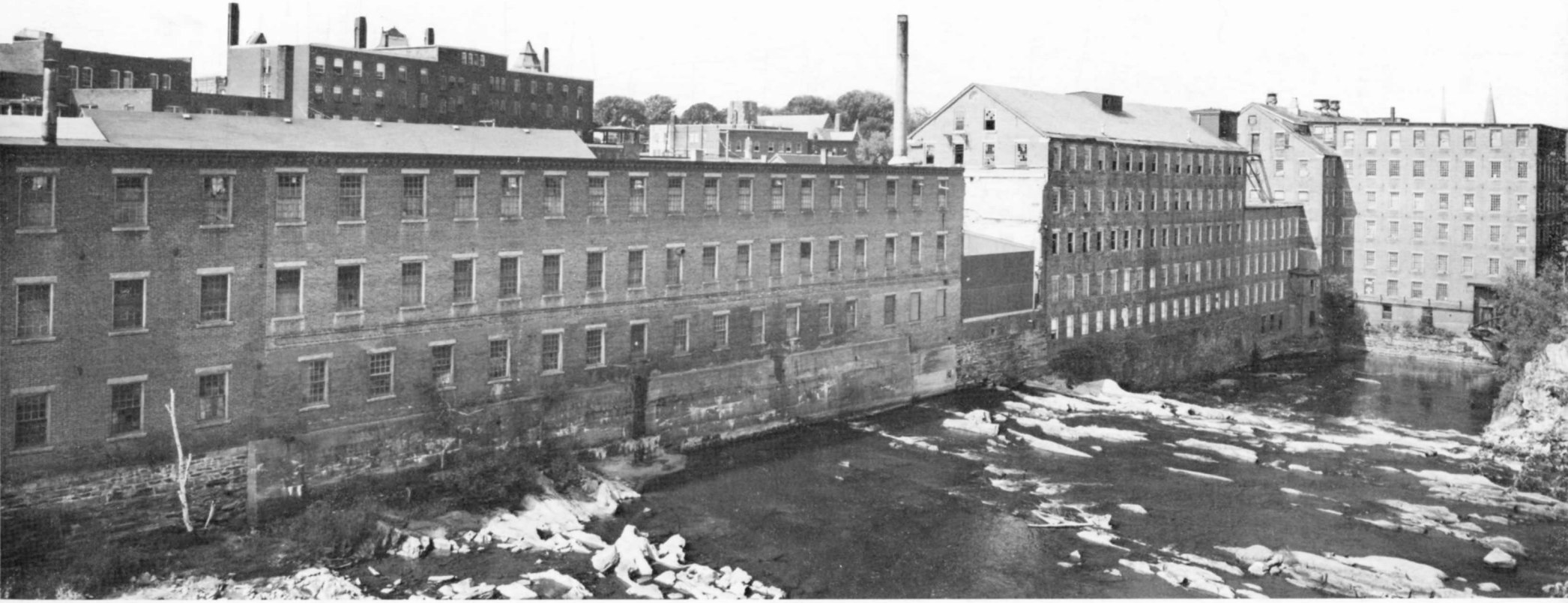
REHABILITATION: CLAREMONT 1978



Planning for Adaptive Use and Energy Conservation in an Historic Mill Village

REHABILITATION: CLAREMONT 1978

Planning for Adaptive Use and Energy Conservation in an Historic Mill Village

Heritage Conservation and Recreation Service
U.S. Department of the Interior
Washington, D.C. 20243

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This planning study was initiated by Douglas L. Griffin, Chief of the Historic American Engineering Record (HAER) to demonstrate the feasibility of rehabilitating historic industrial buildings and the effects of the historic preservation provisions of the 1976 Tax Reform Act.

The Claremont project was cosponsored by HAER and Technical Preservation Services (TPS), programs of the Heritage Conservation and Recreation Service, U. S. Department of the Interior, and by the U. S. Department of Housing and Urban Development. The city of Claremont, the National Center of Appropriate Technology (NCAT), and the U. S. Department of Energy also provided assistance.

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Heritage Conservation and Recreation Service
Philadelphia Regional Office

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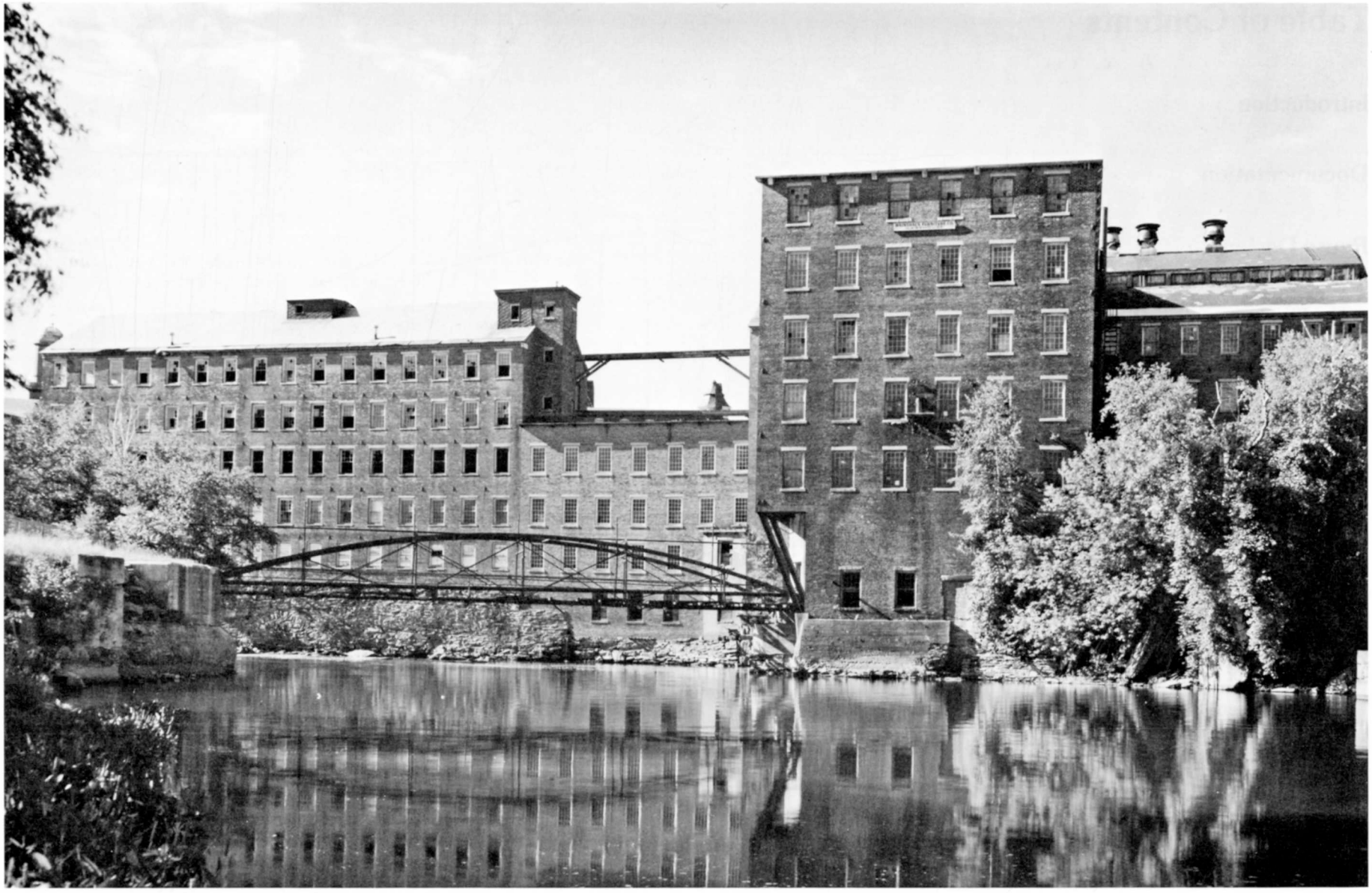
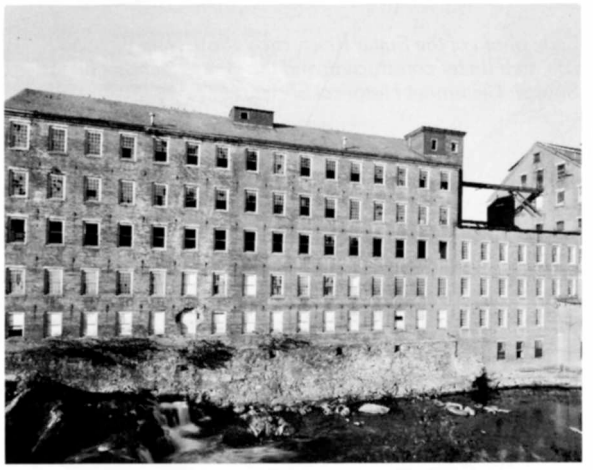


Monadnock Mills complex north facade, just above dam No. 3. Mill No. 1 is on the left, the wheel and pumphouse is the low building in the center, and Mill No. 6 is on the right. Mill No. 2 is behind Mill No. 6. *Photo: J. Lowe.*

Introduction

The Claremont project was conducted by the Historic American Engineering Record (HAER) in the summer of 1978. These projects documented underutilized historic industrial buildings, and suggested means by which some or all of these buildings could be adaptively used to take advantage of the historic preservation provisions in the 1976 Tax Reform Act. The Claremont field team consisted of historians, architects, community planners, an engineer and several architects specializing in energy conservation.



Monadnock Mill No. 1, north facade. Conservation problems studied by the Technical Preservation Service component of this project are evident in this view. Photo: J. Lowe.

The Claremont project was cosponsored by HAER and Technical Preservation Services (TPS), programs of the Heritage Conservation and Recreation Service, U. S. Department of the Interior, and by the U. S. Department of Housing and Urban Development. The city of Claremont, the National Center of Appropriate Technology (NCAT), and the U. S. Department of Energy also provided assistance.

The four components of the project were: documentation, reuse design, building conservation and energy potential. The documentation section produced historical data and professional photographs on the "Claremont Village Industrial District," and measured architectural drawings on selected sites. The reuse design component examined the local private market conditions, and prepared an economic and architectural analysis of the potential for reusing the buildings in the district. The energy component considered the potential for solar and hydroelectric power in the reuse of historic buildings, and the building conservation section evaluated modern weatherization techniques in the rehabilitation of historic structures.

Site Description and History

Claremont is located in the western portion of New Hampshire, approximately 50 miles north of the Massachusetts line. The town is bounded on the west by the Connecticut River, New Hampshire's mutual boundary with Vermont. Claremont lies some five miles east of the Connecticut on a small tributary, the Sugar River.

The Claremont Village Industrial District, situated on both sides of the Sugar River, is approximately one mile in length, varies in width from one eighth to one half mile, and forms the core of the town's urban area.

The Claremont region is characterized by rugged terrain, and some of the highest and most scenic mountain ranges on the eastern seaboard. But because of its industrial background, the inherent qualities of Claremont's setting and historic mill structures have been generally overlooked. However, its decidedly urban character, on a small scale, set in a rural context, makes it a unique town.

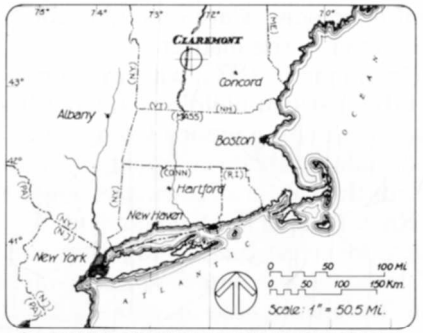
The physical characteristics of the district, taken as a whole, are exciting. There is visual drama in the architecture of the buildings, in the spaces they define, and in the topography of the setting. The wide variety of forms and details in the district, responses to various demands of early industrial processes, are both historically significant and architecturally impressive. The Sugar River, which cuts a gorge through the district, amplifies and enchances that appeal. The visual sweep of the river corridor, combinations of hard and soft edges created by facades of structures abutting it, and the adjacent open spaces are crucial to the historic character of the district.

The district began in 1836, with the construction of the first two buildings in what became known as the Monadnock Company. Sensing that industrial development was moving away from the center of town and down the Sugar River toward the Connecticut, a group of local investors banded together and built a mill building and boarding house on speculation. They were able to attract a Boston firm to purchase and use the buildings. The firm, calling itself the Monadnock Company, produced textiles on the site until 1932. In the process, the company built an additional fourteen buildings for a variety of purposes. Fortunately, only two buildings have been lost: one of the two original overseer houses and a portion of the cloth room bulding adjacent to Mill No. 1. The remaining buildings are a rare surviving example of a substantially complete early New England textile manufacturing complex.

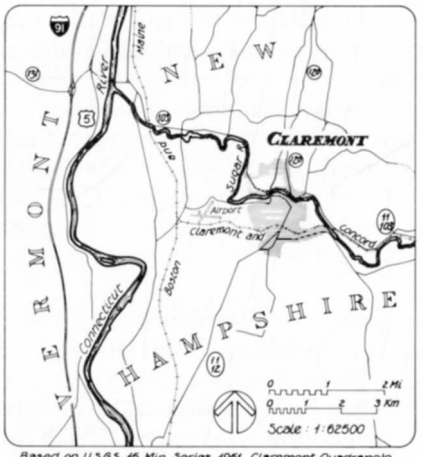
The Monadnock complex is one of two important groups of buildings in the District. The other is the Sullivan Machine Company complex, which began in 1868 around the diamond core drilling inventions of Albert Ball, and the busy machine works of J. P. Upham. In 1888, Ball and Upham built a two-story brick building to house their works. This building was altered and expanded ten times between 1899

CLAREMONT VILLAGE INDUSTRIAL DISTRICT

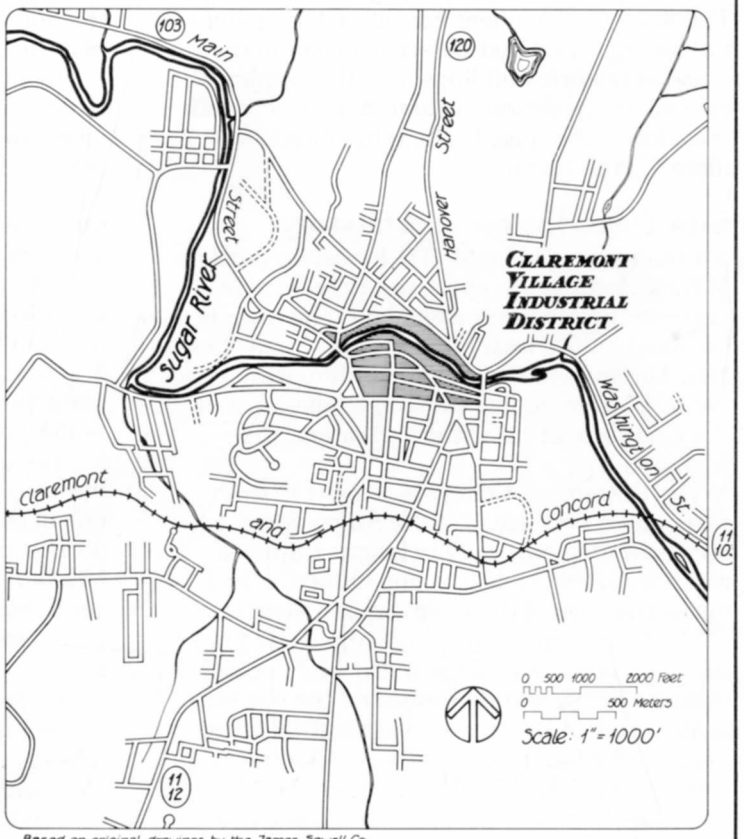
CLAREMONT, NEW HAMPSHIRE



Based on U.S. Geological Survey, The National Atlas of the United States of America, 1970, Maps p.7 and p.9.



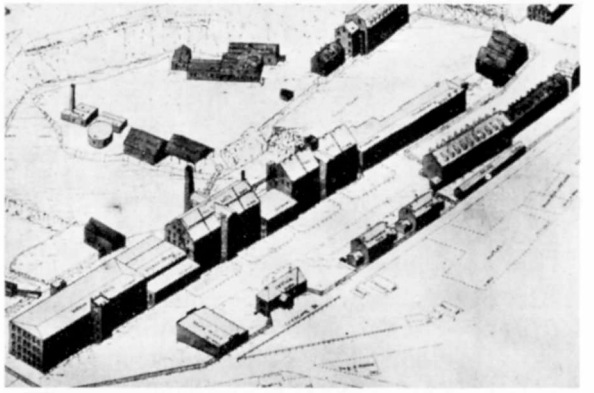
Based on U.S.G.S. 15 Min. Series, 1951, Claremont Quadrangle. UTM Reference: 18 715000.4805725 to 18 715750.4805575 along the Sugar River



Based on original drawings by the James Sewall Co.

Claremont's Regional Location. Delineator: R. Anderson.

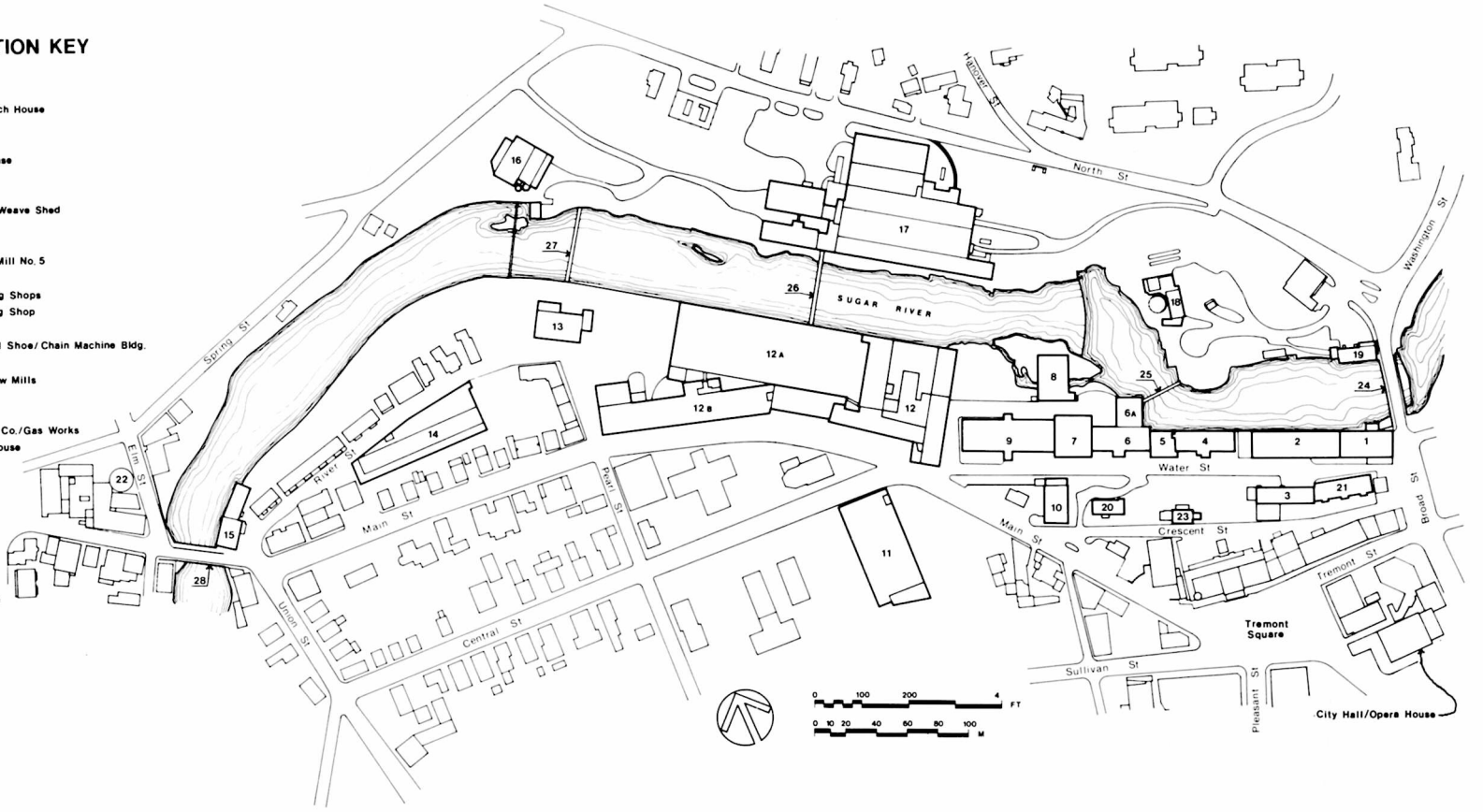
Early photo of the Sugar River, circa 1865. Note the wood crib dam under construction and the iron suspension bridge. Source: Claremont Historical Society.



Insurance company drawing of the Monadnock Mills Complex. Such documents were important sources of information for the historians' reports. Source: Joy Manufacturing Company.

SITE IDENTIFICATION KEY

SITE NO.	HISTORIC NAME
1	Bleach House
2	Cloth Room/Old Bleach House
3	Boarding House
4	Mill No. 1
5	Wheel and Pump House
6	Mill No. 2
6A	Mill No. 6
7	Cotton Wastehouse/Weave Shed
8	Weave Shed
9	Mill No. 3
10	Cotton Warehouse/Mill No. 5
11	Forge Shop
12	Machine and Erecting Shops
12A	Machine and Erecting Shop
12B	Machine Shop
13	Rubber Mill, Maynard Shoe/Chain Machine Bldg.
14	Warehouse No. 34
15	Sugar River Grist&Saw Mills
16	Power Plant
17	Foundry
18	Claremont Gas Light Co./Gas Works
19	Sunapee Mill/Storehouse
20	Office
21	Tenements
22	Freeman&O'Neil
23	Overseer's House
24	Broad St. Bridge
25	Iron Bridge
26	Foundry Bridge
27	Covered Foot Bridge
28	Lower Village Bridge



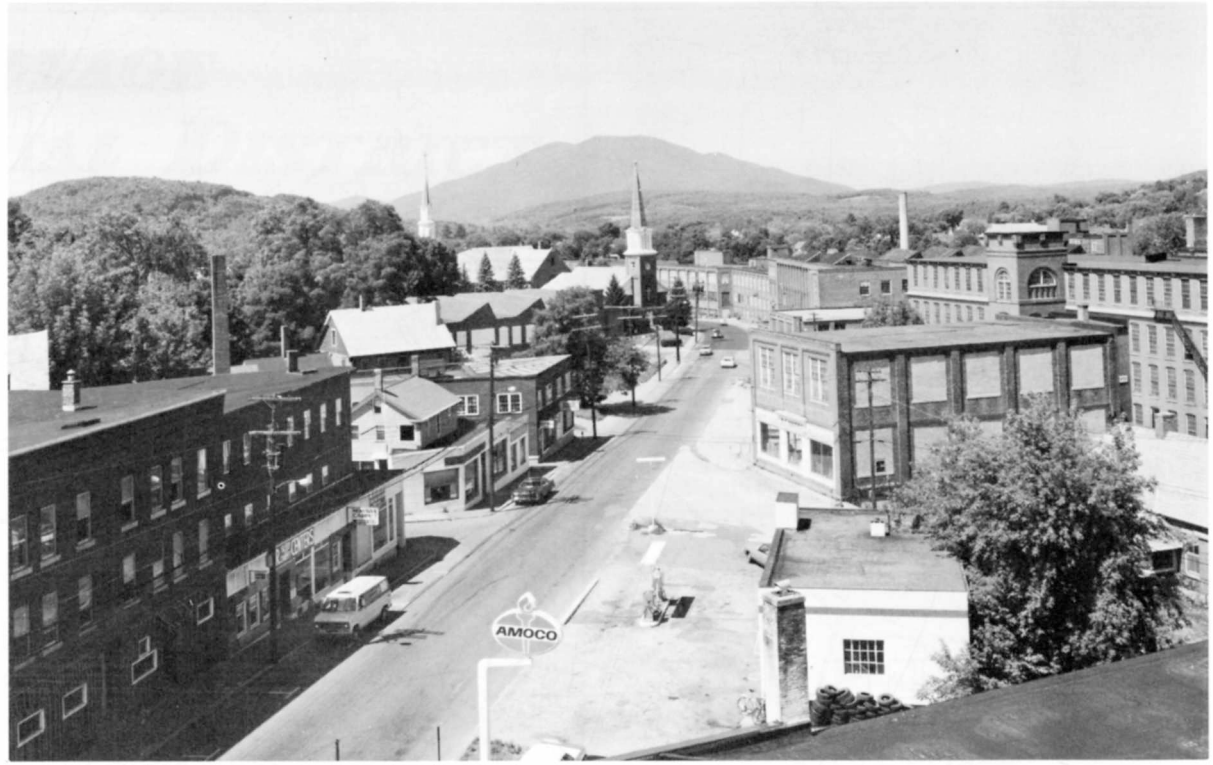
Claremont Village Industrial District.

Delineator: D. Stevenson

The river falls 65 feet between the Broad Street and Main Street Bridges. In the lower right is Tremont Square, the hub of the central commercial district.

and 1910. The company also erected machine and erecting shops, warehouses, a forge and a massive foundry on the north side of the river. In 1946, Sullivan merged with other firms to become Joy Manufacturing Company. The Joy Company is the largest employer in Claremont, but it has vacated nearly all of its original buildings in the District. During a hectic period of development just after the turn of the century, tenements and warehousing were constructed at the western edge of the District. Here, industrial buildings merge with the housing of "The Lower Village," a residential area which has traditionally been home for immigrants working in the industrial district. There was little concern for the close proximity of such differing uses, except to provide housing for the workers pouring into town and storage space for the goods produced. The warehousing has been vacated by its original owners,

The Monadnock Mills Complex, circa 1870. Source: Claremont Historical Society.



Western view of Main Street from Moody Building at Tremont Square. The Connecticut River Valley and Mount Ascutney, Vermont, are in the distance. Photo: J. Lowe.

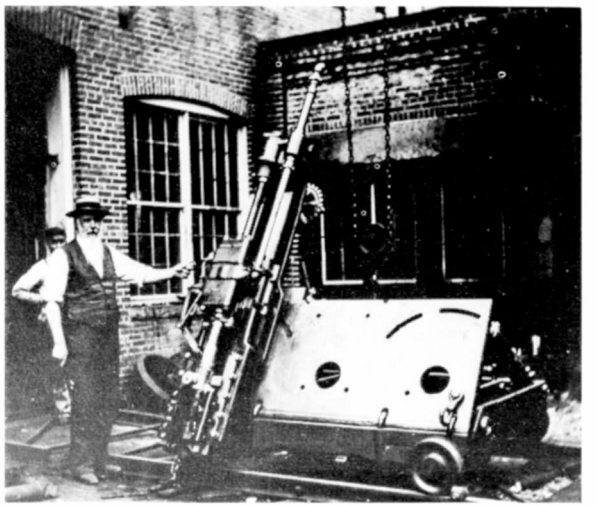
and the housing has been rented to transient populations.

In 1855, construction of the present Sugar River Grist and Saw Mills was begun at the junction of the Sugar River and The Main Street bridge. There have been mills on this site since 1785, historically the western gateway to the town. The area of this intersection continues to be a significant public space in the lower village. The integrity of its historic character is substantially intact with most original 19th century structures extant.

In Claremont, history has come full circle. A group of businessmen have banded together to focus on the underused industrial district. They have seen industrial development and businesses move to the edge of the city and beyond. This group sensed the meaning of Claremont's historic industrial area and they have attempted to find means to attract new businesses to the center of the city, and to return the core to a vital, meaningful, area. It is this aspect of the HAER/TPS work upon which this report focuses.

Sugar River at low water. At these falls was Dam No. 2, removed in 1927. Monadnock Mills clothroom building is on the right. *Photo: J. Lowe.*

The eastern portion of the Monadnock Mills Complex as it looked at the time of the HAER TPS study. Note the changes to the pumphouse between mills 1 and 2, and the tower of mill 2. Photo: J. Lowe.



Albert Ball, mechanical engineer for the Sullivan Machinery Company for nearly 50 years, with an early diamond channeler. Ball held over 130 basic mining equipmen patents which increased mine production all over the world and revolutionized the production of coal fuel. Source: Claremont Historical Society.

River Street tenements and the Sullivan Machine Company warehouse (Site 14). The railroad tracks are still in use and trucks carry industrial goods on this street. Photo: J. Lowe.

The original Monadnock Mills boarding house (brick structure), 1836–1839. The wooden tenements beyond were constructed in 1870, and moved to this site in 1892. Photo: J. Lowe.

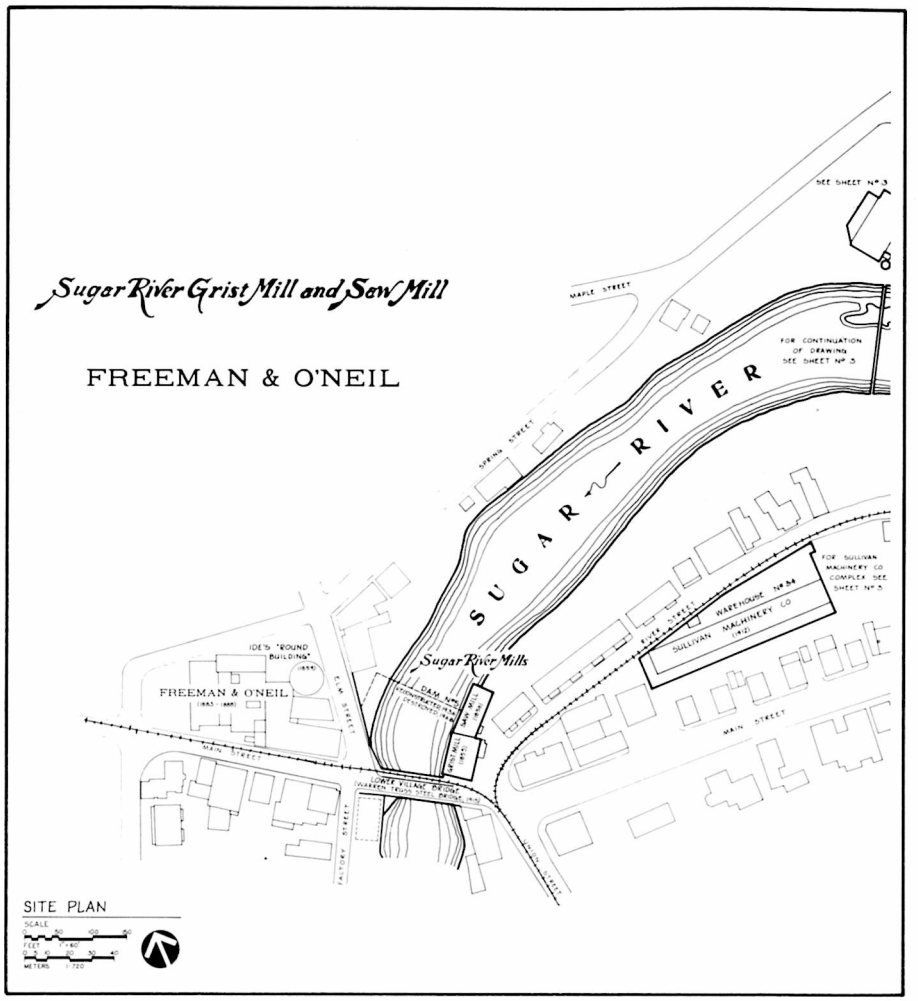
The original Office and Machine Building of the Sullivan Machinery Company, built 1888. The present Main Street facade is the result of remodeling and the addition of two floors in 1919. This building is part of Site 12 in the project plan.

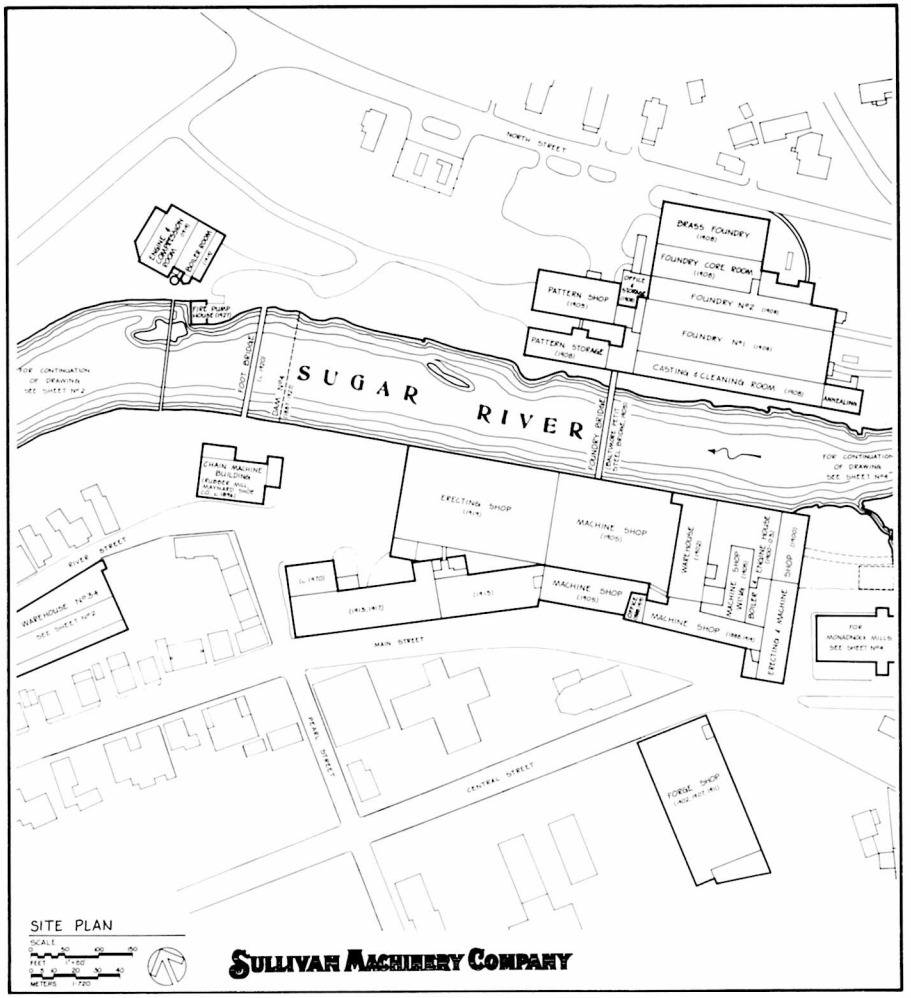
Source: Claremont Historical Society.

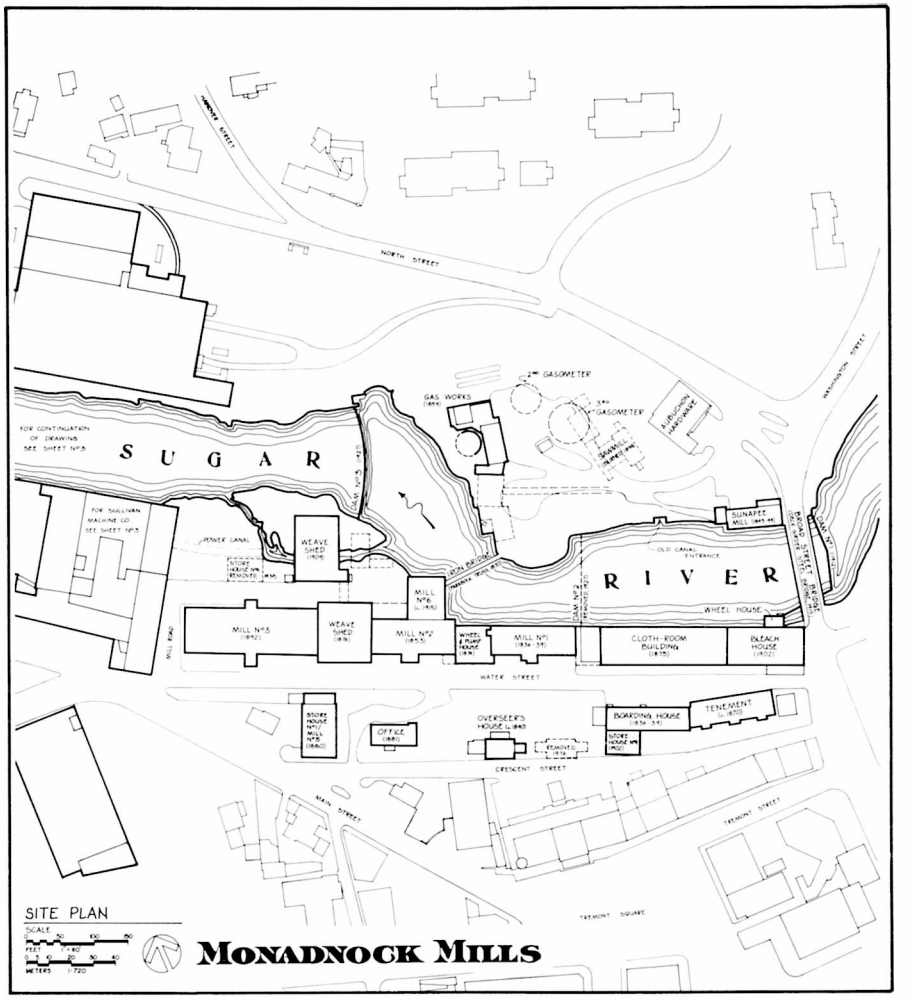
Documentation

The documentation portion of the study at Claremont produced an in-depth investigation of two of the most historically important industrial buildings in the city. It incorporates record drawings, record photographs, and written histories on the two structures. Mill Number One of the Monadnock Company was the first brick mill structure along the Sugar River in Claremont. It also represents a significant contribution to the evolution of the built environment in Claremont, since it was constructed by the citizens of the town in a successful effort to keep industrial development in the downtown area.

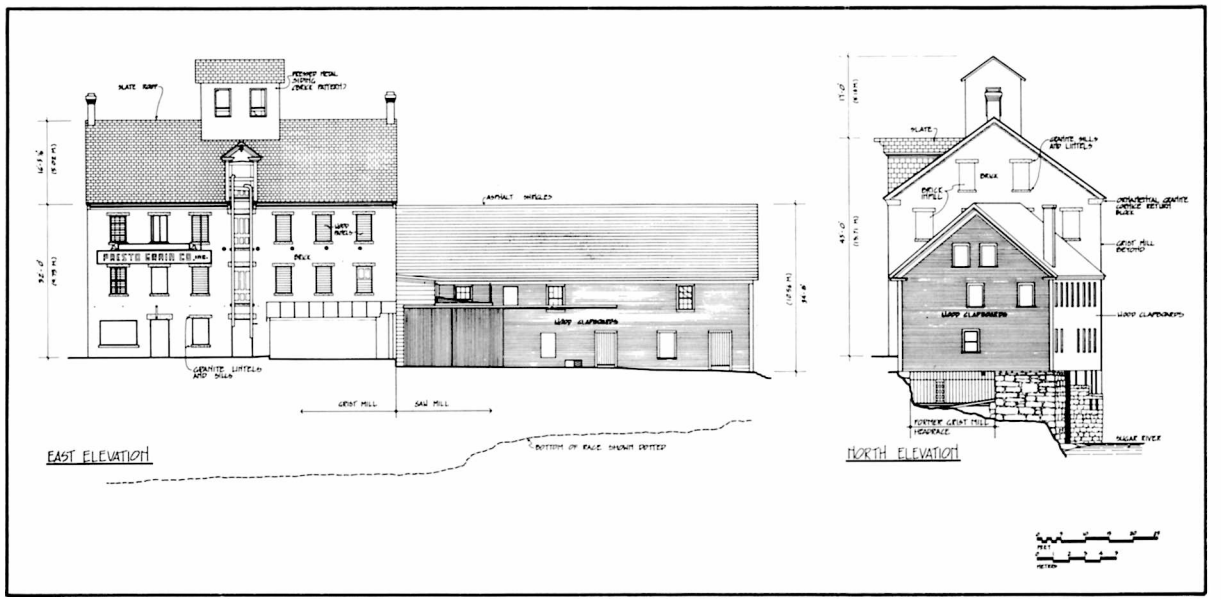
The Sugar River Grist and Saw Mill stands on the site of a grist and saw mill built by the first settlers of Claremont. It was constructed under the supervision of John Tyler, the inventor of the Tyler turbine waterwheel.



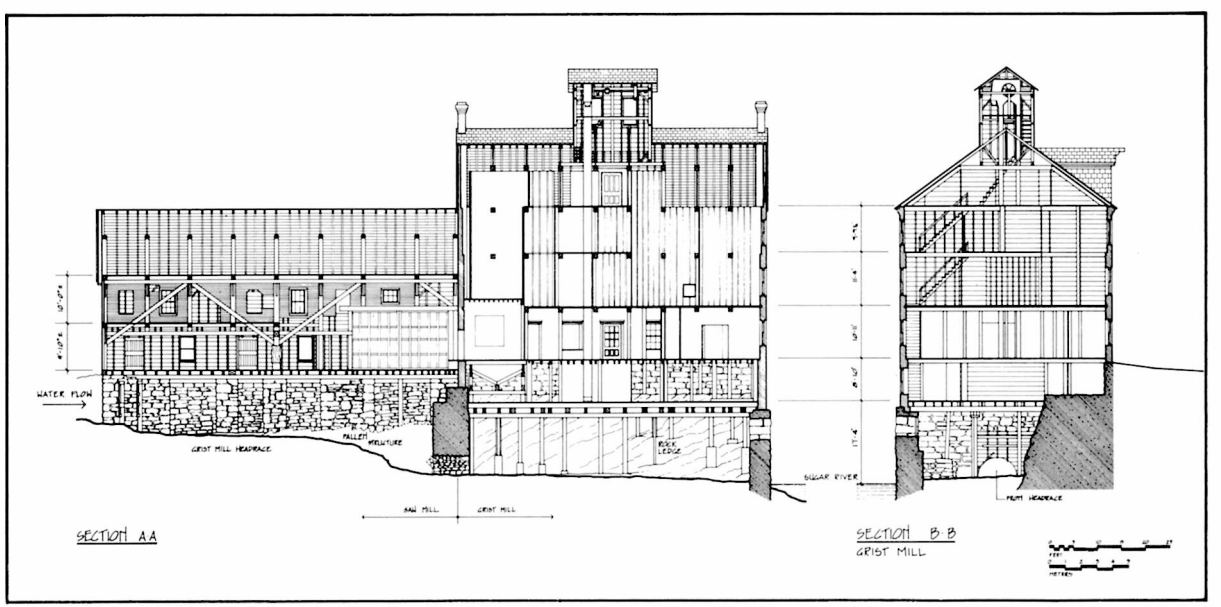




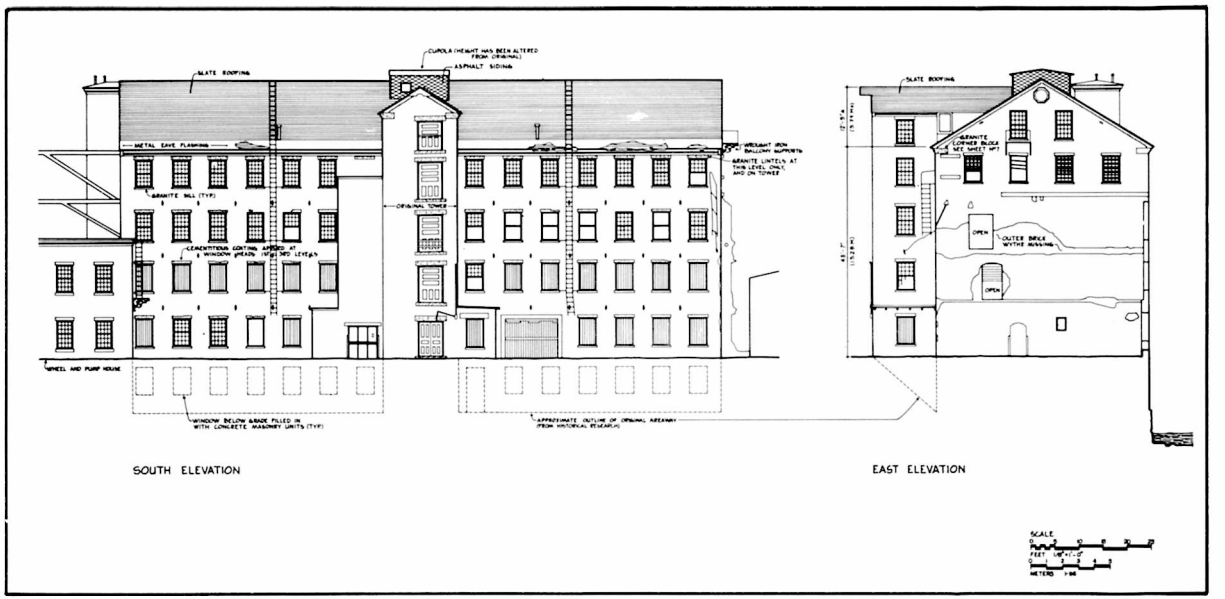
Historic site plans of the Claremont Village Industrial District. Historians researched each building to document its date of construction, original use, and significant changes and additions.



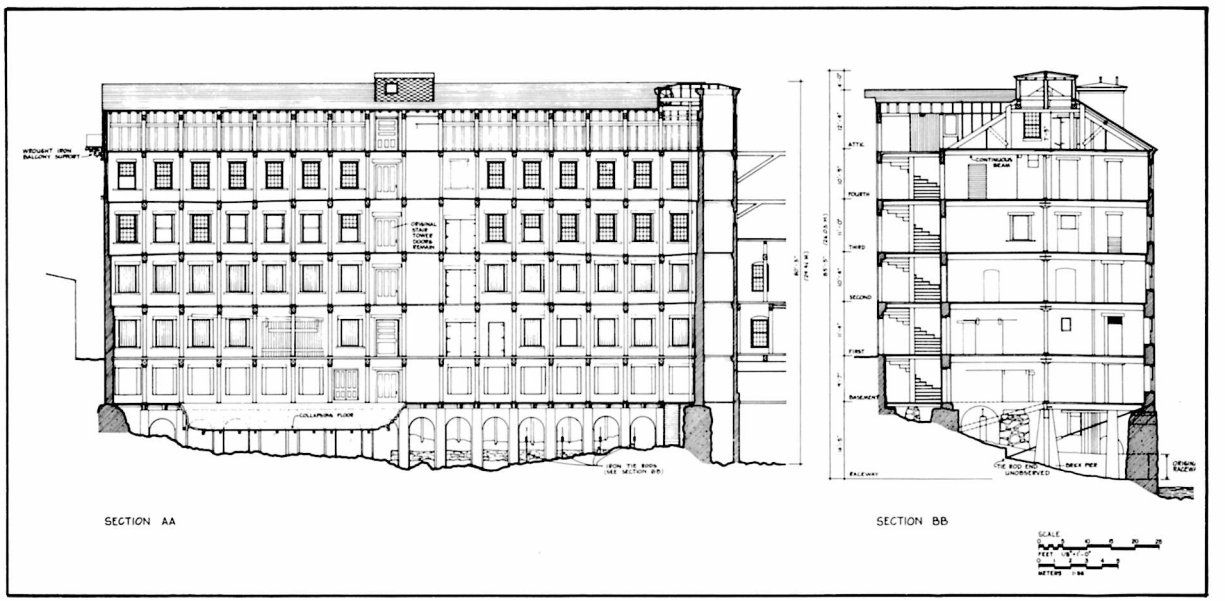
Elevations of the Sugar River Grist and Saw Mills. Delineator: R. Arnold



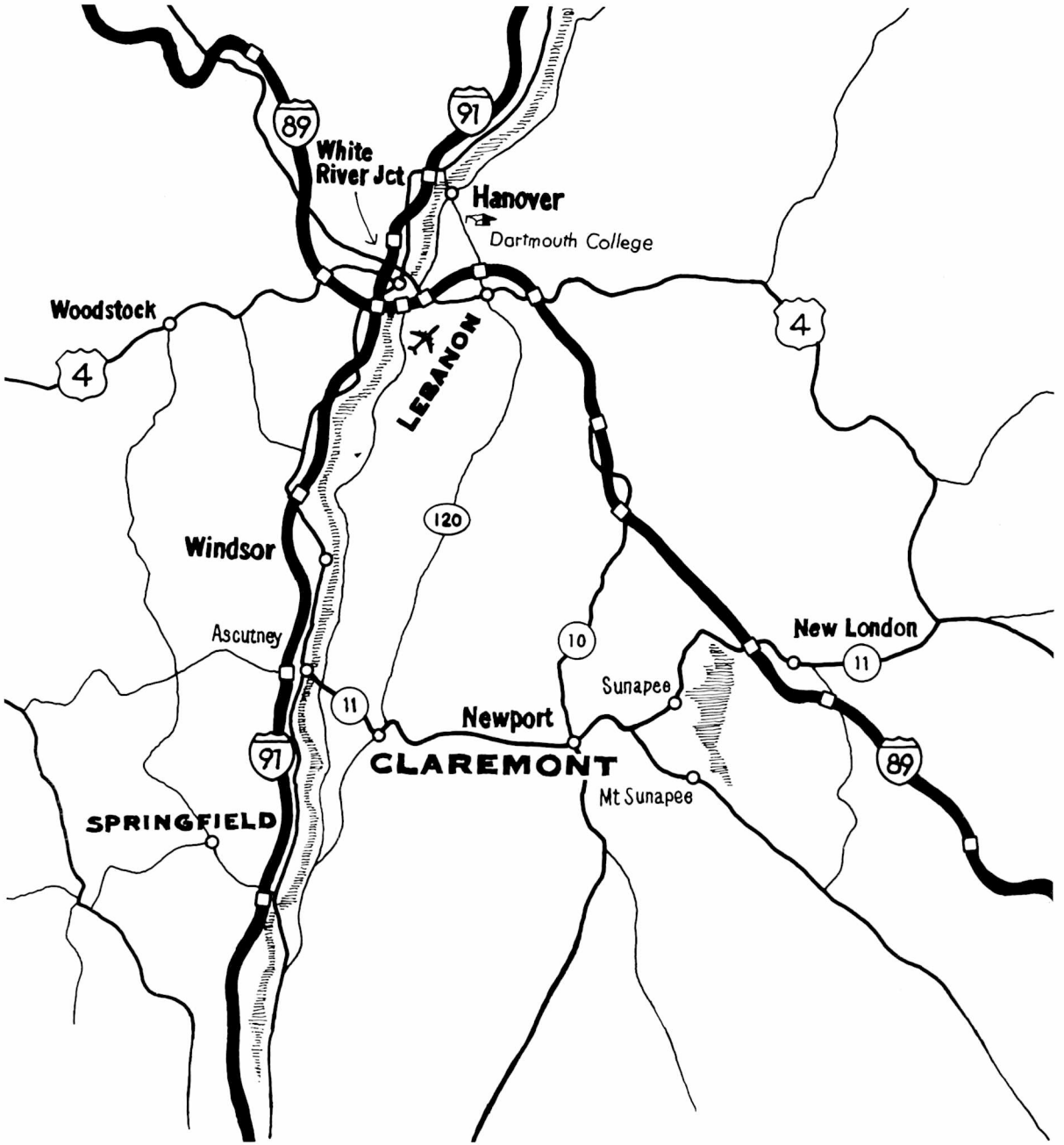
Sections of the Sugar River Grist and Saw Mills. Delineator: R. Arnold



Elevations of Monadnock Mills: Mill No. 1. Delineator: H. Fraser.



Sections of Monadnock Mills: Mill No.1. Delineator: B Cohen



Claremont is situated in the Upper Connecticut River Valley near the junction of two interstate highways.

Reuse Design

Reuse design in the Claremont study involved the production of a plan for preservation of the industrial structures in the Claremont Village Industrial District through adaptive use. The reuse design is predicated on an analysis of the regional economic market for commerce, offices and residences. At the same time the market studies were being conducted, examinations were made of the buildings to be considered for adaptive use relative to structural conditions and make up, floor areas, floor to ceiling heights, and other architectural and site information necessary to an adaptive use program for the buildings. The plan is a result of the correlation of the market analyses with architectural examinations.

The Market

The rehab action projects of the Historic American Engineering Record demonstrate the feasibility of private, commercial redevelopment for historic industrial structures. Studies to develop practical uses analyze the private market potential. In a case like Claremont, where so much of the space is unused or poorly used, the planning process also identified ways in which the public sector could occupy and/or promote private interest in the buildings.

Claremont's commercial market analysis was divided into five categories: industrial, retail, office, residential, and tourism. The potential for development in the Claremont area within those categories was determined for the present and the near future. An attempt was also initiated to identify special or unusual markets that might find the historic character or the size of the spaces an advantage.

Data Limitations

The results of market analysis varied. The team attempted to gather statistical informa-

tion whenever possible. However, in certain instances, such data was not available. Industry, because of jealously guarded trade secrets, does not readily give out information on space needs. For some purposes, the states of New Hampshire and Vermont do not gather useful information from which to make statistical market examinations. Because of the lack of sufficient hard data, the planners placed more than usual reliance on subjective information provided by knowledgeable persons and agencies within the public and private sectors of the New England area, such as the New Hampshire State Industrial Development Authority.

The Industrial Economy

Claremont's economy is related to trends in New England as a whole, to special attributes the government of New Hampshire offers, and to the nature of the so-called "Precision Valley" in which the city is located. The economy of the region hit a low during the 1973–74 recession. Since then, the governments of New England states have actively courted industries which would be least affected by the region's high energy and transportation costs. Some of those newly recruited firms are able to tap the region's high degree of technical knowledge and research capabilities.

Growth Rate and Tax System

New Hampshire is the fastest growing state in New England and is reputed to be the second fastest growing in the nation. The clearest reason for New Hampshire's growth is its tax structure. No sales or income taxes are levied, and business taxes are relatively light. Considering the concern over taxation, as reflected in the passage of California's Proposition 13, it is reasonable to assume the New Hampshire government will not drastically alter the tax system in the near future, and therefore New Hampshire will continue to attract new business.

The Southern Tier

At the present time, the "southern tier", "that part of the State closest to Massachusetts and the Boston area, has received the major share of the new growth. However, large parcels of land appropriate for industrial development are becoming scarce in this part of the state. This process of "filling up" is forcing prospective clients to look elsewhere in the state for industrial locations.

Claremont's Setting

Claremont could participate in New Hampshire's growth. However, the State Industrial Development Authority looks on Claremont as a remote area. The Lebanon/White River Junction area, 20 miles north of Claremont, has experienced recent industrial growth. This region has scheduled air service, a prestigious university, and is located at the junction of two interstate highways (I–89 and I–91), factors which do not exist at Claremont. However, since these regional amenities are not far from Claremont, they should be a positive factor in attracting new businesses.

Like the "southern tier," Lebanon is approaching a saturation point in industrial growth. Since Claremont is known to have a skilled labor pool, it is logical to assume the growing industrial market could become interested in the Claremont area.

Existing Employment Situation

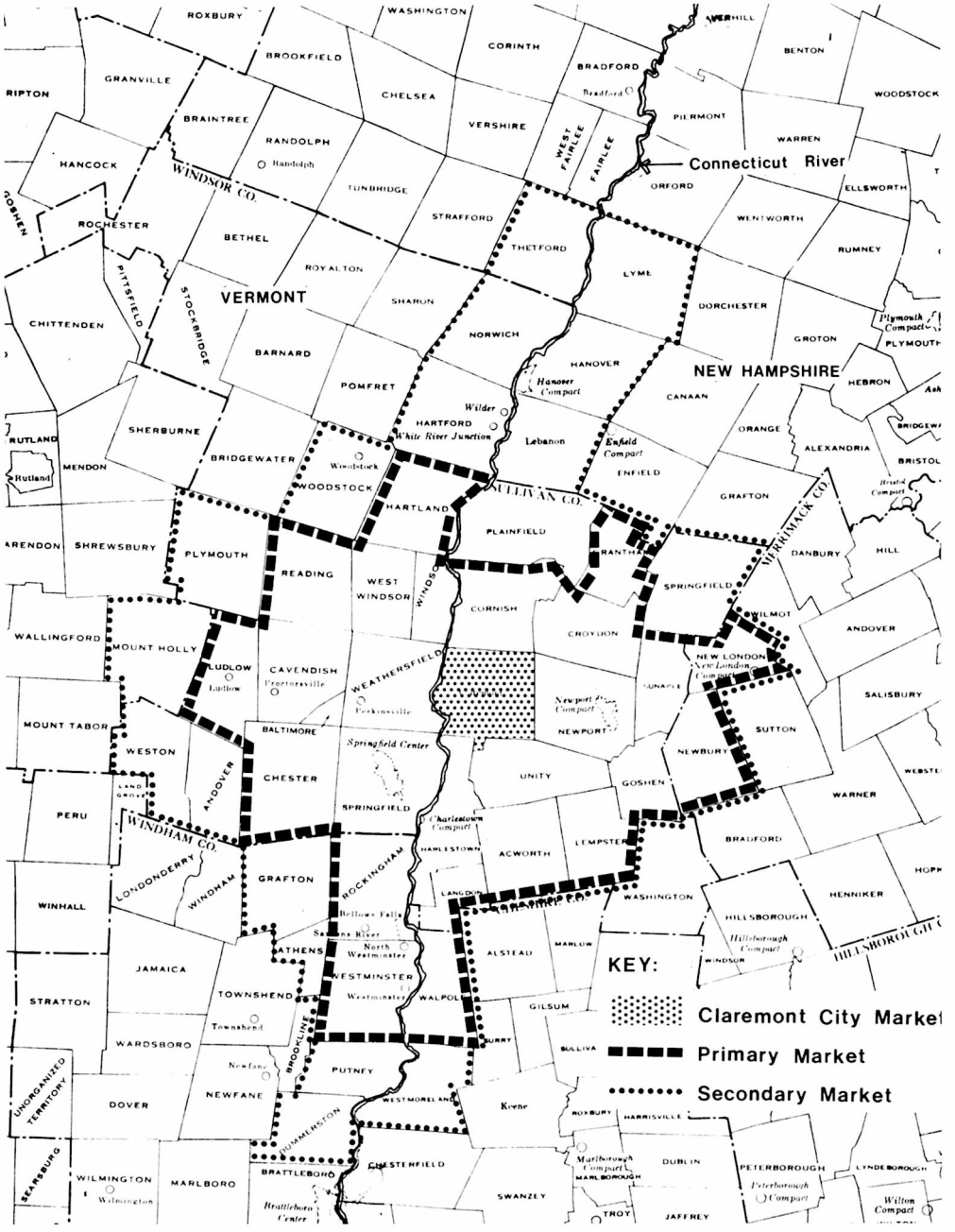
There are nine firms in the city employing more than 50 people, or a nine-firm total of 2,035 employees. Within the past two years, one new major employer has moved to Claremont. Hourly wages are relatively low in Claremont and range from averages of $2.81 for benchwork and $2.98 for domestic service to $4.32 for professional, technical, and managerial help. Because of the low wages, people tend to hold more than one job, and several members from one family will often hold jobs. The unemployment rate in the city is reported to be 2.5%. The "labor force" in New Hampshire, however, is defined differently from most states. Because of this, there are likely to be people who are unemployed, who would be interested in working, and would normally be regarded as part of the labor force, but are not considered as a part of the New Hampshire labor market because they are not registered with the employment security department. Also, there is substantial underemployment, that is, employees working below their level of competence. This underemployment appears to be especially prevalent among persons who have the education suitable for clerical and management training. The New Hampshire Vocational/Technical College, located in Claremont, could be used to provide many of the necessary training programs.

New Businesses

Because of the previously mentioned focus on the Southern Tier, predicting firms that might find Claremont attractive is not easy. Projections are based upon information about the kinds of industrial businesses that have moved into New Hampshire since the 1973–74 recession and knowledge about the kinds of spaces available in the mill buildings. They indicate that new industries would most likely come from electronic assembly, machine tool industries, and woodworking businesses. One other factor which may have some bearing on the industrial potential of Claremont is the four-season tourist and recreational region in which the city exists. As yet, few recreation-related businesses have made use of the potential to locate in areas close to the recreation market. This situation appears to be changing, however, and Claremont could benefit because of its central location.

Machine Tool Skills of The Precision Valley

Claremont is also located in the "Precision Valley," an area which historically has a worldwide reputation for the manufacture of



Claremont's Regional Trade Market Area.

precision machine tool parts. The workers in Vermont and New Hampshire are known for their precision skills, adaptability, and strong work ethic. Changes in the automobile and other industries in the U. S. and abroad have caused a startling growth in the industries of the Precision Valley. Claremont already enjoys a share in the machine tool industry with the Joy Manufacturing Company. Claremont also exports workers to the several centers in Vermont at Springfield, Ludlow, and Windsor. It is likely that Claremont will share in the continued growth of this particular activity.

Retail Market Analysis

Regional Trade Market Area

Previous studies indicate that people in this section of New England tend to drive 30 minutes or more for normal weekly shopping goods. A basic trading region for Claremont was first described by a 30 minute time line. This region was modified to reflect the lack of competing retail centers to the north and west of Claremont and the extensive competition of the larger cities to the southeast.

Retail Supply

There are approximately 3,062,000 square feet of existing retail space in Claremont's trade area. Of this, approximately 350,000 represents shopping center development in the market area. The remaining commercial space is in central business districts of small communities and isolated retail establishments. Few major shopping centers (i.e., 100,000 or more square feet) have been developed in the market area. New development has emphasized individual or small shopping center discount retail outlets, which appeal primarily to the low income segment of the market. Some quality shoppers' goods are offered in small stores in the downtown business districts of towns such as Claremont, Hanover, and Woodstock, but shopping for variety and quality

merchandise is largely done out of the market area.

Competition

Traditionally, Claremont has served as a major retail center for the market area. Substantial development of a quality goods trade in Concord and Manchester to the southeast provide major competition to the Claremont market. The Keene region, due south of Claremont and slightly out of the market area, has a considerable number of lower quality shopping goods stores, similar to the development around Lebanon, which is in the Claremont trade area. Thus, development in Keene would not affect the marketability of Claremont as a quality shopping center.

Quality merchandise and variety provided by major retail malls in the Manchester and Concord area currently attract many retail dollars away from the Claremont market area. New outlets in the Lebanon/White River Junction area are becoming a major competing force by providing similar retail goods to those found in Claremont. Thus, competition from the northern part of the market area is a critical component of the market area analysis. At this point, little major development has occurred in the entire market area. If such development were to happen to the north, Claremont would lose important ground as a potential retail center. It is thought that the city achieving a retail breakthrough will become a dominant force in this market. Many of the retail dollars are spent outside the market area because those goods and services are unavailable near Claremont, and the potential exists to capture some of those dollars.

Retail Development Potentials

There is sufficient retail demand in the Claremont market area to support the development of an additional 730,000 square feet. The current lack of retail development activity suggests the demand will continue to grow in the near future. In addition, it appears that Claremont could benefit most by the development of a quality shoppers' goods center, since the market area is minimally served by major regional shopping centers which provide such goods. It is estimated that 23% of retail expenditures in the market area are spent on shoppers' goods, but most of this occurs outside the Claremont market area.

Estimated Supportable Shoppers' Goods Space
All Dollar Amounts in Thousands of 1972 Constant Dollars

	Rate of Capture	1980 Sales	Square Feet	1990 Sales	Square Feet	2000 Sales	Square Feet
Claremont	90%	8,577	94,258	13,043	143,329	17,526	192,593
Primary Market	35%	17,392	191,120	29,264	321,586	39,846	437,868
Secondary Market	15%	1,327	14,583	2,007	22,054	2,472	27,164
Total		*$27,296*	*299,961*	*$44,314*	*486,969*	*$59,844*	*657,625*

Estimated Supportable Convenience Good and Retail Services Sales
All Dollar Amounts in Thousands of 1972 Constant Dollars

	Rate of Capture	1980 Sales	Square Feet	1990 Sales	Square Feet	2000 Sales	Square Feet
Claremont	90%	9,696	80,800	11,812	98,433	14,930	124,416
Primary Market	15%	8,426	70,216	11,358	94,650	14,547	121,225
Secondary Market	5%	500	4,166	606	5,050	701	5,842
Total		*$18,622*	*155,182*	*$23,776*	*198,133*	*$30,178*	*251,483*

Office Market

Market Area

Six towns in the Claremont market region: Claremont, Hanover, Lebanon and Newport, New Hampshire, and Springfield and White River Junction, Vermont, provide the office needs for the area. The office requirements of the region at this time are small, limited almost exclusively to industry-related needs and local government use. These two groups adequately provide for their own space requirements. Doctors, lawyers, and real estate offices use ground floor locations, or operate from private homes, and thus, the present new office demand is estimated to be nonexistent.

Potential Office Market

It is possible to develop a market in the region if certain types of industries are attracted to the area. There is a sufficient labor force to fill many of the clerical positions required by an office-using employer. Many large office-using industries prefer a park-like setting because it provides open green spaces for the benefit of employees and clientele.

In addition to specific design requirements for the office space, local social, political, educational, and cultural factors affect office locations. A current trend is for firms to locate in areas with a small town environment. The quality of life in and around the community influences the decision to locate there. College towns or communities near a college, for instance, are particularly attractive locations. The housing and retail market must be able to provide the goods and services needed by employees of new office industries.

Cultural and recreational amenities are available near Claremont. Housing sites in and around the town are attractive. With the natural amenities at hand, Claremont offers a marketable environment for new office uses. With a growth in the retail facilities, as suggested above, Claremont would make a prime market.

Development of Office Potential

It has been estimated that the Claremont market area should be able to attract a 50,000 square foot office complex, which would employ 200 to 250 people. Such an office is the average size of insurance companies relocating in New Hampshire. While some employees would relocate with the industry, the majority would be hired from the existing labor force in the market area.

A major emphasis should be made by the city to attract specific types of industries which require large office space, such as insurance or banking companies. As has been mentioned, Claremont has the potential to supply the necessary amenities for a major office-user. In addition to the benefits the district has to offer, a readily adaptable structure would be available on short notice in the mill complex. To make the overall proposal more interesting to a potential large office-user, the city could provide incentives such as reduced taxes, free or low cost land, and training programs.

Housing Market Analysis

Regional Housing Market

In northern New England, people live as much as 45 minutes from their places of employment, a phenomenon true for middle-income and lower-income groups. Theoretically a housing market based on that 45 minute radius could be developed around Claremont. There is an increasing demand in the Upper Connecticut River Valley for second-houses and retirement homes in natural environments. At the same time, new industry and business establishments have created an increase in population around the Lebanon/White River Junction area. These two activities and a decrease in the new housing stock have resulted in a scarcity of housing available to middle income families. It is logical to assume that some of the middle-income market demand will shift to the south and into Claremont where the cost of housing is relatively low.

Claremont's Share in the Region's Residential Growth

The dense land-use pattern and urban character of the Claremont Village Industrial District is a good example of 19th century industrial development in the northeastern United States, and the fact that many of its components have survived is fortunate. For this reason, however, the city does not evoke the traditional image of the rural New England town nestled around a village green, the kind of image which has become popular with tourists and summer residents.

The working class nature of Claremont is not a drawback for establishing a business or shopping place. But the mill district will probably appeal to a limited number of new residents, those who come to the city because of the industry, and who wish to live closer to their work.

This appeal could grow, and more people might be interested in Claremont as a living environment, if the mill structures were returned to active use. Changing energy requirements will also affect lifestyles. More people might want to live close to their work.

Claremont's Housing Needs

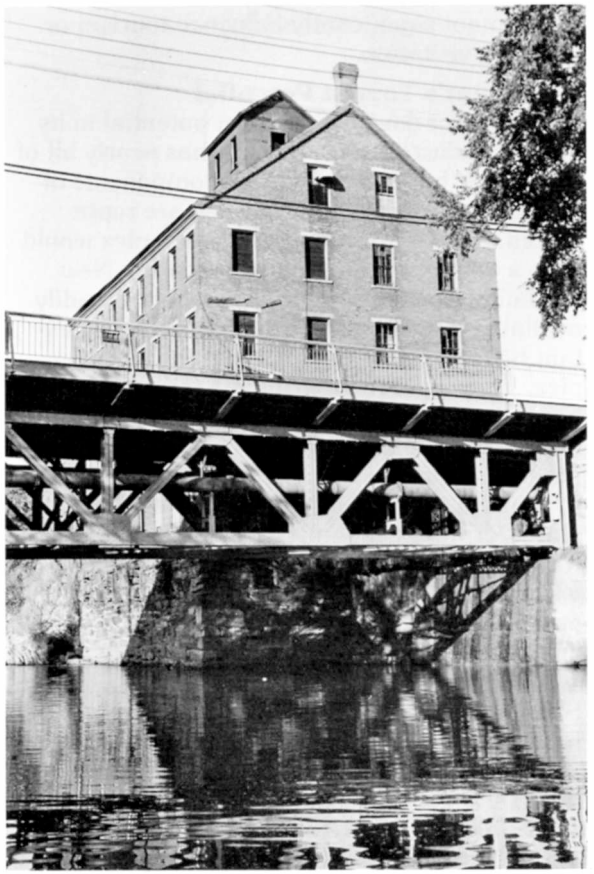
In 1970, the Upper Valley, Lake Sunapee Regional Planning Commission identified a housing deficiency for the city of Claremont of 92 units. Expanded population, a decrease in the number of persons per unit, a decrease in the number of housing starts per year, and the construction lag from the 1973–74 recession suggest that the present deficiency is even greater. However, the 92 unit deficiency represented only 4.6% of the total 1970 stock, and the city has identified the deficiency as existing almost solely among the city's low-income groups. Therefore, the present market is very small. The future housing market is related to growth in the city's population, and to the need for subsidized housing.

Subsidized Housing Market

When the HAER team arrived in Claremont, the city had already embarked on a program to assist its low and moderate income families. It had identified the needs for these groups, the form of assistance they required and had constructed or planned subsidized units for elderly and handicapped persons. Although there are still elderly and handicapped households in Claremont needing public assistance, the regional H.U.D. office suggested that the needs of large families also be considered. During the course of this study, an attempt was made to identify suitable locations in the mill buildings for large families.

Middle Income Market

Housing for middle-income residents was recognized as a possible use for several of the mill buildings. The need for this type of housing was projected using data from present demands of the middle-income households in Claremont, and a middle-income market was



The present Main Street Bridge is a riveted warren deck truss with vertical web members built in 1915 by the Boston Bridge Works. There has been a bridge on this site since at least 1824. The Sugar River Grist Mill is in the background. Photo: J. Lowe

This 103-foot span Mosely wrought iron bowstring arch-truss bridge erected in 1870 carried employees and materials along with steam heat and gas lines. It is valuable as a rare surviving example of this type of bridge and is among the earliest of its type in America. Photo: J. Lowe

A Baltimore through truss steel bridge built in 1905 by the American Bridge Company. Its 15–20 foot wide wooden planking could support teams of horses moving loads between the Sullivan Machine Works and the Foundry. The bridge was used as recently as 1967 and has been suggested as a pedestrian link in the district development plan. The enclosed bridge in the distance was constructed circa 1920 to carry materials from the Chain Machine Building, where coal cutting machines were manufactured, to the north side of the Sugar River, where the company's power plant, pattern shop, and foundry shop were located. Photo: J. Lowe

recognized in the "core" of the city. According to realtors, middle-income people have expressed an interest in living in the downtown area of Claremont. During the past nine years, there has been a twenty-six percent increase in demand by middle-income families for housing in this central area. The large, older houses are interesting historically, provide a unique setting for living, and offer an urban setting in a small town locale.

The middle-income housing market is most compatible with the housing potential of the mills. If an appropriate environment were provided in the mills, half of these potential residents might be induced to rent rather than to buy. Others may be willing to consider condominums.

Tourist Market

There are at present few points of interest in Claremont to attract a tourist trade. Mount Ascutney State Park is directly across the Connecticut River in Vermont, but use of the state park has fallen off in recent years. The Connecticut River is navigable at Claremont for small watercraft and could be an attraction. However, no facilities exist in or near Claremont for boat/canoe rental, nor is there access to the Connecticut in Claremont.

The St. Gaudens National Historic Site is located eight miles north of Claremont on route 12–A. This site is a fine example of an artist's home in northern New England and worthy of national attention. Yet the number of visitors to the site is unlikely to require the development of facilities for their service.

Claremont's Existing and Proposed Recreation Facilities

The city's five parks encompass more than 420 acres and have ski trails, ball fields, ice skating and swimming pools. Its indoor facilities are located primarily in the Community Center, which houses game rooms, a new gymnasium and an indoor pool. Golf courses, ski areas, snowmobile trails and lakes surrounding the city are within a very short driving time.

The city hall and opera house, built in 1896 by Lamb and Rich Architects of New York, has been recently renovated. Photo: J. Lowe.

The city is developing several park/open space areas, including a neighborhood park adjacent to the Sugar River which will provide access to a river pond for swimming. Landscaping, sitting areas and a small children's play area are planned for Tremont Square in the center of the town. On the north side of the Mill District, a new housing development benefiting the elderly and low and middle-income residents will contain park/open space that also provides a vantage point for a panoramic view of the city.

Facilities for year-round recreation are available in the Claremont area and would probably be considered favorably by new permanent residents or industries. These facilities, however, do not significantly influence tourism or transient visitation.

Claremont's Tourist Potential

Claremont does have tourist potential in its historic industrial resources. It has nearly all of its historic building fabric. All components of that complex, including housing, are represented. An interpretation of the complex would offer a unique example of 19th century New England manufacturing processes, not readily available elsewhere. Other portions of the extant historic fabric complement the mill complex. The city is revitalizing a 1,000 seat opera house in the city hall. Events in the opera house could complement or contribute to the other historic and recreation resources.

Tourism is a major part of the New Hampshire/Vermont economies. Vermont out-of-state tourist estimates show a six-fold increase in visitation over the past 25 years. It is anticipated that New Hampshire's visitation will increase in a like manner.

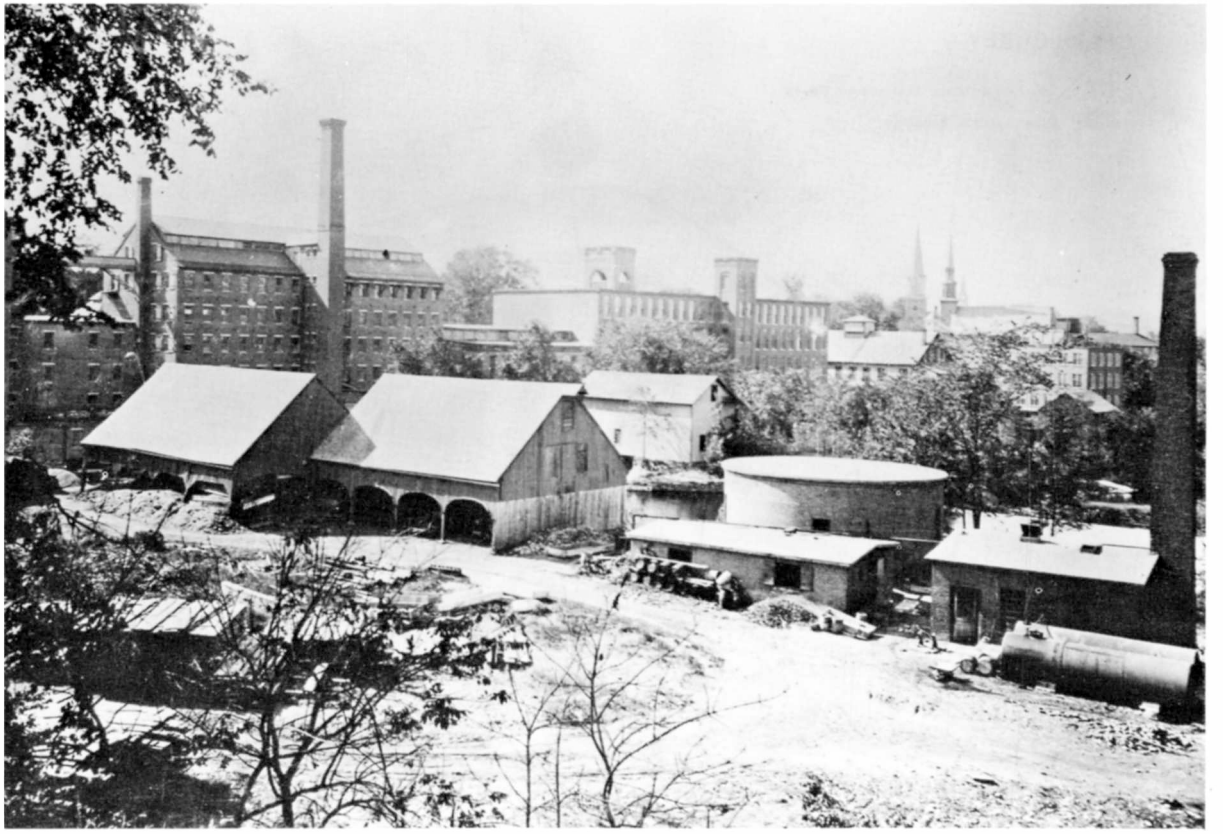
The most popular tourist attraction is Mount Sunapee State Park and Ski Area, 14 miles east of Claremont. It attracts approximately 250,000 people each year. New London, a much smaller town than Claremont, currently serves as the chief retail complex for tourists at the Mount Sunapee area. Only six miles from Sunapee, New London is situated along I–89, the route used by many of the visitors to the Sunapee area. Claremont would need to develop more entertainment facilities in order to attract the Sunapee tourists to the city.

The State of New Hampshire measures tourist expenditures by region. There are six summer regions and five winter regions in the State and Claremont falls into the Sunapee region in both cases. According to the data gathered in the summer of 1976 and the winter of 1977, visitors to the Sunapee region stayed a relatively long time and spent large

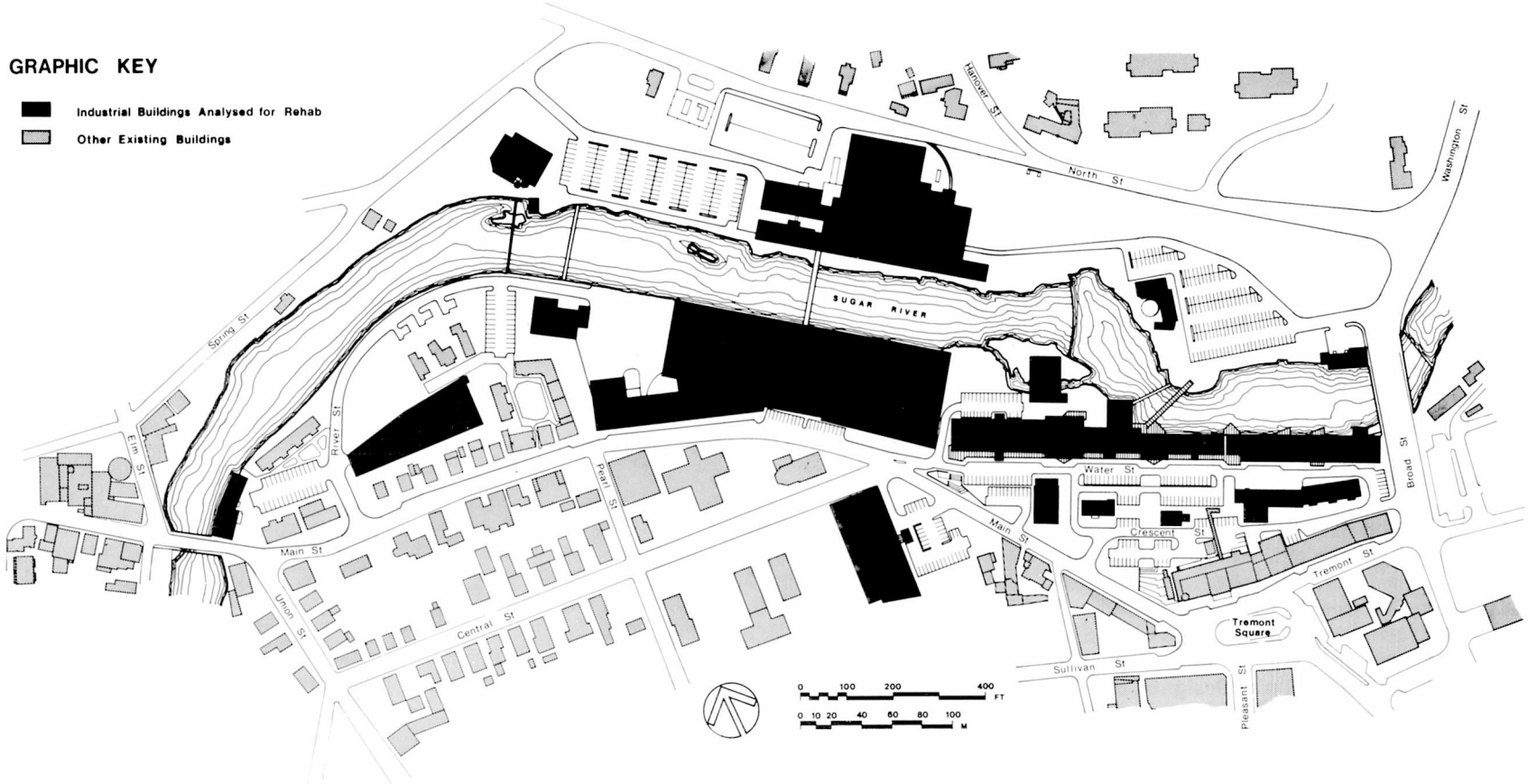
amounts of money during the summer, and a shorter time and a moderate amount during the winter. This suggests that the Sunapee region is attractive to families who come to stay in one place for a two-week vacation. Subsequently, the kinds of attractions which Claremont might develop to attract these people should emphasize family entertainment.

Looking at highway data, one can visualize the tourist potential for Claremont. Although the high volume of traffic through Claremont and Newport is not necessarily bound for those towns, it represents a potential in terms of roadside tourist accommodations. Only one AAA-endorsed motel exists in each city, with a combined total of 30 units. Claremont has several restaurants, but only two could be classed as good quality, the kind which would attract people from outside the immediate area. Newport has only one such restaurant. This lack of hotel/motel accommodations and of restaurant facilities along the Route 11/103 corridor from Newport to the junction of I–91 suggests a need which could be met in sites adjacent to those routes.

Based on the market survey and historic information assembled in the early weeks of the project, the initial phases of the preservation plan were outlined. Primary consideration was given to the complex needs of Claremont and to the potential resolution of those needs by an historic preservation and rehabilitation plan. Thus the plan which follows was designed not only to respond to the needs of Claremont, but to enhance, articulate and preserve its historic resources.



View of Monadnock Mills from North Street showing the company's gas works in the foreground, circa 1895. Source: Claremont Historical Society.



Sites in the Study Area

Proposed plan for district. Delineator: D. Stevenson.

The Plan

Clothroom/Bleachhouse of the Monadnock Mills Complex (Site 2). 1875–1915.

Sullivan Machinery Complex, 1905–1919 (Site 12A) on the right, and Foundry 1905–1908 on the left (Site 17).

Sugar River Grist and Saw Mills, 1856–1857 (Site 15). Photos: J. Lowe.

The Claremont Village Industrial District is the central element for the preservation plan developed by the HAER team. The Sugar River corridor, the commercial center of town, and the lower village residential area were important to the plan. In addition to the market studies, factors included in the analysis of the development potential of the overall district and specific sites were: topography and slope characteristics, open space, view systems, pedestrian movement, existing building use and percentage of occupancy, traffic and parking, regional highway and rail transportation, and the relationship of new development to the existing commercial center.

A physical inventory was made of 23 industrial structures in the district. Data included type, layout, gross area, spatial character, physical condition, and service access. In addition to individual physical descriptions, a comprehensive historical analysis of the district was compiled and brief historical monographs were prepared for each structure or principal engineering feature. Separate studies addressed the solar potential of selected sites, and the feasibility of new hydroelectric power developments on the Sugar River.

The River

The Sugar River is important historically because it provided the means of power for industrial development and was the primary reason for the location of the historic structures. It is also important for its hydroelectric power potential, and as a basis for recreational pursuits.

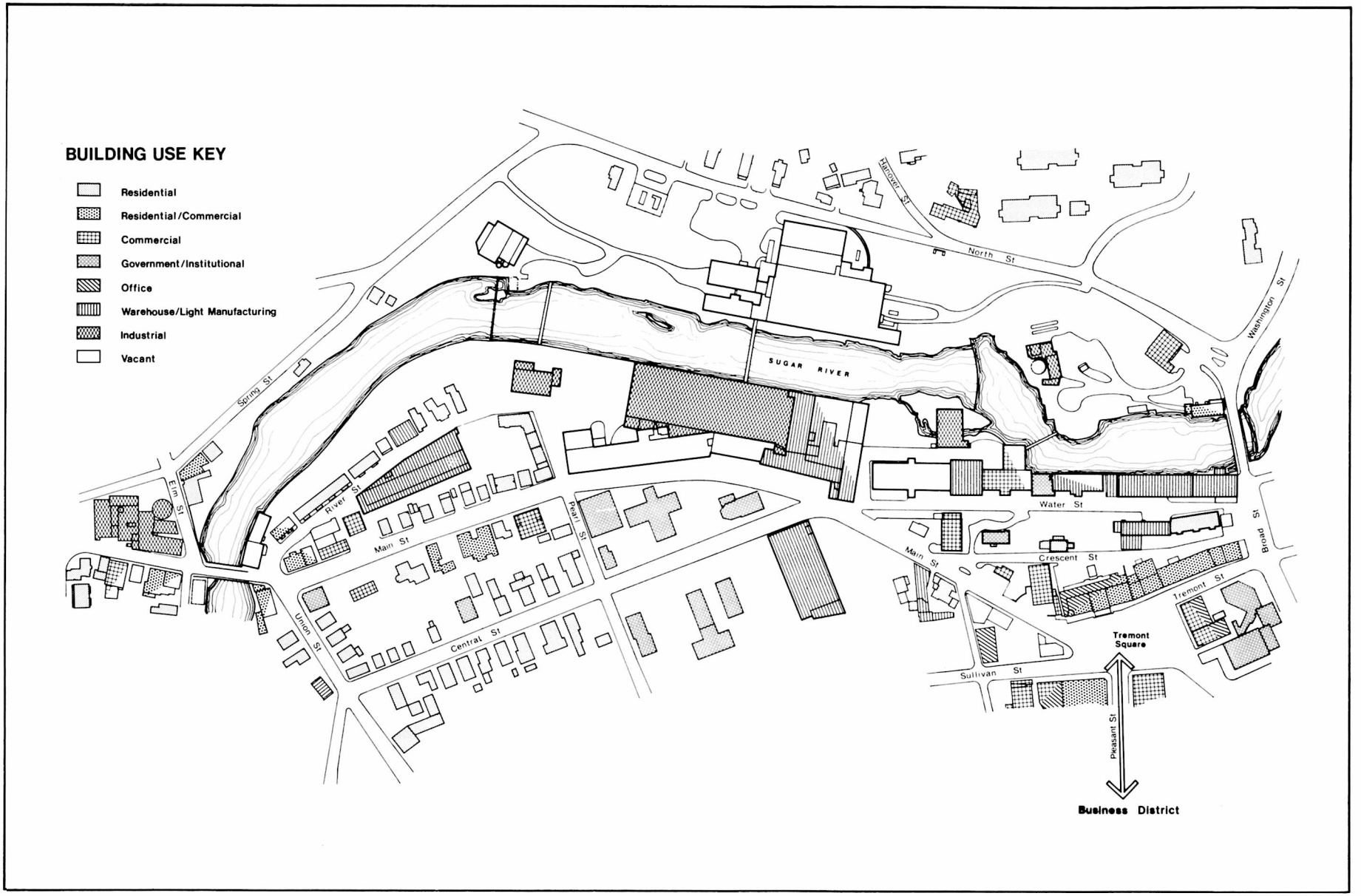
Open space fronting the river is limited within the district, particularly along the south side of the river, and the team made every effort to retain and enhance this space for public enjoyment. The plan for this area emphasizes passive recreation, such as walking paths which allow people to explore and enjoy the interesting spaces along the river corridor.

The entire river was studied from its source at Lake Sunapee to its mouth at the Connecticut River by recreation planners, and suggestions were made for the optimum utilization of the river as a recreation resource.

Sugar River Corridor Recreation Potential

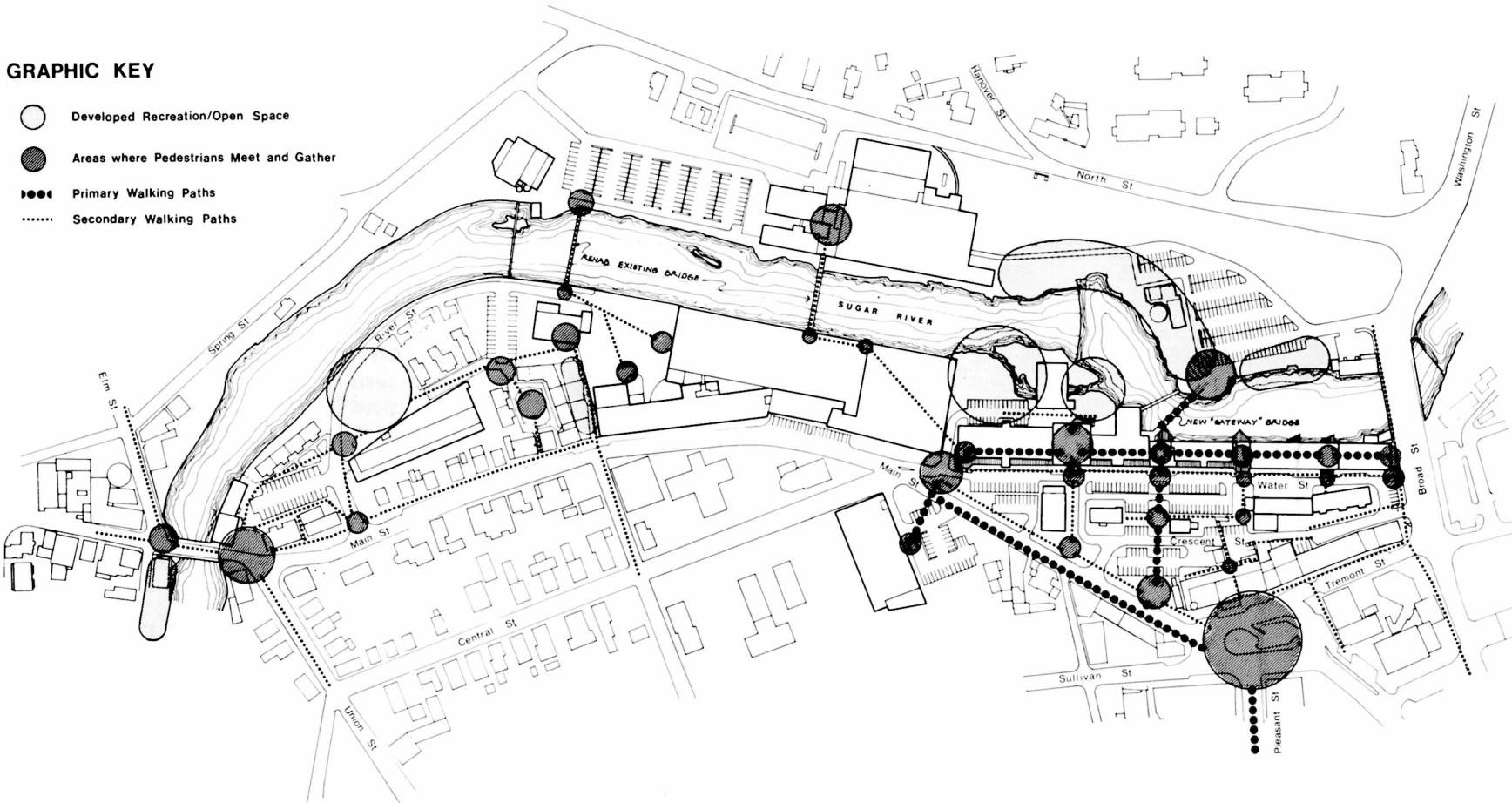
By using an abandoned railroad right-of-way along the Sugar River, a recreational trail system could stretch from Sunapee State Park to the Industrial District in Claremont.

The proposed Sugar River Trail and Greenbelt could be used as a four-season multiple-use trail facility for active and passive recreation. It could also serve as an alternate and energy-efficient way for people to get to and from their homes and the various recreation facilities along the trail. The proposed trail and greenbelt runs through the central business district of Newport and connects it with the outlying village centers. The trail runs to the edge of the Claremont central business district, and, if extended, can pass directly through Claremont's center.



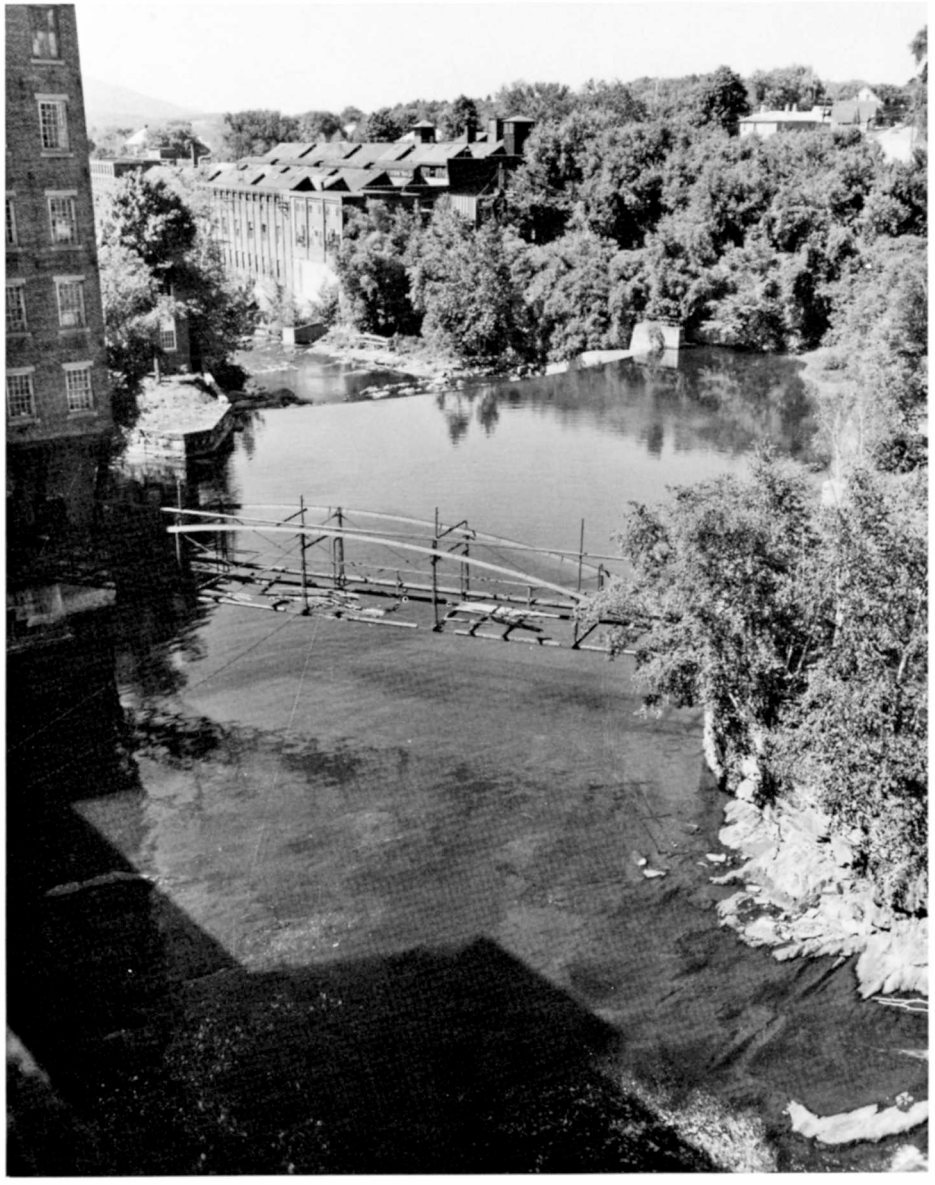
Existing building use.

Delineator: D. Stevenson.



Proposed open space and pedestrian links in the district.

Delineator: J. Arbib.



Character of the Sugar River Corridor Open Space. Mosley bridge in foreground. Dam No. 3 and Foundry in background. Note the former leadgate still in place at the top right of the dam. Photo: J. Lowe.

The recreation and conservation potential of the environment traversed by the proposed trail and greenbelt is exceptionally high because it traverses heavily developed areas and connects them with a natural riverside environment including high quality water and scenic, natural, historic, cultural, and recreational resources. This quick transition from a highly developed environment to an undeveloped riverine environment is one of the strongest assets of this proposed trail project.

Economic and tourist benefits would accrue in the future as the proposed Sugar River Trail would be an important link in an already existing and expanding trail system. This system includes the Monadnock Sunapee Trail, presently being reclaimed. The northern terminus of this trail is located in Sunapee State Park where the Sugar River Trail also has its eastern terminus. On the western side, the Connecticut River has long been proposed as a greenbelt with a trail. The Connecticut River corridor is used informally for bicycle, hiking, canoeing and trail activities. The northern section of the proposed "Low Trail" would meet the Appalachian Trail at Hanover, New Hampshire, where it crosses from Vermont into New Hampshire.

Open Space within the District

Outdoor areas adjacent to the buildings provide an attractive setting for coffee and lunch breaks. As such, these areas should be landscaped with trees, shrubs, grass, ground cover, and flower beds. Benches and picnic tables should be provided in these areas. To complement this river setting, small feeding areas for waterfowl should be considered. This concept, while simple, is successful and is appreciated by employees in similar settings in other northeastern cities, even to the extent that families occasionally join employees for picnic lunches. Walkways help to keep the grass and ground

covering intact. In addition, where open space allows access to the water's edge, similar facilities should be provided. Places for employees who enjoy fishing during lunch breaks or immediately following the work day should also be available.

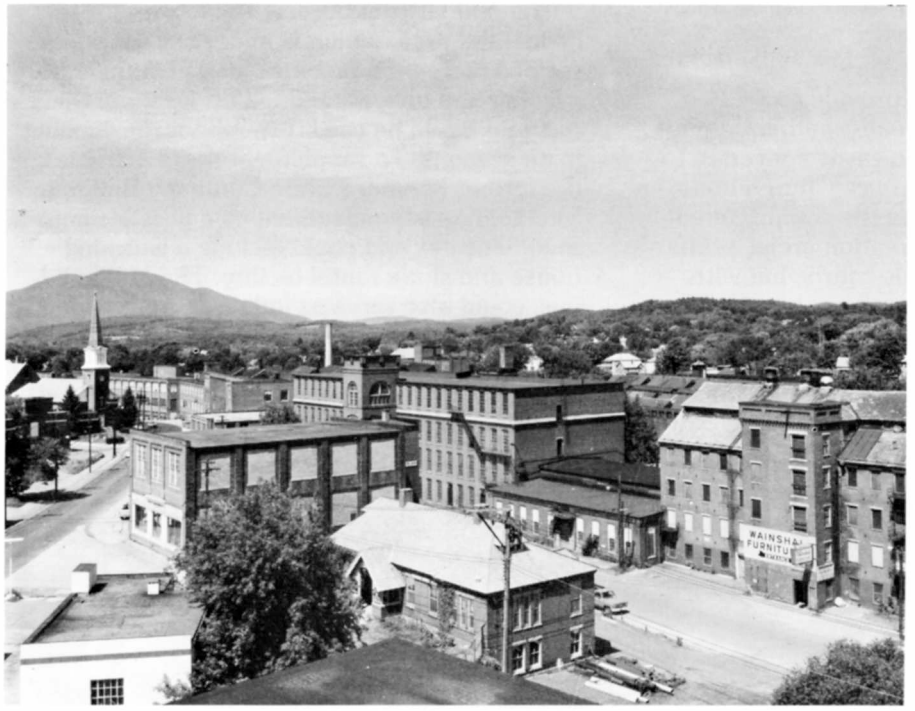
Public access areas and passive recreation sites should be developed in a manner similar to the employee areas, but with different scales to accommodate visitors attracted to the Mill District. In addition to outdoor furniture and landscaping for these users, a self-guiding interpretive historic trail should be constructed. The original Monadnock Mills Gas Works, Site 18, is an appropriate site for development as a museum, shop, headquarters for trail information and maps, and restroom facilities. A system of paths and bridges allowing access to the rear of the mills which, in many cases, form a channel for the river, would offer a unique perspective to view historic uses of water power and would provide access to and from the development planned for these buildings.

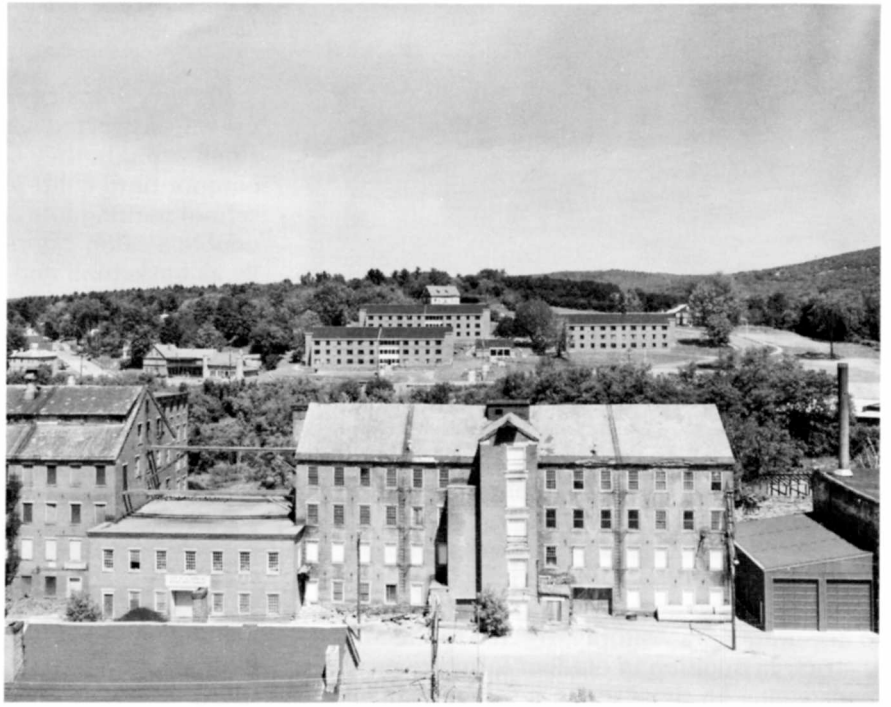
Claremont's central commerical district. Tremont Square is at right center in this aerial view from the northeast. Pleasant Street, the main shopping street is located between the center of the square and the top of the photograph. Five buildings from the Monadnock Complex, the ice covered Sugar River, and Broad Street Bridge appear in lower right. Photo: P. Burke.

A landscaped area used by employees of Claremont Woven Label Company. Photo: D. Stevenson.

Parking areas can also provide recreation uses. Constructed with an all-weather composition asphalt, they can be easily converted to outdoor hard court play areas. Church and school parking lots around the country often double as after-hours recreation areas, primarily as basketball and tennis courts, but with painted boundary lines they can also serve for a wide variety of children's games. These areas can be flooded for ice skating if they are constructed with a four-to-six inch lip around the outer surface.

The Mill District borders the lower village residential area, which is in need of such hard surface recreation facilities for use in the early evening and on weekends. With lighting, these facilities could be used throughout the evening in all seasons. To supplement these activities, the former Maynard Shoe Company Building, Site 13, has been identified as a possible community center and could include a warming house and skate rental facility. The Mill buildings could also serve as indoor recreation facilities, particularly if developed by a commercial athletic enterprise. The Foundry, Site 17, is a likely site for indoor tennis, racquetball, handball, and squash facilities. With its variety of





Panoramic view of the Monadnock Mills Complex. Photos: J. Lowe.

interior spaces and pedestrian accessibility, it is well-suited for recreational uses in addition to other development.

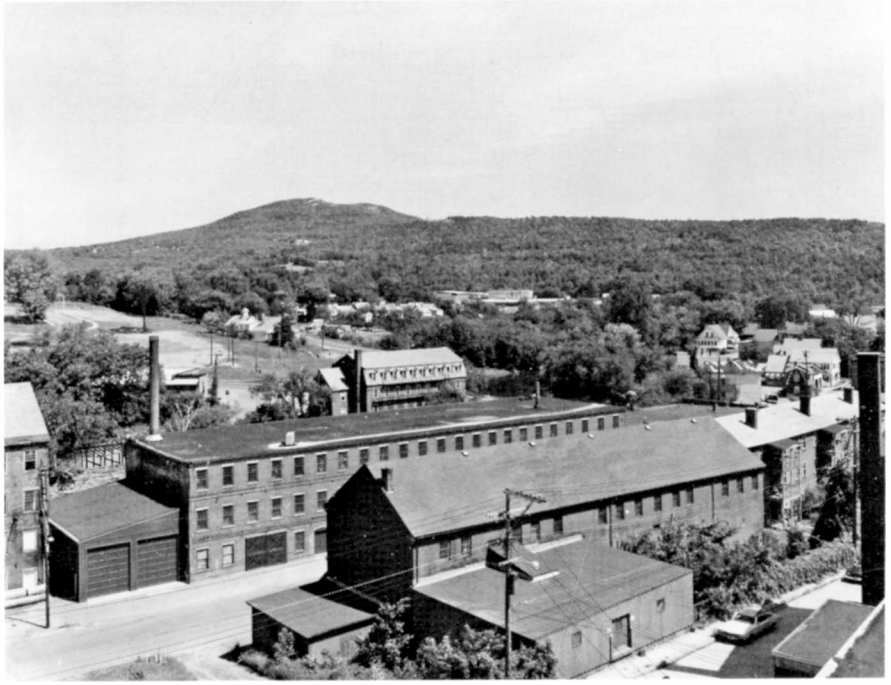
Commercial Center

The downtown is a National Register Historic District with many interesting features. Until the early 1960s, Claremont was the regional shopping center for the area known as the "Upper (Connecticut River) Valley," and the size of the downtown reflects this condition. Downtown is still the central business district for Claremont and vacancy rates are low. According to the market study, Claremont could easily support new retail business.

However, the commercial stability of the downtown area is fragile. Loss of the retail function to outlying centers and to other towns, especially West Lebanon, has eroded the viability of the downtown. Rents in the central area are relatively low and the fortuitous circumstances enabling two new chain grocery stores to find vacant lots on which to locate in downtown has permitted businesses to continue on an even level.

Strip developments on East Washington Street and on Maple Avenue cut into the downtown trade slightly. The downtown commercial district is well used on Friday nights, when the stores are open late, and on Saturday. The two grocery stores remain open until 10 and 11 PM, keeping the traffic and activity in downtown after normal hours. However, it appears that if a modest amount of business was removed from the central business district to a strip development at the edge of town, the district might collapse before it could experience a new influx of shoppers.

The mill buildings of the Monadnock Complex are directly adjacent to the downtown. Historically, merchants of the central business area benefitted from this proximity. In a plan for the mills, it is important to enhance this



A view of Tremont Square showing the trolley which once served the downtown and mills. Source: Claremont Historical Society.

The Moody Hotel on Tremont Square, built 1890–1892, by architect William Emerson of New England resort fame. A bar located on the ground floor was the scene of campaigning by Presidential candidates wooing the New Hampshire primary vote. Photo: J. Lowe.

pattern, rather than detract from the place the existing center holds in Claremont. To realize this goal, major retail facilities should be kept close to downtown, and new retail businesses in the mill district should not duplicate existing retail uses. To facilitate the merger of the two areas, pedestrian links must be reinforced with the downtown. An example of an important connecting link are pedestrian ways between the Monadnock Mills Complex and Tremont Square, accomplished around and possibly through the Moody Building.

Quality items are the merchandise most needed in the Claremont Region. To stabilize that particular market, a department store like

Sullivan Forge Shop, 1901–1911 (Site 11). Photo: J. Lowe.

Filenes or Jordan Marsh is needed. Traditional shopping center developments have utilized such anchor stores of 80,000 to 100,000 square feet. Recently, however, department stores have opened branch operations, which house approximately 40,000 square feet at locations with relatively low population levels. After some discussion with the marketing department at Filenes, it was ascertained that a 40,000 square foot store in this area of New England would be appropriate. A small department store such as this could be used to anchor the quality goods shoppers' market in Claremont. Specialty shops serving the quality goods market could then follow, locating either downtown or in the Monadnock Complex.

Lower Village Residential Neighborhood

The Lower Village has a high percentage of low income families who own their homes. Yet, many have not had the means to maintain them in a manner consistent with today's housing standards. In the fall of 1978 the city received a H.U.D. $1.2 million Small Cities Grant, a part of which was specifically for their maintenance and repair. Some of the homes are of architectural and historic interest. The plan for the district recognizes the need to maintain the residential character of the Lower Village.

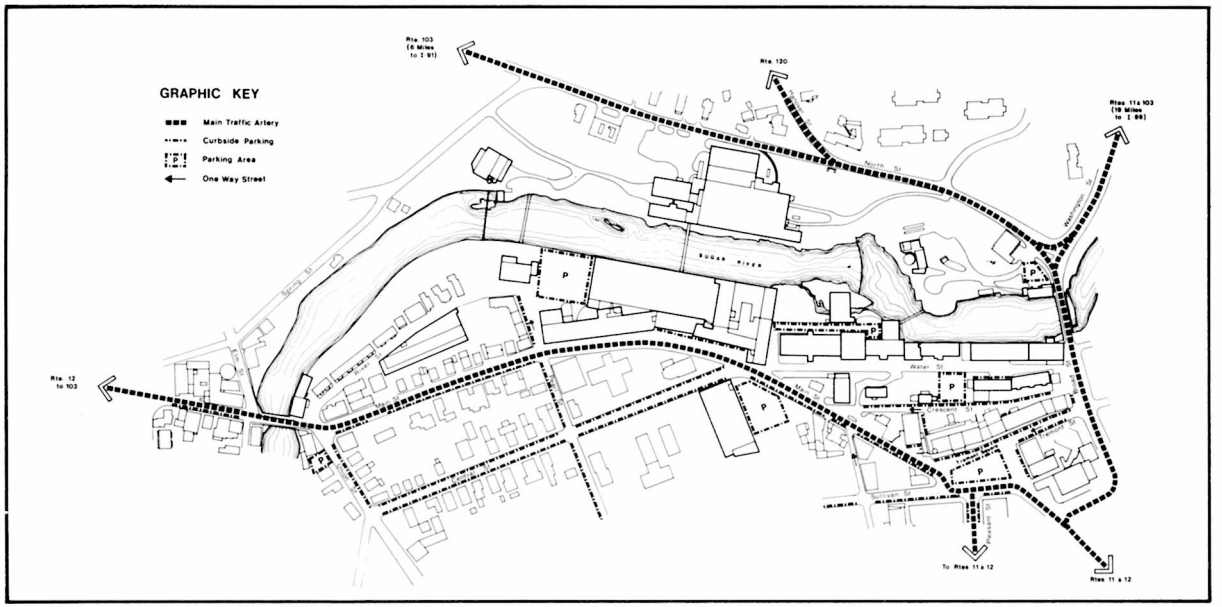
Traffic and Parking

The density of industrial land use in the district reflects the topography of the Sugar River corridor. Railroad service was suited to the narrow routes and steep grades in the river gorge, qualities which, though lending a pleasant scale to the district, resist the demands of modern vehicles for unrestricted movement and storage. Claremont's traffic patterns are confusing and detrimental to pedestrian activities. Large vehicles use narrow streets and travel at high speeds, and the service to buildings often hampers the free flow of traffic. Moreover, the lack of parking is a major drawback to rehabilitation and reuse.

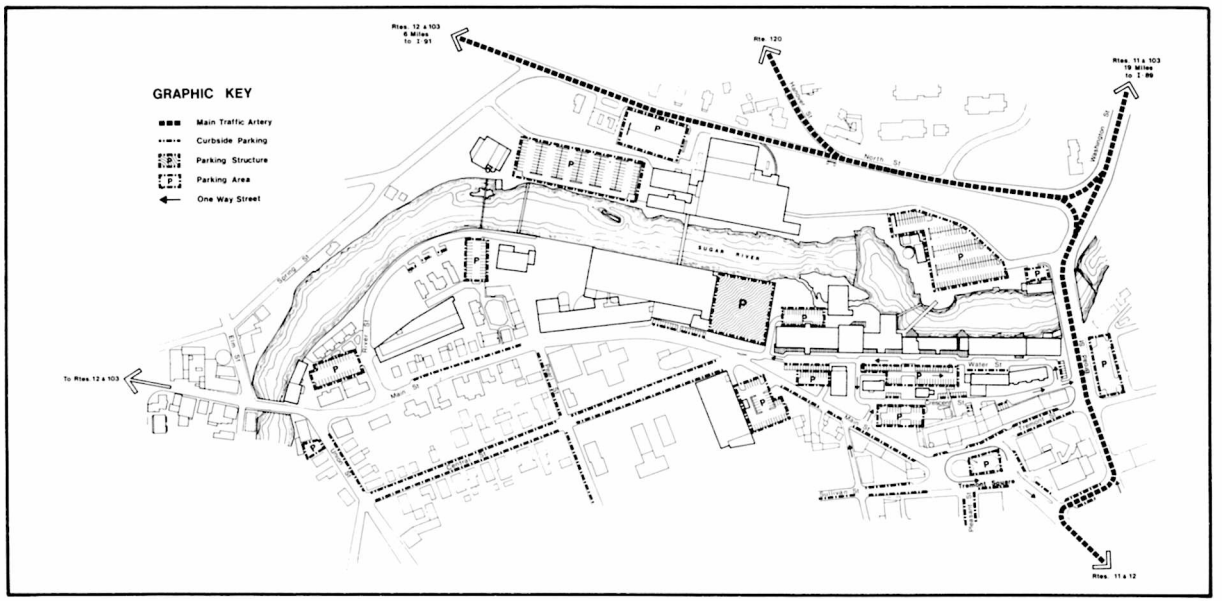
Through traffic uses Main Street and Tremont Square and truck traffic often has difficulty in maneuvering between Main Street and service points. Because of the intensity and speed of vehicular traffic using Main Street, the historic buildings along it are endangered by road vibration or impact from vehicles negotiating sharp turns or backing in tight spaces. People using the stores on lower Main Street are forced to negotiate narrow walkways along the street, which carries a high volume of traffic during certain periods of the day. River Street is used by children for a play

A view of Main Street Bridge intersection, circa 1880. The Grist Mill is at right. Source: Claremont Historical Society.

Long, sloping approach of Main Street to the Grist Mill with workers' housing on the north side of the street. The large brick structure behind the houses is Sullivan Steel Warehouse (Site 14) Photo; J. Lowe.



Existing traffic and parking. Delineator: D. Stevenson.



Proposed traffic and parking, Delineator: D. Stevenson.

area, as well as by trucks and trains serving the industries located in the Sullivan Machine Company complex, Site 12, and a former Sullivan Machinery Company Warehouse, Site 14.

To remedy these situations, the plan suggests rerouting through traffic via existing routes along North Street and to the east of Tremont Square. Certain intersections and roadways need to be redesigned to better accommodate traffic flow and to avoid conflicting pedestrian and vehicle activity. Appropriate spaces for parking are also designated in the plan.

Since the market study identified a need for roadside tourist accommodations, rerouting through traffic would help to concentrate it, and make reuse of certain industrial structures for accommodations more feasible. The most appropriate buildings in the district for hotel/motel use would be the Foundry, Site 17, located along North Street, and the tenement buildings, Site 21, located on Broad Street.

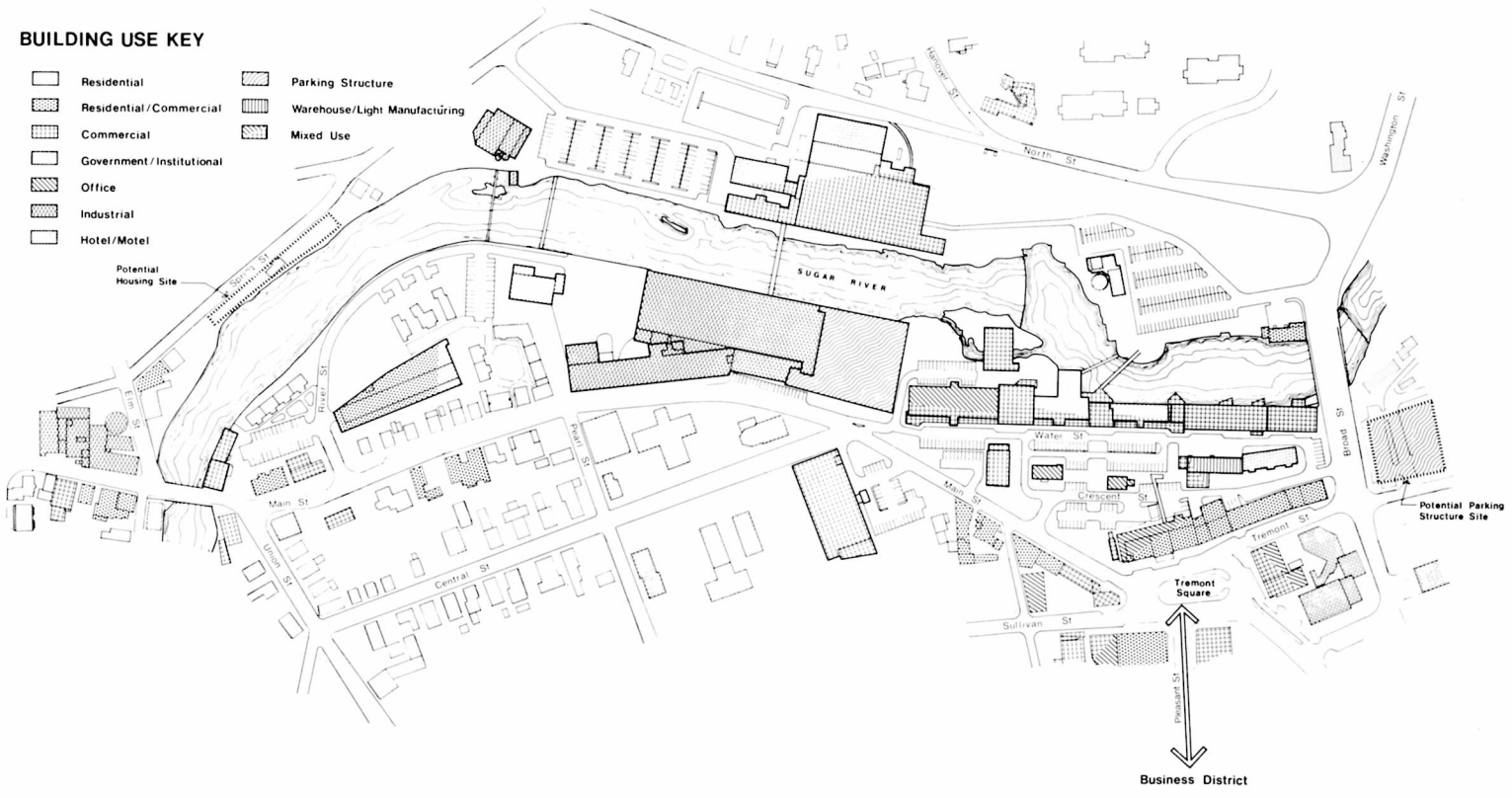
Congested traffic pattern and sharp angle with River Street (right) endangers pedestrians, vehicles, and buildings in this intersection with Main Street. Photo: J. Lowe

Planning Units in the District

The Claremont Village Industrial District was divided into four units: The River Street Neighborhood, Sullivan Machinery Company, the Foundry/Gas Works area, and The Monadnock Complex. These units are based on street patterns, the river, existing uses, and historic identity of neighborhoods and structures.

River Street Neighborhood

The River Street neighborhood is part of the Lower Village. It contains tenement buildings and workers' cottages of the late 19th and early 20th centuries, and three industrial buildings: an 1855/56 grist and saw mill, a 1912 machine parts warehouse, and a small 1890's factory. It is bounded on the north by the river, on the south by Main Street, and on the east by Pearl Street and the large Sullivan Machinery Company complex, Sites 12, 12A and 12B. Development in this area has created a conflict between residential and industrial uses which focuses along River Street, a narrow,



Proposed building use. Delineator: D. Stevenson.

frequently used industrial service road that bisects the area.

The residential units face directly onto River Street and since there is no room for sidewalks, one steps from the porches immediately into the street. The warehouse, Site 14, tightly abuts the opposite side of the street. This is a dangerous and unpleasant situation which is further complicated because children use the street as a play area.

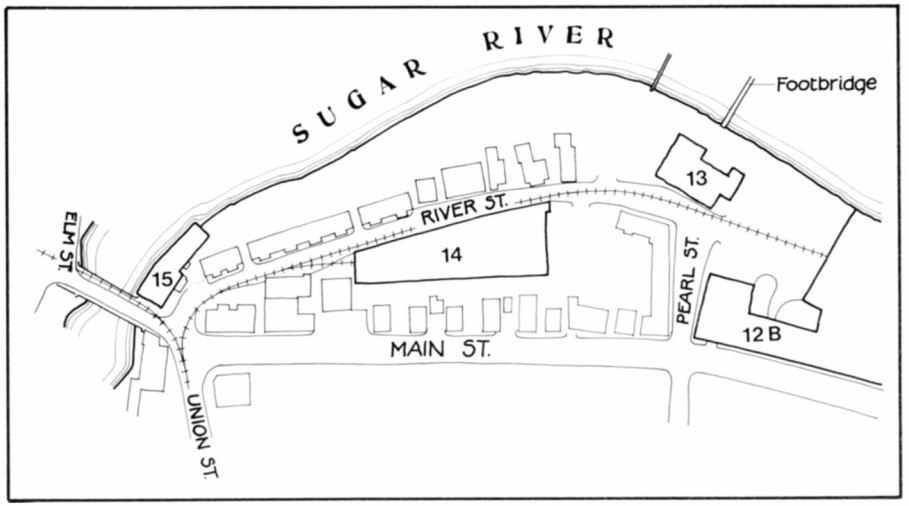
Even though the warehouse and the housing were constructed more or less concurrently at the beginning of the century, today's planning standards would not permit this situation. The plan treats the area as a residential neighborhood for which the adverse effects of industrial uses will need to be mitigated.

The resolution of the conflicts existing in the River Street neighborhood is contingent upon solving the traffic problems associated with River Street. The plan proposes relocating the River Street/Main Street intersection and realigning the River Street right-of-way. The relocation will ease a confusing and hazardous condition that presently exists at the Union, River, and Main Street intersection; and will also remove heavy traffic exiting directly in front of the grist mill. The realignment will take industrial traffic along the riverfront, and around, rather than through, the residential area.

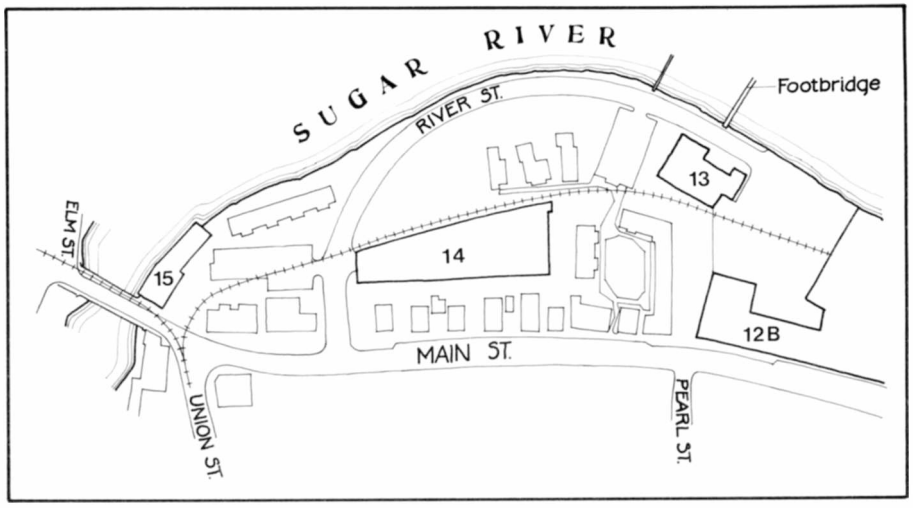
Aerial view of River Street Neighborhood from the cupola of the Grist Mill (Site 15). On the left side of River Street is the warehouse (Site 14). Photo: J. Lowe

The front porches of the tenement housing abut River Street. Photo: D. Stevenson.

The former shoe factory, Site 13, is located at the edge of the residential development, and reuse of that building could be compatible with a residential environment. At the present time, it is used as a storage and maintainance facility for the Joy Manufacturing Company Leasing Operations. However, the building is not entirely adequate for these purposes. Large machines are parked in the adjacent yard. These uses are not compatible with the rehabilitation of the neighborhood. Site 13 forms a particularly attractive end to the line of sight down Pearl Street. It is an excellent structure for a needed neighborhood community center.



Existing River Street location.



Proposed River Street relocation.

The most serious residential and industrial incompatibility stems from the location of the Sullivan Warehouse, Site 14. This warehouse is an enormous brick structure surrounded by houses on River and Main Streets. The houses on Main Street have short, steeply sloping backyards. Considering the overall townscape, the houses along Main Street mask the bulk of the warehouse.

Housing has been suggested as one alternative for reuse of the warehouse. The great depth, unfortunate location of windows, and odd structural volumes may be an obstacle to its rehabilitation and renovation. However, if its redevelopment could be made sufficiently profitable to attract a developer, housing would be the most valuable reuse of this building. Additionally, a small amount of neighborhood retail space might be developed in the building.

Another alternative is to continue its present use. A potential troublesome factor would be the necessity to park or stand trucks outside the building, creating a visual problem.

The Sugar River Grist and Saw Mill, Site 15, is at the western edge of the area at the intersection of River and Main Streets. This mill has a scale and design that harmonizes with, rather than detracts from, the residential character of the area.

The Grist Mill Area

It was clear from old photographs and other historical information that the intersection of Main, River, and Union Streets was a gathering place in the neighborhood. Two of the four corners still contain retail businesses, which appear to be doing well.

At the corner of River and Main Streets is a 19th century three-story brick commercial block with a handsome crow-step gable. The ground floor is occupied by several retail businesses. The excellent wooden two-story Greek Revival structure on the corner of Union and Main Streets contains a hardware store which uses its sidewalk for the display of merchandise. The upper floors of the buildings on both corners are vacant or used for storage. They

Once a 19th century shoe factory, Site 13 would make a good community center. Photo: J. Lowe

can become desirable rental space with the rejuvenation of this area as a neighborhood focus.

The third corner, the Polish-American Club, is very popular in the evening and will continue to reinforce the image of this area as a gathering place.

A parade at the Grist Mill area intersection in 1896. A shop window contains a political poster for William Jennings Bryan. The building with the balcony was replaced by the present Polish-American Club. Source: Claremont Historical Society.

A view of the Grist Mill, circa 1880. Source: Claremont Historical Society.

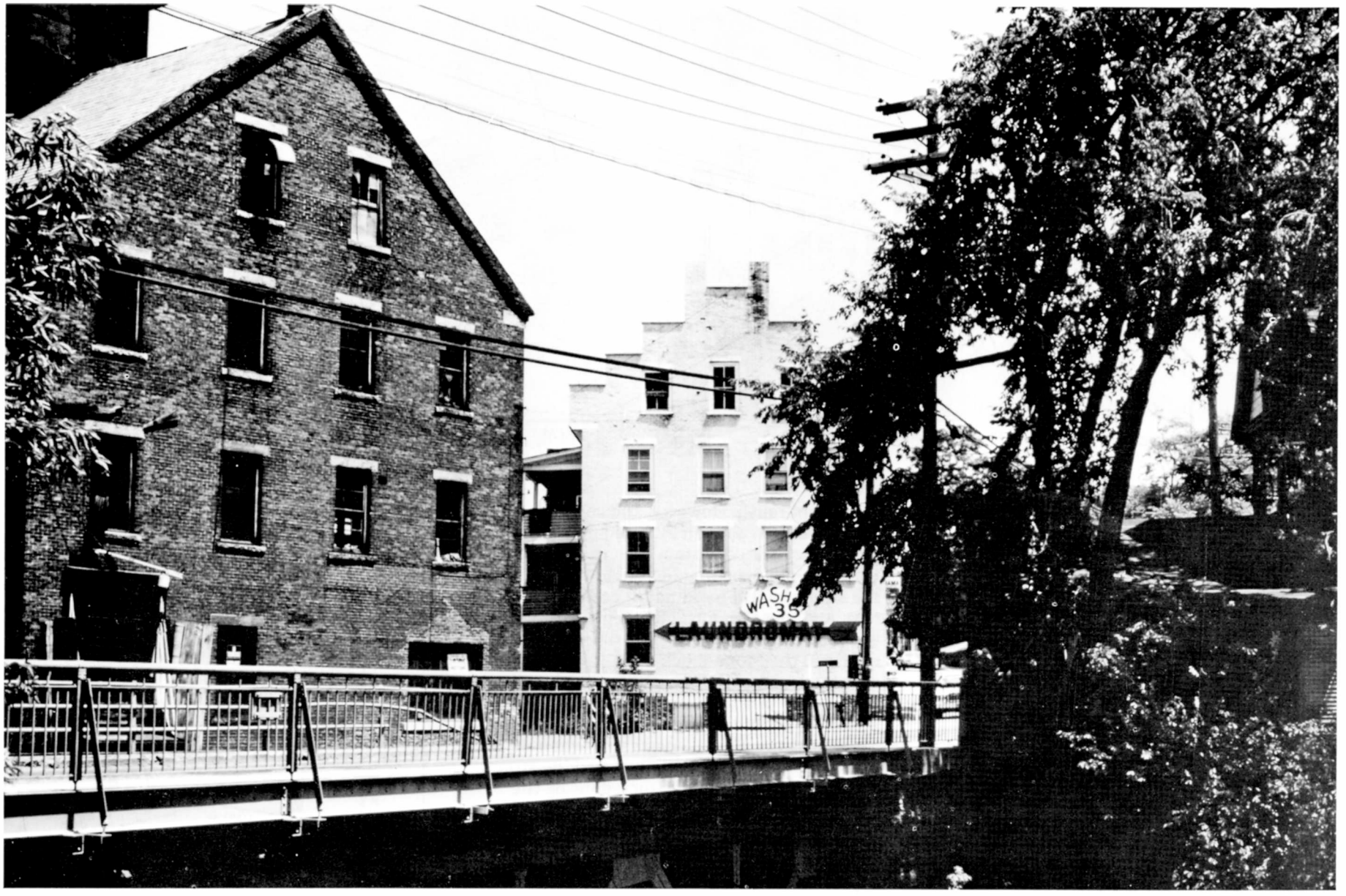
Original Greek Revival moldings on the interior of the Grist Mill in the first floor office area. Photo: J. Lowe.

The Sugar River Grist and Saw Mills, arising impressively from the river against the Main Street Bridge, are, architecturally, among the finest structures in the entire district. The Grist Mill has fine Greek Revival detailing and finishes. The mills not only form a gateway image from the west, but enclose a handsome space before the crow step gable end of the commercial block across River Street. After River Street has been relocated, this space will become a revitalized pedestrian square with adjacent parking and will be the nucleus of the neighborhood. A more intense use of the Grist Mill area should follow as a natural response to its central location, convenient parking and pedestrian access, charming architecture and pleasantly landscaped spaces.

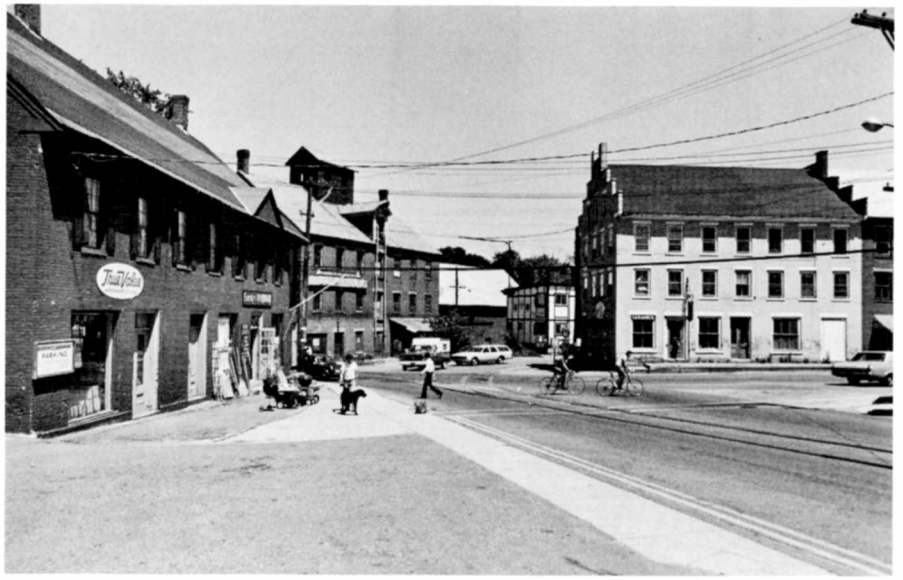
Sullivan Machinery Company

Sullivan Machinery Complex

This site had been used by the Sullivan Machinery Company since 1884 for a variety of functions necessary to its manufacturing process. A large brick factory complex filling the entire block between the south side of the river and Main Street, it was constructed primarily between 1905–1920, a period of hectic expansion of the company's operation. The density



A view of the Grist Mill area from the west side of the Sugar River. Note the crow stepped gable end on the commercial block beyond. *Photo: D. Stevenson.*



The Grist Mill area today, seen from Union Street. Photo: D. Stevenson.

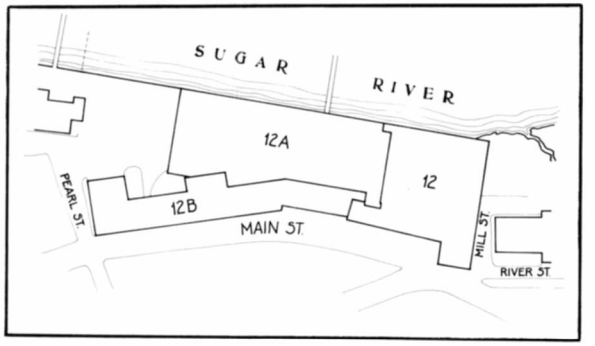
Proposed Grist Mill Square, created by the relocation of River Street. Delineator: D. Stevenson.

of land use, the steeply sloping site and rapid growth created a complex characterized by imposing edges, especially along the river and Main Street, and some interesting and eccentric interior spaces.

The Joy Manufacturing Company, successor to Sullivan, also filled this entire block. Joy abandoned the complex and transferred ownership to the city. Within the past two years however, the Joy Company has repurchased a portion of the complex, Site 12A, and established a heavy metal fabrication and welding operation in it. The company, through its expenditure of a very large sum of money for rehabilitating its physical plant and purchasing new equipment, is committed to remaining in Site 12A for the forseeable future.

Site 12, a maze of structures, levels and passageways, seemed appropriate, when considered by itself, for housing, hotel, and restaurant reuse. However, the complex abuts the fabrication shop in 12A and none of the above uses are consistant with the noise and vibration of heavy machinery. Furthermore, the structure will make reuse costly. These factors, and more importantly its pivotal location between the intensified industrial use to the west and the Monadnock Mills Arcade to the east (as outlined further in this study), suggested that this site would best meet the demands of additional parking requirements. Therefore, the plan suggests that when this demand is reached, a multi-level parking structure for 500 cars be constructed inside the existing exterior fabric of this structure. The plan suggests continued industrial uses in sites 12A and 12B and a parking garage with some commercial infill for Site 12.

Site 12B, built in three phases between 1909 and 1913, has an open floor plan and large windows, and lends itself to a variety of industrial uses, especially incubator type industries which can be housed on a single floor (30,000 square feet). Since two of the three parts of this unit are well suited to industrial use, the entire block should be considered industrial. Site 12B has been examined carefully by po-



Sullivan Machinery Company Complex.

tential industrial users, but the lack of parking has discouraged redevelopment so far. Parking for 200 cars is needed close by in order to use the building for industrial purposes.

Service

Loading, unloading, and moving goods to floors above ground level present problems. Pearl Street, a relatively narrow roadway, has a steep grade from Main Street to River Street. Therefore, the plan recommends using this right-of-way for a series of terraced residential yards and a pedestrian path to the community center in Site 13. In addition, this area would provide a buffer between industrial use and the River Street neighborhood. The solution to the service problem uses the large open area at the rear (north and west sides) of Sites 12A and 12B as a service yard and eighty car parking lot with access from the relocated River Street. An existing loading dock on the north side of Site 12B could be upgraded, the three elevators in the building would be refurbished with a portion of the ground floor set aside as a foyer so tenants would have ground level access to each of the elevators. The service and main employee entrance would be on the north side from the service yard. Visitor parking and a reception center would be provided at the southeast corner of the building along Main Street. Additional parking for this site (to achieve the necessary 200 spaces) is met by constructing a 120 space lot on the north side of the river between Sites 16 and 17. Access to this lot is achieved by rehabilitating an existing footbridge.

Sites 12 and 12B and the Baltimore through truss bridge. Dam No. 3 and the Monadnock Mills Complex are visible in the background. Photo: J. Lowe.

Sullivan Machinery Company (Site 12B). The portion of the building on the right of the photograph was destroyed by fire in June 1979. Photo: D. Stevenson.

Foundry/Gas Works Area

The plan recognizes the north side of the Sugar River as providing a route for the Sugar River Trail with a headquarters for maps and trail information in the Gas Works. Parking and open space development in this area should be compatible with the trail. The foundry complex is suitable for multi-use redevelopment.

At one time there were many workers' houses situated on the north side of the Sugar

The step-down tenements on Pearl Street. Terraced yards and a landscaped pedestrian way are proposed to replace the street and act as a buffer to adjacent industrial uses. Photo: J. Lowe.

River. During the 1960s, however, they were removed through urban renewal. The remaining buildings are a small grocery and private residence; the old power plant for Joy Manufacturing Company, Site 16; the large Joy Foundry, Site 17; the old Monadnock Gas Works building, Site 18; a relatively new hardware store; and the Sunapee Mill Building, Site 19, now converted into ten small apartments, a retail store, and a garage. Most of the area is cleared, unused open space.

Parking and Recreation

Since parking and riverside open space are in short supply on the south side of the river, either use of the cleared ground would benefit the rehabilitation of the industrial buildings if adequate connections could be made. Historically, pedestrian bridges have been constructed across the river in several places to provide workers with an easy access to work from their homes. Two of these bridges could be rehabilitated for pedestrian traffic.

The area between North Street and Spring Street slopes toward the river. Terraced parking garages could use the slope to good advantage. However, costs for garages are high, and on-grade parking will be suitable for present needs. Using the foundry for a parking garage was considered, but such a use would waste the valuable and interesting interior space.

Two parking lots can be placed on level ground near the river. One would serve workers in the Sullivan Machinery Company block and the other would serve shoppers in the Monadnock Complex. For the latter, which lies adjacent to the Monadnock Gas Works, Site 18, a new pedestrian bridge would be constructed between the lot and the Water Works, Site 5, the major entry lobby of the Monadnock Arcade.

The service yard northwest of Sites 12A and 12B. Photo: J. Lowe.

Open space along the river has been retained for passive recreation. This open space, below the parking lot adjacent to Site 18, would form the eastern end of the green area which stretches the length of the river in the district. Building a deck on top of the footings of the old penstock, or on top of the new penstock proposed by the hydropower study would make it possible to have pedestrian movement on the foundry side of the river. Such an element, situated just above the river's surface would provide an exciting view of the powerful confluence of buildings and water.

The Gas Works Building, Site 18, would make an excellent interpretive center for the district and would be a part of the riverfront walkway systems, making it adjacent to ample parking.

The Foundry

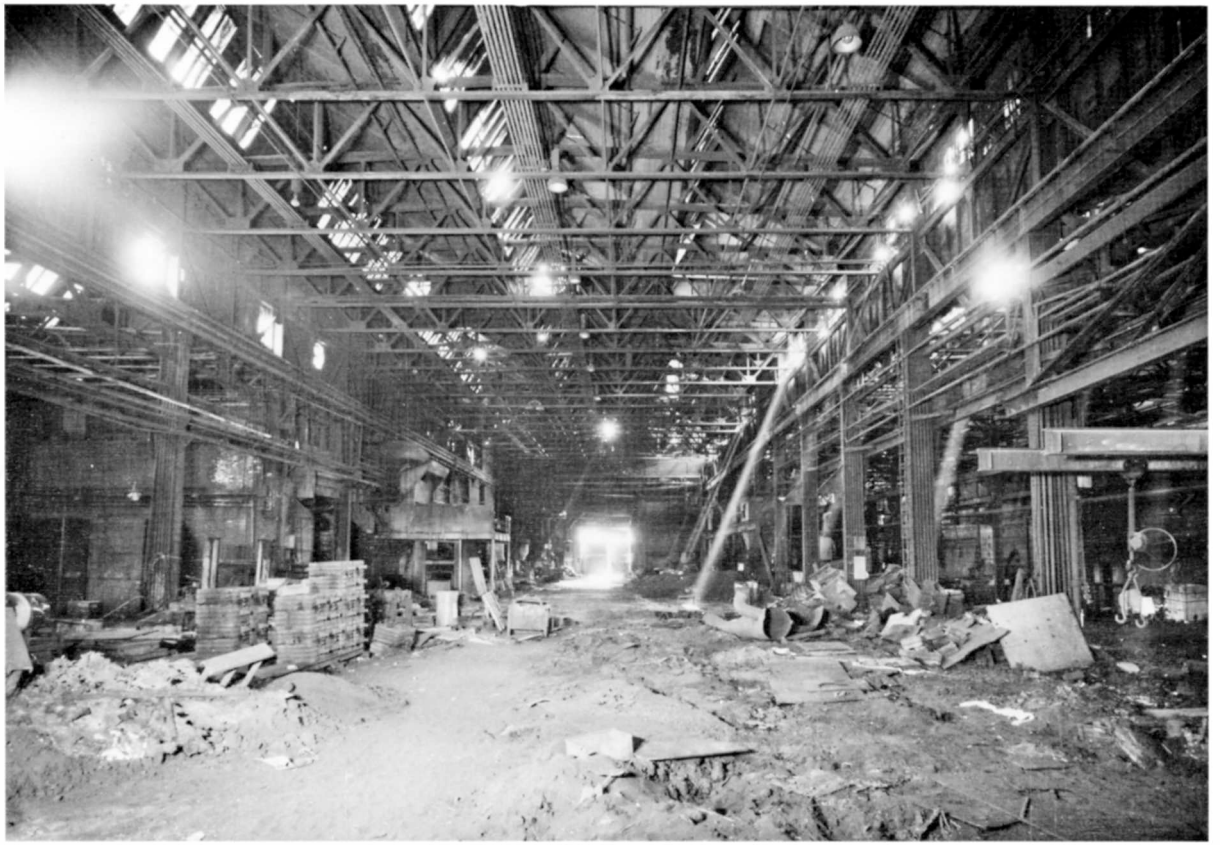
The foundry is a massive complex of 8 interconnected sections. The main structure of the foundry has a very large interior open space lit by continuous north-facing sawtooth skylights. It also contains a smaller brass foundry, concrete catacombs used for materials storage, and a casting and cleaning room. A pattern shop of interesting proportions, a pattern storage area with several floors of relatively low ceilings, and various bridges and trestles abut the main building, creating attractive open spaces.

The Gas Works, proposed as an interpretive center for the historic industrial district. This area would also be the site of parking for the Manadnock Mills. Photo: J. Lowe.

A new use needs to be able to fill the main floor height as well as floor area. The plan proposes to convert the structure into a trade and convention center focusing on recreational goods. There is no place in New England where dealers or manufacturers of recreational and sporting equipment can trade ideas about recreational products, or where new or experimental lines can be displayed before large groups. Shows of various kinds of recreation, skiing, boating, racing, team sports, archery, etc., could be held at different times of the year. Recreational activities could also take place inside the foundry.

The building could also be split into parts, each related in some measure to the central theme, but each rehabilitated on its own. A motel/hotel could be located along North Street in the brass foundry. Retail shops could use the pattern storage area. Such shops would work best if they were related to the activities of the convention center. Lastly, hydroelectric generation equipment could be housed in the section of the building situated on the river.

Approaching the Foundry (Site 17) from the west on North Street. The great bulk of the building is hidden by the typography of the site. Photo: D. Stevenson.



The interior of the Foundry. Photo: J. Lowe.

A horse team hauling a T-connection for a penstock, circa 1900. Source: Claremont Historical Society.

A view of the Monadnock Mills, circa 1900. Note basement level "areaway", and grass covered mill yard. Source: Claremont Historical Society.

Present view of Monadnock Mills. Areaways have been filled, and have become a conservation problem which can be solved by the construction of the arcade. Photo: J. Lowe.

Monadnock Mills Complex

The Monadnock Mills had its origins in the wave of industrial development during the 1830's that shaped and transformed Claremont from a small New England Village into an industrial center. The Monadnock Mills Company is a remarkably intact example of a 19th century textile firm. It is thought to be one of the most complete and best preserved textile complexes in New Hampshire.

Its age and integrity also make it the most important historical resource in the district. This complex is the key to any interpretive program for a tourist market. Because of its relation to the commercial center of Claremont, it is this complex which is best suited to retail use.

Sunapee Mill, 1843–1846 (Site 19). Photo: J. Lowe.

Tenements, 1870 (Site 21). Photo: J. Lowe.

Office, 1881 (Site 20). Photo: J. Lowe.

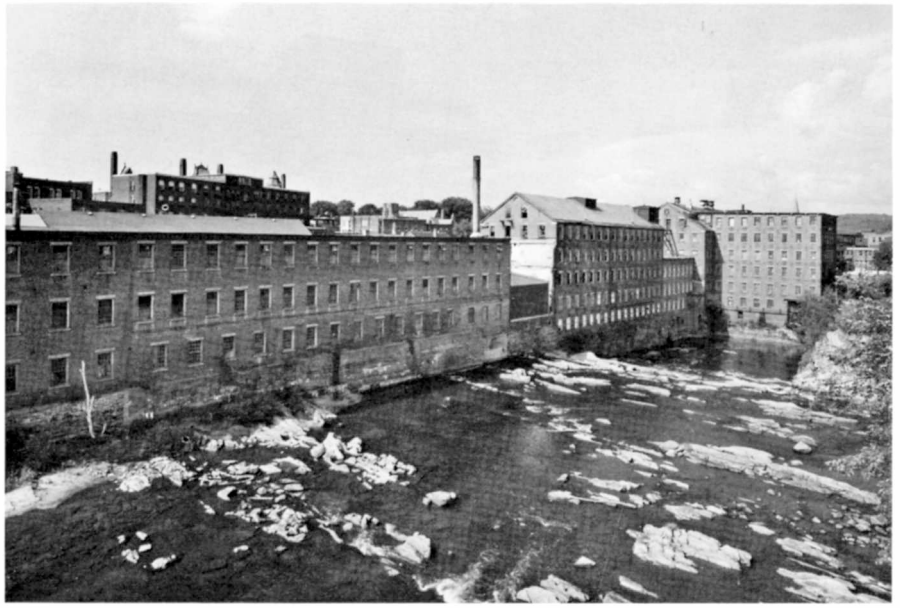
Overseer's house, Circa 1840 (Site 23). Photo: J. Lowe.

Monadnock Mill No. 3, 1892 (Site 9). Photo: M. Chrisney.

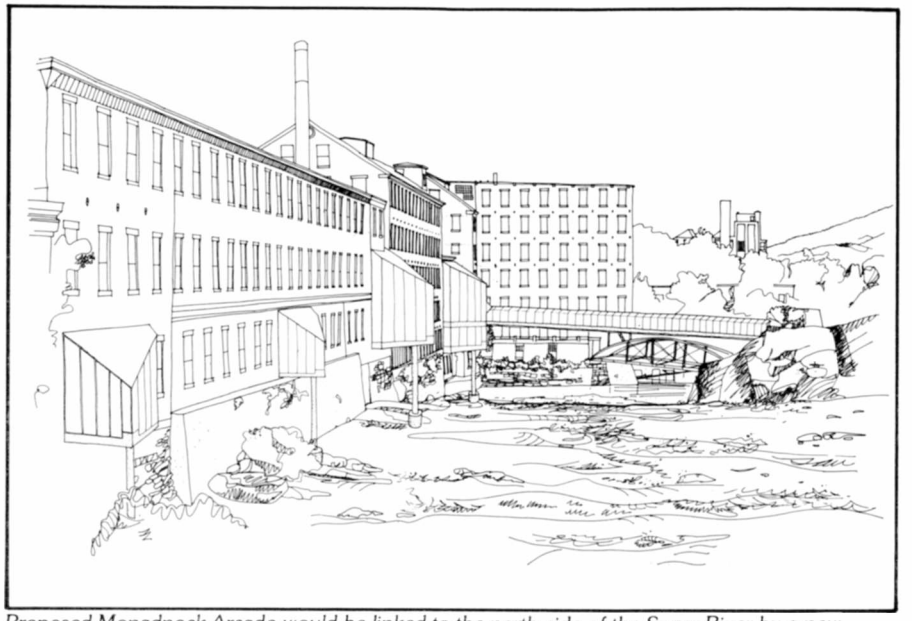
Monadnock Mill No. 2, 1853 (Site 6). Photo: M. Chrisney.

Monadnock Mill No. 1, 1836–1839 (Site 4). Photo: M. Chrisney.

Cloth Room Building/Old Bleach house, 1875–1891 (Site 2). Photo: J. Lowe.



View of Monadnock Mills. Photo: J. Lowe.



Proposed Monadnock Arcade would be linked to the north side of the Sugar River by a new pedestrian bridge. Delineator: J. Arbib.

The Arcade

The unique historic and architectural interrelationship of the Monadnock Mills demands a comprehensive development approach. The plan addresses the uses of the mill yard and associated structures and specifically the mill structures on the river edge.

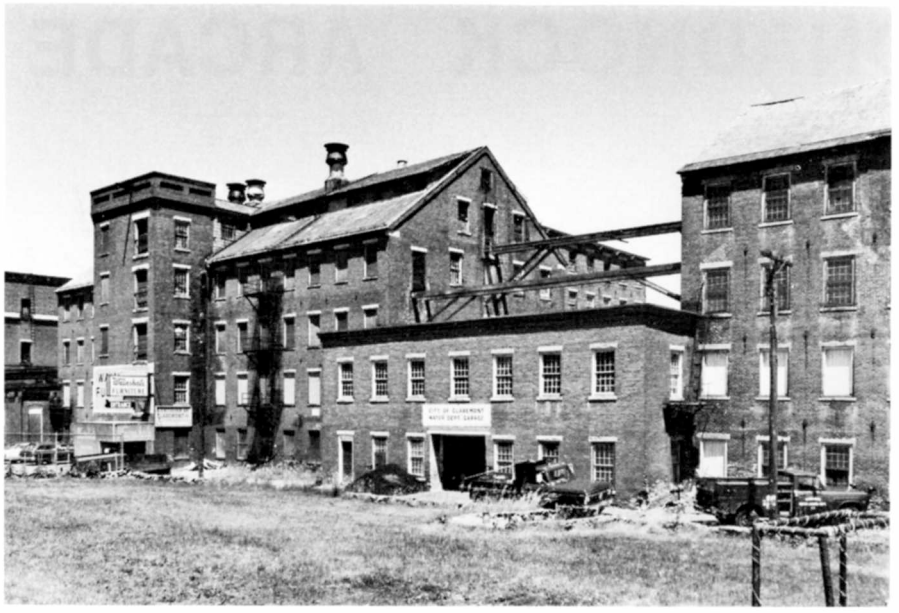
Shops could be located on the ground floor and basement of mill building sites 4, 5, 6/6A, 7 and 9, as well as on the ground and mezzanine of the cotton warehouse. These sites would be connected by means of an interior arcade/pedestrian spine running the length of the complex. An existing tunnel might be used to provide an interior connection to Site 10. Of the river edge structures, the lower ancillary buildings, Sites 5 and 7, are highly visible with large interior volumes and are well suited for entry lobbies for the shopping arcade and upper floor developments. A gap between Sites 2 and 3 may also be used for this purpose.

The arcade concept will enhance the continuity of the Monadnock Mills Complex and provide all weather access to a variety of shops. Recently filled areaways which had originally provided light to the basement, would be excavated as a part of structural conservation measures. A glazed covering for the areaways will provide a two-level interior space visible from the street and will attract people to the complex. Since it would be located on the south face of the buildings, the areaways could be heated with solar energy, providing a net heat gain sufficient for use on one floor of the adjacent mill structure.

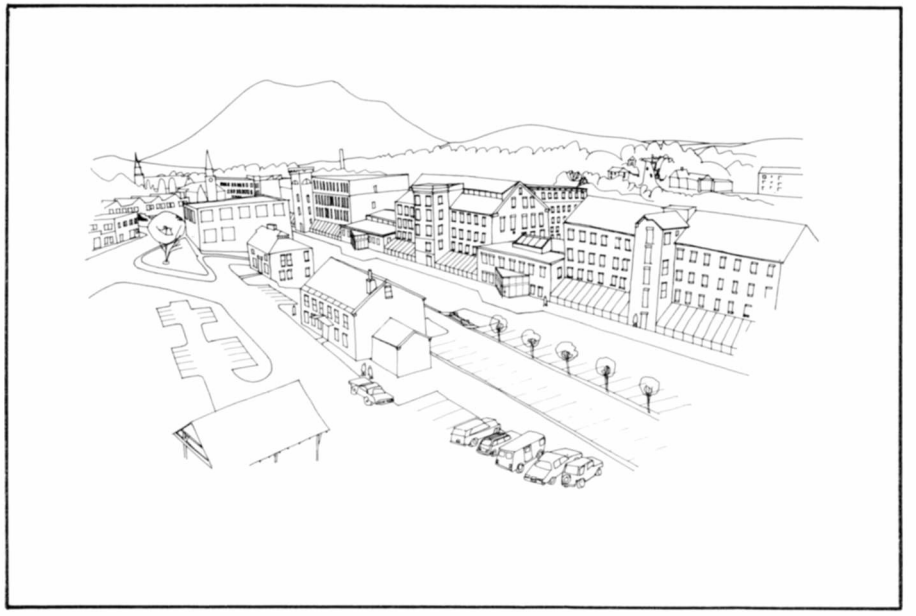
The Upper Floors

The upper floors of the mills are suitable for prestigious offices. The deteriorated condition of Site 4 will require expensive restoration, making it difficult for a private investor to use. There is a market for middle-income apartments in the district, and the upper stories of either Site 6/6A or 9 could be used for that purpose. Either building, in addition to Site 4, affords excellent views across the Sugar River gorge and the north side of the town, a view that would make housing or offices desirable. Additionally, there is an historical precedent for linking the upper floors of Sites 4, 6/6A and 9 by means of bridges between them. It might be desirable to a firm or developer to make the upper stories of a pair of buildings a single large unit.

Site 11, the Forge Shop, is not associated with, but adjacent to the Monadnock Mills. Its most appealing and significant characteristic is its north facing sawtooth skylights. It could



Pump house (Site 5), location of main entrance of proposed arcade. Photo: D. Stevenson



Drawing of the proposed arcade showing glazed areaway cover, terraced parking, and new entrances. Delineator: J. Arbib.

easily house a 40,000 square foot department store on a ground floor and mezzanine. The skylights would be retained in this use. Site 11 is the apex of a triangular pedestrian system which has been proposed between the mills bordering the river and Tremont Square in downtown. Such a store, with the implementation of the proposed pedestrian system, would work to extend the downtown in a natural way.

Pedestrian Access, Traffic and Parking

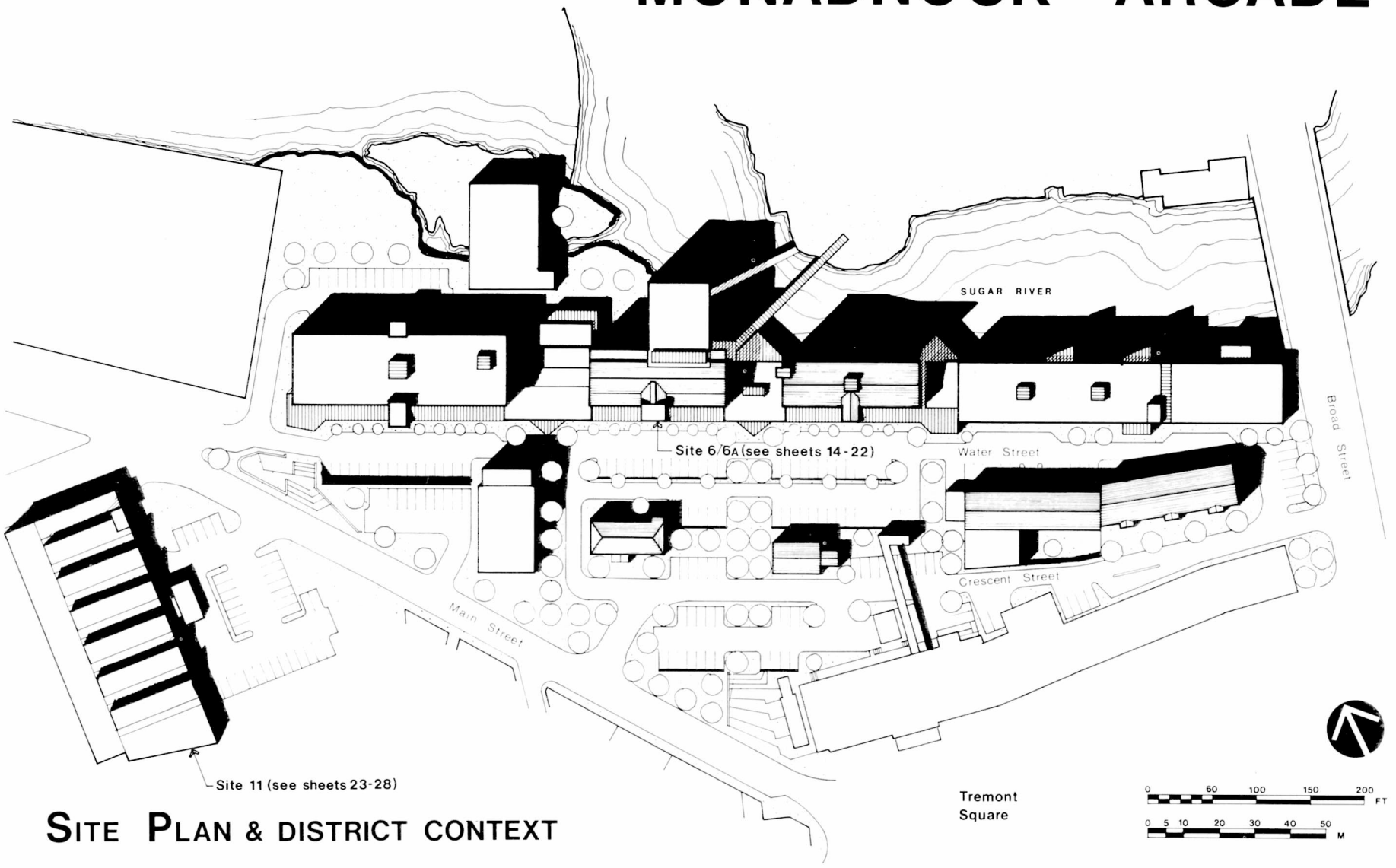
Historic photographs show the millyard area as a grassy slope between Main and Water Streets. The weed and rubble filled space between Water and Crescent Streets is not used efficiently. It is possible to incorporate parking and pedestrian access with landscaping and return this central space to some vestige of its original park-like character.

A main access could be developed between Main Street and the pump house (Site 5). This pedestrian pathway would focus on Site 5 as the principle entry to the Arcade. Parking, terraced into the slope, could accommodate about 170 cars.

Water Street and Crescent Street are currently used as thoroughfares, but fast-moving traffic is not compatible with pedestrian circulation around the mill buildings. The intersection of Water, Crescent and Broad Streets is hazardous. The plan suggests a means by which mill-related vehicular and pedestrian traffic could be accommodated, and the hazardous intersections eliminated. If Site 21 were used as an inn, parking could be provided on the east side of Broad Street.

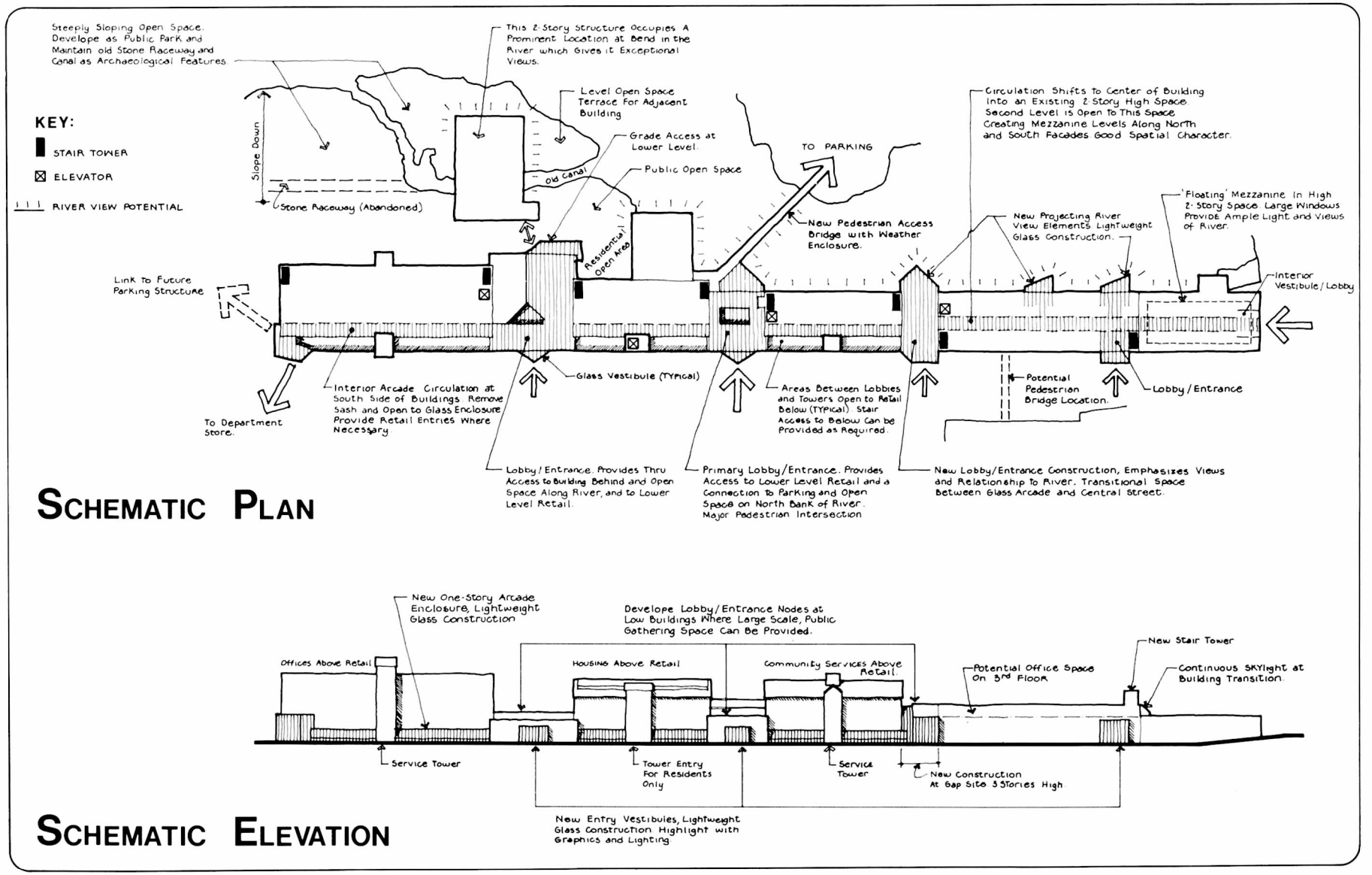
From the north and east, the mills have a dramatic appearance, rising 6 to 8 stories above the river. This view is not seen by many people because of the traffic pattern around the Broad Street Bridge. However, plans are being executed to widen the bridge and change approaches to it. Once this project is accomplished, a parking area located just west of Broad Street along the north side of the river, would, with appropriate landscaping and graphics, be used as the principle capture for the mill shopping arcade. The parking area would be nestled in an attractive natural area, with rocks, rapids, and steep hills surrounding it. A new footbridge could connect the parking area with Site 5, the principal entrance to the proposed arcade.

MONADNOCK ARCADE



SITE PLAN & DISTRICT CONTEXT

Delineator: D. Stevenson.



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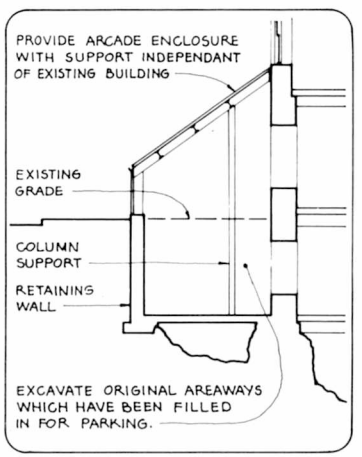
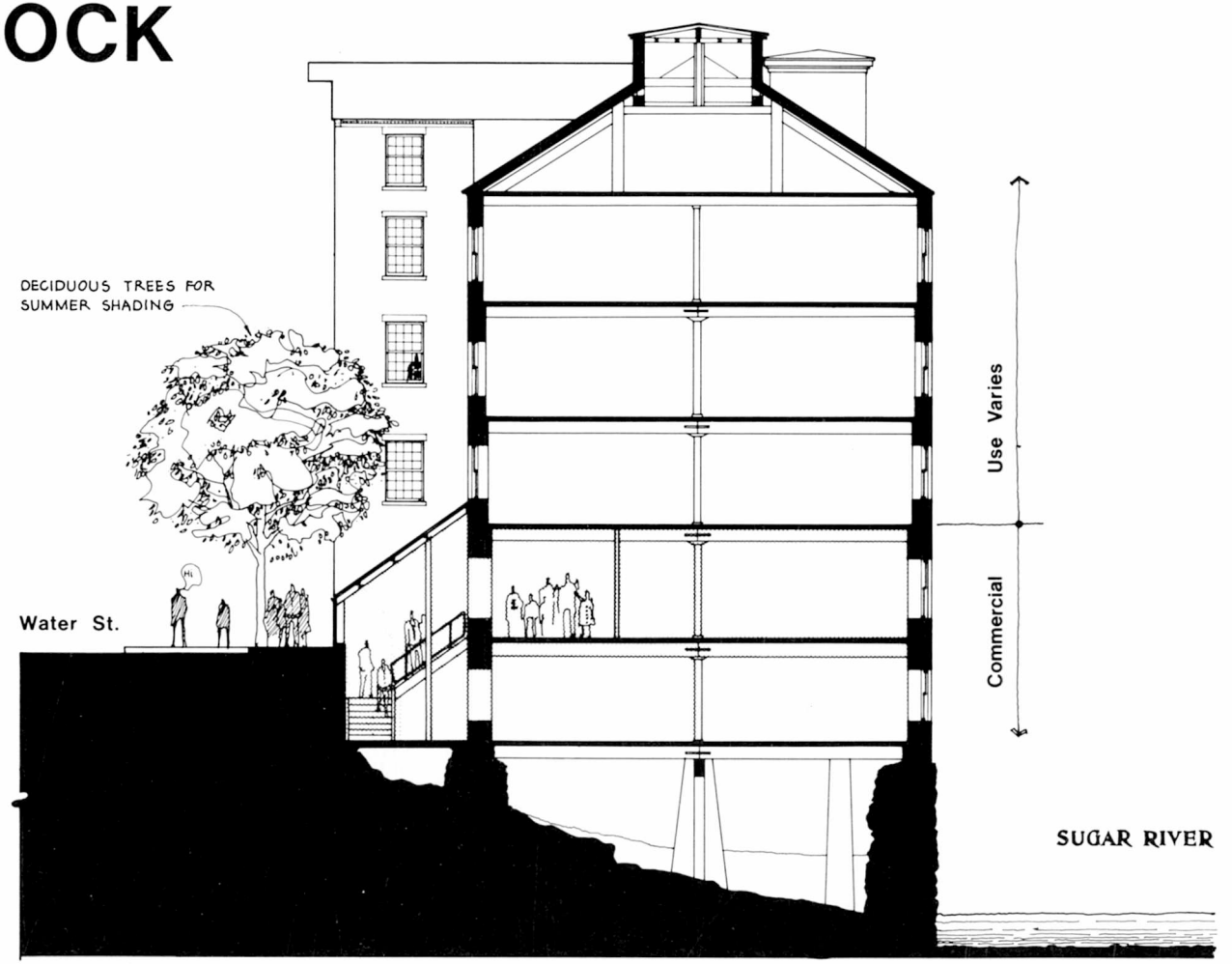
MONADNOCK ARCADE



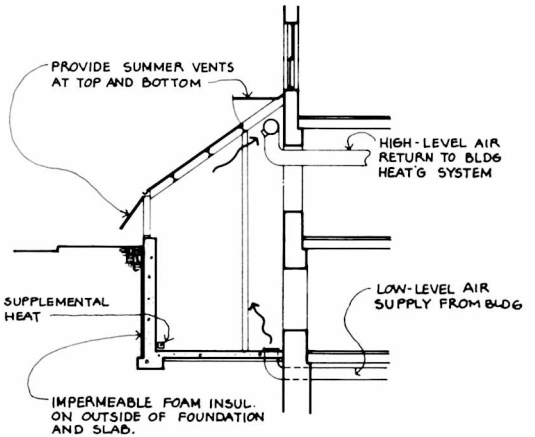


SCHEMATIC CROSS SECTION (Looking West at site 4)

Delineator: D. Stevenson.

SOLAR ASSISTED AIR SYSTEMS

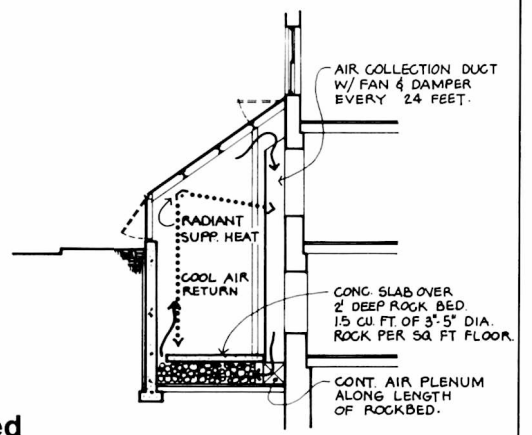
AIR HEATED IN THE ARCADE ENCLOSURE IS DUCTED IN TO SUPPLEMENT A FORCED-AIR TYPE HEATING SYSTEM IN THE BUILDING. COOL AIR IS RETURNED TO THIS SPACE WHICH TENDS TO OVERHEAT ON A SUNNY DAY. IN EXCHANGE FOR HEAT SUPPLIED BY DAY, THE BUILDING MUST RETURN A LOT OF HEAT TO ARCADE ENCLOSURE AT NIGHT. THE SYSTEM IS A NET GAINER OF HEAT OVER A SEASON.



PROPOSAL A:

System Linked to Building Forced-Air

AIR HEATED IN THE ARCADE ENCLOSURE IS BLOWN INTO A SUB-FLOOR BED OF ROCKS WHERE IT COOLS OFF, RETURNING UP THE SOUTH WALL TO AUGMENT NATURAL CONVECTION AND COOL THE SPACE. HEAT FROM THE ROCKBED RETURNS THROUGH THE SLAB AS RADIANT HEATING. SUPPLEMENTAL HEAT IS LESS IN THIS SCHEME AND MIGHT BE MOST EFFECTIVE AS INFRARED HEAT, AS THIS HEAT SOURCE WOULD WARM PEOPLE AND THINGS WITHOUT WARMING THE AIR TOO MUCH.



PROPOSAL B:

System Self-Contained with Rock Heat Storage

DESIGN PARAMETERS:

1. ROOF PITCH: 35° or STEEPER.
2. GLAZING: DOUBLE GLASS or ACRYLIC.
3. FRAME: THERMAL BARRIER ≥ R-VALUE OF GLAZING.
4. NEW FOUNDATION, SLAB, OR ROCKBED, IF USED, INSULATED W/ 3" OF FOAM
5. PROVIDE SHADING DEVICES FOR SUMMER USE.
6. WATER STORAGE TANKS COULD BE USED TO IMPROVE PASSIVE HEAT RETENTION.

GLAZED ARCADE ENCLOSURE—ENERGY ANALYSIS

GREENHOUSES AND GLAZED-ROOF STRUCTURES HAVE LONG BEEN KNOWN FOR THEIR ABILITY TO TRAP LARGE QUANTITIES OF SOLAR HEAT WHEN THE SUN IS SHINING. CONVENTIONAL, SINGLE GLAZED GREENHOUSES HOWEVER HAVE NO HEAT RETENTION CAPACITY AND TEND TO LOSE HEAT RAPIDLY AT NIGHT. IT IS NOT UNCOMMON TO HEAT A CONVENTIONAL GREENHOUSE WITH FOSSIL FUELS AT NIGHT FOLLOWING A SUNNY DAY IN WHICH HEAT HAS BEEN VENTED OUT TO PREVENT OVERHEATING.

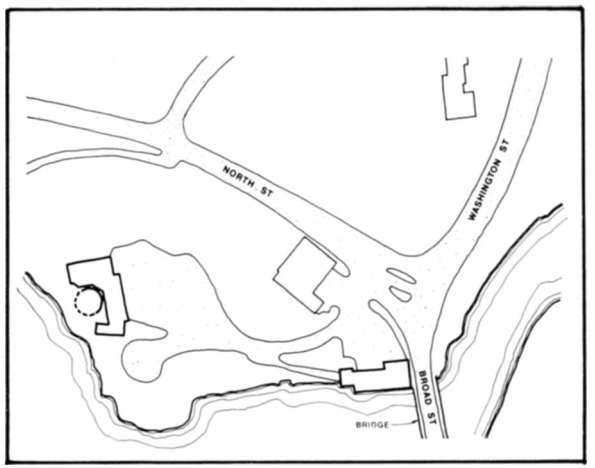
A VARIETY OF GREENHOUSES AND SIMILAR STRUCTURES HAVE BEEN DESIGNED AND BUILT IN RECENT YEARS WHICH RELY UPON THE HEAT-GATHERING CAPACITY OF GREENHOUSES WHILE SEEKING TO LIMIT THEIR THERMAL DRAWBACKS. THESE STRUCTURES DIFFER FROM CONVENTIONAL GREENHOUSES IN SEVERAL IMPORTANT WAYS:

1. GLAZING IS LIMITED TO THE SOUTH SIDE WITH THE HEAT-LOSING NORTH SIDE BEING THICKLY INSULATED AND OPAQUE. LEAN-TO AND ADD-ON STRUCTURES ON THE SOUTH SIDES OF BUILDINGS WORK THIS WAY, USING THE ADJACENT BUILDING AS A NORTH-SIDE BUFFER.
2. THERMAL MASS IS ADDED FOR HEAT STORAGE AND DAMPING. A VARIETY OF SYSTEMS HAVE BEEN USED INCLUDING PASSIVELY-HEATED MASONRY WALLS, TANKS OF WATER, OPEN POOLS, AND FAN-FORCED ROCK-AND EARTH STORAGE BINS. THESE SYSTEMS SERVE THE DUAL FUNCTIONS OF LIMITING RAPID SHIFTS IN DAYTIME TEMPERATURE AND CARRYING OVER EXCESS DAYTIME HEAT FOR NIGHTTIME USE.
3. GLAZING IS AT LEAST DOUBLE-LAYER. THE ADDITION OF A SECOND LAYER OF GLASS OR PLASTIC WILL REDUCE HEAT LOSSES BY 50% OR MORE.
4. PARTICULAR ATTENTION IS PAID TO INSULATION, ESPECIALLY AT FOUNDATION PERIMETERS, AND ALSO TO AIR INFILTRATION. A SMALL AIR LEAK CAN COUNTERACT THE BENEFITS DERIVED FROM A LARGE AREA OF DOUBLE GLAZING.

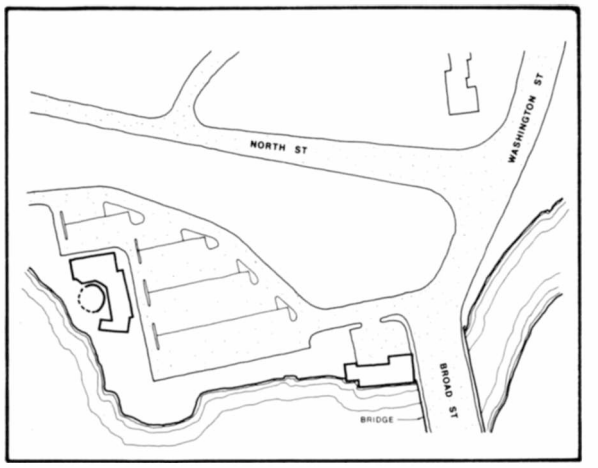
THE APPLICATION OF THESE PRINCIPLES CHANGES THE GREENHOUSE FROM A HEAT DEMANDING STRUCTURE TO ONE THAT EXHIBITS A NET HEAT GAIN OVER THE COURSE OF THE HEATING SEASON. A CAREFULLY DESIGNED SOLAR GREENHOUSE OR GLAZED ARCADE CAN THUS SERVE AS A WALK-IN SOLAR COLLECTOR, BENEFITTING AN ADJACENT STRUCTURE AS WELL AS ITSELF.

FROM A SOLAR-ENERGY COLLECTION STANDPOINT, THE MONADNOCK MILLS ARCADE COMPLEX IS WELL ORIENTED. ITS SOUTHERN FACADE FACES ONLY 23 DEGREES WEST OF SOUTH. SHADING FROM NEARBY STRUCTURES IS MINIMAL. A PRELIMINARY CHECK OF THE HEAT GAIN/LOSS BEHAVIOR OF A 12 FOOT WIDE GLAZED ARCADE ENCLOSURE ALONG THIS FACADE INDICATES THAT, MAINTAINING AN AVERAGE INDOOR TEMPERATURE OF 65F, SUCH A STRUCTURE WOULD EXPERIENCE A NET HEAT GAIN OVER THE HEATING SEASON. THE ARCADE WOULD HAVE TO DRAW HEAT FROM THE MILL DURING DECEMBER AND JANUARY, BUT WOULD MORE THAN RETURN THAT HEAT DURING NOVEMBER AND MARCH. ON ANY ONE SUNNY DAY THE SOLAR HEAT GAINS IN THE ARCADE WOULD ALWAYS OUTWEIGH THE LOSSES, ALLOWING EXCESS HEAT TO BE VENTED INTO THE MILL, REDUCING ITS DEMANDS.

Delineator: D. Stevenson.



Existing intersection at Broad Street Bridge.

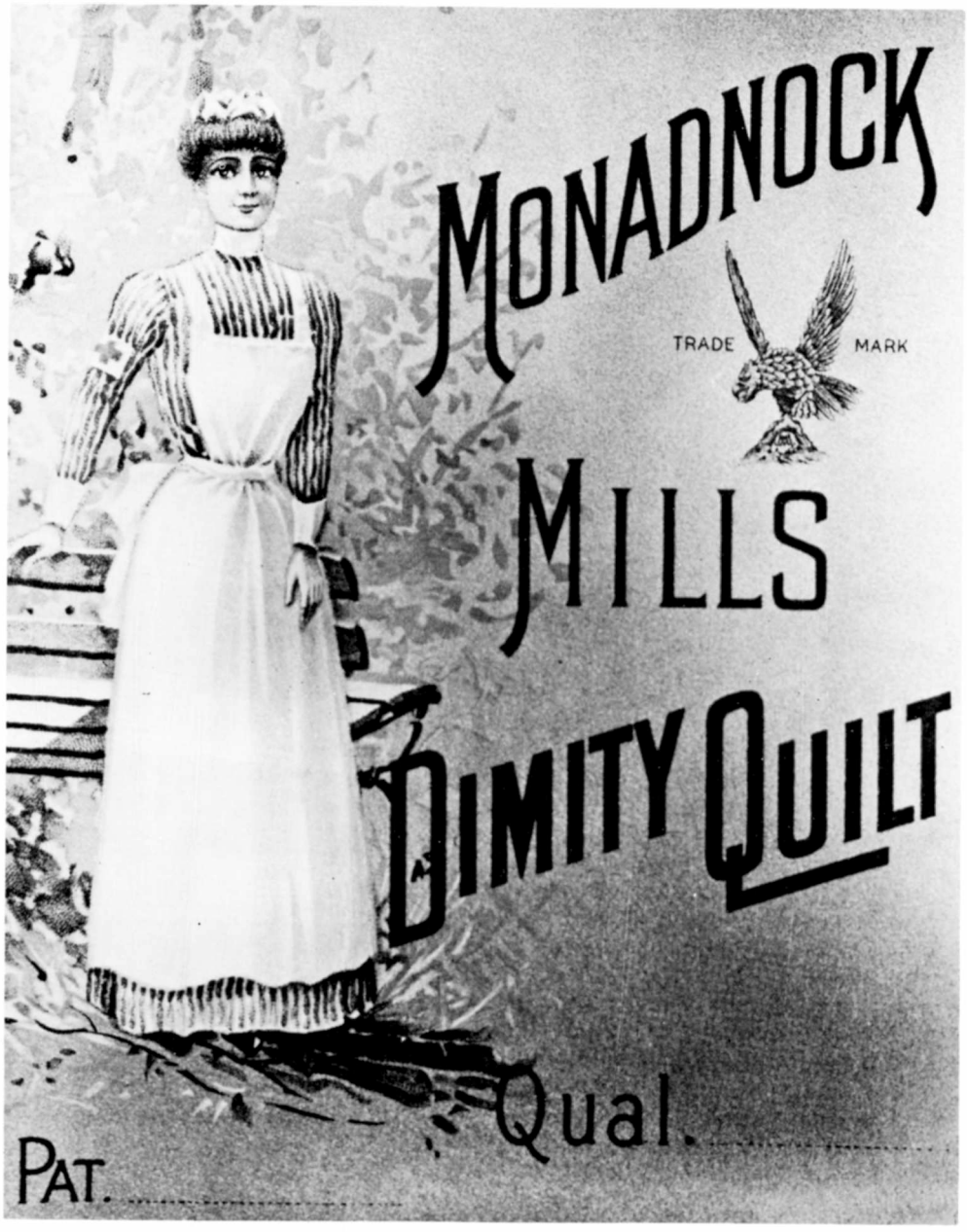


New Broad Street Bridge with relocated intersection.

View from existing Broad Street Bridge south toward city hall. Photo: D. Stevenson.

View of bridge and intersection from Washington Street. The plan recommends eventual relocation of the intersection to the grassy area to the right of the picture. Photo: J. Lowe.

The tenements (Site 21) located at the eastern edge of the district could be reused as an inn. *Photo: J. Lowe.*



Monadnock Mills manufactured what were probably the country's first Marseilles Quilts, beginning in 1870. Dimity quilts were selected for the transatlantic liner Titanic.' Source: Claremont Historical Society.

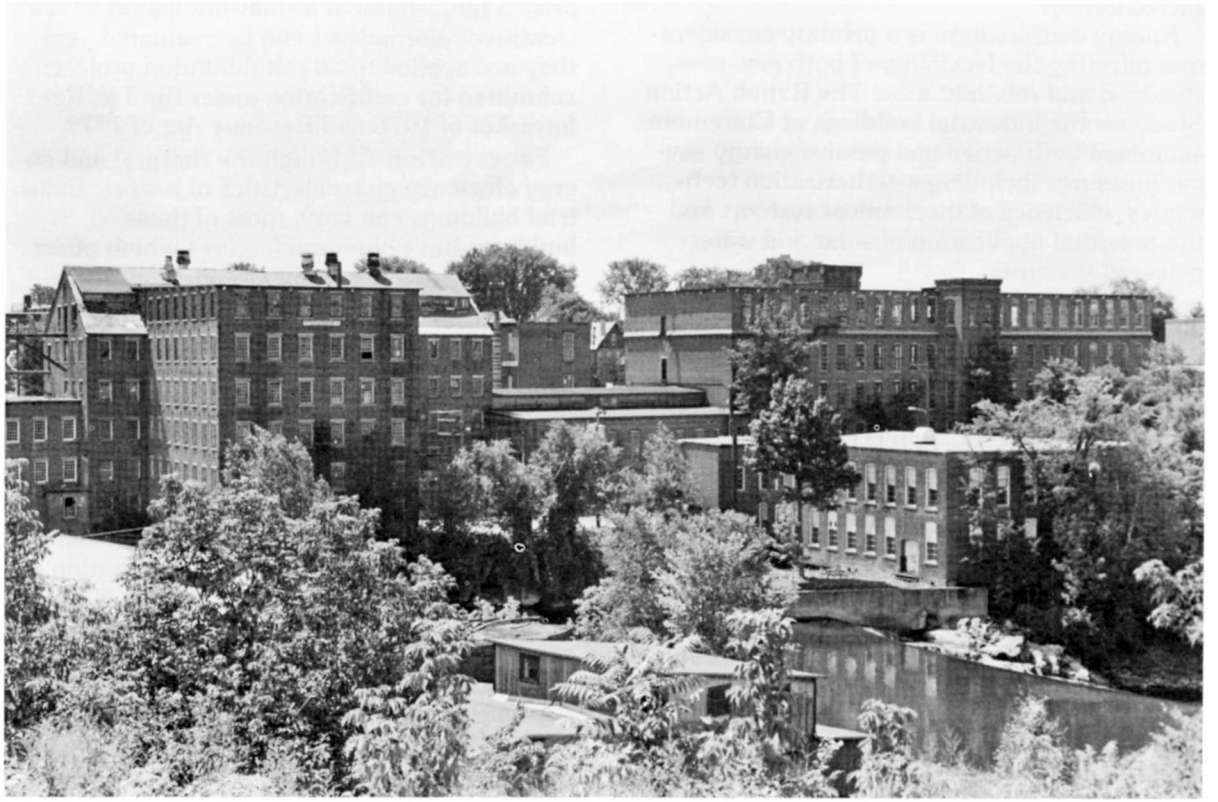
Conclusion

Claremont's industrial nature is duplicated by few other cities in the region. The fact that so many of its structures have remained standing is a fortuitous circumstance, although it may not always have been recognized as such. These buildings represent a physical resource which can be used at some savings over new construction. They also represent an historical resource which is important to the development of Claremont, and which can be used as a dictionary of 19th century mill architecture.

In the twentieth century, the citizens of Claremont have attempted to reenact the forward step of the 19th century which culminated in the construction of the first Monadnock Mill. The city has decided to take the reins of development and to direct its future growth by re-establishing the center of that growth in the historic core of the town.

The preservation plan outlined in this report articulates one alternative for reusing all the historic buildings. The HAER plan emphasizes the physical relationships among structures, and promotes activities which can occur in one while enhancing opportunities for others. Therefore, whatever uses are finally selected for the buildings, their physical relationships must be considered.

The HAER/TPS Rehabilitation Action team helped to awaken the possibilities in Claremont for relating history and planning, past actions and future decisions. Claremont is a unique place in which to live and work, and by recognizing the reasons for its position in New England society, Claremont can establish its place in the future.



Claremont Village Industrial District is a cultural resource of great potential value. Photo: D. Stevenson.

Monadnock Mills, south elevation along Water Street. Delineator: R. Arnold.

Building Conservation

Introduction

Energy conservation is a primary consideration affecting the feasibility of both new construction and rehabilitation. The Rehab Action Study for the industrial buildings at Claremont examined both active and passive energy saving measures including weatherization techniques, efficiency of mechanical systems and the potential application of solar and water-powered systems.

One energy consideration, which is often overlooked, is that vast amounts of energy are embodied in existing buildings. The preservation of existing structures, such as the mill buildings at Claremont, results in an immediate savings of billions of BTU's which would be required (at today's inflated prices) for demolition, production of new materials, and construction of new buildings. This saving represents the conservation of non-recoverable energy and will have a tangible value in any rehabilitation project.

Weatherization

Caulking and Weather Stripping:

Weatherization techniques, such as caulking, weatherstripping, insulation and/or storm windows, can increase the energy efficiency of the mill buildings at Claremont, as well as other commercial and industrial buildings. These techniques can frequently be applied to buildings with minimum impact on the historic fabric and appearance. "Preservation Briefs" No. 3, Conserving Energy in Historic Buildings" recommends a methodology for applying such treatments, beginning with simple passive measures and progressing to more complex systems only as necessary. When technological methods are employed, they should be adapted to the building in a sensitive manner, responding to the spirit and principles of the Secretary of Interior's "Standards for Historic Preservation Projects. These Standards comprise a philosophical framework within which treatment alternatives can be evaluated, and they are applied to all rehabilitation projects submitted for certification under the Tax Reform Act of 1976 and Revenue Act of 1978.

Fenestration Although the thermal and energy efficiency characteristics of historic industrial buildings can vary, most of these buildings have common features which affect their energy saving ability. Such features include window size and quantity, wall mass, ventilation and building orientation.

Typically, there are a large number of windows in these structures, and they perform an important function in admitting light, air and solar heat gains to the interior. Because single-glazed windows also have low thermal resistance, often permit excessive infiltration, or exhibit signs of deterioration, they are usually considered for replacement in rehabilitation work. Existing windows, which can be either wood or steel, frequently receive attention only as an energy liability without an adequate regard for their role as the principle decorative elements in the otherwise plain facade.

Wood windows may frequently appear to be in a deteriorated condition when they are actually quite structurally sound and simply need rehabilitation. Unfortunately it is often expedient to remove the historic windows and replace them with stock contemporary windows such as double glazed aluminum units. The double glazing is selected to cut the conductive heat transfer in half, but unless the aluminum frames have thermal barriers, or breaks, much of this advantage will be lost. On the other hand, wood frames are excellent insulators and simple weatherization techniques can often restore the window unit to efficient use. Replacement or treatment of deteriorated parts can restore structural integrity, and the application of preservatives and repainting can enhance their long term durability and appearance. Proper caulking and weatherstripping can minimize infiltration, and both exterior and interior storms can be adapted to reduce conductive losses. Exterior storm windows are the most commonly used because of the availability of the lightweight, tripple-track aluminum units and because there is the potential for condensation problems with interior storms. The improved performance of existing windows, as a result of the weatherization techniques, can produce substantial energy savings, since up to one-third of the output of a typical heating plan must be used to replace heat loss due to infiltration. However, even without weatherstripping, a wooden double-hung sash of average fit allow less than half the infiltration of metal double-hung windows, (with each weatherstripped, the same wooden window still allows only ¾ the infiltration of the metal window).

Like wooden windows, steel factory windows in historic industrial buildings undergoing rehabilitation are generally removed and replaced with other systems, usually aluminum or translucent fiberglass sandwich panels. Such replacements are not always necessary and often destroy the scaled grid of the original windows and strip the building of much of its historic identity. Some rehabilitation projects retained and repaired these steel factory windows when the sash was in good shape. In these cases, the windows can be made more thermally efficient through weatherstripping and caulking. Several manufacturers supply clip-on spring weatherstrip fabrications which seal the head, sill and jamb sash elements. However, steel factory windows contain no thermal break to insulate the outer face and are thus rapid thermal conductors. If retained, these windows must be fitted with movable storm windows to achieve meaningful thermal improvement while maintaining maximum operability.

The rehabilitation of existing windows which has been described is generally a simple, straight-forward process, but competent professional advice should be sought for the choice of techniques and materials. Sealants, caulking compounds, preservatives and other materials have chemical components and should be selected for compatibility with the existing building fabric. In addition, structural repairs may involve masonry work which requires skilled and experienced personnel.

There are times when the existing windows are too deteriorated to retain, and the window openings must be refitted with new energy efficient systems. It is possible to select single glazed replacement windows which resemble the original units in material and configuration, but storm windows would still be necessary to achieve energy efficiency. More often a contemporary product is selected because it is cheaper, more readily available or more energy efficient. When contemporary windows are used, there are some considerations which should be addressed in order to minimize the visual impact, such as:

1. Matching color and dimensions of the frame and sash.
2. Configuration of the window panes.
3. Reflectivity and color of the glass.
4. Shadow reveals or relation to the wall plane.

In addition to windows, skylights are frequently found in historic industrial buildings. They are an important consideration in weatherization because the total skylight area is often a significant portion of the roof, and in single story structures a large part of the heat transfer is through the roof. There are two basic types of skylights found in late 19th and early 20th century factory buildings. Sheet metal framed skylights (based on a system patented by George Hayes in 1869) consist of a formed sheet metal rafter which holds the fixed glass. The other type is also structured on a rafter supporting system but consists of much heavier rolled steel sections which frame the glass. This system could contain operable panels for ventilation.

Weatherization options for these skylights usually demand total replacement of the sheet metal frames, but may allow retention of the rolled shape framing type. However, use of proprietary rather than custom skylights may minimize replacement costs and will provide a guarantee for this roofing element. The framing grid of these new skylights should attempt to retain the pattern of the original system. Double glazed replacement wire help to increase the thermal efficiency of the rebuilt or newly retrofitted unit. Since skylights have no vision function, translucent plastic sandwich panel glazing, possibly containing light transmissive insulation, may be an appropriate rehabilitation system.

Although windows receive most of the attention in the weatherization effort, shading devices should receive some mention. Shading measures which can be thermally effective in retrofitting industrial buildings may include interior shades and blinds and exterior awnings. In planning for shading devices, it should be kept in mind that lesser energy savings will be realized where the shading devices are used in conjunction with storm windows or double glazing since cumulative effects reduce the performance of each subsequent action.

Awnings, shutters and other exterior shading devices were seldom included on industrial buildings. However, awnings were used occasionally when it was necessary to limit the high interior brightness and heat gains during the summer and on the south side of buildings. Interior devices were usually make-shift shades put up by the employees. Operable canvas, plastic coated canvas, or plastic awnings may be appropriate on some buildings, but fixed aluminum awnings are not appropriate esthetically or functionally. Fabric awnings should be opaque, light colored, have a ventilating gap where they meet the window head, and adequately cover the window opening.

Insulation: Insulation can be used effectively to conserve energy in historic industrial buildings, but it should be chosen and installed to achieve the maximum benefit with the least impact on the significant features of the building. Care should be taken to avoid damaging original material or creating harmful moisture problems in the roof, walls or basement.

The roof is a primary point of heat transfer in a building and should be given high priority when adding insulation. The percentage of total energy loss which occurs through the roof correlates to the ratio of roof area to wall area, and this ratio is relatively high in one to three story structures, (a height typical of many mill buildings). In most mills the roof framing system is exposed, and it may be desirable to retain this feature, while insulating the roof. One technique which allows this is the installation of rigid board insulation between the roof decking and the roofing material. This method can be used on flat roofs with bituminous or synthetic membranes and on pitched roofs with shingles or metal roofing; it does require, however, that the roofing material be removed and replaced. The more prevalent technique is to place batt or blanket insulation between the rafters from inside the roof and finish with gypsum board.

Insulation may also be applied to the masonry walls, but first there should be some understanding of the thermal characteristics of these walls. Masonry walls have thermal inertia, which means that they are slow to react to changes in temperature and therefore act to ameliorate external temperature extremes. In the summer, wall temperatures build up slowly so that heat produced during the peak of the

day does not reach the interior until several hours later, when outside temperatures are lower and the interior space can be cooled by natural ventilation. In winter, sunlit walls store heat which is then radiated into the interior spaces during the evening. The masonry cavity walls of some historic and industrial buildings have additional insulating qualities as a result of the air space between the wythes; typical mill walls, however, are solid masonry.

Insulating the interior of masonry walls in the typical mill can be both effective and relatively simple: the interior surfaces are usually plain so that there is little likelihood of covering or damaging significant interior features. There may, however, be a slight change in the character of the interior space as well as the loss of some desirable thermal inertia heat gains in the winter. The alternative of installing insulation on the exterior is highly undesirable because of the negative impact of such treatment on the historic appearance of the building although this is the thermally preferable location of insulating a mass masonry wall. Though most mill walls are solid, some later ones may have a wall cavity which may appear to be an ideal location for blown-in insulation; in reality the existing air space is a good insulator and the addition of a foam or loose-fill material may not be cost effective.

The roof, walls and floor create a thermal envelope around the interior spaces. Where the first floor is over an unoccupied basement or a crawl space, insulation of the floor is recommended. The insulation should be installed on the underside of the floor with a vapor barrier on the warm side, and the unoccupied space should be ventilated to prevent the buildup of moisture which can damage the building fabric.

The many industrial buildings built on slopes will have basement walls which are exposed on one side. It can be beneficial to insulate such exposed walls, but care should be taken to avoid creating an interior vapor barrier on any damp walls which are below grade. The moisture which can be trapped by such improper vapor barriers may threaten the structural stability of the wall. Where the top of the basement walls extends slightly above the finished grade level, a strip of floor insulation about two feet wide may be installed around the perimeter of the wall to provide some energy savings.

Conclusion: Historic industrial buildings have been particularly favored for rehabilitation and re-use because of several advantageous characteristics such as:

- Large open areas accommodating contemporary usage
- Rectangular plans which are adaptable to a variety of uses
- Narrow widths which facilitate code compliance
- Open spaces which require minimum demolition
- Relatively low sale price
- Heavy structural systems which meet most modern loading requirements.

Careful evaluation of the energy efficiency expectations for the building, coupled with life cycle cost analysis and efficient mechanical systems design and operation controls, often shows that a carefully designed weatherization program can bring industrial buildings up to an adequate level of thermal performance without causing undue alteration of the historically significant aspects of the buildings.

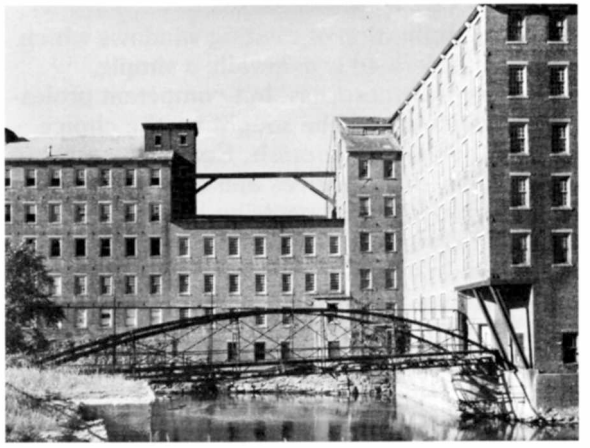


Photo: J. Lowe.

Energy Potential

Alternative Sources of Energy

An appropriate segment of any energy conservation study should focus on possible alternative energy resources. Historically, New England mill towns were centered around a river from which they derived the power to operate their industrial equipment. Claremont was no exception, and throughout its history until the 1940's used hydro-power from the Sugar River to run the machinery of the mills along its banks. As part of the Rehab Action plan, considerations were given to the reinstatement of all or part of this system as a power source for the commercial and residential uses recommended in the rehabilitation.

Solar energy could provide a second alternative power source. The sun was also an historical consideration in the design of the mills, though used exclusively as a source of light. Rooftop monitors and saw-toothed roofs are typical mill elements which admitted as much natural light into single story work spaces as possible. For the purposes of the rehabilitation, these same elements were studied as potential solar collectors.

Hydro-power: A study was conducted of six locations along the Sugar River where hydro equipment could possibly be installed, including the Gas Works, Manadnock Mills, Claremont Woven Label, Hampshire Manufacturing, Sullivan Machine Co., and the Grist Mill. Some of these sites were determined ineligible for redevelopment due to the need for extensive construction under the mills which would involve considerable risk to the structural stability of the buildings. Other river sites did not have sufficient head to be economically feasible. However, two sites along the north bank of the river would be appropriate for hydro-electric generation facilities, the Gas Works and the Sullivan Manufacturing Company.

The Gas Works site was fed via a buried penstock from a dam almost directly under the Broad Street bridge (47–01, N.H. Water Resources Board reference number). It is, hydraulically, the best site of the six for redevelopment. The new dam that will be built to replace it in 1979 should be designed to accommodate a suitable intake structure. From the intake, a new penstock would be buried under Broad Street and under the Gas Works access road to a new power house built on the old site, just south of the Gas Works buildings. The new powerhouse would contain two semi-packaged units, each designed to produce 250 KW when operating under a head of 7.62 meters. The turbines would have a nominal diameter of 1100mm. The plant would produce 3,608,000 KWh per year, or 69% of the maximum site capacity of 5,190,000 KWh.

The second recommended site would be at the Sullivan Manufacturing Company. This scheme envisages the reconstruction of the earlier penstock from the north side of the existing concrete dam located about 100 yards downstream of the old Gas Works site (47–03, N.H. Water Resources Board). The penstock would extend along the river side of the foundry buildings to a new power house adjacent to the Sullivan boiler house. The original power house building still exists, but is used as a pump house and is unlikely to be available for power generation. Thus a new site should be used just downstream of the old one. This site, with a head of 6.7 meters, could utilize two machines identical to those at the Gas Works, giving an output of 440 KW at rated head, for 3,170,000 KWH per year, or 69% of the theoretical site maximum.

Since public utilities are strictly regulated and complex legislation would be required to change the existing situation, it is recommended that the energy be sold to a franchised utility at a contract rate which may allow the utility to pass on the resulting savings to the customers in Claremont. Contract machinery for such an agreement is already in existence.

Both projects are, in effect, merely reconstructions of earlier plants, and permit procedures should not be difficult. The New Hampshire Water Resources Board will require the issue of permits for the various required dam changes. Both plants are small and will come under the scope of the Federal Energy Regulatory Commission "simplified" licensing procedure. Environmental impact will, after construction, be minimal, and in fact, there may be some improvement in conditions following de-silting operations. Town permits will be required.

From general file data, the costs for redevelopment of these two sites were estimated at $1,000/1,200 per KW. The two projects could be brought on the line for between $940,000 and $1,120,000 (based on 1978 figures). With the potential revenue of approximately $200,000 per year, straight payback would be achieved in 4.7 to 5.6 years.

Solar Energy: The question of the feasibility of solar energy use in a large existing complex such as Claremont poses problems not normally encountered in recent solar developments. Most information on solar design is based on new, domestic architecture, and cannot be readily accommodated to an industrial site. While special considerations have already been given to the weatherization of the historic building materials and construction, further concerns should include the scale of the interior spaces; the siting of the structures; the appropriateness of the thermal efficiency; and the cost and aesthetics of any new solar equipment.

The huge scale of the Claremont Mills represents a severe heating problem even for conventional systems. The complex, however, presents an unusual opportunity to experiment with new low-cost systems at a large scale and to investigate new concepts such as seasonal heat storage which may be feasible in a com-

plex with so much available floor area under one roof.

Siting and Form: Historically, the primary consideration in siting the Claremont Mills was the Sugar River, which fortuitously runs in an east-west direction at the mills' site, placing the majority of the buildings in good position for solar heat gain. Most of the southerly facades point 25° to 35° west to true south with sites 11 and 12 oriented almost due south.

Even with this reasonable solar orientation, however, the form of the mill buildings is not conducive to easy solar heating. The bulk of the buildings occupy a steep north slope with 3 or 4 floors above grade on the south and 7 to 8 exposed on the river side. Combined with the east and west facades and the shading of some buildings by others, the net effect of the siting of Claremont Mills is to create 3 to 4 times as much heat-losing surface area as heat-gaining area in the winter. Only the Joy Foundry (site 17) and Site 19 show favorable distributions of heat gaining to heat-losing surfaces.

For the purposes of the Rehab Action plan, several buildings were selected for adaptation to solar systems. The criteria for determining those buildings which have the greatest potential for solar radiation collection were orientation of the building, configuration of the roof, shading, and window to wall area ratio. The sites selected for in-depth study were sites 11, 12–B and 19.

Site 11, Sullivan Forge Shop: Many of the mill buildings in Claremont and other industrial communities have saw-toothed roofs designed to admit north light into the work spaces below. Site 11 at Claremont, the forge shop of the Sullivan Machinery Company, has a saw-toothed roof line running perpendicular to the longitudinal axis which points 2° west of south. A study was made of the design alternatives for utilizing this existing roof line to incorporate solar collectors. In considering the utilization of the roof as a collector area, with a low slope of less than 30 degrees, adjustable brackets would have to be provided to adjust the collectors to an angle of approximately 60 degrees for reasonable efficiency in wintertime. This would have a strong visual impact on the character of the forge shop.

Site 12B, Hampshire Manufacturing Company: Hampshire Manufacturing Company situated on Main and Pearl streets was studied for its large unshaded window area (45%) along Main Street which faces 15° west of south. Passive solar gains through windows is the simplest and most cost-effective collection system. Sunlight admitted through windows can add a substantial amount of heat to the interior. Problems inherent in this include: spot overheating, night heat loss, and glare. Heat pump systems of varying complexity can redistribute excess heat on the south side to colder areas on the north side, and vice versa. Insulated glass and a variety of interior and exterior shades and shutters can prevent window heat loss. Glare can be controlled by space planning and dark heat-absorbing interior shades or curtains.

Site 19, Sunapee Mills: The Sunapee Mills building is on the north side of the Sugar River with the south facade of the building completely exposed to the sun with no shading except for a small portion from the Broad Street Bridge. The south wall faces 15° west of south and is a good area for the collection of solar radiation. One of the most attractive passive systems, in the thermodynamic sense, for this site is the Trombe Wall or glassed masonry collector. The existing masonry wall behind the new glass facades acts as the solar collector, heating the air in the space between glass and masonry for use elsewhere. On this structure, partially used for residential purposes, the Trombe wall could provide the energy for heating the domestic hot water.

A glass arcade designed for the south side of the Monadnock complex along Water Street would also be used as a passive solar collector for heating other portions of the building. Explanation of the operations of this "green house" system is included in figures No. 68 and 69.

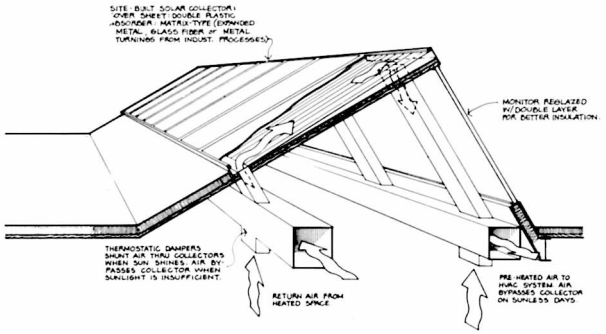
Conclusion: While there is not enough sun in New England to supply 100% of the space heating demands, there is enough to take the brunt of the heating load, bringing the demand down to economically and ecologically acceptable levels. The strategy for dealing with the Claremont Mills then involves the following steps:

1. a designed weatherization program
2. a detailed analysis of existing solar energy gains through windows and walls
3. a careful selection of the most efficient and minimally sized conventional system for the heating of the buildings
4. a determination of what fraction of the net heat load can be economically supplied by the sun through additional solar heating systems, starting with the simplest and working through to the most complex. Life-cycle costing and realistic assessments of fuel and electrical cost escalations must be applied to this determination.

While some of the available systems for solar collection may seem economically disproportionate today, the escalating cost of oil prices almost guarantees that solar energy will be a viable alternative power resource for developments such as Claremont in the not too distant future.

Historic Impact

The choice of the different potential solar systems for these sites depended upon the impact which the equipment would have on the historic appearance of the structures. While the prominent profile of the saw-toothed roof



SITE-BUILT AIR COLLECTORS

THE LEAST COSTLY METHOD OF UTILIZING SOLAR ENERGY IS TO BRING IT IN DIRECTLY WHEN THE SUN IS SHINING, RELYING ON INSULATION AND THE EFFICIENT USE OF FOSSIL FUELS FOR SUNLESS PERIODS.

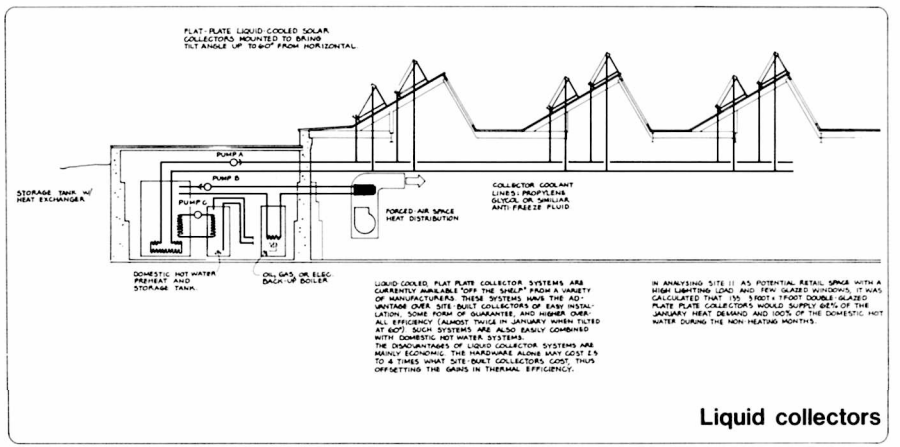
THE SYSTEM DEPICTED HERE UTILIZES A LOW-COST MATRIX-TYPE AIR COLLECTOR BUILT DIRECTLY ON THE SOUTH SLOPE OF THE SAWTOOTH ROOF. THE COLLECTOR BANK IS CONNECTED AS AN ADJUNCT TO THE AIR-RETURN DUCTS OF A CONVENTIONAL HVAC SYSTEM. AIR PASSING THROUGH THE COLLECTORS ON A SUNNY DAY IS PRE-HEATED PRIOR TO RE-DISTRIBUTION.

IF NO HEAT STORAGE IS PROVIDED, 2000 SQ. FT OF COLLECTOR AREA WILL SUPPLY 12% OF THE HEAT FOR SITE II.

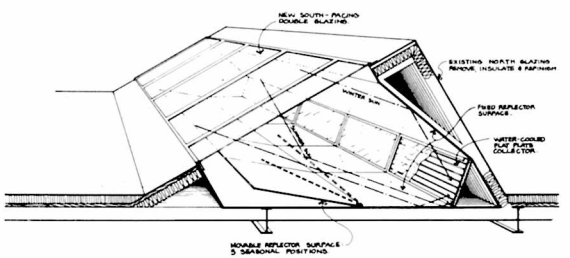
ADDING 1000 SQ. FT OF COLLECTOR AREA AND ADDING A SIMPLE ONE-WAY FLOW ROCK BED FOR HEAT STORAGE (110 CU. YDS. STORES 1 DAY'S HEAT IN JAN. FOR SITE II IF IT IS WELL INSULATED) RAISES THE HEAT SAVINGS TO 62.6%. THE ROCK-BED STORAGE AND HIGH-LEVEL AIR-RETURN SYSTEM ALSO FACILITATE THE CAPTURE AND RECYCLING OF HEAT FROM THE LIGHTING WHICH, IN A FUNCTION SUCH AS A RETAIL STORE, PROVIDES MORE THAN HALF OF THE HEAT REQUIRED.

IN A DEPARTMENT OR RETAIL STORE, THE HEATING SEASON IS SO SHORT THAT ACTIVE COLLECTORS WOULD HAVE TO COST LESS THAN $6 PER SQUARE FOOT TO PAY FOR THEMSELVES IN 15 YEARS. IN A BUILDING WITH A GREATER HEAT LOAD, SUCH AS THE FOUNDRY (SITE IT) THE PAY-BACK PERIOD MIGHT BE SHORTENED SINCE THE COLLECTORS WOULD BE PERFORMING USEFUL WORK FOR A LARGER PORTION OF THE YEAR.

Air collectors



Liquid collectors



Pyramidal optics

IN GENERAL, THE STANDARD NORTH-GLAZED INDUSTRIAL SAWTOOTH ROOF IS POORLY SUITED TO SOLAR HARDWARE: ITS GLAZED FACE IS ORIENTED TO LOSE HEAT ALL WINTER LONG AND ITS LOW-PITCH SOUTH SLOPE FACES THE WINTER SUN AT AN INEFFICIENT ANGLE FOR SOLAR COLLECTION.

ONE SOLUTION TO THIS PROBLEM IS TO TURN THE ROOF MONITORS AROUND AND MOUNT COLLECTORS ON THE 60° SLOPE. SINCE THIS IS NOT ALWAYS STRUCTURALLY OR ECONOMICALLY FEASIBLE, ANOTHER APPROACH IS TO REVERSE THE ORIENTATION OF THE GLAZING ON THE EXISTING ROOF. A SERIES OF SMALL GREENHOUSES ARE THUS CREATED. A COMBINATION OF FIXED AND MOVABLE REFLECTING SURFACES (PYRAMIDAL OPTICS) CAN BE ARRANGED INSIDE TO FOCUS THE SUNLIGHT ONTO A COLLECTOR SURFACE.

THE POTENTIAL ADVANTAGES OF SUCH A SYSTEM ARE:
1) REDUCED CAPITAL OUTLAY FOR COLLECTORS: A SMALL COLLECTOR AREA CAN GAIN THE HEAT OF A LARGE, LESS EXPENSIVE APERTURE AREA.
2) INCREASED SYSTEM EFFICIENCY: THE ENTIRE COLLECTOR BANK, BEING INDOORS, CAN RUN AT A HIGHER TEMPERATURE THAN EXTERIOR INSTALLATIONS.
3) FREEZE PROTECTION: INDOOR COLLECTORS NEEDN'T BE AS WEATHERPROOF AS OUTDOOR. WATER MAY BE USED DIRECTLY INSTEAD OF ANTI-FREEZE, ELIMINATING THE NEED FOR HEAT EXCHANGERS OR COMPLICATED DRAIN-DOWN SYSTEMS.

THE DISADVANTAGES INCLUDE:
1) LOSS OF THE LIGHTER AND INTERIOR SPATIAL CHARACTER OF THE SAWTOOTH ROOF.
2) NECESSITY OF ADJUSTING THE MOVABLE REFLECTOR PANELS AT LEAST ONCE PER SEASON.
3) THE USUAL LEAKAGE POTENTIAL OF LOW-SLOPE GLAZED ROOF INSTALLATIONS.

PYRAMIDAL OPTICS IS PROBABLY MOST COST-EFFECTIVE ON EXISTING ROOFS THAT REQUIRE EXTENSIVE REPAIR.

SITE 11: S.M.Co. Forge Shop
ALTERNATIVE ROOF-MOUNTED COLLECTOR SYSTEMS

These sections through the Site 11 skylights show proposed solar collector systems. Delineator: P. Scharf.

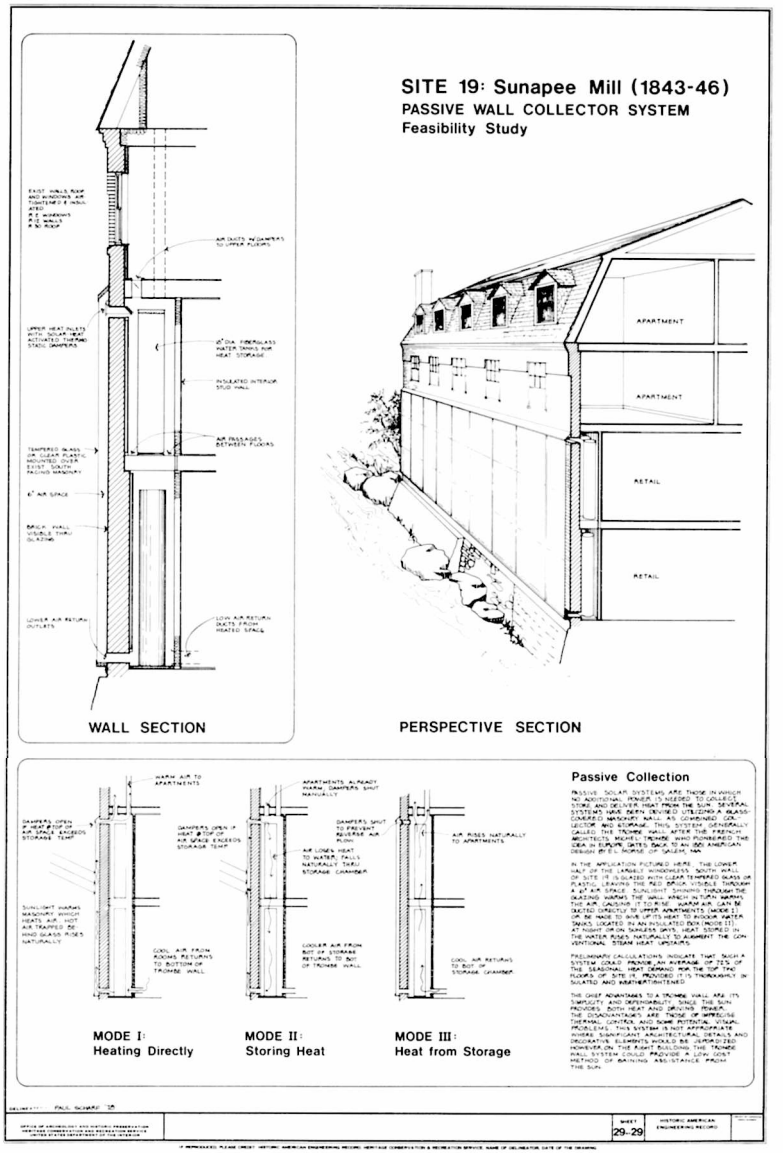
on the forge shop presented the opportunity for roof top collectors, it also restricted the height and angle of the panels. Adjustment of the panels would have to be made within the given dimensions of the existing "teeth."

Roof top collectors would present a disturbing appearance on the long flat roof of the Hampshire Mills (site 12B) which is visible from the center of town up the hill. However, the large amount of window area could be used, leaving the historic integrity of the structure unaltered.

On the other side of the river, the choice of the large conspicuous Trombe wall for site 19 recognized that the side wall of the building was drastically altered from its historic appearance and was not a contributing element of the overall complex. Separated from the continuous facades along the river, the south elevation of the Sunapee Mill could be used as a solar collector without intruding on the historic character of the district.

Development of the idea for the glass arcade is contingent upon its nondestructive addition to the main mill buildings. Construction detailing would place the self-sustaining structure beside the historic masonry, without any penetration of the walls either for access or for structural support. In this way, the visual alteration of the glass arcade can be construed as a modern addition that does not constitute an irreversable change to the historic structures.

These are a few of the historic concerns regarding the solar applications to this project. These concerns should be addressed in any sensitive solar application to a historic building, but they must be addressed in projects which apply for certification of the rehabilitation under the Tax Reform Act of 1976 and the Revenue Act of 1978.



A drawing of the south wall of Site 19 showing the proposed trombe wall in place. The trombe wall would provide solar heated hot water to residents on the upper two floors of the building. Delineator: P. Scharf.

Appendix

Case Study: Site 6/6A

Design Report

Site 6/6A, a six story brick building with a "T" plan, was built in two phases. The original mill building, Mill 2 (Site 6), was erected in 1853, and a rear addition, Mill 6 (Site 6A), was constructed in 1910. Located approximately at the center of the Monadnock Mills Complex, it is sited directly on the south bank of the Sugar River. HAER's regional market study for the Claremont area indicated a demand for 150,000 to 200,000 square feet of middle to upper-middle income housing. Several buildings would seem suitable for housing within the district. Mill 2 was chosen because of its pivotal location in the Monadnock Mill Complex and its appropriate size and physical characteristics.

Certain building limitations were encountered in the reuse design of this structure. The "T" configuration does not allow natural light into a central section of the building. Natural light is a building code requirement for habitable rooms. Furthermore, code requirements state that a habitable room's depth may not exceed 2½ times its window wall width.

Parking is a problem for this building, as well as nearly every other building in the district. The best solution to the parking problem is to locate a parking lot with approximately 100 spaces across the river, accessible by rehabilitating an existing footbridge and/or constructing a new enclosed footbridge.

Rehab costs for the proposed use as middle/upper-middle income housing balances with reasonable housing and retail rental fees if city, State and/or Federal funds were used to construct the arcade system through the Monadnock Mill Complex. (See pro forma analysis). The cost estimate was compiled from dollar figures quoted by local contractors (see cost estimate).

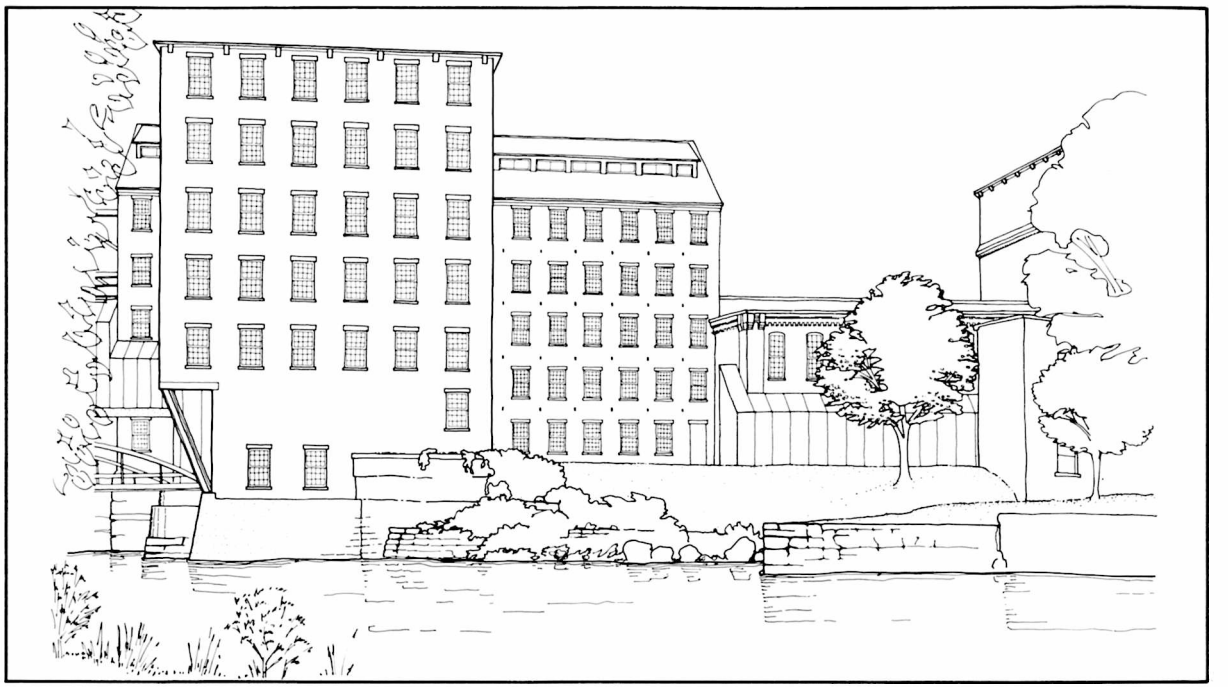
Photo: J. Lowe.

Various apartment types were studied as possibilities within Mill 2. The building width is a little too shallow for a double loaded corridor, but too wide to be used efficiently with a single loaded corridor. A "cross-over", two floor apartment type was selected as the most appropriate. In this scheme, one corridor serves vertically interlocking apartments and therefore accommodates three floors. Some persons enter their apartments at one level, and have a second level below. Other apartments have an entry level and have a second level above. Because of the reduced amount of corridor, this apartment type is larger, has interesting 2-story spaces and cross ventilation.

Because of problems discussed earlier in this report of building configuration and natural light requirements, the choice needs to be made between the use of less expensive standardized units or the best use of the building's square footage. The design solution for Mill 2 is a compromise, with four apartment types. The majority (22 out of 41 apartments) are the "cross-over" type.

A resident exiting from his apartment must have direct access to at least two stairways. The original winding stairs located in the existing stair tower are not an acceptable means of egress by code. Because of the configuration of the building and the length of travel permitted

Delineator: M. Chrisney.



The river side of the building offers the viewer a dramatic appearance. Delineator: M. Mook.

by code, three new fire-rated stairtowers are necessary. A new elevator can be located in the tower.

Vertical circulation within the entire Monadnock Mill Complex was an important design concept. The overall plan for the complex calls for using Sites 7, 5, and the space between 2 and 4 as major entry points and lobby spaces to serve the arcade system. (See Monadnock Arcade drawings). The existing towers should be used only for special entry and/or service access.

The program for Site 6/6A, as derived from the above considerations, and those outlined in the District Plan, is as follows:

1. Retail shall be the major use for the basement and first level of the south or original portion of the building. All retail space will be accessible by a continuous arcade at least 12 feet wide, on the Water Street (south) side of the building. A glass shed covering the proposed excavated areaway will develop a visual connection between the two levels of retail stores.

2. In order to be economically viable there must be at least 36 apartments of ample size.

3. There must be three fire-rated stairtowers and an elevator.

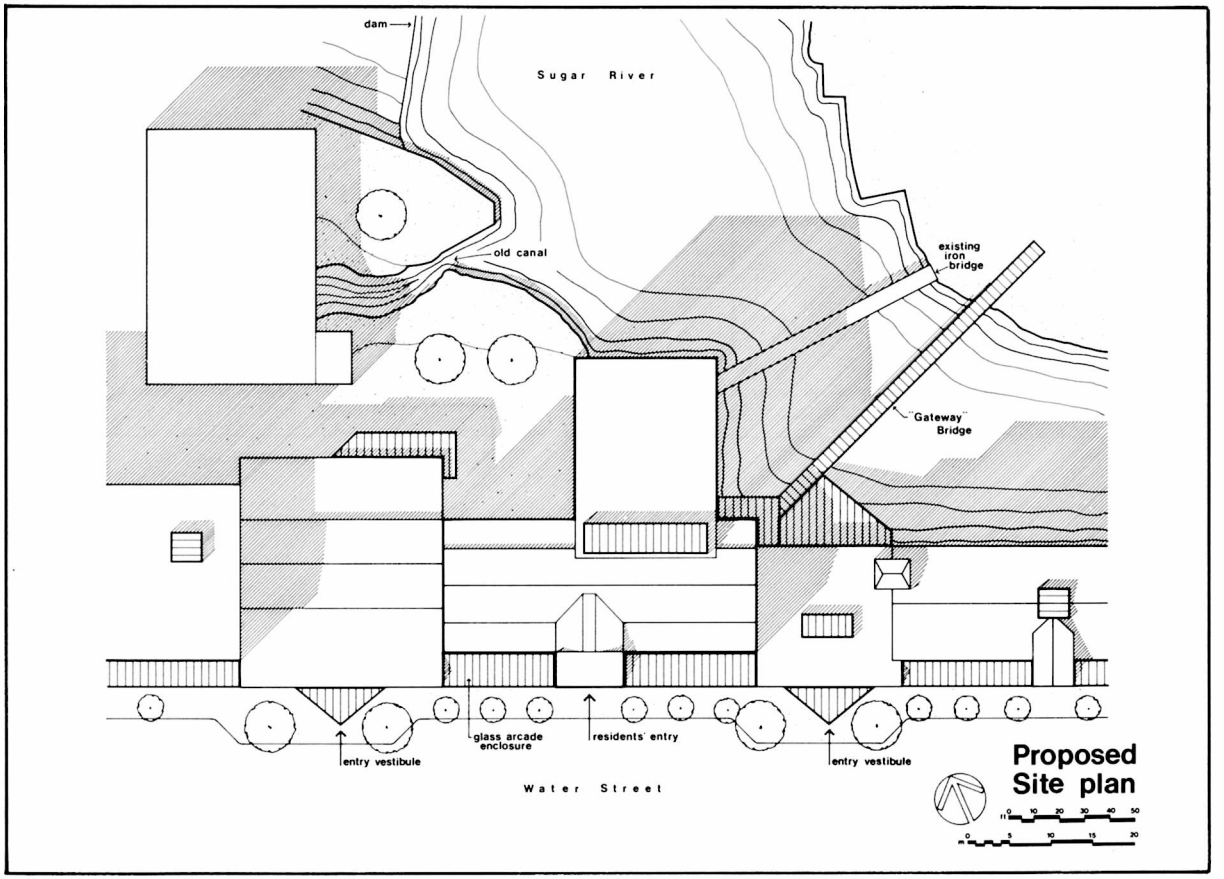
4. The building design should offer the same amenities available at comparable apartment complexes in this area. A laundry, recreation room, extra storage space, and air conditioning should be provided.

5. The original winders in the existing stair tower would be closed at each floor and incorporated as a design feature in the corresponding apartment.

6. The small portion of adjacent land on the river side is to be developed as residential open space.

The rear addition (Site 6A) to the original building, which is located at and helps to form a bend in the Sugar River, can effectively be designed for "cross-over" apartments. Corridors in this section only occur in the first and fourth floors. These apartments all have spectacular views up and down river.

In the original portion of the building (Site 6), the most sensational apartments are those located at the fourth and attic levels. (See attic sketch). These cross-over apartments feature the original, large, wood trusses which span the length of the apartments and provide a roof ridge at an interior height of approxi-

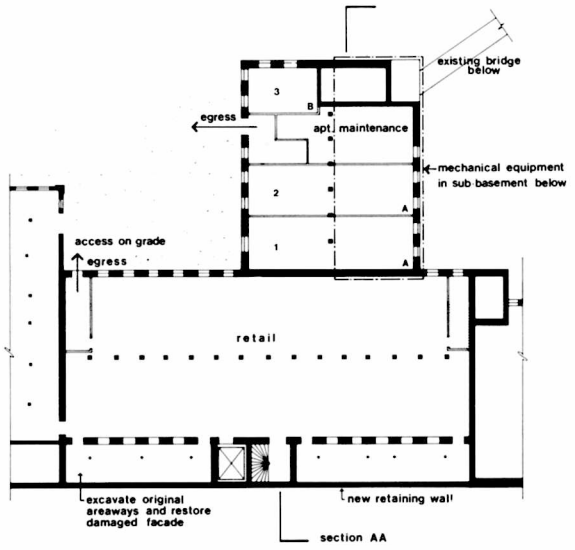


Site plan shows the small amount of land available to the building for recreation. A new pedestrian bridge is shown which would connect the building with potential parking on the north side of the river. Delineator: M. Mook.

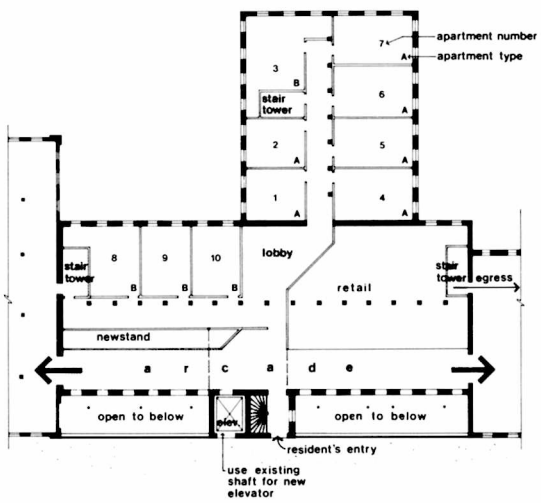
mately 18 feet. A continuous trap-door monitor, which was added to the building in 1870, allows clerestory light into all of these apartments. On the lower floors, the apartment configurations become fairly individualized by the circulation system and the natural light problem at the junction of the "T" (See floor plans). The new stairtowers have been held back from exterior walls so that they obscure as few windows as possible.

Several options were considered in terms of interior finishes. Acoustical separation between apartments can be achieved by treating either the ceiling or floor. Batt or rigid insulation used with a new hung ceiling is the usual treatment for ceilings while lightweight concrete or liquid gypsum covered with carpeting or wood is the usual treatment for floors. The floor treatment approach leaves the existing ceilings and structure exposed. For the interior finishing of existing walls, columns and beams, the choices are cleaning or painting. The recommendations for the residential areas of this building would be to insulate the floor with a lightweight concrete slab, which would also help to level any uneveness in the floor, provide carpeting, and to paint exposed interior surfaces. In the retail areas the existing wood floors would be refinished and other visible surfaces would be cleaned with the appropriate non-destructive technique.

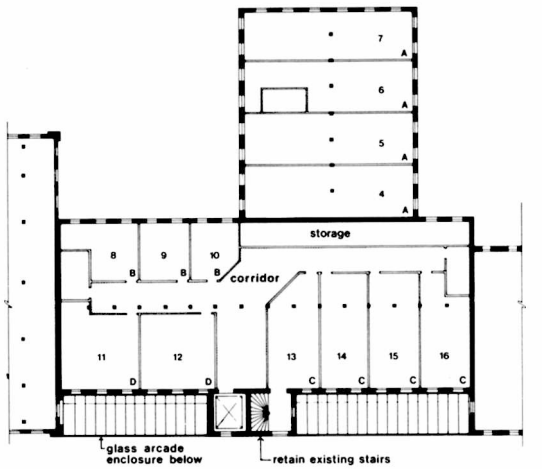
Several possible rehabilitation methods concerning this building have been discussed, recommended or discouraged because of the Secretary of the Interior's Standards for Rehabilitation. Recommendations for building stabilization include: brick cleaning, repointing and selective replacement; repair of several structural beams; replacement of the deteriorated slate roof with a new slate roof; excavation of the historic areaway on the Water Street side of the building. New construction includes a glass shed over the excavated areaway. A major skylight has been added at the juncture of 6 and 6A; it does not alter the roofline, and is impossible to detect from any exterior view. Proposed stairtower and elevator shafts do not extend above the existing roofline and roof access is provided through the monitor windows. Most of the windows do not exist, therefore a replacement of compatible design and high insulative value is necessary. Interior alterations include: 1) floor cuts necessary for access within the two-story apartments; and 2) suspended ceilings in the apartments located only over halls, bathrooms and kitchens, to house mechanical equipment, thus leaving the majority of original ceilings exposed.



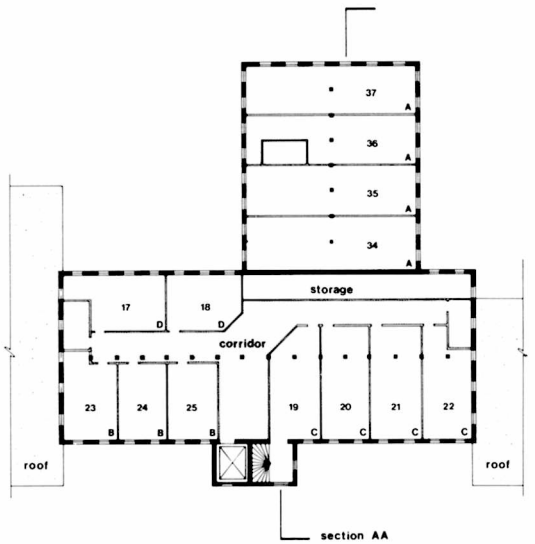
Basement



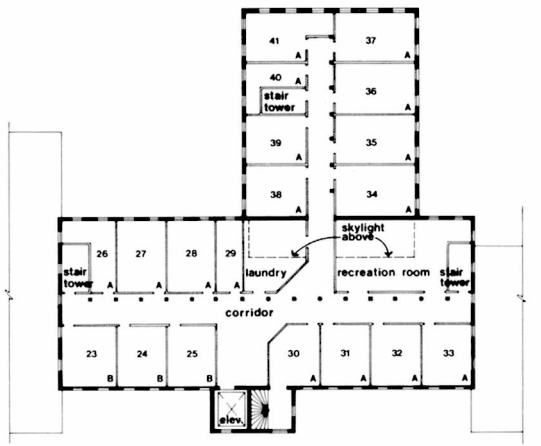
1st Floor



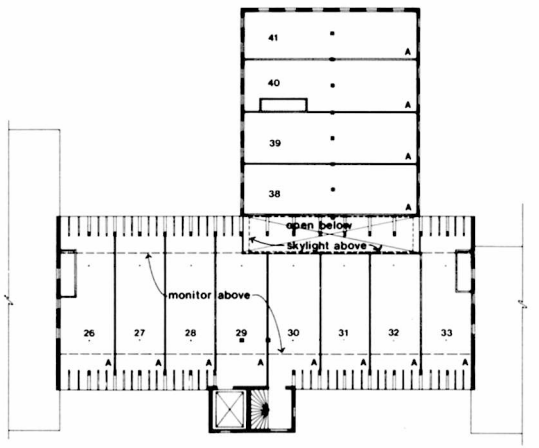
2nd Floor



3rd Floor

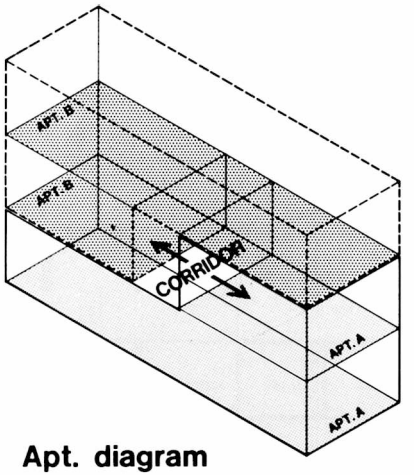


4th Floor



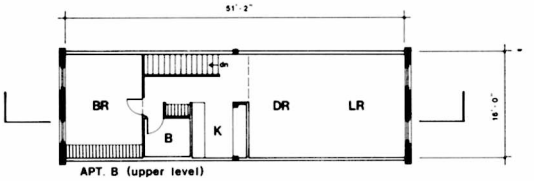
Attic

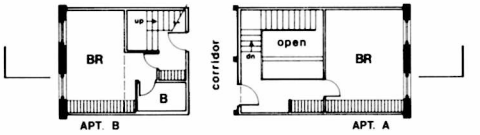
The proposed scheme has retail space in first two levels and housing on the upper levels. Delineator: M. Chrisney.

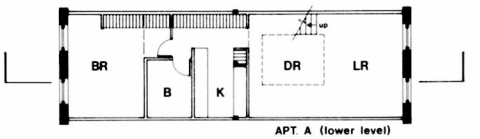


Apt. diagram

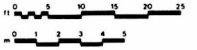
"Cross-over" apartment shown in plan, section and isometric. Delineator: M. Chrisney.

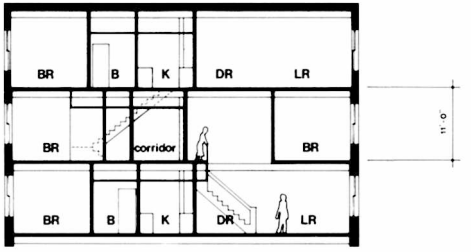




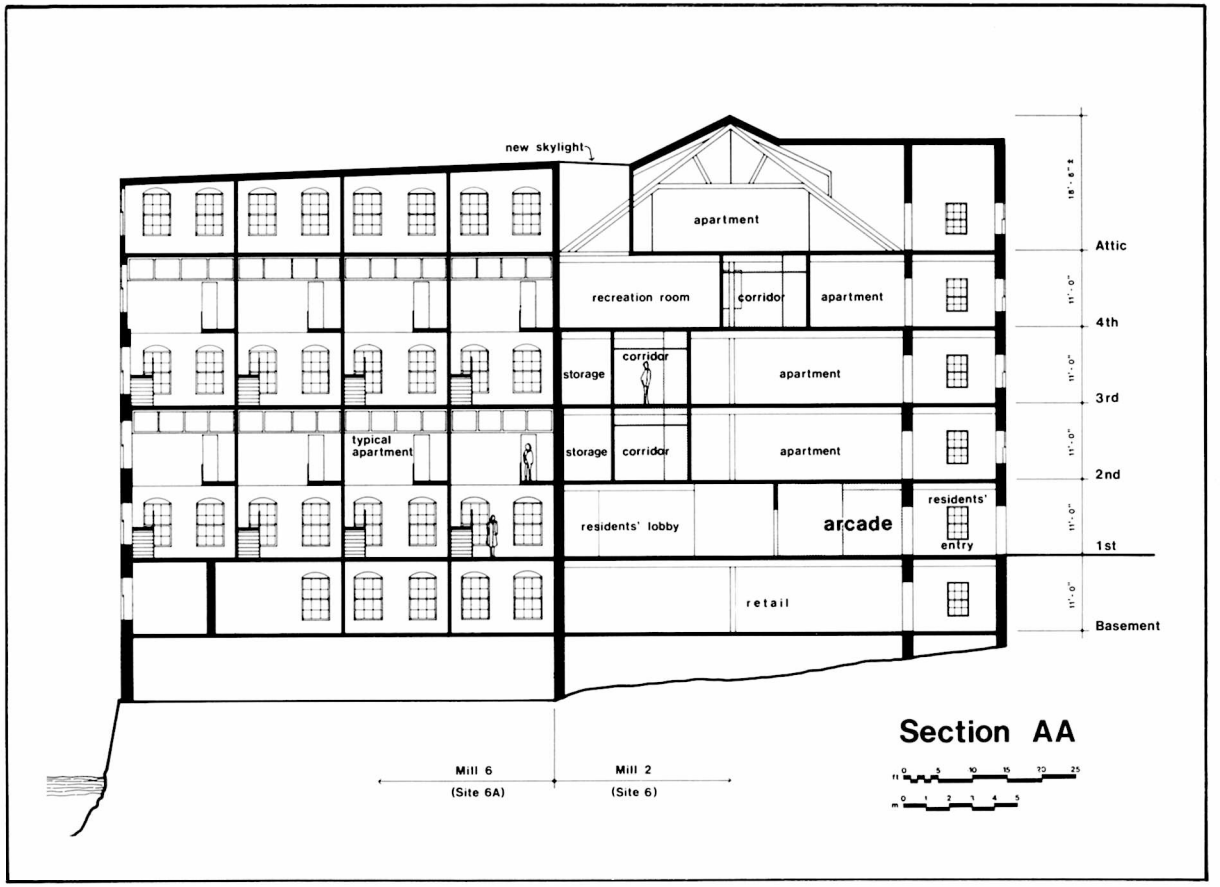


Apt. plans

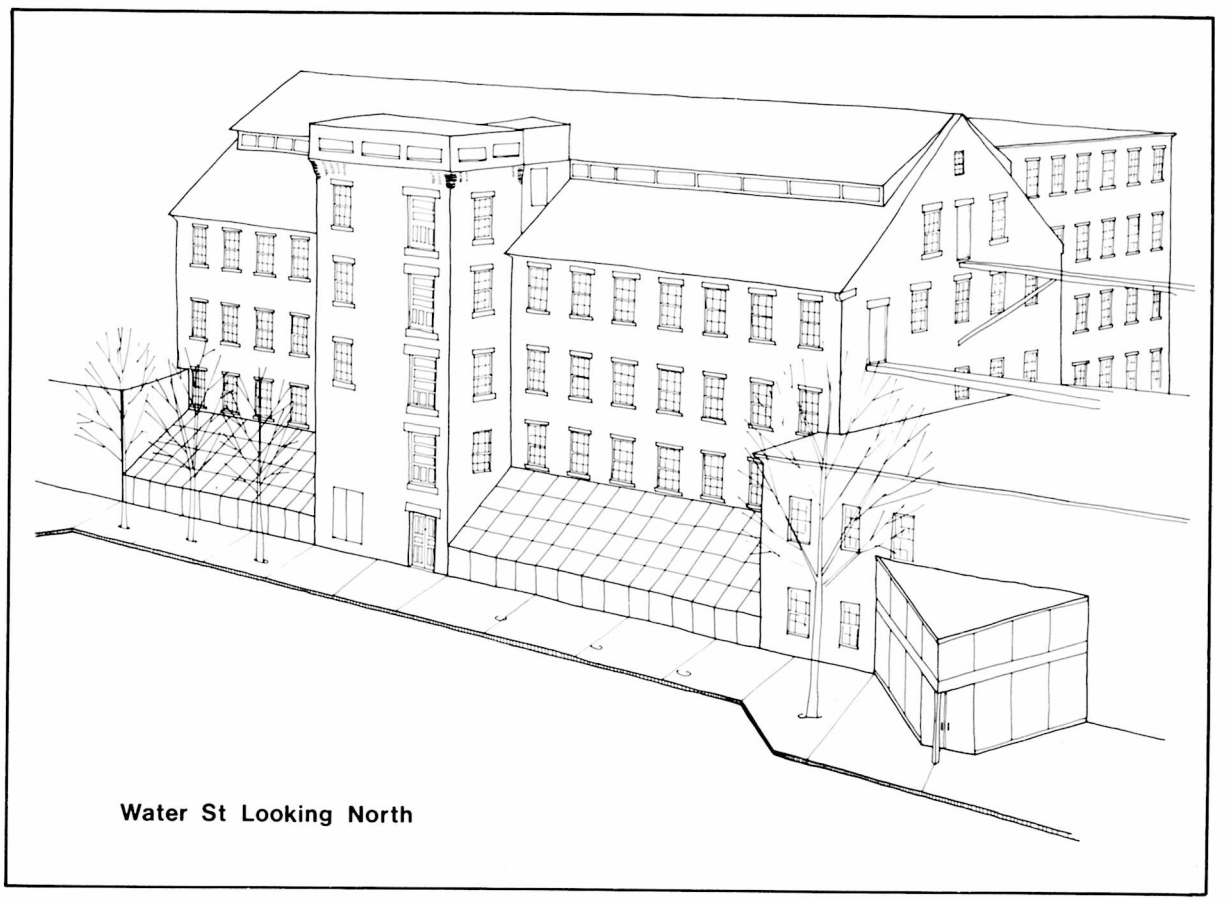




Apt. section



This section through the building shows the relationships between the retail arcade, lobby, apartments, and corridors in the proposed rehabilitation. Delineator: M. Chrisney.



Sketch of the south facade shows the glass arcade for retail shops, and the major entry portal in the building to the east, Site 5. Delineator: M. Chrisney.

Pro-Forma Analysis

Net Incomes from Operations	
41 units @ $350 per month	172,200
Retail rents and charges	143,988
Annual gross rent	*316,188*
Less vacancy allowance 5%	15,809
Effective gross income	300,379
Operating expenses .30	90,114
Annual net income	*210,265*
Financing	
Economic value, 10% cap. rate	2,102,650
Mortgage proceeds, 75% of EV	1,576,988
Debt service, 10.1% constant	159,276
Net Cash Flow	
Annual net income	210,265
Less debt service	159,276
Net cash flow before taxes or dep.	53,989
Supportable Costs	
Supportable equity, 15%	359,927
Supportable equity from mortgage amortization for 30 yrs. .030378	47,906
Subtotal supportable equity	407,833
Mortgage proceeds	1,576,988
Total supportive costs	*1,984,821*
Residual Value	
Total supportive costs from mortgage and equity	1,984,821
Less total improvement costs	1,685,997
Residual loan value	*+ $298,824*

Preliminary Cost Estimate

Excavation	$ 3,000
Demolition	53,000
Site Work	23,500
Concrete	28,900
Masonry	22,100
Rough Carpentry	56,850
Flooring	64,300
Millwork	56,250
Windows	140,707
Doors	31,600
Stairs	45,000
Elevator	35,000
Insulation	75,705
Roof	48,000
Paint	47,500
Equipment	140,358
Areaway Glass Enclosure	80,500
Mechanical	205,000
Electrical	120,000
Total Construction Cost	**$1,277,270**

Improvement Costs

Direct Construction Costs (includes landscaping)	$1,277,270
Inflation and Escalation Factor 10%	127,727
	1,404,997
Indirect Construction Costs (20% Hard costs)	281,000
Total Improvement Costs	**$1,685,997**

Cost per square foot = $30.65

Mechanical System Analysis*

A study was conducted on a mill building in Claremont to compare the most typical locally used heating and air conditioning system to alternative systems which could be installed and used more efficiently, and which might have less impact on the historic building fabric and appearance. The aesthetic impact is significant because the typical local system for air conditioning is a through-the-wall unit with an exterior grille which involves substantial cutting of the historic building fabric and which has a negative visual effect on the facade. Systems which preserve original fabric and which do not require bulky mechanical equipment on the exterior of historic buildings are preferred.

The mill on site 6–6A was chosen because it was typical in materials, massing and orientation of the larger mill buildings in Claremont. The Rehab Action plan proposed use for the structure is retail commercial on the lower floors (12,000 square feet gross), and 40 apartment units on the upper floors (42,000 square feet gross). The building presently has large open floor spaces, wooden floors and framing, and brick load-bearing walls. The solid brick walls vary in thickness from 24 inches in Site 6 and 22 inches in site 6A on the ground floor level to 12 inches at the attic level in both sites. There is 5,550 square feet of window area provided by 12 over 12 double hung sash.

HVAC System Design Parameters: The following program was established to aid in the selection of the HVAC system to be used in the case study:

1. Separate electric meters for each apartment
2. 20 Year life cycle for systems analysis
3. Roof: insulated to U = 0.10 BTUH/SF/° F
4. Walls: insulated to U = 0.15 BTUH/SF/° F
5. Windows: double insulating glass U = 0.56
6. Design to HUD & ASHRAE Standards
7. Annual degree days - 7383
8. Average winter temperature 33° F October to April
9. Annual full load cooling hours - 300 residential and 600 commercial
10. Fuel oil cost 1978 $0.50 per gallon
11. Electric cost 1978 $0.042 per KWH
12. Apartments to be air conditioned per custom for medium to high income units in this area

In addition, HVAC design was predicated on this summary of the HVAC loads.

Air Conditioning		
Apartments	-	50 tons
Retail	-	25 tons
Heat Loss	-	1,000,000 BTUH

Systems Selection: A survey was conducted which determined that the typical HVAC system used locally was hot water baseboard heat with an oil-fired boiler and through-the-wall air conditioning units. This system consists of hot water baseboard convectors for each room with self-powered automatic control valves. Through-the-wall air conditioning units typically are mounted near the ceiling of the living room. Hot water is produced by a central oil-fired boiler. Commercial spaces would have hot water baseboard heating with control valves similar to those used in the apartments. Commercial air-conditioning is by split system units with ducted air distribution and outside mounted condenser units. The condensers would be installed on the grade adjacent to the building or on the roof, This system will be referred to in the analysis as "System 1".

Several HVAC systems were considered and rejected prior to selection of an alternative system for a detailed analysis and comparison to System 1. Central systems were not considered because of the requirement for individual electric meters. Other design constraints included ceiling heights, location of structural members, space for ducts and pipes, etc. The final choices were limited to various types of heat pumps, and self-contained systems; they are listed below.

(A) *Vertical high rise to water heat pump.* Water cooled heat pump with vertical cabinet designed for exposed mounting in the corner of each apartment room at the outside wall. These units include supply and return condenser water loop risers, a condensate drain riser and shut-off valves. Units have self-contained temperature controls. (See "ASHRAE Systems Handbook" Chapter 11 for a detailed description of heat pump systems)

(B) *Horizontal Cabinet air to water heat pump.* Horizontal finished cabinet designed for exposed mounting under the window at the exterior wall. Requires field addition of water and condensate risers in vertical chase next to unit. Self-contained controls.

(C) *Horizontal Cabinet concealed air to water heat pump.* Water cooled heat pump designed for mounting over ceilings. Duct work distribution of conditioned oil required. Thermostat is located in room.

(D) *Self-contained water cooled unit with electric heat.* Fan coil unit with water cooled AC compressor. Same as System A except this does not have heat pump cycle.

(E) *Horizontal Cabinet air to air heat pump.* Designed for mounting at the exterior wall under window in each room. Uses heat exchange with outside air for heat pump cycle. Rejects heat to outside when operating on cooling cycle. This unit requires an exterior louver for air intake and exhaust. Has self contained controls. Heat pump cycle not effective below 35 degrees F. ambient outside air temperature. Below this point heating is by electric resistance heat.

From these five possible systems, the horizontal concealed heat pump was chosen for the comparison. It will be referred to in the study as "System 2".

The horizontal concealed heat pump (C) with duct distribution was selected for further consideration because of lower installation cost for this project. The typical two-story apartment would require three of the cabinet type heat pumps (A, B, D, and E) to adequately serve all rooms. The selected system (C) performs equally well using a single heat pump and air distribution duct work. (M–2) This alternative has lower installation costs because fewer heat pumps are needed.

The heat pump system also minimizes visual impact of A.C. equipment because all units are concealed. Heat pump units are provided for each apartment with duct work for distribution of heating and cooling air. Heat pumps are water source type with commercial and residential units on same circulating water loop. This system will provide heating or cooling as selected by the occupant. On cooling cycle, heat is rejected into the circulating water loop. Units on heating cycle take heat from the loop. Heat from the water loop is stored in a 10,000 gallon storage tank for use by apartments that need heat. Excess heat created by units operating on the air conditioning cycle is rejected by a central cooling tower. In winter after the stored water loop heat is used, an oil fired boiler operates to maintain a minimum water temperature.

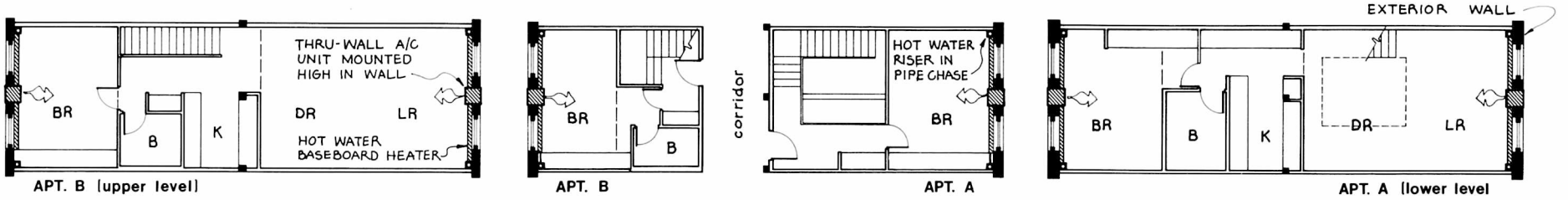
The results of the analysis of the "typical" system and the alternative are included on the following charts.

Conclusion: The System 2 should be selected for this building because of major advantages over the typical system. In this case study it is less expensive to install and has a lower life cycle cost. This is because the majority of the apartments are of a size and arrangement that allows a low installation cost for the heat pump system. The existence of the commercial area provides a source of heat (lights and people) which can be used to offset apartment heat loss when the heat pump system is used. Normally this heat is rejected and lost. Reclaiming heat from the commercial area and heat storage ability make the heat pump system comparable in operating cost to systems depending entirely on fossil fuel heat.

With separate electric meters more heating cost is charged directly to the tennant, promoting conservation. The heat pump system has a single wall thermostat for each apartment. This makes it convenient for the occupant to reduce temperature settings at night and during the unoccupied periods and further encourages energy conservation.

Installation cost savings are realized because the exterior walls do not have to be pierced for air conditioning unit condenser louvers. This would be a significant cost because the walls are up to 20 inches thick solid brick construction. In addition, the number of louvers required (65) for the typical through-the-wall system would adversely affect the building's appearance. The heat pump system is adaptable to solar heating. Solar collectors could be added later when installation becomes economically feasible.

*This report was prepared under contract with Girard and Fox, Ltd., Arlington, Virginia.



HVAC System 1. Delineator: T. Hocker.

Typical System

Annual Energy Usage System 1.

Air Conditioning

A/C Apartments = 50 tons × 300 full load hours × 1.86 KW/ton (6.5 EER) = 27,690 KWH

A/C Retail = 25 tons × 600 full load hours × 1.50 KW/ton (8.0 EER) = 22,500 KWH

Total A/C = *50,190 KWH*

@ $0.042/KWH = *2,100*

Heating

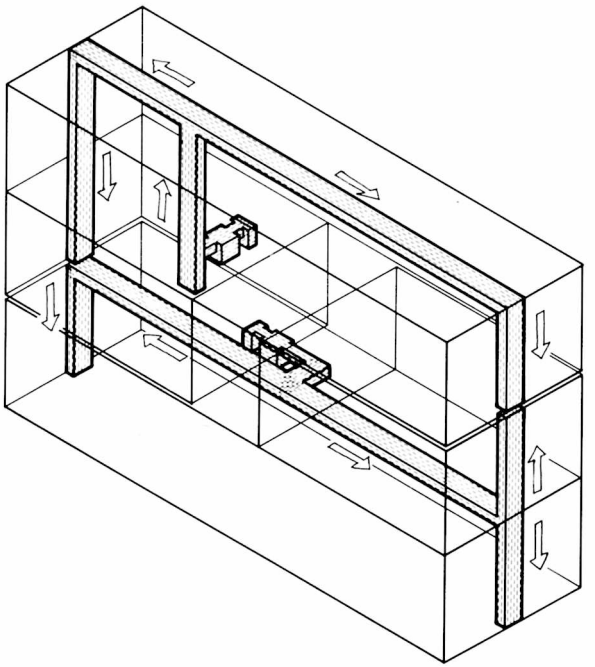
1,000,000 BTUH heat loss × 7383 Degree Days × 24 hr/day 79° F.T.D. × 80% Eff. × 144,00 BTU GAL

× .64 correction factor × 1.56 part load performance factor

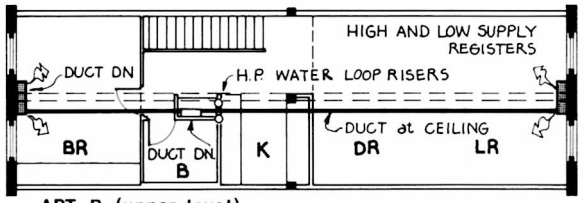
= 19,483 gallons of fuel oil @ $0.50/gal = 9,720

Total Cost Per Year = *$11,830*

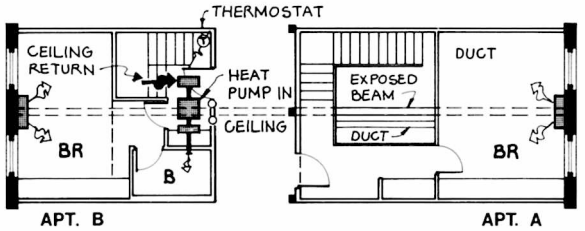
Energy usage for the comparative systems was calculated using the Modified Degree Day Procedure as described in the 1976 ASHRAE Handbook, Chapter 43 page 43.8.



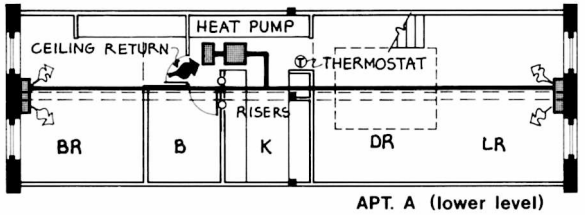
HVAC System 2, diagram showing duct layout and direction of air flow. Delineator: T. Hocker.



APT. B (upper level)



APT. B APT. A



APT. A (lower level)

HVAC System 2. Delineator: T. Hocker.

Heat Pumps

Annual Energy Usage System 2.

Air Conditioning

A/C Apartments = 50 tons × 300 full load hours × 1.43 KW/ton (8.4 EER) = 21,450 KWH

A/C Retail = 25 tons × 600 full load hours × 1.33 KW/ton (9.0 EER) = 19,950 KWH

Total A/C Consumption *41,000*

@ $0.042/KWH *1,740*

Heating

Effective building heat loss is reduced by internal gain from commercial area that is reclaimed by heat pump system.

Oil Usage = 66% of annual usage × (842,000 BTUH Heat Loss × 7383 degree days × 24 hrs/day) 79° FTD × 80% Eff. 144,000 BTU/Gal × 64 Correction Factor × 1.56 Part Load Performance Factor = 120,860 = 5,400 KWH @ $0.50 gal

Electric Usage + 34% of annual usage × (842,000 BTUH × 7383 degree days × 24/hrs/day) × 64 Correction Factor × 1.0 Part Load Performance Factor = 120,860 = 5,070 KWH @ $0.042/KWH

Total Annual Cost $12,210

Allow 5% reduction because of temperature setback during unoccupied hours and at night − 610

Annual Operating Cost *$11,600*

Cost Estimate

Claremont, N.H.

6/6A August 13, 1979

The cost estimate includes significant comparative cost items for these systems in this building in Claremount, N.H. Some items, which are common to each system and do not have impact on the estimate are not included.

Description	System 1	System 2
Heating Boiler & Accessories	$ 20,000	$ 20,000
Hot Water baseboard heaters	22,100	—
Automatic Control Valves	9,800	—
A/C Units Apt—thru-wall	19,500	—
A/C Units Retail Split System	17,000	—
Heat Pumps Apartments	—	27,000
Heat Pumps, Commercial area	—	9,700
Hot Water Storage Tank	—	6,800
Cooling Tower, Pump, Heat Exchanger	—	8,500
Duct Work Apartment	—	11,900
Duct Work Commercial	5,500	5,500
Ventilation & Exhaust System	20,000	20,000
Piping	38,500	23,200
Piping Insulation	7,200	—
Valves	2,700	4,700
Electrical	10,200	7,700
Prepare Wall Openings for A/C Units	6,500	—
Construct Pipe Chases	6,000	—
Total	**$185,000**	**$145,000**

Life Cycle Cost Estimate		System 1	System 2
First Cost		$185,000	$145,000
Annual Cost 10% interest for 20 years		21,730	17,030
Cost for 20 years	434,600		
	340,000		
Energy Cost			
First Year		11,830	11,600
20 year total cost assuming 6% cost escalation per yr.		435,200	426,700
Maintenance Cost			
First Year		1,500	1,875
Life Cycle Cost		55,200	68,900
Total Life Cycle Cost		**$925,000**	**$835,600**

Northeast Corner View

SULLIVAN MACHINERY CO. FORGE SHOP

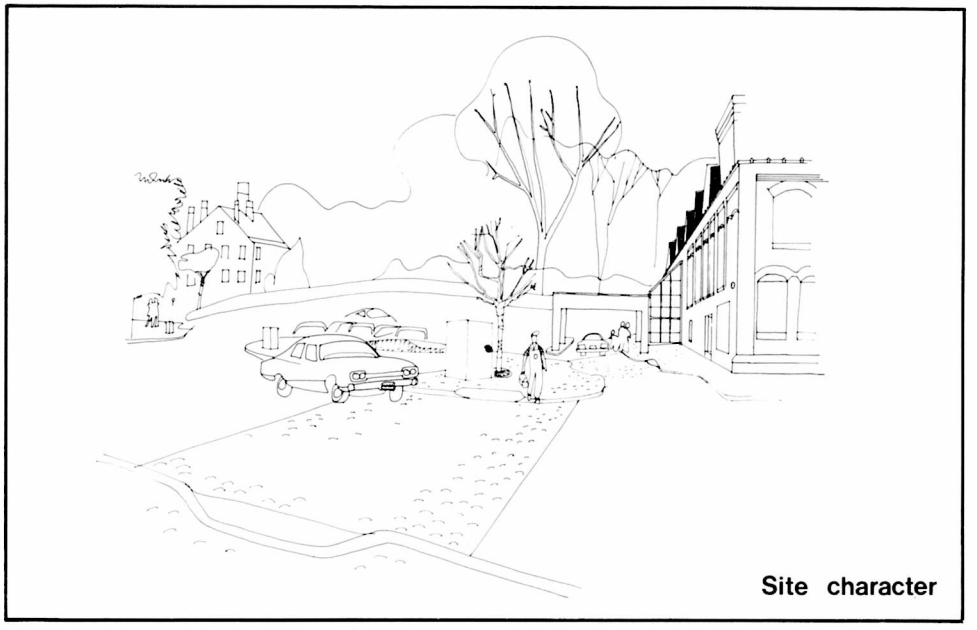
REHAB STUDY : DEPARTMENT STORE

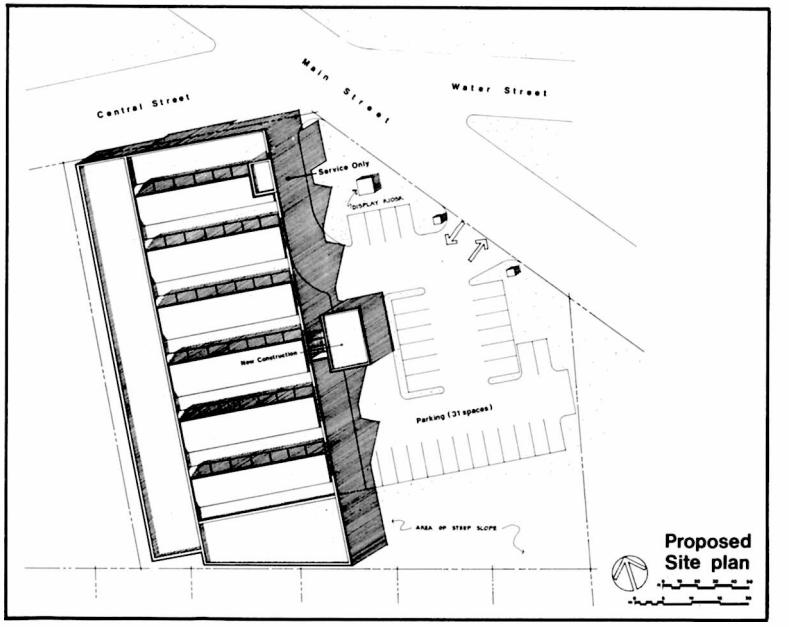
Delineator: J. Arbib.

Case Study: Site 11

Design Report

HAER conducted a market study of the shopping region around Claremont and found a need which could be fulfilled in part through a quality department store. Currently, regional residents are traveling as far as Boston, Mass. and Manchester, N. H. to do specialty shopping. Site 11 seemed well suited to anchor the proposed Monadnock complex retail arcade and to form a connecting link between that complex and the Pleasant Street central business district. Discussions of marketing trends with Filenes of Boston, Mass. and with Glad-





Plan and sketch show the parking area adjacent to the structurre. with the service dock on the northeast corner of the building.

Delineator: J. Arbib.

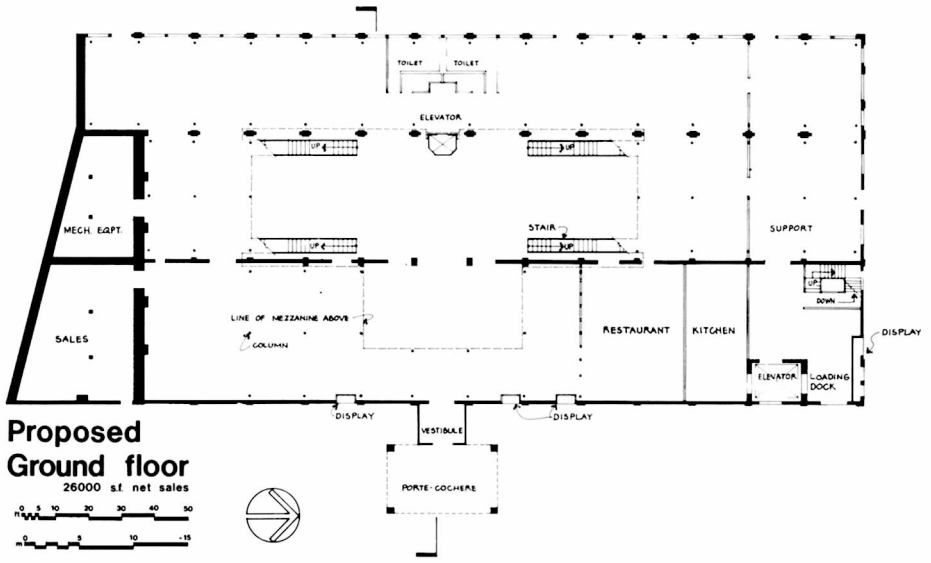
stone Associates, Washington, D.C. indicated that a branch store of 40,000 square feet was acceptable practice for such department store firms in regional markets like Claremont's. The major drawback to the use of Site 11 appeared to be the lack of parking on site. When the Claremont Village Industrial District as a whole is developed, this necessary parking could be accomodated within a reasonable walking distance.

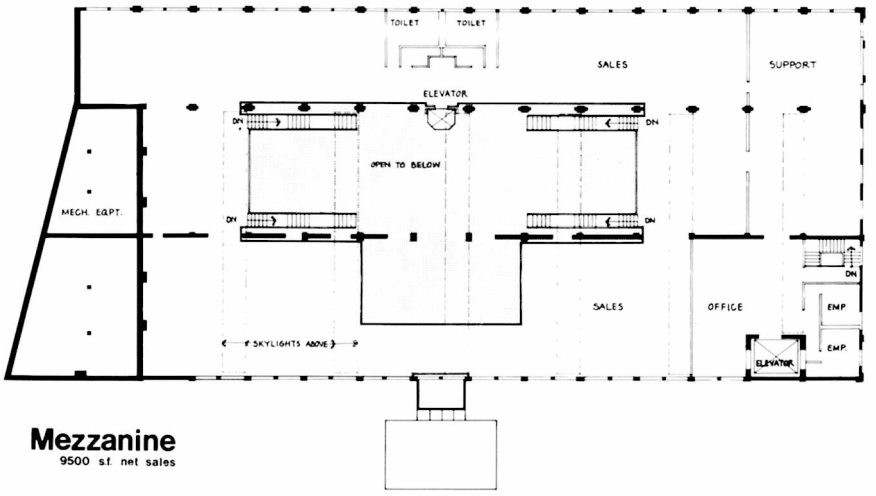
The building presented no major obstacles to the proposed renovation. The structure has high ceilings, and the interior space is lit by large sawtooth skylights. The large spaces within the building lend themselves well to the construction of mezzanines, and if constructed could bring the interior floor space up to the required 40,000 square feet. An independent structure system for the mezzanine carrying the load to the foundations avoids introducing additional loads into the existing structure.

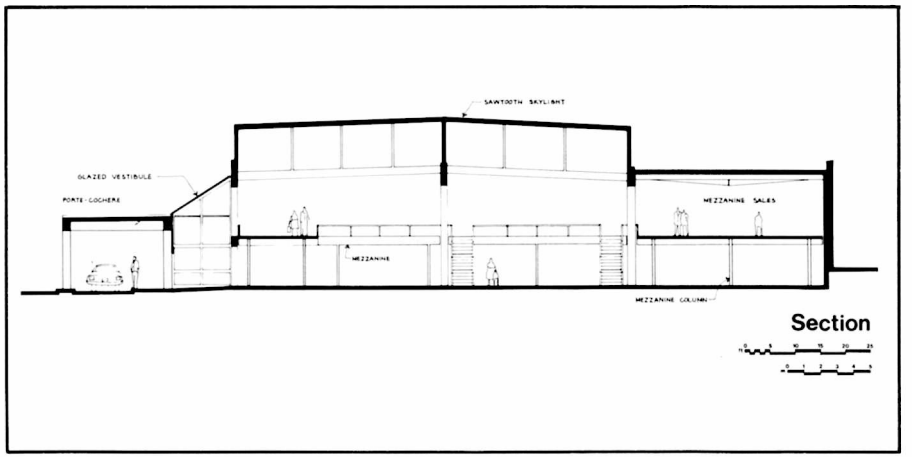
Rehab costs included the new mezzanine, the addition of a porte cochere and entry vestibule, 4 new display windows, related site work and loading dock construction, and refurbishing the existing structure. The latter element includes the repointing of bricks, the cleaning and painting of metal surfaces, leveling the floor, reglazing all windows and skylights, rewiring, insulation, new roofing, and new elevators for freight and passengers.

The solar study previously discussed showed that the building is well suited and of a good physical shape to capture and store solar energy. In fact, the building could be designed to capture and store more solar energy than is necessary to heat the facility. For a retail use such as the one proposed, the required electric lighting will produce sufficient heat to supply the majority of the heating load. The construction of a solar heating system would not be an economy for the provision of the small, remaining heating load, and thus a solar heating system would not be designed for Site 11 alone. A large cooling load to offset the heat developed by the electric lights was anticipated for the summer months, and the HVAC system was estimated accordingly. The building would be well insulated in the designed renovation process, and the insulation would be a significant factor in the heating and cooling calculations. Please refer to the Solar Study in the energy section of this appendix for further information.

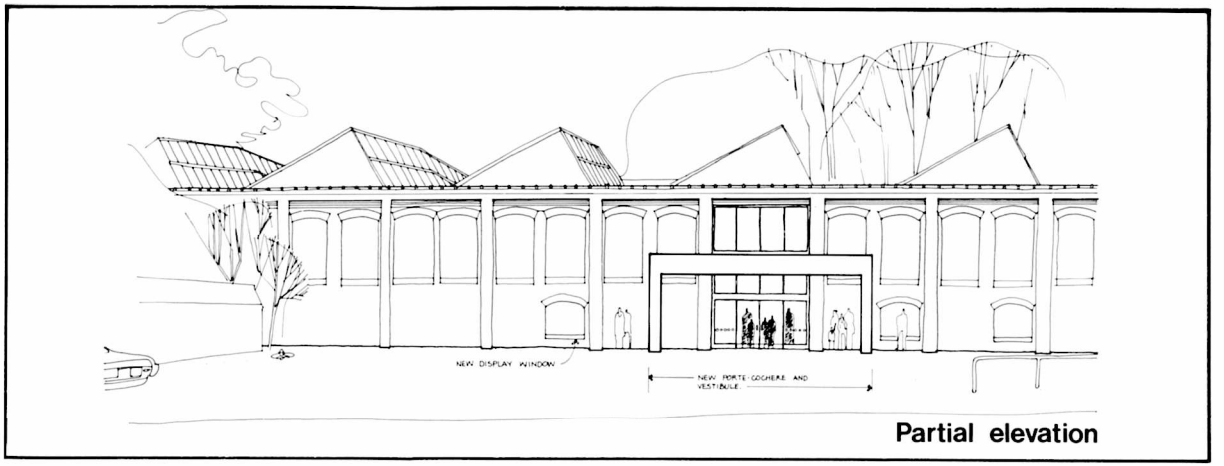
Of the 40,000 gross square feet, 15% was allocated to various types of support: office, storage, restrooms, mechanical space, corridors, receiving and handling. The loading dock must be accomodated on the main facade east of the structure. Although it is felt that this is not a desirable location, the potential visual and pedestrian access problems can be avoided by careful attention to architectural design and a



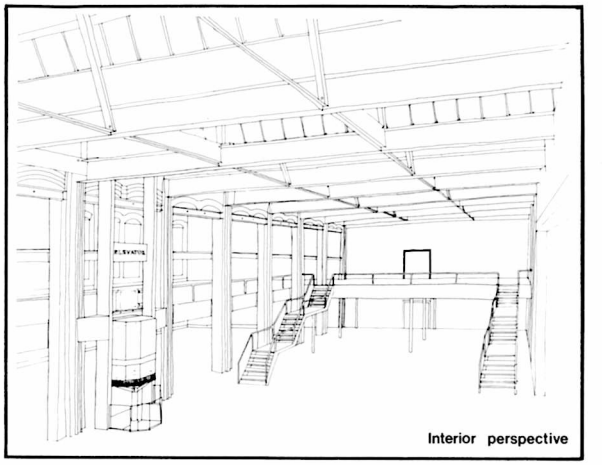




Proposed department store facility in plan and section. Delineator: J. Arbib.



This partial elevation shows the new porte-cochere and entry vestibule. The sawtooth skylights are a prominent architectural feature. Delineator: J. Arbib.



Interior perspective shows stairways and elevator connecting the main floor with the mezzanine. Delineator: J. Arbib.

restriction on the hours when large transport vehicles may be present on the site.

The dollar estimate of the cost of the rehab design for this site was pieced together from a set of preliminary specifications which are thought to be representative of the major costs for retail construction in the area. Individual firms were asked to supply prices for products and specialty items. The latter would include restaurant equipment, specially designed window sash, and other glazing components. Please refer to the pro-forma analysis for further information.

Architectural Design Features: Although the articulation is industrial, the linear bays with high skylit ceilings have a pleasant character not unlike that of the nave of a medieval church. The lighting from the skylights is diffuse, soft, and renders colors well. The rugged brick finish is warm and will make a good contrast with new painted plane surfaces and structure above. The large coal bunkers are cavernous spaces with potential for dramatic lighting of displays. This is a comfortable building, with a great deal of visual interest and a variety of architectural scales. Appropriate graphic design would enhance its character. The building is situated well for visual recognition by persons in automobiles and by pedestrians in the shopping district. The east facade and saw-tooth monitor are distinctive architectural features which would enhance a store's image. It has an existing tunnel connecting it to other buildings across Main Street, a principle thoroughfare. The potential exists for a connection via this tunnel for storage or pedestrian access.

Pro-Forma Analysis

Net Income from Operations

1. Annual gross rent (40,000 sq. ft. @ $6.00)	$240,000
2. Less vacancy allowance 5%	12,000
3. Effective gross income	228,000
4. Operating expenses	68,400
5. *Annual net income*	*159,600*

Financing

1. Economic Value 10% cap. rate	1,596,000
2. Mortgage Proceeds 75% of EV	1,197,000
3. Debt Service 10.1% constant	120,897

Net Cash Flow

1. Annual net income	1,596,000
2. Less debt service	120,897
3. *Net cash flow*	*38,703*

Supportable Costs

1. Supportable equity 15%	258,020
2. Supportable equity from mortgage amortization for 30 yrs. .030378	36,362
3. Subtotal supportable equity	294,382
4. Mortgage proceeds	1,197,000
5. *Total supportable equity*	*1,491,382*

Residual Value

Total supportable costs for mortgage and equity	1,491,382
Less total improvement costs	1,254,000
Residual Loan Value	*+ $237,382*

Preliminary Cost Estimate

Excavation	$ 4,000
Demolition	19,000
Site Work	52,000
Concrete	88,000
Masonry	36,000
Rough Carpentry	38,000
Metals	76,500
Finishes	77,000
Doors, Windows, and Glazing	102,500
Thermal and Moisture Protection	44,000
Specialties	63,000
Elevators	40,000
Mechanical and HVAC	220,000
Electrical	90,000
Total Construction Cost	**$950,000**

Improvement Costs

Direct Construction Costs (includes landscaping and parking)	$ 950,000
Inflation and escalation factor 10%	95,000
	1,045,000
Indirect Construction Costs (20% hard costs: includes legal and architectural fees, taxes, developers overhead and profit, and construction loans)	209,000
Total Improvement Costs	**$1,254,000**

Cost per square foot = $31.35

Report on the Claremont Conference

In the spring of 1979 Senator John Durkin sponsored a conference in Claremont to examine the potential involvement of Federal agencies in the redevelopment of historic buildings and districts. A list of the Federal agencies attending the meeting is shown in Table A. The conference focused its attention on the plan developed for the Claremont Village Industrial District by the HAER Rehab Action team and the five year redevelopment schedule. The redevelopment schedule indentifies specific Federal agencies as potential participants in redevelopment tasks.

The Claremont Redevelopment Staging Schedule indicates the projects in which Federal agencies could effectively participate. EDA for example, could participate in public works projects, particularly those which will provide many jobs over a short period of time. HUD's primary concern would be reflected in programs such as Section 8 rent subsidies and Section 312 loan guarantees. HUD grants can also be used in broader scale urban development and redevelopment if the overall project concerns housing.

HCRS offers small amounts of money through the states for grants and loans toward historic preservation. It has larger amounts available, also through the states, for recreation-related endeavors. The FHWA in DOT has money for Federal-aid highway projects, and these can be used in the redevelopment of historic areas when streets or roadways are involved. The Small Business Administration has low interest loans which can be used to start or improve small businesses in historic buildings.

The Community Services Administration can be used to help organize neighborhoods or other groups, particularly in low or moderate income areas, to achieve more satisfactory environmental conditions and to work, where appropriate, to preserve historic areas. The National Endowment for the Arts can grant money in their "Livable Cities" program for designing, maintaining and improving historic areas. The New England Regional Commission, and similar area commissions, can help organize and orchestrate the Federal funding programs as well as match some Federal dollars. Finally, the Department of Energy funds innovative means of solving energy-related problems.

These general program thrusts are reflected in the redevelopment schedule. However, certain specific circumstances at Claremont will prevent the city from fully using these general program thrusts. For example, the city did not qualify under the EDA regulations for poverty and unemployment, or for the HUD UDAG program. The UDAG regulations are changing and Claremont will need to monitor its economic status to determine whether it might come within the restrictions in the near future. It might also be possible to develop target areas within the city which would meet EDA requirements.

Because the city received a substantial HUD Small Cities Grant in the fall of 1978, it is ineligible for additional funds from that program until the 1980s. It is likely that other HUD funds would not be channeled into Claremont for two or three years. The Small Business Administration in New Hampshire is currently unable to offer funds because of the tight budget conditions, and officers of that agency see the situation continuing for the next several years. Other agencies listed have more ability to provide aid as indicated in the redevelopment schedule.

The schedule is presented here, in part, as a guide to others in the possible use of Federal programs. Each city will find it has its own unique set of circumstances which will affect the full utilization of Federal funding sources. Federal officials should be contacted early in local program development in order to assess the situation and to identify the most useful Federal agencies in particular redevelopment schemes.

TABLE A

Federal Agencies Participating in Claremont Conference, April 30, 1979

Department of Commerce	
Economic Development Administration	(EDA)
Department of Energy	(DOE)
Department of Housing and Urban Development	(HUD)
Department of Interior	
Heritage Conservation and Recreation Service Office of the Secretary	(HCRS)
Department of Transportation	(DOT)
Federal Highway Administration	(FHWA)
Community Services Administration	(CSA)
National Endowment for the Arts	(NEA)
New England Regional Commission	(NERC)
Small Business Administration	(SBA)
Other Agencies Mentioned	
Department of Interior	
Bureau of Sport Fisheries and Wildlife	(BSFW)
New England River Basin Commission	(NERBC)

CLAREMONT REDEVELOPMENT STAGING SCHEDULE YEAR 1

DEVELOPMENT ITEM	SCOPE	AGENCY HELP
Site 4 Stabilization	• Excavate backfill from original areaways. Provide interim weather enclosure. • Restore structural integrity of exterior brick bearing wall, basement level at areaways, and the east wall. • Initiate conservation measures to make building weathertight.	HCRS HUD EDA
Sites 6 and 9 Stabilization	• Excavate backfill from original areaways. Provide interim weather enclosures. • Initiate conservation measures to make building weathertight.	HCRS HUD EDA
Monadnock Complex: Site Development Analysis	• Conduct a comprehensive topographic and utility survey (including river corridor). • Conduct an existing physical condition analysis focusing on structural and conservation problems for each building.	EDA NERC CSA
Monadnock Arcade	• Expand HAER implementation strategy. • Prepare construction documents. • Prepare Design Development drawings. • Study raceway level for exhibit space potential.	NEA HUD SBA
Hydro-Electric Potential	• Expand HAER study to investigate potential sites along the length of the Sugar River within Claremont city boundaries.	DOE USGS NERBC BSFW
Public Works Improvement: Lower Village	• Relocate River Street/Main Street intersection. • Realign River Street.	HUD EDA NERC
Parking: Lower Village	• Provide two parking areas: one adjacent to Site 15 (28 spaces) and the other adjacent to Site 13 (26 spaces).	HUD EDA SBA
Parking Area Adjacent to Site 16	• Provide 120 spaces for industrial tenants in Sites 12A and 12B (excavate and regrade where necessary). • Rehabilitate existing footbridge spanning river.	SBA EDA
Parking and Service Area: Sites 12A and 12B	• Redesign and resurface existing area for three loading docks and 80 spaces.	SBA EDA

CLAREMONT REDEVELOPMENT STAGING SCHEDULE YEAR 2

DEVELOPMENT ITEM	SCOPE	AGENCY HELP
Monadnock Complex: Public Works Improvements	• Complete all subsurface work. • Remove small non-contributing portion of Site 12 to eliminate hazardous road intersection. • Complete improvements to existing roads (2,010 linear feet). • Construct new interior loop roads (170 linear feet). • Close Water and Crescent Streets to through traffic.	EDA CSA NERC
Parking Areas: Monadnock Complex	• Provide 147 spaces (excavate and regrade as required).	EDA SBA CSA DOT
Monadnock Arcade	• Develop arcade at Site 9. • Develop entry lobby and waiting area in Site 7.	DOE NEA NERC HUD
Washington Street/North Street Intersection	• Relocate and reconstruct intersection. • Develop parking area east of Site 18 (145 spaces).	DOT EDA SBA
Office Development: Site 9	• Prepare construction documents and rehabilitate upper three floors.	
Housing: Lower Village	• Provide 40 units of Section 8 housing in lower village vicinity.	HUD CSA
Recreation Development: Site 17	• Develop indoor facilities for tennis, squash, etc. • Upgrade existing parking area at North Street.	
Motel Development: Site 17	• Develop Brass Foundry and Catacombs.	
Industrial Development: Site 12B	• Rehabilitate and modernize loading dock area, roof, floors, windows, utilities and elevators.	

CLAREMONT REDEVELOPMENT STAGING SCHEDULE YEAR 3

DEVELOPMENT ITEM	SCOPE	AGENCY HELP
Monadnock Arcade	• Develop entry lobby and waiting area in Site 5. • Develop arcade in Site 4. • Develop arcade retail sales area in Site 4, 5, 6, 7 and 9.	
Housing Development: Site 6/6A	• Rehabilitate upper four floors into two-story apartments.	HUD SBA
Office Development: Site 4 for Municipal Use	• Rehabilitate upper four floors into offices for Helping Services Agencies.	HEW CSA EDA
Exhibition Space: Site 17	• Further development of Site 17 for meeting rooms and convention exhibition. • Construct parking structure at existing parking area on North Street.	SBA EDA HUD DOE
Bridge from Site 18 parking to Site 5	• Construct new enclosed footbridge (150 feet).	EDA
Riverside Park and Recreation Areas	• Develop open space between Sites 8 and 12 with special consideration to existing archeological features.	HCRS IAS SBA HUD

CLAREMONT REDEVELOPMENT STAGING SCHEDULE YEAR 4

DEVELOPMENT ITEM	SCOPE	AGENCY HELP
Monadnock Arcade	• Construct new glass enclosed entry lobby between Sites 2 and 4. • Complete construction of arcade system in Sites 1 and 2. • Develop retail sales areas on first two levels in Site 2.	SBA DOE EDA NERC
Pleasant Street/Monadnock Complex Access	• Develop pedestrian access through the existing lobby of the Moody Building. • Construct new enclosed footbridge from the rear of the Moody Building across Crescent Street to parking area.	SBA EDA DOT
Office Development: Site 2	• Rehabilitate top floor into office space.	SBA
Motel Development: Sites 1 and 21	• Develop lobby and restaurant in Site 1 and rooms in Site 21. • Provide parking area on the east side of Broad Street.	SBA EDA
Commercial Development: Site 8	• Rehabilitate existing two floors into restaurant/retail use.	SBA

CLAREMONT REDEVELOPMENT STAGING SCHEDULE YEAR 5

DEVELOPMENT ITEM	SCOPE	AGENCY HELP
Monadnock Complex: Site Improvements	• Provide paving, planting, landscaping, lighting, etc.	HCRS NEA
Parking Structure: Site 12	• Construct new multi-level parking structure behind existing facades (500 cars). • Rehabilitate existing facades.	EDA SBA DOE
Development of Link: Sites 11 to 12	• Modernize existing tunnel between Sites 11 and 12. • Complete arcade.	DOE EDA SBA
Bridge between Sites 17 and 12	• Restore structural integrity to existing iron bridge for pedestrian traffic and provide weather enclosure. • Develop interior walkway in Site 12A in order to link Site 17 with arcade.	DOT HCRS EDA
Riverside Parks and Recreation Areas	• Develop areas east of Site 8; east and west of Site 17; walkways along river at Sites 17 and 18. • Complete Sugar River Trail.	HCRS HUR

Acknowledgements

During the summer of 1978, the HAER/TPS team relied on the valuable assistance and co-operation of the citizens and government of Claremont, regional and state agencies in both New Hampshire and Vermont, and Federal officials. The agencies and people who gave so generously of their time and energy to make the project a success are too numerous to mention individually. Special thanks are extended to the following groups and individuals for their particular help.

City of Claremont, Office of the City Manager

Claremont City Council

New Hampshire Industrial Development Authority

New Hampshire Historic Preservation Office

National Center for Appropriate Technology

Department of Housing and Urban Development, Manchester Area Office

Manchester Urban Renewal Authority

Claremont Industrial Development Authority

Claremont Public Library

Claremont Historical Society

Peter Burke

Michael Satzow

Earl Bourdon

John Arbib

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilties to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to insure the wise use of all these resources. The Department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Heritage Conservation and Recreation Service, a non-land managing agency within the Department, is responsible for assuring the identification, protection, and beneficial use of our important cultural, natural, and recreational resources. The Service offers grant assistance, technical information, and guidance to those in the public and private sectors involved in conservation or recreation projects.

HCRS Publication Number Twenty-two

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