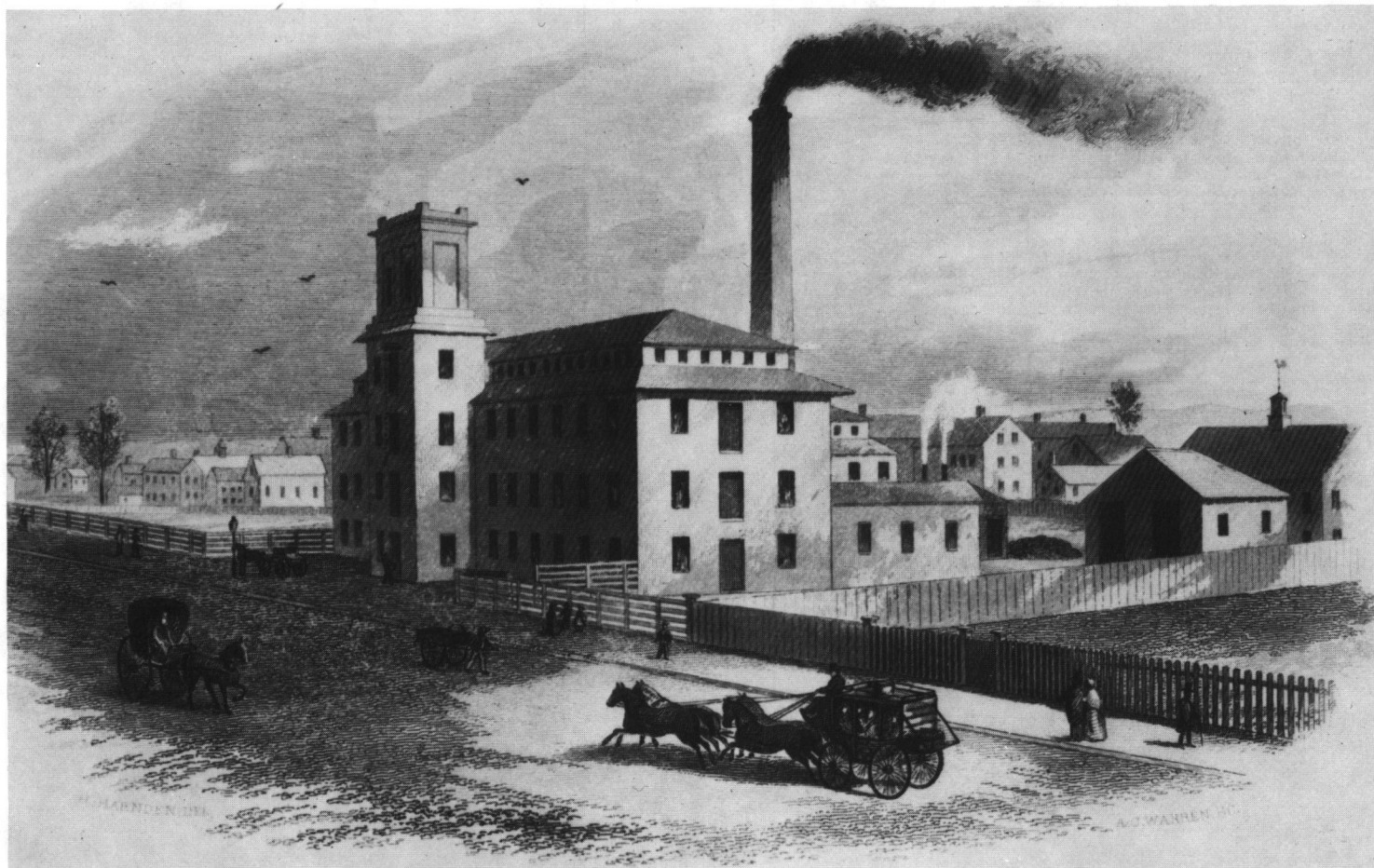


PROVIDENCE INDUSTRIAL SITES

Providence Industrial Sites

Statewide Historical Preservation Report P-P-6

Rhode Island Historical Preservation Commission
July 1981





STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

HISTORICAL PRESERVATION COMMISSION

Old State House
150 Benefit Street
Providence, R.I. 02903
(401) 277-2678

July 8, 1981

The Honorable J. Joseph Garrahy, Governor
State of Rhode Island and Providence Plantations
State House
Providence, Rhode Island 02903

Dear Governor Garrahy:

It is with pleasure that I transmit herewith Providence Industrial Sites--Statewide Historical Preservation Report P-P-6, the thirty-fourth publication in the Statewide Historical Preservation Report series.

This report provides an analysis of the historical and architectural growth of significant individual industrial buildings and industrial complexes in all neighborhoods of the City of Providence and recommends a preservation program which should be incorporated into the city's overall planning effort.

With the publication of this report, the commission is well on its way to fulfilling its responsibility to record the state's rich cultural resources. Six additional reports are now being prepared; their completion will contribute toward the achievement of our goal of producing reports on all thirty-nine cities and towns in the state. Five reports have already been published concerning Providence neighborhoods: The West Side, South Providence, Elmwood, Smith Hill and Downtown. In addition, a citywide overview report will be published.

The Commission believes that its effort, as represented by this and other reports, will further the cause of historical preservation in Rhode Island.

Sincerely,

Antoinette F. Downing
Mrs. George E. Downing
Chairman

/mm



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

HISTORICAL PRESERVATION COMMISSION

Old State House
150 Benefit Street
Providence, R.I. 02903
(401) 277-2678

July 8, 1981

The Honorable Vincent A. Cianci, Jr., Mayor
The City of Providence
25 Dorrance Street
Providence, Rhode Island 02903

Dear Mayor Cianci:

The Rhode Island Historical Preservation Commission is pleased to submit in final published form this survey and report Providence Industrial Sites--Statewide Preservation Report P-P-6.

This report provides an analysis of the historical and architectural growth of significant individual industrial buildings and industrial complexes in all neighborhoods of the City of Providence and recommends a preservation program which should be incorporated into the city's overall planning effort.

The product of detailed research and survey by Lisa Fink of the commission staff, it is truly a joint effort on the part of the City of Providence and the State commission. Moreover, the Mayor's Office of Community Development funds contributed significant financial support for the project.

It is the Commission's hope that this survey and publication will provide a planning tool for neighborhood and city preservation programs and serve as an academic and educational resource, useful in the study of local and state history. It is also hoped that economic development through re-use and rehabilitation of Providence's industrial buildings will be encouraged and that civic pride will be stimulated as residents become aware of the historical and visual environment in which they live.

Very truly yours,

Antoinette F. Downing
Mrs. George E. Downing
Chairman

/mm

This document is a copy of the original survey published in 1981. It has not been corrected or updated.

Since the original publication:

- >additional properties have been entered on the National Register;
- >some financial incentives referred to in these pages are no longer available;
- >some new financial incentives are available.

For up-to-date information, please contact:
RI Historical Preservation & Heritage Commission

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The Rhode Island Historical Preservation & Heritage Commission is your state agency for historical preservation. The Commission identifies and protects historic buildings, districts, landscapes, structures, and archaeological sites throughout the State of Rhode Island.

PREFACE

In 1968, the Rhode Island General Assembly established the Historical Preservation Commission, charging it with, among other duties, the task of developing a state preservation program following the guidelines of the National Historic Preservation Act of 1966 as administered by the Heritage, Conservation and Recreation Service, United States Department of the Interior. Citizen members of the Commission are appointed by the Governor; the chairmen of the House and Senate Finance Committees of the General Assembly, the Director of the Department of Economic Development, the Director of the Department of Environmental Management, the Chief of the Division of Statewide Planning, and the State Building Code Commissioner serve as ex-officio members. The Director of the Department of Community Affairs has been appointed by the Governor as the State Historic Preservation Officer for Rhode Island.

The Historical Preservation Commission is responsible for conducting a statewide survey of historic sites and places and, from the survey, recommending properties of local, state, or national significance for inclusion in the National Register of Historic Places; administering federal grants-in-aid to Register properties for acquisition and development; and developing a state historical-preservation plan. Additional duties include compiling and maintaining a State Register of Historic Places; assisting state and municipal agencies in the area of historical-preservation planning, by undertaking special project-review studies; and regulating archeological exploration on state lands and under waters of state jurisdiction.

The Rhode Island Statewide Historical Survey, inaugurated in June, 1969, has been designed to locate, identify, map, and report on buildings, sites, areas, and objects of cultural significance. In line with the current movement among preservationists, planners, and architectural and social historians, the total environment of a survey area is considered. In addition to outstanding structures and historical sites, buildings of all types, periods, and styles which constitute the fabric of a community are recorded and evaluated. Presently, archeological resources are to be recorded in a separate survey.

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Frontispiece: Fletcher Manufacturing Company (1844 and later); 47 Charles Street; illustration, 1887. Remaining buildings are the office and warehouse (1869) shown in the left foreground.

I. INTRODUCTION

This historical survey of industrial sites in Providence was undertaken for the city by the Rhode Island Historical Preservation Commission, with funds provided by the Commission from the Heritage Conservation and Recreation Service of the U.S. Department of the Interior and the State of Rhode Island, and also by the Mayor's Office of Community Development. The long-range goal of the city and the state Preservation Commission in helping to fund this survey has been to undertake a project aimed at increasing awareness of the significance and potential of Providence industrial sites.

The Providence Industrial Sites Survey, inaugurated in January, 1979, covers significant individual industrial buildings and industrial complexes in all neighborhoods of the City of Providence. Engineering and industrial sites such as bridges, tunnels, and warehouses not connected with manufacturing are not covered in this report but are discussed in *Rhode Island: An Inventory of Historic Engineering and Industrial Sites* by Gary Kulik and Julia Bonham. The Industrial Sites Survey is part of a broader survey program designed to document all of the city's historic areas and individual historic sites. Conducted by the Preservation Commission in cooperation with the Mayor's office over a period of several years, this project expands the coverage already provided by the landmark *College Hill* (first published in 1959) and by *West Side* (1976), *South Providence* (1978), and *Elmwood* (1979) — as well as *Smith Hill* (1980) and *Downtown* (1981). The present coordinated effort will eventually produce a publication giving a summary overview of the entire city.

To accomplish the goals of the project, several steps were necessary, including field survey, historical research, preparation of survey sheets, and a final survey report. This final report is divided into five sections: Location and physical features of Providence, Industrial Historical Analysis, Industrial Architectural Analysis, Re-use of Industrial Buildings, and Appendices.

The first section contains a brief sketch of the city's present size, location, and appearance and an outline of the industrial districts of the city.

The second section contains a history of Providence's industrial development based on the city's existing industrial landscape. Components include factories, warehouses connected with manufacturing, and power plants. Emphasis is placed on the conditions and events—physical, economic, and social—which contributed to the formation of this industrial landscape.

The third section contains a history of industrial building forms in Providence, based on extant structures. Illustrations help to provide an understanding of industrial building technology and architectural development.

The fourth section deals with the re-use of industrial buildings in Providence. Included in this section are recommendations for a preservation plan for the rehabilitation or re-use of industrial buildings.

In the appendices are explanations of the National Register of Historic Places, the grants-in-aid program, and the survey form of the Historical Preservation Commission. An inventory of noteworthy industrial structures and a glossary of industrial terms are also included.

Results of the survey and the report have been reviewed by city officials, local historians, knowledgeable area residents and the members and staff of the state Historical Preservation Commission. Copies of the survey sheets and maps are available to neighborhood groups; city planners; and local, state, and federal officials and agencies.

The objectives of this report are fourfold: to provide a planning tool for neighborhood and city preservation programs; to serve as an academic and educational resource, useful in the study of local and state history; to encourage economic development through re-use; and

to stimulate civic pride, making residents aware of the historical and visual environment in which they live and encouraging them to take a more positive interest in the future of Providence industrial buildings.

The Rhode Island Historical Preservation Commission wishes to thank the following individuals and organizations for their aid in completing *Providence Industrial Sites*: the staff of the Rhode Island Historical Society Library, the staff of the Providence Public Library, Ms. Helena Wright of the Merrimack Valley Textile Museum, Dr. Patrick Malone of the Slater Mill Historic Site, Mr. Joseph Chrostowski and Ms. Susan A. Chapdelaine of the Providence Archives, the Providence Department of Planning and Urban Development, the Providence Preservation Society, the Providence Tax Assessors Office, and the Providence Recorder of Deeds Office.

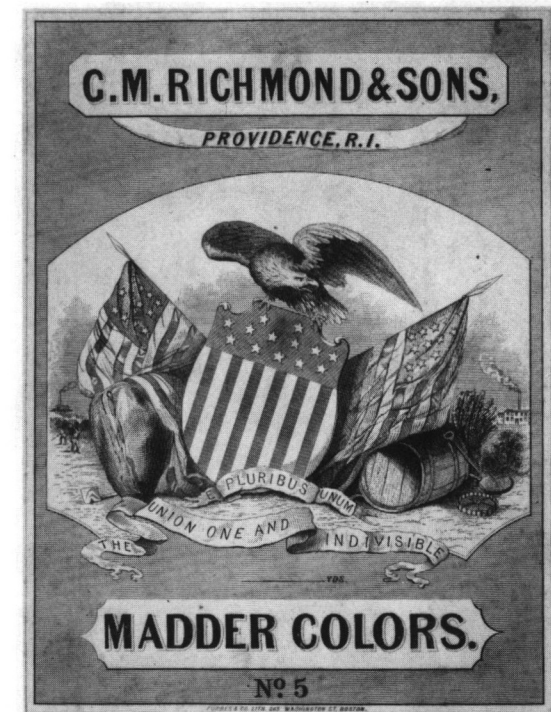


Fig. 1: Textile label of G.M. Richmond & Sons (later the Woonasquatucket Printworks); 325 Valley Street.

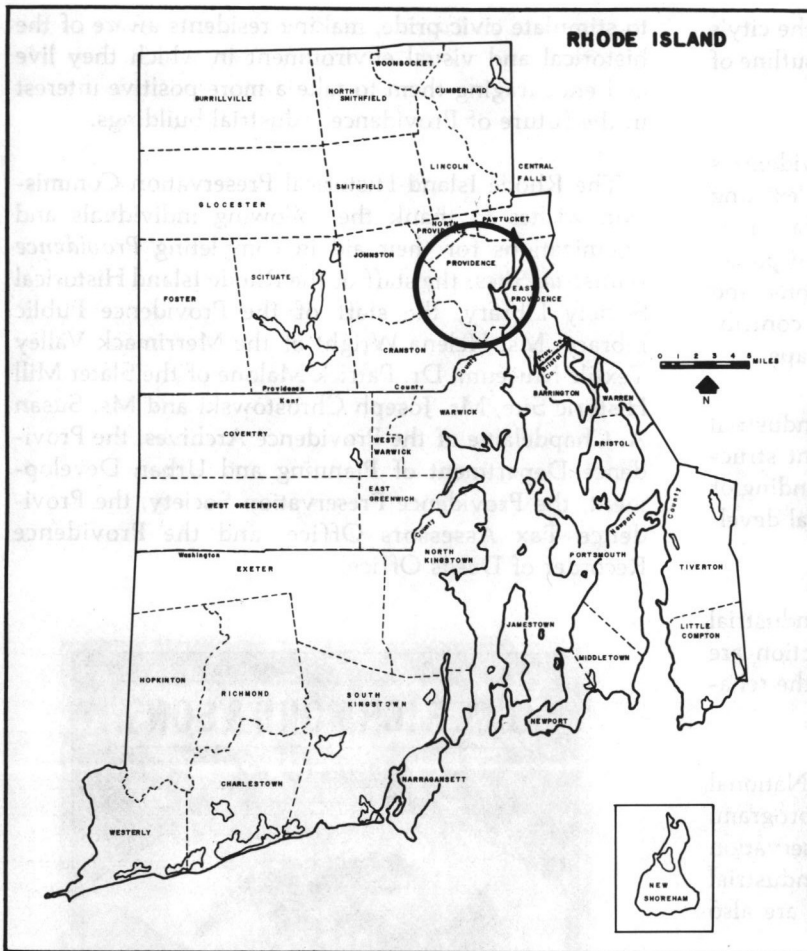


Fig. 2a: Map of Rhode Island, showing the location of Providence.

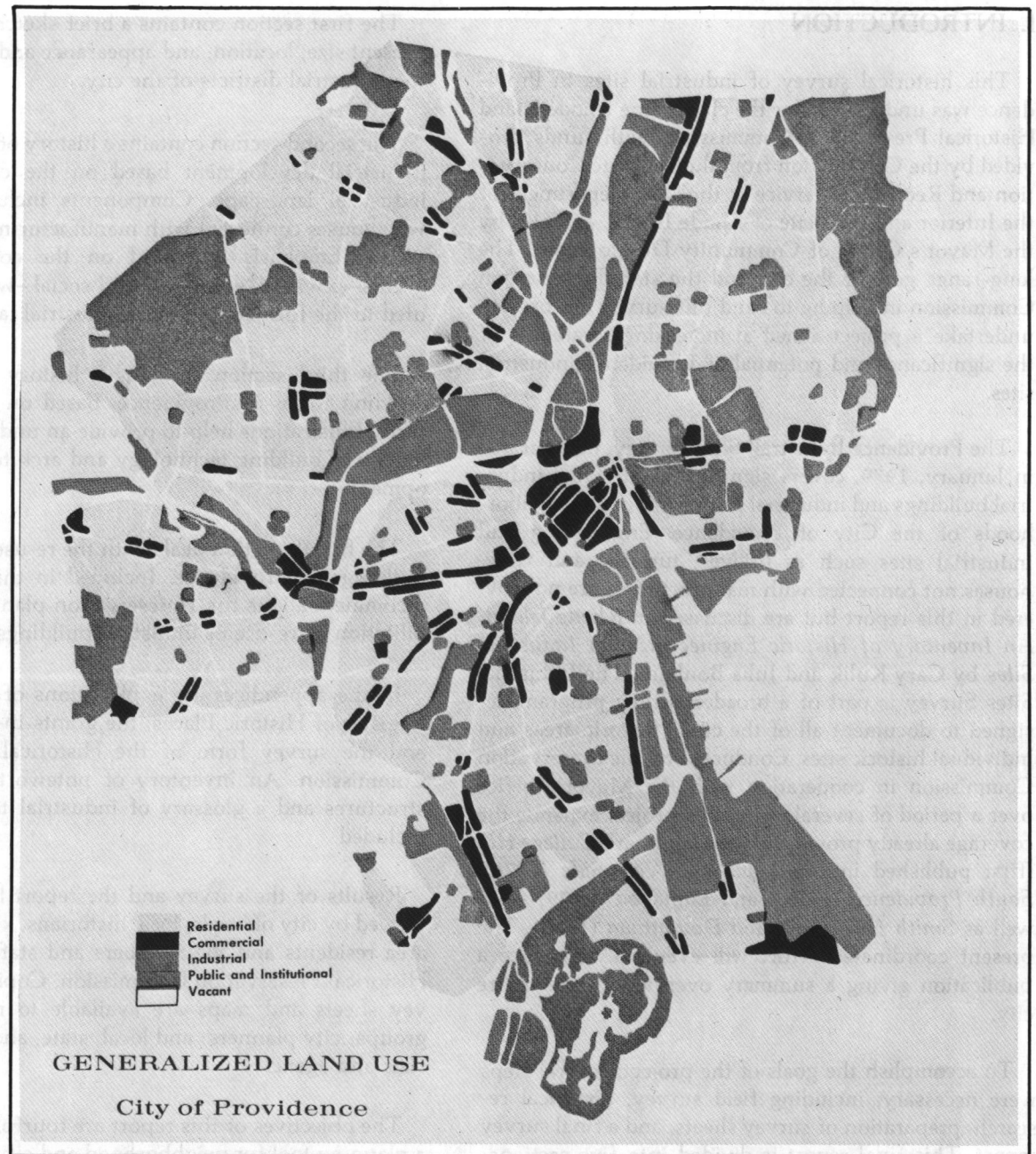


Fig. 2b: Map of Providence showing industrial districts (1964).

II. LOCATION AND PHYSICAL FEATURES

Providence is located at the head of Narragansett Bay. It is 35 miles north from the open ocean, 40 miles southwest of Boston, 157 miles northeast of New York, and covers an irregular area of 18.1 square miles.

Four rivers flow through the city. Two of these, the Moshassuck and the Woonasquatucket, merge to form the Providence River, a tidal arm of Narragansett Bay. In Providence, the Moshassuck River runs a fairly straight course from north to south, while the Woonasquatucket follows a more meandering course in a northwest to southeast direction. The West River runs through the northwestern section of Providence and merges with the Moshassuck near the city's center. The Seekonk River forms the city's eastern boundary.

The Moshassuck and Providence Rivers effectively divide the community into east and west sides. The east side rises steeply forming a spine of hills, to the east of which is the valley of the Seekonk River. The land on the west side of the Providence River forms a shallow basin (the Central Business District). To the west and northwest of the basin, following the Woonasquatucket and West River, the land is characterized by a series of rolling hills and valleys. The southern and southwestern parts of Providence rise at a fairly graduated grade.

Nearly all of the few ponds scattered in the northwestern, western, southwestern, and southern parts of Providence are man made. Mill ponds (formed by damming a river in order to produce waterpower) include Geneva Pond, Whipple's Pond, Upper Canada Pond (formerly Leonard's Pond), and Dyerville Pond. Other bodies of water include Mashpaug Pond (naturally formed), and the man-made lakes of Roger Williams Park.

Major industrial areas in Providence are located along the Woonasquatucket, Moshassuck, and West Rivers, as well as south of the business district on the east and west banks of the Providence River. Smaller industrial districts are found along Eddy Street in South Providence, in the northern section of the West End, in the

Mashpaug Pond area of Elmwood, and in the southeastern tip of Fox Point. Scattered industrial complexes appear in many Providence neighborhoods.

WOONASQUATUCKET RIVER: Large, brick, factory complexes—such as those built by Brown and Sharpe and Nicholson File—dominate the eastern end of the Woonasquatucket River Valley, along with some mid-twentieth-century, reinforced-concrete, commercial, and industrial buildings. Some of the structures in this area retain their original use but most have been divided into smaller rental properties.

OLNEYVILLE: Olneyville contains some of the city's earliest, most distinctive, and largest textile factories. In the center of Olneyville are two large, late nineteenth-century, brick, textile-mill complexes (the Atlantic Delaine Company Mill and the Riverside Mills), with an earlier, stone, textile mill (with many later additions) nearby. West of Olneyville on the Woonasquatucket River are two of the city's oldest textile mills, built in parts of rural North Providence and Johnston which were later annexed to the city in the late nineteenth century.

MOSHASSUCK RIVER: The southern end of the Moshassuck River was the center for the area's earliest mills in the seventeenth and the eighteenth centuries and the location of base-metal works and textile factories in the nineteenth century. Today it contains only a few scattered industrial buildings, such as the Fletcher Building, now used for retail and office space. Further north on the Moshassuck are the few remaining early-and-late nineteenth-century buildings of a textile-printing operation.

WEST RIVER: At the southeastern end of the West River is a modern industrial park with two nineteenth-century complexes—the Corliss Steam Engine Company Works (now heavily altered) and the Providence Tool Company Works, still housing a base-metal operation (in nearly original condition). Farther west along the southern side of the West River is the massive Silver Spring Bleaching and Dyeing Company complex, now subdivided into numerous light industrial and rental units. Originally surrounded by residential and industrial structures, this complex is now adjacent to a highway and a shopping center as well as residential and industrial structures.

WANSKUCK: At the northern end of Providence on the West River is Wanskuck Village. Unlike other industrial areas of Providence, this village was a tightly knit residential and industrial community centering entirely on the textile mills owned by the Wanskuck Company on Branch Avenue, Douglas Avenue, and Wild Street. Today this village retains much of its visual unity, although many small companies now occupy the former textile mills.

JEWELRY DISTRICT: The jewelry district is southwest of the Central Business District. A residential neighborhood until the mid-nineteenth century, this area emerged in the late nineteenth century as a center for jewelry manufacture. The jewelry district's northern boundary was once Pine Street but is now Interstate 195. With only a few remaining, late nineteenth-century, brick, multi-storied jewelry factories, this area is characterized by large, early twentieth-century, brick, and reinforced-concrete jewelry factories interspersed with one- and two-story mid-twentieth-century factories and commercial buildings. These structures have a wide range of uses—from jewelry and other kinds of light manufacturing to commercial and residential.

POINT STREET: South of Elm Street, the industrial district becomes more diversified. This area, bordered by the harbor on the east and Interstate 95 on the south (at the north end of Allens Avenue), contains a mixture of one-to-five-story, middle-to-late nineteenth-century and early twentieth-century, stone, brick, and reinforced-concrete factories which originally were used for the manufacture of such diverse products as textile machines, knitted goods, rubber products, stoves, jewelry, bakery goods, coal gas, and electricity. This area is now occupied by utilities, light industry, and commercial concerns. This district contains a number of vacant industrial structures.

HARBOR: The harbor area south of Globe Street is a mixture of early, middle and late twentieth-century port facilities and natural-gas terminals. The late nineteenth- and early twentieth-century, brick, gas-company buildings still survive at Globe Street, Blackstone Street, and Terminal Road. The early twentieth-century, steel-frame, gas holders at Terminal Road and the handsome brick buildings at the sewage pumping and treatment stations also remain from the earlier stages of the harbor's industrialization.

III. HISTORY OF PROVIDENCE INDUSTRY

PRE-INDUSTRIAL PERIOD

The topography and location of Providence indirectly affected the city's industrial development by providing a natural protected harbor and neighboring arable countryside for the formation of a trade center; the flourishing shipping economy of the eighteenth century provided an economic base for the city's nineteenth-century industrial development. The physical setting also directly affected industrial development in the types of manufacturing companies which formed in Providence in the nineteenth century. During the pre-Revolutionary period the town gradually shifted from a farming to a shipping community, and various physical features of the town were modified to accommodate this transition. The Revolutionary War accelerated the town's ascendancy to a position of trade center for southern New England; the post-Revolutionary period was an era of prosperity in this trade center from which emerged the beginning of Providence's and the country's industrial revolution.

The late eighteenth century was a formative period for Providence's later industrial development. Providence had gained control of the Rhode Island shipping trade and the economy was flourishing. In this prosperous environment new trades and shops were founded; a few of these shops later became important Providence industries or formed the basis for the development of new industries.

Two important businesses founded in the late eighteenth century were Joseph Congdon's iron shop and Nehemiah Dodge's jeweler's shop. Congdon's iron shop, located near the present intersection of Canal and Steeple Streets, later became one of Providence's major businesses (Congdon and Carpenter Company). Nehemiah Dodge, in discovering a method for making gold plate, was one of the founders of the jewelry industry.

Two events were significant in accelerating industrial growth in Providence and surrounding rural areas. In 1789, the Providence Association of Mechanics and

Manufacturers was formed, and in 1790 Slater Mill, the first American machine-powered, cotton-spinning mill, began operations.

In 1789, seventy-nine manufacturers and tradesmen formed the Providence Association of Mechanics and Manufacturers (PAMM), whose stated aims were to encourage industry and to enforce manufacturing standards. This artisan organization represented the first organized effort in Rhode Island (and one of the first in the country) made by manufacturers to confront the problem of a market glutted by goods manufactured in Britain. One of the most important roles of PAMM was in helping to sway public opinion in favor of Rhode Island's ratification of the United States Constitution in 1790. Even before Rhode Island was part of the Union, however, PAMM began to contact manufacturing organizations in Rhode Island towns as well as in numerous towns in other states to encourage them to petition the Congress to raise tariffs on imported manufactured goods. PAMM sent several such petitions to Congress between 1790 and 1815, achieving little success, however, in Congresses dominated by farmers and merchants. It was not until these merchants began investing in manufacturing (especially the textile and textile-related industries) that protective tariffs were passed by the Congress in the early nineteenth century. By the mid-nineteenth century, the role of PAMM had faded to that of essentially a fraternal and benevolent institution.

PAMM demonstrated an early and decisive interest of artisans in manufacturing goods on a par with imported goods. The focal point of investments in manufacturing, however, was the production of cotton yarn and cloth as demonstrated by the following comment in a PAMM report of 1791: "As this (cotton) manufacture is growing in consequence, and engages the attention of gentlemen not immediately concerned in the mechanics arts, we doubt not, it will find advocates." The cotton industry's most able advocate was Moses Brown who had left his brothers' mercantile firm (Nicholas Brown and Company) to pursue the challenge of machine-producing cotton yarn with his son-in-law, William Almy. In England, yarn was machine produced on waterpowered cotton-spinning machinery known as

the Arkwright System, but knowledge of this system was closely guarded by the British.

While Almy & Brown's talented mechanics built workable machines (set up in a rented fulling mill in Pawtucket), the product was a very coarse yarn, the sale of which afforded the firm little or no profit.

Moses Brown attempted yarn production in the late 1780s, but met with little success until he joined forces in 1790 with Samuel Slater, an English immigrant who had a vast practical knowledge of the Arkwright System acquired as an apprentice and later as overseer for an English textile manufacturer. Within a year Slater, aided by several skilled mechanics, rebuilt Brown's machines into a workable Arkwright system. Slater and Brown's success transformed textile manufacturing from a cottage-based to a factory-based industry. The new factory-based cotton industry was of national importance in establishing a pattern for the country's industrialization during the nineteenth century. In Providence, the cotton industry initiated an era of enormous diversified industrial expansion.

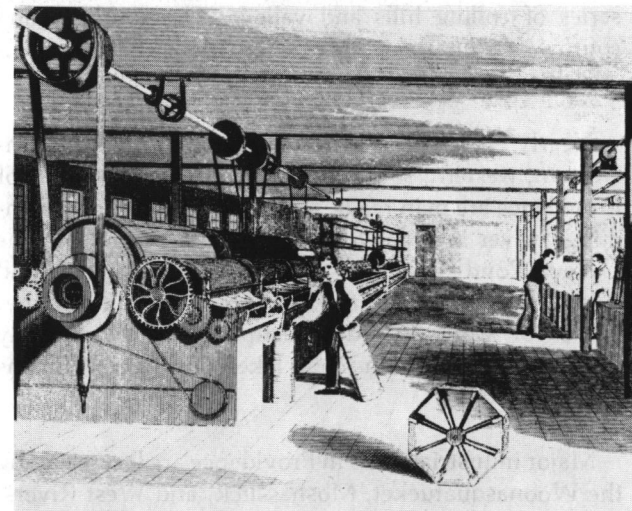


Fig. 3: Idealized view of an early 19th-century spinning mill showing machines used in the Arkwright System; engraving, 1891.

EARLY INDUSTRY: 1807-1829

The first thirty years of the nineteenth century was a period of significant physical and economic growth for Providence. Moses Brown and Samuel Slater's success in reproducing an Arkwright spinning system provided a technical advance in textile manufacturing at the end of the eighteenth century. While the invention of the cotton gin in 1793 had the effect of increasing the southern cotton crop tenfold to fifty million pounds a year by 1807 (which lowered the price of cotton significantly), the Embargo Acts of 1807 and the War of 1812 provided the greatest economic incentives for wealthy merchants (unable to carry on normal trade under these conditions) to funnel investments into textile manufacturing. Although these incentives disappeared when trade was resumed at the end of the war, resulting in an inevitable postwar recession in cotton and woolen manufacturing, merchants who had made a significant financial commitment to manufacturing defended their investments with the passage in Congress of the first protective tariffs.

Once textile manufacturing was supported by this small but powerful number of merchants-turned-manufacturers, advances were made in transportation systems (important to both merchants and manufacturers) and power-generating systems vital to manufacturing. While the Blackstone Canal was a major effort at improving the overland system of transportation, it ultimately did little to aid industry in transporting goods; operational problems and cost overruns, as well as the advent of the steam locomotive, caused its abandonment in 1848. The stationary steam engine, on the other hand, had an enormous salutary effect on industrial expansion, and its manufacture became one of Providence's major industries.

Embargo Acts and the War of 1812

While some Providence merchants reacted to the embargo by violating the law and carrying on a lucrative, if dangerous, smuggling operation, and others went bankrupt when their livelihood was severed, merchants who had already accumulated vast profits or who had inherited shipping fortunes were able to invest in non-

maritime ventures. One alternative was cotton-yarn manufacturing which, having sparked the Industrial Revolution in England, held the greatest interest for potential American manufacturers. Besides available financial resources and access to water-powered, cotton-spinning technology, investors in cotton mills at this time had two additional advantages — the availability of vast amounts of cheap raw cotton (normally shipped to England) stored in seaport warehouses, and the absence of imported, finished British products on the market. In order to supplant British imported goods, owners of spinning mills either adopted the "putting out" system, delivering yarn to hand weavers operating looms in their homes, or employed hand weavers in mills. Although the strictures of the Embargo Act were lessened several times before 1812, the trade situation remained unstable, and investors continued to finance spinning mills. By 1809, twenty-seven spinning mills were counted in Rhode Island, southern Massachusetts, and eastern Connecticut. Manufacturing investments increased after the outbreak of war in 1812 as prices for finished goods rose and the market expanded to fill wartime demands.

Providence merchants, such as the diversified shipping firm of Brown and Ives, invested in cotton-spinning mills in the rural areas of northern and northwestern Rhode Island where cheap and plentiful water-power was available. One new industrial venture, however, appeared in Providence in 1808 when Thomas

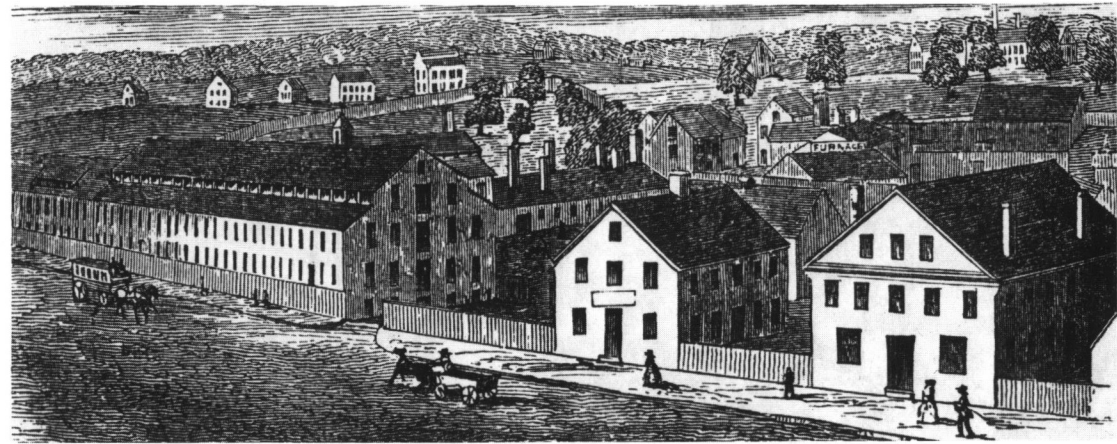


Fig. 4: Franklin Foundry and Machine Company (1800; demolished); Charles Street; engraving, 1860. One of Providence's earliest foundries, by the mid-19th century it was one of the city's most important textile-machine companies.

Fletcher, a weaver of narrow fabrics (such as tapes, rufflings, and lampwicks), moved his business from Boston to Providence. Until the passage of the Embargo Act, Fletcher had probably imported his cotton yarn from England. With his source of cotton yarn severed, however, Fletcher moved close to the ample supply of cotton yarn produced by Slater Mill in Pawtucket. That Fletcher moved to Providence instead of Pawtucket was indicative of Providence's attraction as a marketing and distribution center. Fletcher's narrow-fabric business formed the basis for the Fletcher Manufacturing Company (47 Charles Street), one of Providence's largest manufacturing companies by the late nineteenth century.

The embargo and the subsequent war similarly encouraged the development of the woolen industry previously inhibited by the importation of goods manufactured in England. Merino sheep had been imported from Spain as early as 1803 by David Humphreys, but the demand for Merino wool — a finer wool than common domestic sheep's wool — increased dramatically after the embargo. A "Merino mania" resulted in a sharp rise in the price of Merino wool to four times the cost of common wool by 1809 and, after the embargo was modified, a massive importation of Merino sheep from Spain (about 2500 between 1809 and 1811). This "Merino mania" manifested itself in Providence when John Waterman founded the Merino Mills in 1812. The return of peacetime trade, however, brought all grades

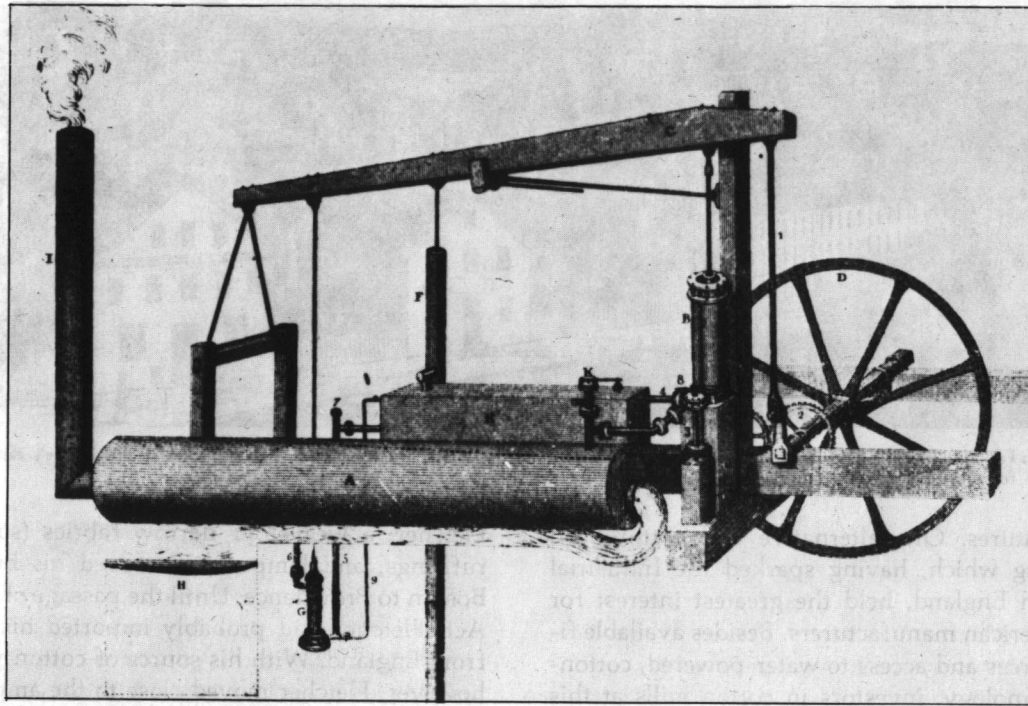


Fig. 5: Columbian Steam Engine (1814); engraving, 1901.

of English-produced woollens back into the American market, and, soon after the end of the war, Waterman transformed the mill to a cotton mill.

While Waterman's Merino Mill represented a relatively small-scale personal investment in woolen manufacturing, the Providence Woolen Company, founded at the same time, characterized a large-scale corporate venture in woolen production. Financed by prominent Rhode Island merchants, with backing from the Providence Association of Merchants and Manufacturers, the Providence Woolen Company was founded in 1812 to produce broadcloth. This company was one of the first Rhode Island companies to supplement waterpower with an Evans steam engine and was one of the state's first integrated textile mills. The Providence Woolen Company works (now the site of the Allen Printworks Complex, Dryden Lane) was the largest woolen mill in the country at the time. Yet, like many textile mills, this company failed at the end of the war when British woolen goods were dumped on the American market. It was many years before Providence investors again

viewed woolen manufacturing as a lucrative investment.

The textile-finishing industry, though it attracted fewer investors at this early stage, proved more stable than the volatile woolen industry. Henry Hoppin, another successful Providence merchant, was one of the founders of the Patent Calender Company, formed in 1814. This company, originally located on Sabin Street, specialized in textile finishing by the calendering process; it was the first finishing company to use a calender with differential gears and the second Rhode Island firm to use the Columbian Steam Engine, built by Oliver Evans. The Patent Calender Company, which later was run by the Hoppin, Olney, and Dyer families under the name of the Providence Dyeing, Bleaching, and Calendering Company, remained in Providence for more than one hundred and twenty years.

Another venture which flourished during the war and provided the basis for further industrial development in Providence was the Franklin Foundry, founded

in 1800 by Stanford Newell, Isaac Thurbers, and others. During the war the Franklin Foundry produced cannon. Later known as the Franklin Machine Company, it became one of Providence's largest textile-machinery manufacturers.

By the end of the war with England, many Providence entrepreneurs had made financial commitments to manufacturing, whether in mills located in Providence, Pawtucket, or in the rural hinterland. In one sense, the few early textile companies (especially those of the Providence Woolen Company and the Patent Calender Company) had set a pattern for later industrial development by seeking a high degree of sophistication in machine technology. This phenomenon cannot be attributed entirely to the wealth of Providence investors, since many funneled money into mills in rural Rhode Island. Another explanation is the large investment made in the purchase of Providence land which demanded an equally high return. A manufacturer near the center of Providence paid a premium for land because of its proximity to brokerage houses which both sold raw materials to the mills and marketed finished goods. Having invested a greater amount of money in the purchase of land, these entrepreneurs procured skilled managers and sophisticated machinery to ensure higher profits. The preciousness of land in Providence and, of course, the wealth of Providence businessmen were among factors which ensured high degree of technological sophistication in the Providence textile and base-metal industries later in the nineteenth century.

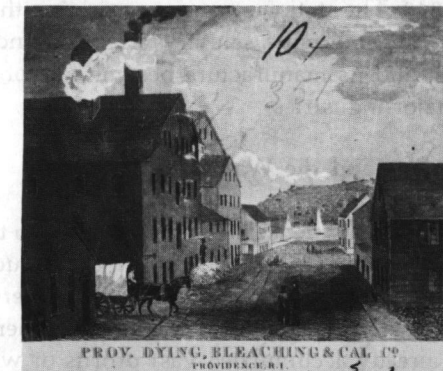


Fig. 6: Textile label (c. 1845).

Protective Tariffs

Overseas trade once again flourished for a short time at the war's end in 1815, and manufacturers consequently faced serious economic setbacks. The American market was flooded with British cotton and woolen goods and many American manufacturers were faced with yard overstocks, resulting in bankruptcy for numerous companies.

By this time, however, many influential citizens had invested a sizable amount of money in textile production and they acted to save their investments. These entrepreneurs turned to the legislative process to overcome the economic hardships produced by foreign competition. As a result, the first protective tariff was passed in 1816, imposing duties on imported textile goods. Tariffs have continued since the early nineteenth century as a fundamental element in the industrial economy.

The Power Loom

The introduction of the Gilmour power loom to Rhode Island in 1817 helped to integrate and stabilize the textile industry. By enabling weavers to keep pace with spinners, the power loom diminished the problem of yarn overstocks, although an ever fluctuating and unregulated market continued to result in periodic overstocks in the textile industry. The promoter of the Gilmour Loom, Daniel Lyman, in a gesture that helped to advance the Rhode Island cotton industry, refused a patent, and copies of the loom soon appeared in many neighboring cotton mills, although a power loom for fancy weaving was not developed until the mid-nineteenth century.

Steam Power and Early Steam-Engine Manufacturers

While water continued to power machinery in many textile mills throughout the existence of the New England textile industry, it had several drawbacks. As more manufacturers located their mills next to rivers and built dams and power canals, conflicts over water rights developed. Moreover, when summer droughts de-

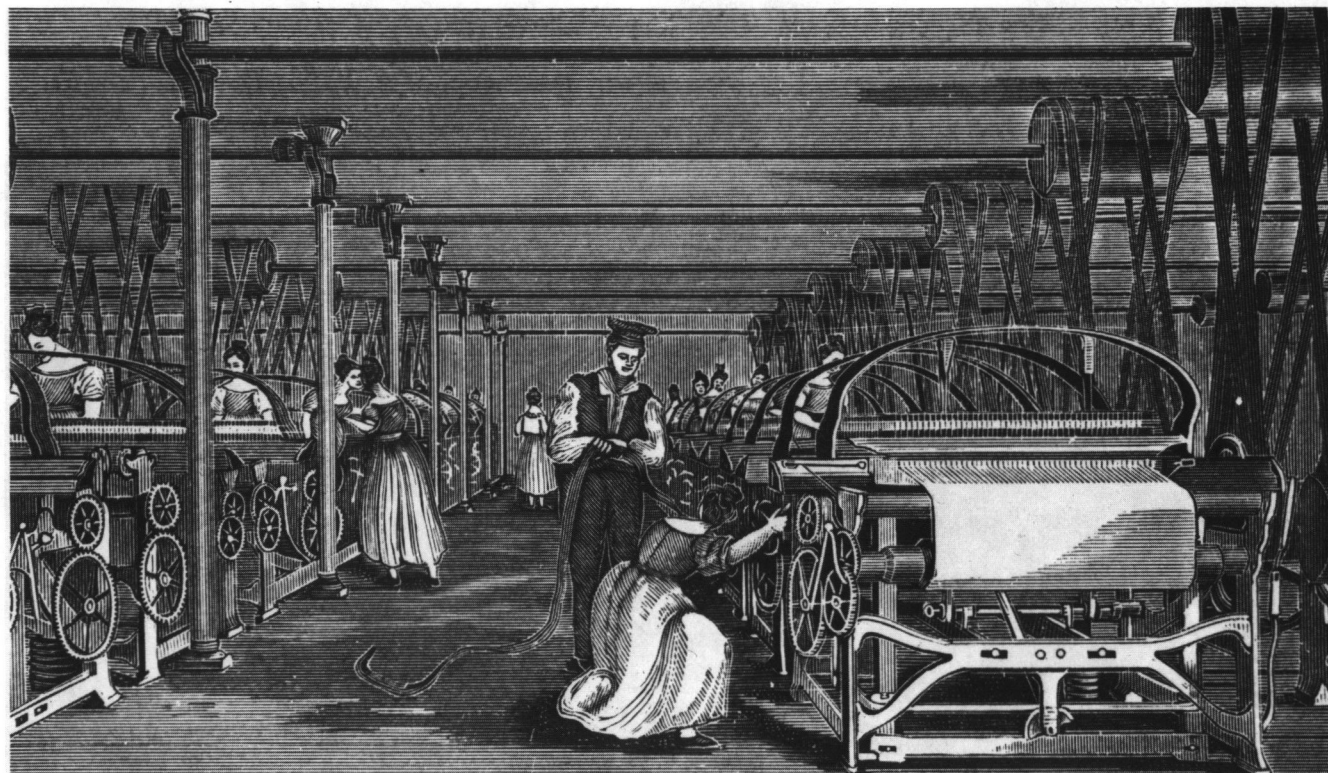


Fig. 7: Power-Loom Weaving in the early 19th century; engraving, 1891.

creased the rivers' water level there was not sufficient force to run the machinery. However, too much water from spring flooding was also a problem. The water wheel could not function smoothly in backwater and could not turn at all in extremely high water. The winter presented another problem for waterpowered mills because the wheel frequently froze in place. These factors eventually posed less of a problem as waterpower technology became more sophisticated, but for most areas in Providence (with the exception of the western section) the available waterpower was sufficient to power only the smallest operations. Thus water from the Woonasquatucket in the more rural western part of Providence (actually part of Johnston until 1898) continued to power mills well into the twentieth century, but urban mills were better suited to steam power.

During the 1820s and 1830s, the use of marine steam engines (powering passenger and freight boats) and stationary steam engines (powering machinery), which

had been largely experimental until about 1820, became more widely accepted. Steam power had an enormous effect on Providence's commercial and industrial development during this period.

The earliest known manufacturer of steam engines in Providence was John Babcock, who had a shop on South Main Street in the 1820s. Babcock's son, John Babcock, Jr., and Robert L. Thurston formed a steam-engine company in 1830 which later evolved into the Providence Steam Engine Company (521 South Main Street).

Possibly using one of Babcock's engines, Samuel Slater built a cotton mill on the land-locked site at Ship and Dyer Streets in 1827. Known as the Steam Cotton Mill, this was the first mill in Providence, and probably in Rhode Island, to use a steam engine as its sole source of power. The success of this venture encouraged other manufacturers to build steam cotton mills in the 1830s.

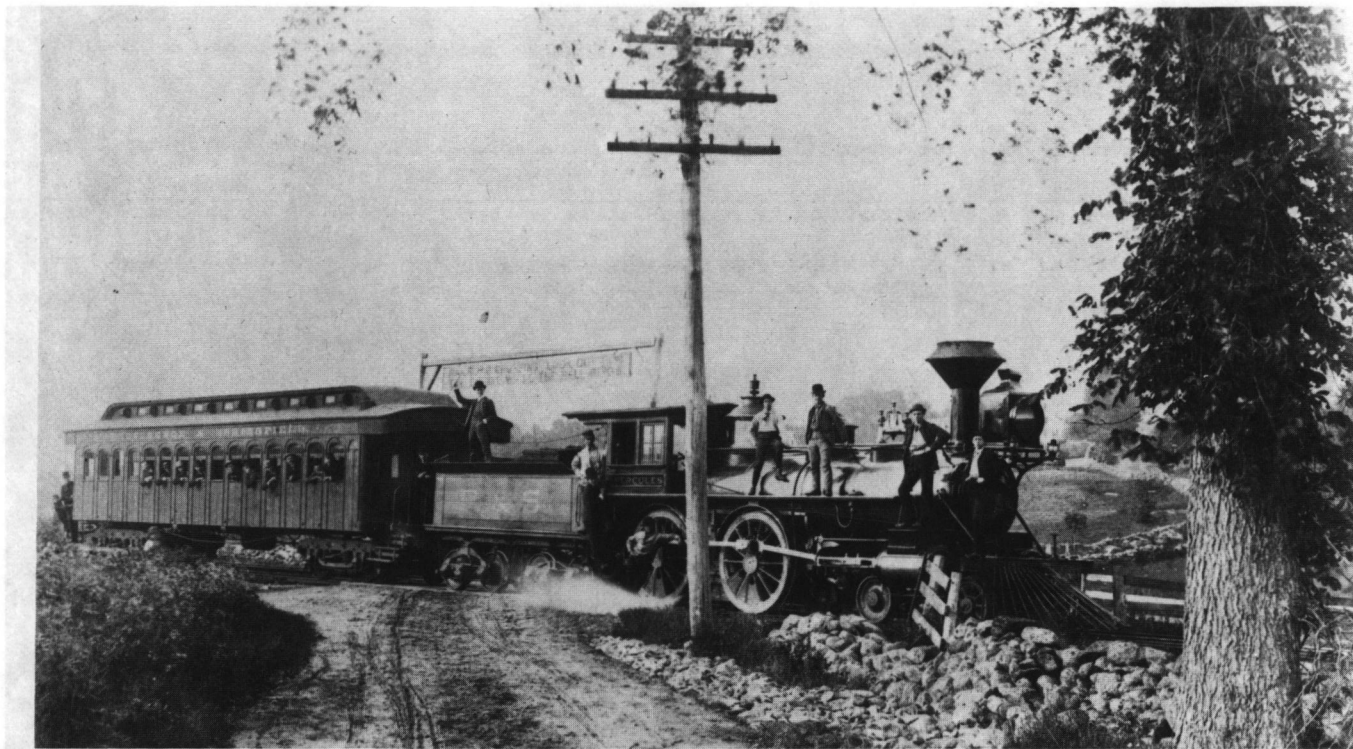


Fig. 8: Steam Locomotive of the Providence and Springfield Railroad; photograph, c. 1873.

EARLY INDUSTRY: 1829-1848

The period from 1829 to 1848 was characterized by economic stabilization as well as industrial and geographic expansion. The depressions caused by the panics of 1829 and 1837 motivated the surviving companies toward economic stabilization through consolidation of financial resources. Thus textile companies gradually became larger, employed more workers, and had a greater amount of financial backing. Another step towards stabilization was manifested in attempts to standardize mill construction, promoted by Zachariah Allen's founding of the first factory-mutual-fire-insurance company — the Manufacturers Mutual Fire Insurance Company of Providence (1835), which provided financial incentives for manufacturers who installed fire-fighting equipment in their mills and employed fire-inhibiting methods of construction. The expansion movement, presaged by the completion of the Boston to Providence Railroad in 1835, was evidenced by the increasing diversity of textile mills, the

founding of the base-metal industry, the strengthening of the steam-engine industry, and the growth of the jewelry and silverware industry.

The population of Providence grew from nearly 17,000 in 1830 to over 23,000 in 1840 and leapt to over 40,000 in 1848—largely due to Irish immigration in the 1830s.

The benefit of a huge labor force was not fully apparent in Providence's industrial expansion until the 1850s — with the exception of railroad expansion during the 1830s and 1840s, made possible, to a large extent, by immigrant labor.

Steam Power

The growth and expansion of the steam railway system between 1830 and 1850 was a crucial factor in making Providence one of New England's most important industrial cities. In 1835, the railroad between

Providence and Boston was completed and regular service was initiated. During the next thirteen years, the Providence and Stonington Line (1837); the Providence and Worcester line (1848); and the New York, Providence and Worcester Line (1848) were completed. The culmination of the initial boom in railroad construction in Providence was the enclosure of the cove, the subsequent construction of tracks around the southern and eastern borders of the cove, and the erection of a passenger station at Exchange Place by the Providence and Worcester Railroad in 1848. The impressive railroad station, designed by Thomas Telford (replaced by the present Union Station of 1898), was appropriately called Union Station since all lines converged at this location in the center of the city.

The railroad's importance to Providence was closely tied to the development of the stationary and marine steam engine. The stationary steam engine allowed manufacturers more flexibility by eliminating the necessity for a river location (although some textile operations such as printing, dyeing, and bleaching were water dependent). The steamship and the steam locomotive transported raw materials such as coal (for steam-engine fuel), cotton, and iron to Providence manufacturers and shipped out finished goods from Providence and neighboring factories to markets in the North, South, and West. But Providence, like other harbor cities, had the advantage of competitive modes of transportation (although during the first railroad boom steamship patronage shrank considerably, it was revitalized during the second half of the nineteenth century) which kept the prices of shipping moderate until the turn of the century when the powerful New Haven Railroad Corporation owned or controlled virtually every mode of freight and passenger transportation in Providence and many other New England cities.

One of the first manufacturers to make use of the benefits of both the stationary steam engine and the steam locomotive was John Waterman who had built the Merino Mills in 1812. Like Samuel Slater's Providence Steam Cotton Mill (1827), the Eagle Steam Cotton Mills built by John Waterman in the mid-1830s depended on steam for its source of power. Waterman, however, was quick to realize the benefits of being on a

railroad line and located his mills on Dike Street next to the tracks of the Providence and Stonington Railroad, then under construction.

The Corliss Steam Engine

In 1845, George Corliss came to the city of Providence because of its reputation as a center for steam-engine manufacturing. While employed at Fairbanks, Bancroft and Company, Corliss began to work on his own to refine steam-engine technology and in 1848 patented an automatic cutoff valve that dramatically increased the efficiency of stationary steam engines. Corliss put Providence at the forefront of American steam-engine manufacture and accelerated the adoption of steam power in Providence industries. One of the first to use one of Corliss' innovative engines was the Providence Bleaching, Dyeing, and Calendering Company (Valley Street) in 1849. This company—under its former name, the Patent Calender Company—had been one of the first to use the Evans Steam Engine in 1814.

Textile Printing and Other Water-Dependent Industries

While steam cotton mills such as Samuel Slater and John Waterman's could be located at land-locked sites, some textile manufacturers such as printing, dyeing, and bleaching companies needed vast amounts of clean water for their operations. Woolen manufacturers also needed water (if they bought raw wool) to wash the dirt and grease out of the fiber. Manufacturers of coarse woolen fabrics could buy pre-washed wool (which when compressed for shipping caused the fibers to break) since they did not need long fibers; but when fine wool and worsted manufacture became one of Providence's important industries later in the century, water for wool washing became a necessity. Moreover, the by-product of these operations was dye- or grease-polluted water which was returned to the stream (a practice which continued well into the twentieth century). Thus, streams and rivers were vital to these sectors of the textile industry both as a resource and a disposal site. Among major Providence companies dependent on water for printing, dyeing, bleaching, or cleaning in the first half of the nineteenth century were the Dyerville

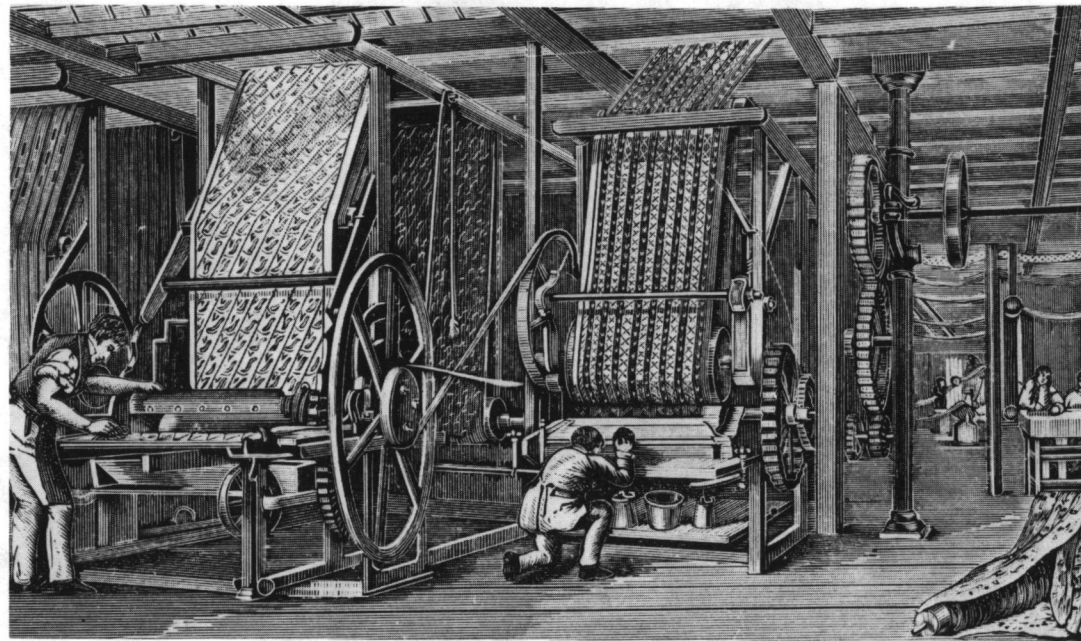


Fig. 9: Calico printing in the early 19th century; engraving, 1891.

Manufacturing Company, a print-cloth manufacturer on the Woonasquatucket River at Manton Avenue (this company also used the river for generating power), and the Allen Printworks on the Moshassuck River at Dryden Lane.

Base-Metal Industries

Although the development of base-metal industries—that is the manufacture of products made from iron or other base-metal materials—can be viewed as a direct response to the blossoming textile industry (since most base-metal products directly or indirectly augmented the manufacture of textiles), not all textile-manufacturing towns and cities developed these industries. Providence already had a few well established foundries, formed during the era of maritime trade. Men trained in founding or in other trades requiring engineering skills (such as house, mill, or ship building) were oriented toward the engineering challenges of industrial development and because Providence was a wealthy town, investors in new and promising industries were not difficult to find.

One investor in the base-metal industry was the renowned textile manufacturer Samuel Slater who with Thomas Hill founded the Providence Machine Company (1838)—an outgrowth of the machine shop at Slater's Providence Steam Cotton Mill on Dyer Street. This company was among the first to produce sophisticated American spinning machinery. Another major textile machine company was the Phenix Iron Foundry (1830; at Eddy Street, later at Elm Street) which produced the earliest American textile-printing machines.

While machine companies and steam-engine manufacturers evolved in support of the textile industry, other base-metal manufacturers supplied machine parts or tools for the textile machine industry and the steam-engine industry, the most important of which was David Brown & Son which later became Brown & Sharpe. This company was established by David Brown, a jeweler and watch and clock maker, and his son Joseph, who had additional training in the machine shop of a cotton mill; David Brown & Son began manufacturing lathes and small tools for mechanics and machinists in the 1840s. While Joseph Brown's tools

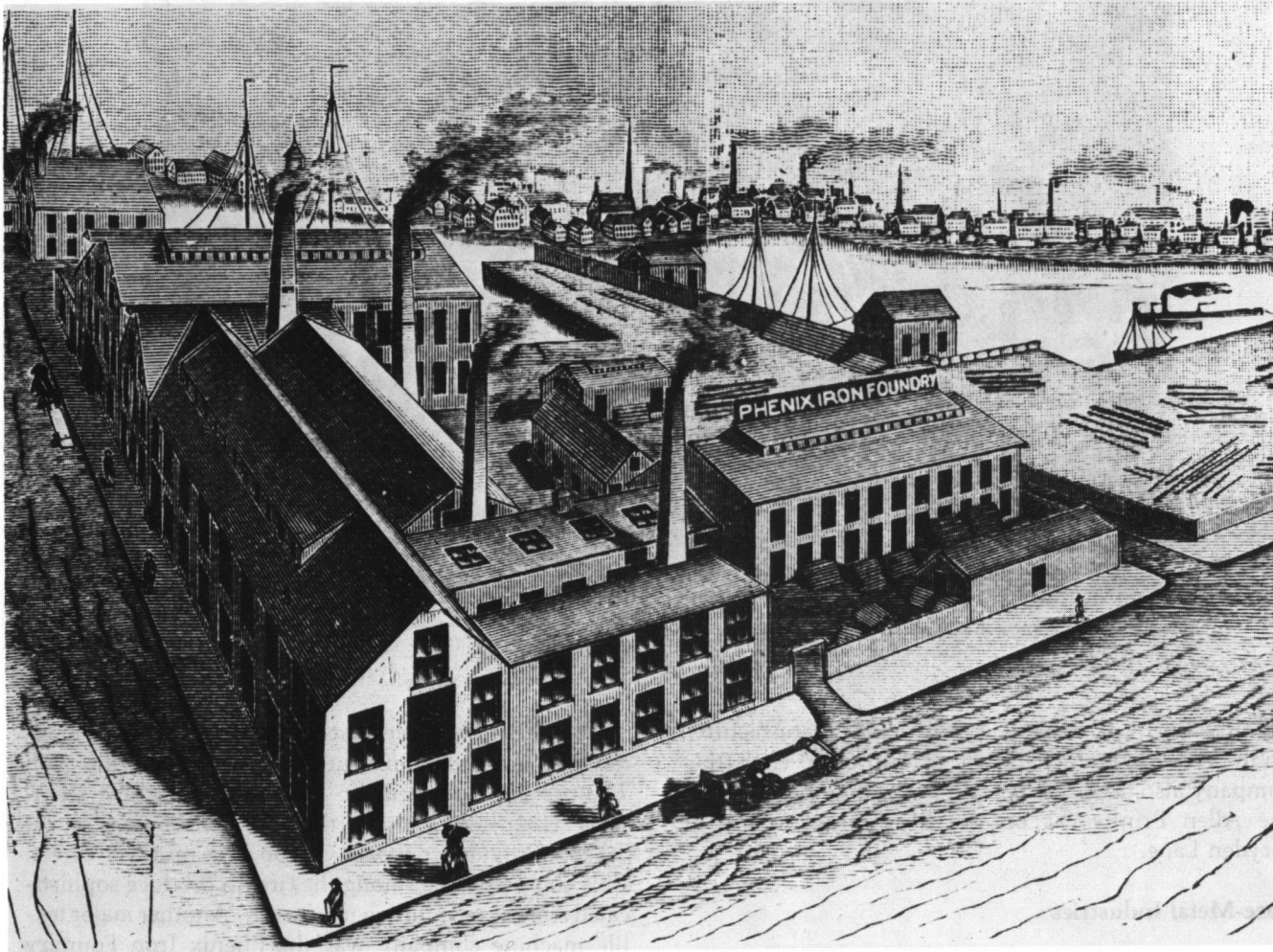


Fig. 10: Phenix Iron Foundry, now the site of the Narragansett Electric Company Power Station (1830 and later); 342 Eddy Street; engraving, 1891.

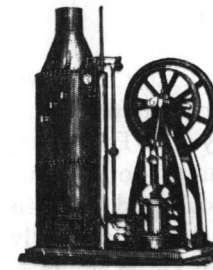
were instrumental in increasing textile machine efficiency, it was not long before the same equipment was adapted for use by steam-engine builders and other machinists. The universality of Joseph Brown's (and later Brown & Sharpe's) hand and machine tools ensured the firm's endurance in the twentieth century when the textile industry and the over specialized textile machine industry declined sharply.

Some base-metal industries however were the result of the wave of prosperity and expansion that accompanied American industrialization. As industries expanded and the population swelled, the consequent boom in transportation and construction stimulated the development of the hardware industry. Taking advantage of the expanding market for nails and screws were the Eagle Screw Company (1840) and the New England

FULLER IRON WORKS,

FREDERICK FULLER, AGENT.

PORTABLE AND STATIONARY



Steam Engines,

SUITABLE FOR

Pile Driving, Pumping, Hoisting, Discharging and Loading Vessels, and applicable to any kind of Machinery.

STEAM, WATER & GAS PIPES,

Mill Gearing and every description of Machinery Castings.

NOS. 416 AND 418 SOUTH MAIN STREET,

PROVIDENCE, R. I.

Fig. 11: Advertisement, 1873.

Screw Company (1850) which later merged into the American Screw Company (Hewes Street), the largest screw manufacturer in the country.

With the boom in house construction also came innovations in such vital functions as heat production. Although the theory of stoves as a separate heating element from the fireplace date from the late eighteenth century, mass production of cast-iron stoves increased considerably as cast-iron technology improved in the 1830s and 1840s. One of the many manufacturers to undertake stove production was Amos Barstow, proprietor of the City Furnace, who in 1836 founded the Barstow Stove Company (Point Street), but, unlike many of the small companies founded at this time, the Barstow Stove Company continued to build innovative models of wood and coal stoves and, later, furnaces into the late nineteenth century.

The period from 1830 to 1850 was a formative period for several other base-metal companies such as the Fuller Iron Foundry (25 Pike Street), the Providence Tool Company (148 West River Street), and the New England Butt Company (304 Pearl Street), which all achieved prominence in the late nineteenth century.

The Jewelry and Silverware Industry

The Providence jewelry and silverware industry grew steadily, if not rapidly, from twenty-seven firms, employing 280 workers in 1830, to fifty-seven firms, employing 590 workers in 1850. While the jewelry industry generally retained the same partnership structure in 1850 as twenty years earlier, the silverware industry shifted towards a larger scale, corporate structure. Though the jewelry and silverware industries have always been associated as manufacturers of precious-metal products, the growth patterns of these two industries diverged after 1842.

Unlike the textile and base-metal industries, the manufacture of jewelry required scant equipment since most work was done by hand. Consequently, it required comparatively little to capitalize a jewelry company. The cost of producing jewelry had been cut in the late eighteenth century with Nehemiah Dodge's discovery that gold could be rolled on copper to make a cheaper grade of jewelry. The lamination of gold onto a cheaper metal was further refined when Thomas Lowe, an English jeweler, came to Providence with a new process of sweating a sheet of gold onto another metal surface to produce a gold-plated substance. That Lowe chose Providence as the city most likely to provide opportunities for his skills and knowledge was an indication of the city's growing reputation as a jewelry center. Providence's importance in this field was due to the existence of a strong core of jewelers during the maritime era; the trade continued to expand under the apprenticeship-journeyman system, whereby after seven years' apprenticeship, two or more journeymen often combined resources to form a partnership. Usually, one partner managed the shop while the other took charge of the clerical work and the marketing of the product.

The other vital factor in Providence's growth as a jewelry center was the establishment of non-local markets. Even before 1830, markets were created in Boston; with the advent of the railroad, however, they were established in New York, as well as cities of the South and West. While the industry continued to develop and expand its markets during the first half of the nine-

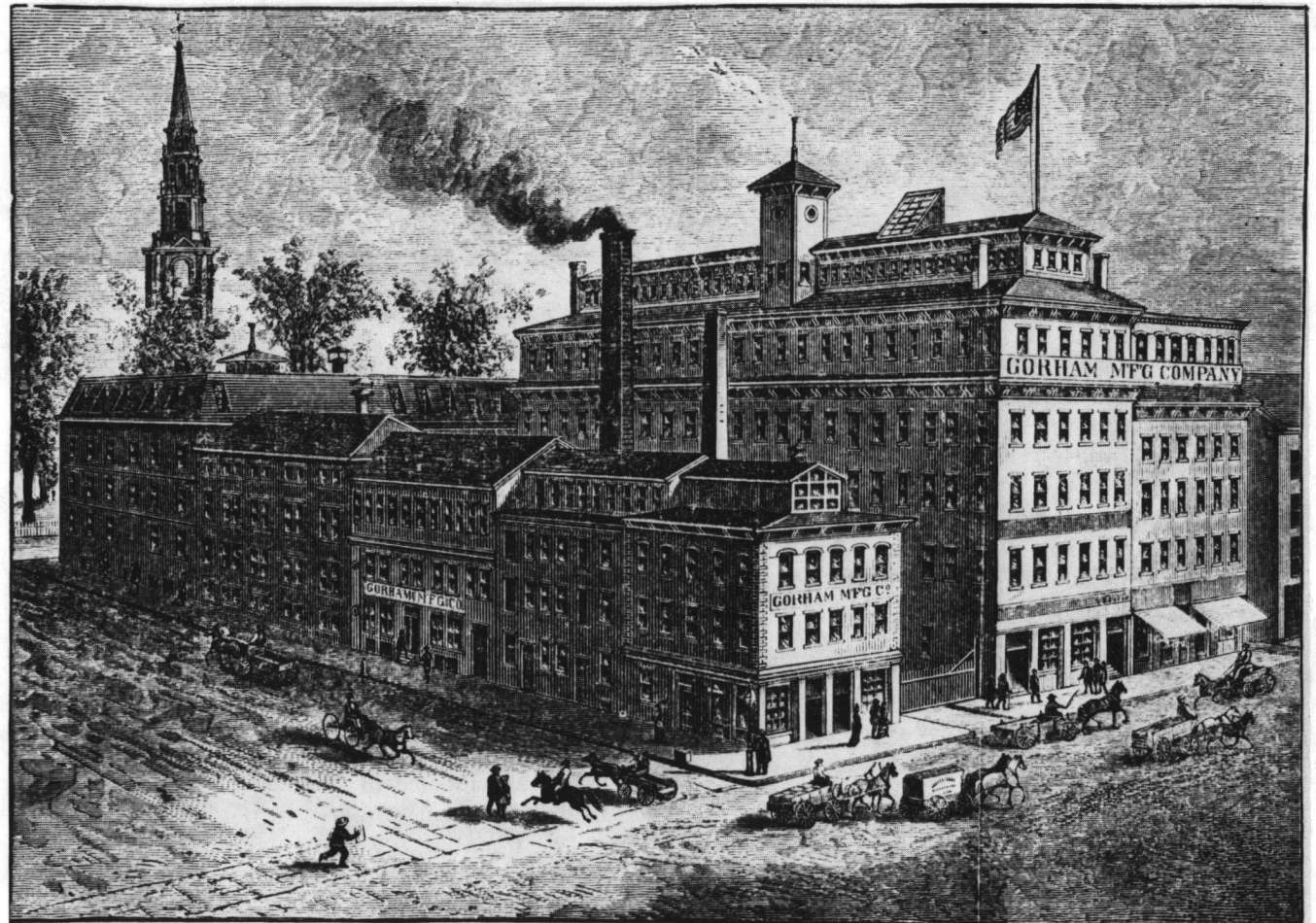


Fig. 12: Gorham Manufacturing Company, now the site of the Providence-Washington Insurance Company Block; Steeple Street; engraving, 1886.

teenth century, it was not until the late nineteenth century that it attained a mechanized and corporate structure.

Unlike the jewelry industry, the Providence silverware industry was not established until the 1830s when the Boston silversmith Henry L. Webster convinced

Jabez Gorham, a Providence jeweler, that there was a large market for silver flatware and holloware. The industry grew from a small silversmith shop under the direction of Gorham and Webster to a thriving, mechanized industry and corporate enterprise after the business was taken over by Jabez Gorham's son John in 1842.

INDUSTRIAL EXPANSION: 1850-1860

Between 1850 and 1860, the population of Providence grew from approximately 40,000 to 50,000 due to vast numbers of Irish immigrants. Immigration—which resulted in a greatly expanded labor force—and the coincident development of “automatic” textile machinery—such as the cap spinner which could be operated by unskilled or child labor—were the major forces in the expansion of the textile industry.

Between 1850 and 1860, the number of cotton mills grew from eight with 1,138 workers to fifteen with 1,730 workers, and the number of woolen mills had grown from two with 60 workers to four with 382 workers. Though the Providence textile industry was expanding and increasing in technological and administrative sophistication by 1860, Providence manufacturers were in general overshadowed by the larger operations of rural Rhode Island.

Some Providence textile companies began to change in size from relatively small companies employing between 50 and 150 workers to larger companies employing over 200 workers. This trend was more apparent in the Providence printing and finishing industries than in the city’s spinning and weaving mills. Another development during these years was a gradual transition from the jointly owned company to the corporation—a transition which was made much later in Rhode Island than other manufacturing states because of a consistently conservative legislature.

The expansion of the Rhode Island textile industry triggered an unparalleled surge of growth in the base-metal industries, ranging in products from steam engines and textile machinery to stoves and sewing machines. In Providence, the industry quadrupled in size from twenty-five firms employing 2,022 workers in 1850 to ninety-four companies employing 3,131 workers in 1860. Moreover, Providence, always strong in the base-metal industries, entirely overshadowed the once booming iron-working center of Pawtucket with almost four times the number of companies. By the eve of the Civil War, then, Providence had an expanding and continually diversifying base-metal industry while those of



Fig. 13: Corliss Steam Engine Co. (c. 1857; buildings now altered); 14 West River Street; photograph c. 1857. Designed by George H. Corliss.

Pawtucket, though well established, remained fairly static after 1850.

Immigration, Incorporation and Expansion

While in the 1820s and 1830s the population of Providence was augmented by small numbers of skilled English and Scottish workers, the population boom of the 1840s, 1850s, and 1860s was due largely to the arrival of large numbers of Irish immigrants. The failure of the potato crop in 1846 and chronic political repression were strong motivating factors for Irish emigration. Furthermore, manufacturers sought a large, flexible, and unskilled labor force to augment and partially replace the skilled independent Scottish, English, or Yankee worker. Irish immigrants were crucial to Providence’s industrial expansion, but social prejudice and a decreasing need for skilled labor in the textile industry precluded much improvement of their socio-economic status until the end of the nineteenth century when second-generation Irish began to rise in the hierarchy of industrial Providence.

By the 1850s, the influx of Irish immigrants had solved most of the labor-supply problems of mill owners. Industry was clearly ready for expansion, but large ventures required large capital investments—which, under the joint-ownership structure, were diffi-

cult to acquire and manage. In 1847, under pressure from manufacturers, the Rhode Island legislature finally liberalized corporate privileges for manufacturing corporations by allowing larger stock sales and limiting corporate liability. One advantage of the new law was that corporations could acquire large amounts of capital by selling stock while avoiding an unwieldy management system (a problem with joint-ownership companies). Moreover, the failure of the corporation under the legislation act eliminated the personal liability of the individual stockholder—an important concession to investors in manufacturing corporations since the threat of bankruptcy was ever present in the fluctuating industrial economy.

The rate of incorporations increased significantly after the new provisions became law. While seven companies petitioned for, and were granted, charters in the 1840s, twenty-seven Rhode Island companies were chartered in the 1850s. Two major Providence companies which took advantage of the new corporation laws during the 1850s were the Atlantic Delaine Company (1851) and the Corliss Steam Engine Company (1856). The Panic of 1857 and the subsequent bankruptcies of numerous companies (one of the major ones in Providence was that of Phillip Allen and Sons at Dryden Lane) convinced many manufacturers that the corporate structure was financially more prudent than the joint-ownership form.

New Industries

At the same time that many textile companies were expanding in the period before the Civil War, entirely new types of base-metal companies were forming in Providence; among them were Stillman White's Brass Foundry, which was known for its Anti-Friction Lining Metal (used by steam-engine manufacturers and other types of precision-machine companies for lining bearings), and the John & Thomas Hope Company, known for the pantograph engraver (the purpose of which was to transfer and engrave a pattern onto the copper rollers used for printing cloth) which eliminated the need for an artisan.

Two Providence companies already in operation—Brown & Sharpe and the Providence Tool Company—directly benefitted from the development of the sewing machine in the mid-nineteenth century. In 1858, five years after Lucien Sharpe had joined Joseph Brown's small company, the firm of Brown & Sharpe procured a contract to produce the Willcox and Gibbs Sewing Machine. At about the same time, the Providence Tool Company obtained a contract to produce the Household Sewing Machine.

THE ONLY GENUINE AND ORIGINAL
HOWE SEWING MACHINE
 — IS THE —
ELIAS HOWE,
 With this Trade-Mark imbedded in the plate.

H. K. AMES, MANAGER.
 STATE AGENCY,
 188 Westminster Street, Barnaby Building.

Fig. 14: Advertisement for the Howe Sewing Machine; illustration, 1872. Elias Howe perfected and patented the first double-thread sewing machine.



Fig. 15: First Rhode Island Regiment leaving Exchange Place (1861). The Civil War had a major salutary effect on the textile and base-metal industries in Providence.

This mass production necessitated the development of small precision-component construction. Joseph Brown of Brown & Sharpe and Frederick Howe of the Providence Tool Company produced the necessary precision gauges and machine tools. These tools were of vital importance as the principles of interchangeable parts became the basis for machine production in the nineteenth century.

INDUSTRIAL EXPANSION: 1860-1873

Between 1860 and 1873, two events—the Civil War and the Panic of 1873—critically affected Providence industry. The outbreak of the Civil War—coming after a decade of mill expansions, capital growth, and new industrial development—provided maximum profits to

established manufacturers, which, in Providence, were mainly the base-metal industries, since they could quickly step-up production or adapt machinery to meet wartime needs. At the same time, however, the war provided needed incentives for the rapid expansion and mechanization of industries (especially the woolen and worsted industry) which had developed at a slower pace before 1860. New developments during or after the war—such as the construction of the streetcar network, the erection of a large new coal-gas production plant, the growth of Wanskuck Village, and the first efforts at labor organization (the Olneyville Ten Hour Association of 1873)—were indications of a prospering industrial economy which lasted until the Panic of 1873. The subsequent depression caused a sharp drop in Providence's industrial production. Prosperity did not fully return to Providence industries until 1879.

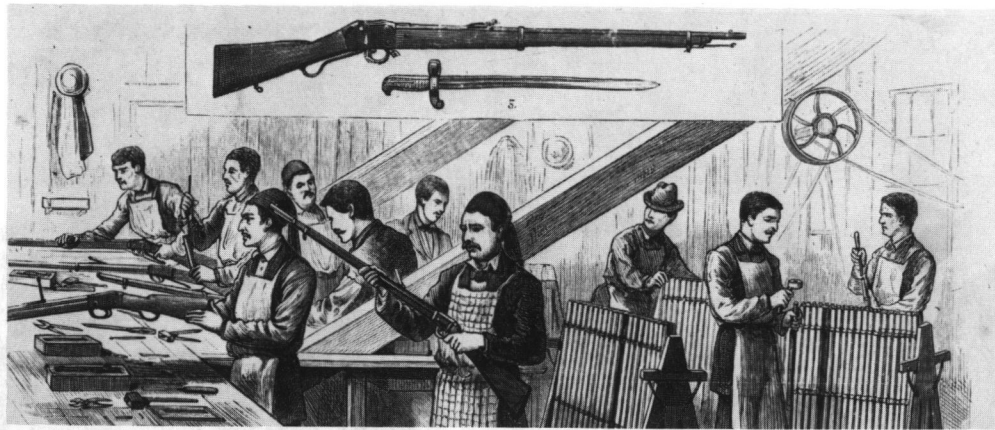


Fig. 16: Turkish Officers inspecting guns at the Providence Tool Company; illustration, 1877.

Weapons Manufacture

The Civil War triggered a full scale expansion of existing industries and a proliferation of new manufacturing companies. Weapons and uniforms were in sudden demand as were machines and steam engines necessary to produce these items.

Companies formed to manufacture arms included the Burnside Rifle Works, manufacturers of breech-loading rifles, and Nicholson & Brownell, manufacturers of parts for Springfield muskets. Companies which adapted their machinery to produce weapons were the Builder's Iron Foundry (Coddling Street) and the Providence Tool Company (148 West River Street).

At the end of the war, however, most of these companies either resumed production of their peacetime line or developed new lines of products expected to prove lucrative. The Providence Tool Company reinstated the manufacture of sewing machines but continued to manufacture rifles (and were, in fact, the major supplier to Turkey during the Turko-Russian War of the 1870s). William Nicholson (of Nicholson & Brownell) sold all of his gun-manufacturing interests and formed the Nicholson File Company, the first successful machine-made, file-manufacturing company in the United States. By the turn-of-the-century, the Nicholson File Company was one of Providence's major industries. The stockholders of the Burnside Rifle Works also reorganized at the end of the war. The new

firm, called the Rhode Island Locomotive Works, became one of the nation's largest producers of steam locomotives.

The Woolen and Worsted Industry

Although the Valley Worsted Mill had been manufacturing worsted yarn since 1842, and the Elm Street Woolen Company (later the site of the Vesta Knitting Mills, Imperial Place) had been manufacturing coarse woolens since the 1840s, the woolen and worsted industries did not flourish in Providence until the 1860s.

Because the wartime blockade of Southern ports severed the supply of cotton, many mill owners (especially the smaller operations with small stocks of cotton) were forced to close. There was, however, no shortage of wool. Domestically grown sheep provided inexpensive wool; importation supplied additional varieties, although tariffs made this wool more expensive. Short-fiber wool was used in the production of both coarse and fine goods, the end product depending on both the quality of the raw material and the cleaning, carding, spinning, and weaving processes.

Long-fiber wool, usually of a medium grade, was used to make worsted yarn which produced a fine and durable cloth. The combing process used to make worsted goods had been a manual operation until the 1850s

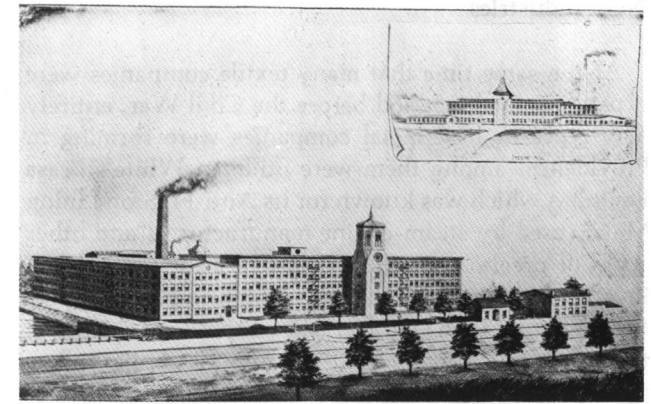


Fig. 17: Wanskuck Village of the Wanskuck Company; lithograph, 1922.

when the Lister and Noble automatic combs were introduced in England. This new technology plus the availability of cheap, long, staple (fiber) wool through the Reciprocity Treaty with Canada (1854-1865) stimulated the growth of the worsted industry, although the boom in worsted production did not occur until the 1870s and 1880s when the cloth gained widespread popularity.

The first of several large woolen mills built in Providence during or immediately after the Civil War was the Riverside Mills (Aleppo Street), built in 1862 by George W. Chapin and Lewis T. Downes to produce mohair and astrakhan cloth used for fine coats. Chapin and Downes modeled their operation on European woolen factories and installed the latest European machinery into their factory.

Soon after the construction of the Riverside Mills, Jesse Metcalf and Henry Steere, who had both been active in the textile industry, built a large woolen mill, the Wanskuck Mill, on Branch Avenue. Two years later, the Wanskuck Company made its first shipment of fine woolen goods to New York. Other mills to begin the manufacture of fine woolen goods during or after the war were the Atlantic Delaine Company, which built a large mill next to their delaine factory, and the Weybosset Mills, bought by Royal C. Taft and William Weeden in 1863 and soon converted to the production of cassimeres. Towards the end of the war, Chapin and Downes began manufacturing worsted goods which



Fig. 18: Hicks Boiler Works (1870, relocated 1920); 614 South Main Street; engraving, 1875. A small base-metal operation which manufactured and repaired boilers until the mid-1970s.

were among the first high quality machine-produced in the country. Other Providence woolen companies such as the Wanskuck Company began the production of worsteds in the 1870s.

Incorporation and Expansion in the Base-Metal Industries

Steam-engine manufacturers especially benefitted from the Civil War. The Providence Steam-Engine Company obtained a contract to produce engines for Union sloops of war. To meet the government's demand for marine steam-engines and manufacturers' demands for stationary steam-engines, the Providence Steam-Engine Company incorporated to gain enough capital for expansion. The Corliss Steam-Engine Company (incorporated in 1856) also expanded to meet war-time production needs.

In the ten years before the war, sewing-machine production had grown so rapidly in the United States that the value of sewing-machines manufactured nearly equaled the value of all textile machinery produced. While the private demand continued, the war expanded

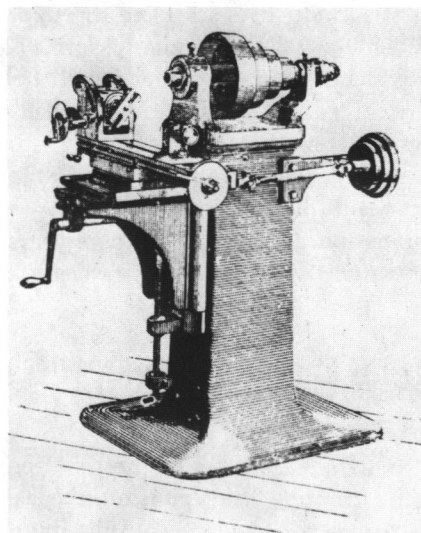


Fig. 19: The Universal Milling Machine; patented by Joseph Brown in 1865. This machine was a major breakthrough in the production of interchangeable parts.

the market for industrial machines to be used in the mass production of clothing, boots, and shoes. Brown & Sharpe continued to expand during and after the war as manufacturers of sewing machines, as well as manufacturers of tools in demand by other sewing-machine companies and by machine manufacturers in need of precision tools. In order to take full advantage of the expanding market for its goods, the company incorporated in 1868 and began construction of a new factory at Promenade Street in 1870.

Gas Lighting and Production

One of the major factors affecting industrial expansion was gas illumination. With it the manufacturer could run his plants for longer hours with less risk of fire and at a lower cost than oil lighting.

Thus the Providence Gas Company, which, by 1872, had a monopoly on municipal production, was one of the city's most important companies. As a result of the growing industrial and private demand for gas lighting, the Providence Gas Company began construction of a large, new, coal-production plant on Globe Street in 1870 and continued to build gasometers in various

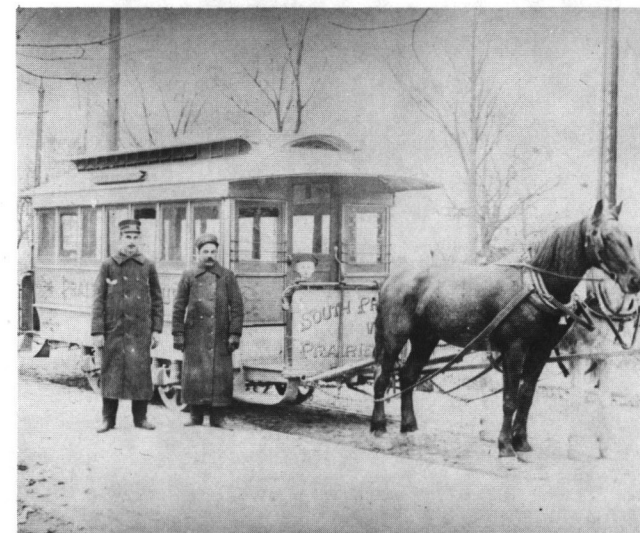


Fig. 20: Horsecar on Prairie Avenue; photograph, c. 1880.

parts of the city. While most companies patronized from the Providence Gas Company, the city's largest textile company—the Atlantic Delaine Company (Manton Avenue)—formed its own coal-gas company.

The Streetcar Network

Another development affecting industrial growth was the construction of the street railways. The system of horsecar lines loosened the bonds which had geographically tied workers to places of employment and allowed the construction of both factories and residential neighborhoods on vacant land away from the dense center of the city by providing connections to the banks, offices, and city markets of downtown.

The first horsecar line ran from Providence to Pawtucket in 1864. In 1865, the Union Railroad was incorporated with large holdings owned by the Sprague family. Its first line ran from Olneyville to Market Square and soon afterwards the company built tracks along the major highways of Providence. In 1872, the Union Railroad Company, having bought the Providence-Pawtucket line, gained a monopoly on horsecar transportation in and around Providence.

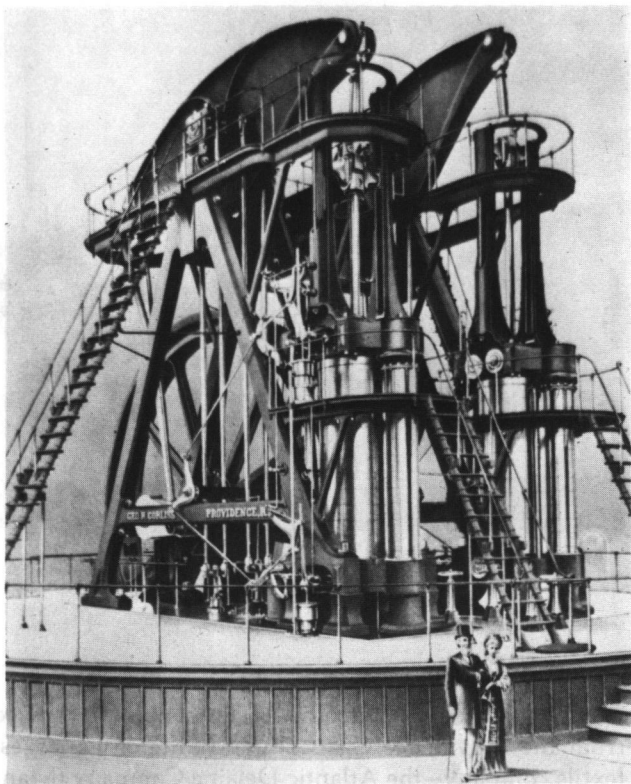


Fig. 21: The Centennial Engine (1876). Built by George Corliss, founder of the Corliss Steam Engine Company. This massive engine provided power for Machinery Hall at the Centennial Exposition in Philadelphia.

The Panic of 1873

The Panic of 1873 proved more devastating than any previous economic depression because of the extent and rate of expansion that had occurred during and after the Civil War. The result of over expansion by the railroads, inflated greenback currency, an overabundance of farm products (causing a sharp drop in prices and a corresponding decrease in spending by the rural sector) was the failure of two vital New York brokerage houses which, in turn, precipitated the panic.

The major Rhode Island concern to fail was the A. & W. Sprague Manufacturing Company. Besides owning the Providence streetcar system and numerous manufacturing and printing plants in the Pawtuxet Valley, the Sprague family had investments in mills and mill sites extending from Maine to Georgia. The Spragues also had investments in Western land as well as in sev-

eral diversified industries scattered throughout various states. When A. & W. Sprague declared bankruptcy, many Providence savings banks which held Sprague notes were forced to reorganize; two failed at a loss to depositors. A few Providence manufacturing companies, including the Atlantic Delaine Company, failed as a direct result of the panic—and most were affected by the depression. During the next six years mill shut-downs, short workdays, and layoffs were common.

INDUSTRIAL MATURATION: 1873-1900

If the first three quarters of the nineteenth century was a period of industrial expansion, the last quarter of the century was a period of consolidation. Industrial growth did not end with the Panic of 1873; the formation of new industries and expansion of the labor force through immigration continued through the nineteenth century and into the twentieth, but the unbridled growth of industry and the drastic extremes of the business cycle gave rise to marketplace adjustments to meet or avoid increasingly complex obstacles to continued economic growth. Having fully committed themselves to a heavily industrialized economy, Providence civic leaders and businessmen began to seek measures to ensure its continuity. These early attempts included diversification into new industries, participation in international expositions (especially the Centennial Exposition of 1876), consolidation of industries, and civic

improvements such as the construction of water-supply and sewage systems, as well as improvement to the Providence Harbor. Another step taken by manufacturers as a response to business crises was cutting labor costs by reducing wages, which alienated the work force and triggered the labor movement of the 1880s organized by the Knights of Labor. These products of the maturation process had a profound effect on the development of Providence's economy in the twentieth century.

Population Growth and Immigration

The population of Providence grew from 50,000, in 1860 to 105,000 in 1880. This enormous rate of growth was due both to the re-annexation of parts of Cranston and North Providence and to a steady influx of immigrants from Ireland, Germany, Scotland, Portugal, and Sweden. After 1880, natives of these countries continued to form part of the immigrant population of Providence, but Italians and Eastern European Jews (fleeing poverty and persecution) formed the largest proportion of new immigrants. They found work largely in the city's textile mills and jewelry factories, which employed proportionately more unskilled laborers. Skilled immigrant workers had a wider range of employers.

Expansion of the Worsted Industry

The worsted industry recovered from the depression of the 1870s and prospered during the 1880s and 1890s.



Fig. 22: Workers at the Nicholson File Company; Acorn Street; photograph, c. 1815. The Nicholson File Company, one of the country's most important base-metal companies, was a major Providence employer.

By 1890, Providence produced more worsted goods than any other American city. The city's worsted companies, with a total of 8,887 workers by 1900, were vital to Providence's economic growth.

The industry prospered because of the popularity of worsted cloth, protective tariffs, the expanded labor force, and improved machinery. Manufacturers had replaced hand combs and other less sophisticated automatic combs with the Noble comb by 1870. After 1870 worsted manufacturers took advantage of continual improvements made in spinning and weaving machinery, among which was the Crompton and Knowles Worsted Loom. This loom could operate at a much faster speed and was built to take particular advantage of worsted yarn's strength. The worsted loom shortened production time thus providing an advantage over woolen manufacturing.

Expansion ultimately depended on a large market for worsted goods. The Paris Exposition of 1867 promoted the fashion of worsted suits and coats in Europe; similarly displays at the 1876 Centennial Exposition stimulated the worsted suit and coat market in America. By the turn of the century, worsted men's suits had nearly replaced woolen suits.

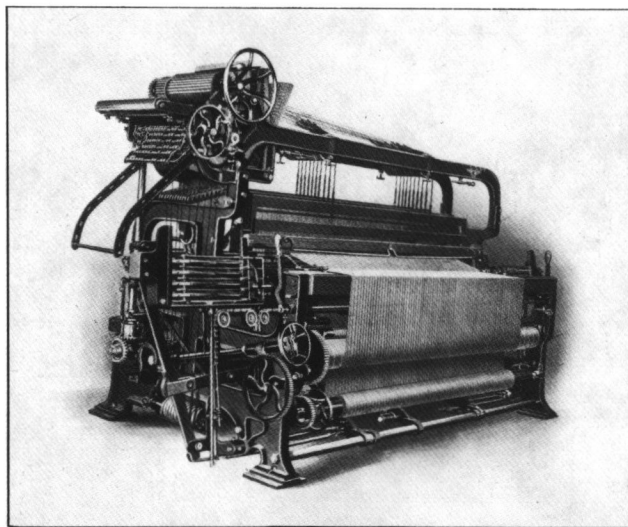


Fig. 23: Crompton and Knowles Worsted Loom; catalog, 1919.

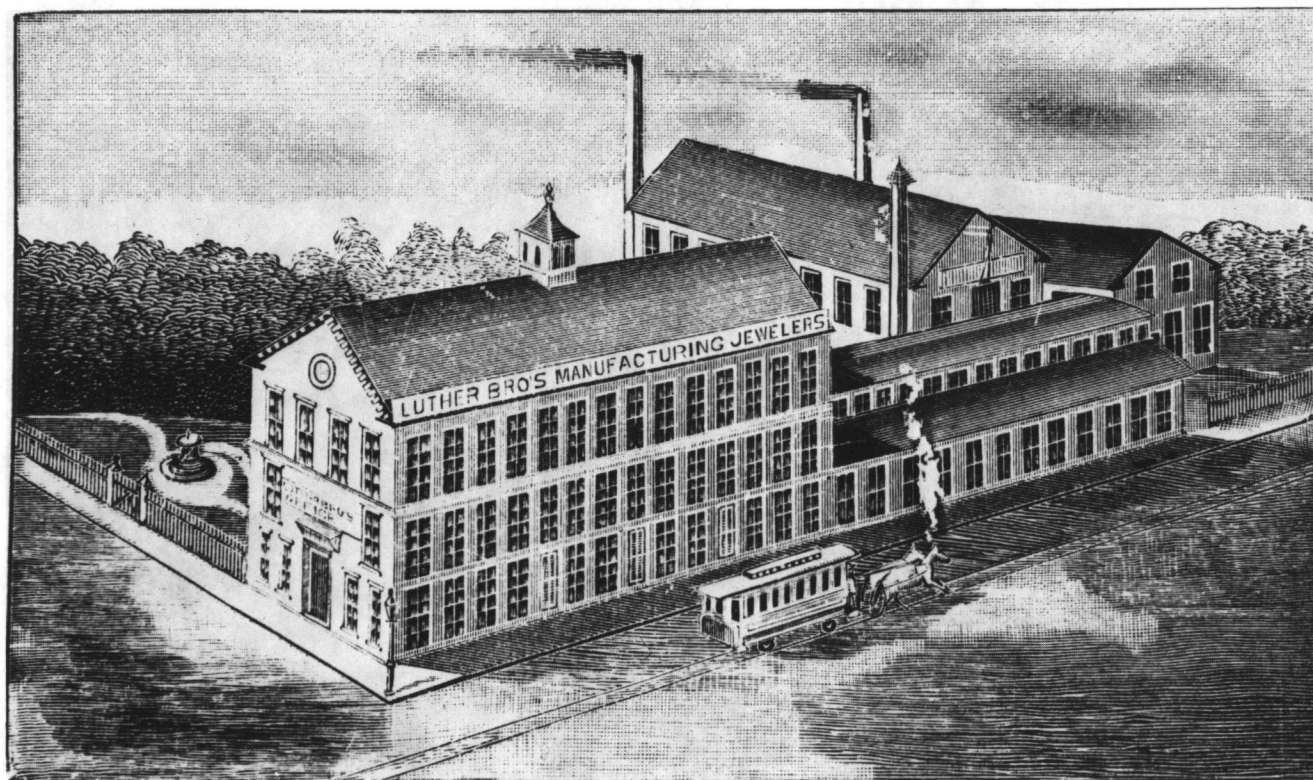


Fig. 24: Luther Brothers Factory (1865 and later); Oxford Street; engraving, 1887. This company was an innovative leader in production equipment and jewelry boxes.

The Jewelry Industry

The jewelry industry had grown sporadically until 1865 because the Panic of 1857 and the Civil War had caused major setbacks. The Panic of 1873, however, seems to have had little effect on the postwar boom in jewelry manufacturing. While in 1865 there were 45 shops employing over 700 workers (half as many as were employed in 1856), by 1875 there were over 130 companies employing almost 2,700 workers. By 1890, Providence had more than 200 firms with almost 7,000 workers. The expanding market for inexpensive jewelry, the growing labor force, and the process of mechanization were responsible for this growth. Unlike the base-metal or textile industries, however, the industry did not attract large investments because of its volatility. Since jewelry was a luxury item, success or failure depended largely on timing and marketing, while in the base-metal or textile industries success was more closely tied to the cost and quality of the product. Consequent-

ly each manufacturer mechanized within his company and rarely sought patents for his machinery. Without patent protection manufacturers could not prevent other companies from imitating machinery (which was generally much less complex than textile machinery), thus accelerating the process of mechanization.

Several Providence companies were responsible for important technological advances in the jewelry industry. Most notably Levi Burdon's seamless-filled-wire production (109-111 Summer Street) stimulated the chain-making industry, and the Luther Brothers (212-216 Oxford Street) stud-wire machine and electroplating process stimulated the production of plated novelty items and shirt studs. The manufacture of novelties (buttons, studs, emblems, and badges) and of traditional pins, earrings, and necklaces aided the development of the findings industry which provided pinbackings, necklace catches, and other components used in the industry.

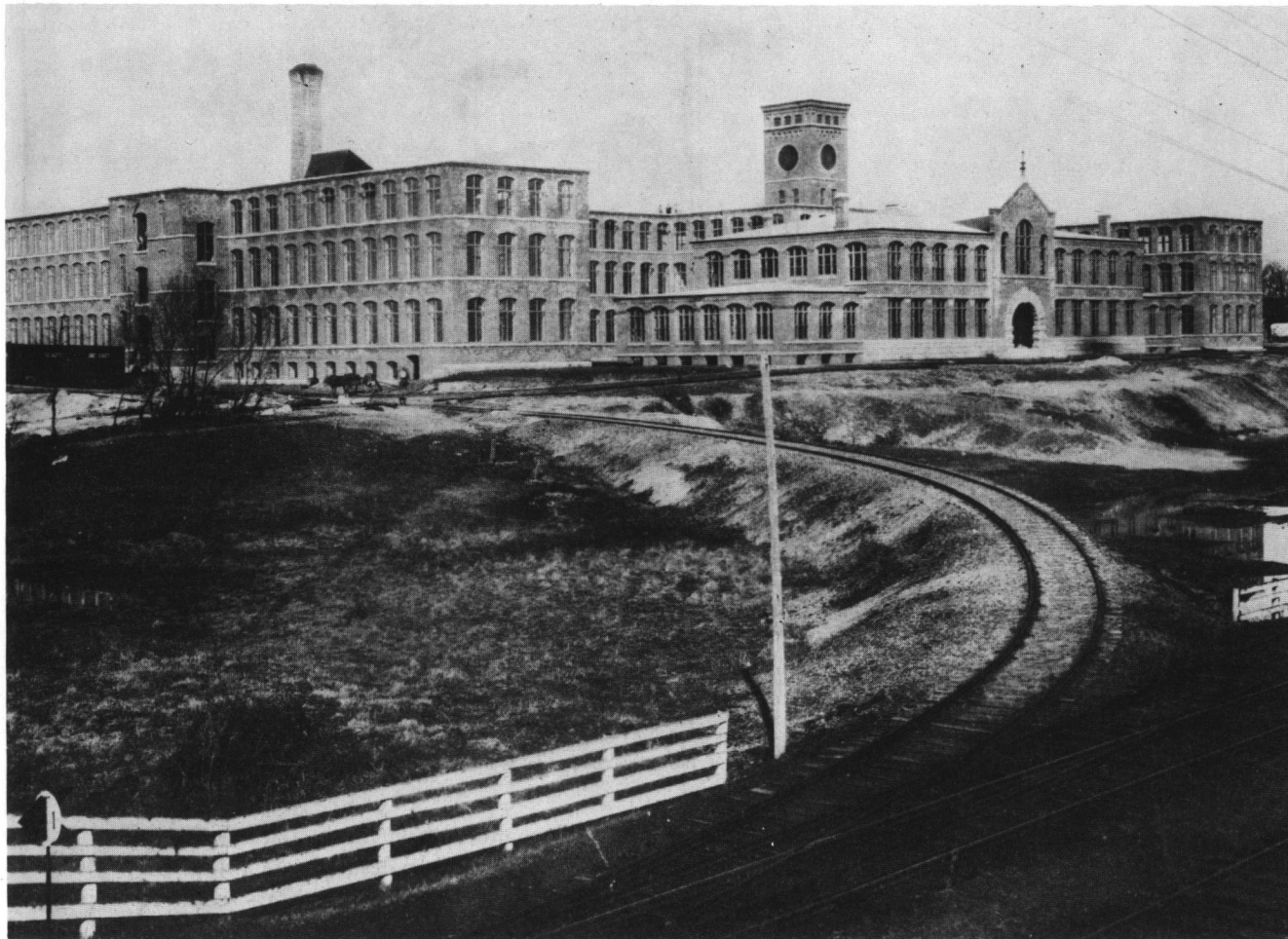


Fig. 25: Gorham Factory (1880); Adelaide Avenue. This large new factory replaced its crowded Steeple Street quarters.

The growing importance of the industry was emphasized by the development of a jewelry district. The increase in both the size and the number of companies caused overcrowding in the former district along North Main Street which had been composed of numerous small shops. The late nineteenth-century jewelry district bounded by Pine, Chestnut, Clifford, and Eddy Streets was characterized by multi-storied brick factories housing numerous companies. Renting a shop in these large factory buildings proved beneficial to small or moderately sized companies; for larger companies the construction of a factory was an excellent investment. Of the numerous manufacturing buildings constructed in the jewelry district in the late nineteenth

century, only the Champlin-Hedison Building (116 Richmond Street), the Remington Building (91 Friendship Street), and the Jesse Metcalf Building (158 Pine Street) survive.

While prominent in the jewelry industry, Providence was also the leading American city in the production of silverware by the turn of the century. The Gorham Manufacturing Company, at the forefront of the industry, built a large factory at Adelaide Avenue in 1890. This construction stimulated the residential and industrial development of the Mashpaug Pond section of Elmwood.

New Industries

Several new companies demonstrated large-scale attempts at industrial diversification. The Davol Rubber Company (69 Point Street) formed in 1874 by Joseph Davol was the first American company to manufacture rubber drug-and-surgical supplies—the American rubber industry previously having been dominated by the manufacture of rubber boots and shoes. Likewise the Vesta Knitting Mills (Bassett Street at Imperial Place) was one of the first American manufacturers to produce knitted goods made on a circular-knitting machine. The knitting industry, begun with the invention of a power-knitting machine (1867), was dominated by companies which made unshaped knitted goods and sewed them together to make garments. Both of these companies were of national importance by the turn of the century. The Oakdale Manufacturing Company (160 South Water Street), a large margarine manufacturer, and the Providence Steam and Gas Pipe Company (later the General Fire Extinguisher Company, 260 West Exchange Street), manufacturers of the Grinnel Automatic Sprinkler System (an advanced fire-prevention system), also became nationally known for their innovative products.



Fig. 26: Vesta Knitting Mills; illustration, 1907. Vesta was one of the first American companies to manufacture knitted goods made on circular-knitting machines.

Utilities and Transportation

Probably the most far-reaching technological advance of the late nineteenth century was the introduction of electricity. Replacing gas for lighting, steam for power (especially in jewelry factories), and horses for trolley transport, electricity had an effect on virtually all aspects of industry.

The Rhode Island Electric Lighting Company (1882) and the Narragansett Electric Lighting Company (1884) were Providence's first electric companies. In 1888 the Narragansett Electric Lighting Company, under the leadership of Providence banker Marsden Perry, bought the Rhode Island Electric Lighting Company, thus forming a monopoly on commercial electric-power production. The company built its first major plant (Eddy Street at South Street) in 1889.



Fig. 27: Interior, Narragansett Electric Lighting Co. office (1897); 60 Weybosset Street.

The reasonable price of gas and existing power systems, particularly in textile mills, precluded immediate universal adoption of electric power, but electric motors solved the problem of excess power production which was a major drawback of steam power, especially for small jewelry and base-metal companies. Furthermore, electric lighting provided superior illumination and decreased fire hazards.

Electric trolley cars, which were a fast and cheap mode of transportation, were adopted by many cities as early as 1888. In 1893, Perry, who had obtained a twenty-five-year monopoly franchise on the trolley system as well as financial backing arranged by Senator Nelson Aldrich, bought all of the Providence and Pawtucket franchises and began the electrification of the system which was completed by 1895. Power was provided by the Rhode Island Company power station, also owned by Perry.

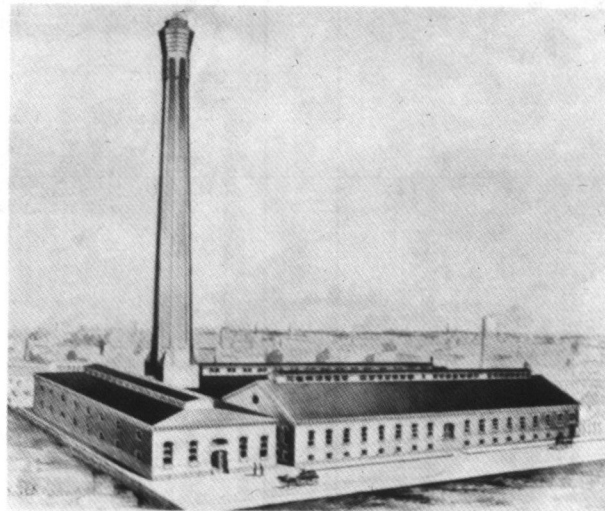


Fig. 28: Narragansett Electric Lighting Company power station (1889; replaced in 1913); Eddy and South Streets.

While Perry's monopoly resulted in quicker electrification of the system than might have been accomplished under city ownership or by a smaller company, there was much dissatisfaction expressed both by the employees and the passengers with the way Perry managed the lines. It was not surprising, therefore, that when the motormen, demanding shorter hours and protesting wage cuts, went on strike in 1902, they were supported by the public.

In 1906 Perry sold the trolley system to the New Haven Railroad, giving it a monopoly on transportation in Rhode Island. The monopoly antagonized manufacturers, brokers, and the general public with high prices as well as poor service, and many expressed concern for its short- and long-term, adverse effect on the city's economic growth.

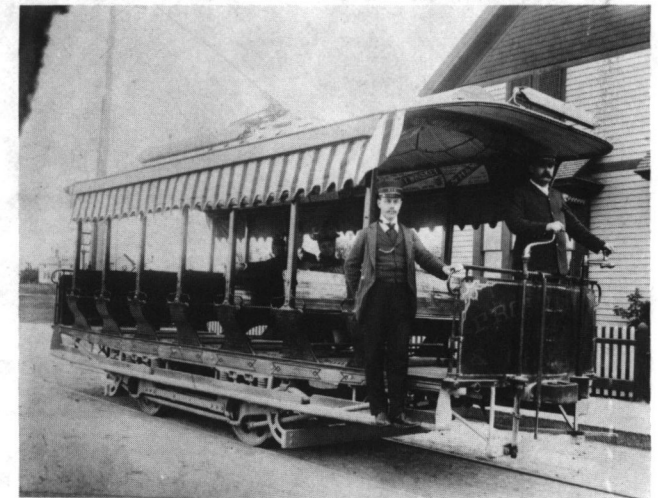


Fig. 29: Electric trolley car, Providence & Cranston line; photograph c. 1895.

Consolidation

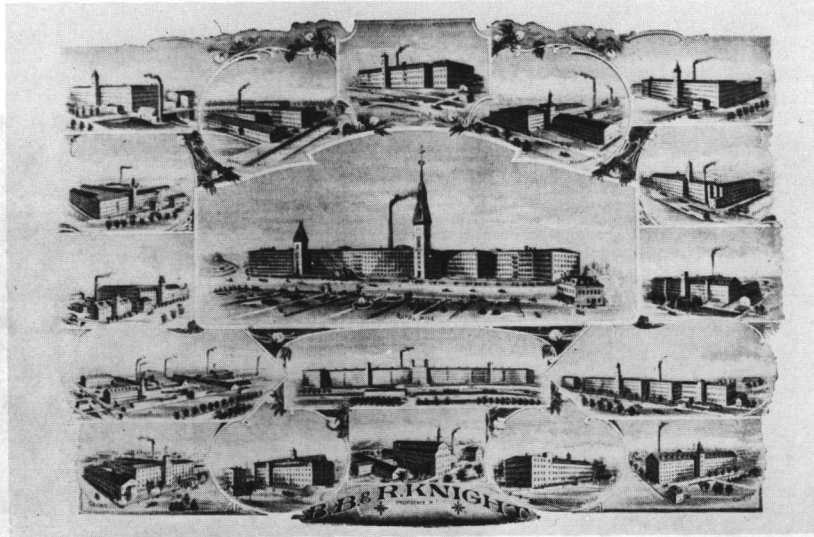
The Panic of 1893, caused by overexpansion and overproduction, resulted in several failures in Providence including the Oriental Mills on Admiral Street and the Armington and Sims Engine Company located in the old Monohasset Mill (530-532 Kinsley Avenue). In a sense that depression did for the consolidation

movement what the Panic of 1857 did for the incorporation movement. The stockholders of many manufacturing corporations preferred to be under the management of a large company, rather than the risks that a smaller independent venture involved.

Southern competition was also a major factor in the consolidation movement. Because of the considerable

investment placed in mills of the postwar period, small corporations often could not afford to scrap their equipment and adapt their structures for newer more efficient machinery and modern shops. This financial conservatism made competition with the blossoming southern textile industry difficult. In an effort to rebuild their economy, southern towns and states offered manufacturers a tax-free status and a work force

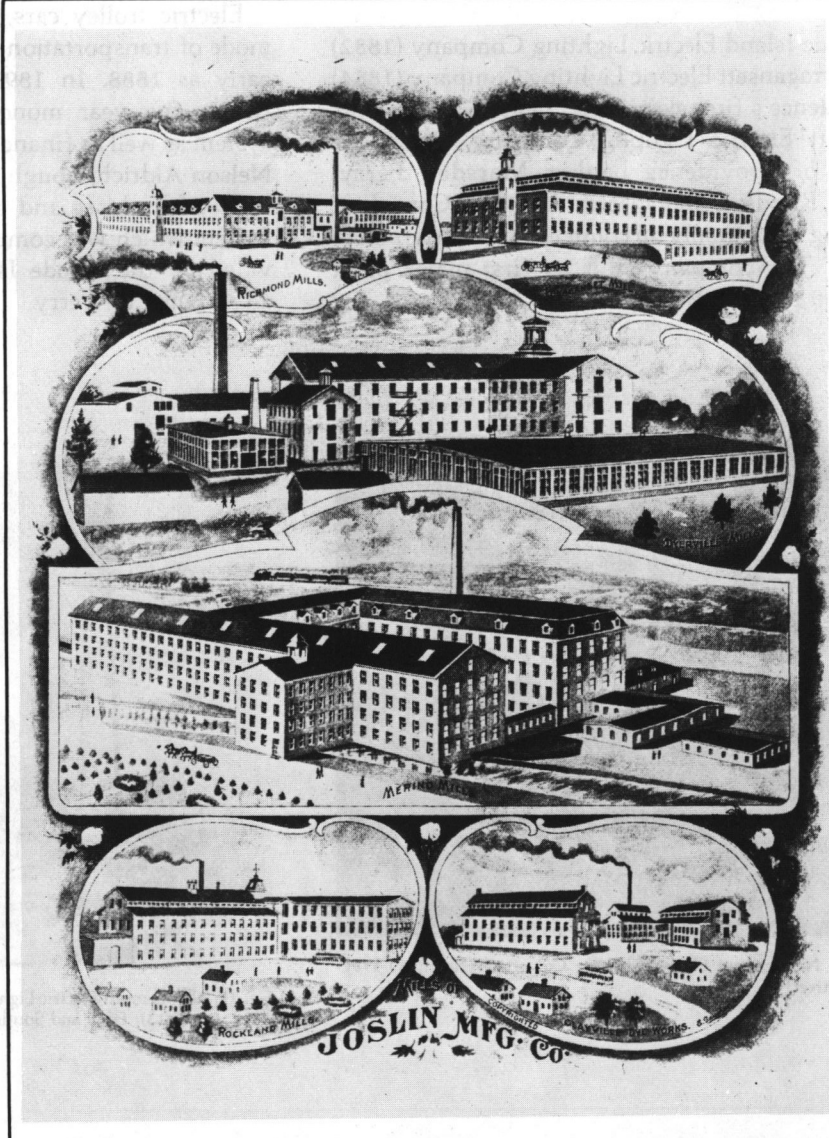
MILLS ESTABLISHED BY B. B. & R. KNIGHT,
MANUFACTURERS OF
FRUIT OF THE LOOM,
ALSO,
FINE SHEETINGS AND SHIRTINGS,
TWILLS, PRINT CLOTHS AND CAMBRICS.



ARCTIC MILL	ARCTIC, R. I.	LIPPITT MILL	PHENIX, R. I.
CLINTON MILL	WOOSOCKET, R. I.	MANCHAUG MILLS 1, 2 AND 3	MANCHAUG, R. I.
CRANSTON PRINT WORKS	CRANSTON, R. I.	NATICK MILLS	NATICK, R. I.
DODGEVILLE MILL	DODGEVILLE, MASS.	PONTIAC MILL	PONTIAC, R. I.
FISKEVILLE MILL	FISKEVILLE, R. I.	READVILLE MILL	READVILLE, MASS.
GRANT MILL	PROVIDENCE, R. I.	ROYAL MILL	RIVERPOINT, R. I.
HEBRON MILL	HEBRONVILLE, MASS.	VALLEY QUEEN MILL	RIVERPOINT, R. I.
JACKSON MILL	FISKEVILLE, R. I.	WHITE ROCK MILL	WESTERLY, R. I.

OFFICES, 3 WASHINGTON ROW, PROVIDENCE, R. I., U. S. A.
Kindly mention The Journal when you write.

Fig. 30: Illustration, July 1910.



JOSLIN MFG. CO.

Fig. 31: Illustration, 1904.

willing to accept low wages. Besides these attractions, manufacturers saw potential savings in cotton- and coal-transportation costs. Moreover, companies locating in the South in the late nineteenth and early twentieth centuries brought the latest and most efficient technology.

One of the many manufacturing empires formed as a response to these forces was the fine-cotton-shirting-and-sheeting-manufacturing network of B. B. and R. Knight. This company, founded by Benjamin and Robert Knight in 1852, gained many of its mill properties by buying the holdings of the bankrupt Sprague empire after the Panic of 1873. By 1886, the Knight mills employed over 6,000 workers and produced cotton cloth known all over the world by its "Fruit of the Loom" label. Although the Grant Mill and later the Nottingham Mills were its only Providence mills, the Knight company undoubtedly supported Providence machinery and base-metal industries.

Another network of mills was formed by the U.S. Finishing Company which bought the Silver Spring Bleaching and Dyeing Company on Charles Street and the Queen Dyeing Company (formerly the Woonasquatucket Print Works) on Valley Street in 1909. This company also owned a large Pawtucket printing company and several other finishing, bleaching, dyeing, or printing companies in the United States. Another example, though on a smaller scale, was the Wanskuck Company which owned five Rhode Island worsted mills, three of which were located in Providence.

Diversification into braiding was yet another response to competition in the cotton-goods industry. Several operations, no longer able to compete in the cotton-cloth industry, were absorbed by the braiding industry. The braiding machine, manufactured in Providence by the Rhode Island Braiding Company as early as 1861 and later manufactured by the New England Butt Company, spurred the expansion of the braiding industry. The industrialization of shoe production and the consequent expanding market for shoelaces also aided in the growth of this industry, as did the expanding market for corset laces and decorative braid for clothing and uniforms.

Two cotton shoelace and braid corporations in Rhode Island, the Joslin Manufacturing Company and the International Braid Company, built a network of cotton-braiding companies by buying struggling textile operations. The Joslin Manufacturing Company bought the Dyerville and Merino Mills, in Providence, as well as four other Rhode Island textile mills, for the manufacture of shoelaces and corset laces. The International Braid Company took over the Fletcher Manufacturing Company (already a braid manufacturer) and the Elmwood Mills in the early twentieth century.

The largest textile combine to form at this time, however, was the American Woolen Company, formed in 1899 by William Wood of Lawrence, Massachusetts, and Charles Fletcher of Providence, who owned the Providence and National Worsted Mills. The American Woolen Company bought several Lawrence worsted mills and in Providence acquired the Riverside, Valley, Weybosset, Manton, and Providence and National Worsted Mills. By 1924, this combine owned sixty New

England woolen and worsted Mills.

The consolidation movement was by no means limited to the textile industry. Without actually forming monopolies, large industries could buy their major competitors and obtain virtually the same effect. Many companies went one step further by buying foreign factories (or building factories abroad), thereby avoiding tariffs.

Two such companies with plants in Providence were the Crompton and Knowles Loom Works, which took over the City Machine Company factory on Harris Avenue, and the International Power Company, which bought the Corliss Plant on West River Street and the Rhode Island Locomotive Work Complex on Hemlock Street. International Power bought these plants with the intent of continuing to produce the goods manufactured at each factory. With the many varied companies it bought, International Power was one of the early conglomerates.

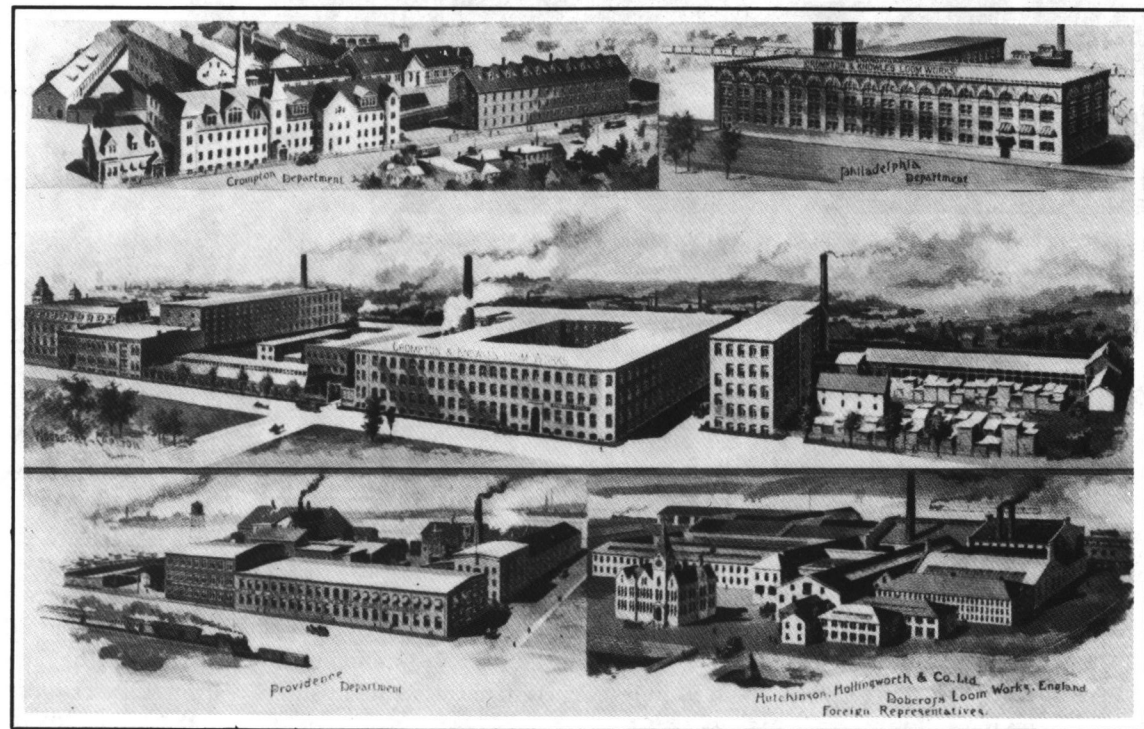


Fig. 32: Crompton and Knowles Loom Works; Harris Avenue; illustration, 1908.



Fig. 33: Brown and Sharpe Manufacturing Company; Promenade Street. This was the largest complex along the east end of the Woonasquatucket River; photograph c. 1910.

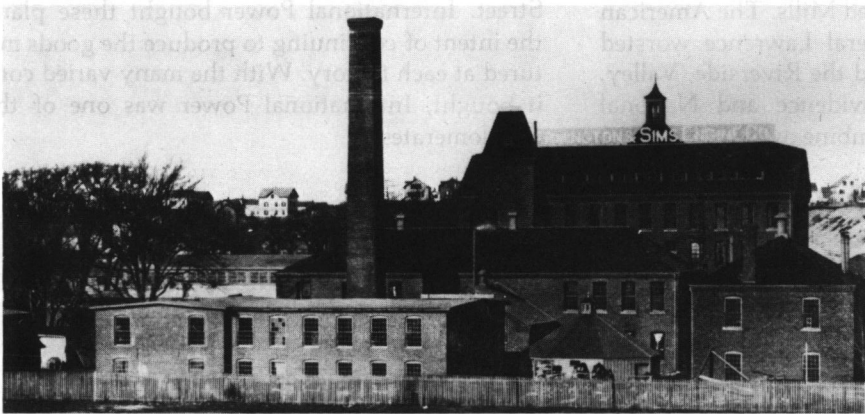


Fig. 34: Armington and Sims Engine Company, (c. 1890); Kinsley and Eagle Streets.

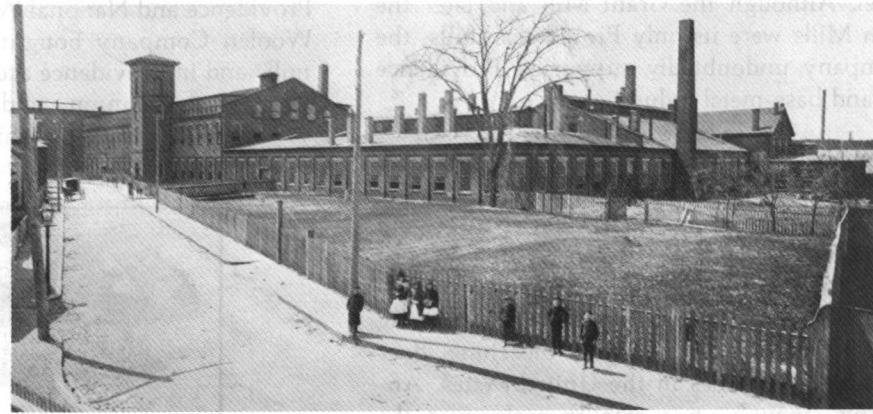


Fig. 35: Rhode Island Tool Co., formerly Providence Tool Co.; West River Street; illustration, 1904.

TWENTIETH-CENTURY INDUSTRIAL PROVIDENCE: 1909-1939

During the early twentieth century, patterns established in the late nineteenth century continued. The city and state made improvements to the Providence harbor, the sewage-treatment and disposal system, and the water-supply system (the construction of the Scituate Reservoir). Labor activism which continued to gain in strength and organization culminated in the strike years of 1902, 1913, and 1922, although the growing anti-labor sentiment of the 1920s decreased the labor unions' effectiveness. The textile and textile-machine industries

temporarily prospered during World War I, foundered during the postwar recession, and nearly ceased production during the Great Depression.

By the first decade of the twentieth century, industrial structures appeared in almost every Providence neighborhood. Although new construction continued later in the century, the industrial landscape was nearly complete. Some parts of Providence had concentrations of one type of industry, such as the worsted district of the Woonasquatucket River corridor or the jewelry district south of the business district. Other areas, such as parts of South Providence or the Point Street Harbor

neighborhood, while predominantly industrial, retained a more diverse composition of manufacturers. A few sections of Providence had only small pockets of industry.

The east end of the Woonasquatucket River corridor contained the large plants of the William A. Harris Steam Engine Company (Park Street; now demolished), the Brown and Sharpe Manufacturing Company (Promenade at Holden Street), the Nicholson File Company (Acorn Street), the American Locomotive Works (Valley Street; now demolished), and Crompton and Knowles Loom Works (Harris Avenue). This area also

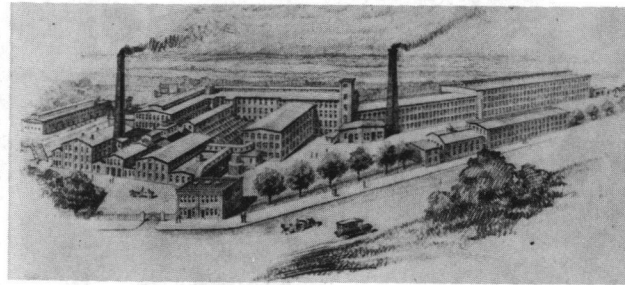
contained the Merchants Cold Storage Warehouse and several small diverse industries, such as lumber and planing mills, stone-working operations, and small base-metal companies.

Adjacent to this diverse industrial area was the textile district containing four worsted mill complexes owned by the American Woolen Company; the large complex of the Atlantic Mills (Manton Avenue), the dyeing and finishing plants of the Queen Dyeing Company, formerly the Woonasquatucket Print Works (Valley Street); and the Providence Dyeing, Bleaching and Calendering Company (Valley Street). Although dominated by these mills, this district also contained smaller textile mills, base-metal operations, a rubber company, and a brewery.

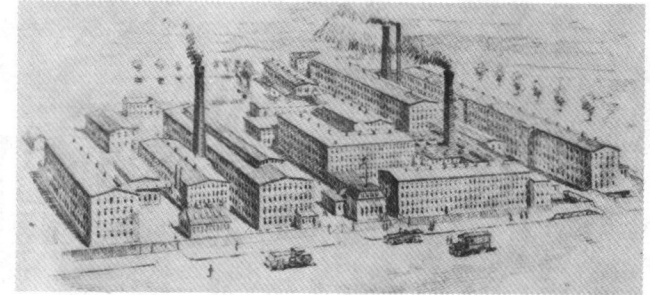
In the western section of the Woonasquatucket River corridor were the Joslin Manufacturing Company's braiding mills: the Dyerville Mill (Manton Avenue) and the Merino Mills (Ponagansett Avenue).

The southern terminus of the Moshassuck River was another concentrated industrial area dominated by the large mill complexes of the American Screw Company (North Main and Hewes Streets), the Franklin Machine Company (Charles Street; now demolished), and the Fletcher Manufacturing Company (47 Charles Street). The only small industrial concern was the Stillman White Brass Foundry (Bark Street). Further northwest on the Moshassuck was the large complex (formerly the Allen Printworks) occupied by the Roger Williams Finishing Company (Dryden Lane).

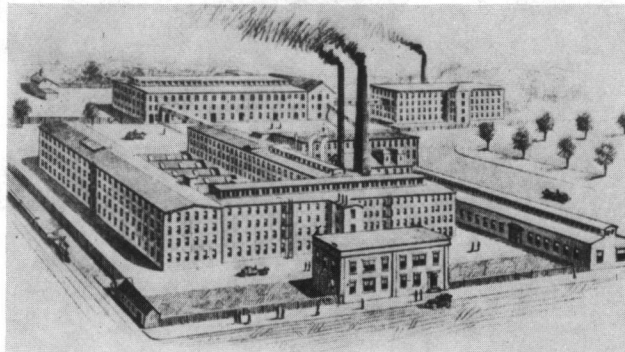
Several factories were located next to or near the West River. The J. P. Campbell Company, a cotton-goods manufacturer, occupied the former Oriental Mills (Admiral Street). The International Power Company, diesel- and steam-engine manufacturers, occupied the former Corliss Steam Engine Works (West River Street) adjacent to which was the Rhode Island Tool Company factory. Next to the West River was the large Silver Spring Bleaching and Dyeing Company complex. These factories were bordered by a residential neighborhood characterized by modest one- and two-family houses and triple-decker tenements.



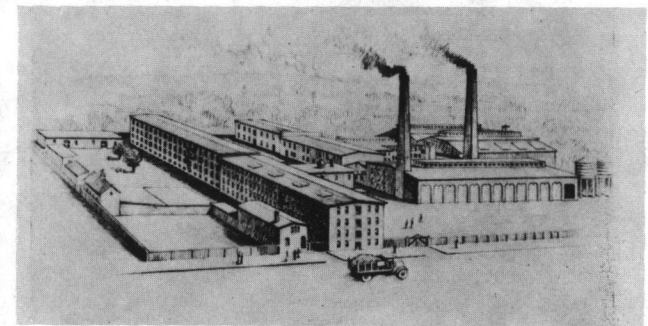
(a) Valley Mills, Eagle Street



(b) National and Providence Worsted Mills, Valley Street.



(c) Weybosset Mills, Dike Street.



(d) Riverside Mills, Aleppo Street.

Fig. 36: Four Providence Worsted Mills owned by the American Woolen Company; illustration, c. 1918. All are in the Olneyville textile district:

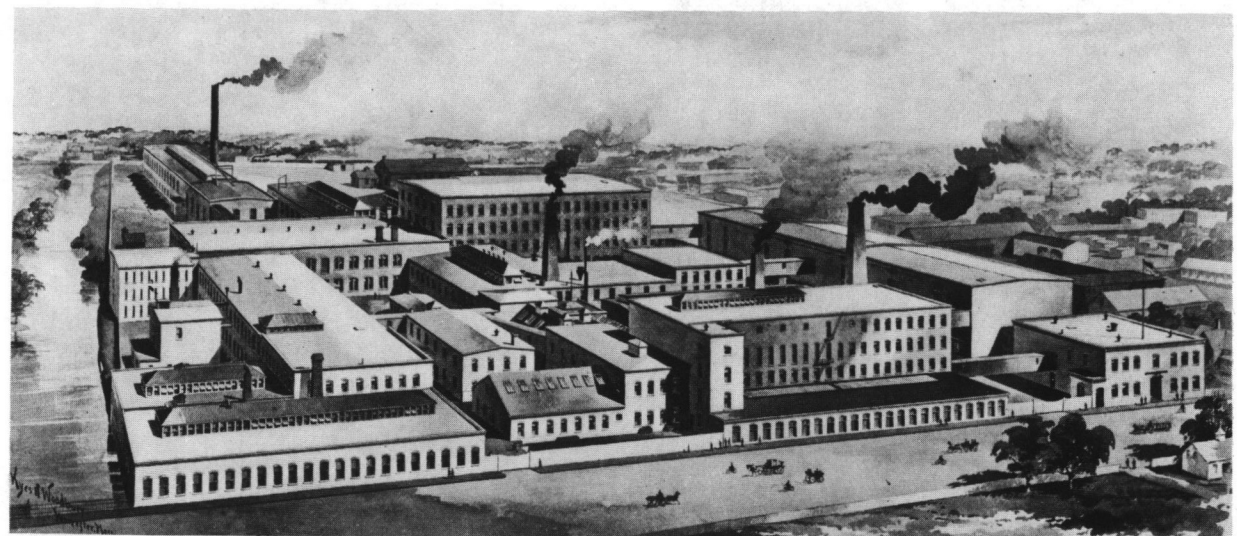


Fig. 37: Silver Spring Bleaching and Dyeing Company (1869 and later); Charles Street.

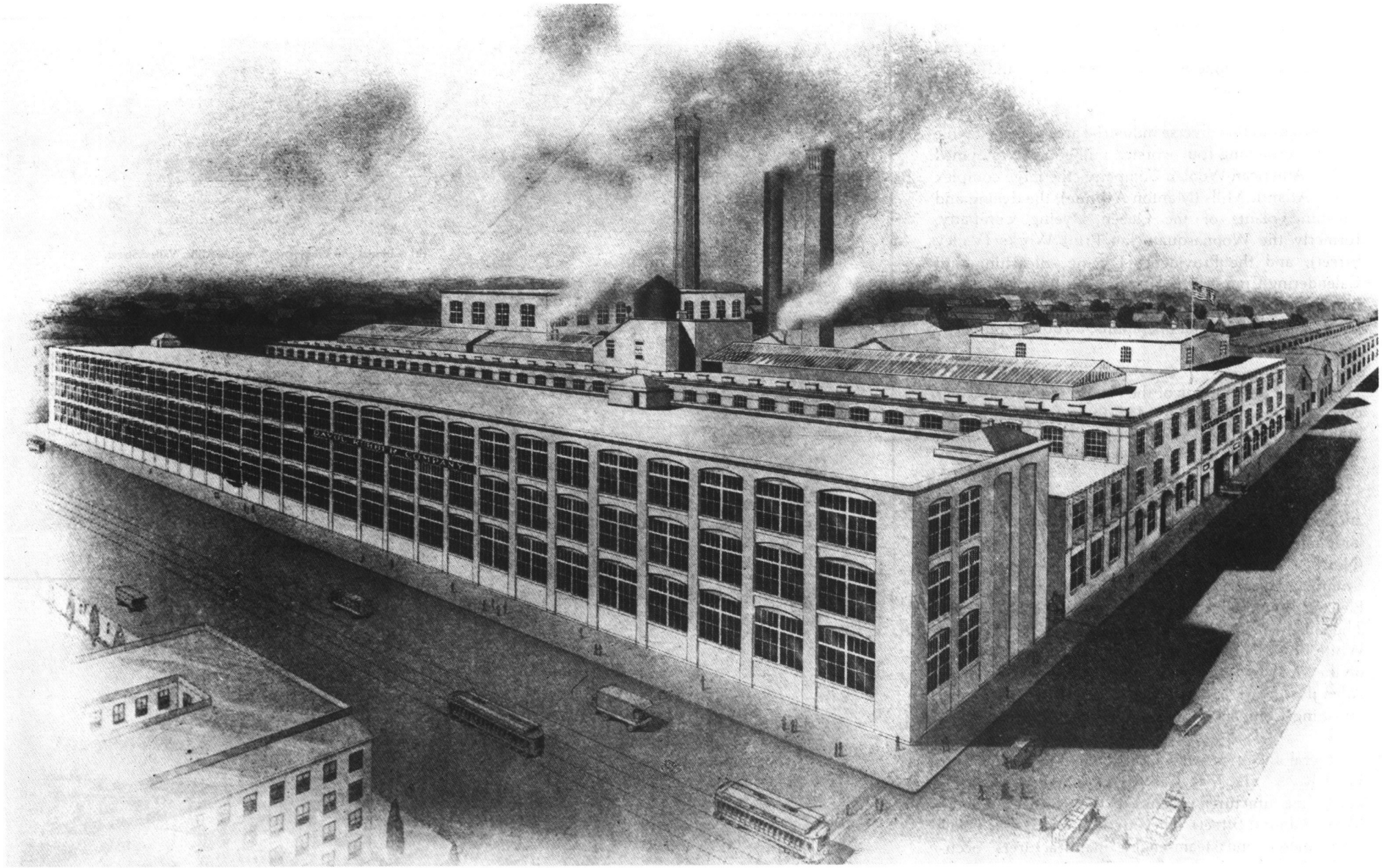


Fig. 38: Davol Rubber Company (1880, c. 1884, and later); Point Street. By the early 20th century the company had built numerous additions to its 1880 plant. Today this complex is under conversion to commercial condominiums utilizing tax incentives stimulated by the Tax Reform Act of 1976 for rehabilitation of historic properties. This innovative project, to be known as Davol Square, under direction of Robert Freeman, Marathon Development Corporation, and Beckman, Blydenburgh & Associates, architects, will open in the fall of 1982.

Further northwest on the West River was Wanskuck Village, which contained the Wanskuck Mill (725 Branch Avenue), workers' housing (on numerous side

streets off Branch Avenue), the Steere Mill (Wild Street), and the Geneva Mills (Douglas Avenue, on both sides of the city line).

South of the Central Business District the jewelry district continued to expand with the construction of multi-storied jewelry factories (divided into numerous


IRONS & RUSSELL'S | How the Emblem Makers' New Home on Chestnut St. Will Look When Completed
NEW BUILDING | Points About the New Plant



Fig. 39: Irons and Russell Building (1903); 95 Chestnut Street; illustration, 1903; Martin & Hall architects. The Irons and Russell Building, a jewelry manufactory, was built on the site of the Home for Aged Men.

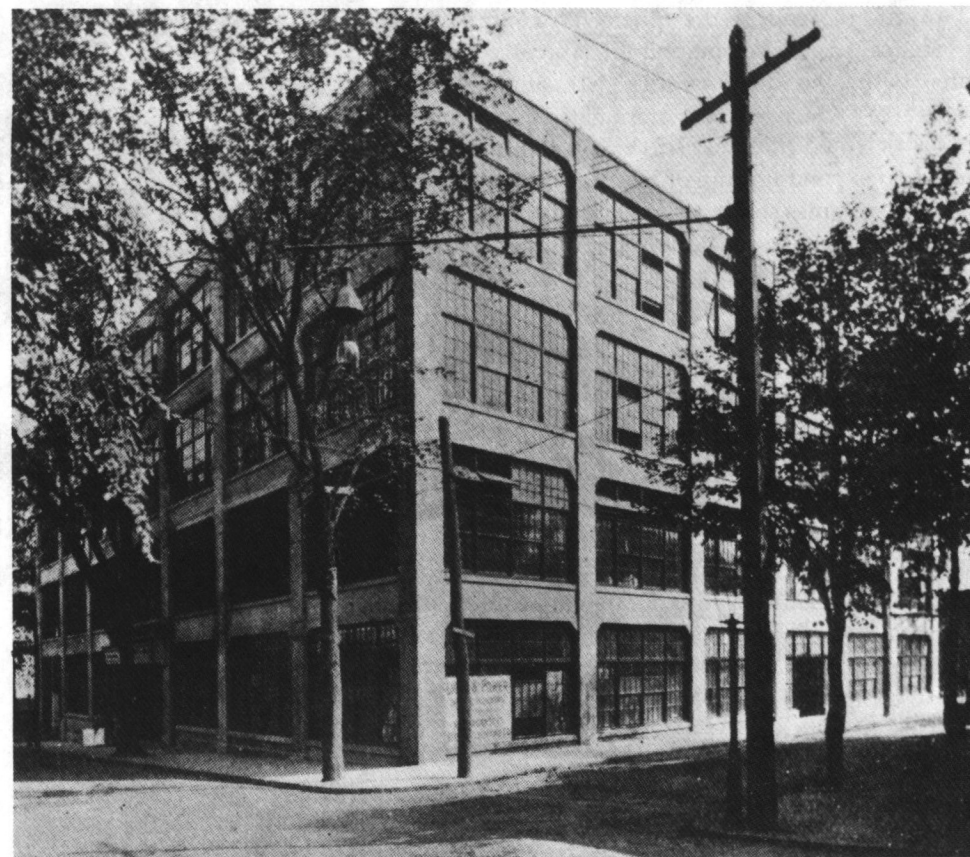


Fig. 40: A. T. Wall Building (1910); illustration, 1910. Monks & Johnson, architects. Built for jewelry manufacturing, the A. T. Wall Building is the first Rhode Island example of C. A. P. Turner's flat-slab, mushroom-column type of reinforced-concrete construction. In 1912 the Doran Company built a jewelry-manufacturing building (Ship Street) using the same type of construction.

rental units) which were built by jewelry companies or real-estate investors in the early twentieth century. The Irons and Russell Building (95 Chestnut Street); the Ostby and Barton Building (118 Richmond Street, recently demolished for the State Courthouse), and the Doran Building (150 Chestnut Street) were major jewelry-manufacturing buildings constructed in the first decade of the twentieth century. Interspersed among these large impressive masonry structures were the reinforced-concrete factories built by the Doran

Company and the A. T. Wall Company. This innovative type of factory construction continued to be used for later factories such as the Nemo Building (222 Richmond Street) and the Coro Building (167 Point Street).

The major development in the Point Street-Harbor industrial district occurred with the construction of the Rhode Island Company electric-generating plant (Manchester Street) and the enlargement of the Narragansett Electric Lighting Company's plant (Eddy Street) as well

as with the plant expansions of the Davol Rubber Company (Point Street) and the Vesta Knitting Mills factory (Imperial Place). The harbor underwent a major change when the Providence Gas Company left their Globe Street plant for a large new plant at Sassafrass Point. The abandoned gas-company plant was taken over by the Burrows and Kenyon Lumber Company. A new addition to this area was the plant of the Almy Water-Tube Boiler Company built in the 1890s at 184 Allens Avenue.

Towards the end of the nineteenth century, South Providence was developing into a diverse industrial center with two districts: the Pine and Friendship Streets area—which was a western extension of the jewelry district—and the Eddy Street corridor. These areas housed an expanding core of jewelry manufacturers (as jewelry companies sought cheaper land with more room for expansion outside the jewelry district) as well as numerous other manufacturing companies. Among major South Providence industries were the United States Gutta Percha Paint Company (8-12 Dudley Street), the American Screw Company (Henderson Street; since demolished), and the E. M. Dart Manufacturing Company (134 Thurbers Avenue).

To the west of South Providence the Elmwood and West End neighborhoods were also mixed-use areas. Plants in this area included the works of the New England Butt Company and the Elmwood Manufacturing Company, two of the area's oldest industrial complexes dating from the mid-nineteenth century. Another large factory complex was that of the Mechanical Fabric Company on Dexter Street.

In the southern section of Elmwood were the impressive complexes built by the Gorham Manufacturing Company (Adelaide Avenue) in 1890 and the modest engraving factory of John Hope and Sons Company (Mashpaug Street) at Mashpaug Pond. A large complex (since demolished) at Mashpaug Pond was built by the American Enamel Company, an important paint manufacturer.

The South Main, Wickenden, and India Street area of Fox Point continued to be an important industrial area with some of the city's oldest factories. The Household Sewing Machine Company, formerly part of the Providence Tool Company, still occupied its Wickenden Street factory (since demolished), while nearby the Providence Engineering Works (formerly the Providence Steam Engine Company) had just completed a remodeling and enlargement of their South Main Street factory. Nearby, at Pike and South Main Streets, the Fuller Iron Works had also expanded its plant with the construction of the city's first steel-framed, glass-walled machine shop in 1893. The Union Oil Company,



Fig. 41: American Electrical Works; Stewart Street; photograph, c. 1890.



Fig. 42: Oakdale Mfg. Co.; South Water Street; drawing, 1901.

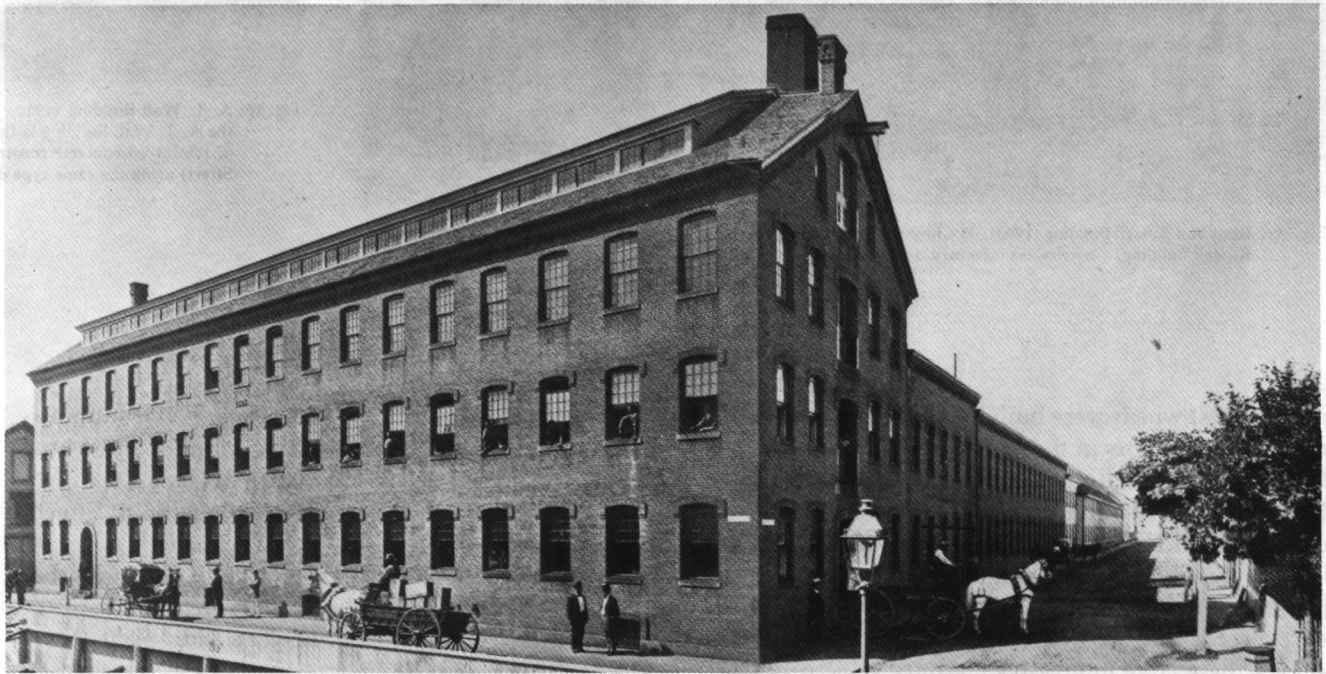


Fig. 43: New England Butt Company, (c. 1890); Pearl Street. Founded in 1842, this was one of the areas oldest manufacturing firms.



Fig. 44: Turn-of-the-century view of the Providence Engineering Works (demolished); South Main Street; photograph, 1901. In the background is an old gasometer from the gas company's Pike Street plant.

a cotton-seed-oil manufacturer, also remained at its Tockwotton Street factory (demolished), and the Hicks Boiler Works, still a small operation, continued to occupy its South Main Street factory.

The area north of Fox Point—South Main Street, North Main Street, and Canal Street—once the site of major industries, was commercial with the exception of the Oakdale Manufacturing Company Works (120

South Water Street). Warehouses of companies such as the Rumford Chemical Works (239 South Main Street) of Rumford, Rhode Island, were located on these streets, conveniently near harbor and railroads.



Fig. 45: Skilled workers manufacturing jewelry; stereograph c. 1915.

Expansion and Diversification in the Jewelry Industry

In contrast to the declining textile industry the Providence jewelry industry was able to expand and diversify. Because of the less complex nature of machinery in the jewelry industry and the typical small capital investment in and personal ownership of jewelry companies, many new experimental companies continued to form. Though not all were successful, many made significant contributions in new products, processes, and machinery.

Many products manufactured in the early twentieth century represented an imaginative, entrepreneurial response by jewelry manufacturers to changing social customs and tastes. One such product was the cigarette lighter which became popular with the increasing number of both men and women smokers (between 1918 and 1928 the total production of cigarettes in the United States more than doubled). The Spiedel Manufacturing Company (70 Ship Street) was one of the first to manufacture the metal watchband (soon more popular than the watch chain). The George F. Berkander Company (891 Broad Street) introduced celluloid jewelry, buttons, and hair ornaments during the 1920s.

As long as the jewelry industry was prospering, findings were in demand regardless of changing fashions; thus, this segment of the industry was less volatile than the manufacture of novelty items or costume jewelry.

The Decline of the Textile and Textile-Machine Industries

By the early twentieth century, Rhode Island textile and textile-machine manufacturers were struggling to recover from frequent panics and recessions, as well as from southern competition. A major failure during the recession of 1903 was the J. P. Campbell Company which occupied the former Oriental Mill (Admiral Street). The plant of this bankrupt fine-shirting-and-sheeting company, however, was bought by the American Silk Spinning Company which actually expanded the factory and work force.

The decline of the New England cotton market caused numerous textile-machine companies to close or consolidate. In Providence the Phenix Iron Foundry (Elm Street) closed its plant during the 1903 recession. The Providence Machine Company (Allens Avenue) sold out to the Whitin Machine Company which moved the operation to its main plant in Massachusetts.

Other branches of the base-metal industries which directly or indirectly supported the textile industry were often able to diversify into products for which there was a growing market. For example, the Providence Engineering Works (521 South Main Street), which had formerly manufactured steam engines, began the manufacture of engines and running gear for the Maxwell Briscoe Motor Car.

The First World War temporarily aided textile businesses in Providence, though profits realized during the war were often lost in the postwar recession. The Atlantic Mills and the U.S. Finishing Company gained government contracts to produce khaki cloth (as did many southern mills), and the five American Woolen Company mills in Providence manufactured woolen and worsted goods for government use.

Base-metal companies such as Brown and Sharpe also garnered a number of weapon-related government contracts during the war. While such companies easily adjusted to a peace-time economy because their products had such a wide range of uses, textile manufacturers were less resilient. Southern mills, well established by the war's end, provided even tougher competition for New England mills. Moreover, women's fashions, requiring much less cloth, further constricted the market for textile goods.

Another problem was the introduction of synthetic fabrics. Many mills, struggling to survive at this point, could not afford to make the investment in synthetics, while other companies did not have the foresight to make the transition.

With growing competition from the South with its cheap labor, sophisticated machinery, lower transportation costs, and—in many cases—northern capital, the New England textile industry continued to deteriorate.

The bankruptcy of B. B. & R. Knight in 1924 as well as the abandonment by the American Woolen Company of two Providence mills in 1928 dramatized this decay in Providence.

"I never knew that before!"

Many a woman learned from her mother, who had learned it from her mother, that Fruit of the Loom can always be relied upon. They use it as a matter of course for making things that must look well and wash well and wear well.

Yet there are many women who are surprised to find that nowadays they can buy Fruit of the Loom in colors and ready-made, and by the yard. The colors are fast and so beautiful and clear that a whole range of new uses for this household friend will instantly suggest themselves to you.

You can get a number of garments all ready-made of colored as well as white Fruit of the Loom. Pajamas, nightshirts, nightgowns, men's shirts, boys' shirts and blouses, aprons and other articles are now on sale at leading stores.

Fruit of the Loom

Whether you are seeking Fruit of the Loom in white or colors, by the yard or in ready-made articles, remember that you can always tell the genuine by the label.

B. B. & R. KNIGHT, Inc.
 Makers of
 Alpine Rose, Hero, Cameo and Other Fine Cotton Fabrics
 Converse & Company, Selling Agents
 88 Worth St., New York

Fig. 46: Advertisement (1922); B. B. & R. Knight, Inc.



Fig. 47: California Artificial Flower Co. (1939); 400 Reservoir Avenue. One of the few Art-Deco industrial buildings of the era.

The Great Depression

The panic of 1929 and the subsequent disastrous depression further exacerbated the decay of Providence's industrial economic base. Between 1929 and 1931 unemployment in Providence was 40 per cent in the textile industry, 47 per cent in the jewelry industry, and 38 per cent in the base-metal industry.

The Crompton and Knowles Loom Works abandoned its Kinsley Avenue plant, the U.S. Finishing Company sold its Silver Spring Factory, the American Woolen Company sold four of its five Providence mills, and several smaller companies (like the Barstow Stove Company and the John Hope and Sons Company) were forced to close their factories.

Mass unemployment resulted in harder working conditions for those who were employed. Many mill owners tried to save money by instituting the practices of "stretch-outs"—longer working hours—or "speed-ups"—increasing the rate of production. Wage cuts

ranged from between 10 and 50 per cent. Such measures sparked the Great Textile Strike of 1934, which was an effort to unionize the northern and southern textile industries. During the latter half of the 1930s, workers gained considerable victories with federal and state legislation which protected the formation of unions, shortened the workday, instituted a minimum wage, created old-age pensions, prohibited strike injunctions, and created the Department of Employment Security and Compensation.

Unlike some Rhode Island towns which were left virtually abandoned when the textile mills closed, Providence still had a diverse (though less than stable), industrially based economy. Two large plants, in fact, were built in the 1930s—the Congdon and Carpenter Warehouse on Promenade Street and the factory of the California Artificial Flower Company (Cal-Art, 400 Reservoir Avenue). These large plants provided employment for several hundred additional workers.

TWENTIETH-CENTURY INDUSTRIAL PROVIDENCE: 1939-1980

World War II

Production activity occasioned by World War II aided economic recovery after the Depression. The Atlantic and Wanskuck Mills, having survived the Depression, were threatened by the decreasing market for worsted goods but were given a temporary reprieve when government contracts boosted production. Among nineteenth-century companies, both Brown & Sharpe and the U.S. Rubber Company (which manufactured thirty-six million rubber heels during the war) realized large profits from wartime contracts, but the greater number of concerns to benefit from the wartime production were twentieth-century companies which were less likely to suffer the problems of old machinery, a less marketable product, conservative stockholders, and—in some cases—second- or third-generation family management. Among businesses formed in the twentieth century the Imperial Knife Company (1916), the American Silk Spinning Company (1908), and the Atlantic Rayon Company (1928) gained large profits from government contracts.

The Imperial Knife Company, formed in 1916 by Felix and Michael Mirando and managed by Domenic Fazzano, manufactured trench knives and pocket knives during the war. This firm was significant in its Italian-immigrant ownership and in its growth into a nationally known enterprise which is still in operation.

The American Silk Spinning Company and the Atlantic Rayon Company were two Providence firms which had begun the manufacture of synthetic fabrics in the 1920s. During the war the American Silk Spinning Company manufactured rayon tops for jungle boots, and the Atlantic Rayon Company (founded by Royal Little in 1928) gained large profits during the war by manufacturing rayon parachutes.

After the war Little formed the Textron Corporation, one of the country's first conglomerates. Little began by buying failing New England textile mills with the intention of operating them at a loss to provide enough of a

tax break to allow expansion into other, more profitable industries. The Textron Corporation had an enormous effect on industry in Rhode Island and other states, both in the company's liquidation of New England textile holdings and in its investments into other industries. Among the many companies owned by Textron today are the Spiedel Company (70 Ship Street), a watchband manufacturer, and the Gorham Manufacturing Company (Adelaide Avenue).

One other major wartime industry began with the construction of the shipyard in 1944 which was operated by the Rheem Ship Building Company. This shipyard built thirty-two Liberty ships during the war. After the war the site became part of the Harborside Industrial Park.

Postwar Era: Urban Decay and Urban Renewal

The 1950s marked a period of decay in Providence. The postwar recession eliminated the city's last large textile companies; the Wanskuck Company, the A. D. Juliard Company (the Atlantic Mills), and the American Silk Spinning Company were forced to cease operations because of large losses or to sell out to other companies which abandoned the failing textile operations for more profitable industries. The worsted industry suffered heavy losses as synthetics overtook the market—even for fine dress goods. Other large industries abandoned their Providence factories for new suburban plants. In 1949, the American Screw Company moved to Willimantic, Connecticut, and, in 1959, the Nichol-



Fig. 49: U.S. Post Office, West River Park; photograph, December, 1970.

son File Company moved its manufacturing operation to Indiana and its offices to East Providence. In 1964, the Brown & Sharpe Manufacturing Company moved to North Kingstown.

The population of Providence which had grown slowly from 237,000 in 1920 to 257,000 in 1949 (due partially to restrictive immigration laws passed in the 1920s) actually declined to 207,498 in 1960. The 16.6 per cent decline between 1950 and 1960 was the second largest drop in population of any American city during that decade. By 1970, the population had dropped to 179,116, a still significant 13.7 per cent decline. The Federal Urban Renewal Program, administered in Providence by the Providence Redevelopment Agency (PRA), was an attempt to reverse the economic decline of American cities. The basic premise of the program was that replacing old buildings with new buildings or

parking areas and improving automobile access would attract new industries, businesses, and residents.

The first large industrial-redevelopment project in Providence was the construction of the West River Industrial Park (1956-1960). The seventy-acre park replaced a large section of the mixed-use, residential, and industrial North-end neighborhood with vacant land (with the exception of the base-metal works at 146 and 148 West River Street). This land was available to light manufacturing or commercial businesses for the construction of new factories and warehouses. The park now contains several one-story manufacturing or warehouse structures as well as the automated Post Office.

Two other major industrial-redevelopment projects were completed by the PRA. In the Point Street neighborhood, fifty-three houses were demolished to provide

Year	State of Rhode Island	City of Providence	City as Percent of State
1900	428,556	175,597	41
1910	542,610	224,326	41
1920	604,397	237,595	39
1930	687,497	252,981	37
1940	713,346	253,504	36
1950	791,896	248,674	31
1960	859,488	207,498	24

Source: United States Bureau of the Census, U. S. Census of Population: 1960, Number of Inhabitants, Rhode Island (Washington, D. C.: U. S. Government Printing Office, 1961) Table 5.

Fig. 48: Chart; Community Renewal Program, 1964.

parking lots for existing industries such as the Imperial Knife Company (Imperial Place) and the Coro Company (167 Point Street). The construction of the Huntington Industrial Park was the largest industrial-redevelopment project in Providence. This project called for the demolition of 567 structures to clear a 117-acre site for the construction of large manufacturing plants. In addition to these projects, the construction of new highways and expressways was intended to aid the city's economic growth.

The result of these projects, however, was the large-scale clearance of areas which, in some cases, were only partially redeveloped. Moreover, highways which cut through the city's neighborhoods created isolated pockets of residential and commercial structures, thus accelerating the decline of these areas.

By the 1960s, it was clear to some people that available vacant land and improved automobile access were only two factors necessary for the city's economic growth. Several plans for alternative development projects stressed the conservation of Providence's built and natural environment as a major factor in revitalizing the city.

The first such plan, presented in the College Hill Planning Study (1959), eventually resulted in the restoration of historic houses in the College Hill section of the East Side. In 1970, architect William Warner presented a plan for the re-use of the huge American Screw Company complex and other industrial buildings in Randall Square for garden apartments, artists' studios, and commercial use—as well as the construction of new office and residential structures. While the final outcome of this plan was the adaptive re-use of two of the American Screw Company buildings and the Stillman White Brass Foundry as well as the large-scale construction of residential and commercial structures, this development was significant as the first re-use of industrial buildings in Providence in the context of an economic-development project.

In the 1970s, several industrial buildings including the Brown & Sharpe Complex (Promenade Street), the Fletcher Building (47 Charles Street), and the Hanley Building (52-62 Pine Street) were adapted for office, retail, or light-manufacturing space. An important rehabilitation project, completed in 1979, was the conversion of the Champlin-Hedison Building (116 Chestnut Street), a vacant jewelry factory, into ten condo-

minium lofts. Besides providing a creative new use for an unused but structurally sound industrial building, this rehabilitation (by Beckman, Blydenburg and Associates) has aided in the rehabilitation of downtown Providence by providing intown residential space.

While economic-development projects concentrating on commercial growth (such as the adaptive re-use of industrial buildings) gained widespread acceptance in the 1970s, industrial revitalization received less attention in Providence after the completion of the West River and Huntington Industrial Parks. Recently, however, city agencies and private business organizations have demonstrated a renewed interest in stabilizing the city's industrial base. The Providence Office of Economic Development and the Greater Providence Chamber of Commerce have been instrumental in developing programs to aid the city's manufacturing companies which employ almost a third of the city's workers. In providing informational services and structuring financial-assistance programs for acquiring, rehabilitating, or expanding factories, as well as identifying available sites for new construction, the public and private sector will play a major role in stabilizing and possibly expanding the city's industrial base.



Fig. 50: View of the 60-acre West River Industrial Park, undertaken in 1956; photograph, 1964.

IV. ARCHITECTURAL DEVELOPMENT

EARLY TEXTILE-MILL CONSTRUCTION

The earliest surviving textile mills in Providence date from the 1830s. Such structures as the Dyerville Mill (610 Manton Avenue) or the Waterman-Weybosset Mills (34 Dike Street) built during this period actually represent a second stage in textile-mill construction. Between 1790 and 1830, textile-mill construction changed significantly from the small, barnlike, wooden, spinning mill with a trap-door monitor set in a gable roof to the larger, stone structure with an exterior stairtower and a wider, continuous, clerestory monitor which provided more light. The exterior stairtower was also a significant improvement as a means of providing more interior work space and as a fire-control measure. While in early mills the interior stairwell created an air shaft through which fire spread rapidly, the exterior stairtower with heavy fire doors, which began to appear in the 1820s, separated this air shaft from the rest of the mill, thereby inhibiting the spread of fire from floor to floor. The exterior stairtower had other functions: freight doors at each level provided for the easy transfer of goods to and from the upper stories; it also provided a location for the factory bell and a focal point for architectural expression.

Zachariah Allen's Allendale Mill of 1822 in North Providence introduced some of these features and other innovative fire-prevention methods later adopted in new factory construction. The mill of 1822 incorporated the first heavy fire doors, sprinkler system, rotary fire pump, and copper-riveted fire hose to be used in American textile mills. In addition, Allen built a heavy fire wall separating the picker room (filled with highly flammable cotton fibers) from the rest of the mill and set the roof shingles in mortar. Allen's innovations in fire control led to his founding of the Manufacturers Mutual Fire Insurance Company, the first of the powerful factory mutual-insurance companies which led to standardized textile-mill construction by the late nineteenth century.

The most important innovation of this period was the change in the interior framing system from the use of

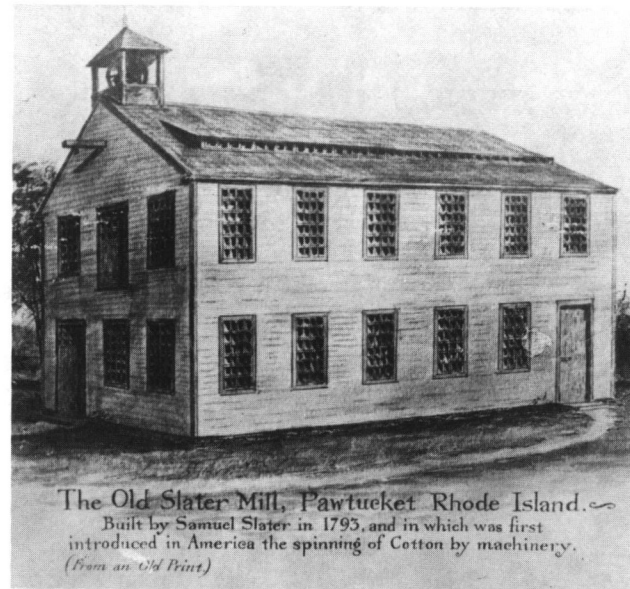


Fig. 51: Idealized view of Old Slater Mill (1793 and later). The earliest spinning mills were usually small, gable-roofed, frame structures with narrow eyebrow monitors to provide more light in the second story.



Fig. 53: Interior, Dyerville Mill (1830); 610 Manton Avenue. Showing use of heavy wooden columns, developed as a fire retardant.

light floor planks resting on numerous floor joists which allowed fire to spread rapidly, to the use of thick floor planking resting on heavy beams supported, in the center, by heavy wooden or cast-iron columns and, at the ends, by the masonry wall. An excellent example of slow-burning construction is the Dyerville Mill (1830) at 610 Manton Avenue.



Fig. 52: Commissary Building, Allendale Mill (c. 1822); 494 Woonasquatucket Avenue. The mill displays simplified Greek Revival details.

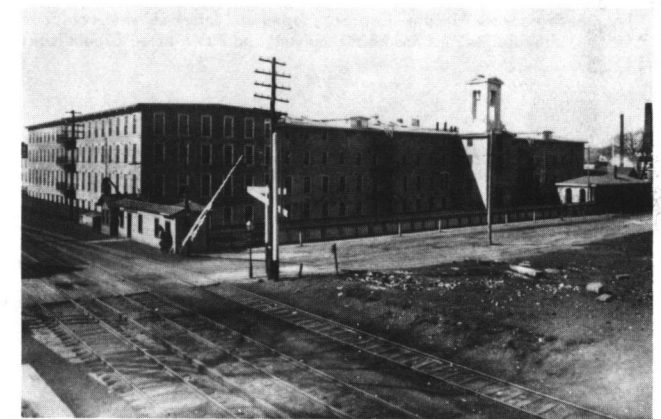


Fig. 54: The Waterman-Weybosset Mill (1835, altered 20th century). Showing original pedimented Greek Revival belfry crowning exterior stair tower.

The incorporation of stylistic elements in mill construction was limited at this stage. However, some mills built at this time, including Zachariah Allen's Allendale Mill and John Waterman's Eagle Steam Mill, later the Weybosset Mills (34 Dike Street), had minimal Greek Revival exterior detailing.

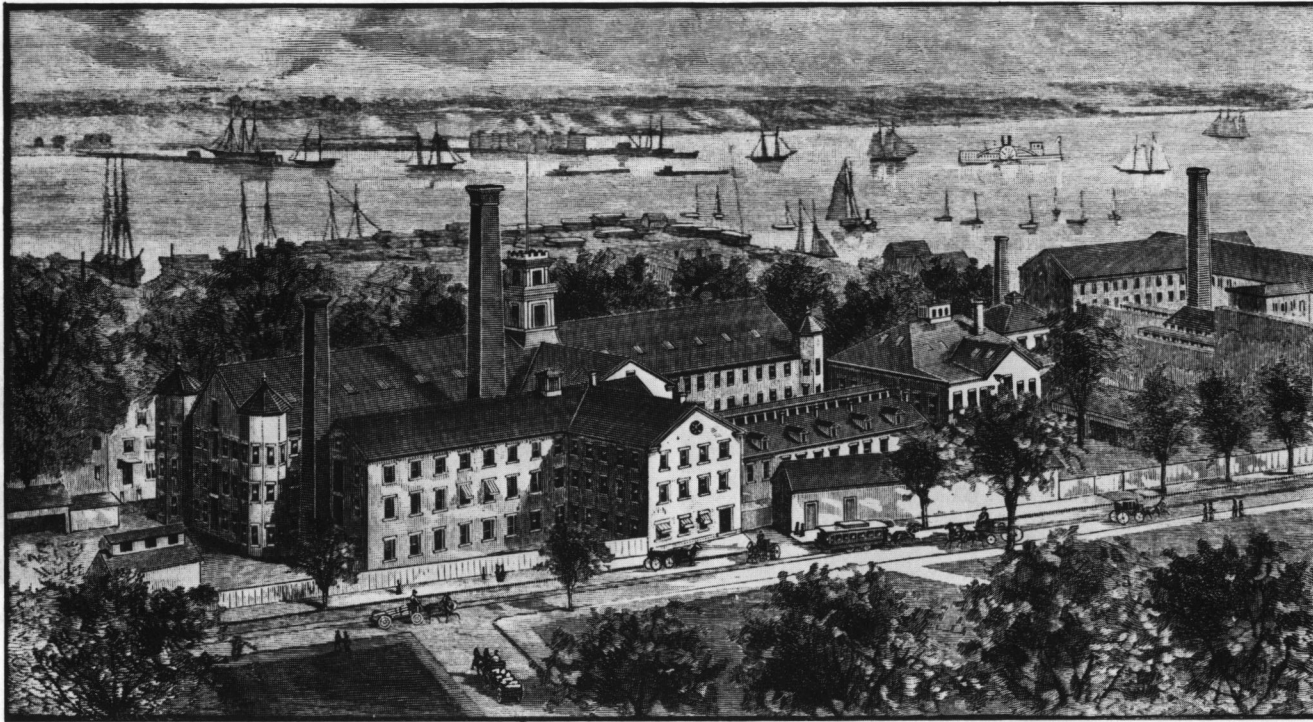


Fig. 55: Providence Machine Company (1846 and later); Allens Avenue; engraving, 1886. Unusual features were four octagonal corner towers (one remains although its roof has been removed) and a two-tiered cupola (since removed) with a crenellated parapet.

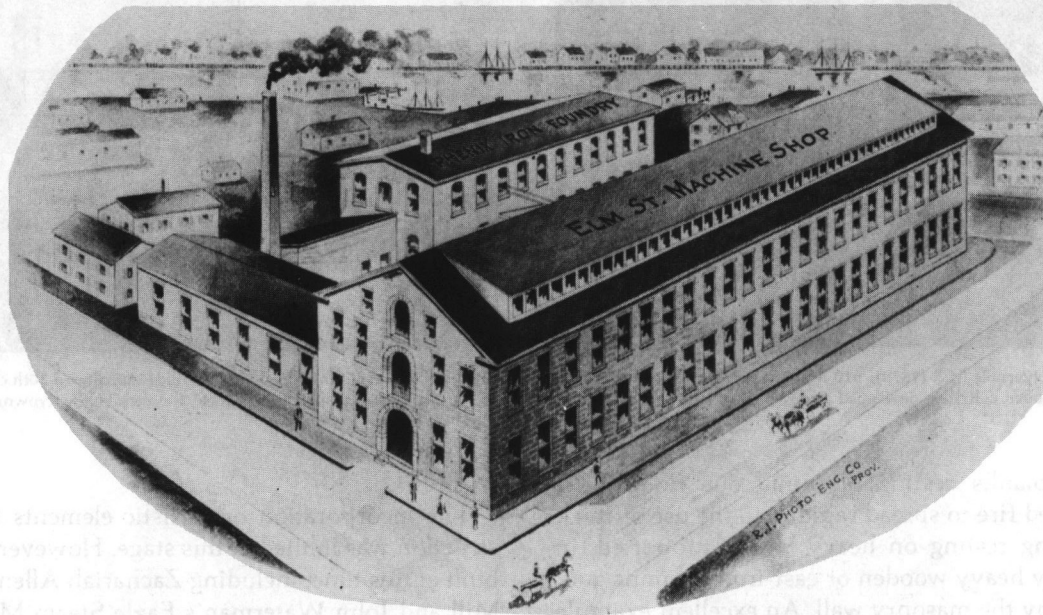


Fig. 56: Elm Street Machine Shop (1848); engraving, 1901. Distinctive features are the huge, arched, freight doors; random-ashlar walls; and eyebrow monitor set in a gable roof.

EARLY MACHINE-SHOP AND FOUNDRY CONSTRUCTION

Because base-metal operations included several processes with entirely different requirements for space, light, and power, the typical early nineteenth-century base-metal company such as textile-machine and steam-engine manufacturers had several one- or two-story buildings instead of the single, large, textile mill of the early nineteenth century. Among the earliest machine shops remaining in Providence are those of the Providence Steam Engine Company (1845), the Phenix Iron Foundry (1848), and the Providence Machine Company (1846). Although built within three years of each other, these machine shops differ greatly in scale and style. The 1845 machine shop of the Providence Steam Engine Company is a simple, two-story, stuccoed-stone, gable-roofed structure, while the Elm Street Machine Shop is more imposing with its random-ashlar construction and vertical line of large, round-arch freight doors graduated in size, on each end of the building. The most unusual of the three machine shops, however, was the Providence Machine Company factory (37 Allens Avenue) with its Gothic Revival features (four octagonal castellated towers and a two-tiered cupola with a crenellated parapet). Most of these features have since been greatly altered or removed.

The casting process had more stringent requirements because of high temperatures produced by the furnaces. The typical foundry of the nineteenth century was a one-story structure with a gable or hip roof, a monitor, and several furnace chimneys. The monitor provided light and allowed for heat produced by the furnaces and chimneys to escape. The Corliss Steam Engine Works (148 West River Street) had a large casting operation housed in a one-story structure with a hip roof and a double monitor for additional light and ventilation.

CHANGES IN MILL CONSTRUCTION

Mill construction underwent many changes in the late nineteenth century as industries such as textile, base-metal, rubber, and silverware manufacturing expanded. Major changes were made in mill size, building configurations, roof forms, window forms, wall-construction systems, building materials, and style of decorative features. The length and width of new textile factories noticeably increased from an average length of less than a hundred feet and width of less than forty feet in the 1830s to an average length of over one hundred and fifty feet and width of just under fifty feet in 1860. The volume of textile mills as well as base-metal, rubber, and silverware factories continued to expand in the late nineteenth century.

A major change in mill-complex configuration occurred mainly outside of the textile industry. New factory complexes were often more symmetrical, following variations of the E-shaped plan and the hollow-square plan among others. Such complexes as the Nicholson File Company (23 Acorn Street), the Brown and Sharpe Manufacturing Company (245 Promenade Street) and the Gorham Manufacturing Company (333 Adelaide Avenue) provided an orderly system of intake and outflow, conserved space (especially important to the Nicholson File Company and the Brown & Sharpe Manufacturing Company—built in a heavily industrialized section of the city), and helped to present a uniform facade to the public.

Another major change which occurred gradually between 1850 and 1900 was the change in roof forms. The gable roof with clerestory monitor made way for several other roof forms, the most popular of which was the near-flat roof, made possible by the use of coal-tar or tar-paper coatings with tin or gravel which effectively made the roof water tight. An early example of this type of roof is the Brown & Sharpe Manufacturing Company factory (1872) designed by engineer Frederick Howe. Near-flat roofs appeared in the 1880s, 1890s, and early 1900s on new mill buildings, such as those of the United States Gutta Percha Paint Company, and as stories were added to older structures, such as the main building of the Wanskuck Mills. The near-flat roof also

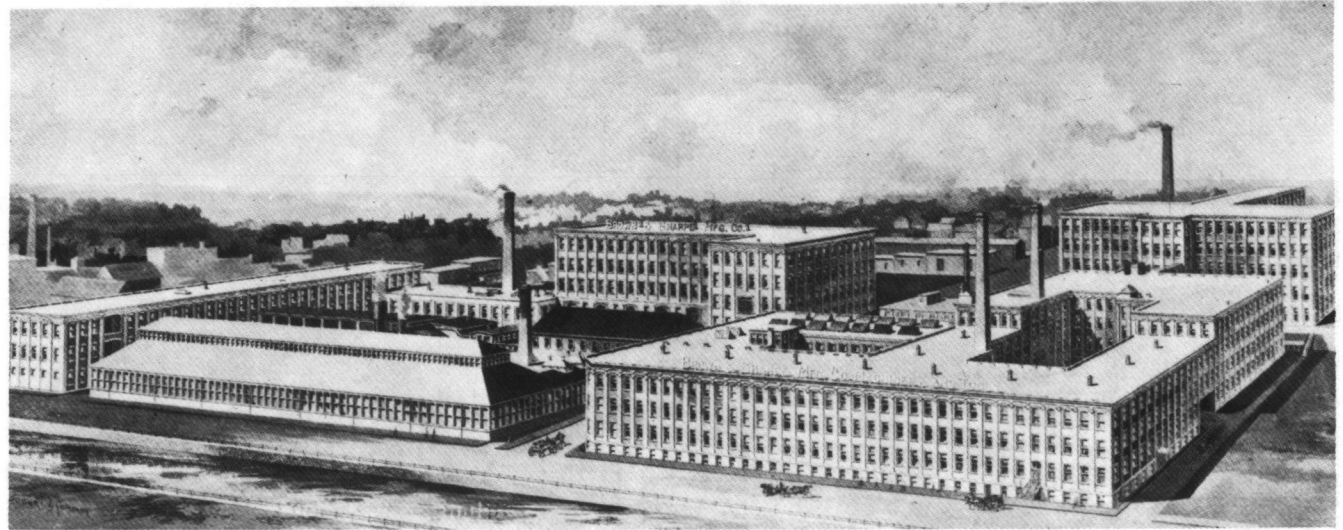


Fig. 57: Brown and Sharpe Manufacturing Company (1872 and later); 235 Promenade Street; illustration, 1901.

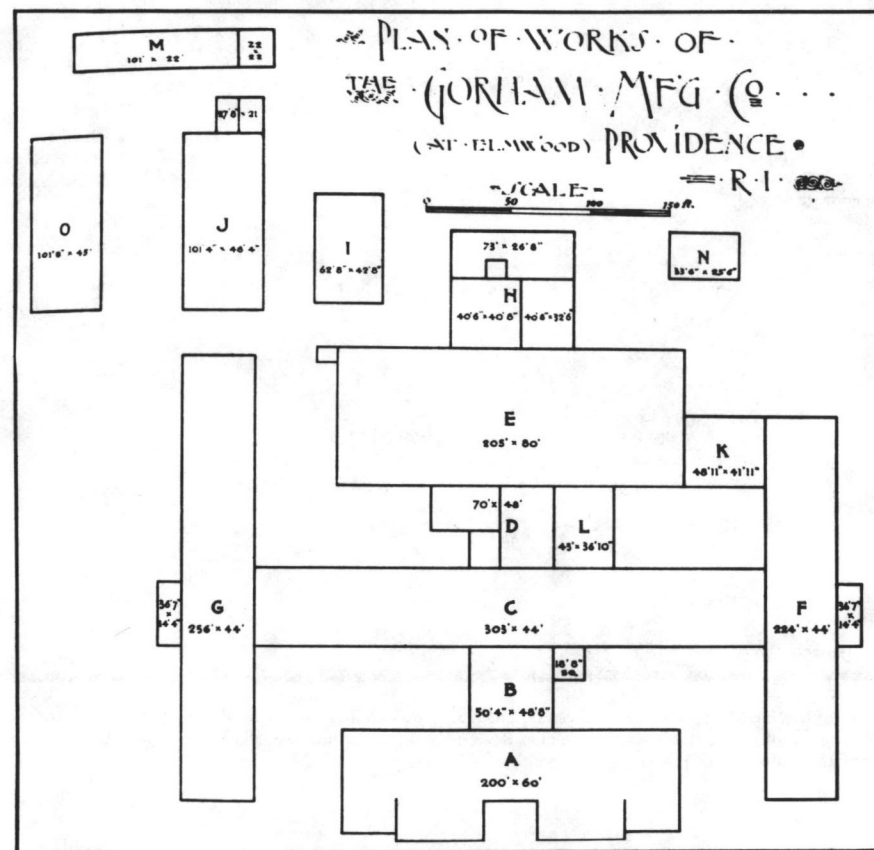


Fig. 58: Gorham Manufacturing Company works (1890); Adelaide Avenue; Frank Perry Sheldon, architect; drawing, 1889. Another geometrical plan.

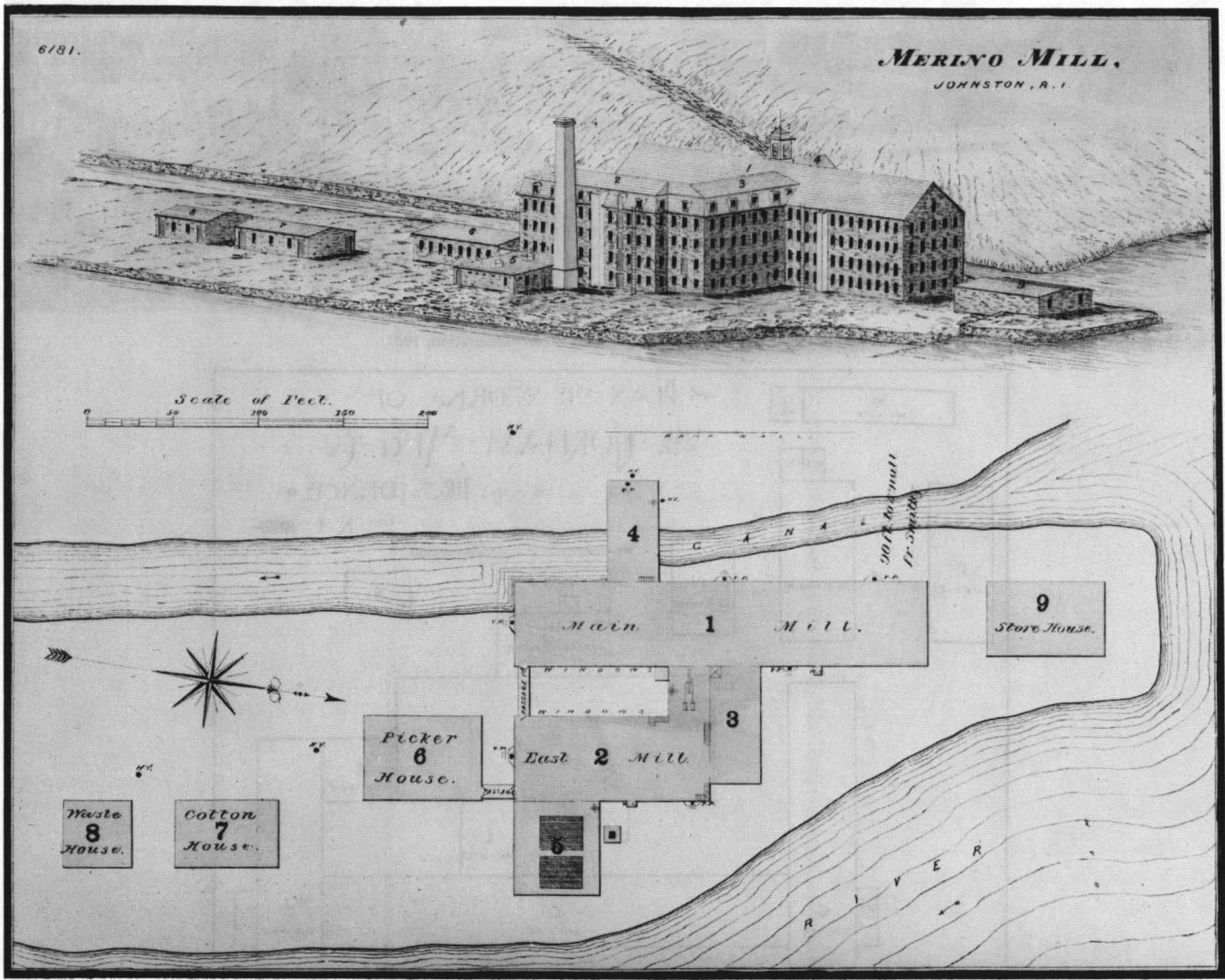
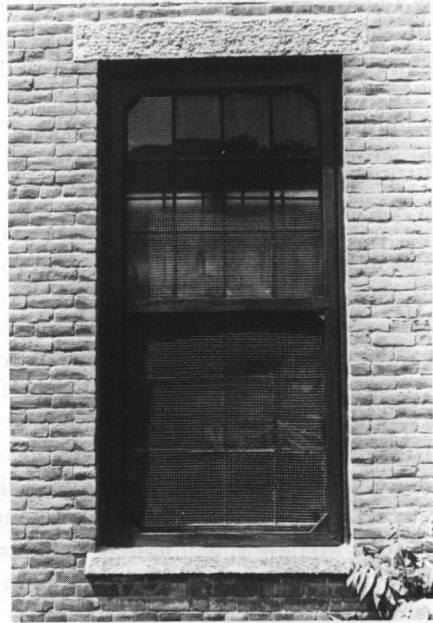


Fig. 59: Insurance plan (1880) of the Merino Mills, Ponagansett Avenue. The plan shows a fairly typical development of a rural, early-to-middle 19th-century, textile mill. The Merino Mills were built along the Woonasquatucket River to make use of the available water power; they were built to conform to the course of the river and to facilitate the transfer of power.

provided more light in the top story than the steeply pitched roof and thus eliminated the need for the clerestory monitor. The clerestory monitor continued to appear on other types of roofs, such as the gambrel roof. Other roof forms used in mills of the late nineteenth century were the jerkinhead gable roof (shown on the main building of the Allen Printworks at Dryden Lane) and the hipped roof.

Although the mansard roof came into vogue during the late nineteenth century, its use was discouraged by the factory-mutual insurance companies because of its high fire risks. The 1870s addition to the Merino Mills on Ponagansett Avenue has a mansard roof, as do the office buildings of the Nicholson File Company at Acorn Street and the Fletcher Manufacturing Company at Charles Street.

Another modification in mill construction was the increased use of the segmental-arch window form instead of the traditional flat lintel form. Because the segmental arch concentrated more of the wall load in the piers between the openings, it was possible to have



59a. Window detail with flat lintel.

larger window openings in what was still a load-bearing wall of uniform thickness. This concept was carried further by the use of non-load-bearing walls with thick supporting piers extending beyond the wall surface. Brick pier-and-spandrel construction permitted even larger windows than was previously possible. Probably the earliest textile mill in Providence to incorporate both of these concepts was the Riverside Mills (1862) on Allepo Street.

The most visible change in Providence mills was the substitution of brick for stone in the construction of exterior walls. Brick was cheaper and its smaller size afforded greater flexibility in construction.

Another change which accompanied the increasing size of Providence's new mill complexes during the 1860s, 1870s, and 1880s was the incorporation of architectural detail intended to lend these large structures an air of grandeur. The exterior stair tower often served as a focal point for architectural embellishment. Good examples of ornately detailed exterior towers can be seen at the Atlantic Delaine Mills (120 Manton Avenue) and the Wanskuck Mills (725 Branch Avenue).



59b. Window detail with segmental arch.

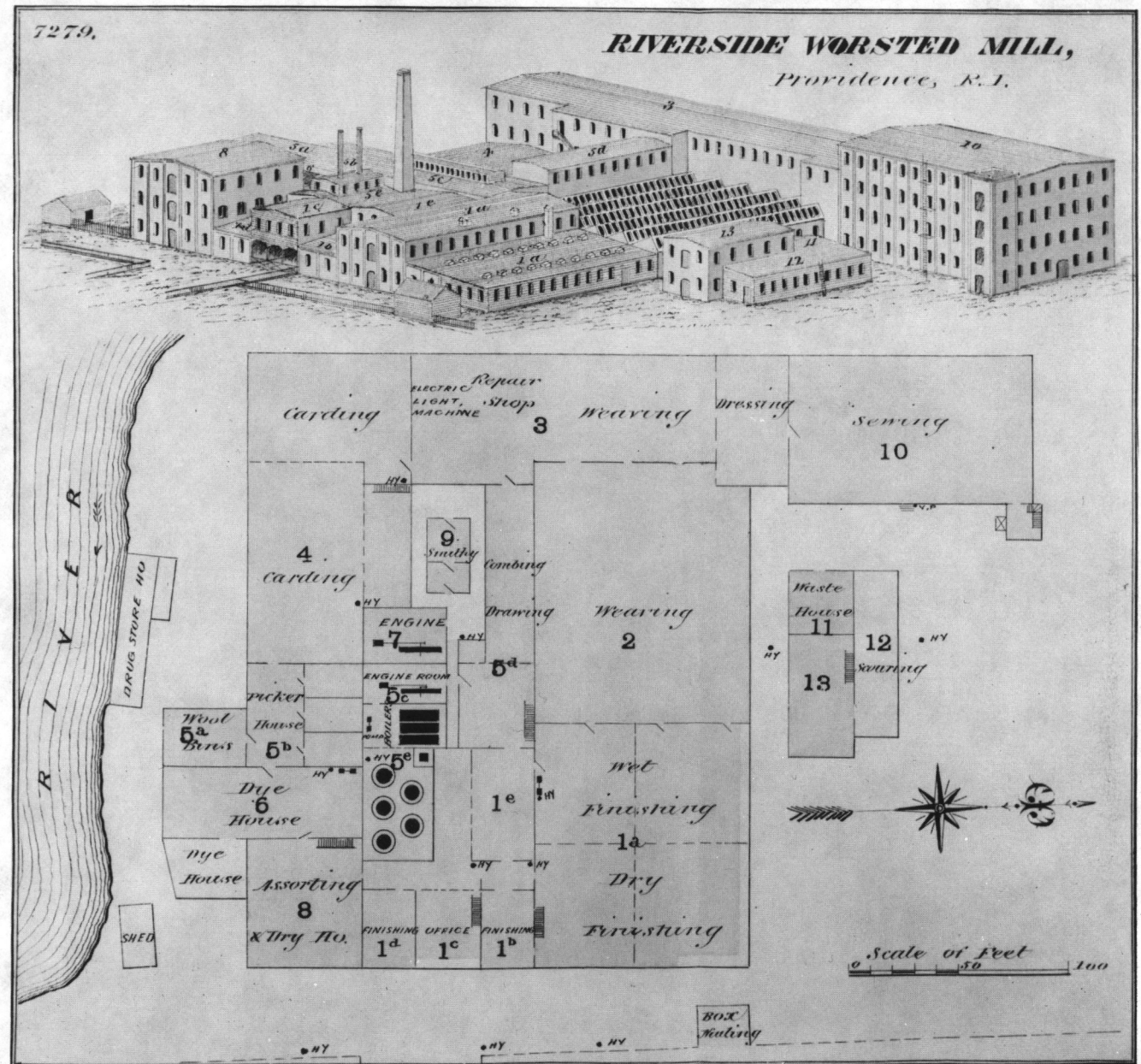


Fig. 60: Insurance plan (c. 1890) of the Riverside Mills, Aleppo Street. Built in the 1860s with numerous additions in the 1870s and 1880s, the Riverside Mills illustrate a typical, urban, late 19th-century, textile-mill configuration. Powered by steam rather than water, many urban mill buildings were arranged in rectangular clusters.

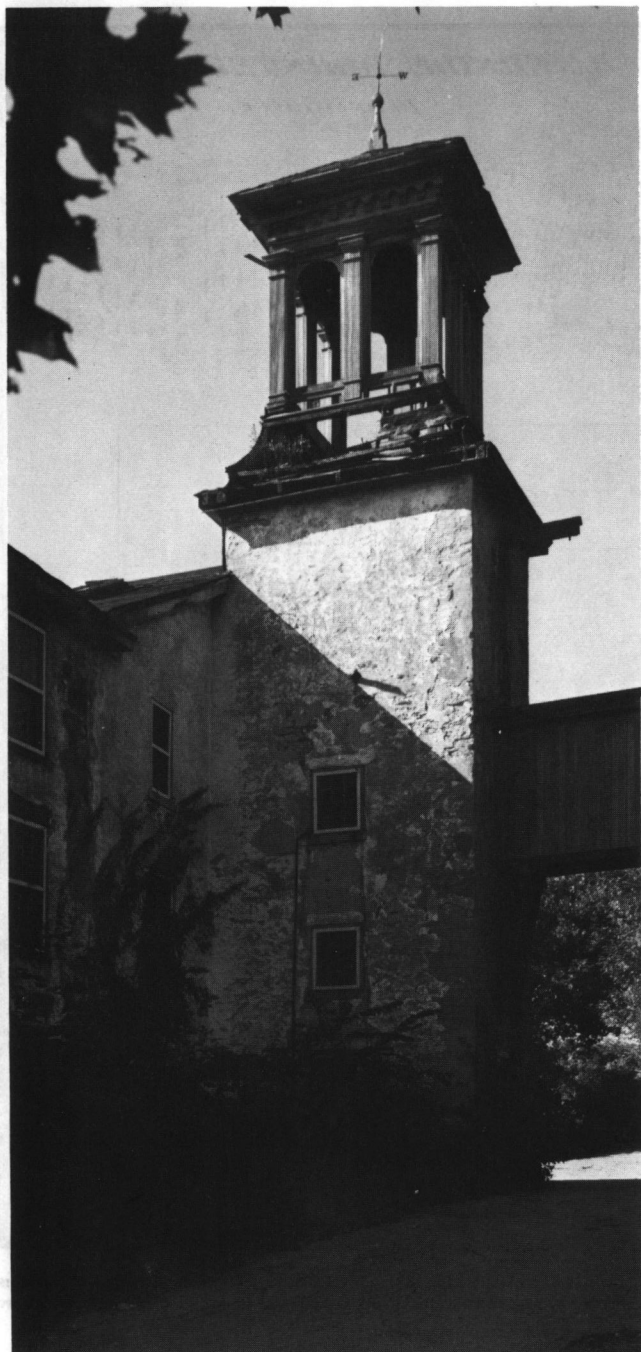


Fig. 61: Dyerville Mill (1835). This square-plan tower with a classically inspired belfry is sited at the narrow end of the structure, a typical early 19th-century configuration.

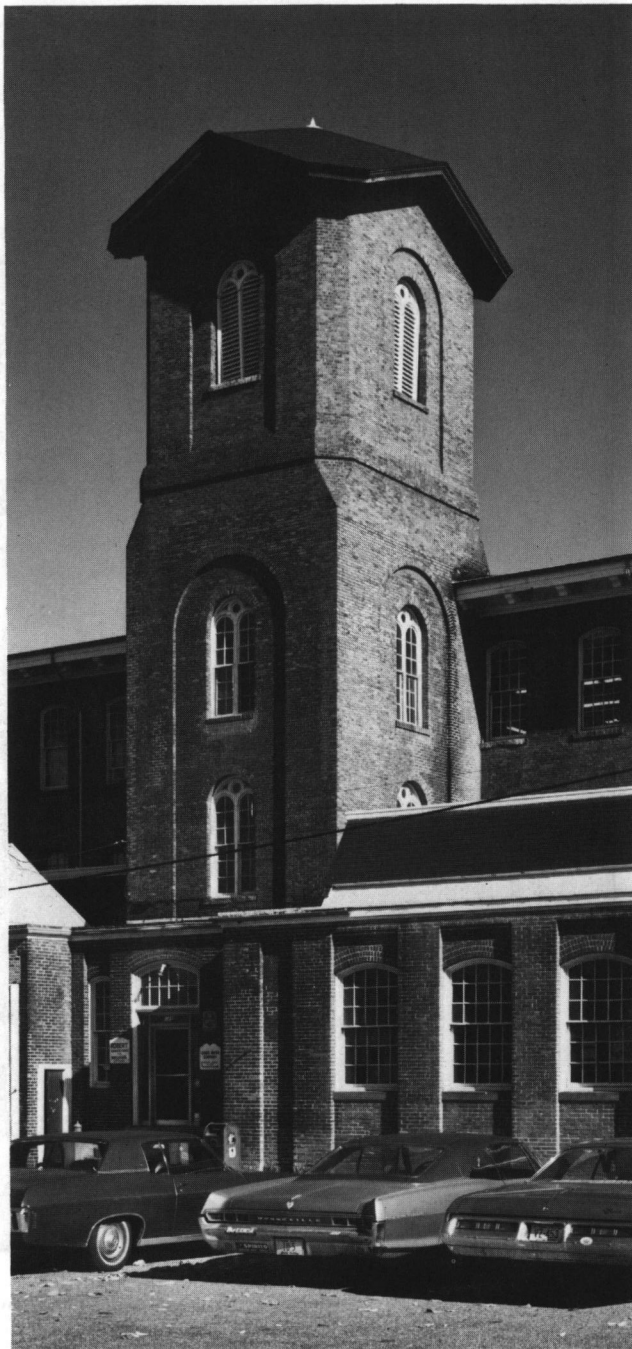


Fig. 62: Oriental Mill (c. 1861). By the middle years of the 19th century, the tower had been moved to the center of the long side. The helm roof is rare in Providence.

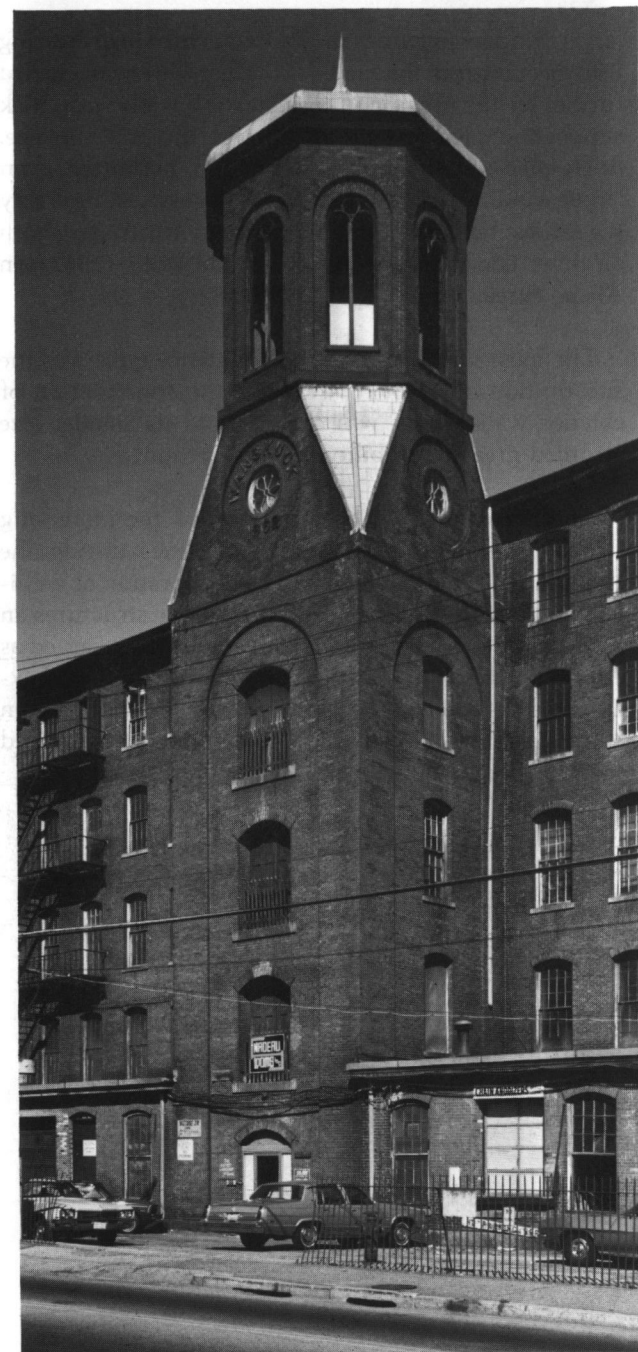


Fig. 63: Wanskuck Mill (1862). The base of the lantern, with its trapezoidal wall planes, makes a smooth transition from the square base to the octagonal lantern. The round-head arch on the base is repeated in the lantern.



Fig. 64: Atlantic Mill (1863 et seq.). The round, paired towers are unusual, but the high domes on balustraded attics are formally kin to those on contemporary gasometers.

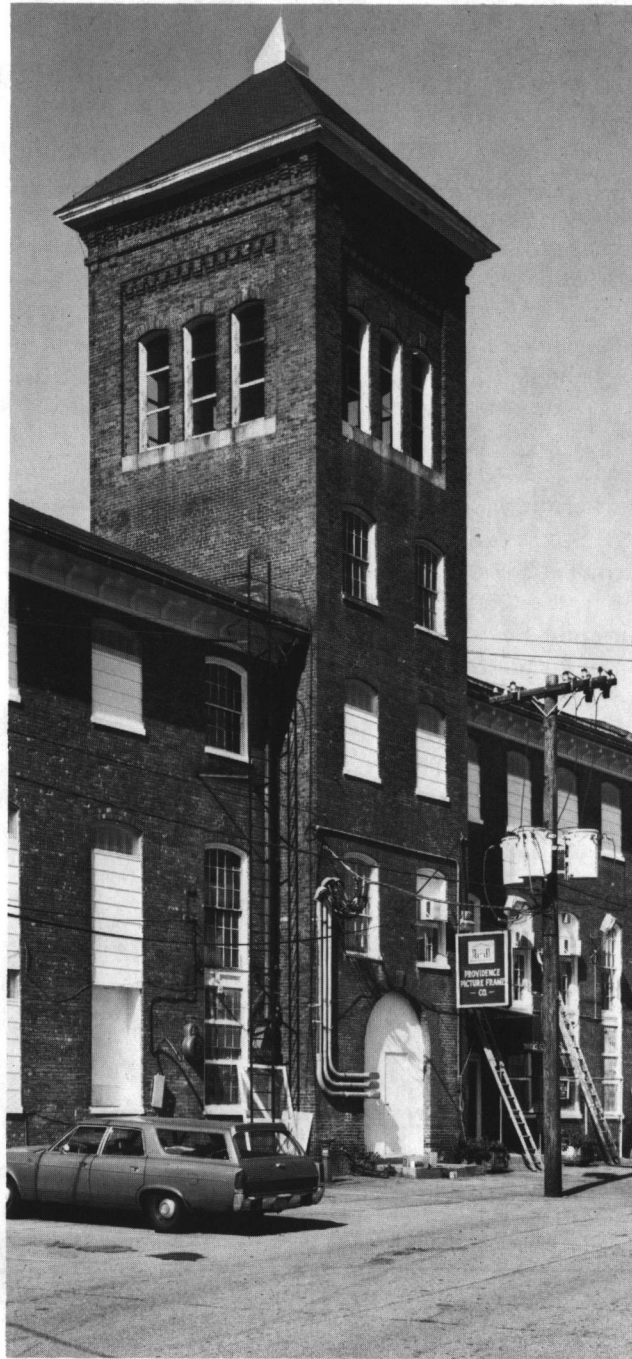


Fig. 65: Allen Print Works (c. 1874). The corbel cornice on this square tower was a popular treatment in late 19th-century industrial architecture, as were the grouped windows.

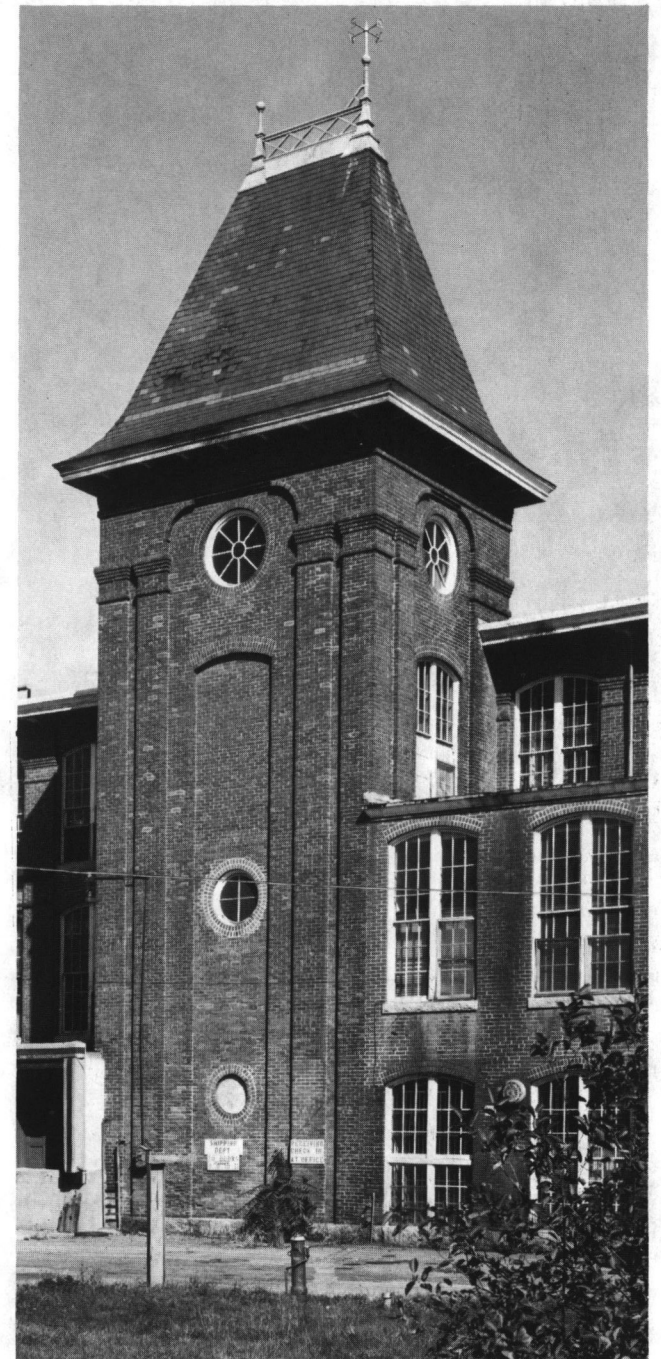


Fig. 66: Steere Mill (1884). The high mansard roof and the bold corner pilasters with corbel caps make this one of the most distinctive mill towers remaining in Providence.

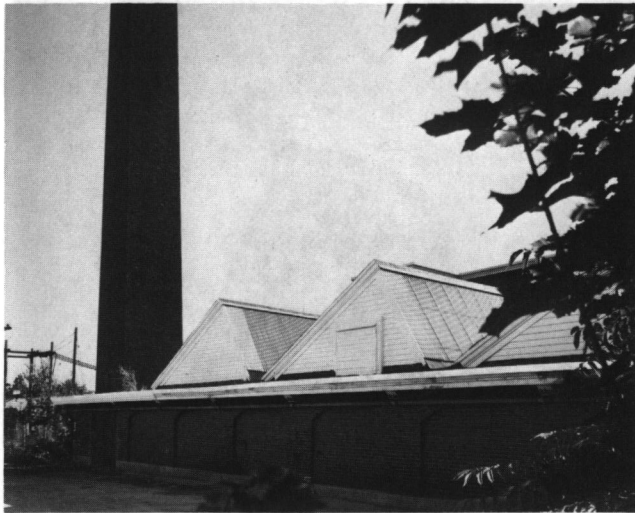


Fig. 67: Weave Shed, Steere Mill (1884); Wild Street. Showing sawtooth roof.

An alternative focal point for architectural expression was the mill office. The Nicholson File Company complex (23 Acorn Street) contains a small handsome mansard-roofed mill office surrounded by larger, simpler, gable-roofed buildings. The Fletcher Building (47 Charles Street), once surrounded by numerous manufacturing buildings, is another excellent mill office.

Not all mill complexes built during this period, however, had outstanding architectural features. A strong contrast is provided by the plain buildings of the Valley Mills (Eagle Street) and, opposite, the handsome Monohassett Mill (530-532 Kinsley Avenue) with a flank gambrel roof and an exterior stair tower (originally surmounted by a high, hipped roof).

By the turn-of-the-century, the standardized mill form began to dominate new construction. While some firms built ornately detailed structures, the characteristic early twentieth-century structure was a plain, wide, brick building with pier-and-spandrel walls, large segmental-arch windows, and a near-flat roof.

In textile complexes the one-story, sawtooth-roofed, weave shed began to appear by the turn of the century. The sawtooth roof, facing north, provided abundant, indirect, diffused light, necessary to the weaving process.

THE JEWELRY-MANUFACTURING BUILDING IN THE LATE NINETEENTH AND EARLY TWENTIETH CENTURIES

The jewelry-manufacturing building provided the small shop equipped with power systems (first steam and later electric), required by most jewelry companies. Because the jewelry district was next to the downtown area where land was quite valuable by the late nineteenth century, jewelry-manufacturing buildings were often narrow multi-storied structures (sometimes filling the same size lot as a commercial block), rather than the long wide structures favored by the textile industry.

Most of these large, late nineteenth- and early twentieth-century structures were built of slow-burning construction with heavy load-bearing brick walls, segmental arch windows, and flat roofs. Good examples of this type of building are the Champlin Building (116 Chestnut Street), the Irons and Russell building (95 Chestnut Street), and the Waite-Thresher Building (10 Abbott Park Place). While steel-frame construction had been introduced by the early twentieth century, its use was not widespread in jewelry-factory construction during this period. Reinforced-concrete construction, introduced in the early twentieth century, provided a

maximum amount of strength by reinforcing concrete (which has compressive strength) with steel (which has tensile strength). Early reinforced-concrete construction employed thick steel and concrete beams which were not only expensive but also occupied almost as much interior space as heavy-timber construction.

Flat-slab construction provided more space than concrete-and-steel-beam construction because the floor was supported directly by columns. C. A. P. Turner's mushroom-column system of flat-slab construction (patented in 1905) was one of the earliest successful flat-slab structural systems. Reinforcing rods extended both directly and diagonally between the columns. In the mushroom capital additional reinforcing hoops were laid on the radial rods. Because the floor and columns were the only structural elements, 80 per cent of the wall was left free for windows, providing a light, airy interior.

Early examples of mushroom-column, flat-slab construction are the A. T. Wall Building (162 Clifford Street) and the Doran-Speidel Building (70 Ship Street). Later reinforced-concrete factories appeared in the jewelry district and other areas during the 1920s.

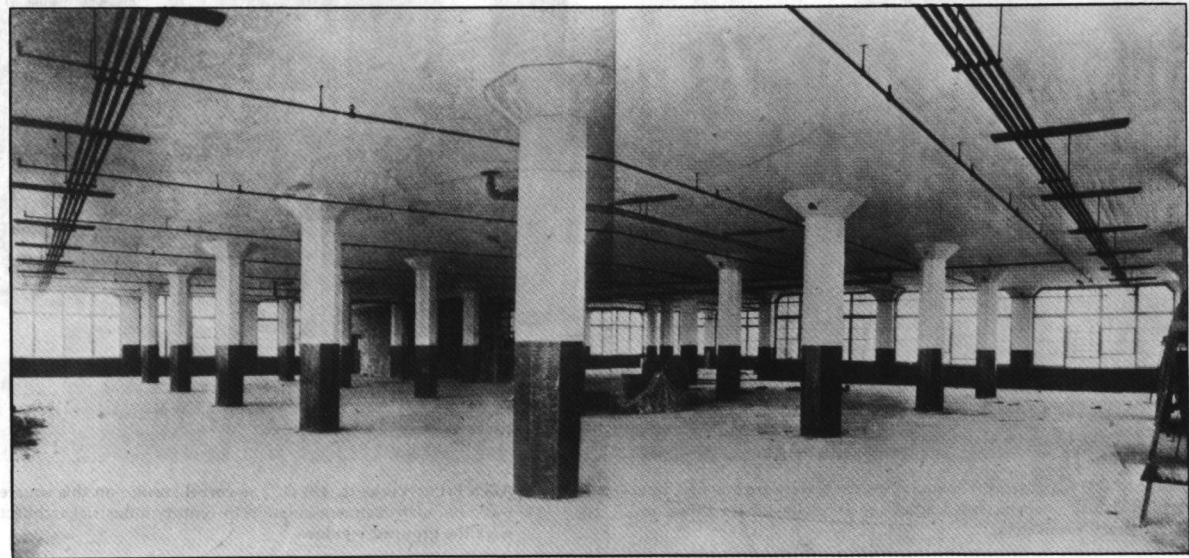


Fig. 68: Interior of the A. T. Wall Building. Showing mushroom column, flat-slab construction.

MID-TWENTIETH-CENTURY INDUSTRIAL BUILDINGS

Mass-production, an early twentieth-century innovation, represented the impact of technology on both the manufacturing process and on the building that housed it. Changes in construction techniques—like mushroom-column, flat-slab structural systems—allowed for large, well-lit areas unhindered by bearing walls; such spatial arrangements facilitated the integration of various component processes required for the completion of goods, particularly complex ones like those made by Brown & Sharpe. Such an interdependence between the building and the process increased production efficiency and encouraged concern with increasing efficiency ever further.

By the mid-twentieth century, this awareness of the correlation between the building and the product changed building requirements for larger industrial firms. Efficiency experts had found horizontal movement of goods far more efficient than the generally used vertical circulation system. Thus, companies that had long occupied multiple-story structures began to move to more efficient, one-story plants. Congdon & Carpenter was an early example, moving from a five-story plant on North Main Street to a one-story, steel-frame structure on Promenade Street in 1930. The American Watch Case Company built a one-story brick building on Dexter Street in 1941. American Screw, Nicholson File, and Brown & Sharpe followed suit after World War II, but those companies, because of their size, were forced to suburban locations outside Providence.

Only after the Providence Redevelopment Agency undertook the redevelopment of the West River and Huntington Avenue areas into industrial parks was open space available to accommodate these spreading, one-story industrial buildings. These utilitarian structures characteristically housed offices in a one-story, masonry-and-glass section in front of a large, steel-frame, metal sided production space. Both of these new industrial parks contain a number of these buildings.

V. RE-USE OF INDUSTRIAL BUILDINGS

Providence retains a valuable resource for economic and cultural development in its numerous historic industrial buildings. Recently recognition of the potential of the historic industrial complex lining both sides of the Woonasquatucket River, first developed in the 1860s, has led to the formation of the Promenade Industrial Center Association. Their vision of a refurbished industrial park, along a clean Woonasquatucket River, offering ample parking, access to railroads, Route 95 and within walking distance of downtown, holds great promise for the city of Providence.

Historic industrial buildings offer several advantages to the developer of commercial, residential, or industrial space. Among such advantages are large areas of open space—which can be used as such, or easily divided into smaller dwelling units, offices, or shops—and heavy structural systems which met the load requirements of most residential, commercial, and industrial uses. Industrial buildings can be made more energy efficient through traditional (and relatively inexpensive) meth-

ods such as caulking and weather stripping existing windows and doors and adding interior insulation where necessary. Moreover, construction or restoration of hydro-electric systems as well as the development of solar energy can be viable alternatives for some industrial rehabilitation projects.

Financial incentives for the rehabilitation of historic industrial buildings are provided by the Tax Reform Act of 1976 (see Appendix B), if the property is on the National Register of Historic Places, and by the low or moderate cost of acquiring many older industrial buildings.

While many factory buildings and complexes in Providence are partially utilized, few are totally vacant. Many of these buildings have historic or architectural value either by themselves or in their relationship with the surrounding area. The cultural value of these structures, as well as the financial incentives for their rehabilitation, should be stressed in industrial redevelopment, neighborhood revitalization, economic development, and preservation programs in Providence.

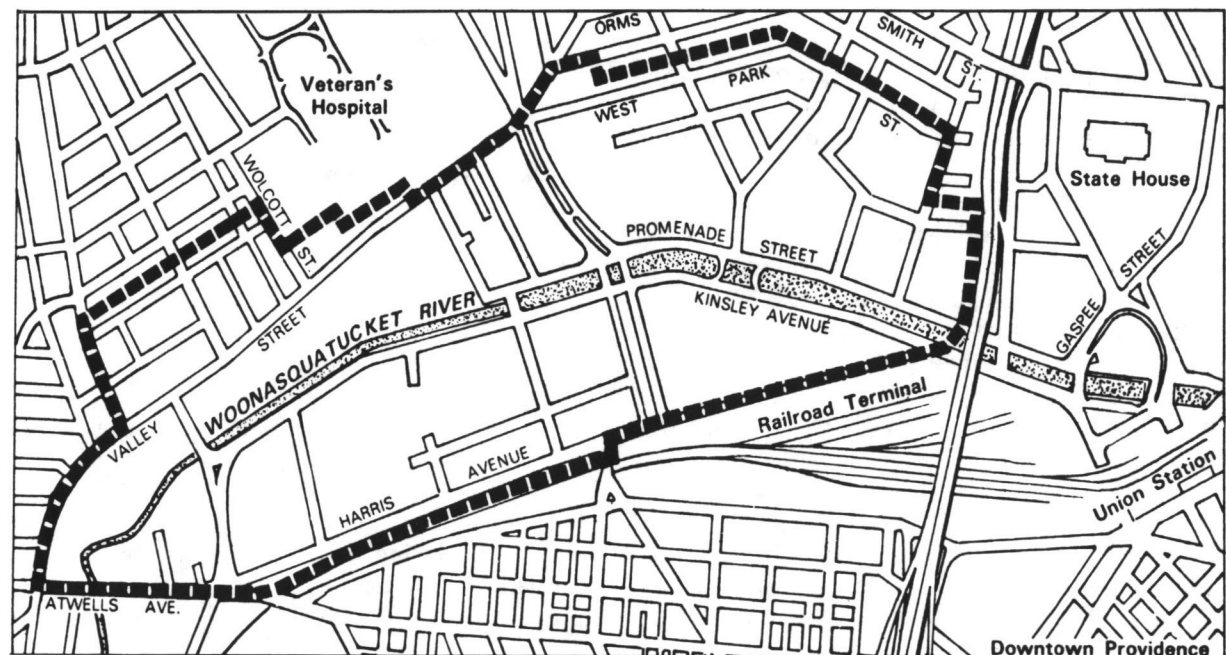


Fig. 69: Map of The Promenade Industrial Center Association Revitalization Area; drawing, 1981.

APPENDIX A: NATIONAL REGISTER OF HISTORIC PLACES

The National Register of Historic places is a record maintained by the Heritage Conservation and Recreation Service, United States Department of the Interior, of structures, sites, areas, and objects significant in American history, architecture, archeology, and culture. Authorized by the National Historic Preservation Act of 1966 as the official inventory of the cultural and historic resources of the nation, it includes historical areas within the National Park System, National Historic Landmarks, federal properties nominated by federal agencies, and properties of state and local significance nominated by each state and approved by the Service. It is an authoritative guide for federal, state, and local governments and private groups and individuals everywhere, identifying those properties which are particularly worthy of preservation throughout the nation. Registered properties are protected from federally funded and licensed activities by a state and federal review process. Listing on the National Register is a prerequisite for eligibility for federal matching grants-in-aid funds which are administered within the state by the Rhode Island Historical Preservation Commission.

The following industrial sites and properties have been given preliminary approval for nomination to the National Register of Historic Places by the Rhode Island Review Board.

Jewelry Manufacturing District, bounded approximately by Point Street, South Street, Imperial Place, Claverick Street, I-195, Ship Street, Elbow Street, Hospital Street; with Chestnut Street and Bassett Street forming cross spines

Wanskuck Mill Village Historic District, along both sides of Branch Avenue

Nicholson File Company, 23 Acorn Street

Gorham Manufacturing Company, Adelaide Avenue between Mashapaug Road and the Railroad

Riverside Mills, 25 Aleppo Street

Cowing and Heaton Mill/Geneva Mill, 1115 Douglas Avenue

Atlantic Delaine Company/Atlantic Mills, 120 Manton Avenue

Merino Mills, 91 Ponagansett Avenue

The following sites have been determined eligible for the National Register of Historic Places by the Secretary of the Interior.

Merchants' Cold Storage Warehouse Company, 65 Harris Avenue
Brown and Sharpe Complex, Promenade and Holden Streets

The following properties are already entered in the National Register of Historic Places.

Moshassuck Square Historic District, along Charles Street, Stevens Street, Smith Street, North Main Street, and Hewes Street

Jones Warehouses, 49-65 Central Street

Dyerville Mill, 610 Manton Avenue

New England Butt Company, 304 Pearl Street

Davol Rubber Company/Davol, Inc., Point Street and Eddy Street

APPENDIX B: TAX INCENTIVES FOR HISTORIC PRESERVATION

The Economic Recovery Tax Act of 1981 contains an important incentive for the rehabilitation of historic income-producing properties. The new 25 percent investment tax credit for such projects replaces the old provisions of the 1976 Tax Reform Act. The Federal Tax Code has now been altered to remove the bias in favor of new construction.

Changes to the tax law in the Economic Recovery Tax Act

1. A new accelerated cost recovery system (effective retroactive to January 1, 1981) permitting recovery of capital costs of real property over 15 years, straight line.
2. A three-tiered investment tax credit (ITC) for substantial rehabilitation of older and historic buildings. A 15 percent ITC is allowed to buildings over 30 years old, a 20 percent ITC to those over 40 years old, and a 25 percent ITC to certified rehabilitations of certified historic structures.
3. Repeal of the 10 percent investment tax credit for industrial and commercial rehabilitations as well as of the five-year amortization and accelerated depreciation provisions of the 1976 Tax Reform Act.
4. Repeal of the demolition disincentive that required straight-line depreciation for new construction on the site of a demolished historic structure, but retention of the provision that denies deduction of demolition costs as a business expense.

A "certified historic structure," qualifying for the 25 percent ITC, is defined in the law as a depreciable structure which is (A) listed in the National Register, (B) located in a National Register historic district and certified by the Secretary of the Interior as being of historic significance to the district, or (C) located in a local historic zoning district certified by the Secretary of the Interior to be controlled by design review procedures which will substantially achieve the purpose of preserving buildings of historical significance. Qualification for the 25 percent ITC includes certification of the rehabilitation as meeting the Secretary of the Interior's Standards for Rehabilitation. Certification of significance and rehabilitation are granted through an application process with the Rhode Island Historical Preservation Commission.

The Economic Recovery Tax Act of 1981 was signed into law by the President on August 13, 1981. It is possible that Congress will reassess some provisions of the Act during its first year of use. Please consult the Rhode Island Historical Preservation Commission for current information.

APPENDIX C: GRANTS-IN-AID PROGRAM

The National Historic Preservation Act of 1966 established a program of matching grants-in-aid for the acquisition and development of properties listed on the National Register of Historic Places. Once a year, the Rhode Island Historical Preservation Commission accepts applications from individuals, public and private organizations, and state and local governmental units who own properties listed on the National Register.

Matching grants-in-aid can be used to acquire, protect, stabilize, rehabilitate, restore, or reconstruct National Register properties. Allowable work under the program includes exterior and interior restoration, structural repairs, installation or updating of utility systems, architectural fees, archaeology, historical research, and the installation of protective systems. New construction, furnishings, and modern landscaping are not allowable costs.

The Commission receives many more applications each year than it is able to fund. The applications are evaluated according to the annual national objectives and following state criteria: the architectural and historical significance of the property; the degree to which the proposed use and treatment respect the historical and architectural values of the buildings; the urgency of the proposed work; the public benefit of the project, both educational and economic; the degree to which the property is threatened; and the geographical location of the property. Grant applicants are urged to submit requests for the amount which they can actually match and realistically complete in one year. The Commission may fund up to half the cost of the project. The grants awarded by the Commission have generally ranged in size from \$3,000 to \$50,000.

Once the Commission has selected the projects to be funded, the grantees must submit professionally prepared specifications and drawings developed in accordance with the Secretary of the Interior's Standards for Historic Preservation Projects. The Heritage Conservation and Recreation Service in the Department of the

Interior must review and approve the individual projects before any work can begin.

Financial assistance for the acquisition and development of National Register properties is provided for the benefit of the general public. Therefore, upon accepting a grant, the property owner must sign a preservation easement which is recorded with the deed to the property. The easement states that the owner agrees to maintain the property and not make any visual or structural changes without prior approval from the Commission. The number of years this agreement is in effect depends on the amount of funds received. Unless the grant-supported work is visible from a public right-of-way, the property must be open for public view twelve days a year.

The Commission accepts applications during March and April each year. The applications are reviewed during May and June and the Commission selects the projects in July, after Rhode Island is notified of its tentative federal appropriation for the grants-in-aid program. Those selected are first awarded funds to have the necessary specifications and drawings prepared. Development grants are officially awarded once the specifications have been accepted by the Commission, the project has been approved by the Heritage Conservation and Recreation Service, and Congress has approved the federal budget. Project work must be completed within a year.

* * * * *

The Commission's ability to award grants-in-aid depends upon the availability of federal funding, and varies from year to year. Those interested in applying for grants should contact the Commission for further information.

APPENDIX D: SURVEY FORM AND MAPS

A standard survey form, the "Historic Building Data Sheet," has been prepared by the Preservation Commission for use throughout the state. On the form a property is identified by plat and lot numbers, street number, ownership at the time the survey was conducted, present use, neighborhood land use, and a photograph.

Each property is also identified by one or more broad period time-frames which denote the original construction date and date(s) of major additions or alterations: P = prehistoric (before 1636), C = Colonial (1700-1800), F = Federal (1775-1840), GR = Greek Revival (1825-1910), EV = Early Victorian (1840-1870), LV = Late Victorian (1865-1910), ET = early twentieth century (1900-1940), MT = mid-twentieth century (1940-1975), and LT = late twentieth century (1975-present).

The "COMMENTS" section is used for brief notations regarding a building's style, structure, details, and architectural significance. The "HISTORY & SOURCES" section includes notes on individuals, organizations, and events associated with the building; dates and nature of significant additions or alterations; selected bibliographical and pictorial references; and identification of the building on historical maps and in street directories.

The four "EVALUATION" sections are intended as tools for quick reference to appraise various aspects of a property's preservation value. In general, the key factors that indicate the reason for preserving structures have to do with their visual significance, that is, "Architectural value" and "Importance to neighborhood." Other factors, such as condition, should be seen as pluses. Nor should a low historical rating be allowed to militate against the preservation of buildings deemed of architectural significance or those important in the neighborhood context.

The evaluation of a structure's exterior physical condition is rated on a 0, 2, 3, 5 scale, without regard to its architectural merits. Buildings assigned "5" are in excellent physical condition (original or altered). Those

rated "3" are in good condition, with only slight evidence of the need for improvement, such as repainting or minor repairs. Structures rated "2" are in fair condition, and may require substantial work, such as re-sheathing, or repairs to porches, fenestration, and so on. Buildings rated "0" are in poor physical condition, and probably require extensive work if they are to be retained. These ratings are based upon observation of the exterior only and do not reflect interior appearance or structural, electrical, and mechanical conditions.

The evaluation of the grounds, either of a building or a site, is rated on a 0, 1, 2 scale. Those that are in good condition and are a visual asset to the environment are assigned "2." The "1" rating indicates that the grounds do not detract from the surrounding area. The "0" rating applies to grounds that have a negative impact on the environs.

The evaluation of the neighborhood's physical condition is based on a 0, 2, 3, scale. "Neighborhood," in this context, denotes the immediate area surrounding a surveyed property and does not necessarily reflect physical features such as street blocks or demographic boundaries. Neighborhoods rated "3" are characterized by a uniformly high standard of maintenance of both buildings and grounds. Those assigned a "2" have well kept properties in much of the area but also have sections where the need for improvement is readily apparent. The "0" rating is used for areas which, for the most part, detract from the visual quality of the community as a whole.

Architectural ratings are assigned on a 0, 10, 20, 30, 38 scale. The "38" rating is reserved for a generally small number of buildings deemed of outstanding importance to the community and which, in most cases, are also of at least regional significance. The "30" rating indicates a structure of meritorious architectural quality, well above the local norm. The "20s" and "10s" constitute the majority of buildings surveyed. They are of local value by virtue of interesting or unusual architectural features or because they are good representatives of building types. The "0" rating applies to properties which have a decisively negative effect on the neighborhood.

Historical value is also rated on a 0, 10, 20, 30, 38 scale. The "38" rating is assigned to properties associated with individuals (including architects), organizations, or events which are of historic significance on the national level. Those of regional or state importance are rated "30." The "20" rating applies to entries related to noteworthy local developments and also includes buildings which, by virtue of their age, are considered to make a major contribution to the community's historic environment. The "10" rating denotes limited local historical value. The "0" rating is used to designate properties of no known historic interest at the present time.

Data from the survey sheets has been transferred to a series of detailed maps, drawn on a 1" = 80' scale. These maps depict every structure, regardless of date or historical importance, along with the address, a code for period or style, and the architectural and historical ratings. They make information pertaining to the cultural resources of Providence's industrial sites available for all planning purposes. Copies of these maps are on file at the Rhode Island Historical Preservation Commission office and at the Providence Department of Planning and Urban Development.


HISTORIC BUILDING DATA SHEET RHODE ISLAND STATEWIDE SURVEY		COUNTY Providence	
FILE NO. _____ PLAT <u>21</u> LOT <u>200</u> LUS _____			
ADDRESS <u>Elm Street</u>			
OWNER <u>Industrial National Bank</u>		CITY/TOWN Providence	
PRESENT USE: 1 fam _____ 2 fam _____ multi _____ pub _____ comm _____ indus _____ rell _____ agr _____ mixed _____ other <u>vacant</u>		NEGATIVE NO. <u>LF 3-13, 9</u>	
NEIGHBORHOOD LAND USE: res _____ comm _____ indus <u>X</u> pub _____ agr _____ woods _____ other _____		KNOWN AS <u>Elm Street Machine Shop</u>	
PERIOD/STYLE: P C F GR (EV) LV ET MT LT		ARCHITECT _____	
DESCRIPTION: Stories: <u>2 1/2</u> Roof: gable (flank _____ end <u>X</u> cross _____) gambrel (flank _____ end _____ cross _____) hip _____ monitor <u>X</u> mansard _____ flat _____ other _____		DATE & SOURCES <u>1848 (keystone)</u>	
Walls: clapboard _____ brick _____ stone <u>X</u> shingle _____ modern comp _____ other _____		ORIGINAL USE <u>machine shop</u>	
Foundation: height _____ stone <u>X</u> brick _____ other _____		ORIGINAL OWNER <u>Phenix Iron Foundry</u>	
Alterations: good _____ poor few none _____ Rare bldg. <u>X</u> Typical of its area _____		HISTORY & SOURCES: Phenix Iron Foundry manufactured bleaching, dyeing, and printing machines, one of the first companies in Providence (ca 1830). Early works demolished in early twentieth century for expansion of NELCO plant at Eddy and South Streets. Bayles, p. 626 Greene, p. 267 Hall, p. 181 Tax Assessor's Records P. I. F. Aug 1854 P. Gas Burner Co. Jul 1903 Gen'l Electric Co May 1912 U.S. Real Estate Co Dec 1933 G.F.L. Corp Dec 1941 Coro Inc Nov 1968 America Luggage Works Inc May 1974 Industrial Nat'l Bank Jun 1977	
COMMENTS: random ashlar walls; huge, round-arch freight doors, graduated in size in each story of gable end; 2-story, brick, gable roof addition (ca 1863); 3-story, flat-roof, brick addition (1907) made by Providence Gas Burner Company		ROAD Elm Street	
SURVEYOR L.F. _____ AV Checked Sep 80 SUPERVISOR WMW _____ HW Checked Sep 80		MAP NO.	
DATE: _____		EVALUATION: Physical Condition structure 5 (3) 2 0 grounds 2 (1) 0 neighborhood 3 (2) 0 Architectural value 38 (30) 20 10 0 3A Importance to neighborhood (14) 10 5 0	
		PRIORITY NR	
		Historical value 38 30 (20) 10 0 Total Score	

Fig. 70: Sample survey form.

APPENDIX E: INVENTORY

The following industrial structures are of architectural, engineering, or historic significance, either in themselves, by association, or as representative examples of a common architectural or engineering type. This inventory omits structures of engineering significance not directly associated with the city's industrial development.

The name of each building derives from the company responsible for the earliest structure or structures. Later corporate owners of significance are mentioned in the text of the entry.

Entries are listed alphabetically by street and then in numerical order by address. Some buildings without street numbers have been assigned numbers for the purpose of this survey; such numbers appear in brackets in this inventory.

** Listed in the National Register

* Proposed for nomination to the National Register

ABBOTT PARK PLACE

- 10 **Waite-Thresher Company Building (1911):** Dwight Seabury, architect. Built by the Waite-Thresher Company, this handsome, 5-story brick building has a flat roof, a simple lip cornice, and horizontal block massing. The pier-and-spandrel wall system is fenestrated with paired, double-hung sash windows which, on the upper stories, are capped with segmental arches. The first story has been altered by the addition of mid-20th-century storefronts.

The company was founded by William H. Waite to produce gold jewelry and was incorporated in 1899 as the Waite-Thresher Company when Henry G. Thresher became a partner. The firm was then located at 61 Peck Street and employed 200 workers. Having outgrown its rented space by 1910, the Waite-Thresher Company built a new factory, but like many jewelry companies which constructed large factories in the jewelry district, the Waite-Thresher Company occupied only part of its new building, renting the remaining space to a printing company, an emblem manufacturer, and two other jewelry companies. In 1935 the Waite-Thresher Company dissolved and sold the building to the newly formed Waite-Thresher Real Estate Company. The building is now used by a mixture of commercial and industrial firms including an employment service, a printing company, jewelry companies, and the Waite-Thresher Real Estate Company.

ACORN STREET

- 23 **Nicholson File Company (1864 and later):** William Nicholson, founder of the Nicholson File Company, began his career as a machinist in 1852 in Joseph Brown's machine shop (later Brown & Sharpe). Having opened his own machine shop in the late 1850s, Nicholson formed the firm of Nicholson & Brownell at the beginning of the Civil War to produce parts for Springfield Muskets. In 1864, Nicholson sold his share in Nicholson & Brownell and formed the Nicholson File Company to manufacture files which were cut, forged, and ground by machinery designed and built by Nicholson himself. When Nicholson's company began production it was the first successful manufacturer of machine-made files in America.

The Nicholson File Company complex, designed by William Nicholson, is a mixture of late 19th- and early 20th-century, 1- and 2-story, brick, gable-roofed, mill buildings. Built between 1875 and 1882, the 2½-story brick office—with a mansard roof, corbeled cornice, and grouped windows with granite sills and lintels—is the most distinctive structure in the complex.

While Nicholson's goal was to produce three hundred files per day, his company grew so rapidly that by 1867 the works were producing 3,600 files per day. In the 1870s, the company broadened its line of files and rasps. This decade also marked William Nicholson's treatise on the proper use of files which was published in 1878 and which was reprinted several times in the late 19th and 20th centuries. By the 1880s Nicholson had already claimed twenty-eight patents, and the drafting room and machine shop were still being used for the invention of more specialized machines. The company then employed 400 workers.

The 1890s and the early 20th century marked the greatest growth for the Nicholson File Company. Not only was the plant in Providence greatly expanded, but the company also acquired the New American File Company in Pawtucket, as well as four other file manufacturing companies in New Jersey, Indiana, Pennsylvania, and Ohio. The company's six plants produced over 10,000 files and rasps a day. Upon William T. Nicholson's death in 1893, Samuel Nicholson took over the management of his father's thriving company. Under his direction, the Nicholson File Company greatly expanded its export trade. By 1916 the company produced over 7,000 different products ranging from the largest rasps to the finest jeweler's and watchmaker's files with as many as 300 teeth to the inch. Also by 1916 there were machines for every step in the file-making process which included: rolling and cutting strips of steel, clipping, forging with power hammers, grinding with huge revolving stones, drawfiling the blanks, and cutting teeth. The files were then cleaned, inspected, and boxed. In 1959, the Nicholson File Company transferred the Providence manufacturing operation to its plant in Anderson, Indiana, and build a structure in East Providence to house its administrative, sales, and engineering offices. Since then the Acorn Street Complex has been occupied by various small industries.

- 333* **Gorham Manufacturing Company (1888-1890 and later):** Frank Perry Sheldon, architect. The Gorham Manufacturing Company was founded as a small jeweler's shop in 1818 by Jabez Gorham, who made beads, earrings, breast pins, rings, and a gold chain known as the "Gorham Chain." In 1831, the firm began manufacturing silver spoons. Soon the shop began the production of other silver items such as forks, thimbles, combs, and children's cups. In 1841 Gorham's son John joined the firm which became known as Jabez Gorham and Son. After his father's retirement in 1847, John Gorham greatly expanded the business by installing a steam engine and producing flat silver and silver holloware by machine. In 1865, the Gorham Manufacturing Company incorporated. It established a separate department for the manufacture of ecclesiastical articles in 1885. This department was quite successful and the company was soon handling large orders for statues and memorials (mainly made of bronze) and for architectural bronze work. One of the many statues cast at the Gorham Manufacturing plant is the Columbus Monument (1893) at Columbus Square in Elmwood; this bronze figure of Columbus is the replica of a silver statue designed by Auguste Bartholdi and cast at Gorham for the Columbian Exposition of 1892 in Chicago.

The complex, which includes one of the largest metal-working foundries in the world, consists of a group of 2- and 3-story, brick structures with low hip or pitched roofs, grouped for the most part symmetrically beside and behind a 3-story (third story added later), hip-roofed office building with a gabled, Romanesque-style, central entrance. All the structures possess uniform corbeled brick cornices and window sills and other trimmings of rock-faced granite. A large, bronze statue of Vulcan, cast at the plant, stands in front of the office building. A short distance to the north of the principal complex is a brick, cross-gabled stable and carriage house erected in 1890 which originally was part of a now demolished station. Also in this area is a long, Colonial Revival building built in 1895 and enlarged in 1906 containing the Board of Director's room, dining rooms, recreation rooms, and dormitories. This building was to be used by the workers as well as the executives. Located next to the Amtrack Railroad, the Gorham Manufacturing Company complex presents a handsome, picturesque facade to the railroad traveler from New York to Providence or Boston. In 1967 Gorham became a division of Textron. The plant is still in operation today.

ADMIRAL STREET

- 1 **Oriental Mills (c. 1861):** In 1860 Alfred A. Reed bought the land then in North Providence at Admiral and Whipple Streets. The Oriental Mill, probably completed in 1861, was built as a cotton mill. Though possibly dormant during part of the Civil War, the Oriental Mills Manufacturing Company was operated for thirty years by the Reed family—first Alfred Reed and later his son Alfred Reed, Jr. The company did not greatly expand during that thirty-year period.

The mill building, though originally surrounded by smaller secondary buildings, is the only surviving structure from this period of construction. This long, 3-story, brick structure has a low gable roof and stair towers in the center of the east and west sides of the mill; the tower on the west side or Oriental Street side retains its original bracketed helm roof above the belfry. The regularly spaced windows, the oculus windows in the gable ends, as well as the severe modillion raking and eaves cornices are characteristic features of the period.

In 1893 the Oriental Mills were sold to the J. P. Cambell Company. Cambell, who also operated the Cranston Print Works, replaced most of the old machinery. By 1901 the J. P. Cambell Company was producing 1,500 pieces of white goods a week and employed 250 workers. However, the company was one of many businesses bankrupted by the panic of 1907; Cambell was forced to liquidate its Providence property, and in 1908 the Oriental Mills were sold at auction to Alfred Lowenstein, a Boston silk manufacturer. Lowenstein soon formed the American Silk Spinning Company which functioned solely as a silk-spinning plant until 1928. As early as the 1930s this company began experimenting with synthetics. Because they were one of the earliest textile plants to explore and expand into the synthetic market, the American Silk Spinning Company remained in business at the Oriental Mill until 1962, at least ten years after most textile plants had closed in Providence. Since 1962 the Oriental Mill has been occupied by the Union Paper Company and the Union Transbag Company.

ALLENS AVENUE

- 31 **Providence Machine Company (1846, c. 1850):** Thomas Hill, founder of the Providence Machine Company, played an important part in the development of the textile industry in Rhode Island. Hill gained his machine-making experience as an apprentice in Gay's mill in Pawtucket. In 1830 he came to Providence to manage the machine shop in Samuel Slater's Providence Steam Cotton Manufacturing Company. Four years later he became a partner with Slater in the newly formed Providence Machine Company. Upon Slater's death in 1835, Hill took over the machine shop and by 1845, under Hill's leadership, the business had expanded so considerably that a new factory became necessary. Completed in 1846, the factory is a large, 3-story, gable-roofed structure which originally had four corner turrets (only one of which still remains, though it has been greatly altered). This structure also had a rectangular, 3-tier cupola with a crenolated parapet which has been removed. The other remaining structure built in the 1850s is a smaller, L-shaped, gable-roofed structure with regularly spaced sash windows and granite lintels.

The Providence Machine Company was the first American Company which successfully manufactured roving machines and fly frames for cotton manufacturers. Before this company existed, cotton-cloth manufacturers were largely dependent on England for these specialized machines. By 1866 when the company incorporated, it had also begun the manufacture of

worsted machinery. Upon Thomas Hill's death in 1894, his grandson, William Pierce, became president, and it was under Pierce's leadership that the Providence Machine Company's "improved patent roving machine" was introduced in 1899. By 1901 these machines were the main product of the Providence Machine Company. In 1910 the company was bought by the Whitin Machine Company of Whitinsville, Massachusetts, and after a few years all of the patterns and machinery were moved to Whitensville. Between 1917 and 1920 the Gorham Manufacturing Company owned the plant and during World War I manufactured shell cases for the navy.

The Franklin Process Company next owned and occupied the plant. This large, dyeing-machine manufacturer and dyeing company has its main plant in Philadelphia with a branch in Manchester, England, as well as one in Providence. A 1925 advertisement for the company claims that the Franklin Machine Company was the largest job dyer in the country. After the company sold the plant in 1957 the complex remained vacant for several years. It is now largely occupied by the State Office and Supply Company.

ALEPPO STREET

- 50* **Riverside Mills (1863, 1865, and later):** This large complex of 1- 2- 3- and 4-story brick, flat- and gable-roofed mill buildings was founded as a woolen mill by George C. Chapin and Lewis Downes in 1863. An 1865 fire destroyed the carding room, spinning room, and finishing room which were immediately rebuilt. Some of the early 2-story buildings designed by Lewis Downes, working with architect Clifton Hall, have handsome pier-and-panel walls and elaborate, brick, corbeled cornices. Most of the buildings, which date from the late nineteenth and early twentieth century, are plainer, flat roofed, brick structures.

Chapin and Downes originally began by manufacturing woolen, coffin coverings and cassimeres but soon changed their product to astrakhan (a cloth made of wool or wool and cotton, which has a curled or looped pile) and other ladies' cloakings. Although the Riverside Mills gained their reputation from their astrakhan, since it was a cloth not widely manufactured in the United States, Chapin and Downes invested most of their energy into the manufacture of worsted cloth for men's wear. According to one source at the turn-of-the century, Riverside Mills was the first worsted plant in the United States to use the Bolette card feeder and the teasel cross jig. The mills were also innovative in using English-made, self-operating mules and in employing a cold-air wool-drying process. In 1872 Louis Downes sold his shares in the mills. A year later in the panic of 1873 the Riverside mills declared bankruptcy and the property was sold at auction. The new owner, E. P. Chapin, incorporated the mills under the name of the Riverside Worsted mills.

The 1880s and 1890s were a period of expansion and changes for the Riverside Mills. In 1889 when the Riverside Worsted mills merged with the Oswego Falls Manufacturing Company, the worsted complex, under the new name of the

Riverside and Oswego Mills, employed 2,700 workers. The business again changed hands in 1891. Finally in 1899 the Riverside Mills were bought by the American Woolen Company, a huge textile company which acquired several other mills in or near Olneyville. Under the ownership of the American Woolen Company, the Riverside Mills continued to manufacture worsted cloth for men's wear. By 1908 the Riverside Mills covered seven acres with approximately eleven mill buildings (most of which were connected) and a 3-story, brick, early 20th-century office on Aleppo Street.

In 1927 the Riverside Mills, with a reduced work force of 1800, was closed by the American Woolen Company; the company was re-opened a year later when the American Woolen Company abandoned its Weybosset and Valley Mills and transferred some of the machinery and workers from the abandoned plants to the Riverside plant. In 1937 the American Woolen Company in liquidating most of its New England mills sold the Riverside Mills to a realty company. One of the first businesses to occupy the Riverside Mills after it was sold was the Providence Warehouse Company, which still occupies part of the complex. Other parts of the mills were rented to various manufacturing companies. At one point there were thirty-three companies in the numerous buildings of the Riverside Mills.

BARK STREET

- 1** **Stillman White Brass Foundry (c.1871 and later):** Stillman White started his brass foundry on this site in 1856. By 1869 White's brass foundry was famous not only in Rhode Island but also in New England for the product called "S. Whites Anti-friction Lining Metal" which was used to line bearings. Stillman White's Brass Foundry was also known for a variety of brass, bronze, and composition castings, which were used by steam-engine companies, cotton-machinery manufacturers, and other industries.

Although Stillman White built his foundry on this site as early as 1856, the original frame structure was replaced by the three structures now on the site in the late 19th and early 20th centuries. At the north end of the site is a 1-story, brick structure with a gable roof and a corbeled cornice. This building, which contained the foundry proper, is identified by its tapering square chimney and four, large, wind-adjustable sheet-metal vents mounted on the roof. The 2-story structure in the middle has a gable roof and similar window treatment and corbeling. The southern section, built in the early 20th century, has a flat roof and similar, long, rectangular windows and corbeling. The 2-story sections were used for office, storage, and work space. Although the foundry was built in three separate stages, the combined 1- and 2-story structures with uniform brickwork, window treatment, and corbeled cornice presents a unified appearance. The Stillman White Company occupied the structure until 1949 when it moved to a modern foundry. During the 1950s and 1960s the building was occupied by various businesses, but had been abandoned by the early 1970s. In 1973 after a fire had damaged the building, the

Stillman White Foundry was included in the Moshassuck Square Historic District listed in the National Register of Historic Places. Still threatened by demolition, however, the foundry was bought and adapted for re-use as office space by the Research and Development Institute (REDE). REDE subsequently occupied the structure until the mid-1970s. The Stillman White Foundry is now occupied by an architectural firm and other offices.

BRANCH AVENUE

725 Wanskuck Mill (1864 and later): The Wanskuck Company established by Jesse Metcalf and Henry Steere in 1862 was one of the many woolen mills formed early in the Civil War when cotton was scarce and army uniforms and blankets as well as civilian clothing were in great demand. Steere and Metcalf bought the land and water privileges of a small abandoned cotton mill on Branch Avenue. Complete in 1864, the main building of the Wanskuck Mill is a very large, 5-story, brick, flat-roofed mill (fifth story added and original gable roof replaced with a flat roof in the 1880s or 1890s) with a projecting square central tower that tapers to an octagonal lantern capped with a low, copper, ogee dome. The machinery of the main mill was powered by a 200-horsepower Corliss engine. Built at the same time and still standing are several smaller buildings including a brick gasometer with a rubble-stone foundation, a small structure which contained carpenter and machine shops, and other small buildings. The brick office built at this time was later supplanted by a brick, 2-story, Romanesque office. Across Branch Avenue the Wanskuck Company built two long blocks of workers', brick, row houses on Vicksburg Street and a boarding house on Winchester Street Two years later the company donated land for the Roger Williams Baptist Church (1866) on Woodward Road.

In 1864 the company shipped its first case of woolen goods to New York, and by 1865 the Wanskuck Company employed 350 workers who produced 261,613 yards of woolen goods yearly. In 1869 the Wanskuck Company began manufacturing worsted cloth used for men's suits, and on January 12, 1870, the Company reputedly shipped (to New York) the first case of men's worsted suit material made in this country. By 1874 worsted production had grown so rapidly that a new mill was built for the production of worsted cloth. This 4-story brick structure to the west of the main building also contained the power plant and dyehouse. In 1884 the Steere Mill (see Wild Street) was opened under the direction of Henry Steere. This mill, associated with the Wanskuck Company, produced worsted yarn. Between 1897 and 1898 the Wanskuck Company acquired the Geneva Mills (see Douglas Avenue) in Providence and the Mohegan and Oakland Mills in Burrillville. The Wanskuck, Steere, and Geneva Mills have interconnected waterpower systems, large parts of which still survive. By the turn-of-the-century the Wanskuck Company had built numerous additions to their mill properties. In addition Wanskuck Hall (c. 1880) on Branch Avenue was built by the company for use by mill employees for social gatherings. In

the early twentieth century the company built several houses for overseers and management on Woodward Road.

The Wanskuck Company maintained its level of production into the 1920s, 1930s, and 1940s. In 1930 the various mills of the company produced 1,300,600 yards of worsted goods. By the 1950s, however, the worsted market had declined so greatly that most remaining worsted companies either reinvested in other kinds of firms or moved south where textile production was cheaper because of lower-paid workers and less expensive energy sources. The Metcalfs sold all of their stock in the Wanskuck Company which subsequently was reorganized as the Wanskuck Corporation. The Wanskuck Corporation sold its textile mills and invested in the New England Butt Company, a braiding-machine manufacturer. Several small companies now occupy the Wanskuck Mill complex.

CARPENTER STREET

299 Grant Mill (c. 1910): Built around an earlier stone mill structure, this plain, 4-story, brick mill with a flat roof and segmental-arch windows was one of the two Providence mills owned by the huge cotton combine of B. B. and R. Knight, best known for its Fruit of the Loom products. Another plant, the Nottingham Mill (originally the Providence Steam Cotton Mill) on Dyer Street, owned by the Knights in the early 20th century, has been demolished. The Knight brothers, Benjamin and Robert, began the manufacture of cotton cloth in 1852 and in 1856 adopted their Fruit of the Loom symbol which was later accompanied by a guarantee of satisfaction. By the early 20th century the B. B. & R. Knight Company owned twenty-two cotton mills in Rhode Island and Massachusetts. After the death of the Knight brothers in the early 20th century, the textile combine was run by their sons until 1920 when a New York corporation bought the Knight holdings. This corporation manufactured cotton goods under the Fruit of the Loom label until 1926 when it filed for bankruptcy; the mills were subsequently managed by the Knight Finance Corporation. In 1935 the Grant Mill was sold to the Blacher Brothers jewelry company which still occupies the mill.

CHARLES STREET

47 The Fletcher Manufacturing Company (1869):** The Fletcher Manufacturing Company, founded by Thomas Fletcher in 1793 for the production of narrow fabrics such as lampwicks, was originally located in Boston. Fletcher moved his company to Providence in 1808, and in 1844 Fletcher's sons, who then ran the business, built a mill, the first structure of the Charles Street factory complex. While Thomas Fletcher had produced lampwicks and other narrow fabrics, his sons expanded the operation to include the manufacture of boot and shoelaces, corset laces, twine, yarns, spindle bandings, and kerosene-lamp wicks. In 1865 the Fletcher brothers incorporated their rapidly growing company as the Fletcher Manufacturing Company. By 1890 the textile factory complex covered over four acres and employed 750 workers. The company remained at this site until the early 20th century when the

International Braid Company bought the Fletcher plant as well as the Elmwood Mills (see Daboll Street) for the production of shoe and corset laces. In the 1950s, when most textile companies were liquidating their New England properties and were moving south for cheaper labor, transportation and energy costs, the International Braid Company sold the large complex. Damaged by fire in the early 1970s, the Fletcher Manufacturing Company complex was demolished except for the office and warehouse.

Built in 1869, the imposing 3½-story office with brownstone trim, a mansard roof, and bracketed dormers, still retains the name of the company which is displayed in projected lettering on a brownstone cartouche above the entrance. Built at the same time and attached to the office is a 3-story brick building which, though less ornate than the office building, is nevertheless a handsome addition. The office and warehouse did not reflect the style of the mill buildings in the complex, which were 2- 3- and 4-story, brick, gable-roofed structures, one of which had a handsome exterior stair tower. In 1973 along with the other remaining industrial buildings in the Randall Square area (see 1 Bark Street and Hewes Street), the Fletcher Building was placed on the National Register of Historic Places and recently has been rehabilitated as an office building.

387 Silver Spring Bleaching & Dyeing Company (1864 and later): The Silver Spring Bleaching and Dyeing Company was formed in 1864 when Henry Lippitt and Charles Merriman bought the buildings, land, and water rights to Frieze and Dow's bleachery on the west side of Charles Street (then part of North Providence). Frieze and Dow had gained a reputation for the extraordinary whiteness of their bleached goods which was due to the clear water produced by a spring (hence the name Silver Spring) and by the West River which ran through the mill site.

Merriman and Lippitt incorporated as the Silver Spring Bleaching and Dyeing Company and began both remodeling the Frieze and Dow Mill and constructing a new plant across the street. Nothing remains today of the old Frieze and Dow Mill. Merriman retired in 1871 and Lippitt's son Charles entered the business. Six years later the Silver Spring Bleaching and Dyeing Company added cloth printing to their operations. It was about this time that the Silver Spring Company began to have problems getting a supply of clean water from the West River as more mills were built upriver. A dam and two reservoirs were built in the hope that the pollutants would settle to the bottom of the reservoir. Having found that this did not solve the problem, the company later obtained water from driven wells and from the city water supply. By 1897 the Silver Spring Bleaching and Dyeing Company had expanded considerably and employed 575 workers. In 1905, the works were bought by the U.S. Finishing Company, a large textile combine.

The U.S. Finishing Company, which also owned the Queen Dyeing Company (see 325 Valley Street) and the Dunnel

Manufacturing Company in Pawtucket as well as five other finishing and dyeing plants in other parts of the country, operated the plant until 1939 when the combine, apparently consolidating its holdings, sold the property. The large complex is now occupied by several stores, offices, and small industries and appears today much as it did when the U.S. Finishing Company bought the plant. Many of the original 1864 structures remain, although almost all of them have been altered or added to. The mills are 1- 2- and 3-story, brick, flat-roofed or slightly-pitched-roofed structures—some with clerestory monitors and corbeled cornices. The office (c. 1890), located at the southern end of the complex, is a 2-story, brick, flat-roofed structure with segmental-arch windows and a corbeled cornice which is hidden behind a band of modern siding. A small 19th-century engine house is at the northeast end of the plant, adjacent to a large early 20th-century boiler house with huge roundhead windows and buttressed walls. Behind the boiler house is a tall brick chimney with the names of both the U.S. Finishing Company and the Silver Spring Company painted on it. The ornamental brick work at the top of the chimney can be seen from the street.

CHESTNUT STREET

95* Irons & Russell Company (1903-1904): Martin and Hall, architects. The Irons and Russell Company began as the Charles F. Irons Company in 1861 for the manufacture of society emblems, pins, and charms. In 1886 Charles E. Russell, who had learned the jewelry business while in the employ of Irons, opened his own company in the third and fourth floors of the Sackett Building (no longer standing) on Friendship Street which Irons also occupied. The Charles E. Russell Company also specialized in society emblems, trade emblems, rolled gold-plate pins, and chains. Russell employed about twenty-six people. Finally, in 1893, Irons and Russell joined their separate businesses to form the Irons & Russell Company. By 1901 they employed seventy-five workers. In 1903 having outgrown the Sackett Building, Irons & Russell commissioned a new building to be erected at 95 Chestnut Street (the site of the old Federal-style mansion which had last been occupied by the Home for Aged Men, now on Broad Street). The Irons & Russell building, which was intended to house other light-manufacturing interests as well, is a 6-story, brick, industrial building with a flat roof, a corbeled cornice, and segmentally arched windows which are separated by narrow brick piers.

The building was noted at the time of its construction for its use of all electric power which eliminated much of the need for belting and shafting, making the work area lighter and clearer. The building was also equipped with a steam boiler, a Westinghouse engine, and electric-generating and controlling equipment. It was heated with the exhaust steam from the steam-boiling system, and the water system was supplied by a good source of pure water, discovered when the foundation was being excavated. The water was distributed to the various manufacturing concerns in the building by means of an

electric pump. By 1909, the flourishing Irons & Russell Company employed 170 people. The building, which, for its first years in existence only housed a couple of other firms, was filled in 1917 by four other jewelry manufacturers and by a company that specialized in engine turning. The Irons & Russell Company occupied this structure until 1956, when it sold the building to Carl-Art, Inc., a jewelry-manufacturing company and long-time occupant of the Irons & Russell Building. Owned by Carl-Art until 1969, the structure still retains several jewelry manufacturing tenants. Leo's Cafe also occupies this building.

116* Champlin Manufacturing Company (1888), 1901): The S. B. Champlin Company was founded by Stanton B. Champlin and his son, George, in 1872 to manufacture gold rings and gold-filled chain. In 1894, George Champlin bought and incorporated the E. M. Dart Company and in 1895, when his father died, incorporated the S. B. Champlin Company. The Champlin family maintained control over both companies for over eighty years; in the mid-20th century both companies were managed by George B. Champlin's son, George S., who is still associated with the Dart Union Company Inc., the successor to the E. M. Dart Manufacturing Company.

Having outgrown its quarters on Eddy and Elm Street, the S. B. Champlin Company built a new factory to the west of the existing jewelry district in what was then a largely residential area. Now in the center of the jewelry district, the Champlin Building is a 5-story, brick structure with segmental-arch windows and a corbeled cornice. The southern half of the structure was added in 1901.

Like most large factories built in the jewelry district, the Champlin building housed other manufacturing companies. Among these, the E. M. Dart Company, the Edwin Lowe Company, and the Hedison Manufacturing Company are the most notable. The E. M. Dart Company was formed by the mechanically gifted Edward M. Dart in 1865. In spite of numerous inventions in the field of gas, water, and oil pipe fittings and pumps, valves and regulators. Dart's company remained small and obscure until 1894 when Champlin and other investors incorporated the company, patented Dart's inventions, expanded the company, and moved the operation to the Champlin Building. In 1917 the E. M. Dart Company moved from the Champlin Building to its new factory at 134 Thurbers Avenue, which it still occupies. The Edwin Lowe Company which occupied the Champlin Building from 1900 to 1930 was a small plating company. Edwin Lowe, the son of Thomas Lowe who introduced an innovative gold-plating process invented in Birmingham, England, to Providence in 1842, carried on his father's plating business until 1930, when the company ceased operations. The Hedison Manufacturing Company, jewelry manufacturers, occupied the factory from 1925 until 1977 and owned the building from 1917 to 1978. The S. B. Champlin & Sons Company (successor to the S. B. Champlin Company) occupied the Hedison building until the mid-1970s.

The Champlin Building, now known as the Hedison Build-

ing, was converted to condominium lofts in 1978 and retains a mixed commercial and residential use.

150 James Doran and Sons (1907): James Doran and Sons began as a North Attleboro firm, Doran and Hall, in 1885. In 1902, James Doran and his son James, Jr., formed a new findings business in Providence under the name of Doran and Doran, which a few years later changed to James Doran and Sons when Doran's other son, Arthur, joined the firm.

Having outgrown its rented quarters by 1907, James Doran and Sons built a large factory on Chestnut Street. The Doran Building is a 7-story, brick structure with heavy timber framing, brick walls, segmental-arch windows, and a corbeled cornice. James Doran and Sons, like other jewelry companies which invested in large multi-storied factories in the jewelry district, occupied only one floor of the factory and rented the rest of the space to other jewelry manufacturers. The second Doran Building (the Doran Spiedel Building at 70 Ship Street) was used entirely as jewelry-manufacturing rental units. James Doran and Sons owned and occupied one floor of the original Doran building until 1957. Since then the structure has housed jewelry-manufacturing rental units under the ownership of various investment and real-estate companies. The Doran Building was recently subdivided into condominiums for light industrial and commercial use.

CLIFFORD STREET

162* A. T. Wall Company (1908): The A. T. Wall Company was founded in 1888 by Ashbel T. Wall to manufacture gold-plated wire. By 1901 the A. T. Wall Company, located in the Manufacturers Building (a large jewelry-manufacturing building formerly at Sabin Street), employed sixty workers. Having outgrown its rented quarters by 1908, the company commissioned the Bowerman firm of Boston to design a new factory. The A. T. Wall Building at the western edge of the jewelry district is the earliest known Rhode Island example of mushroom-column, flat-slab, reinforced-concrete construction developed by engineer C. A. P. Turner in 1906, and patented by him in 1908. Built by the Thomas F. Cullinan Company of Providence, the 4-story structure with concrete exterior walls; pier-and-spandrel treatment; and large, glass, curtain walls has 30-inch octagonal columns with utility holes in the capitals to accommodate pipes and wires running from floor to floor. Reinforcing rods extend from the roof and the north elevation to facilitate building enlargement. The A. T. Wall Company continued the manufacture of gold-plated wire and rolled gold plate into the mid-20th century. In 1941 when Ashbel T. Wall died, his son Ashbel T. Wall, Jr., who had been vice-president in charge of the special-gifts division, took charge of the business. In the early 1970s the A. T. Wall Company moved to Warwick.

Like most jewelry companies which built large factories in the jewelry district, the A. T. Wall Company rented space to other jewelry companies. Among the first tenants was the Clark & Coombs Manufacturing Company. This company, which was established in 1862, had built a national reputation

for manufacturing gold rings by the early twentieth century; by mid-century, however, production had dropped sharply due to antiquated machinery and inefficient management practices. In 1946 the business reorganized, and under the management of a new president and veteran jewelry manufacturer, Vita Carneglia, Clark & Coombs increased production by 100 per cent within a seven-year period. The company further expanded with the purchase of jewelry tools and dies from the Ostby & Barton Company, which, upon leaving its Richmond Street factory for a new Warwick factory, continued only its precision-tool production. The Clark & Coombs Company still occupies this structure as does the Clark & Coombs Realty Company, the current owners of this structure. The Van Dell Corporation, jewelry manufacturers, are also current occupants of this structure.

DABOLL STREET

- 222 **Elmwood Cotton Mills (1866, and later):** One of Elmwood's largest industrial plants, the Elmwood Mills complex contains several 2- and 4-story stone-and brick structures with low-pitched or flat roofs. The two stone buildings were erected in 1866 as the Elmwood Cotton Mills by the James Y. Smith Manufacturing Company which manufactured cotton cloths, prints, sheetings, and fancy goods. The company's best known product, called "Elmwood Shirting," was a fancy-grade cotton cloth which gave the company a reputation for producing high-quality goods. James Y. Smith, the governor of Rhode Island from 1863 to 1866, and his brother, Amos D. Smith, were the developers of the large 1847 Locust Grove subdivision which included this complex. In 1891 the business, which was then run by F. H. Potter, produced 450,000 yards of cotton goods a year.

In 1895, the William E. Joslin Company, a shoelace and braid manufacturer, bought the complex and operated the mill until 1900, when it sold the factory to the Elmwood Mills, also a shoelace and braid company. This company was responsible for the construction of early 20th-century brick buildings on either side of the stone buildings. The last structure erected in the complex (at the eastern end of the complex) was built before 1918. The International Braid Company manufactured shoelaces, boot laces, corset laces, and decorative braid at this factory as well as at the Fletcher Manufacturing Company (see 17 Charles Street) from 1912 until 1948. Cable Electric Products, which still remains at this site, bought the Elmwood Mills in 1948.

DEXTER STREET

- 425 **American Standard Watch Case Company (1941, 1945):** The American Standard Watch Case Company, founded in 1920 was formerly located on Sprague Street. In 1941 the company built this large, low, 1-story, brick factory with simple modernist detailing around the doorway. An addition to be used as a cafeteria for the company's 800 workers was built in 1945. The American Standard Watch Case Com-

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pany was bought by the Bulova Watch Company in 1948. Bulova continues to manufacture watch cases at this factory.

DIKE STREET

- 34 **Waterman-Weybosset Mills (1836 and later):** John Waterman's Eagle Steam Mill, a cotton mill, was located in two mills on Dike Street on either side of Troy Street. After 1855, however, the mill on the western side of Troy Street (now altered beyond recognition) was operated under separate ownership. John Waterman, who earlier in the century had built the Merino Mills (see Ponagansett Avenue), was one of the earliest Providence cotton-cloth manufacturers to use a steam engine as the sole source of power. In the 1850s Waterman sold the mill to R. and J. Peckham who operated the cotton mill until the outbreak of the Civil War, which constricted the supply of raw cotton. In 1866, Royal C. Taft (later Governor of Rhode Island) and William Weeden bought the abandoned mill and incorporated as the Weybosset Mills. Taft and Weeden who had both been active in the woolen industry sold all of the cotton machinery and converted the Waterman Mill into a woolen mill. The Weybosset Mills soon became well known for its fine cassimeres woven from original designs.

The Weybosset Mills were responsible for all of the 19th-century additions to the original 3½-story, stuccoed, stone, Greek Revival mill with a central tower (obscured by a later brick structure). Early 1870s structures include a small brick mill (mill number two) on the northeast corner of Troy and Oak Streets, a large stone ell on the eastern side of the earlier structure, and a small addition to the rear extension of the mill. These structures were used for scouring, picking, and dyeing the wool. The 4-story, stone mill (mill number three) with a projecting central tower, corner quoins, and multi-paned sash windows also dates from this period. This mill was used for auxiliary carding and spinning. Later buildings are a c. 1890 addition to the office and an early 20th-century storehouse on the southeastern corner of Oak and Troy Streets. By the early 1880s with the increasing popularity of worsted goods, the Weybosset Mills sold its carding machinery and installed combing, drawing, and spinning machinery for worsted production. In 1885 Royal C. Taft sold his shares in the Weybosset Mills, and in 1899 William Weeden sold out to the American Woolen Company. Under the ownership of the American Woolen Company the Weybosset Mill produced cloth for overcoats and cloaks. The fourth mill, on the southeast corner of Troy and Oak Streets, was built between 1908 and 1918 and was used for storage. In 1928 the American Woolen Company made plans to abandon the Weybosset Mill and finally sold it to a realty company in 1932. The Weybosset Mill has since been occupied by several small manufacturing companies.

DOUGLAS AVENUE

Cowing and Heaton Mill (c. 1850): The Cowing and Heaton Mill, just inside the city line, is the oldest surviving building of the complex known in the late 19th century as the Geneva Mills. The other buildings of the complex are on

the North Providence side of the city line. This small, 2-story, stuccoed, stone mill with a flat roof (originally a gable roof) and quoined corners was built by Martin Cowing and Robert Heaton who were both involved in various aspects of the textile industry. They formed the Cowing and Heaton Mill Company which seemed to function as a landlord to and perhaps partial investor in different textile businesses that leased the mill and machinery for a certain period of time. The various companies referred to this lease as the Cowing and Heaton Privilege. The original mill, started as early as the 1830s by Martin Cowing, was used as a cotton-dyeing-and-bleaching establishment until the late 1850s. Among those to use the mills for these purposes were Ellsworth & Cushing and John L. Ross. Hale & Burroughs began operating the mill in 1860 to produce woolen goods. It was apparently at this time that the mills became known as the Geneva Mills. An 1861 fire destroyed most of the complex which was subsequently rebuilt. Owners in the 1860s and 1870s were F. B. and E. A. Smith and the Owen Brothers (who were later proprietors of the Atlantic Mills; see 120 Manton Avenue). In 1880 the Cowing & Heaton Privilege was transferred to the Geneva Worsted Company, owned by Sack and Ullman, and in 1896 the Geneva Mills were bought by the Wanskuck Company (see 725 Branch Avenue). This large, worsted manufacturer remodeled the mills with the exception of this small stone mill which remains intact. The Wanskuck Company sold its textile mills in the 1950s. Today the Geneva Mills are occupied by Fintex Industries, Inc.

DRYDEN LANE

- 27 **Allen Printworks (1830 and later):** The Allen Printworks, more than any other printing establishment in Providence, was a vital force in the textile and cloth-printing industry. Founded in 1830 by Phillip Allen — an engineer, inventor, and governor and state senator — the Phillip Allen & Sons Company originally printed cloth by hand with carved blocks, but as early as 1835 Allen introduced printing machines to his establishment which greatly increased the speed of calico production. By 1846 Phillip Allen & Sons had five printing machines and employed 250 workers who turned out 130,000 yards of calico cloth a week. By 1849 the printworks had one main mill and six ancillary structures surrounding it.

When the panic of 1857 swept the country, however, Phillip Allen & Sons was one of the many firms forced to declare bankruptcy. The printworks, which had tripled in size since 1849, were bought by Phillip Allen's brother Crawford and were reorganized as the Woonsocket Company. Crawford Allen, who had been involved in the printworks and cotton industry in Valley Falls and in Pawtucket, managed the business aspect of the operation, while Zachariah Allen, the middle and most famous Allen brother, managed the plant itself. Zachariah Allen was well known for his contributions to steam-engine and textile-machine technology. In 1870 Crawford Allen retired from active management, and in 1871 the company was reorganized under the control of Allen's lawyers

as the Allen Printworks; at this time Zachariah Allen also retired. When the newly organized printworks failed, however, in 1879, the works were reorganized and put back into operation by the major stockholders of the company. By this time the Allen Printworks had had its greatest period of growth with most of the building having occurred in the 1850s, 1860s, and 1870s under the control of the Allen Brothers. One of the remaining buildings in this sprawling complex is the main mill which is a 3-story brick structure with a 5-story central tower and a jerkinhead-gable roof. The northern part of the mill was rebuilt in 1874 after a fire and incorporated part of an earlier stone mill. The section south of the tower was built in 1871. To the east of the main mill is a small, 2-story, stone and brick structure with a trapdoor-monitor roof. This building is the oldest on the site and may be the original stone structure built by Phillip Allen in 1830. For twenty years after the printworks were taken over by the stockholders, printing operations continued under the name of The Allen Printworks. In 1901, however, the stockholders sold the printworks to the Roger Williams Finishing Company which leased the works to a cloth-printing company. In 1907 all of the printing machinery was sold. The Roger Williams Finishing Company seems to have occupied the plant for a few years in the early 1920s, but by the 1930s the plant was occupied by several smaller businesses. Today the remaining buildings have been converted to commercial and light industrial use.

DUDLEY STREET

8-12 United States Gutta Percha Paint Company (1906): This large, 4-story, brick, pier-and-panel, industrial building with its long, rhythmical facade and widely bracketed cornice, designed by Perry Whipple, is the second site of the United States Gutta Percha Paint Company founded by J. William Rice in 1886 and originally located at Mathewson and West Exchange Streets. Not long after the building was completed a 3-story brick annex for the boiler room was designed by Fontaine and Kennicut. Rice had been active as a painter, chemical, and dye-stuff dealer since 1861. He invented a paint-making process which used Malayan gum-tree resins known as gutta percha. The paint which resulted was an early white latex called "barreled sunlight" that was, according to the company's advertisements, unique in its non-yellowing properties. The U.S. Gutta Percha Paint Company also produced oil-based paints, enamels, and a popular white lead paint called "Rice's Crown German White Lead." By 1930 the company had a network of 170 distributors and 7,500 retail dealers as well as a significant export business.

The plant was vacated before 1962 and is now occupied by the CNC Chemical Company which specializes in the manufacture of chemicals for textile- and paper-finishing companies.

EAGLE STREET

45 Valley Worsted Mills (1866 and later): Founded in

1842 by John Giles, the Valley Worsted Mill was one of the earliest worsted mills in the United States. Initially the machinery in this early mill was powered by oxen and the product of the mill, worsted yarn, was used by hand knitters. In 1866 the old Valley Mill was destroyed by a fire and was entirely rebuilt the same year. The main mill, a 3-story structure with a slightly pitched roof and segmental-arch windows, still remains as does a small wooden ell, now covered with simulated brick siding. A second, 2-story, brick, gable-roofed structure was built between 1868 and 1875. The flat-roofed, 2-story structure adjoining the main mill is an early 20th-century addition. The office, situated just south of the mill, has been demolished. By 1868 the newly rebuilt worsted mill turned out 2,000 pounds of worsted yarn a day. In the late 1880s, the Valley Worsted Mill employed 450 workers and had gained a reputation for its varieties of fine worsted yarns which included floss zephyr, knitting worsted, shetland, spanish, saxony, and frosted yarns. By the late 1890s the Valley Worsted Mill was at the height of productivity and had upgraded its equipment with modern machinery. Replacing the 120-horsepower engines were three Greene 250-horsepower engines as well as several upright horizontal boilers. These engines and boilers produced the power for the worsted machinery which turned out 100,000 pounds of worsted yarn a month.

In 1899 the American Woolen Company bought the Valley Worsted Mills (as well as several other worsted mills in or near Olneyville). This huge textile company operated the Valley Mill until 1928 when the company abandoned the mill, by then only partially occupied. Much of the machinery from the Valley Worsted Mill was moved to the Riverside Worsted Mill which, having been closed a year earlier, was scheduled to re-open. The American Woolen Company sold the Valley Mill to a realty company in 1931. For approximately ten years the Valley Mill was rented by other textile companies, but during the 1940s, 1950s, and 1960s the former worsted mill was used by various trucking businesses and jewelry-related firms. Today parts of the Valley Mill are being used by an office-furniture company, jewelry companies, and other light industries.

EDDY STREET

342 Narragansett Electric Lighting Company (1913 and later): The first electric company in Providence was the Rhode Island Electric Lighting Company (1882) which supplied the electric light for ten arc lamps in Market Square. Two years later, Marsden Perry and other Providence businessmen formed a rival company, the Narragansett Electric Lighting Company, the first customer of which was the owner of a skating rink on Aborn Street. The same year the Narragansett Electric Lighting Company garnered a contract to produce electricity for seventy-five arc lamps in downtown Providence. By 1888 the city had 236 electric street lights (compared to 2,590 gas and 1,618 naphtha or gasoline lights) and various businesses had installed a total of twenty-one electric motors, the largest of which ran the pump for Shepard's hydraulic

elevator. One year later the Narragansett Electric Lighting Company bought the Rhode Island Electric Lighting Company (giving it a monopoly on electric-power production in Providence) and completed the construction of a new large plant (to replace its former Aborn Street powerhouse) on Eddy and South Streets. In 1900 the Narragansett Electric Lighting Company bought the 2-story brick warehouse at 146 Dyer Street (for a battery-storage station) in back of which the company later built a three-story substation (c. 1924).

By 1913 the use of electricity for light and power had gained widespread acceptance and the city began the removal of all gas lights from city streets to replace them with electric lights; the same year the city granted the Narragansett Electric Lighting Company a franchise to provide the electricity for these street lights.

In 1913 the Narragansett Electric Lighting Company entirely rebuilt the South Station. The 1913 structure is a massive brick and granite-trimmed building in the Georgian Revival Style with large, roundhead windows and four, 217-foot, truss-braced chimney stacks. Although none of the equipment which was originally installed in the plant still survives, two 1919 Westinghouse steam turbines and a 1926 G.E. turbine remain in the plant. Since 1913 the company has expanded the complex so that the main building now supports seven stacks, six of which are connected by steel braces.

Between 1913 and 1921 the annual kilowatt-hour production at the South Street Plant increased by 500 per cent. For many years this company was the largest power company in the New England Power Association, which it had joined in 1926. Upon joining the association, the company changed its name to the Narragansett Electric Company. Five years later it bought the Manchester Street Powerhouse from the United Electric Railways Company (see Manchester Street).

The Narragansett Electric Company continues to operate the South Street Station, the Manchester Street Station, and the Dyer Street substation as well as several other stations outside the city.

460 Rhode Island Company Powerhouse (1904): The Rhode Island Company was formed in 1902. Owned by the New York, New Haven and Hartford Railroad, this company leased the trolley lines of the Union Railroad Company which ran trolleys to the towns and factories on the outskirts of Providence. The powerhouse, completed in 1904, was praised for its modern efficient construction and design. The *Engineering Record* in an article about the new plant noted that the chief interest lies in the arrangement and details of the machinery and apparatus and in the attention paid to the architectural and constructional features of the building, resulting in a fireproof structure having a majestic exterior and a lofty well-lighted, and appropriately finished interior.

Today only half of the original powerhouse remains in a relatively unaltered form. It is a 4-story brick structure with false, stepped gables and huge, arcaded fenestration with granite trim. The southern section of the building was altered in

1913 when the powerhouse was enlarged. In 1912 the City of Providence granted the Rhode Island Company an exclusive right to operate streetcars in Providence. In accordance with the terms of the franchise, the company removed the tracks from College Hill, repaired other city tracks, and built the East Side Tunnel through which their street cars were to travel. As the automobile and the motorized bus gained popularity, the Rhode Island Company began to lose business. Finally in 1921 the company declared bankruptcy. A year later the United Electric Railway Company formed to operate the trolleys. By the early 1930s, however, buses had completely overtaken the public-transportation market and the Manchester Street Power Station was abandoned. In 1932 the Narragansett Electric Company, which operated a power station further north up the harbor at South and Eddy Streets, bought the Manchester Street Power Station. This plant is still owned and operated by the Narragansett Electric Company, as is the South Street Station.

ERNEST STREET

1-37 Ernest Street City Sewage Pumping Station and Sewage Treatment Station (1897, 1900, and later):

The first sewer system, which was put into operation in 1872, poured raw sewage into the rivers. It was not long before the city leaders realized that this system was seriously damaging the rivers, and in 1884 the city engineer, Samuel Grey, went to Europe to investigate the latest methods of sewage treatment and disposal. Grey presented a comprehensive plan to the city council in 1886, and the council called in a panel of engineers to study Grey's suggestions. This panel approved the plan in 1887, and in 1889 construction of this massive system was begun. By 1897, the city had completed the pumping station and the miles of sewers which ran at a downhill grade to Field's Point where the sewage was to be pumped into precipitation tanks before entering the river. However, the treatment station was not completed until 1900 so that massive amounts of untreated sewage were pumped into the Providence River for another three years.

The pumping station, below street level, is a 2½-story structure with a hip roof; a small gabled dormer; and a large, arched doorway with Indiana-sandstone trim. Other detailing includes sandstone trim around the windows and copper trim on the roof eaves and ridges. The treatment station, closer to the harbor, consists of a 1- and 2-story, brick-and-granite, cross-gable-roofed laboratory; a 2-story, brick, gable-roofed chemical building; a 2-story, brick, hip-roofed press house; and concrete precipitation tanks. Mid-20th-century additions are located adjacent to the earlier structures.

FRIENDSHIP STREET

91 Horace Remington & Sons Company (1888):

Horace Remington entered the silver and gold refining and smelting business as an apprentice in the large refining firm of John Austin & Company and several years later became the firm's manager. In 1881 Remington formed a partnership with

Charles Barber who retired a few years later. When Remington's son Albert became a partner in 1888, Remington renamed the refining firm Horace Remington & Son. The business incorporated in 1901 as Horace Remington & Sons Company when Remington's younger sons, Horace E. and Clarence G. Remington, joined the firm. By the turn-of-the-century Horace Remington & Sons refined nearly a million ounces of silver a year. The business, one of the largest refining companies in the city, was known for its sophisticated machinery and innovative processes. One of Remington's inventions was a machine capable of mixing (to produce an even quality of metal) 1000 to 6000 pounds of sweepings in two hours time, an operation which traditionally took two workers ten hours to accomplish. Another machine collected the silver or gold dust which rose during the refining process.

When Horace Remington retired in 1923, Horace Remington & Sons was the oldest refining firm in the city. In 1969, when the president and treasurer of the refining company, Horace E. Remington, died, the Horace Remington & Sons Company ceased operations.

The Remington Building is a 5-story masonry structure with a flat roof, regularly spaced segmental-arch windows, and a metal cornice. This structure, one of the few late 19th-century industrial buildings remaining in this area, is now occupied by the Mara Jewelry Company.

301** Sylvester R. Jackson & Company (c. 1853):

Sylvester R. Jackson & Company, a soap and candle manufacturing firm, was founded in 1841 and was originally located on Bridgman Street. Sylvester Jackson purchased the Friendship Street site in 1843 and constructed the factory ten years later. Built on a scale in keeping with the modest residential structures in this neighborhood, the 2½-story, brick, gable-roofed factory has a pendant cornice, rectangular windows with granite sills and lintels, and a 2nd-story freight door set in the gable end. Sylvester R. Jackson & Company manufactured soap and candles at this factory until 1866, when he sold the property to the Phetteplace & Bartlett Company, also a soap-manufacturing firm. Occupied by Phetteplace & Bartlett and later by Woodley & Leonard, this structure continued to function as a soap factory until the turn-of-the-century. In 1903, Samuel Moore & Company, which had been located in one of the jewelry factories in the jewelry district, bought the former soap factory and refitted it for the manufacture of jewelry. Samuel Moore, founder of the company, was a machinist who had patented mechanisms to produce such diverse objects as freight and passenger car wheels, shoe nails, twist drills, shot chains, and beaded wire. Samuel Moore & Company, which specialized in jewelry findings, greatly expanded its line in the 1890s and early 1900s and consequently was vitally important to jewelry-manufacturing centers in the United States. After Moore's death in 1935, Samuel Moore & Company continued to operate under family management until 1961, when the company became a division of the Fulford Manufacturing Company (see 107 Stewart Street). Samuel Moore & Company continues to manufacture jewelry findings at this site.

GLOBE STREET

80 Providence Gas Company (c. 1870, c. 1876): The Providence Gas Company was established in 1848 by Amos D. Smith and other investors and was located on Pike and Benefit Streets. By 1849 meters were in use, mostly downtown where the first mains were laid. Because oil lamps required constant cleaning and maintenance, while gas lamps needed relatively little care, gas lighting soon replaced oil lighting for both street lamps and house lights in the rest of the city. Brick gasometers (for storing coal gas) were located in various neighborhoods. Three survive: at Westfield Street, the Atlantic Mill Site (see 120 Manton Avenue), and the Wanskuck Mill (75 Branch Avenue). In 1870, having outgrown the Pike Street plant, the gas company built a new plant. Located at the eastern tip of Globe Street at the Harbor, it was known as the West Station. In 1878 the Providence Gas Company, still growing rapidly, bought out the Citizen's Gas Company which had a plant at the foot of Public Street called the South Station. Both the Pike Street plant and the Public Street plant have been demolished, but two buildings of the West Station remain. The earliest building (c. 1870) is an unusual, large, 2½-story, brick, basilica-plan building distinguished by its elaborate corbeling and roundhead windows with hood molds. This building might have been used for processing coal gas. Probably built for office and storage space, the other remaining building (c. 1876) is a 2-story, brick, trapezoidal structure with ornamental corbeling and segmental-arch windows. This structure has been altered by the removal of its mansard roof.

Two years after the construction of the West Station, the Providence Gas Company built a huge gasometer on Crary and Hospital Streets. This gasometer, one of the largest in New England at the time that it was built, was designed by Clifton A. Hall. Known as the Crary Street Gasometer, this 7-story, metal-lined, brick silo with a tall dome crowned by a lantern was 148 feet in diameter. By 1938, however, with more modern gas holders in use, the Crary Street Gasometer had been abandoned and was demolished to make way for a playground; Interstate 95 now runs through this site. In 1910 the gas company built a new plant at Sassafras Point. This plant was used as a coal-gas station and soon after its completion the West Station was abandoned. The old gas station was used by various companies during the 20th century. Today the earliest building is occupied by the Leeming Brothers Construction Company which has been here since the 1950s. The later structure is occupied by a chemical company. The South Station was operated as a water-gas plant (the production of gas released from water molecules began in the late 19th century and continued into the early 20th century) until 1916 when a water-gas plant was incorporated into Sassafras Point. A plant built in the mid-Thirties for water gas was later used for oil gas and was abandoned in the early 1970s. In 1976, a huge, early 20th-century, cylindrical, metal-frame gas holder on Blackstone Street was demolished, although an adjacent 1-story brick heater and regulator house with a pitched roof and rectangular windows with granite sills and lintels still remains.

Two early 20th-century steel-framed gas holders and five early 20th-century, monitor-roofed structures still survive at the Sassafras Point plant.

GORDON AVENUE

20 Beaman & Smith, (1898 and later): The Beaman & Smith Company was founded in 1886 by Elmer A. Beaman and George H. Smith for the manufacture of metal-working machine tools. In 1898 the company incorporated and built a factory on Gordon Street. This 2-story, steel-framed, brick-and-glass structure has an extension at the rear which was used for stockrooms and a blacksmith's shop. A 1-story pattern-storage building was erected to the north of the main building. New wings were added to the plant in the early 20th-century. Beaman & Smith Company was noted for its milling and boring machines, some of which weighed up to 65 tons. By the turn-of-the-century, the plant employed seventy-five to one hundred workers and covered a city block with 1- and 2-story buildings. The company went out of business in 1927. From the 1930s to the early 1960s, this factory was occupied by the James Hill Company, a can manufacturer. Today most of the plant is occupied by a printing firm.

69-105 American Tubing & Webbing Company (1896): This 5-story, brick, flat-roofed building with large segmental-arch windows was built for the American Tubing & Webbing Company, manufacturers of flexible, gas tubing for elevator droplights, wicks for oilstoves, and silk and cotton, elastic, garter webbings. Founded in 1883 by Arthur Caldwell as the American Tubing & Manufacturing Company, the company incorporated in 1891 under the new name of the American Tubing & Webbing Company, and built a new factory in 1896. When completed, it was noted as the largest manufacturing plant in the United States devoted to this line of business. Although the business was thriving in 1901 (according to a trade book published at that time), the factory and machinery were sold at auction to the Glendale Elastic Fabric Company in 1903. Most likely the bankruptcy of the American Tubing & Webbing Company was caused by the business recession of 1903 and overexpansion or overproduction. The Glendale Elastic Fabric Company, based in Easthampton, Massachusetts, opened a branch factory in the American Tubing & Webbing Company building. This company, which also manufactured elastic threads and fabrics, remained here until 1928 when (like many companies which were consolidating their holdings at this time) Glendale Elastics sold its Providence plant to the Chiapinelli Company which converted part of the tubing and webbing factory to jewelry manufacturing. The Chiapinelli Company, named for its founder and president Salvatore Chiapinelli, manufactured jewelry in this factory for twenty-six years. Chiapinelli was also the president of the Geneva Insulated Wire Company which occupied part of the factory during the 1940s, 1950s, and 1960s. Although neither company remains in the factory today the structure is still known as the Chiapinelli Building. In 1971 the Chiapinelli Company sold the factory to the E. and F. Realty Company;

today it is occupied by a restaurant-supply company.

HARRIS AVENUE

City Machine Company (1868 and later): Founded in 1865, the City Machine Company produced fly frames and roving frames for cotton-yarn manufacturing. Between 1865 and 1882, the company more than doubled in size, having increased its workforce from 60 workers to 135. In 1888, the Woonsocket Machine Company purchased the City Machine Company and moved all operations to its Woonsocket plant. One year later the George W. Stafford Manufacturing Company bought the machine works. Stafford produced loom-harness regulators such as dobbies and witches as well as Jacquard fancy-weaving looms. The president of the company was Gardiner Sims, the cofounder of the Armington and Sims Engine Company nearby on Eagle Street; George W. Stafford was the treasurer and general manager of the company. In 1895, the Knowles Looms Works, which had a well established reputation for its quality woolen and worsted looms, bought the works of the Stafford Manufacturing Company. Two years later the Knowles Loom Works and the Crompton Loom Works, another major loom manufacturer, merged. The Crompton and Knowles Loom Works was the largest loom manufacturing company in the world with numerous plants in the United States and England. Crompton and Knowles sold its Harris Avenue plant in the late 1930s. Since then the complex has been occupied by numerous small manufacturing companies.

The textile-machine works covers more than one city block with numerous 1- 2- and 3-story brick structures built between 1868 and the late 1920s. The original, 3-story, brick, machine shop with a gable roof, corbeled cornice, and segmental-arch windows still remains.

IMPERIAL PLACE

2* Vesta Knitting Mills (1893, 1903): In 1883 Rudolph Berry established a company to manufacture ribbed, knitted underwear and hosiery made on circular-knitting machines. This type of jersey underwear for women and children previously had been imported from France, England, and Switzerland. Berry's company started in a small, 2-story building. By 1888 he had outgrown these structures and built two 3-story buildings. A few years later, in 1891, the business incorporated as the Vesta Knitting Mills. By this time the company had doubled its output of knitted goods. The machinery included spinning, carding, drying, scouring, and knitting machines which were operated by 300 employees. The company soon established a sales office in New York and Vesta products were distributed throughout the country.

The Vesta Knitting Mills, one of the few textile companies located in this part of the city, took advantage of the proximity of the jewelry district in a few blocks to the northeast when it expanded its factory in 1893 and 1903. The Vesta Company occupied most of its 1893 factory—a handsome, 6-story, brick structure with segmental-arch windows, rounded corners, and

a corbeled cornice—and rented the remaining space to jewelry manufacturers. With jewelry-manufacturing rental space at a premium in or near the jewelry district, the Vesta Knitting Mills soon invested in a second large factory designed primarily for jewelry manufacturing. The company rented five of the six floors to jewelry manufacturers and occupied one floor of the new structure. This plain brick structure with a flat roof, segmental-arch windows, and granite sills is adjacent to the earlier structure. In 1916 the Vesta Knitting Mills reorganized as the Vesta Underwear Company with Ovide de St. Aubin as the president and his brother Percival as the treasurer. By 1930 the Vesta Underwear Company was producing 4000 dozen garments a week. In 1941, however, the Vesta Underwear Company closed its plant and sold the buildings to the Imperial Knife Company which already occupied the 1903 structure. The Imperial Knife Company founded by Felix Miranda was the first large American manufacturer of jack knives, a product which had previously been imported from Germany and England. By 1929 the company employed 1,000 workers. The Imperial Knife Company, which now manufactures all kinds of cutlery, still occupies these buildings.

KINSLEY STREET

530-532

Monohasset Mill (1866): J. C. Bucklin, architect. The Monohasset Mill was established by Paine & Sackett in 1866 as a woolen mill. The main building—a 4-story, brick structure with granite trim, a flank-gambrel roof, and a 5-story, flat-top tower which originally had a steep hip roof—contained the engine room, boiler room, drying room, and packing room. The tower contained stairways, dressing rooms, and an elevator. The 2-story, hip-roofed, brick building contained wool shops and more boiler and engine rooms. The Monohasset Mill specialized in the production of fancy cassimers and was known during its twenty-one years in operation as one of the best woolen manufacturers in the country.

In 1887 the woolen mill was taken over by the Armington & Sims Engine Company, established in 1878 by Pardon Armington and Gardiner Sims, which was formerly located on the western part of Westminster Street. The engine company built engines for the Riverside Worsted Mills, the Silver Spring Dyeing & Bleaching Company, and other mills in the United States and abroad. In the 1880s the Armington & Sims Engine Company won several gold medals for its engines at national and international expositions.

Probably due to the business depression which followed the panic of 1893, Armington & Sims failed in 1896 and the factory and machinery were sold at auction to Julius Palmer, F. M. Bushnell, and James M. Scott. The new company, which retained the same name, was sued by Armington and Sims who had not given permission for their name to be used. The name of the company was subsequently changed to the Eastern Engine Company. This company lasted until 1903.

During the 20th century, the mill was used by several worsted companies, one of which was the Cleveland Worsted Mills, which occupied part of the mill for almost twenty years.

In the 1940s and early 1950s the mill was occupied by machinery dealers, worsted mills, a rug manufacturer, and a jewelry manufacturer. The Monohasset Mill was last occupied by a woolen or worsted company in 1955; since then it has been utilized by several small jewelry and industrial companies.

MANTON AVENUE

120* **Atlantic Delaine Mills (1863, and later):** Originally located farther east near the junction of Manton Avenue, Hartford Avenue, and Plainfield Street, the first mill of the Atlantic Delaine Company was built in 1851 by General C. T. James to manufacture delaine; only the first floor of this mill survives as part of a supermarket. In 1863 the Atlantic Delaine Company built an impressive 3-story, brick, pier-and-span-drel mill structure with an unusual round-domed tower surmounted by a glazed lantern; this mill was located immediately west of the 1851 mill. Built as a worsted mill, the 1863 mill contained worsted rooms, spinning rooms, spoiling rooms, warping rooms, and dressing rooms. The brick gasometer, built at the same time, still survives though its original dome and lantern have been removed. These structures were designed by Clifton A. Hall. In 1882, a mill, nearly identical to the 1863 structure was constructed also with a domed tower. This mill is connected to the west side of the 1863 mill. Other buildings in the complex include: a 4-story brick mill (c. 1871) which was used for dyeing and finishing; a 3-story, brick, worsted mill (1893) which is behind the main mills; a brick office building (1899); and a 4-story brick mill (1899) with segmental-arch windows, granite sills, and a slightly pitched roof. In addition to these mill buildings, the Atlantic Delaine Company built numerous workers' houses. By 1872, the company was responsible for the construction of 57 workers' houses containing 163 apartments.

By 1865 the Atlantic Delaine Company was best known for its fine alpacas (which, according to the *Providence Journal*, were only equaled in New England by the Pacific Mill of Lawrence, Massachusetts). Most of the specialized woolen and worsted machinery was imported from Germany, although some less specialized machines were supplied by Thomas Hill of the Providence Machine Company (see 36 Allens Avenue). The Atlantic Delaine Company went bankrupt in the panic of 1873, and in 1879 the land, mill buildings, and machinery were sold at auction. The new owners incorporated as the Atlantic Mills. By the late 1880s the Atlantic Mills was well known for its worsted and cotton-warp fabrics. By this time the mill operation was the largest in Providence, employing 2,100 workers. In 1903 the Atlantic Mills began manufacturing khaki (in addition to worsteds) which the government soon began using for uniforms. The A. D. Julliard Company bought the Atlantic Mills in 1904 and operated the mill for nearly fifty years. In 1953, however, the A. D. Julliard Company, like numerous other faltering New England textile companies during the 1930s, 1940s and 1950s, ceased operations and sold its mill property. The main buildings of the Atlantic Mills now provide primarily commercial space.

610** **Dyerville Mill (1835):** The Dyerville Mill, probably the oldest and least altered mill in Providence, is a 3-story, stuccoed-stone, L-shaped structure with a gable roof and a square central tower surmounted by a small, wooden, arched belfry. In front of the main building is a 1-story office (c. 1850) with a hip roof, a deep entablature under a modillion cornice, and paneled corner pilasters; the central entrance with sidelights and transom is surmounted by a projecting pediment supported on consoles. The facade which might originally have been a 5-bay arrangement has tripartite windows on either side of the entrance. The interior of the office was heavily altered in the late 19th or early 20th century. A stone picker house located on the southwest side of the mill, a 1-story brick extension originally used as a weave shed (which is now connected to a modern concrete addition), and a wooden wheel house and boiler house (both to the northwest of the main building) still survive. Also remaining is the dam on the Woonasquatucket River from which ran a raceway (providing water power for the mill) although the gates of the dam have been removed.

The Dyerville Mill was founded by Elisha Dyer, a successful Providence commission merchant. Dyer, like many Providence merchants, reinvested his money in manufacturing as trade became less profitable. By 1849 the Dyerville Mill employed thirty men and thirty-five women who turned out 800,000 yards of calico cloth a year. Elisha Dyer, Jr., who was governor of Rhode Island from 1857 to 1859, took over the company when his father died in 1854. Dyer was the sole owner and agent for the company until 1867 when he sold the mill to the Beckwith family. Truman Beckwith, owner of the largest cotton-brokerage firm in Providence, and his son Amos (who acted as the agent for the company) incorporated the firm as the Dyerville Manufacturing Company. By 1870 the company employed forty men, forty-eight women, and twenty-four children.

With the New England cotton industry already facing competition from the South by the turn-of-the-century, however, attempts were made at diversification. In 1903 the Joslin Manufacturing Company, a braid and shoelace manufacturer, bought the Dyerville Mill as well as the Merino Mill (61 Ponagansett Avenue). The Joslin Manufacturing Company sold the Dyerville Mill to a wholesale grocery company in 1931. This company although no longer the owner, continues to occupy part of the mill. Today the Dyerville Mill is owned and partially occupied by the Leonard Jewelry Company which first occupied part of the complex in 1949. The mill complex also houses several other light industries.

MASHPAUG STREET

1 **John & Thomas Hope Company (1882):** The John & Thomas Hope Company was established in Providence in 1850 and provided a unique and much needed service for the printing industry. John Hope invented the first efficient pantograph engraving machine. These machines in one step transferred and engraved in copper printing rolls the design from

a two-dimensional pattern. Even thirty years after this company was founded it could claim to be the only pantograph-engraver manufacturer and the only supplier of these items to printing establishments in this country as well as in Europe. In 1882 the firm built its new factory on Mashpaug Street in Elmwood. This simple, unadorned building has a slightly pitched roof and segmental-arch windows with granite sills. The company incorporated in 1890 as John Hope & Sons and continued manufacturing pantograph engravers and engraving cylinders until 1930. The company remained in family control until both of John's sons died in the late 1920s, and the company was taken over by Andrew Stockman. Under Stockman's control, the interior of the plant was remodeled and modernized and a photo-engraving department was added. The John Hope and Sons Company also began engraving brass cylinders which were used for embossing paper. John Hope and Sons remained in the Mashpaug Street factory until 1936. Since then, this factory has been occupied by more than one company. The longest to remain in the building was the Koffler Trunk Company which manufactured trunks here from 1937 until the 1960s. The John and Thomas Hope factory is now occupied by a moving company and a jewelry-tool manufacturer.

NORTH MAIN STREET

530** **The American Screw Company—Additions to the Bay State Mills (c. 1882, c. 1908):** The once huge complex of the American Screw Company's Bay State and Eagle Mills on the north and south sides of Stevens Street were destroyed in a 1973 fire. Of the two remaining buildings which were known as the Hewes Street additions to the Bay State Mills, the earliest is the 2-story brick structure (c. 1882) with a broad pitched roof and a fine corbeled cornice. The later mill (c. 1900) just north of and enveloping some of the 1882 addition is a large, 3-story, brick structure with a simple cornice and a flat roof. This large, rounded-triangular shaped building is located at the prominent corner of North Main and Stevens Street, and, with the earlier Bay State addition, stands as an important reminder of one of Providence's largest industries. The American Screw Company was made up of the Eagle Screw Company, incorporated in 1838, and The New England Screw Company, incorporated in 1840. These two firms, which manufactured machine and wood screws, merged in 1860 under the direction of William G. Angell, one of the founders of the Eagle Screw Company, to form the American Screw Company. By 1886 the American Screw Company was one of the three largest screw companies in the country. It occupied this huge complex (as well as a factory next to the Providence Harbor on Eddy Street) until 1949 when it moved to Connecticut. During the 1950s and 1960s, the various buildings were occupied by several different businesses, but by the early 1970s the mills were largely vacant. At this point the still intact original mill complex was placed on the National Register of Historic Places. After the 1973 fire, however, with almost all of the original buildings destroyed, these two additions to the Bay

State mills, as well as the Stillman White Brass Foundry (see 1 Bark Street) and the Fletcher Building (see 47 Charles Street) were placed on the National Register. Soon after the American Screw Company buildings were rehabilitated—the earlier building as a restaurant, and the large early 20th-century mill for use by the Rhode Island Group Health Association.

OXFORD STREET

- 212-216 Luther Brothers (c. 1865 and later):** The Luther Brothers firm, run by William and Edward Luther, was founded by William Luther in 1870 to manufacture novelty jewelry. Though not the originators of the electroplating process, the Luther Brothers firm introduced electroplating to its factory as soon as the patent for the process expired in the 1870s. By 1890, the company was the largest manufacturer of electro-plated novelty jewelry in the United States and Europe. By 1877 the Luther Brothers firm had outgrown its rented quarters in the Dyer Land Company Building and bought a 2-story structure known as Temperance Hall (built by the St. Michael's Abstinence Society) with enough land for future expansion. The Luther Brothers immediately raised the structure one story. The Luther Brothers factory was then a 3-story, gable-roofed structure with 4-over-4 rectangular windows and a cupola with paired round-arch windows and a peaked roof. This structure has been greatly altered from its 1880s appearance: the clapboards have been covered with modern siding; the window sash has been modified; and the cupola has been removed. The 1- and 2-story wooden wings were built in the early 1880s, and the 1-story brick addition on Harriet Street was built in 1900. The rapid physical expansion of the company in the 1880s was the result of the Luther Brother's decision to add new operations, such as gift-box and locket manufacturing, to its business. In addition, the Luther Brothers firm dramatically increased its shirt-stud production with the invention of a stud-wire machine capable of turning out 2,000 wires per hour. In 1888, Edward Luther retired and William Luther's son Frederick joined the firm, which operated under the new name of William Luther and Son. William Luther and Son continued operations at its South Providence factory until 1917, when it sold the property to Frank H. Goodwin of the Goodwin Bradley Pattern Company, manufacturers of wood- and metal-production patterns. Goodwin Bradley, which also makes molds for the plastic industry, still remains at this site.

PEARL STREET

- 304 The New England Butt Company Complex (c. 1850, 1865, and later):** The New England Butt Company, established in 1842 by N. A. Fenner, originally manufactured cast-iron butt hinges. By 1880, however, the introduction of cheaper, stamped-metal butts rendered cast-iron butts obsolete, and the company turned to the manufacturer of braiding machinery. The oldest building in the complex is the much altered 2-story, monitor-roofed, frame building in the center of the block on Perkins Street, built between 1849 and

1857. The main building, constructed in 1865 from plans by Spencer R. Read, is a handsome, gable-roofed, brick structure with corbeled brick cornices, brick window caps, and arched door surrounds. This building, fronting on Pearl Street, was originally used for machining and assembling, but is now used for offices. A long, brick, 2-story wing built at the same time behind the main building was later raised to three stories. Although this building has window caps identical to the main building, it may incorporate an older structure. In 1951 a large, flat, 1-story, glass-and-brick structure replaced the foundry on Perkins and Rice Streets. By 1901 the New England Butt Company employed 200 skilled workmen in the manufacture of braiding machines for silk, worsted, and cotton braid as well as telephone, electric light, and crinoline wire. The Wanskuck Corporation bought the New England Butt Company in 1955. The factory continues to produce braiding machinery and cabling machinery at this site as well as at the works of the former Providence Steam Engine Company (see 521 South Main Street).

PIKE STREET

- 25** Fuller Iron Works (1869, 1893):** The Fuller Iron Works, established by Frederick Fuller in 1839, first occupied the old wooden buildings of the Fox Point Foundry on the northeastern corner of South Main Street (then called Fox Point Street) and Pike Street. By 1850 the Providence Directory noted that "the Fuller's Foundry and Machine Shop is an extensive establishment and is in very flourishing condition." The Fuller Iron Works produced heavy-machine castings, water pipes, steam engines, and other heavy-metal products. Upon Frederick Fuller's death in 1867, his sons, Frederick and George, took over the business and erected the 3-story brick building with a low, pitched-gable roof and segmental-arch windows with granite sills on the southeast corner on south Main and Pike Streets. In 1893, the Fuller Iron Works built the glass and steel machine shop (which is now covered by modern siding) located to the south of the earlier structure. It was the first steel-frame and glass machine shop in Providence. The Fuller Iron Works, which continued to be controlled by the Fuller family, ceased operations in 1937 when R. Clinton Fuller shifted entirely to the field of real estate, having founded several years earlier the Fuller Real Estate Company. For quite a few years the 1869 machine shop was used by a social-service organization. In the 1960s, the building was converted to office use and the tall central window on the north elevation was installed.

PINE STREET

- 52-62 Hanley Building (1910-1911):** William R. Walker and Son, architects. A six-story, brick-sheathed building with a flat roof, a boxed-and-bracketed metal cornice, and vertical block massing with truncated corners—this structure was built for James Hanley (of Hanley's Brewery), who intended it to be used for light-industrial purposes. It has a slightly altered, wood and plateglass 1st-story storefront with the upper stories

articulated by a pier-and-spandrel system which culminates in round-head arches above the fifth story. Fenestration consists of Chicago windows on the second through fifth stories and evenly spaced sash windows on the sixth story. The first occupants of this handsome industrial building were a gold-leaf manufacturer, a dye-stuff company, a book-binder, a printer, and an electric-supply company. Following the trend of de-industrialization of this downtown area, this structure has recently been converted for use as an office building.

- 158 Jesse Metcalf Building (1896):** Named for the founder of the Wanskuck Mills (see 725 Branch Avenue) and owned as an investment property by his daughters, Eliza Raedeke and Sophia Baker, the Jesse Metcalf Building was built especially for jewelry-manufacturing businesses. The 5-story brick structure with cast-iron storefronts, large segmental-arch windows, pier-and-spandrel articulation on the upper stories, and a corbeled cornice was divided into numerous rental units, each equipped with the latest, improved forges and windpipes. The power-generating system was electric as was the lighting system. Additional light was provided by two light shafts in the center of the building. The jewelry companies located in the Metcalf Building were generally small with an average of about nineteen workers per company. In 1920, the Metcalf Building was bought by a realty company. Known for many years both as the Standard Building after the Standard Realty Company, a twenty-year owner of the building, and the Page Realty Company Building after a later owner, the Metcalf Building is now owned and partially occupied by the J. I. Manufacturing Company, a jewelry manufacturer. Several other small or moderately sized jewelry companies now occupy the Metcalf Building.

PLEASANT VALLEY PARKWAY

- 95 Coca-Cola Bottling Plant (1939):** Coca-Cola began its Providence bottling operation at 477 Smith Street in 1917. In 1939, the company built the present structure designed by the Atlanta architectural firm of Robert and Company, which was retained by Coca-Cola to design Coca-Cola Bottling Plants. A 2-story block at the front of the structure contains office space, while bottling machinery and warehouse space occupy the remaining interior space. The office block has a 3-bay facade with a center entrance and vertical concrete spandrels decorated with stylized versions of the company's product. Horizontal-band casement windows illuminate the plant area. This plant, with others like it constructed between 1927 and 1949, was built from one of a series of plans sanctioned by the Coca-Cola Company's Committee on Standards, which approved designs for all company products.

POINT STREET

- 69 Davol Rubber Company (1880, c. 1884, and later):** The Davol Rubber Company, founded by Emery Perkins and Joseph Davol in 1874 as the Perkins Manufacturing Company, was the result of two years of experiments and

inventions by Joseph Davol. Although the manufacture of rubber goods such as boots and shoes was well established in the United States, and there were a few such manufacturers in Providence, the processes used by Davol to manufacture drug and surgical supplies were entirely new to this country. In 1878, Davol assumed control of the company which he renamed the Davol Manufacturing Company. Incorporated in 1882 as the Davol Manufacturing Company and in 1884 as the Davol Rubber Company, the firm was the international leader in the production of rubber drug-and-surgical supplies by 1888 and had markets for its goods in South America, Germany, Australia, China, and Japan, as well as in all parts of the United States. The Davol Rubber Company continued to expand in the twentieth century under the leadership of Davol's son, Charles Davol; between 1900 and 1930, the company increased its workforce from 275 to 600. In 1932 the company reorganized as Davol, Inc., having expanded its line beyond rubber goods.

The original site of the Davol Rubber Company was near the site of the planing works owned by Davol's grandfather-in-law, Eban Simmons. The earliest existing structure built for the company is the Simmons Building on the south side of Point Street. Named for Eban Simmons, the Simmons Building (1880) is a long, 4-story, brick structure with a flat roof, granite beltcourses above rectangular windows, and 1st-story cast-iron storefronts. In the late 1880s and 1890s the Simmons Building was occupied mainly by jewelry manufacturers, but by the early 20th century it was reoccupied by the Davol Rubber Company. The main complex of the Davol Rubber Company, on the north side of Point Street, contains several late 19th- and early 20th-century structures, the earliest of which is a 3-story brick structure (1884) with segmental-arch windows, a 5-bay storefront with large round-arch windows, and a central arched doorway. About five years later, the company constructed a nearly identical, 3-story structure which was connected to the 1884 structure by a small, 3-bay, 3-story structure with rectangular windows and a large rectangular central entrance. As intended, the three structures present a symmetrical facade on the Point Street elevation. Other structures in the complex include a 2-story, brick office (c. 1900; second story added later); a long, 4-story, steel-frame brick structure (1913; fourth story added in 1960); and numerous late 19th- and early 20th-century additions at the rear of the complex. In 1969 Davol, Inc., built an additional plant in Cranston, and in 1977 the company vacated its Point Street plant for a modern factory in North Carolina. The Davol Rubber Company Complex is currently being developed for adaptive re-use.

- 118 Barstow Stove Company (1849 and later):** The Barstow Stove Company was established in 1836 by Amos Chafee Barstow. Barstow had first been a stove dealer on Weybosset Street and later was proprietor of the City Furnace on Broad Street. Barstow built a new stove foundry on Point Street in 1849. The first ranges turned out at the Barstow factory were called Bay State Stoves. These coal and wood

stoves soon became a national favorite. For a short period of time in the early 1850s, the Barstow Stove Company produced heavy castings for Corliss Engines, but with the increased demand for stoves this pursuit was dropped. In 1851, the company won several prizes for its wood and coal stoves; these stoves included the Bay State Wood and Coal Stoves, the Banner Stove, the Hedenberg Coal Stove, and the Pyramid Stove.

Most of the construction of the Barstow Stove Factory Complex took place in the 1850s and 1860s, but only three buildings survive of the complex which nearly filled the Point, Chestnut, and Richmond Street Block. The earliest of these structures is a 3½-story (third story added in 1864), brick, gable-roofed structure (1849) with a clerestory monitor, a corbeled cornice, and rectangular windows with granite lintels. On the east side of this building is a 4½-story structure (c. 1855) with a jerkin-head roof (which appears flat from the street level) and rectangular windows with granite sills and lintels. The other surviving structure is a later, 3-story, brick building with a flat roof. The Barstow Stove Company incorporated in 1859. Barstow, who had been the mayor of Providence in 1852 and 1853 and who remained active in city and state government, was named the president of the newly incorporated company. Barstow's son, Amos C. Barstow, Jr., was named treasurer. At this time the company's works covered two-and-one-half acres; the complex included two molding rooms, a flask-storage building which held up to 9,000 flasks, a room for mounting stoves, storage areas which held up to 5,000 stoves, and a storage area for patterns which were designed in the factory under Barstow patents. The company employed 200 workers and produced 50 different varieties of stoves and furnaces. In 1873 the company received the grand medal of merit at the Vienna World's Fair for the best cooking stoves and ranges.

Amos C. Barstow died in 1892 and his son Amos Barstow, Jr., became company president. Under his leadership, the Barstow Stove Company acquired the Spicer Stove Company, another Providence-based firm, well known for its Model Grand Stove. The Barstow Stove Company also acquired all of the Spicer patterns and stock, making it the only stove foundry in Providence and the largest stove company in New England.

Upon the death of Amos Barstow, Jr., in 1903, his son, J. Palmer Barstow, took over the business. J. P. Barstow reorganized the company under a new charter in 1919. In 1920, the company acquired joint ownership with another stove company of a former electric plant in Rehoboth which they used for a gas-stove enameling plant. By this time gas stoves had overtaken the stove market. Also because of the increasing use of gas stoves, the decision was reached in 1927 to convert the foundry into a gas-stove assembly area. The Barstow Stove Company made arrangements to buy castings from the Builders Iron Foundry. This decision meant reducing the work force by seventy-five people, mostly molders. In 1928 the company produced one of its last new models, a fully enam-

eled gas stove which featured an insulated heat-controlled oven, a patented top-burner thermostat, and a fully insulated broiler. In 1930 the Barstow Stove Company failed. For about ten years part of the plant was occupied by Home Service Inc., a household-repair company. Various manufacturers occupied the factory including a Barstow Repair Parts Company which lasted two years after the stove-company's end. Since 1974, Tops Electric Supply Company has occupied the factory.

- 167 Coro Company (1929):** The Coro Company, which started as the Cohn & Rosenburger jewelry firm located in New York City, formed a Providence branch in 1911 at Abbott Park Place. Having outgrown its rented quarters, the Coro Company commissioned Frank S. Perry to design a new building which was dedicated in 1929. The Coro building is a 3-story, U-shaped structure with a flat roof and a decorated parapet. Other features include a reinforced-concrete frame and a glass curtain wall. In 1947 the Edward Sturgeon Company (which was the contractor for the main building) constructed an addition to the west side of the factory. According to the *Providence Journal*, The Coro Company was the largest manufacturer of costume jewelry in the 1950s and 1960s. By 1964 Coro Inc. operated three branch plants in Providence, Olneyville, and Bristol. Two subsidiary companies were located in Canada and England. By 1970 the Coro Company had bought several other firms. The same year the Coro Company became a subsidiary of Richton International Corporation. In 1979 Richton International closed its Point Street factory; the Coro building is currently vacant.

PONAGANSETT AVENUE

- 61 Merino Mills (1851 and later):** The Merino Mills, one of the earliest mills in Olneyville, was established in 1812 by John Waterman, who reputedly built the 18th-century farm house nearby on Ponagansett Avenue. The mill was built to manufacture merino cloth. The original mill was destroyed by fire in 1841 and was rebuilt in 1851 by the Franklin Manufacturing Company which used the mill to produce cotton cloth. The present complex is a group of connected stuccoed-stone buildings. The 1851 building is a 3-story, T-shaped, gable-roofed stone building with many regularly spaced multi-paned windows and a wooden, open belfry surmounted by a pinnacle near the crossing. The later buildings have dormered mansard roofs. The Franklin Manufacturing Company, run by C. H. and H. P. Franklin, operated the mill for almost 40 years. By 1888 the company was operating 30,000 spindles and employed 325 workers.

In the late 19th century the plant was bought by the Joslin Manufacturing Company, which sold the spinning and weaving machinery and used the mills for the finishing of tubular and flat shoe laces, laced braids, and corset laces. The Joslin Manufacturing Company owned four other mills which were connected by trolley cars. By 1907 the company was still run by water power from the Woonasquatucket River which produced 250 horsepower. The Joslin Manufacturing Company

operated this mill until the 1930s. The Merino Mill is now occupied by the Lincoln Lace and Braid Company.

PROMENADE STREET

235* Brown & Sharpe Manufacturing Company Complex (1872 and later): The Brown & Sharpe Manufacturing Company which was of worldwide importance to the growth and development of the precision-tool industry, began as a small, watch- and clock-making company founded by David Brown and his son Joseph in 1833. When David Brown emigrated from Providence to Illinois in 1841, Joseph Brown took over the business and began making small tools and lathes in his shop on South Main Street. Joseph Brown's first important invention was an automatic, linear-dividing machine which made possible the production of the vernier caliper in 1851. The vernier caliper was a precision measuring tool which was lauded by machinists for greatly improving the accuracy of their work. Joseph Brown's company made other important advances in the 1850s. In 1853 Lucian Sharpe, who had been an apprentice with Joseph Brown since 1848, was made a full partner, resulting in the new company known as J. R. Brown & Sharpe. This arrangement left Brown free to handle mechanical problems while Sharpe directed the business activities of the firm. In 1855, Brown invented a precision gear cutter used in the manufacture of gears for clocks and other instruments or machines. The most significant event of the 1850s, however, was the procurement of a contract to manufacture Wilcox & Gibbs sewing machines. The sewing machine, with its interchangeable parts, was largely responsible for the further development of precision measuring and machine tools which were necessary for the economical and accurate manufacture of that product. During the 1860s Brown & Sharpe continued to grow rapidly. In 1861 the company built its first commercial machine tool, a turret lathe or screw machine, which was used in the manufacture of percussion-lock muskets. This machine was designed by Joseph Brown and noted inventor Frederick Howe (then superintendent of the Providence Tool Company, who later joined Brown & Sharpe). Another Brown and Howe collaborative effort produced the Universal Milling machine in 1862. In 1868 Brown invented the Universal Grinding Machine. Before J. R. Brown & Company incorporated as the Brown & Sharpe Manufacturing Company in 1868, Samuel Darling of Bangor, Maine, Brown and Sharpe's only competitor in the manufacture of quality measuring tools, was invited to join Brown & Sharpe. Darling, Brown, & Sharpe functioned as a separate company specializing in precision tools until 1896 when Darling was bought out and the works became another department of Brown & Sharpe Manufacturing Co.

After Joseph Brown's death in 1876, Lucian Sharpe, aided by highly skilled engineers, continued to expand and refine the company's line. Oscar Beale, a Brown & Sharpe engineer, made a major contribution to the integrity of precision measuring tools when he completed a new system of measurements (started by Joseph Brown) known as the B & S

standard. In the 20th century, Lucian's son, Henry Dexter Sharpe, was an important force in Brown & Sharpe's growth into a corporate giant. In his fifty years with the company, he made significant manufacturing contributions. Henry Dexter Sharpe, Jr., was responsible for the reorganization of the company on a divisional basis and for the introduction of modified mass-production techniques in the 1950s.

In 1964, Brown & Sharpe moved to a new plant in North Kingstown. The Brown & Sharpe Complex, now known as the Capital Industrial Center (CIC), is occupied by several industries, businesses, and state agencies.

The Brown & Sharpe Manufacturing Company, which had grown from a small company with a work force of fourteen in the 1850s to two hundred workers in 1868, was overcrowded at the South Main Street factory and plans were drawn for a new factory complex on Promenade Street; the first building was completed in 1872. Frederick Howe who had joined the company in 1868 was largely responsible for the design of the Brown & Sharpe complex which was lauded as a model of handsome and efficient industrial construction. The first building of the Brown & Sharpe factory (facing Promenade Street) is a 4½-story (fourth story added in the late 1890s or early 1900s) brick structure with segmental-arch windows separated by brick pilasters. Other buildings constructed before 1875 were a drawing room, a central wing, and an east wing. The southern section of the Promenade Street structure was added in the late 1870s or early 1880s. The two buildings on Beach Street were built in 1895 and 1916. The complex followed the hollow-square plan which was noted for making use of a limited amount of land. A factory planned along these lines also evoked a sense of order noticeably lacking in some industrial complexes which appeared at this time.

RESERVOIR AVENUE

400 California Artificial Flower Company (1939): Albert Harkness, architect. The California Artificial Flower Company (known as Cal-Art) was founded in 1922 by Michael D'Agnillo, an Italian immigrant, who turned his hobby of making paper and cloth flowers into a means of support. The flowers were first used by stores in their display windows, but soon were sold to the general public as their popularity increased for home use. D'Agnillo operated his factory in leased floors of the building at 263 Weybosset Street and employed 300 workers, mostly women, who D'Agnillo trained for six months.

As in the costume-jewelry factories, most of the work was handwork requiring manual dexterity, but unlike costume-jewelry management D'Agnillo paid his workers a weekly salary instead of a piecework rate. By the 1930s, the California Artificial Flower Company had grown considerably with numerous lines of flowers—including Los Angeles roses, Russian violets, dahlias, and rhododendron—and had established several sales offices in various parts of the country. With the company's steady growth, it had soon outgrown its rented quarters on Weybosset Street. Completed in 1939, the Cal-Art

factory is a 3-story brick structure with a continuous band of windows around each of the three stories. Distinctive features of this Art-Deco industrial building are the tall octagonal tower with the name of the company in elongated letters around the top and the stainless-steel marquee with similar lettering. In the 1950s the Cal-Art Company began manufacturing plastic flowers and fruits which are now their primary products, although paper flowers are still produced on a smaller scale.

RICHMOND STREET

222 Little Nemo Manufacturing Company (1928): Frank S. Perry, architect. The Little Nemo Manufacturing Company was founded in 1913 by Benjamin Brier, Charles Brier, and Samuel Magid to manufacture imitation diamond jewelry. The company imported stones from all parts of the world and cut, polished, and—in some cases—set the stones by machine, producing more than 33,000 pieces of jewelry yearly. Having outgrown its rented quarters in the Doran-Speidel Building on Ship Street, the Little Nemo Manufacturing Company built a new factory in the mixed-use, residential, commercial, and industrial area on the southern outskirts of the jewelry district. The Nemo Building is a 3-story reinforced-concrete structure with a glass curtain wall which is rounded on the corner of Richmond and Ship Streets, a flat roof, a central parapet with Art-Deco detailing, and simpler corner parapets. Modern windows have been installed and the original marquee has been removed. The Little Nemo Manufacturing Company occupied the structure until the late 1970s. The Nemo Building is partially occupied.

SHIP STREET

70* Doran-Speidel Building (1912): Monk and Johnson, architect. Built by James Doran and Sons (see 150 Chestnut Street) as an investment property, this 5-story structure has a concrete pier-and-spandrel exterior wall with large rectangular windows, and a decorated parapet. The interior mushroom columns are similar to those in the A. T. Wall Building (see 162 Clifford Street). The 5-story addition on Bassett Street was built in 1965. One of the tenants of this jewelry factory was the Speidel Chain Company, run by German immigrant Albert Speidel. The Speidel Chain Company manufactured gold watch chains for several years before and after World War I. During the post-World War I era, however, changing fashions and social customs fostered the development of casual, moderately priced watches—such as the expandable bracelet watch designed by Speidel's brother Edwin in 1930. This bracelet was manufactured by Automatic Chain Company (the successor to the Speidel Chain Company) until 1935 when Edwin Speidel formed his own company, the Speidel Corporation.

In 1951, Edwin Speidel set aside part of the factory, by that time owned by the Speidel Corporation, for the manufacture of Desitin ointment. The Desitin Chemical Company occupied part of the Speidel factory until 1963. In 1965, Textron Inc. bought the Speidel Corporation and continued the manufacture of watch bracelets at the Ship Street factory.

SOUTH MAIN STREET

213* **Fall River Iron Works (1848):** The Fall River Iron Works which manufactured iron nails was founded in Fall River in 1822. In 1845, however, the iron company bought this Providence waterfront lot from Thomas Halsey and soon after built a warehouse and office building. This handsome, 3½-story, brick, Greek Revival building has an end-gable roof and a granite storefront. The Fall River Iron Works owned and occupied the building until 1881, then the Fall River & Providence Steamboat Company took title to the warehouse and office building. The next business to own and occupy this structure was the well known Rumford Chemical Works. Named for Count Rumford, an 18th-century scientist who founded a professorship at Harvard, this company was founded by a former chairman of the Harvard Science Department, Eben N. Horsford, who devoted his life to the study of nutrition, especially the chemical process involved in the conversions of grains into breads. The products of the Rumford Chemical Works manufactured in East Providence included Horsford's Cream of Tartar Substitute, bread preparation, baking powder, Rumford Yeast Powder, and Horsford's Acid Phosphate. The Rumford Chemical Works (which continues to manufacture Rumford Baking Soda but is no longer located in East Providence) used this structure for their main office; labeling departments; packing, shipping, advertising departments; and research laboratories until 1927 when the chemical company sold this building to the Phillips Lead Company, a plumbing-supply company. Owned and occupied by the Phillips Lead Company until 1973 this warehouse was rehabilitated by the Rhode Island School of Design for use by its architecture department.

521* **Providence Steam Engine Company (1845 and later):** The Providence Steam Engine Company is said to have had its start as early as 1821 when John Babcock, an early steamboat builder, worked on or near this waterfront site. In 1830 Babcock's son, John Babcock, Jr., and E. L. Thurston combined their mechanical expertise to establish a steam-engine company. Soon afterwards, when the inventor Noble Greene joined the company, the name was changed to Thurston, Greene, & Company. In 1841, Thurston, Greene, & Company bought the patent rights to the Sickle Cut-off Valve. Seven years later when Corliss introduced his stationary steam engine with an automatic regulator, Thurston, Greene, & Company sued Corliss for infringement on the Sickle Patent but lost the case after many years of litigation.

An 1845 fire destroyed the complex, but it was immediately rebuilt. A 2-story, stuccoed-stone, gable-roofed structure with chamfered-beam and joist framing survives from the 1845 rebuilding. Other structures in the complex date from 1892 to 1894, though these later buildings might incorporate parts of the complex built between 1863 and 1864. These 1890s structures include a 3-story pattern and erecting shop with round-arch fenestration on the east of the complex; a 3-story, brick, engine house with a gently sloping gable roof on the south;

and a 3-story machine shop with a slightly pitched roof on the west of the complex.

In 1854, the company added a new partner, H. W. Gardiner, who ran the company for many years. In 1855 the firm introduced the Improved Greene Engine featuring the automatic valve gear. This engine was noted for its efficient speed control, durability, and stability. During the Civil War, the company produced the engines for two sloops of war, the *Algonquin* and the *Contoocook*. In order to produce the capital needed for expansion during the booming war years, the business incorporated in 1863 as the Providence Steam Engine Company. By 1865 the works had tripled in size. While in the 1870s the company continued to manufacture the Improved Greene Engine, a new product—a steam-riveting machine—was added to the company's line; this machine held plates of iron together while forming the head of the rivet. Another product was the Burdict Nut and Bolt Machine. In 1874 the company completed a pumping engine for the Hope Reservoir which could pump as much as 2,000,000 gallons of water in a twenty-four hour period. This engine was praised for its unique and efficient regulating mechanisms. In the late 1890s, the Providence Steam Engine Company, which employed 300 workers by this time, merged with the Rice and Sargent Engine Company. The new company, called the Providence Engineering Works, produced both the Rice and Sargent Engines and the Improved Greene Engine as well as designing and manufacturing general machinery. In 1908 the works manufactured the running gear for the Maxwell Motor Car and a few years later began constructing engines for other automobiles as well. The Providence Engineering Works was liquidated in 1955, and the complex was bought by the New England Butt Company (see 304 Pearl Street), a division of the Wanskuck Company, which today manufactures braiders, wire stranding, and cable machinery.

614** **Hicks Boiler Works (1870):** Hicks Boiler Works was founded in 1861 by Gideon Hicks who had previously worked nearby at the Providence Steam Engine Company plant. Hicks' company specialized in the manufacture of stationary and marine boiler works. The first buildings on the site were frame structures, which were superseded by the 2½-story, brick building constructed in 1870. This structure has a mansard-roof and a large central doorway surmounted by an entablature supported on consoles. By the late 1870s Hicks Boiler Works employed thirty people and was equipped with three large lathes, a planer, two upright drills, and two power punches. Although the boiler works was never greatly expanded, the Hicks family maintained its steady business until 1920 when the business finally changed hands. The new business, known as the Rhode Island Boiler Works, built and repaired boilers as well as smokestacks, flues, and dye vats. The company also specialized in sheet-metal work and welding. During the Depression the business again changed hands. The next to occupy the shop was the Narragansett Boiler Works, which operated here until the mid-1970s. The building is now vacant.

SOUTH WATER STREET

160** **Oakdale Manufacturing Company (c. 1854, 1895):** The Oakdale Manufacturing Company, formed in 1891 by the merger of three Providence dairy companies, bought the William Butler warehouse and refitted it for the manufacture of "butterine." In 1894, Oakdale bought the lot just south of the former warehouse and constructed a 6-story brick and granite structure, while adding two stories to the older building. As completed (from plans by engineer-architect George Leach), the two buildings formed a handsome, unified block.

By 1901 the Oakdale Manufacturing Company, which employed over 200 workers and produced 100,000 pounds of margarine daily, was one of the largest margarine companies in the United States. The margarine industry, however, threatened the dairy industry, which lobbied to have the color additive used with margarine taxed. This tax was eventually the downfall of the Oakdale Manufacturing Company which was forced to close in 1916.

Next to occupy the structure was the Mason Manufacturing Company, run by E. H. Mason. This company, which manufactured cans, occupied these structures until 1931 when it moved to East Providence.

In 1939, Roitman's Furniture Company bought the factory for its present use as a furniture store and warehouse.

STEWART STREET

107 **American Electrical Works (1890):** The American Electrical Works, founded by Eugene Phillips in 1870 for the manufacture of insulated electrical wires, grew so rapidly that in the space of forty years the company occupied four different factories, each larger than the last. The third factory occupied by the company, this 4-story, brick and granite structure which occupies a square block, was built in 1890. Unusually handsome with its bands of windows unified by granite belt courses, this factory still maintains much of its architectural value even though it has had much of its cornice removed and modern window sash installed.

When the company moved into this building in 1892, it employed 325 workers. Electrical wire was in such great demand by rapidly expanding telephone, lighting, and electric-trolley companies that by 1894 the American Electrical Company had outgrown its Stewart Street plant and built a large new complex in East Providence. For many years afterwards, however, the Stewart Street factory was known as the Electric Building.

Next to occupy this building was the Joslin Manufacturing Company, a shoelace manufacturer which remained only a few years before moving to the Elmwood Mills on Daboll Street in the mid-1890s. After the Joslin Manufacturing Company, the Atlantic Manufacturing Company, which manufactured flexible gas tubing in an adjacent structure, used the Electric Building for additional factory and storage space. Perhaps not able to utilize much of the large amount of space available in the factory, the Atlantic Manufacturing Company

sold the Electric Building to a realty company in 1902. Various companies—including wire, tubing, tea, and shoelace manufacturers—leased the building from 1902 to 1918 when the Fulford Manufacturing Company—manufacturers of brass and steel beds, metal ornaments, and stampings—bought the factory. It occupied part of the structure and leased the rest of the building to other industries and businesses. Fulford still remains at this site.

SUMMER STREET

109-111 J. P. Haskins Building (1888):** Built by J. P. Haskins, a box manufacturer whose factory was located nearby, the J. P. Haskins Building is a handsomely detailed 4-story brick factory with a corbeled cornice and window hoodmolds. The first occupant of the structure, the Burdon Seamless Filled Wire Company, founded by Levi Burdon, was the first company to manufacture seamless gold- and silver-plated tubing used by jewelry manufacturers. By 1892, the company was producing 5,000 ounces per day of tubing and wire which was in demand by the growing jewelry industry. In 1896 the company, which had expanded its product to plate stock of all kinds in addition to wire and tubing, changed the name of the firm to Burdon Wire and Supply Company. In 1902, it merged with a Pawtucket company to form the United Wire and Supply Company which operated until 1918.

Since 1918 the Burdon building has been occupied by several varied industries.

VALLEY STREET

50-54 Providence Dyeing, Bleaching and Calendering Company (c. 1843 and later): The Providence Dyeing, Bleaching and Calendering Company was founded in 1814 as the Patent Calender Company when Henry Hoppin, Hercules Whitney, Edward Mason, Jr., and Daniel Bates bought the third steam engine to be used by the textile industry in Rhode Island. This early steam engine, called the Columbian Steam Engine, was unique for its ability to develop twenty horsepower; the Patent Calender Company was the first company to use a steam engine for finishing cloth (previous uses of a steam engine in Rhode Island had been in the Wilkinson Mill, 1810-1811, in Pawtucket, which was a cotton-spinning mill, and the Providence Woolen Company, 1812, in Providence which was a wool-spinning-and-weaving mill). The founders of the Patent Calender Company also bought the patent rights to the first calender (a machine which presses cloth between rollers or plates in order to give the cloth a smooth, glossy, or glazed finish) ever to use differential gears.

Equipped with this valuable machinery, the Patent Calender Company (controlled mainly by the Hoppin and Dyer families) built a plant on the corner of Mathewson and Sabin Streets and for twenty-nine years centered its cloth-finishing business there. In 1843, the Patent Calender Company was incorporated as the Providence Dyeing, Bleaching and Calendering Company with 192 shares and capitalized at \$192,000.

At this time, under the leadership of William C. Snow, the

company bought land in Olneyville and converted an old gristmill (later replaced by a brick factory) into a bleachery. Between 1846 and 1857 the Valley Bleachery had expanded to several buildings, as did the main plant on Sabin Street. The Sabin Street plant became especially well known for finishing jaconets, a lightweight cotton cloth with a semi-glaze finish.

In 1872 upon William Snow's death, Stephen Cornell, who had been a superintendent, was elected an agent; later, in 1883, Cornell was elected president of the company. He immediately closed the large Sabin Street complex (now demolished), and the finishing operations, except for the dyeing process which was abandoned, were moved to the Valley Bleachery.

The plant on Valley Street continued to grow into the 20th century under the direction, first, of William O. Cornell and, later, of J. P. Farnsworth. Production jumped from four tons of goods finished in a week in 1885 to twenty tons or 100,000 yards of light dress goods in 1901.

In 1952, the company, which still employed over 300 workers, sold the plant to the Jali Realty run by the Licht family. Jali Realty subdivided the plant, removed the machinery, extensively renovated the building, and within a year sold and rented various buildings and floors of this large plant to smaller industries, including various costume-jewelry companies, plating companies, and tool manufacturers. The large plant is now occupied by approximately nineteen separate businesses.

166 National and Providence Worsteds Mills (c. 1887):

This large complex of six, similar, 4-story, brick, pier-and-spandrel mills with slightly pitched roofs was built after the original mill, erected by Charles Fletcher in 1867, burned in 1885. The square 1½-story, brick, mansard-roofed office had granite lintels over rectangular windows, a deep corbeled cornice and rows of closely spaced hip-roofed dormers. Charles Fletcher, an Englishman who had acquired his knowledge of worsted production in the famous worsteds mills of Bradford, England, built the Providence Worsteds Mill as a spinning mill to produce worsted mohair and genappe yarns, but upon rebuilding the complex in the 1880s, Fletcher added the National Worsteds Mill, a worsteds-weaving mill which he initially operated as a separate entity from the Providence Worsteds Mill. The National Worsteds Mill produced material for suits, overcoats, and cloaks. The power for the mills was produced by eight Corliss steam engines and, to a lesser extent, by water power. When Fletcher incorporated the two operations as the National and Providence Worsteds Mills in 1893, the mill complex covered ten acres or two city blocks. At this time the company employed 750 workers and produced 900,000 yards of worsteds goods yearly. Six years later Fletcher sold the National and Providence Worsteds Mills to the American Woolen Company, a large wool-and-worsted combine of which he, with William Wood of Lawrence, Massachusetts, had been the co-founder. The American Woolen Company, which had also bought the Weybosset, Manton, Valley, and Riverside Mills, began selling its numerous Rhode Island and Massachusetts

mills in the 1920s and continued to liquidate its holdings as profits continued to decrease in the 1930s, 1940s, and 1950s. In the mid-1950s the American Woolen Company, which was soon absorbed by Textron, sold the National and Providence Worsteds Mills. This complex is now occupied by several small industries and businesses.

325 Woonasquatucket Print Works (c. 1895): The Woonasquatucket Print Works was founded by G. M. Richmond and Victor Carr in the 1840s. By 1849, the print works, which specialized in calico printing, occupied six buildings, employed 250 men and 30 women, and produced 10,900,000 yards of printed goods yearly.

By 1857 the print works had grown considerably. At least four of the existing buildings were enlarged and four buildings were added. Production of calicoes and fancy print goods involved numerous processes, and by 1862 there were twelve buildings including machine and boiler rooms, an engine room, a bleach house, several dye houses, a block shop, a stenting (stretching) room, a dry house, a guarancene (sizing) house, two storehouses, a mangle (ironing) room, and an engraving shop. By the early 1860s Victor Carr had left the business which in 1865 incorporated as the Richmond Manufacturing Company. Frank E. Richmond remained president, and his son G. H. Richmond became treasurer.

In 1892 the Queen Dyeing Company bought the plant and remodeled the buildings at this time into the present complex of 2- and 3- and 4-story, brick, flat-roofed mill buildings with large segmental-arch windows. The original complex included many buildings of wood and stone.

The Queen Dyeing Company, incorporated in 1895, was led by William Penn Mather who had been involved in the machine industry in Manchester, England. The company specialized in a dye called aniline-black which was used primarily for women's petticoats. The company employed 300 people and produced 100,000 yards of aniline-black cloth daily. In 1909, the Queen Dyeing Company was bought by the U.S. Finishing Company which also owned the Silver Spring Bleaching and Dyeing Company (see 387 Charles Street) and the Dunnel Manufacturing Company in Pawtucket as well as five other dyeing and finishing plants in various parts of the country.

During the first World War, the Queen Dyeing Company turned out several million yards of khaki cloth a month. By the 1920s, however, the demand for vast amounts of either aniline-black or khaki cloth decreased considerably and the Queen Dyeing Company turned to printing and finishing cloth. The company produced fancy printed cloth often used for women's pajamas; finished lower quality rayon and cotton cloth; and bleached, dyed, or finished fine fabrics for dresses and shirts. The Queen Dyeing Company division of the U.S. Finishing Company employed 350 people at this time.

In 1952, U.S. Finishing merged with a Baltimore drapery company and sold the Providence plant to a realty firm which rented it to various jewelry manufacturers and other industries until the Uncas Manufacturing Company, a large jewelry manufacturer, bought the property in 1977.

WATERMAN STREET

- 331 **The American Emery Wheel Works (1898, 1909):** Knight C. Richmond, architect. The American Emery Wheel Works was established in Boston and moved to this long 3-story, brick, flat-roofed, factory building with segmental-arch windows immediately after its completion in 1898. The company, headed by mechanical engineer H. A. Richmond, manufactured a full complement of emery wheels and stones. These grinding wheels and stones were used by many of the manufacturing concerns in the city, and this was the only Providence-based firm of its kind.

The factory had a separate engine room which contained a sixteen-horsepower gasoline engine. The engine was installed by Fairbanks Morse Company of Beloit, Wisconsin, and was the only one of its kind in Providence at that time. The works also used conventional steam engines and generators for power production. The first floor of the factory was used for mixing, molding, and firing the wheels; the second floor was used for finishing the wheels, a process which required the use of black diamonds. The whole process of manufacturing wheels was accomplished in two days by a crew of sixteen workers.

In 1909 the company expanded and commissioned Knight C. Richmond to build an addition to the factory. The American Emery Wheel Works continued to manufacture grinding wheels, stones, and emery cloth in this factory until 1978.

WEST RIVER STREET

- 146 **Corliss Steam Engine Company (c.1875):** George H. Corliss, a native of New York State, moved to Providence in 1844. An inventor and engineer, Corliss devoted his energy to discovering ways of improving the steam engine. Originally, the modest works of the Corliss Engine Company were located on India Street, but by 1849 the stationary steam engines produced by Corliss, with its patented, automatic, cut-off valve, were in such demand that a new large plant designed by Corliss was built at Charles and West River Streets. Seven years later the Corliss Steam Engine Company incorporated. The company continued to expand as Corliss made more innovative changes to steam-engine design. Corliss was awarded several medals and honors including a gold medal at the 1867 Paris Exposition. In 1876, Corliss built the vertical "Centennial Engine" to power the 1876 Centennial Exposition in Philadelphia.

By the late 19th century, the Corliss plant had grown into a large complex of nine 1-, 2-, 3- and 4-story, hip-roofed, brick structures, many of which featured pier-and-panel wall construction. These structures contained an iron foundry, a forge shop, a boiler shop, an erecting shop, a pattern shop, a ware shop, two machine shops, and offices. All of the remaining structures—including the 1870s iron foundry, with a double-monitor hip roof, and parts of the 1-story machine shop and offices—have been heavily altered and bear little resemblance to the once impressive complex which could be seen by railroad travelers on the Providence-Boston line.

After George Corliss died in 1888, the company was run by William Cowen, William Sherman, and Charles Giles until 1896 when the business failed. Three years later the company was bought by the International Power Company—IPC—(this company also bought the Rhode Island Locomotive Works on Hemlock Street) which continued to manufacture Corliss engines as well as Greene Wheelock engines (formerly manufactured at Worcester) at the West River Street plant. This company was probably responsible for the large, 20th-century, brick-pier structure (now heavily altered) on the site.

Today the remaining structures of the complex are occupied by a textile-machine repair shop and a granite-cutting company.

- 148 **Providence Tool Company (1861):** The Providence Tool Company was founded in 1845 and incorporated in 1847. Beginning as a small business located on Wickenden Street, it employed 40 workers in the production of heavy hardware and railroad supplies. Later the company began manufacturing sewing machines and muskets. In 1861, having outgrown its original plant, Providence Tool expanded into new quarters on West River Street while maintaining the Wickenden Street factory for the production of sewing machines. The 1861 factory on West River Street, a 2-story brick-pier structure with a handsome, 4-story, Italianate tower, has been altered by the removal of the original gable roof. The 3-story brick structure on the west side of the mill is a later addition.

Frederick Howe, one of Providence's well known inventors and engineers, was greatly responsible for the growth of the Providence Tool Company. Howe designed the Howe Miller, the prototype for the Brown and Sharpe Universal Miller. The Universal Miller was the result of a collaborative effort by Joseph Brown and Frederick Howe and was extremely important for the Providence Tool Company's production of rifles during the Civil War. In 1868, Howe joined the Brown and Sharpe Manufacturing Company.

Providence Tool bought the patent for the Peabody Martini Breech Loading Rifle in 1865; these weapons were manufactured and sold to the Turkish government during the Turko-Russian War. By 1878 the flourishing factory employed 1,500 workers at the Wickenden Street plant. In 1883, this large company was reorganized into two separate entities: the Household Sewing Machine Company, which remained at the Wickenden Street plant (demolished), and the Rhode Island Tool Company, at the West River Street plant. Rhode Island Tool, led by George H. Dart, ceased production of rifles and concentrated on the manufacture of machine bolts, tap bolts, cap screws, machinists wrenches, and turnbuckles. The company still manufactures special machine bolts and forgings.

WILD STREET

- 81* **Steere Worsted Mill (1884):** The Steere Worsted Mill was founded as a part of the Wanskuck Mills (see 725 Branch Avenue) under the direction of Henry J. Steere, who was also the co-founder of the Wanskuck Mills. The Steere Worsted

Mill, built to manufacture worsted yarn, is a long, 3-story, brick, flat-roofed structure with a projecting central tower under a peaked roof, ornamented with copper cresting. The most interesting feature of this rather typical mill is the short tower with brick pilasters and bulls-eye windows. Attached to the main mill is a wool storehouse and dyehouse. The Steere Mill made its first shipment of worsted yarn in 1884. By 1930, the mill contained 39 worsted cards, 28 combs, and more than 10,000 spindles. At this time the mill employed 395 workers. The Steere Mill was closed in the 1950s, when the Wanskuck Company sold all of its textile mills; it is now occupied by a luggage manufacturer.

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STEEPLE STREET

- 3 **Congdon & Carpenter Company Building (c. 1793):** By 1790, Joseph Congdon was offering "lately come to hand, and now for sale, A Quantity of Iron-Stock, for the Use of Forges, amongst which is a large Proportion suitable for Blacksmiths' Business." A considerable market awaited, for in addition to a steady demand for tools, firearms, maritime instruments, and farming implements made of iron, the incipient industries of Providence, Pawtucket, and the hinterland increasingly required Congdon's wares. His move to this 3-story, hip-roof, brick structure in 1793 implies early success and expansion. The 5 tons of imported iron bars that formed the usual stock were stored in a small warehouse on the north side of the structure; domestic iron was rare until the second quarter of the nineteenth century. During its 75-year tenancy of this building, the company expanded into retail sales of hardware, horse supplies, and coach equipment. With the outbreak of the Civil War, orders from Rhode Island manufacturers poured in for all kinds of round, flat, and square iron; spring steel; horseshoes and horseshoe nails; hoops, bands; and calking steel. Hurried orders to organize and equip an army placed heavy demands on textile and machine manufacturers, who in turn relied on Congdon & Carpenter to supply their needs. By the end of the Civil War, the company's activities required more space, and Congdon & Carpenter moved one block north to a new structure at the corner of Canal and Elizabeth Streets, since demolished. The company moved to 405 Promenade Street (q.v.) in 1930. This structure is the oldest industrial building in the city and, after Pawtucket's Slater Mill, the oldest in the state.

PROMENADE STREET

- 405 **Congdon and Carpenter (1930):** Jenks and Ballou were the consulting engineers for this Art Deco structure built by Charles B. McGuire. Comprising a 1-story flat-roof office block in front of a large, flat-roof production-block, the reinforced-concrete structure has regularly spaced sash windows in the office and casement windows in the warehouse. Founded in 1792, Congdon and Carpenter operated its metalworks in two locations on Canal Street (see 3 Steeple Street) before moving to this location.

GLOSSARY

- Alpaca:** A kind of llama; a fine yarn spun from alpaca wool; a thin cloth woven with alpaca yarn or a mixture of alpaca and cotton yarns.
- Arkwright System:** The first successful water-powered machines for spinning cotton; invented in England by Richard Arkwright in 1769 and later improved by Jedediah Strutt.
- Astrakhan:** A type of Russian lamb's fur; a lustrous woolen cloth with a curled or looped pile to imitate astrakhan fur.
- Bobbin:** A cylinder on which roving or yarn is wound in machinery for spinning or weaving.
- Calender:** A textile-finishing machine used in the cotton industry which produced a smooth, glossy finish.
- Carding:** The process of disentangling wool or cotton fibers.
- Carding Machine:** A machine consisting of cylinders with intermeshing wire teeth; the cylinders revolved at various speeds and in different directions to disentangle wool or cotton fibers.
- Cassimere:** A woolen cloth woven into intricate patterns usually on Crompton looms. Cassimeres were made from a moderately priced, medium-fine woolen yarn.
- Castling:** The process of shaping material in a mold; in making metal objects, the pouring of molten metal into a mold.
- Cast Iron:** A high-carbon-iron alloy. Cast iron was ideal for making machine parts and was also used for building facades, structural building components, bridges, and stoves as well as countless other products.
- Comb:** The implement, necessary to the manufacture of worsted yarn, which separates the long wool fiber from the shorter fiber and arranges the fibers in a parallel order. The Lister comb (1851) was the first sophisticated automatic comb. The Noble comb (1853), a more efficient combing machine, superseded the Lister comb by the 1860s and 1870s.
- Combine:** The result of a combination of several companies of the same type.
- Conglomerate:** A large corporate structure comprised of numerous diversified companies.
- Delaine:** From the French, *Mousseline-de-laine* (a muslin made from wool). Although originally an all-wool product, delaine fabrics which were manufactured in England and the United States were a cotton warp with a cheap woolen or worsted weft. Delaine cloth, which was usually dyed or printed, was extremely popular for moderately priced dress material because of its durability, pleasing texture, and bright finish. Delaines were among the earliest, mass-produced, worsted goods.
- Dobby:** A loom attachment for weaving intricate patterns.
- Drawing:** The process in which cotton or woolen strands or rovings are passed through a series of successively faster rollers which straightens the fibers and attenuates the strand of roving.
- Dressing:** Refers to the processes of fulling, napping, shearing, and pressing in the manufacture of woolen cloth.
- Feeders:** Used in both cotton- and woolen-yarn manufacturing. In both cases these machines automatically transferred the fiber from one machine to another. The Bolette Card feeder (1864) was an innovative feeder which automatically transferred loose wool from one carding machine to the next.
- Findings:** Pin stems, backings, and assorted hardware used in the manufacture of jewelry.
- Fly Frame:** A type of roving machine used for making fine cotton yarns.
- Forging:** A metal part formed by pressure, with or without heat.
- Foundry:** The structure in which iron, bronze, or other metal is melted and poured into a mold.
- Fulling:** The process which followed the weaving operation in woolen-cloth manufacturing. During the fulling operation the woolen cloth was washed, shrunk, and felted (matting the fiber together by means of heat, moisture, friction, and pressure).
- Gasometer:** A building which housed a gas-storage tank.
- Integration:** The production of cloth from raw wool or cotton to finished cloth at one factory site.
- Jack Frame:** This machine accomplished the same purpose as a roving frame, but was used in the production of finer yarns.
- Loom:** The apparatus used in the weaving process.
- Merino:** The fine wool from merino sheep used both for fine woolen and worsted manufacture.
- Milling Machine:** A machine with rotary cutters used to shape metal parts.
- Molder:** A person who makes foundry molds.
- Napping:** The raising of fibers from woolen cloth by means of teasel gigs. This process usually followed the fulling operation.
- Picker:** A picking machine; a person who runs a picking machine or manually performs the picking process.
- Picking:** Cotton — the process of cleaning the cotton by beating sand, heavy dirt, and seeds from the fibers. Wool — the process of beating and forcing air through the wool to eliminate dirt and straw from the fibers.
- Precipitation:** A method of sewage treatment involving the separation of solids, liquids, and gases from the sewage.
- Printing:** The process of transferring a pattern to cloth by means of engraved copper cylinders (one cylinder for each color in the design) placed in a printing machine through which the cloth passes.
- Rayon:** A synthetic fiber used to make yarn and cloth similar to silk or cotton. Rayon was one of the earliest synthetic fibers.
- Roving:** The process of twisting the strand of cotton or wool prior to the spinning process.
- Roving Frame:** The apparatus on which the drawing and roving operations are carried out.
- Scouring:** The removal of the wool grease, suint, and dirt from the wool fibers by immersing the wool in troughs filled with a chemical solution; this process usually followed the picking process.
- Shearing:** The process of evening the fibers of woolen cloth raised by the napping process.
- Spinning:** The final process in the production of yarn in which the roving is drawn out and twisted into yarn. The spinning machine used in the Arkwright System was a flyer frame (also called a water frame). This machine produced stronger yarn than the earlier spinning jenny. The flyer frame was replaced by the cap spinning frame (also called a Danforth frame) and by the ring spinning frame which was the most popular type of cotton-spinning machine in America by the late nineteenth century. The spinning mule which combined the features of two earlier spinning machines was widely used for spinning fine cotton yarn and for spinning wool by the late nineteenth century.
- Stamping:** In jewelry manufacturing, brass, copper, or steel is pressed between a die and a mold to produce a small detailed finding which is often the major component of the piece of jewelry.
- Studs:** A type of button with a shank on the back which was inserted through an eyelet in a garment; studs were used both for fastening and ornament.
- Teasel Cross Gig:** An innovative machine used in the napping process. Early teasels were the dried, spiny flowers of the teasel plant attached to a frame which were used to raise the nap of woolen cloth. Later teasels were made of metal and were attached to a machine called a gig.
- Tenter:** A frame with hooks (tenterhooks) along two sides which was used for stretching, evening, and drying woven cloth after it had undergone the dyeing, cleaning, or shrinking processes.
- Tenter Room:** A room or building in which the cloth is tented.
- Warp:** The threads extended lengthwise in the loom harnesses according to the desired design. Warp yarns must have a tighter twist than weft yarns because they are subjected to a greater strain in the weaving operation.
- Weft:** The yarns carried across the warp with a shuttle; also called filling yarns.
- Witch:** A loom attachment like a dobbie for weaving intricate patterns.
- Worsted:** Describing a kind of woolen yarn made from parallel strands of long-fibered wool. Cloth woven with worsted yarn usually has a smooth texture and a sheen. Worsted fabrics such as serge are still used for quality men and women's suits and coats. Types of worsted yarn include Saxony, Shetland, and zephyr.

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Fig. 71: Manufacturers Building (1892, demolished 1968); formerly at 101 Sabin Street.

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