only the top of the arch (2'10") from the second story is visible at this loft level. The arches are filled with brick. The arch infill is recessed for 8" on the west side and 2-3/4" on the east side.

Center Bay. The south half of the central arch which continues from the floor below is missing because of the introduction of the rectangular opening. The north half is still intact. The arch height from the loft-floor level is approximately 4'8". The infill for the semi-circular arch is flush with the wall plane. The infill brick appears to be recycled brick and the mortar work was sloppily executed.

Cornice:

A decorative raking-cornice runs along the south and north slope of the wall at the roof. This cornice is exposed for 1-1/2 bricks, with one squint brick.

Structural: The roof framing purlins and ridge pole pierce the wall at the cornice.

* * *

Partition Wall 4 - PW4

Location: First and Second Stories; Truncated at the Second Story.
Center Wall of Long Storehouse II.
Abuts South/North Wall between Bays 50/52 and 49/51.
Separates SPACE 19B37 and SPACE 19B51.

First Story. The west side of the wall is largely obscured by debris on the north and a makeshift shed on the south.

Material: The wall is constructed of brick.

Wall Thickness: The wall is 1'4" thick.

General: Like PW1 and PW2, it extends to the second story. At the second story, however, it is truncated.

First Story. At the first-story level, the wall is not continuous across the center aisle. It consists of two separate sections: a south section and a north section. Each section features a semi-circular arch which has been filled with brick. The south-arch infill is flush and the keyed to the side walls with two keys each. The north-arch infill is recessed for 3-3/4" on its east side and 4" on its west side. The infill of north arch on both the west and east sides of the wall also exhibits a pilaster at the arch center. The arches feature imposts. Two piers have been introduced at the opening. These attached piers are raised from the wall. The opening is currently secured with a wood frame and wire-mesh partition and plywood double-doors.

Second Story. At the second story, the wall is 5' wide x 16" thick and 9'3" high. The wall abuts the south and north walls.

Finishes: The wall on both sides is unpainted except for the infill of the north arch. The east side pilaster of the north arch is unpainted, however.

PW4, First Story

Opening: The opening in the masonry is floor to ceiling, extending the approximate width of the center aisle 14'. It is flanked on either side by a brick pier. A makeshift

enclosure has been constructed at the opening. The upper third of the opening has been closed-off with wood framing and wire mesh. The lower two-thirds include plywood covered, wire mesh, double doors at the center and approximately 17" of chain link at either side of the doors.

Structural: Steel beams enter the wall in the following locations:

South End

The south center channel-beam system sits on a 2' square pier which flanks the opening. The side I-beam travels into the arch slightly to the south of its keystone. On the west side, a corbelled shelf (8 courses in height) has been constructed below the crown of the arch for added support. The east side features new brick laid horizontally and flush with the existing arch face.

North End

The north center channel-beam system also sits on a 2' square pier which flanks the opening. The side I-beam travels into and is supported by pilasters and the brickwork surrounds them. The pilasters are located in the arch on its west and east sides. The pilasters are 3' wide x 8-1/4" deep. On the west side, they are raised several inches from the arch face. The pilasters extend from floor to ceiling.

* * *

**Partition Wall (Fire Wall) 5 - PW5
(an original party wall and currently a fire wall)**

Location: First, Second, and Loft Stories.
West Wall of Long Storehouse I.
East Wall of Long Storehouse II.
Abuts South/North Walls between Bays 66/68 and 65/67.
First Story. Separates SPACE 19B51 and SPACE 19B67.
Second Story. Separates SPACE 19C37 and SPACE 19C67.
Loft. Separates SPACE 19D37 and SPACE 19D67.

First Story. The east side, south end of the first-story wall, is partially obscured by debris.

Material: The wall is constructed of brick.

Wall Thickness: The wall is 1'4" thick.

General: PW5 is two-stories high and three-bays wide. It is the original west end wall for LSHI. The south and north bays of the first story feature semi-circular arches which have been filled with brick keyed to the wall. Rectangular openings are extant at or near the center of the wall on the first and loft stories. At the second story, a square opening is extant at the center of the wall; there are no arches at this level. The semi-circular arches on both sides of the first-story wall feature imposts. The center bay of the same story is flanked by pilasters on either side of the wall. The wall is of a single plane except for the imposts and pilasters as noted above.

Finishes: The wall exhibits no painted finishes.

PW5, First Story

Wall Thickness: The wall is 1'4-1/2" thick at the first-story level.

Opening: A rectangular opening is located in the center bay. The opening is fitted with a sliding fire-door which is mounted on the east wall and slides from south to north. (See Appendix E for a description of the fire door). The current masonry opening is 10'11" high x 9'9" wide.

Arches: The brick infill of the arches is flush with the wall plane and keyed. As noted above, the arches feature imposts at both sides of the wall. The arches, where the structural steel enters the wall, have been rebuilt with bricks laid horizontally rather than radially.

Structural: The arches do not feature pilasters. Two piers are extant at the center bay, flanking the opening, however they appear more like pilasters. Apparently, when the fire door was introduced additional brick infill was introduced in the opening giving the piers a more distinct pilaster appearance. The piers are 2' square and are positioned-in 2' from the current opening. They are currently raised 8-1/4" from the center-bay infill and 4" from the wall surface.

The steel channel-beam system at the center aisle sits ontop of the piers. The side I-beams travel into the radial brickwork of the arch. They are not supported by pilasters as noted above. Instead the infill for the arch is flush with the wall plane, presumably providing greater support.

PW5, Second Story

- Wall Thickness: The wall is 1'4" thick at this level.
- Brickwork: It appears that the wall was originally truncated at its south and north ends. At some point--presumably when the steel work was introduced and fire walls--the wall was extended crosswise and to the roof. Today, the original truncated portions of the earlier wall are visible; the new wall has been keyed into this brickwork. The old wall measures forty-five (45) courses high x 4'6-1/2" wide on each side (this measurement does not include the key). This original brick is darker and redder than the newer brick.
- At the base of the west side of the wall, at the south and north sides of the opening, a course of brick is missing (14 headers in length). The floorboards extend to the wall in this area.
- Opening: A rectangular opening is found at the center of the wall, 7'11" square. It features a typical sliding fire-door which is mounted on the east side of the wall and opens from south to north. (See Appendix E for a description of the fire door, lintel, and threshold.) An unpainted wood board (function unknown) is mounted on the wall to the south of the opening. It is 15-1/2" high x 8" wide.
- Structural: Both sides of the wall support joists for the loft floor.

PW5, Loft

- Wall Thickness: The wall is 1'6" thick. On the west side of the wall, 9'4" from the floor level (15" above the opening), across the width of the wall, the wall is raised from the existing wall plane by 2 $\frac{1}{2}$ ". The wall continues at this thickness to the peak.
- Opening: A rectangular opening pierces the wall, located off-center towards the south. Its north jamb is in-line with the roof peak. The opening is 8'5" high x 6' wide. A fire door is mounted on the west side of the wall and opens from south to north. (See Appendix E for a description of the fire door, lintel, and threshold.)
- On the east side of the wall, north of the opening, eight (8) courses from the floor level and 16'2" from the opening, an iron eye-bolt is extant. Below it, is a hole in the floor. The purpose of this feature is unknown.
- Structural: The roof framing purlins and ridge pole rest on the wall.

A rafter runs along the slope, directly adjacent to the wall on the west side.

* * *

Partition Wall 6 - PW6

Location: First and Second Stories; Truncated at the Second Story.
Center Wall of Long Storehouse I.
Abuts South/North Wall between Bays 82/94 and 81/83.
Separates SPACE 19B51 and SPACE 19B67.

First Story. The west side, north wall section, is obscured from view by a high-voltage room which sets flush against the wall from floor to ceiling.

Material: The wall is constructed of brick.

Wall Thickness: The wall is 2'1/2" thick (at the piers at the opening).

General: PW6 extends to the second story where the wall is truncated like PW1, PW2, and PW4.

First Story. The wall on the first story is not continuous across the center aisle, but rather consists of two separate sections: a south section (18'3" long) and a north section (18' long). Each section features a semi-circular arch which has been filled with flush brick. The infill of the east side of the wall also exhibits a pilaster at the center of each arch. The arches on both sides of the wall featuresimposts. Two attached piers have been introduced at the opening. These piers are raised from the wall as well.

Second Story. The second-story wall abuts the south and north exterior walls. Each section is 5' wide x 16" thick. It is 9'3" high which corresponds in height to the side-wall piers.

Finishes: No painted finishes are extant on the wall.

PW6, First Story

Opening: The opening is floor to ceiling and stretches the approximate width of the central aisle 13'10". It is flanked on either side by a brick pier.

Structural: The 2' square piers which flank the central aisle support the central channel-beam system. The east side of both the south and north arches feature a floor to ceiling pilaster

which aids in supporting the side I-beams of the structural system. These pilasters are 2'11" wide and are raised from the wall 4'1/2".

* * *

Partition Wall (Fire Wall) 7 - PW7
(an original end wall and currently a fire wall)

Location: First, Second and Loft Stories.
West Wall of the Stables.
East Wall of Long Storehouse I.
Abuts South/North Walls between Bays 96/98 and 95/97.
First Story. Separates SPACE 19B83 and SPACE 19A-B15.
Second Story. Separates SPACE 19C67 and SPACE 19AC1.
Loft. Separates SPACE 19D67 and SPACE 19D1.

The wall adjacent to the elevator shaft at bay 97 was inaccessible. The wall adjacent to the stairway at bay 96 and the first-story lavatory at bay 98 was partially obscured.

Material: The wall is constructed of brick with sandstone sills for the semi-circular arches. Concrete thresholds are extant at the fire-door openings.

Brick: The west side of the wall is laid in American bond, generally seven (7) stretchers to one (1) header. The east side of the wall is laid in stretcher bond. It was an original end wall, prior to the addition of the Stables. Header courses are featured at the lintel for the openings.

General: The wall is two-stories high and three-bays wide. It is the original east end wall for LSHI. The bays include the following: semi-circular arches at the south and north bays on the first and second stories; a square opening at the center bay on the first story; and rectangular openings at the center bay on the second and loft stories. The second-story arches do not correspond to the current floor height as they extend into the loft space. The semi-circular arches on the east side of the wall feature imposts, while those on the west side do not. The imposts are three (3) brick-courses high x three (3) brick-stretchers long.

The wall is of a single plane except for the following: at the semi-circular side arches which are recessed in varying depths; and, at the loft level--two (2) courses above the crown of the south and north arches--the wall is recessed one brick length in depth.

Finishes:

First Story. The west side of the wall is painted grey up to twenty-one and one-half (21-1/2) courses from the ground level and is painted white above. Paint appears to pre-date the pilaster in the north-bay's arch because it features no paint. The east side of the wall is painted light grey for the lower forty-five (45) courses, creating a wainscot effect. This treatment applies throughout except in the lavatory where the wall is painted all green.

Second Story: The older part of the east side of the wall in the center bay is painted light brown, with dark brown trim. This is historic paint. The areas of the north arch which are exposed for view are painted dark brown, this includes the radial brickwork and the imposts. The new brickwork in the center and north bays is unpainted. All of the brickwork at the south bay, within the partitioned room, is painted green.

Loft: The west side of the wall is unpainted. The east side of the wall is painted light brown while the cornice and arch details are highlighted in dark brown. This is historic paint.

PW7, First Story

Wall Thickness:

The wall is 2'4" thick.

Opening:

There is one opening in the wall at this level. It is located in the center bay and is square in design (11' square). The semi-circular arch which originally was featured in this bay was replaced with the current opening. Today, the opening features a corrugated metal door which is mounted on the west side of the wall on a pulley. The door rolls upward to the lintel. (See Appendix E for a description of the door.) The base of the opening's jambs are faced with iron angle bumper guards (5' high).

Arches:

The brick infill of the south and north arches on the west side of the wall are recessed 8", while those on the east side of the wall are flush featuring keyed sides. The west side arches do not exhibit imposts, while the east side do feature the detail.

South Bay. The stairway cuts into brickwork at the north jamb of the arch. The arch infill does not feature a pilaster. The east side of the south bay is partially obscured by a lavatory. The arch of the lavatory exhibits flush brick infill at its lower end and recessed at the upper end.

Center Bay. The exact configuration of the original

opening is not known. Currently the east side opening infill is keyed to wall brick.

North Bay. The west side of the wall arch was not completely accessible for surveying because it is behind a wire-mesh cage. The brick infill of the west arch contains a pilaster. The east side of the north bay is partially obscured by the elevator shaft.

Structural:

Each side of the wall is impacted by two different structural systems, therefore, they are segregated below.

West Side

The typical center-aisle channel-beam system enters the west side of the wall without the additional support of piers. Presumably the thickness of the wall (being a former end wall, 2'4" thick) did not necessitate additional support in the form of piers. The stairway, at bay 96) required that the south I-beam be severed. The north I-beam travels in the arch way and is supported by a pilaster, as noted above. The space was not accessible to obtain the dimension of the pilaster.

East Side

The east side of the wall is impacted by the structural system which serves the vehicular passageway and garage of the Stables. Since these areas required an expanse of open space, oversized beams were introduced to carry the span of the second floor. Two I-beam systems enter the wall one in-front of the south lavatory and the other in-front of the elevator shaft.

PW7, Second Story

Wall Thickness: The wall is 1'4" thick and the rectangular-opening brick infill extends for 6" to 7" in the opening.

Opening: Only one opening is extant on this wall. It is located in the center bay and features a rectangular opening. The masonry opening is 8'1" high (originally 9'6" high) x 7'10-1/2" wide. The fire door is mounted on the west side of the wall and the door slides from north to south. (See Appendix E for a description of the fire door, lintel, and threshold.)

Arches: Imposts. Imposts are not extant on the west side of the wall, but embellish the arches of the east side of PW7.

South Bay. The west-side arch brick infill is recessed for 4". The east side of the wall arch is enclosed in a partitioned room which was inaccessible. The partition commences about 2-1/2' from the north jamb of the arch and 4'1/2" from the opening. The brick arch has been filled with brick which is recessed from the wall plane.

Center Bay. The west side of the archway is partially filled with brick. This infill is flush with the wall plane and keyed at the sides. The east side of the wall at the opening bay is recessed (7-1/2" on the south and 6-1/2" on the north). Above the opening at the ceiling level, a steel channel-beam running south/north has been installed in the wall. It cuts into the upper course of the arch impost on either side.

North Bay. The west side of the arch brick infill is recessed for 4" from the wall plane. On the east side of the wall, the elevator shaft which occupies bay 97 obscures part of the north bay. The arch is filled with brick which is flush with the wall plane.

Cornice: The raking cornice is not visible at this level.

Structural: Joists travel into the wall on both sides.

PW7, Loft

Wall Thickness: The wall is 2'1/2" thick from the floor to 4'6"; above this level it is 1'4" thick. Six feet on either side of the opening, the thicker wall is seven (7) courses greater.

Opening: One opening serves this wall. It is rectangular and is located off-center towards the south with the opening's north jamb lining up with the roof peak. The masonry opening is 8' high x 6' wide. A sliding fire-door is mounted on the east side of the wall and the door slides open from the south to the north. (See Appendix E for a description of the fire door, lintel, and threshold.)

Arches: South and North Bays. Only the top of the arch (west side, north arch - 2'11-1/2"; east side, south arch - 2'6") from the second story is visible at this loft level. The arches are filled with brick. The west side is recessed for 4" while the east side, south arch is recessed for 8". The east side's, north arch infill is flush. On the east side of the wall, the elevator shaft at bay 96 partially obscures the north corner of the wall.

Center Bay. The center bay's infill--to accommodate the rectangular opening--is flush with the wall plane. The

seams of the infill with the historic wall brick were executed sloppily. The arch height from the loft floor level is approximately 4'3". The arch is exposed on the west side of the wall for 2'10" from the floor level.

Cornice: A decorative stepped raking-cornice is extant along the slope of the east wall. It is identical to the cornice at PW3, west wall.

Structural: The roof framing purlins and ridge pole pierce the wall at the cornice. The areas around these features are patched with mortar.

* * *

Partition Wall 8 - PW8

Location: First Story.
Bordering the Vehicular Passageway on the East.
Abuts South/North Walls between Bays 102/104 and 101/103.

Material: The wall is constructed of brick.

Brick: The wall and infill brick is the typical American bond found elsewhere in the building, however, the pilaster bond is different from that found in other pilasters. It is American bond, but is laid with six (6) stretcher courses to one (1) header course.

Wall Thickness: The wall thickness was not obtained.

General: PW8 is one-story high and three-bays long (south, center, north). There are two pilasters on each side of the wall. These pilasters flank the center bay. Only one semi-circular arch is extant, located at the center bay. The arch does not feature imposts. The west side is filled with flush brick which is keyed at the lower sides. The east side, brick infill, is recessed for 8" from the wall plane. The wall is solid without an opening. It is all of a single plane with the exception of the pilasters.

Structural: The following structural members impact the wall:

West Side

The pilasters which flank the center bay are raised from the wall plane 8". The south pilaster is 4'1" wide, while the north pilaster is slightly wider at 4'2-1/2". The pilasters support the oversized I-beam system which enters the wall at the ceiling level.

East Side

The ceiling on the east side is covered, therefore any structural details are not visible. The pilasters which flank the center bay are raised from the wall plane 9". The south pilaster is 4'2-1/2" wide; there is a notch out of the top of this pilaster. The north pilaster is 4'1" wide. The pilasters support the oversize I-beam system which extends from the vehicular passageway into the garage occupying the east side of PW8.

Finishes: The finishes vary from the west side to the east side of the wall, as follows:

West Side

The wall is painted grey for twenty-one (21) courses from the floor level upward, creating the effect of a wainscot. The wall is white above this level.

East Side

The lower eighteen (18) courses are painted dark brown, again creating the effect of a wainscot. The wall is painted white above this level.

* * *

Partition Wall 9 - PW9

Location: First Story.
Bordering the West Garage of the Stables and the Partitioned Rooms on the East.
Abuts South/North Walls between Bays 108/110 and 107/109.
Separates SPACE 19A-B9 and SPACE 19A-B1.

First Story. A wire-mesh partition cage abuts the wall on the west side, south corner. The north half of the east side of the wall is enclosed by a series of rooms, including a generator room and mechanics office.

Material: The wall is constructed of brick.

Wall Thickness: The wall thickness was not obtained.

General: PW9 is one story in height. It features a semi-circular arch at its center. This arch has been partially filled to accommodate a rectangular opening. The east side of the wall is embellished with raised pilasters. These pilasters flank the center bay.

Apparently, at the south end of the wall, a passageway was extant at one time connecting the two rooms. The doorway has been filled-in with brick. The infill for the doorway is 7'8" high x 3'3" wide. On the east side of the wall, to the north of the doorway, was a stairway connecting the first story with the basement and second story. The stairway has been removed but scars indicating its placement on the wall are still extant.

Opening: Only one opening currently pierces this wall at its center bay. The rectangular opening is 8'5" high x 9' wide. At the opening, 11" of the wall for the south room protrudes into the opening. A steel lintel was introduced at the spring of the arch.

Structural: The structural system varies between the two sides of PW8, as follows:

West Side

Two oversized I-beams enter the wall without the support of pilasters.

East Side

This side of the wall features pilasters. The south pilaster is raised from the wall for 13" and it is 3'1" wide. The north pilaster is raised from the wall for 12" and is 3'2" wide. The typical channel-beam system rests on each pilaster.

Finishes: The wall is painted alike on both its sides. It is painted dark brown at the wainscot level and painted white above.

B. Original Appearance of Partition Walls

General Notes: PW1 through PW9.

Semi-circular arches flanking the center aisle in partition walls 1, 2, 4, 5, and 6. As far as can be determined on the earliest available plan (1916), these arches were open on the first story. PWs on the second story truncated.

Former

End Walls: PW3 and 7 were original endwalls and extended through the loft. Semi-circular arches in the PWs were filled with brick at all levels.

PW7 was a solid wall from the first story through the loft with only an opening at the center bay on the first story.

PW3 was solid with a center door on the second story and completely solid with no openings in the loft. PW5 was originally only extant on the first story.

Stables' PWs: There were two partition walls in the Stables, PW8 and PW9.

PW8 had just a center semi-circular arch on first story with no PW above on the second and loft stories.

PW9 had just a semi-circular center arch with a passageway at the south end of the wall on the first story. No PW9 above on second and loft stories.

C. 1968 Appearance of Partition Walls

General: PW1 through PW9.

All open semi-circular arches in partition walls filled with brick (ca. 1942).

Structural
Supports:

Pilaster supports added to surface of brick infill of arches to support structural steel, PWs 3, 4, 5, 6, 8, and 9 (ca. 1940).

End piers added to PWs 1, 2, 4, 6 to support structural steel system on first story (ca. 1940).

Fire Walls:

PW5 originally truncated on second story and non-existent in the loft, now both stories have a full partition wall with center opening. Presumably erected as a fire wall.

New openings introduced at PW3 (loft level) and PW7 (second and loft stories). Date unknown.

Fire doors installed at PWs 3, 5, 7 on first, second, and loft stories (ca. 1942 or ca. 1955?).

Stables' PWs:

PW8 closed/filled-in perhaps when vehicular passageway at bays 99-102 was created.

PW9 passageway at south end of wall filled (specific date unknown, presumably associated with the removal of the stairs at bay 110).

D. Historic Sources

- April 20, 1909 Drawing. Long Store House. Floor Plan (No. SA 268). Includes locations of PWs. (See Volume II, Figure 21.)
- Oct. 9, 1916 Drawing. Long Store House Floor Plans, Springfield Armory (No. SA 1675). Includes locations and configurations of PWs. (See Volume II, Figure 22.)
- Nov. 1, 1940 Drawing. Structural Steel, Reinforcing Floor "B" of Building No. 19, Hill Shops (No. SA 13243-1). Semi-circular arches in PWs infilled. "...all brick arches in present brick walls to be bricked in as shown." Four manners in which arches to be infilled including addition of brick piers and pilasters. (See Volume II, Figure 27.)
- Dec. 29, 1941 Drawing. Structural Steel for Reinforcing of Floor Above Spaces 19A-B1, 19A-B9, and 19A-B15; Building No. 19; Hill Shops (No. SA 13390). Brick pilasters added to PW8 and PW9.
- Jan. 1, 1942 Drawing. Alteration to Doors; Building No. 19; Hill Shops (No. SA 13397). Door schedule including four of the present fire doors at PW3 and PW7. Door types include:
- Rolling steel door with wicket door at PW7, first story.
 - 3-ply lab. tin clad incline slide door at PW3 first story and PW7 second and loft stories.
- It is assumed that PW5 (fire wall) was erected at this time and a tin-clad incline fire door installed at the first through the loft stories. Likewise, the remaining two fire doors on PW3 were probably installed at the same time. (See Volume II, Figure 29.)
- May 10, 1955 Drawing. Preliminary Sketch, Proposed Renovation and Rehabilitation of Building 19 for Property Division, Armory Square (No. PM 666). Possibly unfulfilled proposal including installing fire doors at PW3 and PW5 at the first through the lofts stories, and at PW7 at the second and loft stories. May have made some alterations to existing fire doors.
- 1943 to 1961 Drawing. Building 19, All Floors (No. SA 13305). (See Volume II, Figure 34.)

FRAMING

(See Volume II, "Framing," Figures 144-173.)

A. Existing Appearance

The description of framing begins with the roof framing, followed by the loft-story floor framing, and continues with the second-story floor framing and the first-story floor framing at the basement. The roof framing consists of fifty-six (56) queen-post trusses. The loft-story floor framing consists of this truss system with the additional support of square wooden posts that were presumably placed sometime during the late-nineteenth or early-twentieth centuries as indicated by the use of wire nails. The second-story floor framing features original wood beams, augmented by a structural steel system that was introduced in the early 1940s. The system supporting the first-story at the basement (bays 109-110) is formed-concrete construction introduced in ca. 1937.

* * *

Roof Framing

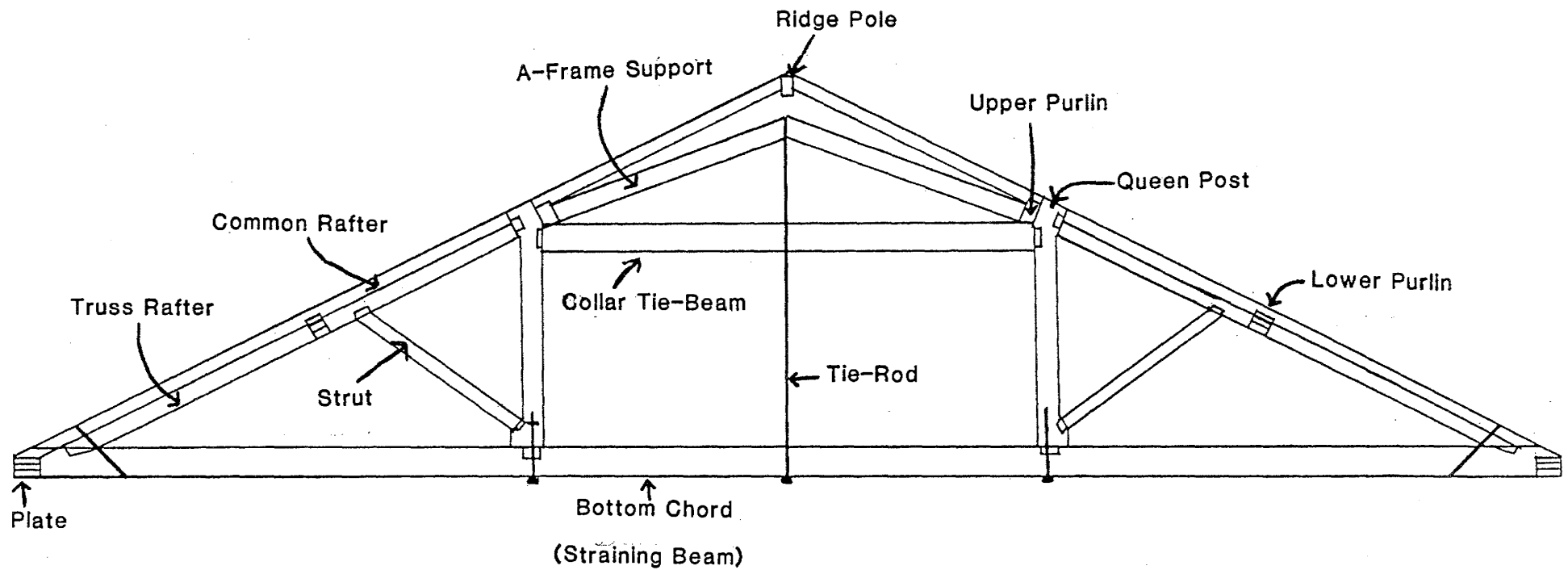
The roof framing may be identified as a queen-post truss system. The features of this framing include the following: bottom chords, queen posts, collar tie-beams, truss rafters, struts, A-frame supports for the center tie-rods, center tie-rods; purlins; plates; common rafters; and ridge poles. Each of these features is described below. (See illustration on page 160.)

Bottom Chord: The bottom chord (straining beam) spans the width of Building 19 and provides the base for the truss. There are fifty-six (56) extant within the building (one per truss). They are positioned approximately 12-1/2' apart, defining the fifty-eight (58) bays of the building, along the east/west axis. The chord is an integral part of each truss, upon which all the other members sit or are tied.

At the south and north walls the ends of the chord rest on wooden cushions (6" high x 1' wide x 2' long). These cushions sit atop a 3'3-1/2" wide brick pier located between each bay of second-story walls; long, iron, tie-bolts travel through the cushion, chord, and truss rafter tying timbers together at the eaves.

Queen Posts: There are two queen posts per truss. These queen posts are situated approximately 18' apart, defining the center aisle. The queen posts provide the vertical support for the truss and into them major features of the truss are framed or tied including the truss rafter, collar tie-beam, and strut (if present). Each queen post is shouldered at its upper end to receive the truss rafter and lower end to receive a strut. Each queen post is bolted to the

QUEEN-POST TRUSS



Building 19 - Long Storehouse and Stables, SPAR NHS, framing. Annotated by J. Quinn, 11/1/91, from original drawing dated to 1866.

underside of the bottom chord with a tie-rod, nut, and washer of varying dimensions and configurations.

Struts. Only the truss systems in LSHI and LSHII feature struts. The struts are mortised and tenoned to the shouldered base of the queen posts and to the truss rafters. They assist in supporting the truss rafters and in turn are supported by the queen posts.

Iron Stirrups. In LSHI and LSHII, iron stirrups (2-1/4" wide x 1'9" high from the finished floor) are secured on the east and west sides of the queen posts. They pass through the floorboards and loop around the bottom chord below.

Collar Tie-Beam: The collar tie-beam is framed crosswise between the queen posts. There is one collar tie-beam per truss, mortised and tenoned into the queen-post's upper end. These beams are 18' in length, spanning the center-aisle. They assist in supporting the upper purlin.

Truss-Rafters: There are two truss-rafters (principal rafters) per truss positioned on an incline along the south and north slopes of the roof. They are mortised and tenoned into the queen posts and bottom chord. The truss rafters support the lower purlin that in turn aids in supporting the common rafters.

A-Frame Support for Center Tie-Rod: The A-frame support is essentially a frame-within-a-frame from the upper purlin to just below the roof peak. It appears to have been specifically included to support the center tie-rods. It consists of two timbers that are mortised and tenoned into the upper purlins at their lower ends and butted to one another at their upper ends. The center tie-rod travels through its peak and is bolted on a flattened surface at the peak of the A-frame.

Center Tie-Rod: Each truss has an iron tie-rod centered between its queen posts. This tie-rod is bolted at the upper flattened surface of the A-frame support as noted above and to the underside of the bottom chord, passing through both features and the collar tie-beam along its path.

Purlins: There are two purlins--an upper and a lower--placed horizontally along each slope. The upper purlin is mortised and tenoned into the collar tie-beam and the A-frame support. The lower purlin is mortised, tenoned, and pegged to the truss rafters. Two pegs are used.

Plate: The wall plate rests on the top of the south and north walls. Running west/east, it rests on a bed of mortar atop

the brick wall. The bottom chord ties into the plate. The timbers composing the plate are each one-bay long.

Common Rafters: These common rafters are laid on the incline of the roof. They are in two sections per slope with their seams alternating between the lower and upper purlins at every other rafter. There are generally six rafters per slope. They rest on, and are toe-nailed to, the purlins with cut nails. They appear to be toe-nailed to the ridge pole, as well. At the eave they are mortised into the plate and were designed to lap over the brick wall.

Ridge Pole: The ridge pole stretches the length of the building at the peak of the roof. It is the timber against which the common rafters pitch and are toenailed. A section of the ridge pole generally spans a little more than two bays. At the endwalls and PWs, the ridge pole sets into the masonry wall.

West Addition, Roof Truss
SPACE 19D1

Quantity: Seventeen (17) queen-post trusses.

Truss Numbering System: "19D1" to "19D33", west to east; stencilled in white on the west side of the collar tie-beam, at the south end.

Features: Bottom Chord; Shouldered Queen-Posts; Collar Tie-Beam; Truss Rafters; A-Frame Support for Center Tie-Rod; Center Tie-Rod; Common Rafters; Purlins (lower and upper); Plate; Ridge Pole.

Timber Milling: Circularly sawn, with chamfers. (Field observation in the West Addition suggested that there may be several species of wood used in the construction of the truss. Wood samples were taken but require laboratory analysis.)

Structural Variations: There are no iron stirrups tying the queen posts to the bottom chords. In addition, there are no struts extending from the queen posts to the truss rafters.

Hardware: The center tie-rod bolt at underside of loft floor consists of a square nut, round washer plate, and threaded tie-rod; queen-post ties at the underside of the loft floor consist of a square nut and rectangular washer plate.

Dimensions: Bottom Chord
13" high x 9" wide

Queen Posts

9-1/2" to 9-3/4" wide x 7-1/2" long

Collar Tie-Beams

12" high x 8" wide

Truss Rafters

12-1/2" high x 8" wide

A-Frame Support for the Center Tie-Rod

8" high x 7" wide

Center Tie-Rod

4-1/2" circumference

Purlins

10" high x 7" wide

Plate

9-1/2" high x 10" wide

Common Rafters

5-3/4" high x 3" wide

laid on-center 25-1/2" to 26"

Ridge Pole

not measured

Alterations:

Truss 19D1 (south slope). The joint of the wall plate, bottom chord, and truss rafter has been reinforced with a metal suspension rod.

Truss 19D3 (south slope). The joint of the wall plate, bottom chord, and truss rafter has been reinforced with a riveted metal plate.

Trusses 19D3 (north side) and 19D7 (south slope). The queen posts at these locations have been altered. A new wood support, diagonally placed, has been introduced between the queen post and collar-tie beam. The queen post has been notched-out to provide a shelf for the support to rest upon. (Appears to function like a strut.) An iron-strap ties the queen post, truss rafter, and collar tie-beam.

Between Trusses 19D7 and 19D9. Rafters and the ridge pole have been altered in this area due to the removal of the original ventilator.

Between Trusses 19D27 and 19D29. Rafters and the ridge pole have been altered in this area due to the introduction of a new ventilator.

Between Trusses 19D29 and 19D31 (south slope). Rafters have been altered in this area due to the introduction of an elevator at bay 30.

Long Storehouse II, Roof Truss
SPACE 19D37

Quantity: Fifteen (15) queen-post trusses.

Truss Numbering System: "19D37" to "19D63," west to east; stencilled in white on the west side of the collar tie-beam, at the south end.

Features: Bottom Chord; Shouldered Queen-Posts; Collar Tie-Beam; Truss Rafters; Struts; A-Frame Support for Center Tie-Rod; Center Tie-Rod; Common Rafters; Purlins (lower and upper); Plate; Ridge Pole.

Timber Milling: Vertically-sawn timber, with some chamfered edges.

Hardware: Center tie-rod bolt at underside of loft floor consists of a octagonal nut and flared rectangular washer plate; queen-post ties at the underside of the loft floor consist of a square nut and flared rectangular washer plate.

Dimensions:

- Bottom Chord
13" high x 8" wide
- Queen Posts
10" wide x 7" long
- Collar Tie-Beam
11-1/2" high x 7-3/4" wide
- Truss Rafters
12" high x 7-3/4" wide
- Struts
6" high x 8" wide
- A-Frame Support for Center Tie-Rod
7-3/4" high x 8" wide
- Center Tie-Rod
4-3/4" circumference
- Purlins
10" high x 7" wide
- Plate
10" high x 10" wide
- Common Rafters
6" high x 3" wide
laid on-center 25-1/2" to 26"
- Ridge Pole
not measured

Alterations: Between Trusses 19D59 and 19D61 (south slope). The lower purlin has been replaced with a used timber; an iron strap placed here wraps around the top of the truss rafter. In addition, in bay 60, rafters from the upper purlin to the eaves are different from the typical. They feature a square groove, centered along their length.

Between Trusses 19D61 and 19D63 (south slope). Rafters have been altered due to the introduction of an elevator at bay 62. Two side rafters of the bay were maintained. The other rafters from the plate to the upper purlin were removed to accommodate the elevator.

Truss 19D63 (north slope). Strut missing. It appears to have been sawn-off at the truss rafter and pulled-out at the queen post.

Long Storehouse I, Roof Truss
SPACE 19D67

Quantity: Fifteen (15) queen-post trusses.

Truss Numbering System: "19D67" to "19D95," west to east; stencilled in white on the west side of the collar tie-beam, at the south end.

Features: Bottom Chord; Shouldered Queen-Posts (with iron stirrups); Collar Tie-Beam; Truss Rafters; Struts; A-Frame Support for Center Tie-Rod; Center Tie-Rod; Common Rafters; Purlins (lower and upper); Plate; and Ridge Pole.

Hardware: Center tie-rod bolt at underside of loft floor consists of a square nut and a rectangular washer plate; queen-post ties at the underside of the loft floor consist of a square nut and rectangular washer plate.

Timber Milling: Vertically-sawn timber, with very random-tooled edges. The tooled edges were presumably made with a draw-knife. They are crude and when they do exist, often they do not extend the full-length of the timber.

Dimensions:

- Bottom Chord
12-1/2" high x 8" wide
- Queen Posts
9-1/2" to 10" wide x 7-1/2" to 8" long
- Collar Tie-Beam
12" high x 7-1/2" wide
- Truss Rafters
12" high x 8" wide
- Struts
5-3/4" to 6" high x 8 to 8-3/4" wide x 7'6" long
- A-Frame Support for Center Tie-Rod
8-1/2" to 9" high x 7" wide
- Center Tie-Rods
4-3/4" circumference
- Purlins
10" high x 6-1/2" wide

Plate

10" high x 10" wide

Common Rafters

6" high x 3" wide

laid on-center 25-3/4" to 26"

Ridge Pole

not measured

Alterations: No alterations to the framing in this section were noted during the existing appearance survey.

Stables, Roof Truss

SPACE 19A-D1

Quantity: Nine (9) queen-post trusses.

Truss Numbering
System:

"Sec. 97" to "Sec. 113," west to east; stencilled in white on the west side of the collar tie-beam, slightly off-center towards the north.

Features:

Bottom Chord; Shouldered Queen-Posts; Collar Tie-Beam; Truss Rafters; A-Frame Support for Center Tie-Rod; Center Tie-Rod; Common Rafters; Purlins; Plate; Ridge Pole.

Timber Milling:

Circularly-sawn timber, with random-tooled edges. The queen posts appear to have been planed and do not feature tooled edges. The tooled edges presumably were accomplished with a draw-knife.

Structural
Variations:

There are no iron stirrups tying the queen posts to the bottom chords. In addition, there are no struts extending from the queen posts to the truss rafters.

Hardware:

Center tie-rod bolt at underside of loft floor consists of a square nut and square washer plate; queen-post ties at the underside of the loft floor consist of a square nut and rectangular washer plate.

Dimensions:

Bottom Chord

12" high x 8" wide

Queen Posts

9-1/2" wide x 7-1/2" long

Collar Tie-Beam

12" high x 8" wide

Truss Rafters

12" high x 8" wide

A-Frame Support for Center Tie-Rod

8-1/2" high x 9" wide

Center Tie-Rod
4-1/2" circumference
Purlins
10" high x 7" wide
Plate
10" high x 10" wide
Common Rafters
6" high x 3" wide
laid on-center 26"
Ridge Pole
not measured

Alterations: Between PW7 and Truss Sec. 97 (north slope). Rafters have been altered in this area due to the introduction of an elevator at bay 97.

Truss Sec. 97 (north slope). The joint of the wall plate, bottom chord, and truss rafter has been reinforced with a riveted metal plate. This repair is similar to that found in truss "19D3" of the West Addition.

Between Trusses Sec. 105 and Sec. 107. At bay 106, there has been some alteration to the rafters. Two new sistered rafters have been introduced in between existing rafters and an existing rafter has been sistered with new wood.

Between Trusses Sec. 109 and Sec. 111. Rafters and the ridge pole have been altered in this area due to the removal of the original ventilator.

* * *

Loft-Story Floor Framing

The framing of the loft floor is nearly as consistent a system as the roof framing, varying little from the west to the east ends of the building. It consists of posts, the bottom chords of the roof truss, and joists, as follows:

Posts. Pairs of square wooden posts flank the center aisle defining bay divisions and assist in supporting the bottom chords that in-turn carry the joists. The majority of the posts rest on wooden pads secured to the floor. The posts are toe-nailed to the bottom chord at their upper end and to a floor pad at their lower end.

Bottom Chord. The ends of the bottom chord rest upon and are tied into a curved wood cushion (6" high x 1' wide x 2' long) that sits on 3'3-1/2" wide brick pilasters located between each bay at the north and south walls. Long iron tie-rods pass through the cushion, bottom chord, and truss rafter above tying the timbers together at the eaves.

Joists. Joists are carried by the bottom chords and consequently run west/east. They are generally cupped on the ends and mortised into the beams. The joists stop short of the south/north walls, leaving a gap of approximately 8 to 9 feet on each side. The span of the joists consist of three zones, corresponding somewhat to the south, center, and north bays. The center zone of floor framing is generally older than the side zones.

Subtle variations exist between the different phases of construction in the dimensions, milling, and finishing of timbers; spacing between joists and posts; the details of the placement and raising of joists; and the size of gaps between the floor and walls.

West Addition (Bays 1-36), Loft Floor
SPACE 19C1

Allowable Loads: A sign suspended on the framing at the entrance to SPACE 19D1 at the loft reads:

Allowable Floor Loading **60 LBS. PER. SQ. FT.**
Uniformly Distributed...By Order of the Post Engineer.

Plan: The floor framing between bays 1-15 is twenty-one (21) joists wide. Between bays 17-35 the floor framing is twenty-six (26) joists wide. There is a 9' gap in flooring on the south side and on the north side a 16' gap extends only from bay 1 to bay 17. Bay 30 is punctuated by an elevator shaft, while bay 36 is pierced by a stairway.

Posts: A double battery of seventeen (17) posts flank and define the center aisle. They are generally 5-3/8" square. The posts sit on floor pads that are 3' long x 9-1/2" wide x 1-3/4" deep. There is some variation in the posts at the following locations:

Posts 1 through 3 (south and north)

They are slightly larger at 8-1/2" square.

Posts 6 (south and north)

The post measures 7-3/4" long x 5-3/4" wide. The pad is larger than the other pads at 3'4-1/2" long x 11-1/2" wide x 2" deep.

Bottom Chord
of Truss:

The seventeen (17) bottom chords of the truss system support the joists. The chord runs south/north and is 13" high x 9" wide. At the west end (south and center bays) to accommodate the lack of a bottom chord adjacent to the wall, makeshift supports have been introduced and a beam set across. Six (6) newer joists (without finished flooring) have been introduced at the south bay directly in

front of the semi-circular arched window. The center arch has the same arrangement, but features wood floorboards extending the floor to the wall.

Joists:

Center Bay. Twenty-six (26) joists run west/east. The joists are 10-1/2" high x 2-3/4" to 3" wide x approx. 13'8" long (spanning a bay in length). They are laid 31" on center. The joists feature circularly-sawn surfaces with cupped ends cut to hang on the bottom chord. Some have chamfered edges.

South and North Bays. Six (6) joists are extant on either side of the center bay of joists. They are laid 15" to 17" on center and are toe-nailed to the bottom chord. They do not feature a cup at their joint end like the center-bay joists. The side joists appear newer and consist of varied woods and mill treatments. They are not chamfered. These joists only serve a single thickness of floor above.

Long Storehouse II (Bays 37-66), Loft Floor
SPACE 19C37

Allowable Loads: A sign suspended on the framing at the entrances to SPACE 19D37 at the loft reads:

Allowable Floor Loading **60 LBS. PER. SQ. FT.**
Uniformly Distributed...By Order of the Post
Engineer.

Plan: The floor framing consists of twenty-six (26) joists, laid west/east. The gap in flooring on the south is 8'10" wide, while that on the north is 8'8" wide.

Posts: There are fourteen (14) pairs of posts that flank each side of the center aisle, defining the bays. The bottom chord adjacent to the west wall does not feature any posts. The floor pads serving the posts are 3' long x 9-3/4" wide x 1-1/2" deep. They feature circular saw marks. There is some variation in the posts, as follows: (The posts are consecutively numbered west to east.)

Posts 1 (south)

It is 6" square and circularly sawn. Its floor pad is not circularly sawn, however.

Posts 2 through 8 (south and north)

These posts are 5-1/2" square, vertically sawn and planed.

Posts 9 through 14 (south and north)

These posts are 8" square, vertically sawn, and

not planed.

Posts 10 and 11 (south)

A round tie-rod is extant at posts 10 and 11. The rod stretches from floor to floor and is secured with square washers and square nuts. The posts lack a floor pad due to the intervention of the tie-rods.

**Bottom Chord
of Truss:**

There are fifteen (15) chords that carry the loft floor joists. The chord is 13" high x 8" wide. Along the third chord from the west, a row of cut nails at the center aisle suggests there might have been a partition wall at one time.

Joists:

Center Bay. The center bay consists of fourteen (14) older joists. Six (6) newer joists are found on either side of the center bay. The joists span a bay in length (12-1/2'). The center-bay joists are 9-3/4" deep x 2-3/4" to 3" wide. They are laid 31-1/2" on center and are vertically sawn and chamfered. In addition, they are shaved at their lower joint end creating a slight cup.

South and North Bays. The south and north bay joists are 9-3/4" deep x 2-3/4" wide and unchamfered. They are laid 32" on center. They are toe-nailed to the chords with wire nails. These newer joists rest on a wood strip affixed to the bottom chord, which raises the floor on either side approximately 1".

Long Storehouse I (Bays 67-96), Loft Floor
SPACE 19C67

Allowable Loads:

A sign suspended on the framing at the entrances to SPACE 19D67 at the loft reads:

Allowable Floor Loading **60 LBS. PER. SQ. FT.**
Uniformly Distributed...By Order of the Post
Engineer.

General:

Twenty-six (26) joists span across the width of the floor. No joists are extant at bay 96 where a stairway to the loft and first story intercedes. There is a 8'9" gap in the flooring on the south and north sides of the space.

Posts:

There are fourteen (14) posts on the south and thirteen (13) posts on the north (the easternmost post is missing). The posts are 8" square. The posts are nailed into the chord at their upper end and to a floor pad at their lower end. The posts are vertically sawn.

Each post sits on a pad that is 3' long x 9-3/4" wide x 1-3/4" deep. The pads are nailed with large round-headed nails. A larger pad is extant at post 12, north. Its dimensions are 3'6" long x 5-1/2" high x 7-1/2" wide.

Bottom Chord
of Truss:

The fifteen (15) bottom chords of the truss system support the joists. The chord runs south/north and is 12-1/2" high x 8" wide. Carpenter marks are visible on the chords in the form of an "x" where the pockets for the joists were to be cut.

Bottom Chords 12 and 13

The bottom chords at these bays have been altered. A new beam (14" high x 8" wide) has been introduced beneath the old extant chord. The south/north wood cushions on the brick pilaster between the windows have been removed and the composite beam of old and new travel directly into the pilaster. New brickwork is evident around point of entry. The new beam is vertically sawn, without chamfers. The posts were cut-down to accommodate the beam. Wood braces have been introduced to insure the tie of the older beam to the truss rafter.

Joists:

Center Bay. Fourteen (14) joists, running west/east, are located in the center bay. These joists are 10-1/4" high x 3-1/4" wide and laid on-center between 30-1/2" to 31-1/2". They span a bay in length, approximately 12'4". The joists are vertically sawn and exhibit chamfered edges. They are mortised and tenoned into the bottom chord and their ends have been shaved on the underside creating a cup shape before entering the chord.

South and North Bays. Six (6) joists are on either side of the center bay. These joists are constructed of reused wood, therefore they vary in dimension and surface treatments. Two strips of wood, 5-1/2" high x 1-1/4" wide, are nailed to the bottom chord. These boards expand the width of the chord. The joists lap over this nailer that is toe-nailed into the chord. At the east-end chord, a nailer has been introduced on the east side to carry the floor to the wall. New infill joists, spanning approximately 1' have been laid. The joists are not chamfered and are shorter and wider than other joists in the space.

Stables (Bays 97-116), Loft Floor
SPACE 19A-C1

Allowable Loads: A sign suspended on the framing at the entrance to SPACE 19A-D1 at the loft reads:

Allowable Floor Loading **60 LBS. PER. SQ. FT.**
Uniformly Distributed...By Order of the Post
Engineer.

General: Twenty-four (24) joists span the width of the floor. The floor-to-wall gap on the south side of the building is 9' wide, while that on the north is 8'8" wide.

Posts: There are ten (10) pairs of posts that flank and define the center aisle. The tenth pair (i.e., closest to the east wall) does not relate to the truss system. The wooden posts are generally 6" square. There is some variation in the distance between posts and the type of wood, dimensions, and milling.

Posts 4, 5, 7, 8, 9 (south and north for each)

Iron tie-rods have been bolted to beam for the support of the second-story floor and the top of the trusses' bottom chord. These tie-rods are located in front of the posts, facing the center aisle. Ten tie-rods are extant.

Post 9 (south)

This post has an added wood section between top of post and chord. The section is bolted to the chord with four bolts.

Bottom Chord
of Truss:

The joists are framed into the nine (9) truss system bottom-chords, except for a beam adjacent to the east wall. This east wall beam is not related to the truss system. The beam does not rest on a cushion, but directly atop the pilasters. It is in three sections with a seam at the south and north posts. The sections are nailed together.

Joists:

Center Bay. Eighteen (18) joists support the loft-flooring in the center bay. These joists run west/east and are 9" high x 3-1/2" wide. They are laid 20" on center. Each joist spans a bay, approximately 13'3". They are notched and nailed to the chord. Both joists and joist supports appear to have been treated with a clear coating. The joists are constructed of vertically-sawn timber and are not chamfered. On either side of the chord, boards have been introduced (5-1/4" high x 1-1/2" wide x varying lengths), serving as nailers. The joists of bays 115/116 are slightly different. Since the beam is not as high as

the chord, the joists are not as deeply notched.

South and North Bays. Three (3) joists on each side support the flooring that is laid south/north. The details of these joists were not recorded.

* * *

Second-Story Floor Framing (Structural Steel)

General: The floor framing and structural steel system found supporting the second floor is basically consistent from west to east. There is some variation in the Stables due to the introduction of the vehicular passageway and garage. This variation to the typical system will be described below under the separate heading of "Stables." Bethlehem structural steel is found throughout.

West Addition, LSHII, and LSHI (Bays 1-96), Structural Steel SPACES 19B1, 19B13, 19B25, 19B51, 19B67, 19B83

Allowable Loads: A sign suspended on the framing at the entrances of the second-story spaces reads:

Allowable Floor Loading **400 LBS. PER. SQ. FT.**
Uniformly Distributed...By Order of the Post
Engineer.

General: There are three major elements to the structural steel system in this area, as follows:

Center-Aisle Columns; Wood Beams; Channel Beams

Steel I-beam columns flank the center aisle (referred to as center-aisle columns). They carry double wood beams running west/east. These wood beams are sistered with steel channel beams bolted to steel column capitals.

Side Columns; I-Beams

Steel I-beam columns are located at the approximate mid-point between the center-aisle column and the exterior wall (referred to as side columns). They carry a single steel I-beam running horizontally west/east to support joists in the zone between the south/north walls and the center aisle.

Steel Joists

Steel joists run south/north between each side

and center-aisle column.

Numerous mechanical systems are affixed or appended to the structural steel system and to the wood joists. Alterations to the west end of the building have obscured some of the structural steel system with suspended ceilings and acoustical panels.

Columns:

Center-Aisle Columns. These columns are 8" long x 6-1/2" wide x 3/8" thick. They feature a flared or trapezoidal capital, consisting of two steel plates riveted (with ten rivets each) to the top of the column at its west/east sides. They are designed to carry a load wider than the column. The width of the capital at the top is 21-3/4". At the floor level, the columns are set into the concrete covering.

Side Columns. The side columns are 8" long x 6-1/2" deep x 3/8" thick.

Beams:

Wood Beam Units. Two wood beams are supported by the center-aisle columns. These beams constitute a unit and run west/east. Each beam is 14-3/4" high x 5-1/2" wide. The beams display a 3" long x 1-1/2" wide wood shim, acting as a tie and a spacer every four feet or so on the under side of the beams.

Steel Channel-Beams. These beams sister with their flat side the wood beams. They are located on the south/north sides of the wood beam unit. They are 14" high x 3-1/2" wide. Seams are featured at every two bays. The butt-jointed seams, are augmented by riveted plates that are bolted to the wood beam unit by bolts that travel south/north through the wood and steel channel-beams.

Padding for Center-Aisle Beam System. Wood pads rest on the steel channel beams and wood beam unit, cushioning the joists above. A 1-1/4" board separates the channel beam from the wood beam unit, providing a side cushion.

I-Beams. The I-beams are supported by the side columns. They run west/east and are 16" high x 8" wide. The I-beams are bolted to the top of the column with four bolts. There is a seam every two bays. The butt-jointed seams are augmented by riveted plates, featuring eight rivets. A wood pad, 3-3/4" high x 7-1/2" wide lies on top of the beam acting as a cushion for the joists above.

Joists:

I-Beam Joists. The I-beam joists are supported by the center-aisle and side beams. They run south/north and are 3-1/2" square.

Wood Joists. The wood joists are supported by the center-aisle and side beams. They run south/north like the I-beam joists. They are in three sections--corresponding with the south, center, and north bays--that span the width of building. They rest on top of the steel channel beams at the center aisle and they sit on a brick ledge at the north and south walls. They are inserted between short pilasters built at the ledge. The joists vary between the various building parts, as follows:

West Addition

The joists are 11-3/4" high x 3" wide. They are laid 17-1/2" on-center. They feature vertical saw marks and are chamfered along their lower edges.

Long Storehouse II

The joists of LSHII are 12" high x 3-1/2" wide. They are laid 17" to 18" on-center. They are sawn and are chamfered along their lower edges.

Long Storehouse I

The joists of LSHI are 7" high x 3" wide. They are laid 17-1/2" on-center.

Additional
Support:

Several elements were introduced into the brick walls to help support the extra weight of the steel system. They consists of end piers added to center bay of partition walls to carry the wood beam and steel channel-beam units and pilasters added to the center of infilled arches to carry the side I-beams.

End Piers

Located at PW1, PW2, PW4, PW5, PW6.

Pilasters

Located at PW3, PW4, PW6, PW7.

Framing at Former
Hatches:

At the locations of former hatches, the framing varies from the typical framing, as follows:

Bays 51/52 and 65/66

The former rectangular hole (8' long x 5" wide) is framed by larger timbers. Two west/east timbers are pegged to the regular joists. They mark the original sides of the hatch opening. Five short joists now fill the former hatch opening between the two west/east timbers.

Bays 92/93

The former rectangular hole (10' long x 5' wide) is framed by larger timbers held together with iron straps. Five iron south/north joists are inset in the area. Iron angle-bars reinforce and replace the west/east timbers.

Stables (Bays 97-116), Structural Steel

SPACE 19A-B15, SPACE 19A-B9, SPACE 19A-B1

Allowable Loads: A sign suspended on the framing at the entrance of SPACE 19A-C1 at the second story reads:

Allowable Floor Loading 180 LBS. PER. SQ. FT.
Uniformly Distributed...By Order of the Post
Engineer.

General:

The primary difference between the structural steel system in this section of Building 19 consists of large I-beams sistering original wood beams and the lack of selected support columns. The alteration to the general plan reflects the function of those spaces as a vehicular passageway and garage. Support columns would have interfered with the free flow of vehicles through those bays. To compensate for the lack of support columns, large I-beams were utilized. There is no center aisle orientation in the Stables.

Wood Joists. Since much of the ceiling of the Stables is covered, not all the joists were visible. The joists of the Stables are 12" high x 3" wide. They are laid 19-1/2" to 20" on-center. They rest on the steel beams and brick ledge of the walls. The joists span a bay and rest side by side on the beams, presumably they are secured in some way. The joists feature circular saw-marks and are painted grey at bays 98, 100, and 102.

Bays 97-102:

No steel support columns are extant. The original double west/east wood beams are reinforced with large square plates bolted to the underside of the wood beams. The I-beams are of 1/2" steel measuring 2' high x 9" wide at top and bottom. Wood spacers, every 6 to 7 feet, keep the beams consistently 2'2-1/2" apart. Spacers are toe-nailed to the underside of the joists. Tie bolts are used to tie the I-beams together at each wood spacer. The I-beams are supported at PW8 and PW9 by specially added brick pilasters. Pilasters were added to both sides of PW8 and the east side of PW9 to carry the steel framing.

Bays 103-108:

The structural steel framing in these bays is identical to that found in bays 97-102 (described above) with no steel

support columns and large I-beams sistering the original wood beams. However, the installation of a galvanized sheet metal ceiling obscures most of the framing.

Bays 109-116:

The structural steel system as found in the West Addition, LSHII, and LSHI is resumed in these bays. Center-aisle columns are extant, however no side support columns exist. The columns carry steel channel-beams sistering the two original wood beams that run west/east. Joists in these bays are obscured by suspended ceilings.

* * *

First-Story Floor Framing (Basement Concrete and Steel)

General:

The survey of the basement was restricted by limited access to the space, therefore the details of the structural system were not recorded and will not appear here. Some general notes were made, however.

The system consists of a grid of formed-concrete beams and concrete columns that together support the first-story concrete floor in the Stables. The floor and its structure date to the same time. Each feature will be described below.

Concrete Beams:

Six (6) beams extend across the space running south and north. The westernmost beam is in line with the west wall of the space. The other five (5) south/north beams are more or less equally spaced. These south/north beams are intersected by two (2), equally spaced, west/east beams. The beam and concrete floor thickness is 2'2" and the beam is 1'4" wide. The beam is exposed in the basement for only 1'11". According to historic drawings the beams are supported by steel stirrups that tie them into the concrete floor above.

Concrete Columns:

There are formed-concrete columns where the beams intersect, as follows: two (2) at the west wall and two (2) at every other beam, making a total of six (6) columns. The columns are 12" x 16" and sit on 4'6" square footings.

B. Original Appearance of Framing

Roof Framing:

Queen-post truss system, consisting of 56 trusses.

Long Storehouse I and II similar in the details of the truss systems, including vertically-sawn timber, struts,

and iron-stirrups. Slight variation in the bolt nuts and washers, however.

West Addition and Stables similar in the details of their truss systems, including circularly-sawn timber, and not struts or iron-stirrups. Variation in the bolt nuts and washers employed in the two phases of construction.

Tooling of timber varied throughout.

Loft-Story
Floor Framing:

Exact original configuration unknown. Theoretically, loft floor supported by roof truss and iron tie-rods and stirrups.

Center fourteen (14) joists and eighteen (18) foot wide floor above. Original floor of Stables may have been wider. Joists ran south/north.

Second-Story
Floor Framing:

Exposed structural system. Exact configuration unknown but presume wooden (west/east) cross beams supported by cast-iron columns as per 1846 estimate, one column per bay.

Framing interrupted at PW 1, 2, 4, 5, and bay 91-92 for hatches in the floor.

First-Story
Floor Framing
at Basement:

Exposed structural system. Exact configuration unknown but presume eight 7" diameter cast-iron columns with brick base carrying double wood beam, as indicated in surviving drawing from ca. 1937 alterations (Drawing No. SA 10004).

C. 1968 Appearance of Framing

Roof Framing:

Removal of original ventilators and installation of copper ventilators altered rafters and roof sheathing at bays 27-28, 47-48, 69-70, and 89-90. The introduction of the elevators at bays 30 (ca. 1942), 62 (ca. 1935), and 97 (ca. 1942) impacted the framing in those areas.

Repairs to framing at the west and east ends of the building as noted in "Existing Appearance."

Loft-Story
Floor Framing:

Original width of loft floor widened to 36' by adding six joists to each side (south and north) in West Addition, LSHI, and LSHII and adding just three joists to each side in the Stables. All new framing nailed with wire nails.

Square wooden posts supporting loft floor not original. Date of introduction unknown. Function, to support floor. Toe-nailed to bottom chord. Rest on wooden pads (except at Stables).

Second-Story
Floor Framing:

Exposed structural system. Structural steel replaced cast-iron columns and bolsters wood cross beams and joists. West Addition, LSHI, and LSHII in ca. 1940. Stables in ca. 1941.

For additional support bick piers, pilasters, and some infill in partition wall arches introduced at time of steel system.

First-Story
Floor Framing
at Basement:

Formed concrete beams and concrete columns supporting concrete floor. A drawing does exist dating to the introduction of the system. Unfortunately, it was not possible to reproduce it for the draft of this report. It is suggested that the drawing be referred to in the SPAR collections.

D. Historic Sources for Framing

no date
ca. 1866

Drawing. No title (NHSD 128). Proposed alteration to Long Storehouse raising middle bays one story. Sketch of a roof truss is found on the reverse of this drawing. (See drawing in the "Existing Appearance" part of this section. It is traced from the drawing mentioned here.

April 20, 1909

Drawing. Long Store House Floor Plan ... Storage Rooms, 51-59 (SA 268). Includes small drawing of a roof truss in top right corner; details are not accurate. (See Volume II, Figure 21.)

Oct. 9, 1916

Drawing. Long Storage House Floor Plans. (No. SA 1675). Includes a small drawing of a roof truss in top right corner; details are not accurate. (See Volume II, Figure 22.)

March 15, 1935

Drawing (revised 1937). Alterations to Floors and Doorways; Stables; Building No. 19A; Hillshops (No. SA 10004, Sheet 1 of 2; and SA 10004A Sheet 1 and 2 of 2).

Dec. 28, 1936

Drawing (revised 1937). Steel Schedule; Alterations to Floor; Stables; Building No. 19A; Hill Shops (No. SA 10004-B). (See Volume II, Figure 25.)

Nov. 1, 1940 Drawing. Structural Steel, Reinforcing Floor "B" of Building No. 19, Hill Shops (No. SA 13243, Sheet 1 and 2 of 2). (See Volume II, Figure 27.)

Dec. 29, 1941 Drawing. Structural Steel for Reinforcing of Floor Above Spaces 19A-B1, 19A-B9 and 19A-B15; Building No. 19; Hill Shops (No. SA 13390).

Jan. 4, 1954 Drawing. Alterations to West End of Building No. 19 for Electric Sub-Station (No. PM 585). (See Volume II, Figure 32.)

June 1960 Drawing. Radiographic Inspection Lab - Bldg. 19, Plans, Elevations, Sections, and Details (No. 35-51-01). (See Volume II, Figure 33.)

Sept. 30, 1960 Drawing. Modification of Basement Area, Building 19, Springfield Armory (No. PM 814). (See Volume II, Figure 34.)

FLOORING

(See Volume II, "Flooring," Figures 174-179.)

A. Existing Appearance

The description of flooring commences with the first story, followed by the second and the loft floors, and concludes with the basement. Each story of flooring (except for the basement) is discussed from west to east by construction phase; i.e., West Addition, Long Storehouse II, Long Storehouse I, and Stables. The basement is discussed generally, without any demarcation of space. Because the first story and basement feature such a variety of flooring materials, the sections have been organized according to flooring type. On the second and loft stories, the flooring is consistently wood; therefore, the organization is by material, dimensions, fasteners, design, and variations to the design.

* * *

First Story

West Addition (bays 1-36), First Story SPACE 19B1, SPACE 19B13, SPACE 19B25

General:	The general treatment for the West Addition, first story is poured concrete paving that flanks a center aisle of asphalt paving.
Concrete:	Concrete is the general treatment throughout bays 1-12, with the exceptions noted below. The concrete is dark grey. Concrete paving is found along the side bays of bays 12-36. Expansion joints are not visible.
Linoleum Squares:	Linoleum squares cover the classrooms located in the northwest corner of the building (bays 1, 3, 5).
Ceramic Tile:	Ceramic tile finishes the floor in the men's lavatory (bay 9). The tile is buff and rust colored.
Asphalt:	Asphalt paving with large black aggregate is found covering the central corridor from PW1 to PW3. The central corridor paving is 9'6" wide and is slightly raised in a mound effect from the side bays.
Plywood:	Located on the north, from bays 16 through 30, is a 3/4" plywood floor that appears to cover concrete. The plywood is built on a raised frame, 1-1/2" high.
Brick & Sandstone:	Visible around the piers at the opening of PW3 is a sandstone sill with its striated finish and several bricks,

probably former paving. The bricks are 7-3/4" long x 3-3/4" wide.

Long Storehouse II (bays 37-66), First Story
SPACE 19B37, SPACE 19B51

General: The general treatment of the first floor of LSHII is similar to that of the West Addition consisting of a central aisle of asphalt paving (8'6" wide) flanked by poured concrete on the south and north. The floor in LSHII seems to be about 1" higher than the floor in the West Addition.

Concrete: Large aggregate concrete extends up to the interior partition walls and the exterior wall brick piers and archway wood frames. It is level with the sandstone water-table on the south and north. The concrete floor appears to have been poured after the brick piers and pilasters were added to the partition walls as the concrete laps around these features. The concrete is not exceptionally smooth.

At each steel column, a 3' square concrete pad is delineated by expansion joints (seams made to facilitate expansion/contraction). Expansion joints also run across the floor from south to north at each bay.

Asphalt: The center-aisle asphalt features a rough finish.

Long Storehouse I (bays 67-96), First Story
SPACE 19B67, SPACE 19B83

General: The flooring of the first floor of the LSHI matches that of LSHII described above. A center aisle of asphalt paving is flanked by large aggregate concrete on the south and north. It is suspected, however, that some of the floor has been resurfaced. Expansion joints are not visible in bays 67-81 suggesting that they have been covered over. Expansion joints are visible in bays 83-95.

Stables (bays 97-116), First Story
SPACE 19A-B15, SPACE 19A-B9, SPACE 19A-B1

General: The entire Stables floor is covered in concrete. The concrete varies between two types, as follows: an asphalt concrete and a poured concrete.

Asphalt Concrete: The vehicular passageway in bays 97 through 102 displays

asphalt concrete. The floor, in the same, displays two expansion joints running west/east across the floor dividing it into three sections.

Concrete: The remainder of the Stables (bays 103 through 116) features poured concrete and no expansion joints. This concrete is smooth. In the space occupied by bays 103 through 108, a mechanical car lift has been introduced at the north end of the floor. In addition, a manhole is located near the southwest corner of the room.

Linoleum Squares: The concrete floors in two partitioned rooms of the Stables have been finished with linoleum tiles. These include the mechanic's office at bay 109 and the room in the northeast corner of the building where gardiner's equipment is maintained.

* * *

Second Story

The flooring on the second story is all wood flooring. The floorboards extend wall-to-wall. The West Addition and LSHII feature floors of a single thickness, while LSHI of a double thickness and the Stables of a triple thickness.

West Addition (bays 1-36), Second Story **SPACE 19C1**

Material: Pine boards (field observation, not verified).

Design: The floorboards run west/east. They feature tongue-and-groove seams and their lengths are butt ended.

Dimensions: The boards are random widths, measuring from 4-1/2" to 11-1/2" wide.

Fasteners: The boards are nailed with cut nails.

Variations: Narrower, tongue-and-groove flooring is found in front of the freight elevator at bay 30. This newer flooring is set into an area of older planks that were cut out; it forms an 18'4" wide x 10'4" long pad. The surfaces of the two floors are nearly flush. The individual boards are 3-1/4" wide.

Hatches: A raised hatch-like feature with door is located at bay 27. Wire mesh covers the small hole in the trap door. (May be a former vent.)

At PW2 and PW3 in the center aisle there were at one time, rectangular hatches accessing the first floor. These

hatches are recorded on the 1916 floor plan. Today, a metal plate marks the location of the former hatch at PW2. No evidence in the flooring marks the location of the former hatch at PW3.

Long Storehouse II (bays 37-66), Second Story
SPACE 19C37

Material: Pine boards (field observation, not verified).

Design: The boards are laid west/east. Their lengths are butt ended. The floorboards feature tongue-and-groove seams.

Dimensions: The boards are random widths, averaging between 7" and 12" wide. They generally extend from 12' to 16' long.

Fasteners: The boards are secured with cut nails.

Variations: Narrower, tongue-and-groove boards are located in front of the freight elevator in bay 62. These boards run south/north and are set in a frame nailed with cut nails. They form a pad of 12'10" long x 8'10" wide x 1" thick. The individual boards are 3-1/4" wide.

At bay 60, abutting the elevator on the west, there is a section of replaced boards measuring 7' to 7-1/4" wide. The boards extend the width of bay 60. They are keyed into the adjacent floor at bay 58 on the west and sit on a brick lip designed into the elevator shaft on the east. There is a similar arrangement abutting the east side of the shaft at bay 64, though the infill floor here is just 1' wide.

Hatches: At one time rectangular hatches were located in the center aisle at PW4 and PW5. The hatches are recorded on the 1916 floor plan. No evidence is visible on the surface of the flooring today.

Long Storehouse I (bays 67-96), Second Story
SPACE 19C67

The flooring of LSHI was difficult to survey completely because it is covered with stored furnishings.

Material: Wood boards.

Design: The flooring of the second story of LSHI is of double thickness. It features a finish floor and a subfloor. The subflooring was not accessible when surveyed.

The finish floor is laid west/east. Both the finish floor

and subfloor feature tongue-and-groove seams. The finish floor may be divided into three zones, more or less corresponding to the bays: center, south, and north. The flooring in the center bay varies from that in the side bays. The obvious differences are dimensional and fastener types. The center-bay flooring runs to the north posts, but stops short of the south posts; i.e., the type of flooring exhibited in the south bay extends slightly beyond the south posts into the center aisle.

Dimensions:

Center Zone. They are random widths, measuring between 7" to 9-1/2" wide.

South and North Zone. These boards are generally wider, averaging between 7" to 16". Both types of boards are of random lengths.

Fasteners:

Center Zone. They are nailed with wire nails.

South and North Zones. These boards are secured with cut nails.

Hatches:

The 1916 plan reveals that a rectangular hatch was located in the center aisle at bay 91/92. Today, the hatch is filled with boards flush with the flooring. The patch measures 10' long x 4'8-1/2" wide is laid in three sections from west to east. Each section is 3'4" long. The infill boards feature tongue-and-groove seams and measure approximately 3-1/4" wide x 1" thick.

Variations:

A floor patch has been introduced in two areas, as follows: 1) west wall, north of the south bricked-in passageway; and 2) on the same wall, but south of the north bricked-in passageway. Both patches are laid in a south/north direction, against the wall. They are fastened with wire nails. The former is 6'8" long x 4-3/4" wide; while the latter is 5'8" long x 5-3/4" wide.

Stables (bays 97-116), Second Story
SPACE 19A-C1

Material:

Wood boards. The bottom subfloor displays vertical saw marks.

Design:

Three layers of flooring are extant, as follow: a finish floor and two layers of subflooring. The finish floor is laid south/north, while the other two layers are laid west/east. The finish floor exhibits tongue-and-groove seams, while the second layer may not. The bottom subfloor that is nailed to the joists appears to feature tongue-and-groove seams.

Dimensions: Finish floorboards are 3" wide x 1" thick and of random lengths, varying between 8-1/2' to 12' long. The second layer of flooring was not entirely accessible, therefore complete dimensions are lacking. The boards are of random widths, varying between 6-1/2" to 15-1/2". The bottom subfloor was not completely accessible either. The boards appear to be $\pm$ 14" wide x 1" thick.

Fasteners: The finish floorboards are secured with cut nails. The fasteners for the two subfloors could not be identified without destructive investigation. Presumably, they are cut nails as well.

Variations: At the fire-door threshold, at fire wall PW7, a sheet of plywood has been inset.

At the posts, square holes have been cut through the floor. Posts rest on the subfloor below. Holes were cut so that the posts did not have to be disturbed when the new floor was laid. At bay 100/102, the post travels through the flooring and rests on a beam.

At bays 106 and 107 in the center aisle, two insulated aluminum pipes jut up through the floor. They stand about 6' tall.

Hatches: At bay 102, the former hatch (shown in the 1916 floor plan) is obscured by later flooring.

* * *

Loft

The flooring at the loft level is all tongue-and-groove wood boards, running south/north. The floor on this level does not extend from wall-to-wall. It is suspended by the truss system, with voids of varying dimensions between the floor and south/north walls. There are three zones of flooring throughout the loft generally corresponding to the south, center, and north bays. The term zone will be used below to describe the three sections of flooring. The center zone of flooring is two layers thick, while those of the side zones are one layer thick.

West Addition (bays 1-36), Loft SPACE 19D1

Material: Wood boards.

Design: There are three zones of flooring, as follows: the center is 21'8" wide and the sides are 7'4" wide (except between bays 1-15 on the north where no additional side flooring

has been laid). The floorboards are laid in a south/north direction. All feature tongue-and-groove seams.

Subfloor. There is a subfloor below the center section of flooring. This subfloor consists of 1" thick, tongue-and-groove boards.

Barrier. A makeshift railing of 1" high x 4" wide boards are nailed along the south and north edges to provide a barrier.

Dimensions: The total width of the floor is 35'5". The center zone is 21'8" wide while the side zones are 7'4" thick.

The floor-to-wall gap on the south side is 9' wide, while that on the north side is 16' wide from bays 1-15. Bays 1-15, on the north, never had flooring added so the gap here is greater than elsewhere on this floor.

The floorboards are of generally regular widths, varying only slightly between 7" to 7-1/4" wide. They are of random lengths, 10' to 16' and 1" thick.

Fasteners: Wire nails.

Long Storehouse II (bays 37-66), Loft
SPACE 19D37

Material: Wood boards.

Design: There are three distinct zones of flooring running the length of the space, as follows: a south, center and north zone. Throughout, the floorboards are laid in a south/north direction. The center and south zones exhibit tongue-and-groove seams, while the north zone does not. The floorboards in the latter zone are nailed directly to the floor joists below.

Subfloor. There is definitely a subfloor below the central zone flooring. It appears to be tongue and groove, laid south/north. Little else can be determined without destructive investigation.

Ramp. The floor in the West Addition is higher 8" than the floor in LSHII, therefore, a ramp has been constructed at the opening in PW3 to ameliorate the difference. The ramp is constructed with the same materials as found in the center zone. It measures 12'9" long x 6'6" wide. It angles to the south in order that loads being moved down the ramp could avoid collision with iron tie-rods running down the center aisle.

Barrier. To protect someone from falling over the edge of the opening, a makeshift barrier has been introduced. The barrier is constructed of 2" x 4" boards. There are some horizontal rails, but the general design of the barrier consists of vertical "posts" nailed with diagonal braces to the rafters. A flat board runs along the edge at floor level.

Dimensions: The total width of the floor is 36'10". The central zone of flooring is 21'8" wide, while the side zones are 7'5" wide.

The floor-to-wall gap on the south side is 8'10" wide, while that on the north side is 8'8" wide.

Center Zone. The boards are of generally consistent widths, 7-1/4" wide.

North Zone. The floorboards are random widths, averaging between 11" and 17" wide x 1" thick.

South Zone. These floorboards are of a common dimension of 9" wide x 1" thick.

Fasteners: Wire nails.

Long Storehouse I (bays 67-96), Loft
SPACE 19D67

Materials: Wood boards.

Design: As in LSHII, there are three distinct zones: a center zone flanked by a south and north zone. These zones correspond to the bays. The boards run in a south/north direction throughout. They feature tongue-and-groove seams.

The center zone flooring is laid over, and nailed to, a subfloor (possibly an earlier finish floor). The side flooring is of a single thickness. Joists for the south and north zones have been raised an inch to accommodate the differences in floor thickness.

The floor does not extend to the south and north walls, as noted above. Unlike the other spaces in the loft, there are no guardrails or barriers at the edge of the floor.

Dimensions: The total width of the floor is 36'6". The center zone is 21'8" wide; the south is 7'4" wide; and the north is 7'6" wide.
The floor-to-wall gap on the south and north sides are both

8'9" wide.

Center and North Zones. The floorboards are of generally regular widths and thickness, 7-1/4" to 7-1/2" wide x 1" thick. They feature random lengths.

South Zone. These boards are of random widths and lengths. They average between 8" to 11" wide.

Fasteners: Wire nails.

Variations: In bay 96, there is no south-side flooring because of the presence of a stairway.

At bays 90/92 and 89/91 the juncture of flooring in bays is uneven, possibly due to the repair of the two beams below.

Stables (bays 96-116), Loft
SPACE 19A-D1

Material: Wood boards.

Design: Similar to the other spaces on this story, the flooring may be divided into three zones. The center zone, lying between the posts and two boards beyond, features 3-1/4" boards that are laid in a west/east direction, while those at either side are laid in a south/north direction and are 7" to 7-1/4" wide. All boards display tongue-and-groove seams. The center zone features two layers of flooring, while the side zones only one layer. The floorboards of the side zones are generally continuous.

Dimensions: The total width of the floor is 35'6". The center zone is 29'3" wide, while the south zone is 4' wide and the north is 4'2" wide.

The floor-to-wall gap on the south side is 9' wide, while that on the north side is 8'8" wide.

Center Zone. These boards exhibit generally regular dimensions of 3-1/4" wide x 1" thick. They are of random lengths.

South and North Zones. The floorboards are random widths, averaging between 7" and 9" wide. There are two exceptions noted below.

Fasteners: Wire nails.

Variations:

For the first three bays on the south side (bays 98, 100, and 102) and the first bay on the north (bay 97), the flooring extends to the wall. The floor at the former bays provides a ceiling for an office created below at the second story. Flooring in bay 97 merely surrounds the brick elevator shaft inhabiting most of the bay. The floorboards vary from the typical in these spaces. Bay 98 exhibits boards similar to those found in the center zone. Bays 100 and 102 feature larger boards. The extended flooring in bays 98, 100, and 102 were not accessible for closer study.

* * *

Basement

(The basement is extant only under bays 109-116.)

Concrete: Concrete predominates in the basement. It is at least 3" thick in some areas. There appears to be more than one layer of concrete. It covers the original dirt floor that is visible in one deep hole in the concrete.

Linoleum Squares: Linoleum squares cover concrete in the northeast room and entry hall.

Ceramic Tile: Ceramic tile is extant in the bathroom and against the east wall to the south of the entry door.

B. Original Appearance of Flooring

Basement: Unknown, possibly dirt.

First Story: Center-aisle, stone pavers with sandstone curbing along length. Side bays, brick pavers laid in sand, except in Stables where a wood floor was likely.

Second Story: Wood. Unfinished tongue-and-groove boards, random lengths and widths (wide boards), nailed with cut nails. Soft wood, presumably pine. Flooring extended wall-to-wall.

Hatches. Originally at least six (6) hatches were located in the center aisle at PW1, PW2, PW4, PW5, Bay 91/92, and Bay 101/102. Hatches were installed for ease in loading between first and second stories.

Loft: Same as above except that flooring originally was only 18' wide with 18 foot gaps on south and north sides. Floor was suspended by the queen-post truss system.

C. 1968 Appearance of Flooring

Basement: Poured concrete.

First Story: Concrete floor in Stable poured in ca. 1937. Presumably the first concrete for the rest of the building was introduced with the structural steel system in ca. 1940. Present concrete with expansion joints was laid in ca. 1952. During the 1952 work, the asphalt center-aisle that runs west to east was retained from earlier work.

In addition, modern flooring includes linoleum squares in bays 1, 3, 5, 114, 116, ceramic tile in bay 9, and linoleum squares in the Stables.

Second Story: Wood. Unfinished tongue-and-groove boards, random lengths and widths (wide boards). Soft wood, may be pine. Flooring extended wall-to-wall. Narrower tongue-and-groove pad nailed to original flooring in front of elevators at bays 30 and 62.

The West Addition and LSHII flooring seems to be original.

LSHI flooring's current double thickness laid in three zones (south, center, north) by 1968; dates of changes unknown.

Stables flooring probably current triple thickness by 1968; dates of changes unknown.

Loft: Wood. Tongue-and-groove boards, random lengths and widths (wide board). Soft wood, may be pine. Double thickness in center zone. Extended generally 9' on both south and north to measure around 36' wide with 9' gaps on either side (some variation between different spaces in the building). Floor widened by 1961 (shows up on plan last revised in 1961).

D. Historic Sources for Flooring

April 20, 1909 Drawing. Long Store House. Floor Plan (No. SA 268). Notes locations of hatches. (See Volume II, Figure 21.)

October 9, 1916 Drawing. Long Storage House Floor Plans (No. SA 1675). Notes locations of hatches and special features in Stables including grain shutes and air shafts. (See Volume II, Figure 22.)

March 15, 1935 Drawing (revised 1937). Alterations to Floors and Doorways; Stables; Building No. 19A; Hillshops (No. SA 10004).

March 15, 1935 Drawing. Alterations to Floor and Doorways; Stables; Building No. 19a (No. SA 10004A). Bays 99-102, vehicular passageway, new concrete ramp including concrete floor.

Nov. 1, 1940 Drawing. Structural Steel, Reinforcing Floor "B" of Building No. 19; Hill Shops (No. SA 13243-1). West Addition, LSHI, LSHII. Includes information related to flooring. (See Volume II, Figure 28.)

Dec. 29, 1941 Drawing. Structural Steel for Reinforcing of Floor Above Spaces 19A-B1, 19A-B9 and 19A-B15; Building No. 19; Hill Shops (No. SA 13390). Stables. Includes information related to flooring.

Nov. 28, 1952 Drawing. New Floor Construction, Building No. 19 (No. 33-01-03). West Addition, LSHI, and LSHII. "Remove existing brick paving and excavate 3-1/2" to receive new 6" concrete slab. Existing asphalt to remain (center aisle), stone base underneath. Remove existing brownstone curb (6" wide)."

Seems to have been (and remains) a mixture of old and new concrete. West Addition: all new concrete with expansion joints. LSHII: new concrete - bays 37-57, 64, 66; old concrete - bays 58, 60, 62, 59, 61, 63, 65. LSHI: new concrete - bays 83-96; old concrete - bays 68-82

(See Volume II, Figure 31.)

June 1960 Drawing. Radiographic Inspection Lab; Building No. 19; Electrical Plans (No. 35-51-01). Bays 1, 3, and 5 have concrete floor. Bays 7 and 11 have asphalt tile. Bay 9 has ceramic tile. (See Volume II, Figure 33.)

Sept. 30, 1960 Drawing. Modification of Basement Area; Building No. 19 (No. PM 814). "Existing 2-3" concrete floor slab within new partitioned areas to be removed and replaced with 4" concrete slab." Vinyl asbestos along north side of basement. Ceramic tile in toilet, bay 116. (See Volume II, Figure 34.)

VERTICAL CIRCULATION

(See Volume II, "Vertical Circulation," Figures 180-191.)

A. Existing Appearance

There are currently two stairways in Building 19. The first stairway is located in bay 36 of the West Addition (SPACE 19B25) and the second in bay 96 of LSHI (SPACE 19B83). Both are constructed of wood and run from the first to the loft stories. Though the stairway in bay 96, predates that in bay 36 by a few years, the materials and construction of both are very similar. The design and materials of the stair in bay 36 resemble those of the earlier stair, though they are slightly more refined.

In addition to the stairways noted above, vertical circulation in Building 19 is made possible by three elevators. They are 2-ton freight elevators that service the first, second, and loft stories at bay 30 (West Addition, SPACE 19B25), bay 62 (LSHII, SPACE 19B51), and bay 97 (Stables, SPACE 19A-B15). Consequently, there are two elevators accessible on the south elevation and one on the north elevation. The architectural treatment of these elevators within the building is similar; therefore, the elevators are described collectively below.

* * *

Stairway at Bay 36

Material: Wood.

Dimensions: Landing. 10'10" long x 6'10" wide.
Landing Floorboards. 10-3/4" wide, vertically sawn.
Treads. 4'11" high x 1' deep x 1-3/4" thick.
Risers. 7-1/2" high.
Banister. 2'4" high x 4-1/2" wide.
Banister Siding Boards. random widths, 4" and 5".
Newel Posts (only east extant). 2'7" high.
Joists Beneath Landing. 6" high x 2-3/4" wide, vertically sawn, chamfered.
Joists Beneath Stairs. 1'1/2" high x 2" wide, vertically sawn, chamfered.
Main Framing Timbers. 7-1/2" high x 5-1/2" wide, vertically sawn, pegged.

Fasteners: Cut nails.

Plan: Bay 36 consists of a half-pace stair from the first to the second stories and a straight run of seventeen (17) steps from the second to the loft stories. The half-pace stair contains a run of twelve (12) steps to a full landing and a run of another twelve (12) steps from the landing to the second story.

It is currently enclosed by floor to ceiling 3/4" plywood partitions on the first story. This enclosure measures 5'7" wide. A padlocked door is located at the foot of the stairs. The current arrangement prevents free access to the stories above.

**Banister
System:**

The open stair consists of tongue-and-groove, single bead, vertical banister boards nailed to the stringboard at both sides of the stair, except from the landing to the second story where the stair is built flush against the brick wall. Boards are vertically sawn of varying widths. The banister boards are topped by a smoothly turned handrail with a flattened cyma profile. The east banister runs from the first story to the loft story. The west banister runs from the first story around the landing and then stops. It resumes briefly along the stairs from the second to loft level. All the banister returns in the stairway are circular. As a safety precaution, a steel pipe railing (painted yellow) is currently affixed to the original wooden handrail at the straight stair runs.

Newel Post:

Tapered, turned newel-posts with flat round newels were once located at the foot of the stairs on the first story. Only the east newel post survives today. The profile of the post is quite bulbous with cyma recta curves stacked atop one another. The handrail is eased and butted at the newel posts.

Framing:

The framing is largely obscured by the enclosure.

Finishes:

Banister Boards. Painted light brown.
Handrail. Stained dark brown.
Stairs and Risers. Stained dark brown.
Plywood Enclosure. Painted light grey.

* * *

Stairway at Bay 96

Material:

Wood.

Dimensions:

Landing. 12'6-1/2" long x 6'3" wide.
Landing Floorboards. 10-1/2" wide.
Treads. 8-1/4" high x 5'9" wide x 12" deep (round nosing).
Risers. 8" high.
Banister. 2'7" high x 4-1/2" wide.
Banister Siding Boards. random widths, 4-1/2" to 7-1/2".
Newel Posts. 5-1/2" square.
Joists Beneath Landing. 12" high x 1-3/4" wide.
Joists Beneath Stairs. 5-3/4" high x 3" wide.
Main Framing Timbers. 9-3/4" high x 5-1/4" wide.

Fasteners: Cut nails.

Plan: The plan consists of a half-pace stair from the first to the second stories and a straight run of seventeen (17) steps from the second to the third stories. The half-pace stair contains a run of twelve (12) steps to a full landing and a run of another twelve (12) steps from the landing to the second story. The whole is of pegged construction and was built flush against the original end wall of LSHI (PW7). When constructed it was an open stair. Sometime since, however, the landing and run from landing to second story were enclosed in 1/2" plywood.

A locked door in the enclosure at the top of the first twelve (12) steps (at the landing) provides the only access to the stair beyond from the first story.

Banister System: Tongue-and-groove single bead vertical-board siding forms a partition banister on the west and east side of the stair and around the stairwell openings on the second story. Boards are vertically sawn. The banister boards are topped with a crudely turned handrail with a cyma and fillet profile. Today, a steel-pipe railing (painted yellow) is affixed to the wooden handrail as a safety measure.

Newel Posts: Unembellished square newel-posts with square caps are located at: the bottom west of the stair; the newel return at the landing stairwell; the corners of the stairwell on the second story; and at the bottom of the straight run of stairs to the loft story. All handrailings are butted to the newel posts and pegged.

Framing: The framing of the landing consists of four main pegged timbers with ten chamfered joists mortised into the frame. The stairs are supported by five joists beneath each run of stair jointed into the framing of the landing.

Finishes: Banister Boards. Painted light brown.
Underside of Third Stair Run. Painted light brown.
Handrail. Painted dark brown.
Newel Posts. Painted dark brown.
Stairs. Painted dark brown.
Plywood Enclosure. Painted light grey.

* * *

Elevators and Elevator Shafts

Plan: As noted above, the elevators serve three stories.

Inside the rectangular shaft, the elevator consists of solid metal walls on the east and west and wire mesh on the south and north. Brass control button panels are located inside the elevators and outside the shafts, either to the left or right of the door.

On the first story, each elevator features two doors; one on its south and north sides to access the interior and exterior of the building. The other two levels are finished with one interior door.

At the second-story level, a wooden pad of narrow, tongue-and-groove boards is nailed on top of the flooring immediately in front of the elevator at bays 30 and 62 (bay 97 does not have this feature). The pad raises the floor for ease of unloading and loading supplies from the elevator. This pad is 1" thick with sloped edges and varies in size. (See "Flooring" for details.)

At the third level, a metal ladder is affixed to the outside of the shaft adjacent to the elevator door. The ladder rises beyond the roof and into the shaft. At the top of the ladder is a wooden landing and fire door. The fire door leads into an elevator motor room that is suspended at the top of the shaft. A perforated metal floor holds the elevator motor and pulley mechanisms.

Elevator
Manufacturer:

All three elevators were manufactured by the Bay State Elevator Company of Springfield, Massachusetts.

Brick Shaft:

The elevators are installed in brick shafts that measure approximately 10'5" wide x 11" deep. The shafts rise through the roof. (See "Roof Covering and Features" for a more detailed discussion of the brick shafts' treatment above the roof.) The shaft bricks measure at bay 30 (8" to 8-1/4" long x 2-1/4" high x 3-3/4" deep); bay 62 (8" long x 2-1/4" high x 3-1/2" deep); at bay 97 (7-3/4" to 8" long x 2-1/8" high x 3-1/2" deep).

Exterior Loading
Platforms:

See Appendix B for a discussion of this feature.

Elevator Doors:

All elevator doors were made by the St. Louis Fire Door Company. The doors measured 6'2" high x 7'6" wide. They contain a single vision panel with safety glass in the

upper left or right corner. Canvas straps facilitate opening and closing the doors.

Finishes: Bay 30. Elevator door and surrounds - painted green; shaft - unpainted.

Bay 62. Elevator door, surrounds, and shaft - painted grey.

Bay 97. Elevator door, surrounds, and shaft - painted green.

B. Original Appearance of Vertical Circulation

Stairways

Bay 36: Unenclosed wood-stair from first to loft stories. Half-pace stair from first to second stories. Straight run stair from second to loft stories. Served the West Addition only.

Bay 96: Unenclosed wood-stair from first to loft stories. Half-pace stair from first to second stories. Straight run stair from second to loft stories. Served LSHI and LSHII only.

Bay 110: Stair from basement to loft stories, presumably wood. All were straight run stairs (no turns or landings). Served the Stables only.

Finishes: Vertical-board banister - painted light brown (rose beige).
 Handrail - thin layer of dark varnish.
 Stairs - thin layer of dark varnish.

* * *

Elevators

None were extant.

C. 1968 Appearance of Vertical Circulation

Stairways

- Bay 36: Original stair remains but half-pace portion from first story to second story enclosed with rigid asbestos board (ca. 1955) as a fire protection measure. Currently, the stair is enclosed with a plywood partition. It is possible that the asbestos board was not introduced.
- Bay 96: Original stair remains but landing area of half-pace stair between first and second stories enclosed with rigid asbestos board (ca. 1955) as a fire protection measure. Currently, the stair is enclosed with a plywood partition. It is possible that the asbestos board was not introduced.
- Bay 110: Stairway in Stables removed. Specific date of removal is unknown.
- Finishes: Original finishes appear never to have been painted over, therefore, the finishes extant today may be original.

* * *

Elevators

- Location: Bays 30, 62, and 97 contained 2-ton Bay State freight elevators.
- Bay 30: Introduced in ca. 1942.
- Bay 62: Bay 30 elevator was installed in ca. 1935, replacing an earlier elevator (ca. 1918) which featured a dormer shaft on roof.
- Bay 97: Introduced in ca. 1942.

D. Historic Sources for Vertical Circulation

See various floor plans illustrated in Volume II for the locations of stairways and elevators.

* * *

Stairways

March 15, 1935 Drawing (revised 1937). Alterations to Floors and

Doorways; Stables; Building No. 19A; Hillshops (No. SA 10004, Sheet 1 of 2). Notes "Present staircase to be rebuilt after completion of floor."

March 4, 1937

Drawing. Relocation of Stairs in Stable; Building No. 19A; Hill Shops (No. SA 10150). Plan to remove existing stair and relocate on opposite side of PW9. No stairs in stables today.

May 10, 1955

Drawing. Preliminary Sketch, Proposed Renovation and Rehabilitation of Building 19 for Property Division, Armory Square (No. PM 666). Proposal includes enclosing stairs with rigid asbestos board. Not certain whether proposals were carried-out.

* * *

Elevators

Research uncovered three references to elevators being installed at the Springfield Armory prior to the 1918 one listed below. These references dating to 1862, 1889, and 1911, however, do not specify which buildings were recipients of the elevators. The reference dating to 1918 specifically identifies Building 19.

April 1918

Contract. Marcil & Arnold. Elevator for Building 19 (Storehouse). "A direct connected winding machine with an alternating current meter, electric brake, hatchway limit switches, wood car sling and platform, hand rope control, hand rope lock, platform about 6'9" postwise by 5'0" front to back, with wood sheathing on two sides of platform to height of 6'. . . Capable of lifting 3000 pounds at a rate of 40' per minute . . . Travel from first to third floors."

April 15, 1935

Drawing. 2-Ton Freight Elevator Section 62; Building No. 19-B-S1; Hill Shops (No. SA 10003 F). Present Bay State elevator and loading platform in bay 62 installed. (See Volume II, Figure 23.)

January 7, 1942

Drawing. 2-Ton Freight Elevator; Space 19A-B15 of Building No. 19, Hill Shops (No. SA 13403). Present elevator and loading platform in bay 97.

January 8, 1942

Drawing. 2-Ton Freight Elevator; Space 19B-25, Section 30; Building No. 19; Hill Shops (No. SA 13404). Present elevator and loading platform in bay 30. (See Volume II, Figure 30.)

MECHANICAL SYSTEMS¹

A. Existing Appearance

Building 19 has relatively few mechanical services and most of the existing mechanical equipment is considered old and/or obsolete. Mechanical systems, as defined for this study, include heating, ventilating, air-conditioning, electric, plumbing, fire-protection, intrusion, and communication equipment.

Heating

Parts of the building (the west end from bays 1-12 and the east end from bays 98-116) are heated by low-pressure steam, with terminal heating equipment consisting of cast-iron radiators and ceiling-suspended unit heaters. There is one manually-controlled valve for this branch of the steam line. The overall efficiency of the system, in 1988, was considered low since the steam distribution lines were old, there was almost no condensate return from this system, and the system operation required almost continuous maintenance. The basement area has wall-mounted heating pipes that connect to a similar arrangement on the east wall of the first story--the former area of the Stables.

Part of the main high temperature heating water (HTHW) pipe loop for the buildings at the west end of the STCC campus runs through Building 19, between bay 68-102. The large HTHW pipe was installed in 1983, apparently with little regard for its visual impact. The HTHW is generated in the Central Power Plant in Building 17, converted to 50 psi steam, tied-in with the steam distribution lines from Building 27, reduced to 25 psi, delivered to Building 19, and reduced to 5-10 psi.

Ventilating

There is no general ventilating system in the building, other than the passive ventilating system comprised by roof ventilators (discussed under Roof Covering and Features), floor hatches, and louvered door and window openings. Electric window fan-units are installed in various window openings near the west and the east.

¹ Prepared by Richard Crisson, Historical Architect, Building Conservation Branch, Cultural Resources Center (NPS). Data used for this section was obtained from visual inspection and from the 1988 Springfield Technical Community College Comprehensive Facilities Plan (section named "Existing Facilities Condition Report"). The completeness of the systems discussed herein should be verified in the future by a qualified systems engineering firm.

Air-Conditioning

There is no general air-conditioning system in the building. Part of the main chilled water (CHW) loop runs through Building 19; though chilled water is thus available, the pipe is capped off in Bay 38. There is no distribution system for cooling within the building. A window air-conditioning unit is located in bay 109.

Electric

Building 19 is the centralized location of much of the campus electrical distribution system. Presently there are feeder lines not only to Building 19, but to Buildings 11, 13, 21, 26, 28, 32, and 35. Although drawings suggest that the "electric sub-station" was installed in bay 2-4 in ca. 1954, it is presently used as the transformer room. Service notations attached to the equipment in the room indicate that the system has been inspected since ca. 1983. The modern 13,800 V power supply is transformed down to 277/480 V in a transformer room in bay 81 (also called the High Voltage Room) and distributed to the west end of the campus, where it is boosted up to 600 V and transformed for individual building use to 110/220 V (the same as the former 1,500 KVA transformer system). The transformer substation in bay 81 has been fitted with modern metal doors, concrete masonry units and stucco partitions, and an exhaust system. According to 1983-86 construction plans, the new service feeds Buildings 2, 13, 17, 19, 20, and 27.

Building 19 uses 110/220 V, 120/240 V and 277/480 V power, at various locations throughout the building. Distribution panels and branch wiring are randomly located, depending on changing needs over the years. For example, bay 10 has a modern panel circuit box with 200 Amp/240 V service; a panel box is located in bay 97; the basement area was modernized between 1960-63 with suspended ceiling fixtures and an electric centrifugal exhaust wall-vent. The interior of Building 19 is characterized by numerous types of pendant fluorescent and incandescent fixtures, and recessed incandescent ceiling light fixtures. There is no emergency power, lighting, egress lighting, nor illuminated exit signs.

Plumbing

The building is supplied by underground service with water for both potable use and for the fire suppression system. There is an 82 gallon electric domestic hot water (DHW) heater in the east end of the basement area. The west end has an additional DHW heater to service the toilet rooms in this area. Building 19 is connected to the existing campus sanitary waste lines, which in turn lead to the city's waste treatment facilities. Most of the plumbing fixtures (toilets, sinks, interior pipes, and hardware) are in fair condition, excepting the derelict toilet room in bay 98. Two newer (probably after 1968) toilet rooms have been installed in the west end of the building. Modern industrial sinks are located near bay 107, in the present maintenance area.

Fire Protection

Building 19 is protected by four dry-type sprinkler systems, that were probably installed ca. 1940 (see 1968 Appearance of Mechanical Systems). Although the automatic sprinkler system was primarily a nineteenth-century development (first with the wet-pipe, and then the dry-pipe sprinkler systems), fire suppression systems were perfected later in the twentieth century. The dry-pipe system as found in Building 19 was developed as a result of having to protect unheated buildings. A dry-pipe valve controls the sprinkler system; the valves are protected from freezing by enclosing them in an enclosed, or heated, room. These rooms were generally known as "valve enclosures." The dry-pipe system does not contain water above the level of the valve, and air pressure restrains the water that comes in from the water supply main. As in a wet-pipe system, water lines extend throughout the structure via branch lines with quick opening devices, or sprinkler heads. The sprinkler heads are designed with solder elements that fuse when the temperature reaches 160 degrees F. Water pressure then forces the cap off and pressurized water blankets the area in the shape of an umbrella. At the same time as water flows through the check valve, the clapper moves a lever that operates a mechanical gong.

Due to the great length of Building 19, four dry-type sprinkler systems were required. The four valve enclosures are numbered, west to east, as follows: A-17-S (in bay 24), A-16-S (in bay 50), A-15-S (in bay 82), and A-14-S (in bay 106). The first three valve enclosures are wood-partitioned with tongue-and-groove panelling; the fourth enclosure may have been replaced with a wire-mesh enclosure, or perhaps the wire mesh was original, since it was located in a heated space. Both valves at A-17-S and A-16-S are Model E-2 (175 lbs.), stamped "Grinnell Company, Inc. Providence, RI." Both valves at A-15-S and A-14-S are Model C-1954, stamped "Rockwood Sprinkler Co., Worcester, Mass., Pats. Oct. 28, 1919 and March 22, 1927." Each valve enclosure has a metal box with spare sprinkler heads; the sprinkler heads are also stamped "Rockwood, Worcester, Mass., Model 160 [degrees] -D-42, Pat. Mar. 30, 1942." The sprinkler heads in the loft at the east end were also made by Rockwood, but differed in that they are stamped "Patd. Jan. 29, '07; Oct. 13, '08; May 3, '10 - 160 [degrees] (1917)." Wall-mounted gongs, or fire alarms, are located outside of each valve enclosure; each is stamped "Rockwood." Several manual pull stations are located outside the building; the one facing west is stamped the "Gamewell Co., Newton, Mass, Fire Alarm Station and Gamewell Box 66." On the north elevation, between bays 101-103, is another Gamewell fire alarm station, numbered 72, protected by a metal hood. Facing east is Gamewell fire alarm box number 62 (but not in the same location as was recorded in 1962). It is connected by metal conduit to a red globe lamp protected by a metal lamp guard.

The sprinkler systems in Building 19 appear to be operational and are checked on a yearly basis. The last report available was dated June 22, 1990 and noted that the four systems performed in a "satisfactory" manner, but had "unsatisfactory conditions or comments" related to having found the exhaustor off; it could not be reset; and recommended that it should be repaired or replaced. There are no standpipes with fire hose cabinets, nor are there fire department siamese or pumper connections. The sprinkler system activates a local audio alarm via wall-mounted water motor alarm gongs and the audio/visual alarm at the campus guard station; the manual pull stations are supposed to do the

same, but some (or all) have been temporarily deactivated due to a malfunction (communication between STCC and the author in August 1991). The alarm system is old and appears in poor condition. Without annunciators, it does not designate the exact location of a fire emergency in the building. There are no smoke or heat detectors. Modern hand-held fire extinguishers are located in random areas of the building, but the wall-mounted boards for the earlier hand-held fire extinguishers are prevalent throughout.

Intrusion

Building 19 has no general intrusion system; the building appears to have had a limited security system consisting of the "Watchman Signal System," installed ca. 1937. The Watchman system consists of external boxes (watch or clock stations) located at the east and west elevations. Based on other similar systems, the system operates by having a recording of inspections made during the rounds made by a security watchman. The Watchman Signal System appears obsolete and the boxes may have also been deactivated.

Communication

The original (pre-1968 and perhaps as early as ca. 1917) telephone system has been upgraded with limited telephone distribution points for approximately forty telephone locations connected to the main campus telephone distribution line. Building 19 has no central communication system, nor is it connected to the campus-wide public announcement (PA) system.

B. Original Appearance of Mechanical Systems

There is no documentation for any original mechanical systems; none of the mechanical systems discussed above were originally found in the building at the time of construction. The only exception might be the rudimentary and passive "ventilating system" that consisted of roof ventilators, floor hatches, and louvered doors and windows. A drawing dated to 1936 clearly shows the floor hatches/air shafts that permitted the flow of air inside the building; many of the original louvered doors and windows remain. Physical evidence remains of the original ventilators that were later removed and replaced with the existing copper ventilators (see Roof Covering and Features).

C. 1968 Appearance of Mechanical Systems

With few exceptions, most of the mechanical systems and equipment that remain in Building 19 were also extant in 1968. None of the existing mechanical systems have been upgraded. The "mechanical systems" are defined for this study and summarized in the following order: heating, ventilating, air-conditioning, electric, plumbing, fire-protection, intrusion, and communication.

Heating

Parts of the building were heated by low-pressure steam, with cast-iron radiator units. A steam line ran north-to-south through bay 105-106, as was shown in plans dating to as early as 1877. Not until 1938, however, was there a specific mention of steam heating in Building 19.

Ventilating

There was probably no general ventilation system, other than the air movement caused by the roof ventilators, hatches, and louvered openings discussed previously under "Original Appearance of Mechanical Systems." It is probable that the window fan units, located near the east end, were in existence by 1968.

Air-Conditioning

The building has never had a general air-conditioning system; the first mention of air-conditioning equipment was in 1960 for the modifications of bays 1-9 as a "radiographic inspection laboratory" and the basement area for an undisclosed use. An "a.c. room" was installed in bay 112 in 1963. There probably were no window air-conditioning units prior to 1968.

Electric

Building 19 most likely had become the centralized location for electric power to the west end of the Armory prior to 1968. A drawing dated to 1961 was titled "Proposed Feeder Lines from Building 19 to Building 20, Electrical." Servicing other buildings may have occurred even earlier with the installation in 1954 of an electric substation in bay 2. Although electricity had apparently been introduced in the vicinity of the Hill Shops as early as 1902, according to the contract "Electric Power Plant from General Electric for Armory, there was no indication that Building 19 was included. However, in 1918 the building had electricity to power the newly-installed 3000-pound freight elevator (see Vertical Circulation).

It is unclear when the following extant electric improvements in Building 19 were actually made: a wall-mounted service box located inside the sallyport (bay 102); a PCB Transformer at the second story between bay 94-96; and a wood board with three porcelain insulators and conduits through the window frame on the second story of the north elevation, adjacent to bay 1. What can be documented is the installation of three Rockwood electric valve heaters in 1940; followed in 1941 by the installation of numerous light receptacles and floodlights. In 1954, alterations to the west end included the installation of an electric sub-station enclosure. By 1963, the electrical service to the building consisted of a 600 V line from two 1,500 KVA transformers (the two transformers were disconnected but left in place when a newer 13,800 V main supply was installed).

Plumbing

The building may have been supplied with potable water by the turn of the century since it was close to a fresh water source--the pond to the east of Building 19, and to underground water pipes that ran adjacent to the building along the south elevation (documented in the 1877 topographical plan). None of these early plans, however, apparently connected Building 19 to the "city water pipe," nor to the "spring water pipe," or to "sewers" that were shown in the 1904 general plan. There may have been water service to the building by 1938, as shown in the drawing depicting the "toilet partition" in bay 98. Water and sewer connections can be confirmed by the building record for 1938 that stated: "Water and Sewer Connections in Place." The Crane fixtures installed in the toilet room in bay 98 were documented in a contract dating to 1939. The room had its own water heater and cast-iron radiator. The toilet room was probably still in service in 1968, since it survives today, but in derelict condition. Water mains also supplied the fire suppression system described below under "Fire Protection."

Fire Protection

The most significant mechanical system introduced in Building 19 was the automatic dry-type sprinkler system installed ca. 1940. Due to the great length of Building 19, there were four dry-type sprinkler systems required. The four valve enclosures were numbered, west to east, as follows: A-17-S (in bay 24), A-16-S (in bay 50), A-15-S (in bay 82), and A-14-S (in bay 106). The first three valve enclosures were wood-partitioned with tongue-and-groove panelling; the fourth enclosure may have been replaced with a wire-mesh enclosure, or perhaps the wire mesh was original, since it was located in a heated space. Both valves at A-17-S and A-16-S were Model E-2 (175 lbs.), stamped "Grinnell Company, Inc. Providence, RI." Both valves at A-15-S and A-14-S were Model C-1954, stamped "Rockwood Sprinkler Co., Worcester, Mass., Pats. Oct. 28, 1919 and March 22, 1927." Each valve enclosure had a metal box with spare sprinkler heads; the sprinkler heads were also stamped "Rockwood, Worcester, Mass., Model 160 [degrees] -D-42, Pat. Mar. 30, 1942." The sprinkler heads in the loft at the east end were also made by Rockwood, but differed in that they were stamped "Patd. Jan. 29, '07; Oct. 13, '08; May 3, '10 - 160 [degrees] (1917)." An entry from the 1941 building record stated: "2 Exterior Fire Alarm Boxes," and later that year: "2 10-inch Gamewell Fire Alarm Gongs installed." A drawing dated 1962, "General Fire Alarm Signal System," documented either a modification or an addition to the existing system. Fire alarm pull boxes were then located at bay 62, first-story elevator wall; at bay 62, second-story elevator wall; number 66, first-story west exterior; and number 72, between bays 101-103 on the first-story north wall.

That some of this work was executed can be confirmed by the existence today of wall-mounted gongs, or fire alarms, outside of each valve enclosure; each is stamped "Rockwood." Several manual pull stations were located outside the building; the one facing west was stamped "The Gamewell Co., Newton, Mass, Fire Alarm Station and Gamewell Box 66." On the north elevation, between bays 101-103, was another Gamewell fire alarm station, numbered 72, protected by a metal hood. Facing east was Gamewell fire alarm box number 62 (but not in the same

location as was recorded in 1962). It was connected by metal conduit to a red globe lamp protected by a metal lamp guard. The building never had smoke or fire detectors. Hand-held fire extinguishers were used throughout the building prior to 1968, as evidenced by the numerous surviving red-painted board wall mounts.

Intrusion

The building has never had a general intrusion protection system. The only system related to intrusion was the monitoring system using external wall-mounted signal boxes (see discussion under Existing Appearance), and called the Watchman Signal System. It is not clear when the system was installed or how it operated. Although a "Watchman" system was mentioned for the Hill Shops in 1918, it is not until 1937 that Building 19 was referenced with a "Watchman's Station and Fence Signal System." At that time the west box was numbered 5, a south box was numbered 6, a center box was numbered 18, and a southwest box was numbered 39. It is unclear why in 1941, the building record states that there were only "2 Watchman Station Boxes installed." In 1962, the system was referred to as the "General Police Signaling System," with the stations labelled as number 39, inside the west end; number 18, center wall; number 24, east end; and number 69, outside the east end. The signal box facing west, on the south arch impost (perhaps the former no. 39), was made by the Gamewell Company and was stamped "Springfield Armory Guard Signal System." A wall-mounted conduit led to a blue globe protected by a metal lamp guard. On the east elevation, inside the south jamb of the center segmental arch, was another signal box stamped "Springfield Armory Guard Signal System - Control Box 73," (perhaps it was the former no. 69) with conduit to a glass globe protected by a metal lamp guard.

Communication

Apparently, the building may have had a limited hard-wired telephone communication system prior to 1968, since an "Automatic Telephone System and Code Calling System" was installed in the vicinity of the Hill Shops in 1917. The ca. 1940 Watchman system installation in Building 19, may have required hard wiring. The first clear indication of a telephone system was not until 1963, when the east end of the building was renovated as a Facilities Office and had a telephone control panel on the north wall.

D. Historic Sources for Mechanical Equipment

Feb 1877

Drawing. No. SA 84. Topographical Plan of the U.S. Armory, Springfield, MA. With additions of 1882, referencing city water pipes, hydrants, drains and sewers, gas pipes, and holly steam pipe; gas pipes running north to south through Building 19 and drains and sewers near the south and east foundation were very similar to the 1864 site plan.

1900 Ordnance Records. "Hill Shops, pipes recommended covered with asbestos and cork covering; Trainer Mfg. Co. work of covering pipes satisfactory; Covering, asbestos and cork, pipes at Hill Shops recommended covered with."

Feb 7, 1907 Drawing. No. SA 198. Plan of Main Grounds, Springfield Armory, Mass. showing Buildings, Roads, Pipes, and Wires. Designating Building 19 as the "Long Store House" and the Stables as the "Barn."

Apr 30, 1902 Contract. "Electric Power Plant from General Electric for Armory." No mention of Building 19.

May 2, 1904 Drawing. No. 19-12-50. Plan of Main Grounds of Springfield Armory. Showing location of buildings, roads, sewers etc. (Dec 31, 1904, but with changes to Jun 30, 1905); steam and gas pipes run north to south through Building 19, while sewer drains follow the south elevation. Building 19 was labelled as "20-Long Store House," and "21-Barn."

Feb 23, 1910 Letter. "Plan of the main grounds at the Hill Shops showing location of poles and wires of the United Electric Light Co." No mention of Building 19.

Jul 9, 1917 Contract. "Furnishing and Installation of Automatic Telephone System, \$8520." By the Automatic Electric Company; in Ordnance Supplies and Construction, 1806-1918; no mention of Building 19.

Oct 1, 1917 Contract. "Automatic Electric Company...to furnish and install an Automatic Telephone System and a Calling System at the Hill and Water Shops." No mention of Building 19.

Nov 7, 1917 Contract. "Installation of electric power plant, Hill Shops...including steam turbine generators...." No mention of Building 19.

Mar 11, 1918 Drawing. No. SAE-101. Buildings and Grounds, Hill Shops, Springfield Armory. With revisions from 1918-36, showing steam lines and city water crossing Building 19 north to south; sewer connection at the south elevation; coal trestle rail along the south elevation; annotated that the pond at the east end was filled-in on Dec. 15, 1918.

Apr 1918 Contract. "Elevator for Building 19...A direct connected winding machine with an alternating current meter, electric brake...from first to third floors...." By Marcil and Arnold; First mention of electricity in Building 19.

Nov 11, 1918 Drawing. No. SA-E-223, 224, & 225. Electric Fire Alarm, Time Record, and Watchman Systems, Springfield Armory Hill Shops. No mention of Building 19.

Sep 19, 1919 Drawing. No. SA-E-329. Electric Signal Equipment, Springfield Armory, Hill Plant, Office Information Sheet; Automatic Telephone and Manual System. For contract dated July 9, 1917; but no mention of Building 19.

Jul 31, 1936 Drawing. No. SA 13305 (formerly SA 6085). Floor Plans - Building 19 and 19A. Showing hatches and air shafts between 1-2 stories; 19A is the Stables.

Apr 6, 1937 Drawing. No. 19-12-202 (formerly 19-12-195). Watchman's Station and Fence Signal System. Revisions from 1938-57; showing Station 5, west ext. wall; Station 6, south ext. wall; Station 18, center wall; and Station 39, southwest ext. corner.

Apr 26, 1938 Drawing. No. SA 10220. Alterations to Sallaporte [sic], Building 19, Hill Shops. Showing new vehicular passageway in bays 100-102, and toilet partition in bay 98, but without plumbing fixtures.

Jun 1938 Record. "Steam Heating System in Place." At Building 19.

Jun 30, 1938 Record. "Water and sewer connections in place." At Building 19.

Apr 24, 1939 Contract. "3 Water Closets Installed and 1 Urinal Trough." Waterclosets, Crane No. 110337, and 60-inch Trough, Crane No. 15763; at bay 98.

Mar 28, 1940 Record. "3 Rockwood Auto Electric Valve Heaters Installed." Building 19 would have needed four valve heaters, unless the valve in bay 106 was considered to be in a heated space, as it is today.

May 13, 1940 Record. "Water-Cooled Drinking Fountain Installed." At Building 19 but with no mention of electricity.

May 21, 1941 Record. "2 Fire Alarm Boxes Installed," and "2 Watchman Station Boxes Installed." At Building 19.

Jun 12, 1941 Record. "2 Exterior Fire Alarm Boxes." At Building 19.

Jun 30, 1941 Record. "51 Electric light receptacles (sockets) installed;" "4 Electric light receptacles (plug-in) installed;" "8 Floodlights, Type MUA No. 43959, installed;" "2 10-inch Gamewell Fire Alarm Gongs Installed." At Building 19.

Jan 1, 1942 Drawing. No. 19-12-196. Plan of Springfield Armory Hill Shops, Showing Fire Alarm Signal System (Fire Alarm Box Locations). Including Building 19, and with revisions from 1938-60.

May 23, 1942 Drawing. No. SA 13468. Connections of Downspouts, south side of Building 19; to Extensions of Sewers, Armory Square Hill Shops. With 2-inch sprinklers and 1-1/2 inch exhaust drains.

Jan 10, 1950 Drawing. No. 1740-97. Circuit details (Hill Shops) Electrical Conversion 550 Volts to 440 Volts. Electric conduit between bays 63-65 and Building 32 north.

Nov 18, 1952 Drawing. No. PM 499. Alteration to Sprinkler Systems Spaces 19-C-1, 19-C-37, 19-C-167, Hill Shops. New dry pipe system sprinkler, with sprinklers, pipes, and fittings.

Jan 4, 1954 Drawing. No. PM 585. Alterations to West End of Building 19 for Electric Sub-Station Enclosure. With revisions of April 9, 1954; substation to be located in bays 2-4; transformer pad outside of bays 2-4; and newly-bricked exterior arches.

Jun 1960 Drawing. No. 35-51-01. Radiographic Inspection Lab: Architectural Plans, Elevations, Sections, and Details; Mechanical, Electrical, and Construction Sign. Complete drawings to convert bays 1-9 into an X-ray laboratory with new lights, heating, and air-conditioning, and toilet room (in bay 9).

Sep 30, 1960 Drawing. No. PM 814. Modification of Basement Area - Building 19. Plan of plumbing, air-conditioning, lighting, and power; with small toilet room adjacent to east wall vented by a centrifugal fan, and with a light fixture over the east exterior door.

Dec 13, 1961 Drawing. No. PM 862. Proposed Feeder Lines from Building 19 to Building 20, Electrical. With 3-4 inch conduit from Building 25 to the east end of Building 19, and extending to the west end in the transformer sub-station in bays 2-4.

Jun 1962 Drawing. No. 18-02-101. General Police Signaling System. Police Station Boxes: no. 18, center wall; no. 39, inside west end; no. 24, east end; and no. 69, outside east end.

Jun 1962 Drawing. No. 18-02-101. General Fire Alarm Signal System. Fire alarm pull boxes: first-story elevator wall [bay 62]; second-story elevator wall [bay 62]; No. 66 first-story, west ext.; and No. 72, first-story, north end, east of vehicular passageway.

Jan 1963 Drawing. No. SK 71-03-04. Proposed Electrical Modifications, Springfield Armory, Hill Shop Area. 600 V system in transformer room.

Oct 1, 1963 Drawing. No. PM 909. Installation Facilities Office, Facilities Engineering Branch, Location 19-A and 19-B. Preliminary telephone exchange; work at bays 109-116; including

two toilet rooms on the south side of bays 112-114; with switchboard and air-conditioning room in bay 112.

- Nov 7, 1983 Contract. "Campus Utility Distribution System SPTCC." By Cleverdon, Varney, and Spike; installation of High temperature water system with future chilled water pipe.
- 1988 Document. "Comprehensive Facilities Plan: Existing Facilities Condition Report, STCC." By Crissman and Solomon, Architects; preliminary analysis of Building 19, including the mechanical and electrical (portions prepared by the engineering firm of Richard D. Kimbell).
- Jun 25, 1990 Document. "Dry Pipe Valve Trip Test Report." By Bay State Sprinkler Company; summary of yearly inspection for each of the four dry-pipe valves.

IV. CHARACTER-DEFINING FEATURES WITH RECOMMENDATIONS

INTRODUCTION

A. Critical Documents

The philosophical and practical foundation for the discussion on CDFs that follows is based upon the documents listed below. For these reasons, it is critical that the reader of this chapter be familiar with their content as a prerequisite to participating in any decision-making process on the rehabilitation of Building 19.

The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, rev. 1990.

Nelson, Lee H. Preservation Briefs 17 - Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character. Washington, D.C., Preservation Assistance Division, National Park Service, U.S. Department of the Interior.

Jandl, H. Ward. Preservation Briefs 18 - Rehabilitating Interiors in Historic Buildings: Identifying and Preserving Character-defining Elements. Washington, D.C., Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1988.

"Agreement Between the United States of America and the Commonwealth of Massachusetts" (concerning the administration of Springfield Armory National Historic Site), March 27, 1978.

B. Definition of the term "Character-defining Feature" (CDF)

The proposed treatment for Building 19 is rehabilitation. According to the Secretary of the Interior's Standards for Rehabilitation, "Rehabilitation" is defined as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." Critical to rehabilitating any structure under the Secretary of the Interior's standards and guidelines is an assessment and definition during the project planning stages of the significant character-defining features (CDF). In turn, each CDF is slated as a dynamic entity in any future planning or actuated work on the structure. A primary goal of this historic structure report on Building 19 has been the definition of its CDFs.

A character-defining feature (CDF) of a historic structure may be described as that element or treatment that imparts a certain quality or distinction to the structure and without which the architectural or historical integrity of that structure would be diminished or lost. According to Preservation Briefs 17, a CDF may relate to the structure's shape, materials, craftsmanship, decorative

details, interior spaces and features, as well as various aspects of its site and environment. It may be solely of an architectural nature or have historical association with a particular event, person, or complex/district. Therefore, a CDF may date to the initial construction of a particular structure or to a later alteration.

The importance of adhering to all the approved CDFs during the planning and construction phases of any project cannot be overstated. As the professional literature and experience points out, a small compromise today or tomorrow may lead to a slow withering away of the CDF such that the collective impact of the compromises seriously impacts the integrity of the structure over time.

B. Identification of Character-defining Feature Categories for Building 19

An analysis of the architectural and historical data collected on Building 19, in combination with a review of the current management documents for the Springfield Armory National Historic Site, led the authors of this study to formulate eleven categories of CDFs for the building. The CDFs attempt to address Building 19 in the context of the historical continuum of the Springfield Armory. This historical continuum reflects the appearance of the Armory at the time of its deactivation in 1968. By then, Building 19 had evolved with the rest of the Armory from the stately high-style architectural appearance fostered by its early commanding officers, Lee and Ripley, to a more industrial appearance founded on the principle that form follows function. The CDFs reflecting the historical continuum may not necessarily respect the original architectural integrity of the building. Their significance lies in the specific association with the Armory evolving as a whole. They are the tangible elements of that evolution.

The categories are: Style, Shape/Scale, Roof and Roof Features, Exterior Wall Openings, Materials, Setting, Plan, Exposed Structure, Interior Features, Surface Finishes, and Mechanical Systems.

Each category includes a background discussion, an identification of the CDFs, and a presentation of recommendations to fulfill the preservation of the CDFs.

STYLE

A. Background

The style of Building 19 in 1968 could be described as industrial. By 1968, the features that had contributed to its original style had been significantly compromised by the process of adding and subtracting elements. Its distinct Greek Revival and Italianate appearance became overlaid with modern intrusions. The motivation for the alterations was largely functional, relating mostly to the operation of the larger industrial complex. The buildings of the complex were seen only as a means to an industrial end. The aesthetic effect that any particular action would have on a buildings' integrity, therefore, was not taken into account.

B. CDFs

- Industrial style with added utilitarian features.

C. Recommendations

- Preserve original elements that contribute to the industrial functionalism of the building as it existed in 1968, such as the elevators and rectangular openings.

SHAPE/SCALE

A. Background

In 1968, the essential shape of Building 19 as a long, narrow gable-ended rectangle remained. Its exterior dimensions had been maintained as 764' long by 55' wide and two-stories high. The flat wall surface, characteristic of all elevations at construction, was impacted during the 20th century by several concrete elevator platforms--two on the south elevation (bays 30 and 62) and one on the north elevation (bay 97). Otherwise, the building's wall elevations maintained their two-dimensional flatness. The corbelled cornice and sandstone returns at the gable ends remained virtually unaltered.

The shape and scale of Building 19 continued to be consistent with other buildings within the Armory complex in 1968.

B. CDFs

- The long, narrow length and the gable-ended lines.
- The lack of significant projections from the wall elevations, with the exception of the three concrete elevator platforms.
- The simple line of the corbelled brick cornice and sandstone returns at the gabled ends.

C. Recommendations

- Retain the essentially two-dimensional character of the wall elevations, while repairing and rehabilitating the three concrete elevator platforms.

Treatments of the Segmental Arches

At construction, the second-story segmental arches had been filled with double fixed-sash of 40 lights or louvered blinds. By 1968, the south elevation's segmental arches were all fitted with double fixed-sash of 40 lights; the louvered blinds were gone. The north elevation still retained some of its louvered blinds in the West Addition, Long Storehouse I and II. The Stables, by then, were all fixed sash.

Interior Shutters. Interior shutters had been removed from the semi-circular arches that had been filled with brick, wood garage-doors, matchboard siding-doors, and the arches converted to rectangular openings. Otherwise the interior shutters were intact.

B. CDFs

- The hierarchy of openings between stories.
- Retain exterior wall opening profiles.
- The special treatments for the arches, noted under "Background" above.

C. Recommendations

- Maintain existing opening configurations and brick infill.
- Replace, in-kind, where missing or repair, in-kind, those treatments to semi-circular arches that are extant, including the following: frames, louvered blinds, solid panels, and fanlights.
- Satisfy code egress requirements by utilizing existing opening locations to the extent possible. Use solid-panel treatment for new doors that may be required.
- Improve the thermal efficiency of the archway treatments; all glazing and/or insulating measures should be installed on the interior without interfering with exterior historic treatments.
- Maintain second story, window frames, glazing, and louvers conforming to ca. 1968 configurations and details.
- Insure that the openings and archways are maintained and visible on the interior; i.e. they should not be obscured with suspended ceilings or by other modern features.
- Preserve where extant and replace where missing interior shutters, if possible. Otherwise, preserve a select group of shutters in-situ and remove the rest.

MATERIALS

A. Background

The predominant materials at construction included brick, sandstone, slate, and wood and have remained dominant throughout the structure's history. The significant difference in materials between original construction and the 1968 date was the introduction of a formed-concrete structural system in the basement in ca. 1937 and the introduction of a structural steel system throughout the first story in the early 1940s.

B. CDFs

- Brick walls and cornice.
- Sandstone details (water table, sills, returns).
- Wood details (sash, louvered blinds, panelled infill for arches).
- Slate roof.
- Structural formed-concrete.
- Structural steel.

C. Recommendations

- Historic materials, identified as CDFs, should not be substituted; repair in-kind.
- Monitor, evaluate, and repair brick deterioration caused by moisture penetration.
- Monitor, evaluate, and repair possible brick deterioration caused by paint removal.
- Monitor, evaluate, and report whether later repointings with a possible portland cement mortar is exacerbating deterioration of masonry walls.
- Monitor, evaluate, and repair structural cracks in the masonry walls.
- Monitor, evaluate, and replace or repair deteriorated sandstone.
- Replace, in-kind, the following: broken, mechanically damaged, or spalled brick.
- Remove ivy and other biological growth from the wall surfaces.

SETTING

A. Background

Building 19 still maintained in 1968 some of its visual prominence on the north side of the Armory that it possessed from initial construction. This prominence was compromised, however, by the heavily built-up and modernized environment that encircled the building. Substantial buildings were constructed to the east and immediate north of Building 19. To the north a large brick structure (Building 32) was constructed, separated by only a concrete alley from Building 19. A vehicular passageway was inserted through Building 19 in place of an earlier pedestrian and horse passageway. The south elevation still maintained a green space between it and the grouping of 19th century buildings situated behind the buildings facing the parade ground. Concrete sidewalks and a railroad trestle were installed adjacent to Building 19. The more bucolic and planned landscape of the 19th-century had given way to a more industrial setting in the vicinity of Building 19.

B. CDFs

- Prominence at the north end of the Armory site.
- West/east orientation.
- Unencumbered views from the west, south, and east elevations.
- Green spaces to the west and south of the building.

C. Recommendations

- Retain entire building in present location.
- Remove asphalt immediately adjacent to the building.
- Evaluate and rehabilitate or replace perimeter subsurface drainage system.
- Evaluate the efficiency and effect on the building of the concrete embankment on its north side; remove or repair as determined to be appropriate.
- Reinstall a limited green zone (at least 12' in width) around the building for both aesthetic and protective reasons, to extent feasible; treat the landscape as is determined to be appropriate.
- Regrade ground around the building so that water would slope away from the building.

- Reroute circulation patterns around the building, including the introduction of sidewalks for access to the building's entry points.
- Assess the detrimental effects the vehicular passageway has on the building fabric and evaluate other ways to provide vehicular access around the building.
- Evaluate the potential for developing the area to the north of Building 19, 28, and 32 for parking. Currently, the proximity of Building 32 makes landscaping changes problematic on the north. To the north of all three buildings, however, is an abandoned parking lot. This area appears to have potential to be utilized, landscaped, and developed for parking.
- Evaluate the potential for landscaping the enclosed asphalted area at the east side of the building.
- Evaluate the possibility of retaining vestiges of the building's immediate industrial past including signs, mechanical boxes, etc. attached to the building, and introducing interpretative (historical) markers and signs as determined to be appropriate.

PLAN

A. Background

Major interventions to the plan occurred prior to 1968 at the west and east ends of the building in the West Addition and the Stables, respectively. The portion of the building in-between these areas remained virtually unchanged. The west end of the West Addition was substantially altered by the introduction of an electric substation in ca. 1954 and a radiographic lab in ca. 1960. The east end was significantly altered in the late 1930s by projects undertaken by the Works Progress Administration. Alterations at both ends of the building destroyed the rhythm of the bay plan introduced at construction.

Several bays within Long Storehouse I and II were affected by the introduction of the three freight elevators (at bays 30, 62, and 97). Each elevator was confined to one bay and enclosed within a brick shaft. The elevators serviced each floor, in addition to the original stairways remaining at bays 36 and 96.

The principal entrance at the west of the building lost its importance in the architectural hierarchy of openings. Although still somewhat limited, new openings were introduced along both the south and north elevations. The center aisle maintained its role as the primary west to east circulation artery. Affecting the circulation patterns, was the infill treatment of semi-circular arches along partition, fire, and end walls. The arches of the walls that separated the different phases of construction work were filled with brick and the center archway was transformed from a semi-circular archway into a rectangular opening. The original semi-circular arch in PW8 was filled with brick creating a solid wall. Access was no longer possible into the Stables from the Long Storehouse on the first story. On the second and loft stories, however, the Stables were no longer segregated from the Long Storehouse by the introduction of an opening at each floor. PW5 which apparently had been truncated at construction was converted into a firewall during the 20th century on the second and loft floors. By 1968, PW3, PW5, and PW7 on all floors had been converted into fire walls, complete with fire doors.

On the first floor, sprinkler system valve rooms were introduced at bays 24, 50, 82, and 106. The building was thus separated into four zones for the sprinkler system.

B. CDFs

- West/east orientation of the building.
- Large rectangular spaces, defined by the different construction phases.
- Semi-circular arched masonry partition walls (PWs) that further subdivide the different sections.

- Continuous center aisle with bays on either side defined by the exposed structural system.
- Limited egress.
- Brick elevator shafts.

C. Recommendations

- Restore the west end as the principal entrance, with limited egress along the south and north elevations.
- Retain the four major sections of the building--defined by the original masonry bearing walls (PW3, PW5, and PW7)--as the prime division of space.
- Retain the arched masonry partition walls (PW1, PW2, PW4, PW6, PW8, and PW9) that subdivide the space within major sections of the building.
- Retain the west/east center aisle as the primary circulation artery.
- Preserve the industrial ambience of the exposed structure and of all open spaces, i.e. partitioning-off the central entrance bay (center aisle) with a single open office to either side may be a reasonable division of building space, should it be required.

EXPOSED STRUCTURE

A. Background

The structural system as it survives today is identical to the one extant in 1968. It consists of load-bearing brick walls with arches throughout; steel columns, channels, and I-beams on the first story; wood posts on the second story; and a queen-post truss system on the third story. The system varies from the original system on the first story in two ways, as follows: first, the cast-iron columns were replaced by a steel structural system; and secondly, by the addition of pilasters and piers at the arches and openings, and the filling of arches. The structural system is exposed, except where new brick partition walls have been introduced at the west end of the first story. The structure continues to play the role established at construction in defining the floor plan according to bays.

B. CDFs

- Exposed structural system.
- The rhythm of the structural system that defines each bay at each story.
- Exposed load-bearing brick walls, with semi-circular arches.
- Queen-post truss system.

C. Recommendations

- Maintain exposed the structural system as a prominent component of the interior. (If proposed uses of the building require suspended ceilings, furred walls or raised floors, these features should be installed with minimal impact on the existing surfaces.)
- Retain all existing load-bearing masonry walls and historically identified features.
- Retain the queen-post truss system.
- Survey, evaluate, and repair any structural weaknesses.

INTERIOR FEATURES

A. Background

The continuing use of Building 19 as a storehouse presumably influenced the fact that the interior features were altered only minimally throughout its history. The original stairways at bays 36 and 96 have survived, but have been enclosed by plywood partitions (stairway at bay 110 was removed). A new feature introduced during the 20th century was the fire doors. By 1968, the flooring on the first story and in the basement was primarily concrete. The second and loft stories still had wood flooring. The flooring had been modified and partially replaced with newer wood flooring since construction.

B. CDFs

- Stairways at bays 36 and 96.
- Fire doors at all stories of PWs 3, 5, 7 and bay 59.

C. Recommendations

- Retain the original wood stairways, removing enclosures. (If code requires enclosure, introduce elements sympathetic to the historic fabric.)
- Retain the simple utilitarian lines and the use of wood in new stairway construction.
- Introduce new stairways, if necessary, adjacent to or along the masonry end, partition, or fire walls in such a manner that they do not penetrate the walls. (Any new stairways should not interrupt the circulation pattern and should keep center aisles free of obstruction.)
- Investigate and document through archeology the history of flooring material employed on the first story before any significant change to the extant flooring materials is made.
- Maintain exposed wood floors in the upper stories, where possible.
- Rehabilitate fire doors.

SURFACE FINISHES

A. Background

The significant difference in exterior surface finishes between the original construction and the 1968 date was the removal of paint from the brick walls. This action occurred in ca. 1938 and changed the overall exterior character of the structure. All the buildings in the Armory complex that had been painted were stripped of their paint. The exterior wood trim remained painted.

The fact that Building 19 always was a secondary, utilitarian structure under the Armory's jurisdiction contributed to maintaining the rugged, industrial interior appearance. This included the exposed brick walls and structure. Walls that were painted at construction, however, are still painted, but appear in deteriorated condition. The remodelling of portions of the West Addition and the Stables have significantly altered the interior to the extent that the surface finishes are not distinguished.

B. CDFs

- Unpainted brick exterior walls.
- Painted exterior wood details.
- Unpainted brick interior walls, exposed structural system, and wood flooring.
- Painted opening treatments (frames, louvered blinds, solid panels, sash, shutters, and hardware).
- Painted stairways.
- Historic paint on PW3 (west side) and PW7 (east side).

C. Recommendations

- Repaint exterior wood trim to match historic 1968 color scheme, as determined by paint analysis.
- Maintain the rugged, industrial character of the building's interior through the lack of interior finishes on the brick, exposed structural system, and flooring.
- Repaint the interior opening treatments (frames, sash, blinds, doors, shutters) and stairways, as determined by paint analysis in a consistent manner to maintain the uniformity of appearance.

MECHANICAL SYSTEMS

A. Background

The mechanical systems that were extant in Building 19 by 1968 included: three freight elevators (bay 62, 1935, and bays 30 and 97, 1942); a dry-pipe fire sprinkler system (Rockwood, ca. 1942); electrical lighting and receptacles (electric power plant at Armory, ca. 1917); steam heating system in the Stables (ca. 1938); and lavatories (ca. 1939 and 1960).

B. CDFs

- Fire sprinkler system.
- Freight elevator shafts.

C. Recommendations

- Evaluate design options so that any new mechanical systems will not physically intrude upon the building's other CDFs.
- Evaluate the possibility of installing new mechanical systems along the first story west/east center aisle, thereby not impacting the arched masonry walls.
- Evaluate the load limits of floors to accommodate new mechanical systems, as well as any new proposed uses.
- Evaluate the possibility of carrying the utilities from the ground to the loft area within the elevator shafts, if the elevators are not desirable and space is available in the shaft.
- Evaluate the effects and options for moving the systems that are tied into other buildings in the Armory, i.e. High Temperature Hot Water (HTHW) system that was installed in ca. 1983; the transformer station, installed in 1986; and the electrical substation installed in 1954.
- Evaluate options for recirculating the HTHW system in a manner more sympathetic to the CDFs of the building.
- Introduce any new plumbing vents on the north side of the building so they are not visible from the south elevation.
- Maintain in-place, a representative portion of the existing fire protection system, if at all possible, for interpretive purposes.

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For a complete list of microfilm available at SPAR NHS see the Microfilm Index following this Bibliography. The following rolls of microfilm from SPAR NHS were used by the authors; 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 55, 56, 57, 58, 59, 60, 61, 114, 132, 141, 142, 143, 144, 159, 160, 161, 162, 163, 164, 193, 194, 195. Record Groups and Entries listed below represent the location of specific data used in this report.

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**AN INVENTORY OF HISTORIC DRAWINGS AND PLANS
OF
BUILDING 19
SPRINGFIELD ARMORY**

From the Collections of SPAR NHS
Arranged Chronologically
Undated Drawings are Listed Last

1860

Title: Foundation Wall for Barn
Date: August 20, 1860
Drawing No.: NHSD 129
Dimension: 22-1/2" x 44"
Material: Original, drafting linen, ink
Collection: SPAR, Drawer 7, Folder 2A

1861

Title: Stables and Long Storehouse Ventilator for Barn
Date: July 24, 1861
Drawing No.: SA 1455
Dimension: 21-1/2" x 36"
Material: Original, paper, ink
Collection: SPAR, Drawer 7, Folder 2A
Comment: See also Small Drawer 3, Folder 4A for other SA 1455 drawings.

1862

Title: Addition to West End of Storehouse
Date: August 20, 1862
Drawing No: NHSD 128
Dimension: 20" x 81-3/4"
Material: Original, drafting linen, ink
Collection: SPAR, Drawer 7, Folder 2A

1909

Title: Long Store House Floor Plan... Storage Rooms, 51 to 59
Date: April 20, 1909
Drawing No: SA 268
Dimension: 24" x 39"
Material: Original, drafting linen, ink
Collection: SPAR, Drawer 7, Folder 2
Comment: Building 19

1916

Title: Long Storage House Floor Plans
Date: October 9, 1916
Drawing No.: SA 1675
Dimension: 24" x 39"
Material: Original, drafting linen, ink
Collection: SPAR, Drawer 7, Folder 2
Comment: Building 19

1918

Title: Storage Platform in Third Section from East End of Long Storehouse; Hillshops
Date: February 18, 1918
Drawing No: SA-E-74
Dimension: 12" x 20"
Material: Original, drafting linen, ink
Collection: SPAR, Small Drawer 3, Folder 4
Comment: Building 19

1935

Title: Alterations to Floor and Doorways; Stables; Building No. 19A
Date: March 15, 1935; revised 1937
Drawing No: SA 10004A
Dimension: 18" x 29-1/2"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Present Elevator Shafts Buildings Nos. 19 and 27; Hill Shops
Date: March 15, 1935
Drawing No: SA 10003-S3, Sheet 4 of 5
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: Alterations to Floors and Doorways; Stables; Building No. 19A; Hillshops
Date: March 15, 1935; revised 1937
Drawing No: SA 10004, Sheet 1 of 2
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: Alterations to Floors and Doorways; Stables; Building No. 19A; Hill Shops
Date: March 15, 1935
Drawing No: SA 10004A, Sheet 2 of 2
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: 2-Ton Freight Elevator Section 62; Building No. 19-B-S1; Hill Shops
Date: April 15, 1935
Drawing No: SA 10003-F
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

1936

Title: New Cinder Road at South West End of Building 19; Hill Shops
Date: July 1, 1936
Drawing No: SA 10124-S
Dimension: 12-1/2" x 20-1/4"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Floor Plans Building Nos. 19 and 19A; Hill Shops
Date: July 31, 1936
Drawing No: SA 6085; superceded by SA 13305
Dimension: 24-1/4" x 40-1/2"
Material: Original, traced copy, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: Steel Schedule; Alterations to Floor; Stables; Building No. 19A; Hill Shops
Date: December 28, 1936; revised 1937
Drawing No: SA 10004-B
Dimension: 10-3/4" x 25-1/2"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

1937

Title: Steel Lintel; Alterations to Floor; Stables; Building No. 19A; Hill Shops
Date: January 20, 1937
Drawing No: SA 10145
Dimension: 12-3/4" x 20-3/4"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Angle Corner Guards; Alterations to Floor; Stables, Building No. 19A; Hill Shops
Date: January 20, 1937
Drawing No: SA 10146
Dimension: 11-1/2" x 18-1/2"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Sliding Doors for Building No. 19A; Hill Shops
Date: February 15, 1937
Drawing No: SA 10148
Dimension: 12-1/4" x 20"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Relocation of Stairs in Stable; Building No. 19A; Hill Shops
Date: March 4, 1937
Drawing No: SA 10150
Dimension: 11-1/4" x 18"
Material: Original, tracing paper
Collection: SPAR, Small Drawer 3, Folder 4

1938

Title: Steel Lintel; Alterations to Salaporte; Building 19; Space B99; Hill Shops
Date: April 26, 1938
Drawing No: SA 10221
Dimension: 12" x 21"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Alterations to Salaporte; Building 19; Space B99; Hill Shops
Date: April 26, 1938
Drawing No: SA 10220
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

1940

Title: Structural Steel Lintel and Corner Guards; Building 19A; Space B-9; Hill Shops
Date: June 21, 1940
Drawing No: SA 13196
Dimension: 12" x 20"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: Structural Steel, Reinforcing Floor "B" of Building No. 19; Hill Shops
Date: November 1, 1940
Drawing No: SA 13243, Sheet 1 of 2
Dimension: 24" x 39"
Material: Original, tracing paper, pencil; blue line on white paper
Collection: SPAR, Drawer 7, Folder 2

Title: Structural Steel, Reinforcing Floor "B" of Building No. 19, Hill Shops
Date: November 1, 1940
Drawing No: SA 13243-1, Sheet 2 of 2
Dimension: 24" x 39"
Material: Original, tracing paper, pencil; blue line on white paper
Collection: SPAR, Drawer 7, Folder 2

1941

Title: Structural Steel for Reinforcing of Floor Above Spaces 19A-B1, 19A-B9 and 19A-B15; Building No. 19; Hill Shops
Date: December 29, 1941
Drawing No: SA 13390
Dimension: 18" x 29-1/2"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

1942

Title: Alteration to Doors; Building No. 19; Hill Shops
Date: January 1, 1942
Drawing No: SA 13397
Dimension: 18" x 29-1/2"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

Title: 2-Ton Freight Elevator; Space 19A-B15 of Building No. 19, Hill Shops
Date: January 7, 1942
Drawing No: SA 13403
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: 2-Ton Freight Elevator; Space 19B-25, Section 30; Building No. 19; Hill Shops
Date: January 8, 1942
Drawing No: SA 13404
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: Connections of Downspouts; South Side; Building No. 19; to Extensions of Sewers; Armory Square; Hill Shops
Date: May 23, 1942
Drawing No: SA 13468
Dimension: 24" x 48"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

1950

Title: Circuit Details (Hill Shops) Electrical Conversion 550
Volts to 440 Volts
Date: January 10, 1950
Drawing No: 1740-97
Dimension: 24-1/2" x 42"
Material: Print, blue line on white paper
Collection: SPAR, Drawer 7, Folder 1
Comment: Building Nos. 19, 28 and 32

1952

Title; Alterations to Sprinkler Systems Spaces 19-C-1, 19-C-37,
19-C-167; Armory Square, Hill Shops
Date: November 18, 1952
Drawing No: PM 499
Dimension: 24" x 52"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: New Floor Construction, Building No. 19
Date: November 28, 1952
Drawing No: 33-01-03, Sheet 1 of 1
Dimension: 28-1/2" x 40-1/2"
Material: Original, drafting linen, pencil and ink
Collection: SPAR, Drawer 7, Folder 1

1954

Title: Alterations to West End of Building No. 19 for Electric
Sub-Station Enclosure, Armory Square
Date: January 4, 1954
Drawing No: PM 585
Dimension: 18" x 29-3/4"
Material: Original, tracing paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4

1955

Title: Preliminary Sketch, Proposed Renovation and Rehabilitation of Building 19 for Property Division, Armory Square
Date: May 10, 1955
Drawing No: PM 666
Dimension: 24" x 41"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: Building No. 19, All Floors
Date: March 1, ? ; 1st revision 1943; last revision 1955
Drawing No: SA 13305
Dimension: 24-1/2" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2
Comment: Supercedes tracing SA 6085

1960

Title: Radiographic Inspection Lab; Building No. 19; Architectural Plans, Elevations, Sections, and Details
Date: June 1960
Drawing No: 35-51-01, Sheet 1
Dimension: 29-1/2" x 40"
Material: Original, drafting linen, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: Radiographic Inspection Lab; Building No. 19; Mechanical Plumbing, heating, Ventilating, and Air Conditioning Plans
Date: June 1960
Drawing No: 35-51-01, Sheet 2
Dimension: 29-1/2" x 40"
Material: Original, drafting linen, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: Radiographic Inspection Lab; Building No. 19; Electrical Plans
Date: June 1960
Drawing No: 35-51-01, Sheet 3
Dimension: 29-1/2" x 40"
Material: Original, drafting linen, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: Modification of Basement Area; Building No. 19
Date: September 30, 1960
Drawing No: PM 814, Sheet 2 of 2
Dimension: 24" x 40"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 1

1961

Title: Proposed Feeder Lines From Building 19 to Building 20, Electrical
Date: December 13, 1961
Drawing No: PM 862
Dimension: 24-1/2" x 42-1/2"
Material: Original, drafting linen, pencil
Collection: SPAR, Drawer 7, Folder 1

1963

Title: Installation Facilities Office Facilities Engineering Branch Location Building 19; Lower and Upper "A" Floor Communication Facilities
Date: December 31, 1963
Drawing No: PM 909
Dimension: 29" x 41"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 1

NO DATES

Title: Stables
Date:
Drawing No: SA 1455
Dimension: 16-1/4" x 26-3/4"
Material: Original; detail paper, ink and watercolor
Collection: SPAR, Small Drawer 22, Folder 2
Comment: Building 19

Title: Stables (Proposed Alteration to South Elevation of the Long Storehouse.)
Date: (ca. 1866)
Drawing No: SA 1455
Dimension: 13-1/2" x 27-3/4"
Material: Original; detail paper, ink and watercolor
Collection: SPAR, Small Drawer 3, Folder 4A
Comment: Building 19

Title: Stables in Long Storehouse
Date:
Drawing No: SA 1455
Dimension: 19" x 30"
Material: Original; detail paper, ink and pencil
Collection: SPAR, Small Drawer 3, Folder 4A
Comment: Building 19

Title: Stables; 19A
Date:
Drawing No: SA 1455
Dimension: 19" x 30-1/2"
Material: Original; detail paper, ink and pencil
Collection: SPAR, Small Drawer 3, Folder 4A

Title: 19A; Stalls in Stables in Long Storehouse
Date:
Drawing No: SA 1455
Dimension: 15" x 19" (glued on larger sheet of paper)
Material: Original; detail paper, pencil
Collection: SPAR, Small Drawer 3, Folder 4A

Title: Windows Long Storehouse
Date:
Drawing No: SA 1455
Dimension: 20" x 28"
Material: Original; detail paper, ink
Collection: SPAR, Small Drawer 3, Folder 4A

Title: Building 19
Date:
Drawing No: NHSD 123
Dimension: 13-3/4" x 20"
Material: Print; blue line on white paper
Collection: SPAR, Small Drawer 3, Folder 4
Comment: 19A-B9; 19A-B2

Title: Untitled, but shows walks and catch basins around Building 19
Date:
Drawing No: NHSD 124
Dimension: 24" x 39"
Material: Original; tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: Building 19; West End B1 to B11 Bays
Date:
Drawing No: NHSD 125
Dimension: 31-1/2" x 42-1/4"
Material: Original; drafting linen, pencil
Collection: SPAR, Drawer 7, Folder 2

Title: Plan of New Boiler Room and Section, Boiler Room
Date:
Drawing No: NHSD 126
Dimension: 20" x 42"
Material: Print; blue line on white paper
Collection: SPAR, Drawer 7, Folder 2
Comment: Building 19; copied in 2 pieces

Title: WG 19-4; Welded Grating
Date:
Drawing No: NHSD 127
Dimension: 17" x 22"
Material: Print; blue line on white paper
Collection: SPAR, Small Drawer 3, Folder 4

Title: Sprinkler; Building 19; Deck
Date:
Drawing No: PM 499
Dimension: 29" x 52"
Material: Print, with original markings added, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: Installation Facilities Office; Facilities Engineering
Branch; Location 19A-B2 and A-B9
Date:
Drawing No: PM 909
Dimension: 28" x 42"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 1

Title: Plant Facilities Office; Project and Plans Branch; Building
No. 19; Proposed Metallurgical (Powdered) Lab
Date:
Drawing No: PM 882, Sheet 1 of 1
Dimension: 24" x 42"
Material: Original, tracing paper, pencil
Collection: SPAR, Drawer 7, Folder 1

MICROFILM INDEX

(Copies of the rolls of microfilm listed
herein are located at SPAR NHS.)

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current as of November 29, 1990

ROLL	ENTRY	ENTRY TITLE AND DATES
	1362	Letters rec'd 1813-1817
"	"	" " 1818-1820
"	"	" " 1819-1821
"	"	" " 1821-1823
"	"	" " 1824-1826
"	"	" " 1826-1827
"	"	1827-1829 and Constitution of Watershops Fire Company, c. 1830
"		Letters rec'd 1829-1831
"	"	" " 1831-1833
0	"	" " 1834-1837
1	"	" " 1838-1840 and "Instructions for Browning Arms" and "Condemmed stores sold at auction, 1840"
2	"	Letters rec'd 1841-1843
3	"	" " 1847-1860 and various documents from 1860
4	"	" " 1861
5	"	" " 1861-1862
5	"	" " 1862
7	"	" " 1862-1863
3	"	" " 1863
9	"	" " 1863-1864
0	"	" " 1864
1	"	" " 1864-1865
2	"	" " 1865
3		NOT RECIEVED YET
4	1362	Letters rec'd 1867-1868
5	"	" " 1868-1869
5	"	" " 1870-1871
7	"	" " 1871-1872
3	"	" " 1872-1873, 1875, 1879-1880
9	"	" " 1880-1881
0	"	" " 1881
L	"	" " 1881-1882
2	"	" " 1883-1884
3	"	" " 1885-1886
4	"	" " 1887
5	"	" " 1887-1888
5	"	" " 1888-1889
7	"	" " 1889-1890
3	"	" " 1891
0	"	" " 1892
0	"	" " 1892-1893, 1909, 1913
2	"	" " 1892-1893
2	"	" " 1893
2	"	" " 1893
2	"	" " 1894
3	"	" " 1895
3	"	" " 1895
3	"	" " 1895-1896
3	"	" " 1897
3	"	" " 1897
3	1360	Index to letters rec'd, 1886-1894

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COLL	ENTRY	ENTRY TITLE AND DATES
0	1363	Index to letters rec'd ,official,1894-1900
51	1350	Index to letters sent,general,1882-1886
	1353	" " " " ,Chief of Ordnance,1884-1891
	1358	" " " " rec"d,misc.,1873-1900
52	1365	Letters rec'd,official,1816,1818-1822
53	"	" " " " 1823-1829
4	"	" " " " 1830-1838
5	"	" " " " 1834-1844
56	"	" " " " 1845-1848
7	"	" " " " 1849-1852
8	"	" " " " 1853-1855
59	"	" " " " 1856-1858
60	"	" " " " 1862-1863;Weekly statement of Ordnance stores;1863-1864,Telegrams rec'd,1862-1864
61	"	Letters rec'd,official,1864-1863 and Weekly Statement of Ordnance stores,1864
2	"	Letters rec'd,official,1866-1868
3	"	" " " " 1869-1870
74	"	" " " " 1871-1873
5	"	" " " " 1872-1874
6	"	" " " " 1874
57	"	Letters rec'd,official and miscellaneous,1875
58	"	" " " " " " 1875-1876
9	"	" " " " " " 1876-1877
0	"	" " " " " " 1877-1879
1	"	" " " " " " 1878
2	"	" " " " " " 1879
3	"	" " " " " " 1879-1881
74	"	" " " " " " 1882-1884
5	"	" " " " " " 1884-1888
6	"	" " " " " " 1889-1891
7	"	" " " " " " 1892-1894
8	"	" " " " " " 1892-1894
9	"	" " " " " " 1896-1898
0	"	" " " " " " 1866-1867
31	1352	Press copies of letters sent 1871-1872
2	"	" " " " " " 1873
3	"	" " " " " " 1873-1874
54	"	" " " " " " 1875
5	"	" " " " " " 1876
6	"	" " " " " " 1877
7	"	" " " " " " 1878
58	"	" " " " " " 1878-1879
9	"	" " " " " " 1879-1880
0	"	" " " " " " 1881
91	"	" " " " " " 1896
2	"	" " " " " " 1896-1897
3	"	" " " " " " 1897
94	"	" " " " " " 1897
5	"	" " " " " " 1897-1898
6	"	" " " " " " 1898
7	"	" " " " " " 1898

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8 1352	Press Copies of letters sent 1898-1899
9 "	" " " " 1899
00 "	" " " " 1899
01 "	" " " " 1899
02 "	" " " " 1899
03 "	" " " " 1899-1900
04 "	" " " " 1900
05 "	" " " " 1900
06 "	" " " " 1900
07 1367	General correspondence and documents 1903-1915
08 "	" " " " 1905-1915
09 "	" " " " 1902-1910
10 "	" " " " 1902-1910
11 "	" " " " 1910-1914
12 "	" " " " 1902-1910
13 "	" " " " 1901-1912
14 1384	Index of reports to Commanding Officers 1892-1902
1385	Reports to Commanding Officers 1863-1869
15 "	" " " " 1870-1877
16 "	" " " " 1878-1881
17 "	" " " " 1882-1885
18 "	" " " " 1896-1900
19 "	" " " " 1901-1902
20 "	" " " " 1903-1905
21 "	" " " " 1906-1903
22 1369	General correspondence 1916
23 "	" " " " 1916-1917
24 "	" " " " 1916-1918
25 "	" " " " 1918
26 "	" " " " 1918
27 "	" " " " 1918-1919
28 "	" " " " 1919
29 "	" " " " 1919
30 "	" " " " 1919
31 "	" " " " 1919
32 1386	Reports and proceedings of Boards of Officers 1864-1876
33 "	" " " " " " " " 1877-1879
34 "	" " " " " " " " 1879-1882
35 "	" " " " " " " " 1883-1889
36 "	" " " " " " " " 1889-1896
37 "	" " " " " " " " 1896-1902
38 "	" " " " " " " " 1898-1900
	1902-1905
39 1387	Reports of powder tests at SpAr 1877-1903
40 "	" " " " " " " " 1877-1903
41 1382	Contracts for Ordnance, Supplies and Construction 1806-1918
42 "	" " " " " " " " 1806-1918
43 1367	General correspondence 1903-1915
1368	Telegrams sent and received 1861-1868

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144	1372	Orders, Circulars, Regulations 1827-1840
		1373 General Orders for SpAr 1871-1872, 1881-1893
	1378	Circulars of Ordnance Dept. 1841-1851
	1394	Master Armorer, letters sent 1889-1899
	1389	Letters sent by Storekeeper and Paymaster 1799-1815
45	1389	Letters sent by Storekeeper and Paymaster 1814-1856
46	1389	Letters sent by Storekeeper and Paymaster 1856-1859
	1357	Letters sent by Executive Officer 1874-1877
47	1366	Letters rec'd, Official 1827-1833 and general correspondence 1900-1915
48	BOOK	A. Mordecai, 1849, "Artillery for the United States Land Service"
49	BOOK	L. deTousard, 1818, "Elements of Artillery" or "American Artillerist's Companion"
50	BOOK	Historical Record, Springfield Armory, 1932-1942
51	BOOK	Scrapbook #1, 1846-1941
52	BOOK	" #2, 1943-1954
53	BOOK	" #3, 1954-1957
54	BOOK	" #4, 1957-1964
55	BOOK	" #5, 1964-1967
56	BOOK	Project Manual for IFB 1930-82b, Interior Rehabilitation of Building 13
57	BOOK	Project BDNR#873-136, Bids for Repairs to Buildings 13 and Quarters 1
58	1351	Letters sent 1815-1834
59	"	" " 1835-1860
60	"	" " 1860-1861
61	"	" " 1861-1863
62	"	" " 1863-1864
63	"	" " 1864-1865
64	"	" " 1864-1870
65	"	" " 1873-1884
66	"	" " 1885-1891
67	"	" " 1891-1893
68	"	" " 1893-1894
69	"	" " 1894-1896
70	"	" " 1896
71	1370	Annual Reports of arms made on contract 1818-1830
	1380	Journals of Receipts 1794-1811
72	1391	Press copies of letters sent by Shopkeeper & Paymaster to Washington, 1861-1869
73	"	Press copies of letters sent by Shopkeeper & Paymaster to Washington, 1875-1879
74	1355	Press copies of letters & endorsements sent to the Commander of the Ordnance Department 1871-1873
75	"	As Above 1895
76	"	" " 1895-1896
77	"	" " 1896
78	"	" " 1896-1897
79	"	" " 1897
80	"	" " 1897-1898
81	"	" " 1898
82	"	" " 1898

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OLL ENTRY ENTRY TITLE AND DATES

83	"	Press copies of letters & endorsements sent to the Commander of the Ordnance Department	1899
84	"	As Above	1898-1899
85	"	" "	1899
86	"	" "	1900
87	1356	Letters sent by the Commander of the Ordnance Detachment	1878-1892
88	"	As Above	1892-1893
89	"	" "	1893-1895
90	"	" "	1896
91	1356	Letters sent by the Commander of the Ordnance Detachment	1897-1900
92	"	As Above	1900
93	1354	Letters sent to the Chief of Ordnance	1836-1847
94	"	" " " " " "	1847-1860
95	"	" " " " " "	1860-1870
96	"	" " " " " "	1873-1881
97	"	" " " " " "	1882-1897
98	"	" " " " " "	1887-1892
99	"	" " " " " "	1891-1895
00	BOOK	Derwent Stainthorpe Whittlesey, "The Springfield Armory: A Study In Institutional Development"	
01	1359	Registers of letters rec'd,	1867-1873, 1894-1895
02	"	" " " " " "	1896-1900
03	1361	" " " " " "	1873-1879
04	"	" " " " " "	1880-1881, 1886-1887, 1882-1883
05	"	" " " " " "	1884-1885, 1888-1891
06	"	" " " " " "	1892-1894
07	1364	Registers of letters rec'd, official	1894-1895
08	"	" " " " " "	1896-1897
09	"	" " " " " "	1897-1898
10	"	" " " " " "	1899-1900
11	1374	General Orders of the Springfield Armory	1934, 1936-1938
	1375	Special Orders of the Springfield Armory	1934-1939
12	1376	Memorandum orders of SpAr	1918-1919
	1374	General Orders of the Springfield Armory	1918-1920
13	1395	Records of the Technical Detachment fo Ordnance	1918-1919
14	1396	Correspondance of the Coast Artillery Corps guard detachment	1919
	1397	Special Orders of the Coast Artillery Corps guard detachment	1919
15	1388	Miscellaneous records of Springfield Armory	1925-1938
16	"	" " " " " "	" "
17	M927	Letters, orders for pay, accounts, receipts, and other records concerning military stores,	1776-1780
18	M853-1	Index for numbered record books concering military operations and service ,pay and settlement of accounts and supplies in the War Department Collection of Revolutionary War Records	
19	M853-14	Lists of Connecticut, Massachusetts & Rhode Island troops,	1776-1783

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21 M853-26	Register of letters received by Timothy Pickering, May-August, 1781, and letters sent by same, 10 May 1781-9 May 1782
222 M853-27	Letters sent by Timothy Pickering, Quartermaster General, 4 January 1782-21 January 1783
223 M853-28	Letters sent by Timothy Pickering, Quartermaster General, 8 January 1783-9 July 1787
24 M853-29	Estimates and returns of supplies, funds and personnel, Quartermaster General's Department and Commissary General of Military Stores Department, 1780-1793 (volumes 148, 103)
25 M853-33	Letters sent by Samuel Hodgdon, Richard Frothingham and Benjamin Flower, 19 July 1778-24 May 1784
26 M926	Letters, returns, accounts and estimates of the Quartermaster General's Department, 1776-1783
27 M913	Personnel returns of the 6th Massachusetts Battalion and returns and accounts of military stores for the 8th and 9th Massachusetts Regiments, 1779-1782
28 1371	Springfield Armory Work Returns
229 "	" " " " "
30 "	" " " " "
31 "	" " " " "
32 "	" " " " "
33 MISC.	a) Statements of machines and manufacturing capacity at U.S. Arsenals, 1 January 1864 b) Reports of Ordnance Equipment, 1812 c) Inventory of Lands and Buildings at SpAr, c. 1900's d) Statement of fabrications at Arsenals, 1861-1867, SpAr e) " " expenditures " " 1831-1905, SpAr f) National Armory Accounts, 1791-1831 g) Arsenals of the United States
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36	" 1828-1836
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38	" 1839-1842
39	" 1842-1844
40	" 1844-1846
41	" 1846-1847
42	" 1847-1850
43	" 1850-1852
44	" 1853-1854
45	" 1854-1857
46	" 1857-1859
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261	" 1867-1868
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264	" 1870
265 495-3	" January-March 1871, 1872
266 495-2	" January-March 1873-1879
267 495-1b	" January-March 1880-1883, February-March 1884
268 495-1a	" February 1884, January-March 1885-1888
269 504-1	" January-March 1889-1897
270 504-2a	" January-March 1898-1899
271 502-2b	" January-March 1900-1901
272 504-2b	" January-March 1902-1904
273 504-4	" January-March 1905-1906, January-February 1907
274 504-5a	" March 1907, January-March 1908-1909
275 504-5b	" January-March 1910
276 504-6	" January-March 1911
277 496	Work Returns, July 1824-September 1825
278 BOOK	"The Springfield Armory: A Study in Institutional Development" by Derwent Stainthorpe Whittlesey
279 BOOK	"The Federal Ordnance Bureau 1861-1865" by Donald A. MacDougall
280	"Historical Record, Springfield Armory, Land and Improvements" 1932-1942, negative copy

