Buildings 8 & 10
Historic Structure Report

Coltsville National Historical Park
Hartford, Connecticut

2017

RECOMMENDED:

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Superintendent, Coltsville National Historical Park

APPROVED:

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Chief, Historic Structure Research & Documentation,
Historic Architecture, Conservation and Engineering Center,
Northeast Region

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Unless noted otherwise, all figures are site photographs taken by EYP during the winter of 2016-2017. When the figure is a detail from a full-page reproduction included in an appendix, the detailed attribution and acknowledgement is given in the cited appendix.

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INTRODUCTION

EXECUTIVE SUMMARY

Purpose and scope

This historic structure report (HSR) was commissioned by the National Park Service's Northeast Region Office and researched and written by EYP Architecture & Engineering. It is intended to document the original design and construction of Buildings 8 and 10 in the Coltsville National Historical Park and to illuminate the evolution of the two buildings up to the present time. Its ultimate purpose is to help the National Park Service (NPS) reach informed decisions regarding the future treatment and use of the two buildings. Its focus is limited to these two buildings. It does not address the remainder of the factory complex or any other component of the Coltsville N ational Historical Park.

The NPS has made it clear, however, that it is not looking for recommendations for treatment and use of Buildings 8 and 10 in this report. Their immediate objective is to stabilize the two structures. The NPS has judged that unless and until that goal is reached, detailed recommendations for treatment and use are premature. EYP has already provided recommendations for the structural stabilization of both buildings, recommendations that were developed, in concert with the NPS, to minimize adverse effects and to maximize later opportunities for treatment and use. Consequently, the customary Part 2, Recommendations for Treatment and Use, is not developed in this report. Nor is a separate section describing in detail the current condition of physical features (as opposed to their form), since, as the NPS has determined, the critical aspects of their current condition were addressed in the structural study.[1]

Basis of Investigation

The report is based on site investigation of the fabric, archival material found at the Connecticut State Library, the Connecticut Historical Society and the Hartford Public Library, on-line research, published secondary materials, and conversations with local archivists familiar with Coltsville. Site investigation was primarily visual. It was conducted during the winter and spring of 2017. Probes were made only where masonry materials could be temporarily disassembled and then reassembled by hand. No off-site analysis of materials was included in the project.

Highlights of the Historical Background

The report uses archival materials that document the historic background of Samuel Colt and the context for the construction of the Colt Patent Fire Arms Co. in Hartford only to the extent that they illuminate the particular character of Buildings 8 and 10. It focuses on his prior experience with construction of an armory and with the business of production and sale of arms in Paterson, New Jersey, an industrial district that had explored the use of steam power. A critical lesson of his early failure was the importance of marketing, and the flexible use of the factory building in response to changing demand. The latter involved the letting of space to sub-contractors and the manufacture of alternative products. In between the years in Paterson and 1855, Colt also learned the value of innovation, promotion and expertise, as evident in his deals with the British

government and the construction of his London factory, and his cultivation of Elisha Root, Eli Whitney Jr., and other leading engineers of the Connecticut Valley and New England.

All these factors came together in the design of Buildings 8 and 10. The report argues that Colt, together with his master mechanic, Elisha Root, with their broad experience of forging and foundry work, were principally responsible for the space planning of the Hartford factory, and for guiding the form and major details of Buildings 8 and 10, if not for structural design and ornamental detailing. They were, as is documented here, the patent holders for the drop hammers and hearths that were central to the production of forged parts that came out of these two buildings under their management.

Principal Features of the Original Construction

The report documents that the drop hammers were powered by steam, and argues that, given the availability of steam power, steam-driven fans were used to draw the exhaust gases out of the building. It describes, based on site investigation, how a network of vertical, unlined masonry stacks and horizontal ducts were constructed within alternating masonry piers and the entablatures of both buildings. It argues, since early photographs and illustrations show no chimney stacks rising from the eaves above each hearth, that the ducts were linked to the original central space between the two buildings, a store room which was provided with a major chimney.

EYP's mechanical engineers believe that the long ducts, running the full length of each building, could not have provided effective exhaust if driven by heat alone. We also know that Colt was in London in 1851, exhibiting his firearms at the Great Exhibition, where a member of the Institution of Civil Engineers exhibited a model of a steam driven exhaust fan for a colliery. Colt had delivered a lecture to the Institution earlier that year. For all these reasons, the report concludes that Buildings 8 and 10 were designed and constructed with a built-in exhaust system that was likely powered by steam-driven fans. It cites contemporary reporters who commented on the remarkably pure atmosphere that prevailed in what should have been an inferno. Site investigation also revealed that the masonry stacks in the piers ran from just below the level of the hearths to below grade, and the report posits that this is part of an intake air system that delivered combustion air direct to the hearths.

These features were skillfully incorporated in what appeared at first to be standard architectural features, the entablatures and the piers that supported them. They were so artfully concealed that they seem to have gone unnoticed, since the connection of the hearths to the piers was noted by the contemporary reporters.

While the large, tall column-free spaces accommodated the machinery and hearths well, and allowed easy layout of production lines, it is noteworthy that they were also easily adapted to other uses. The subsequent varied use of the buildings, documented in the section *Changes in Form and Use over Time*, proved this.

Developmental Changes

Although the report concludes that the original form of both buildings remains largely unchanged, the same section identifies several features that changed within the period of significance spelled out in the 2008 Coltsville Historic District and National Historic Landmark nomination. That period spans from 1855 to 1945. Most readily visible is the construction of a steam tunnel the full length of the west elevation of Building 8, and the piping through both buildings that brought steam to the north and south armories. These were structures added in 1916 to meet the increased demand for weapons in World War I. Also readily seen are added and enlarged doorways, infilled window openings, a few bays reconstructed in brick, and the scars of roof structures that, starting in the 1930s, were added to link Building 10 to nearby structures erected in the adjoining courtyards. Less obvious changes are the two styles of metal windows that replaced the majority of the originally wood windows, probably in the same period as the north and south armories were built, and the extension of slate roofing over the eaves and the original built-in stone gutter. That appears to have occurred before the major expansion of the factory complex to the west in 1861.

Character Defining Features

The report includes the exhaust flue system among the character-defining features of the two almost identical structures, as well as their column-free space, the overall form of the two buildings and their alignment and location within the factory complex. It identifies Portland brownstone brick and slate as character-defining materials of the envelopes and the regular system of window bays as defining the major elevations. The timber trusses, rafter and roofing boards are identified as the character-defining features of the roof structure and the gabled roof as its character-defining form. The wood frames, sash and trim in Building 10 are thought to be original but deserving of more detailed investigation. The two forms of metal windows that fill the bays of Building 8 date from within the period of significance given to the Coltsville National Historical Park. While most alterations to doorways took place within the period of significance, none of the existing doors are character-defining.

The exact locations of each type of window and doorway are located in plans attached in an Appendix, while the variations in masonry, windows and doorways are described bay by bay, inside and outside, in the section *Physical Descriptions*.

Suggested Alternate Period of Significance

The report suggests that the National Park Service may wish to identify a narrower period of significance for Buildings 8 and 10. Both Colt and Root, the genii behind the buildings and the armory, were dead within a decade of their construction. The report presents evidence that forging operations had moved out of Building 10 perhaps as early as 1861 but certainly by 1885, by the same date, a large part of Building 10 was being used for finishing, not as a foundry. While later uses exemplify the flexibility designed into the original buildings, no traces survive of significant or interesting alterations related to those uses.

Consequently, in listing character-defining features, this report distinguishes systematically between those that relate only to the lengthier period of significance and those which pertain to a proposed shorter, early period. All suggested features for both periods are linked to one or more figures included in the preceding developmental history or physical descriptions.

Recommendations for Treatment

The report concludes with limited observations for treatment and use that relate to the possibility of the selection of a narrower period of significance.

Appendices

Four appendices have been attached to provide larger reproductions of plans and photographs and illustrations, to supplement the smaller figures in the body of the report. Two more provide copies of several pages of the work of contemporary writers who had walked through the forge, the foundry and the rest of the original complex. They may provide material of interest to the NPS about the larger factory complex.

ADMINISTRATIVE DATA

NAME, NUMBER AND LOCATION DATA

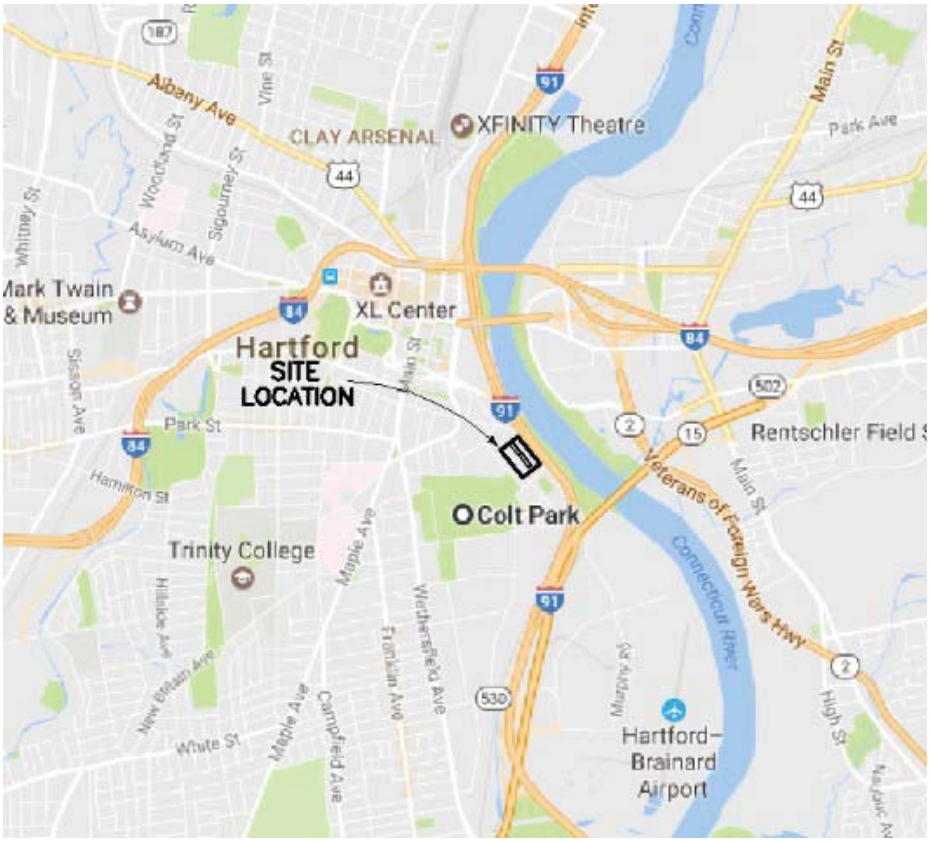


Figure AD-1 Location map of the original Colt Patent Firearms Company factory

Buildings 8 and 10 are original components of the Colt's Patent Fire Arms Company factory, and are now part of the larger Colt Industrial NRH District in the Sheldon/Charter Oak neighborhood of Hartford, Hartford County, Connecticut. The original factory was bounded by Van Dyke Avenue on the east, Sequassen Street on the north, Huyshope Avenue on the west and Weehasset Street on the south. See figure AD-1 for the location of the factory site.

Colt Industrial Historic District, as placed on the National Register in 1976, was larger than the original factory as it included the southward expansion of the factory to Masseek Street that had taken place during World War 1 and the attendant closure of the east end of Weehasset Street. It also included Colt worker and management housing built immediately to the west between Huyshope and Van Block Avenues, from Sequassen to Masseek, Colt Park on the far side of the housing, and finally, at the west end of the park, Armsmear, Samuel Colt's home. In 2001, the boundaries of the District were expanded to include later factory buildings and offices along both sides of Vredendale Avenue, the south end of which terminates at Sequassen opposite the north end of Building 8. This area is also known as Coltsville. Since 2014, the NR Industrial Historic

District has been recognized as the Coltsville National Historical Park, for which the address is 140 Huyshope Avenue.

Coltsville covers 260 acres at the southern edge of downtown Hartford, Connecticut's state capital. It is bounded on the east by Interstate I-91 and the Connecticut River. It falls entirely within the 06106 zip code area.

The east and south armories of the factory complex have been rehabilitated for use as schools, residential apartments and offices. The North Armory remains unrenovated just east of Building 8, but all other buildings between Van Dyke, Sequassen, Huyshope and Masseek have been demolished, either in the later years of the factory or as part of the remediation of the site after it had been designated a brownfield by the U.S. Environmental Protection Agency. Buildings 8 and 10 now stand almost entirely isolated by parking lots serving the rehabilitated buildings. See site map, figure AD-2.

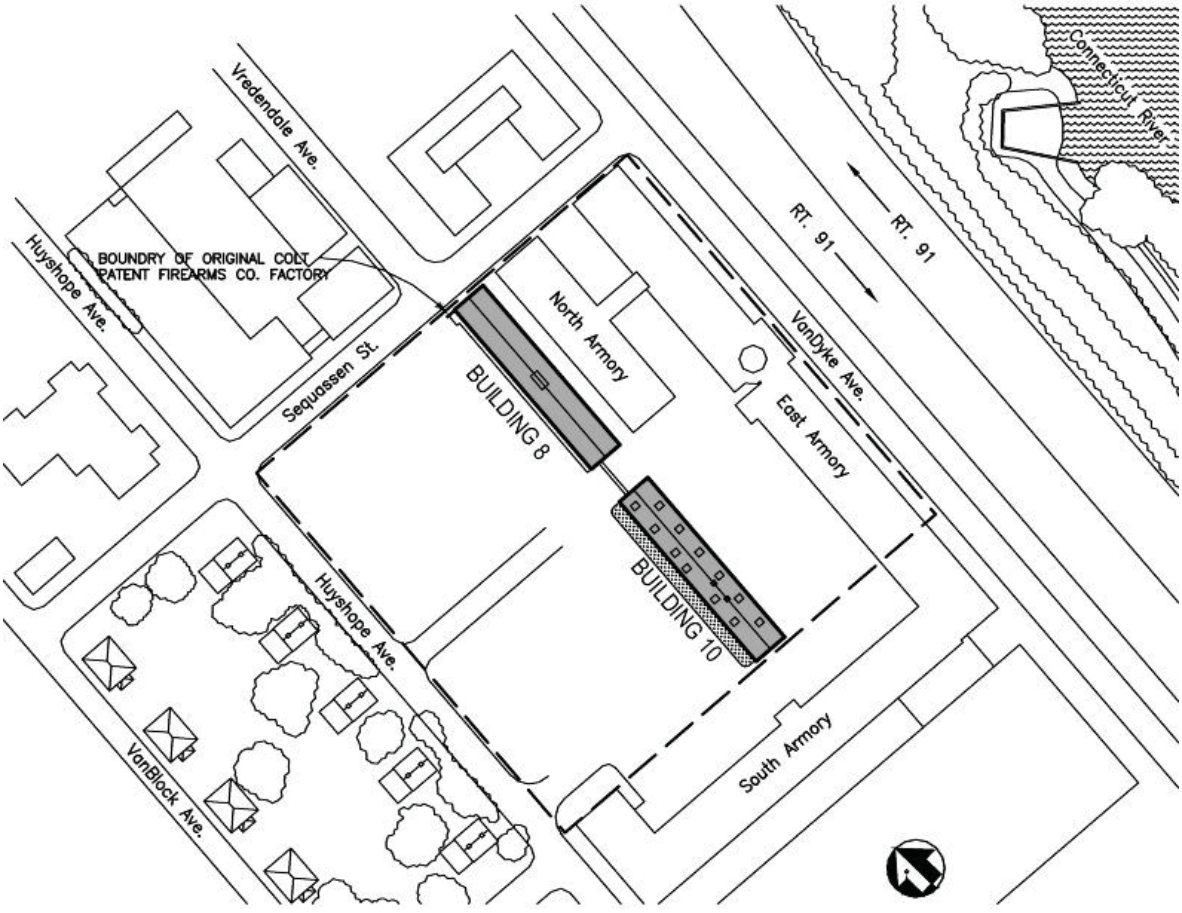


Figure AD-2 Site map

HISTORIC SIGNIFICANCE

The nomination form that led to the Colt Industrial District being included as a Historic District in the National Register of Historic Places, on June 8, 1976, describes "the factory" as one

“component” of “the manufactory established in 1848 [sic] by Col. Samuel Colt,” along with workers’ housing and a 114-acre public park. It does not identify Buildings 8 and 10 separately, neither in the text nor on the accompanying map of the district. Nor does it employ the terms ‘contributing’ and ‘non-contributing’ to distinguish elements that align with the established significance of a historic district from those that don’t.

After a boundary increase for the Colt Industrial Historic District was approved in 2001, it was included on July 22, 2008, in the Coltsville Historic District and National Historic Landmark in an expansion of the existing nearby National Historic Landmark of Armsmear, Samuel Colt’s home, which had been designated in 1966. On December 12, 2014, the United States Congress gave final approval for the creation of the Coltsville National Historical Park, which includes the Coltsville Historic District and National Historic Landmark.

The NHL nomination for the Coltsville Historic District argued that it is nationally significant because it meets two NHL criteria: criterion one, association with events that made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history, and from which an understanding and appreciation of those patterns may be gained, and criterion five, that it is composed of integral parts of the environment that collectively compose an entity of exceptional historic or artistic significance, or outstandingly commemorate or illustrate a way of life or culture. The nomination asserts that the factory complex was the site of manufacturing and business developments which made significant contributions to broad national patterns of United States history (criterion 1), and the district is notable as a planned industrial district that linked the factory with worker and managerial housing, community structures, civic amenities and a recreational landscape that characterized important aspects of American industrial development (criterion 2).[2]

The period of historic significance is defined in the NHL Designation as lasting from 1855 to 1945, from the time that the company completed its first factory on the site until the end of World War II, for which it was a major arms supplier. After 1945, the company declined and moved to new premises in West Hartford. Significant dates are 1855, when the first factory was completed; 1867, when the factory reopened after the East Armory was rebuilt following a significant fire; and 1916, when the factory was significantly expanded to meet the demand for arms during the 1st World War.[3]

Buildings 8 and 10 are two of the 1855 factory buildings. Building 8 is identified in the NHL nomination as Building D, Forge Shop, where innovative drop-forging operations took place, and Building 10 as Building F, Foundry. There is no doubt from the contemporary evidence available that they formed part of the manufacturing development that made significant contributions to broad national patterns of United States history, (i.e., criterion one for recognition of national significance). There is some evidence that their plan and use was affected by, and contributed to, the commercial innovations for which Samuel Colt is renowned.

The nomination judges that these buildings maintain their integrity of materials and workmanship. Both are 40 feet wide and 225 feet long, each with a grade level, open and unobstructed single-story interior and a slate-covered gable roof supported on wood trusses whose bottom chords are about 17 feet above grade. The enclosing walls consist of regular bays of large window openings, separated by piers of random brownstone ashlar that support an entablature of brick between a brownstone architrave and cornice.

Such a large, open and linear ground-level space facilitates the design of building systems and the intake and distribution of raw materials. It also suits the installation of specialized machinery in well-spaced rows that simplify the onward movement of parts requiring further finishing. But, at that same time that it permits finely-tuned industrial layouts, it lends itself to rapid, economical future reorganization.

PROPOSED TREATMENT

There is as yet no NPS general management plan for the factory buildings now included in the National Historic Park, nor is either Building 8 or 10 on the NPS List of Classified Structures, which typically contain brief statements of proposed treatments. The immediate purpose of the work order, of which this historic structure report is part, is to make recommendations for the stabilization of both structures.

The nomination states the Historic District illustrates two major themes and several sub themes from the National Historic Landmarks Thematic Framework. These are Theme V: Developing the American Economy: production, distribution and consumption, and Theme VI: Expanding Science and Technology: technological applications. One sub theme relates to Theme VIII: Changing Role of the United States in the World Community: commerce, another is "Developing the American Economy: workers and work culture." However, no specific recommendations have been made for the treatment of Buildings 8 and 10.

RELATED STUDIES

GMS Associates, Inc.	*Structural Condition Survey, Buildings 8 & 10*, June 2, 2004. GMS Associates, Inc., 730 Hebron Avenue, CT 06033
National Park Service	*Coltsville Special Resource Study*, November 2009. National Park Service, Northeast Region, Division of Park Planning & Special Studies, 200 Chestnut Street, 3rd Floor, Philadelphia, PA 19106
National Park Service	*Existing Conditions Survey, Building 8 and 10, Coltsville National Historical Park, Hartford Connecticut*, February 3 2017. EYP Architecture & Engineering, Albany, NY, 12203

END NOTES

[1] National Park Service *Existing Conditions Survey, Building 8 and 10, Coltsville National Historical Park, Hartford, Connecticut*, February 3 2017. EYP Architecture & Engineering, Albany, NY, 12203

[2] National Park Service, Department of the Interior. *National Register of Historic Places, Nomination Form*, Colt Historic District, December 20th 1977, pp.21-22.

[3] Ibid, pp.23-24

PART 1

DEVELOPMENTAL HISTORY

HISTORICAL BACKGROUND AND CONTEXT

INTRODUCTION

This Historic Structure Report is focused on Buildings 8 and 10 and not the whole factory complex. The National Park Service, biographers of Samuel Colt, weapons historians, and scholars of the 19th and 20th century phases of the American Industrial Revolution, have all described several aspects of the complex as a whole. These include the personal and historic background and the regional context for Samuel Colt's construction of the complex; the significance of the factory in the evolution of production and marketing techniques of private armaments factories in the United States and in the treatment of their labor force; and its contribution to the increasing sophistication of weaponry. For this reason, the historical background and context of the complex is only described briefly here, focusing on elements that pertain most directly to Buildings 8 and 10, originally the forge shop and foundry for the factory. For more detailed information on the complex, the reader can turn to several items listed in the bibliography.

SAMUEL COLT'S EARLIER CAREER

Samuel Colt was born in Hartford in 1814, the son of a textile manufacturer, so it is likely that as a child he gained familiarity with the mill culture of the area.[1] However, according to the Colt company official history,[2] it was while serving as a seaman on the ship *Corvo* that he developed the concept of the revolving cylinder for firearms, and it was on the Gunmill Lot at Van Houten and Mill Streets in Paterson, New Jersey, where his uncle had established John Colt's Rolling and Nail Factory between 1822 and 1825,[3] that he established the Patent Arms Manufacturing Company and, with the help of investors from New York, built his first factory in 1836, the year he had obtained a U.S. patent for a revolver.[4] Interestingly, the site of the factory at the intersection of Van Houten and Mill Streets was in an area of swamp next to the Passaic River, which was successfully constrained to provide power for a dense complex of early manufacturing enterprises.[5]

The history of both his uncle's factory and his own is interesting in the light of the history of use of the Coltsville factory. At first his uncle's business had prospered, but as demand for his product fell, in 1829 he switched to weaving cotton duct, and in 1834 let space out to a millwright, a jobbing shop and a woolen factory. In 1836, he purchased the rest of the lot from the Society for the Establishment of Usefull Manufactures (established by Alexander Hamilton and others in 1791) and immediately leased the entire lot and the factory building, including all "the buildings, flumes, furnaces, wheels, fixtures and machinery" to his nephew.[6] Clearly, industrial production was a volatile business in these days, and Samuel Colt gained early experience of the advantages of the flexible use of manufacturing space.

Colt carefully researched the manufacturing basis for the production of his revolver. In 1836, he travelled with his father, also called Samuel, "interviewing key personnel and inspecting iron mines

and machinery, beginning, appropriately, at Samuel Collins's ax factory in Collinsville, Connecticut, and ending up at Simeon North's armory in Middletown."[7] Colt "found that the [air] used at the forges was supplied [*sic*] by the operation of a large [air] pump made from the sillinder [*sic*] & piston of a steam engine."[8] During the same tour, they "had an interview with Mr. Ripley [Springfield Armory superintendent James Ripley] in relation to the different Iron mines…[The] best Iron now made [is] in Salisbury Ct" There they saw the mines, forges and furnaces before returning to "examining the mashinery [*sic*] &c. at the U.S. Armory." They also visited the private armory of Simeon North, in Middleton, Connecticut.[9]

For his Paterson factory, Samuel Colt replaced the existing factory with a four-story brownstone building. See figure 1: the factory is shown at the center right. Interestingly, it featured a projecting tower with a cupola and spire, topped by "a vane, very elaborately made in the design of a finished gun and in front of the mill was a fence, each picket being a wooden gun, and the whole was very beautifully painted."[10] It seems that the basis for Colt's noted leadership in using his factories for corporate branding began before he built Coltsville in Hartford.

Figure 1. The Colt Gun Mill, Van Houten and Mill Streets, Paterson NJ, 1836-1842.

However, despite such advertisements and producing some 5,000 guns, he was unable to secure government contracts. Within two years, he was leasing out space to his brother Christopher for a silk mill, which failed to get off the ground; in 1840, he leased the same space to another manufacturer, who produced sewing silk. Then, despite issuing mortgages on the property, the Patent Arms Manufacturing Company failed.[11] In 1842 Samuel Colt closed his operations in Paterson and left town; his investors and creditors lost money.

But Colt had gained manufacturing and commercial experience that clearly contributed to his vision for, and use of, the Coltsville factory. It is also worth noting that one of his neighbors in Paterson was the Rogers Locomotive Works, which developed out of Rogers, Ketchum and Grosvenor, a manufacturer of textile looms and machinery. Rogers announced plans to manufacture his own steam locomotives based on an English model, and the first, *The Sandusky*,

made its maiden trip in 1837. So, Colt already had experience of steam power before leaving Paterson, which at this date was one of the most developed centers of industrial production in the country.

As the Indian Wars continued from the 1830s to the 1840s, favorable reports about his weapons were coming back from the American West.[12] The Republic of Texas was one of the earliest customers for Colt's .36 five-shot revolver having ordered handguns made at the Paterson factory for its Navy. In 1846 Colt met Samuel H. Walker, by that time a Captain of the United States Riflemen, who had had experience in the late 1830s using a Paterson handgun in expeditions in Texas against the Comanche. Colt accepted Capt. Walker's recommendations for a heavier and safer pistol with a six-shot cylinder and developed the design that he called the Walker Colt. Walker ordered 1,000 of these improved weapons. Colt had it manufactured by the factory of Eli Whitney Jr. in Hamden, Connecticut in 1846-7.[13] It was used in the Mexican American War.[14]

By 1847 Colt had re-established himself in Hartford. With money borrowed from a banker cousin, Elisha Colt, and other Hartford business men, he leased a factory on Pearl Street to manufacture repeating pistols and guns. By 1849 he was operating an armory out of the first floor of Porter Manufacturing Company's factory on Commerce Street[15] that consisted of "a shop 150 feet by 50 feet… [with] long lines of shafting and machinery…in rows," where a reporter described "machines [being] objects of far greater curiosity than the pistol itself, performing difficult work and shaping irregular and intricate forms of solid steel, as if it were soft lead."[16] That year, R. G. Dun and Co. reported favorably on the success of his business.[17]

Within a year or two, Colt began to acquire land in the South Meadows area on the west bank of the Connecticut River, about a mile from downtown, to build his own facilities and expand.[18] As a young man in Hartford, Colt must have known this location was susceptible to flooding. But perhaps his experience of Paterson gave him confidence that he could tame the river. Before he built his factory, he built a two-mile dike,[19] parts of which still runs under Warwarme and Van Dyke Avenues,[20] and set up a ferry that served to bring in materials for the buildings.

In 1849 Colt had hired Elisha K. Root as his lead "mechanic" at Pearl Street. Root, whom Colt had met some 20 years earlier, had worked at the Collins Company in Collinsville, Connecticut, the same axe-making company that Colt had visited with his father in 1836. Root is credited for the development of modern die casting at the Collinsville factory. His reputation was such that in 1845 he had been offered the position of "master armorer" at the U.S. Government armory in Springfield, Massachusetts, which he had turned down. In 1853 Root patented a drop hammer, a machine that was to become a world-wide staple of the metal manufacturing industry.

Since it was not until the winter of 1854-1855 that Colt hired the Hartford architect Octavius Jordan,[21] and the buildings were ready for the installation of machinery by the summer of 1855,[22] one can reasonably assume that Root and Colt, with their extensive experience in the production and sale of weaponry, were mainly responsible for the planning of the factory, including Buildings 8 and 10, in the period between 1849 and 1854. The only record of drawings produced by Jordan at this time tied his contribution to the gable ends of the roof and sketches and plans for the onion dome.[23] These were components with which Colt and Root were likely not familiar. Such details would not have been required to initiate construction.

The flooding of the Connecticut River in the spring of 1854 and other extraneous contemporary factors may have influenced the budget and construction of the new factory buildings, which was already underway.[24] Described as the Great Flood, it flooded both Commerce Street where "all the machinery…submerged," and Pearl Street, half a mile from the river bank, and attacked the dike.[25] Given the volume of orders being addressed at the Commerce Street plant, there would have been pressure for Colt to bring his new factory on line as soon as possible. At the same time, the business of repairing the dike and dealing with the damage at his existing plant, as well as the task of getting his London armory up and running, which he did over the years 1853-1857,[26] would have distracted Colt and eaten into his available capital, which R. G. Dun concluded was largely operating income.[27] And in 1853 Colt's local rival, Sharps' Rifle Company, opened a new company in Hartford.[28] There are several reasons to believe that the design and construction of the buildings of the Colt Patent Fire Arms Manufacturing Company, while carefully planned, may have been strongly affected by the need for haste and competition for scarce resources. However, when the Connecticut River flooded again in 1855, Colt was able to keep his factory running while much of the town was overwhelmed.[29]

THE HISTORICAL AND LOCAL CONTEXT

Colt's Patent Fire Arms Manufacturing Company was built not only in a period of violence within and on the borders of the United States, when a repeating firearm brought overwhelming advantage, but also, and relatedly, in the midst both locally and temporally, of a phase of intense industrial development in the American northeast. As The National Park Service Special Resource Study states:

> *"The Colt Fire Arms Company was part of the precision manufacturing region in the Connecticut River Valley that developed the "American System of Manufacture," which emphasized machine production of standardized parts and attracted great attention in Europe in the mid-19th century. The so-called "Precision Valley," stretching from New Haven through Hartford in Connecticut to Springfield, Massachusetts, and Windsor, Vermont, contained the most advanced manufacturers in America during the 19th century and into the 20th century. Colt's production and quality control techniques incorporated "armory practices" developed at the Springfield Armory, 25 miles to the north, and such private factories as Robbins and Lawrence in Windsor, Vermont; Simeon North in Middletown, Connecticut; and Eli Whitney in Hamden, Connecticut. The synergy between gun makers and machine tool builders who supplied them with manufacturing equipment had ramifications far beyond firearms."*[30]

The Study goes on to say:

> *"Precision manufacturing is associated with a distinctive social and architectural landscape, paralleling but different from the complexes formed by the textile industry elsewhere in New England, or the heavy industry of Pennsylvania."*

The current report will not attempt any extensive comparison with these other regional industries but will attempt to describe the manner in which the basic mill form of Buildings 8 and 10 responded to the precise needs of a foundry and forge at this point of the industrial development of the northeast.

It was a period characterized by increasing competition for government contracts, which promoted experiments in metallurgy and production as well as in business models. The West Point Foundry in Cold Spring, New York, for instance, was not only making cannons for the government using the latest processes for work in cast and wrought iron, but also, by 1848, using the plant for the manufacture of a range of non-military hardware. This included hydraulic presses, steam engines, locomotive engines and blowers and pumps, as well as a variety of commercial castings like urban water-pipes, and wrought iron pieces.[31] Such diversification should have provided some protection against falling demand for individual products such as Colt had experienced at the family works in Paterson, but, as others have pointed out, peace and politics make the arms industry particularly vulnerable to rapid change in demand.[32] This would have put a premium on the development of industrial machinery that could be re-used or re-configured to manufacture a new line of products. This is precisely the nature of the machines designed by Elisha Root. His compound, crank-driven drop hammer, patented in 1853, was an improvement on machinery developed by John Hall at Harpers Ferry in the 1820s.[33] It could form small parts faster and more accurately and allowed different parts to be produced simply by changing the form holding the metal to be stamped. These changes generated greater profits by increasing the rate of production and reducing waste and hand labor.

Another method of covering costs and spreading risk which Colt made good use of was to provide sub-contractors space inside his factory buildings, even allowing them to use that space to service other clients.[34] Hosley points out that such sharing of space, techniques and ideas had been a feature of the development of the arms industry in Springfield around the federal armory and in the industrial communities along Connecticut River valley.[35] Colt would have been familiar with this culture from his early days in New Jersey. One can suggest that simple, ample open spaces served by a flexible circulation system would better accommodate such a business model than highly specialized construction; the H-shaped, grade-level layout of which Buildings 8 and 10 were part, seem well suited, as will be explored in more detail below.

Factory planners also had to respond to the availability and quality of raw materials. When Eli Whitney Jr. took over the management of his father's factory in 1842, he began using crucible steel for the barrels of his small arms. This replaced the wrought iron manufactured in Salisbury, Connecticut, which had been the backbone of the Connecticut small arms industry until the 1830s when its quality began to drop.[36] Colt too had turned to steel for his pistol barrels when he started production in Hartford in 1848, but, like Springfield Armory, imported English pig iron for his revolver frames, a practice he continued after 1853.[37]

Malleable cast iron, less brittle than white cast iron, had been developed by Seth Boyden in Newark, New Jersey, between 1826 and 1832. He used a precise two-stage annealing process of heating and cooling.[38] A foundry for malleable cast iron was established in Naugatuck, Connecticut, in 1854. It appears that the Whitney factory in New Haven was producing it in the same period using crucibles and was experimenting with it to produce revolver frames by the late 1850s. The earliest available plan for Colt's 1854 factory shows the foundry, Building 10, with an annealing room immediately adjacent to its iron foundry. And in 1853 Colt had taken out a patent in England (#654) for an "Apparatus for Heating and Annealing Metals" to "facilitate the cutting and forging of metals." The furnace, he said was constructed "in such a manner that the attendant is able to ascertain, by inspection, when the metal has attained the required temperature and at what time to damp the furnace fire.[39] Such a furnace could have been used both for annealing cast iron and softening metal billets for stamping.

There has been considerable academic discussion of the extent to which Colt's manufacturing processes attained the precision needed to manufacture parts so that they could be freely interchanged. Buyers, in particular the military, would have favored interchange as it could allow damaged weapons to be quickly restored to operable condition at less expense than a new weapon. It is clear that Colt was not the first to pursue this goal. At the Harpers Ferry, West Virginia, John Hall spent 20 years, starting in 1820, "tooling workshops and perfecting precision machinery for producing rifles with interchangeable parts" for the War Department. Eli Whitney and Simeon North, a manufacturer of pistols, had similar goals. Whitney had developed a manufacturing armory near New Haven in 1798; North developed one in Middletown in 1843.[40] While Colt and Root had similar goals, what is more relevant to the understanding of Buildings 8 and 10 is the type of equipment Colt and Root planned to use to achieve these ends.

In 1853 as noted above, Elisha Root patented his first drop hammer (U.S. Patent # 9941)[41] and Colt took out a patent for his annealing furnace. The drop hammer was essentially a tall, narrow piece of machinery since it depended on kinetic force applied to a small area. It required considerable clear height. At the same time, the drop hammer had to be close to the heating apparatus as the whole point of Colt's furnace was to regulate and supervise the process by which metal was brought to a precise, malleable temperature. It is likely that they designed the forge and the foundry with these pieces of equipment in mind.

In sum, to produce reliable, precise and economical basic parts with steel, pig iron and brass, Colt needed not only a forge and foundry spaces for different metals, but an annealing shop and a store, all in close proximity to each other. His 1855 factory included a space labeled 'Store Room' conveniently placed between the forge (Building 8) and the foundries and the annealing shop (Building 10), with access from each (Appendix, plate 8). At the south end of Building 8, immediately adjacent to the Store Room, there was an enclosed space labeled 'Inspectors Room.' These may have been the personnel responsible for ordering and supervision of the iron and steel billets stored there as well as those responsible for inspecting each forged piece.[42]

At this date, none of the die stamped or cast components would have been produced accurately enough to be reliably incorporated into a pistol or rifle without hand finishing; convenient circulation for transport of parts to finishing shops would also have been a necessity. Later description of the production process puts the finishing process in the 'Machine Shop Armory Proper,' accessible directly across open courtyards from Buildings 8 and 10.[43]

Another consideration that would have driven the design for a building for a foundry and forge would have been fire resistance. Typically, the shell of an East Coast mill building or armory at this date was load-bearing brick or local stone. The interior frame was typically wood not cast iron as was already employed in England at this date. The use of heavy timbers and thick planking was considered slow-burning construction that could be suppressed by firefighters using fire-fighting devices such as standpipes and manual or automatic sprinklers fed by abundant local water supplies. The main driver for the East Coast designs was cost; structural timber was cheap compared to structural iron.[44] Colt, as we have noted, had several competing claims for his capital at the time he was building his new factory. It is no surprise then that the construction of Buildings 8 and 10 follow the typical East Coast approach to fire resistance of the period.

CHRONOLOGY OF DEVELOPMENT AND USE

BUILDINGS 8 AND 10 AS BUILT

Planning and Design

To judge by early plan drawings, photographs and written accounts, Buildings 8 and 10 were designed and built to the form and general dimensions that remain today, although no architectural plans have been found that can be shown to pre-date their construction. William Hosley, author of *Colt: The Making of an American Legend*, the most detailed biography of Colt that has been published to date, states that Colt hired Octavius Jordan, a British trained, Hartford-based architect, to work up plans in the winter of 1855.[45] However, that period seems to postdate the beginning of construction, as Hosley states that the armory 'was nearly completed and ready for installation of machinery by the summer of 1855 despite a spring flood that year.'[46] Judging by the description of the drawings for which Colt paid him, Jordan seems to have been hired to design the more decorative features of the factory, like the Russian-style onion dome of the East Armory.[47] Such features would not have been needed for construction to start and were certainly not critical to creating the plans for the Buildings 8 and 10. Barbara Tucker, Professor of History at Eastern Connecticut State College and author of *Industrializing Antebellum America: the Rise of Manufacturing Entrepreneurs*, cites Colt's nephew, H. A. G. Pomeroy, as the architect, but Hosley believes that Pomeroy acted more as superintendent of the works.[48]

It is reasonable to suppose that both Colt and Root were largely responsible for planning the size, shape and adjacencies of spaces for the layout of equipment and for efficient circulation between departments. They knew the precise requirements of their machinery. They were, after all, using their own patented equipment not only in the forge and the foundry in Buildings 8 and 10, but also in the machine shops in the East Armory. They each had years of experience working in buildings designed for forging, foundry work and arms production. Colt had even had one built expressly for these purposes in Patterson, New Jersey, in 1836 and another in London in 1853 so he also would have been familiar with the design process.

They may have turned to others for structural advice and calculations, but these would have had to be completed before construction started. It is not impossible that Elisha Root, clearly a gifted designer and engineer, handled these matters.

The contractors for brick masonry, stone masonry, painting and woodwork were local companies.[49]

Site

The site of Colt's armory for his Patent Fire Arms Manufacturing Company was only about a mile from the municipal center of Hartford, which was on raised ground. Like other early industrial areas of Hartford,[50] Colt's site, the South Meadows, was low and flat. It was an area known to have been subject to repeated flooding by the Connecticut River. By the time Colt had the factory built, his land was protected by a long dyke of his making.

The site remains flat today, and the buildings seem to retain their original, more-or-less plane relation to grade despite the fact that the courtyards around them have been paved to provide parking. This is probably because the site had been designated a brownfield that had to be remediated by excavation of topsoil before the parking areas were paved.[51]

Buildings 8 and 10, together with a connecting space labeled “Store Room” on an 1857 plan (Appendix D, plate 8), formed the western edge of the original complex overlooking Vredendale Avenue.[52] In the other direction they faced the East Armory which formed the east boundary of the site along Van Dyke Avenue. The East Armory and Buildings 8 and 10 were connected at their center-points by a spine running at right angles to them forming an H. Low walls across the ends of the courtyards completed an overall regular, enclosed, rectangular form for the complex. The works entrances were into two courtyards. To the north, one faced Sequassen Avenue, which still forms the north boundary of the factory complex; the other courtyard faced Weehasset Avenue to the south. See figure 2 below for a view towards the south courtyard. Figure 3 provides a partial view of the north courtyard.

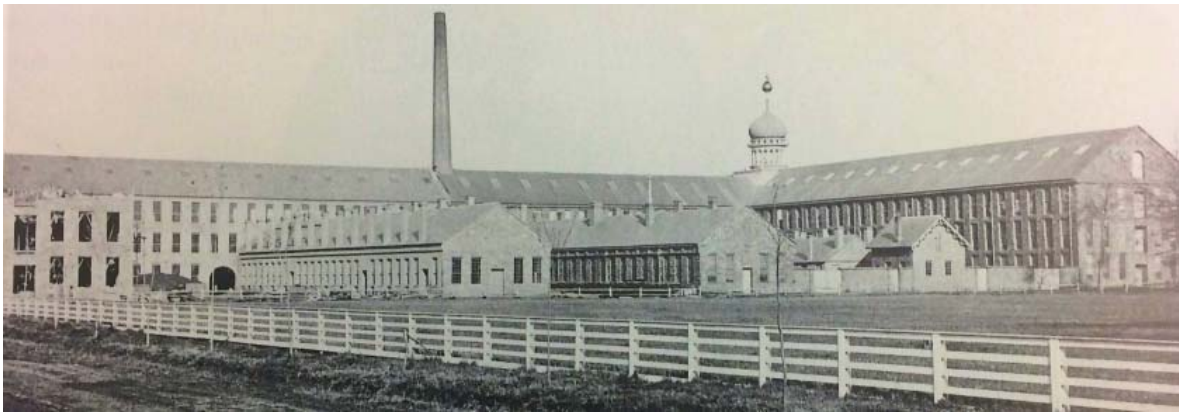


Figure 2. Detail, view from southwest, during the expansion west in 1861.

Vredendale Avenue was soon enclosed within the factory grounds when the armory expanded west in 1861. Weehasset Avenue east of Vredendale was incorporated into the factory grounds when the armory expanded south at the time of World War I. These sections of both avenues are now part of the parking lot that almost entirely surrounds Buildings 8 and 10. The parking lot also includes the connecting space between them which was demolished in the 20th century.

Building Form and Circulation

Buildings 8 and 10 were both large, separate, single-story rectangular structures of the same overall length, breadth and height. Each were approximately 225-feet long by 40-feet wide, and were joined by a central ‘Store Room’ 50-feet long and the same width, to which each had access. They were laid out in a straight-line parallel to the main three-and-one-half story East Armory which had the same overall length of 500 feet. Buildings 8 and 10 had identical gable roofs with the same moderate slopes, so their ridges aligned vertically and horizontally.

Their overall form and alignment were confirmed in a number of early illustrations. These were set up as bird’s-eye views from the east, so Building 8 was always depicted at the right of the picture

with Building 10 on the left, and they comprised the first full line of construction beyond the East Armory which is always in the foreground (Appendix A, plates 3, 4 and 7).

The shorter building connecting the two bars of the H has perhaps misleadingly been described, as a spine. An early plan, dating from 1857 showed that at ground level the spine did not actually provide circulation between Buildings 8 and 10 and the East Armory (Appendix D, plate 8). Travel from one bar of the H to the other must have been both across the courtyards and between courtyards, through the space marked 'Passage' in the spine, creating a more diffuse, flexible, circulation system. Traces of the archway leading into this passage remain at the south end of Building 8 and the north end of Building 10, and the voussoirs of the arch itself can be seen in figure 3.

This original configuration lasted only about six years as Colt expanded the factory to the west of Buildings 8 and 10 in 1861. The original form and some building details, like the opening in the south end wall of the foundry (Building 10), were confirmed by an early photograph (Fig. 2). It was taken in 1861 during the construction of the West Armory (seen at the extreme left) and captured a view of the factory complex from the southwest. This photograph showed that construction of the envelopes of another pair of single-story buildings included in the same expansion was evidently already complete, one can be seen to the left (west) of Building 10. This building campaign doubled the capacity of the armory and gave it the form of a double H.

Barbara Tucker claims that Colt's factory was patterned after the Wauregan Mills, a textile company near Plainfield, Connecticut, but that seems unlikely. Colt had been planning his factory for several years and started construction in 1854, the year of the Great Flood. Construction of the first part of the Wauregan Mill only began in 1853.[53] The H-shaped model was not unprecedented at the time. Betsy Hunter Bradley, a well-known specialist in historic preservation and author of *The Works: The Industrial Architecture of the United States*, cites the Colt factory as a prime example of the type and asserts that the "H shape provided more floor area than a hollow square plan, was equally well lighted, and shortened travel distances."[54]

Materials, Structure, Elements and Details

Foundations. No sub-surface investigative probes were undertaken as part of this historic study. However, a test pit was dug on the exterior west wall of Building 10 as part of a structural investigation in June 2003.[55] It revealed 'a brownstone foundation that extended approximately 4'-6" below grade. The exterior of the foundation wall widened with depth. The overall horizontal projection of the foundation wall at the base is approximately 6".' It added that excavations later that year for a different project revealed similar conditions at Building 10.

Envelope.

Walls - Although the 1857 plan (Appendix D, plate 8,) with its black poché line work, showed the building perimeters as continuous walls, the 1861 photograph (Fig. 2) showed the west elevation of Building 10 as a series of regular window bays formed by piers of rusticated stone. Although in this view the new wing to the west hid much of the west elevation and only fourteen bays were captured, on-site survey of the extant façades quickly confirmed that there were originally 27 bays of identical width in this and all the east and west elevations of Buildings 8 and 10.

Perimeter walls designed with piers of masonry dividing the facades into a regular series of window bays were consonant with established mid-19th century methods for providing economic envelopes for well-lit production floors. The structural survey conducted by EYP for the NPS earlier this year had already investigated the walls of the envelope. It found that the piers of the east and west elevations were approximately 20" thick and consisted of unreinforced masonry with masonry rubble fill at their center. The finish stone face material was load bearing not ashlar. Investigation for this historic structure report revealed that not all the piers were solid, and the structural report had noted that above the window heads the east and west walls increased to 34" thick. These two facts suggested that the structure of the perimeter walls of Buildings 8 and 10 was not standard, mill-type construction, but something unusual. Just how different they were, and how they were uniquely tailored to the planned functions of the two buildings, is elaborated below in the sections *'Masonry shafts and ducts' and 'Integration of hearths and forges and building systems.'*

Figure 2 included the south elevation of Building 10. The structural survey noted that the north and south ends of both buildings shared a different form of construction:

> *"The north wall of Building 8 and the south wall of Building 10 are approximately 20" thick and are "rubble walls" with brownstone facing units and rubble infill of mortar and scrap brownstone pieces. The facing units are generally 4" to 6" in thickness but vary significantly in size and in coursing. It appears that the south wall of Building 8 and the north wall of Building 10 are of the same construction as the other end walls, although a non-original brick veneer was added at an un known time."*

The brick veneer is described in the section Changes in Form and Use over Time. More detailed description of the original end walls is included below.

Figure 2 provided some confirmation of original materials. The south gable end wall of Building 10, which is shown just below the dome, was clearly stone. Its texture resembles that of the south gable end wall of the East Armory, which appears at the extreme right of the photograph. We know from Henry Barnard author of *The Home, the Arm and the Armory of Samuel Colt, a Memorial*, which was published in 1866, that the original East Armory facades were brownstone. (After the East Armory was destroyed by fire in 1864, it was rebuilt in brick in 1867.) Barnard states that it was "quarried at Portland, a few miles below on the river."[56] The flooded quarries can still be seen there close to the east bank of the Connecticut River. The piers of the west façade of Building 10 appear to have been the same material, which remains, for the most part, today.

Examination of the brownstone walls on site today indicated that the brownstone units of the envelope typically had a rock face, with some variation in the amount of rustication, but that there was always a vertical, chiseled edge on the pier units at the pier-to-window arris and a smooth face on the returns of the window jambs (See Figs. 4 and 5 below). Sills were also brownstone, one-piece, sloped and smooth. Door jamb units had a chiseled rabbet all round their face and the same smooth finish on the return; these units were longer and thinner than the typical wall unit. Units at outside corners of the building also had a chiseled vertical edge at the arris. On site investigation revealed that chiseled perimeter rabbets occurred occasionally in random locations around units in the main field of brownstone masonry.

Figure 2 showed a continuous heavy band at the level of the west elevation window heads. The band was made up of stone units over the windows together with similar units at the same elevation in the piers. This band aligned with the elevation of the heads of the window openings on the south face.

It was clear that the units on the west elevation projected forward, since there was a continuous shadow line under the whole course. Since there was a cornice, a similar, slightly lighter line of stone at the eave above, this projecting line of stone at the window heads gave the appearance of an architrave forming the base of an entablature. It was at this entablature that the east and west walls increased to the 34" depth noted in the structural report. The photograph suggested that the brownstone still defining the entablature today was original.

The current survey has confirmed that both strings of stone have a semi-bullnose (quarter round) profile projecting out and up with a bush-hammered finish. While it is possible that some units have been re-dressed in this manner, to improve their appearance after material has been lost to freeze/thaw damage (a common practice with East Coast brownstone), figure 3 hints strongly that this profile and finish was original.

In figure 2, the frieze between the brownstone courses appeared to be subdivided in the same rhythm as the window bays, although the pilasters appeared narrower and smoother than the rusticated piers below. The pattern evokes the alternation of triglyphs and metopes in a Doric frieze.

There are a few bays at the north end of the west elevation of Building 10 today where brick pilasters (triglyphs) remain. This suggests that the original pilasters were brick, as were the plain panels (metopes) between, and that the smooth brick face of the frieze that runs south for the remainder of this façade today was not the original as-built form of Building 10. Figure 3 confirms in better detail that the entablature just described also topped the east façade of Building 8.

Figure 3. Detail, view southwest across the north courtyard to Building 8, in aftermath of the 1864 fire. *The entablature of Building 8 and an archway into the spine are clearly visible.*

Windows and window openings - In figure 2, the distinctly heavier line of the meeting rail of the windows in the south elevation suggested that although today many windows and window frames are metal, the original frames were wood. Besides, metal factory windows were not produced in the United States until the last decade of the 19th century. The later photograph (Fig. 3), looking southwest towards Building 8 at the time of the fire of 1864, added more evidence that the original windows were wood, with double-hung sashes containing divided lights. Figure 3 confirmed that the light count, difficult to read in figure 2, was 16 (four by four) in the upper sash. Although the lower sash was not visible in this photograph, the original proportions of the tall window openings, most of which remain, suggest that there was an equally large lower sash with 16 lights hidden behind the wood crib that seems to hold coal. This supposition is confirmed wherever a wood window remains today, although all wood windows have been removed from Building 8. See Physical Descriptions section below, pp. 103-105.

When metal replacement windows were installed at the beginning of the 20th century as described in the developmental history section below, they were placed within, and flush with the inner face of, the brownstone window openings. This has revealed a standard detail at the jambs, a setback built in brick. This is typical detailing for the insertion of a wood window frame with weight pockets. The manner in which the remaining wood frames fit within the masonry openings and the simplicity and uniformity of the remaining casings suggests strongly that they were original.

Their sashes could also be original or possibly 19th century replacements. Detailed comparative examination of sash details on site, which might have established an approximate date of manufacture, was not possible given the materials stored along the walls. But it is hard to imagine why replacement wood frames and sash would have been installed at any date after the majority of the windows were replaced in metal. Changes in window type over time are discussed further below. See pp. 78-82.

Site observation has revealed that openings in the brownstone masonry had typical details. While the brownstone of the elevations was typically rock-faced, the perimeter of the rock-face of the jamb units was chiseled, and their return in the jamb was smooth. The head units had a semi-bullnose profile curving up from the window heads and were bush hammered as discussed above. See figures 3, 4, 6 and 12. By contrast, the inner face of the same head units projected straight out from the interior wall, and their vertical front edge was rock-faced. See figure 18. The sills were also brownstone. It appears today that they projected only slightly beyond the brick spandrels and even less beyond the brownstone spandrels. They are heavily worn, so projection as well as finish may have been lost. It is likely that they were dressed smooth to aid run-off. See figure 4 and figure 47c below.

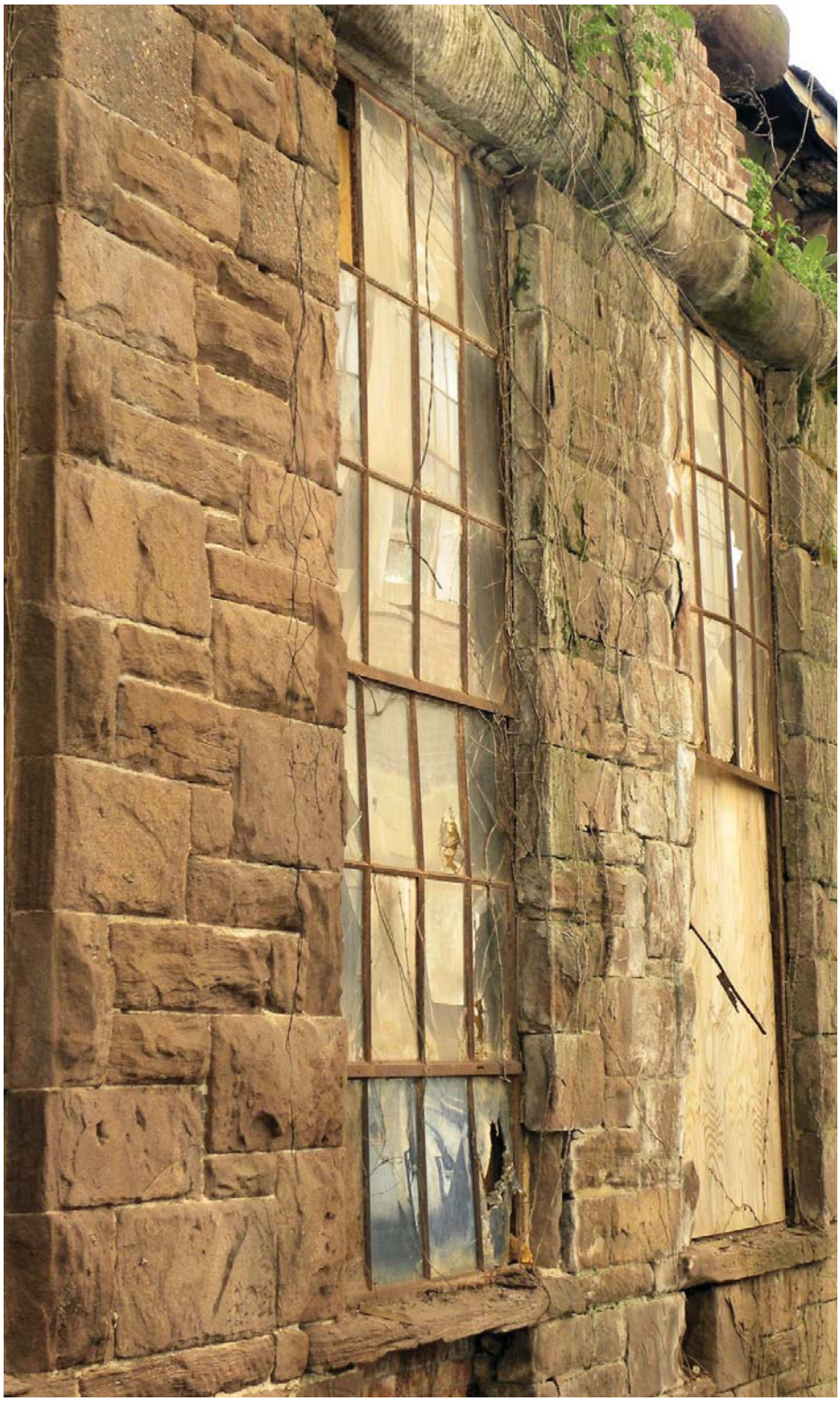


Figure 4. Typical masonry window opening treatment, Building 8, east elevation. *The sash is not original.*

Doorways - Like the 1857 plan in Appendix D, plate 8, the admittedly partial elevation that can be seen in figure 2 suggested that there were no doorways in the original west elevation of Building 10. This makes sense. A west perimeter wall without doors would have confined access to the personnel and carriage gates in the north and south walls of the factory compound, past watchmen's cottages and into the north and south courtyards from Sequassen and Weehasset Avenues respectively. There are no complete dressed stone surrounds in the west elevations today that could be evidence of original doorways there.

There is, however, a brownstone lintel built into the wall and brownstone fill above it in bay W9 of Building 8. It is hidden under a corrugated shed roof that protects a later, larger doorway with its own concrete lintel. See the plan of the building in Appendix F for the location, and figures 4a and 4b below.

Figure 4a. Exterior of bay W9, Building 8. *Note integrated brownstone masonry between the original architrave unit and the later corrugated shed roof below. Photo by J. Woolsey, NPS.*

Figure 4b. Brownstone lintel set above later concrete lintel, bay W9, Building 8. *Photo by J. Woolsey, NPS.*

The unit appears to be set at the same height as a typical doorway head and shares similar dimensions but it does not have precisely the same character. It appears to lack the chiseled perimeter of all other doorway surround units. However, the fill above it has the same rock-face finish found in the typical walls into which it blends smoothly. This fill does not have the straight vertical boundaries that might have accompanied a quick infill of an original window opening.

However, the 1857 plan showed no doorway in this elevation (Appendix E, plate 8). Further, this plan and the existing building today suggests that all other doorways and, indeed, all aspects of the envelopes and the arrangement of the two buildings were developed to be symmetrical. That suggests that a single, eccentric doorway with a brownstone header is more likely to have been inserted into an existing window bay at this location only in or shortly after 1861 to add access to the newly created courtyard to the west. The larger doorway with a concrete lintel was surely created at a later date, as discussed in the developmental history of the 20th century below.

By contrast, there are two openings in each east façade where elements of original doorways can be found. At these doorway openings, the heads were set lower than the window heads. They also lacked the protruding semi-bullnose of the window heads and were set flush with the building face. The face was bush hammered and provided with a chiseled perimeter rabbet. Like the window openings, their brownstone jamb units had a chiseled perimeter around their rock face and a smooth return.

The jambs were detailed with tall, thin upright units alternating with low, narrow, horizontal units. This pattern contrasted with that created by the more evenly matched face dimensions of the rock-faced jambs of the window openings and of most units in the general fields of the walls. However, both window and door jambs units dovetailed into the intervening brownstone piers. See figure 5.

Figure 5. Typical detailing of original doorway surround, Building 10, east elevation.

The EYP site survey established that the two original doorways in the east elevations of Buildings 8 and 10 were placed at approximately third points. They divided the 27 window bays of each elevation into three groups. At each end of both elevations there was a group of eight window bays. In the center was a group of nine. Between the center group and each end group there was a bay with a doorway instead of a window. Doorway openings were drawn in these locations in early views from the east (see Appendix A, plates 3 and 4) and confirmed in a slightly later one (Appendix A, plate 8).

The organization of the south wall of Building 10 captured in figure 2 reads as it does today, with one small central doorway flanked on each side by two symmetrically placed window openings. The windows appeared to contain double-hung units with divided lights as on the long elevations. One can assume they were wood. In this façade, which is planar overall, the windows are not set back between piers as they are on the west elevation.

There are no photographs or illustrations that adequately suggest the style of the original doors (see Fig. 2), nor are there any original doors remaining.

East and west elevations – Despite the paucity of early photographs, figures 2 and 3 and the construction that remains today indicate strongly that the east and west elevations of both buildings were designed and built with the same overall dimensions, the same number of window bays and the same details. Some of these details were hidden, as described below in *Masonry shafts and ducts and Integration of earths and forges and building systems*. Each window had double-hung wood sash with divided lights. A continuous entablature, with a brownstone architrave and cornice and a pilastered brick frieze, ran immediately over the window heads of the long elevations. This entablature and frieze with pilasters still remains at the northwest corner of Building 10 (Fig. 6). The same combination of early photographs and remaining construction suggests that there were no original doorways in the west elevations, but two in each of the east.

Figure 6. Building 10, northwest corner, showing brownstone architrave and cornice and brick frieze with pilasters.

North and south elevations - No early photographs of the north face of Building 8 have been found. It is hidden behind another building in the only early photographic view from the north.[57] However, a shot of a 1934 strike action (Fig.7a below) showed that the form, masonry and layout of this façade was exactly the same as the south face of Building 10 included in the photograph of figure 2. Checked on site, the window openings of this façade appeared to have the same size, elevation and proportion as the typical window openings of the longer elevations. There was no need to doubt that they were original. In figure 7a, the window openings were clearly covered with narrowly spaced bars. These may have been original; Barnard mentioned iron-barred windows when he described the main building (the East Armory).[58] They resemble those in place today (Fig. 7b). It is difficult to read the window sash type in the 1934 photograph but divided lights can be discerned; the sash no longer remain in place.

Figure 7a. Detail, strikers outside the north end of Building 8, 1935.

Figure 7b. North facade of Building 8 today.

Figures 7a and b show that the north gable end of Building 8 and the south gable end wall of Building 10 had a raked stone caps. There was also a brownstone return of the cornice at the eave below. They can still be seen. The clarity of these details helps one to discern them in the distant view of the south end of Building 10 (Fig. 2). Stone caps were also shown on an early lithograph but not the returns (Fig. 8). It is reasonable to believe that stone caps were the original material; a few units at the south end of Building 10 that appear to be cast concrete must be later replacements.

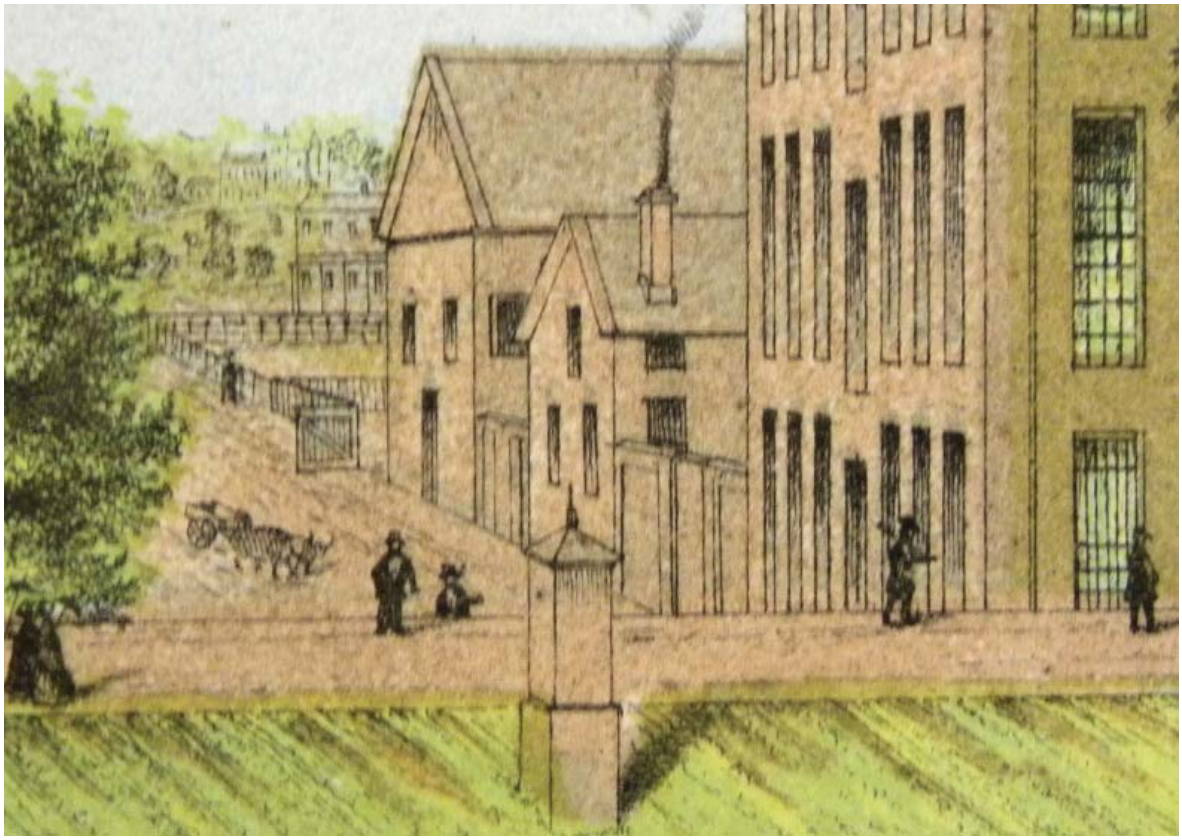


Figure 8. Detail, south end of Building 10, prior to 1861. *From Kellogg.*

The stone caps at the opposite ends of each roof cannot be original since these ends were originally flashed against the walls of the spine as shown in figure 3. Further, this photograph showed that what is now the south façade of Building 8 was once a brownstone wall shared with the store room that lay between the two buildings.

Neither this façade of Building 8 nor the north façade of Building 10 were planned as exterior elevations. These elevations were once load-bearing interior partitions, separating Buildings 8 and 10 from the central spine as shown in the 1857 plan and suggested by figure 3. The brownstone that appears today, projecting east from the east ends of both of these two facing elevations, was in fact part of the walls of the spine left in place when the spine was otherwise demolished. Closer observation on site revealed that the “buttresses” were in fact the remnants of the dressed west jambs of the archways that led into the passageway connecting the two original courtyards. This passageway was clearly marked

in the 1857 plan (Appendix D, plate 8). The units have the rock face and chiseled perimeter of doorway brownstone units, but in contrast, their returns are also rock faced. See figures 9a and 9b.

Figure 9a. Buttress, originally jamb of entry arch to passage from the north to the south court yards, Building 8, southeast corner.

Figure 9b. Detail of jamb shown in Figure 9a.

This early plan suggested that these two facing end walls of Buildings 8 and 10 each had only a small central doorway into the intervening ‘Store Room’ which have since largely disappeared with the later insertion of modern, larger openings. It became clear from site investigation that the brick skin that now covers both of these elevations was a later addition over the brownstone original. The two continuous concrete belt courses, just below the elevation of the eaves and nearer the peak of the gable, addressed the locations where the original brownstone walls, stepped in to carry the ends of the framing members supporting the second and third floors of the spine. The form of the north face of the original three-story spine, and the relation of its framing to the south wall of Building 8, can be readily inferred from figure 3. There is every reason to believe that the same relationship existed at the connection to Building 10 at the south face of the spine.

The 1857 plan revealed no obvious need for fenestration in these original brownstone partitions. However, seen from the interior today, the now bricked-in openings at the east end of the wall between Building 8 and the store room suggest otherwise. There were three. Figure 10a shows the most westerly and most distinct from the interior. Two similar bricked-in window openings can be discerned in the eastern half of the north elevation of Building 10.

Figure 10a. Infilled window opening, Building 8, south interior elevation.

The size, shape and elevation of these infilled openings echo the features of a typical original window opening as does the dovetailed detailing of the brownstone jamb units and sills and the relationship of the head to the architrave above. See figures 4 and 6 above. Perhaps the two to the east of the doorway were added early to improve observation of the store room from the 'Inspectors Room' shown at the south end of Building 8 in the 1857 plan (Appendix D, plate 8), but there is no obvious reason for openings between the adjacent 'Tool Room' and the store room, nor for openings between the storeroom and the 'Annealing Room' shown at the north end of Building 10.

As seen from the interior today, the masonry details suggest that the design of the openings in these two walls was very similar to that of the outer end walls as seen in figure 2. However, the exterior details of their design cannot be verified since the exterior face of these openings is now concealed by a brick veneer which was added later. The 1857 plan (Appendix D, plate 8) appeared not to show any openings, other than doorways, throughout the plan of the complex, so the presence of actual window openings in these inner end walls need not be read definitely as a later alteration. The openings could be original. If they were added later, perhaps in response to changed use of Buildings 8 and 10 and the original store room, it is hard to imagine why the details of original window openings would have been carefully copied.

Certainly, the form of the original design of these two walls cannot be inferred from the window opening at the west end of the south façade of Building 8 (Fig. 63 below). Its height contrasts strongly with that of the typical window and the surrounding masonry is all brick not brownstone. It contains a metal window and has a metal lintel. It appears to be part of an overall rebuilding of the southwest corner of Building 8 in brick at some time in the 20th century, and it shows that, at least at that time, imitation of original details was not a concern.

Overall form of original elevations – The bulk of the evidence, even including that of the bricked-in window openings just discussed, suggests that the two building envelopes shared the same original, symmetrical opposite-handed design.

The construction of the window sills of the long façades was not depicted in either early photograph. In figure 2 there appeared to be coal stacked in the yard to the west of Building 10 almost up to the level of the sills. In figure 3 there was a pile of rubble as well as some cribbing. However, it is most probable that all original sills were brownstone since that is the sill material wherever regular window openings remain intact today (see Figs. 4, 6, 7b and 8a). In contrast to the heads, the sills did not reach the faces of the piers so there was no reading of a continuous line of stone along the elevations at this height.

No early photographs captured the construction of the envelope below the window sills. On-site inspection showed that every second spandrel still visible between grade and a sill was brownstone set in the same plane as the pier. These brownstone spandrels alternated with common brick panels which were set back under the sill and laid up in a stretcher or running common bond. See figure 4. However, certain details suggest that they may not be original. The brick never appears to be toothed into the surrounding brownstone masonry, and sometimes the top course is set with sailors not stretchers. See figure 10b.

One or two have a top course of brick fragments. Together these facts suggest that the brick could have been a later infill responding to as-built conditions. Perhaps the brick was installed when the two buildings were no longer used as a forge and a foundry. Mortar analysis showing Portland cement in the mix would establish that they were installed decades after the buildings were constructed, since the EYP site survey found that all non-repair mortar in the brownstone masonry was clearly a lime and sand mix. Further research would be required to establish how the areas with the brick panels were originally detailed, perhaps as vents for make-up air or cooling, or as hatches for delivery of coal for the hearths and furnaces.

Figure 10b. Brick spandrel with sailor top course, Building 8, east elevation.

Roof form – Figure 2 showed the original roof of Building 10 clearly had the same double-pitched form with gable ends as it has today. There was a slight projection above the south gable end which may have been a stone wall cap since such a cap is still in place today, just as there is at the north gable end of Building 8. Given the numerous bird's-eye illustrations that depict the roof form of Building 8 as identical (see Appendix A), there is every reason to believe that the double-pitched roof with gable ends was the original roof form of both buildings.

Roofing – It was not possible to read the roofing material from figure 2, but figure 3, a detail from an 1864 photograph looking towards part of the east face of Building 8, showed slate roofing. It appeared to extend over the cornice, shedding rainwater to grade. This is puzzling since site investigation by EYP has revealed that the top surface of each brownstone cornice unit was gently channeled to form a built-in gutter. At Building 10, this survey also found remnants of sheet metal flashing that ran up under the slate and directed water down into the stone gutter. See figure 11.

Figure 11. Kickers added over original stone gutter, Building 10, west elevation.

Figure 3 showed that the flashing/counterflashing between the slate and the brownstone wall of the spine was not stepped. It appeared rudimentary, perhaps only a mastic, not metal. Alternatively, it could be read as a series of small, lapped pieces of counterflashing set in a straight reglet. It appeared in the photograph that might have been a small metal ridge cap in the form of an inverted-V at the peak of the gable. A remnant of a similar sheet metal cap remains today at the north end of the ridge of Building 8; there is no certainty that it is original (see Fig. 49 below).

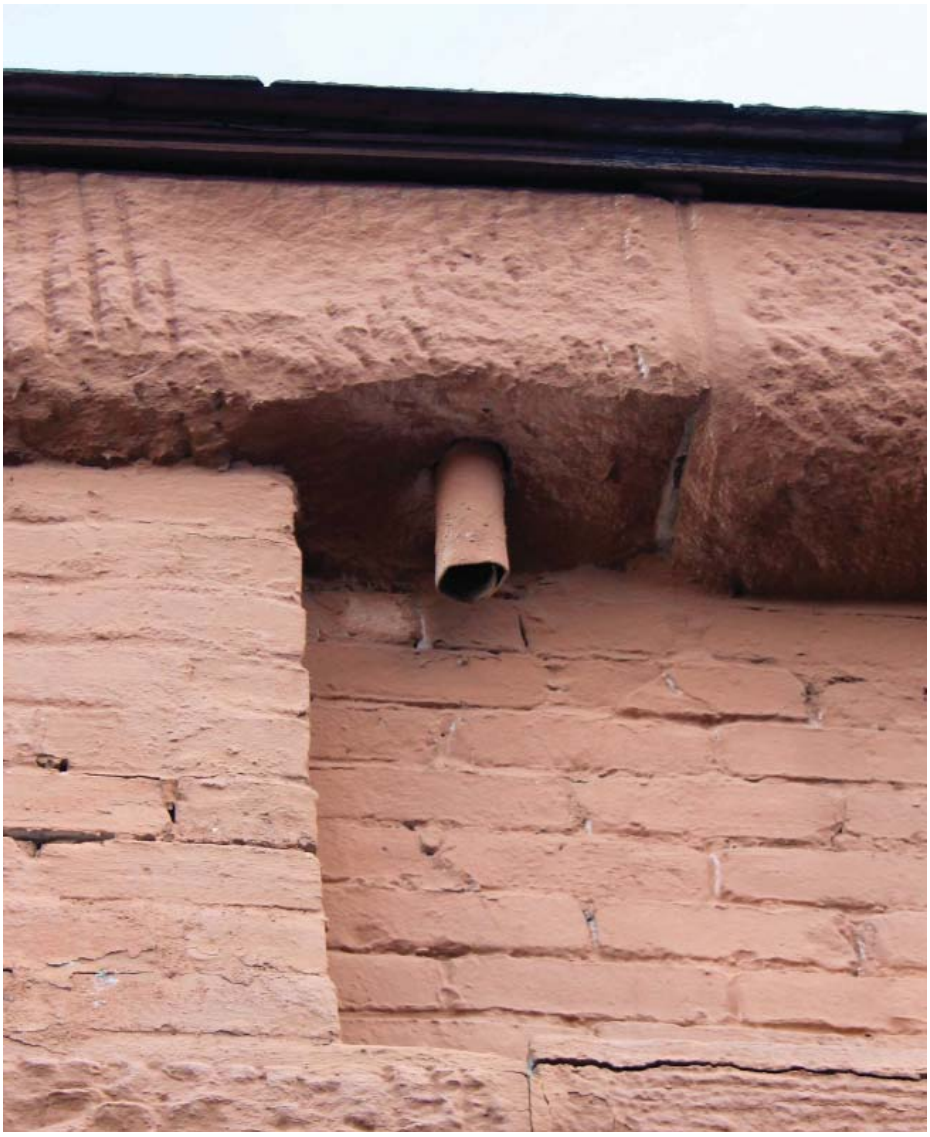


Figure 12a. Outlet from stone gutter, Building 10, west elevation.

Figure 12b. Hole for outlet from stone gutter, Building 8, east bay 27.

Downspouts – Curiously, three downspouts were depicted on the east elevation of Building 10 in figures 13 and 14a and 14b (below), but figure 13 showed no downspouts on the same elevation of Building 8. These figures are details taken from bird's-eye views that must date from between 1861, when the West Armory was built, and 1867, when the East Armory was rebuilt in a slightly different form after it burned down in 1864.[59] By 1864 when the photograph of Building 8 used for figure 3 was taken, the slate roofing of Building 8 had been extended down over the gutter. The extent of the elevation caught by the original photograph (Appendix A, plate 5) included no leader and suggested, like figure 13, that rainwater was allowed to drip to grade. Plate 5 captured no sign of the hung gutter system that is found today at the north end of the same face of Building 8. However, the site survey located a metal outlet, possibly lead, extending out of a hole cut down through the stone gutter of Building 10 (Figs. 12a) and other outlets (Fig. 12b). Given the depiction of downspouts in early illustrations (Appendix A, plates 3 and 4), and the existing exit holes in the stone gutters, it seems likely that the two buildings originally had downspouts.

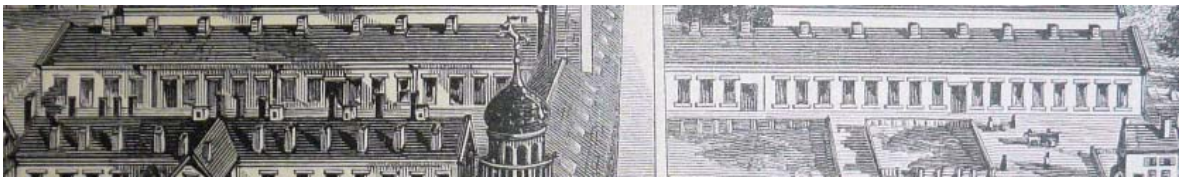


Figure 13. Detail, Buildings 8 & 10, east elevations, from *Barnard*, 1861-1866.

Roof Structures – There were no skylights depicted on early photographs but there was a variety of other structures shown on the earliest photograph (Fig. 2, 1861). Figure 3 (1864) showed only a small portion of the roof of Building 8; it included no chimneys. Figure 2 showed two low stacks set three bays apart toward the southern end of the ridge line of Building 10; it appears there may have been one or two further north, but the photograph was not sharp enough for certainty. See Appendix A, plate 2 for a larger reproduction. Their sharp profiles and thin components conveyed that they were metal not masonry, probably ventilators. The same elements were shown at the ridges of both buildings in early bird's-eye illustrations but no chimneys. See figures 13, 14a and 14b below, or Appendix A, plates 3 and 4.

Figure 2 also showed one larger, somewhat taller stack just below the ridge on the west slope of the roof at about the mid-point of the elevation. It corresponded with an annotation 'Annealing Furnace' on an 1885 roof plan (Appendix E, plate 2), but the only early plan dating from 1857 showed the iron foundry below this point (Appendix D, plate 8).

On the same slope nearer the south end of the roof there was a narrower chimney stack supporting what appeared to be a slender column or pole surrounded by a spiral of material that turned upwards in an anticlockwise direction. At the tip was an ovoid form. The function of this element is not readily apparent. Further research might establish if it was a specialized flue for cupolas used in foundries since it was above the plan area designated 'Brass Foundry' in the 1857 plan (Appendix D, plate 8).

Early drawings of the complex provide no certainty on roof structures since the content differs. A lithograph that included a small section of the south end of Building 8, and appears to have been created prior to the expansion of 1861, showed no chimney stacks on the roof (see Fig. 8 above, and Appendix A, plate 1). However, the lithograph misrepresented the overall design of the south elevation as photographed in 1861 (Fig. 2), and as it can still be read today; this illustration should not be taken as gospel.[60]

One overall bird's-eye view reproduced in Barnard[61] (see Appendix A, plate 3), put nine structures at or close to the ridge on each building (see detail in Fig. 13 above). Their spacing suggests that these were the items we have identified from figure 2 as ventilators for Building 10. However, this view did not show the chimneys near the west gable of Building 10 that had been captured in the same photograph. It also appeared to locate the main chimney too far to the east along the spine. The 1857 plan (Appendix D, plate 8) showed it at the center of the store room. The illustration also misrepresented the number of window bays. One can harbor doubts for the accuracy of this etching as well.

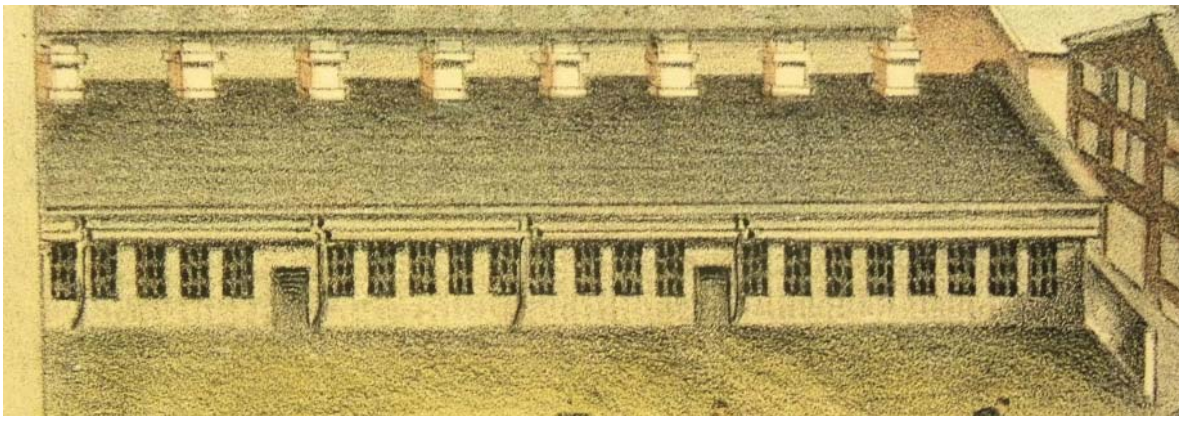


Figure 14a. Detail, Building 10, east elevation, from *Serierholz*, 1861-1866.

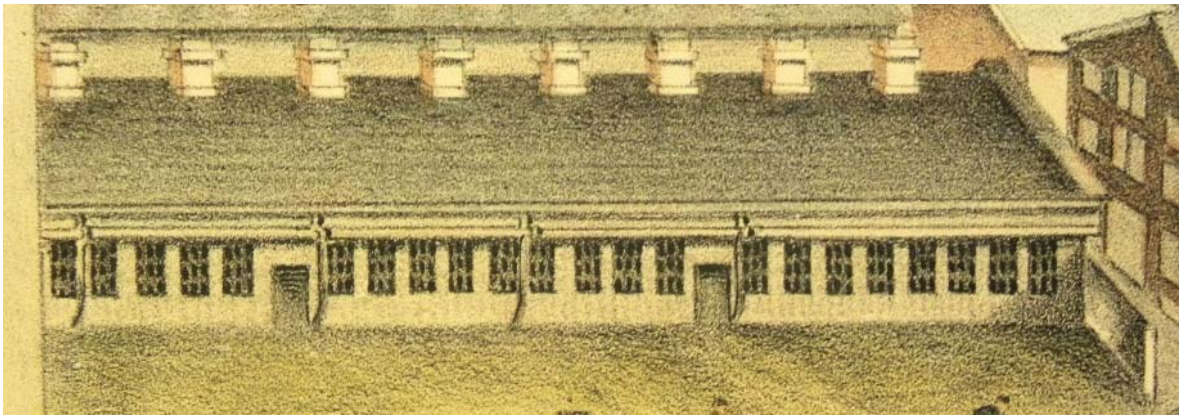


Figure 14b. Detail, Building 8, east elevation, from *Serierholz*, 1861-1866.

Another lithograph, which must also have been sketched between 1861 and 1864 (i.e., after the expansion and before the East Armory burned down), showed one chimney stack on the east gable of Building 10 (see Serierholz, Appendix A, plate 4). It also showed the slim stack emitting smoke (Detail, Fig. 14a). A detail of the representation of Building 8 (Fig. 14b) showed like Barnard a row of structures at the ridge lines of both buildings. Incidentally, both Barnard and Serierholz, agreed in the depiction of downspouts on the east façades of both buildings.

Figure 15, a detail of a cameo included below an 1877 publication showed no structures on either roof (See Appendix A, plate 7, City of Hartford by O. H. Bailey, 1877).[62] One should note that by contrast, in all of these post-1861 views, the pair of new one-story buildings erected to the west of Buildings 8 and 10 in 1861 both had a regular series of chimneys along both eaves.

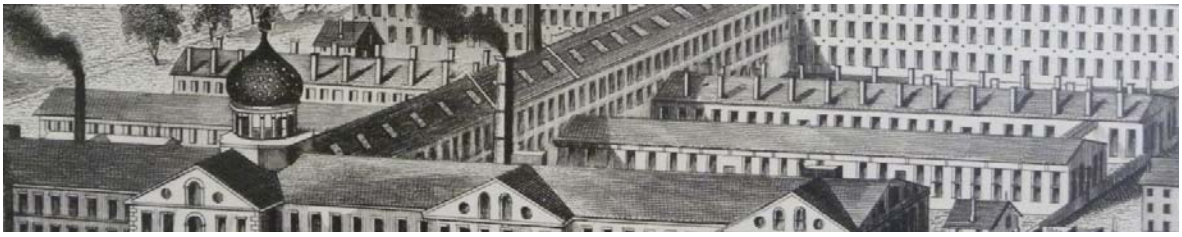


Figure 15. Detail from cameo, The Colt Arms M'F'G Co., 1877. *From O.H. Bailey & Co.*

Since all these views clearly indicated skylights on the roof of the East Armory but none on the east roofs of Buildings 8 and 10, one is more inclined to believe that they were accurate in showing none at Buildings 8 and 10. Furthermore, the EYP survey found no signs of infilled skylights in the exposed roof boards of either building.

Interiors.

Arrangement and Sequence of Spaces – There were no early photographs of the interiors. The 1857 plan (Appendix D, plate 8), shows Building 8 with a largely open plan except for two small enclosures at the south end, an Inspectors Room and a Tool room. They were placed on either side of a small passageway leading south towards the main storeroom and Building 10. An etching of the Forging Shop, Building 8 (Fig. 16), which was based on a tour through the building in 1857, confirmed the general character of the open space and possibly depicted one partition in the background.[63] From the way light was represented, and the fact that the plan showed no interior partition at the north end of the building, it is reasonable to assume that this view was looking south. The partition could have been the north wall of the enclosure of the Inspectors Room. It appeared to start from the east wall, stop below the plane of the roof trusses, and reach perhaps halfway across the building. Incidentally, the sketch provided no clear indication of the construction below the windows.

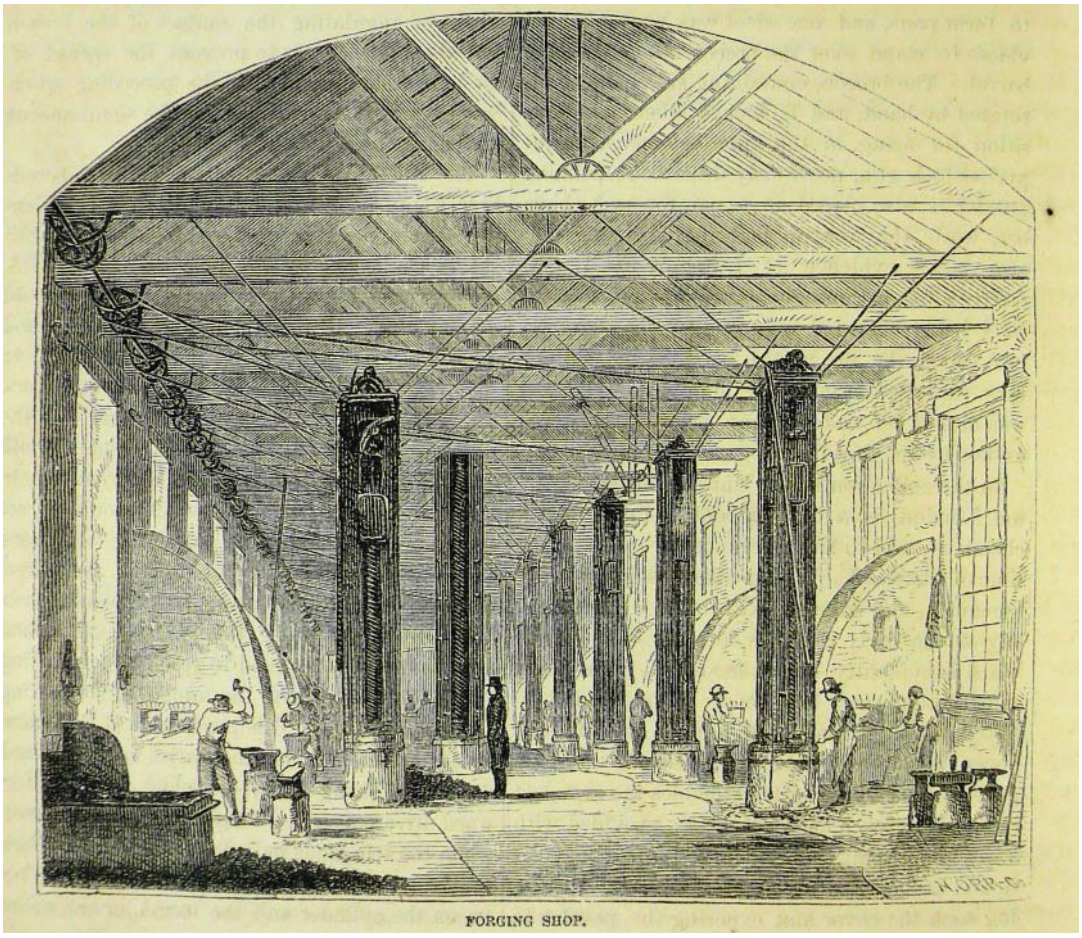


Figure 16. View through the forging shop, Building 8. 1857. *From The United States Magazine.*

In the 1857 plan, Building 10 was shown divided by a series of partitions crossing the building from east to west. From north to south they created spaces denoted as an annealing room, an iron foundry, and a brass foundry, which was subdivided by a partition running north-south. A small etching from the same 1857 article focused on a small hearth involved in the bluing operation in the foundry built against one of the piers between the windows, like the hearths in Building 8. There was no partition depicted in the view. Since no material from any of the partitions or enclosures survives today, it is not possible to draw a complete picture of the original interiors.

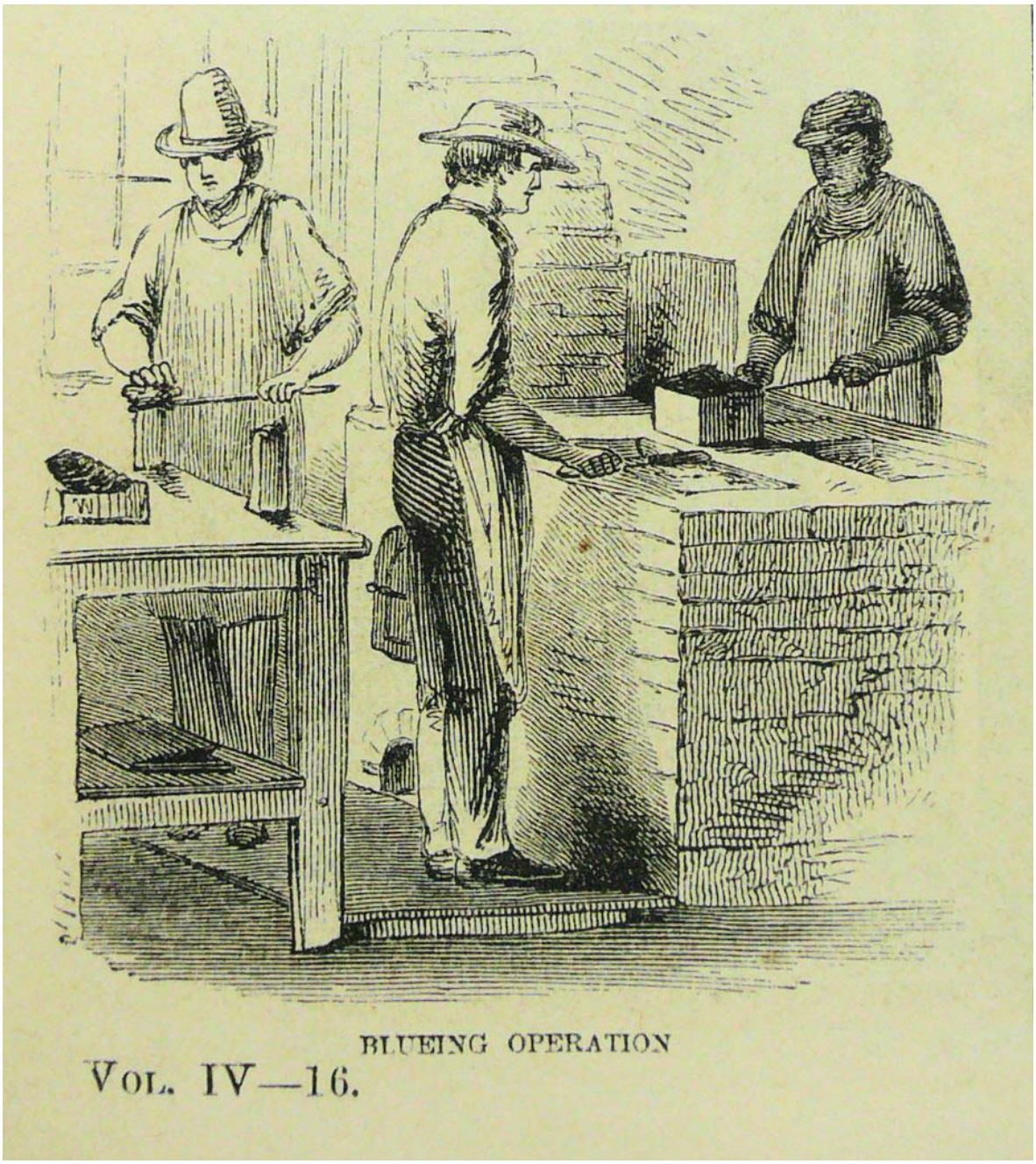


Figure 17. Detail, bluing operation, Building 10. 1857. *From The United States Magazine.*

Main Open Spaces – The present condition of Building 8, where only the exterior walls and roofing system remain, provides a reasonable impression of the column-free space as it was created for both buildings. However, absent today are the original masonry forges built against every other pier of the long side walls illustrated in the 1857 article in *The United States Magazine* (Fig. 16). An HAER 2005 photograph taken in Building 8 (Appendix A, plate 9) gave a better impression of volume of the space than photos taken during the site survey could provide as many windows had been boarded up and the space filled with construction materials since then, and at the time of the site survey, there was no artificial light. The HAER photograph showed much of the interior painted white. The paint seen is probably modern; this could be established by paint analysis. It may be that none of the interior masonry was originally painted; Colt could have seen this as an unproductive expense.

The interior structural masonry of all four walls was mostly roughly dressed brownstone – erected as piers along the east and west walls and as plane masonry at the gable ends. The piers were of rubble type construction with load-bearing brownstone finish units and a center fill of stone, brick and mortar. The interior window opening and doorway jambs, as well as the window sills, were smooth brownstone as they were at the exterior. The brownstone units forming the window heads were left with rock faces that often protruded several inches out from the general plane of the masonry. This detail was picked up in the etching in *The United States Magazine* article (Fig. 16). Beneath the windows of the long sides were the same spandrels seen on the exterior, brick alternating with brownstone. Both materials were set flush with the inner face of the piers.

Figure 18. Characteristic view of perimeter wall bay, Building 10, east wall. *Note wood windows and casing and alternating brick and brownstone masonry panels below.*

Ceilings and Roof Structure – The bottom chords of the unprotected composite heavy timber trusses that supported the roof created the original open ceiling line. They were provided with wrought iron rod and connecting hardware creating a queen post truss. See the HABS/HAER photograph from 1905, Appendix A, plate 9. Although there were some modern repairs visible at that date, there is no reason to believe these trusses were not original. Figure 16 drawn in 1857 illustrated the trusses with exactly the same configuration of heavy timbers. The trusses, one per bay, were connected by two purlins on each roof slope and supported wood rafters that in turn carried roofing boards. The ends of the bottom chord and the sloped chords of each truss were set into a cast-iron shoe set on the brownstone units that made up the cornice.

Figure 19. Cast iron shoe and anchor for truss bearing end, Building 8.

At the eaves, low brick filler walls spanned the gaps between the trusses. Not all this brick, nor its pointing, is now the same, suggesting that some at least was not original, but the absence of any other form of lateral bracing suggests that the filler wall was part of the original design.

Masonry Shafts and Ducts – Above each window opening there was a slightly projecting flat rock-faced brownstone head unit in line and continuous with similar stone units over each of the piers. This line of brownstone carried a low wall of brick with the same height as the frieze seen on the exterior elevations. The brick was topped by units of a second continuous line of brownstone units that has been identified as a cornice in the description of the exterior envelope. This construction was integrated with the entablature described above for the east and west elevations of both buildings. At this height, the depth of the masonry construction was 34”. On-site investigation showed that at both

levels single units of brownstone spanned this entire depth and even cantilevered out slightly beyond the interior face, while the outer and inner brick walls were separated by about 20 inches creating a hollow masonry tube within the 'entablature.' Initial site investigation suggested strongly that in Building 8 this tube ran the entire length of the east and west walls and that there was similar construction within the eastern part of the south wall but not within the north wall. It cannot be known whether it originally ran the full width of the south wall because the west end of this wall was completely rebuilt in altered form in brick at some later date. If it did, it would have created a continuous horizontal U-shaped duct.

Figure 20. Interior view of entablature, Building 10, east elevation.

Figure 21. View along masonry duct, Building 10, west elevation.

Wherever access was feasible, the EYP site survey ascertained that the same horizontal duct ran though the entablature of all four walls of Building 10. One could also see rectangular holes cut at regular intervals in its brownstone floor. The intervals coincided with the centerlines of every other pier. It is in these piers that patches of brick infill were noted throughout the interior elevations of both buildings.

Figure 22. Typical brick patch in brownstone pier, Building 10.

Where these patches were already partially open, or where loose bricks could easily be removed, it was possible to confirm that some piers were also hollow. From the distribution of patches, it appeared that every alternate pier were in this condition. In the piers investigated, a rectangular shaft about six inches by fourteen inches led up from the

uppermost line of patches typically about four feet below the window head to the floor of a horizontal duct. Here, as far as could be determined, a hole was cut in the brownstone unit at the top of every alternate pier. There is every reason to believe that this system of linked masonry stacks and ducts was the same in both buildings and was an original feature. Its function is examined immediately below.

Figure 23. View down vertical stack in pier, Building 10.

Figure 24. Opening from vertical stack to horizontal masonry duct, Building 8.

Integration of Hearths, Forges and Building Systems – Fortunately, Colt authorized two detailed magazine descriptions of the inner workings of his armory. The first appeared in *The United States Magazine* in March 1857, less than two years after the factory opened. The author said:

> *"We now pass into the forge shop, an apartment 40 by 200 feet square, comprising the whole of one arm of the parallel. Along each side range stacks of double covered forges – the blast for which, entering and discharging through flues in the walls, carry off the smoke and gases. Here, for the first time in our life, we were in a blacksmith shop in full operation, yet free from smoke, cinders, and with a pure atmosphere."* [64]

The space described was provided with an illustration (Appendix D, plate 7). It appeared that the hearths were built against every second pier and connected to them by a curved brick chimney. It is evident from this illustration, the text above, and from the details of the design of Colt's patented hearth (Fig. 36) that gas and heat from the hearths were being exhausted through these brick chimneys directly to the masonry shafts within the piers. But instead of ascending straight up chimney stacks to the open air directly above, the exhaust must have passed into the horizontal ducts.

During the site survey, it was also noted that there were brick patches at a lower elevation, lower than the waist height of the hearths shown in Appendix D, plate 7. Probes revealed shafts of similar dimensions to those already described going down below grade. It was not possible to see beyond the bottom of these shafts. Presumably they provided a source of fresh air that would be ducted straight to the bed of the hearths, again, as illustrated in figure 36, to assist combustion. It is possible that the alternation of brownstone and brick panels below the windows and to the side of each pier was associated with the continuation of the intake air duct, but this was not investigated.

The question remains as to how the exhaust gas that reach the horizontal ducts was exhausted from the buildings.

The following description quoted in Hosley was published in the *Boston Olive Branch and Atlantic Weekly* in 1859: [65]

> *"[the] store room … [is] crammed with iron and steel in bars … [In the] forge shop … 200 feet by 40 … a host of forges in full blast, roaring like so many lions, and yet the air…perfectly pure … [There we saw a] double row of black columns … hammers of the kind termed 'drop,' that are peculiar to this establishment … [being raised on the endless screw principle and tripped by a trigger."* [66]

Figure 16 showed a double row of drop hammers marching down the central zone of the forge shop, tied back overhead to the bottom chords of the roof trusses. It should be possible to discern the pattern of their attachment from close inspection and analysis of holes in the bottom chords of the trusses, some of which can be seen in figure 25.

Figure 25. Representative pattern of holes in bottom chord of a truss, Building 8.

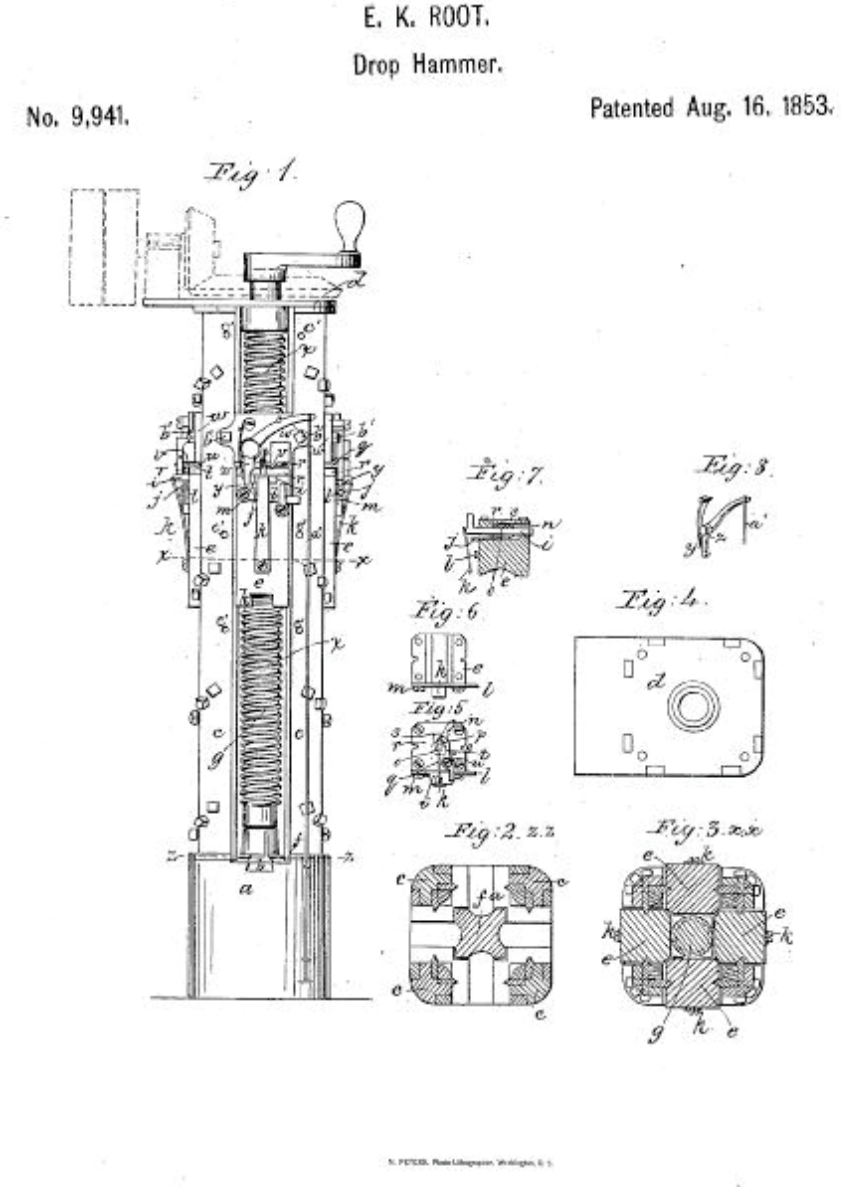


Figure 26. Elisha Root's 1853 patent for a drop hammer. *Note indication of belt drive at top left and the vertical threaded shaft.*

It appeared from the configuration of drive belts shown in the 1857 illustration, which were all attached to a continuous crankshaft running down the left-hand wall, that the threaded lifts, the 'screw principle' of the drop hammers, employed a centralized source of power. Judging by Barnard's text, this was steam.[67] The left-hand wall depicted was probably the east wall since it would have been closer to the source of steam power which was located in the spine between the East Armory and Building 10 (Appendix D, plate 8). The same passage of the 1859 account started *"At the center of the main building [i.e., the East Armory]…the steam engine… a miracle of mechanical engineering …250 horsepower."* Barnard, writing in 1866, said that there was a back-up engine of 450 horse power as well as a third and fourth connected to the "new building," presumably the West Armory.[68] He described at least one of these furnaces *"smoking, as a cigar, a chimney one hundred and thirty-eight feet high."* [69]

The earliest lithograph of the complex dating from before 1861 showed only one chimney, although its exact location was not clear (Appendix A, plate 1). The 1861 photograph (Fig. 2) also showed only one, clearly rising from the spine between Buildings 8 and 10. The bird's-eye view that Barnard included in his 1866 book (Appendix A, plate 3) illustrated two in the original complex. Again, one was in the spine slightly east of the spot where the 1857 plan showed a store room and a chimney between Buildings 8 and 10. The second was in the north courtyard. The latter was captured by photographs of that court taken immediately after the fire of 1864. (See Appendix A, plates 5 & 6).

It seems that the forge and the foundry were powered by steam when built, even if the boiler was located outside them, probably over the spine.[70] We would argue that for the long horizontal masonry ducts to have served as effective exhausts from the stacks and hearths to one of the nearby tall chimneys, the natural draft created by the heat of the forges would have had to be supplemented by exhaust fans. These could have been steam driven and located in the store room between the two buildings and immediately below one of the two chimneys.

Although we have found no descriptions of steam-driven exhaust fans in other American factories at this date, they had begun to be used in England. In 1851, four were installed in a hospital to draw in outside air and force used air out through the ceiling, and a different model, which had been installed in a colliery, was exhibited at the Great Exhibition in the Crystal Place.[71] The designer was William Brunton, a member of Britain's Institution of Civil Engineers.[72] Colt not only gave a lecture in London to the Institution of Civil Engineers that same year, but was himself an exhibitor.[73] It is easy to imagine that, given his interest in industrial machinery, Colt would have explored the Exhibition and seen the potential of this steam driven fan, especially since he was already involved in the planning of his London factory, which opened the following year.[74]

The 1857 plan indicated small forms in the northwest and southwest corners of the store room hard against the end walls of Buildings 8 and 10 that represented dogleg stairs leading to the upper levels of the three-story spine. But enough space remained for steam-driven fans that could have drawn exhaust gasses from the masonry flues and ducts and driven them up the chimney that was located against the center of the south wall of the store room.

In the 1857 illustration of Building 8 (Fig. 16), the forges were shown built against the side walls. It is evident that if the curved brick construction above the hearths contained a flue or possibly two flues, it would have conducted hot air and smoke from the fire beds to the vertical shafts in the piers and thence to the horizontal masonry ducts. This would have provided incombustible protection against unwanted fires and a path for the exhaust of smoke and carbon monoxide.

Ample soot was found in several of the vertical stacks that were explored during the site investigation. From the built evidence of these flues, and from *The United States Magazine* illustration, one can conclude that the forge was built with hearths at every other window bay on both sides of the building. It seems highly unlikely that such a major investment in masonry and machinery represented a change made between 1855 when the factory opened, and 1857 when this illustration was drawn. And the hidden exhaust would have accounted for the wonder expressed in the accompanying article about the smoke-free environment of the forge.[75]

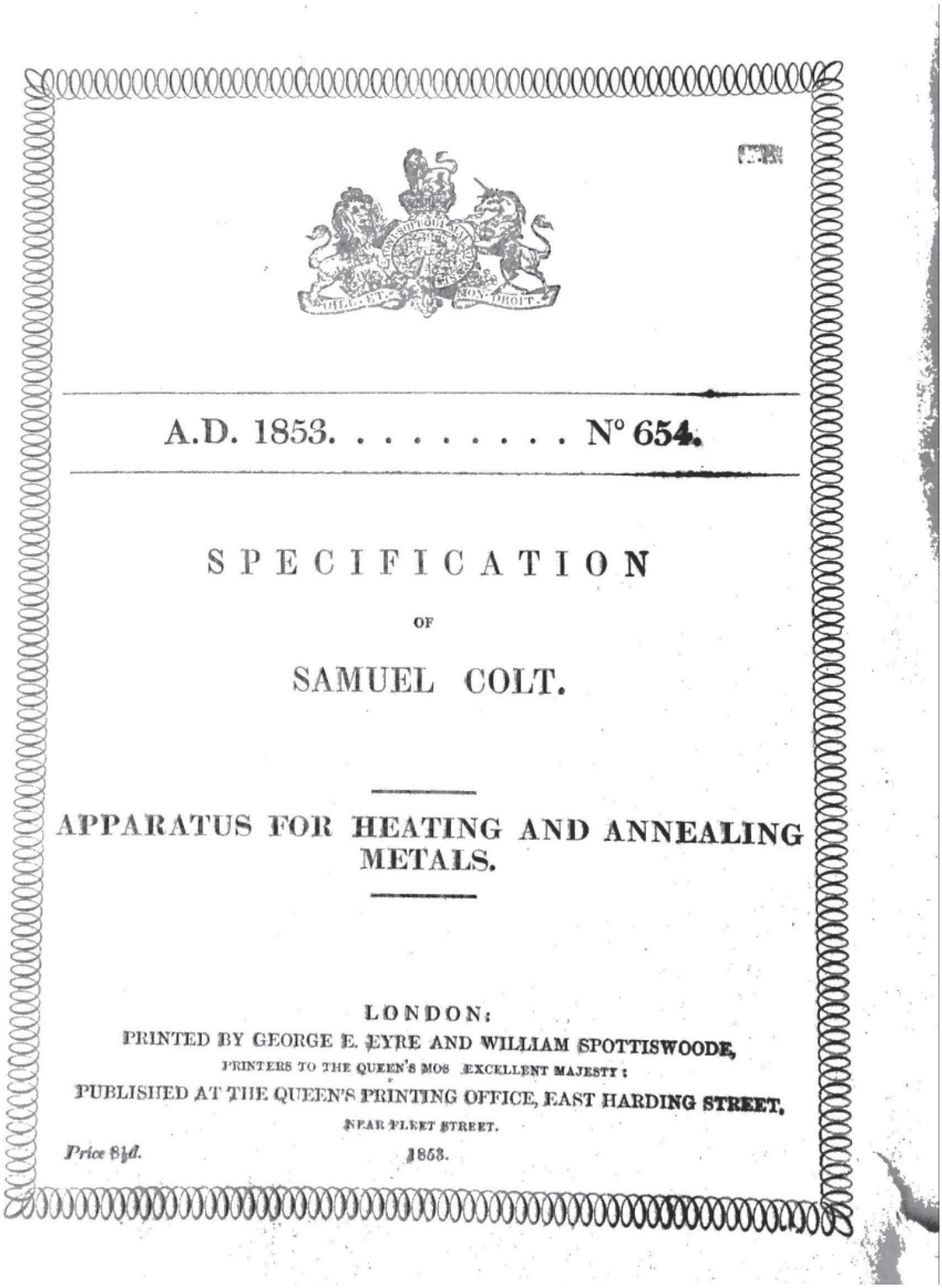
Further, in both buildings site investigation revealed that, where there were brick patches indicating the locations of former connections of forge flues to vertical stacks, there were also bricked-up openings lower in the same pier. These brick patches were typically at around waist height. Shafts were found behind the brick patches at this level as well, but in this case, they rose from below grade. In Building 8, this lower shaft was always separated from the upper shaft by a brownstone cap. There was no such cap at the piers investigated in Building 10. This may point to differences in the requirements for forges and foundries that warrant further investigation.

If we posit a fan-driven exhaust system at eave level, it is no great reach to propose that there was a fan-driven supply of fresh air drawn through a second horizontal duct system below the factory floor. It is a hypothesis that could be tested by archaeological investigation.

More immediately, supporting data can be found in the details of Colt's 1853 patent. It described an exhaust system consonant with the evidence of the 1857 illustration and the material remains on site. When talking about softening steel, Colt said:

> *"The metal to be operated upon is placed in a cast-iron box and surrounded by charcoal dust, as is usual in such operations. This box is set in brick work, and forms the top of the fireplace. The flame plays directly upon the bottom of the box, and passing upward, when it has arrived at the end thereof it is divided and directed into two streams along the sides to the front of the box, where the two streams meet and pass upwards under a cast-iron cover, which is placed on top of the box, and forms a flue for conducting the flame and gasses of combustion to the chimney."*

Later, when talking about the means to control flame and heat and to avoid unsteady burning of the fuel used which was anthracite, he said "the blast is carried up from below." [76]



A.D. 1853. . . . . N° 654.

SPECIFICATION

OF

SAMUEL COLT.

APPARATUS FOR HEATING AND ANNEALING METALS.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:
PUBLISHED AT THE QUEEN'S PRINTING OFFICE, EAST HARDING STREET,
NEAR FLEET STREET.
Price 8½d. 1853.

Figure 27a. Cover page for Colt's patent application, London, 1853.

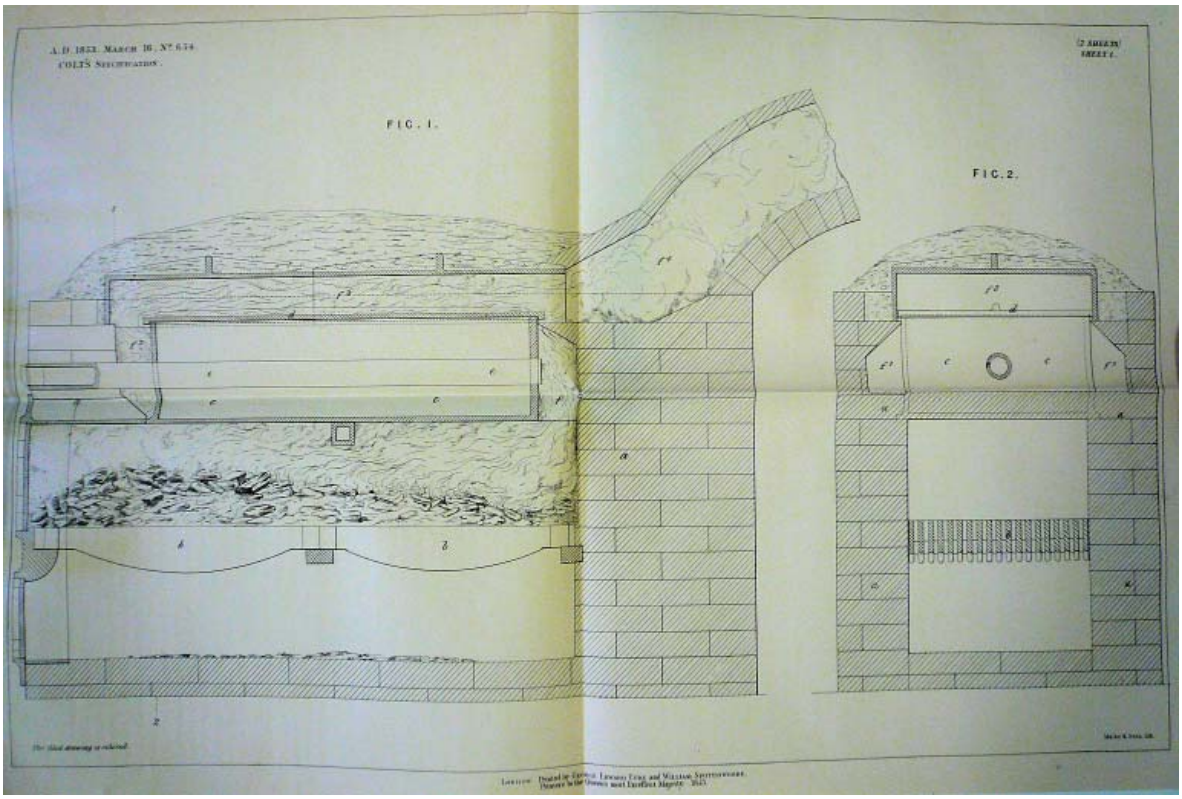


Figure 27b. Colt's heating and annealing apparatus, Application N° 654, Fig. 1, 1853.

Apart from the illustration of the bluing station in the 1857 *The United States Magazine* (Fig. 17), there was little contemporary pictorial or written description of the foundry setup in Building 10. Barnard concentrated more on the forge shop.[77] Of the forge he simply said that molten metal "flowing out of a sort of tree, with guards as branches" goes into molds made "so that each turns out a dozen guards at once."[78] But, in 1853, Colt had patented an apparatus in London intended for both heating and annealing. The annealing process depended on precise control of different temperatures; Colt's patent incorporated reliable means for observing the temperature at the coals. It is possible that some hearths were set up in the foundry in the same manner as in the forge.

It is also possible that straightforward melting of iron and brass for pouring into molds was achieved using cupolas, i.e., free-standing metal furnaces. These typically had no forced air supply but would have had exhaust breeching. This might explain the different detailing of the vertical stacks in this building.

Gas Lighting – In addition to the built-in systems of air supply and removal, it appears that both buildings had gas lighting. The 1857 article mentioned "gas burners to illuminate…for night work."[79] Although the factory buildings had adequate natural light during daylight hours, Barnard reported that, at least for the East Armory, the ten-hour shifts that Colt demanded meant that supplementary lighting had to be provided for the early morning hours and late afternoon hours in winter.[80] Further, Barnard stated, by the time of the Civil War Colt used double shifts particularly to meet demand, but he is also said to have been concerned with safety.[81] Gas light would have created better illumination and, to that extent, safer working conditions during night-time work shifts. Being flammable, it

would also have brought increased risk of fire and even explosion, but it was better than any other lighting source available at the time.

Supplementary Heating – There is no obvious sign today of original supplementary heating in Buildings 8 and 10. *The United States Magazine* article mentioned steam heat piping in the East Armory, while Barnard mentioned hot air heating in the same building, but neither remarked on a heating system in the forge or the foundry.[82] Given the heat being generated at the forges and cupolas, one might question whether any was needed. But since Barnard mentioned hot air heating in one part of the factory complex, and the on-site survey uncovered masonry ducts entering the buildings via the piers from below grade, it might be worth investigating the possibility that waste heat was delivered from the onset from the nearby engine room in the spine (see Appendix D, plate 8).

Other data suggest that heating was installed, only later. The Baker and Tilden Atlas of 1869 showed an addition against the west wall of Building 10 in the corner between Building 10 and the spine. On an 1885 survey, the same addition appeared with the annotation 'Used for heating.' Perhaps heat was provided for the two buildings for the first time after 1861 when, as will be argued below, forging operations moved out of Building 8. Heat-producing operations were also reduced in Building 10 at some time before 1885 when the same survey noted that most of the space was devoted by that time to polishing.

Water supply – Barnard stated that the forge was equipped with ice-cooled drinking water pumped from Colt's own reservoir.[83] There may have also been a fire-suppression water service located at the center of the east walls of both buildings where there is now a more modern riser. Such fire suppression aids were becoming common by the mid-19th century in slow-burning construction, which is how Buildings 8 and 10 should be classified for fire resistance.

It is also possible that Colt company managers installed them in these two buildings after the disastrous fire that ruined the East Armory and the spine in 1864. Barnard, describing the East Armory after it was rebuilt, said that there was "a hydrant for drinking and ablutions as well as a hose for extinguishing fires."[84] The existing remnants of the sprinkler systems to which the extant risers are now connected were most likely installed only decades later, as such systems began to appear in factories in the 1880s.[85]

Summary

While the original materials, finishes and form of both buildings spoke of economy and functionality, contemporary commentary asserted that both were equipped with a range of up-to-the-minute building systems. On-site investigation has revealed that these included fire-proof air supply and combustion exhaust duct systems concealed within the masonry walls. Analysis of available plans and early photographs has suggested that steam-driven fans drew fresh air into these buildings and exhausted combustion gas out through a tall central chimney located in the interstitial 'store room.' When the buildings are thoroughly emptied, more careful and focused site investigation may reveal more traces of each of these systems.

CHANGES IN FORM AND USE OVER TIME

1855 to 1885

For the years immediately after they were built there appears to be little record of change to either Building 8 or 10, except that it seems from figure 3 the slate roofs were extended over at least some of the built-in stone gutters by 1864. But there were several changes in their immediate surroundings. These changes may or may not have directly have affected the use of Buildings 8 and 10, but they indicate that the evolving operation of the factory required rapid change in its built form.

The first major change was the doubling of the original H plan of 1855 (Appendix D, plate 8). This occurred in 1861 as caught in a photograph (Fig. 2) that showed the West Armory under construction and between Building 10 and the West Armory, a completed one-story shed of approximately the same size as Building 10. The completed expansion was first recorded in plan view in the Baker and Tilden Atlas of 1869.

An interesting detail in figure 2 was the row of tall, thin chimney stacks shown on west gable of the new single-story wing to the west of Building 10. These were placed precisely over every other pier. This spacing is the same as that revealed by recent on-site investigation by EYP, which found vertical stacks within every other pier of the long elevations of Buildings 8 and 10. The stacks appeared to be part of the exhaust and flame control for the original forge and foundry. Another stack can just be discerned on the new building's east gable; it could be the first of a complementary series. The bird's-eye views by Barnard and Serierholz suggested this was the case (see Appendix A, plates 3 and 4). Both illustrated the built form of the complex as it appeared after 1861 before the East Armory was rebuilt in slightly altered form in 1867.

The second plan to be annotated with armory functions, the Sanborn map published in 1885 (Fig. 32 below), indicated an 'Iron Foundry', not a 'Forging Shop,' in Building 8. A 'Forging Shop' was shown in the 1861 wing west of Building 10.

The forge might have been moved out of Building 8 as early as 1861. The row of chimney stacks in the 1861 wing could suggest that the steam-powered exhaust duct system of Building 8 had not been a great success, or that it was more expensive to recreate in the new wing than a small, individual chimney at each hearth. Alternatively, to meet the greater demand for weaponry created by the Civil War, Colt may have increased the factory's capacity for forging in 1861, adding hearths in the new wing while maintaining forging in Building 8. Forging could have continued in Building 8 after 1861, only to be abandoned sometime before 1885 when a Sanborn map labeled it as an 'Iron Foundry,' perhaps due to the economic recession of 1882-1885. Later atlases and Sanborn maps never again showed forging in Building 8; it remained in the 1861 wings. By 1885 until at least 1909, forging was in the more southerly of these wings (Appendix E, plates 2 & 4). By 1919 it had moved to the northerly wing (Appendix E, plate 6).

It has been suggested in a geotechnical contribution to the structural evaluation of Buildings 8 and 10 that vibration attendant on forging operations could have affected 'the soil beneath the building and the foundations and floors resting on the soils.'[86] Although the author characterized the machinery of the 1800s as relatively light (ibid.), he argued later that soil liquefaction induced by low frequency oscillations, which 'many types of machinery have,' were 'a large causal

component of the building movements,' i.e., tilting of the foundations.[87] Perhaps the two relocations of the forging shop were in part related to such failures. An early photograph, figure 3, seemed to show as early as 1864 differential settlement of the south end of Building 8 near the taller central spine where shear loading on the foundations would have been heavier than under the typical Building 8 footings.

One could counter this argument by pointing out that there is no evidence that similar vibration-inducing machinery was ever used in Building 10 the foundry, which has nonetheless also suffered differential settlement. However, site investigation has revealed that in both Buildings 8 and 10 there were hollow tubes in the masonry of the piers reaching down the level of the footings. If these hollow tubes were part of a fresh air intake system, it would have had to extend out from at least one side of the base of the pier to reach a source of fresh air. Such a requirement could have introduced asymmetrical loading of the footings.

A photograph taken looking southwest across the north courtyard in the aftermath of the fire of 1864 (Appendix A, plate 5) showed two buildings east of Building 8 set hard against the north side of the spine. They were built around a tall brick chimney. None of these three structures was evident in an 1861 photograph taken of the complex from the north during the construction of the West Armory (Fig. 28). Another photograph (Appendix A, plate 6) which must have been taken a short time later revealed that the smaller building closer to Building 10 had already been demolished. The larger remaining building may have been a boiler house added between 1861 and 1864 to increase the supply of steam, possibly to Buildings 8 and 10.

Figure 28. Detail, the factory complex from the north, 1861. *The West Armory, at the extreme right, is still under construction. The original north watchman's cottage, a one-story building with a gabled roof can be seen in the courtyard to the west of the East Armory (under the dome). No other structures appear to have been erected in the north courtyard by this date.*

The 1869 Baker and Tilden *Atlas of Hartford City and County* (Fig. 29) confirmed the presence of this boiler house and chimney in its outline plan. It showed the completed double-H factory complex, the new freestanding building in the southeast courtyard (glimpsed in Fig. 2 and labeled "Annealing & Tempering" on the 1885 Sanborn map) and a number of other small free-standing buildings in all six courtyards.

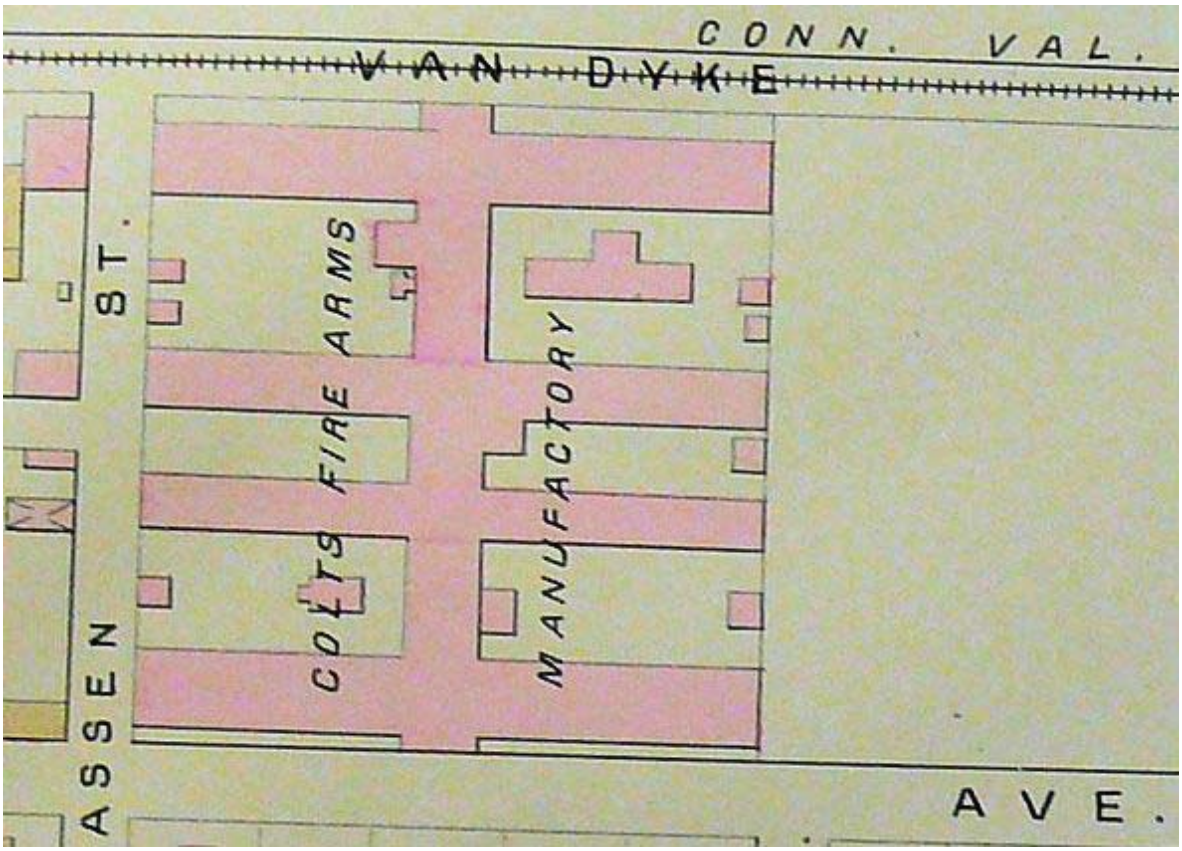


Figure 29. Detail from Baker and Tilden Atlas of Hartford City, 1869.

It also included the first addition to Building 10 at its western intersection with the extended spine. Its function was not labelled, but an 1885 Sanborn map showed the same form with the annotations “used for heating” and “75HP”; a black circle immediately to its south may have indicated its chimney. The Richards Atlas of 1909 described an addition of the same size, shape and location as a boiler house. Given such a specialized function, it is reasonable to assume that this was the original function of the addition. It appears that this boiler house and its attendant chimney were not built before the fire of 1864 as there was no indication of the chimney in the Barnard and Serierholz views (Appendix A, plates 3 and 4).

Where this structure abutted the west elevation of Building 10, one can today still see a section of entablature detailed with the brick pilasters (Fig. 30). This suggests that the boiler house roof, which a later Sanborn map represented as flat, was at the level of the eave of Building 10 so that it encased and provided protection for a few bays of original brick masonry details that were later lost along the remainder of this elevation. The brick pier towards the right (south end) of figure 31 may represent the point at which the boiler house terminated. It could, however, be related to the radical alteration of the next few bays to the south at an undetermined later date.

Figure 30. Frieze with pilasters at location of boiler house addition, Building 10, north end of west elevation.

1885 to World War I

An 1885 map (Fig. 31 below) showed considerable changes of use that affected Buildings 8 and 10 and many adjacent buildings.

The use of the building that was already present in the southeast courtyard by 1861 (see Fig. 2) was identified as “annealing and tempering,” while the north end of Building 10, which was originally used for annealing (see Appendix D, plate 8) had lost this function and was given over to ‘polishing.’ Perhaps the boiler house addition at the north end of Building 10 had been added because the change of use had eliminated cupolas and annealing hearths as sources of heat in that area.

The space at the south end of Building 10 remained dedicated to brass. A group of dots was labelled “brass furn,” presumably furnaces, at the location of the chimney stack surmounted by the tapered column visible in figure 2. One of the two partitions visible the 1857 plan (Appendix D, plate 8) still remained separating the “brass foundry” from the remainder of the floor which otherwise was shown open.

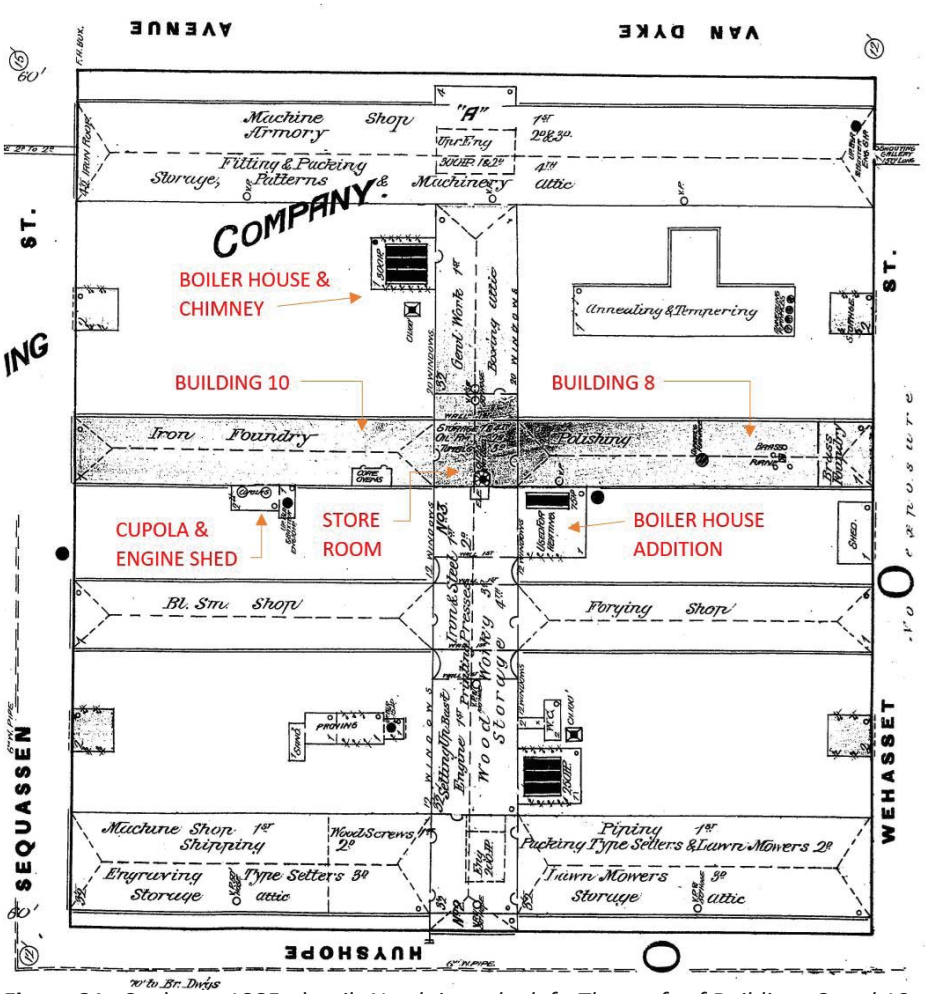


Figure 31. Sanborn, 1885, detail. *North is to the left. The roofs of Buildings 8 and 10 are shaded. No forging operations remain in Building 8. Foundry operations have been reduced in Building 10 but expanded into Building 8.*

The space at the intersection of Buildings 8 and 10 and the spine was shown to be devoted still to storage with other functions on the floors above. The central tall chimney remained, but a note beside it says, 'not used.' As previously mentioned, the map confirmed that the structures added to the northeast courtyard were indeed a boiler house and chimney.

According this map, the forging shop had moved out of Building 8, and the iron foundry which had originally occupied most of the north half of Building 10 had replaced it (Appendix D, plate 8). The forging shop had moved from Building 8 to the 1861 wing to the west of Building 10 as discussed above. The floor of Building 8 appeared more open than before; the inspection and storage spaces at its south end have disappeared. A small structure titled 'coke ovens' was shown added against the west wall close to the south end. Today, there is no structure remaining to provide an idea of its appearance. The structure appears to have spanned from approximately bays 20 to 22.

Outside the same wall, around the midpoint of the elevation, it outlined two new structures. One was shown with two cupolas; the other, labelled 'Up. Bur & Baxter Eng. 10HP' was presumably an engine shed. A later undated drawing that focused on underground utilities showed the bare outline of the cupola enclosure only and noted its plan dimensions as 12x24; no engine shed was recorded. See figure 32.[88]

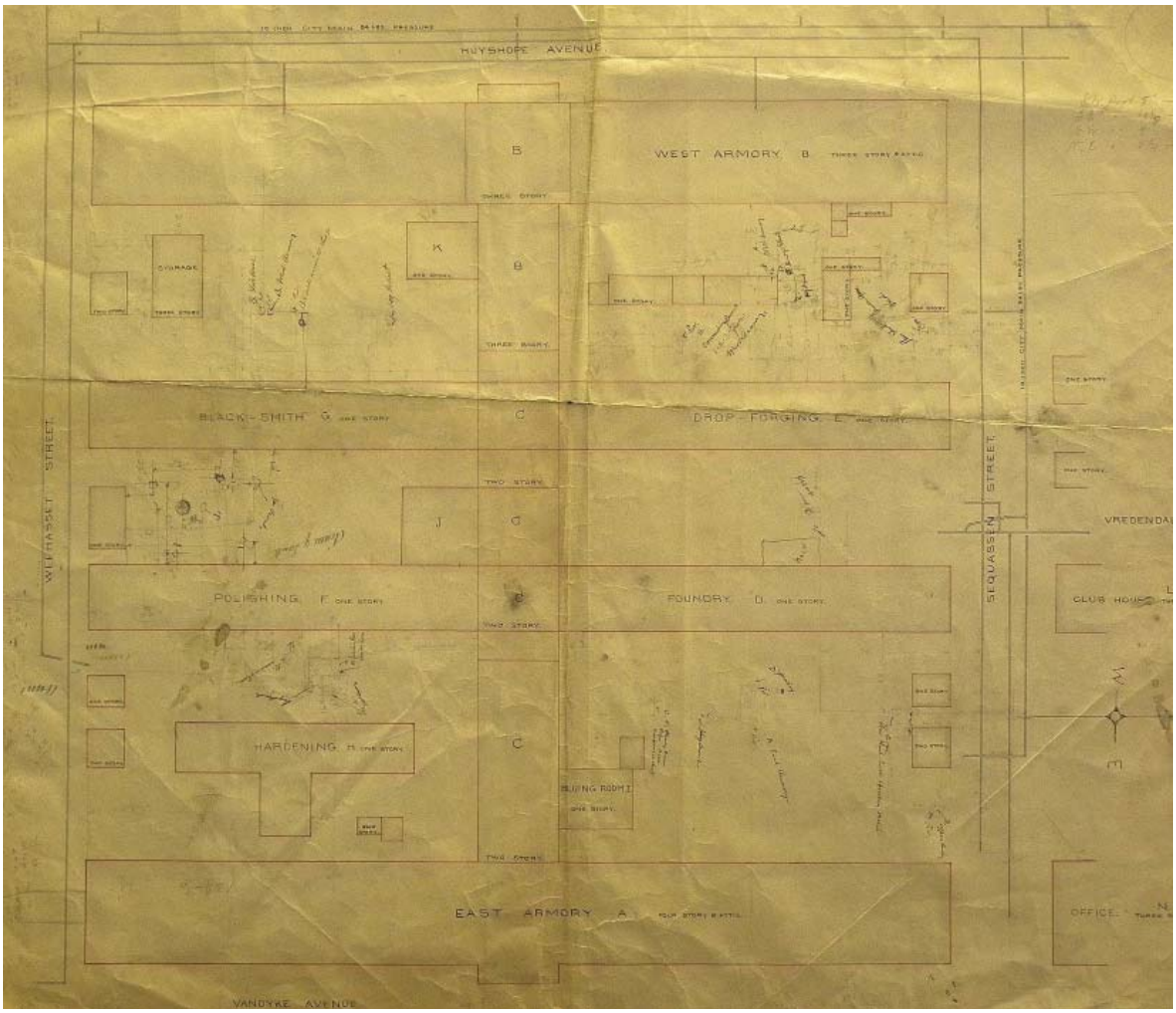
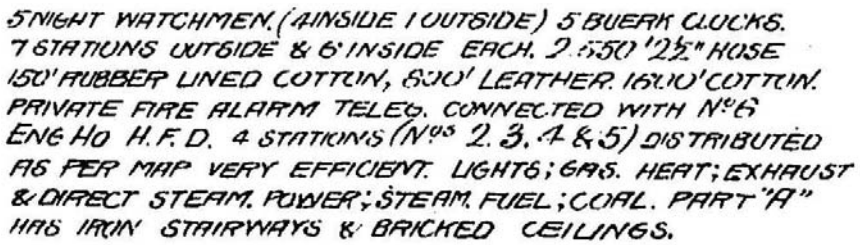


Figure 32. Undated survey, post 1867, prior to expansion to the south. *Note that north is to the right.*

One imagines that there should have been a door created between the foundry and the cupola shed, perhaps by lowering a window opening, but at the exterior, the space below the windows is now obscured by a concrete steam tunnel. At the time of the site investigation, many materials were stacked against the interior face of the west wall limiting detailed inspection of the lower sections of the wall. There should be an opportunity in the future to take a closer look for evidence of reworking of window openings in this section of the west elevation.

Today there appears to be only one altered bay to the north of the cupola shed at bay 9 where there is a double-wide doorway and the steam tunnel dips below grade. The placement of this doorway and it width suggests that it was created to facilitate communication between a lumber shed built next to the north end of Building 8 at a later date when Building 8 was being used as a woodworking shop. It is possible that the double-wide doorway took advantage of an earlier opening made to provide access to the cupola or to the courtyard created to the west of Building 10 in 1861 and the new wing to its west.

There was an interesting note on the 1885 map (Appendix E, plate 2) inscribed in the largely empty lot to the north. It clearly referred to the factory complex:



This transcribes as:

> *5 NIGHT WATCHMEN (4 INSIDE, ONE OUTSIDE) 5 BUERK CLOCKS.*
> *7 STATIONS OUTSIDE & 6 INSIDE EACH [building]. 2 550' 2½" HOSE,*
> *150' RUBBER LINED COTTON, 800' LEATHER. 1600' COTTON.*
> *PRIVATE FIRE ALARM TELEG[raph]. CONNECTED WITH N° 6 ENG[ine]*
> *HO[use] H[artford].F[ire].D[istrict]. 4 STATIONS (N°s 2, 3, 4 & 5)*
> *DISTRIBUTED AS PER MAP. VERY EFFICIENT. LIGHTS; GAS. HEAT;*
> *EXHAUST & DIRECT STEAM. POWER; STEAM. FUEL; COAL. PART "A"*
> *HAS IRON STAIRWAYS & BRICKED CEILINGS.*

It confirmed that there was indeed water for hoses for the factory buildings by this date, as well as a direct telegraph service to Hartford Engine Company No. 6; only Part A, which is the East Armory, was singled out as having fireproof construction. It also confirmed that steam power remained in effect and that there was still gas lighting.

It is also interesting that nothing related to the production of arms was recorded for the West Armory on this 1885 map. It was dedicated to lawn mowers, piping, type setters, engraving and machine shop shipping. In the previous decade, the U.S. was not directly involved in any wartime conflicts, except against the indigenous people of the country, now called Native Americans. However, it is possible that the Colt Patented Fire Arms Company was selling arms to the British or to other European powers who were engaged in a number of colonial wars in Africa at this time.

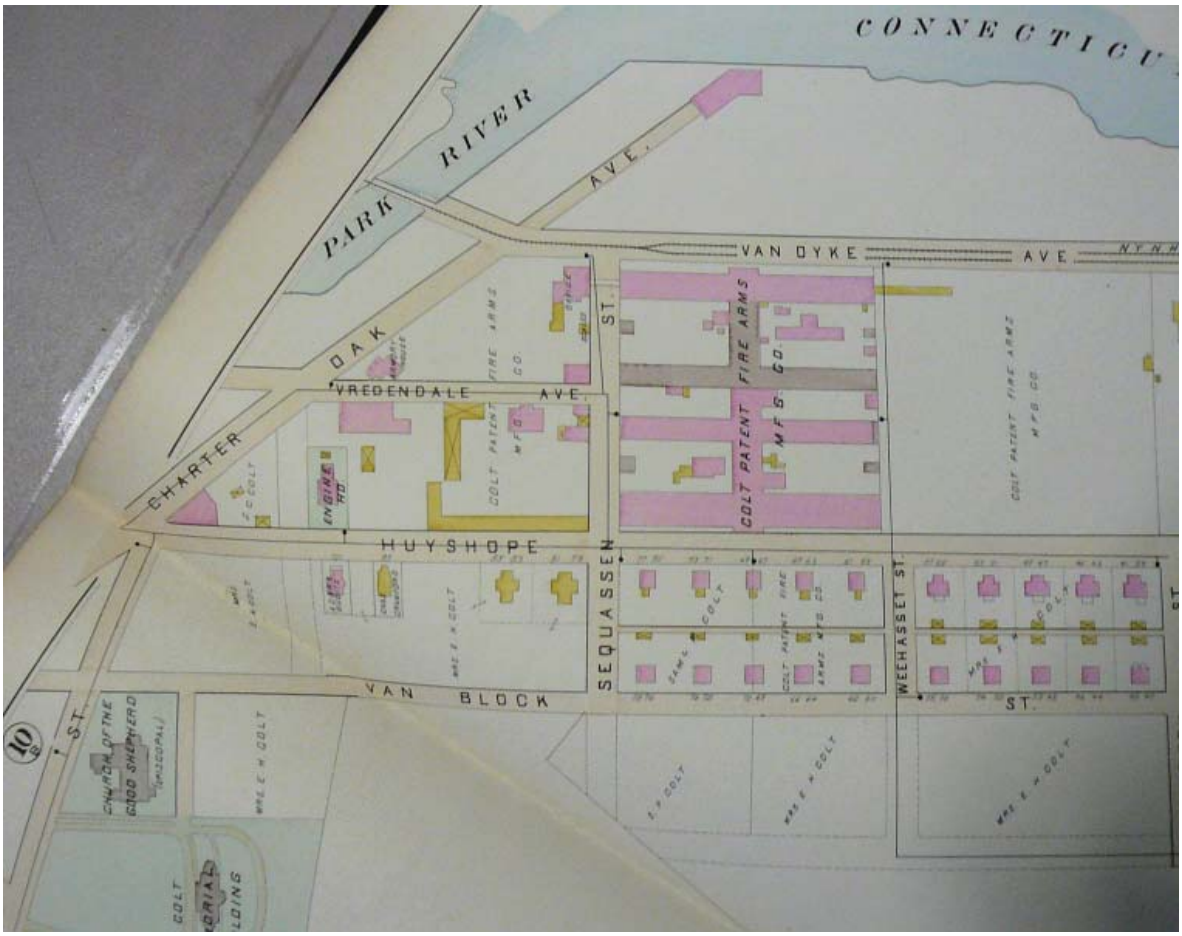


Figure 33. Detail, Richards Atlas of 1896.

The 1896 L. J. Richards Atlas of West Hartford carried no information on the activities being conducted in any of the factory buildings (Appendix E, plate 2). It showed no new additions to these buildings, but the outline of the boiler building attached to the west elevation of Building 10 and of the cupola and engine sheds attached to the west side of Building 8 remained unchanged from the Sanborn map of 1885. A few small unlabeled buildings appeared for the first time in the courtyards to the east, well clear of Buildings 8 and 10.

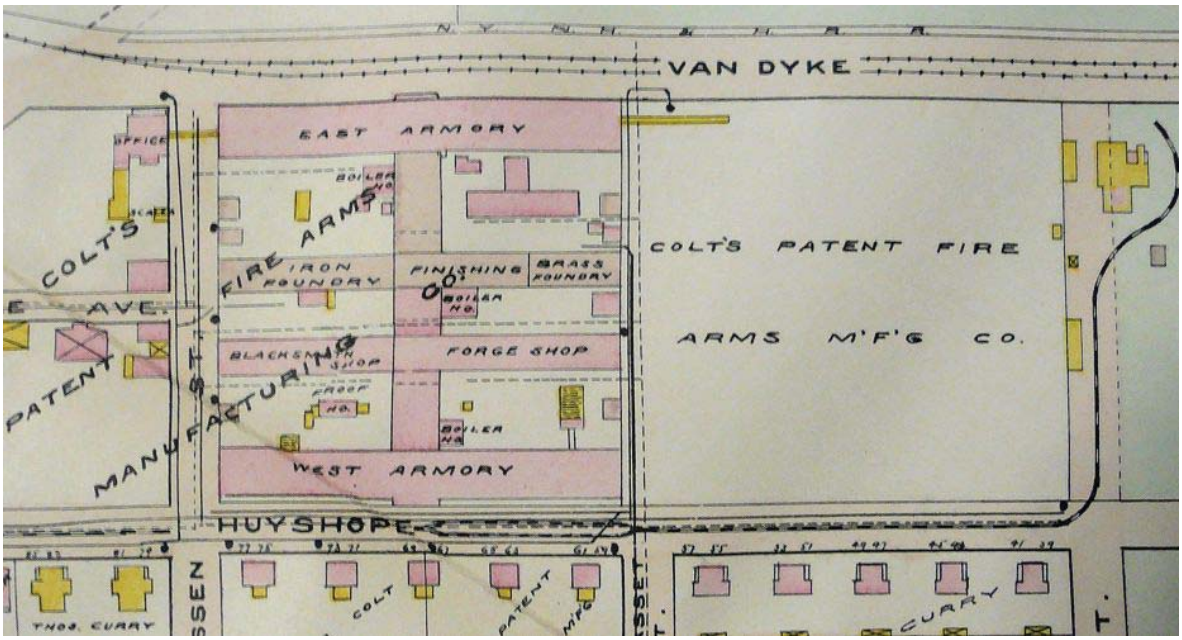


Figure 34. Detail, Richards Atlas of 1909.

The Richards Atlas of 1909 showed little change in plans but some changes in use. The two additions on the west elevations of Buildings 8 and 10 remained as they were in the 1896 atlas. The space in Building 10 labeled 'polishing' in 1885 was now labeled 'finishing' and extended into the central structure originally identified as a store room (Appendix D. plate 8). This atlas showed no chimney in the central space and neither did their 1896 atlas, but a chimney appeared on a 1934 aerial photograph (Appendix C, plate 1) and was still drawn on a 1938 survey (Fig. 36, below); there is little reason to believe it was demolished before this later date.

The 1909 atlas showed that the partition separating the finishing area from the brass foundry had moved northwards toward the mid-point of Building 10 but recorded no subdivision of the brass foundry itself.

The fact that the atlas colored the Buildings 8 and 10 and the spine brown confirmed that the elevations of these buildings were brownstone. The pink that characterized the remainder of the complex, shaded pink, indicated that it was built in brick.

Changes related to World War I

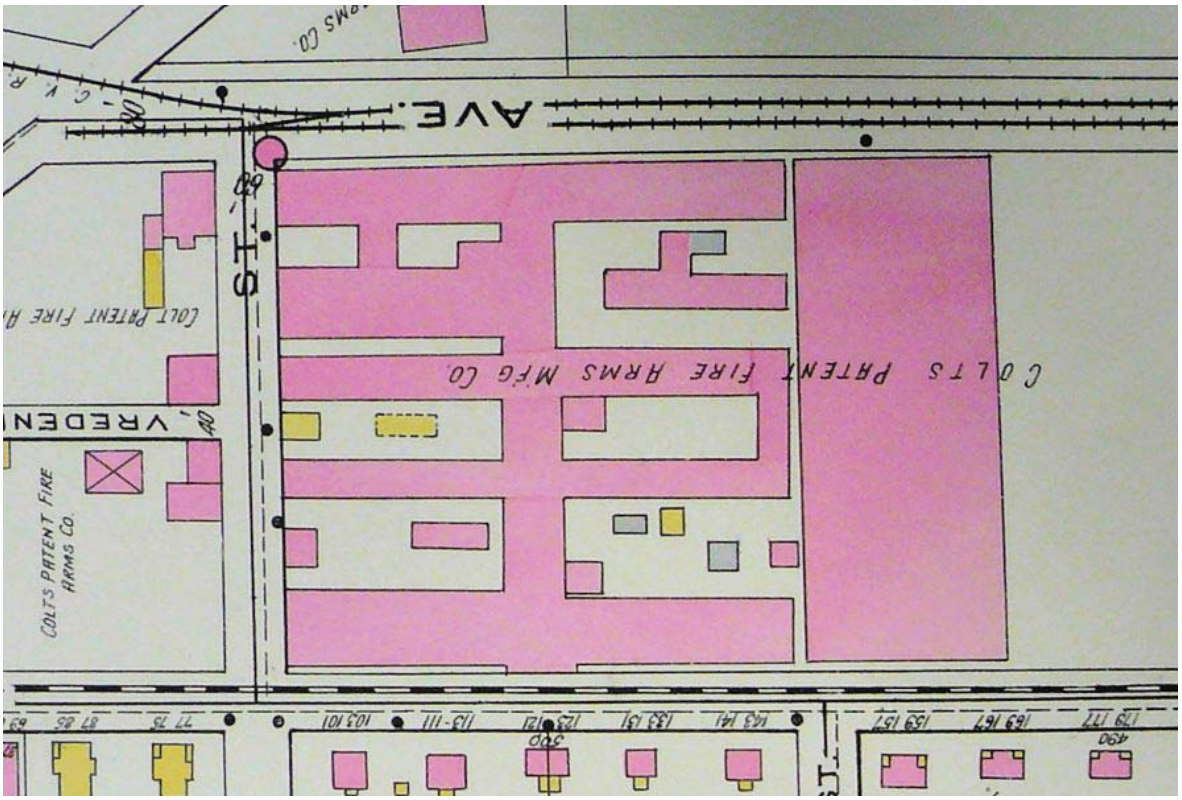


Figure 35. Sanborn Map Company, Atlas of the City of Hartford and West Hartford, 1917. *North is to the left. The South Armory appears for the first time, to the south of Building 10. The annealing building east of Building 10 has grown and changed shape. Building 10 is now linked to the 1861 wing to its west. The North Amory has been built east of Building 8. Both watchmen's cottages have disappeared.*

The Sanborn map of 1917 recorded the significant expansion of the factory in 1916 to meet the demands for arms for World War I. Unfortunately, it indicated none of the functions within the buildings. The new South Armory was shown almost touching the south ends of the East Armory and Building 8, entirely taking over the east end of Weehasset Street. This position appears to be have been drawn several yards farther north than it should have been, judging by the present location of the South Armory.

The map showed a building connecting the south end of the west elevation of Building 10 to the south end of the east elevation of the south wing of the 1861 expansion (to which the foundry had moved by 1885). The link was labeled as a storage shed on a 1919 isometric (Fig. 40, below) and in a 1938 survey (Fig. 36). It replaced or included the free-standing structure that had been shown in this location in the Richards Atlas of 1909. Its construction created an enclosed courtyard in the northeast corner of which the boiler house addition still remained.

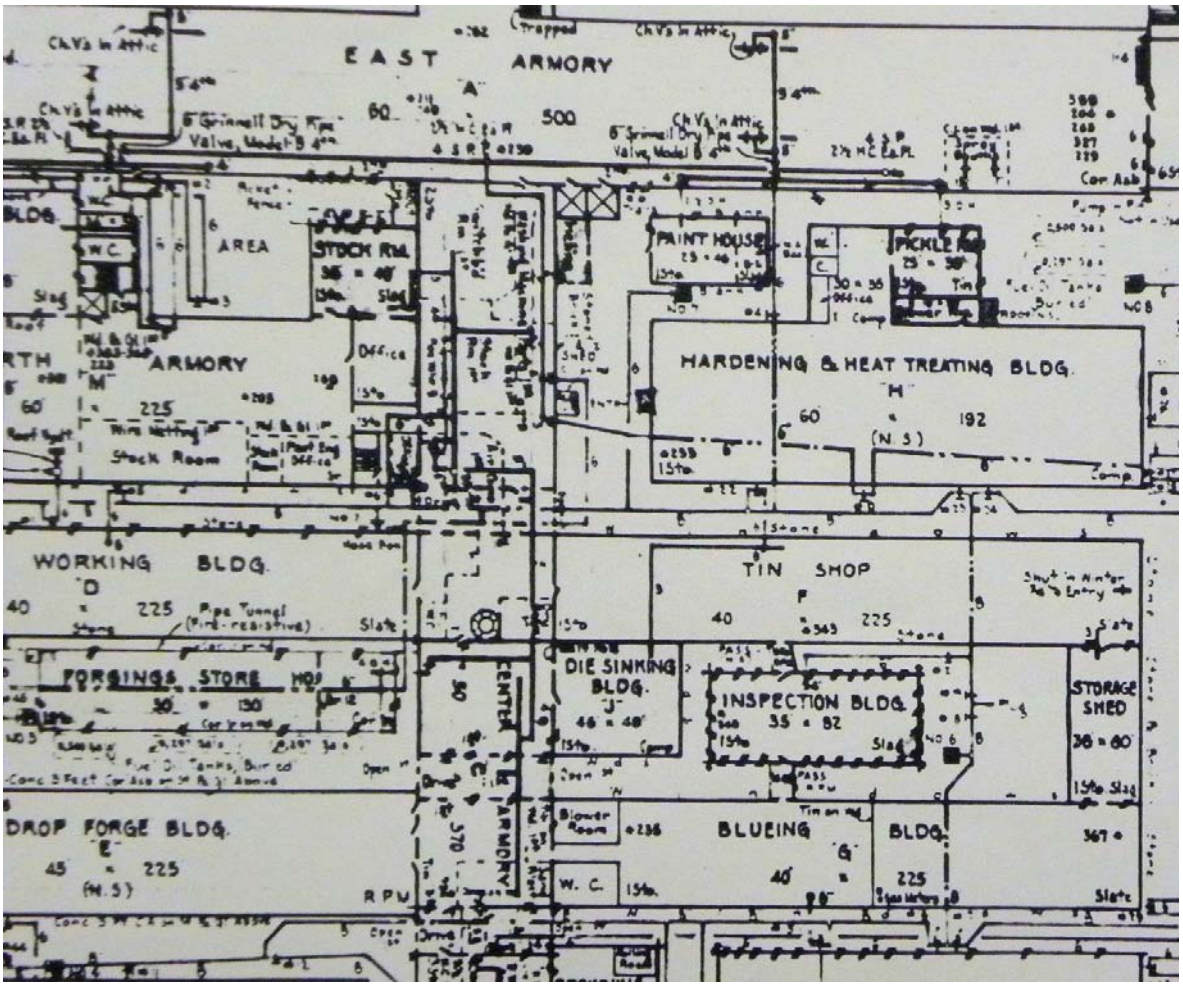


Figure 36. Detail of 1938 survey. *North is to the left. Storage shed linking Building 10 to the 1861 wing appears at the lower right of plan.*

Alterations apparently related to this shed can be seen at the three southern bays of the west elevation (W25, 26 & 27; see Appendix F for building plan and bay numeration system). These include the doorway created in W26 and the infill of the window openings W25 and 27 with concrete block. There also appears to be a remnant of the north wall of the shed, marking where it was attached to Building 10 immediately to the north of the bay W25. See figures 37 and 40 where this shed can be seen immediately behind the water tower.

Figure 37. Location of storage shed, shown on Sanborn map of 1917, west face of Building 10.

In a 1934 aerial photograph the shed appeared to have had a flat roof at about the elevation of the eave of Building 10 (Appendix C, plate 1). It is possible that the connection to this roof was the cause of the great amount of missing and damaged brick masonry in the frieze above these three window bays. It exceeds that which occurs at intervals of approximately one opening per bay along the frieze between bays W8 and W24. These holes were made later to accommodate the beams for a small roof that linked the west elevation of Building 10 to an inspection building constructed sometime later in the same courtyard.

Figure 38a. Pipes between east face of Building 8 and the North Armory.

The same 1917 Sanborn map (Fig. 35) showed the North Armory placed just a few feet east of Building 8 running from Sequassen Street to the spine. This created a narrow-shaded passageway between the two buildings.

Figure 7a, taken during a strike in 1935, showed recessed perhaps a foot from the north façade a short length of perimeter wall with a stone cap. It was probably a remnant of the perimeter wall shown in that location on the original site plan (Appendix D, plate 8). It headed east to support a metal picket fence and gate that opened into and protected the passageway. This new passageway led directly to the original passageway through the spine and afforded access to the southeast courtyard, the buildings within it and the new South Armory. This small gate could have been a significant point of entry to the complex, perhaps the principle point, which would explain why strikers were parading immediately outside it in 1935.

The same photograph showed part of a metal window sash with divided lights still in place in the top section of the first window bay behind the fence. However, the 1938 survey (Fig. 39) indicated a small enclosure inside Building 8 at this point labelled 'Gate Man.' There is an exterior doorway there today (Fig. 38b) in what the stone detailing and the remaining lights which serve as a transom show to have been a window bay. It was probably created at that location in or after 1916 when the North Armory obliterated the watchman's cottage that had surveilled entry from the north since 1855.

Today, a pair of pipes still runs through Building 8 from bay E1 to bay W1, and from the steam tunnel and across this passageway into the North Armory. It appears to have been the steam service for the new building.

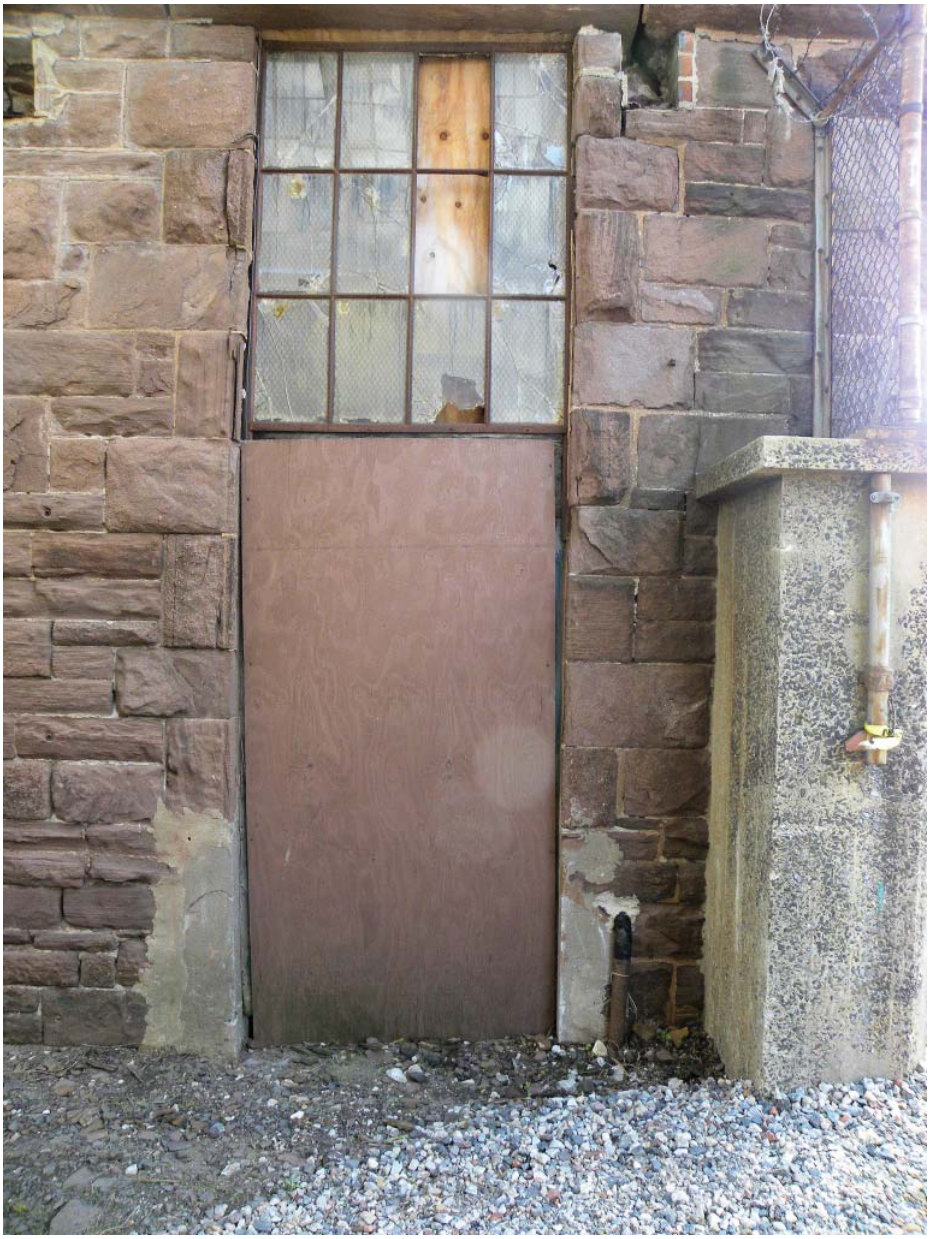


Figure 38b. Doorway created at bay 1 of east elevation of Building 8.

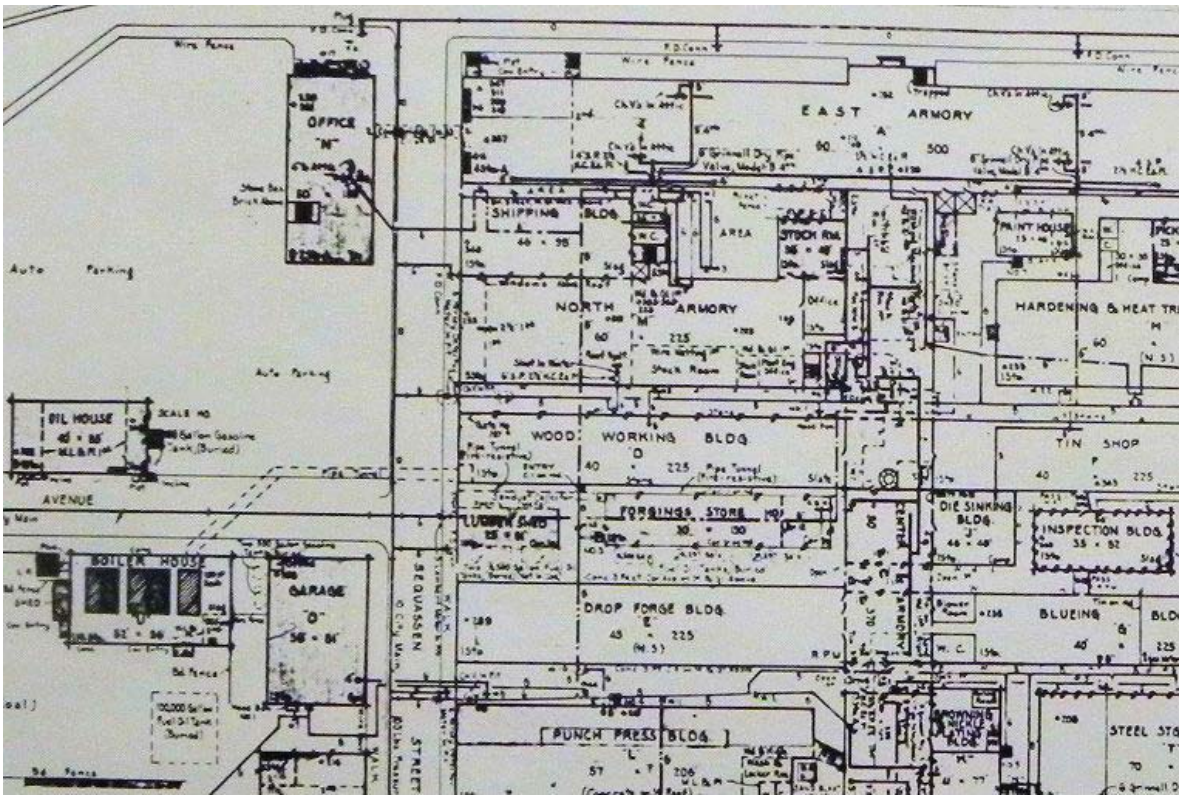


Figure 39. Detail of 1938 survey.

A 1938 survey provided some confirmation of this. It showed dashed lines for a pipe tunnel running from a boiler house to the northwest corner of Building 8 and a similar line across the north end of the North Armory (Fig. 39). This boiler house had been built just north of Sequassen Street by 1919 on the west side of Vredendale Avenue (see Fig. 40 below). It must have been built to meet the vastly increased demand for heat for the north and south armories and the huge machine shop beyond the South Armory that had been built to expand production for the World War I. These structures appeared on maps for the first time in 1917 (Fig. 35). It is likely that the steam tunnel running along the west elevation of Building 8 was built at this time to facilitate the distribution of the steam. The steam pipes running through the roof trusses of Building 10 were probably installed at this time. However, the steel truss that carried these lines overhead between Building 8 and 10 could not have been put in place until after the spine was demolished sometime after 1945 and outside of the period of significance. It is possible that the steam piping on the south wall of Building 8 was reconfigured when the steel truss was built.

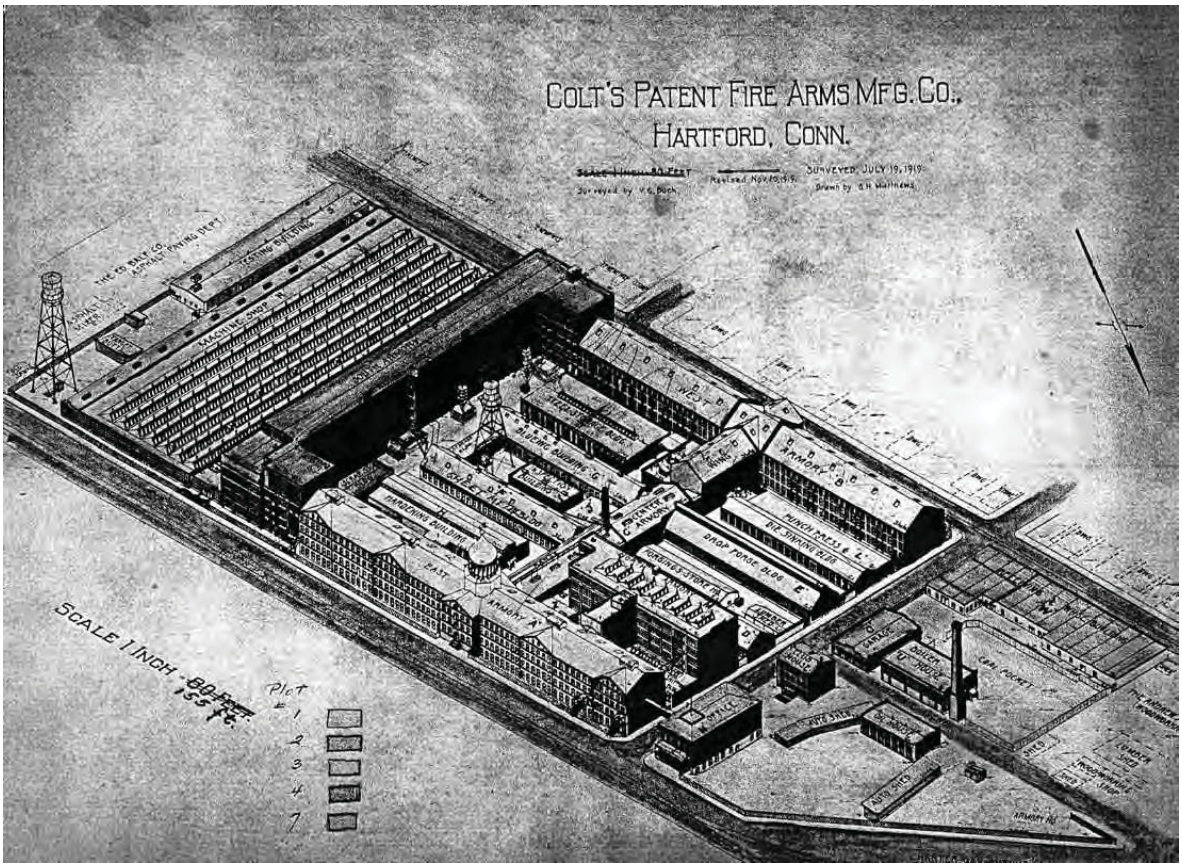


Figure 40. Isometric of the factory complex, 1919.

Building 10 – Masonry Changes from the 1920s to 1945

In the 1920s the focus of change shifted to Building 10. Change in overall form began for the first time to accompany changes in use.

Around the turn of the century Building 10 had apparently been given over entirely to polishing (Fig. 32) and the original foundry operations had moved into Building 8. By 1909, Building 10 had been divided by a central partition between an area for finishing and a brass foundry (Fig. 34). The foundry occupied the southern half. Finishing filled the northern half and the space of the former storage room between Buildings 8 and 10. In 1919, an unattributed isometric drawing of the Colt Patent Fire Arms Manufacturing Company (Fig. 40) showed Building 10 as a 'Sheet Metal Bldg.' The drawing did not reveal whether the storage room had been converted to a similar use. The use of Building 10 was not noted on the 1920 Sanborn map (Fig. 41) but in the 1938 survey, it was called out as a tin shop. See figure 36.

The changes in the masonry details of Building 10 appear to have been related to the development of other structures immediately adjacent to it within the surrounding courtyards.

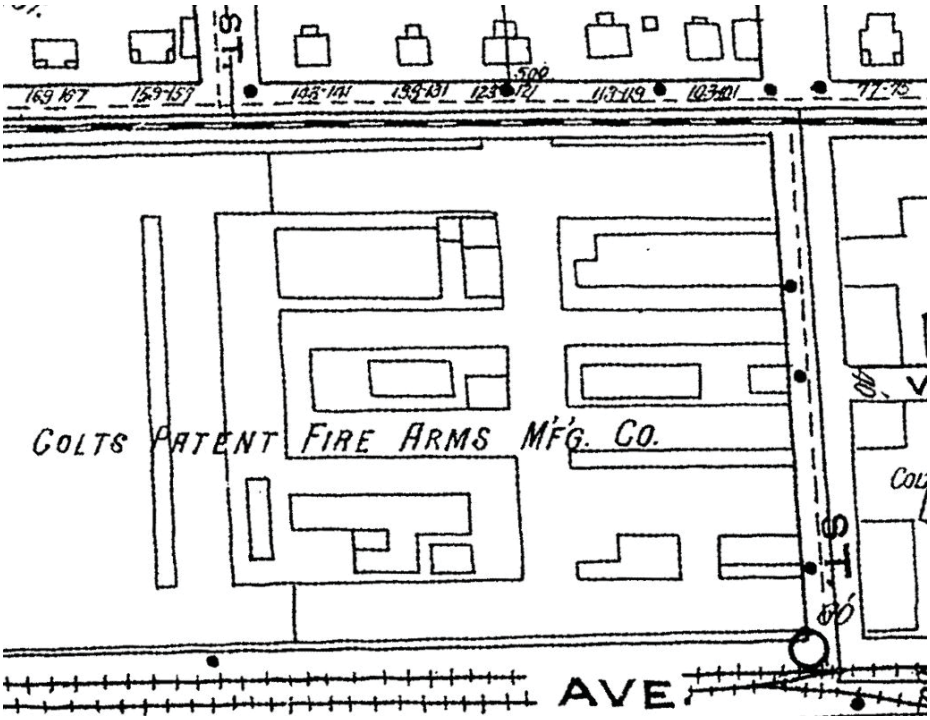


Figure 41. Detail, Sanborn map of Hartford, 1920.

The 1920 Sanborn map put the north face of the South Armory in line with the south edge of Weehasset Street. This left a space between it and the south end of Building 10 that was consistent with the distance depicted in the 1919 isometric and with the area of open space to the south of Building 10 that still obtains today. But the isometric showed a new structure, an 'Inspection Bldg.,' occupying about half of the area of the courtyard to the west of Building 10, which had already been enclosed and diminished by the construction of the storage shed at its south end as described above. The new structure was drawn, unlabeled, on the Sanborn map of 1920 (Fig. 41). A 1934 aerial photograph (Appendix 3, plate 1) revealed that it was actually built closer to the west face of Building 10 than depicted on the Sanborn map and that at least by this later date it extended north almost to the location of boiler house addition. The 1938 survey identified the structure as an "Inspection Building" and gave its dimensions as 35' by 82'.[89] It also showed that it was connected by a small roofed passageway to the tin shop (Building 10) which was provided with a doorway slightly to the north of the mid-point of its west elevation. This was probably the doorway at bay 11 seen in figure 42b. Traces of what would have been the north wall of the passageway can be discerned in the pattern of cuts in the brickwork of Building 10, (brickwork that will be examined in more detail below), and a few bricks set at right angles to the existing elevation. Traces of tar on the brickwork suggest that the roof of the passageway was set below the entablature and sloped north draining towards bay 10. See figure 42a.

There was no indication on this survey that the inspection building was connected to Building 10 except at this passageway which appeared no more than two bays wide. But later the space between them was roofed over apparently in two separate campaigns of work.

Both the 1919 isometric and the 1934 aerial photograph showed a tall free-standing water tower between the inspection building and the 'storage shed' at the south end of the west elevation of Building 10. This tower did not appear on the 1920 Sanborn map. See figure 41, above. The

inspection building was captured more clearly in the Connecticut Aerial Survey photograph of 1965 (Appendix C, plate 3). By that time, the water tower had disappeared, and the inspection building had expanded south to meet the storage shed.

The inspection building clearly had a flat roof. The aerial photograph made it clear that the roof of the inspection building was not directly connected to the west face of Building 10. Rather, it was connected by a lower, long and narrow flat roof at the level of the west eave of Building 10. The south end of this flat roof abutted the roof of the storage shed just north of bay 25, but its north end stopped a few bays south of the north end of the inspection building probably incorporating the roof of the passageway mentioned above which can be estimated by scaling the 1938 survey to have been bay 11. The construction of this roof would have accounted for the openings in the masonry of the frieze from bays 11 to bay 25 to allow the ends of the beams supporting the roof of the link to rest on the masonry structure of the west entablature of Building 10. There is no firm evidence that these openings were cut during the period of significance, i.e., before 1945.

Figure 42a. Brick reconstruction of bays 7 through 10, Building 10, west elevation.

An aerial photograph taken in 1970 appeared to indicate that the connecting roof had been extended slightly north since 1965 (See Appendix C, plate 4, and Fig. 42a). This would date the cuts in the frieze between bays 8 and 11 to the period between 1965 and 1970, clearly outside the period of significance. Figure 42a shows that, as a set, the holes in the masonry in these bays are narrower than those to the south of bay 11, also suggesting that they were part of a separate project.

A later aerial photograph showed that both the inspection building and the storage shed remained in place until at least 1995 (see Appendix C, plate 7). Their outlines still appeared in the February 2003 Geotechnical Report site plan (p. 5)[90] but not in the Structural Condition Survey of June 2004.[91] Presumably they had been demolished in the interim. The cuts were left open when the three structures – the inspection building, the storage shed and the link roof – were demolished around 2004, and the beams that had supported their roofs were removed.

Figure 42b. Typical openings in west frieze, Building 10, bay 18.

It is reasonable to assume that the doorway introduced at the west bay 18 (Fig. 42b) was an alteration related to the connection of Building 10 to the inspection building at the time the linking roof structure was built, creating an enclosed space parallel to the west façade of Building 10. One should note in passing that this is not a bay where an original doorway might have been located if it had been created opposite one of the original doorways of the east façade (where there was one, which still remains, at bay 19). Again, there is no evidence that it was cut before the end of the period of significance in 1945.

The concrete block infill of the window openings between bays 13 and 24 was also probably related to the construction of the linking roof. The roof would have made the windows useless for light; the block fill would have allowed functions within Building 10 to be securely separated from those on the other side of its west wall. As argued above, this enclosure was not complete until the inspection building was extended south to bay 25 to meet the storage shed. The evidence

found to date can only suggest that this occurred between 1938 and 1965. The block infill at bay 12 may have been placed at a different date, since it is set back from the plane of the wall, unlike all the other fill in the window openings to the south. See figure 42c.

Figure 42c. Bays 11 and 12, Building 10, west elevation.

What has not been explained by the surveys, maps and aerial photographs presented so far was the obvious reconstruction of bays 7 through 10 of the west elevation of Building 10. In these bays, the brownstone units of both the architrave and cornice have disappeared, the piers and the spaces between them have been rebuilt in brick, the elevation of three of the four window sills has been raised, the sill of the fourth replaced in concrete at the original level, and the window openings provided with concrete lintels, as can be seen in figure 42a above. The new window openings have windows with a profiled steel frame and sash. Interestingly, the profile resembles that used for the metal windows installed the length of the east façade of Building 8, which may well have been installed when the North Armory was built a few feet away around the beginning of World War I and the narrow passageway became a heavily used entrance to the center east area of the factory complex.

This alteration must have been accomplished before the linking roof was extended north at these four bays, which appears to have been between 1965 and 1970 since cuts for the roof beams not carefully built pockets can be seen in its brick masonry.

It is interesting that this brickwork unlike that of the over the doorway in bay 11 is painted. This paint appears to be the same as that applied to the brownstone and brick masonry in bays 1 to 6 to the north, the bays against which the boiler house addition had been constructed sometime

between 1861, when the factory complex was extended west across Vredendale Avenue, and 1869, when its presence was recorded in the Baker and Tilden Atlas of Hartford City & County (Fig. 29).

This addition was still called out as a boiler house in the 1909 L. J. Richards Atlas of the City of Hartford and the Town of West Hartford (Fig. 34). It appeared in the isometric of 1919 (Fig. 40) and its outline was included and unlabeled in the Sanborn map of 1917 (Fig. 35). The structure was still in place in 1938 but labeled a 'die sinking bldg.' See figure 39. A 1951 aerial photograph (Appendix C, plate 2) revealed that the West Armory and much of the spine west of Buildings 8 & 10 had been demolished, but it did not clearly indicate whether the boiler house had also been removed. There appeared to be some sort of structure to the west of the very north end of Building 8 but extending slightly into the space formerly occupied by the spine. Perhaps it was a temporary structure. But the aerial photograph of 1965 clearly confirmed that the boiler house, the store room and the tall chimney that rose above it had by then been demolished (Appendix C, plate 3). So, it appears that bays one through six of the west elevation of Building 10 would have become exposed to the weather by 1965 and possibly even before 1951.

If the brick infill of the window openings had been installed when the boiler house was constructed, to separate it from the annealing workshop, as seems likely, it is possible that the bricks used were not face brick and that there was good reason to paint them when the boiler house enclosure was demolished. Mortar, brick and paint analysis could test these hypotheses. If they prove sound, the paint on brick bays 7 through 10 would argue that these bays were reconstructed in brick at some time before 1965 and possibly as early as 1951 or even earlier. The fact that this paint does not extend onto the brick infill of bay 11 indicates that the paint was applied when the wall and roof of the passageway connecting Building 10 to the inspection building were already in place, which could have been before 1938, when the passageway was first recorded on a survey. The use of the profiled steel windows could suggest an even earlier date since it seems that the only other windows with this detail could have been installed at Building 8 around the time of the construction of the North Armory. Unfortunately, there is no definitive evidence as yet that would fix the earliest date at which the reconstruction of bays 7 through 11 could have occurred or why.

There was a similar evolution of construction and demolition along the east elevation of Building 10. The annealing facility which first appeared as an inverted T-shaped building in the southeast courtyard in 1869 Baker and Tilden atlas (Fig. 29, above), was shown extending further to the south in the 1917 Sanborn map (Fig. 35). The 1919 isometric (Fig. 40, above) illustrated it as a rectangular building almost as long as Building 10 with a roof monitor the length of its ridge and labelled it 'Hardening Building.' The form and location of the building were captured when the complex was photographed from the northwest during the 1936 flood (Fig. 43). By that time, it seemed to have expanded or to have been reconstructed to closer to the east elevation of Building 10 at about the same remove as the North Armory from Building 8.

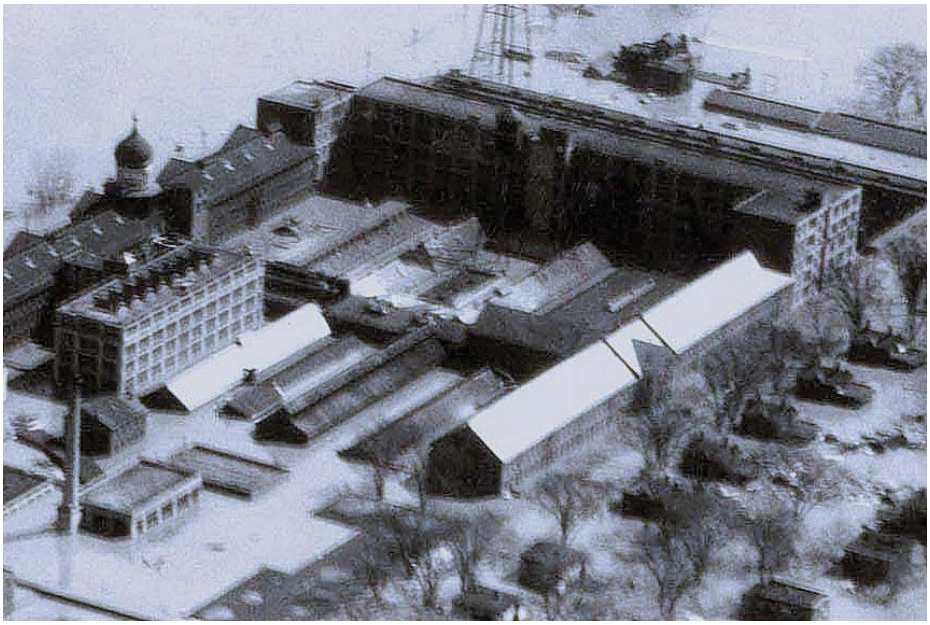


Figure 43. Flood of 1936. Aerial view from the northwest.

This proximity and the enlarged footprint of this building was confirmed in the 1938 survey (Fig. 36), which identified it as a 'Hardening and Heat Treating Building.' Its south elevation was now in line with the south face of Building 10. The expansion to the south had eliminated the 1855 watchman's cottage, which had remained part of south perimeter wall as late as 1909 (Compare Figs. 1 and 34). The cottage would no longer have been needed in that location when the South Armory, shown for the first time on the 1917 Sanborn map, effectively re-aligned the original south perimeter of the complex. Compare figures 1 and 35.

The hardening/heat treating building appeared unchanged in the 1965 aerial survey photograph (Appendix C, plate 3), but by 1970 it was fully connected to Building 10 by a long narrow flat roof that even extended a few feet north beyond the building (Appendix C, plate 4). Just as at the west elevation, openings were cut in the brick frieze of the east elevation for steel beams to support a connecting roof. Beams were attached from bay 27 to bay 3. There was possibly a beam at bay 2, but a considerable amount of brick has been lost from the frieze of this bay at the point where a beam could have been attached.

Figure 44. Typical cut end of roof beam, Building 10, east elevation.

The hardening/heat treating building still registered clearly with the same configuration in the aerial survey photograph of 1995 (Appendix C, plate 7). The outline of the building and the flat roof were included in the February 2003 geotechnical report. Neither were mentioned in the Structural Condition Survey of June 2004. It appears that they were demolished at the same time as the inspection building. But here, when these two structures were demolished, the steel beams were cut, leaving the ends in place in the frieze (Fig. 44). Figure 44 also shows a steel angle left attached to the brick masonry; it was probably used to support metal decking for the connecting roof.

Figure 45a. Enlarged exit doorway cut into original door opening, bay 19, Building 10, east elevation.

Figure 45b. Doorway cut into window bay 12, Building 10, east elevation.

In this east elevation of Building 10 there were two original doorway openings as discussed above. One at bay 9 retains its original form (Fig. 7). The second at bay 19 has been widened (Fig. 45a). A third doorway has been created out of an original window bay at bay 12 (Fig. 45b). From signs still mounted on the exterior face of the wall above the latter two, it appears that they were created and used as exits from the hardening and heat treating building into Building 10. This work must have been done between the late 1960s and about 2005, outside the period of significance.

Figure 46. South facade of Building 10.

The evolution of the south end of Building 10 is harder to read, although the basic design of 1855 is still visible. The aerial photograph of 1970 seemed to suggest that some sort of link structure had been built, connecting Building 10 to the South Armory. It may have been present before, but the earlier aerial photographs were not clear, and no link was drawn in the 1938 survey (Fig. 36, extreme right-hand side). It seems to have survived until at least 1995, when it can just be made out on the aerial photo (Appendix C, plate 7). This link would explain the gable-shaped trace of mastic, a shallow inverted V, over the location of the original centered door. It appears to have been demolished by 2004 since no outline of a structure appears in that location in the geotechnical report provided to the NPS at that time.[92]

Figure 47. The south wall of Building 10, interior view.

The original center doorway has been altered, perhaps to provide fork lift access through the link during the later years when the building was used for storage, or perhaps to the parking lot after the demolition of the link. It has been furnished with a drop-down paneled door (Fig. 47) and has certainly been widened but not symmetrically. While the original east jamb remains, the west jamb has been demolished. A new west door jamb built of brick has been built within the original window opening immediately to the west (Fig. 48). This jamb, together with the altered remainder of the window opening, was actually used to form another small doorway. It lacks a door; the opening is protected only with plywood. Behind the plywood panels in the window openings to the east, the sashes remain in place.

Figure 48. Exit door from the electrical closet, Building 10, southwest corner.

One might also surmise that once this link was installed, the new doorway seen in figure 46 was built in the original extreme west window opening. It would have recreated direct access between the yard and Building 10. But it could also have been created to provide a second means of egress from the cinder-block electrical closet that has been erected in the southwest corner of the building. An exit sign hangs on plywood blocking above the metal door which is hidden behind the plywood paneling visible on the exterior. No date for these doorway alterations, nor for the

construction of the electrical closet, can be established from the data found up to now, but it is clear that none fall within the period of significance.

As will be discussed in more detail in the section below on the demise of the central storage room, Building 10 had become separate from Building 8 by 1970. The 1995 aerial survey photograph, the last available in the Connecticut State Archives, showed the storage and inspection building to the west of Building 10 still in place, as was the hardening shop to its east. Since all were shown in outline in the plan included in the February 2003 geotechnical report but none were included in the June 2004 structural report, it is reasonable to assume that they were demolished between these dates. The geotechnical report did not show any link leaving the south façade in the direction of the South Armory. From 2004, Building 10 has stood alone as we see it today.

Building 8 – Masonry Changes from the 1920s to 1945

There had been changes to Building 8 as well that were related to the construction of new buildings in the courtyards to the east and west during and after World War I.

In the northwest court alongside Building 8, the 1919 isometric included a building labelled 'Forgings Storage' and another smaller building, closer to Sequassen Street labelled 'Lumber Shed' (Fig. 40 above). They did not appear on a 1917 Sanborn map of 1917, so it is reasonable to assume they were built very late in the war or shortly after its end. Their outline appeared on the Sanborn map of 1920, and their dimensions noted on the survey of 1938. The forgings storage was 30' wide by 130' long; its east side was only about four feet from Building 8, and the south end was only a few feet from the spine. Clearly it was built right against the west side of the steam tunnel which had probably been extended the length of the west elevation of Building 8 at the same time steam was brought in from the new boiler house to the north of Sequassen Street. The lumber shed was not placed so close to Building 8.

The north gable end of the smaller building seems to have been depicted in a Colt Fire Arms Company bird's-eye view of the whole factory complex. Given the style of the cars and trucks illustrated, the view probably dated from the later 1920s (Appendix A, plate 10). It also appeared in the 1936 view of the factory submerged in a flood (Fig. 43 above). Its function remained noted as a lumber shed in the survey of 1938 (Fig. 39). So, it is not surprising that Building 8 labelled in 1909 (Fig. 34) as an iron foundry, (one of the original functions of Building 10), was described in the 1919 isometric (Fig. 40) as a 'Woodworking Building.'

The larger new building was called a 'Forgings Store.' The reason for its siting was evident in the fact that as the 1919 isometric revealed, the forging operation itself had moved from the more southerly to the more northerly of the two 1861 one-story wings. That wing was then called the 'Drop Forge Building' as it was still at the time of the 1938 survey. It is clear from that survey that the forgings store was set hard against the south side of the pipe tunnel that still runs along the west side of Building 8. In contrast to the situation at the same elevation of Building 10, it appears from the uniform brickwork that remains in the frieze on this face that the forgings store was never linked to the west elevation of Building 8 by a bridging roof structure.

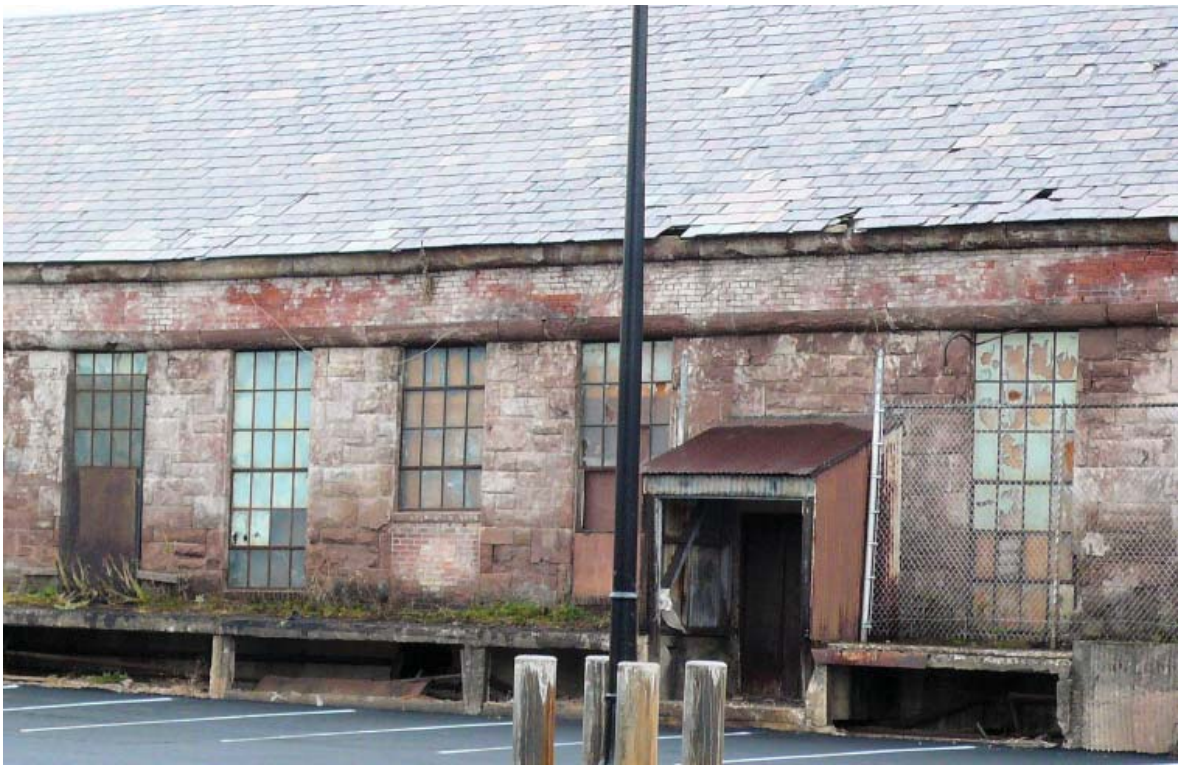


Figure 49a. Opening to the west, and pipe tunnel, Building 8, west elevation.

As discussed earlier in relation to the question whether there were any original doorways in the west elevation, the 1938 survey did show an entry at bay 9 of the west elevation of Building 8. It was clearly the doorway that still remains at bay 9 where the pipe tunnel, which otherwise runs partly above grade, is offset below it (Fig. 49a). The doorway was probably created to provide access from the woodworking building (Building 8) to the lumber store. The 1951 aerial survey photograph showed the store had already been demolished; this suggests that Building 8 might no longer have been a woodworking shop by then.

There have also been changes in the north elevation. The 1935 pictures of strikers on Sequassen Street (Fig. 7a and Appendix A, plate 11) revealed that the north elevation of Building 8 had the same design as the original south end of Building 10 (Fig. 2), and that its materials and details had not changed up to that time.

Since then a large opening with a roll-down paneled metal door has been inserted, centered on the original doorway. It was wide enough to engage part of both of the original window openings on either side, requiring that the remainder of these openings be bricked in. Otherwise, this elevation appears unchanged since 1855. See figure 7b.

Figure 49b. North end of the pipe tunnel, Building 8, west elevation.

The 1965 aerial survey (Appendix C, plate 3) revealed that a short length of the 1861 stone perimeter wall still remained attached to and running west from the northwest corner of Building 8. This section of perimeter wall remains today (Fig. 7b, extreme right). The aerial photograph showed two small sheds in the corner where the wall intersected with Building 8. Neither the size nor the shape of either building corresponded with the plan of the lumber shed that stood at the north end of this courtyard from approximately 1919 until at least 1938. Presumably, the lumber shed had been demolished and these two smaller sheds erected in the years between 1938 and 1965. The aerial photograph of 1951 was not sharp enough to confirm whether they had been built before that year. These two small sheds were no longer extant for the 1970 aerial survey (Appendix C, plate 4). Perhaps the extra wide section of pipe tunnel west of the north end of the west facade was built above once these sheds were demolished. See figure 49b. The 1938 survey had the pipe tunnel reaching Building 8 under the north façade itself (see Appendix E, plate 8).

Building 8 was separated from Building 10 by 1970, as discussed below in the section on the demise of the central store room. The forgings store and the lumber shed seem to have been demolished by 1951 (Appendix C, plate 2). Two small buildings erected subsequently at the north end of the west façade had in turn been demolished by 1970. Building 8 has stood isolated as it is now, and its overall form has not changed since that date.

Changes in window openings

From the time of World War I until 1938, maps, surveys and photographs showed Buildings 8 and 10 increasingly surrounded by new buildings erected in the neighboring courtyards, often at a very close distance. One wonders to what extent the distribution of window types now found in Buildings 8 and 10 was associated with this progressive encirclement.

One possible explanation would be the impact of building codes and insurance requirements, particularly in relation to the maintenance of fire safety when new buildings are constructed hard by existing structures with non-fire resistant windows. Under typical 20th century building codes for factory buildings, a new freestanding building cannot be erected within a few feet of an existing building unless the exterior wall construction has a fire resistance rating of two hours or more. The original fenestration was wood. Window openings with wood sash, frames and trim and clear glass could never have provided such a rating. Openings provided with metal sash with wired glass, or protected by 'opening protectives' (steel shutters that would automatically slide over window openings in the event of a fire), could have provided the requisite fire resistance rating.

Figure 50a. Metal sash between original brick jambs, Building 10.

Figure 50b. Wood sash with casing over brick jambs, Building 10.

A typical detail of the metal window installations makes it quite clear that they replaced a wood window system. As they have pivoting operating sashes that require no counterweights, the metal windows were chosen to fit between existing brownstone jambs with the frames placed to cover the transition between brownstone and a brick offset, as can be seen in figure 50a. The earlier wood windows with double-hung sash extended over these offsets, which accommodated the extra width of their counterweight pockets. The pockets were covered with wood casing, as can be seen in figure 50b. No casing was provided around the metal windows. As a result, the brick jambs became visible, as they remain today.

Metal sashes were installed in the new Colt factory buildings that were built to meet the increased demand for weaponry in World War I, i.e., the north and south armories. It seems quite likely that where new construction was placed within a few feet of Buildings 8 and 10, metal windows of the same style could have been installed to replace the original wood sashes of Buildings 8 and 10 as needed from that time on. Wood windows have remained in window openings in some significant

façades never blocked by new construction, namely the north façade of Building 8 and the south façade of Building 10, lending some credence to the hypothesis.

Other facts do not support this idea in a straightforward manner. The earliest such new construction was the North Armory which ran the full length of Building 8, a distance of 16 feet. All the windows along the east elevation of Building 8 were replaced with units with a shaped profile for the frames, muntins and mullions. The glazing was wired glass. There is good reason to believe that this was done at the time the North Armory was built as it too was provided with metal windows. They can be seen at the top left corner of figure 7a.

However, the entire west elevation of Building 8 has also been provided with metal replacement windows. Here, they had flat bar frames and light dividers and ribbed translucent glazing. This glazing would not have had the same fire-resistant value as wired glass, but the new building that might have prompted the window change, a forgings store, was only four feet away. See figures 35 and 40. This building ran from bay 9 to the south end of Building 8. The new building to its north, the lumber shed, was at a greater remove – at the same distance from the west elevation as the North Armory from the east elevation. While this could explain why all the wood windows were changed for metal, it doesn't explain why a more significant form of fire protection, perhaps some sort of opening protective, was not chosen for bays 9 through 27.

Further, by 1919 the hardening building in the southeast courtyard had grown to be only three or four bays short of the length of Building 10 (see figure 40), and at least as recorded in the 1938 survey, seemed to have reached within about 18 feet of its east façade, almost as close as the North Armory to Building 8. Yet, here, all of the windows that would have faced the hardening building, from bay 4 to bay 27, were not changed out but remain in place today. Wood windows were only removed from the three most northerly bays, opposite which there was never any construction and these window openings were bricked in. Curiously, the only time when a change in use around bay 4 of Building 10 was noted was in the 1857 plan (Appendix D, plate 8). It showed annealing separated from the iron foundry at approximately this point. Thereafter, the entire north end of the building was always shown with a single function at any one time.

Most of the window bays on the west elevation of Building 10 have been filled, either with brick or concrete block. From bay 1 to 6 this appears to have occurred when the boiler house addition was constructed right against this elevation before 1869; similarly, bays 25 through 27 lost their fenestration when a storage shed was built there between 1909 and 1917. But the window openings between bays 12 through 25 were also filled in with block rather than provided with metal windows when the inspection building was constructed only 12 feet away or when the space between the two buildings was roofed over. Only at the four bays not affected by additions or blocked by adjacent construction, bays 7 through 10, were metal windows with wire glass installed, although admittedly in a completely altered section of the façade.

In sum, although it seems that metal windows replaced wood windows and provided some improved fire safety in Building 8, this move was not extended to Building 10. There, the wood windows were kept at the east elevation, despite the encroachment of the hardening building; at the west elevation they were replaced in brick or concrete block. The changes in fenestration cannot be explained as systematic responses to greater fire risks. Nor is it possible given the paucity of exact dates for surrounding construction to assign precise dates to the installation of the metal windows.

Figure 51a. Bar stock frame with ridged glass, Building 8.

Figure 51b. Profiled metal frame with wired glass, Building 8.

Although the metal windows at Building 8 typically had the same pattern of divided lights, fixed sashes and a central, operable pivoting section, the frame, muntins and mullions differed. Two styles of metal window were installed. In one, the extrusions had some depth and slight offsets and curves (Fig. 47c); in the other, these elements were just flat bars (Fig. 47d). This latter style was originally provided with translucent ridged-glass glazing units. Profiled metal sashes were glazed with wire glass.

Today, clear glass is randomly distributed among the divided lights of these metal windows. It has replaced broken units of their original glazing in response to vandalism and other damage that has occurred since the Colt Fire Arms Company completed its move out of the complex in 1993.

Changes in roofing details and roof structures

Figure 52a. Central monitor on Building 8.

The 1936 aerial photograph of the factory complex beleaguered by the great flood revealed that the large monitor was in place at the center of the roof of Building 8 by this time (Fig. 43 above, Fig. 51a below). Unfortunately, its location was hidden in the 1919 isometric drawing and the 1920s bird's-eye view so it cannot be determined if it was actually installed a decade or two earlier.

It also seemed to indicate that the chimney of the small engine shed, first shown next to the west wall of Building 8 in the Richards Atlas of 1896, was still in place despite the construction of the forgings store. The building with the darker gabled roof, seen north of the forgings store, must have been the lumber shed.

Figure 52b. Ventilator and skylight at Building 10.

The same aerial photograph revealed that there were still at least two ventilators at the south end of the ridge of Building 10 where the brass foundry was first located and had remained until at least 1909. Ventilators had been first recorded in this location in 1861 (Fig. 2), and there are still two today. However, the originals were square in section with the extant ventilators round and galvanized. It is not possible to make out the form of the ventilators in the 1934 photograph, but judging by the loss of galvanized surface, those now in place are many decades old and may be those depicted in 1934. These roof structures probably date from within the larger period of significance. See figures 51a and 51b.

Figure 52c. Skylights and ventilators on Building 10.

In the 1965 aerial survey photograph (Appendix C, plate 3), it was possible with some difficulty to discern the rectangular outlines of several skylights on the west slope of the roof of Building 10. The 1970 shot picked them out better, at least on the west slope. They appeared to have the spacing that exists today (Fig. 52c). It is not possible to discern the same pattern in the rather poor quality earlier aerial photographs of 1934 and 1951, but the 1936 aerial photograph of the flooded factory complex (Fig. 43) and a 1938 bird's-eye photograph taken after the hurricane of that year (unfortunately not reproducible) both showed only one or two skylights. However, these bird's-eye views were either partial or not very sharp. A row of six had been sketched in on the west slope in the isometric drawing of the whole factory complex that was made in 1919 (Fig. 40, above), and at least that many were shown in the Colt Fire Arms Company rendering of 1920s (Appendix A, plate 10). There are six along each roof slope today, arrayed in an alternating pattern. This alternating pattern was not picked up in aerial photos before 1990, but the east slope had been in heavy shadow during each prior shoot. It is possible that there were six skylights in these alternating locations since before 1936 during the period of significance. That does not exclude the possibility that they have been re-glazed since or rebuilt. If they have been rebuilt, they have likely been rebuilt in the same locations, since the open underside of the roofing boards today reveals no apparent signs of infill of other skylight locations.

It could be argued, since only two skylights were caught in the 1936 and 1938 photographs, despite earlier drawings showing six on the east side, that skylights were inserted in the roof of Building 10 in response to the progressive loss of daylight through the windows in the east

and west. Over time, buildings had been erected or expanded at either side: first the storage shed at the south end (by 1917), then the inspection building and its flat roof bridge to the east (1919 through 1965), and finally the enlarged annealing building (in place by 1919, expanded south by 1936 and linked by 1970). If this were true, some skylights may have been added outside the period of significance. However, the precise similarity of each one in the set of 12, from the shape, size and style of the skylight to the details of the flashing, argues strongly that they were all installed at the same time.

The skylights were provided with lead or lead-coated copper flashing and simple lapped counterflashing (Fig. 52b). Much of the glazing was translucent ridged glass, but there has been some replacement in wire glass. If the skylights had been installed by 1919, the glazing hints that the metal windows along the west elevation of Building 8 may have been installed around the same date.

After 1920, there were no useful maps or surveys until 1938. The 1938 survey called out the roofing of Buildings 8 and 10 as slate, and this was confirmed by the 1935 photograph of striking workers outside the north end of Building 8 (Fig. 7a, above). The slates in this location looked very regular and none appeared to be missing; it could have been recently reroofed. However, the aerial photo of 1934 and several later aerial photos showed lighter patches of roofing at the south end of the west slopes of Building 8 and at the north end of the same slope of Building 10. The patches coincided with the largest areas of slate replacement that were observed during site surveys this year. See figure 6. The aerial photographs suggest that these patches dated from before 1934. Since the roofing is now composed of patched and well-worn slate, and figure 3 showed clearly that the roofing on Building 8 was slate less than 10 years after the factory opened in 1855, it is reasonable to assume that the roofing has always been slate. The depiction of it as a standing seam metal roof in the bird's-eye view drawing of the 1920s (Appendix A, plate 10) must have been the artist's error.

Figure 7a also showed a single line of a linear metal snow guard attached to the slate roofing of Building 8, four courses above the eave, but the photo does not catch the ridge. There was no snow guard in 1861 (Fig. 3).

Figure 53. Metal flashing at ridge, Building 8, north end.

A current photograph (Fig. 5) shows a well-aged remnant of metal ridge flashing just behind the north gable end similar to that which was suggested in the 1861 photo of the south end of the same building (Fig.3). The site survey found discontinuous sections of similar metal flashing at the ridge of Building 10. It is likely that metal ridge flashing was an original detail but that most, if not all, of what is in place today was replaced at least 50 years ago.

There are currently different styles of roof-wall counterflashing at the gable end walls of Buildings 8 and 10. Stepped counterflashing was installed on the raised gabled end walls outside the period of significance after the demolition of the spine. At the original gable ends, at the north and south ends of Buildings 8 and 10 respectively, the counterflashing is simply lapped in the same manner the skylights (Fig. 54). This suggests that the lapped counterflashing dates from around the same period, the end of the World War I.

Figure 54. Lapped flashing at the south gable end of Building 10.

Figure 7a also showed an exterior electric lighting fixture attached to the east wall just south of the north façade which appears to be of a different design from those found today on the west elevation of Building 10. This fixture must have been installed before 1935.

The demise of the central store room and chimney and the recladding of the facing façades of Buildings 8 and 10, post 1945

The 1938 survey gave no indication of how the central space between Buildings 8 and 10 was being used, but it appeared to retain its doorways into both buildings. A smaller enclosure was outlined in the southwest corner. The central chimney was still shown against the west wall. Unless it just referred to the remains of its base, this was an error, for the photographs of the 1936 flood (Fig. 43) and the 1938 hurricane (Appendix A, plate 12) both showed no chimney rising in this location. It is possible that it was no longer used after foundry operations left the building between 1909 and 1919 (compare Figs. 34 and 39). We have argued that the main function of this chimney was not to vent a steam boiler exhaust, but rather to vent the fumes from the hearths supporting the foundry and forging operations in Buildings 8 and 10. One wonders whether the extensive areas of slate replacement at the west slopes of the roofs of Buildings 8 and 10 could be related to disrepair in the disused chimney that loomed above it, or even to its demolition, which might also have contributed to the need to rebuild the southwest corner bays of Building 8.

The 1919 bird-eye illustration of the complex viewed from the northeast also seemed to show that the central part of the spine, west of Buildings 8 and 10, labeled 'Center Armory,' had been altered (fig. 40). There is a gap with a flat roof between it and the next section of the spine labeled 'Wing.' The 1936 photograph taken during the flood (figure 43) showed the center armory itself with a flat roof starting at the intersection with the store room and Buildings 8 and 10. However, the 1938 still records some structure in this location (Fig. 39). Perhaps these buildings survived this decade despite the assertion in the NPS Special Resource study that these buildings had been demolished "in the mid-1930s and 1947."[93] The 2006 Coltsville National Historic Landmark Nomination dated the demolition of these buildings to 1947.

An aerial survey photograph confirmed that demolition had taken place by 1951 (Appendix C, plate 2). The West Armory and entire central spine had been razed from just beyond the west walls of Buildings 8 and 10 out through the West Armory as far as Huyshope Avenue. The forgings store immediately west of Building 8 had also disappeared but not the inspection building west of Building 10. The space gained was given over to parking. It also showed that the 1861 building to the west of Building 8, which was operating as the drop forge building as late as 1938, remained standing. This photograph did not include Building 10 in its field of vision.

The 1970 aerial photograph showed that the remainder of the spine had been demolished and paved, from the west elevation of Buildings 8 and 10 nearly as far as the west elevation of the East Armory. The original 1855 store room had disappeared, but the trestle carrying the steam pipes from Building 8 to Building 10 was now in place overhead. One cannot discern, because of the angle at which it was taken and the quality of the print, whether the end elevations of Buildings 8 and 10 had been bricked over by this time. When first exposed these façades would have been brownstone. Not until 1986 were the angle and light of the aerial survey photograph sufficient to render the south end of Building 8 with a bright surface that is more likely to have been brick. Nonetheless, the brick skin was probably installed soon after the center spine was removed, at some time between 1951 and 1965. The 1965 aerial photograph, taken from the south (Appendix 3, plate 3), showed a continuous stone or concrete cap over the north gable end of Building 10. There could have been no such cap when this gable end butted against the spine, but it would have been sensible to provide a cap to cover any new brick facing, and that is what is in place today.

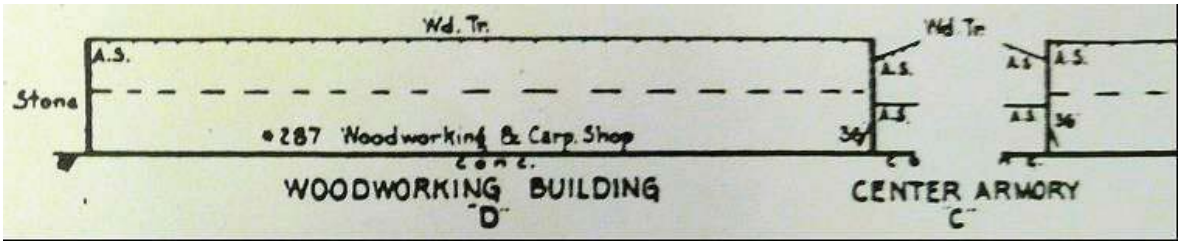


Figure 55. Detail, transition from Buildings 8 and 10 to the spine, 1938 survey.

The exposed original walls varied in thickness. Above grade the brownstone was thickest for the first story. It then stepped back at the height of the second floor to provide structural seating for the joists supporting this floor of the spine. It stepped back again a few feet below the apex of the gabled end of each façade. This second setback was at the point at which the eaves of the roof framing of the spine swept past Buildings 8 and 10. This configuration was revealed in a small detail on the 1938 survey (which also noted that the floors of Buildings 8 and 10 were concrete) (Fig. 55). The brick skin added after the demolition reflected these details. It also set back approximately four to six inches at each of these two locations. These transitions were achieved in a belt course of pre-cast concrete units fashioned like a water-table.

Figure 56. North elevation of Building 10.

The larger doorway opening at the center of the north façade of Building 10 (Fig. 56) was probably made at the time the brick veneer was added. It has since been partially filled with concrete block to recreate a smaller opening, probably when a second still larger opening was created at the west end of the façade (Fig. 56). The window openings to the east of the central doorway remain hidden behind the new brick ashlar. The window frames and sashes have been removed. There are no dates established for these alterations, but they must all postdate the end of the period of significance.

Figure 57. South elevation of Building 8.

Similarly, the large doorway near the center of the south façade of Building 8 (Fig. 57) was most likely created when the spine was demolished and truck access from within the site became possible for the first time. Like the new doorway in the south façade of Building 10, the metal-framed opening was located off center so that the new opening intruded into the original window bay immediately to the east but not into the window bay immediately to the west. Consequently, the window bay to the immediate east was completely bricked in so that the interior face became flush with the plane of the brownstone not only to provide support for the existing masonry above but to engage the recessed metal door frame. By contrast, two of the original window openings not impacted by the new doorway (i.e., the one immediately to the west and the other at the extreme east) were simply sealed by the new brick skin whose date of installation and details matched those of the north façade of Building 10.

The history and treatment of the window opening at the extreme west of this façade is difficult to explain. Though covered with plywood, it is the only one that can be seen from outside, and the only one that still contains fenestration. Nothing in the first and last available plan drawings from 1857 and 1938 (Appendix D, plate 8, and figure 36) suggested a reason for an opening in this location. Like the fenestration in the three bays immediately adjacent in the west elevation, the metal window frame was set in new brick construction not fitted to the existing brick jambs like the rest of the metal windows in the building. Its head was set even lower than the head in the three adjacent bays, but there appeared to be no reason for the opening to be shorter. The opening was behind the pipe tunnel which was brought into Building 8 at the southwest corner around 1916 *en route* to the South Armory. The pipes run both above and below grade making access to the window difficult. This suggests that it might already have been in place before the steam pipes were installed, but why? Perhaps to provide borrowed light to the section of the finishing room that by 1909 had taken over the original storage room between Buildings 8 and 10. As it is so difficult to reach, one must ask why this window opening was kept after the spine and storage room had been demolished and the brick skin was added. By contrast, the window opening in the southeast corner, where sashes would have been easy to reach and operate, was bricked up.

Another possible factor promoting alteration of this window bay could have been the routing and possible rerouting of the steam pipes. When they were installed, clearly to bring heat to the new South Armory and the enormous machine sheds built behind it in 1916, they might have crossed the spine just under the spine's first floor level or even near grade, rather than at the height that they do now – just above the bottom chords of the roof trusses of Building 10. Either alternative path could have entailed the alteration of the south wall or window bays.

The small section from the 1938 survey (Fig. 55) shows that the present elevation of the steam pipes would have brought them through the second story of the spine at about mid-height of the space - not a very convenient height. This pathway, between the upper plane of the truss cords and the underside of the bearing points of the roof trusses of the spine, would also have been rather cramped. Running the steam pipes across the spine at the lower elevations would have only been a problem after the spine was demolished when for the first time it would have restricted large trucks which could have used the space for access to the east courtyards. The pipe path could have been altered at some point between 1951 when the spine still remained at this location, and 1965, when it no longer did (compare plates 2 and 3, Appendix C). The presence of welded connections in the steam pipes suggests work done later than 1916. The brick skin seems to have been built around the steam piping and its supports after it had been set at its current height.

The rebuilding of the three adjacent bays in the west wall of Building 8 (W25, W26 and W27) was itself unexplained and undocumented. The brownstone piers were rebuilt in brick, but the new piers carry what appear to be the original timber roof trusses and decking. The brownstone window heads were replaced in reinforced concrete, and the hollow entablature was not recreated. The heads were set very slightly lower than the typical window head. It amounts to a radical rebuilding in a location not directly affected by the construction of any later adjacent building. Perhaps the construction of the pipe tunnel, which turned into the building slightly below grade in the last window bay, destabilized the brownstone piers.

PHYSICAL DESCRIPTIONS

INTRODUCTION

Physical documentation of Buildings 8 and 10 was conducted on May 3 and 4, 2017. The weather was fine, but observation and recording of interior conditions was limited by low light levels caused by blocked and boarded up windows and lack of artificial lighting. All observation was made from grade on this occasion, aided by zoom photography, but it benefited from data and photographs generated by EYP in an assessment of the stability of the two structures earlier in the year.[94] The project did not include making probes, taking samples, or laboratory analysis of materials such as paint and mortar.

This section has two parts. The first provides an overview of the two buildings as they stand today, describing their overall form, the components of the envelope, the palette of materials and standard details, as well as patterns of alterations and the remaining impacts of the construction and demolition of adjacent buildings. Guiding it is the need to marshal the evidence that enables character-defining features to be identified and described in the final section of Part 1. The physical condition of materials and elements is assessed only in a general manner as the NPS has indicated that they do not expect a detailed assessment beyond that already achieved by the structural survey recently completed by EYP. The second lists local variations in form, materials and details bay by bay. The bay numbers are keyed to current plans of the two buildings included in Appendix F.

OVERVIEW

The Impact of the Demolition of Surrounding Factory Buildings

Since the inspection building, the hardening building and the storage shed have been demolished from around Building 10, as well as the forgings storage and lumber shed to the west of Building 8, the scale, massing and overall form of Buildings 8 and 10 are quite clear, especially when viewed from the west. It is easy to read the contrast with the size, materials and typical details of the East Armory, the only other extant early (but not original) structure, and the still greater contrast with the two remaining later structures, the north and south armories.

Figure 58. Buildings 8 and 10, viewed from the west today. *The North Armory is behind Building 8 on the left, the east and south armories behind Building 10 on the right.*

The removal of the hardening building restores some idea of the scale and form of the original south courtyard between Building 10 and the East Armory, while the continued presence of the North Armory in the original north courtyard provides one illustration of the manner in which space that had been planned for circulation and temporary storage was taken over for building and expansion throughout the history of the factory.

However, the demolition of every one of the buildings that made up the westward expansion of the factory in 1861 that doubled the size of the factory complex, as well as the demolition of the buildings that later encroached on the original forge and foundry, means that the buildings that remain provide a limited vision of the total scale of the complex and the density of construction on the site that developed over the length of its operating history.

The demolition of the spine that once connected the East Armory to the original west wings (i.e., Buildings 8 and 10) and of the store room and 125-foot chimney at the west end of the spine that originally connected the forge and the foundry and, as we have argued, was integral to their operation, has hollowed out the character of Buildings 8 and 10 in particular. They no longer read as a continuous form, two wings mirrored around a central common space and an east/west axis once defined by the dome on the East Armory and the chimney over the store room.

What remains are the scars of adjacent construction and demolition. The most obvious of these includes the openings and steel beam-ends left in the east and west friezes of Building 10; the addition and enlargement of doorways, particularly at the north and south elevations of both buildings; the infill of window openings the length of the west elevation of Building 10; the refinishing/stabilization in brick of the brownstone end elevations that were originally part of the spine; the steam tunnel partly obscuring the west elevation of Building 8, the associated steam piping running through both buildings to serve the north and south armories, and the trestle that carried the pipes between Buildings 8 and 10.

Since they bear witness to the active history of the factory and its effect on Buildings 8 and 10 in the period of significance identified for the Historic District in the National Historic Landmark nomination of 2009, these impacts must be distinguished from those that simply mark the passage of time and deferred maintenance, such as missing and damaged slate, missing and broken glazing, sagging brickwork, crumbling mortar and eroded and scaling brownstone. While the latter have been noted, they have not all been located and quantified since, as mentioned above, the NPS feels that at this time they have been adequately addressed by the recent structural survey. However, the scars of adjacent construction and demolition on the two buildings have been fully noted.

Given the scale of the demolition of the factory complex that has already occurred, the question arises whether the scars alone can carry the burden of interpretation of 95 years of history or if it might be better to concentrate on stabilizing and restoring, to the extent possible, the elements that represent the original design and the shorter exclusive use of the Buildings 8 and 10 as a forge and foundry.

Building Form

Fortunately, many general extant features of the existing buildings represent both the original intent and function and their longer history. These include their shape, size and structure. Their simple, long, high, column-free rectangular form with abundant natural light was as suited to woodwork and sheet metal work in an early 20th century industrial context, and later to storage, as it was to the original installation of tempering hearths, drop forges and crucibles for the serial operations involved in the fabrication of gun parts in the mid-19th. See Appendix A, plate 9 and figure 59.

Figure 59. Building 10 as a storage facility, looking north. *Note change of character due to blocked-up window openings, altered doorways, and the steam pipes overhead that served the South Armory. Brownstone units in the north wall define the course of the horizontal masonry duct in that elevation. Bricked-in window openings can be seen at the east end of the same wall.*

Both buildings retain their original overall dimensions of approximately 40 by 225 feet. The open space is maintained by the perimeter masonry piers that define 27 window bays and support the clear-span heavy-timber Queen-post trusses that are set at 17 feet above the ground level floor. In fact, the open space today is greater than it was originally, for the light partitions that defined a storage area, an inspector's office, and separated brass and iron foundry and annealing work areas have all disappeared. Compare Appendix D, plate 8, with figures 58 and 60. The only extant interior sub-division is a late 20th century cement block enclosure for an electrical closet at the southwest corner of Building 10.

Figure 60. Building 10 interior looking south, 2005. *The modern electrical closet can be seen at the far end to right of center. Note pattern of window bays, alternating skylights.*

Both buildings retain their original gable-ended sloped roofs and slate roofing although the latter is in poor repair including missing and damaged slate and missing and rusted flashing at the ridge which is allowing water to drip into the buildings (Fig. 77, below). The roofing incorporates considerable replacement slate often mismatched in color, texture or thickness (Fig. 61). There are also holes in the roof deck. Along the eaves there has been considerable loss of the slate and wood supports added early to extend the roof over the gutters. This has allowed the original stone gutters and the masonry below them to become saturated, leading to freeze/thaw damage and loss of mortar. This is most marked along the east elevation of Building 8 where the façade is rarely in sunlight and air movement is more limited, but it occurs at all elevations. See figures 11 and 62a, 42c, 61 and 63. There is no trace of sheet metal liners in the carved stone gutters, only the occasional opening carved in the stone for an outlet to a downspout with which the two buildings were originally provided but must have been removed when the roof was extended at some time before 1861 (Figs. 12a and 12b). Today, the masonry of the façades, comprised of porous stone and less than well-fired brick reflect over 150 years of poor control of rainwater run-off from the roofs and at grade.

Since originally the two buildings had no brick chimneys and few roof structures, the overall clean lines of the roofs today capture much of their original character. This included ventilators at the ridge of at least Building 10 where there are two replacement ventilators today. Later additions that remain include the central monitor at Building 8 and the set of 12 low, flat skylights at

Building 10, equally divided and offset from each other on the two slopes of its roof. See figure 58. Stone caps still cover the gable end walls at the north end elevation of Building 8 and the south end elevation of Building 10, but the re-worked opposite end elevations that once faced the spine have later 20th century concrete caps.

Figure 61. Mismatched slate at the south end of Building 8, west roof slope. *In the foreground is the raised, early 20th century steam tunnel. The last three window bays are not original. Note missing slates at eave and water damage to masonry below.*

The Masonry Walls

The vertical enclosures of both buildings retain the fundamental elements of their original design, with the long, east and west elevations organized into 27 regular bays defined by load-bearing masonry piers linked by a continuous entablature while the north and south elevations remain as plane gabled walls. See figure 58 above. Where brick was loose or missing from the patched openings that once linked the flues in the hearth chimneys to the masonry stacks in the piers, it was easy to establish that the piers were rubble masonry construction. The stacks are voids between load-bearing brownstone mixed with brick and rubble. The brownstone is not an ashlar tied back to a brick core.

Figure 62a. Building 8, partial east elevation, looking north. *The second window has been created in an original doorway as evident in the shape of the jamb units. This explains the sequence of three brick panels, instead of an alternation between brick and brownstone, below the window sills.*

Figure 62b. Building 8, east elevation, rough aggregate concrete patches on brownstone.

Figure 63. East elevation of Building 10 looking north. *An altered original doorway can be seen in bay 19 (ninth from the left).*

Most of the brownstone of which the piers and end walls were built remains, and it retains its rock face finish. It remains in least altered condition on the east elevations of both buildings (Fig. 62a), although the 13 south bays of the east elevation of Building 10 have been painted white (Fig. 63), and the brownstone of the east elevation of Building 8 shows the impact of shadow and damp in eroded and patched brownstone and deteriorated and missing mortar (Fig. 62b). At the west elevation of Building 8, the character of the wall has been altered by the addition of the raised concrete steam tunnel along its full length, which, except at the later doorway introduced at bay 9, completely obscures the masonry below the window sills and the relation of the building to grade. See figures 49a, 49b, 61 and 64. At the west elevation of Building 10, the piers defining bays 7 through 10 have been rebuilt in brick (Fig. 42a), as have the western bays 25 through 27 in Building 8 (Fig. 61). Also, what were once window openings elsewhere in the west elevation of Building 10 now read as masonry, since windows have been replaced with brick at bays 1 through 6 (Fig. 65), and with concrete block at bays 12 through 27 (Fig. 37). Generally, these infills are in better condition than the brownstone, although the masonry of bays 26 and 27 of the west elevation of Building 8 is in poor shape (Fig. 61).

Figure 64. Building 8, overall view of west elevation.

Figure 65. Building 10, west elevation. *Note the brick pilasters over the brownstone piers at bays 1 through 6, bays 7 through 10 rebuilt in brick, and the open beam pockets cut into the southern stretch of the frieze.*

At the east and west elevations too, the definition of the entablature as a frieze of brick between a brownstone architrave and cornice still remains clear. There has been local loss of brownstone units due to weathering, particularly at the higher course. At locations, just identified, where the piers have been rebuilt in brick, the brownstone elements of the entablature have been omitted (Figs. 61 and 65). The character of the frieze is now largely altered on all four elevations. Its original subdivision into pilasters and panels (see Appendix A, plate 5), which echoed the alternating sequence of triglyphs and metopes of the Doric order has disappeared except at bays 1 through 6 of the west elevation of Building 10. See figure 65 above. Clearly most of the brick of the friezes is not original. Further, the brick of the east and west friezes has been altered and damaged by the cutting pockets and placing beams for roofing over the spaces that had been created between Building 10 and buildings erected close to it at the time of World War I. These interventions are now represented by a series of holes in the west frieze and a series of beams ends left to rust in the east frieze. See figures 63 and 65.

Figure 66. Recent brick veneer, Building 10.

The end elevations of the two buildings differ considerably in their present condition and relationship to their original design. Change is most marked in the elevations that once connected to the storeroom in the spine (the south elevation of Building 8 and the north elevation of Building 10), as drawn in the plan of 1857 (Appendix D, plate 8). What were once interior partitions are now exterior walls. Traces of their integration with the intermediate storeroom and the spine are confined to the traces of the jambs of the arches into the passageway that crossed under the spine immediately east of the storeroom and linked the original north and south courtyards. See figure 9a. At both buildings, the almost brownstone of the party wall which can still be seen on the interior (Fig. 59) had its exposed face completely concealed by a wythe of face brick. See figures 56, 57 and 66. Only the setbacks at the original floor levels of the spine are recalled by string courses of canted cast stone or concrete. The gables are capped with the same material. See figures 56 and 57.

Originally, these two walls had small centered doorways that connected the wings to the center storeroom. Judging by the 1857 plan, these openings were modest. Both have been considerably enlarged. Both were installed slightly off center, presumably because this required alteration of only one jamb not both. Consequently, the window opening to one side was compromised and simply filled with brick. Curiously, the new doorway in the north elevation of Building 10 has been partially infilled with concrete block to create a smaller doorway and a new higher and wider doorway cut into the west end of the wall with even greater impact on the original fabric. See figures 56 and 59. The doors installed in these openings are resolutely devoid of architectural interest. Traces of original window size openings, in themselves rather a mystery given that they were in a wall that was an interior partition, can be seen on the inner elevation of both walls. They are typically filled with brick, but in one at the west end of Building 8 a metal window that matches the size of no other window in the building has been installed and the wall above completely rebuilt in brick. See figure 67.

Figure 67. Building 10, south elevation.

The south elevation of Building 10 has undergone similar transformations. For a while, a passageway ran from its center to the South Armory, but only traces of mastic over the doorway tell its story. Since we have an early photograph of this elevation (Fig. 20), it is easy to see that the doorway was widened and provided with a concrete lintel. Like the other central doorways, the doorway was widened only in one direction, leaving the east jamb in place. Although all the original window openings still retain their original heads and jambs, the two to the west have been converted into doorways. A number of the original capstones are missing from the east gable, and some brownstone masonry is missing or damaged where holes have been cut for the steam pipes that served the South Armory.

Figure 68a. Building 8, north elevation.

The north elevation of Building 8 retains more original character. See figure 68a which can be compared to the 1935 photograph of picketers protesting outside it (Fig. 7a). Again, the center doorway has been enlarged with a concrete lintel, and while both of the original jambs have been destroyed and the remainder of the window openings on either side have been bricked in, at least the doorway and the overall composition of the façade remains centered. The form of the outer window openings is uncompromised, original metal grilles remain in place, as do traces of the original wood window frames. The rest of the brownstone is intact and in fair condition and there is a full complement of stone caps.

Windows, and Window and Door Openings

It is in the treatment and introduction of windows and window and door openings that the character of the major elevations has also been further changed. The least change is at the east façades

of both structures. The regular procession of window bays and their original proportions can be sensed in figures 62a and 63, as well as the characteristic alternation of brick and brownstone panels beneath the window openings. Window coverings at the east elevation of Building 10 are plywood and easily disassembled, unlike the block infill of the windows from bay 12 to the south end of the west elevation and the brick infill of bays I through 6 (Fig. 65). However, the plywood hides the only remaining array of double-hung wood windows, some 20 in all, which may well be original (Fig. 50b above). The sash has 16 over 16 divided lights. Along the east façade of Building 8, temporary plywood protection is installed at the inner face of the window so the fenestration remains part of the character of the façade. However, all the windows are steel replacement units. They are about 100 years old and in very poor condition (see Fig. 62a above). The window units of the west façade of the same building are also all steel replacement units of perhaps a slightly later date and in somewhat better condition (see Fig. 61 above). Although both sets of units have center sections of pivoting operable sash, and the same 12/8/4 configuration of divided lights in all three sections which creates a credible uniformity, their construction differs. The windows of the east façade have a profile for the mullions, muntins and components of the frame that incorporates curves and slight offsets. Those of the west are constructed from plain flat bar stock. Compare figures 51a and 51b.

Originally, the east and west elevations differed in that door openings were confined to the east elevations where there were only two doorways each set like a window in a standard bay but with a brownstone header at a considerably lower elevation than the window headers which were part of the architrave (Appendix A, plate 3). These two doorways divided the 27 bays into three sections, the outer two comprised of nine window bays, the center section of eight.

Traces of all these openings remain in differing degrees. They share some details with the typical window openings. Both have heads with a bush-hammered finish that contrasts with the typical rock face of the brownstone in the fields of the wall, but the door heads are flush while the window heads have a protruding semi-bullnose that curves up and out so that the plane of the frieze is slightly outset. Compare figure 5 and figure 62a. The brownstone units that make up their jambs have the same smooth returns and the chiseled perimeters around the face as the window jambs. In both, much of the crispness of the hand hammered and chiseled details has eroded away. However, the proportions of the jamb stones differ. The units used at door jambs are much more slender than those chosen for the window jambs and the fact that they are laid alternately horizontal and vertical only makes the difference more striking. Compare figures 4 and 5.

Figure 68b. Building 8, new doorway in east bay 1.

Unfortunately, the original organization of these two façades has been compromised by the widening of an original doorway (Building 10 bay 19), the creation of new doorways in original window bays (Building 8, bays 1 and 21-22, and Building 10, bay 12), and the infill of doorways (Building 8, bays 9 and 19). In addition, no original doors and frames remain. See figure 68a.

Interiors

As mentioned above, the interiors retain the clear open space for which their envelopes and structural system were designed. All of the clear-span heavy timber trusses remain, together with the purlins and rafters that support the roof. However, the wood ends of many trusses have already deteriorated, as described in the Structural Condition Report. They have usually been repaired with plywood gussets, but some ends are held together with metal straps.[95] See figure 75 below. In both buildings, there are also a few temporary truss supports (Lally columns and scaffolding) that detracts from the openness. There are several ancillary wood elements of no certain provenance attached to the trusses that detract from the overall clarity of the original structure, as does superannuated electrical conduit and sprinkler piping. See figures 59, 69 and 77. No original partitions remain. At the southwest corner of Building 10 there is a painted block roofed enclosure for a non-functioning electrical closet. See figure 69 above, far right.

Figure 69. Building 10, interior looking south. *Note concrete block enclosure of electrical closet at right.*

Figure 70. Scaffold support, Building 8, interior looking north. *Note concrete block infill of later doorway at bays 19 & 20 at right.*

In both buildings, exposed rock-face brownstone provides the major interior finish surface. It has been painted white, but the paint, which is very likely not original, is in poor condition. At the level of the window heads, a course of projecting rock-face units carries an unarticulated low brick wall, which in turn supports a string course of brownstone units that carries the bearing ends of the trusses. This creates a masonry entablature like that on the long exterior elevations, and it is present at all interior walls except the north wall of Building 8 and the south wall of Building 10 (Fig. 71). Between the truss ends is another low brick wall that provides some lateral stiffening of the trusses and rafters. Hidden behind this wall, cast-iron shoes with tie rods provide seating for the bottom chords of the trusses and clamp them to the sloped timbers, but they are not pinned to the brownstone. They are in better condition than the truss ends and much of the brick masonry which like the brownstone is painted white. See figures 19 and 72.

Figure 71. Representative view of upper part of interior walls, Building 10, east wall. *Note remnants of an early electrical power distribution system at left.*

Figure 72. An unseated truss shoe.

Behind the unarticulated brick wall of each entablature runs a horizontal masonry duct. The top and bottom planes are made of brownstone units; the side walls are brick masonry. See figure 21 above. Access was possible at only a few points where brick was already missing, but it was clear that the inner and outer walls contained different types of brick and that sometimes there were two wythes of brick in a duct wall, sometimes one. See figure 21 above for a typical view.

Within the piers that support the entablature run unlined masonry shafts that connect to the horizontal masonry ducts through holes in the brownstone base of the ducts (Fig. 73). These shafts, typically about 6 by 14 inches, are built into every other pier in the long elevations of both buildings. They can be identified by the brick patches, filling holes that once allowed the heat and exhaust gasses from the hearths to pass into these shafts through flues built into chimney breasts immediately above the hearths. See figure 22 above and figure 74 below. These chimney breasts have long been demolished, but their form can be seen in and their connection to the shafts intuited from plate 7 of Appendix D and figure 27b above. It also seems, where there were lower openings through which air would have been supplied to the hearths, that the shafts descend below grade. See figure 23 above. The source of the input air was not able to be determined. All these shafts seemed to be in fair condition. Occasionally, deposits of sooty dust were found within them.

Figure 73. Masonry shaft with opening into masonry duct above.

Figure 74. Building 8, interior opening to original exhaust flue shaft.

Between the piers and in the end walls, there are window bays. The various types of windows and their distribution is covered in the description of the exteriors as well as the fact that many openings have been filled with brick or block and that others are sealed with plywood. The wood windows can only be observed from the interiors at present. They are provided with a flat casing which has a corner bead. Frames and casings are painted white as is much of the glazing. Many lights have missing or broken clear glass and are missing sash cords. Typically, the frames are set on brownstone sills, the noses of which are set flush with the brownstone plane of the interior face of the wall. Under every other window in the east and west façades, the masonry panel is brick typically flush with the brownstone. Brick has been used to repair or replace a number of brownstone sills. See figure 18 for a representative view of the wood windows, a pier with brick patch, and treatment of the lower section of the perimeter wall.

The underside of the roof is visible. Roofing boards, like all the rafters, purlins and trusses are painted white. The boards vary somewhat in width, but there are no obvious signs of replacement or patching (Fig. 71). A few are missing. See figure 75.

Figure 75. Missing roofing boards, east elevation, Building 8. *Note metal straps joining the decayed truss elements.*

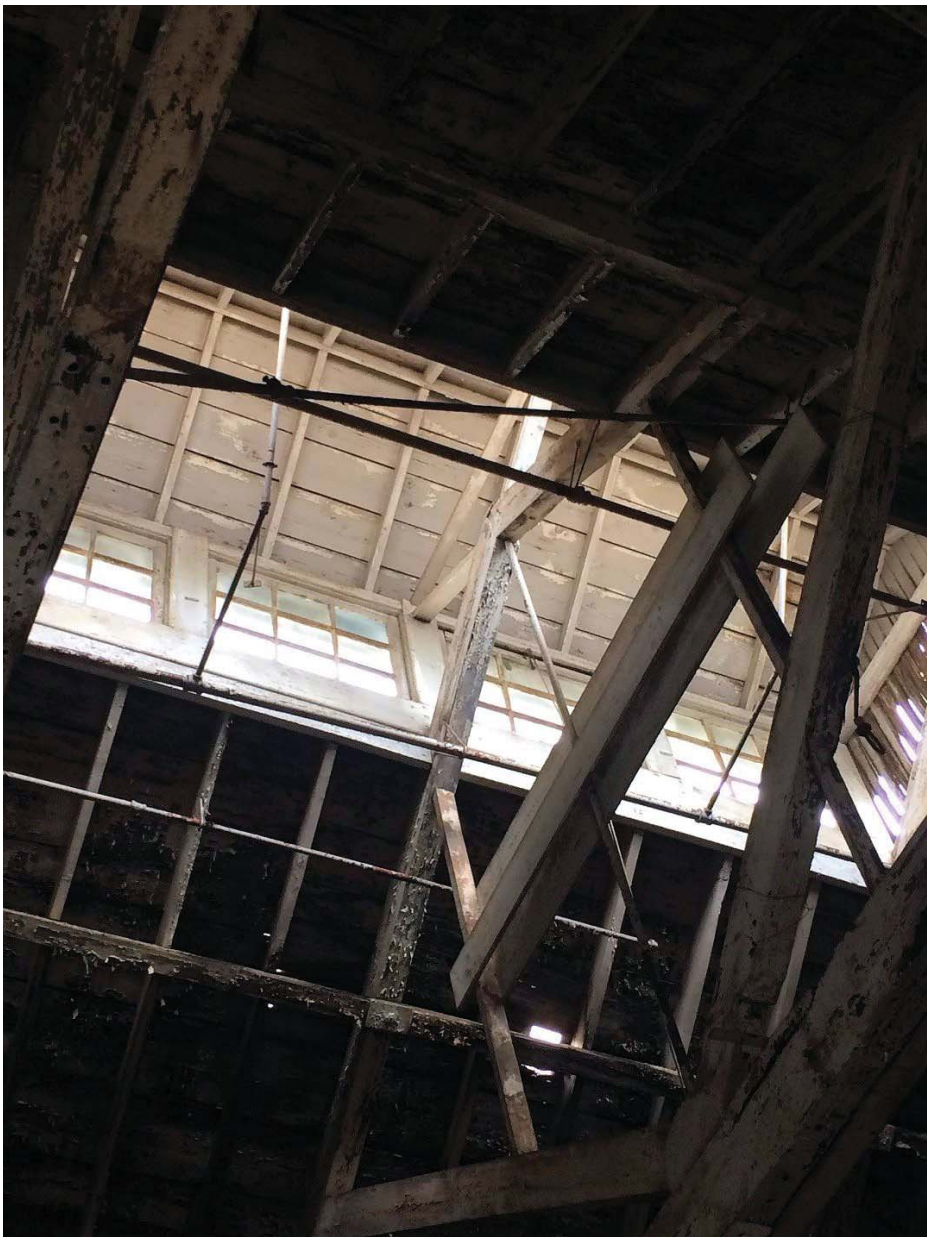


Figure 76. Building 8, central rooftop monitor.

At the center of Building 8 at the ridge one can see the wood framed monitor which is painted white like all the other timber components. The gabled roof construction appears to be in fair condition, but the vertical siding at its north and south ends has rotted and warped and is open. In the roof of Building 10 there are 12 flat, metal skylights, six on each slope, offset from one another. The frames seem sound, if rusted. Several glass lights are cracked, a few are broken and allow rainwater to fall freely into the building.

Figure 77. Skylights and steam piping at Building 10. *Note daylight where ridge flashing is missing and ancillary framing below trusses.*

During the sight survey, the floors were largely covered with piles of stored materials. In both buildings, they appeared to be concrete divided into panels. There was some unevenness within and between the panels, particularly towards the north end of Building 8.

As mentioned above, there are remnants of old electrical distribution systems and sprinkler piping throughout, but neither are active, and there is no artificial illumination. There are standpipes for fire protection against the east walls near the center of both buildings, but they do not appear to be functional. Insulated steam pipes run up the south wall of Building 8 and through the trusses of Building 10, but they are not active and there is no heating in either building.

Figure 78. Southwest interior of Building 8.

DETAILED DESCRIPTIONS

Building 8 – Exterior

West Wall. A concrete chase for steam pipes runs along the entire west side of the building, from slightly below grade to the level of the window sills, except as noted at bay 9. The concrete obscures all window sills, unless noted otherwise. At each bay, the pier to the north is described first; the description of the window follows

EXTW1: Brownstone wall with anchor holes; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Thin, ribbed glass in most panes, with a few unribbed glass panes. Several panes are missing.
EXTW2: Brownstone wall with anchor holes; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Thin, ribbed glass in most panes, with a few unribbed glass panes. Several panes are missing or broken.
EXTW3: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Thin, ribbed glass in most panes, with a few unribbed glass panes. Several panes are broken. Steel angles replace a section of missing brownstone architrave at south end of window head.
EXTW4: Brownstone wall; flat profile steel window with three sashes (4/8/4 configuration) with the 8-light sash operable by a pivot hinge. Thin, ribbed glass in most panes, with a few unribbed glass panes. Several panes are broken. A header row of brick is installed at the raised window sill, with brick installed in running bond from below the sill to the top of the concrete steam chase. A section of cornice stone is missing over the north end of the pier.
EXTW5: Brownstone wall; flat profile steel window with a fixed, 12-light sash at the top and unknown configuration below. Wired glass. A steel wire mesh covers most of the window and is anchored to the stone. A wood ledger is anchored to the brownstone on either side of the lower window opening.
EXTW6: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Wired glass. A header row of brick is installed at the window sill with brick installed below the sill to the top of the concrete steam chase.
EXTW7: Brownstone wall; flat profile steel window with three sashes (4/8/4 configuration) with the 8-light sash operable by a pivot hinge. Wired glass with two broken panes. A rowlock course is installed at the raised window sill with brick installed below the sill to the top of the concrete steam chase.
EXTW8: Brownstone wall with two anchor holes; flat profile steel window with a fixed, 12-light sash at the top and missing sash below with plywood covering. Wired glass with some panes broken or missing. A rowlock course is installed at the window sill with brick installed in running bond below the sill to the top of the concrete steam chase.
EXTW9: Brownstone wall with concrete lintel over double-wide door opening with wood door. There is also a brownstone lintel built into the wall above the concrete lintel. Doorway extends north into the stone pier. A two-sided, wood-framed, open corrugated-metal enclosure with sloping roof protects the doorway. The concrete steam tunnel is depressed below grade at this bay.

EXTW10: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Curved metal light stanchion projects from top of steel sash; fixture is missing.
EXTW11: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW12: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW13: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. A steel wire mesh covers most of the window and is anchored to the stone. A wood ledger is anchored to the brownstone on the north side of the lower window opening.
EXTW14: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW15: Brownstone wall with two-fixture light pole anchored to upper face of wall and extending up past roof eave. Flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW16: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW17: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW18: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW19: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW20: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. A steel wire mesh covers most of the window and is anchored to the stone. A two-bar snow guard is installed on the roof at the second/third slate course running to W24.
EXTW21: Brownstone wall with anchor hole; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Snow guard on roof.
EXTW22: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Horizontal opening into concrete steam chase is covered by a low four-sided sheet metal pyramid roof. Snow guard on roof.

EXTW23: Brownstone wall with wood panel approximately 24 x 36 inches anchored to wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Snow guard on roof.
EXTW24: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes.
EXTW25: Brownstone wall; running brownstone architrave and cornice above windows comes to an end. The wall above the window is running bond brick up to the eave. Flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Concrete lintel above window.
EXTW26: Running bond brick wall up to roof eave with electric meter and conduit on face of wall; flat profile steel window with an assortment of sashes (possibly 8/8/4/4 configuration) with the second 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Concrete lintel above window.
EXTW27: Running bond brick wall up to roof edge and extending to the southwest building corner and up to the concrete cap on the gabled end. A 10-course-high brick wall with concrete cap projects out from the west elevation aligned with the gabled end wall. Flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Ribbed glass with some missing and broken panes. Concrete lintel above window.

South Wall. The solid masonry south wall is faced with a veneer of running bond brick stepping back twice as it rises to the gable point. A precast concrete band with a clipped angled face runs the full width of the façade at each point that the façade steps back. The gable is capped the full length of each raking slope with flat precast concrete units.

A single window opening is located on the west side of a more or less centrally located double-wide doorway. The window opening is boarded up with a sheet of plywood and has approximately the same width but less height as the windows on the east and west facades. It has a steel lintel and concrete sill.

The plywood-faced double-door has steel hinges and rough lumber frames. A steel lintel spans the full opening.

Anchored to the masonry veneer between the door and window are vertical steel framing members that rise to support several overhead steam pipes of varying diameter. The steam pipes penetrate the upper south wall and span the open area between Buildings 8 and 10. Small diameter abandoned pipes and conduit span the brick façade running both horizontally and vertically.

East Wall. EXTE1: Brownstone wall with boarded over doorway. Fixed 12-light profiled steel sash window above doorway with extant steel window frame on north side of doorway. The opening has brownstone jambs above but concrete jambs below where the doorway was cut into the original window opening. The concrete jambs rise 36 inches from grade. Brownstone missing at open beam pocket above window. A half-height concrete wall with concrete cap extends from the brownstone wall between the doorway and the building corner. A line of flexible flashing and asphaltic cement located between the brownstone architrave and the brick frieze runs from EXTE1 past E3.

EXTE2: Brownstone wall with open beam pocket at window-head height; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed running-bond brick infill below the sill.
EXTE3: Brownstone wall with exposed end of wood beam at window-head height; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill. Two horizontal wood ledgers one above the other are anchored to the wall. Several remaining anchors and anchor holes.
EXTE4: Brownstone wall with open beam pocket at window-head height; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed running-bond brick infill below the sill.
EXTE5: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration) covered by a steel-framed mesh grate anchored to the stone. Brownstone sill. Open anchor holes in the wall.
EXTE6: Brownstone wall with steel anchor for horizontal pipe running across middle of profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill. Rowlock top course at infill with running bond below to grade.
EXTE7: Brownstone wall with steel anchor for horizontal pipe running across middle of profiled steel window with three sashes (12/8/4 configuration). Brownstone sill.
EXTE8: Brownstone wall with steel anchor for horizontal pipe and a single anchor above window; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill.
EXTE9: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration). Sheet metal panning system located in place of sill. Recessed brick infill below the metal panning system. Brownstone sill at grade.
EXTE10: Brownstone wall with concrete patch at north jamb; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill.
EXTE11: Brownstone wall with two areas of concrete patching; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill.
EXTE12: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration) covered by a steel-framed mesh grate anchored to the stone. Brownstone sill with recessed brick infill below the sill. Rowlock top course at infill with running bond below to grade. A post indicator valve (PIV) projects up from grade in front of the window.
EXTE13: Brownstone wall with one area of concrete patching; profiled steel window with 12-light fixed sash above and plywood infill below. Brownstone sill. A brownstone unit below the sill is missing exposing the rubble infill.
EXTE14: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill. Rowlock top course at infill with running bond below to grade.
EXTE15: Brownstone wall with three areas of concrete patching; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill.
EXTE16: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with running-bond recessed brick infill below the sill. A pipe end penetrates the brick frieze above the window.

EXTE17: Brownstone wall with one area of concrete patching; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill. Exhaust pipes penetrate the upper window sash and the brownstone architrave.
EXTE18: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill. Rowlock top course at infill with running bond below to grade. Exhaust pipes penetrate the upper window sash and the brownstone architrave.
EXTE19: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration) covered by a steel-framed mesh grate anchored to the stone. Brownstone sill.
EXTE20: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill.
EXTE21 and 22: Brownstone wall to the north of a two-bay-wide doorway with two areas of brick infill within the brownstone. See figure 72. The doorway has CMU infill, steel lintel and brick infill above the lintel to the brownstone architrave. A concrete apron extends out from the doorway and a capped pipe projects up from grade.
EXTE23: Brownstone wall with one area of brick infill at the south jamb of the adjacent doorway; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill.
EXTE24: Brownstone wall with two areas of concrete patching; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill.
EXTE25: Brownstone wall with one area of concrete patching and one anchor hole; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill.
EXTE26: Brownstone wall with one area of concrete patching; profiled steel window with three sashes (12/8/4 configuration). Brownstone sill with recessed brick infill below the sill.
EXTE27: Brownstone wall with three areas of concrete patching; profiled steel window with three sashes (12/8/4 configuration) covered by a steel-framed mesh grate anchored to the stone. A steel lintel is inserted above the window with brick infill between the steel lintel and the brownstone architrave above. A drain hole from the original brownstone gutter is exposed. Brownstone sill. A half-height brownstone pier with brownstone cap extends out from the face of the wall. The brick-veneered south wall of the building was installed upon the brownstone pier.

North Wall. The solid brownstone north wall rises to a central peak in a single flush plane. Several anchors and anchor holes remain on the wall face. A half-height brownstone wall with brownstone cap extends to the west in the same plane as the gabled wall face. A metal chain-link fence extends the height of the short wall.

The gable is capped the full length of each raking slope with flat brownstone units and brownstone gable returns. The brownstone caps have steel straps anchored to the upward face of each unit, stitching each unit to the next. Roofing cement has been applied over each joint.

The façade is divided into three bays: two outer window bays, and a center garage door bay. Two additional window bays, one each side of the doorway, have been infilled with brick. The infilled window openings retain their brownstone lintels.

All sashes are missing from the remaining window openings which are boarded up with plywood. Existing wood frames and metal sash pulleys remain indicating that the sash removed were

double-hung. Both windows have brownstone lintels and sills. At both windows, full-height steel bar grates are anchored to the brownstone jambs.

The center door opening width extends into the bricked-in window openings to either side of the doorway. The door opening has deep brick-veneered jambs and a concrete lintel. It is furnished with a rolling metal garage door at the inner face of the opening and a horizontally sliding chain-link gate at the exterior face. The metal track for the sliding gate extends across the face of the east window. A metal gate stop is anchored to the face of the wall at the east jamb.

Roof, roof structures and roofing. A slate-covered gable roof covers the entire building in a single plane on each side of the sheet-metal-capped ridge. Primarily a dark gray slate, some areas of lighter slate appear at scattered locations. The south end of the west gable is entirely roofed with lighter-colored slate.

A four-bay-long monitor is located at the center of the ridge. See figure 51. The west- and east-facing windows are each single nine-light sash with wood trim between windows. The operation system is not evident. The unit is clad on the north and south face with vertical wood plank siding. The roof of the clerestory is slate with a sheet metal ridge cap.

Metal anchors for rail-type snow guards remain on the east roof slope. Some of the rails of the snow guards remain at the north end of the roof. Sheet metal flashing has been installed along the lower edge of the east slope from mid-point of the building to the south end. Some areas of wood board sheathing and roof trusses are exposed.

Building 8 - Interior

The interior of Building 8 is a single open space with exposed painted brownstone walls and open timber trusses. The trusses bear on the solid brownstone cornice units between windows. A monitor is situated near the center of the building over the ridge line. Most of the walls were accessible at the time of documentation, but a few were concealed behind materials stored in the building. A few different painting campaigns were evident.

Running along the west and east walls is a brownstone architrave at the window heads and a brownstone cornice above it on which the truss ends rest. Four rafters run between each truss. The space between the truss ends is filled with a running bond brick frieze that also captures the rafters. Several brownstone units in the architrave protrude into the interior in ‘as cut’ condition. They were not trimmed flush with the wall when they were originally set. In every alternate brownstone ‘pier wall’ between windows there is a rough pattern of areas of brick infill.

West Wall. In each bay description, the masonry pier is to the north of the window. The upper west wall comprised of the brownstone architrave, brick infill, and brownstone cornice projects approximately eight inches into the interior. Some architrave units project further still. The projecting masonry runs from Window 1 up to, but not above, Window 25.

> **INTW1:** Brownstone wall; boarded up window with stacked brick shims along both window jambs. Concrete window sill with concrete infill from the sill to the floor. There is

a cast-concrete opening below the window to allow access to the exterior steam chase. The opening is at floor level approximately 24 inches high x 36 inches wide.
INTW2: Brownstone wall with areas of brick infill and abandoned anchor holes; boarded up window with stacked brick shims along both window jambs. Remnants of a course of brick remain on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW3: Brownstone wall with minor brick infill; boarded up window with stacked brick shims along both window jambs. A rowlock course of brick is installed on the window sill. The masonry beneath the sill is brownstone.
INTW4: Brownstone wall with areas of brick infill and three anchor holes; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW5: Brownstone wall with minor brick infill; fixed flat profile 12-light steel upper sash with lower window boarded up. The bottom window sash rests on a 12-inch tall raised brownstone ledge which rests on the brownstone sill. Brownstone between sill and floor.
INTW6: Brownstone wall with areas of brick infill and abandoned anchor holes. Boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW7: Brownstone wall with one anchor hole; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Two courses of running bond brick are laid below the sill with brownstone between brick and floor.
INTW8: Brownstone wall with significant brick infill, especially at the upper wall and one defined area of brick infill near the floor. Boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW9: Brownstone wall with double-wide doorway and concrete lintel. Above the concrete lintel is a shorter, brownstone lintel. There are brick door jambs and areas of brick infill within the brownstone.
INTW10: Brownstone wall; boarded up window with stacked brick shims along both window jambs. A rowlock course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW11: Brownstone wall; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW12: Brownstone at lower wall with significant brick infill above. Boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.

INTW13: Brownstone wall; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW14: Brownstone wall with brick infill; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW15: Brownstone wall with three abandoned anchors; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Brownstone from the sill to the floor.
INTW16: Brownstone wall with one abandoned anchor; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW17: Brownstone wall with two abandoned anchors; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW18: Brownstone wall with areas of brick infill; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW19: Brownstone wall with minor brick infill; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. A single running brick course is laid directly below the sill with brownstone below that, extending to the floor.
INTW20: Brownstone wall with areas of brick infill; flat profile steel window with three sashes (12/8/4 configuration) with the 8-light sash operable by a pivot hinge. Stacked brick shims along both window jambs. A rowlock course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW21: Brownstone wall with two anchor holes and one abandoned anchor; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Brownstone from the sill to the floor.
INTW22: Brownstone wall with areas of brick infill; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick is laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTW23: Brownstone wall; boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Brownstone from sill to floor.
INTW24: Brownstone wall with significant brick infill and four abandoned steel anchors. Boarded up window with stacked brick shims along both window jambs. A header course of brick is installed on the window sill abutting a brownstone sill behind it.

INTW25: Brownstone wall with areas of brick infill, mostly along north jamb of window. The projecting upper wall ends at this point. Boarded-up window has a concrete lintel and sill, with brick above the lintel and below the sill. An opening below the window, through three wythes of brick, penetrates the exterior steam chase. An electrical panel is surface-mounted at the center of the brick wall to the north of the window with conduit running vertically above and below the panel box.
INTW26: Brick wall with electrical panel box located on the lower wall. Boarded up window has a concrete lintel and sill with brick above the lintel and below the sill.
INTW27: Brick wall with electrical duplex outlet located on the lower wall. A steel angle is anchored to the brick, approximately 48-inches from the floor. Boarded up window has a concrete lintel and sill, with brick above the lintel and below the sill. One-half of the concrete sill has been removed for steam pipes.

South Wall. The south wall rises unobstructed from the floor to the gable point. Approximately 30 feet of the solid masonry south wall (east and center) is brownstone in a single plane. Approximately 10 feet of the west portion of the wall is brick, in the same plane as the adjacent brownstone. Large diameter steam pipes are exposed as they enter the building below the floor level at the southwest corner of the building and run along the interior of the building below the cut-away floor line for about 10 feet. At this point the pipes turn vertically to the roof line where they penetrate the south wall to the exterior. Several other small pipes and conduit run along the face of the wall and penetrate the masonry.

A double-wide door opening is centrally located below the gable point, with a single window opening on the west side of the door. This window (boarded up on the exterior) is a fixed steel sash with 20 lights (4 by 5) with each light measuring approximately 12 by 18 inches. Between the window and the door is a specific area of brick infill in the brownstone, suggesting a former window opening. The door opening has a steel frame with two inoperable bi-parting steel doors suspended from steel roller tracks above. Two horizontal timbers, one above the other, are anchored to the brownstone above the door opening. The timbers are approximately the same length as the door opening.

To the east of the door are two specific areas of brick infill in the brownstone, suggesting former window openings. One, closer to the door, has brick infill extending from the running brownstone lintel to the floor. The other has brick infill extending from the running brownstone lintel to a brownstone sill with brownstone from sill to floor.

East Wall. The upper east wall is comprised of a brownstone architrave, brick infill, and brownstone cornice for the full length of the building. Some wall piers between windows have openings to the original flue system.

INTE1: Brownstone wall with water pipe and valve cut-off near the floor. Wood door and frame with boarded-up opening above the door. There is extant hardware for an operable transom.
INTE2: Brownstone wall with areas of brick infill; boarded up window with splayed parging at both brownstone window jambs. Brick header window sill with running bond brick laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.

INTE3: Brownstone wall; boarded up window with splayed parging at both brownstone window jambs. Brick rowlock window sill with running bond brick laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTE4: Brownstone wall with areas of brick infill and anchor holes; boarded up window with splayed parging at north jamb. Brick header window sill with running bond brick laid in a defined area from the sill to the floor. The brick infill is in the same plane as the adjacent brownstone.
INTE5: Brownstone wall with anchor holes; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. Pulley and chain for operable sash remains. Brick rowlock window sill with one running bond brick course below sill and brownstone to the floor.
INTE6: Brownstone wall with areas of brick infill and one anchor hole; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. Brick header window sill with running bond brick to the floor.
INTE7: Brownstone wall with one anchor hole; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. Brick header window sill with one running bond brick course below sill and brownstone to the floor.
INTE8: Brownstone wall with significant brick infill; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. Brick header window sill with running bond brick to the floor.
INTE9: Brownstone wall with minor areas of brick infill; window is boarded up with extant parging on south jamb. Brownstone sill with middle third cut away.
INTE10: Brownstone wall with significant brick infill; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. Brick header window sill. Lower wall is obscured.
INTE11: Brownstone wall with one anchor hole; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. Brick header window sill with one course of running bond brick below the sill. Brownstone to the floor.
INTE12: Brownstone wall with significant brick infill; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE13: Brownstone wall; boarded up window with splayed parging at both brownstone window jambs. Parging is partly missing on the south jamb. A header course of brick is installed on the window sill abutting a brownstone sill behind it. One course of running bond brick is located below the sill and then brownstone to the floor.
INTE14: The lower pier wall is brownstone and the upper wall is brick with two flue openings, one above the other. An abandoned water supply pipe runs vertically up the east window jamb. The profiled steel window with three sashes (12/8/4 configuration) has tilt vent type middle sash. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE15: Brownstone wall with minor brick infill; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A rowlock course of brick is installed on the window sill abutting a brownstone sill behind it. One course of running bond brick is located below the sill and then brownstone to the floor. An 8” metal angle is anchored to the wall.

INTE16: Brownstone wall with significant brick infill and several abandoned anchors; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE17: Brownstone wall with significant brick infill and several abandoned anchors; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it. One course of running bond brick is located below the sill and then brownstone to the floor.
INTE18: The lower pier wall is brownstone and the upper wall is brick with several abandoned anchors; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE19: Brownstone wall with several abandoned anchors; profiled steel window with three sashes (12/8/4 configuration) with splayed parging halfway up both brownstone window jambs. A running course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE20: The lower pier wall is brownstone and the upper wall is brick with one existing anchor and several anchor holes; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A rowlock course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE21 & 22: Brownstone pier wall to the north of a doorway with several anchor holes. The doorway spans two original window bays and has been infilled with CMU, as have the upper window openings. The wall area between the infilled upper windows is filled with brick. A steel lintel above the doorway rests on brownstone at either end.
INTE23: Brownstone wall; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it, with brownstone to the floor.
INTE24: Brownstone wall with areas of brick infill and several anchor holes; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A running course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE25: Brownstone wall with two anchor holes and an abandoned telephone box anchored to the wall; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it. One course of running bond brick is located below the sill and then brownstone to the floor.
INTE26: Brownstone wall with one opening to the original flue system and significant brick infill; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. A header course of brick is installed on the window sill abutting a brownstone sill behind it. Running bond brick from sill to floor.
INTE27: Brownstone wall with three anchor holes; profiled steel window with three sashes (12/8/4 configuration). Middle sash is tilt vent type. The brownstone sill is parged and then brownstone to the floor. The wall pier between Window 27 and the end wall is brownstone with minor brick infill at the floor.

North Wall. The brownstone north wall rises unobstructed from the floor to the gable point. An overhead coiling garage door is centrally located below the gable point, with two infilled window openings on either side of the door. The innermost windows have been infilled with brick; the outermost windows are mostly boarded over. There is a small open area at the top of each plywood infill, exposing the steel bars on the exterior. The window sash are missing, exposing the wood window frame and extant sash pulley hardware. The easternmost window has a wood sill on top of a brownstone sill, with brownstone to the floor.

Floor. The floor is concrete. The concrete is poured in discreet sections. Stored materials cover much of the surface. Towards the north end there are depressions and ridges in limited areas, but overall the floor surface is reasonably plane.

Interior Roof Structure. Open trusses are located one per bay across the full width of the building, with the bottom chords resting on brownstone masonry between windows. They are constructed of solid timbers with plywood and steel repairs. The trusses are connected by two purlins on each roof slope supporting wood rafters that in turn carry roofing boards. Several abandoned utility elements exist along the trusses, including conduit, junction boxes and wood v-carriers for pipe. The clerestory skylight is open to the building interior.

Building 10 - Exterior

West Wall. Bays 1 through 6 have the typical brownstone and brick pier and spandrel details seen at Building 8. However, they exhibit a unique detail at the frieze between the horizontal brownstone architrave and cornice; the brick infill panel above each window is recessed between short brick pilasters. The masonry of bays 7 through 11 is entirely brick. Bays 12 through 27 return to the typical brownstone and brick masonry but with a flush brick entablature. Regularly spaced open beam pockets, some with steel shim plates, remain in the entablature from bay 8 to bay 27. A reddish paint finish covers the entire elevation, deteriorated in varying degrees.

EXTW1: Brownstone wall with minor areas of brick infill. The brick veneer of the north elevation is evident at the outermost corner with a north-facing parapet wall extending above the horizontal brownstone cornice (gutter). One downspout pipe is evident in a crack in the brownstone cornice, revealing a small portion of the original gutter. The brick-filled window opening has a brownstone sill with brownstone below the sill to grade. An abandoned pipe extends from the top north corner of the window area.
EXTW2: Brownstone wall. The brick-filled window opening has a brownstone sill with brick infill below the sill to grade.
EXTW3: Brownstone wall. The brick-filled window opening has a brownstone sill with brownstone below the sill to grade.
EXTW4: Brownstone wall with minor area of brick infill. The brick infill at the window opening, continues in the same plane all the way to grade. There is no window sill.
EXTW5: Brownstone wall. The brick-filled window opening has a brownstone sill with brownstone below the sill to grade. An area of brownstone cornice (gutter) has been infilled with brick. A brownstone bracket is located mid-wall, to the north of the window area.
EXTW6: Brownstone wall with minor area of brick infill. The brick infill at the window opening continues in the same plane to a sill at grade.

EXTW7: A vertical brick buttress rises to the level of the adjacent brownstone architrave, projecting out approximately 24-inches and corbelling back to the face of the wall at its top, separating the previous brownstone construction from the brick construction of bays 7 through 11. A vertical metal plate is inserted approximately 2/3 of the height of the buttress. A fixed 16-light profiled steel window with concrete lintel is located in a recessed panel of the brick wall. Brick extends from the high window sill to a parged, sloped sill at grade.
EXTW8: Brick wall with recessed steel sash window obscured by a plywood panel. Concrete lintel and parged, sloped sill at grade.
EXTW9: Brick wall with recessed steel sash window obscured by a plywood panel. Concrete lintel and parged, sloped sill at grade. Four abandoned pipes penetrate the brick wall above the concrete lintel.
EXTW10: Brick wall with recessed steel sash window partially obscured by a plywood panel. Window has a concrete lintel and concrete sill. Brick wall below window sill to parged, sloped sill at grade.
EXTW11: A boarded up doorway in the brick wall extends into the adjacent brownstone wall to the south of the doorway. The doorway has a steel lintel. The typical horizontal brownstone architrave and cornice (gutter) with brick-filled entablature takes up again above the doorway and continues across the west elevation to its end.
EXTW12: Brownstone wall with minor brick infill. CMU infill at recessed window opening. Window sill is missing and CMU infill extends to grade.
EXTW13: Brownstone wall. Flush CMU infill at window opening. Brownstone sill with brownstone wall below sill to grade.
EXTW14: Brownstone wall. Flush CMU infill at window opening. Brownstone sill with recessed brick-filled panel below sill.
EXTW15: Brownstone wall with abandoned steel anchors. Flush CMU infill at window opening. Brownstone sill with brownstone wall below sill to grade.
EXTW16: Brownstone wall. Flush CMU infill at window opening with anchor holes. Brownstone sill with recessed brick-filled panel below sill.
EXTW13: Brownstone wall. Flush CMU infill at window opening with abandoned junction box and anchor holes. Brownstone sill with brownstone wall below sill to grade.
EXTW18: Brownstone wall. Flush CMU infill at upper window opening and boarded up doorway below. A wood ledger is anchored to the face of the wall above the doorway extending south across Bay 19.
EXTW19: Brownstone wall partially removed for doorway. Flush CMU infill at window opening with two round penetrations in the CMU. Brownstone sill with brownstone wall below sill to grade.
EXTW20: Brownstone wall. Flush CMU infill at window opening. Brownstone sill with recessed brick-filled panel below sill.
EXTW21: Brownstone wall. Flush CMU infill at window opening. Brownstone sill with brownstone wall below sill to grade. Brownstone cornice (gutter) has an arched cut-out infilled with brick.
EXTW22: Brownstone wall. Flush CMU infill at window opening, extending in same plane to grade with steel lintel inserted in CMU at midpoint of wall. A curved metal anchor projects from the brick-filled entablature.
EXTW23: Brownstone wall with one abandoned anchor. CMU infill at the window opening is slightly proud of the adjacent plane of stone wall. Brownstone sill with brownstone wall below sill to grade.

EXTW24: Brownstone wall with one abandoned anchor. Flush CMU infill at window opening. Brownstone sill with recessed brick-filled panel below sill. Pipe penetration in brick infill below window sill.
EXTW25: Brownstone wall with half-height, projecting brick buttress at north jamb of window. Flush CMU infill at window opening. Brownstone sill with brownstone wall below sill to grade.
EXTW26: Brownstone wall. Recessed, boarded-up doorway with steel lintel and concrete threshold. Flush CMU and brick infill at upper window opening, above doorway. Several abandoned anchors.
EXTW27: Brownstone wall. Flush CMU infill at window opening with several anchor holes. Brownstone sill with brownstone wall below sill to grade.

South Wall. The solid brownstone south wall rises to a central peak in a single flush plane with minor areas of brick infill. Several anchors and anchor holes remain on the wall face and several abandoned steam pipes of various diameters penetrate the wall above the western-most window bay.

The gable is capped the full length of the west raking slope and half of the east raking slope with flat brownstone units and brownstone gable returns.

The façade is divided into five bays; two western and two eastern window bays, and a center double-wide door bay. All window bays have heavy brownstone lintels. The two western window bays have been extended to a concrete threshold at grade, and the two eastern bays retain their brownstone sills with brownstone wall below the sill to grade. All window openings have been boarded up with plywood.

The center boarded-up door opening has a concrete lintel inserted below a shorter brownstone lintel. Asphaltic mastic residue in a gable-shape remains on the face of the brownstone wall above the doorway, suggesting a former roof over the doorway.

East Wall. Regularly spaced cut-off steel beam ends project from the brick-filled entablature from Bay 3 to Bay 27. White paint partially covers the brownstone and the brick frieze from bays 14 to 27.

EXTE1: Brownstone wall with abandoned anchors and holes. The brick-faced north wall extends beyond the east wall approximately 2’– 0”, rising from a half-height brownstone wall. Abandoned conduit remains on the wall surface. Window opening is boarded up. Brownstone sill with brownstone wall below sill to grade.
EXTE2: Brownstone wall with abandoned anchors. Window opening is boarded up. Brownstone sill and wall below sill is missing. A brownstone sill at grade remains.
EXTE3: Brownstone wall. Flat profile steel window sash at upper window with shimmed jambs. Lower sash is boarded over with plywood panel. Brownstone sill with brownstone wall below sill to grade.
EXTE4: Brownstone wall with anchor hole in architrave. Window is boarded over with plywood panel. Brownstone sill with recessed brick-filled panel below sill.
EXTE5: Brownstone wall with anchor hole in architrave. Window is boarded over with plywood panel. Brownstone sill with brownstone wall below sill to grade.

EXTE6: Brownstone wall. Window is boarded over with plywood panel. Brownstone sill with recessed brick-filled panel below sill.
EXTE7: Brownstone wall with decorative metal anchor in architrave. Boarded up opening extends from brownstone architrave to grade. Rubble wall filling is exposed at the lower jambs.
EXTE8: Brownstone wall with two areas of concrete patching. Window is boarded over with plywood panel. Brownstone sill with recessed brick-filled panel below sill.
EXTE9: Brownstone wall with anchor hole in architrave. Boarded up single door opening with dressed-edge brownstone jambs and lintel. Concrete threshold.
EXTE10: Brownstone wall with anchor hole in architrave. Window is boarded over with plywood panel. Brownstone sill with recessed brick-filled panel below sill.
EXTE11: Brownstone wall with anchor hole in architrave. Window is boarded over with plywood panel. Brownstone sill with brownstone wall below sill to grade.
EXTE12: Brownstone wall with anchor hole in architrave. Upper window opening is boarded up. Lower door opening with concrete threshold is boarded up. Metal exit sign above door head.
EXTE13: Brownstone wall with two large holes and one area of concrete patching. Window is boarded over with plywood panel. Brownstone sill with brownstone wall below sill to grade. Anchor hole in architrave.
EXTE14: Brownstone wall with two areas of concrete patching. Window is boarded over with plywood panel. Brownstone sill with recessed brick-filled panel below sill. Anchor hole in architrave.
EXTE15: Brownstone wall with several abandoned anchors. Wood window frame with upper 16-light wood sash. Lower sash is obscured. Brownstone sill with brownstone wall below sill to grade.
EXTE16: Brownstone wall with anchor hole in architrave. Wood window frame with upper 16-light wood sash. Lower sash is obscured. Brownstone sill with recessed brick-filled panel below sill.
EXTE17: Brownstone wall. Wood window frame with boarded up sashes. Brownstone sill with brownstone wall below sill to grade.
EXTE18: Brownstone wall with anchor hole in architrave. Wood window frame with upper 16-light wood sash with sash cord exposed. Lower sash is obscured. Brownstone sill with recessed brick-filled panel below sill.
EXTE19: Brownstone wall with several anchors. Brownstone lintel over doorway with a steel plate lintel inserted below. A horizontal wood ledger is anchored to the face of the stone at the height of the door head and extending south to the next window bay. The south jamb of the doorway has a dressed edging. There is a metal exit sign above the lintel.
EXTE20: Brownstone wall. Window is completely obscured. Brownstone sill with recessed brick-filled panel below sill.
EXTE21: Brownstone wall. Wood window frame with boarded up sashes. Brownstone sill with brownstone wall below sill to grade.
EXTE22: Brownstone wall with anchor hole in architrave. Wood window frame with sashes boarded over. Brownstone sill with recessed brick-filled panel below sill.
EXTE23: Brownstone wall with wood nailer anchored to stone face and decorative metal anchor in architrave. Wood window frame with boarded up sashes. Brownstone sill with brownstone wall below sill to grade.

EXTE24: Brownstone wall. Wood window frame with sashes boarded over. A horizontal steel angle spans across the window at mid-height anchored to stone face at each end. Brownstone sill with recessed brick-filled panel below sill.
EXTE25: Brownstone wall with abandoned anchors. Wood window frame with boarded up sashes. Brownstone sill with brownstone wall below sill to grade. Wood nailer attached to frieze.
EXTE26: Brownstone wall with two wood nailers anchored to stone face and decorative metal anchor in architrave. Window is fully obscured. A metal pipe penetrates the cover. Brownstone sill with recessed brick-filled panel below sill.
EXTE27: Brownstone wall with several anchor holes and two decorative metal anchors in architrave. Wood window frame with boarded up sashes. Brownstone sill with brownstone wall below sill to grade.

North Wall. The solid masonry north wall is faced with a veneer of running bond brick, stepping back twice as it rises to the gable point. A precast concrete band with a clipped angled face runs the full width of the façade at each point that the façade steps back. The gable is capped the full length of each raking slope with flat precast concrete units. A full-height projecting brick pier with a concrete band and concrete cap is located at the northwest corner of the building. A double-light pole is attached to the face of the projecting pier.

A central door opening has a steel and concrete lintel and a recessed single door set into CMU and brick infill. The east jamb is concrete and the west jamb is brownstone. A double-wide door to the west has a steel lintel and brick jambs.

Above the west door opening is a horizontal steel ledger spanning the width of the door opening to which is attached steel support framing for several large overhead steam pipes which run from Building 8, across the gap between the buildings, and into Building 10.

Roof, roof structures and roofing. A slate-covered gable roof covers the entire building in a single plane on each side of the slate-capped ridge. See figures 78 and 80. Primarily a faded brown slate, some areas of lighter gray slate appear at scattered locations. The north end of the west gable is entirely roofed with lighter-colored slate. Some areas of slate are missing, exposing the wood board roof sheathing.

The north end wall extends above the roof as a parapet wall. Stepped metal flashing is installed at the roof-to-wall juncture, except at the northeast slope where the rising brick parapet has been parged. Remains of a rail-type snow guard and one pipe penetration are also located on the lower northeast slope.

The south end wall extends slightly above the roof with sheet metal tile used as flashing along the roof-to-wall juncture. Areas of slate are missing from the lower southeast slope, exposing the original brownstone gutter. The lower section of stone cap at the south gable end wall is missing, exposing the solid brownstone end wall.

Regularly spaced five-light flat metal skylights are located on low flashed curbs on opposing roof slopes, six skylights per roof slope, their locations offset from one slope to the other. Two metal gravity ventilators are located near the southern end of the ridge.

Building 10 – Interior

The interior of Building 10 is a single open space with exposed ashlar brownstone walls with areas of complete reconstruction in brick and open timber trusses. The trusses bear on the brownstone cornice units at each bay. Five skylights are evenly spaced on each roof slope. Most of the walls were accessible at the time of documentation but a few were concealed behind materials stored in the building. A few different painting campaigns are evident.

Except for areas of brick construction noted, a brownstone architrave runs along the west and east walls at the window heads and a brownstone cornice above it at the truss ends. Four rafters run between each truss. The space between the trusses is filled with a running bond brick frieze that also captures the rafters. Several brownstone units in the architrave protrude into the interior in 'as cut' condition. They were not trimmed flush with the wall when they were originally set.

West Wall.

INTW1: Brownstone wall with brick infill at window opening. Two pipe penetrations at upper wall.
INTW2: Brownstone wall with abandoned anchors. Brick infill at window opening extends to floor.
INTW3: Brownstone wall with minor areas of brick infill and abandoned anchors. Two short vertical wood nailers are anchored to the stone face at the upper wall. Brick infill at window opening.
INTW4: Brownstone wall, lower wall obscured. Brick infill at window opening extends to floor, stepping back at a steel lintel. One abandoned anchor.
INTW5: Brownstone wall with significant brick infill. A short horizontal wood ledger is anchored to the stone at the upper wall. Brick infill at window opening.
INTW6: Brownstone wall with abandoned anchors and holes. A short, horizontal wood ledger is anchored to the stone at the upper wall. Brick infill at window opening extends to floor with one pipe penetration at upper wall.
INTW7: Transition to brick wall with corbelling at upper wall to receive projecting brownstone and brick entablature. Profiled steel window sash partially obscured with concrete lintel in recessed brick bay. Vertical wood board rising from floor anchored to brick face.
INTW8: Brick wall; profiled steel window with two sashes (8/8 configuration) with concrete lintel in recessed brick bay. Top sash has pivot hardware and handle, lower sash is fixed. Vertical wood board rising from floor anchored to brick face.
INTW9: Brick wall; profiled steel window with 8-light upper sash, concrete lintel in recessed brick bay. Lower sash is obscured. Vertical wood board rising from floor anchored to brick face.
INTW10: Brick wall; profiled steel window with 8-light upper sash, concrete lintel and concrete sill in recessed brick bay. Upper sash has pivot hardware and handle. Lower sash is obscured. Vertical wood board rising from floor anchored to brick face.
INTW11: Brick construction transitions back to typical brownstone construction. Upper window opening has brick infill above boarded over, double-wide doorway with steel lintel.
INTW12: Brownstone wall with significant brick infill and several anchors and anchor holes. CMU infill at window extends to floor.
INTW13: Brownstone wall with areas of brick infill. CMU infill at window with brownstone sill and brownstone below sill to floor.

INTW14: Brownstone wall with lower wall obscured. CMU infill at window with brick rowlock sill and running bond brick to floor.
INTW15: Brownstone wall with small wood ledger anchored to wall and lower wall obscured. CMU infill at window with brick sill and brownstone to floor.
INTW16: Brownstone wall with several anchor holes. CMU infill at window with brick rowlock sill and running bond brick to floor.
INTW17: Brownstone wall with several anchor holes. CMU infill at window with brownstone sill and brownstone to floor.
INTW18: Brownstone wall. CMU infill at upper window. Steel lintel and doorway inserted below.
INTW19: Brownstone wall cut away for doorway and lintel in Bay 18. CMU infill at window with brownstone sill and brownstone to floor.
INTW20: Brownstone wall, lower portion obscured. CMU infill at window. Lower wall obscured.
INTW21: Brownstone wall with areas of brick infill. CMU infill at window with brownstone sill and brownstone to floor.
INTW22: Brownstone wall. CMU infill at door opening extending to floor. Brownstone door jambs have dressed edging.
INTW23: Brownstone wall, lower portion obscured. CMU infill at window. Lower wall obscured.
INTW24: Brownstone wall. CMU infill at window with brick header sill and running bond brick to floor. A pipe penetrates the wall near the floor.
INTW25: Brownstone wall with areas of brick infill; profiled steel window with three sashes (8/8/8 configuration), with the top and bottom sash on pivots and middle sash fixed. CMU infill on outer face of window.
INTW26: Brownstone wall with 10-feet-tall CMU partition walls extending out, creating a small electrical panel room in the corner of the space. Partition has doorway with metal door frame. Exterior window opening has CMU infill at the upper sash and a door to the exterior inserted below.
INTW27: The interior face of the brownstone walls is partially obscured by the abandoned electrical panels. The brownstone wall has significant areas of brick infill. A window opening behind the electrical panels has been infilled with CMU and the window jambs are edged with brick. The window sill is parged and below the sill is a brownstone wall.

South Wall. The brownstone south wall rises unobstructed from the floor to the gable point, stepping back at the horizontal brownstone architrave. An overhead-coiling garage door has been cut into the brownstone. The door is somewhat centrally located below the gable point with two windows on the east side of the door and two window openings on the west side of the garage door. The west window opening nearest the door has been partially eradicated by the insertion of the garage door.

The windows on the east side of the door are double-hung wood with brownstone sills and brownstone to the floor. The outermost east window has a 16-light lower sash and missing upper sash. The east window nearest the door has 16-over-16 light sash. The windows on the west side of the door are boarded up at the upper sash and a door has been inserted at each window location. Both doors are currently boarded up. The CMU-partition electrical panel room covers the outermost west window opening.

Three large heavy timber ledgers are anchors horizontally on the brownstone wall above the architrave; a short one is located over the door and two longer ones are located over each pair of window openings. The timber ledgers carry north/south truss bracing. Scaffolding has been erected to provide additional support to the north/south truss bracing.

East Wall.

INTE1: Brownstone wall; flat profile steel window with three sashes (9/3/6 configuration), with the three-light sash operable by a hopper hinge opening inward. The window opening has been shimmed with brick. A pipe rises from the floor and runs vertically along the south window jamb. Brownstone sill with brownstone to floor.

INTE2: Brownstone wall; flat profile steel window with three sashes (9/3/6 configuration), with the three-light sash operable by a hopper hinge opening inward. The window opening has been shimmed with brick. The sill and wall bellow the sill is missing and open to the exterior.

INTE3: Brownstone wall with minor brick infill; flat profile steel window with three sashes (9/3/6 configuration). The window opening has been shimmed with brick. A pipe rises from the floor and runs vertically along the south window jamb. Brownstone sill with brownstone to floor.

INTE4: Brownstone wall with one abandoned anchor; double-hung wood window (16/16 configuration) with lower sash boarded up and with several muntins and glass missing. Running bond brick sill and wall below.

INTE5: Brownstone wall with areas of brick infill and one flue opening halfway up wall; double-hung wood window (16/16 configuration) with some muntins and glass missing. The sill is obscured; brownstone to floor.

INTE6: Brownstone wall with lower portion obscured; short horizontal wood ledger anchored to upper brownstone wall. Double-hung wood window (16/16 configuration) with some muntins and glass missing. The sill and wall below is obscured.

INTE7: Brownstone wall with areas of brick infill; boarded up opening spans from architrave to floor.

INTE8: Brownstone wall with several anchor holes; double-hung wood window (16/16 configuration) with some muntins and glass missing. Running bond brick sill and wall below.

INTE9: Brownstone wall with single width, boarded up doorway. Brownstone lintel and jambs. Three abandoned anchors and a few anchor holes.

INTE10: Brownstone wall; double-hung wood window (16/16 configuration) with several muntins and glass missing. Brick header course sill and running bond wall below.

INTE11: Brownstone wall with areas of brick infill; double-hung wood window (16/16 configuration) with several muntins and glass missing. Brownstone sill and brownstone to floor. Abandoned sprinkler pipe rises vertically full-height from floor at face of wall.

INTE12: Brownstone wall with several anchor holes; upper 16-light wood window sash remains with boarded up door opening below.

INTE13: Brownstone wall with areas of brick infill and several abandoned anchors and anchor holes; window sash are missing but wood jambs remain with extant sash pulley hardware. Brownstone sill. Wall below is obscured.

INTE14: Brownstone wall with several abandoned anchors; upper window sash is missing but wood jamb remains with extant sash pulley hardware. Lower sash is boarded up. Two brick header courses at the sill and running bond brick to floor.

INTE15: Brownstone wall with areas of brick infill and several abandoned anchors and anchor holes; double-hung wood window (16/16 configuration) with some muntins and glass missing. Brownstone sill. Brownstone to floor.
INTE16: Brownstone wall with several abandoned anchors; double-hung wood window (16/16 configuration) with some muntins and glass missing. Two brick header courses at the sill and running bond brick to floor.
INTE17: Brownstone wall with areas two abandoned anchors; double-hung wood window (16/16 configuration) with some muntins and glass missing. Brownstone sill. Brownstone to floor.
INTE18: Brownstone wall with several abandoned anchors; double-hung wood window (16/16 configuration). One brick rowlock course at the sill with one header course below the sill and running bond brick to floor.
INTE19: Brownstone wall with several anchor holes and one duplex outlet without conduit; boarded up door opening with a steel lintel inserted between the door head and a brownstone lintel. Minor brick infill at lower north jamb.
INTE20: Brownstone wall; boarded up window opening with some areas of wood window frame exposed. Brick rowlock sill with running bond brick to floor.
INTE21: Brownstone wall with areas of brick infill; boarded up window opening with some areas of wood window frame exposed. Brownstone sill. Brownstone to floor.
INTE22: Brownstone wall with two abandoned anchors; boarded up window opening with some areas of wood window frame exposed. Unknown masonry sill material with running bond brick to floor.
INTE23: Brownstone wall with areas of brick infill and one flue opening halfway up wall; boarded up window opening with some areas of wood window frame exposed. Brownstone sill. Brownstone to floor. A circular area of brick infill is located within the upper brick frieze.
INTE24: Brownstone wall with heavy paint obscuring detail; boarded up window opening with some areas of wood window frame exposed. Brick running bond sill with running bond brick to the floor.
INTE25: Brownstone wall with areas of brick infill and heavy paint obscuring detail; 16-light upper wood sash with boarded up lower sash. Brownstone sill. Brownstone to floor.
INTE26: Brownstone wall with heavy paint obscuring detail; boarded up window opening with some areas of wood window frame exposed. Brick header sill with running bond brick to floor.
INTE27: Brownstone wall with areas of brick infill; 16-light upper wood sash with boarded up lower sash. Brownstone sill. Brownstone to floor.

North Wall. The brownstone north wall rises unobstructed from the floor to the gable point. The original four window openings are apparent in the upper portion of the wall, just below the horizontal brownstone architrave. All window openings have been infilled with brick.

A double-wide doorway with steel lintel has been inserted across the width of the two western window openings, eradicating the lower portions of the window openings. Temporary plywood doors with hasp locks are installed in the opening. A large vertical wood brace is anchored to the brownstone over the doors.

A double-wide doorway with steel lintel has been inserted into the brownstone wall at the center of the wall. A single steel door with wired glass and automatic closer is located within the wider doorway set in CMU infill.

The easternmost window opening has a brownstone sill and brownstone to floor.

Three circular areas of brick infill are regularly spaced in the brownstone wall above the brownstone architrave. Heavy timber horizontal bracing is anchored to the lower portion of the brownstone gable end. Several steam pipes penetrate the brownstone wall at the west side of the gable end.

Floor. The floor is concrete. The concrete is poured in discreet sections. Stored materials cover much of the surface. Towards the north end there are depressions and ridges in limited areas, but overall the floor surface is reasonably plane.

Interior Roof Structure. Open trusses are located, one per bay, across the full width of the building, with the bottom chords resting on brownstone cornice units at each bay. They are constructed of solid timber with plywood and steel repairs. The trusses are connected by two purlins on each roof slope supporting wood rafters that in turn carry roofing boards. Several abandoned utility elements run within the open truss structure, including steam piping that runs north-south the entire length of the west side of the building. In several locations wood boards are attached to the underside of the bottom chord, running from truss to truss.

CURRENT CONDITION OF THE FABRIC

The National Park Service has indicated that they do not expect a separate, comprehensive survey of existing conditions in this report. Notable conditions have been captured at many points in the text and the accompanying photographs above. The structural condition of both buildings has been recorded and analyzed, together with recommendations for stabilization in a separate report.[96]

CHARACTER-DEFINING FEATURES

INTRODUCTION

As stated in the NPS Preservation Brief 17, 'character refers to all those visual aspects and physical features of a building that comprise the appearance of every historic building,' and 'character-defining elements include the overall shape of the building, its materials, craftsmanship, decorative details, interior space and features, as well as the various aspects of its site and environment.'[97] Identifying the character-defining features of a historic property is critical to realizing two goals highlighted in the Secretary of the Interior's Standards for the Treatment of Historic Properties, namely, the preservation of historic materials and the preservation of a building's distinguishing character. If character-defining features are not clearly identified, any treatment of a property risks damaging essential elements of its character in the process of change.

The brief suggests a three-step process for selecting character-defining elements. First, identification of overall visual aspects, such as the general aspects of its setting, the shape of the building, its roof and roof features which can be prominent, projections, voids, window and door openings, trim and lastly, the materials of the envelope. Second, description of materials, craftsmanship and craft details as they emerge on reexamination of the building at arm's length. Finally, identification of the visual character of the interior spaces, features and finishes, including, where appropriate, the character that emerges from movement through the space.

This approach was largely followed in the current study. The openness of the site and the interiors facilitated the observation and description of the form of the buildings, exterior envelope materials, and the overall visual character of the interiors. Arm's length observation of interior details was somewhat curtailed by large quantities of haphazardly stored materials and lack of light. On the other hand, probes and observation from high ladders, executed during the structural survey, revealed significant hidden historic construction details that might have been overlooked in a typical 'arm's length' survey.

The brief also emphasizes that 'there are many other facets of a historic building besides its functional type, its materials or construction or style,' for instance a sense of time and place or an association with events or people. It goes on to say that a complete understanding would include knowledge of the original builder, the occupants and the evolutionary history of the building, and it implies even more. Indeed, in arguing in 2008 for the nomination for Colt's factory as a contributing part of a historic district and national historic landmark (NHL), the National Park Service placed stronger emphasis on the place of the factory in the evolution of armament manufacture and American business practices than on the architectural character of the factory buildings.

It is important to summarize these prior judgements since they inevitably influence one's perception of the architecture of Buildings 8 and 10, and hence in part the choice of character-defining features.

The nomination asserted that the national significance of the Coltsville Historic District should be based upon two NHL criteria; first, "that the district is associated with events that have made a significant contribution to, and are identified with, or that outstandingly represents, the broad national patterns of United States History and from which an understanding and appreciation of those patterns may be gained," and second, "that the Coltsville Historic District is composed of integral parts of the environment…[that] collectively compose an entity of exceptional historic or artistic significance, or outstandingly commemorate or illustrate a way of life or culture."[98]

It also argued that the District had national significance related to two major themes and several sub-themes from the NHL Thematic Framework. First, under Theme V, "Developing the American Economy: production, distribution and consumption," it had such significance because: a) the Colt Fire Arms Company, under Samuel and Elizabeth Colt and their successors, played a pivotal role in advancing American manufacturing, b) Coltsville was representative of late 19th and early 20th century American industrial districts, and c) Colt weapons became a well-marketed consumer product. Second, under Theme VI, "Expanding Science and Technology: technological applications," it had such significance because the Company invented and used technologically advanced machinery critical to the precision manufacturing process not only for weaponry but also for many other new machine goods in the second half of the 19th century. The nomination also relied on a sub-theme for Theme V, "Developing the American Economy: workers and work culture" that would be relevant not only to Coltsville, but to the factory itself.

The nomination also stated that the buildings that remained from the period of significance retained "a high degree of integrity of location, design, setting, materials, workmanship, feeling and association," and mentioned the brownstone of the forge shop and iron foundry in this context.[99] Later, when describing existing features of the contributing buildings in the NHL District, it noted the slate roofs, roof features such as skylights and ventilators, the brownstone, the exposed wood trusses that support them, and the open and unobstructed interiors of Building 8 and 10.[100] Clearly, this section of the nomination sets the direction for the identification of the character-defining features of these two buildings. As Brief 17 argues, 'Even though buildings may be of historic, rather than of architectural, significance, it is their tangible elements that embody… significance for association with specific events or persons and it is those tangible elements both on the exterior and interior that should be preserved.'[101]

Character-defining elements for a landmark site cannot however be identified in isolation from a stated period of significance for the site, nor without confidence in the place of each element as part of the original construction or its date in later evolution of the building. Elements that date from beyond the period of significance are not regarded as character defining.

PERIOD OF SIGNIFICANCE

The 2008 nomination proposed that the period of significance for Coltsville as a whole should run from 1855, the year the first factory buildings were erected, until 1945, when World War II ended and the Colt Fire Arms Company began to withdraw from the site. It argued that the period of significance should extend into the 20th century because "Not only did the Colt Fire Arms Company itself produce hundreds of thousands of sidearms and machine guns vital to both war efforts, but the machine tool-based industrial sector that grew out of the firearms industry was instrumental in enabling the United States to achieve exceptional levels of material production."[102]

There is good reason to accept the period of significance of 1855 to 1945 proffered by the NPS for the NHL District as a whole, and to apply it to Buildings 8 and 10. The two buildings embody both the first period of construction and the continued use of both buildings for purposes related to the manufacture of arms until at least 1938, first as foundries and forges, later as workshops for polishing, blacksmithing, woodworking and tin smithery.

However, one can also argue that for these two buildings there is special significance in the first decade of their existence, or possibly the first three decades.

This dual significance results from contrasting aspects of their original design. On the one hand, the design was highly original, specially tailored to support the operations of mechanized forges designed by Elisha Root in Building 8 and the operations of multiple annealing and smelting devices designed by Samuel Colt in Building 10. On the other, their design incorporated simple, open, column-free space, well prepared to accept new functions when demand and production techniques changed.

As we have argued, it is very possible that the forging moved out of Building 8 in 1861 when the factory was first extended to the west (see Fig. 2). The new single-story building to the west appeared, from its array of chimneys, to be planned for rows of hearths exhausted straight to the sky. It could have supplemented or even replaced the forging operations in Building 8. Certainly, forging had moved out by 1885, when Building 8 was labeled “iron foundry” in the atlas of that date, which placed the forging operations in the 1861 west wing (Fig. 31).

In Building 10, only the brass foundry remained from the original operations in 1885 and was confined to the south end. Annealing had moved into a building in the southeast courtyard and had been replaced by polishing operations (Fig. 31). It may have moved earlier; the outline of an identically shaped building in the southeast courtyard had already been recorded, unlabeled, in 1869 (Fig. 29). Another survey which could date from soon after 1885 (when another survey first showed the outline of the cupola at the center of the west elevation of Building 8) registered nothing but ‘polishing’ in Building 10 (Fig. 32). The 1909 survey showed the south end as a brass foundry once more, but by 1919, the entire building was given over to sheet metal work.

In considering a shorter early period of significance for these two buildings, one should also bear in mind that Samuel Colt and Elisha Root, the minds behind their design, were both dead by 1865.

CHARACTER-DEFINING FEATURES

In light of the groundwork laid by the 2008 National Historic Landmark nomination, establishing the period of significance and detailing a variety of criteria for the national significance of the Coltsville Historic District, we propose the following as character-defining features of Buildings 8 and 10. Since little has changed in both buildings, many existing features can represent either the 90-year period of significance put forward in the nomination or the shorter period of special significance proposed here, except as noted below. The numbered sections divide the character-defining features by related groups; the letters spell out individual character-defining elements. Features marked with an asterisk (*) would not be character-defining features if the period of significance for Buildings 8 and 10 was restricted to the shorter period in which they were used as built for forging and foundry operations. References are given to relevant illustrations for each suggested feature; using the list of figures, these references will guide the reader to relevant text. The figures cited are intended to provide examples of features, not a complete inventory of all instances of common features. Locations of most noted components can be verified in the Detailed Descriptions section.

Overall Visual Aspects

1) Placement and site

a) Buildings 8 and 10 with the East Armory, as indicators of the original H plan. (Fig. 58)
b) Buildings 8 and 10 as original western perimeter of factory complex. (Appendix D, plate 8)
c) The open area between Building 10 and East Armory that represents the original south courtyard. (Fig. 2; Appendix D, plate 8)
d) Open areas to west of both buildings locate the courtyards formed by major 1861 expansion. (Fig. 58)
e) Proximity to workers' housing which still remains. (Fig. 33)
f) Proximity to Connecticut River and the railway that formed the backbone of the 19th century Connecticut valley industrial development from Springfield to the coast. (Appendix C; Fig. AD-2)
g) Flatness and low elevation of site that recall the original undeveloped flood-prone meadows and Colt's acumen as an entrepreneur and developer. (Appendix A, plate 1; Fig. 43)

2) Form, massing

a) Two simple, long, identical rectangular enclosures with the same moderately sloped gable roofs with no significant projections or voids in the masonry. (Fig. 58)
b) End-to-end length precisely matching that of the East Armory (both as original and as rebuilt) forming the two uprights of the H plan. (Appendix D, plate 8)
c) Single story height, contrasting with multistory height of the East Armory and the extant, later additions of the north and south armories. (Fig. 58)
d) Apart from roof structures (see 4c and d below), symmetry of the two original buildings around the east-west axis that passed through the spine that once connected them. (Appendix D, plate 8)
e) Symmetry of the overall building forms around the long north-south axis running down their ridge lines. (Appendix C, plate 7)

3) Openings

a) Regular pier/opening bay design the full length of both east and west elevations. (Appendix F: Figs. 62a, 63, 64, 65)
b) Fenestration of window bays running from waist height to the full height of the piers. (Fig. 62a)
c) All remnants of two symmetrically-arranged original punched window openings of the same height on either side of central doorways in the north and south plane masonry façades of both buildings. (Figs. 1, 67, 68a, 69)

4) Roofs and roof structures

a) Two simple, long, identical rectangular enclosures with the same moderately sloped gable roofs with no significant projections or voids in the masonry. (Fig. 58)
b) End-to-end length precisely matching that of the East Armory (both as original and as rebuilt) forming the two uprights of the H plan. (Appendix D, plate 8)
c) Single story height, contrasting with multistory height of the East Armory and the extant, later additions of the north and south armories. (Fig. 58)
d) Apart from roof structures (see 4c and d below), symmetry of the two original buildings around the east-west axis that passed through the spine that once connected them. (Appendix D, plate 8)
e) Symmetry of the overall building forms around the long north-south axis running down their ridge lines. (Appendix C, plate 7)

5) Major features of the masonry envelope

a) Brownstone piers (Fig. 62a)
b) Brick alternating with brownstone as fill below window sills at east and west elevations. (Figs. 37, 42b, 62a, 63)
c) Continuous brownstone architrave and brownstone cornice at the east and west elevations. (Figs. 42b, 62a, 63, 64)
d) Brick frieze with pilasters. (Figs. 2, 3, 65)
e) Brick frieze elsewhere.* (Figs. 42b, 62a, 63, 64)

Exterior Visual Character at Close Range

1) Materials

a) Masonry

i) Portland Connecticut brownstone at piers, end walls, architraves, cornices, and window sills and heads. (Figs. 42b, 62a, 63, 64, 67, 68a)
ii) Orange-red face brick below alternate window openings of east and west facades and in frieze of entablature. (Figs. 62a, 63. See also section “Detailed Descriptions.”)
iii) Original lime mortar with coarse sharp aggregate struck flush with arris. (Note: much has been repointed, at unknown dates, in a variety of mortars.) (Fig. 62b)
iv) Stone gable end caps at north end of Building 8 and south end of Building 10. (Figs. 2, 53, 54)
v) Two symmetrically placed doorway locations in two bays in each east façade creating an 8-9-8 subdivision in the window bays of the east elevations. (Appendix A, plate 3)

b) Slate

i) Variegated but predominantly gray and semi-fading textural slate roofing. (Figs. 63, 64, 65)

c) Metals

i) Flat metal window frames and sash painted black with ribbed glass divided lights.* (Fig. 51a; see also section "Detailed Descriptions.")

ii) Profiled metal shaped window frames and sash painted black, with wired glass divided lights.* (Fig. 51b; see also section "Detailed Descriptions.")

iii) Vertical metal grilles over window openings, north elevation, Building 8. (Figs. 2, 7a, 7b)

iv) Stub ends of beams in east frieze of Building 10.* (Figs. 44, 63)

d) Wood

i) Wood window frames, sash, flat brick mold and casing with corner bead with clear glass divided lights (Building 10 only). (Fig. 50b; see also section "Detailed Descriptions.")

e) Concrete

i) Reinforced concrete at steam tunnel, east elevation of Building 8.* (Figs. 49a, 49b, 61, 64)

2) Details

a) Perimeter masonry

i) Brownstone

(1) Rock faced semi-coursed brownstone in piers and walls. (Figs. 7b, 62a, 62b, 63, 64, 65, 67, 68a)

(2) Full depth smooth brownstone returns at doorway openings. (Fig. 5)

(3) Tall vertical brownstone units at door jambs, alternating with longer horizontal units, both with rock face and chiseled surround. (Fig. 5)

(4) Rock-faced brownstone lintels at window openings of north face and south face of Building 10. (Figs. 67, 68a)

(5) Smooth-finish brownstone window sills with projecting noses over brick panels, flush elsewhere. (Fig. 62a)

(6) Brownstone gable end returns at north elevation of Building 8 and south elevation of Building 10. (Figs. 67, 68a)

(7) Brownstone end stops to friezes at north end of Building 8 and south end of Building 10. (Fig. 38a, 49b, 37 (hidden behind tree)

(8) Openings for downspouts in the underside of the cornice units. (Figs 12a, 12b)

(9) Brownstone remnants of arched entries to the original passageway through the spine at the south end of Building 8 and north end of Building 10, east elevations. (Figs. 9a, 9b)

ii) Brickwork and blockwork

(1) Brickwork in stretcher bond below windows, long elevations of both buildings. (Fig. 10b)

(2) Plane stretcher bond brickwork at friezes of entablature, long elevations of both buildings.* (Fig. 49a, 49b, 52c bay 12 and south, 62a, 63)

(3) Brick pilasters within the frieze, west elevation of Building 10 only. (Fig. 65)

(4) Brick infill at window openings at boiler house addition, Building 10. (Fig. 6)

(5) Concrete block infill at bays 12-24, 25, 27, east elevation of Building 10.* (Figs. 37, 42b)

(6) Remnant of brick wall of boiler house addition, bay 6-7, west elevation of Building 10. (Fig. 65)

b) Roofing

i) Extension of slate roofing over original built-in carved brownstone gutters. (Figs. 3, 11, 63, 64, 65)

ii) Remnant metal flashing from original slate eave to stone gutters. (Fig. 11)

iii) Upside-down V-shaped metal ridge caps. (Figs. 3, 52a, 52b, 53)

c) Roof structures

i) Flat rectangular raised steel skylights with five vertical panels of translucent glazing and copper counterflashing. Six per gable, offset from one gable to the other, just above mid-point of each slope, Building 10 only.* (Figs. 52b, 52c, 77)

ii) Two metal ventilators at ridge line of Building 10.* (Figs. 2, 52b)

iii) Gabled wood framed and trimmed monitor with eight panels of 3 over 3 divided lights and projecting slate-covered eaves and gable ends straddling ridge at the mid-point of Building 8.* (Fig. 52a, 76)

d) Windows

i) Projecting window sills and recessed brick panels below in relation to piers. (Figs. 10b, 62a)

ii) Window heads projecting flush with architrave units of piers. (Fig. 62a)

iii) Horizontal-pivot middle section in otherwise fixed metal windows.* (Fig. 49b, 62a)

iv) Double-hung sash in wood windows, with flat brick-mold. (Fig. 50b)

v) Regular pattern of divided lights, 12 over 8 over 4, in metal windows.* (Figs. 49b, 62a)

vi) Regular pattern of divided lights, 16 over16, in wood windows. (Fig. 49b, 62a)

e) Steam tunnel

i) Raised and below grade concrete steam tunnel, full length of east elevation of Building 8.* (Figs. 49a, 49b, 61)

3) Craft details

a) Bush hammered semi-bullnose treatment of architrave and cornice units and gable end returns. (Figs. 12a, 49b)

b) Chiseled edges of all stone units around window and original door openings and outside corners at north end of Building 8 and south end of Building 10 (and occasionally in the masonry fields). (Figs. 4, 5, 9b, 38a)

c) Bush-hammered flush brownstone heads at door openings. (Fig. 5)

Interior spaces, finishes and details

1) Sequence and general character of spaces

a) Clear open space throughout northern 85% of Building 8, from floor to underside of roof deck, including the trusses, purlins and rafters. (Appendix D, plate 8)

b) Similar clear open space near center of Building 10, approximately 55% of total area. (Appendix D, plate 8)

c) Any traces on perimeter walls of partitions shown on 1855 plan. (Appendix D, plate 8)

d) Ground floor plane virtually level with surrounding grade, both buildings. (Figs. 56, 60, 65)

2) Materials

a) Masonry

i) Brownstone piers, wainscot, and stone courses at top and bottom of brick duct over window heads. (Figs. 18, 22, 60)

ii) Brick panels below window openings. (Fig. 18)
iii) Brick cornice above window heads and piers. (Figs. 60, 71)
iv) Brick infill between truss ends. (Fig. 71)
v) Original window openings and their brick fill, south end of Buildings 8, north and south ends of Building 10 (Figs. 10a, 59)

b) Heavy timber construction

i) Trusses, purlins, rafters and roofing boards. (Figs. 71, 76, 77)

3) Openings

a) Windows (see exterior sections 1c & d, and 2d above for window descriptions)

i) Original brownstone window openings, all elevations. (Fig. 60) (See Detailed Descriptions)
ii) Flat painted wood casing trim at wood windows. (Figs. 18, 50b)

4) Building systems

a) Heating

i) Steam piping in steam tunnel, south wall of Building 8, in roofing structure of Building 10.* (Figs. 60, 77, 78)

b) Fire Protection

i) Standpipe locations near center of east perimeter wall, both buildings. (Fig. 18)
ii) Remnants of sprinkler piping in both buildings (unless further research can show heads are of very early design).* (Fig. 77)

5) Details

a) Perimeter masonry

i) Rock face projection of brownstone window heads. (Figs 18, 20, 59, 60)
ii) All brick/incomplete patches at openings in alternate brownstone piers. (Figs. 18, 22, 74)
iii) All concealed vertical unlined masonry flues in alternating piers, from below grade to the window heads, including intermediate masonry stops. (Figs. 16, 23, 27b, 73)
iv) All concealed horizontal ducts running over the window heads in east and west elevations, including openings to the vertical stacks, and any continuation of such ducts in the south wall of Building 8 and the north wall of Building 10. (Fig. 12b, 21)
v) Stretcher bond brickwork panels, flush with brownstone piers, below windows. (Fig. 18)

b) Roof structure

i) Queen post heavy timber truss design. (Figs. 59, 60, 77)
ii) Wrought iron central tie rods, shoes and bolts, and cast-iron end seats of trusses. (Figs. 19, 60, 72, 77)
iii) Remnant patterned holes in underside of truss bottom chords (from anchorages for steam power shafts and drop forging equipment). (Fig. 25)

c) Window openings

i) Smooth brownstone sills. (Fig. 18)
ii) Cement fillet fill at jambs of metal windows.* (See Detailed Descriptions for locations)
iii) Additional brickwork at sills of metal windows.* (See Detailed Descriptions for locations)

END NOTES

[1] National Park Service, 1977. Item 8, p.2.
[2] www.colt.com/Company/History Colt's Manufacturing Company LLC, Copyright 2017, accessed 1.27.2017.
[3] The details of John and Samuel Colt's Paterson factories are from National Park Service, HAER No. NJ-17
[4] HAER No. NJ-17, p.21 includes this note on early luminaries of the industrial development of Paterson: "Peter Colt - Colt, earlier Treasurer of the State of Connecticut, was made Superintendent of all of the Society's operations in 1793. He adopted L'Enfant's somewhat grandiose European-style plans to the American engineering conditions and standards of that time and completed the first raceway." It adds, p.22, that Peter Colt was the father of John Colt, and asserts that "the first and second floors of the Colt Gun Mill Factory remain today as part of the Allied Textile Printers complex.
[5] American Society of Civil Engineers/American Society of Mechanical Engineers, 1977. Fig.1
[6] HAER No. NJ-17
[7] William Hosley, 1996, p.42
[8] Samuel Colt, *Diary, April 1836 - April 1837*, quoted in Hosley, 1996, pp. 42-43.
[9] Location of factory, Robert Carlson, New England Antique Arms Society, Quarterly Newsletter , Edition #48, September 2009.
[10] Trumbull, p.167, cited in HAER No. NJ-17
[11] HAER No. NJ-17
[12] Connecticut State Library, Collections, "Colt's Patent Fire Arms manufacturing Company." https://www.flickr.com/photos/ctarchives/collections/72157622690693521/. Accessed 2.13.2017. Apparently the Texas Rangers were spreading word of their successful use of Colt revolving firearms in the Mexican American War (1846-1848) and Indian Wars. See Connecticut History.org, "Workers at the Colt armory, 1867" (although the photo is labeled 1876) http://connecticuthistory.org/workers-at-the-colt-armory-hartford-1867/ , accessed 2.13.2017
[13] National Park Service, Coltsville Special Resource Study, Nov. 2009, p. 17.
See also C. C. Cooper, R. B. Gordon and H. V. Merrick "Archaeological Evidence of Metallurgical Innovation at the Eli Whitney Armory," Table 1, p.3. The Journal of the Society for Industrial Archaeology, Vol. 8, No. 1, 1992. Content downloaded from JSTOR, 1.10., 2017.
[14] Texas Ranger Hall of Fame and Museum, "The Colt Revolver" in Ranger History in Brief, Part 1, Mike Cox with updates from the Texas Ranger Hall of Fame and Museum staff. http://www.texasranger.org/history/BriefHistory1.htm, accessed 2.13.2017. See also "The Colt Patent Fire-Arms Manufacturing Company" at http://connecticuthistory.org/the-colt-patent-fire-arms-manufacturing-company/, accessed 21.3.201.
[15] Hosley, op. cit., p. 107
[16] The Hartford Courant, quoted in Hosley, 1996, p. 26.
[17] Hosley, op. cit., p. 238 (note 40).
[18] ibid, op. cit., p. 61 and p. 238 (note 17).
[19] Tucker, p.83.
[20] ibid. p. 108. National Park Service, 2009, p. 11.
[21] Hosley. p.106.
[22] ibid. p. 107.
[23] ibid, p 238, note 42
[24] ibid, p.108.
[25] ibid. p. 107.
[26] ibid. p. 107.
National Park Service, 2009, p. 21.
[27] Hosley, p.
[28] Ibid., p.238, note 30.
[29] ibid, p.108.
[30] The National Park Service, p.18.
[31] Louis F. Gorr, p.58. Accessed through jstor.org, 10.1.2017.
See also Steven A. Walton, p. 11. Accessed through jstor.org, 1.10., 2017.
[32] National Park Service, 2009, p. 19.

[33] Hosley, op. cit., p. 42.
[34] National Park Service, 2009, p. 19.
[35] Hosley, op. cit., p. 63.
[36] Cooper, Gordon & Merrick, "Archeological Evidence of Metallurgical Innovation at the Eli Whitney Armory," p. 7.
[37] Cooper, Gordon & Merrick, op. cit., p. 8.
[38] Cooper, Gordon & Merrick, op. cit., p. 8.
[39] Copy available at the Connecticut State Library.
[40] Eli Whitney Museum and Workshop, Hamden, CT. https://www.eliwhitney.org/7/museum/about-eli-whitney/factory. Accessed 2.16.2107. "Simeon North" by Robert Carlson, New England Antique Arms Society, Quarterly Newsletter, September 2009, Edition #48. http://neaas.org/wp-content/uploads/2011/04/Simeon-North-by-Bob-Carlson-UPDATED-TO-ADOBE.pdf
[41] Museum of Connecticut History, Connecticut Patents. http://museumofcthistory.org/2015/09/connecticut-patents-2/, accessed 2.16.2017.
[42] *The United States Magazine*, pp. 232 and 234
[43] *The United States Magazine*, p. 234
[44] Sara E. Wermiel, "America's 19th-Century British-Style Fireproof Factories," pp., pp. 23-24. The Journal of the Society for Industrial Archaeology, Vol. 27, No. 2, 2001. Content downloaded from JSTOR, 1.10., 2017.
[45] William Hosley, Colt: *The Making of an American Legend*, p. 106.
[46] Hosley, op. cit, pp. 108-109.
[47] William Hosley, op. cit., p.238, note 42. Items paid for are listed as "drawings of gable ends to Armories" (12.10.1854), "making 2 designs for dome" (1.26.1855), and "framing plans and full size working drawings for dome" (1/28/1855). The note also states that "Colt paid Jordan $243…during the course of construction, suggesting a significant but limited role." Hosley's source was 'Colt PFAMC [Patent Fire Arms Manufacturing Company], Bills and Receipts, 1854-55, np. CSL, Box 1', and 'Cash Book A, January 1856-March 1864… private collection, Colt Archives', both in the Wadsworth Atheneum, Hartford, Connecticut.
[48] Barbara Tucker, professor of history and director of the Center for Connecticut Studies at Eastern Connecticut State University, *Industrializing Antebellum America: the Rise of Manufacturing Entrepreneurs*, 2016, p.83. Hosley, ibid., p. 107
[49] Hosley, ibid, pp. 106-107: Hiram Bissell, brick masonry; James Batterson, stonework; Henry Burgess and Son, woodwork. Hosley cites the same sources as listed in endnote 2 above.
[50] Hosley, ibid, p. 107.
[51] Department of Energy & Environmental Protection, State of Connecticut, "CT DEEP Brownfield Inventory" p. 5, l. 163. 2.25.16.
[52] *The United States Magazine*, March 1857, p. 227.
[53] B. Tucker, op. cit., p. 84.
The Gombach Group, "Wauregan Historic District." http://www.livingplaces.com/CT/Windham_County/Plainfield_Town/Wauregan_Historic_District.html,
Accessed 2.17.2017
[54] Betsy Hunter Bradley, *The Works: The Industrial Architecture of the United States*, p.66.
[55] GMS Associates, Inc. *Structural Condition Survey, Buildings 8 & 10, June 2, 2004*. GMS Associates, Inc., 730 Hebron Avenue, Glastonbury, CT 06033, p. 7
[56] Henry Barnard, *The Home, the Arm and the Armory of Samuel Colt, a Memorial*, p.210.
[57] Hosley, op. cit., p.107.
[58] Barnard, op. cit., p.210.
[59] Barnard, op. cit., Serierholz 1866. See Appendix A for full page photographic copies of the originals.

[60] Lithograph, “Armory of Colt’s patent Fire Arms Manufacturing Company” undated, B & E.C. Kellogg, Hartford, in the collections of the Connecticut Historical Society. Interestingly, it shows fences and a gated enclosure immediately to the west of Building 10, which would have stopped free public use of Vredendale Avenue. This suggests that pressure for more controlled space for factory operations had been building before 1861. In the full photograph of which Figure 3 is a detail, which was taken at the time of the fire in 1864, one can see a boiler house, a chimney and another small building in the north courtyard, none of which were sketched on the 1857 plan (Appendix D, plate 8). If, as is possible, they had been in place for a few years before 1864, they would have taken away considerable area from the courtyard, requiring new space to be found for coal delivery, ash removal and possibly other functions necessary for the everyday efficient operation of the factory.

[61] Barnard, op. cit., 1866.

[62] The same illustration, shown in black and white, is cited by Hosley, p. 199, as published in *Industrial America: or Manufacturers and Inventors of the United States*, by Atlantic Publishing and Engraving in 1876. A copy of this version is in the Connecticut State Library.

[63] See figure 16and Appendix D, plate 7. *The United States Magazine*, vol. IV, 1857

[64] *The United States Magazine*, vol. IV, 1857. p.234

[65] Hosley, op. cit., p.62.

[66] ibid., p. 62

[67] Barnard, p. 212

[68] Ibid.

[69] ibid.

[70] Barnard, p. 211.

[71] Royal Commission, *Official Catalogue of the Great Exhibition of the Works of Industry of All Nations, Corrected Edition*. Mining and Mineral Products, p.23: "**404** Brunton, W. - Model of plan proposed for ventilating mines, and diagrams"

[72] Boase, George Clement, *William Brunton*. Dictionary of National Biography, 1885-1900, Volume 07, p.149

[73] Hosley, p. 61. In the official catalogue of the Great Exhibition, Colt appears as “**321** S. Colt, Hartford, Connecticut – Specimens of Fire-arms” in the section *America, United States of*, p. 189.

[74] Houze, H.G., Cooper, C.C., & Kornhauser, E.M. *Samuel Colt: arms, art, and invention*, p. 83

[75] *The United States Magazine*, 1857, p. 235.

[76] Samuel Colt, 1853.

[77] Barnard, op. cit., pp.227-228.

[78] Barnard, op. cit., p.227.

[79] *The United States Magazine*, 1857, p. 234.

[80] Barnard, op. cit., p.211.

[81] Barnard, op. cit., p.211. On Colt’s concern for safety, Hosley cites The Hartford Daily Times, March 3, 1870.

[82] *The United States Magazine*, 1857, p. 235. Barnard, op. cit., p. 234.

[83] Barnard, op. cit., pp. 240-241.

[84] Barnard, op. cit., pp. 210-211.

[85] Bradley, op. cit., pp. 114-115.

[86] GMS Associates, Inc. *Buildings 8 & 10, Structural Condition Survey*. Appendix E, Geotechnical Report, p. 2, February 25, 2003. Dr. Clarence Welti, P.E.

[87] Ibid, p. 4.

[88] Manuscript at the Connecticut State Archives. It probably dates from around the turn of the twentieth century, since it still shows Weehasset Avenue open, but shows more buildings than are recorded on the Tilden survey of 1895.

[89] A hand-written note on a copy of this survey, in the possession of the Connecticut State Library, suggests that the survey was undertaken on behalf of the ‘Factory Assurance Association of Hartford’; another note says, ‘Today they are the Industrial Risk Insurers of Farmington Ave.’

[90] GMS Associates, Inc. *Buildings 8 & 10, Structural Condition Survey*. Appendix E, Geotechnical Report, p. 6, February 25, 2003. Dr. Clarence Welti, P.E.

[91] GMS Associates, Inc. *Buildings 8 & 10, Structural Condition Survey*, *Buildings 8 & 10*. June, 2004.
[92] GMS Associates, Inc. *Buildings 8 & 10, Structural Condition Survey*. Appendix E, Geotechnical Report, p. 7, February 25, 2003. Dr. Clarence Welti, P.E.
[93] National Park Service, *Coltsville Special Resource Study*, November 2009, p.11.
[94] National Park Service, *Existing Conditions Survey, Building 8 and 10, Coltsville National Historical Park, Hartford, Connecticut*, February 3 2017. EYP Architecture & Engineering, Albany, NY, 12203
[95] Ibid. p.3
[96] Ibid.
[97] National Park Service, U.S. Department of the Interior, Technical Preservation Services. *Preservation Brief 17: Architectural Character – Identifying the Visual Aspects of Historic Building as an Aid to Preserving their Character*, 1988, page 1.
[98] NPS 2008, p. 22
[99] NPS 2008, p.7
[100] NPS 2008, p.9
[101] Ibid, p 1.
[102] NPS 2008, p. 23

PART 2

RECOMMENDATIONS FOR TREATMENT AND USE, BIBLIOGRAPHY

RECOMMENDATIONS FOR TREATMENT AND USE

Recommendations for structural stabilization have already been made in the structural report prepared for the National Park Service by EYP Architecture & Engineering. The NPS has made it clear that they are not looking for recommendation for treatment and use until the buildings have been stabilized. However, the recommendations for structural stabilization were developed, in concert with the NPS, with the intent of minimizing impact on extant character-defining conditions as described in Part 1 of this report.

It should be clear from the discussion in this report of the period of significance for Buildings 8 and 10 that a period of significance could be established for these two buildings that would be shorter than the period prescribed for the Coltsville National Historical Park as a whole. Since Buildings 8 and 10 were constructed as part of the original factory complex, both would share the opening date of 1855, but different end dates could be assigned. Buildings 8 and 10 could be assigned an earlier end date because within a decade or two, they were no longer being used for the purposes for which they were specifically designed. At the same time, the details of this design, and the masonry exhaust system described in detail in this report, are unique and still largely extant. Frankly there is much less of their later uses, for a woodshop and for finishing operations respectively, that is unique, and there are few extant features that derive from those uses. Clearly, accepting a shorter period of significance could have a major impact on recommmending and implementing possible uses and treatment for the two buildings.

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Appendix A

Full Page Plates

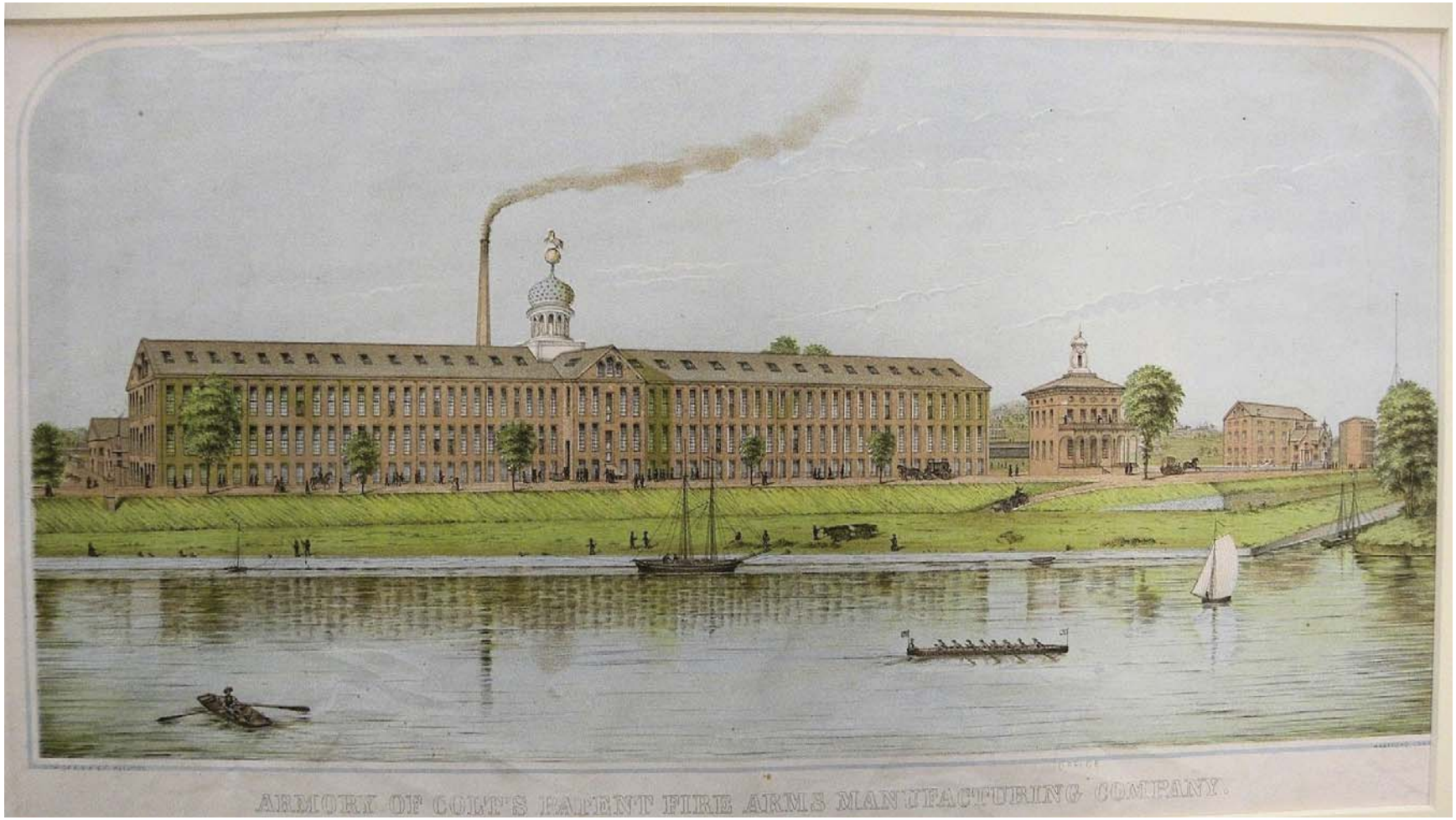


Plate 1. Original factory viewed from the Connecticut River, with the main armory building in foreground and the south end of Building 10 just visible behind it beyond the watchman's cottage at the extreme left.

Lithograph published by B & E. C. Kellogg, Hartford. Reproduced courtesy of the Connecticut Historical Society, Hartford, CT. Catalogued as 1995-182-194. Its date is recorded as "1840-1867" by CHS, but this must be an error. The factory was not built until 1855, and the image represents the factory without either the railroad of 1857 (see Plate 7 below), or the westward extension of 1861.

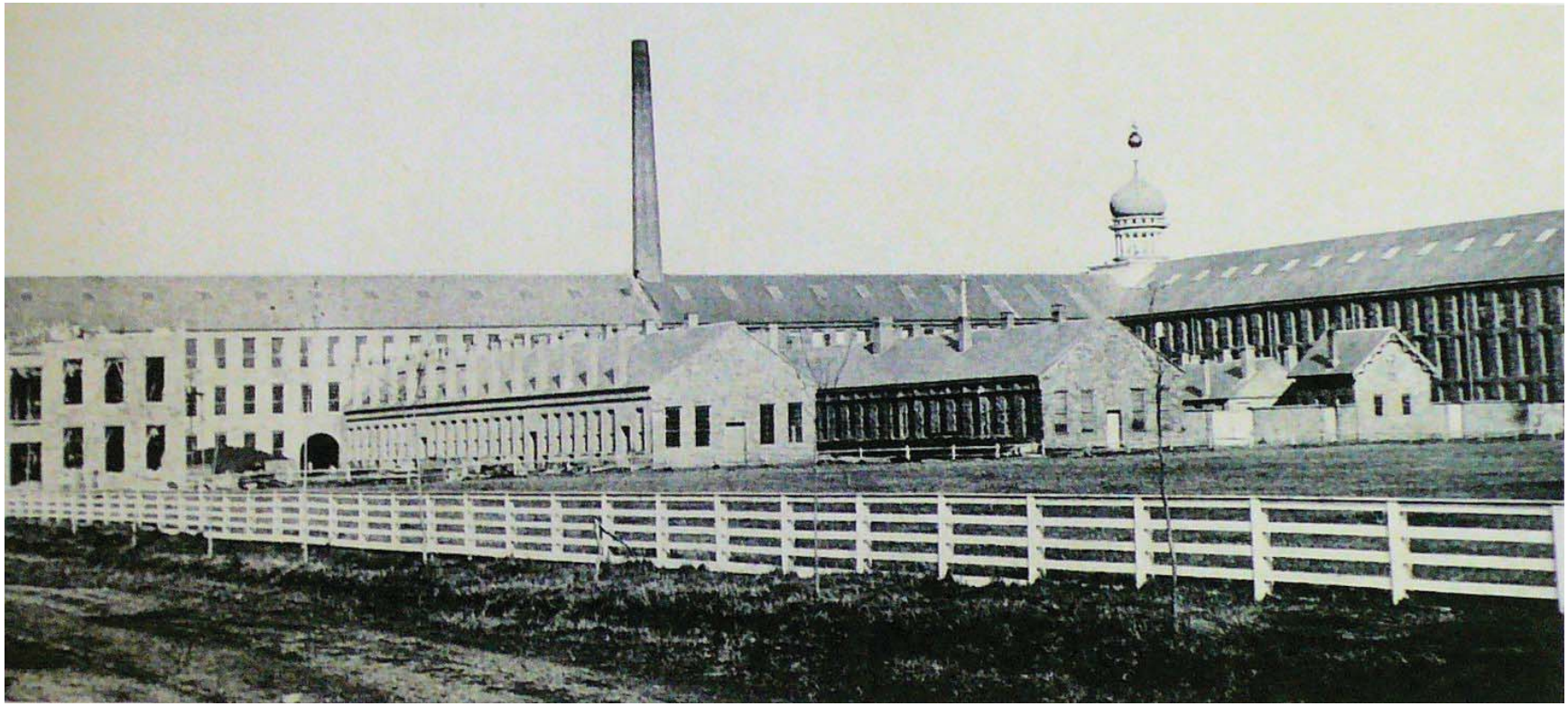


Plate 2. View of factory complex from southwest during construction of the westward expansion in 1861. The south end of Building 10 is below the dome. The watchman's cottage is to the right of Building 10, the new wing to its left. The tall chimney at the center is rising from the storeroom between Buildings 8 and 10 and marks the original west end of the spine, which can also be discerned in the change in roof tone. Note the chimney stacks rising from the west eave of the new wing (and probably form the east eave) and the rows of ventilators at the ridges of Building 10 and the new wing.

Photographer probably R. S. Delameter, according to Hosley. Image reproduced courtesy of the Connecticut Historical Society.

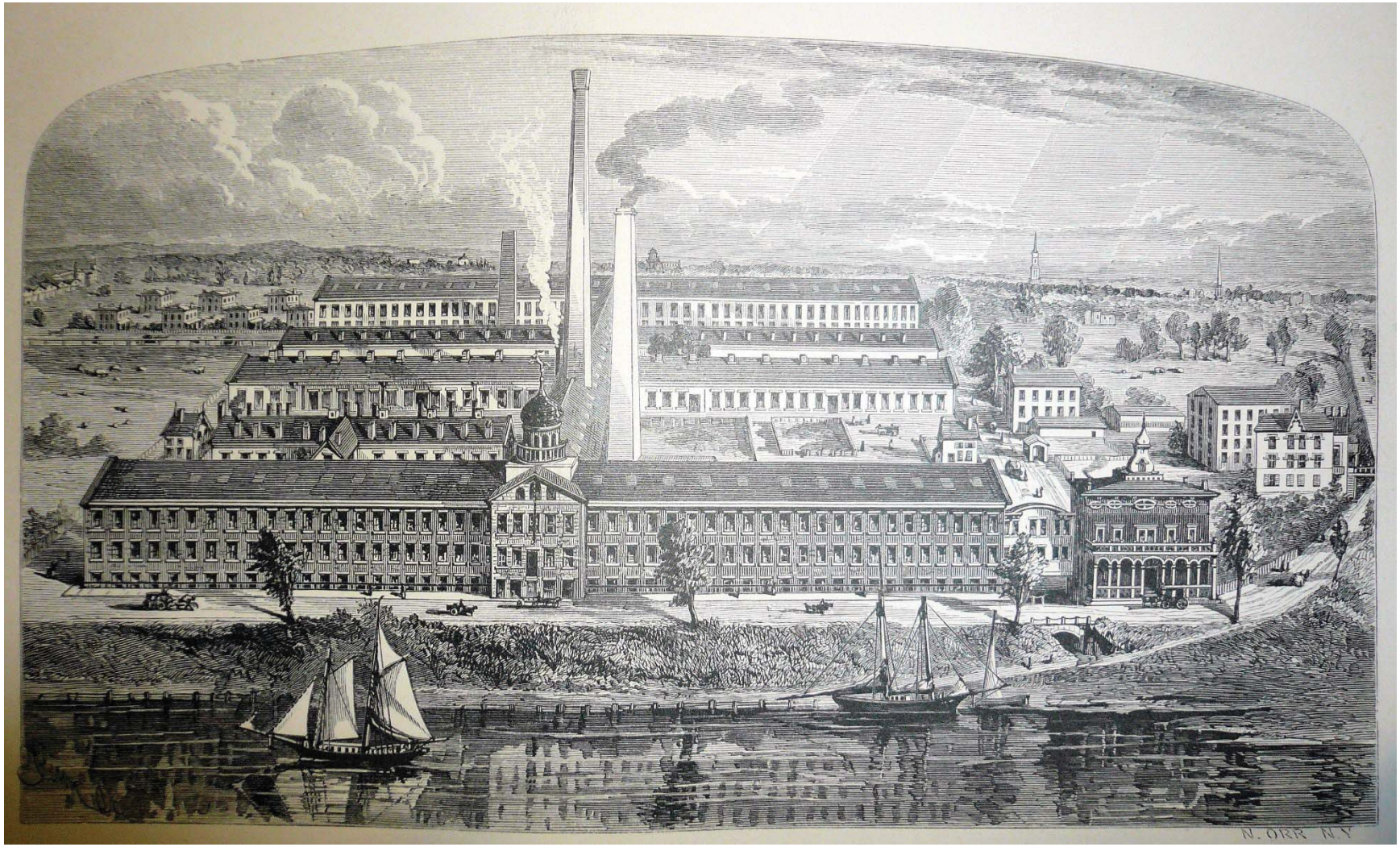


Plate 3. View of the enlarged factory complex from the east, after the expansion of 1861. Buildings 8 and 10 run from right to left, to each side of and just behind the second tall chimney. The chimney is not accurately placed; it should be on far side of the ridges of Buildings 8 and 10.

Illustration from Barnard, The Home, the Arm and the Armory of Samuel Colt, a Memorial. Hartford, privately printed, 1866. Engraved by N. Orr, NY. Reproduced by courtesy of the Hartford History Center, Hartford Public Library. Drawn after the expansion of 1861 and before the fire of 1864.

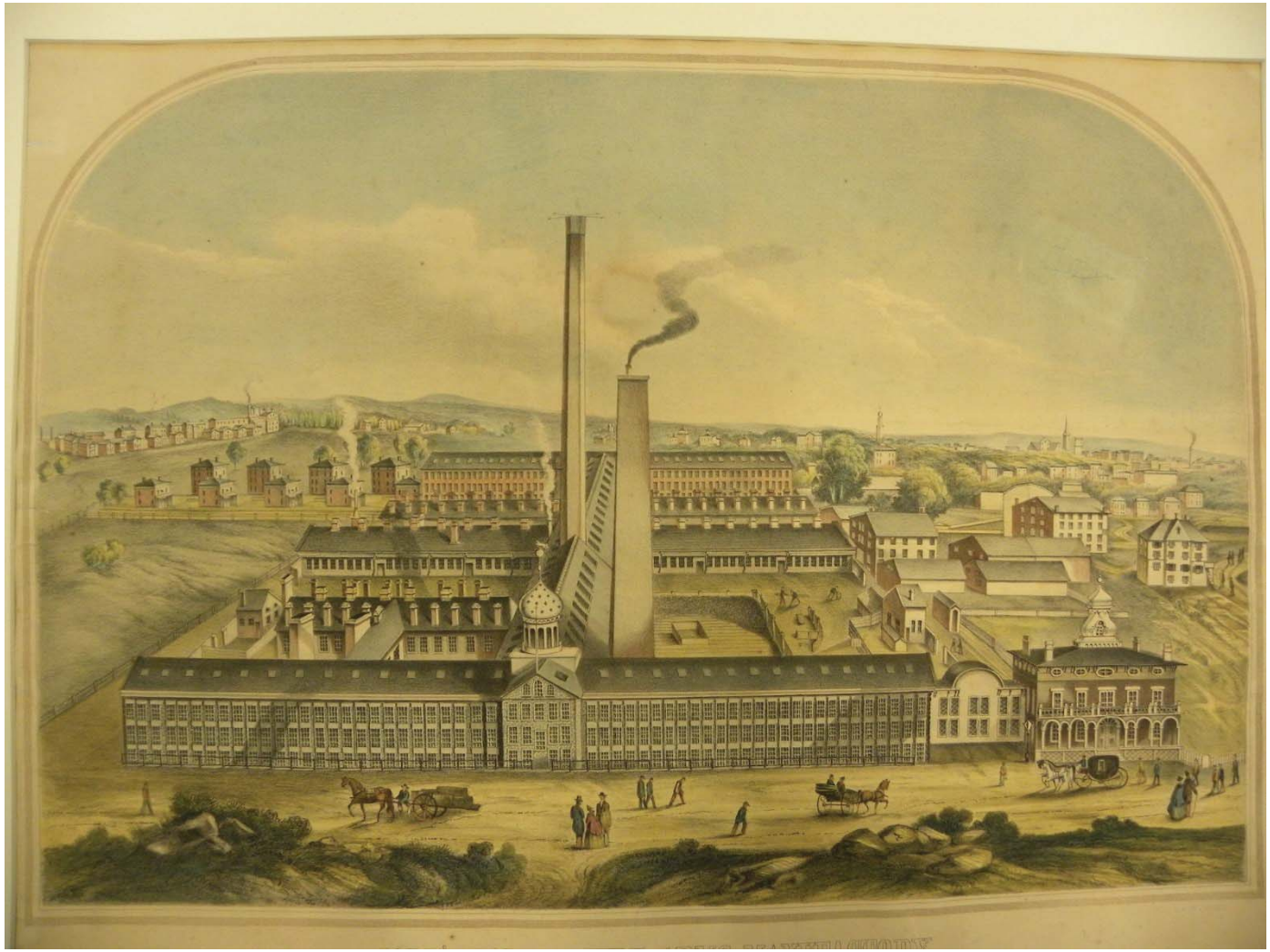


Plate 4. View of the enlarged factory complex from the east, drawn after 1861 and, judging by the cross-gable-less design of the East Armory, before the fire of 1864. Buildings 8 and 10 run from right to left, just behind the second tall chimney. The chimney is not accurately placed; it should be on the far side of the ridges of Buildings 8 and 10.

Lithograph. L. Serierholz, no date. Image reproduced courtesy of the Connecticut Historical Society. 1960-93-9.

Plate 5. View southwest across north court, shortly after the fire of 1864. The south end of Building 8 is on the right.

Photographer unknown. Reproduced by courtesy of the Connecticut State Library, State Archive.

Plate 6. View south down the East Armory, with the north court and the spine to the right, at the time of the 1864 fire.

Photographer unknown. Reproduced by courtesy of the Connecticut State Library, State Archive. Pg460_003_005_004.jpg.

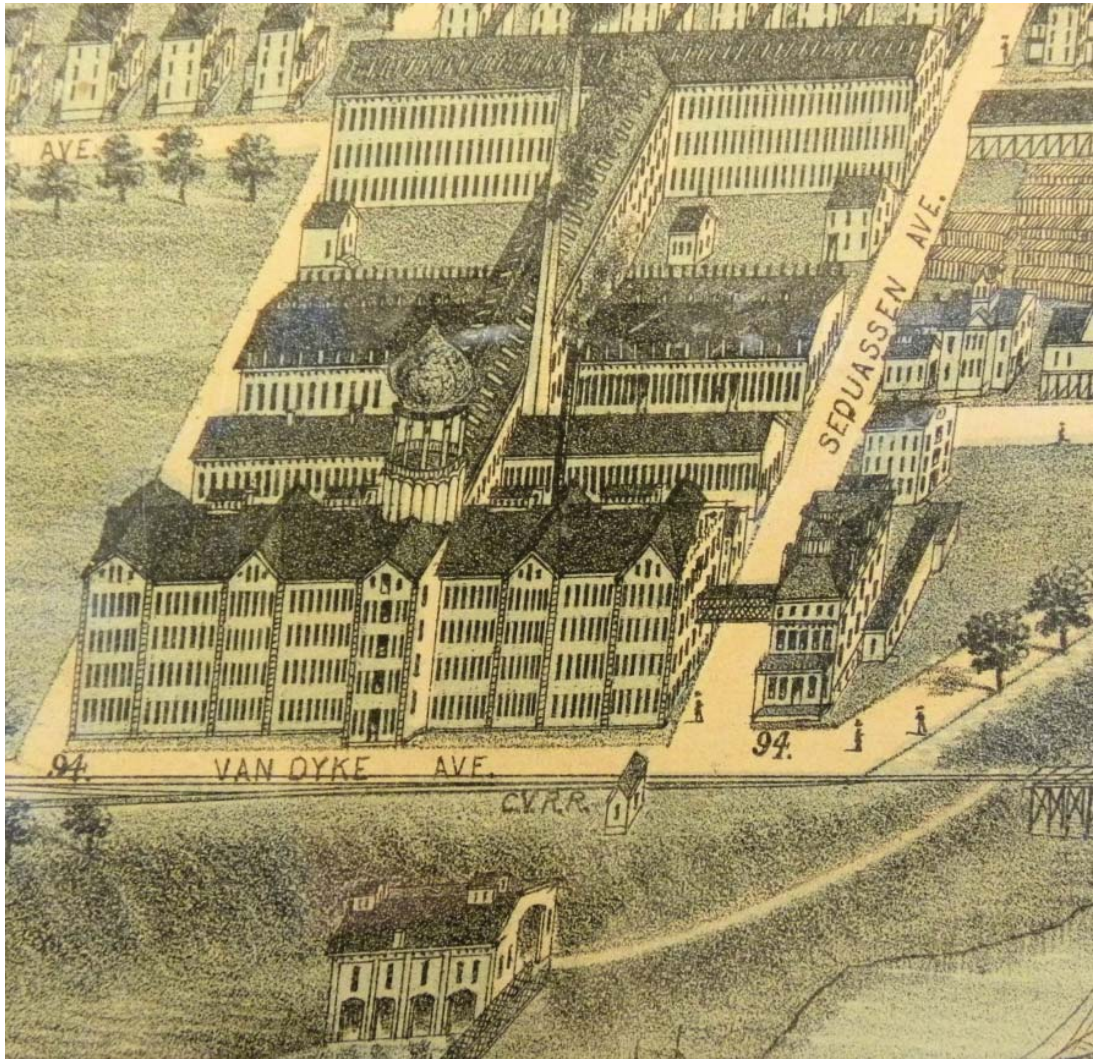


Plate 7. Post 1867 complex viewed from the east. The tall chimney is wrongly located behind Building 8. Note the railroad spur in the foreground, built for Colt in 1857 according to Hosley (p. 610); however, it does not appear in the earlier plates (Plates 1, 3, 4).

Detail from lithograph drawn and published by O. H. Bailey & Co, Boston, 1877. Submitted to Congress in 1877 by O. H. Bailey and J. L. Gault. Image reproduced courtesy of the Connecticut Historical Society.

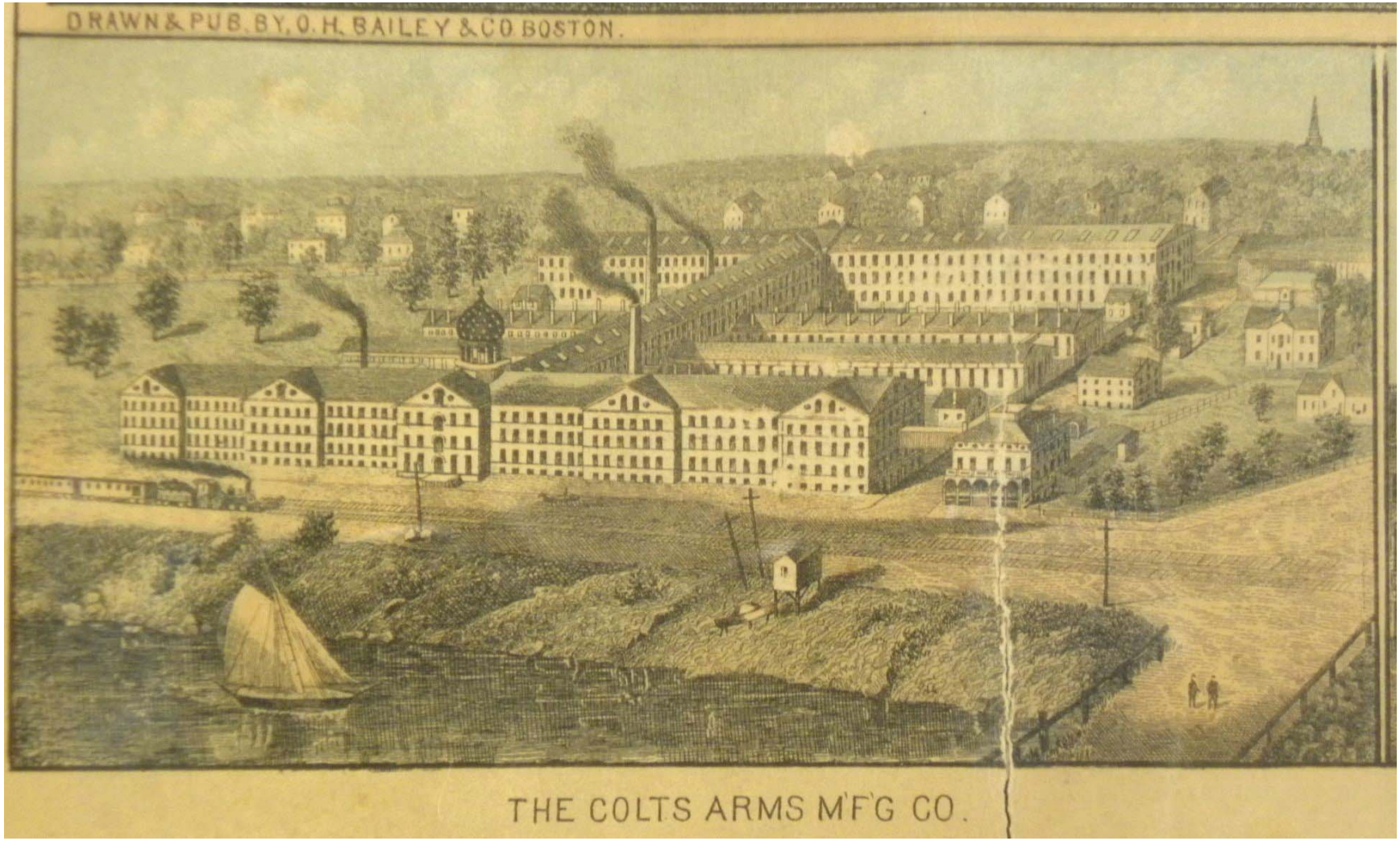


Plate 8. View from the northeast. Note the absence of roof structures at Buildings 8 and 10 but chimneys near the eaves of the new 1861 wings. The pilasters can be read in the frieze of Building 8. Note the cross gables of the rebuilt East Armory.

Included as a cameo below the lithograph reproduced in Plate 7. Image reproduced courtesy of the Connecticut Historical Society.

Plate 9. Interior of Building 8, looking south.

HAER Image provided by the NPS that appears to be part of a 2005 photographic survey by Jet Lowe. Other images in that survey are catalogued and made available by the Library of Congress under HAER CT-189-E, but some are not available to be downloaded electronically.

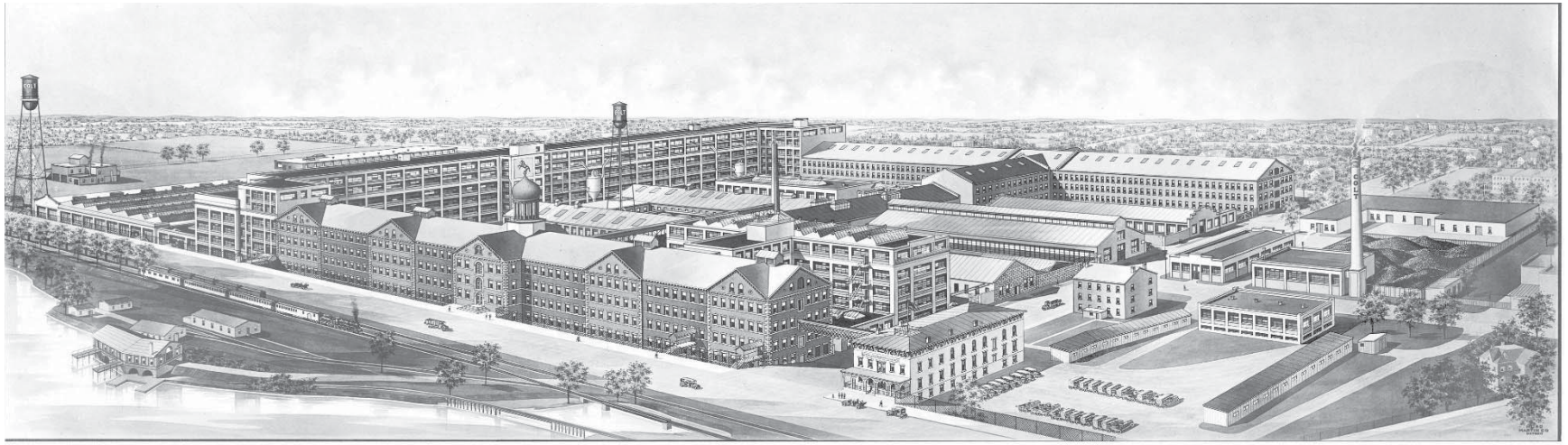


Plate 10. Overview of the factory complex from the northeast. Building 8 is largely hidden behind the North Armory, constructed as part of the expansion of the complex for World War I, which included the South Armory and the machine shops seen left of center. Building 10 is illustrated with skylights. The tall chimney is still in place at the storeroom location between Buildings 8 and 10.

Undated print issued by the Colt Firearms Company. Reproduced by courtesy of the Connecticut State Library, State Archive. Pg460_003_004_013.jpg. From the style of the cars and trucks, the image probably dates from the 1920s. Note the metal roof depicted for Building 10, a material that is not noted or drawn in any other survey or illustration. See slate roof in the 1934 photograph that follows.

Plate 11. Striking workers passing the north end of Building 8 and the North Armory, 1934. Building 8's roof is clearly slate.

Photographer unknown. Image reproduced by courtesy of the Connecticut State Library, State Archive. Pg460_005_09_010.jpg.

Appendix C

Aerial Survey Photographs, 1934 -1995

Each plate is a detail of an aerial photograph covering more or less the same area of Hartford, taken as part of an aerial survey of Connecticut in the year shown. The surveys were carried out only once or, rarely, twice a decade, although there seems to have been a longer hiatus around the time of World War II.

The photographs are reproduced with permission from the Connecticut State Library. They can be viewed on-line and in electronic form at the library; the file number is listed below each plate.

Each detail retains the orientation of the original photograph, which has been enlarged as much as feasible and adjusted electronically as necessary to maximize readability. Wherever possible, the detail includes the streets that defined the area of the original factory complex – Van Dyke Avenue, Sequassen Street, Huyshope Avenue and Weehasset Street.

In Plate 1, a photograph taken in 1934, Van Dyke Avenue can be seen running across the upper left corner, heading upwards approximately north; Interstate 91 had not yet been built. The rebuilt East Armory of 1867 runs immediately parallel to Van Dyke, forming the east edge of the original factory complex and of the current site. Parallel to the north section of the East Armory, between it and Building 8, is the North Armory of 1916. The rebuilt original spine and its 1861 extension are clearly visible, running from the center of the East Armory (marked by the dome) to the West Armory. It separates Buildings 8 and 10, which form the first long line parallel to, and equal in length to, the East Armory. A second such line, a little to the west, is formed by the shops added in 1861. Towards the bottom of the image, the South Armory runs east to west, from Van Dyke to Huyshope, and to its south are the extensive saw-tooth roofs of the machine shops, all built in 1916. The small gap between the south armory and Building 10 is the trace of Weehasset Street, which marked the southern boundary of the original site but was incorporated into it when the south armory was built.

The original workers' houses are arrayed along the west side of Huyshope Avenue, facing the West Armory that was added to the original complex in 1861. Sequassen Street completes the perimeter, running west to east across the north ends of the east and west armories and Building 8.

The H shape of the original plan and the double H of the complex as expanded in 1861 are easily traced, although the courtyards they enclosed are still filled with smaller ancillary facilities, such as the annealing building in the southeast court between the East Armory and Building 10, and the inspection building immediately west of Building 10.

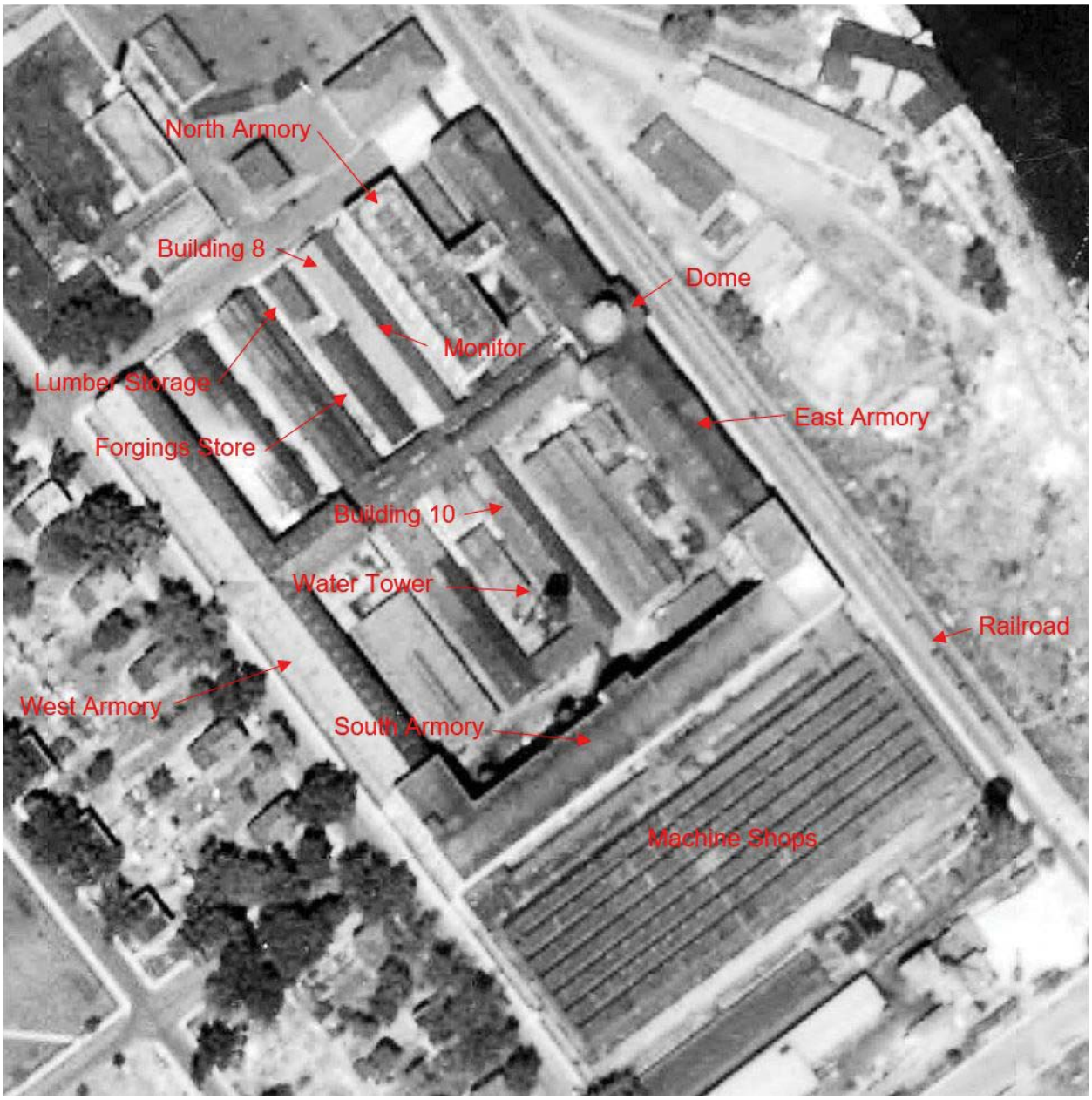


Plate 1. 1934 See introductory comments above. The monitor location can be detected on Building 8. Aerial_survey_of_Connecticut_1934_photograph_09713.jpg

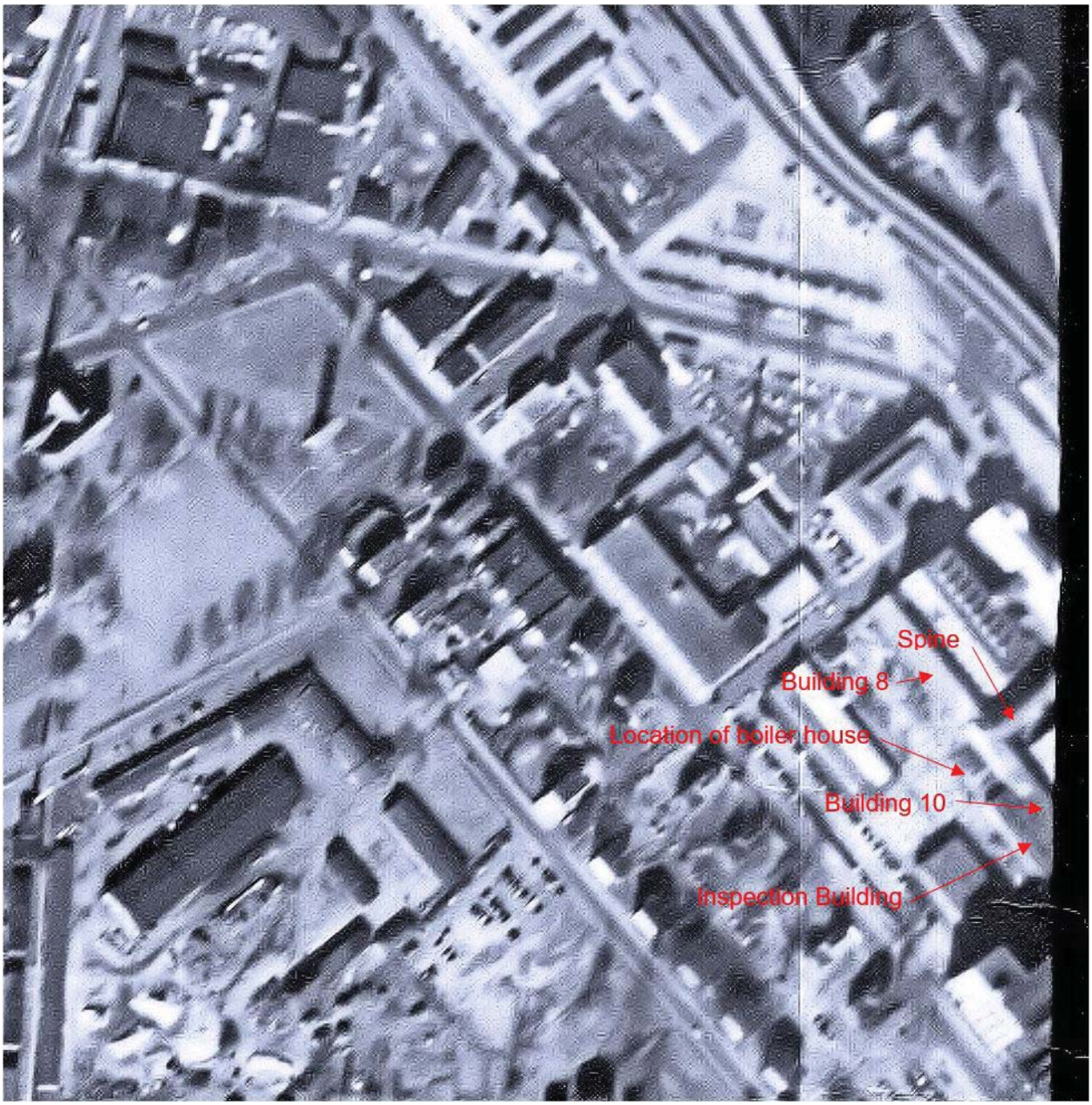


Plate 2. 1951. The site is only partially included, at the lower right. Building 8 is shown, but only part of Building 10. The spine beyond them and the West Armory have already been demolished and probably the boiler house at the northwest corner of Building 10.

adimg_37831_03_CNE8H15_1951_s8_pma_1_tf.tif

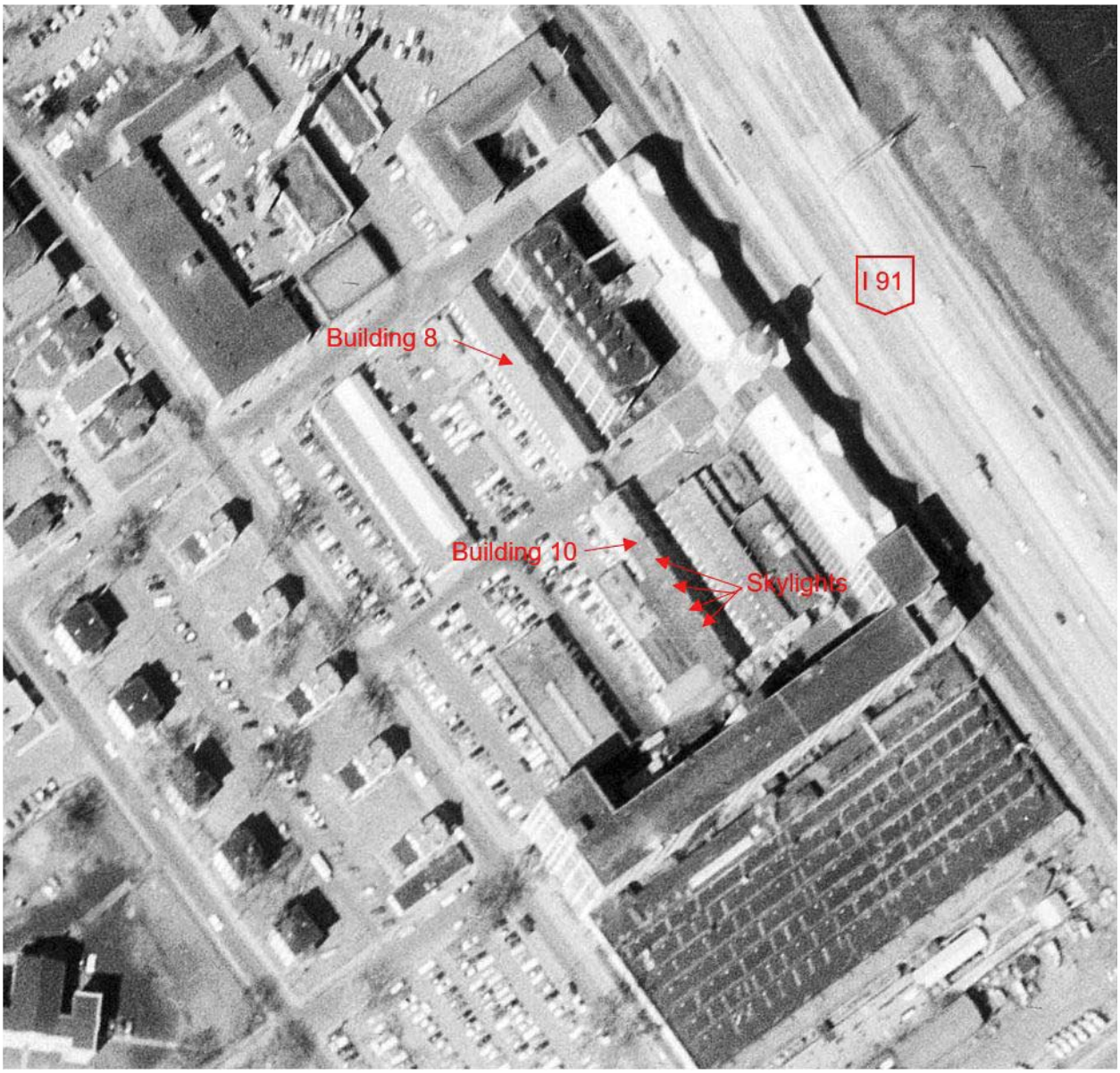


Plate 3. 1965. Skylight locations are apparent on Building 10, on the west slope of the gable roof. The narrow flat connecting roof along the west elevation stops short of the north end of the inspection building, at about the third point of the elevation.

Aerial_survey_of_Connecticut_1965_photograph_01129.jpg

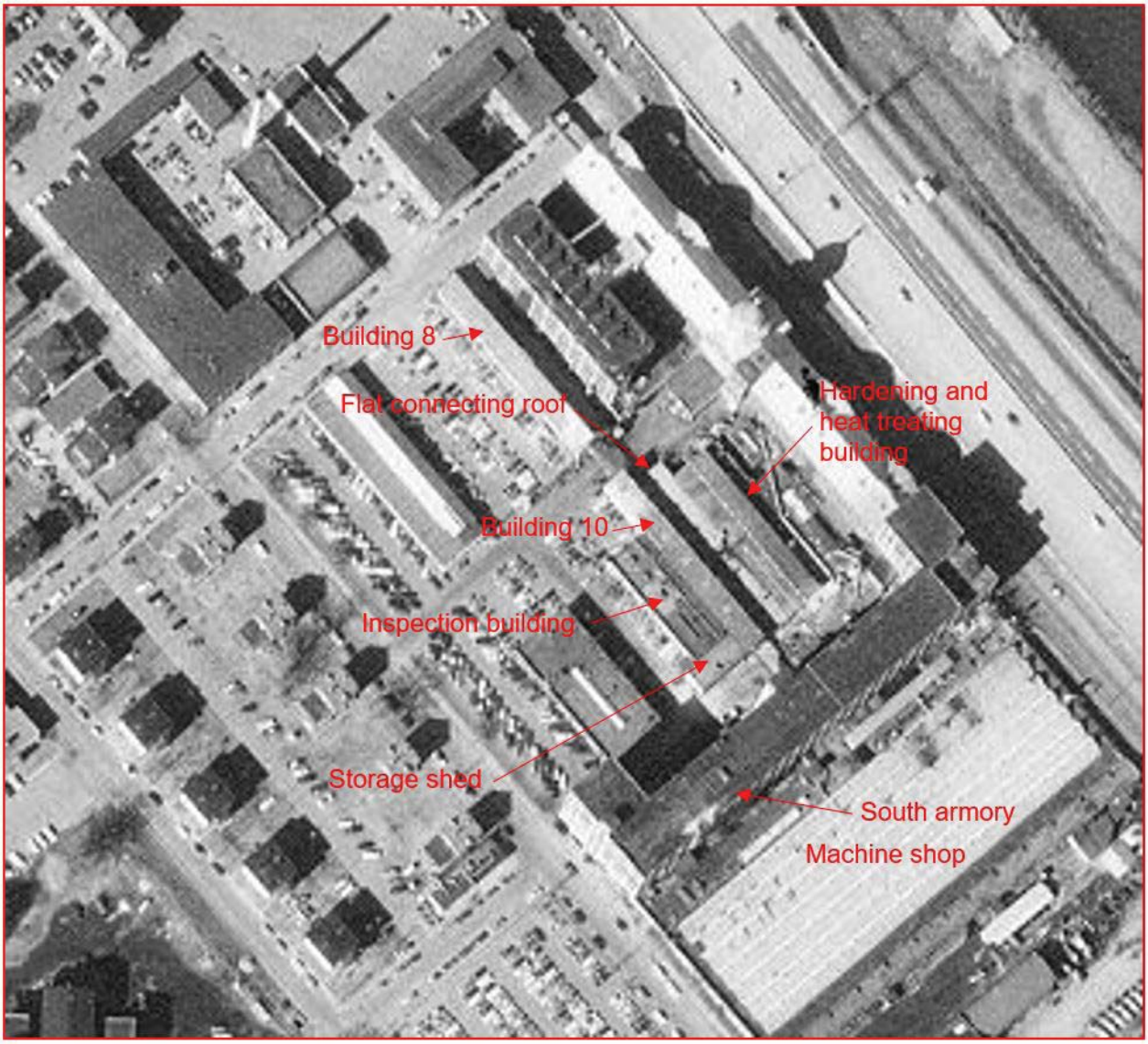


Plate 4. 1970. Little change since 1965, except perhaps the length of the roof connecting Building 10 to the inspection building.

adimg_37800_00_18ct3342_1970_s20_DPW_1_tf.tif

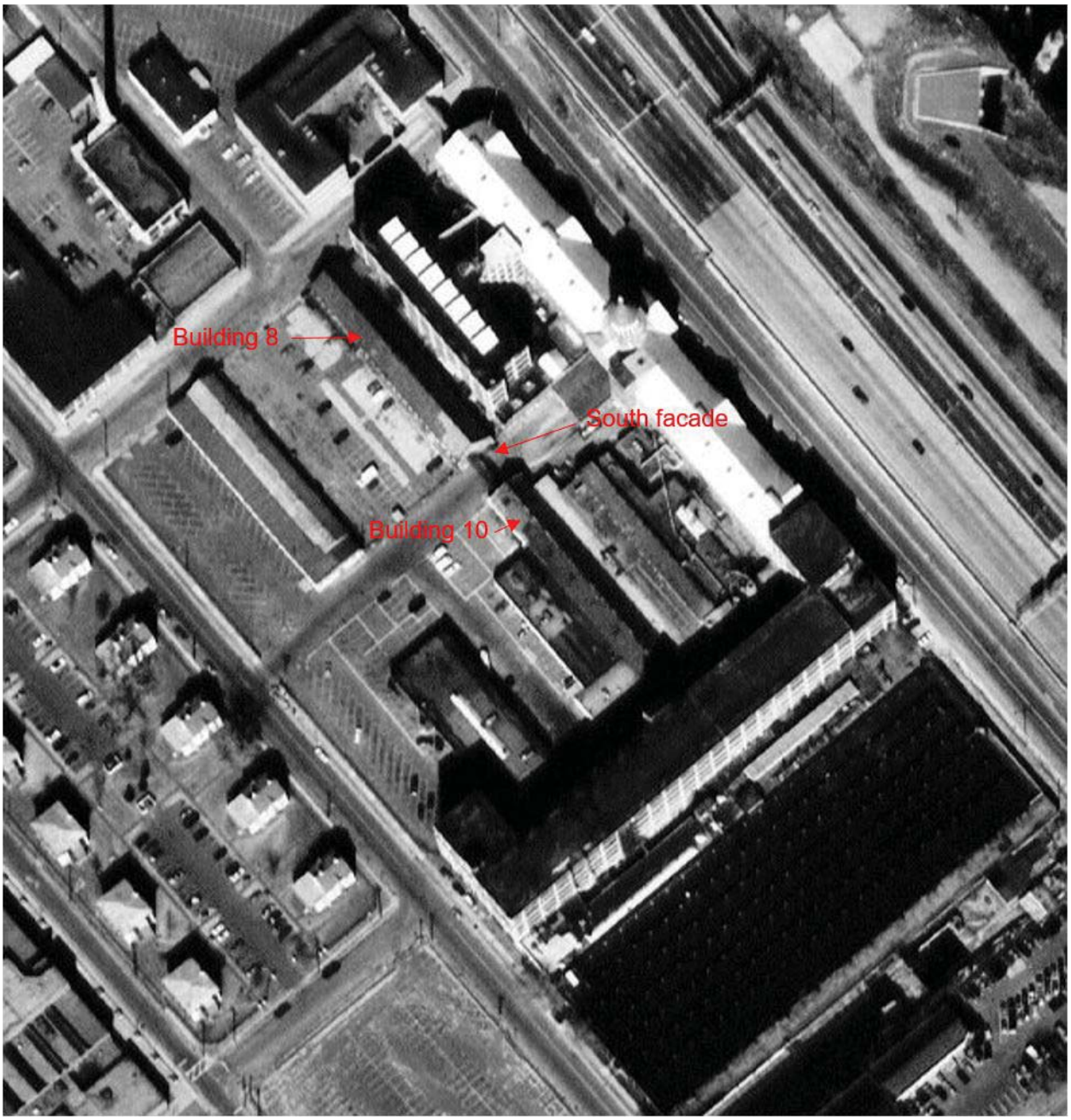


Plate 5. 1986. The lighter surface on the south face of Building 8 suggests that the brick veneer is in place.

adimg_37800_00_47ct3270_1986_s6_CTDEP_1_s(1).tif

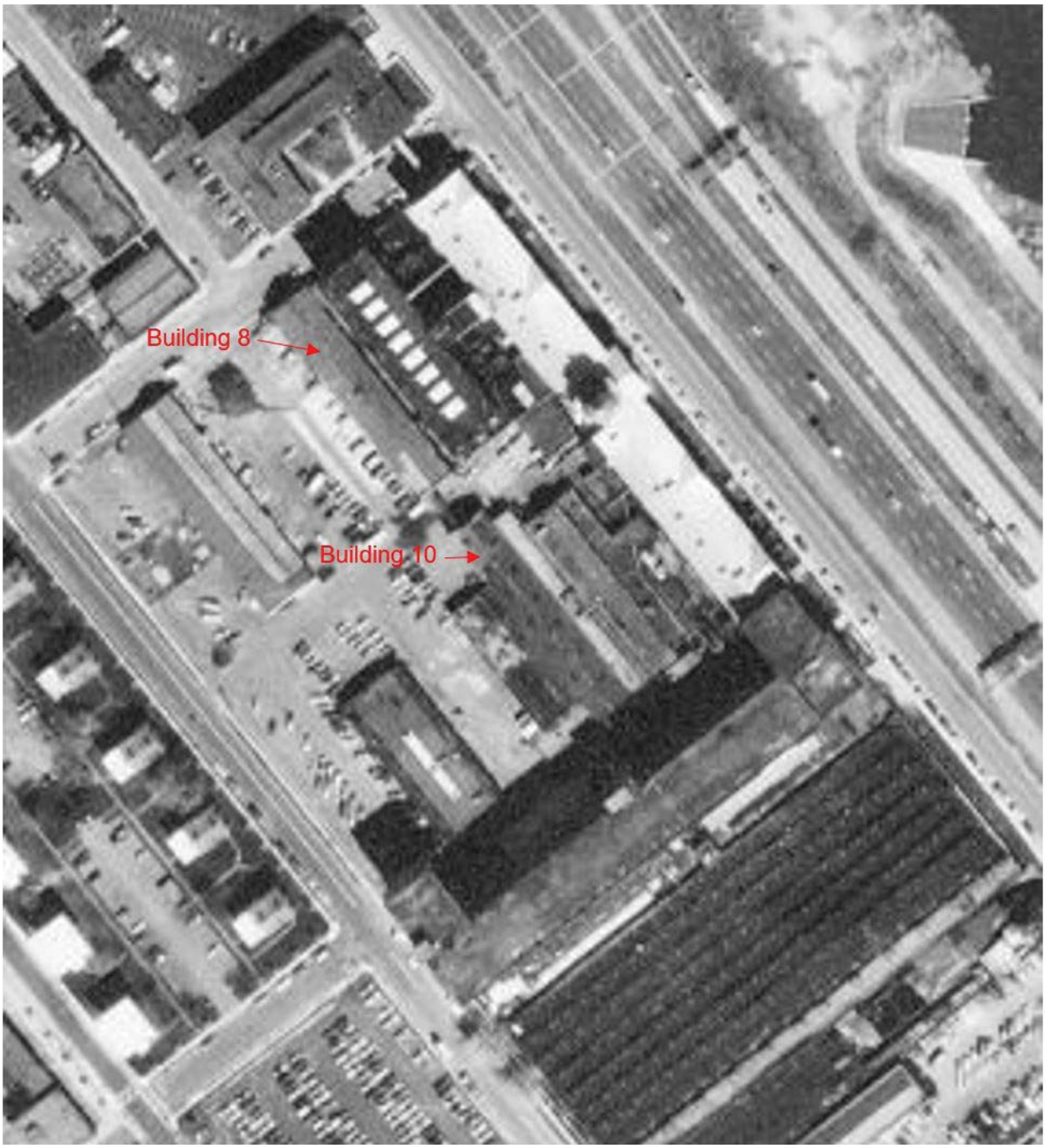


Plate 6. 1990. The full pattern of skylights is revealed on Building 10.

adimg_37800_00_47ct3374_1990_s1_CTDEP_1_s.tif

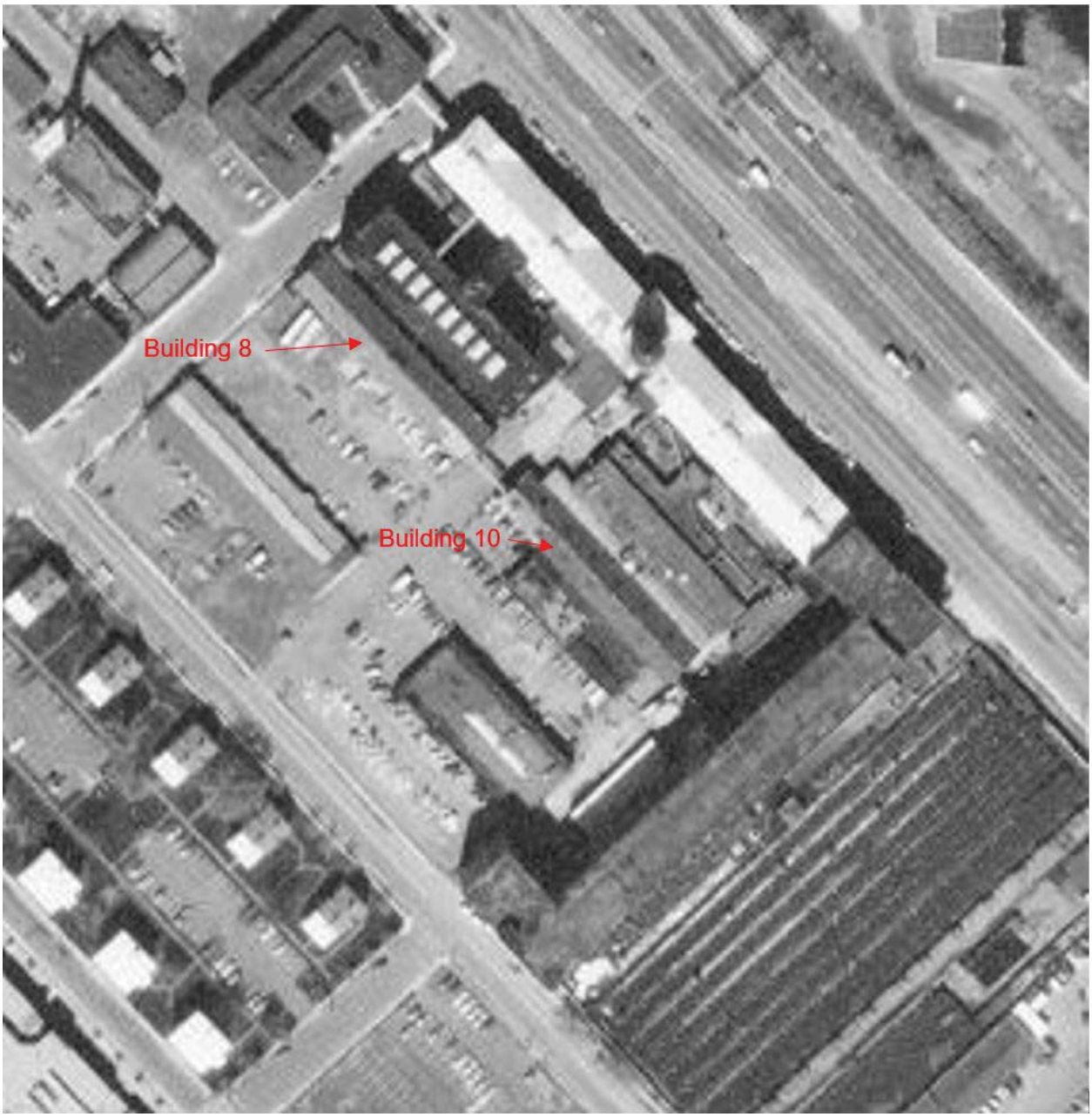


Plate 7. 1995. No change since 1990.

adimg_37800_00_45ct31_1995_s1_STCT_1_s.tif

Appendix D

Selected pages from *The United States Magazine*
March 1857

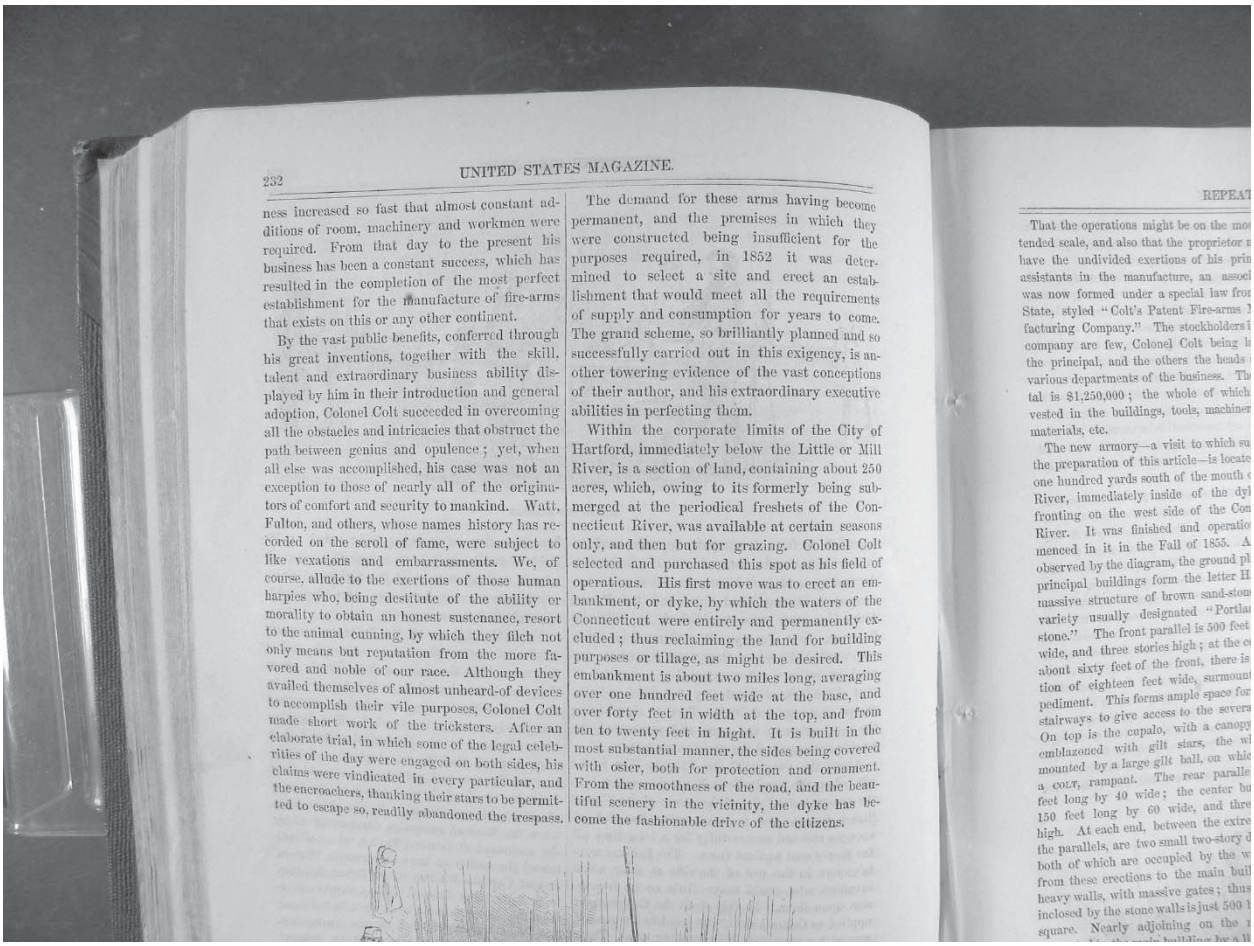
BORING THE BARRELS.

capitalists to form a company to make and introduce his arms to the public. His indomitable energy and well-known business perseverance soon accomplished this, and the Patent Arms Company was established in 1836, at Paterson, New Jersey. It continued in existence until 1842, when they were forced to suspend operations, after expending a capital of over $300,000, without any beneficial results, except those gained in the further simplifying the mechanism of the arms and perfecting the machinery required for their manufacture.

About the year 1837 the Florida War broke out, when the Seminole Indians, retreating into the "everglades," defied the power of the United States troops, and a comparative handful of savages resisted successfully for a long time all the forces sent against them. The Indians were as expert in the use of the rifle as their white invaders, who could make little or no impression upon them. In this strait the Government applied to Colonel Colt, who went to the seat of war with a supply of his repeating arms. These were found so effective that more were at once ordered, and in the hands of the hardy mounted Rangers, commanded by General Harney, who by their aid became the terror of the red men, the war was soon brought to a close; for when the Indians saw their foes fire six times without lowering their weapons to load they knew their former tactics were useless and surrendered. This success, however, though very glorious for the Government, was exactly the reverse for Colonel Colt, for by exterminating the Indians and bringing the war rapidly to an end, the market for the arms was for a long time destroyed. Yet, if without pecuniary remuneration, Colonel Colt could exult in the full measure of mental reward. The vast advantages of his invention, after being fully tested on the field of battle, had been universally acknowledged, and his name and the virtues of his repeating arms were becoming more thoroughly disseminated throughout the land.

From the failure of the Paterson company until 1847 none of these arms were made, and in the mean time the demand from Texas, where they had been adopted in both army and navy, and used with the most marked success, had completely drained the market. The fact has been admitted by the celebrated Colonel Jack Hays himself, that the grand prestige of his renowned Rangers was principally owing to their "six shooters," which rendered them the terror of all who opposed them. In the above year, when the Mexican campaign commenced under the command of General Taylor, who had witnessed the utility of these weapons in Florida, he sent Captain Walker, of the Texan Rangers, to procure from Colonel Colt a supply of revolvers. Not one could be found; but the gallant Colonel soon prepared for the emergency, and this case presents another striking instance of the extraordinary energy and the firm determination of purpose so prominent in his character. He was looked upon as a ruined man, but he thought otherwise; he felt and knew that his eventual triumph depended upon himself, and here was the opportunity to retrieve the embarrassments he had been drawn into by the acts of the corporation. He at once contracted to furnish Government one thousand arms for $24,000. As a temporary arrangement, he hired an armory at Whitneyville, Connecticut, where he completed his first contract, and shortly afterward established the nucleus of *his own* manufactory at Hartford, Connecticut. One order rapidly followed another, and the busi-

Plate 1. Page 231 Early career of Samuel Colt.



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ness increased so fast that almost constant additions of room, machinery and workmen were required. From that day to the present his business has been a constant success, which has resulted in the completion of the most perfect establishment for the manufacture of fire-arms that exists on this or any other continent.

By the vast public benefits, conferred through his great inventions, together with the skill, talent and extraordinary business ability displayed by him in their introduction and general adoption, Colonel Colt succeeded in overcoming all the obstacles and intricacies that obstruct the path between genius and opulence; yet, when all else was accomplished, his case was not an exception to those of nearly all of the originators of comfort and security to mankind. Watt, Fulton, and others, whose names history has recorded on the scroll of fame, were subject to like vexations and embarrassments. We, of course, allude to the exertions of those human harpies who, being destitute of the ability or morality to obtain an honest sustenance, resort to the animal cunning, by which they filch not only means but reputation from the more favored and noble of our race. Although they availed themselves of almost unheard-of devices to accomplish their vile purposes, Colonel Colt made short work of the tricksters. After an elaborate trial, in which some of the legal celebrities of the day were engaged on both sides, his claims were vindicated in every particular, and the encroachers, thanking their stars to be permitted to escape so, readily abandoned the trespass.

The demand for these arms having become permanent, and the premises in which they were constructed being insufficient for the purposes required, in 1852 it was determined to select a site and erect an establishment that would meet all the requirements of supply and consumption for years to come. The grand scheme, so brilliantly planned and so successfully carried out in this exigency, is another towering evidence of the vast conceptions of their author, and his extraordinary executive abilities in perfecting them.

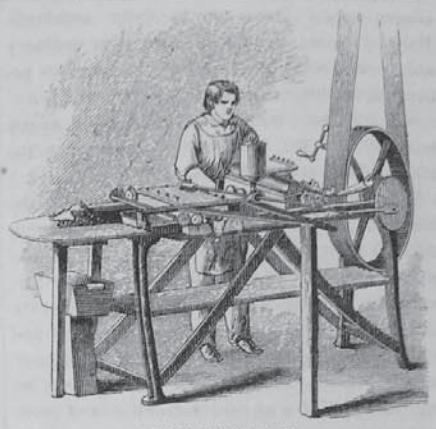
Within the corporate limits of the City of Hartford, immediately below the Little or Mill River, is a section of land, containing about 250 acres, which, owing to its formerly being submerged at the periodical freshets of the Connecticut River, was available at certain seasons only, and then but for grazing. Colonel Colt selected and purchased this spot as his field of operations. His first move was to erect an embankment, or dyke, by which the waters of the Connecticut were entirely and permanently excluded; thus reclaiming the land for building purposes or tillage, as might be desired. This embankment is about two miles long, averaging over one hundred feet wide at the base, and over forty feet in width at the top, and from ten to twenty feet in hight. It is built in the most substantial manner, the sides being covered with osier, both for protection and ornament. From the smoothness of the road, and the beautiful scenery in the vicinity, the dyke has become the fashionable drive of the citizens.

Plate 2. Page 232 Acquisition of the South Meadow area; construction of the dyke.

That the operations might be on the most extended scale, and also that the proprietor might have the undivided exertions of his principal assistants in the manufacture, an association was now formed under a special law from the State, styled "Colt's Patent Fire-arms Manufacturing Company." The stockholders in this company are few, Colonel Colt being largely the principal, and the others the heads of the various departments of the business. The capital is $1,250,000; the whole of which is invested in the buildings, tools, machinery, raw materials, etc.

The new armory—a visit to which suggested the preparation of this article—is located about one hundred yards south of the mouth of Little River, immediately inside of the dyke, and fronting on the west side of the Connecticut River. It was finished and operations commenced in it in the Fall of 1855. As will be observed by the diagram, the ground plan of the principal buildings form the letter H. It is a massive structure of brown sand-stone, of the variety usually designated "Portland free-stone." The front parallel is 500 feet long, 60 wide, and three stories high; at the center, for about sixty feet of the front, there is a projection of eighteen feet wide, surmounted by a pediment. This forms ample space for hall and stairways to give access to the several stories. On top is the cupalo, with a canopy of blue, emblazoned with gilt stars, the whole surmounted by a large gilt ball, on which stands a COLT, rampant. The rear parallel is 500 feet long by 40 wide; the center building is 150 feet long by 60 wide, and three stories high. At each end, between the extremities of the parallels, are two small two-story dwellings, both of which are occupied by the watchmen; from these erections to the main buildings are heavy walls, with massive gates; thus the space inclosed by the stone walls is just 500 by 250 feet square. Nearly adjoining on the north, and connected to the main building by a light lattice-work bridge, is a brick building, three stories high, 60 by 75 feet square, and surmounted by a turret and clock. This is occupied by the officers, and as a wareroom.

The motive power is located about in the center of the main building. It consists of a beam engine—cylinder, 36 inches in diameter, 7 feet stroke, fly-wheel 30 feet in diameter, weighing 7 tuns. This engine, which is rated at 250 horse-power, is supplied with the well-known "Sickel's Cut-off," which the superintendent and engineer speak of as the most useful and important addition to the steam-engine



RIFLING THE BARRELS.

since the days of Watt. The steam is furnished from two cylindrical boilers, each 22 feet long and 7 feet in diameter. The power is carried to the attic by a belt working on the fly-wheel; this belt is 118 feet long by 22 inches wide, and travels at the rate of 2,500 feet per minute.

Fully appreciating the great interest manifested by our readers in descriptions of this kind, we will now proceed to conduct them through the interior of this immense industrial pile, and on the way we will endeavor to explain, as understandingly as possible, the various processes of the manufacture, from the raw metal and wood, to the complete and effective arms familiarly known as Colt's Revolvers.

Leaving the office we cross the bridge, pass down through the machine shop, engine room, etc., to the rear parallel, an apartment 40 by 50 feet square, the center of which is appropriated as the store-room for iron and steel. Large quantities of these materials, in bars and rods, are stored here in charge of a responsible party, whose duty it is to fill the orders from the contractors, and render an accurate statement of such deliveries to the main storekeeper's department. This latter system is universal throughout the establishment—thus the materials of all kinds can be readily accounted for, no matter what their state of transposition.

At this point it is well to inform the reader that almost the entire manual labor of the establishment is performed by contract. The contractors are furnished room, power, tools, material, heat, light, in fact all but muscle and brains; themselves, however, and their subordinates are all subject to the immediate government, as prescribed by the code of rules, laid down by the Company. The contractors number some scores—some particular manipulators requiring only their individual exertions, while

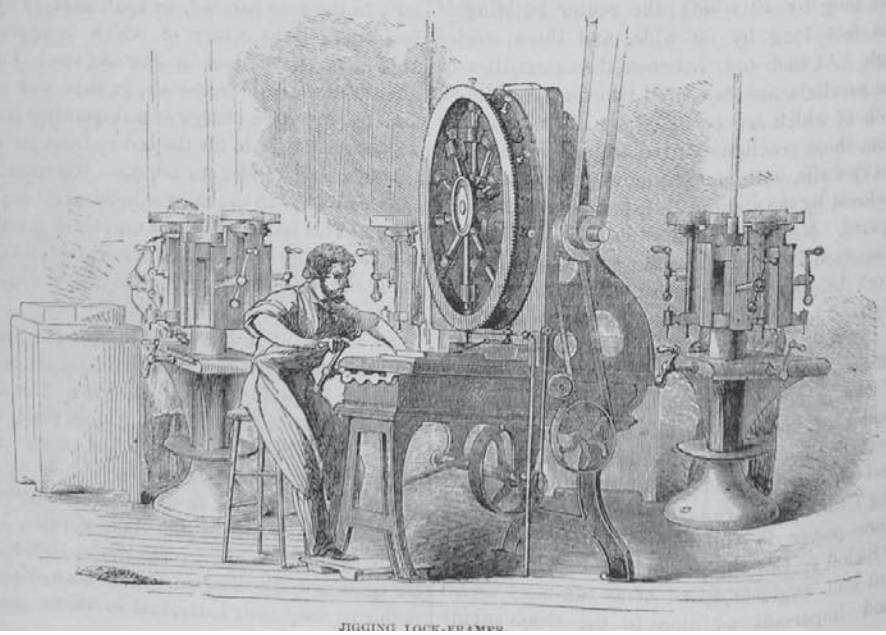
Plate 3. Page 233 Factory plan, materials, size, steam power; the storeroom.

others employ from one to forty assistants. Many of them are men of more than ordinary ability, and some have rendered themselves pecuniarily comfortable by their exertions.

We now pass into the forge shop, an apartment 40 by 200 feet square, comprising the whole of one arm of the parallel. Along each side range stacks of double-covered forges—the blasts for which, entering and discharging through flues in the walls, carry off the smoke and gases. Here, for the first time in our life, we were in a blacksmith shop in full operation, yet free from smoke and cinders, and with a pure atmosphere. Several kinds of hammers are used—those most in use, however, being "drops" of a novel construction and peculiar to the establishment; they are raised on the endless screw principle, and tripped by a trigger at the will of the operator. All the parts of the fire-arm composed of iron or steel are forged in swedges, in which, although they may have ever so many preliminary operations, the shape is finally completed at a single blow. That some idea may be formed of the amount of work on a single rifle or pistol, we have determined to state the number of separate operations of each portion, and in each department. We adopt the navy or belt pistol, the weight of which is thirty-eight ounces, as the example. In forging, the number of separate heats are enumerated: lock-frame, 2; barrel, 3; lever, 2; rammer, 1; hammer, 2; hand, 2; trigger, 2; bolt, 2; main spring, 2; key, 2; nipples, two each, 12; thus we find that no less than *thirty-two* separate and distinct operations, some of which contain in themselves several sub-divisions, are required in the forging for a single pistol.

After forging, each piece is inspected, and, if passed, is removed to the annealing ovens, which are situated in the foundry—this latter occupying the opposite arm of the rear parallel, its dimensions also being 40 by 200 feet. The arrangements here for both brass and iron castings are on a liberal scale; the former is mostly for mountings, bullet-molds, etc.—the latter for machinery. After being annealed, the forgings are immersed in a chemical preparation, to cleanse them by removing the scales and dirt; they are now ready for milling, shaping, etc.

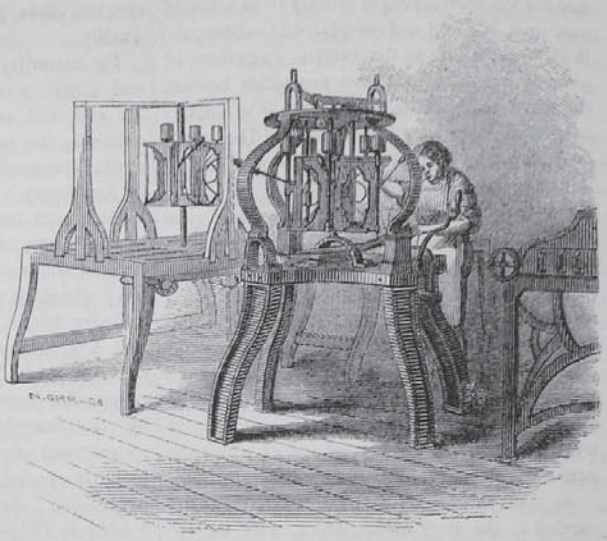
We now follow them to the armory proper, which, in the first place, is the second story of the front parallel. This is probably not only the most spacious, but the best arranged and fitted workshop extant. We fully understand this to be a broad and sweeping assertion, yet we have an abundance of competent authority to back the opinion. On first entering this immense room, from the office, the *tout ensemble* is really grand and imposing, and the beholder is readily impressed with an exalted opinion of the vast mechanical resources of the corporation. The room is 500 feet long by 60 feet wide, and 16 feet high. It is lighted, on all sides, by 112 windows that reach nearly from floor to ceiling; it is warmed by steam from the boilers—the pipes being under the benches, running completely around the sides and ends; there are



JIGGING LOCK-FRAMES.

Plate 4. Page 234 Descriptions of the forge, foundry and main building (East Armory).

also perfect arrangements for ventilation, and sufficient gas-burners to illuminate the whole for night-work. Running through the center is a row of cast-iron columns, sixty in number, to which is attached the shafting—which here is arranged as a continuous pulley—for driving the machines, as close together as possible, only allowing sufficient space to get around and work them. The whole of this immense floor space is covered with machine tools. Each portion of the fire-arm has its particular section. As we enter the door the first group of machines appears to be exclusively employed in chambering cylinders; the next is turning and shaping them; here another is boring barrels; another group is milling the lock-frames; still another is drilling them; beyond are a score of machines boring and screw-cutting the nipples, and next them a number of others are making screws; here are the rifling machines, and there the machines for boring rifle-barrels; now we come to the jigging machines that mortice out the lock-frames; and thus it goes on all over this great hive of physical and mental exertion.



STOCKING MACHINERY.

This machinery, though at first sight like that employed in the manufacture of cotton and silk, apparently intricate, is in reality mostly composed of simple and well-known elements, ingeniously and specially applied to effect the mechanical actions required; no better evidence of its perfection can be adduced than the fact that the various parts of the arms produced are so perfectly identical that, in assembling a pistol, the several pieces, taken promiscuously from the heaps, unite almost without manual labor. The limited space of this paper prevents a detailed description of the various machines, nearly 400 of which are in use in the several departments; however, it would be well for some other establishments that we have in our time visited if a portion of the mechanical advantages which they insure were more universally adopted for all general purposes—that of running by adhesive contact, instead of bands, more especially. Most engineers, undoubtedly unaware of its virtues, would seem to have neglected this natural principle of mechanism. In the stocking department, a circular saw, 30 inches in diameter, receives its only propelling power from the surface contact of the pullies.

It is unnecessary to describe all the operations performed by the machines; a few will render the whole understandable. Taking the lock-frame, for instance: they commence by fixing the center, and drilling and tapping the base for receiving the arbor or breech-pin, which has been previously prepared—the helical groove cut in it, and the lower end screwed—once grasped is firmly fixed into its position, furnishing a definite point from which all the operations are performed, and to which all the parts bear relation. The facing and hollowing of the recoil shield and frame, the cutting and sinking the central recesses, the cutting out all the grooves and orifices, planing the several flat surfaces and shaping the curved parts prepare the frames for being introduced between hard steel clamps, through which all the holes are drilled, bored and tapped for the various screws; so that, after passing through thirty-three distinct operations, and the little hand finishing required in removing the burr from the edges, the lock-frame is ready for the inspector. The rotating, chambered cylinder is turned out of cast-steel bars, manufactured expressly for the purpose. The machines, after getting them the desired length, drill center holes, square up ends, turn for ratchet, turn exterior, smooth and polish, engrave, bore chambers, drill partitions, tap for nipples, cut pins for hammer-rest and ratchet, and screw in nipples. In all there are thirty-six separate operations before the cylinder is ready to follow the lock-frame to the inspector. In the same

Plate 5. Page 235 Operations in the main building, tools and tool layout, parallels with cotton and silk mills.

handed over for the blueing process—an operation that requires nicety and practical experience. The ovens for this, as well as for the case-hardening—to which process all the iron work is submitted—as well as the forges for tempering the springs, etc., are located in the forge shop. From the polishers, the mountings go to the electro-platers—who occupy a room 25 by 40, in the basement of the office building, where they are plated with silver, and afterward burnished. The wood work returns to the stock-maker's shop—a room 60 by 80, in the third story of the center building. This is supplied with power saws, planes, morticing and shaping machines, for wood work, and, as throughout the whole establishment, every means is adopted for labor-saving. The stock then comes back for varnishing and the final finishing.

DRY POLISHING.

On their final completion, all the parts are delivered to the general store-keeper's department, a room 60 feet wide by 190 feet long, situated in the second story of the central building, and extending over the rear parallel. All the hand-tools and materials (except the more bulky kinds) are distributed to the workmen from this place; several clerks are required to parcel the goods out and keep the accounts; in fact, it is a *store*, in the largest sense of the term, and rather on the wholesale principle at that. On the reception of finished, full sets of the parts of the pistols, they are once more carried up to the assembling room; but this time to another corps of artisans. Guided by the numbers, they are once more assembled; and now, although each portion has associated with scores of its fellows, and gone through many distinct operations in distant parts of the establishment, our particular pistol, number 138,565, is re-assembled as first united, and the finished arm is laid on a rack, ready for the prover; of course many others accompany it to the department of this official, which is located in the third story of the rear building. Here each chamber is loaded with the largest charge possible, and practically tested by firing; after which, they are wiped out by the prover and returned to the inspection department. The inspectors again take them apart, thoroughly clean and oil them, when they are for the last time put together and placed in a rack for the final inspection. This is done by Mr. William Tuller, a gentleman who has been in the constant employment of Colonel Colt since the manufacture commenced in Hartford. The parts having been so thoroughly examined and tested, it would seem that this last inspection was scarcely necessary; but, after a short observation, we saw several laid aside. Taking up one with a small mark on the barrel, "Why do you reject this?" we inquired. "Pass that to-day, and probably much larger blemishes would appear to-morrow," replied Mr. T. The order from the Principal is perfection; and a small scratch in the bluing or varnish is sufficient to prevent the arm passing. The finished arm is now returned to the store room; from whence, after being papered, they are sent to the wareroom—situated in the basement of the office building; from this they are sent to nearly every portion of the habitable globe. We

BLUEING OPERATION

Plate 6a. Page 237 Bluing, hardening and testing, early use of the spine building.

every means is adopted for labor-saving. The stock then comes back for varnishing and the final finishing.

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BLUEING OPERATION

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Plate 6b. Page 237 Detail of bluing hearth.

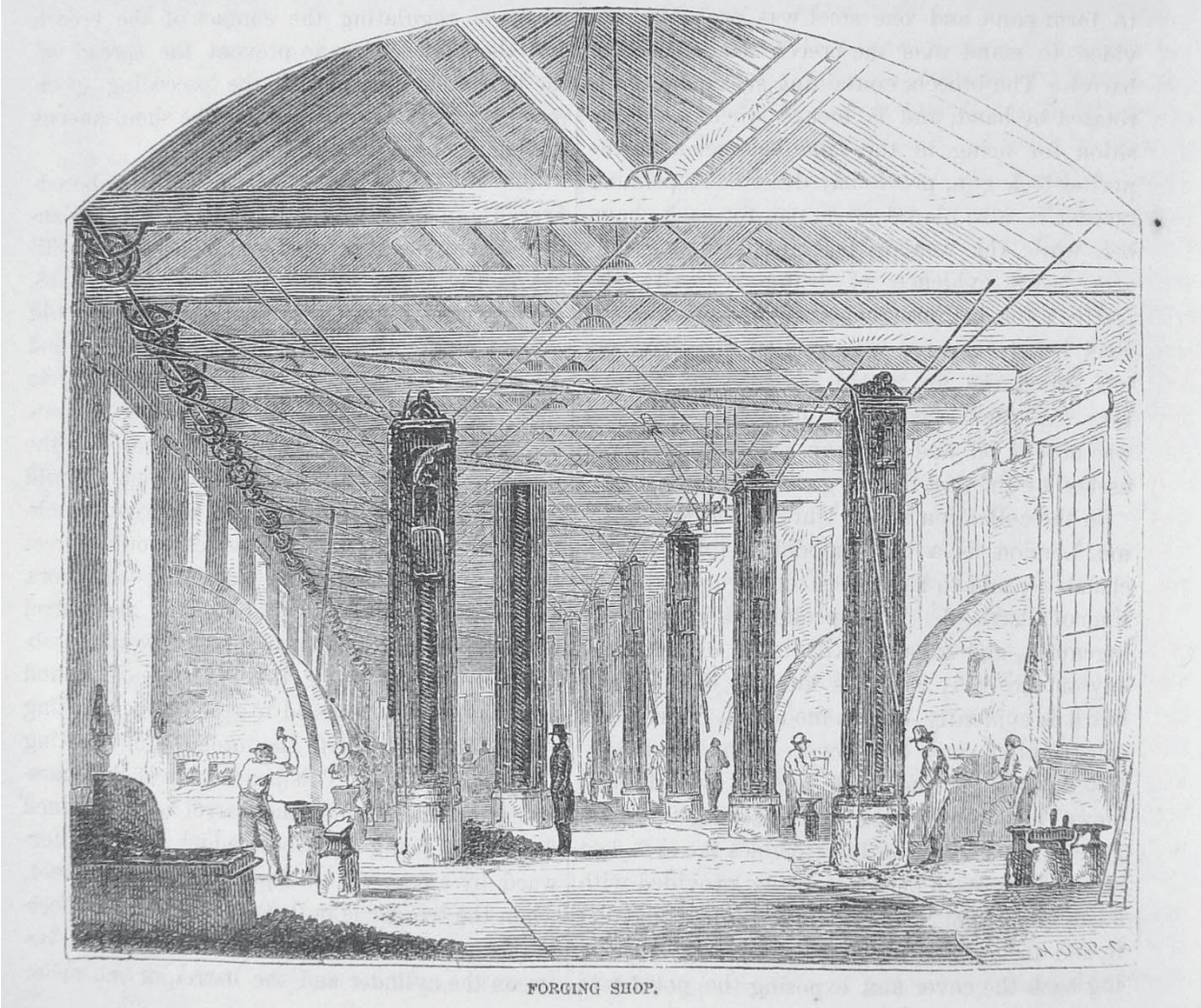
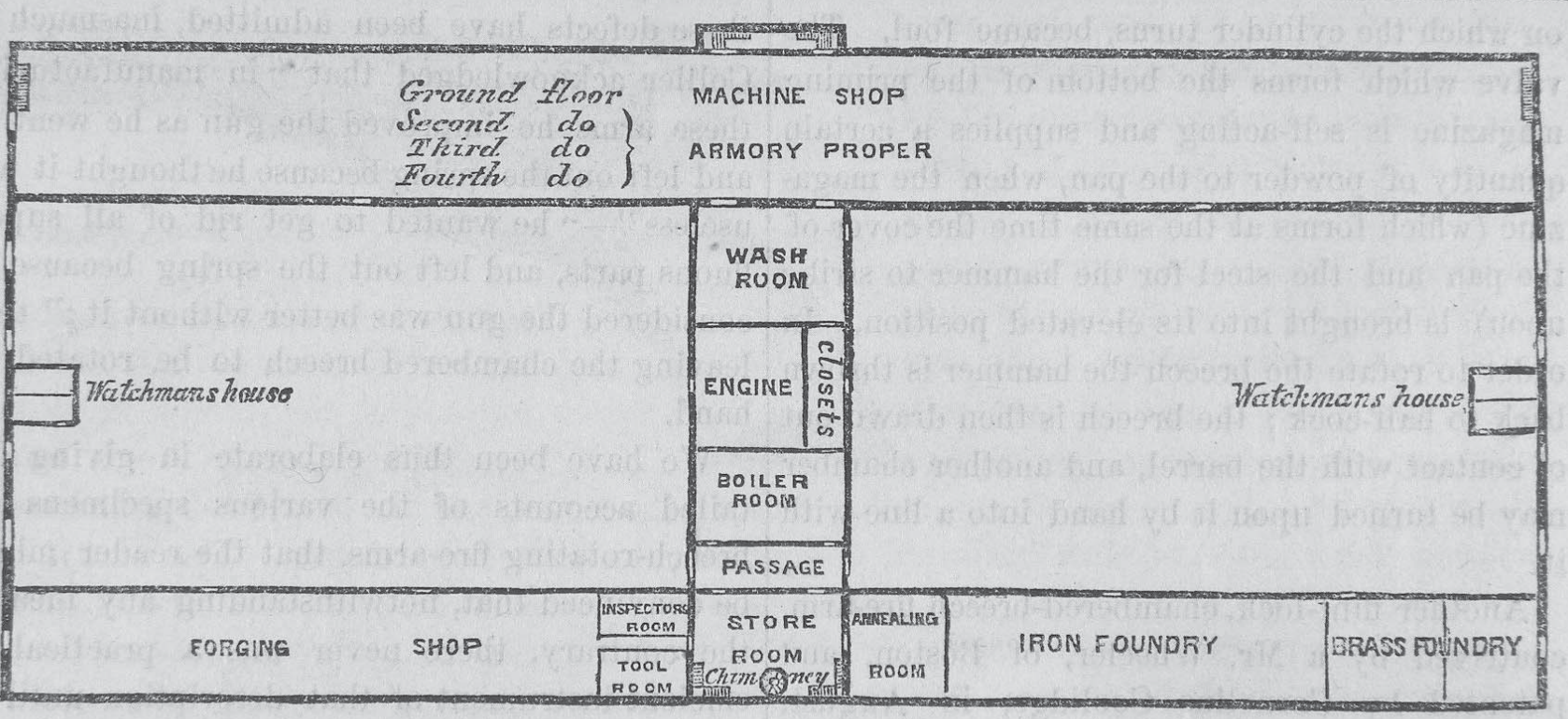


Plate 7. Page 236 View through the forging shop. Note double row of machinery, tied back to trusses; steam operated drive belts; hearths tied back to piers; course brownstone lintels over double- hung windows.



GROUND PLAN OF THE ARMORY.

Plate 8. Page 227. Plan. North is to the bottom of the page. White rectangles within the poché black lines of the walls appear to represent gates or doorways. Note two in each of the east façades of the forging shop and foundry, none in the west facades. Note chimney in storeroom and the engine and boiler rooms in the spine connecting the East Armory to the storeroom.

Appendix E

Plans and Surveys, 1869-1938

Each figure is a detail covering more or less the same area of southeast Hartford, taken from an atlas issued by one of a variety of companies providing business and insurance information.

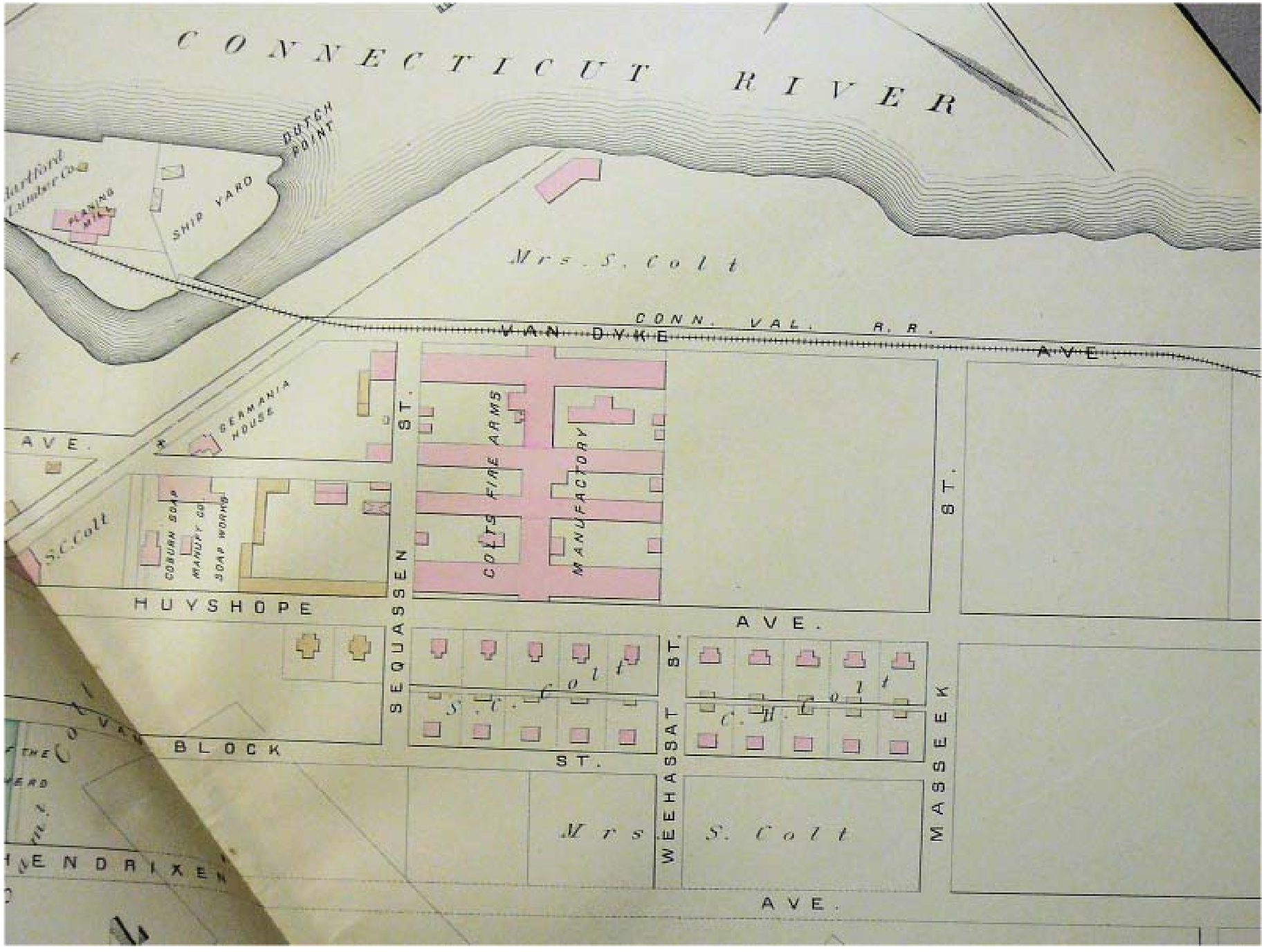


Plate 1.

1869

Baker and Tilden, Atlas of Hartford City and County. North is to the left.

The East Armory runs north-south the full length of the complex, immediately below the railroad line. Buildings 8 and 10, together with the storeroom in the east-west spine between them, make up the next full bar below, with Building 8 on the left. The map shows the boiler house in the corner between Building 10 and the spine. The building shaped like an inverted T in the southeast courtyard is the annealing building, which appears to have been built before 1861. It appears fully built in the 1861 photograph taken during the construction of the westward expansion of the complex (See Appendix A, Plate 2).

Plate 2.

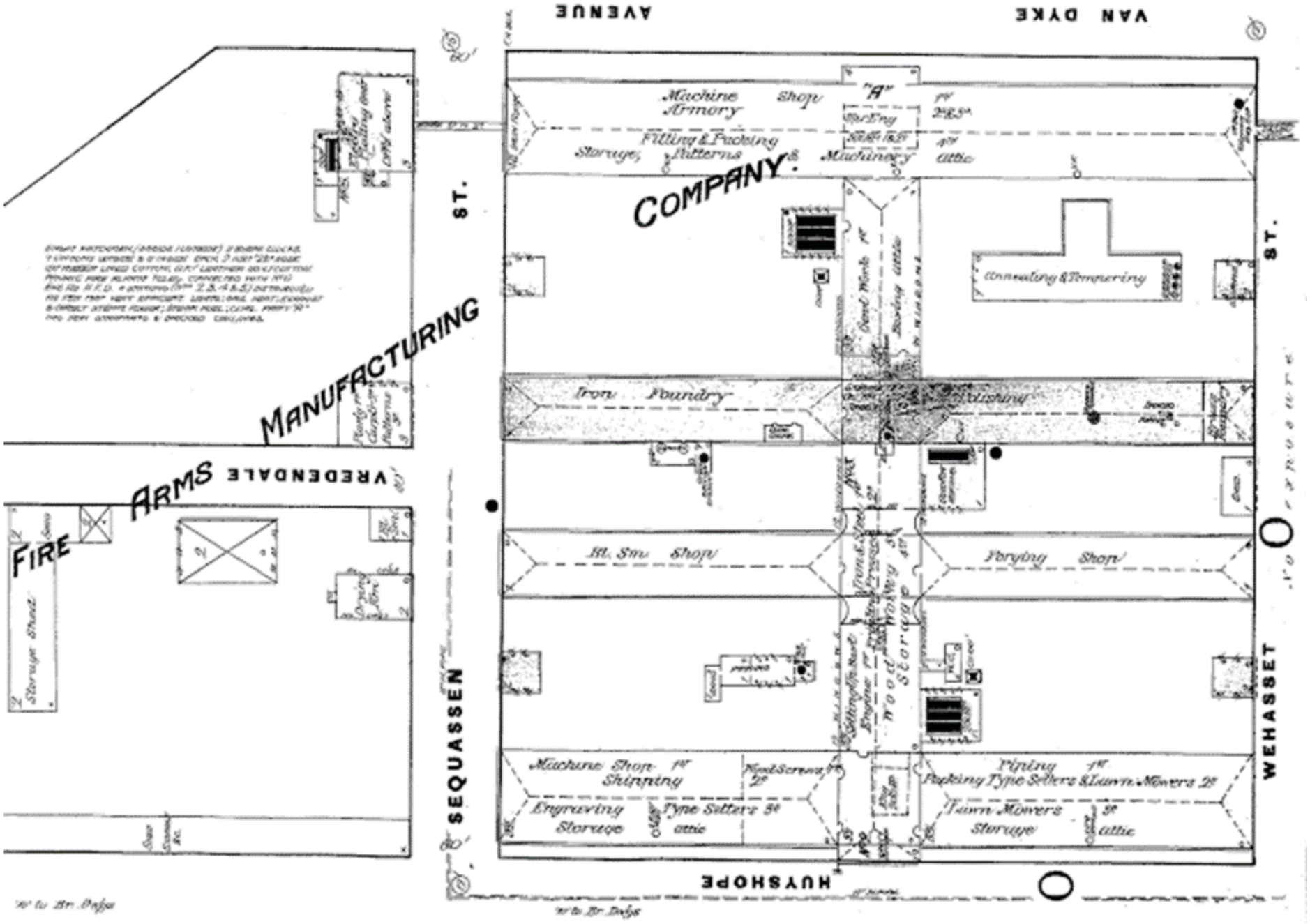
1885 map (Sanborn?)

North is to the left; the East Armory is at the top of the plan. This is the first atlas to note the uses of the factory buildings. Building 8 is labeled Iron Foundry. Buildings 8 and 10 and the storeroom between them have shaded roofs.

A note beside the black dot at the center of the roof of Building 10 (center right) indicates that it is related to an annealing foundry. This is probably the large, albeit square, chimney stack visible in the 1861 photograph (Appendix A, Plate 2).

The small rectangular building against the west side of Building 8 is labeled 'cupolas,' i.e., small free-standing furnaces; at the right end is an engine shed.

The dashed lines on the roofs seem to indicate hipped roofs on Buildings 8 and 10. This is at odds with all the early photographs and lithographs (see Appendix A). On the other hand, the East Armory was rebuilt, as can still be seen today, with cross-gables, which are not shown.



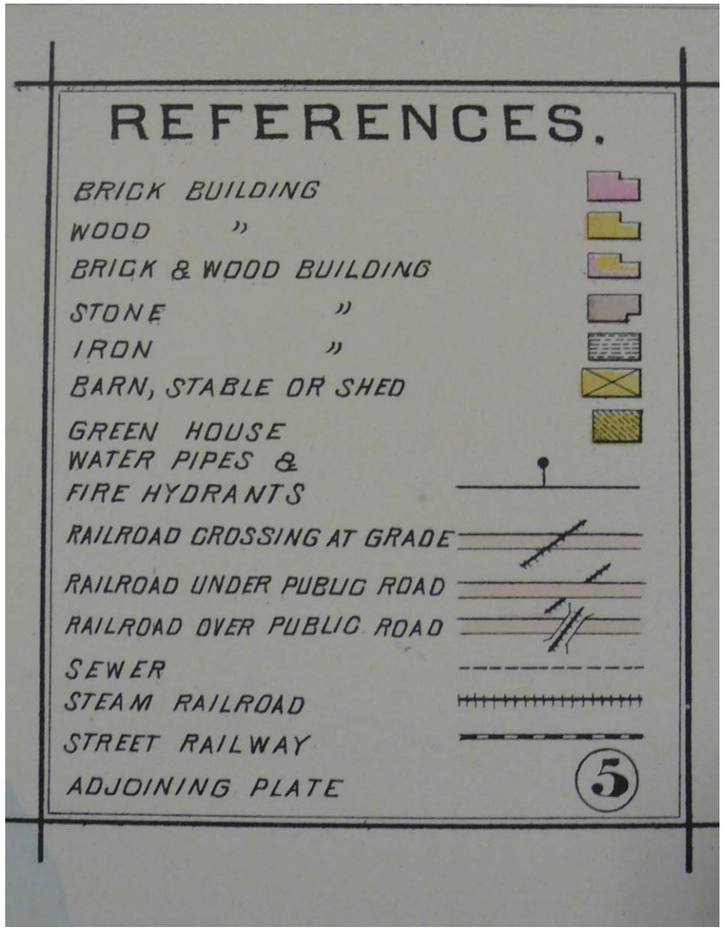
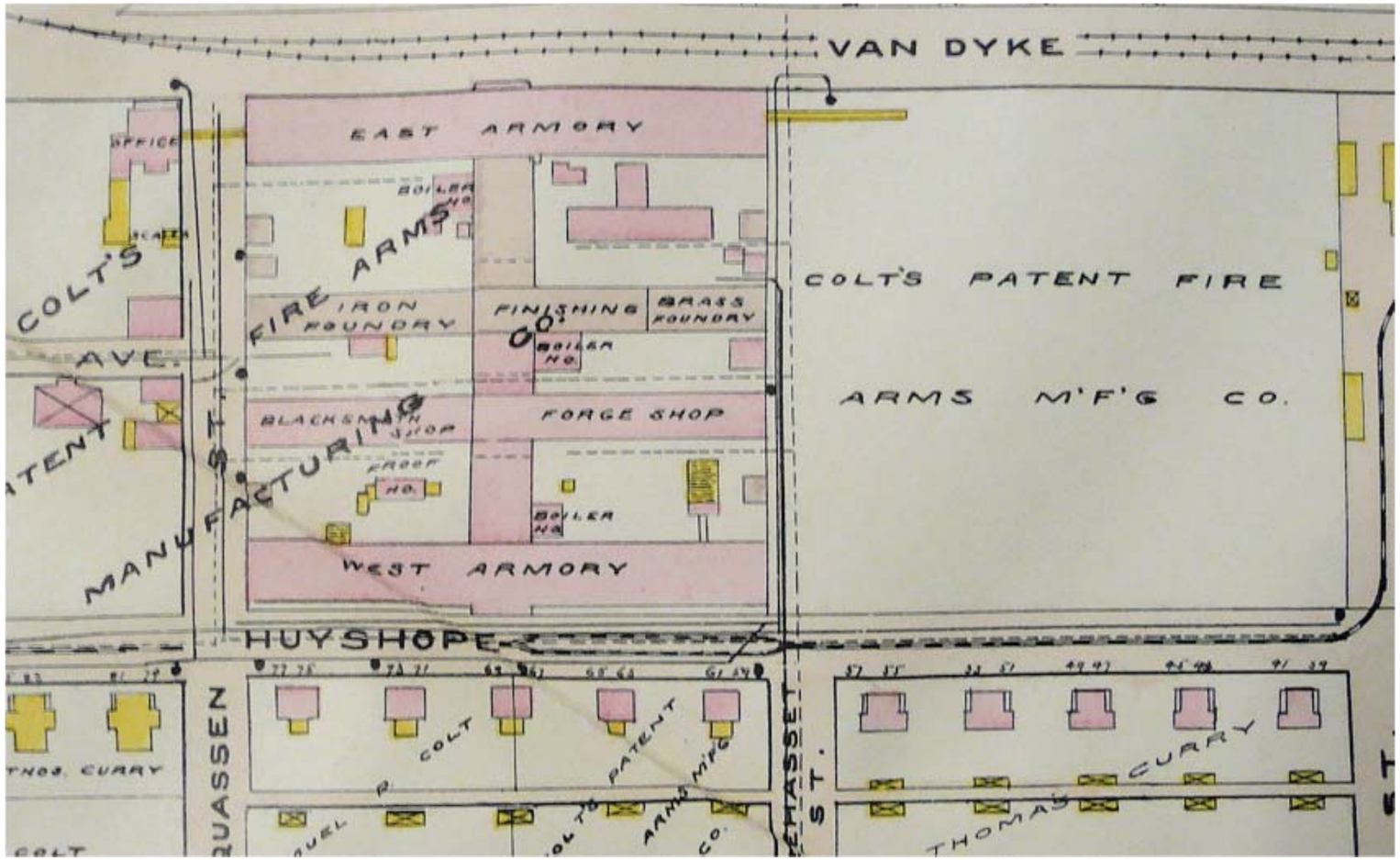


Plate 3.

1896

L. J. Richards & Co., Springfield MA, Atlas for the City of Hartford, Connecticut. Buildings 8 and 10 and the original spine location are rendered in brown, indicating they are stone buildings. Weehasset Street is already shown closed where it used to form the southern boundary of the factory site.



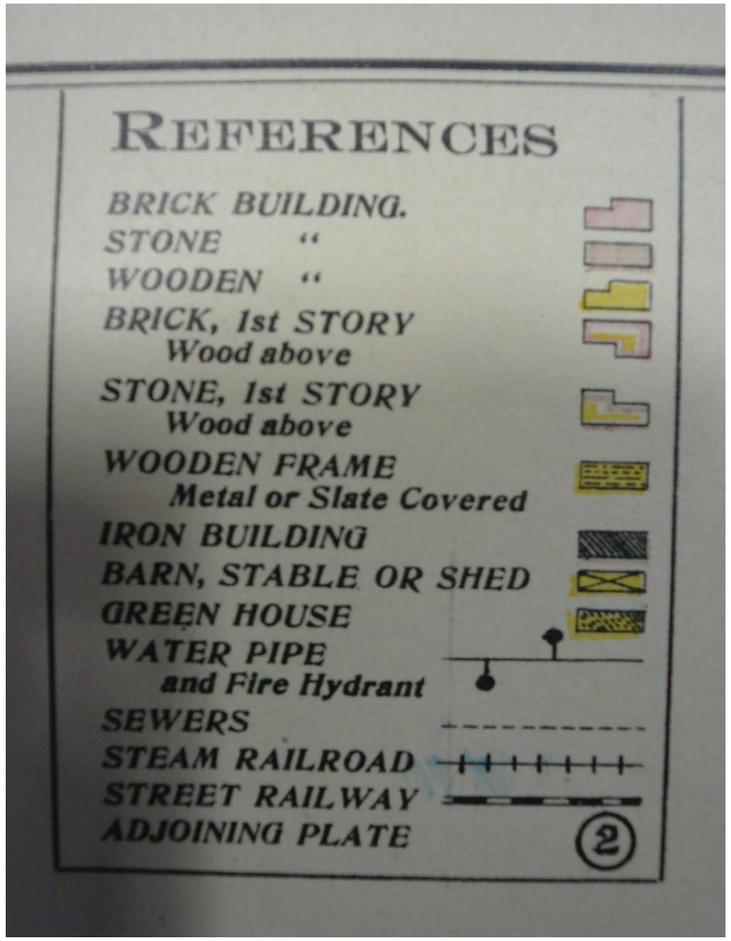
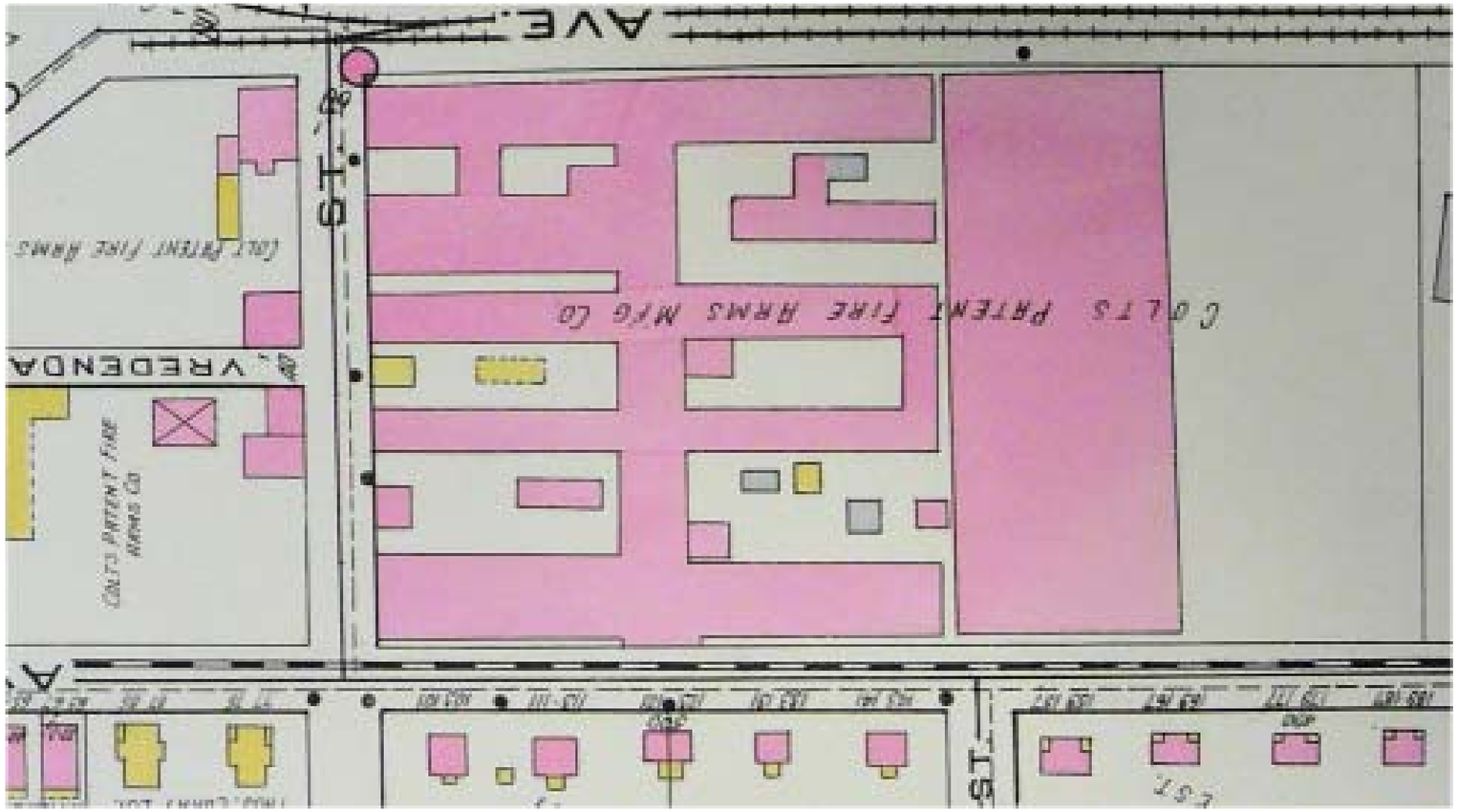


Plate 4.

1909

L. J. Richards & Co., Springfield MA, Atlas for the City of Hartford, Connecticut. Again, Buildings 8 and 10 are picked out in brown. Their uses are still much as shown in 1885 (Plate 2).



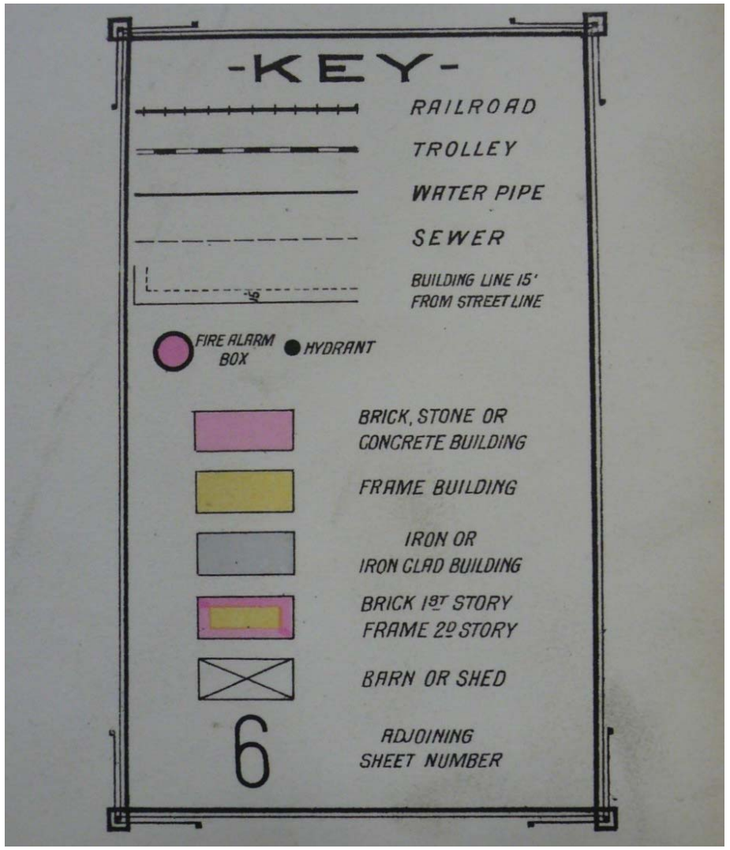


Plate 5.

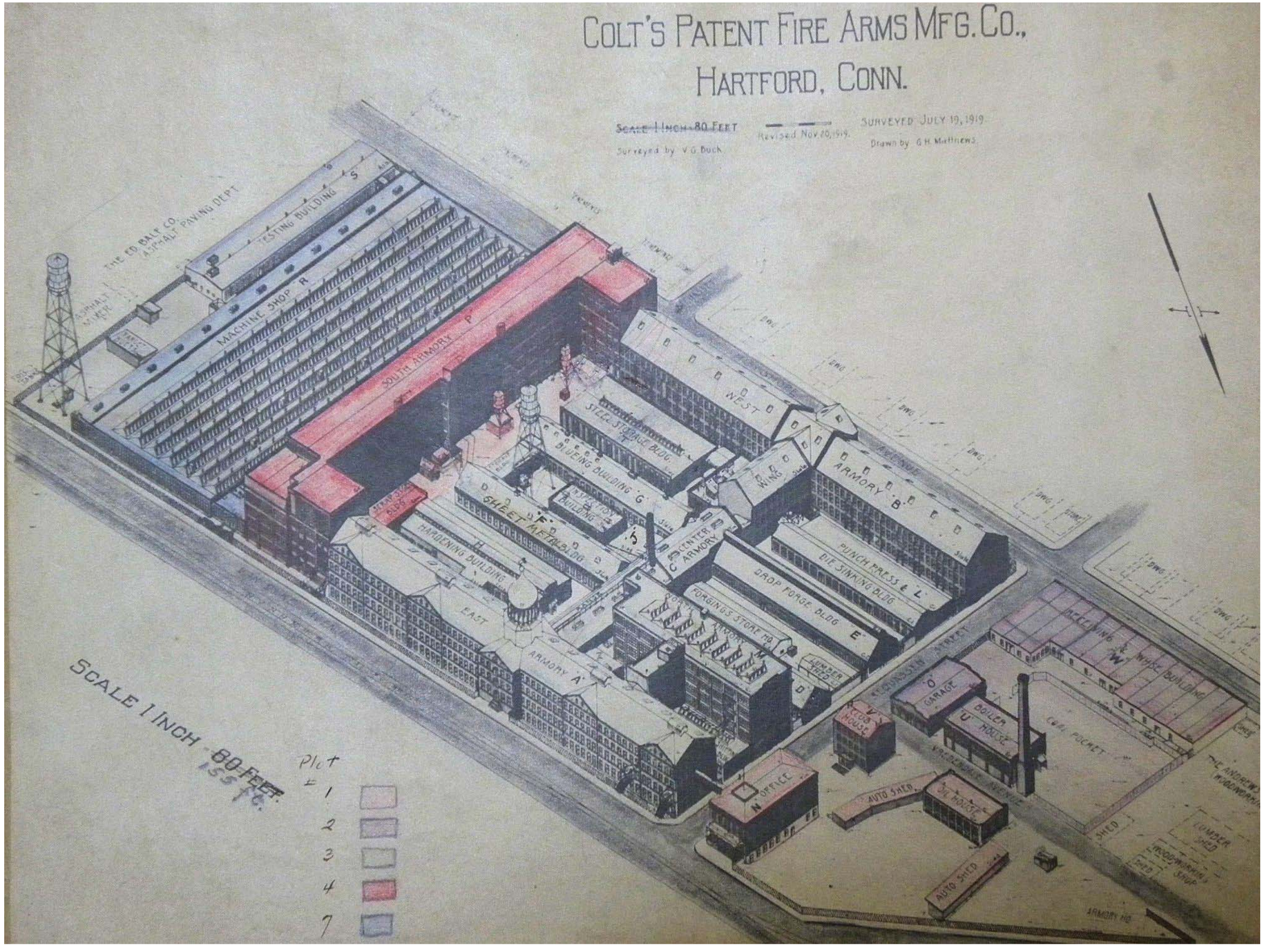
1917

Sanborn Map Company, New York City, Atlas of the City of Hartford, CT. North is still to the left. The North Armory now stands between Building 8 and the East Armory. Unlike the north wall, the original south wall connecting south ends of the buildings is no longer represented. The South Armory building, the large pink rectangle on the right, has taken over its function of enclosing the south courtyards. The south end of Building 10 is now connected to the south end of the parallel 1861 building. The frame building (drawn yellow), later labeled 'lumber shed' (see Plate 7), has already appeared just west of the north end of Building 8.

Plate 6.

1919

Survey by V. G. Buck, drawn by G. H. Matthews. Unfortunately, Building 8 is hidden by the North Armory, but the function of the buildings immediately to its west are clearly shown. Building 10 is given over entirely to sheet metal work. The hardening building, perhaps a new building, appears much closer to the east elevation of Building 10 than shown in earlier surveys.



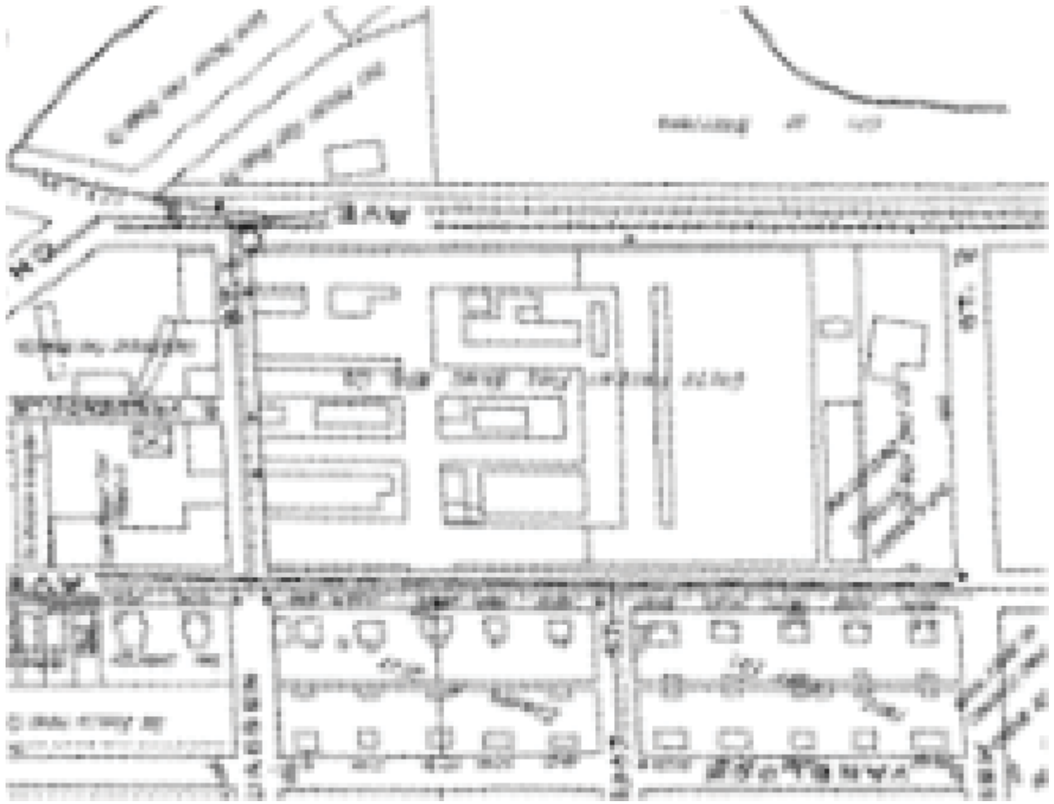


Plate 7.

1920

Sanborn Map Company, New York City, Atlas of the City of Hartford. North to the left. The outline of a building, later labeled ‘Forgings Storage’ (Plate 7), is considerably larger and closer to Building 8 than when it first appeared on an atlas in 1917 (Plate 5). Another building appeared for the first time in the courtyard to the west of Building 10; it was later identified as an Inspection Building’ (Plate 7).

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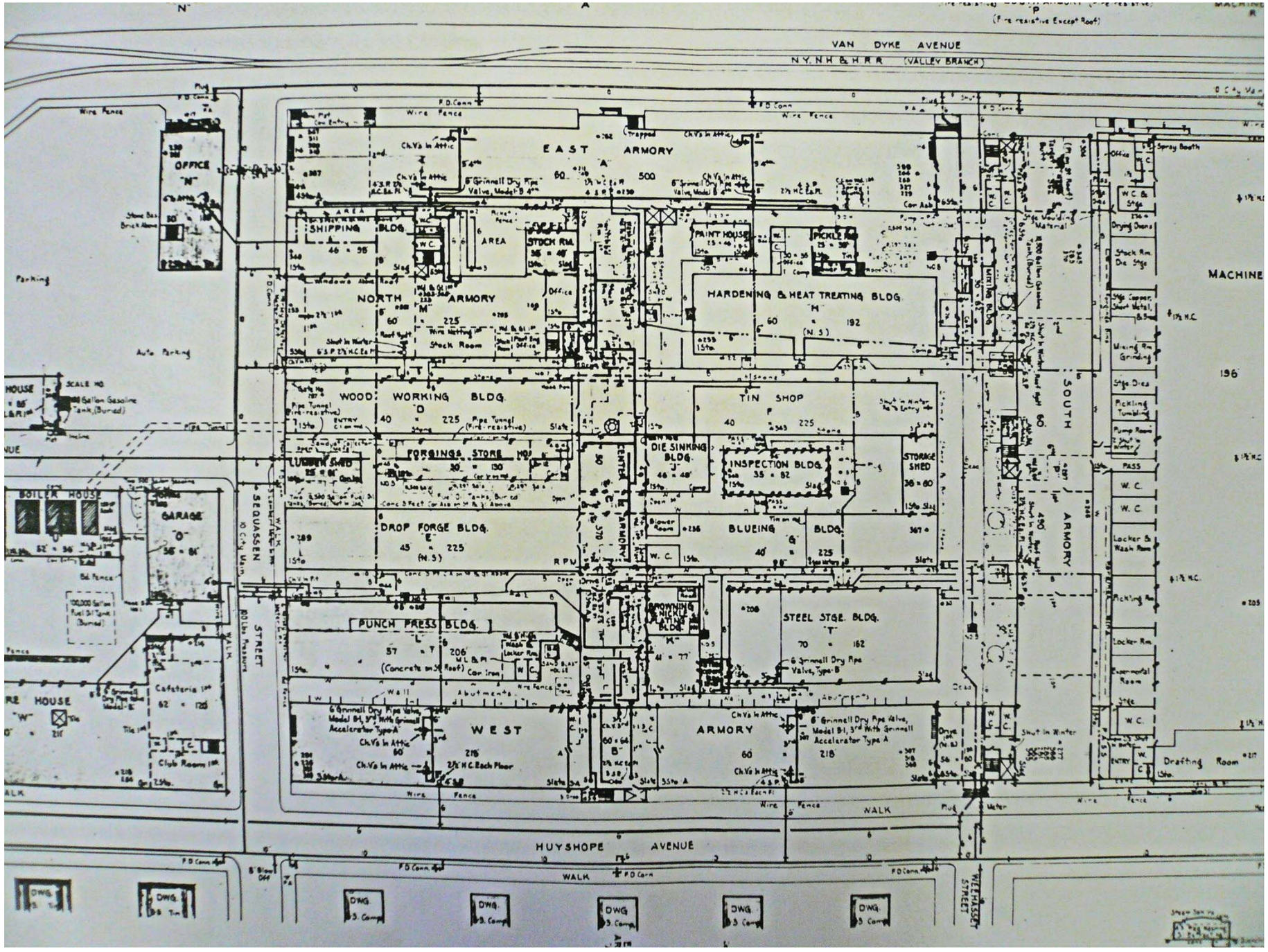
Plate 8.

1938.

Detail of survey. No publisher recorded.

Building 8 is labeled ‘Wood working building,’ Building 10 ‘Tin shop.’ The old boiler house in the corner between Building 10 and the spine is now shown as a ‘Die sinking building.’ It appears to be the same size as the old boiler house. The ‘hardening and heat treating building’ to the east of Building 10 appears to have been enlarged in the direction of Building 10 and to the south, replacing the watchman’s cottage at the south end of the original courtyard.



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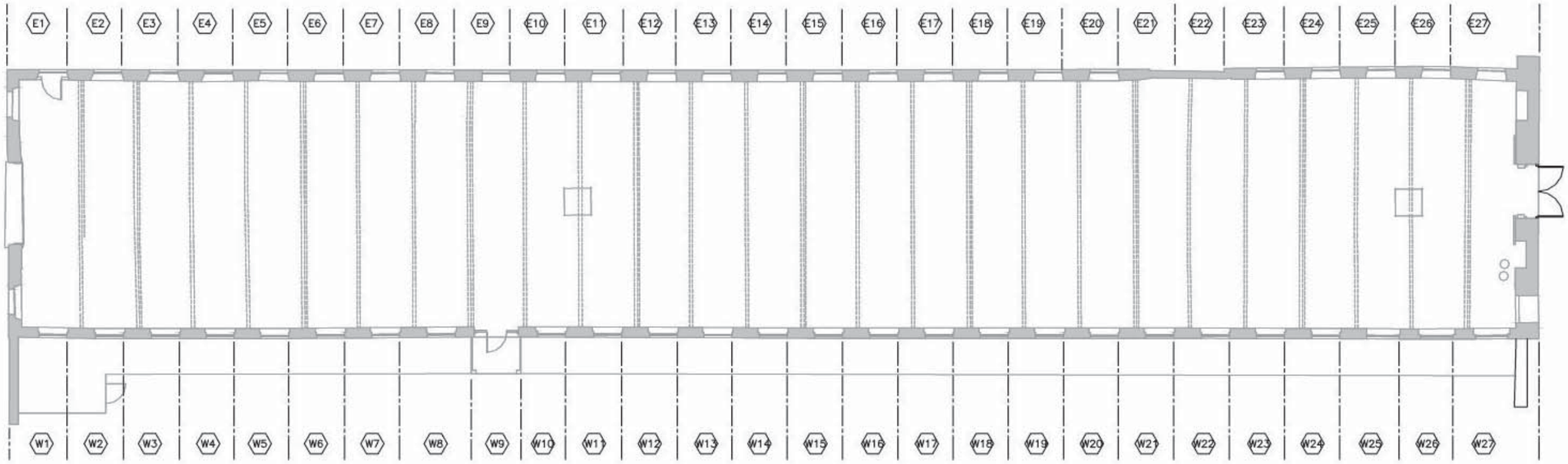
Appendix F

Current Plans

E

N



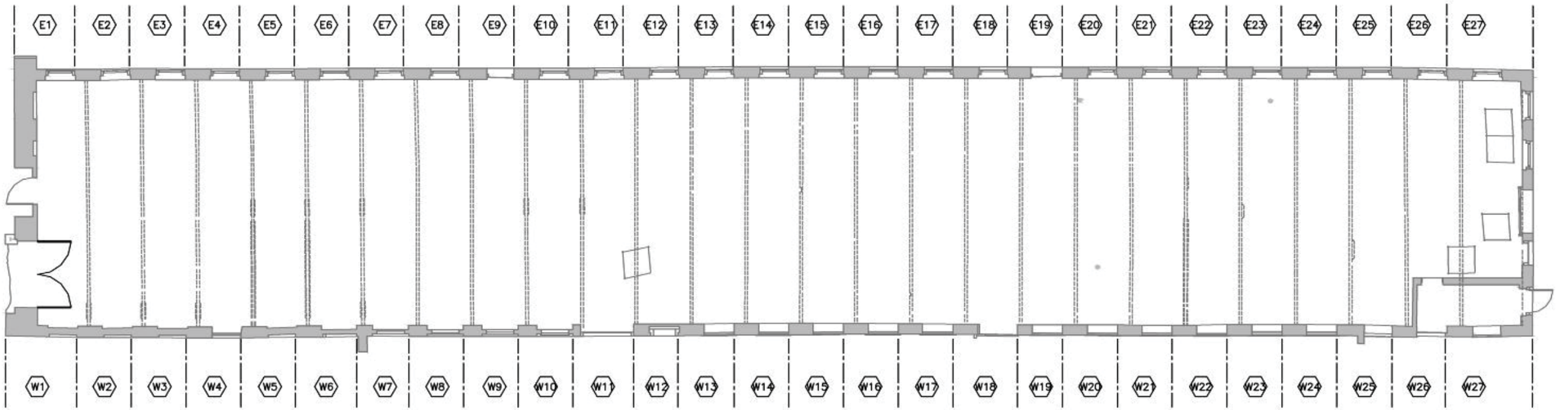
S

FLOOR PLAN – BUILDING 8

W

E

N



S

W

FLOOR PLAN – BUILDING 10