

Insurance Mapping and Industrial Archeology

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Fire insurance maps provide detailed information about building construction, interior features, and manufacturing processes. City-wide atlases, such as those published by the Sanborn Map Company, are widely known, but the atlases produced by local firms and site-specific surveys of individual industrial properties published by Barlow, Hexamer, and the insurance industry are a rich resource presently underutilized by industrial archeologists. This article identifies the firms involved and discusses their contributions by date, place, and type of site. An appendix lists publishers and locations of major collections.

Industrial properties always have presented special fire insurance risks due to the highly flammable nature of many of the commodities worked, such as cotton, rags (used in paper mills), and dust in grain- and sawmills. Various oils and coal gas, the available sources of illumination in the 19th century, were inherently combustible, and the frame construction of many buildings presented another incendiary factor. The introduction of steam engines with potentially explosive boilers created another risk, while heat produced from the friction of belts, shafting, and other mechanical power-transmission systems added yet another.

Each of these factors—the manufacturing process, architecture and construction, sources of heat and light, power and its transmission—represents an area of interest to the industrial archeologist, yet it was due to the fire-related threats inherent in each that we owe a most valuable historical document: the insurance survey. Insurance surveys contain a great wealth of detailed information distilled into a convenient form for IA-related work, yet they are not as widely known and used as they might be. The remarks that follow will identify the basic types of surveys available and will suggest where they might be found.

Insurance maps exist for entire cities, as single-sheet plans or complete atlases, as well as in the form of site surveys for

individual industrial properties. This article will discuss both types, but it will place the most emphasis on site-specific surveys of manufacturing plants.

Mapping for fire insurance purposes began as a tool for insurance company underwriters.⁷ In the first few decades of the 19th century, serious fires destroyed large sections of many American cities, wiping out the resources of small local insurance companies along with the buildings that burned. With the growth of urban centers and the spread of industrialization, larger insurance companies with greater capital resources were formed to underwrite property. The insuring company was not always located near the property being insured, and, since the underwriter could not visit the site in person, maps were developed to provide information on the fast-growing number of potential fire risks in the form of commercial, residential, and industrial structures. Insurance companies were funded both as stock investment corporations and, particularly for factories, as mutual companies, where the owners of similar types of property formed a cooperative association to insure themselves. Both types of insurers relied on maps or surveys to document the properties under consideration.

The Jefferson Insurance Company of New York sponsored the production of the first large-scale detailed fire insurance maps to be published in the United States. Surveyed and published by William Perris, a British-born architect and civil engineer, these maps of New York City were produced in seven volumes between 1852 and 1859. Through the 1880s, Perris's successor firm consisting of his son and son-in-law, Perris & Browne, continued to produce fire insurance maps of New York City, Brooklyn, and Newark, New Jersey.⁸ Perris's maps displayed many features typical to the genre of fire insurance plans. Of first importance were the colors used to show different construction materials. Red was used to show brick construction, yellow for frame, blue for stone, and so forth. Perris used green to show a special risk, such as an industrial building.

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Once printed insurance maps became available, the underwriter could determine “by a single glance” all the information he desired to know about a building: “The map maker managed by colors, characters, and signs to give a full description of the construction, equipment, and occupation of the building.”³ Insurance map makers brought down to a science the distillation of essential information for insurance underwriters, and many of their concerns were very similar to ours as historians.

Signs and symbols were developed to differentiate such details as stairs, roofs, skylights, and other construction features. These symbols were identified on a key included with the map. For the atlas format, such keys are found at the beginning of the book, along with the geographical index map. On individual city sheets or site plans, the key usually is a box to one side or at the bottom of the plan.

Fortunately, for the purpose of this study,

manufacturing plants are known as special hazards among insurance men and are given an even greater amount of detail. In such cases there are noted on the insurance maps all elevators, chimneys, and boilers. There are also indicated the number and location of the standpipes for fire purposes and their sizes, the position of the fire pumps, the kind of hose in use and its length, the style of lighting apparatus for the buildings. . . . There are even included such obscure things as bake ovens, furnaces, coal chutes, forges, kitchens, etc.⁴

This type of tally of interior features and equipment helps to identify the manufacturing process where it is otherwise unknown and provides useful details about the placement of specific machines, thereby greatly assisting the work of the industrial historian.

Sanborn Maps

Sanborn is the best-known name in insurance mapping, the most prolific publisher and still a going concern. Daniel A. Sanborn, civil engineer and surveyor, began his career with the Aetna Insurance Company, a private stock company that employed map makers as early as 1855. By 1866 Sanborn established **his** own firm, the National Insurance Diagram Bureau, in New **York**. In his first year he mapped 50 cities and towns, and 7 years later had to his credit 600 maps covering the whole United States. During the 1880s, he opened branches in Chicago and San Francisco. Sanborn died in 1883, but by the turn of the century the company he founded was the acknowledged leader in the field, far outproducing what remained of the competition and eventually absorbing most of it.⁵

Similar city fire insurance atlases were produced locally around the country by engineers and surveyors, real estate map publishers, and insurance company sponsors. Like Sanborn's in format, these atlases contained an index map with a page of key symbols that directed the user to a numbered plate covering several city blocks with remarkable detail. Sanborn atlases devoted considerable attention to industrial properties, and the company also prepared individual sheet surveys of industrial sites, hospitals, and universities.

The process of making the maps began in the field, with a surveyor preparing a detailed measured drawing showing each building to scale, noting such matters as construction (in color), number of stories, roof type, and occupancy. Manufacturing plants received a thorough interior inspection.' The surveyor's plan and notes were forwarded to the publishing office where draftsmen transferred the plan to lithographic stones for printing. Women employees added the color coding by hand, using stencils. The colored sheets then were mounted and bound into atlases.

A special Sanborn feature was its correction service. Additions, and changes due to fire, demolition, or reconstruction, were noted by the field inspectors, redrawn, printed, and colored. The corrections then were pasted over the proper site on the plan, either at the main publishing plant or by the traveling “paster corps” who visited the insurance office. This updating practice creates some difficulties in the study of site changes over time because it means that the former configuration is covered over. Successive editions of atlases were published for most cities over time, but these contained individual sheets corrected at different times according to site changes. It also is possible for atlases bearing the same publication date to exist in several different states of correction, depending on the efficiency of the correction service in a particular area. Fortunately, other insurance map makers issued new plans when corrections were necessary.

Canadian insurance maps similar to Sanborn's were produced in the last quarter of the 19th century for cities in the eastern provinces, and for western locations after 1900. A few surveys of individual industrial sites also were produced. In fact, Sanborn sent surveyors to Canada in 1874 at the request of insurance agents and produced maps of several cities. A local competitor soon established himself on the scene: Charles E. Goad began work in Montreal in 1875 and dominated the Canadian insurance-plan business **for** more than fifty years. Goad worked also in England where the company centralized operations after

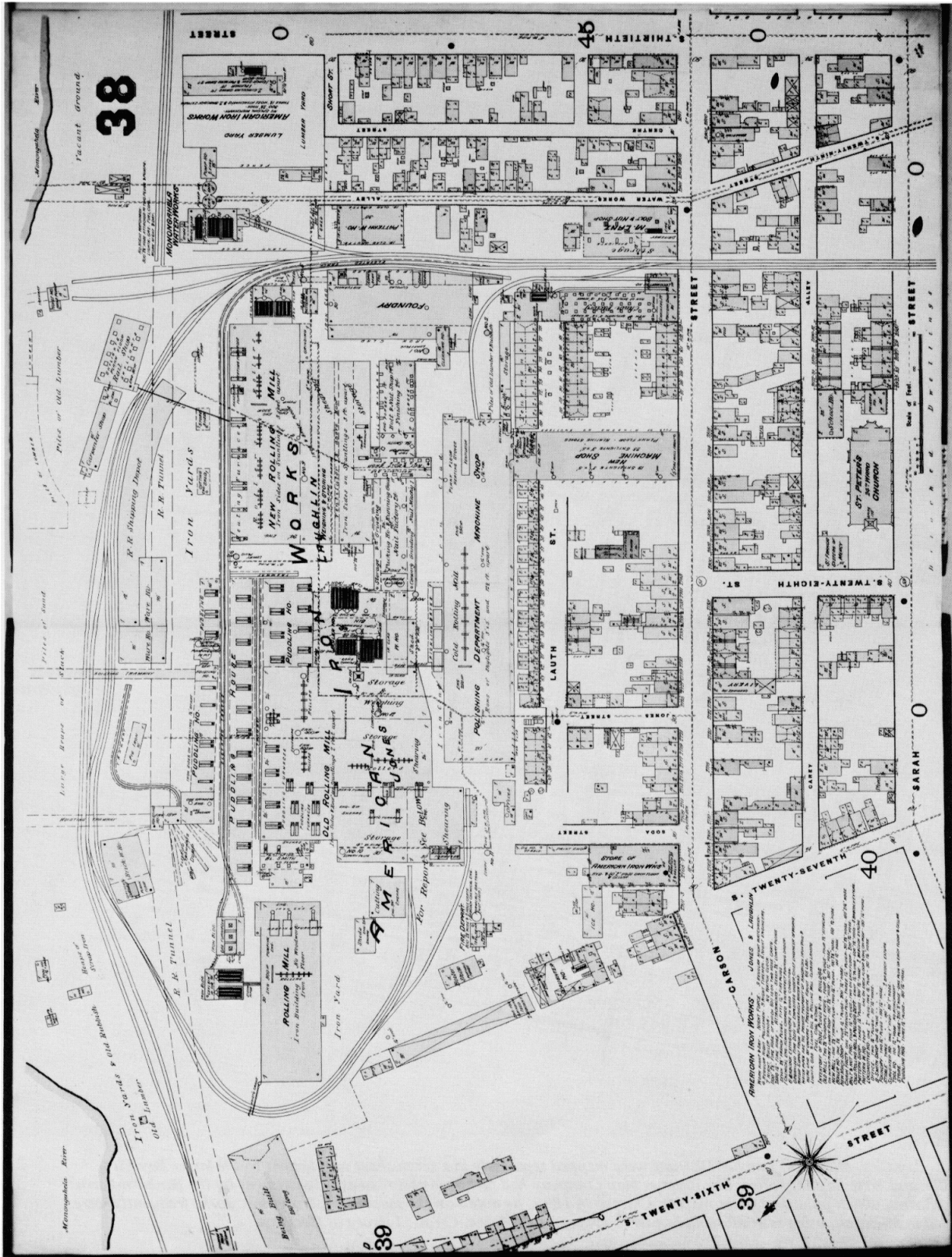


Figure 1. Sanborn's 1884 Pittsburgh atlas thoroughly documented Jones & Laughlin's American Iron Works puddling and rolling mill. Note the extensive rail network to all parts of the site, and Lauth Street worker-housing that virtually touched the ell of the new machine shop. Such maps give a sense of a community's scale and density, in addition to specific details of construction and operation. Credit: Library of Congress.

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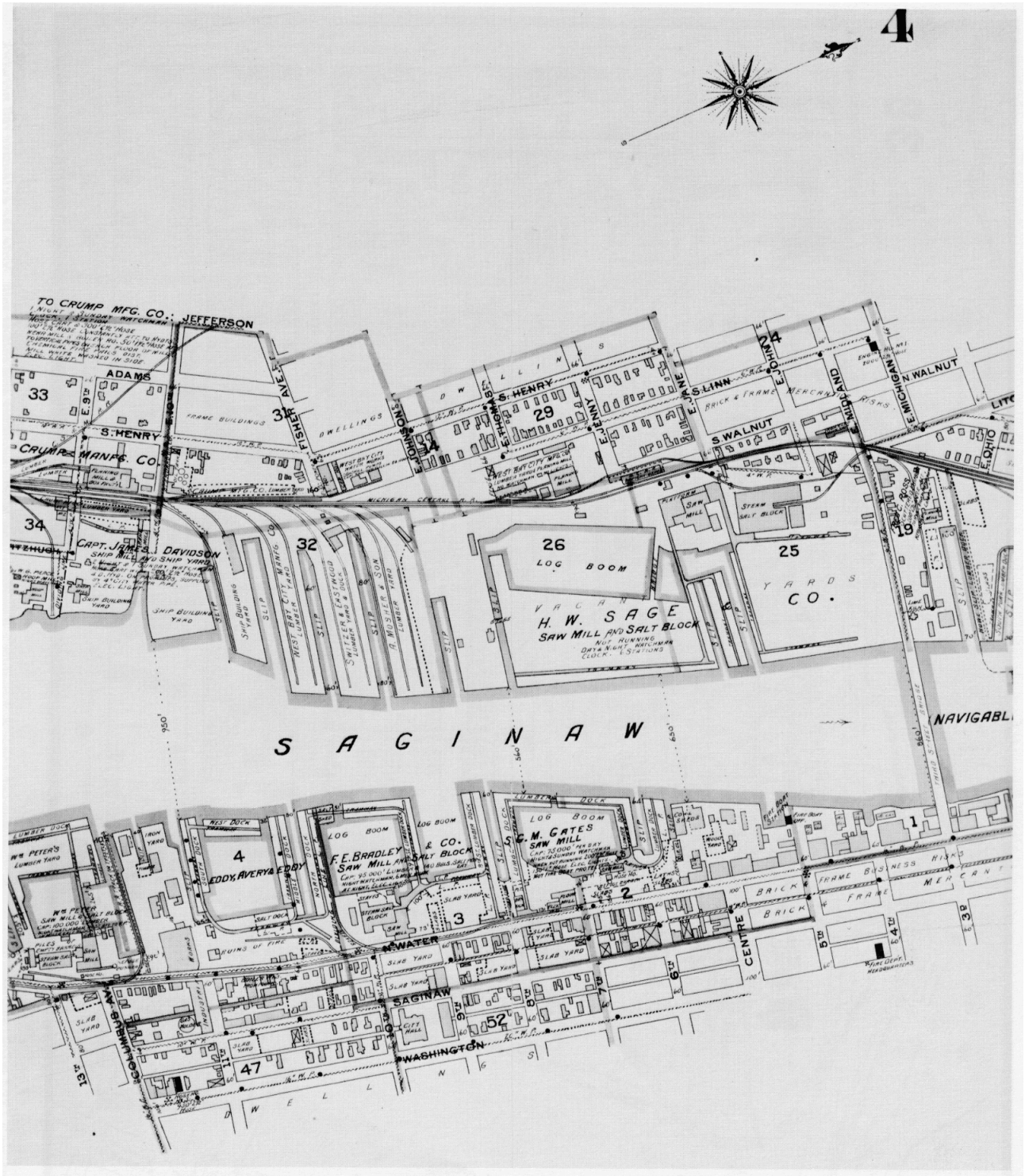


Figure 2. Bay City, Michigan, Lumber Districts were mapped separately in a seven-sheet supplement to the larger Bay city, Essexville, and West Bay city atlas. The Rascher Map Company had just been absorbed as a department by the Sanborn-Perris Map Company, which published these maps in Chicago in 1895. As noted on the maps, lumber and salt works frequently were combined in Michigan, using sawmill scrap as fuel to evaporate the brine. Credit: Library of Congress,

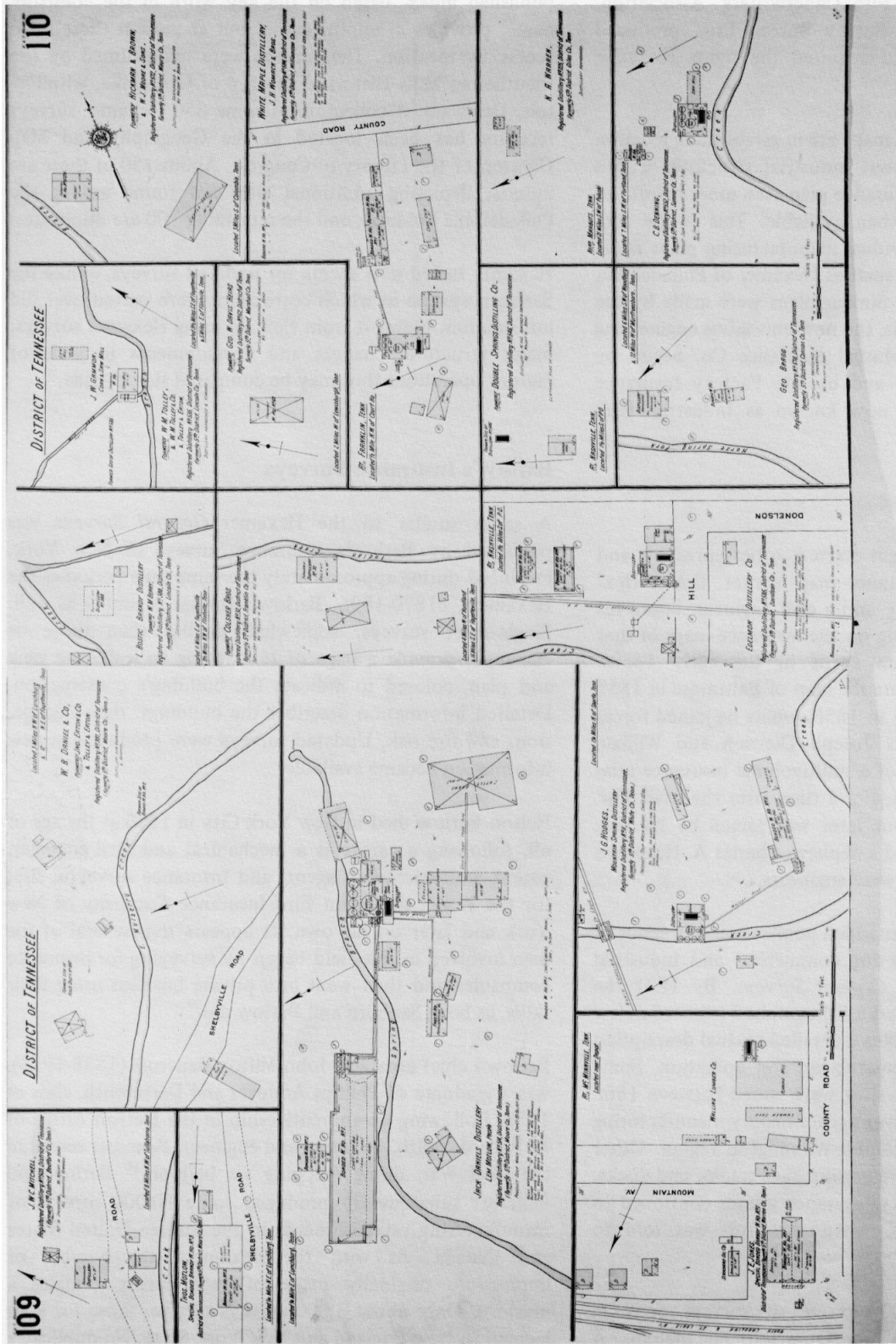


Figure 3. Sanborn produced a separate survey of distilleries and warehouses of Kentucky and Tennessee, published in 1910. Sources of water for both power and process are shown, as well as the necessary sawmills and lumber yards which were often adjacent. An earlier edition of this survey was published in 1894. Credit: Library of Congress.

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his death. The Canadian Fire Underwriters' Association, through its Underwriters' Survey Bureau Ltd., produced plans for its members and acquired the rights to revise Goad's plans after 1918.'

As useful as Sanborn-type maps are in establishing location and other information about industrial structures within cities, there is a type of insurance plan even more helpful to the industrial historian, when available. This is the site-specific survey of an individual manufacturing plant made by private surveying firms such as Hexamer of Philadelphia and Barlow of New York. Similar plans were made by the Associated Factory Mutuals, the now-enormous engineering division of the Factory Mutual Insurance Co. begun by Zachariah Allen in 1835, and by the Factory Insurance Association of Hartford, now known as Industrial Risk Insurers.

Hexamer's General Surveys

About the time Sanborn got started, other surveyors and engineers entered the insurance map market. Ernest Hexamer, a native of Germany and a civil engineer, began his career in New York working on the insurance maps of that city published by William Perris in the early 1850s. Hexamer published an insurance map of Baltimore in 1855 and moved to Philadelphia in 1856, where he joined forces at first with copublishers Joseph Dietrich and William Locher in the production of a multivolume insurance atlas of the city of Philadelphia. For a time after the Civil War, Hexamer worked alone but later was joined by his son, Charles John Hexamer, and a nephew, Charles A. Hexamer. Both son and nephew also were engineers.

In 1866, the Hexamer firm added publication of a series of individual insurance plans for commercial and industrial buildings, known as the *General Surveys*. By 1871 the format of the plate included a lithographed isometric view and a plan of the factory plus a detailed textual description of the works, both its construction and operation. Some 3,000 plates of individual sites were issued between 1866 and 1896. The *General Surveys* cover mainly manufacturing sites in the greater Philadelphia-Wilmington region. Other mid-Atlantic sites include reservoirs, race tracks, and docks. In addition, Hexamer's city insurance atlases continued to be published until 1915, when the firm was sold to Sanborn.

Copies of most of the 3,000 Hexamer site surveys survive in the map collection of the Free Library of Philadelphia. A

published index, based on the key word in the company name, provides a helpful guide, but at present there is no access by location. The surveys were microfilmed by the Eleutherian Mills Historical Library of Greenville, Wilmington, Delaware. A collection of some 850 Hexamer surveys recently has been located in the Geography and Map Division of the Library of Congress. About 150 of these are unique, depicting additional sites not found among the Philadelphia holdings, and the remaining 700 are duplicates.

Hexamer issued new sheets for updated surveys, unlike the Sanborn system in which corrections were pasted over old information, hiding it from view. In using Hexamer surveys, major structural changes and developments in scale of factory operations thus may be compared side by side.'

Barlow's Insurance Surveys

A series similar to the Hexamer *General Surveys* was published by Barlow's Insurance Surveys of New York. Produced during approximately the same time period as the Hexamers, c1870-1896, Barlow's format is similar as well. Single-sheet surveys, somewhat smaller than those of Hexamer, provide a page of text facing an isometric view and plan, colored to indicate the building's construction. Detailed information describes the buildings, their occupation, and fire risk. Updated surveys were produced as new information became available.

Nelson Barlow died in New York City in 1886 at the age of 69, following a career as a mechanical and civil engineer, patent and machinery agent, and insurance surveyor, first for the North American Fire Insurance Company of New York and later on his own. It appears that several of the men involved in this field began by surveying for insurance companies and then went into private business using their skills. as both Sanborn and Barlow did.'

Barlow's chief assistant, John Milton Bancroft (1838-1918), was a graduate of Phillips Andover and Dartmouth, class of 1859. Following an apprenticeship in the Detroit office of E. Willard Smith, architect and engineer, Bancroft served in the Civil War, doing mapping via balloon." Barlow and Bancroft subsequently produced some 10,000 surveys of manufacturing establishments in the eastern United States and Canada. As with the Hexamers, the number of impressions originally made of each survey remains a mystery. Only about 3,000 surveys survive, those for sites located in New England and New York State. No duplicates

Tacony Edge Tool and Hammer Factory, C. Hammond, Owner of Real Estate On Tacony Creek, Cheltenham Tp., Mont. Co. Pa.

2933
Formerly 1189

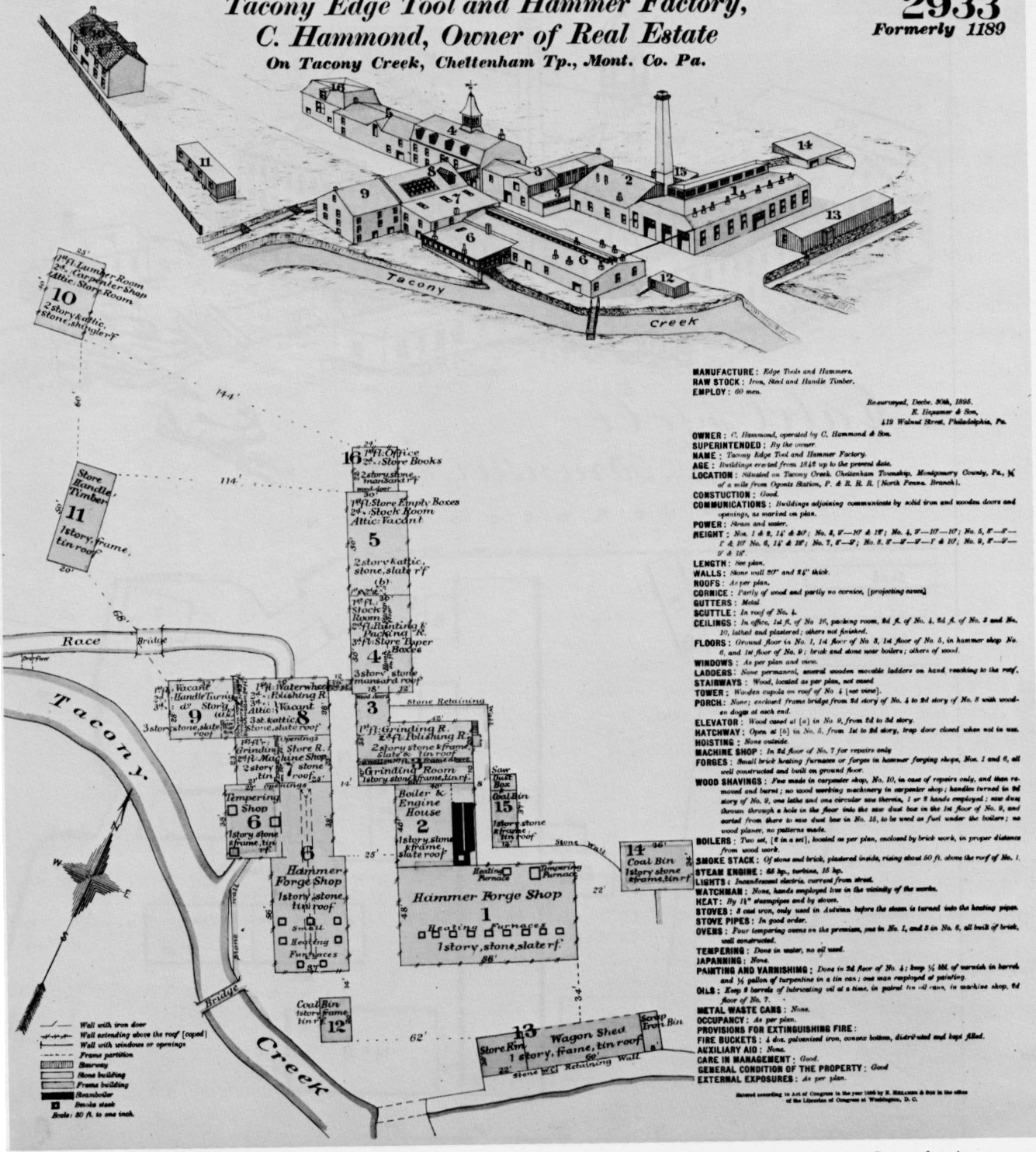


Figure 4. A typical Hexamer survey, this lithographed plan and view of the Tacony Edge Tool and Hammer Factory in Pennsylvania was published in 1895, updating an earlier survey. In addition to information on its construction and equipment, the age of the plant (1842 plus additions) and details of its operation (tempering, japanning, painting, and varnishing) also are listed in the text. Credit: Library of Congress.

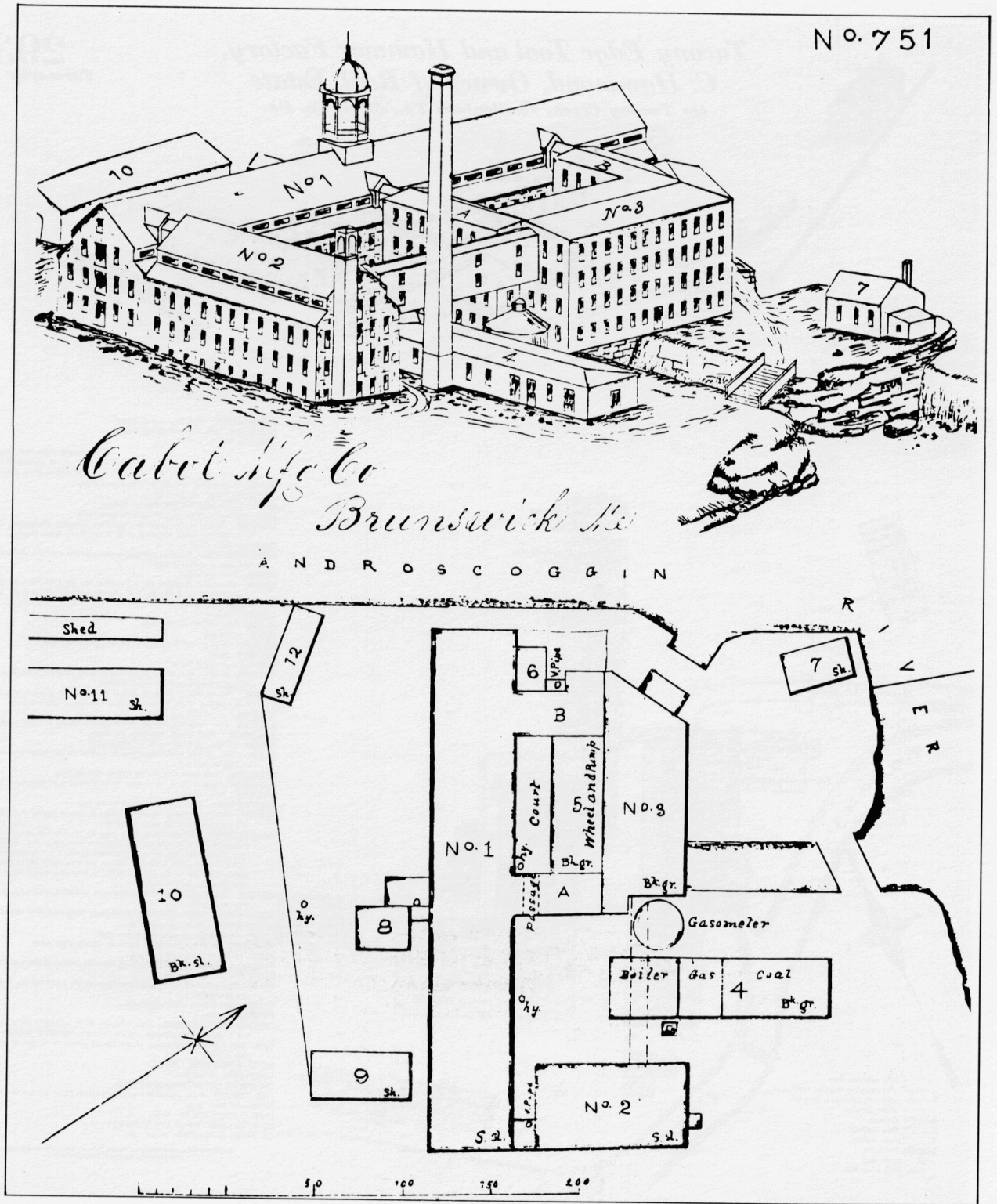


Figure 5. Early surveys made about 1860 for insurance companies, like this one of the Cabot Manufacturing Company, Brunswick, Maine, contained only a plan and a view. Presumably the text was included with a written inspection report. A volume of these early plans for New England mills is housed, along with thousands of late 19th- and early-20th-century plans, at Factory Mutual Engineering in Norwood, Massachusetts. Credit: Factory Mutual Engineering and Merrimack Valley Textile Museum.

BROAD BROOK COMPANY, BROAD BROOK, EAST WINDSOR, CONN.

OWNED—By Company.
GOODS—Fancy Cottons.
STOCK—All Wool; no Cotton. Work up their own hand made and longings.
CAPACITY—Thirteen sets.
POWER—Water and Steam.
EXPOSURE—See plan. June 20, 1875. J. M. B.

DESCRIPTION.

- No. 1. MAIN BUILDING & WING**—Built 1841-1846. Heavy four-story wall basement. Size—162x44 feet, wing 162x44 feet. Water-stones, fair iron doors in dilapidated wall, which is only eight inches above roof of wing. Rows—also and slings. Casings—wood. Screens—several. Locomotives with platforms. Engines—ordinary, not suitable for feeding. Boilers—has been torn out opposite sprinker pipes. Stairs—in towers. Elevators—in side, open.
Occupation—Basement, wheels, weaving, spinning and filling. First story, weaving. Second story, pick spinning and dressing, such as third story, pick spinning. Fourth story, pick spinning. Left, spread and finish. Wing, treatment, filling and cloth room. First story, weaving. Second story, cutting. Third story, cutting. Fourth story, cutting. Wing, treatment, filling and cloth room. First story, weaving. Second story, cutting. Third story, cutting. Fourth story, cutting.
- No. 2. Boiler and Dry House**—One story, stone, shingle roof. Open to mill. Brick divisions wall used boilers. Open chimney; not down beyond.
- No. 3. Dye House**—One story, stone, shingle roof. Inside stairs. Small 4½ horse power engine, with upright boiler, in brick addition. No. 4. Machine Shop. Two stories, brick, slate roof. Carpenter shop in second story, lumber in attic. Brick wall toward No. 5. Iron door in second story.
- No. 5. New Store House**—Two stories, brick, slate roof. Brick wall toward No. 4, with iron door in second story. Brick partition wall. First story, wood and drags. Second story, store box, stock, mill together below.
- No. 6**
- No. 7. Wood House**—One and one-half and two stories, brick, shingle roof.
- No. 8. Ticker House**—Two stories, brick, corrugated iron roof.
- No. 9. Engine House**—One story, brick, gravel roof. Wood cased land to No. 1. Wood door to No. 2.
- No. 10. Gas House**—One story, brick. Frame gasometer and shed.
- No. 11. Office Building**—One story, frame.
- No. 12. Blotch House**—One story, frame.

SPECIAL FEATURES.

- Heating**—Steam, chiefly in suspended pipes.
- Lighting**—Gas, made on premises, from *brandy oil*; the latter costs slightly more per gallon, as compared with *tenite* for *crude oil*.
- Watches**—Two nights and a day watch; Black Watch. Signal in kitchen.
- Pickers**—In No. 8; floor brick; power by shaft. Brick partitions to gauge center. Locomotive and common pickers. Second story contains substantial pickers and rag pocket for hand made, corrugated brick. Back road.
- Fire Pumps**—Two of the largest size Eales & Jencks; driven by Hose. Five-hundred feet, patent valves.
- Sprinklers**—Hull's system in upper stories of Nos. 1 and 2.
- Casks & Buckets**—A good supply.
- Steam Jets**—None.
- Extinguishers**—Four.
- Lightning Rods**—Yes.
- Ladders**—Wood and iron, with platforms.
- Auxiliary Aid**—None.

CHARACTER.

STOCK—Of good quality. Buildings well advanced in years. Floors considerably worn, some have been renewed. Cans by sweeping. Considerably improved since former survey. Management practical and energetic, and business probably has been successful.

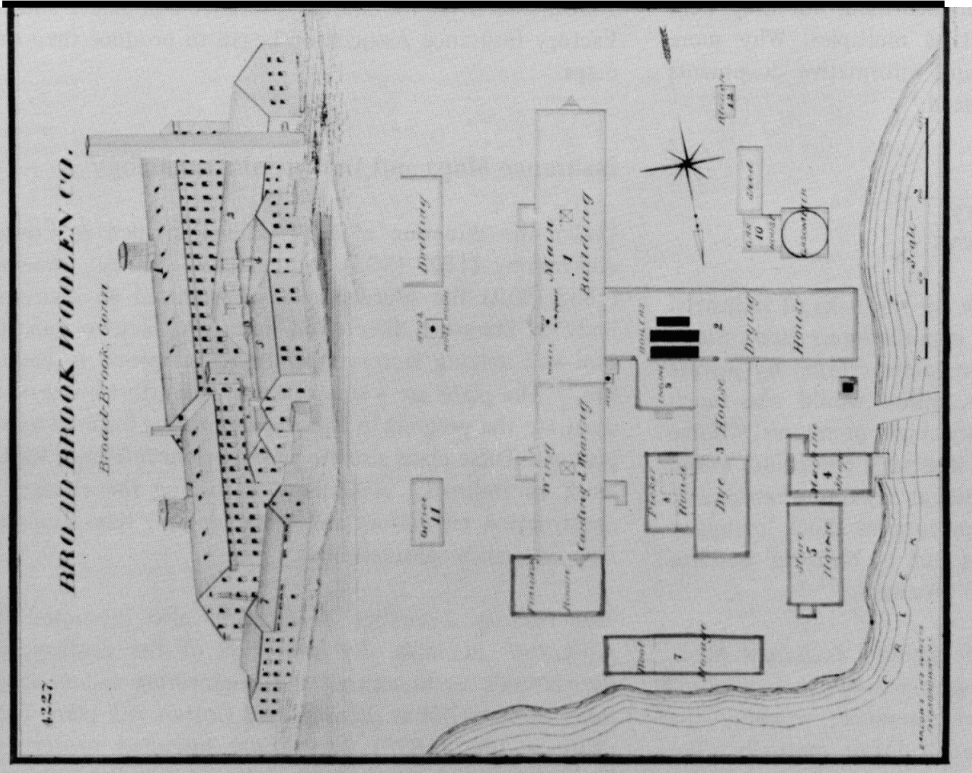


Figure 6. Barlow's Insurance Surveys featured a plan and isometric view facing a page of text describing the building's construction and occupancy, and often noting its age, hours of work, etc. This survey of the Broad Brook Company, a Connecticut woolen mill, was published in 1876. Credit: Merrimack Valley Textile Museum.

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of any surveys have ever been identified, but they were printed and thus should exist as multiples. Why more examples of these attractive and informative documents have not survived is puzzling indeed.”

The Mutuals and the Factory Insurance Association Surveys

Finding insurers willing to take on the risks of industrial properties was a problem early manufacturers faced. Stock companies, those insurance companies created by private investors looking for a profit, either would not touch industrial risks or charged very high premiums. “Some conservative managers of stock insurance companies would not take a risk upon a cotton mill at any rate whatever.”” In fact, the president of a prosperous stock company offered “‘to insure any cotton mill to burn up’ but not against **loss** by fire at any rate of **premium**.””¹³

Under the leadership of Rhode Island’s Zachariah Allen, textile manufacturers banded together to insure themselves, a principle known as mutual insurance, whereby the manufacturers agreed to share all losses mutually. The mutual idea spread among other industrial owners, resulting in the formation of a number of mutually owned industrial insurance companies, such as Lumbermen’s Mutual and Paper Makers’ Mutual, all based on the concept of distributing manageable amounts of risk liability among several insurers.¹⁴ With the growth of the Mutual system for factory insurance, however, and with their increasing development of their own engineering and inspection services, more industrial sites were covered by the Mutuals’ own plans. Their plan department, organized in the late 1880s, became a prolific producer of factory surveys for plants insured in Mutuals. Initially they were not as informative as the surveys of Hexamer or Barlow, since they were only an adjunct to the more comprehensive written inspection report also prepared by the burgeoning engineering department.

Known by the individual insurance company name, or as the Associated Factory Mutuals after they combined, the Mutuals’ plans, and those of their competitor, the stock-owned Factory Insurance Association, were single or double-sheet surveys containing a plan, sections, and an isometric view, but with only minimal text. Barlow’s insurance surveys often noted that a factory was “insured in Mutuals,” and it is interesting to note that Barlow’s firm, along with Hexamer’s *General Surveys*, died out in the

1890s, soon after the mutual insurance companies and the Factory Insurance Association began to produce their own maps.

Insurance Maps and Industrial Archeology

Under the direction of such influential men as Edward Atkinson (1827-1905) and John Ripley Freeman (1855-1932) the Mutual system produced an enormous body of literature directed at improving factory construction and making factory operations less prone to causing fire.” The plans are a side effect of this effort but serve to illustrate the progress in factory engineering inspired by the Mutuals. These plans also are an important reference for the work of industrial archeology, recording the changes in construction techniques and materials over time stemming from insurance considerations.

The Factory Insurance Association also promoted fire prevention in mills. By the turn of the century, the association’s architectural and engineering recommendations came to life as the Standard Cotton Mill plan. These plans at first (1898) were “only intended to serve as illustrations of the general principles most desirable from an underwriter’s standpoint and are not issued for the purpose of actual builder’s plans.” By 1905, however, the revised plans added the statement: “We recommend the employment of an experienced, reliable, and responsible mill architect and engineer to advise on conditions, prepare plans and to be responsible for the construction of all mill properties.””¹⁶

As documented in these plans, insurance recommendations came to have considerable influence on mill construction. The very term “mill construction” was defined in the fire insurance field by the characteristics identified also as “slow-burning construction”: thick plank floors supported on interior beams of large cross-section rather than joists of small section, and shingles set in mortar, Stairs, elevators, and belts have cut-offs at floors and preferably are put in towers so as to avoid vertical openings that permit fire to go quickly from story to story. This is “mill” or “slow-burning” construction.

The frequent reiterator of these standards, Edward Atkinson, commented on his friend H.H. Richardson’s adoption of these principles: “The great warehouse built by Richardson and his successors for Marshall Field is but a glorified cotton factory, and the lovely little building connected

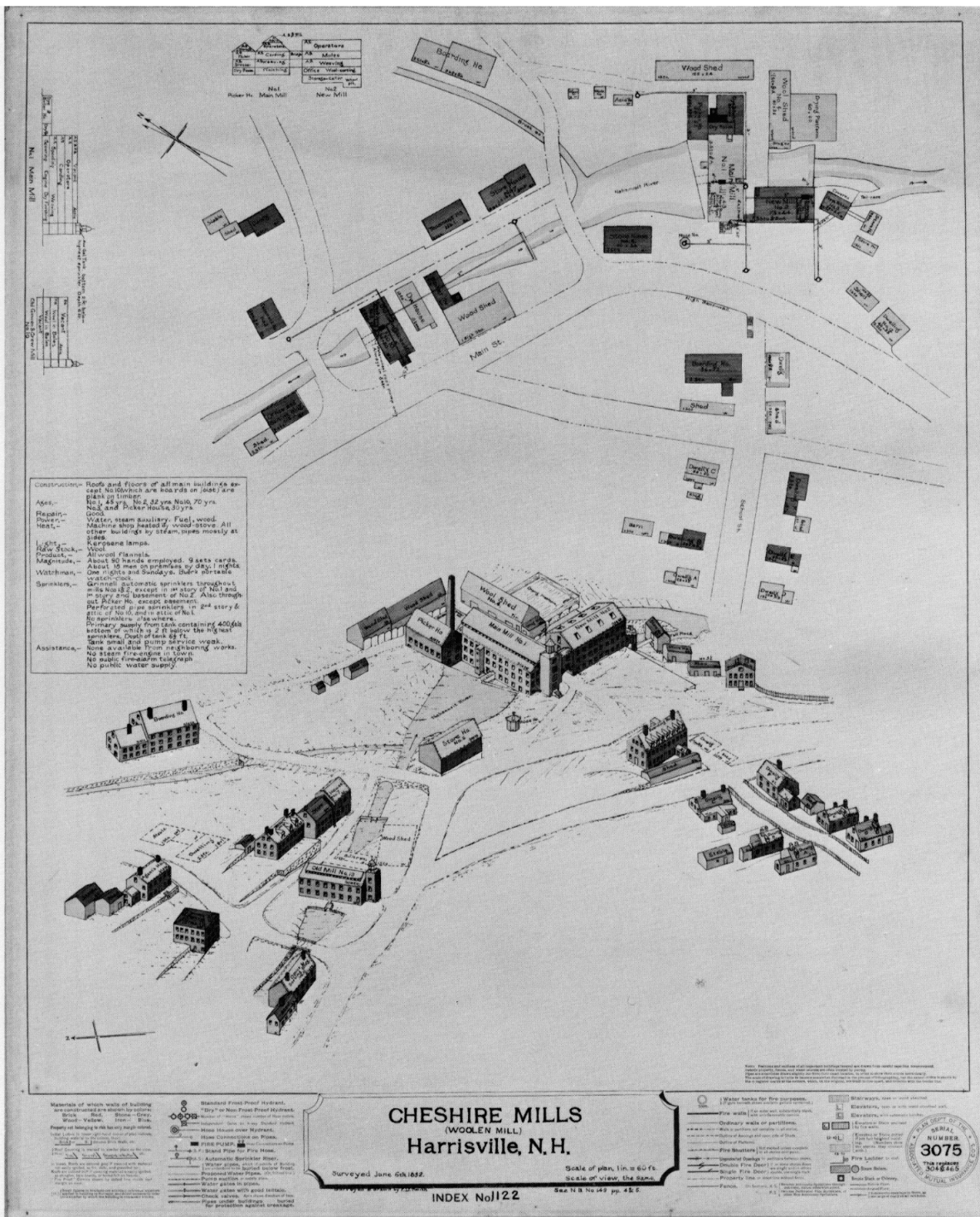
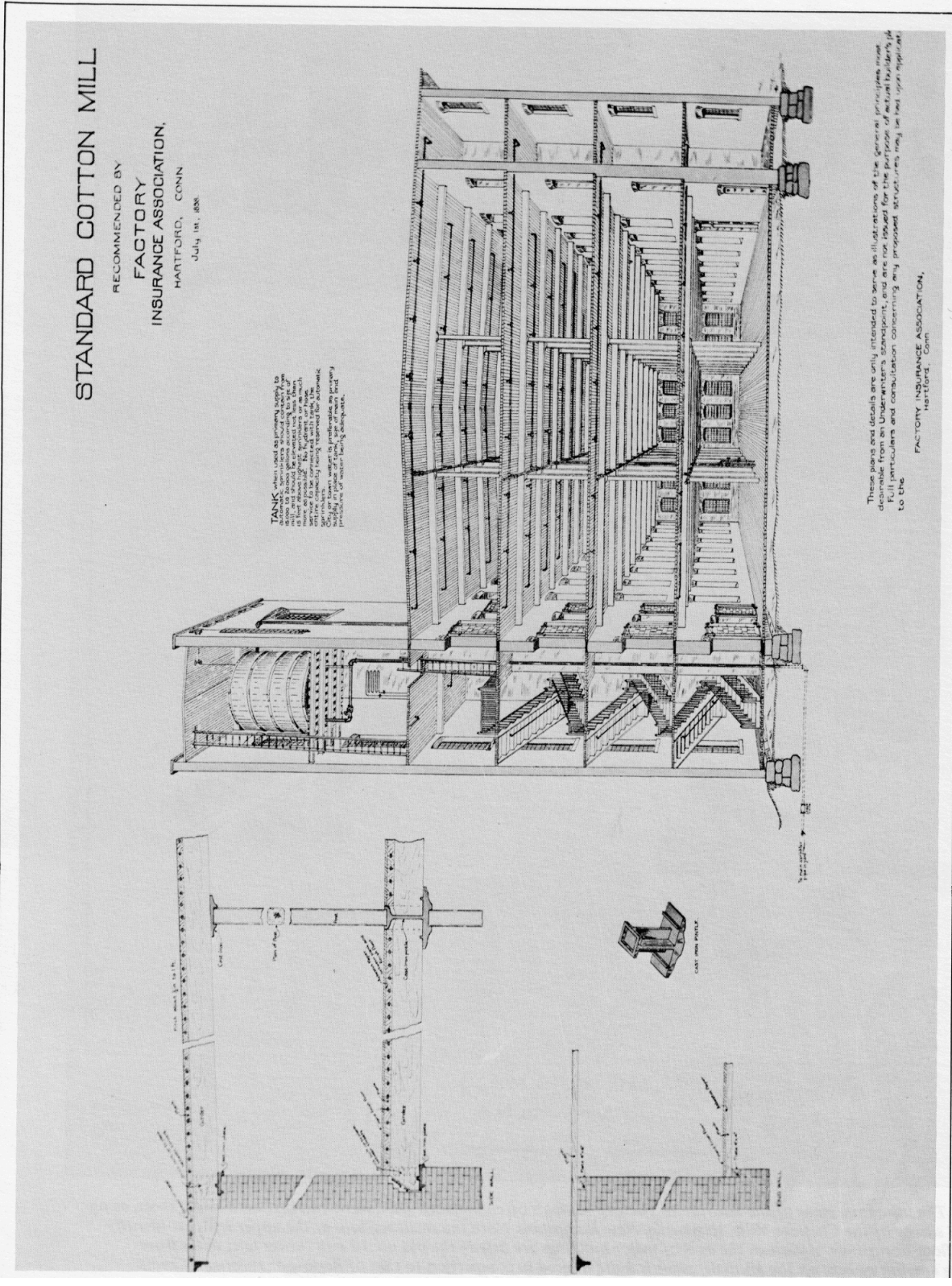


Figure 7. The insurance plans of the Associated Factory Mutuals often included plan, view, and text on a single sheet, as on this 1892 survey of the Cheshire Mills, Harrisville, New Hampshire. Note the small sections at the upper left that identify floor-by-floor occupancy. Although the ages of major buildings are listed—the old no. 10 mill (lower left) dates from 1822—the amount of text on the Mutuals’ plans is quite limited in comparison to that of Barlow or Hexamer. Credit: Merrimack Valley Textile Museum



STANDARD COTTON MILL

RECOMMENDED BY
 FACTORY
 INSURANCE ASSOCIATION,
 HARTFORD, CONN.
 July 18, 1905.

TANK shown above is primarily adapted to store water for sprinklers around factory buildings. It is made of cast iron and is supported on a concrete foundation. The tank is filled with water and is connected to the fire-retardant standards by a pipe. The tank is also connected to the fire-retardant standards by a pipe. The tank is also connected to the fire-retardant standards by a pipe.

These plans and details are only intended to serve as illustrations of the general principles and are not to be taken as a recommendation of any particular construction, and are not issued for the purpose of actual building. All dimensions and construction details are subject to change without notice. For further information, apply to the Factory Insurance Association, Hartford, Conn.

Figure 8. The Mutuals' competitor, the Factory Insurance Association, produced insurance plans of the mills its members underwrote. In appearance and content they are very similar to the Mutuals' plan. FIA also recommended standards for fire-retardant construction, as represented by their Standard Cotton Mill plan, section, and isometric view, published in two editions, 1898 and 1905. The 1898 section is reproduced here. Credit: Merrimack Valley Textile Museum.

with the home office of Mr. Richardson, in which his art treasures were safely housed, was but the picker building of a cotton factory with a touch of genius added.””

Picking, from the incendiary standpoint the most hazardous operation in working cotton, usually was conducted outside the main mill, in a separate building erected for the purpose. Picker house construction often figured prominently in insurance survey descriptions of textile mills. Such descriptions were typical of the information contained in site-specific surveys. In addition to stating the building's dimensions, materials, and age, text titled "Occupation" described the operation of the factory, made more useful because the occupancy note was broken down building by building, room by room, giving a very complete picture of what was being done on each floor. Machinery was located and identified; in an 1844 application by the Blackinton Woolen Mill for insurance coverage in Mutuals, machinery is specifically identified even to the point of distinguishing the frames, whether iron or wood.

For some of the more technical manufacturing processes, a succinct description was provided. The surveyor's field manual made very clear his responsibilities for this type of reporting: "It is a commendable ambition for an inspector to learn as much about the general nature of the processes and machinery which he sees as he can without making himself offensive." Specifically, he was enjoined to make the following distinctions:

Occupancy. In a cotton mill distinguish between frame spinning and mule spinning, and distinguish between an opening room where cotton bales are merely opened and one which contains opener pickers. In woolen mill "Finishing Rooms" distinguish between wet finishing and dry finishing. In works other than woolen mills and paper mills (where the word suggests certain definite processes), try and select or add a word less vague than "finishing" alone. In a paper mill make it clear whether a room contains a steam engine or bearing engine; steam boilers or rag boilers for bleach. In miscellaneous factories sometimes the local name for a room used by the workmen must be discarded on the plan, and a name devised by the surveyor. In naming the occupancy of a room or a building, select the word or two words which will convey the clearest possible ideas of the process or occupancy to one who has never seen the mill and is not skilled in that line of manufacture.¹⁸

Surveys provide process information in other ways, as well. An original manuscript drawing made in 1872 for a local insurance agent of the Clegg Loom Harness Works indicates quite clearly the type of harness made. The presence of a picker house, well-separated as it should be, proves that

Clegg still made cotton-string heddles for at least some of his harnesses well after the introduction of the wire heddle.

These surveys give evidence that insurance considerations influenced industrial processes as they related to causes and prevention of fires, bringing about changes in machinery and mill practices as well as in design and construction. Examples are the relative location or separation of operations and buildings, notably picker and boiler houses and drying facilities; the development of fireproof machinery, such as yarn dryers; and reduced fire risk in the transmission of power by boxing or covering inter-floor and inter-room belts. Practices such as the employment and scheduling of watchmen and the requirement of two men on night repair work had a direct influence on the labor force.

Concern for construction and process alike came to fruition in the development of increasingly professional training and requirements for mill architects and engineers. The vocabulary of architecture and topographical drafting found a place in insurance mapping. By the turn of the century, firms like Charles T. Main and Lockwood Greene, among others, specialized in a comprehensive system of mill engineering based in part on the development of specifications for factory design and operation that insurance surveys had been detailing and conveying since the close of the Civil War.

In this paean of praise, I would add a note of caution. Naturally these surveys are not 100 percent accurate for all building or process descriptions. However, they do provide an important source of operational explanation in conjunction with a plan of the buildings, a juxtaposition of inestimable value. Technical studies often are written without a consideration of the physical space within which the work is to be performed. The industrial historian wants to know not only how something was done, but also where it was done within a factory, often in reference to a specific site. Insurance maps inform with an important cumulation of data, relating the process to the physical space.

Acknowledgment

Earlier versions of this paper were presented at the SIA Annual Conference in Hartford, Connecticut, May 1981, and at the North American Print Conference, "Mapping the Americas," in Philadelphia, October 1981. The Print Conference version will be published in the Conference Proceedings by the Historical Society of Pennsylvania.

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Notes

1. The earliest American insurance plan known to survive represents Charleston, S.C. surveyed in 1788 and published in London in 1790. See W.J. Ristow, "U.S. Fire Insurance and Underwriters' Maps, 1852-1968," *Quarterly Journal of the Library of Congress* 25 (July 1968).
2. *Ibid.*, p. 198; Perris and Browne was absorbed by Sanborn in 1899, which then took the name Sanborn-Perris Map Co. After 1902 it became Sanborn Map and Publishing Co.
3. R.P. Getty, "Insurance Surveying and Map Making," *Cassier's Magazine* 39 (November 1910):19.
4. *Ibid.*, p. 22; see also the discussion of standard plan symbols in Crosby-Fiske-Foster, *Handbook of Fire Protection*, 9th ed. (Boston: National Fire Protection Association, 1941), pp. 1050-1057.
5. Sanborn Map Company, *Sixtieth Anniversary, 1866-1926* (New York, 1926), p. 4. It is impossible to mention all the map companies producing insurance surveys of potential interest to industrial historians. Two major firms publishing in the field were Rascher Insurance Map Publishing Company and the Central Map, Survey and Publishing Company, both of Chicago. In 1891-1892 Central and Rascher engaged in a competitive issue of multi-sheet stockyard plans. Central sold out to Rascher in 1892, and both were absorbed by Sanborn in 1892. Central's manager, Charles Yerkes, was also connected with the Western Insurance Survey Company which published surveys of the mining and lumber districts in Wisconsin and Minnesota in the 1890s, as well as of grain elevators and other industrial structures. (See bibliographic note.)
6. Sanborn surveyors paid special attention to details of manufacturing processes. Their company magazine, *The Sanborn Survey*, published from 1921 to 1923, contained numerous articles on factory visits by field inspectors. Industries noted include beet sugar, lead refining, paper, rubber, and coal gas, with mention of bridges, dams, and building construction.
7. Robert Hayward, *Fire Insurance Plans in the National Map Collection* (Ottawa: Public Archives of Canada, 1977); G.T. Bloomfield, "Canadian Fire Insurance Plans and Industrial Archeology," *IA: The Journal of the Society for Industrial Archeology* 8 (1982):67-80.
8. Jefferson Moak, "E. Hexamer & Son" (unpublished manuscript); Moak, *Philadelphia Map Makers* (Philadelphia, 1976); Moak to author; Nathan L. Thomas, "Philadelphia Map History," *The Sanborn Survey* 1 (November 1921):8; Joyce Post, *A Consolidated Name Index to the Hexamer General Surveys* (Philadelphia, 1974); J.B. Post and Joyce Post, "Indexing the Hexamer General Surveys," *Special Libraries*, March 1977, pp. 103-108.
9. Trow's New York City Directories 1857-58, 1865, 1868, 1876, 1878-79; North American Fire Insurance Co. circular, 1869 (in Merrimack Valley Textile Museum, North Andover, Massachusetts [hereafter MVTM]); *Insurance Directory of New York, Brooklyn & Jersey City* (New York, 1884-1885), p. 16; *The Business Directory of New York, Brooklyn & Newark* (New York: American Reporter Co., 1885, 1886); *Murphy's Business Directory of New York City, 1888*. Stephen Victor was kind enough to visit Nelson Barlow's grave in New Haven, providing further data from family gravestones.
10. *Dartmouth Alumni Magazine*, April 1919, p. 310. Trow City Directory Co.'s *Co-partnership & Corporation Directory of New York City* (New York, 1889) lists Barlow (Charles A.) and Bancroft (John M.) together through 1897-1898, although showing several changes of address. Nelson Barlow last appears in the American Reporter New York directory of 1886; Charles A. (his brother? 1836-?) first appears in Murphy's of 1888.
11. 1,100 Barlow surveys of textile mills and related industries such as textile-machinery makers are in the collection of the MVTM; an additional 1,600 reside at the Baker Library of Harvard's Graduate School of Business Administration. There are about 25 at Albany in the New York State Library, and some 150 more in the Warsaw Collection of Business Americana at the Smithsonian's National Museum of American History, formerly Museum of History and Technology. The Baker and MVTM Barlows originally came from the Warsaw Collection, before its purchase by the Smithsonian Institution. The New York State Library copies came from a Wall Street office. Printed geographical and numerical indexes which served as tables of contents to the original volumes remain at MVTM. Baker has made a name index and MVTM a geographical listing of their holdings as well (See bibliographic note.)
12. Edward Atkinson, *Supplementary Report to January 1, 1880* (Boston: Boston Manufacturers Mutual Fire Insurance Co., 1880), quoted in John Crnkovich, "The New England Mutuals Influence on Industrial Architecture" (unpublished paper, 1978), p. 37.
13. Arkwright Mutual Fire Insurance Co., *Fifty Years, 1860-1910* (Boston, 1912), p. 25.
14. Manufacturers Mutual Fire Insurance Co., *The Factory Mutuals, 1835-1935* (Providence, 1935).
15. See the *Dictionary of American Biography* for a listing of Edward Atkinson's more important publications. As director of the insurance engineering experiment station, he directed and reported on many experiments for testing construction and fire-fighting materials. His article "Slow-Burning Construction," published in *The Century Magazine* 37 (February 1889) reached a wide audience. C.J.H. Woodbury's *The Fire Protection of Mills* (New York, 1882) is another important study.
16. *Standard Cotton Mill Recommended by Factory Insurance Association* (Hartford, 1898, 1905), plan, elevation, section: 3 sheets per edition (MVTM).
17. Atkinson, "Slow-Burning Construction" (n. 15 above), p. 598.
18. John R. Freeman, *Rules and Suggestions for the Surveyors and Draftsmen* (Boston: Associated Factory Mutual Insurance Companies, 1893), pp. 2, 5. The nomenclature defined in several technical dictionaries by William A. Harris—*A Technical Dictionary of Fire Insurance* (Liverpool, 1896); *Technological Fire Insurance Commentary* (1894)—represents excellent descriptions of manufacturing processes, products, and their combustibility. His "Glossary of Terms Used in the Principal Manufacturing Industries" includes many archaic terms which identify equipment and processes. The Sanborn Map Company's *Surveyor's Manual*, 1936 edition, includes copious instructions on the recording of storage buildings, including industrial storage and transportation-equipment garages, manufacturing buildings, and whiskey distilleries and warehouses. By 1936 floor-by-floor occupancy notes were not required.

A Bibliographic Note

The literature on fire insurance maps has been engendered primarily by map librarians and geographers, with the result that historians, architects, planners, and other professionals for whom these maps would be an appropriate resource have had little knowledge of them. Moreover, while the Sanborn atlases are universally acclaimed, the local producers of similar atlases have remained obscure, and the site-specific surveys of Barlow, Hexamer, Factory Mutual, and the Factory Insurance Association likewise have received little attention. It would be difficult to provide a complete list of all the known producers and repositories for these maps, but the remarks that follow aim to assist researchers by outlining the major sources and collections.

Related resources are real estate maps and atlases. These often display color-coding of structural materials for buildings shown, a feature borrowed from insurance maps, but they show no interior or construction details and contain no explanatory process-related text. City and county maps and atlases are readily available in many libraries, however, and often provide useful information identifying property ownership and occupancy by name. Richard W. Stephenson, *Land Ownership Maps: A Checklist of 19th-century County Maps in the Library of Congress* (Washington, D.C., 1967) is a helpful guide to the large sectional or rolled maps. Clara Egli LeGear, *United States Atlases: A List of National, State, County, City and Regional Atlases*, is equally informative on her topic: Vol. 1 (Washington, D.C., 1950) lists Library of Congress holdings; Vol. 2 (1953) is a union list incorporating holdings of cooperating institutions. Arrangement of both works is by place, enabling a researcher quickly to establish the titles and dates of sources useful for a particular project. Well-known examples of such maps and atlases were published by H.F. Walling, D.G. Beers, L.J. Richards, Greeley & Carlson, A.T. Andreas, and others, but these should not be confused with insurance maps.

Two major books identify Sanborn maps in the Library of Congress and around the country. They also supply dates of publication and number of volumes per atlas for each city Sanborn surveyed. The earlier of the two, *Union List of Sanborn Fire Insurance Maps Held by Institutions in the United States and Canada*, 2 vols. (Santa Cruz: Western Association of Map Libraries, 1977), followed a 1973 publication by the same association listing the large Sanborn collection at California State University, North-

ridge, given by Sanborn's San Francisco office when it closed. The *Union List* identifies repositories, mainly state libraries, which received Sanborns distributed by the Library of Congress from its duplicates acquired for copyright registration. However, many more locations such as public libraries, city engineers' offices, and historical agencies frequently house Sanborn atlases for their region. The *Union List* did not survey repositories; it listed state library holdings but did not go beyond that in any comprehensive way. The Library of Congress list by Walter W. Ristow, *Fire Insurance Maps in the Library of Congress: Plans of North American Cities and Towns Produced by the Sanborn Map Company* (Washington, D.C., 1981), is useful in that it constitutes a list of Sanborn's production once the firm began to seek copyright registration. The LC holdings are weak for Sanborn's National Insurance Diagram Bureau days, 1866-70, and for his atlases of the 1870s, but it is very comprehensive for the firm's titles after 1883. Often it is helpful simply to know what is available for a given location at a particular time. LC's Sanborn maps are being microfilmed for sale by Chadwyck Healey of Teaneck, N.J., but unfortunately in black and white, so that the special features of insurance maps shown in color will not be recognizable.

Regional map bibliographies such as Robert W. Karrow, Jr. *Checklist of Printed Maps of the Middle West to 1900* (Boston: G.K. Hall, 1981), in eleven volumes (one for each of the ten midwestern states plus a regional volume) include fire insurance maps. While Karrow relied on the previously published *Union List* and Ristow's Library of Congress list, he added Sanborns not found in either as well as maps published by other firms which came to light during the project.

Local and national underwriters' associations and individual engineers and insurance companies also made surveys and maps in the 19th and 20th centuries. Explore local sources, such as insurance company files, business collections in libraries, registries of deeds, and city engineers' offices. Jon Walstrom, map curator at the Minnesota Historical Society, located some 1,000 maps of Minnesota and North and South Dakota towns published by Fisher's General Inspection Bureau in the Insurance Service Office of Minnesota. Many states have Insurance Service Offices; Walstrom described the Fisher Maps and listed the State Service Offices in an article for the Special Libraries Association's *Geography and Map Division Bulletin* No. 124 (June 1981).

Industrial Archeology

Gary Fitzpatrick of the Library of Congress's Geography and Map Division is compiling a list of non-Sanborn fire-insurance maps held in the library. More than 5,000 editions published by nearly 100 firms will be represented.

Among the major publishers the following names stand out as especially prolific, early, or otherwise significant examples of the type. Many may be located at the Library of Congress, the New York Public Library Map Room (which also has a published catalogue), or in local repositories.

Atlases: Northeastern United States

Publisher	Region Surveyed and Dates Published
Perris, William Perris & Browne	New York City, 1852-1880s; Brooklyn, New York; Newark, New Jersey, 1860s-1880s.
Arnois & Spielmann; Spielmann & Brush	Northern New Jersey, 1868-1870s.
Miller, William A.	Northern New Jersey, 1870s.
Klein, F.	Pittsburgh, 1870s.
Hexamer, Ernest	Philadelphia city atlases, 1857-1915; see also below under site surveys.
Scarlett & Scarlett	Newark and other New Jersey locations, 1880s; Haverhill, Massachusetts, 1886; Pennsylvania counties, 1880s.
Scarlett & Van Wagoner	Albany, New York, 1891.

Atlases: Midwestern United States

Aubin, C.T.	St. Louis, 1874-1875.
Oliver & Whipple; Whipple, Alphonso	St. Louis, 1876 St. Louis, 1889, 1898.
Bennett, Henry	Based in Cedar Rapids, Bennett mapped most of Iowa between 1895 and 1905.
Fisher, Walter I., d/b/a: General Inspection Bureau Fire Underwriters' Inspection Bureau, Insurance Service Office of Minnesota	Minnesota, North and South Dakota towns; some industrial and commercial sites, e.g., iron ranges, department stores, 1890s-1970s.

Chicago Firms

Western Fire Map Publishing Co.

Western Insurance Survey Co.

Charles Rascher, manager, a/k/a Rascher
Insurance Map Publishing Co.

Central Map, Survey & Publishing Co.,
Charles Yerkes, manager

Central sold out to Rascher in December 1892

Rascher absorbed by Sanborn's Chicago
Office in 1893

Western Insurance Survey Co.
Yerkes as manager

Yerkes Insurance Survey Co.

Milwaukee, 1876; Chicago packing houses, 1880;

1890s: mining and lumber districts of Wisconsin and
Minnesota; stockyards and packing houses in
Chicago, Kansas City; grain elevators, warehouses,
etc., plus city atlases.

Competitive issue of atlases published by Western/
Rascher above; especially heated battle over
stockyards volumes in 1891-1892.

1895: lumber districts; grain elevators, warehouses;
includes some isometric views.

1901: stockyards.

Site Surveys

Barlow's Insurance Surveys

New York, NY

Individual manufacturing sites. Active 1870s-1890s;
surveyed the eastern United States and Canada;
produced about 10,000 surveys of which only about
2,800 survive, those for New England and New
York State.

Collections

Manuscript Division, Baker Library, Graduate
School of Business Administration, Harvard
University, Soldiers Field, Boston, MA 02167

1,600 surveys, primarily metalworking, paper mills,
leather and tanning operations in New England;
index by name and survey number.

Merrimack Valley Textile Museum
800 Massachusetts Avenue
North Andover, MA 01845

1,100 surveys of textile mills and textile-related
industries, machinery manufacturers, in New England
and New York State. Indexed by place; copies of
original Barlow indexes by place and number also
available.

Warshaw Collection of Business Americana,
c/o Archives Center, National Museum
of American History, Smithsonian Institution,
Washington, DC 20560

150 surveys of mixed industries in New England.
Indexed by place. Baker and MVTM holdings
originally owned by Warshaw and sold before the
rest of the collection went to the Smithsonian.
Barlow surveys originally bought by Warshaw from
the Insurance Library of Boston.

Manuscripts & Special Collections,
New York State Library, Cultural Education
Center, Empire State Plaza, Albany, **NY** 12230

25 surveys of mixed industries in the Albany area,
listing available.



Hexamer's General Surveys
Philadelphia, PA

Individual industrial sites, primarily manufacturing plants, but including reservoirs, race tracks, etc. Active 1870s-1890s. Surveyed primarily the mid-Atlantic region: Pennsylvania, Delaware, New Jersey, Maryland. Produced about 3,000 surveys, most of which survive.

Collections

Map Collection, Free Library of Philadelphia,
Logan Square, Philadelphia, PA 19103

2,800 surveys plus microfilm. Index by key word in company name. Microfilm also available at Eleutherian Mills-Hagley Foundation in Wilmington, Delaware.

Geography & Map Division, Library of
Congress, Washington, DC 20540

850 surveys, 150 of which are *not* duplicates of those in Philadelphia and are therefore unique.

Insurance Industry Surveys

Factory Mutual Engineering,
1151 Boston-Providence Turnpike.
Norwood, MA 02062. Attn: Cornelius
J. Mahoney, Plan Division

Bound volume of several hundred plans for New England mills, c1860. Thousands of plans for industrial and institutional sites around the country from the 1890s to the present. Access by prior appointment ONLY. Write for information.

Industrial Risk Insurers (formerly Factory
Insurance Association), 85 Woodland Street,
Hartford, CT 06102. Attn: Kenneth G.
Richardson, Manager, Communications

Plan file available; size, dates, and subjects unexplored by author. Write for information.