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final environmental impact statement

general management plan

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FINAL ENVIRONMENTAL IMPACT STATEMENT
on general management plan

UNITED STATES DEPARTMENT OF THE INTERIOR

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE GENERAL MANAGEMENT PLAN

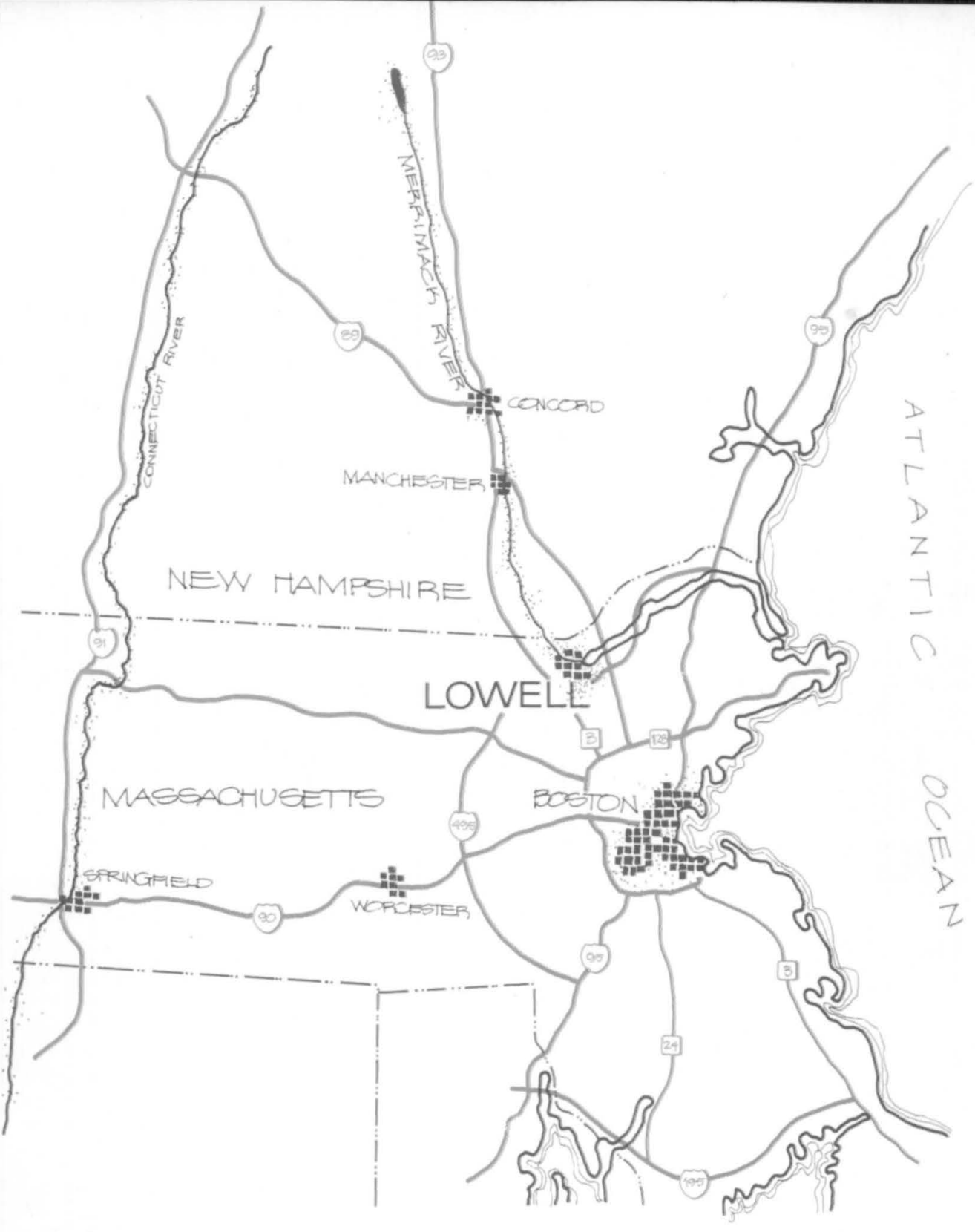
PREPARED BY THE
NATIONAL PARK SERVICE WITH THE
COOPERATION OF THE
LOWELL HISTORIC PRESERVATION COMMISSION

LOWELL NATIONAL HISTORICAL PARK
LOWELL, MASSACHUSETTS

This Final Environmental Impact Statement for the Lowell National Historical Park General Management Plan includes changes to the Draft Environmental Impact Statement (DEIS) and responds to comments on that document. Some actions described under the preferred alternative have changed. As discussed in the DEIS, implementation of the preferred alternative will provide for the preservation, rehabilitation, and interpretation of the cultural resources of Lowell. The park concept integrates adaptive use of historic structures; cooperative agreements with federal, state, and local agencies; and minimal National Park Service landownership. The Park Service will acquire six structures and will work cooperatively to develop the 5.6-mile canal system and to upgrade the streetscape. This Final Environmental Impact Statement describes the affected environment, four alternatives for development and use, and the impacts of each alternative, with an emphasis on the preferred alternative. The proposed development of the park will have significant impacts on the city of Lowell and the surrounding region. It will enable the rehabilitation and interpretation of cultural resources and the enhancement of the urban environment. For further information contact:

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SUMMARY

BACKGROUND

Lowell National Historical Park, which was authorized by Congress on June 5, 1978 (PL 95-290), is one of the most innovative park concepts in the country. The park is to be administered by the National Park Service in cooperation with the Lowell Historic Preservation Commission, the Massachusetts Department of Environmental Management, and the city of Lowell. The primary purpose of the park, as stated in the legislation, is "to preserve and interpret the nationally significant historical and cultural sites, structures, and districts in Lowell." The legislation authorizes the adaptive utilization of these sites and districts so that they actively contribute to Lowell's economy. It also authorizes cooperative agreements for the ownership, development, and management of Lowell's resources with federal, state, local, and private organizations, and it minimizes the amount of federal landownership.

This Final Environmental Impact Statement presents alternatives, including the preferred alternative, for preservation, management, and use at Lowell National Historical Park. The major issues that are addressed in each of the four alternatives are interpretation and visitor use, resources management, and general development of National Park Service and related structures and sites. Each alternative focuses on a different site for the major Park Service interpretive facility. The alternatives range from the development of an extensive interpretive center at either the Wannalancit Mill complex or Boott Mill complex; to a combined approach with interpretive centers at Old City Hall, Boott Mill, and Wannalancit (the preferred alternative, which is the proposal discussed in the General Management Plan); to a "no-action" alternative, under which present policies would be continued.

The Lowell Historic Preservation Commission, Massachusetts Department of Environmental Management, and the city of Lowell have cooperated in the preparation of the Lowell National Historical Park General Management Plan and this Final Environmental Impact Statement. The Lowell Historic Preservation Commission and the National Park Service have developed a special cooperative agreement to assess some of the impacts of the Preservation Commission proposals. Where possible, impacts of these proposals are included in this document. A comprehensive assessment of Preservation Commission programs is addressed in an environmental assessment prepared by the Preservation Commission.

ALTERNATIVES AND THEIR IMPACTS

Four alternatives have been considered in the development of the General Management Plan. Each of these alternatives, with the exception of the no-action alternative, represents a differing approach towards accomplishing the legislative mandate of the park. Selection of the preferred alternative is based on the finding that it is best suited among the alternatives to achieve the multifaceted purposes for which the park was established. A summary of the alternatives and their impacts follows:

Alternative 1 (The Preferred Alternative): Emphasis at Old City Hall, Boott Mill, and Wannalancit Mill

This alternative would establish a dispersed National Park Service (NPS) presence at three locations: Old City Hall, Boott Mill, and Wannalancit Mill. In contrast, alternatives 3 and 4 concentrate NPS activities and their impacts at the respective single locations of Boott Mill and Wannalancit Mill. By dispersing NPS development in three locations, the preferred alternative avoids the negative environmental and economic impacts associated with the concentration of activities at single locations. This alternative also results in the highest degree of preservation of important historic structures among the four alternatives presented. In addition, this alternative would enable optimum interaction of park visitors with the resources of Lowell's central business district but avoids potential disruption of existing retail activities.

Of the alternatives, this would have the most beneficial effect on improving the local economy, especially with reference to the service sector. Land acquisition, development, and operations costs are highest under this alternative, but the costs are within the park's development ceiling and anticipated funding levels.

The preferred alternative has undergone some modification since the Draft General Management Plan for the park was published in May 1980. The most noteworthy change is that several interpretive functions proposed for the Wannalancit Mill complex will be shifted to the Boott Mill complex. The impacts associated with alternative 1 will remain unchanged. This shift occurred in response to two factors--the recent closure of the textile manufacturing operation at the Wannalancit Mill complex and the emerging downtown development plans formulated for the city of Lowell by the American City Corporation. While the draft plan proposed substantial Park Service involvement at the Wannalancit Mill complex and lesser involvement at the Boott Mill complex, the final General Management Plan reverses the emphasis.

Alternative 2: No Action

This alternative would result in the park continuing in its present form but with greatly reduced development potential. Staffing and budget levels would not appreciably change, and several properties authorized for park acquisition would not be acquired. Under this alternative, the park's legislative mandate to preserve identified nationally significant resources could not be achieved. Potential beneficial impacts of the park on the local environment and economy would be minimized. Land acquisition, development, and operational costs would be the lowest of any of the alternatives, with commensurate results.

Alternative 3: Primary Emphasis at Boott Mill

Under this alternative the Boott Mill complex would be the central focus of NPS development efforts. In contrast to alternative 1, the Wannalancit Mill would not be utilized by the National Park Service, and a

concentration of activities would occur at the Boott Mill and H&H Paper Company area. This alternative would generally improve the urban environment and stimulate the downtown economy, but the heavy concentration of NPS activity in this area could result in potentially negative impacts, including congestion in the central business district and possible conflicts with local retail activity. Since the Park Service would not acquire or develop unique hydropower resources and associated space at the Wannalancit Mill, it is likely that these resources would continue to deteriorate and eventually be destroyed. The land acquisition and development costs associated with this alternative would be approximately the same as alternative 1. However, operational costs would be somewhat less because activities would be more centralized.

Alternative 4: Primary Emphasis at Wannalancit Mill

This alternative would focus most park development activities at the Wannalancit Mill. While the Wannalancit would receive extensive rehabilitation and preservation treatment, this would occur at the expense of foregoing NPS development and rehabilitation of the Old City Hall and Boott Mill complex. Unlike alternative 1, this alternative would tend to concentrate increased economic activity in an area separate from the downtown retail core area, thus minimizing the potential beneficial economic impacts of NPS activity on the latter area. Circulation and parking problems in the area adjacent to the Wannalancit Mill would also arise under this alternative. Land acquisition, development, and operational costs would be somewhat less than under alternatives 1 and 3 because the scope of the park would be more limited.

CONCLUSION

The selection of the preferred alternative is based on the finding that it best satisfies the intent and provisions of PL 95-290, which authorized the establishment of Lowell National Historical Park.

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PURPOSE AND NEED

To preserve the cultural resources of Lowell and to interpret the significance of historic events in Lowell, an innovative approach to resource management and preservation was needed. To enhance the urban environment while ensuring that any modifications of historic resources were sensitive to their historic integrity, an innovative approach to legislation was needed. Public Law 95-290 addressed these needs by authorizing the National Park Service to develop a plan to preserve and interpret Lowell's cultural resources in cooperation with a new agency of the Department of the Interior, the Lowell Historic Preservation Commission. The Park Service, therefore, has prepared a General Management Plan to provide the basis for cultural resources preservation, interpretation, and visitor use, primarily within the legislatively established boundaries of the park. This Environmental Impact Statement assesses the impacts resulting from the proposed Park Service actions.

Because of the urban nature of Lowell National Historical Park, the Park Service is coordinating project proposals with several federal, state, local, and private agencies. Besides the Preservation Commission, these agencies include the Department of Environmental Management, the city of Lowell, University of Lowell, the Proprietors of the Locks and Canals, the Lowell Regional Transit Authority, and others.

The National Park Service must integrate the actions proposed in the General Management Plan for Lowell with the proposals of each of these agencies and organizations. A combined, cooperative approach will enable the preservation of Lowell's cultural resources while maintaining and enhancing the urban environment and economy of Lowell. By encouraging private ownership and development within the park, an economically self-sustaining, viable city can continue to develop and grow.

AFFECTED ENVIRONMENT

BACKGROUND

Lowell, Massachusetts, is 30 miles northwest of Boston in the Merrimack River Valley. Founded in 1822 at Pawtucket Falls to utilize the waterpower most efficiently, Lowell was the first planned American industrial city. The factory system at Lowell combined new technology with revolutionary forms of labor organization and finance to provide for the mass production of cotton cloth.

The entrepreneurs of Lowell developed a 5.6-mile canal system, complex hydraulic machinery, and other technological innovations, in addition to using a unique labor system, New England farm girls. The first mill operatives, known as mill girls, had a lifestyle regimented by mill agents and overseers, who demanded long working hours and required them to live in strictly supervised corporate-owned boardinghouses. But the young women who came to Lowell looked forward to new opportunities with relatively high wages, self-improvement, and interaction with other women of similar age and with like interests. As the American industrial society matured, working conditions became more difficult as investors demanded greater dividends and as Lowell had to start competing with other mill cities. Because of deteriorating working conditions and foreign immigration, the mill girls were gradually replaced with Irish, French Canadian, Polish, and Greek immigrants. The Lowell textile industry declined in the late 19th and early 20th centuries because of competition from other mill cities (location and waterpower were no longer as critical as in the early industrial days), labor unrest, and poor management.

Today much of Lowell's past remains intact and in place within the housing, commerce, and industry of the 20th-century city. The existing resources include the entire canal system and the related gatehouses and locks, seven massive mill complexes, and hundreds of historic structures. In addition to its physical resources, the modern city of Lowell retains much of the ethnic and cultural character of its past.

CULTURAL RESOURCES

ARCHEOLOGICAL RESOURCES

Lowell National Historical Park includes mills, canals, residences, and a portion of Lowell's business district. Thus the park provides a representative cross-section of the 19th-century city. Very different activities took place at these various locations, and the cultural resources associated with each will reflect those activities.

By an examination of historic documents and artifacts, the private as well as public lives of Lowell's early and more recent inhabitants can be better understood. Traditional archeological questions about what, where, and how much people ate, the kinds of dishes they ate on, and where the dishes came from can be addressed. Also information about status, immigration, and settlement patterns can be gained by studying the distribution of cultural material.

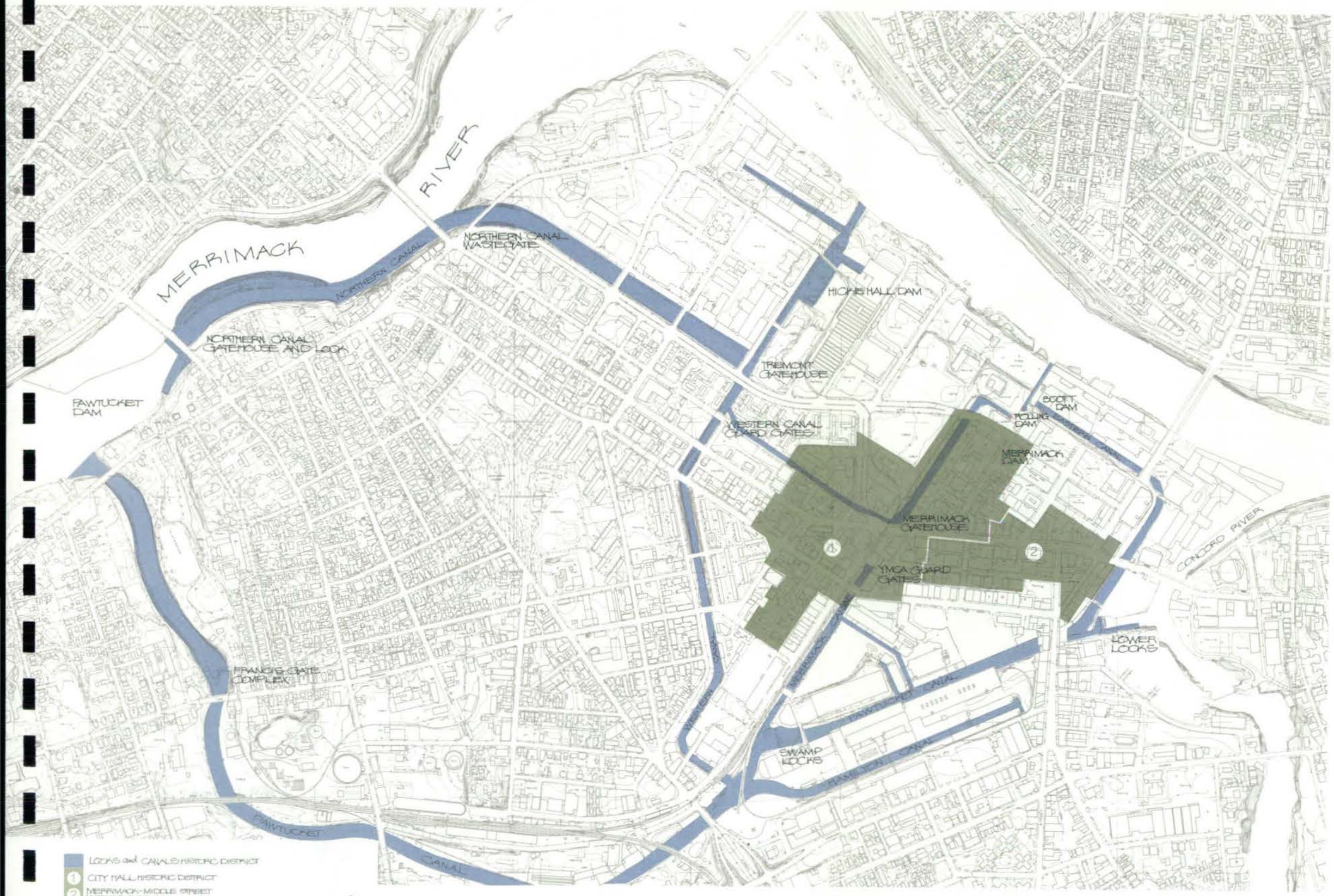
In 1974 and 1975, Robert Schuyler, a historical archeologist, excavated at five different locations in the Lowell area. Although the amount of information obtained from the sites varied, he did establish that significant deposits of cultural material exist in Lowell. Schuyler compared artifacts from residential areas which represent various segments of Lowell society: unskilled labor, skilled labor, and company management. Although his analysis of the artifacts is incomplete, the historical records establish that the residential pattern associated with mill workers was very complex, with skilled and unskilled laborers in some cases living in different portions of the same structure.

Within the park there are undoubtedly deposits as important to the understanding of Lowell's history as those excavated by Schuyler. An archeological resource study has identified potentially significant subsurface cultural remains in Tremont Yard and at the six sites authorized for acquisition by the Park Service. These areas now must be tested by subsurface excavation to determine if undisturbed cultural deposits exist. Areas with potential for cultural resource significance will require careful planning for the management of these resources.

HISTORIC RESOURCES

Cultural resources relating to Lowell's history are found within the boundaries of Lowell National Historical Park. The predominant cultural resources are the canals, mills, and residential, church, and public buildings of a 19th-century industrial city. Here are physical expressions of a number of major themes in the nation's history, the most significant resources of which have been included in the following local and federal districts (see the Historic Districts map).

Local Historic Districts (established under Massachusetts General Laws, Chapter 40C)



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HISTORIC DISTRICTS ■■■ LOWELL NHP

City Hall Historic District -- This district, which encompasses much of the downtown park area, was established on August 29, 1973, by the Lowell Historical Commission. Included are a variety of structures--commercial, residential, religious, and public buildings that typify 19th-century industrial Lowell.

Locks and Canals Historic District -- This district was also established by the Lowell Historical Commission on August 29, 1973. It includes waterways and related structures.

National Register of Historic Places Districts (established under the National Historic Preservation Act of 1966, as amended)

City Hall Historic District -- Accepted on the register on August 13, 1976, this district has the same boundaries as the local City Hall Historic District.

Locks and Canals Historic District -- Also added to the register on August 13, 1976, this approximately 123-acre district includes virtually the entire Lowell canal system, canal-related structures, the remains of seven mill complexes, and three boardinghouses originally associated with the mills. On December 22, 1977, the waterways and related structures were given national historic landmark status. The millyards are included on the National Register, but they are not historic landmarks.

Merrimack-Middle Streets Historic District -- Added to the National Register on January 16, 1979, this district incorporates the heart of Lowell's downtown historic district, including Merrimack Street and adjacent sections of Middle, Central, and Prescott streets.

Under contract with the National Park Service, the architectural firm of Shepley, Bulfinch, Richardson, and Abbott has prepared a cultural resource inventory of all buildings and structures within the park and preservation district. The city of Lowell is preparing a nomination form for multiple resources within the remainder of the city.

National Park Service Structures

The park's enabling legislation authorizes the National Park Service to acquire, in fee and/or less-than-fee, the following seven structures:

Old City Hall -- From its construction in 1830, this building served combined government and commercial functions. Since 1896, when the city of Lowell sold the structure to private interests, the buiding has been a commercial operation. It has been radically altered over time and bears little resemblance to its original appearance.

Jade Pagoda and Solomon's Yard Goods -- Although these two commercial structures occupy lots sold by Locks and Canals in 1828, neither is historically significant.

Merrimack Gatehouse -- Built in 1848 to protect the gates of the new Moody Street feeder, this gatehouse is one of the finest in Lowell. The structure is in excellent condition and has been only slightly modified since construction.

Kirk Street Agents' House (formerly Linus Child House) -- This brick duplex, named after an early mill agent, was built in 1845 to house agents of the Boott and Massachusetts mills; it was used for housing into the 20th century. The structure is a significant example of one type of corporate housing.

H & H Paper Company -- This building was constructed between 1835 and 1838 as one of a series of boardinghouses for operatives of the Boott Textile Mills and represents the physical relationship between mill operative housing and work location. The boardinghouses were originally three-story, traditional brick builidngs with gable roofs. Most have been demolished, and the H & H Paper Company has been radically altered from its original appearance.

Wannalancit Mill Complex -- Originally known as the Suffolk Manufacturing Company, the Wannalancit complex is representative of late 19th-century architectural developments in Lowell's textile complexes.

Except for the Jade Pagoda and Solomon's Yard Goods, all of these structures are on the National Register of Historic Places. To date the Park Service owns the Kirk Street Agents' House, the Jade Pagoda, Solomon's Yard Goods, and Old City Hall.

Lowell Historic Preservation Commission Structures

As described in the park legislation, the Preservation Commission will participate in the preservation, restoration, management, development, or maintenance of the following properties.

Boott Mill Complex--This complex is architecturally and historically the most significant of the ten designated properties under the jurisdiction of the Preservation Commission. Of the original millyards, The Boott Mill complex is the most intact surviving example of the first phase of Lowell's mill construction. All four of the original 1835 mills in the Boott millyard survive as part of an interconnected series of mill buildings. The remainder of the complex, which is comprised of later additions, is also significant because it demonstrates the evolution of the mills. The clock tower and belfry, completed circa 1865, are part of this later phase of construction and survive today as one of the most memorable architectural monuments in Lowell. The complex is owned by the Boott Mill Corporation, which leases space for light industry and warehousing. The facility is in good condition, although repair is needed.

Lowell Manufacturing Company Complex--These two mill buildings, now known as the Market Mills, are the surviving buildings of the former Lowell Manufacturing Company and its successor, the Bigelow Carpet Company. The earlier mill was constructed in 1882 and the other in 1902. For the past ten years one building has been vacant with both buildings in a state of disrepair. Recently, fire destroyed a major portion of the top floor and the roof of the 1902 mill.

AHEPA Building--Originally known as the Kirk Street Primary School, this structure was constructed by the city of Lowell in 1881. It is a most unusual Victorian period design. The building was given by the city of Lowell to the American Hellenic Educational Progressive Association (AHEPA) in 1945. In general, it has maintained its original form and use. The structure is currently underutilized and needs major repairs.

Early Residence--These 2½-story row houses were constructed ca. 1845-1849 and are examples of mid-19th century residential architecture. The structures form an historically and architecturally important neighbor to the adjacent Kirk Street Agents' House. They are basically in good condition but need substantial repairs.

Lowell Gas Light Company--This 1859 structure typifies many characteristics of the Italianate style. The building is in a key location on Shattuck Street, in an area that expresses the evolution of commercial architecture in Lowell. The Preservation Commission has rehabilitated a portion of the building and provided office space for their staff. A facade grant will be supplied by the Preservation Commission for additional improvements to the exterior.

The Yorick Club--Constructed between 1855 and 1864 as a residence for officials of the Merrimack Manufacturing Company, the building remained in the hands of the company until 1901 when it was purchased as a young men's social club. It is one of the few remaining examples of housing owned by the first textile mill in Lowell. This Italianate, Neoclassical-style building is a product of 1901 restoration. Used today as a restaurant, the building is in excellent condition.

The Welles Block--This 1846 commercial building originally housed office and store space. In the late 19th century it was used as a public hall for social and cultural affairs. Occupying one of the key sites in the Lowell central business district, the building serves as commercial retail and office lease space. Significant aspects of the building's historic fabric and character were modified in a recent renovation.

Lowell Institution for Savings--This Greek Revival-style building was constructed in 1845 as a savings bank for the mill operatives. Since its construction, the building has had a number of tenants and has recently been renovated to accommodate a modern banking facility. The building is owned and operated by the Lowell Institution for Savings. It is in good condition; however, extensive historic fabric was removed in the renovation.

The Jordan Marsh Company Building--The company occupies the Bon Marche' Realty Trust and Railroad National Bank buildings on Merrimack

Street and the Mitchell Block on Kirk Street. Owned today by the Bon Marche' Realty Trust, the three buildings were constructed during the last quarter of the 19th century and are important examples of Victorian-style commercial architecture.

The upper floors of the buildings remain intact with only minor alterations to the historic fabric, but there has been major irreversible damage to the historic fabric on the first floors.

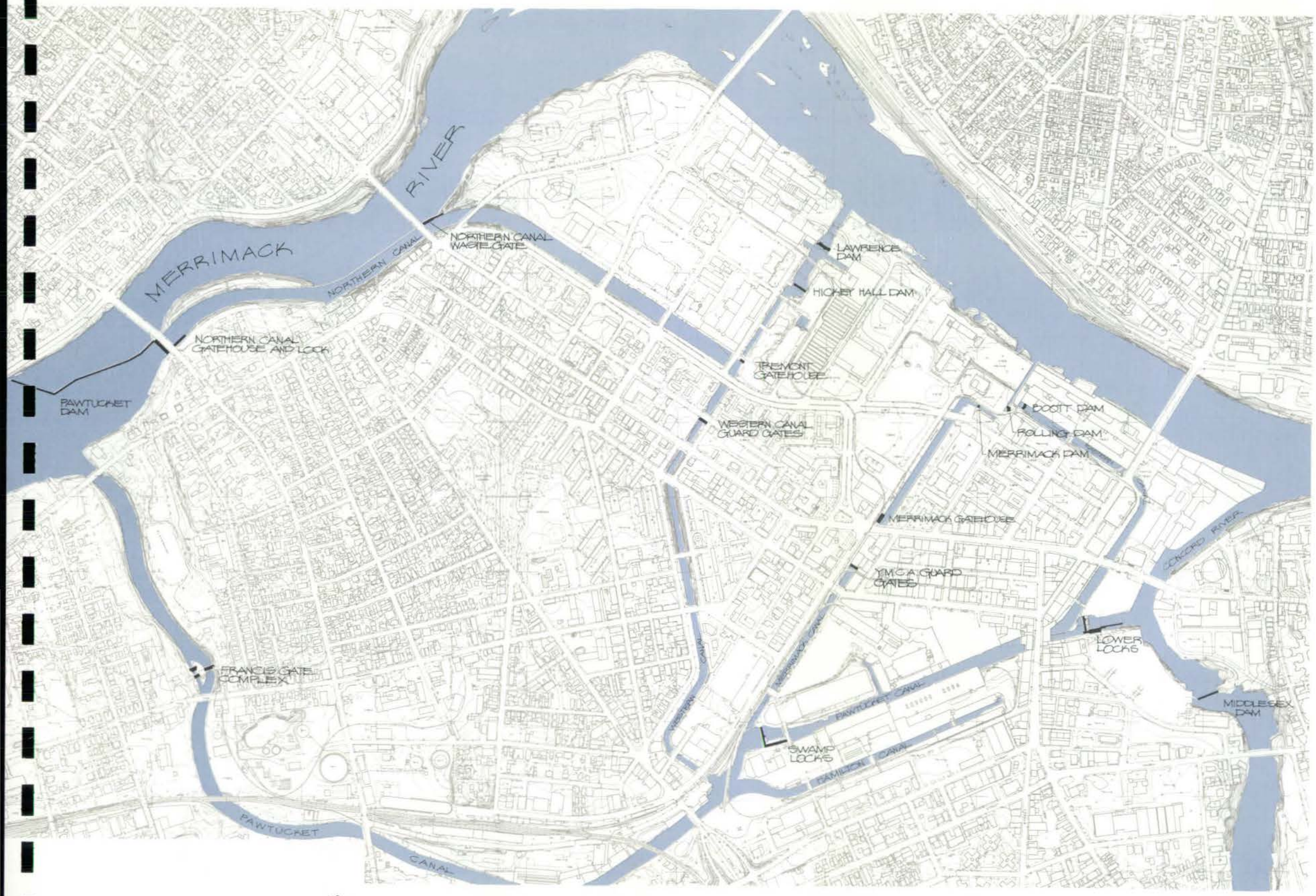
St. Anne's Church and Rectory--Constructed in 1825 and 1826, St. Anne's Church and Rectory were constructed out of stone excavated during construction of the Lowell canal system. This first church in Lowell was designed by Kirk Boott and was important in the early relationship between the city of Lowell and the manufacturers. The early Revival Gothic-style church and Greek Revival-style rectory are owned by St. Anne's Episcopal Church. Both structures are in very good condition; only minor repairs are required.

Canal System

The Lowell canal system is the most significant of the pre-hydroelectric power canal systems in the country. The 5.6-mile system of interrelated power canals was developed from the Pawtucket Canal built in 1796 for navigation around the Pawtucket Falls. The five feeder canals that dissect Lowell were built to channel water as a power source for the textile mills. The complexity of the system is partially due to the wide curve of the Pawtucket Canal around Lowell because of the rocky highlands adjacent to the river. The canal system operates on two levels for operational expediency and was designed to be redundant to allow for the continuous flow of water during repairs and breakdowns. (For a detailed account of the history and development of the canal system, see the The Lowell Canal System by Patrick M. Malone.)

Today, the canal system is remarkably well preserved. It is a functional asset to the Proprietors of Locks and Canals on the Merrimack River, which generates electricity at four locations--Assets, Hamilton Yard, John Street, and Bridge Street. Most of the system has been maintained to allow for the uninterrupted flow of water. Elements that are not essential for supplying water to the above sites have been allowed to deteriorate.

Several structures of the system are in critical need of renovation and repair. These structures include many of the gatehouses, the Francis Gate (which is an integral part of the city flood control system), and the granite-block canal walls that have been severely undermined by vegetation. (See the Canal System map.)

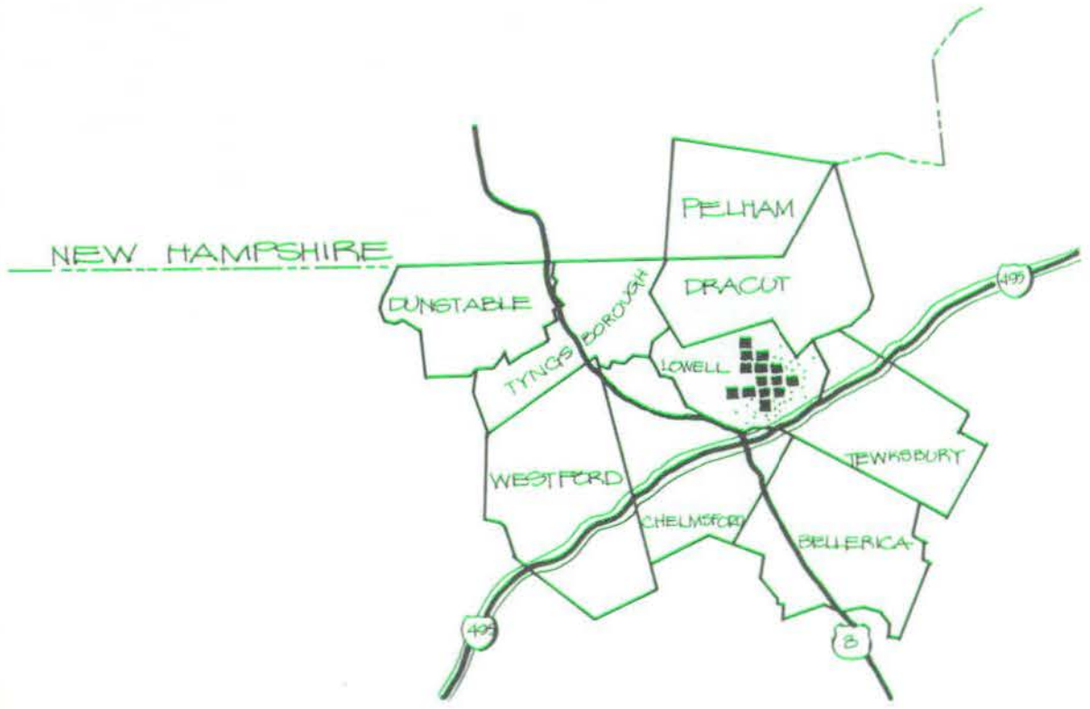


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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

CANAL SYSTEM ■■■ LOWELL NHP

ON MICROFILM



MASSACHUSETTS

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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SMSA
LOWELL NHP

ON MICROFILM

URBAN ENVIRONMENT

Lowell is relatively dense and compact, and is part of its own nine-community standard metropolitan statistical area (SMSA), but there are many growth and development pressures because of its proximity to Boston. (See Lowell SMSA map.) Lowell maintains its emphasis on industry, with a more diversified industrial base than in the 19th century. The declining textile, apparel, and leather goods industries have been replaced by the mini-computer, aerospace, and defense equipment industries.

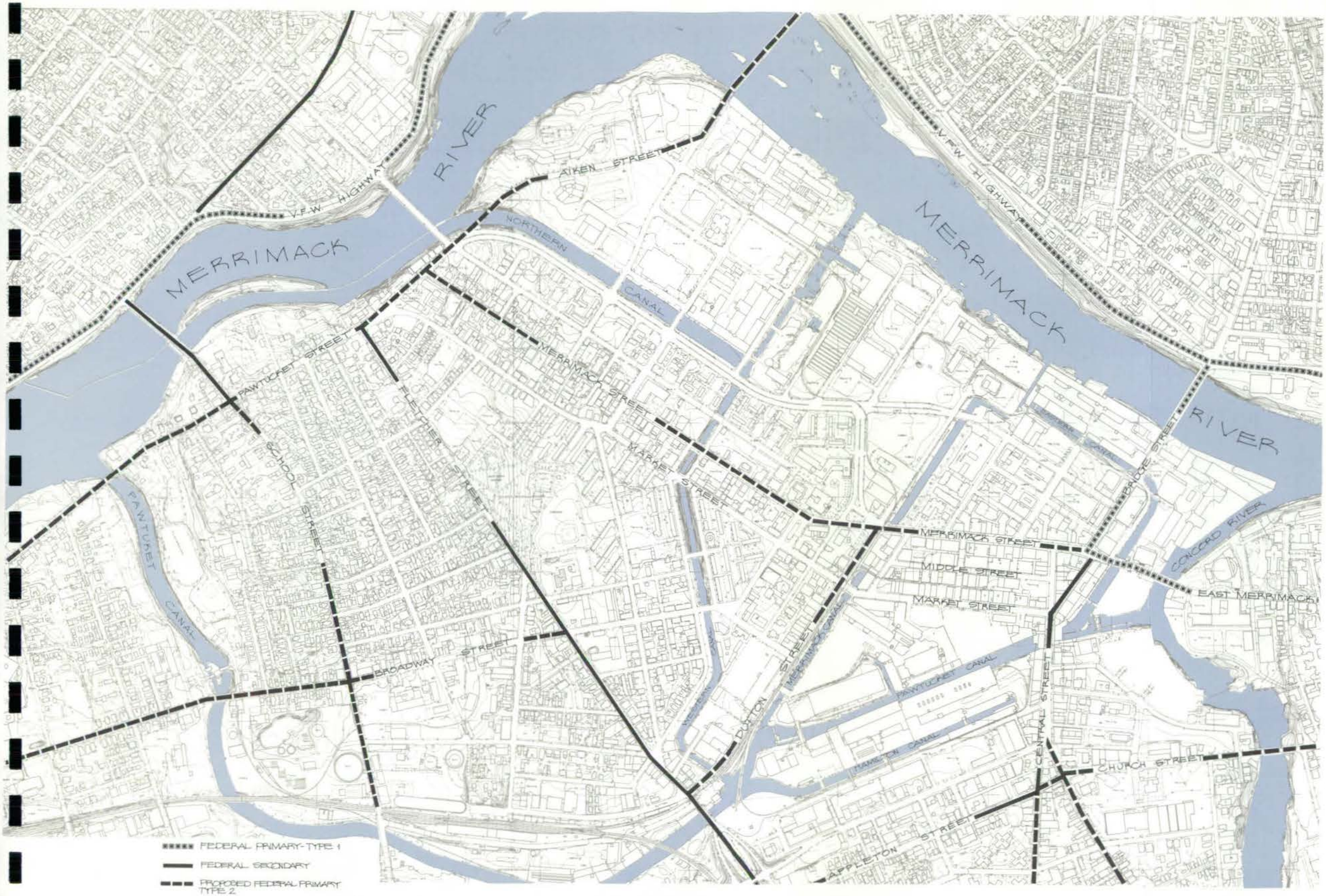
TRANSPORTATION

Lowell is accessible by automobile, train, and bus. It is serviced by two major divided highways, Massachusetts Route 3, which runs north-south, and Interstate 495, the outer beltway of the Boston metropolitan area. Access from I-495 to the downtown Lowell area is by the "Lowell Connector," a six-lane divided highway. Other major highways that pass through Lowell are Massachusetts 113, 38, and 110. Lowell is also accessible by intercity bus and by rail from Boston. Rail service has recently been expanded on a trial basis from Boston through Lowell to the New Hampshire cities of Nashua, Manchester, and Concord. This service may be discontinued or modified in the future.

The road system in Lowell has developed in the spaces remaining between the planned locations of the canals, mills, housing, and commercial areas (see Federal Roadway Classifications map). Consequently, many roads are narrow and circulation can be difficult. According to a 1972 report on Lowell's major streets, 50 percent of Lowell's streets are utilized beyond their design capacity, and an additional 15 percent are operating between 90 and 100 percent of design capacity. Much of the resulting congestion is caused by through-traffic in the downtown core (see Summary of Traffic Characteristics map). A controversial river crossing has been proposed to help alleviate this congestion (for a detailed discussion of the proposals see "Merrimack River Crossing Corridor Planning Study," April 1979, by the Northern Middlesex Area Commission).

Public transportation is available within the city of Lowell and in some of the surrounding area. The Lowell Regional Transit Authority (LRTA) was established in 1974 and provides public transportation in member communities (see LRTA Member Communities map). The LRTA has received a $4.2 million grant for improvements, including a bus staging facility, a downtown information center, signs and shelter, and 40 new buses of varying sizes (including 5 buses equipped with lifts for the elderly and handicapped).

The Massachusetts Department of Public Works is currently in the design phase of the proposed Sampson Connector, which will greatly facilitate travel on Thorndike and Dutton streets (see "Projects and Proposals of Others" section).



SOURCES: MAJOR STREET PLAN, LOWELL 1975. CITY DEVELOPMENT AUTHORITY. 479| 40002 DSC| MAY 80

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE

FEDERAL ROADWAY CLASSIFICATION ■■■ LOWELL NHP

ON MICROFILM

A 1979 rail feasibility study has been conducted under the direction of the Preservation Commission and the Park Service. The study, by Storch Associates and Gordon Fay Associates, shows that the existing industrial railroad tracks in the park and the historic preservation district can be utilized to provide a trolley circulation system to connect major park and city attractions. Lowell residents and park visitors will be encouraged to use the trolley system.

POPULATION

The 1970 federal census showed 94,280 residents in the city of Lowell. While the population declined during the first half of the decade, it has now recovered and is expected to increase slightly during the next decade. Projections for the greater Lowell area predict a 6.0 percent population growth rate during the next decade. Table 1 shows the most recent Northern Middlesex Area Commission population projections.

Ethnic Composition

According to 1970 data, Lowell houses a large number (40.4 percent) of people whose mother tongue is not English. The three largest groups are French, Greek, and Polish. Approximately 9 percent of the population is foreign born, and 25 percent is first-generation American (i.e., born to parents who immigrated to America). This large percentage of recent immigrants, coupled with the ethnic diversity, clearly contributes to Lowell's cultural pattern. Table 2 shows the population composition and ethnic diversity in Lowell.

The 1970 census shows that Lowell has less than 3,000 blacks and Spanish-speaking people, or only 3.2 percent of the population. This percentage is far below the state average. Because of possible errors in the 1970 census and a recent influx of minority groups, it is estimated that there are as many as 10,000 Spanish-speaking people in Lowell. The percentage is less for the suburbs.

Elderly

Lowell will have over 12,490 people 65 years of age or older in 1980 (approximately 13 percent of Lowell's base population). The Lowell region, excluding the city itself, will have 9,990 elderly by 1980 (approximately 6.3 percent of the total population).



SUMMARY OF TRAFFIC CHARACTERISTICS

LOWELL NHP

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SOURCE: LOWELL TRANSPORTATION PLANNING STUDY, 1975
SKIDMORE, OWINGS AND MERRILL

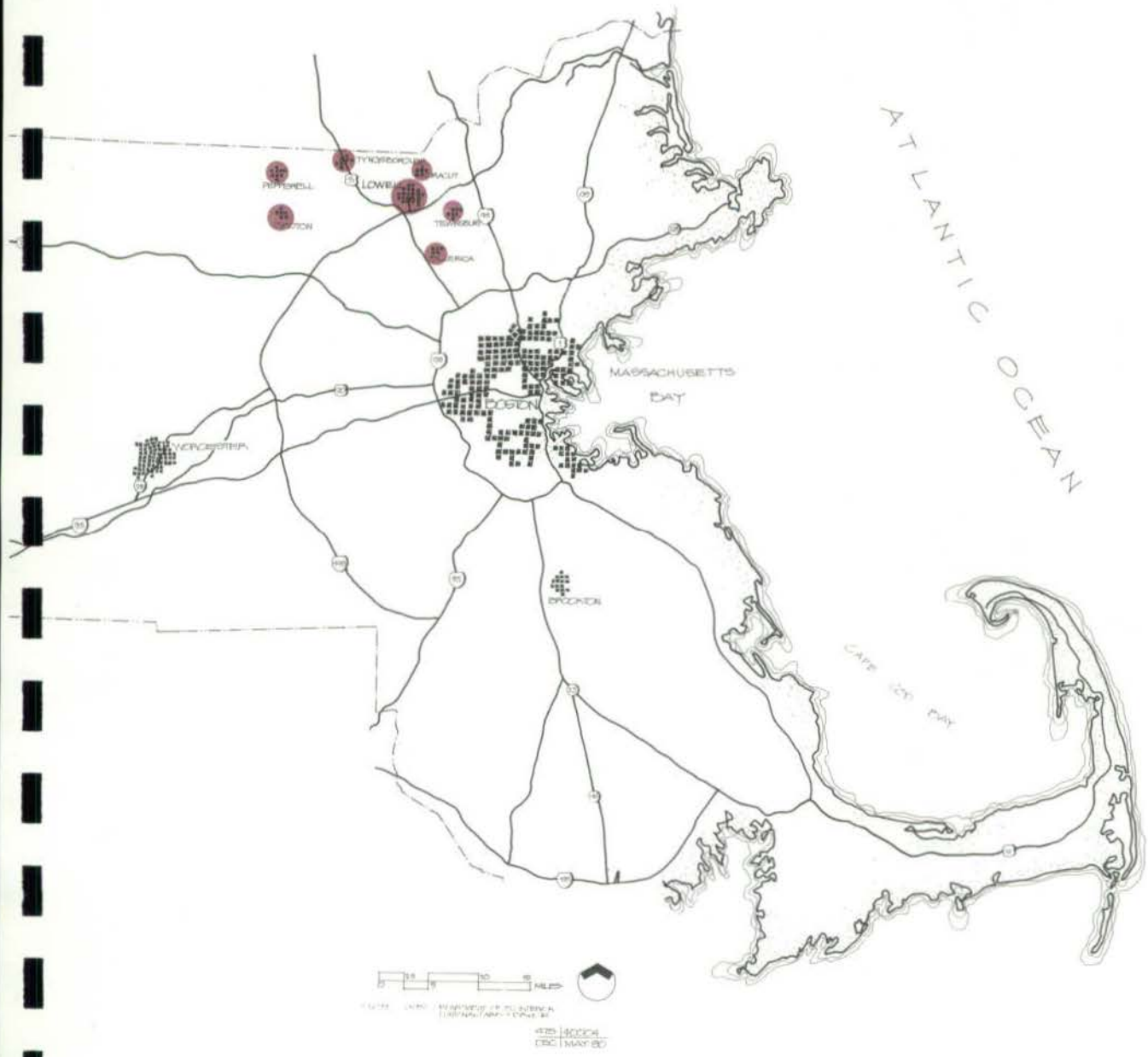
ON MICROFILM

Table 1. Estimates of Population and Growth Rate by Community

Community	1975	1980	1985	1990
Billerica	35,767	40,204	43,420	46,459
		(12.4)	(8.0)	(7.0)
Chelmsford	31,650	33,707	37,098	39,509
		(6.5)	(10.0)	(6.5)
Dracut	20,258	23,542	26,367	29,531
		(10.4)	(17.0)	(12.0)
Dunstable	1,531	1,831	2,197	2,570
		(19.6)	(20.0)	(17.0)
Pepperell	6,723	7,933	9,418	10,830
		(18.0)	(18.7)	(15.0)
Tewksbury	23,980	27,266	30,047	33,051
		(13.7)	(10.1)	(10.0)
Tyngsborough	4,864	5,886	7,357	8,828
		(21.7)	(25.0)	(20.0)
Westford	12,935	14,926	18,657	22,854
		(15.4)	(25.0)	(22.5)
Northern Middlesex Area Commission	137,708	155,295	174,561	193,632
		(12.8)	(12.4)	(10.9)
State (high estimate)	137,708	169,000	185,000	202,000
		(14.9)	(9.5)	(9.2)
State (low estimate)		154,000	159,000	165,000
		(4.7)	(3.2)	(3.8)
Lowell	91,000	95,000	98,000	100,000

SOURCE: Northern Middlesex Area Commission, Population and Economic Projections (Lowell, Mass., 1977)

NOTE: Numbers in parentheses indicate percentage increases over populations five years earlier



● DISTRICT COMMUNITIES

NOTE: THE COMMUNITIES OF LOWELL, BILLERICA, AND PEPPERELL ARE PRESENTLY RECEIVING TRANSPORTATION SERVICE

LRTA MEMBER COMMUNITIES

LOWELL NHP

ON MICROFILM

Table 2. Ethnic Population of Lowell
(1970 Census Data)

Composition	Population	Percent
Immigrant Status		
Native of native parents	62,438	66
Native of foreign parents	23,615	25
Foreign born	8,227	9
TOTAL	94,280	100.0
Ethnic Minorities		
Black	786	0.8
Spanish-speaking	2,251	2.4
White	91,243	96.8
TOTAL	94,280	100.0

SOURCE: City of Lowell Department of Planning and Development

NOTE: The native languages in Lowell include English, French, German, Polish, Yiddish, Russian, Italian, Spanish, Greek, and Portugese.

DRACUT

TYNESBOROUGH

DRACUT

CENTRALVILLE

PAWTUCKETVILLE

MERRIMACK

RIVER

BELVIDERE

MERRIMACK

MIDDLESEX

NORTH CHELMSFORD

VILLAGE

LOWELL HIGHLANDS

CHELMSFORD

AYERS CITY

TEWKSBURY

CHELMSFORD

CHELMSFORD

TEWKSBURY

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ON MICROFILM

LOWELL NEIGHBORHOODS

LOWELL NHP

Population Densities

The average population density of Lowell in 1970 was 7,043 people per square mile, or 10.2 persons per acre. Each of Lowell's neighborhoods has a character of its own. These differences are reflected in table 3. The relatively high population density of Lowell is indicated by comparing the regional population densities in table 4.

Table 3. Neighborhood Population Densities

	Acres	1970 Population	Density per Acre
Pawtucketville	1,802	10,767	5.98
Centralville	993	15,548	15.66
The Acre	580	10,653	18.37
Central Business District	292	859	2.94
Highlands	1,966	27,221	13.85
Flats	422	9,112	21.59
Ayer City	925	4,510	4.88
Belvidere	1,242	11,305	9.10
South Lowell	928	4,264	4.59

Table 4. Community Population Densities
(persons per square mile of land area)

Community	1960	1970
Lowell	6,884	7,043
Billerica	702	1,243
Chelmsford	671	1,394
Dracut	656	874
Tewksbury	768	1,099
Tyngsborough	196	249
Westford	201	343
Lowell SMSA	1,095	1,419

SOURCES: Massachusetts Department of Commerce and Development; and U.S. Department of Commerce, Bureau of the Census, United States Census of Population, 1960, and United States Census of Population, 1970

LAND USE

Lowell is an area of intense land use. The 19th-century industrial origin of Lowell is seen today in the concentration of industrial and commercial activities and in the density and compactness of Lowell.

As a regional commercial center, Lowell has a high percentage of commercial land clustered in the well-defined central business district (see tables 5 and 6 and the Existing Land Use map).

Table 5. Lowell Existing Land Use, 1975

Category	Acres	Percentage
Vacant Land	584	6.3
Agricultural Land	25	0.3
Mining	90	1.0
Surface Water	616	6.7
Forests - Private	1,197	13.0
Forests - Public	504	5.5
Governmental/Institutional	615	6.7
Public/Quasi-Public Open Space	94	1.0
Recreation	197	2.1
Industry	512	5.5
Commercial	595	6.4
Residential	3,947	42.8
Waste Disposal	43	0.5
Highways	213	2.3
TOTAL	9,232	100

SOURCE: Goldberg, Zoino, Dunnicliff and Associates, Inc., Inventory of Groundwater Resources in the Northern Middlesex 208 Area (Newton Upper Falls, Mass., 1977)

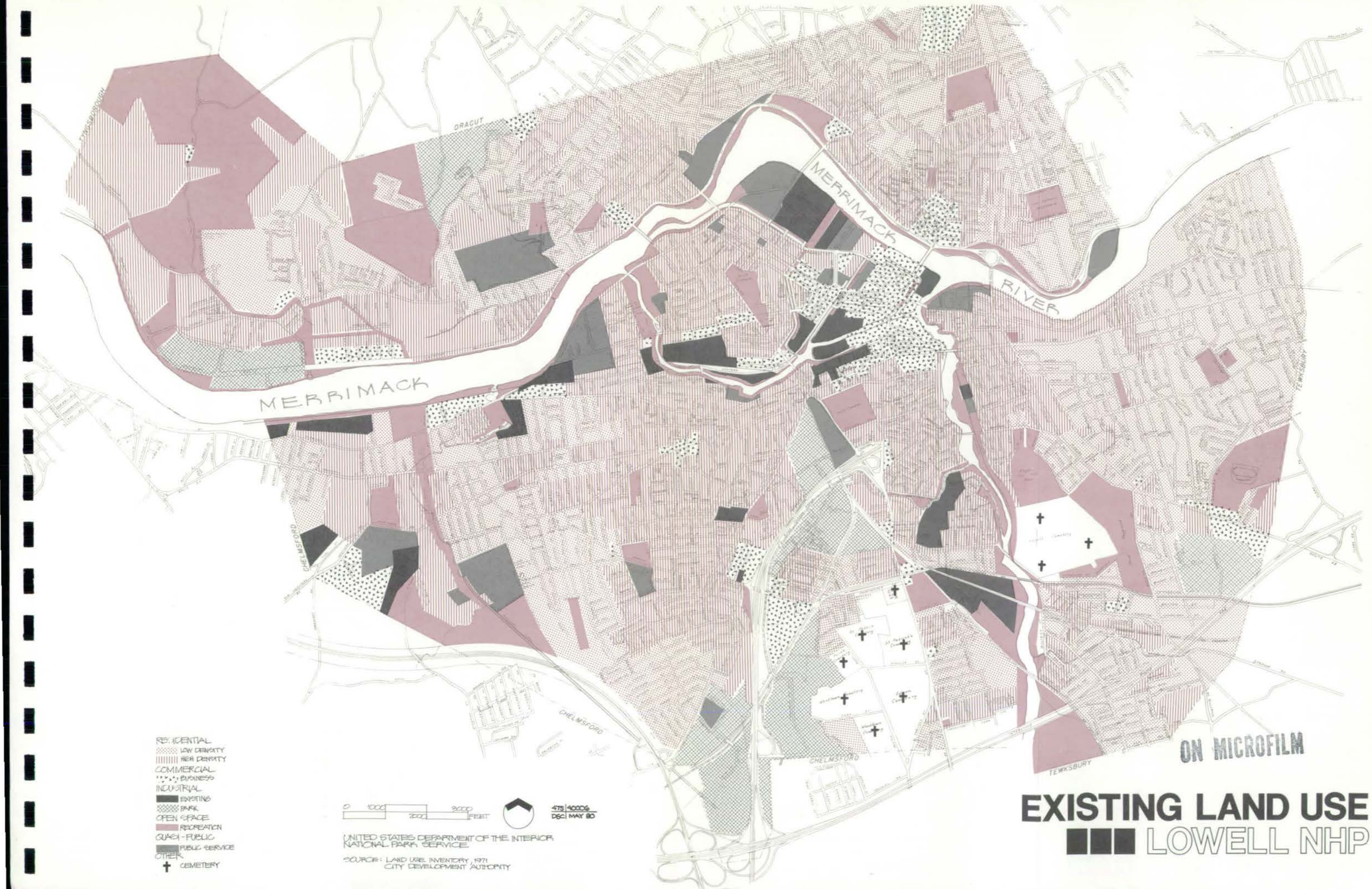

DRACUT
MERRIMACK
RIVER
MERRIMACK
CHELMSFORD
CHELMSFORD
CHELMSFORD
TEWKSBURY
RESIDENTIAL
LOW DENSITY
HIGH DENSITY
COMMERCIAL
BUSINESS
INDUSTRIAL
EXISTING
PARK
OPEN SPACE
RECREATION
QUASI-PUBLIC
PUBLIC SERVICE
OTHER
CEMETERY
0 1000 3000 FEET
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
SOURCE: LAND USE INVENTORY, 1971
CITY DEVELOPMENT AUTHORITY
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ON MICROFILM
EXISTING LAND USE
LOWELL NHP

Table 6. Northern Middlesex Area Commission Region
Existing Land Use, 1975

Category	Acres	Percentage
Vacant Land	5,399	5.4
Agricultural Land	7,022	7.0
Mining	1,215	1.2
Surface Water	5,927	5.9
Forests - Private	44,773	44.9
Forests - Public	3,773	3.8
Governmental/Institutional	1,510	1.5
Public/Quasi-Public Open Space	1,423	1.4
Recreation	1,088	1.1
Industry	1,475	1.5
Commercial	1,803	1.8
Residential	22,566	22.6
Waste Disposal	298	0.3
Highways	1,408	1.4
Total	99,682	100.0

SOURCE: Goldberg, Zoino, Dunnicliff and Associates, Inc., Inventory of Groundwater Resources in the Northern Middlesex 208 Area (Newton Upper Falls, Mass., 1977).

NOTE: Communities include Billerica, Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, and Westford

Lowell has 56 parks and playgrounds for a total of approximately 700 acres. These parks range from passive woodlands to tennis courts and ballfields. Some of the more significant parks in Lowell are Boulevard Park (24 acres), North Common (11 acres), Pawtucket Street River Park (13 acres), Shedd Park (53 acres), South Common (12 acres), and the Lowell, Dracut, Tyngsborough State Forest (957 acres, of which 272 are in Lowell).

Other nearby recreation facilities are Warren Manning State Forest (375 acres) in Billerica, Great Brook Farms (855 acres) and Carlisle Pines (22 acres) in Carlisle, and the Concord River unit of the Great Meadows National Wildlife Refuge (approximately 1,200 acres).

Potential recreation areas include a riverway park extending upstream and downstream on both sides of the river and an historical greenspace along the remains of the Middlesex Canal from Middlesex Village in Lowell to Somerville. These potential recreation areas would be well suited for walking and biking paths to link the recreation facilities along the Merrimack River Valley with those of the Boston metropolitan area.

ECONOMY

Employment

The Lowell region has had a "boom or bust" economy for the past 60 years. Present projections for the future are cautiously optimistic. Total employment and wages over the past decade have climbed steadily, even after discounting inflation. Lowell's recovery from the 1975 recession has been slow but steady, as evidenced by the declining unemployment rates: 13.3 percent for 1975, 10.8 percent for 1976, 8.8 percent for 1977, and 6.9 percent for 1978. Data for 1979 indicate that unemployment will decline to approximately 6.6 percent for the year. The area's labor force currently stands at 69.1 percent of the total population.

A net gain of 6,362 new industrial jobs is estimated in greater Lowell by 1985. These gains will most notably be in durable goods industries, such as nonelectrical machines and electronic computing equipment. This "upbeat climate" is also indicated by the development of several new industrial parks, including two industrial parks in Billerica, three in Lowell, and one in Chelmsford. However, agriculture, textiles, and leather-related jobs are projected to continue to decline throughout the area.

Nonagricultural wage and salary employment in the Lowell area increased by 2,700 workers during 1978 to a total of 69,700 in March 1979. This increase resulted primarily from growth in the durable goods industries of the manufacturing sector, particularly by the rapid expansion of Wang Laboratories. Within the nonmanufacturing sector, noteworthy growth occurred in the wholesale and retail trades. In addition, the unadjusted unemployment rate in March 1979 was the same as in March 1978 (6.4 percent). However, there were increases of 300 unemployed and 4,900 employed persons for the year.

Average weekly earnings of production workers were $17.54 higher in March 1979 than in the previous March, and average weekly hours worked increased to 40.5 hours. However, the purchasing power of wages continued to erode as a result of inflation.

According to short-term projections of the Massachusetts Department of Employment Security, the unemployment rate will rise slightly in the near future because employment expansion will not keep pace with additions to the labor force. This decline in employment will be followed by a period of slow but steady growth for the next two years.

Industrial Growth

Local industry is the major determinant of the future employment situation in greater Lowell. Overall it appears to be healthy and is growing, particularly in the areas of durable goods and electronic computing equipment. Relatively little reliance is placed on automobile and construction-related employment, which is very sensitive to slight changes in the national economy.

The greater Lowell area appears to be able to withstand the most serious impacts of a poor national economy, as evidenced by its slow but steady recovery from the 1975 recession. Assets that are most attractive to industrial corporations include the availability of 1.5 million square feet of vacant or underutilized industrial space which could be funded through local banks and financial institutions for speculative business investments and would require minimal investment before occupation.

The most important example of industrial corporations moving into Lowell is Wang Laboratories. Their world headquarters, a 14-story, 360,000 square-foot tower, was recently completed. They have also purchased a portion of the Boott Mill complex and constructed a 164,000-square- foot expansion. In addition, they hold an option to purchase 60 acres to develop a new 1 million-square-foot facility in Pawtucketville. This expansion alone accounts for thousands of new jobs.

Other recent major expansions include Prince Macaroni (250,000 square feet in Lowell), Joan Fabrics (180,000 square feet in Lowell), U.S.C.I. (105,000 square feet in Billerica), Merrimack Magnetics (50,000 square feet in Lowell), Astro Circuits (40,000 square feet in Lowell), and Courier-Citizen Company (30,000 square feet in Lowell). Further, the Pilgrim Health Applications Division of Arthur D. Little has moved to Lowell, resulting in 200 additional jobs for the area. Other expansions now being considered involve Honeywell Corporation in Billerica, the 3M Corporation in Chelmsford, and the Raytheon Corporation in Tewksbury.

Economic Activity in Lowell's Central Business District

Downtown Lowell is one of the major retail centers in the state, as measured by dollar volume and per capita value of sales. According to the 1971 Lowell Central City Study, stores that sell comparative shopping items (e.g., general merchandise, apparel and accessories, and furniture and fixtures) strengthen the downtown retailing base. In Lowell, however, reliance on this type of sales had dropped from 55.3 percent in 1971 to 46.0 percent in 1977 (U.S. Department of Commerce, Bureau of the Census, 1977). This decrease is attributed to a shift in such activities from the downtown core to outlying shopping centers, indicating that the Lowell market is not as fully developed as it could be. The Lowell market is not meeting increased suburban and regional competition through the expansion of comparative goods and selected services merchandising lines.

Lowell's retail base was examined for the 1972-1979 period; the results are shown in table 7. While information for miscellaneous retail establishments (e.g., liquor stores and florists) and the total number of retail firms was not available for 1978 and 1979, some basic trends were still identified.

In 1972, the city of Lowell had 737 retail firms, posting sales of approximately $215 million (USDC, Bureau of the Census, 1974). Although present information does not confirm it, apparently the number of retail firms decreased sharply between 1972 and 1977, especially miscellaneous retail and food stores.

Although having information on the total number of retail firms in Lowell is worthwhile, ascertaining the health of the local retail economy is more important. Data clearly show that Lowell continues to maintain a strong position, as measured by dollar volume of sales ($215 million in 1972 to $341 million in 1979). From 1972 to 1979, the biggest increases in sales were in the areas of food stores, up $30 million, and automotive dealers, up $30 million. However, a percentage of that growth is due to inflation, since food and autos are two areas where prices rise the fastest. Overall, the retail trade sector in Lowell appears to be relatively stable in terms of the number of establishments and increasing its sales volume.

Real Estate Market

One of the best indicators that Lowell's economy is strong and growing is a booming real estate market. A telephone survey of eight major local real estate agents indicated that property prices have doubled in the past two years. Parcels selling for between $.50 and $.75 a square foot a short time ago are now going for $1.00 and $1.30 per square foot. Similarly, rentals for commercial space have risen from $4.00 per square foot to between $6.50 and $8.28 per square foot.

Clearly Lowell National Historical Park and other related development have revived pride in Lowell. While real estate prices in Lowell are rising, they are still lower than in the Boston area. Therefore, families are moving into Lowell, precipitating additional development and even further demand for services.

Confidence in the future of Lowell is also indicated by banks and other lending institutions that are making funds available for the first time in years for speculative investments. The key organization in stimulating these activities has been the Lowell Development and Finance Corporation. This corporation provides low-interest loans of up to $33,000 for exterior and interior renovations that conform to the historic preservation theme.

Development

Lowell's economy is expected to continue to increase as a result of the many federal, state, and private investments. Well over $300 million in new construction and revitalization projects are summarized in table 8. Development activity is also indicated by a rise in building permits from an annual average of 396 during the first half of the decade to 517 during the last half. During the first eleven months of 1979, 610 building permits were issued. One of the greatest stimuli to development has come from Congress's commitment of $40 million to support the Lowell National Historical Park and Historic Preservation Commission. However, this is only a portion of the millions of dollars being spent on central business district revitalization, transportation and parking, public facilities, housing, industrial development, and recreation.

Table 7. Number of Retail Businesses in Lowell

Type of Use	Number of Firms 1972[a]	1977[b]	1978[c]	1979[d]
Building materials, hardware, garden supplies, mobile home dealers	20	21		
General merchandise	36	37		
Food stores	103	87		
Automotive dealers	42	46		
Gas stations	64	54		
Apparel and accessories	49	38		
Furniture, home furnishings	53	50		
Eating/drinking places	164	148		
Drug and proprietary stores	36	33		
Miscellaneous retail	170	126		
Total Number Firms	737	640	n.a.	n.a.
Estimated Sales (millions)	$215	$272	$311	$341

[a]U.S. Department of Commerce, Bureau of the Census, 1972 Census of Retail Trade -- Massachusetts, Geographic Area Series (Washington, D.C.: Government Printing Office, 1974)

[b]U.S. Department of Commerce, Bureau of the Census, 1977 Census of Retail Trade -- Massachusetts, Geographic Area Series (Washington, D.C.: Government Printing Office, 1979)

[c]"1978 Market Guide -- Massachusetts Retail Sales," Editor and Publisher Magazine

[d]"1979 Market Guide -- Massachusetts Retail Sales," Editor and Publisher Magazine

Table 8. Lowell Revitalization Program - 1980
Completed, Under Construction, and Proposed Projects

Lowell National Historical Park and Lowell Historic Preservation Commission	
10-year Implementation Program	$ 40,000,000
Lowell Heritage State Park	10,000,000
Projects Underway:	
Pawtucket Boulevard Park ($750,000)	
Park Visitors' Center ($750,000)	
Park Interpretive Program	
Central Business District Revitalization	
Facade Grant Program (25% grants) (city)	200,000
Lowell Development and Finance Corporation (4% loan program)	350,000
Site Improvements (city) - streets, sidewalks, period lighting, street furniture, trees	2,000,000
Smith Lot Hotel	11,000,000
Transportation and Parking	
Sampson Connector	3,500,000
Towers Corner	330,000
CBD Signalization Project	250,000
Gallagher Terminal	5,000,000
Market Street Garage	4,500,000
Public Facilities	
Lowell High School Expansion	14,500,000
Wastewater Treatment Facility	150,000,000
Water Filtration Plant	9,000,000
Housing	
Neighborhood Preservation Program	5,000,000
Neighborhood Strategy Areas	1,000,000
Section 8 Elderly Rehabilitation (160 units)	7,000,000
Market Mill Project (217 units)	8,000,000
Kenefick Manor (mill rehabilitation)	1,325,000
Hildreth Street Project	1,500,000
Industrial Development	
Astro Circuits	2,500,000
Wang Laboratories	n.a.
Industrial Avenue Expansion	18,000,000
Pawtucketville Development	33,000,000
Courier-Citizen Company	20,000,000
Parks and Recreation	
Shedd Park Picnic Area	100,000
McPherson Park Restoration	600,000
Doane Street Park	100,000
St. Louis Park	100,000
Fayette Street Playground.	50,000
	$348,905,000

NOTE: Based on data from the city of Lowell.

Lowell will be directing street and sidewalk improvements with funding from the U.S. Department of Housing and Urban Development community development block grant. In addition, a grant program of the Lowell Department of Planning and Development has allowed private owners of historic structures to improve and restore facades with 25 percent grants. To date 22 downtown facades and numerous residential properties have been improved. Another incentive for private property owners to restore historic structures is to obtain low-interest loans from the locally financed Lowell Development and Finance Corporation.

Along with the above investments, private industry is also expanding. The Hale-Howard and Lowell industrial parks have added 81 acres of industrial land to Lowell. Wang Laboratories and Astro Circuits are two of the major new tenants of these industrial parks.

Other development trends in Lowell are the conversion of downtown historic structures to federally subsidized housing. Projects that have either been completed, are under construction, or are planned total 1,276 units. The Federally Subsidized Housing Inventory map indicates the number and special distribution of these projects.

Property Taxes

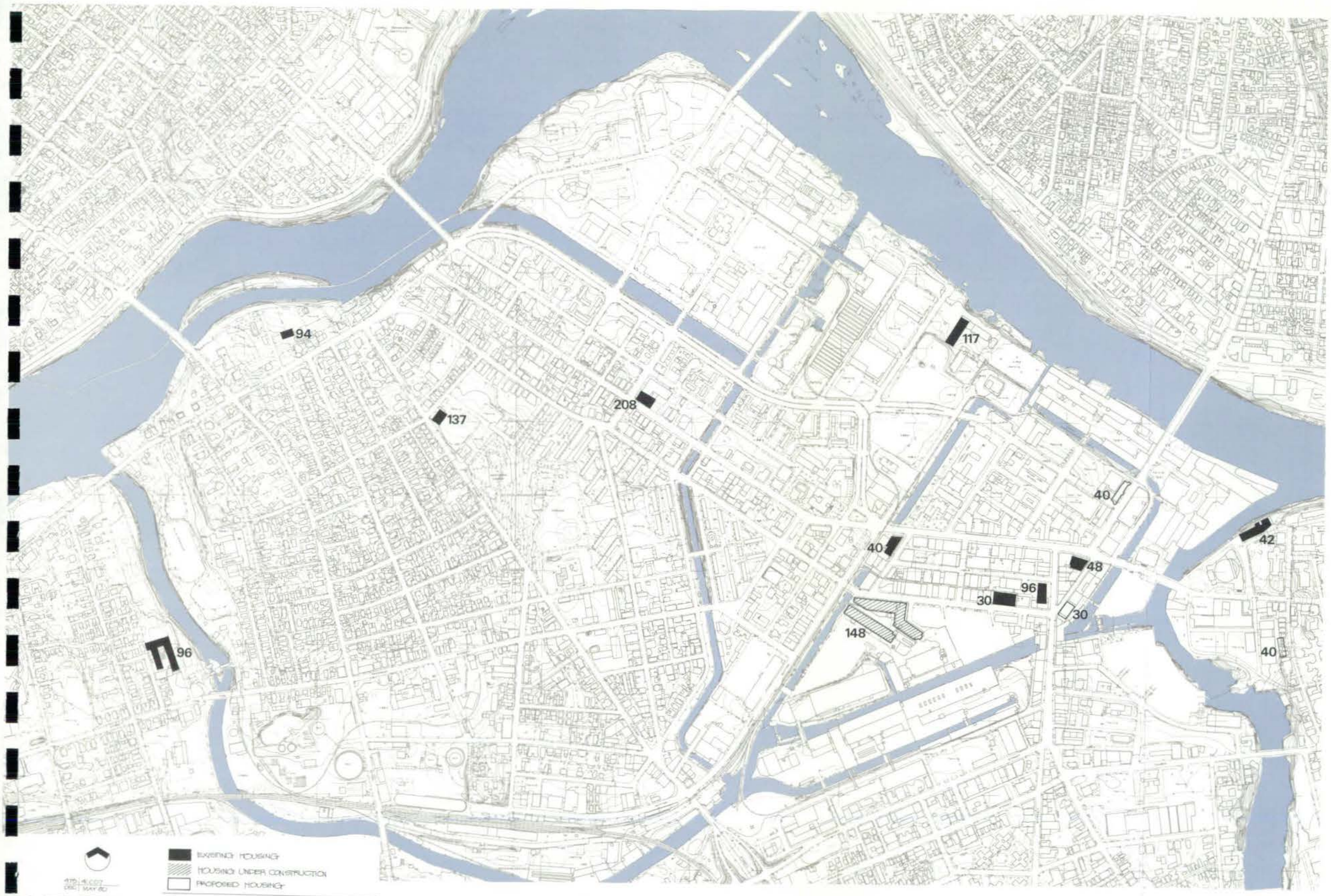
Full value rates for the greater Lowell area are shown in table 9. Although the city of Lowell is the most heavily taxed area, the tax rate

Table 9. Lowell Area Property Tax Rates

	Actual Tax Rates					Full Value Rates*	
Community	1968	1976	1977	1978	1979	1978	1979
Lowell	$122.00	$167.60	$179.60	$201.40	$180.80	$66.50	$54.00
Billerica	130.00	254.00	247.00	316.00	312.00	47.40	47.70
Chelmsford	114.00	41.50	45.75	59.00	53.00	42.50	38.00
Dracut	117.00	218.00	216.00	242.00	190.00	46.00	39.80
Tewksbury	141.00	40.00	41.00	50.00	49.50	39.00	43.80
Tyngsborough	197.00	44.00	46.00	52.00	49.50	37.40	31.30
Westford	38.00	60.20	65.50	76.60	68.40	40.60	34.50

SOURCE: Massachusetts Taxpayers Foundation, Inc., "Municipal Financial Data," January 1976, February 1977, and February 1978; and personal communication with Massachuetts Department of Revenue

*Full value tax rates have been computed on the basis of actual tax levies and the estimated full value of property.



FEDERALLY SUBSIDIZED HOUSING INVENTORY ■■■ LOWELL NHP

ON MICROFILM

for 1979 has dropped substantially--to $54.00 from a full value rate of $66.46 in 1978. Suburban tax rates, on the whole, have also fallen. Given the influence of the state-imposed tax cap and the desire of Massachusetts residents to minimize governmental expenditures, property taxes throughout greater Lowell will apparently continue to increase very slowly or even decline. This situation is encouraged in part by substantial new industrial developments.

Accommodations in the Lowell Area

Three motels are immediately accessible to downtown Lowell, and another 16 motels are within 15 miles. Overnight accommodations are in great demand in the greater Lowell area, reflected by the currently approved and funded plan to build a 200-room hotel in downtown Lowell. The marketing analysis for this hotel showed a high demand for rooms without considering the influx of tourism resulting from the park.

Four small privately owned campgrounds are in the greater Lowell area. The nearest state campground is over 20 miles from Lowell.

NATURAL ENVIRONMENT

GEOLOGY/PHYSIOGRAPHY

Lowell is within the Merrimack River basin in the eastern plateau region of Middlesex County, Massachusetts (U.S. Department of Agriculture, Bureau of Chemistry and Soils 1924). This is a low relief area, with elevations ranging from approximately 50 to 200 feet above sea level. A few hills in the surrounding area extend up to 500 feet. The elevation drops abruptly in the Merrimack River just north of the park. Here the river crosses exposed bedrock and falls approximately 30 feet. (The waterpower generated by this sudden drop in elevation led to the location of power canals in the Lowell area.) Within the park, the elevation ranges from 70 to 100 feet above sea level, decreasing gradually from northeast to southwest.

The gently rolling hills in the surrounding area were made from glacial till and outwash. The higher hills have a bedrock core made up of Carboniferous period sedimentary rocks and igneous rocks of undetermined age (USDI, Geological Survey 1917). The most common types of bedrock are granitic rocks, gneisses, and schists. The weathering of these rocks contributes to the till and stratified deposits of the area. (Water Supply Study 1974). The till and stratified deposits date back to the most recent advances of glacial ice and to the more recent deposition of alluvium by modern streams and rivers.

HYDROLOGY/WATER QUALITY

The Lowell area is drained by the Merrimack River and one of its tributaries, the Concord River. A dam and the Pawtucket and Northern canals now divert much of the water in the Merrimack River around Pawtucket Falls. The canals then flow back into the river below the falls.

The Merrimack River basin, the fourth largest in New England, extends from the White Mountains in New Hampshire south to Newburyport, Massachusetts, and the Atlantic Ocean. The Merrimack River is formed by the confluence of the Pemigewasset and Winnipesaukee rivers at Franklin, New Hampsire. The total length of the main stem of the Merrimack River is 116 miles. The lower 22 miles of the river are tidal. The elevation drop in the 94 miles above tidewater is 245 feet, averaging 2.6 feet per mile. The average discharge at the mouth is about 8,000 cubic feet per second. The monthly flow of the Merrimack River just below the Concord River in Lowell is shown in table 10.

The water quality of the Merrimack River had changed from a natural to a contaminated condition by the early 20th century. In the past decade, several federal and state programs have been successful in improving the river's water quality and in the construction of fishways where obstructions to fish migration occur. The Federal Water Pollution Control Act of 1972 has established water quality goals for "fishable and swimmable" water quality by 1983, has eliminated the direct

Table 10. Monthly Flow of Merrimack River Below Concord River at Lowell, 1927-1972 (cubic feet per second)

Month	Mean	Minimum	Maximum
January	6,438	1,833	13,469
February	6,698	2,104	18,400
March	12,233	4,131	45,778
April	19,425	8,795	35,020
May	11,703	4,092	24,767
June	6,077	1,825	11,737
July	3,168	1,160	8,811
August	2,588	900	7,547
September	3,184	895	19,649
October	3,391	1,035	9,522
November	5,923	1,842	17,688
December	6,747	2,126	15,075

discharge of sewage to water bodies, and has provided federal grants for sewage treatment plant construction.

In the Lowell area, federal funds with state and local contributions have enabled the construction of the Duck Island sewage treatment plant, a $44 million project with a capacity of 32 million gallons per day. The plant is designed to treat sewage from Lowell and parts of Dracut, Tewksbury, and North Chelmsford. Interceptor sewers will eliminate the need for direct discharges into the Merrimack River in all but the most severe rainstorms.

Because of these programs, the Merrimack River in Massachusetts is now classified (according to the water quality classification standards adopted by the Massachusetts Division of Water Pollution Control) as Class B in the freshwater sections and Class SB in the tidal areas. These classifications provide for the propagation of fish, other aquatic life, and wildlife, and also for swimming and boating.

The completion of a scheduled wastewater treatment plant along with sewage abatement programs will be needed to achieve Class B fishing/swimming uses of the Merrimack River and canals. Water quality analysis of the canals is not available. There are point discharges to the canals and hazardous waste storage along the canals.

CLIMATE

Lowell has a temperate, humid climate that is noted for its variability (USDA, Bureau of Chemistry and Soils 1924). Detailed monthly climatic data are shown in table 11. Lowell receives approximately 44 inches of precipitation per year. The average length of the growing season is 5½ months.

Table 11. Climatic Data

Month of Year	Heating Degree Days (DD/MO)	Poss. Sunshine* (%)	Sunshine Hours (HRS/MO)	Average Temperature Mo (°F)	Day (°F)	Night (°F)	Wind Speed (mph)	From (dir.)	Relative Humidity (%)
August	15	63	280	72	76	67.5	10	WSW	70
September	98	61	232	65	69	61	11	WSW	78
October	316	58	207	55	59	51.5	12	WSW	70
November	603	48	152	45	48.5	41.5	13	WSW	70
December	983	48	148	33	36.5	30	17	N	70
January	1,088	47	148	30	33.5	26.5	17	W	68
February	972	56	168	30	33.5	27.5	14	NW	69
March	846	57	212	38	41.5	34.5	14	NW	65
April	513	56	222	48	52	44	14	WSW	67
May	208	59	263	59	63.5	54.5	12	SW	70
June	66	62	283	68	72	63.5	11	SW	70
July	7	64	300	74	78	69.5	10	WSW	70
Totals	5,715	57	2,615	50	55	48	15	W	69

SOURCE: Total Environmental Action, Solar Energy Home Design (1975)

*For cooler months approximately 10% additional possible sunshine is available as difuse radiation with most varieties of solar collectors

AIR QUALITY

The air quality of Massachusetts is monitored and regulated by the Massachusetts Department of Environmental Quality Engineering (DEQE). In compliance with the Clean Air Act and the amendments of 1977, the DEQE has made determinations of air quality based on the health- and welfare-related standards for five major air pollutants: sulfur dioxide, carbon monoxide, total suspended particulates, nitrogen dioxide, and ozone. The Clean Air Act amendments require that the state prepare a state implementation plan, which must be approved by the U.S. Environmental Protection Agency (EPA), that documents strategies to control pollutants that violate the standards.

Air quality problems in Lowell that are caused by auto traffic have been recently studied by the Northern Middlesex Area Commission (NMAC) in conjunction with DEQE and EPA air quality programs. NMAC has identified the 20 most severe carbon monoxide "hot spot" intersections in their ten municipality region. Six intersections with a high carbon monoxide concentration are in downtown Lowell. Plans are currently being prepared to improve the Fletcher-Thorndike-Dutton streets intersection, and the Arcand Drive-Merrimack-Dutton streets intersection is expected to be improved in the future. All mitigating measures should be applied to minimize impacts in these areas. The Park Service will support and cooperate with the city, NMAC, state, and federal agencies to improve air quality and traffic flow in Lowell.

The DEQE updated the state plan in May of 1979 for ozone and carbon monoxide in Massachusetts. According to this report, the entire state is in violation of the ozone standard, and "vigorous efforts must be made to reduce ozone precursor pollutants, especially non-methane hydrocarbons which come from both motor vehicles and industrial processes in Massachusetts in order to attain the ozone air quality standards by 1987." According to the Massachusetts Air Quality Summaries for 1978, compiled by DEQE, Lowell is in violation of the EPA standards for carbon monoxide. Sulfur dioxide, total suspended particulates, and nitrogen dioxide are within EPA standards. Violations of the standards have been recorded at selected sites in the state. (Massachusetts, Transportation Element of the Massachusetts State Implementations Plan for Air Quality 1978.)

Most existing stationary source pollutants in Lowell are currently not included in the state plan. Although EPA has set standards for industrial emissions, the DEQE is reviewing the recommended levels and will comment on the standards. Controls on certain stationary sources of nonmethane hydrocarbons (a precursor to ozone) were promulgated by the state in the spring of 1979.

Immediately adjacent to the park boundary are several industries that emit potentially toxic, visible pollutants that are in violation of DEQE standards. When certain common meteorological conditions combine with production days that emit toxic and visible smoke, the white, acrid smoke permeates the entire downtown area.

The companies involved produce synthetic leather and other synthetic textile products. Each of the industries is aware of the extent of the air quality problems and is in the process of abating the illegal emissions. The violations are expected to be alleviated or a compliance schedule established by the summer of 1980.

VEGETATION AND WILDLIFE

The park is in an urban setting with little native vegetation. The surrounding area is in a transition vegetation zone of mixed deciduous and coniferous forests. The land was once cleared and farmed, but most of these farms have been abandoned, and second-growth timber and scrub oak cover the fields.

Native and migratory birds are common in the Lowell area. Fur-bearing animals were trapped during the early historic period, and in most cases their numbers have not recovered. Anadromous fish have suffered from industrialization and the resulting pollution. Salmon declined after the Essex dam on the Merrimack River in Lawrence was constructed in 1847. The most common fish in the lower Merrimack River are pollution-tolerant species such as the white sucker, brown bullhead, and carp. In recent years, water pollution control programs have enabled the return of several warm-water fish species that have little tolerance for pollution. For a complete list of the principal fish species inhabiting the Merrimack River drainage area, see A Strategic Plan for the Restoration of Atlantic Salmon to the Merrimack River Basins (USDI, Fish and Wildlife Service 1979).

Because of historical fishery runs and suitable habitat, the Merrimack River has been selected for restoration of all anadromous fishes to their historic ranges through the cooperative efforts of New Hampshire and Massachusetts state agencies, the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the U.S. Forest Service. Shad eggs were placed in the Merrimack River in 1969 to determine the viability of spawning and nursery habitat. Stocking of adult shad with the intent of generating a return run of fish took place in June 1978. The shad stocking programs have been very successful with large, increasing shad runs. It is early for returns of salmon, but limited numbers have been recorded.

There are no known endangered species in the vicinity of Lowell. However, the endangered shortnose sturgeon (Acipenser breviorostrum) is known to inhabit the Merrimack River below the Essex dam.

PROPOSALS AND PLANS OF OTHERS

One of the purposes of the park legislation is to encourage coordination and cooperation among all federal, state, local, and private agencies and organizations to ensure the development of the best possible plans, programs, and activities for Lowell. All development plans and proposals are currently, and should continue to be, coordinated with the Preservation Commission, city of Lowell, Department of Environmental Management, the Northern Middlesex Area Commission, the park, and private development and commercial interests in Lowell. Each of these agencies and organizations is in various stages of development planning for Lowell. As a result of several organizational meetings among the key planning groups, it was agreed that it was essential to maintain the flow of information of planning alternatives and proposals to the concerned parties. To minimize duplication of effort and to allow for accomplishment of different agency goals, it was agreed that each agency would carry out those functions to which it was most suited in the given time frames.

One of the major complicating factors in plan development has been the staggered planning time frames of each of the responsible agencies. Consequently, while all plans are developed in cooperation they must also be at the same time independent to account for uncertainty in the development and implementation of a cooperating agency's plan. It is in this manner of cooperation and independence that the park plan has been developed. Maximum cooperation and coordination has been encouraged in the planning and development of all aspects of the park and preservation district, but should any proposed action by a responsible agency not occur, the National Park Service will remain and carry out its proposals in cooperation with other agencies.

The coordination and cooperation among the federal, state, and local agencies has resulted in the development of the General Management Plan that integrates the resources, funding, and management capabilities of several governmental agencies. Thus, the park General Management Plan minimizes the expenditures of any one agency, eliminates duplication among agencies, and enables a plan that no single agency could carry out. In this manner, the resources and environment are enhanced for both the Lowell area resident and the national and local visitor. The combination of federal, state, and local plans along with private investment will result in the continued upswing of the Lowell economy and Lowell's reputation as a desirable community to live and work.

The coordination and cooperation of federal, state, and local agencies has also resulted in several programs that would not be possible without the unusually high degree of interaction. Joint programs include the information/orientation center, the trolley system, interpretation, street improvements, facade improvements, and canal development. Shared funding and responsibilities have enabled the innovative use of federal, state, and local funds. Although there has been a high degree of coordination and cooperation among the federal, state, and local agencies, some aspects of the individual agency plans are independent. If there had been less cooperation, there would still be an improvement in Lowell's economy and environment but not the degree of development possible with

the joint plans. The major benefit to the city of Lowell, as a result of this high degree of cooperation, is the quality and extent of the proposed park development.

THE PRESERVATION COMMISSION PROGRAM

The primary goals of the Lowell Historic Preservation Commission are to make private sector preservation feasible in the historic area surrounding the park and to sustain the culture and traditions of Lowell to provide a "living park" for visitors and residents.

To implement these goals, the Preservation Commission's responsibilities have been defined as follows:

reinforce the development of the park

determine priority projects in the preservation district

establish districtwide standards and incentives for the preservation of historic and cultural properties

Priority development projects are the rehabilitation and development of the ten structures designated in the legislation, including the Boott Mill complex and structures and streetscape of the city center area. Proposals for the ten structures fall into the following groups:

Major Preservation

Boott Mills
- exterior restoration and interior rehabilitation
- partial acquisition, public and private use
- mixed use; NPS exhibits, museum space, continued light industry, office and housing use

Market Mills
- private exterior and interior rehabilitation underway
- NPS information/orientation center
- commercial space leased by Commission to private users
- upper floors elderly housing

Moderate Rehabilitation

Lowell Gas Light Building (Shattuck St.)
- exterior rehabilitation
- interior rehabilitation for Commission offices and private law offices

Welles Block
- recently rehabilitated with Commission grant
- continued office and commercial use

Jordan Marsh (Bon Marche')
- exterior rehabilitation, remove paint from windows
- continued present use

St. Anne's Church
- repair exterior masonry
- minor maintenance
- continued present use

AHEPA Building
exterior and interior rehabilitation and reuse

work to be done in cooperation with Northern Middlesex Area Chamber of Commerce

Early Residence (Kirk St.)
exterior and interior rehabilitation
reuse for exhibits, public meeting areas, and office space

work to be done in cooperation with Greater Lowell Central Labor Council

No Further Work Necessary
Lowell Institution for Savings
Yorick Restaurant

The Preservation Commission will provide development incentives for the rehabilitation of structures in other areas to reinforce the historical setting of the park. Specific development projects include the Boott Mill boardinghouse (H & H Paper Company) and the Massachusetts Mills.

The Preservation Commission will also support cultural programs, including a boardinghouse restaurant and exhibits and a multiethnic center. Finally, the Preservation Commission is developing an index of properties that categorizes structures according to their significance. This index will also designate structures eligible for financial assistance and provide the basis for the standards and criteria.

The Preservation Commission's enabling legislation required that standards and criteria for rehabilitation and new construction be developed and incorporated into city ordinances. Standards are now being developed to set guidelines in such areas as building heights, setbacks, materials, density, onsite parking, signs, and landscaping. Handbooks and technical assistance will help make these guidelines clear and workable. These standards apply to the park and preservation district only. For more information about the Preservation Commission's plan, see the Report of the Lowell Historic Preservation Commission.

THE LOWELL PLAN

The Lowell Plan is a joint proposal by Senator Paul Tsongas and City Manager Joseph Tully in cooperation with public and civic leaders. The objective of the plan is to direct a total community investment with Lowell's physical plan by seeking to have each component of the community undertake a project or projects so that the collective efforts will form the basis for the new Lowell.

The Lowell Plan group will coordinate the actions of federal and state agencies with Lowell's activities, private banks, corporations, clubs, civic groups, and individual landowners. The federal role will be to continue to fund on an annual basis the Lowell National Historical Park and the

Preservation Commission. In addition, the responsible federal agencies will complete the design and construction of the Gallagher transportation terminal, various subsidized housing projects, and the Market Street garage. Continued assistance with urban development and assistance grants, transportation and highway projects, and other grants and programs will all be part of the federal role. The commonwealth of Massachusetts will continue to fund the Lowell Heritage State Park and to provide assistance and funding for highway projects in Lowell. The city of Lowell will coordinate the Lowell Plan projects, complete the downtown landscaping improvements, and adopt the standards and criteria for historic districts. The Lowell Plan enumerates categories of projects for the private sector--principally banks, major corporations, civic organizations, Lowell University, the school system, and downtown property owners.

To help direct efforts, an advisory committee to the Lowell City Manager has been created. The originators of the Lowell Plan concept have set late June 1981 as the completion date for all community and private projects. A major weekend festival (the first annual Lowell festival) will be held to celebrate the total community effort.

In support of the Lowell Plan, the city has contracted the American City Corporation to prepare a development plan for the downtown area. A report was produced in November 1980, which calls for $105 million of new public and private investment. The contract with American City Corporation has been retained by the city to assist in the ongoing implementation of this plan.

THE LOWELL HERITAGE STATE PARK

The Lowell Heritage State Park concept and proposal were developed in 1974 by the Massachusetts Department of Natural Resources, now the Department of Environmental Management. The primary purposes of the state park are to preserve the cultural heritage of Lowell and the surrounding region and to utilize Lowell's canals and rivers for cultural and recreational purposes. The state park has served as a model for the development of a state heritage park system in other Massachusetts cities.

The major components of the park are Pawtucket Boulevard Park, the Tremont Yard Park, the Lowell-Dracut-Tyngsborough State Forest, and the park entry area, including the Mack Building and surrounding site (see Lowell Heritage State Park map). To date, the Francis Gate and a major portion of Pawtucket Boulevard Park have been completed. The Francis Gate Park offers 12.2 acres of landscaped bicycling and walking paths bordering the Pawtucket Canal. The nearby Francis Gatehouse and related structure will be restored later. Pawtucket Boulevard Park is a 1.4-mile linear park along the north side of the Merrimack River pool, just upstream of the Pawtucket Dam. Here, a performing arts pavilion has been constructed, along with bicycling and walking paths and benches. Community boating activity will be accommodated in a boathouse to be constructed by the Department of Environmental Management, and a new public access boat ramp may also be included in the area. Efforts are underway to establish a route providing more direct access from the Pawtucket Boulevard Park to the Lowell-Dracut-Tyngsborough State

Forest, where special interpretive programs focusing on the forest's natural and social history will be conducted.

The design of the entry area and the interpretive program for the Mack Building is now in progress. The Mack Building will house a major exhibit on waterpower, administrative offices, and public meeting room.

BOOTT MILL HYDROELECTRIC PROPOSAL

As the value of electricity continues to increase, the construction of new hydroelectric generating plants is becoming increasingly profitable. A feasibility study has recently been completed by Raytheon Service Company, the Boott Mills, and the Proprietors of Locks and Canals on the Merrimack River, to construct a new 15,000-kilowatt hydroelectric plant in Lowell. Although still in the planning stages, the proposed site is adjacent to the Northern Canal wall, near the corner of French and Pawtucket streets. The Park Service will be monitoring the development of the project and cooperating with the Boott Mill Corporation to develop a mutually agreeable proposal.

The National Park Service encourages the adaptive use or reuse of the canal system and Merrimack River for hydroelectric development. The park plan will not prohibit the use of the canal system or river for production of electricity. However, any significant modifications made to the canal system must comply with federal and state compliance procedures and appropriate mitigation efforts will have to be undertaken. If federal funds are used to make modifications or developments, actions must receive the approval of the Secretary of the Interior.

SAMPSON CONNECTOR

The Sampson Connector Highway improvement project will facilitate traffic movement from the Lord Overpass to the Merrimack-Dutton Street intersection. This project will reduce traffic congestion and travel delays that are most noticeable at the Thorndike-Dutton streets intersection. The project was first proposed in the early 1970s; the project is now being proposed, using a five-lane concept of highway design. There will be four travel lanes, with lefthand turning lanes at Broadway Street. Three new bridges will be constructed as part of the project. The connector will provide for direct visitor access to the NPS visitor center as well as relieve one of the most congested intersections in Lowell.

ALTERNATIVES INCLUDING THE PROPOSAL AND THEIR CONSEQUENCES

ALTERNATIVE 1:
EMPHASIS AT OLD CITY HALL, BOOTT MILL, AND WANNALANCIT MILL

OVERALL STRATEGY

Alternative 1 is the preferred alternative that is discussed as the proposal in the General Management Plan for the park. As discussed in the "Summary" section of this document, the preferred alternative has been modified since publication of the Draft General Management Plan in May 1980. The location of several park interpretive functions have been shifted from the Wannalancit Mill complex to the Boott Mill complex. The preferred alternative now combines the most feasible aspects of alternatives 3 and 4, enabling park visitors to be in the central business district without causing excessive pedestrian and auto congestion. This alternative maximizes National Park Service opportunities for the preservation of cultural resources, for interpretation, and for management. To utilize park funds most efficiently, the Park Service will keep land and building acquisitions to a minimum and develop cooperative agreements wherever possible with the Lowell Historic Preservation Commission, the Massachusetts Department of Environmental Management, the city of Lowell, and others.

Interpretation and Visitor Use

The park's interpretive themes and programs will focus on Lowell's existing historic resources. Personal services by the Park Service and Department of Environmental Management staff, together with theme museums, wayside exhibits, and other markers, will be the principal means of interpretation.

Activities and programs related to interpretation and visitor use consist of three major components--an information/orientation center, four interpretive centers, and the canal system. The information/orientation center in the Lowell Manufacturing Company complex will introduce visitors to the park's interpretive themes and visitor services, enabling them to plan their visit. The interpretive centers, theme museums, exhibits in place, wayside exhibits located throughout the park, and guided and self-guided tours will provide detailed interpretation. (See Information and Interpretive Centers map on inside of back cover.)

The information/orientation center will offer an audiovisual presentation and exhibits designed to convey an overall sense of the park's primary interpretive themes. The interior space will offer an architecturally dramatic example of an adaptively used textile mill. The facility will be designed for an average stay of 30 to 45 minutes for visitors to get an idea of what resources they would like to see on their own. The staff will orient visitors to the attractions of the park, preservation district, and city. Lowell will provide general tourist information at a Lowell tourist center, also at this site. A sales area, general seating, and comfort facilities, will be available. Office space will also be provided for Park Service visitor services staff.

A major interpretive center will be located in a portion of the Boott Mill complex with other interpretive exhibits in the downtown area at Old City Hall, the Kirk Street Agents' House (Linus Child House), the Merrimack Gatehouse, the H & H Paper Company, and a floor of the Wannalancit Mill complex. Archeological interpretation may be done in the Tremont Yard, the parking lot adjacent to the H & H Paper Company, and behind the Kirk Street Agents' House. Another major focus of Park Service interpretive activity will be the canal system at Francis Gate, the Northern Canal Gatehouse, and aboard canal barges. Park Service interpretive activities will also be directed toward guided and self-guided tours of the downtown park and preservation district.

The Department of Environmental Management will concentrate its primary interpretation at the Mack Building and contiguous park, the Francis Gate area, along the canal banks, at the Lower Locks, and at the Tremont Yard. Other state interpretive locations will include the Pawtucket Boulevard Park and Lowell-Dracut State Forest.

Interpretation will focus on five major themes outlined below. These themes are chapters in the story of Lowell's unique and representative role in the industrial revolution - "the other American revolution."

Interpretive Themes	Locations
Power	
Water Power	
Canals	Mack Building, Merrimack Gatehouse, other sites along the canal system
Mechanical Hydropower	Boott Mill complex, Wannalancit Mill complex
Hydroelectrical Power	Boott Mill, Northern Canal hydroelectric plant
Steam	Boott Mill
Power Transmission	Boott Mill
Capital	
The Lowell Factory System	
The Waltham Experiment	Kirk Street Agents' House
The Boston Associates and the Corporation	Kirk Street Agents' House
Management	Kirk Street Agents' House, Boott Mill

Labor

Changes in Work: Farm to Factory	Boott Mill
Changes in the Work Force	
Mill Girls	
Living	H & H Paper Company and adjacent boardinghouse park
Working	Boott Mill
Immigrants	
Living	Boott Mill
Working	Boott Mill
Worker Responses to Factory Life	Boott Mill, Early Residence

Machines

Changes in Technology	Boott Mill
Cotton Manufacturing Process	Boott Mill
Workers' Relationship to the Machine	Boott Mill
Spread of Technology	Boott Mill, Dutton Street parking lot (wayside exhibit)

The Industrial City

The Planned Industrial City	Old City Hall
The City and the Corporation: Changing Relationships	Old City Hall
A City of Immigrants	Old City Hall
Decline and Revitalization	Old City Hall

Recreational as well as interpretive experiences will be available to park visitors. The park's primary recreational activities will be walking and biking along the canals and the banks of the Merrimack River, boating in portions of the canal system, and riding trolleys. Additional recreational activities will include boating and fishing on the Merrimack River, and biking and picnicking along Pawtucket Boulevard and in Lowell-Dracut State Forest. Supplementing such ongoing activities will be special programs of cultural and educational interest sponsored by the Park Service, Department of Environmental Management, the Preservation Commission, the city of Lowell, and other public and private organizations.

Use and Treatment of National Park Service and Related Structures and Sites

The proposed use, treatment, and development actions for these structures and sites will follow the park's management objectives for interpretation and cultural resources protection. Preservation and rehabilitation will be the general approach to building exteriors, and interior treatment will vary from preservation to rehabilitation for adaptive use.

Lowell Manufacturing Company Complex. The park's information/orientation center will be on the first and second floors of the Market Street building. The remaining first-floor space and parts of the second floor will be leased. The upper floors of the Market Street building and of the adjacent structure will be adaptively used by a private developer for federally subsidized housing. An attractive entry from the Dutton Street parking lot will be cut through a three-window-wide section of both mill structures. The courtyard will be landscaped with plantings and seating areas. Direct access will be possible from the courtyard to the information/orientation center and to Market Street.

Old City Hall. This structure will be adapted to serve several uses. The first floor will become an NPS interpretive center and visitor contact station, although a small portion may be leased for commercial uses compatible with park activities. Exhibits will focus on Lowell's development as an industrial city, as symbolized by the architectural evolution of Old City Hall and the current revitalization of the city. The balance of the building will be used for the park's administrative offices and headquarters.

The exterior of Old City Hall will be preserved in its present Colonial Revival style. Some of the missing architectural detail will be replaced, and the late 19th-century storefronts will be rehabilitated. Interior space will be adaptively used, but remaining original detail on the upper floors will be retained to the greatest extent possible.

Jade Pagoda and Solomon's Yard Goods. These one-story commercial structures are located on Merrimack Street. Although they occupy lots sold by the Locks and Canals in 1828, neither are of historical or architectural significance and both are incompatible with the structures in the surrounding area. The buildings were four-story structures, which were severely damaged by fires. The top three floors of Solomon's Yard Goods were removed in 1962, and the ground floor facade was rebuilt. The original building now occupied by the Jade Pagoda restaurant was remodeled in 1942. These two structures will be removed, and the space will combine park use with a public-gathering or special events space and possibly a restaurant with an outdoor cafe.

Site development may incorporate segments of earlier foundations and other remains. Design treatment for the space will be compatible with the urban setting, making use of traditional building materials such as granite, brick, and, if appropriate, portions of the foundation walls. Period lighting will be employed, comforming to the street treatment of the downtown area. A portion of the space may be covered with

transparent panels for year-round use. Public seating will be provided, with possible development of a small interpretive area.

Merrimack Gatehouse. The Merrimack Gatehouse will serve as an interpretive exhibit, utilizing intact historic fabric to tell the story of the gatehouse's function in controlling the flow of water in the canals. Interpretation will be accomplished through personal services, a pamphlet, and graphic displays. Alteration to the structure will be minimal. The building will be used primarily from early April through late October, and at other times for special tours.

The exterior will be preserved, and the entrance on Merrimack Street will be retained for visitor access. The interior will be returned to its historic appearance when actively used as a gatehouse by Locks and Canals.

Kirk Street Agents' House. This duplex functioned historically as residences for mill agents. The north unit will become the center for interpreting the role of capital in Lowell, emphasizing the lifestyle and function of mill agents in the corporate structure of Lowell's textile industry. Interpretation will employ personal services, audiovisuals, and exhibits, and possibly include limited use of period furnishings. The south unit will be adaptively used as a residential/conference center for educational and other groups and perhaps seasonally as a hostel.

Interior treatment of the north unit will preserve the 19th-century historic fabric. The south unit will be rehabilitated to accommodate residential/conference center activities, with care taken to preserve the existing historic fabric.

Boott Mill Complex. The Park Service, in cooperation with the Preservation Commission, will pursue development of a portion of the Boott Mill complex. These agencies, together with the Boott Mill Corporation, will participate in a mixed-use development package being prepared by the city of Lowell and its consultant, the American City Corporation. The bulk of the complex will be used by the private sector.

Spaces in the mill occupied by the Park Service will become a major interpretive center focusing on themes central to the Lowell experience -- the application of technology to production in a factory setting and the living and working patterns of the people who kept the factories running.

Currently identified Park Service exhibits, interpretive programs, and leased spaces will require approximately 120,000 square feet of floor space in the complex. Potential cooperators in the development and use of a portion of this space will include the Preservation Commission, the Lowell Museum Corporation, the Word Works (Museum of Printing and Publishing), and the Northeast Document Conservation Center. In addition, part of this space might be made available for textile artisans' shops, where handcrafted items would be produced and sold to the public.

Sections of the mill complex which are most desirable for Park Service use are buildings 1, 2, and the connector joining them; the countinghouse; and the coal pocket in building 6. Buildings 1 and 2 represent the most historically and visually important parts of the complex, incorporating two

of the four original mills and the clock tower, which has become a symbol of mill architecture in Lowell. If, due to unforeseen circumstances, buildings 1 and 2 are not available for Park Service use, other comparable space will be sought. The countinghouse, located at the entrance to the millyard, will function as a visitor orientation center for the complex and also conta... an exhibit on mill architecture, emphasizing the evolution of the Boott Mill. The coal pocket will be used for maintenance and storage of park-operated trolleys used for visitor transportation.

Additional space in the mill complex may be required to facilitiate expansion of activities identified for buildings 1 and 2. If more space is required, it will be sought in buildings 5 and 7 along the Merrimack River.

Exterior and interior building treatment will preserve the evolutionary character of the mill's architecture. Inappropriate recent alterations to original building fabric will be removed, and missing building details will be restored as needed. Special attention will be given to restoration and preservation of the clock tower. Elevators and restrooms will be constructed in visitor use areas. Such areas will be developed for barrier-free access.

The eastern portion of the main millyard will be restored to its historic appearance and the western portion relandscaped in compatible materials.

H & H Paper Company and Boott Mill Boardinghouse Parking Area. The H & H Paper Company, a substantially altered boardinghouse, will be restored and developed as a cultural center by the Preservation Commission. Space will be provided for Park Service interpretation of boardinghouse themes.

The parking area east of the structure will be developed by the Park Service, in cooperation with the Preservation Commission, as an interpretive area. Archeological remains of the boardinghouse era will be investigated and possibly incorporated into the site development. Wayside exhibits may be developed to tell the story of the boardinghouses that once bordered the Boott Mill complex. The new park site will serve as a viewing area for the Boott Mill complex and as a site for special events and festivals, incorporating an amphitheater for the performing arts.

Wannalancit Mill Complex. The first floor of building 6 of the complex contains seven mechanical hydroturbines that date to the late 19th century. These historic turbines provide the best opportunity for interpreting mechanical hydropower generation and transmission. The turbines may be developed as a static exhibit in place, or one or more turbines may be made operable to power representative examples of textile machinery, using shafts, belts, and pulleys. The proximity of the Tremont Yard enhances the Wannalancit's interpretive value by illustrating the relationship between raceways and turbines.

Remaining space in the Wannalancit Mill complex will be subject to reuse by the private sector. Depending upon the nature of future development proposals for the complex, the Park Service may pursue acquisition of preservation easements on the building facades.

The Tremont Yard, site of the former Tremont Mill, is historically as well as physically closely associated with the neighboring Wannalancit Mill complex. The Tremont Yard will be developed as a park space with archeological and interpretive exhibits on hydropower and mill architecture, a trolley stop, sitting areas, and picnicking areas. This approach will require partial excavation and stabilization of structures and building remains. Landscaping will integrate sitting and picnicking areas, with walkways along the Western Canal to the Merrimack River.

The Department of Environmental Management will acquire the entire millyard by purchasing portions of the site currently owned by the Courier-Citizen Company. Planning and development will be undertaken by the state, with Park Service assistance. Alternatively, the site may be donated to the Park Service for management and development.

Park Service guided and self-guided tours of the historic structures in the area, the Hall Street Agents' House, and Tewksbury Wood Products (a former boardinghouse) will be available.

General Development

A combination of public and private sector development actions will be required to implement the preferred alternative. Actions will be cooperatively undertaken by the city of Lowell, the Massachusetts Department of Environmental Management, the Lowell Historic Preservation Commission, the Park Service, and the private sector. Some development in the preservation district will complement development activities proposed for the park. Each agency or private sector entity will undertake actions most suited to its expertise and capabilities. Overall development activities will focus on preservation and revitalization through adaptive use.

The overall development approach will be phased. The first phases in the downtown area have already been undertaken by the Department of Environmental Management and the Park Service. The Park Service will be primarily responsible for the structures cited in the legislation and a portion of the Boott Mill complex. The Park Service will also provide technical assistance as described in the "Resources Management" section.

Lowell will coordinate private sector development within the park and preservation district. The Chamber of Commerce, business leaders, and merchants working cooperatively with the city of Lowell will either undertake or encourage development projects that are compatible with park objectives. Lowell will continue to have a major role in encouraging commercial and industrial activities, and it will participate in park developments through capital improvements, community development grant programs, public works programs, and various maintenance functions.

The Park Service will undertake a substantial technical assistance support role to agency and private sector interests within the park and preservation district, including preliminary design, preservation, rehabilitation, and landscaping. Park staff will continue to work closely with the city of Lowell and Preservation Commission to preserve building facades.

The Preservation Commission will be directly involved in the preservation and use of the ten structures listed in the park legislation. It will assist in facade preservation through a grant and loan program. The Preservation Commission will reinforce private sector investment through the leasing of space, development of marketing strategies, acquisition of structures with leasing and/or sell-back arrangements, and development of visitor circulation systems such as the trolley system. It will work with the city of Lowell in developing standards and criteria to guide rehabilitation and preservation in the historic preservation district.

Access. Private vehicle access to the park will be via the Lowell Connector from the intersection of I-495 and Massachusetts Route 3. I-495, the "outer beltway" of Boston, connects with major interstate highways I-95, I-93, and I-90. Visitors will be directed by signs (via the proposed Sampson Connector) to parking facilities on Dutton Street that are adjacent to the information/orientation center in the Lowell Manufacturing Company complex. When these nearby spaces are filled, visitors will be directed to a perimeter parking area at the junction of Thorndike Street and the Pawtucket Canal (referred to as Swamp Locks lot).

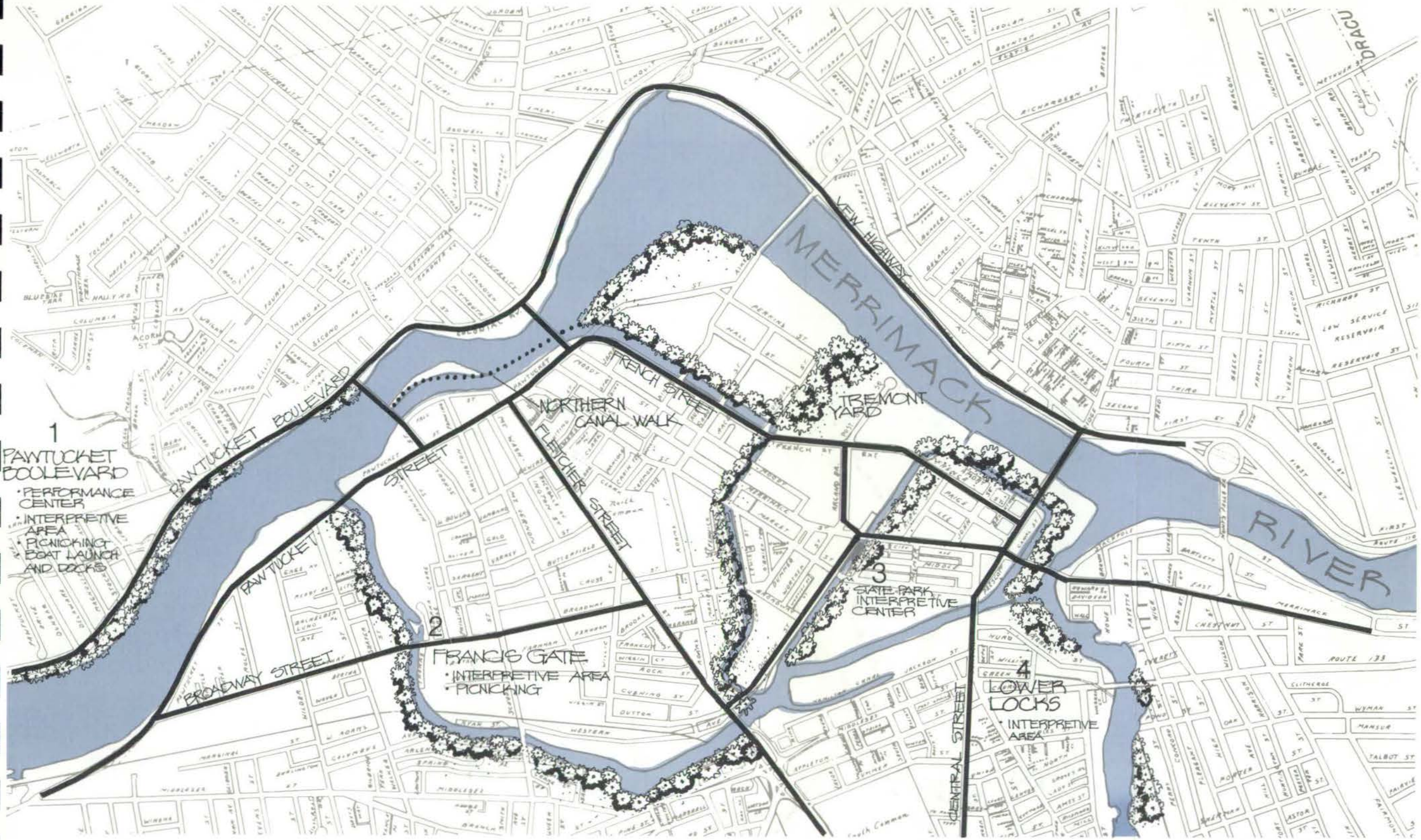
Access to the park by bicycling and walking will be facilitated by a proposed multiple-use bikeway on top of the interceptor sewer that is currently under construction. The Environmental Protection Agency has been working with Lowell, the Northern Middlesex and Merrimack Valley regional planning agencies, and engineering consultants to develop walking and bicycle paths on the surfaces of the interceptor sewers. A trail system will be created to link the canals and downtown Lowell with miles of riverfront, adjoining towns, and recreation and conservation areas.

For park visitors arriving by tour buses, access to the information/orientation center will be the same as for motorists. Visitors will be dropped off at the Dutton Street parking facility, close to the information/orientation center's entrance. Visitors arriving on trains at the transportation terminal will be transported to the information/orientation center by the shuttle buses.

Visitors will also be encouraged to reach the park by bicycling, walking from nearby neighborhoods, and using the bus services of the Lowell Regional Transit Authority. (See the Access, Parking, Circulation map on the inside back cover.)

Parking. Park visitors will be strongly discouraged from using on-street parking spaces. (See Off-Street and On-Street Parking Survey maps.) A visitor parking system will be developed utilizing the Dutton Street-Broadway area. Spaces in the vicinity of Dutton Street and Broadway will provide immediate pedestrian access to the information/orientation center.

Visitor parking will be developed in two phases. The first phase will include NPS development of 160 spaces at the Dutton Street lot and 150



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NATIONAL PARK SERVICE

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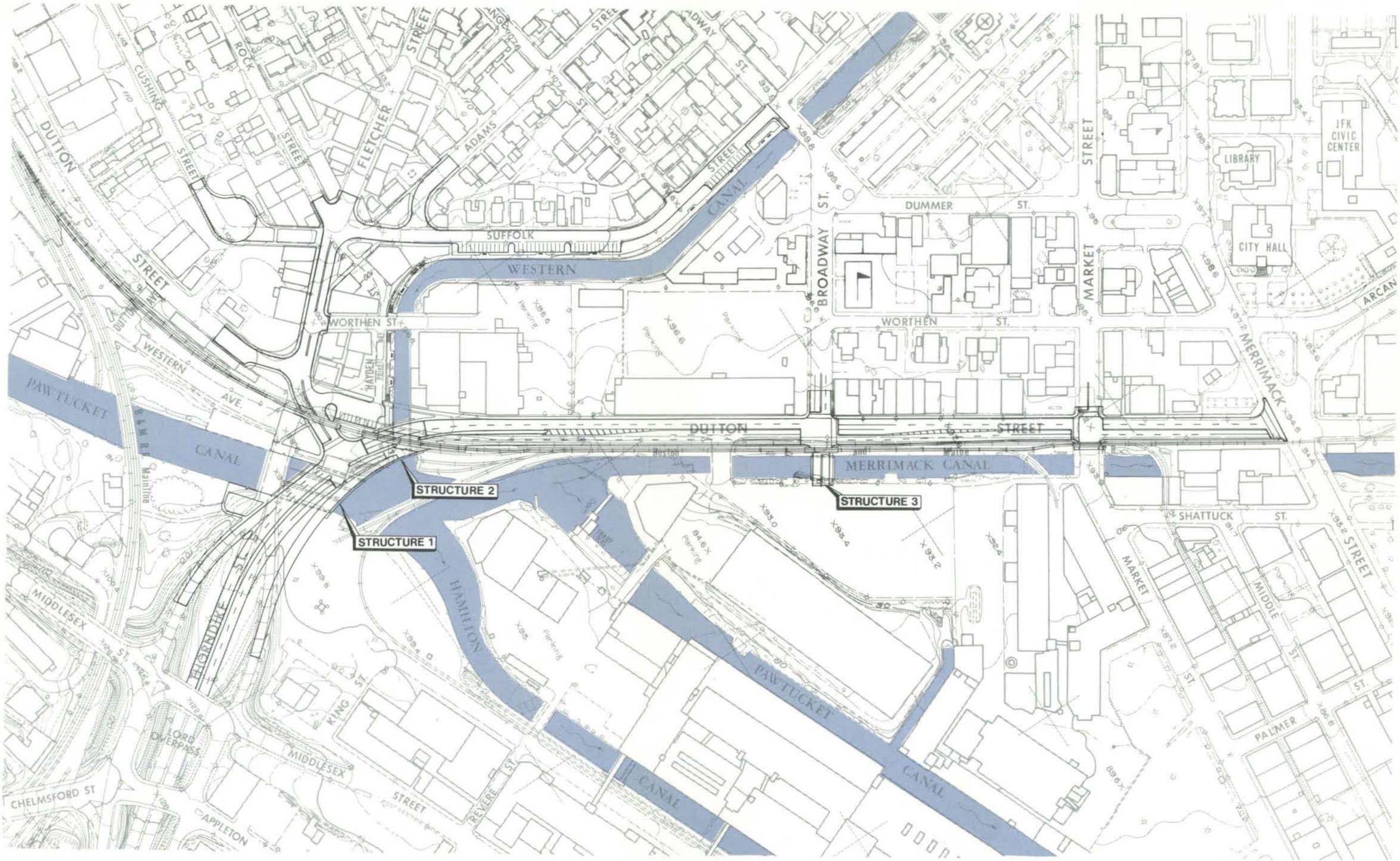
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— MAJOR STREETS
WATERWAYS
PARKLANDS
1·2·3 PARK NODES

LOWELL HERITAGE STATE PARK

LOWELL NHP

ON MICROFILM



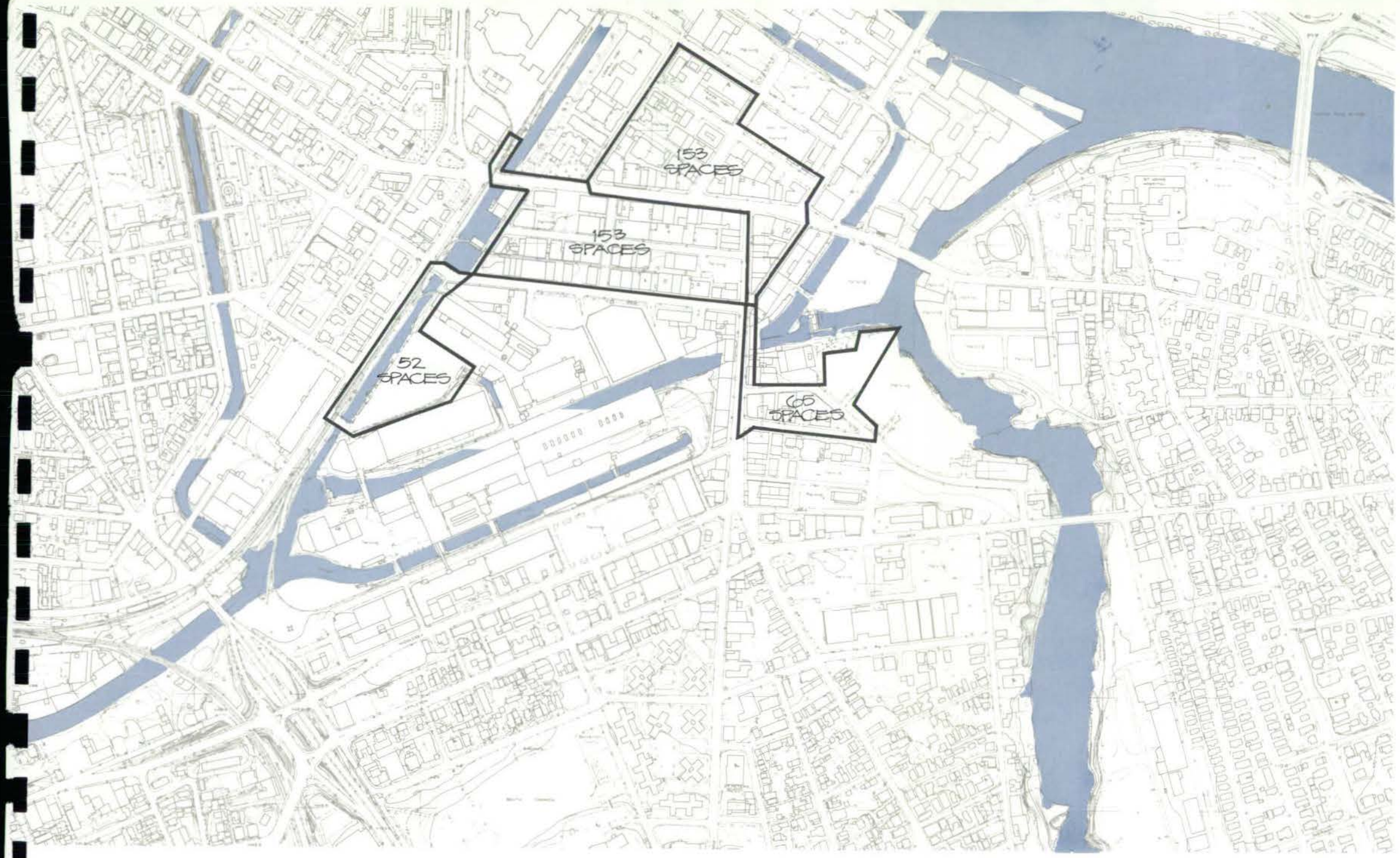
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PROPOSED SAMPSON CONNECTOR

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DOWNTOWN LOWELL
ON-STREET PARKING SURVEY

LOWELL NHP

ON MICROFILM

spaces at the Joan Fabrics Corporation lot near the intersection of Dutton and Broadway streets. The spaces belonging to Joan Fabrics will be leased for approximately six years. The two lots will provide 310 spaces close to the information/orientation center, which will be sufficient for the first four years of park operation. The Park Service proposes eventual acquisition of the Joan Fabrics lot for long-range parking needs.

The second phase of parking developments will involve a cooperative effort that will include the city of Lowell, the Preservation Commission, and the National Park Service to acquire and develop a potential visitor parking area at the Swamp Locks lot. The use of this lot for visitor parking will provide an additional 200 surface parking spaces. The trolley system and a pedestrian walkway will be extended to the site, which will provide access to the information/orientation center.

Projected parking needs following park implementation indicate a requirement for 1,060 spaces. The National Park Service suggests that the Swamp Locks lot be used as a site for a 1,000-vehicle parking garage that could accommodate much of the park's visitor parking needs during peak periods. Development of the garage will be a cooperative effort using a development package supported financially by several government agencies. The city of Lowell and the Preservation Commission should take the lead in planning, design, and development of the garage.

The availability of a parking garage at Swamp Locks with other parking at the Dutton Street lot and possibly at Broadway Street will provide sufficient space to meet most of the projected parking needs for 1990.

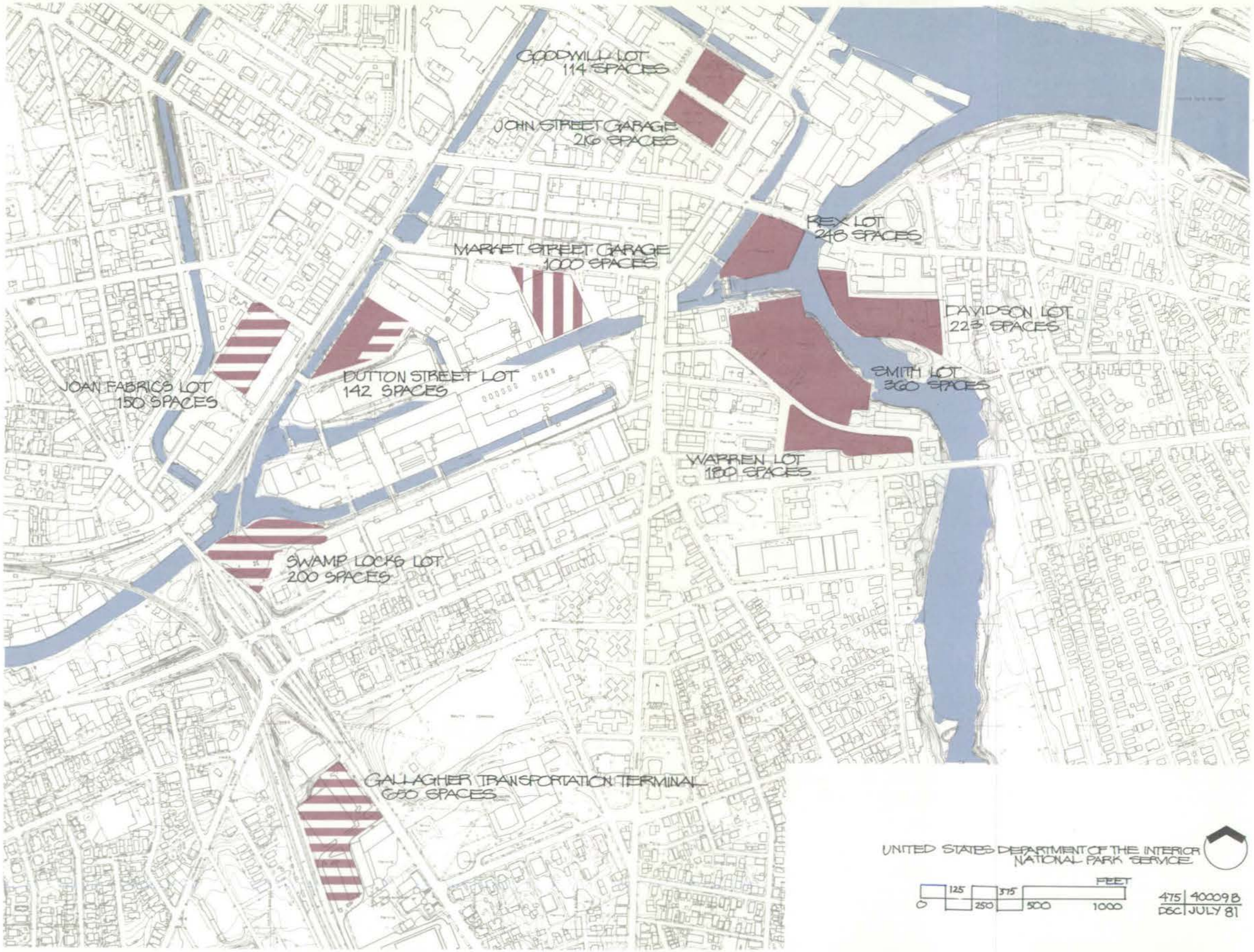
Spaces for 10 buses will be provided at the Joan Fabrics parking lot during phase one, and long-range bus parking may be provided at the Gallagher transportation terminal. Secure bicycle parking will be provided at various park sites.

Circulation. Visitor circulation by private automobile will be strongly discouraged. Visitors parking in outlying areas, and those arriving by rail, will be transported to the information/orientation center by shuttle buses.

Visitors leaving the information/orientation center to visit the primary park sites will travel by trolley, canal boat, bicycle, or on foot within the park area. Shuttle buses will also be available to take visitors to the historical sites away from the downtown area.

A trolley system will connect the information/orientation center, the Wannalancit/Tremont Yards area, the Boott Mill complex, and Swamp Locks area. Existing tracks will be used from the information/orientation center to the Wannalancit/Tremont Yards area, with a spur to Boott Mill. New tracks will be added to existing tracks south of the Curran-Morton Warehouse and continue along the Eastern Canal to the Lower Locks area.

The Park Service will be responsible for operation of the trolley system. Development costs for implementation of the system will be provided by the Preservation Commission.



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NATIONAL PARK SERVICE

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EXISTING
PROPOSED
UNDER CONSTRUCTION
SOURCE: NORTHERN MIDDLESEX AREA COMMISSION

ON MICROFILM

DOWNTOWN LOWELL OFF-STREET PARKING SURVEY

LOWELL NHP

Because distances within the park core area are not great, visitors will be encouraged to visit individual sites on foot, using self-guided materials and participating in interpretive tours led by park interpreters. Primary and secondary walking routes will be suggested.

In addition to interpretation, the canal system will serve as a visitor circulation system. Canal boat transportation will enable visitors to gain a better understanding of how the rivers and canals served Lowell, to see many of Lowell's historic sites, and to circulate in the park by some means other than their cars.

Persons wishing to use bicycles to visit park sites will be provided with maps indicating local streets and other usable rights-of-way, and also the location of secure bicycle parking fixtures or lockers. A bike route will be developed that follows the canal system as closely as possible.

Canal System Development. The development of Lowell's 5.6-mile canal system and its associated structures will involve the cooperative efforts of four organizations: Proprietors of the Locks and Canals on the Merrimack River (Locks and Canals), the Massachusetts Department of Environmental Management, the National Park Service, and the city of Lowell. A multiple use concept will guide joint management of these resources, with hydropower, transportation, and recreational uses blended in a compatible manner. A cooperative agreement defines the management responsibilities of each of the agencies. In many areas the lead agency will receive operational assistance from the other parties to the agreement.

Locks and Canals will be responsible for maintenance of the Pawtucket Dam, maintenance and operation of existing hydroelectric facilities, and maintenance and operation of all mechanical waterflow control equipment in canal gatehouses. The Department of Environmental Management has agreed to be the lead agency in the acquisition, development, and much of the maintenance of major elements of the Lowell canal system. Development projects to be initiated include renovation of structures, improvements to canals, and installation of interpretive displays and signing. Maintenance will include all canal structural components (canal banks and walls, locks, and associated mechanical equipment), all canal-related structures, and canal-related recreation land (hiking and biking paths). Maintenance of the canals will require the dredging and removal of debris as well as the removal of encroaching vegetation.

The primary role of the National Park Service will include the development of two interim barge landings, the long-term maintenance of all barge landings and the terminals, the acquisition (with assistance from the Preservation Commission) of canal boats, the provision of interpretive services to park visitors riding on canal boats, and boat maintenance. Because the canals are closely associated with municipal functions, the city of Lowell will be involved in all aspects of canal development. The city will be directly involved in the development of funding strategies for the maintenance and alterations of bridges.

The canal system will be developed in three phases. Phase one will include canal boats on the Northern, Pawtucket, and Merrimack canals and possibly on the Hamilton Canal. Phase two will add the lower

Pawtucket Canal between the Swamp Locks and the old police station on Market Street (including restoration of Swamp Locks). Phase three will add the lower Pawtucket Canal beyond the Lower Locks (including removal of structures on Central Street and restoration of the Lower Locks) and the Western Canal. Full implementation of the canal barge system depends upon some combination of the raising or removing of obstacles such as bridges, pipes, and conduits and the lowering of the canal water levels.

Streetscape Development. In the downtown park zone, the street scene will reflect the historical character of Lowell, while providing a pleasant and inviting outdoor space for pedestrians.

Historically, many of Lowell streets were tree-lined and paved with cobblestones; sidewalks were often brick and granite block with granite curbing; and ornamental gaslight standards provided lighting. Wherever appropriate, similar elements (brick and granite sidewalks, granite curbing, cobblestones, extensive tree planting, and ornamental gaslight standards) will be used. (See the Downtown Park Development Plan map on the inside back cover.)

Park visitors will leave the information/orientation center at Lowell Manufacturing Company complex, cross Market Street, and proceed north up Shattuck Street. Pedestrian/auto conflicts at Market Street will be minimized by a safe method, which may include a pedestrian-operated signal. A pedestrian crosswalk at Market Street will be marked and delineated on each side.

The sidewalks along Merrimack Street, from Kirk to Dutton streets, will be widened, and parking will be eliminated. The two traffic lanes will allow for more efficient traffic flow because of reduced parking and turning movements. Kirk Street will be closed to traffic from Lee Street to French Street. This auto-free area will be landscaped with trees, period light standards, and brick sidewalks.

The section of Dutton Street that extends beyond Merrimack Street to the Yorick Club and the Masonic Temple, which is currently used as a parking area, will be closed and converted into a pedestrian area. The Dutton Street-Merrimack Street-Arcand Drive intersection and the pedestrian spaces surrounding it should be redesigned to allow for proper vehicular and pedestrian flow. Streetscape elements will include brick paving, trees, and benches.

Pedestrians may go from the Old City Hall area to the Wannalancit Mill complex along the northern side of Merrimack Street, then north along the Western Canal to the French Street Extension. Another option will be for visitors to walk along Kirk Street to the Kirk Street Agents' House and the Boott Mill complex. A pedestrian walkway will be developed along French Street from the Boott Mill complex to the Wannalancit Mill complex. These routes will be marked by brick sidewalks, trees, and ornamental light standards.

Park Maintenance Site. The National Park Service will acquire a warehouse owned by the Albert Notini Company for park maintenance

operations and boat storage. The single-story building, constructed of concrete block with brick veneer, contains 20,700 square feet of floor space.

LAND ACQUISITION

The land acquisition authorities of the Lowell National Historical Park are defined in section 202 of the act (PL 95-290) authorizing establishment of the park. The key aspects of these authorities are as follows:

The National Park Service may acquire by donation, exchange, purchase (with donated or appropriated funds), or condemnation the Old City Hall, the Merrimack Gatehouse, the Wannalancit Mill complex, the Jade Pagoda and Solomon's Yard Goods, and the H & H Paper Company. The park is authorized to acquire the Linus Child House (Kirk Street Agents' House) by donation only.

Property or interest owned by the commonwealth of Massachusetts or any political subdivision thereof may be acquired only by donation. Condemnation may be used to acquire privately owned structures only after seeking a negotiated purchase. The Lowell Historic Preservation Commission and the Lowell City Council must be consulted in instances where condemnation is considered.

The park may acquire easements within its boundary on the basis of the authorities and restrictions stated above.

To date the Park Service has acquired the following properties:

Kirk Street Agents' House. This property was previously owned by the city of Lowell. The structure and appurtenant lands were donated to the park in 1979.

Jade Pagoda and Solomon's Yard Goods. Both properties were purchased in fee by the Park Service in 1979.

Old City Hall. This property was acquired in fee in the spring of 1980.

Other properties authorized for Park Service acquisition include:

Merrimack Gatehouse. Negotiations for fee purchase of the gatehouse from a private corporation will be undertaken.

Wannalancit Mill. This mill complex will not be acquired for Park Service use and development. However, the Park Service will seek to obtain use of the first floor of building 6 (the "turbine room") for interpretive purposes. It is expected that this will be accomplished through a lease, cooperative agreement, or some other mechanism agreeable to the owner of the complex. Depending on the nature of future development proposals for the complex, the Park Service may pursue acquisition of preservation easements on the building facades.

H & H Paper Company. This building will not be acquired for Park Service use and development. However, the Lowell Historic Preservation Commission does intend to acquire this property for purposes of restoring the original architectural features of the former boardinghouse, and developing a cultural center and associated exhibits within the structure.

Proposed Land Acquisitions Not Listed in the Legislation

The following five areas are proposed for NPS acquisition that are not listed in PL 95-290:

Boott Mill. This mill complex is in private ownership and currently houses a variety of light industrial uses. Cooperative joint development involving private industry, the city of Lowell, the Preservation Commission, and the Park Service appears to be the most feasible approach to preserving and rehabilitating this mill complex. A legislative amendment to section 202 of PL 95-290 will be required to enable direct Park Service purchase of a portion of the mill complex and millyard.

Boott Mill Boardinghouse Park. This area once contained boardinghouses associcated with the Boott Mill and will be developed as a park unit in direct association with the adjacent boardinghouse. Acquisition of this area will be a coordinated effort between the Park Service and the Preservation Commission.

Notini Property. This 3.1-acre property is proposed for purchase by the Park Service for use as the park maintenance facility. The building, located at 220 Aiken Street, is a single-story structure containing 20,700 square feet of floor space, which will be adequate space for maintenance operations and boat storage. This property is currently under lease by the Park Service for these purposes.

Dutton Street Parking Lot. This property, adjacent to the Lowel Manufacturing company complex, is currently owned by the commonwealth of Massachusetts and will be donated to the Park Service. The Park Service will develop the site as a visitor parking area.

Tremont Yard. This property, adjacent to the Wannalancit Mill complex, is currently owned by the Massachusetts Department of Environmental Management and the Courier Citizen Company. The plan proposes that the site be acquired by the state and the DEM and NPS develop the site as an interpretive park. The Park Service will not accept ownership and management responsibilities for the Tremont Yard site if the DEM chooses to donate the land.

BOUNDARY CHANGES

The National Park Service proposes to add six areas to the existing park boundary. These boundary additions do not require legislative amendments, but any changes will require consultation with the

Preservation Commission, the Lowell City Manager, timely notice in writing to Congress, and publication of the revised boundary description in the Federal Register. In addition to the Tremont Yard and the parking lot near H & H Paper Company described above, the following properties will be added to the park boundary.

The Joan Fabrics Corporation parking lot, located on Broadway Street to the east of the Macheras property, will be used for short-term visitor parking.

The downtown park zone will be expanded to include the area bounded by Market, Palmer, and Merrimack streets. This expansion will facilitiate the park's capabilities in preservation and rehabilitation of the downtown area.

The Lawrence Canal spur will be a technical addition to the park. It is part of the original canal system; however, it was inadvertently overlooked in the establishing legislation.

The Swamp Locks visitor parking area will be included within the park boundary. This addition is required so that the National Park Service can develop the site as a peripheral parking area.

ENERGY PROGRAM

Each of the park's structures, with the exception of the maintenance building, has been studied to determine its potential for energy conservation and renewable energy systems.

In all structures where alternative and innovative energy proposals are implemented, a description of the energy conservation techniques, systems, and economic implications will be available to inform visitors of the energy saving procedures.

At Old City Hall, energy will be conserved by double-glazing and weatherstripping all windows. Insulation will be installed in the attic roof (R-38) and exterior walls (R-11). Energy for Old City Hall will be provided by an oil-fired boiler and a solar energy system. Site-built solar collector panels (1,600 sq. ft.) will be installed on the roof of the adjacent Bascom Block.

At the information/orientation center in the park's Lowell Manufacturing Company complex, all windows will be the high-quality, low-infiltration type, which will be double-glazed and weatherstripped.

New, double-glazed wood sashes will be installed in the windows in NPS areas of the Boott Mill complex. Upper sashes will be fixed and caulked; lower sashes will remain operable. The roofs and top two floors of north-facing walls in NPS areas will be insulated to R-19 in roofs and R-11 in walls. Several heating methods for the Boott Mill complex will be evaluated during the planning process. These methods included use of solid waste energy, solar, hydropower, and wind energy. A determination of the specific system will not be made until a development

package is formalized for the mill complex and specific uses are determined.

At the Kirk Street Agents' House interior storm windows will be installed and weatherstripped. On the north unit, the folding interior shutters will be rehabilitated so that when they are shut (approximately 14 hours per day in winter), little air will leak from the windows. Exterior walls may be insulated with blown-in insulation or fiberglass insulation. In the basement, finished stud walls will be constructed to contain 3 inches of fiberglass roll or batt insulation. Steam heat will be supplied to the premises from the Lowell High School generating plant.

At the Merrimack Gatehouse, natural or low-energy ventilation actions are recommended to keep this building comfortable during the summer. Since minimal winter use of the gatehouse is proposed, energy conservation measures to reduce heat loss will not be required.

IMPACTS

Cultural Resources

In general, the Park Service, in cooperation with other agencies, will significantly enhance the cultural environment by maintaining and preserving what exists today. Structures that the Park Service is directly concerned with will be preserved, restored or rehabilitated, and secured, and existing deterioration will be arrested. Other historic structures within the park or preservation district boundaries will be eligible for technical assistance from park staff and for possible grants for facade improvements. In addition to structures within the park and preservation district, other significant structures will be eligible for technical assistance.

Modifications to structures may be divided into two general categories--restoration and rehabilitation/adaptive use. Before any restoration of Park Service owned and related structures is undertaken, their histories will be thoroughly researched, both in terms of use and materials. Restoration will then be accomplished using the best available techniques and materials, and it will be as authentic and accurate as possible. Restored structures will be modified to provide barrier-free access to the extent feasible, modern and more efficient heating and ventilating systems, and appropriate security systems.

Rehabilitation/adaptive use of structures will involve the modification of a structure's historic fabric to accommodate new uses. Adaptively used structures will have less historical authenticity than in restored structures. Modifications may include new utility and support systems, use of new materials, and redesigned interior spaces. Facades will be rehabilitated on all Park Service structures to the greatest extent possible.

The implementation of this proposal will be most noticeable in the upgrading and rehabilitation of structures, the canal banks, and the streetscape, and in the removal of incompatible structures.

The canal banks are constructed of granite blocks carefully placed to retain the earth from entering the canals and the water from escaping. These canal banks were originally free of any vegetation so that work near the canal would not be hampered; vegetation would also severely undermine the strength of the canal walls. Recently scrub vegetation and "weed" trees as large as 12 inches in diameter have overgrown the banks of the entire canal system. Removal of most canal vegetation will prevent severe damage to the canal banks and walks from tree roots and will arrest further deterioration. This will alter the present appearance of the canal system while creating a more historical scene.

The removal of the Jade Pagoda and Solomon's Yard Goods on Merrimack Street will alter the visual character of the street. However, the visual impacts will not be significant because the existing structures bear no resemblance to the four-story commercial structures that occupied the site prior to 1960. The removal of the existing structures will enhance the appearance of the architecturally significant structures on both sides of them. Designs for a park at this site will use elements such as walls, bollards, and planting materials to create a visually unified streetscape.

The preservation and protection of archeological resources will be based on historic preservation laws, National Park Service preservation guidelines and management policies, and other professional standards. All archeological investigations will be conducted by a professional archeologist. Archeological investigations at the Tremont Yard, Boott Mill boardinghouse parking lot, Kirk Street Agents' House parking lot, Jade Pagoda and Solomon's, alley behind Old City Hall, Dutton Street parking area, and the east millyard at the Boott Mill, may destroy archeological data by disturbing the resource. These impacts will be mitigated by careful documentation of the resources during excavation and by the retrieval of information.

To further increase the resource information base, a systematic program of subsurface testing will be initiated. This information will then be used to develop a plan for the preservation and interpretation of the archeological resources. Where archeological resources will not be excavated, they will be stabilized and protected. Other areas of potential importance for the recovery of significant cultural deposits have been identified in the "Archeological Resources Study" (USDI, NPS 1979a).

The effects of vegetation on cultural resources will be monitored on a continuing basis; vegetation will be removed in areas where it is harming a resource. In areas where development will disturb archeological resources, all actions will be designed to minimize adverse effect. All archeological excavations will be programmed well in advance of construction.

As for properties within the park that are not owned by the Park Service, every endeavor will be made by the Park Service to assist landowners in identifying potential archeological resources and to advise them on the value of preserving these resources. If Park Service actions affect archeological resources on these properties, procedures for compliance with section 106 of the National Historic Preservation Act of 1966 will be followed.

A sensitivity to archeological resources will be maintained for all development and maintenance activities within the park by directly involving park and regional cultural resource personnel in the planning stages of all projects affecting cultural resources. Park personnel and Lowell residents will also be educated about the importance of archeological resources and the need for their protection.

The cataloging and storing of artifacts by the Park Service, in cooperation with the Preservation Commission, the city of Lowell, the University of Lowell, and the Department of Environmental Management will ensure their preservation for future research and interpretation.

The National Park Service and Preservation Commission have coordinated with the Massachusetts State Historic Preservation Office and National Advisory Council throughout the planning process. Compliance procedures have been formulated that address the basic approach of rehabilitation and adaptive use that will be pursued within the park and preservation district. A memorandum of agreement has been developed between the National Park Service, the state historic preservation officer, and the Advisory Council.

Urban Environment

Local Economy. The overall impacts of the establishment of Lowell National Historical Park and Lowell Historic Preservation Commission are already being felt in the city of Lowell and the surrounding region. The revival of interest in Lowell's history and culture in the mid-1970s, culminating in the establishment of the park and the historic preservation district in June 1978, have combined with the current trends in Lowell's economy to create a very positive economic outlook for Lowell. (See discussion of economy under the "Urban Environment" section; for a more detailed discussion of economic impacts, see Lowell National Historical Park, Economic Analysis, Gross, et al. 1979).

The implementation of the preferred alternative for the park will significantly improve the urban environment and economy of Lowell. As compared to the overall economic growth that is already taking place in Lowell and the region, this alternative appears to have less impact.

However, park development will accelerate growth in Lowell and the surrounding region. It is also clear that the general economic climate in Lowell will be enhanced significantly by proposed park development. Development costs for the preferred alternative are shown in table 12.

Acquisition of property within the park will cause a loss of tax revenue to the city of Lowell. However, land acquisition by the Park Service will be kept to a minimum, and tax losses will be mitigated by the tax revenues that will be realized by secondary private development, visitor-oriented retail activity, and intensive adjacent land use.

The most noticeable impact of the national park on Lowell will be the projected 700,000 to 1,000,000 visitors per year. The characteristics of park visitors can be projected from studies by Zube (1976) of six national

historical theme parks and from studies by Brydon-Miller (1979), Gilmartin (1977), and Parker (1978) of Old Sturbridge Village in Massachusetts. These demographic and behavioral characteristics are summarized in tables 13 and 14.

The studies indicate an equal number of males and females can be expected to visit the park. Only 20 percent of the visitors will be children or teenagers needing adult supervision, not counting the possibility of large numbers of school-sponsored trips. A very large portion of visitors will have a college education and professional, managerial, or highly skilled occupations. Visitors typically will go to at least one National Park System area a year; however, as many as 60 percent will be visiting this park for the first time.

Relatively few visitors will reside in greater Lowell, and over half will be farther than 300 miles from home. Visitor groups will tend to be composed of a few close friends or relatives, and most groups will be couples. Most visitors will be vacationing away from home, therefore lodging in hotels or campgrounds; relatively few visitors will be staying with friends or relatives. Some visitors will be tourists passing through to another destination or on day trips from nearby areas where they are vacationing. The size of this latter group is difficult to project. It may follow the pattern at other national historical theme parks and be relatively small; however, it may be quite large if the park attracts day-trippers from Boston and the vacation areas along the coast. Most visitors will spend three to five hours in the park.

Table 12. National Park Service Development Schedule
Ten-Year Program

Development Phase	Cost in 1980 Dollars[a]	
	Project Planning	Construction
Phase 1		
Lowell Manufacturing Company information/orientation center	$235,000	$1,500,000[b]
Jade Pagoda & Solomon's Yard Goods/ Old City Hall Park	51,000	350,000
Old City Hall	546,000	2,132,900
Merrimack Gatehouse	31,500	148,300
Northern & Pawtucket Canal Locks[c]	141,000	--
Barge Terminal (1)	18,750	125,000
Dutton Street Parking Lot	35,000	550,000
Maintenance Building (Notini Property)	168,600	500,000
Boott Mill Complex	230,510	1,469,644
Phase 2		
Gallagher Transportation Terminal	--	--
Swamp Locks Parking Area	35,000	500,000
Kirk Street Agents' House	150,000	558,400
Wannalancit Textile Mill Complex	28,000	172,000
Downtown Streetscape	146,300	975,000
Barge Terminals (1)	18,750	125,000
Boott Mill Boardinghouse Park	85,000	600,000
Tremont Yard/Interpretive Area	52,500	350,000
Boott Mill Complex	153,674	2,057,501
Phase 3		
Boott Mill Complex		2,351,430
Barge Landing (1)	15,000	100,000
Downtown Streetscape	48,800	325,000
TOTALS	$2,190,384	$14,890,175

[a]The cost figures are subject to annual congressional appropriations.

[b]The cost estimates are preliminary and are subject to revision.

[c]Northern and Pawtucket Canal Lock restoration will be undertaken by the Massachusetts Department of Environmental Management.

Table 13. Visitors' Social Demographics (in percentages)

Visitor Study	Sex		Age[a]			Education[b]				Total Respondents[c]
	Male	Female	Child	Youth	Adult	8th	H.S.	Col.	Grad.	
Old Sturbridge Village										
1977	49.2	50.8								238
1978						9.3	18.17	48.3	23.6	329
1979										153
Historical National Parks										
Bandelier	48.7	51.3	3.9	19.6	76.5	8.1	31.8	33.1	27.0	163
Fort Raleigh	51.1	48.9	8.6	10.0	81.4	9.8	25.0	40.9	24.3	152
Gettysburg	56.8	43.2	2.2	8.7	89.1	3.1	29.1	44.4	23.3	250
Pettersburg	60.8	39.2	5.6	7.6	86.8	11.3	33.3	39.7	15.6	153
Scotts Bluff	44.2	55.8	8.3	31.9	59.7	21.7	33.3	29.7	15.2	154
Wright Brothers	48.8	51.2	8.6	15.3	76.1	12.9	35.1	35.7	16.3	376
Mean (x)	51.7	48.3	6.2	15.5	78.3	11.2	31.3	37.3	20.3	--
All National Parks										
Cape Cod	48.4	51.6	3.9	11.9	84.2	8.8	27.1	40.1	24.0	400
Great Falls	46.2	53.8	8.1	21.0	71.0	9.9	24.0	39.2	26.9	199
Olympic	50.2	49.8	4.1	10.6	85.3	6.4	19.7	37.8	36.1	256
Rocky Mt. - Alpine	59.0	41.0	3.3	10.4	86.3	7.1	23.5	42.7	26.6	353
Rocky Mt. - Headquarters	49.0	51.0	6.2	14.0	79.8	9.2	24.8	35.7	30.3	259
Yosemite	51.9	48.1	5.2	13.4	81.4	10.7	23.8	41.2	24.4	350
Mean (x)	51.4	48.6	5.4	13.8	80.8	9.5	27.1	38.9	24.5	--

SOURCE: Meir Gross, et al., Lowell National Historical Park Economic Analysis (Amherst: Environment and Behavior Research Center and National Park Service Cooperative Research Unit, University of Massachusetts, 1979).

[a] A child is under 13 years old; a youth is between 13 to 18 years old; and an adult is over 18 years old.

[b] 8th is an education up to 8th grade; H.S. is 9th through high school diploma; Col. is some college or a Bachelors degree; Grad. is some graduate school.

[c] The total number of respondents; missing responses are rarely greater than 10 percent.

Table 14. Visitors' Economic Demographics (in percentages)

	Income (x $1,000)					Occupation[a]							
Visitor Study	Under 10	10-19	20-29	30-39	Over 40	Not In	Craft	Const.	Oper.	Farm	Prof.	Clerk	Other
Old Sturbridge Village													
1977													
1978													
1979	6.3	19.0	27.5	27.5	19.7								
Historical National Parks													
Bandelier						50.3	1.3	--	1.3	--	33.8	7.3	6.0
Fort Raleigh						28.5	6.6	4.4	2.2	1.5	35.8	13.1	8.0
Gettysburg						35.2	4.2	2.1	1.7	2.5	36.9	12.3	5.1
Pettersburg						46.6	6.8	6.8	4.7	--	28.4	4.1	2.7
Scotts Bluff						58.7	3.5	2.1	--	--	29.4	4.9	1.4
Wright Brothers						43.7	1.8	2.7	2.1	0.6	32.4	11.8	5.0
Mean (x)						43.8	4.0	3.0	2.0	0.7	34.6	8.9	4.7
All National Parks													
Cape Cod						36.1	4.4	0.6	1.7	0.3	39.1	13.8	4.1
Great Falls						52.7	1.6	--	1.1	0.5	32.8	6.5	4.8
Olympic						41.6	2.9	2.5	.4	2.5	39.5	5.8	4.9
Rocky Mt. - Alpine						31.6	6.0	2.4	1.8	1.8	46.7	7.8	1.8
Rocky Mt. - Headquarters						45.3	2.0	3.3	--	0.4	35.9	9.0	4.1

SOURCE: Meir Gross, et al., Lowell National Historical Park Economic Analysis (Amherst: Environment and Behavior Research Center and National Park Service Cooperative Research Unit, University of Massachusetts, 1979).

[a]Not in labor force includes armed forces, homemakers, retired people and students; Craft is skilled craftspeople and non-farm foremen; Const. is construction workers and non-farm laborers; Oper. is equipment and mining operators; Farm is laborers, foremen, managers and owners of farms, ranches, forests and related activities; Prof. is professionals, technical workers, managers, proprietors, and administrators; Clerk is retail and wholesale sales people, clerical and secretarial workers; and Other is personal, household, or other occupations.

If the pattern established at previously studied National Park System historical areas is followed (according to unpublished surveys by Zube, Crystal, and Palmer as part of a study prepared for the Denver Service Center, National Park Service, Visitor Center Design Evaluation, April 1976), then 34.5 percent of the visitors will stay in hotels, 34.5 percent in campgrounds, 15 percent with friends or relatives, and 16 percent will be passing through or will be on day trips. These figures must be adjusted for visitation patterns characteristic of more urbanized areas. For the preferred alternative, 40 percent of the visitors are expected to stay in hotels, 10 percent in campgrounds, 15 percent with friends or relatives, and 35 percent on day trips.

Anticipated expenditures by visitors in 1978 dollars are projected from average figures for Massachusetts, which were adjusted for use in Middlesex County. These visitor-day expenditures are calculated from an input/output model developed by Cournoyer and Kindahl of the University of Massachusetts. Table 15 illustrates the average daily expenditures for visitors in Middlesex County by type of visitor lodging.

The preferred alternative will produce an anticipated $31 million per year in direct expediture (see table 16). Most of the dollar gains will be in the lodging, eating and drinking, and liquor store sector of the economy. A conservative multiplier for indirect and induced expenditures due to tourist-based income suggests that in 1990 the total economic impact under the preferred alternative will be $40 million per year. Visitor expenditures will compose approximately 4 percent of Lowell's present expenditures on goods and services. This amount will make tourism one of the more important sources of income for greater Lowell.

A variety of other impacts are associated with the development of the park. The preferred alternative will create the equivalent of approximately 1,200 new "equalized" full-time jobs. Most of these jobs will be seasonal because of the concentration of visitors during the warmer months of the year. These jobs will be primarily in the service sector.

Another impact involves the park's passive role as a catalyst for private investment. Lowell is becoming an attractive address, in part from the presence of the park, and this is a psychological benefit when Lowell is marketed for industrial and commercial purposes. It provides one more boost for Lowell's growing economy. In addition, the park will provide a focus for improved cultural experiences that will be afforded local residents.

Other impacts associated with the park's development will be conflicts with the "normal" operation of Lowell's central business district. Some change seems to be inevitable because of pressures from nearby shopping centers. However, the park may create pressures for more tourist-oriented businesses, undermining resident-oriented businesses. Such retail developments are often disliked because they do not serve community needs (e.g., groceries, medicines, and hardware).

Although NPS development will be kept to a limited number of specific sites, there will be some loss of commercial space and the relocation of existing businesses.

Table 15. Average Daily Expenditures for Visitors in Middlesex County by Type of Visitor Lodging

	EXPENDITURE TYPE								
Lodging Type	Lodging	Drinking	Eating & Grocery	Stores	Liquor Station	Gas Transit	Local Public Amusement	Miscel-laneous	TOTALS
Hotel or Motel	$19.05	$14.98	$ .83	$ .71	$3.35	$1.97	$1.67	$6.93	$49.49
Campground	2.12	3.55	1.86	.45	2.38	.45	1.06	2.97	14.84
Friends or Relatives	.12	5.08	1.65	1.43	2.70	.97	.75	6.44	19.14
Day Trip Passing Through	.82	5.66	.63	2.59	2.01	1.79	.99	4.82	19.31

SOURCE: Cournoyer, N.G., and Kindahl, J.K. Travel and Tourism in Massachusetts, 1978: An Economic Analysis. Amherst: Department of Hotel, Restaurant, and Travel, University of Massachusetts.

NOTE: All amounts are in 1978 dollars.

Table 16. Visitor Expenditures -- 1990, Alternative 1
EXPENDITURES (x $1,000)

Lodging Type	No. of Visitors	Lodging	Eating & Drinking	Grocery	Liquor Stores	Gas Station	Public Transit	Local Amusement	Miscel-laneous	TOTALS
Hotel or Motel	400,000	7,620	5,992	332	284	1,340	788	668	2,772	19,796
Campground	100,000	212	355	186	45	238	45	106	297	1,484
Friends or Relatives	150,000	18	762	248	215	405	146	113	966	2,873
Day trip or Passing Through	350,000	287	1,981	221	907	704	627	347	1,687	6,761
TOTALS		8,137	9,090	987	1,451	2,687	1,606	1,234	5,722	30,914

NOTE: All estimates are in 1978 dollars.

The removal of the Jade Pagoda and Solomon's Yard Goods on Merrimack Street and the acquisition of Old City Hall will eliminate commercial space. This can be mitigated by providing relocation assistance for these commercial enterprises to nearby, vacant first-floor downtown space and by the new revenues to Lowell resulting from park development. In the same manner, tenants displaced by Park Service acquisition of a portion of the Boott Mill complex will be encouraged to relocate within the city of Lowell. The National Park Service will provide relocation assistance to all affected parties.

Any projection of economic impact must involve a substantial measure of uncertainty, particularly where other overpowering influences such as the recent industrial growth in greater Lowell are present. As previously mentioned, most of the economic impact has taken place, and the present economic growth will continue independently of park actions. Changes in the businesses in and around the park can be guided through the use of traditional planning tools, including rent subsidies, "percentage of profit" rental agreements, tax abatements, and resettlement assistance. In large measure the park must rely on cooperation from Lowell and the Preservation Commission to implement these tools.

Another impact may come from the relocation of neighborhood residents as property values escalate. It is possible that existing residents will be replaced by middle- and upper-income families. This situation will be mitigated in part by increasing incomes associated with industrial development. Remaining impacts will be mitigated by a cooperative effort of the park, the Preservation Commission, and Lowell to develop a system to monitor the economic, demographic, and social influences at work in Lowell. This system could detect neighborhood changes and suggest regulations, investments, or planning to avert any undesirable development patterns. Even with these mitigating measures, the neighborhoods of Lowell will continue to evolve as land values, demographic characteristics, and housing demand change.

National Park Service development of the Boott Mill boardinghouse parking lot and the Dutton Street parking lot will have the impact of eliminating 110 and 140 existing parking spaces respectively. The Boott Mill boardinghouse parking lot is currently used by the tenants of the Boott Mill for employee parking. The Dutton Street parking lot is utilized primarily by employees in the downtown area.

The loss of these 250 parking spaces will be mitigated by the 1,000-car Market Street garage and a proposed 1,000-car garage on the site of the "Goodwill Lot" and the John Street garage.

An impact of the ten-year projected visitation in Lowell is that the demand for lodging in Lowell will greatly increase. The three motels in the immediate Lowell area are used to capacity and the current demand is sufficient for one proposed hotel project to be financed and another proposed hotel to be in the formative stages. The limited lodging availability will result in more difficulty in finding lodging in the greater Lowell and greater Boston areas.

Streetscape Development. The streetscape treatment of downtown Lowell and other park-related areas overall will enhance Lowell for public use and enjoyment. The closing or modification of Kirk Street to general traffic will greatly facilitate pedestrian circulation. Visitors, shoppers, and business people should be able to find walking and sitting in these areas a safer and more enjoyable experience. These improvements will also be an incentive to neighborhoods adjacent to the central area to fix up and enhance their areas.

During the peak visitor months, visitor and traffic conflicts may occur on Shattuck Street. A large percentage of visitors (an estimated 5,000 on peak days) are expected to walk from the Market Mills information/orientation center to the Mack Building, City Hall, and the general Merrimack Street vicinity. It is hoped that if conflict develops, the city will work with the Park Service to close Shattuck Street to general traffic during the months of peak visitation. Before any street may be closed, a traffic analysis must be conducted to determine feasible alternative routes. The selected rerouting must minimize air, congestion, and noise impacts.

An impact of the park streetscape treatment will be the modification of the existing environment. The combination of period light standards, auto-restricted zones, and new sidewalk paving, along with 20th-century commercial establishments and vehicles, will reflect a contemporary environment with a historic ambience.

Park Staffing and Operations. The economic impacts attributable to park staffing and operations will be small in comparison to the regional economy (the following analysis of this impact is adopted from a study of economic impacts attributable to the University of Lowell; see Dery, Downey, and McDonough 1979). The projected 1990 park budget for the preferred alternative is presented in table 17. The park budget will be approximately $5 million per year. The anticipated number of park employees will increase from the present staff of 50 to 200, and the park budget will be evenly divided between payroll and operations. The addition of 150 employees will increase the Lowell's labor force by only 0.5 percent, and the increase for the greater Lowell region will be less than 0.2 percent.

Of the $2.5 million projected for the park's payroll under the preferred alternative, about 33 percent ($850,000) will be spent in the city of Lowell, and 52 percent ($1.3 million) will be spent in the greater Lowell area. The expected geographical distribution of the park operations budget will be approximately $1.7 million in Lowell and $1.8 million in the greater Lowell area. These direct purchases of goods and services will also generate additional related expenditures. Every dollar spent directly by the park will produce an additional $0.75 in the city of Lowell and $0.87 in the greater Lowell in indirect and induced business.

Under the preferred alternative, approximately $4.4 million will be spent in Lowell and $5.7 million will be spent in greater Lowell. The $4.4 million in expenditures that can be attributed to the direct operation and employment of the park in 1990 will only be a small fraction (0.5 percent) of what is expended on goods and services in Lowell (approximately $1.0 billion currently).

Table 17. Direct and Indirect Park Expenditures--1990
Alternative 1

	Lowell	Greater Lowell
Direct		
Staff	$ 847,200	$1,301,600
Operation	1,675,000	1,775,000
Total	$2,522,200	$3,076,600
Indirect[a]		
Park Related Business	378,300	615,300
Non-Staff Related Business Expenditures	1,513,300	2,045,900
Total	$1,891,600	$2,661,200
TOTAL	$4,413,800	$5,737,800

[a]Multiplier adapted from G.C. Dery, G.J. Downey, and C.C. McDonough, University of Lowell Economic Impact Study (Lowell, Mass.: University of Lowell, 1979).

Circulation. By the year 1990, 700,000 to 1,000,000 people can be expected to visit Lowell National Historical Park. Based on an analysis of nearby historical NPS sites and privately operated sites in the northeast, it is estimated that fifty percent of the park's total annual visitation is likely to take place during the summer, with visitation being spread out fairly evenly throughout the week. During the winter 10 percent of all park visitors will arrive, mostly on weekends, and the spring is expected to have 10 percent of the annual park visitation. The fall, a season of higher visitation in New England, should average about 30 percent of the annual visitation. On an average summer day, some 5,000 visitors to the park can be expected.

The standard National Park Service conversion factors for numbers of visitors per car are between 3.3 and 3.5 visitors per car. For Lowell these national averages are considered high because 1979 statistics at Old Sturbridge Village indicate that 81.7 percent of the visitor groups have between 2 and 3 people. In view of these statistics and the urban environment of Lowell, 3.0 visitors per car has been used to project the number of visitors to the park. Assuming that all park visitors travel to the park in their own cars, 1,666 additional cars will enter Lowell on the average summer day. Increased traffic from visitors to the park will have little or no effect on traffic circulation patterns in surrounding communities or on the interstate highway system. Therefore, no highway improvements, other than signs are recommended.

An additional 1,666 cars per day on Lowell's congested downtown streets during the week would severely impair the movement of vehicles. Consequently, four measures have been undertaken to mitigate this impact

during the week. On Sundays, additional parking will be available in the 1,000-car Market Street garage and the 500-car capacity Gallagher transportation terminal. Cooperative agreements with the Lowell Regional Transit Authority and the city of Lowell will be necessary to enable visitors to use these facilities.

The first mitigating measure is to post signs on the major regional highways to direct park visitors arriving by private vehicle to a single, direct route into Lowell. Park signs on Massachusetts Route 3 and I-495 will direct visitors to Lowell via the Lowell Connector, Thorndike Street, and Dutton Street to the information/orientation center at the Lowell Manufacturing Company complex. Park visitors using this clearly identified access route will not pass through congested areas nor will they exacerbate congestion on other access routes to the central business district.

The second mitigating measure will be to strongly encourage visitors to use intercity public transportation. Lowell is connected to Boston by the Boston and Maine (B&M) rail service, which provides convenient access from Boston's North Station. The train stops at the transportation terminal on Thorndike Street, which will be redesigned and expanded as the Gallagher transportation terminal. It is less than ½-mile from the park information/orientation center. All park informational material will describe this convenient and efficient means of access. To facilitate visitor travel to the information/orientation center, a shuttle bus schedule will be coordinated with train arrivals and departures.

In addition to arriving by train, a significant number of park visitors are expected to come to Lowell with organized tour groups, which generally travel on intercity tour buses. This projection is based on studies of visitation at Charlestown Navy Yard (part of Boston National Historical Park) that indicate a significant percentage of visitors are on organized tour groups. Consequently, 15 percent of the park visitors are expected to arrive by train or bus.

The third measure to mitigate auto congestion will be to provide adequate and convenient parking. Sufficient parking will enable visitors to park and leave their cars upon entering Lowell, thus eliminating competition with downtown shoppers and business people for the existing parking spaces. Insufficient parking would result in park visitors circulating around the downtown area to look for parking spaces (causing additional congestion). Those park visitors who do park in the downtown area will be occupying space needed by local merchants to maintain their businesses, adversely affecting the local economy.

Because of the relatively extensive interpretive program being anticipated, as many as 75 percent of the visitors are expected to be at the park during the peak hours of the day, probably from around noon until 2 to 3 p.m. To provide adequate parking for the visitors, 1,060 parking spaces must be provided.

Visitor parking will be developed in two phases. The first phase will include NPS development of 160 spaces at the Dutton Street lot and 150 spaces at the Joan Fabrics Corporation lot near the intersection of Dutton

and Broadway streets. The two lots will provide 310 spaces close to the information/orientation center, which will be sufficient for the first four years of park operation.

The second phase of parking development will involve a cooperative effort that will include the city of Lowell, the Preservation Commission, and the National Park Service to acquire and develop a potential visitor parking area at the junction of Thorndike Street and the Pawtucket Canal, which will be referred to as the Swamp Locks parking area. Initially 200 surface spaces will be developed. In the long term, as parking demands increase and funding becomes available, the city will be responsible for taking the lead role in seeking out funding and a development package to construct a parking structure on the site.

Fringe parking facilities were considered at several locations, including the Lowell stadium and the Sears plaza. Because of the urban nature of Lowell, shuttle buses would be required from these sites, so the facilities were not considered feasible. If a demand for such facilities arises, the Park Service might reevaluate the possibility of using these facilities.

If the Swamp Locks parking area is not developed or adequate space for visitor use during the summer is not provided, congestion and competition for parking spaces will increase to levels that could disrupt downtown business activity. Competition for parking spaces will discourage shoppers from using the downtown area. Traffic congestion will become more severe due to shoppers and visitors circling the downtown area looking for parking spaces.

The final measure to mitigate the impacts of visitors' autos is to encourage visitors to circulate within the park and the downtown area by means other than private automobiles. Providing information on the vehicular circulation and parking difficulties in downtown Lowell, explaining shuttle services available between sites, and encouraging walking (either escorted by Park Service and Department of Environmental Management interpretive personnel or along self-guided paths) will all help to get visitors out of their cars. Shuttle services will be available by bus, trolley, and canal barge. (See Access, Circulation, and Parking map on the inside back cover.)

To provide the most attractive environment possible for pedestrian movement, street closings and streetscape upgradings have been proposed for the downtown area. The streetscape plan for the park proposes the closing of Kirk Street to general traffic, the modification of Merrimack Street, and sidewalk improvements (paving material, period light standards, plantings, and street "furniture"). The closing of Kirk Street (present capacity, 3,750 vehicles daily) from Lee Street to French Street will have no negative impacts on traffic flow because this street is now used for parking, circulating in the downtown area while looking for parking, and as a shortcut from Merrimack Street to French Street to avoid traffic and traffic lights. Parking should be eliminated on Merrimack Street from Kirk Street to Dutton Street.

Initially the rerouting of traffic flow will cause some congestion. However, traffic flow will be improved by installing new street signals at

several downtown intersections, by improving traffic flow on Dutton Street as a result of the Sampson Connector project, and by completing the north-south connection from the redesigned Dutton Street-Merrimack Street-Arcand Drive intersection to French Street. Besides improving traffic flow, redesigning the Dutton Street-Merrimack Street-Arcand Drive intersection will also enhance the pedestrian link between Old City Hall and the central business district.

Traffic conflicts between pedestrians and autos will still occur at key intersections, and motorists will experience delays and inconvenience during days of peak visitation. Safety hazards will be clearly marked to alert visitors and motorists to problem areas.

A temporary impact will be caused by construction activities in the park. Although construction will not be extensive, it will temporarily disrupt pedestrian and auto traffic. The greatest impact will be from the demolition of the Jade Pagoda and Solomon's Yard Goods, the construction of a park on that site, and the rehabilitation of Old City Hall. These activities will result in increased traffic congestion, delays, and inconvenience for residents and visitors.

Convenient access to and circulation within the park depends on the construction of two major transportation projects, the Gallagher transportation terminal and the Sampson Connector. The $6.2 million Gallagher transportation terminal will be on the site of the existing transportation terminal and adjacent surface parking lot. The project will involve a three-level parking garage that will provide approximately 500 parking spaces and a surface parking area with 150 spaces. Bus parking and loading areas and also improved commuter waiting areas and platforms will be included. The transportation terminal has received federal and state funding, and final design will be completed in the near future. The terminal is intended as a parking facility for park visitors only when it does not conflict with commuter use (Sundays and holidays). The terminal will facilitate visitor access by train.

The Sampson Connector will allow for improved auto traffic from Thorndike Street to Dutton Street. The project involves the construction of a new bridge and intersection at Thorndike and Dutton streets plus the widening of Dutton Street to four travel lanes, with lefthand turning lanes at Broadway.

Natural Environment

The Park Service will continue to cooperate with local, state, and federal authorities and programs to improve Lowell's air and water quality. Where possible, all efforts will be made to enhance the natural environment of Lowell.

Air Quality. The development of Lowell National Historical Park could affect air quality since more automobiles, trucks, and buses will be present in Lowell. The park's major air quality impacts are vehicle-related, and hence, a mesoscale analysis of the motor vehicle-generated pollutants (hydrocarbons, carbon monoxide, and oxide of nitrogen) was undertaken.

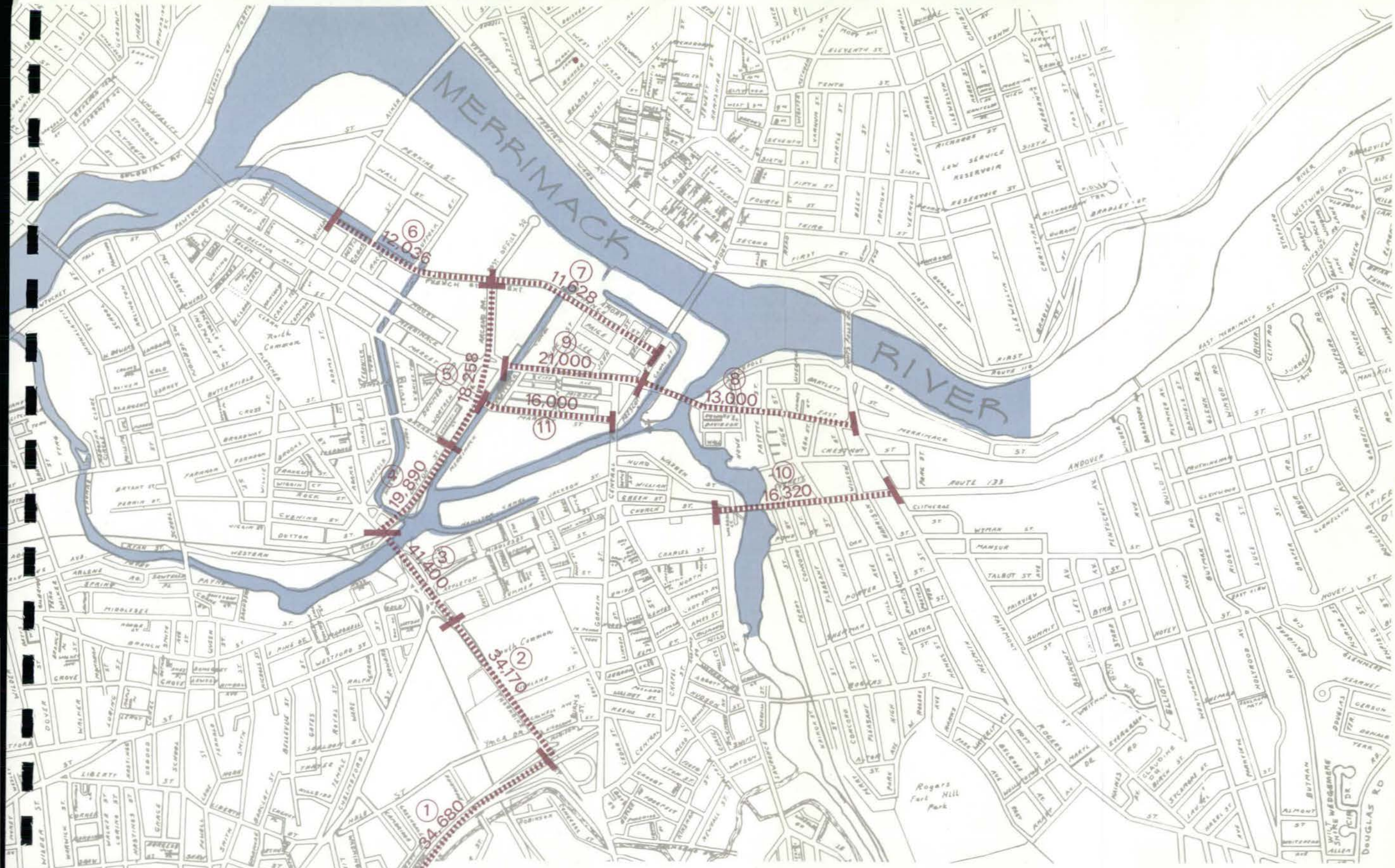
Traffic capacity at the intersections analyzed are at the highest volume possible per hour. Additional traffic may have the impact of extending the peak-hour periods.

The mesoscale area is the area that will be affected by the proposed park development. Within this 4-square mile area, selected primary roads (links) have been identified that will be affected by trips to, from, and within the park. Table 18 describes the roadway segments and the Roadway Segments and Daily Trips map shows data for 1979. Average daily trips (ADT's) are based on the 1975, Route 213 Draft Environmental Impact Statement and on unpublished 1979 traffic counts by the NMAC. All trip data was converted to the base year (1979) by the incorporation of a 2.0 percent annual trip growth rate. The 2.0 percent annual growth rate was derived by modifying the 2.6 percent annual growth rate estimated for vehicle miles traveled to reflect the increase in fuel costs and changes in traditional travel and vacation patterns. Using existing traffic characteristics, speed, and volume, baseline pollutant emissions may be computed.

Projections of pollutant emissions have been calculated for the year of estimated time of completion (ETC), which is the year when construction will be completed, and for the design year, which is the year when the projected park visitation will be attained. The ETC for the park is 1988; the design year is 1990. Although the ETC will be 1988, most of the park development will take place between 1980 and 1984. Thus most park visitation will be responding to projects and programs completed in 1984 with the design levels of visitation attained in 1990. (See table A-1 in the appendixes for the projected additional park-related traffic for 1988 and 1990 for each link.)

Total pollutant emissions for each roadway segment have been computed for each of the four alternatives for the ETC and the design year. To compute total pollutant emissions, average daily trips were estimated for each alternative. These estimates were then multiplied by the length of each segment to determine the vehicle miles traveled. The product of the vehicle miles traveled and the appropriate emission factor from Mobile 1 (an EPA air emissions model) yielded the total pollutant emissions. The emission factors that have been utilized in this analysis are for carbon monoxide, nitrogen oxides, and hydrocarbons. Total pollutant emissions were computed for average vehicle speed. This is considered to be a "worst-case" example. Other variables that have been incorporated are a 20 percent cold start operation and a mix of vehicle types ranging from autos and light-duty trucks to heavy-duty gas and diesel trucks. (Cold start operation is significant in air pollutant analysis because of the high percentage of pollutants emitted from vehicles started cold. The "worst case" temperature for this analysis was 40°F, since most vehicle impacts in and around the park will be during the summer months.) The detailed analyses are included in appendix A.

The mesoscale analysis shows that the total pollutant emissions for all alternatives in both the ETC and the design year are substantially less than they are now. These results reflect reduced emission factors. The reasons that future emission factors are less than the base year is that the Federal Motor Vehicle Emission Control Program requires new



ROADWAY SEGMENTS DAILY TRIPS-1979

475 | 40011
DEC | MAY 80

500 1000 2000 FEET

LOWELL NHP

ON MICROFILM

automobiles to meet more stringent emission limitations, and that in the future the newer, less-polluting vehicles will comprise an increasing proportion of the vehicle fleet. Even greater reductions than those already accounted for will result from new air quality policies for transportation, criteria and procedures for transportation plans and project reviews, federal motor vehicle emissions control program, auto emissions inspection and maintenance program, and ridesharing regulations.

Table 18. Roadway Segments

Link No.	Street	Segment	Distance (miles)
1	Lowell Connector	I-495 to Thorndike St.	0.8
2	Thorndike St.	Lowell Connector to Summer St.	0.3
3	Thorndike St.	Summer St. to Dutton St.	0.2
4	Dutton St.	Thorndike St. to Broadway St.	0.2
5	Dutton St.	Broadway St. to French St.	0.4
6	French St.	Arcand Dr. to Aiken St.	0.4
7	French St.	Arcand Dr. to Bridge St.	0.4
8	East Merrimack St.	Nesmith St. to Bridge St.	0.5
9	Merrimack St.	Prescott St. to Dutton St.	0.3
10	Church St.	Nesmith St. to Lawrence St.	0.4
11	Market St.	Shattuck St. to Central St.	0.3

Traffic capacity at the intersections analyzed are at the highest volume possible per hour. Additional traffic may have the impact of extending the peak hour periods. However, the detailed analysis contained in appendix A shows that park-related traffic accounts for a small percentage of the additional traffic. The air analysis shows that alternatives 1, 3, and 4 are all higher than the no-action alternative. Thus all reasonable and feasible measures will be taken to mitigate the projected higher pollutant levels of alternative 1. The Park Service will encourage the use of public transportation to Lowell, provide informational signs on regional highways and local streets to direct park visitors to parking areas, provide visitor parking, and encourage visitor circulation within the park boundaries by canal boats, trolleys, and walking tours. (See discussion of circulation under "Urban Environment" for more details.) These mitigating measures will minimize the increase in air emissions; however, the design year emissions for the preferred alternative will continue to be higher than the no-action alternative.

In addition to the mesoscale air quality analysis, the Park Service has conducted a capacity analysis of selected intersections in Lowell to determine if park-related traffic represents a significant impact on existing levels of service. The key intersections listed below were selected for analysis because they would most likely be impacted from park traffic patterns (see appendix B for a complete description of the capacity analysis).

Merrimack-Dutton-Arcand
Market-Central-Prescott
Broadway-Dutton
Fletcher-Dutton-Thorndike

Other air quality impacts, such as degradation of historic structures in the park, will be monitored on a regular basis to document possible damage resulting from air pollution. Should such effects be noted, documentation of the damage will be necessary to accomplish remedial action such as retrofitting those industries with more adequate pollution control equipment.

Water Quality. The Park Service will minimize impacts to water quality resulting from park projects by adopting standard maintenance practices. Parking lots will be swept and storm drains cleared regularly.

Water Supply. The proposed park development will have negligible impacts on water supply in Lowell. Drinking water in Lowell is supplied by the Merrimack River through a 30 million-gallon per day (mgd) water treatment plant. The peak demand for water in Lowell is 15 mgd, and there are no predictions for shortages in drinking water during the ten-year time frame of the plan.

Noise. Truck and auto traffic noise is a significant problem in Lowell. Monitoring programs have been undertaken near specific development areas. Downtown Lowell, especially Merrimack Street, is an area of high intensity noise and also high pedestrian use. To eliminate a significant portion of this noise, it is recommended that the city of Lowell, in cooperation with the Northern Middlesex Area Commission, restrict through truck traffic on Merrimack Street from Bridge Street to Arcand Drive. Alternative routes would add time and distance to the truck route through Lowell as well as increase congestion at some intersections, but it would reduce the noise on Merrimack Street and enhance the environment in downtown Lowell. Prior to implementation of any truck rerouting proposals, additional study will be needed to identify impacts of noise on alternate routes. The rerouting of general traffic in downtown Lowell from the proposed partial closing of Kirk Street will have minimal noise impacts. Although traffic will increase slightly on adjacent streets, it will not significantly increase noise.

Similarly, visitor vehicles will increase traffic on selected streets outside the downtown area; however, the noise impacts will be minimal. Projected traffic increases will be less than 10 percent on all streets. Because of the nature of park visitation, traffic increases will occur at off-peak hours; all but two of the regularly scheduled park tours are between the hours of 9 a.m. and 3:30 p.m.

Floodplains. The city of Lowell is participating in the federal flood insurance program of the Federal Emergency Management Agency. The floodplains have been mapped and a flood insurance rate map has been prepared, effective April 16, 1979. Lowell has adopted floodplain protection provisions as part of the zoning ordinance, in accordance with federal regulations. The 100-year floodplains within the park boundary include the canal system (see the Floodplains map). Another area of

flooding is the general vicinity of the Dutton Street parking lot, which is subject to "minimal flooding."

The Park Service will take the necessary precautionary measures to ensure visitor safety and facility protection in the event that flooding occurs. They will work with the city of Lowell to coordinate a course of action with the city's evacuation plan.

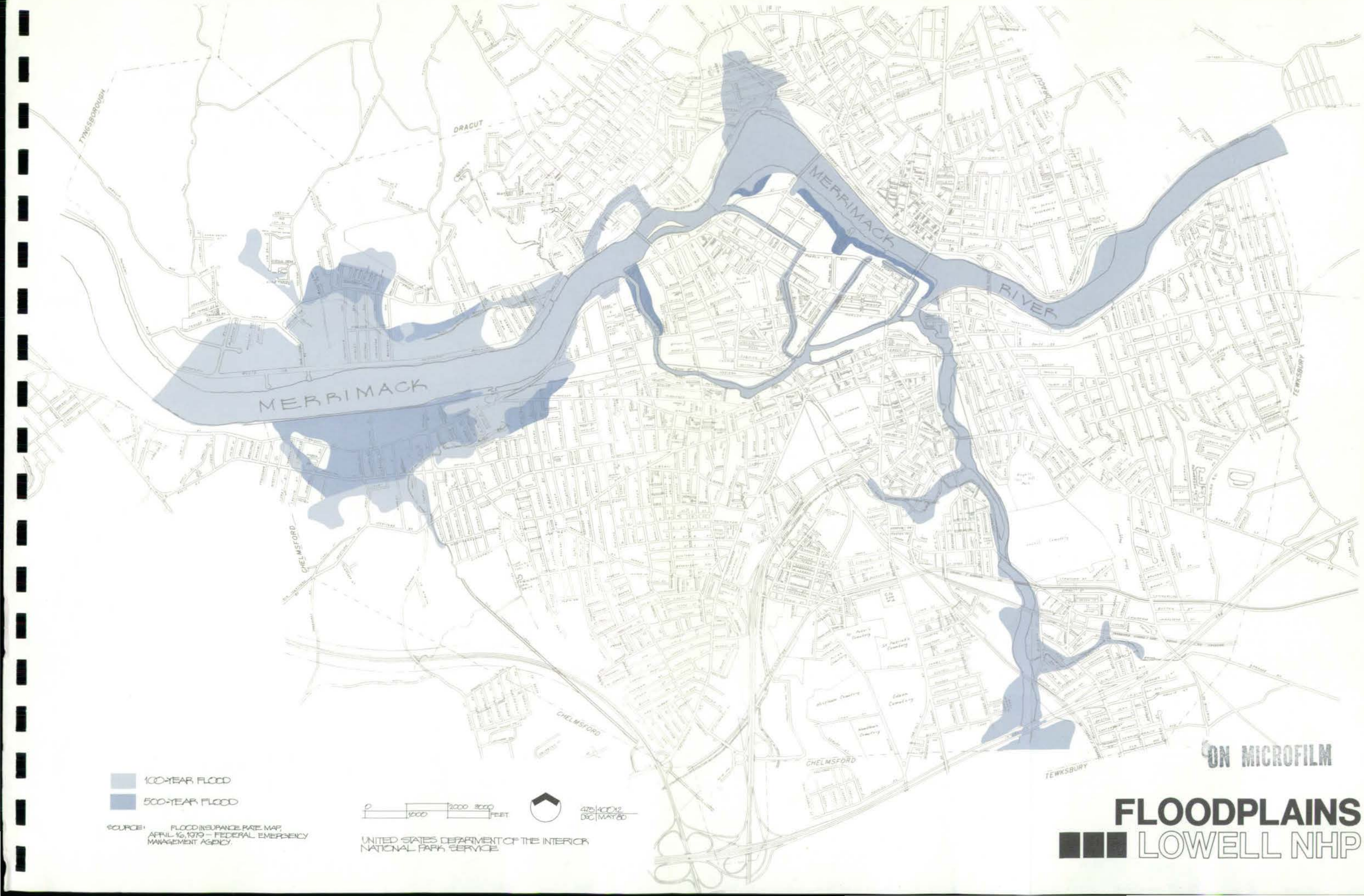
Specific sections of the canal system have been identified for development. However, the detailed designs for these projects have not yet been prepared. Proposed construction and development in or adjacent to floodplain areas will comply with Executive Order 11988, "Floodplain Management" as adopted by the Water Resources Council in 1978, federal flood insurance program guidelines, the city of Lowell floodplain zoning regulations, and the Lowell Conservation Commission regulations. Approval for development projects will be requested when sufficient detail of the extent of the project has been determined. Special consideration will be given to any artifacts stored or exhibited in the floodplains.

Fisheries. As discussed in the "Affected Environment," the Merrimack River currently supports an extensive fishery resource. Several state and federal agencies are coordinating efforts to restore the anadromous fisheries. These sensitive anadromous fisheries must be protected while canal and riverbank construction is in progress. Any canal or river construction will be done in a manner that minimizes any increase in river turbidity levels, particularly during certain seasons. Any new or modified obstructions or potential hazards to anadromous fish must comply with U.S. Fish and Wildlife Service regulations. Canal and turbine development must allow for the safety and unhindered migration of anadromous fish. Screens or similar devices will be placed upstream of turbine intakes to minimize adverse effects on fish.

Throughout the planning process the Park Service has coordinated with the Interagency Task Force for the Restoration of Fish on the Merrimack River. Assuming that the Park Service coordinates with the task force and all mitigating measures are taken, NPS activities will have no significant impacts on the Merrimack River restoration program. In addition, the Park Service will not participate in any activities that will significantly impact the restoration of the fishery resource.

Park development will promote river and canal related activities such as canal tours and walking and sitting areas along the canal. Fishing access areas will be developed with the cooperation of the city and state. The recreation developments will promote visitor and public awareness and use of the river and canals. These facilities should be made available to all handicapped persons.

Dredging. As development of the park proceeds, it will become necessary for one or more of the cooperating agencies involved in the canal systems management to remove silt and debris that has accummulated in the canals for years due to inadequate maintenance. When the extent of dredging required is determined and the agencies to be responsible are designated, appropriate dredging and wetland permits from the Lowell Conservation Commission, Massachusetts Department of Environmental


TYNGSBOROUGH
DRACUT
MERRIMACK
RIVER
MERRIMACK
CHELMSFORD
CHELMSFORD
CHELMSFORD
TEWKSBURY
100-YEAR FLOOD
500-YEAR FLOOD
SOURCE: FLOOD INSURANCE RATE MAP, APRIL 16, 1979 — FEDERAL EMERGENCY MANAGEMENT AGENCY.
0 1000 2000 3000 FEET
475|400|12
DEC|MAY|80
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
ON MICROFILM
FLOODPLAINS
LOWELL NHP

Quality Engineering, and the U.S. Army Corps of Engineers will be requested.

PRESERVATION COMMISSION DEVELOPMENT

Lowell Historic Preservation Commission development will have a number of important impacts on the city of Lowell. In its first year of operation, the Preservation Commission's grant, loan, and technical assistance programs have saved two important buildings and begun the rehabilitation of nine others. A total of $473,000 in Commission grants in 1979 will trigger over $16 million in private investment. It is estimated that Commission development proposals for each of the ten structures designated in the park's enabling legislation will generate $831,000 in property tax revenues to Lowell (see table 19). In addition to property tax revenues, the proposed uses for these structures will provide for a net gain of 2,000 jobs in downtown Lowell.

The Commission's environmental assessment in Details of the Plan, October 1980, includes a more detailed analysis of the impacts created from the Commission's projects. The following discussion highlights the important impacts; 23 have been identifed which are divided into the five categories.

Historic Preservation
- historic building rehabilitation
- historic building maintenance
- historic interpretation
- design controls

Physical
- public access
- pedestrian access
- visual quality
- motor vehicle traffic
- parking resources
- air pollution
- open space

Governmental
- local governmental control, legal clarity, administrative changes
- regulatory costs

Social
- cultural expression

Economic
- employment tax base, property tax revenues, financial assistance
- concentration of resources, leveraging of funds, displacement

Most Commission projects encourage historic building rehabilitation and cultural expression. Several key projects--gateway exhibits, labor exhibits, and Boott Mill development--affect both of these factors; in each case, a nationally significant building is rehabilitated so that a form of

cultural expression of Lowell's history can occur. The gateway and Boott Mill projects will be carried out in cooperation with the National Park Service. The impacts of these projects are more fully discussed in the "Alternatives and Their Consequences" section of this document.

Three projects that will directly impact historic preservation by means of design control are boundary changes, index, and standards. The standards, currently written as guidelines for historic preservation within the preservation district, will be translated into enforceable regulations. Additional structures to be included in the boundary changes will be subject to the standards.

The impacts of the standards should be considered in tandem with those of the regulatory framework. The proposed framework will streamline the permit process; however, a temporary impact will occur because of the change in the existing procedure for project review. There will be resistance at first, until the review process has been established and tested. Administration of the standards will bring additional costs for both the city and the Commission. It is anticipated that most of the costs to building owners will be mitigated by a proposed financial assistance program. This program (grants and loans for exterior rehabilitation) will enhance the Commission's limited resources because it will place them in four priority areas in the preservation district. Thus, rather than a "scatter shot" approach, the financial incentives will be concentrated close to the national park to help ensure that groups of nationally significant buildings will be preserved. This approach will improve the historic character of the park and the city.

The Commission's proposed transportation-related actions are planned to enhance Park Service and city projects (see General Development section). The trolley system, parking garages, canal barges, and pedestrian improvements will greatly assist in the circulation of park visitors and all users of the downtown area.

The trolley and canal barge projects, which are currently operated by the Park Service, will expand visitor circulation systems and provide for historical interpretation. The Commission's participation in the parking garages and in the trolley system will improve vehicluar traffic circulation because residents and visitors will have an incentive to leave their cars in one place rather than drive around.

The district-wide cultural programs are designed to give residents of Lowell opportunities they might not otherwise have to express their ethnic backgrounds. The impacts will to some extent be intangible--a sense of local pride. Others will be more physical--works of art or research funded by Commission grants.

Table 19. Anticipated Property Tax Revenue Resulting from Preservation Commission Development

Structure	Proposed Use	Area (Square Feet)	Property* Taxes
AHEPA	office/residential	3,000	$ 3,000
Boott Mill (Wang portion)	light storage	100,000	50,000
Boott Mill (remainder)	mixed	500,000	250,000
Early Residence	office	10,000	15,000
Jordan Marsh	retail, storage	116,000	60,000
Lowell Gas Light Building	office	5,000	7,500
Lowell Manufacturing Company	residential & commercial	270,000	400,000
Lowell Institution for Savings	retail	14,000	21,000
St. Anne's Church	church		
Welles Block	retail, office	4,000	20,000
Yorick Club	retail	5,000	5,000
TOTAL			$831,000

*The following estimated property taxes have been assumed for the first year after rehabilitation: retail, $1 per square foot; office, $1.50 per square foot; storage mill space, $0.10-0.25 per square foot; upgraded manufacturing (high tech), $0.50 per square foot; residential, $1500 per unit; hotel/motel, $1000 per unit.

ALTERNATIVE 2:
NO ACTION

OVERALL STRATEGY

The no-action alternative would meet needs, problems, and objectives by continuing past and present trends, conditions, and responses into the foreseeable future. This alternative would not freeze conditions in a status quo state, nor would it reverse present conditions and trends to a prior time.

A continuation of existing policies at the park would mean that present staffing and budget levels would not change in the future. Because a general management plan would not be approved, limited additional funding would be available for new positions or major development projects. Therefore, no new structures or open space areas would be added to National Park Service ownership. The park would develop structures and land areas it now owns to the fullest extent possible by making extensive use of cooperative agreements with the Massachusetts Department of Environmental Management, the Preservation Commission, Lowell Museum, city of Lowell, and other organizations able to help finance a development project.

Interpretation and Visitor Use

Activities and programs for interpretation and visitor use would resemble the park's present program. The information/orientation center would continue to be on the first floor (900 square feet) of the Welles Block on Merrimack Street. Here the park would provide many of the functions described under alternative 1 for the information/orientation center in the Lowell Manufacturing Company complex. The Welles Block information/orientation center would have limited audiovisual capabilities and no regional tourist information center. Its exhibits would be designed to convey an overall sense of the park's primary interpretive themes and to orient visitors to the attractions of the park, preservation district, and city of Lowell.

The major interpretive area would be the Wannalancit Mill complex. Through cooperative agreements with the Lowell Museum Corporation, the park would use the existing 10,000-square-foot Lowell Museum, with some limited expansion and additional interpretive exhibits. As in alternative 1, other areas of Park Service interpretive activities would be the canal system and guided and self-guided tours of the downtown park area and preservation district. The major interpretive themes would be the same as for alternative 1. Because substantially less space would be available for interpretation than under alternative 1, these themes would be explained briefly. Many of the complex issues surrounding the development, production, decline, and recent rejuvenation of Lowell would be simplified because of the space limitations.

Use and Treatment of National Park Service and Related Structures and Sites

Lowell Manufacturing Company Complex. The Park Service would have minimal involvement in this structure. The private developer who has proposed subsidized housing for the upper floors would now be able to use the entire structure for housing. The Park Service would maintain and staff an information kiosk in the adjacent Dutton Street parking lot to direct visitors to the downtown area.

Old City Hall. The Old City Hall would remain in Park Service ownership. Commercial functions on the first floor would continue. The Park Service and Preservation Commission would cooperate to restore sections of the facade. Major actions, such as strengthening its structural integrity and developing an interpretive center, would not be undertaken.

Jade Pagoda and Solomon's Yard Goods. These two structures, currently owned by the Park Service and used for a community social services organization and Park Service school program offices, would be retained, assuming that no funds would be obtained to demolish these structures and develop a park as proposed under alternative 1. Possibly the buildings would be leased to a concessioner.

Merrimack Gatehouse. This would continue to be owned by Locks and Canals. The city of Lowell, the Department of Environmental Management, and the Park Service would develop cooperative agreements to interpret the structure. The site could also serve an information/orientation function. Minor improvements would be made to the facade through Park Service or Preservation Commission funds. The structure would remain, for the most part, in its present condition.

Kirk Street Agents' House. This structure would have the same uses as those proposed in alternative 1. In addition, the basement, a small portion of the first floor, and the rear yard area would serve as the park maintenance headquarters. The funds available for renovation and adaptive use would be less than those recommended in alternative 1, therefore renovation and interpretation would not be as extensive.

Wannalancit Mill Complex. This complex would remain in private ownership, with the Lowell Museum continuing at its present location and level of activity. The existing vacant mill space could be leased for private development as museums, restaurants, and light industry. The Park Service would continue to interpret the mill structures and the surrounding areas by conducting walking tours of the area, and it would modify and expand some of the museum exhibits.

The Park Service and Preservation Commission would have funds available for minor restoration projects. Most restoration and adaptive use of the complex would be financed by private developers. The Tremont Yard would be developed by the Department of Environmental Management as a passive park. Through cooperative agreements, the Park Service could assist in the archeological investigations and interpretation of the site.

The Park Service would offer guided and self-guided tours of the Wannalancit area. Historic structures in the area would be interpreted from the outside.

Boott Mill Complex. Portions of this mill complex would be purchased by the Preservation Commission for adaptive use. The Park Service would have an exhibit in this facility, but it would be much smaller in scope that what is described under alternative 1, because of lack of funds for acquisition and limited funds for exhibit development. The Preservation Commission, with Park Service technical assistance, would develop a passive park on the Boott Mill boardinghouse site.

H & H Paper Company. Same as alternative 1.

General Development

Access and Parking. Access to the park would be the same as under alternative 1, and parking would be limited to the Dutton Street parking lot, the Market Street garage, proposed new parking structures in the Boott Mill area, and any available on-street parking.

Circulation. Circulation would be facilitated by Lowell Regional Transportaion Authority (LRTA) shuttle buses that would be leased by the park. Shuttle bus routes would connect the downtown area, Boott Mill complex, Wannalancit Mill complex, Northern Canal Gatehouse, the Francis Gate complex, and the Dutton Street parking lot. Other means of circulation within the park would be by private vehicle, walking, and canal boats on a limited basis.

Canal System Development. Development of the canal system for visitor use and interpretation would be made possible by a cooperative agreement with the Department of Environmental Management, which would proceed to develop the canal system for recreational and interpretive use as proposed in 1974 for the Lowell Heritage State Park. The Francis Gate Locks would be restored, and the canals would be open for recreational boating as well as for interpretive tours.

The Park Service would provide technical assistance in the design and construction phases and continue interpretive support. It would also help maintain limited portions of the canal system and the adjacent open areas.

Locks and Canals would proceed with development and managment plans for the proposed hydroelectric facility on the Northern Canal.

Streetscape Development. Street treatment would be limited to minor sidewalk improvements along Shattuck Street, Kirk Street, and Merrimack Street. Improvements would consist of sidewalk repaving and period light standards.

Park Maintenance Site. The park maintenance division would be located in a portion of the Kirk Street Agents' House. A portion of the first floor in the rear, the basement, and the parking lot would be available for maintenance activity.

Park Boundary Changes

There would be no park boundary changes or land acquisition.

Energy Program

There would be no innovative or alternative energy program. Conventional methods of energy conservation, such as insulation and storm windows, would be used in Park Service structures.

IMPACTS

Cultural Resources

Under the no-action alternative, there would be less rehabilitation, adaptive use, and enhancement of cultural resources than under alternative 1. The Kirk Street Agents' House, the only historically significant structure owned by the Park Service, would be stabilized and maintained in its present condition, as would related structures. Because of the lack of funds, the Park Service would not be able to acquire new structures or undertake major rehabilitation of currently owned structures. It is likely that some structures would deteriorate, and some cultural resources could be lost.

This impact could be mitigated by grants from the Preservation Commission to arrest the loss of cultural resources, or by private developers acquiring structures so that they could be adaptively used. The Old City Hall and the Boott Mill complex are most prone to deterioration, unless actions are taken now to stablilize the structures.

Although Preservation Commission grants could be used to mitigate some of the loss, the funds available for facade improvements (including roofs) are limited. Moreover, the Preservation Commission already is committed to rehabilitating the ten structures for which it was made responsible in the park legislation. Commission grants would only be possible for selected structures within the park and preservation district.

If structures were rehabilitated and preserved and used adaptively by a private developer, the historic fabric could be modified. These modifications are usually more extensive than would be undertaken by an agency whose mandate is to "conserve the scenery and the natural and historic objects . . . by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act of 1916).

The development of the canal system under alternative 2 would be carried out almost entirely by the Department of Environmental Management. Under the other alternatives, the Park Service would play a major supportive role. Because the Department of Environmental Management would be acquiring, developing, and maintaining the canal system with the same funds that would be available under alternative 1 (where extensive Park Service assistance would be available), the Department of Environmental Management would either acquire portions of the canal

system or develop and maintain relatively small segments. This development and maintenance program would not be sufficient to restore the canal system to its 19th-century appearance, nor would it arrest the deterioration of the canal walls. Unless encroaching vegetation was removed in the near future, the canal walls would probably yield to the root pressure of vegetation. Without proper maintenance, portions of the canal walls could collapse.

The implementation of this alternative would change the existing streetscape very little. The Park Service would provide technical assistance to Lowell to encourage period street treatment, but minimal funding would be available. The resulting streetscape would be a combination of various light standards and sidewalk paving materials.

Archeological resources within the park and preservation district boundaries would not receive the same degree of protection, investigation, and interpretation as under alternative 1. Potential archeological sites that would not receive federal protection would be the Dutton Street parking lot, Boott Mill parking lot, and Tremont Yard, possibly resulting in damage to, or destruction of, cultural resources. This impact could be mitigated by the Massachusetts Historical Commission, which has the authority to regulate the disturbance and excavation of archeological resources (Massachusetts General Laws, chapter 62, section 27C).

Urban Environment

Local Economy. As discussed under alternative 1, the major economic impacts of the park have already begun to affect Lowell. The differences between the economic impacts of alternative 1 and this alternative would be few. They would center around visitor projections, park staffing, and the park operating budget.

Under this alternative, 100,000 annual visitors would be expected, or about 10 percent of what is expected under alternative 1. The scaled-down visitor projections resulting from no further action to develop the park are shown in table 20. For this model, 60 percent of the anticipated visitors were assumed to be on day trips, in keeping with more of a regional park than a national park. Only 5 percent of the visitors probably would camp, 20 percent would use hotels, and the remaining 15 percent would stay with friends and relatives in the area.

Even though visitation was estimated at 10 percent of the preferred alternative level, total visitor expenditures would come to only 8 percent of alternative 1, or $2.5 million, because people on day trips spend less than those on overnight vacations. A conservative multiplier for indirect and induced expenditures due to tourist-based income indicates that in 1990 the total economic impact under the no-action alternative would be $3.18 million per year. In the context of Lowell's total economy, this would represent .02 percent of what Lowell expends on goods and services. The $3.18 million in visitor expenditures would generate approximately 103 adjusted full-time jobs. This would convert to many more seasonal service jobs.

Table 20. Visitor Expenditures--1990
Alternative 2

EXPENDITURES (x $1,000)

LODGING TYPE	No. of Visitors	Lodging	Eating & Drinking	Grocery	Liquor Stores	Gas Station	Local Public Transit	Amuse-ment	Miscel-laneous	TOTALS
Hotel or Motel	20,000	381	300	17	14	67	40	34	139	992
Campground	5,000	11	18	9	2	12	2	5	15	74
Friends or Relatives	15,000	2	76	25	22	41	15	11	97	289
Day trip or Passing Through	60,000	49	340	38	155	121	107	59	289	158
	TOTALS	443	734	89	193	241	164	109	540	2,518

Note: All estimates are in 1978 dollars.

Park Staffing and Operations

Economic impacts attributable to park staffing and operations would be much smaller than under alternative 1 and very small compared to the regional economy. The projected 1990 park budget for the no-action alternative is presented in table 21. The park budget would be approximately $1.5 million per year, with 50 park employees. The budget would be evenly divided between payroll and operations.

Of the $700,000 projected for the park's payroll under this alternative, about 24 percent (or $171,000) would be spent in Lowell, and 44 percent (or $310,000) would be spent in greater Lowell. The expected geographical distribution of the park operations budget would be approximately $506,000 in Lowell and $536,000 in greater Lowell. These direct purchases of goods and services would also generate an additional volume of expenditures. As under alternative 1, every dollar spent directly by the park would produce an additional $0.75 in Lowell and $0.87 in greater Lowell in indirect and induced business. Under this alternative, approximately $1.2 million would be spent in Lowell and $1.6 million spent in the greater Lowell area.

Table 21. Direct and Indirect Park Expenditures - 1990
Alternative 2

	Lowell		Greater Lowell	
Direct				
Staff	$170,800		$310,200	
Operation	505,800		535,900	
Total		$ 676,600		$ 846,100
Indirect[a]				
Park Related Business	101,500		169,200	
Non-Staff Related Business	406,000		562,700	
Total		$ 507,500		$ 731,900
TOTALS		$1,184,100		$1,578,000

[a]Multiplier adapted from G.C. Dery, G.J. Downey, and C.C. McDonough, University of Lowell Economic Impact Study (Lowell, Mass: University of Massachusetts).

Circulation. The projection of 100,000 annual visitors would translate to approximately 500 visitors on an average summer day. Assuming a ratio of three visitors per car, 167 cars would enter Lowell on the average summer day. An additional 167 cars per day would not cause significant traffic problems on access roads to Lowell. Signs would be erected on I-495 and Massachusetts Route 3 to direct visitors by way of the Lowell Connector, Thorndike Street, and Dutton Street to the Dutton Street

parking lot. The existing 142 public parking spaces would be supplemented by 25 additional spaces in the adjacent parking lot, which is currently leased by Compo Industries.

Circulation within the park would be available by shuttle bus, private car, walking, and a minor barge tour. Visitors would be encouraged to walk, or take shuttle buses and barge tours. But most visitors would probably use their own cars to travel within Lowell. This additional traffic on Lowell's already crowded streets would cause some traffic congestion. However, this congestion would be less than that caused under alternative 1.

Natural Environment

No effects on the natural environment beyond those described for alternative 1 would be anticipated.

ALTERNATIVE 3:
PRIMARY EMPHASIS AT BOOTT MILL

OVERALL STRATEGY

This alternative would maximize visitor interaction with Lowell's central business district. All park-related activities would take place as close as possible to the downtown area, resulting in the greatest increase in downtown economic activity. This alternative would show a cross-section of 19th-century Lowell, closely approximating the Report of the Lowell Historic Canal District Commission.

Interpretation and Visitor Use

Most visitor activities would be concentrated in the central business district. The information/orientation center would be at the Lowell Manufacturing Company complex and developed as described under alternative 1. From the information/orientation center, visitors could tour four interpretive centers, which would illustrate a variety of Lowell's themes. The Mack Building would be developed by the Department of Environmental Management as a museum illustrating hydropower. The Park Service would acquire the Old City Hall, where it would interpret industrial urbanization. The Kirk Street Agents' House would be developed as described under alternative 1--a theme museum to interpret mill agents' lives and as a residential/conference center. The fourth theme museum would be in the H & H Paper Company, a former boardinghouse that would be acquired and reconstructed by the Park Service for use as a theme museum to interpret boardinghouse life.

In addition to the theme museums, the Boott Mill complex would become a major interpretive center. The Park Service would acquire and rehabilitate at least two of the structures. All the themes that would be interpreted in the Wannalancit and Boott Mill complexes as described under alternative 1 would be interpreted in these two structures. The Park Service would also restore and upgrade one of the millyards to its late 19th-century appearance and provide funds to rehabilitate the facades of the remaining Boott Mill complex structures.

The location of the theme museums on Merrimack Street and the adjacent streets, combined with the attractions of the Lowell Manufacturing Company and Boott Mill complexes, would create a major pedestrian use space in this area. Park visitors and Lowell residents would be able to take advantage of the amenities and complementary commercial uses that would be available.

Other interpretive locations would include the canal system and possible archeological investigations at the Boott Mill boardinghouse parking lot.

Use and Treatment of National Park Service and Related Structures and Sites

Lowell Manufacturing Company Complex. Same as alternative 1.

Old City Hall. Same as alternative 1.

Jade Pagoda and Solomon's Yard Goods. Same as alternative 1.

Merrimack Gatehouse. Same as alternative 1.

Kirk Street Agents' House. Same as alternative 1.

Wannalancit Mill Complex. Same as alternative 2, with the relocation of the Lowell Museum to the Boott Mill complex.

Boott Mill Complex. The Boott Mill complex would be acquired by the Preservation Commission. Two structures would be leased by the Park Service and utilized to interpret industrial and labor themes at Lowell. Other uses of these structures would be for archives and curatorial storage. The Preservation Commission would lease or resell portions of the complex for various adaptive uses, including mixed commercial activities, hotel, market housing, a cultural center, and office space. The Park Service and Preservation Commission would rehabilitate the facades of each structure and the two millyards.

The Boott Mill boardinghouse parking lot would be developed by the Park Service as described under alternative 1.

H & H Paper Company. This structure would be acquired by the Park Service and restored to its original appearance. Outbuildings and gardens would also be reconstructed. In this re-created boardinghouse setting, the lifestyle of mill girls would be interpreted by using contemporary exhibits, living history explanations of mid 19th-century corporate housing conditions, and refurnished rooms in representative sections of the boardinghouse.

General Development

Access and Parking. Access to the park would be the same as alternative 1, with parking being available at the Dutton Street parking lot and Market Street garage. Parking on a short-term basis would be provided at the Joan Fabrics parking lot on Broadway. A 600-vehicle multilevel parking structure, cooperatively financed by the National Park Service, city, state, and federal funding sources, would be developed on a site adjacent to the Boott Mill complex. Altogether, approximately 2,000 spaces would be located at these sites in two multilevel parking structures to take care of an estimated 5,000 visitors per day.

Circulation. Circulation would be the same as described under alternative 1, except that canal tours would be less extensive. There would be less emphasis on the outer canal loop because visitor activities would be concentrated in the downtown area.

Canal System Development. Canal development and management would be very similar to alternative 1. There would be a higher priority on developing a downtown shuttle-barge that would operate from the Lowell Manufacturing Company complex through the restored Swamp Locks and Lower Locks to a park to be developed at the Rex Lot. The outer canal loop from the upper Pawtucket Canal to and including the Northern Canal would be a long-range development project.

Cooperative agreements would be developed as described under alternative 1 by the Park Service, Department of Environmental Management, and Locks and Canals.

Streetscape Development. Same as alternative 1.

Park Maintenance Site. The park maintenance site would be on property within the park at Broadway Street and the Western Canal, currently owned by the Macheras Brothers. The 58,000-square-foot site is now used for fuel, truck, and auto storage.

Park Boundary Changes

The following boundary changes would require the same procedures as those described under alternative 1.

Additions:

The parking lot east of the H & H Paper Company

The Joan Fabrics Corporation parking lot on Broadway Street

The area bounded by Market, Palmer, and Merrimack streets and the area bounded by Merrimack, Kirk, and John streets

The Lawrence Canal spur

The Strand Theater

Deletion:

The Wannalancit Mill complex

Energy Program

The same conservation measures described under alternative 1 would be applied to the structures included under this alternative.

IMPACTS

Cultural Resources

The differences between alternative 3 and the other alternatives are exhibited in the impacts on three structures: Wannalancit Mill complex, Boott Mill complex, and the H & H Paper Company.

Because the Park Service would not be involved in the Wannalancit Mill complex, the buildings could deteriorate to a point where rehabilitation was no longer feasible. Possibly a private developer could adaptively use the entire complex. This would probably mean a less historically and architecturally authentic rehabilitation of the mill facades than if alternative 1 was implemented.

Park Service involvement in the Boott Mill complex would result in a more accurate rehabilitation of the structures.

Restoration/reconstruction of the H & H Paper Company (the former Boott Mill boardinghouse) and re-creation of outbuildings and other structures would result in some damage to the historic fabric of the building and in disturbance of archeological resources. Because the structure today bears little resemblance to its original appearance, restoration would be close to reconstruction. Restoration/ reconstruction would contribute to the integrity of the district. Archeological excavation, which would necessarily precede any action, would provide information useful in interpreting the history of Lowell.

Urban Environment

Local Economy. The economic impacts of this alternative would be similar to alternative 1. The differences would not be in the amount of growth, but specifically where the growth would occur. Very little growth would take place in the Wannalancit Mill area. Merrimack Street would not have visitor-oriented commercial space, so possible impacts of visitors in the Little Canada neighborhood would be eliminated.

The effect of concentrating all visitor activity between the Lowell Manufacturing Company complex and the Boott Mill complex would encourage the location of visitor services in this area. These services would be suited to the seasonal fluctuations of a tourist market. High volume, tourist-oriented businesses might replace existing marginal retail activity.

The amount of congestion caused by the projected 5,000 visitors per day would benefit newly established visitor services, but it would hinder the general commercial establishments that depend on the local population for patronage. Highly congested downtown streets and sidewalks could discourage local and regional residents from shopping in the downtown area, which could force retail stores to relocate outside of downtown Lowell. Visitor expenditures would be similar to what was discussed under alternative 1.

The cost for this alternative would be moderate, and development costs would be high because of the reconstruction of the Boott Mill boardinghouse. Costs for park operations would be slightly less than under alternative 1 because fewer structures would be owned by the Park Service. The loss of tax revenues by Lowell would not be as great as alternative 1 because the Park Service would not acquire as many structures.

Locating the park maintenance site on property at Broadway Street and the Western Canal would provide convenient access to the downtown area and to the canal system. It would also help upgrade the general area.

Circulation. Circulation and its related impacts would be generally the same as under alternative 1. However, because activities in the downtown area would be more concentrated, more congestion would result. This could be mitigated by clearly defining visitor and pedestrian circulation routes through the downtown area.

Most visitors would begin their visit to Lowell with a 30- to 40-minute stop at the Lowell Manufacturing Company complex. They would then proceed by foot, trolley, or private car to the Boott Mill area. Visitors would spend most of the day in this area because of the number of attractions. The length of stay and volume of visitors would result in more private cars going to this location, causing increased congestion at the Dutton Street-Merrimack Street-Arcand Drive intersection as well as at the Arcand Drive-French Street intersection.

The volume of visitors walking to the Boott Mill complex would cause pedestrian/auto conflicts on French Street. A pedestrian-activated signal would provide safe street crossing, but it would also impede the smooth flow of traffic on French Street.

To accommodate the visitors and patrons of the revitalized Boott Mill complex, additional parking for a minimum of 600 autos would be provided by a multilevel parking structure adjacent to the complex.

Natural Environment

Impacts would be similar to those described for alternative 1.

ALTERNATIVE 4:
PRIMARY EMPHASIS AT THE WANNALANCIT MILL COMPLEX

OVERALL STRATEGY

This alternative would concentrate most park development in the Wannalancit Mill complex. National Park Service areas and activities would be separated from the present activity areas of Lowell, and visitors would be directed away from the downtown area to minimize impacts and conflicts. This alternative would be the easiest to manage because Park Service activities would be concentrated. Park Service structures that have already been acquired and existing agreements about the use of Park Service related structures have been incorporated in this alternative.

Interpretation and Visitor Use

The information/orientation center would be in the Lowell Manufacturing Company complex, as under alternatives 1 and 3. The distinguishing element of this alternative would be the concentration of interpretive activities at the Wannalancit Mill complex. All of Lowell's interpretive themes would be interpreted either in the Wannalancit Mill complex or by interpretive tours in the general vicinity.

Use and Treatment of National Park Service and Related Structures and Sites

Lowell Manufacturing Company Complex. Same as alternative 1.

Old City Hall. Same as alternative 2.

Jade Pagoda and Solomon's Yard Goods. These structures would be transferred to the Preservation Commission, which would lease or sell them for commercial uses.

Merrimack Gatehouse. Same as alternative 2.

Kirk Street Agents' House. Because all interpretation would take place in the Wannalancit Mill complex, no Park Service interpretive ehxibits would be planned for the Kirk Street Agents' House. The exterior would be rehabilitated and adaptively used as a residential/environmental education center. It could also be used by the city for special high school programs.

Wannalancit Mill Complex. The entire Wannalancit Mill complex would be acquired by the Park Service and rehabilitated. It would be used for interpretation, hydropower exhibits, alternative energy exhibits, curatorial and archival storage, and park headquarters. Other adaptive uses that would be considered for the complex include a hotel, restaurant, private interpretive museum, cultural center, and office space.

Tremont Yard would be acquired by the Park Service and developed as a park and archeological interpretive exhibit. Adjacent sites that would be acquired for interpretation are the Hall Street Agent's House and Tewksbury Wood Products. These structures would be used to interpret the themes of mill agents and boardinghouse life, respectively.

Two contemporary, incompatible structures on the corner of Hall and Cabot streets, which are now used as an auto parts store and body shop, would be acquired and removed. A park would be developed, with wayside exhibits illustrating the rows of boardinghouses that once stood on this site.

Boott Mill Complex. The Boott Mill complex would be developed by the Preservation Commission as described under alternative 2. However, because of the magnitude of Park Service involvement in the Wannalancit area, no Park Service interpretive exhibits would be planned for the Boott Mill. Guided and self-guided tours would still include this complex. The parking lot would be developed by the Preservation Commission, with technical assistance from the Park Service, as described under alternative 2.

H & H Paper Company. Same as alternative 1.

General Development

Access and Parking. Access and parking would be the same as described under alternative 1, but the capacity in the Wannalancit area would be expanded to 600 spaces. Some of the spaces at the nearby Lowell University dormitories might be shared through cooperative agreements.

Circulation. Same as alternative 1.

Canal System Development. Same as alternative 1.

Streetscape Development. The primary streetscape elements would be brick sidewalks and period light standards. Major street landscaping would be undertaken in the Wannalancit Mill area. Suffolk and Cabot streets would be closed to general traffic. Parking lots and walking paths would be landscaped throughout the area. Streetscape improvements in the central business district would be kept to a minimum. No streets would be closed, nor would autos be restricted in this area. The city of Lowell would assume responsibility for upgrading these streets and sidewalks.

Park Maintenance Site. Same as alternative 1.

Park Boundary Changes

The following boundary changes would require the same procedures as those described under alternative 1.

Additions:

The Hall Street Agents' House at 119 Hall Street

The 2-acre parking lot on Hall Street now owned and used by the Ames Textile Company

The remainder of the block bounded by Hall, Cabot, and Suffolk streets and the Northern Canal

The Tremont Yard

The Joan Fabrics Corporation parking lot on Broadway Street

The Lawrence Canal spur

Energy Program

The same conservation measures described under alternative 1 would be applied to the structures included under this alternative.

IMPACTS

Cultural Resources

In general, the impacts on cultural resources would be the same as those described under alternative 1. The differences are a result of the specific development actions for various structures. Because the Old City Hall would not be rehabilitated, it could deteriorate. Less extensive rehabilitation of the Kirk Street Agents' House and the central business district could also lead to deterioration of the area. To compensate for these potential losses, other structures would be rehabilitated, such as the Hall Street Agents' House and the Cabot Street boardinghouse.

Urban Environment

Local Economy. This alternative would have economic impacts very similar to the other alternatives. However, the extent of visitor impacts in the central business district would be minimized. Much of the tourist-related commercial activity would be concentrated in the vicinity of the Wannalancit Mill complex, transforming the character of this area from a manufacturing and light industry orientation to a tourist-oriented area. Existing companies that would not be acquired in the Wannalancit area would be under pressure from speculators to convert to tourist-oriented services. This would cause the replacement of existing employment opportunities with lower-paying seasonal jobs.

Street closings would not have a negative impact since few establishments are served by Suffolk and Cabot streets.

The total cost of this alternative would be moderate, with acquisition, development, and operational costs being less than alternatives 1 and 3.

The loss of tax revenues by Lowell would be similar to what was discussed under alternative 1. The number of visitors and visitor expenditures would also be similar to what was discussed under alternative 1.

Circulation. The major circulation impact of this alternative would be that all park visitors would be expected to visit the Wannalancit Mill complex. Because of the number and variety of attractions in the Wannalancit area, visitors would stay most of the day there. The length of stay at Wannalancit, plus the volume of visitors, would result in more private cars in this area. This would cause increased congestion at the Dutton Street-Merrimack Street-Arcand Drive intersection as well as the Arcand Drive-French Street intersection.

The additional auto traffic would necessitate the provision of 600 visitor parking spaces on existing vacant land in the area.

Natural Environment

Impacts would be similar to those discussed under alternative 1.

SUMMARY OF ALTERNATIVES AND THEIR CONSEQUENCES

A summary of alternatives is presented in table 22. The most critical impacts considered in the selection of the preferred alternative were those related to cultural resources, the urban environment and economy of Lowell, and total projects costs. (Costs were based on acquiring, developing, and operating structures and sites.) A summary of the impacts, cost estimates, relative degrees of coordination with other federal agencies, and the management effectiveness for each alternative is described below and summarized in table 23.

ALTERNATIVE 1: EMPHASIS AT OLD CITY HALL, BOOTT MILL, AND WANNALANCIT MILL

The preferred alternative will have significant impacts on cultural resources because maximum preservation of these resources will be undertaken. There will be impacts on cultural resources from minor modifications for public use and barrier-free access.

Park Service development will significantly improve the urban environment and economy of Lowell. The service sector of Lowell's economy will expand, with minimal loss of existing retail activity.

Acquisition costs will be relatively moderate to high, and development/operational costs will be high. Because there will be many resources preserved at various locations, high expenditures will be required under this alternative. Use of funds will be maximized by extensive coordination with other federal, state, and local agencies.

ALTERNATIVE 2: NO ACTION

This alternative would have the most impact on cultural resources. Because Park Service involvement would be minimal, significant cultural resources would probably deteriorate.

Impacts on the urban environment and the economy of Lowell would be minimal, and the present economic trends would not change.

The total cost would be low in comparison to the other alternatives. Coordination with other agencies would be maximized, but the effectiveness of cooperative efforts would be minimal because there would be few Park Service resources.

ALTERNATIVE 3: PRIMARY EMPHASIS AT THE BOOTT MILL COMPLEX

This alternative would have significant impacts on cultural resources. There would be negative impacts on the Wannalancit Mill complex. Unique hydropower artifacts may not be available for interpretation and preservation.

The urban environment would be improved as described under alternative 1. Although service-related retail activity would increase substantially, the character of the central business district would be impacted by the seasonal, tourist-related retail activity and the subsequent loss of services required by residents. The congestion in the central business district and the emphasis on tourist-oriented services would discourage residents from using the downtown area.

The total cost of this alternative would be less than the preferred alternative. Acquisition costs would be moderate, and development costs would be high due to the reconstruction of the Boott Mill boardinghouse. Operational costs would be slightly less than the preferred alternative because the Park Service would own fewer structures. This alternative would have the highest level of coordination with other agencies which might result in limited Park Service interpretive programs and less flexible uses of Park Service owned and related structures.

ALTERNATIVE 4: PRIMARY EMPHASIS AT WANNALANCIT MILL COMPLEX

This alternative would have significant impacts on cultural resources; however, the concentration of Park Service activities in one area might cause cultural resources in other parts of the city to deteriorate.

There would be minimal impacts on the urban environment. The major economic impacts of the park would be in the vicinity of the Wannalancit Mill complex rather than in the central business district.

The total cost of this alternative would be less than the preferred alternative. Acquisition and development costs would be relatively moderate, and operational costs would be less than alternatives 1 and 3. The concentration of Park Service activities would facilitate management. This alternative would have less coordination and cooperation with other agencies than the previous alternatives.

Table 22. Summary of Alternatives

Alternative Plans	Alternative 1 Emphasis at Old City Hall, Boott Mill, and Wannalancit Mill	Alternative 2 No Action	Alternative 3 Primary Emphasis at Boott Mill	Alternative 4 Primary Emphasis at Wannalancit Mill
Overall Strategy	Maximized opportunities for preservation of cultural resources, interpretation, and management	Existing policies continued	Maximized downtown interaction	Minimized downtown conflicts
Interpretation/Visitor Use				
Information/Orientation	Lowell Manufacturing Company complex	Welles Block	Lowell Manufacturing Company complex	Lowell Manufacturing Company complex
Interpretive Center(s)	Old City Hall Boott Mill complex Kirk Street Agents' House Mack Building - DEM Wannalancit Mill complex	Wannalancit Mill complex, Lowell Museum Mack Building - DEM	Boott Mill complex Old City Hall Kirk Street Agents' House H & H Paper Company Mack Building - DEM	Wannalancit Mill complex Mack Building - DEM
Use and Treatment of NPS Owned and Related Structures and Sites				
Lowell Manufacturing Company Complex	Infomation/orientation center Commission commercial space Private housing	Information kiosk Private housing	Same as 1	Same as 1
Old City Hall	Industrial urbanization interpretation NPS headquarters	Private concession use NPS assistance for facade improvements	Same as 1	Same as 2
Jade Pagoda/Solomon's Yard Goods	park	Community use Commercial space Concession	Same as 1	Commission -- lease or resell for commercial use
Merrimack Gatehouse	NPS exhibit in place	City exhibit in place Information center	Same as 1	Same as 2
Kirk Street Agents' House	Mill agent themes interpretation Residential/conference center	Same as 1 plus maintenance	Same as 1	Residential/conference center--city & NPS
Wannalancit Mill Complex	NPS interpretive hydropower exhibit	Lowell Museum Private deveopment, including museums Exterior interpretation	Same as 2 without Lowell Museum	Major NPS interpretive exhibit (larger than 1) NPS headquarters

Alternative Plans	Alternative 1 Emphasis at Old City Hall, Boott Mill, and Wannalancit Mill	Alternative 2 No Action	Alternative 3 Primary Emphasis at Boott Mill	Alternative 4 Primary Emphasis at Wannalancit Mill
Tremont Yard	NPS archeological exhibit and interpretive park	Passive park--DEM	Same as 2	Same as 1
Hall St. Agents' House	Exterior interpretation	Same as 1	Same as 1	NPS acquisition for interpretation of mill agent themes
Tewksbury Wood Products	Exterior interpretation	Same as 1	Same as 1	NPS acquisition for interpretation of mill girls themes
Boott Mill Complex	Major NPS interpretive exhibit Commission development	Minor NPS exhibit Commission development	Major NPS exhibit Lowell Museum	Commission development
Boott Mills Boarding Parking Lot	NPS interpretive park and archeological exhibit	Commission development as interpretive park with NPS technical assistance	Same as 1	Same as 2
H & H Paper Company	Commission development with NPS technical assistance	Same as 1	NPS acquisition and reconstruction for interpretation of boardinghouse themes	Same as 1
General Development				
Access	Auto -- I-495 Lowell Connector	Same as 1	Same as 1	Same as 1
Parking	Dutton Street Swamp Locks parking lot Short term: Joan Fabrics parking lot	Dutton Street Boott Mill area Market Street On-street	Dutton Street Swamp Locks parking lot Market Street Boott Mill area Short term: Joan Fabrics parking lot	Same as 1 with expanded Wannalancit facilities
Circulation	Shuttle bus Trolley Pedestrian Barge	Shuttle bus Private car Pedestrian Minor barge tour	Shuttle bus Trolley Pedestrian Minor barge tour	Same as 1
Canal Development	DEM development Phase 1: Aiken St. to Dutton St. Phase 2: Restore Swamp Locks Phase 3: Remove Central St. structures; restore Lower Locks and Western Canal Hiking and biking paths	DEM development Francis Gate Swamp and Lower locks Hiking and biking paths Minor barge tour	DEM development Promote downtown canal loop Less emphasis on outer loop	Same as 1

Alternative Plans	Alternative 1 Emphasis at Old City Hall, Boott Mill, and Wannalancit Mill	Alternative 2 No Action	Alternative 3 Primary Emphasis at Boott Mill	Alternative 4 Primary Emphasis at Wannalancit Mill
Streetscape Development	Upgrade downtown Close Shattuck St. and half of Kirk St.	Minor sidewalk improvements Period lighting in limited area	Same as 2	Minor improvement downtown Upgrade Wannalancit
Maintenance Site	Notini property	Partial use of Kirk Street Agents' House	Macheras lot	Same as 1
Boundary Changes	Additions: Boott Mill parking lot Shattuck to Palmer St. Tremont Yard Joan Fabrics parking lot Lawrence Canal Spur Swamp Locks parking lot	Additions: None	Additions: Kirk to John St. Shattuck to Palmer St. Lawrence Canal Spur Joan Fabric parking lot Deletion: Wannalancit area	Additions: Wannalancit area Tremont Yard Joan Fabrics parking lot

Table 23. Summary of Impacts

Impacts	Alternative 1 Emphasis at Old City Hall, Boott Mill, and Wannalancit Mill	Alternative 2 No Action	Alternative 3 Primary Emphasis at Boott Mill	Alternative 4 Primary Emphasis at Wannalancit Mill
Cultural Resources	Maximum preservation	Potential loss of resources	Preservation with some loss of resources in Wannalancit area	Preservation with some loss of resources in parts of the city
Urban Environment	Greatly improved	No change	Greatly improved	Moderately improved
Urban & Regional Economy	Significant improvement	No change	Improvement but possible replacement of downtown retail stores	Less improvement than alternative 1
Acquisition Costs	Moderate to high	Low	Moderate	Moderate
Development Costs	High	Low	High	Moderate
Operations Costs	High	Low	Moderate to high	Moderate
Coordination with Other Agencies	High	High but not very effective	Moderate	Moderate
TOTALS	High	Low	Moderate	Moderate

CONSULTATION AND COORDINATION WITH OTHERS / INDEX

DEVELOPMENT OF THE PROPOSAL AND PREPARATION OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

Public and interagency coordination in Lowell began prior to the enactment of the national park in June 1978. The Lowell Historic Canal District Commission, which was established by federal legislation in 1975 to prepare a plan for the preservation, interpretation, development, and use of the historic, cultural, and architectural resources of Lowell, began the planning process. The canal district commission contracted with consultants David A. Crane and Partners/DACP, Gelardin/Bruner/Cott, and Michael Sand & Associates, Inc. to prepare a plan for submission to Congress. A major component of this planning effort was the coordination of public and interagency participation. A series of local planning discussion meetings was conducted by the consultants, and a public newsletter called the "Canal Packet" was used to present alternative planning concepts for comment. When the National Park Service planning effort began, a history of public participation existed in Lowell and a number of residents were familiar with the details of the Report of the Lowell Historic Canal District Commission Report.

The National Park Service began a major planning and public involvement effort in Lowell during November 1978. A 2-year resident planning team was located in Lowell to coordinate the planning at the local level. Because the park concept in Lowell involves a complex interagency and private sector approach, extensive coordination and consultation were required.

As a result of the detailed public and interagency coordination process used at Lowell, planning and management decisions were completed in a timely and effective manner. This successful coordination of many different interests has resulted in a plan that has support and approval by the many interests involved. The daily interaction was very beneficial and created a feeling among all the groups that everyone was making a significant contribution to the planning decisions.

The consultation process began with the identification of agencies, organizations, and interested publics, along with their specific expertise or interests. Meetings were conducted to determine activities that were underway by the various agencies so efforts were not duplicated. Educational organizations, such as the Lowell school system and the University of Lowell, were contacted by the park and planning team staffs to help formulate interpretive and educational program ideas.

Frequent consultation sessions were held with the staffs of the Massachusetts Department of Environmental Management and the Lowell Historic Preservation Commission. The department is responsible for the development of the Lowell Heritage State Park, and the Preservation Commission is responsible for the preservation district plan and the preservation and adaptive use of several buildings within the park. The three agencies and the city of Lowell were involved in various planning presentations, reviews of consultant contracts, and technical assistance reviews concerning modifications to park and preservation district structures by the private sector.

PLANNING NEWSLETTERS

The planning team prepared a public involvement strategy during the spring of 1979. A key component of this involvement process was a planning newsletter entitled "Planning NEWS." The first issue was distributed to about 2,500 individuals. This issue stressed the various roles of the agencies involved in the park, delineated park and preservation district boundaries and roles, listed key park buildings and activities, and included interviews with personnel of the many agencies and organizatons involved in planning for the park. The newsletter also presented the planning schedule to be followed by the park planning team and provided an opportunity for the public to involve themselves in the planning activities.

A second planning newsletter was released for public comment in June 1979. This newsletter included alternatives for park development and the pros and cons of each. Over 4,000 copies were distributed within the greater Lowell area. A public response form was inserted in the newsletter, and all interested individuals were asked to mail responses to the planning team. The planning team summarized all comments and provided them to interested publics.

In January 1980 a summary of the preferred plan was released for public information through the park's newsletter entitled, "Milling Around." The summary was released for informational purposes at this time because of local interest and the lengthy schedule required for agency review of more formal documents. Approximately 14,000 copies were distributed to everyone who had previously indicated an interest in park-related activities.

PUBLIC MEETINGS

The Lowell Historic Preservation Commission and Park Service planning team held public meetings during the summer of 1979 to evaluate various park-related issues. Specific community leaders and organizations were invited to present comments regarding the preservation district and park. Issues ranged from social-ethnic problems to the specifics of park development and implementation.

The Park Service planning team and park staff conducted additional public meetings to ensure a broad representation of interested groups. The meetings were publicized in the Lowell and Boston areas through news releases, radio broadcasts, posters, and letters to community or group leaders. Items discussed during these meetings included approaches to information/orientation, transportation and lodging, locations and themes for interpretive centers, and use and treatment of Park Service properties.

A public mailing list related to planning activities was initiated during the public meetings and has been continually updated as more planning activities occur. (The park staff has a larger mailing list used to circulate park newsletters and information on park activities and special events.)

A series of planning presentations for special groups was made following the general public meetings. Any group or organization that was thought to have an interest in the park or associated impacts was contacted. Meetings were scheduled and presentations were made to the following organizations, agencies, or clubs:

Lowell Historical Society, Board of Trustees
Downtown Businessmen's Association, Executive Committee
Greater Lowell Association of Retarded Citizens
Community Teamwork, Inc.
The Exchange Club
Rotary Club of Lowell
Lowell City Fair Staff
Lowell Department of Planning and Development
Lowell Association for the Blind
Lowell Museum Corporation, Board
Lowell City Council
Lowell Heritage State Park, Advisory Committee
Lowell Chamber of Commerce
Northern Middlesex Area Commission
Lowell Regional Transit Authority
Westford Rotary Club
Lowell Rotary Club
Lowell Police and Fire Department Chiefs

INTERAGENCY PLANNING TASK GROUPS

Several informal planning and consultation groups were formulated during the first year of planning for the park and preservation district. Group meetings addressed various subjects related to park development and associated impacts. Among the subjects evaluated were access to and within the park, facade programs, sign codes, visitor and retail parking, street closings and restrictions, park attractions, canal preservation and use, and energy systems. Organizations involved in these meetings included the following:

Lowell Department of Planning and Development
Lowell Historic Preservation Commission
Massachusetts Department of Environmental Management
Northern Middlesex Area Commission
Lowell Regional Transit Authority
Moore-Heder Consultant Team
Proprietors of the Locks and Canals on the Merrimack River
Massachusetts Department of Public Works

ROLE OF THE PRESERVATION COMMISSION IN THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT

The Lowell Historic Preservation Commission, an agency of the Department of the Interior, was mandated by the same legislation that created Lowell National Historical Park. Its primary goals are to make preservation feasible in the historic area surrounding the national park and to sustain

the culture and traditions of Lowell in order to build a "living park" for visitors and residents. The Preservation Commission has prepared a Preservation Plan to guide its actions in the preservation district, a buffer zone surrounding the national park.

Because of the overlapping goals, objectives, and physical proximity of their programs, the Park Service and Preservation Commission sought ways of combining their efforts in assessing the environmental impacts of the proposed actions. Wherever possible, the NPS Environmental Impact Statement discusses and assesses Preservation Commission projects. In some cases, however, full information was not available, and some actions could not be assessed in this document. These and other aspects of Preservation Commission projects are addressed in an environmental assessment. In this document, the Preservation Commission assesses more fully its mandated programs, specifically the standards and criteria for treatment of properties in the preservation district and the grant and loan program. This environmental assessment accompanies the Preservation Plan which is currently available.

The National Park Service and Preservation Commission began coordination efforts with the state historic preservation officer and advisory council prior to the formulaton of the plan for the park and preservation district. Meetings were held to discuss various planning alternatives, architectural treatment of historic structures, and adaptive use problems. A process was established for the Park Service and Preservation Commission to meet various compliance requirements and to ensure that the National Historic Preservation Act and other federal executive orders were properly considered in the planning activities.

This coordination has been very successful and has resulted in a memorandum of agreement between the Park Service, the state historic preservation officer, and the advisory council. The state historic preservation officer and the advisory council will continue to be actively involved in design and mitigation work. Final design details for the park site now occupied by Solomon's Yard Goods and the Jade Pagoda will require the approval of the state historic preservation officer.

COORDINATION IN THE REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

In 1980, a Draft Environmental Impact Statement was prepared, which described and assessed the proposal for Lowell National Historical Park. The Draft Environmental Impact Statement was released in May 1980, along with the Draft General Management Plan for the park.

The documents were distributed to interested groups and individuals. Public meetings for comments on both documents were held on June 25 and 26 in Lowell. These meetings were attended by more than 60 Lowell residents and agency and organization representatives. Members of the planning team and park staff responded to questions and comments on both documents.

COMMENTS AND RESPONSES ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The letters and responses in this section are organized first by federal agencies and then by state agencies and regional organizations. The responses to the comments are presented on the right side of the page and number coded to the comments that the National Park Service has determined to be substantive. In some cases, this commentary warranted an overall response. In most cases, the responses have been tied to text page changes in the Final Environmental Impact Statement or General Management Plan.

As a result of comments received from three agencies--Environmental Protection Agency (EPA), Massachusetts Department of Environmental Quality Engineering, and the Federal Highway Administration--followup meetings were held between representatives from the Park Service and the agencies. The meetings were held jointly because the comments were of similar nature. A meeting with EPA was held on August 26 and with all three on October 22; the purpose was to refine issues to be resolved for the final environmental impact statement and for the nature and scope of additional work. At a joint meeting on November 25, the revisions were reviewed and accepted as satisfactory by all agencies involved.

Federal Agencies

Department of Commerce
    National Marine Fisheries Service
Department of Energy
    Federal Energy Regulatory Commission
Department of Housing and Urban Development
Department of the Interior
    Fish and Wildlife Service
    Heritage Conservation and Recreation Service
    Lowell Historic Preservation Commission
Department of Labor

Department of Transportation
- Federal Highway Administration, Region One
- Urban Mass Transportation Administration
- U.S. Coast Guard

Environmental Protection Agency

Massachusetts Agencies

Department of Environmental Management
- Division of Fisheries and Wildlife
- Division of Marine Fisheries
- Division of Parks and Recreation

Department of Environmental Quality Engineering
- Office of Communities and Development
- Office of Environmental Affairs
- Office of Transportation and Construction
- Division of Air Quality Control

Historic Preservation Officer

Regional Organizations

Essex Corporation
Julius Tofias & Co.
Northern Middlesex Area Commission

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
Environmental Assessment Branch
7 Pleasant Street
Gloucester, Massachusetts 01930

September 23, 1980

Superintendent, Lowell National Historical Park
171 Merrimack Street
Box 1098
Lowell, MA 01853

Dear Superintendent:

The National Marine Fisheries Service has reviewed the draft environmental impact statement for the General Management Plan, Lowell National Historical Park, Lowell, Massachusetts.

In order to provide as timely a response to your request for comments as possible, we are submitting the enclosed comments to you directly, in parallel with their transmittal to the Department of Commerce. These comments represent the views of the Northeast Region, National Marine Fisheries Service, and are not the formal, consolidated views of the Department.

Sincerely,

Ruth Rehfus

Ruth Rehfus
Acting Branch Chief

Enclosure

cc: NPS Boston - D. Clark

COMMENTS

RESPONSES

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Environmental & Technical Services Division
Environmental Assessment Branch
7 Pleasant Street
Gloucester, Massachusetts 01930

September 23, 1980

TO: PP/EC - Joyce M. Wood

FROM: F/NER62 - Ruth Rehfus

SUBJECT: Draft Environmental Impact Statement -- General Management Plan, Lowell National Historical Park (Unnumbered)

The Draft Environmental Impact Statement (DEIS) for the general management plan, Lowell National Historical Park. has been received by the National Marine Fisheries Service (NMFS) for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments

While the discussions of fishery resources in the project area are not as detailed as they might be, we find them generally adequate for decision-making during the general management planning phase. Construction plans for any canal and river construction undertaken later will be subject to Fish and Wildlife Coordination Act review, and the NMFS would at that time recommend such measures as we think necessary to minimize any potential adverse impact to resources of concern to this agency. For example, seasonal restrictions might be necessary to prevent increases in turbidity during migrations of anadromous fish. We note with approval that page 96 of the DEIS emphasizes the intent of project staff to allow for the safety and unhindered migration of anadromous fish. These anadromous runs are of historic as well as biological importance, and as such are of particular interest as part of a National Historic Park area.

Specific Comments

Page 47, paragraph 5.

1 The NMFS is also a party to the efforts to restore Atlantic salmon and American shad to the Merrimack River, and should be so listed.

Page 47, paragraph 6.

2 The endangered shortnose sturgeon (Acipenser brevirostrum) is known to inhabit the Merrimack River below Lawrence, Massachusetts (Essex Dam) however, there are no records of this species presence in the Lowell area.

1 We concur; see page 43 for appropriate changes.

2 See correction made on page 43.

COMMENTS

Therefore, no further consultation is necessary under Section 7 of the Endangered Species Act of 1973, as amended. However, should project plans change, or if additional information on listed or proposed species becomes available, consultation should be reinitiated.

CLEARANCE: SIGNATURE AND DATE:

F/HP:JROTE:

RESPONSES

COMMENTS

Department of Energy
Region I
150 Causeway Street
Boston, Mass. 02114

26 SEP 1980

Superintendent
Lowell National Historical Park
171 Merrimack Street
Box 1098
Lowell, MA 01853

Dear Sir:

Region I of the Department of Energy has reviewed the draft environmental Impact Statement and general management plan "Lowell National Historical Park/Massachusetts". The following are our comments relating to the above impact statement.

1. We are pleased with the concepts presented in this project. Not only is this a plan for the restoration of a historic site but also maximum use will be made of historic mass transportation means. This should provide an excellent education tool for energy conservation as well as a method of informing sightseers of possible things that could be done in their own communities.

1 2. Page 17, second paragraph - A reference is made to the fact that trains are now running to New Hampshire through Lowell. It is my understanding that this is a trial measure and may be discontinued or reduced. This fact should be included within this paragraph.

3. Page 66 Access and pages 70 & 88 Circulation - We concur with your concerns regarding congestion, use of visitor parking areas and availability of provided shuttle transportation. Not only will this improve the authenticity of the Park, it will also provide for the uniform movement and control of visitors. Congestion creates an increase in energy use with vehicles idling waiting to get from place to place.

4. Page 75 - Energy Program - If all older structures could undergo the renovations which have been described, the energy situation would easily be reduced. It is felt that some of the efforts and actions taken should be highlighted at the facility, especially those that use alternative energy systems. If these procedures are to be part of the demonstration, this fact should be included as part of the DES.

Thank you for the opportunity to comment.

Sincerely,

Harold J. Keohane
Regional Representative

cc: David Clark
National Park Service

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RESPONSES

1 We concur; see page 17 for appropriate change.

COMMENTS

RESPONSES

FEDERAL ENERGY REGULATORY COMMISSION
NEW YORK REGIONAL OFFICE
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

September 17, 1980

Superintendent
Lowell National Historical Park
P.O. Box 1098
Lowell, MA 01853

Re: Draft Environmental Impact Statement
and General Management Plan for
Lowell National Historical Park

131

Dear Sir:

This is in response to your letter of September 5, 1980, requesting our review and comments on the subject documents. Our examination focussed on matters related to the jurisdiction of the Federal Energy Regulatory Commission (FERC) and we offer the following remarks for your consideration.

Boott Mills and Proprietors of Locks and Canals on the Merrimack River (Applicant) filed an application with FERC on December 17, 1979, and a revised application on May 20, 1980, for a major license for the Lowell Hydroelectric Project, FERC No. 2790. The proposed project falls within the boundaries of the Lowell National Historical Park. The facility would consist of the existing Pawtucket Dam on the Merrimack River in Lowell, a proposed 15,000-kilowatt power plant to be located on the existing Northern Canal, and four existing smaller generating stations located at separate locations along the approximately six-mile Lowell Canal System. The five separate generating stations would be hydraulically integrated and operated as a single project. The project would have a total installed generating capacity of 22,915 kilowatts.

Our staff has concluded that the proposed construction activities related to the hydro project as well as the operation of the completed project would have both short-term and long-term impacts, respectively, on historic, fishery, and recreational activities of the planned Park. The Applicant has attempted to design the hydro project to reduce impacts to historic structures and is continuing to consult with agencies on all aspects of project design and operation. Various agencies indicated that further consultation is necessary and that final project plans need to be reviewed by the agencies. Most agencies, however, have not expressed opposition to the proposed project.

COMMENTS

Our staff also concluded that resolution of the issues and the negotiation of acceptable mitigative measures would depend upon close coordination with the Lowell Historic Preservation Commission, National Park Service, State and local historic interests, and Federal and state fishery interests. It was further concluded that negotiations among interested agencies can produce a satisfactory project plan with a design and operation schedule acceptable to the agencies involved.

The subject documents as well as the application for license for the hydro project corroborate the fact that some problems might be incurred if the hydro project is constructed. However, it appears that the Applicant is working closely with all of the concerned agencies and local interests to develop a hydro project that would be acceptable to all parties concerned. On page 41 of the General Management Plan for the Park, it states that the Proprietors of the Locks and Canals (Applicant) will be part of a four party cooperative agreement which will oversee the management of the canal system for the Park.

1 Our review of the subject documents did reveal one seeming inconsistency related to the effects of the proposed powerhouse on recreational boating. On page 59 of the draft General Management Plan, the discussion in the third paragraph indicates benefits to recreational boating, while on page 52 of the draft Environmental Statement, the discussion in the last paragraph indicates only problems for recreational boating posed by the construction of the powerhouse. Clarification of this matter would be helpful.

We appreciate the opportunity to review and comment on the subject documents.

Sincerely,

Martin Inwald
Acting Regional Engineer

cc: Mr. David Clark

RESPONSES

1 The FEIS states that potential complications could occur for canal boat tours (interpretive boats) and that modifications would be required for recreational boating. In the GMP, we state that modifications for clearance of recreational boats would have to be made before certain types would be able to pass through all areas.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
BOSTON AREA OFFICE
BULFINCH BUILDING, 15 NEW CHARDON STREET
BOSTON, MASSACHUSETTS 02114

REGION I

SEP 17 1980

Superintendent
Lowell National Historical Park
171 Merrimack Street
Box 1098
Lowell, Massachusetts 01853

Re: Draft Environmental Impact Statement
Lowell National Historical Park

The above DEIS which was sent to the HUD Regional Office has been referred to the HUD Boston Area Office for review and comment.

This office has reviewed the DEIS and has no comment to make on the General Management Plan for the Lowell National Historical Park.

Thank you for the opportunity to review and comment on the DEIS.

Sincerely

Edward Machado
Environmental Officer

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
New England Area Office
P. O. Box 1518
Concord, New Hampshire 03301

SEP 4 1980

Mr. Lewis Albert, Superintendent
Lowell National Historical Park
171 Merrimack Street
P.O. Box 1098
Lowell, Massachusetts 01853

Dear Mr. Albert:

This is in response to Mr. David Clark's August 29 request for review and comment upon the draft environmental impact statement and draft general management plan for the Lowell National Historical Park which we received from him on September 3. A copy of this letter is being sent to Mr. Clark.

General Comments

We note that a major effort will be made through interpretive themes and programs to detail the several phases of industrial, cultural and socio-economic evolution experienced in the greater Lowell area. The discussions in the DEIS on vegetation and wildlife (p. 47) and on fisheries (p. 96) note very briefly the historical presence of American shad and Atlantic salmon, but the major emphasis on the fisheries subject appears to be directed toward recognition of the present-day restoration effort and current national park planning to include consideration of both resident and migratory fishes.

1 We urge you to give consideration to developing some historical interpretive materials on the scope and economic importance of the fisheries of the Merrimack River before the advent of the dams which blocked fish movement and the concurrent increase in waterway pollutants. We submit that this is an important aspect in the historical development of the basin, and justifiably should be given more emphasis although its heyday preceded development of the planned industrial city. We feel that the "story" would be more complete if this subject is given added emphasis in interpretive materials. It would serve effectively, too, as a basis for development of information on the need for today's coordinated planning of the entire park complex so as to protect, and enhance if possible, resident and anadromous fisheries.

1 We concur that the fisheries theme is an important one. The responsibility for developing this theme rests primarily with the Department of Environmental Management through the interpretive programs of Lowell Heritage State Park as described on page 47. However, the fisheries story is currently, and will in the future, be told by NPS interpreters in their story of the development of the Merrimack River for transporation, power production, and other cultural purposes.

COMMENTS

Specific Comments

On page 96 of the DEIS note is made that National Park Service activities will have no significant impacts on the Merrimack River (anadromous fisheries) restoration program. We note, too, that ongoing efforts are being made to coordinate activities with the Interagency Task Force for the Restoration of Fish on the Merrimack River. We conclude that continued coordination should be carried out to insure that hydroelectric development, and development of the canal system for visitor use and interpretation, give due consideration for fishery management concerns. We concur that fishing access be considered a subject for further definition as planning proceeds.

1 Page 58 of the Draft General Management Plan discusses provisions for the physically handicapped in visitor-circulation throughout the Park. We recommend this planning be extended to include facilities for the handicapped, if at all possible, at any designated fishing areas which may be developed either on the river or on the canal system.

2 Dredging Impacts: Several sections in the DEIS discuss the possibility of dredging. Specific items that would need to be addressed include nature and extent of pollutants (oil/grease, heavy metal, pesticides, PCB's) in the sediments, availability of proper disposal sites, impact on fisheries, fish habitat, and fish migrations.

Sincerely yours,

Charles R. Maloy
for Area Manager

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RESPONSES

1 The FEIS includes a statement regarding access by the handicapped to fishing and recreational areas, see page 90.

2 Dredging impacts will be assessed further by the involved agency or agencies on a case by case basis.

COMMENTS

RESPONSES

United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE
NORTHEAST REGION

600 Arch Street — Room 9310
Philadelphia, Pennsylvania 19106

IN REPLY REFER TO

JUL 21 1980

Mr. Lewis S. Albert
Superintendent
Lowell National Historical Park
171 Merrimack Street
Lowell, MA 01853

Dear Lew:

We have completed our review of the draft general management plan and environmental impact statement for the Lowell National Historical Park in Massachusetts. Overall, the draft more than adequately addresses the current picture in Lowell, as well as the tremendous opportunities for the future. We commend the attention and efforts made by NPS to address barrier free accessibility and energy conservation in the plan.

The following specific comments are provided for your consideration and use:

1 Management Plan,Table 2 - The three phases in the Ten Year Development Schedule should each be assigned an approximate timeframe for completion. Also, if Alternative 1, the preferred Alternative is chosen, the plan should contain discussion of a "back-up" prioritized development schedule should annual Congressional appropriations fall short of the existing schedule.

1 Time frames have been assigned to each phase; a prioritized schedule will be established based on congressional appropriations.

2 Management Plan, page 41 - This section in the canal system management responsibilities states that NPS will operate a demonstration hydroelectric exhibit. We understand that DEM will be operating a similar exhibit on hydroelectric power in the Mack Building. The final plan should contain discussion as to the possible duplication and overlapping of visitor and interpretive programs and efforts to avoid this.

2 This subject has been discussed by the two agencies, and both agree that the proposed exhibits will be complementary rather than duplicative.

3 Management Plan, pages 37 and 51 - The plan notes that DEM is in the process of acquiring Tremont Yard from the Courier Company as an integral part of the State Heritage Park. It is also stated that NPS would assume management and development of this site if Massachusetts wishes to donate the property to NPS. Our concern involves the use by Massachusetts of the

3 Discussion will be carried out if the Park Service assumes management.

COMMENTS

Page 2 - Mr. Lewis S. Albert

Land and Water Conservation Fund (Project #25-00248), in the acquisition of Tremont Yard. Any thoughts at this time as to the transfer of management/donation of this property to NPS from DEM should be discussed with the Heritage Conservation and Recreation Service, especially prior to any further DEM acquisitions.

4 Impact Statement, Table 8 - NPS may wish to add the Fayette Street Playground under the "Park and Recreation Projects" heading at a total cost of $50,000. Lowell was granted $35,000 under the Urban Park and Recreation Recovery Act Program for the rehabilitation of this facility.

Thank you for the opportunity to review these documents.

Sincerely yours,

Robert W. McIntosh, Jr.
Regional Director

RESPONSES

4 We concur; see table 8.

COMMENTS

RESPONSES



August 6, 1980

Mr. Lewis Albert
Superintendent
Lowell National Historical Park
171 Merrimack Street
Lowell, MA 01852

Dear Mr. Albert:

The Lowell Historic Preservation Commission has reviewed the Draft Environmental Impact Statement (EIS) on the General Management Plan for the Lowell National Historical Park. The Commission welcomed the opportunity to participate as a cooperating agency in the preparation of this document.

We found the EIS to be clear and complete and were pleased that the published statement incorporated most of our comments from the preliminary drafts. Although the EIS adequately assesses the impacts of future Park Service actions, we recommend several changes relating to the Commission.

Of primary concern are discussions of Commission programs and development proposals which have changed somewhat since the draft EIS was published. Our final preservation plan will be complete in October and will detail our plans for the next eight years. In compliance with the National Environmental Policy Act, we are preparing an environmental assessment on these plans and alternatives. This document will incorporate much of the background data stated in the Park Service draft EIS, both to reduce duplication and to emphasize the cooperation between our two agencies.

1 Related to this, there are several word changes we request you change in the EIS. On page 98, the second paragraph states that Commission development will have "significant impacts on the City of Lowell." This wording has very specific NEPA connotations and implies that the Commission has completed the assessment and has made a formal determination of significance. We suggest that the title of this section be changed to "Preservation Commission Development" and the first sentence be modified to read: "The Lowell Historic Preservation Commission development will have a number of important impacts on the City of Lowell."

Finally, we want to restate our concern that the main thrust of both agencies' efforts be directed to the City Center area to further strengthen Lowell's 19th century setting and its economic viability.

Lowell Historic Preservation Commission Department of the Interior 204 Middle Street Lowell, Massachusetts 01852 (617) 458-7653

1 We concur; see page 92.

COMMENTS

RESPONSES

We look forward to continuing the spirit of cooperation with the Park Service on the projects already underway as well as those in the future.

Sincerely,

FF/mvk

Fred Faust
Executive Director

COMMENTS



Mr. Lewis Albert
Superintendent, Lowell National Historical Park
171 Merrimack Street
Lowell, Massachusetts 01853

Dear Mr. Albert:

The following are my comments on the National Park Service's draft environmental impact statement (EIS) on the general management plan for the Lowell National Historical Park. The EIS is very readable and graphically pleasing and exciting and the National Park Service should be especially commended on those attributes.

1 The draft EIS addresses transportation matters under the heading of "Circulation." While acceptable, this approach deals only with the park in a vaccum without any regard to the impacts of vehicles (1,666 additional cars daily in the summer) on city streets outside the Lowell CBD, surrounding communities and main highways to the city. I recommend that the draft EIS examine the "downline" impacts of these additional vehicles on communities and highways as to traffic congestion, noise and air quality, and the need for highway improvements necessitated by increased traffic.

2 Visitor parking at Thorndike Street and the Pawtucket Canal (a 1,000-vehicle garage) is proposed without any presentation or examination of fringe parking out on the Lowell connector, I-495 or other main arteries on the outskirts of the city. Fringe parking should be shown as an alternate to bringing large numbers of vehicles into the CBD with a comparison of noise, air quality, and other impacts on residents made for both downtown garages and fringe parking alternatives.

3 In the matter of the Gallagher Transportation Terminal (page 92), this facility is primarily a commuter-oriented transit improvement. The draft EIS plan calls for its use by Park visitors but fails to examine commuter-visitor parking conflicts. It would be appropriate to examine in the draft EIS the needs of the Lowell Transit Regional Authority for the transportation terminal parking facilities and what problems may arise when there is park visitor interface with commuters.

4 On pages 49, 64, and 110, the draft EIS is emphatic that the Lowell Historic Preservation Commission will do phased or partial acquisition of the Boott Mills (page 49) and acquire the entire Boott Mills (pages 64 and 110). This "cast in iron" approach to the discussion of alternatives for the Park is one of the weaknesses of the draft EIS. It does not take into consideration that the Commission at this point has not determined it will acquire totally or partially the Boott Mills. As discussed at the June Commission meeting the current owners may want to be the developers of their own property and as such will preclude major decisions on use by either the Park Service or Commission.

RESPONSES

1 We concur; see changes made in the impact section on air and noise.

2 The Park Service is now proposing the Swamp Locks lot for parking. Fringe parking areas were considered infeasible; see pages 82 through 85.

3 Gallagher transportation terminal has been considered for visitor parking on Sundays and holidays; see page 85.

4 As discussed in the summary of the FEIS on page vii and in the Alternatives section beginning on page 55, a new approach has been developed which includes joint Preservation Commission, National Park Service, and private sector development of the Boott Mill complex.

COMMENTS



Also, Commission funding may not be available to acquire the property. I believe that the Park Service should condition their Boott Mill discussion to reflect these contingencies.

5 A lesser point, the draft EIS alludes to documents such as a four-party cooperative agreement on Canal System Development (page 71) and a Memorandum of Agreement on section 106 compliance (page 131), but they are not available in the Appendix for reference. I suggest that the final EIS include these documents plus others referenced in the EIS.

6 I am curious as to why Interstate 93 is never discussed as part of the routing to Lowell from Boston and points north. I suggest that I-93 in conjunction with either Route 128 and Route 3 or with I-495 be listed as routes to Lowell.

I hope these comments are helpful and look forward to reveiwing the NPS final draft environmental statement on the Park.

Sincerely,

Robert F. Crecco
Member, Lowell Historic Preservation Commission
U.S. Department of Transportation

cc:

Lowell Historic Preservation Commission

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Lowell Historic Preservation Commission Department of the Interior 204 Middle Street Lowell, Massachusetts 01852 (617) 458-7653

RESPONSES

5 The cooperative agreement is included in the GMP, and the memorandum of agreement is included in the appendix of this document.

6 I-93 is shown on the Vicinity map (pg. iv) as a main access highway.

U.S. DEPARTMENT OF LABOR
Employment & Training Administration
John Fitzgerald Kennedy Federal Building

Boston, Massachusetts 02203

Refer: 1TGBF

5 SEP 1980

Superintendent
Lowell National Park
171 Merrimack Street
Box 1098
Lowell, Massachusetts 01853

Dear Sir:

The draft environmental impact statement and the draft general management plan have been reviewed by this office with enthusiasm and approabation.

In as much as the development of the national park complex in Lowell will result in a great influx of tourists, many new jobs, permanent and seasonal, will be created. Furthermore, the activity created by the park establishment will undoubtedly induce other economic activity which will result in the creation of additional jobs in the labor market.

Sincerely,

Barbara A. Farmer
Acting Regional Administrator
for Employment and Training

COMMENTS

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE
31 St. James Avenue-Room 211
Boston, Massachusetts 02116

Lowell National Historical Park Draft EIS

IN REPLY REFER TO

December 3, 1980 HEV-MA

Superintendent Lewis S. Albert
171 Merrimack Street
Box 1098
Lowell, Massachusetts

Dear Superintendent Albert:

Several meetings between members of my staff and the National Park Service concerning the Draft EIS for the above project have occurred since our letter dated August 20, 1980. We have reevaluated our comments in that letter and now believe that the Draft EIS is satisfactory. Our reasons are:

(1) The Draft EIS was for the general management plan for the proposed Lowell National Historical Park and, therefore, can be considered a first tier EIS. Other second tier environmental documents for the actions described in the plan may follow.

(2) The Environmental Protection Agency and the Massachusetts Department of Environmental Quality Engineering have found the level of air and noise environmental impact analyses to be satisfactory.

(3) The transportation impacts of the proposed Park are not significant.

We will accept the responsibility for examining the environmental impacts of any individual transportation actions in the Lowell area involving Federal-aid highway funds.

Sincerely yours,

N. J. Van Ness
Division Administrator

By: Edwin P. Holahan, Assistant
Division Administrator

cc: Mr. Dave Clark
Department of Interior

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RESPONSES

COMMENTS

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION ONE
100 Summer Street - Suite 1517
Boston, Massachusetts 02110

Lowell National Historical Park
Draft EIS

IN REPLY REFER TO:
HEV-MA

August 20, 1980

Superintendent, Lowell National Park
171 Merrimack Street
Box 1098
Lowell, Massachusetts 01853

Dear Sir:

1 This is in response to a request for the Federal Highway Administration's comments on the Draft Environmental Impact Statement for the Lowell National Heritage Park in Massachusetts.

Circulation

The map on p.95 should show both existing and projected traffic volumes for the no-action alternative and selected alternative. It should also be expanded to show where this traffic is coming from outside of the immediate area of the Park.

Traffic level of service should be determined for each corridor for both existing and projected volumes for the no-action alternative and the selected alternative. The FEIS should then discuss the need for additional traffic capacity i.e. TOPICS-type improvements, additional lanes, etc. We do not believe that signing and encouragement to use mass transit in and of themselves constitute mitigation measures.

In addition to the corridor traffic analysis discussed above, the effect on the traffic level of service of the downtown street from the street closure, one way circulation, auto-restricted zone and other traffic changes described on pp. 88-92 should be determined.

Air Quality

Since existing and projected traffic levels of service for the no-action alternative and the selected alternative will differ, the impact on air quality should be evaluated. A microscale air analysis should be performed to determine whether any "hot spot" intersections are created.

RESPONSES

1 These issues were discussed in meetings and resolved to the satisfaction of FHWA. (See Dec. 3, 1980, FHWA letter, page 143.)

COMMENTS

The document also states on p.90 that if the Thordike Street parking area is not developed congestion in the downtown area will become more severe. A separate microscale analysis should be performed to determine air quality impacts for this situation.

The FEIS should contain a letter from DEQE stating whether or not this report is consistent with the Massachusetts State Implementation Plan.

Noise

The report states that traffic noise is a significant problem in Lowell. A noise analysis should be performed to predict the quantitative effects of the Park on existing noise. The FEIS should also outline the assumptions and methodology used in the noise analysis to arrive at these predicted decibel (dBA) figures.

The report also states on p.94 that through truck traffic would be restricted from Merrimack Street and diverted. How much of a dBA decrease would occur as a result of this diversion? Does the benefit of noise reduction outweigh the consequences of possible increased air pollution at some intersections and increased gasoline consumption?

Streetscape Development

Some of the proposed street amenities, such as cobblestones, bollards, etc., can create safety hazards to both motorists and pedestrians, particularly those located in the roadway or close to the roadway edge. Also, many of the sidewalk and walkway amenities will become a maintenance burden for the City.

Other Comments

p.19 The Federal Roadway Classification terms are outdated. "Primary-Type 1" should be changed to "Primary" and "Primary-Type 2" should be changed to "Urban System". Some of the streets depicted on this map may already be on the Lowell Urban System and, thus, should not be referred to as "proposed".

p.38 Consider including the highway projects on Pawtucker Boulevard and Andover Street in this list.

p.92 The Sampson Connector project involves widening Dutton Street to five lanes, not four.

p. 92 The Route 213 Draft Environmental Impact Statement was circulated in 1975, not 1978.

p. 93 What emission factors were used in the mesoscale analysis?

P.114 The report incorrectly states that the impact of Alternative 3 on the natural environment would be the same as Alternative 1. First, the

RESPONSES

figures shown on pp. 136-138 for Alternatives 1 and 3 are slightly different. Second, the microscale air impacts of Alternative 1 will be different from Alternative 3. This statement is also on p. 118 and should be changed.

Should you have any questions about the above comments or wish to discuss them further, please contact Frank Bracaglia (223-2875) of my staff.

Sincerely yours,

N. J. Van Ness
Division Administrator

cc: Mr. George R. McCarthy, Regional Representive to the Secretary of UCT Region 1

COMMENTS

RESPONSES

DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION
WASHINGTON, D.C. 20590
55 Broadway
Cambridge, Massachusetts 02142

Region I

September 8, 1980

Mr. Lewis S. Albert
Superintendent
Lowell National Historical
Park
171 Merrimack Street
Box 1098
Lowell, Massachusetts 01853

Dear Mr. Albert:

We have reviewed the Draft Environmental Impact Statement on General Management Plan for Lowell National Historical Park, Lowell, Massachusetts and have no comments.

We look forward to continued cooperation with the National Park Service in the development of Mass Transit facilities in the Lowell area.

Sincerely,

Peter N. Stowell
Administrator, Region I

cc: G. McCarthy

COMMENTS

RESPONSES

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
COMMANDER (dp1)
FIRST COAST GUARD DISTRICT
150 CAUSEWAY STREET
BOSTON, MA 02114
Phone: 617-223-6251

16475
14 July 1980

Superintendent, Lowell National Historic Park
171 Merrimack Street
Box 1098
Lowell, MA 01852

Dear Sir:

The draft environmental impact statement for The General Management Plan for Lowell National Historic Park has been reviewed and I have no comments at this time.

Sincerely,

S. L. RICHMOND
Commander, U. S. Coast Guard
Coastal Zone Management Officer
By direction of the Commander,
First Coast Guard District

Copy: George R. McCarthy
DOT Regional Representative
of the Secretary

COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

August 8, 1980

Superintendent Lewis S. Albert
Superintendent's Office
Lowell National Historic Park
171 Merrimack Street
Lowell, MA 01853

Re: D-NPS-B61009-MA

Dear Superintendent Albert:

We have completed our review of the Draft Environmental Impact Statement (EIS) for the General Management Plan, Lowell National Historic Park, Lowell Massachusetts. In accordance with our national EIS rating criteria, a copy of which is enclosed, we have rated this Draft EIS LO-2.

We support the preferred alternative to establish several visitor centers rather than a single center or "no action". The preferred alternative will take advantage of the diverse features in historic Lowell that develop the theme of historic Lowell, "The Industrial Revolution in America". It will encourage visitors to go to the various sites and the canal system by foot and by canal boat. It will also maximize dispersion and may check potential traffic congestion.

We suggest that the plan discuss the relationship of the Lowell National Historical Park, interpretive centers, and access circulation patterns to the comprehensive planning for the Merrimack River and its corridor. As part of the clean-up of the river, EPA through its water quality management and wastewater treatment grants programs, has been working with Lowell, the Northern Middlesex and Central Merrimack regional planning agencies, and engineering consultants to develop promenades, walking, and bicycle paths over the restored surfaces above interceptor sewers under construction along both banks of the Merrimack River. These will form an interconnected trail system linking the Historical Park, the Canals, downtown Lowell with miles of riverfront, adjoining towns and recreation/conservation areas. The system could serve as a basis for an arterial network for access to the Historic Park.

Our agency cites the Urban Cultural Park in historic Lowell as a case example of how the clean-up of the Merrimack and coordinated riverfront access parkways, open spaces and urban waterfronts can become a foundation for the revitalization of Lowell. This effort is cited in EPA's recent national booklet, Recreation and Land Use: The Public Benefits of Clean Waters.

RESPONSES

Overall

The concerns of EPA were discussed in meetings in October 1980, on air quality, water supply, and noise aspects with DEQE (State), FHWA, EPA, and NPS, whereupon the impact analysis text was revised and expanded (pages 85-89). Further, appendix A was expanded and a new appendix was added (see appendix B). The NPS understands that EPA's concerns have been satisfied.

COMMENTS

We note proposals for a parking garage fronting on the Merrimack River. The Plan and EIS might address the impact on riverfront access, recreation uses, and visual amenities. We believe a location back from the river would be preferable.

Attached are additional specific comments for your use in preparing the Final EIS.

Thank you for the opportunity to review and comment on the Draft EIS. Please send five (5) copies of the Final EIS when it becomes available.

If you have any questions relative to our comments, please contact Donald Cooke, of my staff at (617) 223-4635.

Sincerely,

Donald C. Cooke for WES

Wallace E. Stickney, P.E.
Director, Environmental &
Economic Impact Office

Attachment

150

RESPONSES

COMMENTS

Environmental Protection Agency
Comments on
Lowell National Historic Park
Draft EIS

Air Quality

1 Page 93 of the Draft EIS states that, "Although the design year emissions are higher than the no-action alternative, the projected levels are well within EPA standards". However, there appears to be no analysis to support this statement. The Draft EIS only includes a mesoscale analysis projecting total pollutant emissions in the proposed project area. This information is useful and necessary in determining the impact of the proposed project on the Massachusetts State Implementation Plan and its goal of reducing statewide emissions. The Final EIS should include a discussion of this proposed project's interaction with the State Implementation Plan.

A mesoscale analysis does not readily lend itself to a comparison to the National Ambient Air Quality Standards; a microscale analysis is needed for that. The Final EIS should include a microscale analysis, which calculates the carbon monoxide concentrations at air quality receptors located on roads impacted by traffic generated by the proposed project. Years of analysis should include a base year no-build, estimated time of completion build, and a design year build and no-build. The results of this analysis can then be evaluated with respect to the project review criteria in the Massachusetts State Implementation Plan.

Water Supply

2 An increase in runoff can be anticipated with the increase in parking areas, walkways, and loading areas called for by the Draft EIS. The magnitude of the increased runoff should be addressed in the EIS document with respect to a decrease in groundwater recharge, and to potential increase in contamination from additional salting and automobile oil leakage.

With a majority of the park visitors (700,000 to 1,000,000 per year) anticipated to visit in the warm months while on vacation, a greater demand will be placed on existing water supplies when water supplies are generally low. The EIS should address the additional water demand, source, method of withdrawal, treatment and the economics of providing this additional water.

Noise

3 The Lowell National Historical Park is expected to generate about 2000 extra vehicle trips into downtown Lowell per day on busy/summer days, and truck traffic may be re-routed; therefore, it is probable that there will be a noise impact. However, the Draft EIS does not contain an assessment of noise impact. We believe a comprehensive coverage of the motor vehicle caused noise impacts should be included in the Final EIS. (Since there are no major airports or high speed highways nearby, street traffic is believed to control the sound levels for residents living in and near downtown Lowell.)

The study plan needed for the motor vehicle-caused impacts would resemble the following:

RESPONSES

1,2,3 See response on page 149.

I. Automobile Traffic - Park Visitors

1. Determine specific probable routes of travel, including alternatives, and time of day information for park visitors.

2. Determine the impacts of the increased traffic volumes on route neighbors.

   A. Determine the route segments where the increase in volumes is significant (an increase of 5dB would be noticeable and significant. Lesser increases may be significant if they cause the noise level to exceed applicable standards and guidelines such as those set by EPA, HUD or DOT. Note: The travel time hour patterns for park visitors will probably be different - midday vs. rush hour peaks - from current/baseline patterns.)

   B. For significant segments, develop baseline and predicted travel noise contours.

   C. Using the methodology of reference document (fractional impacts) determine the equivilant impacted population for each case.

II. Trucks

1. Determine the probable routes of the rerouted truck traffic.

2. Determine the impacts of the changed truck traffic.

   A. Assume all segments are significant and develop noise contours for the baseline and for all cases.

   B. Determine the equivalent impacted population for each case.

Water Quality

The Draft EIS-Draft General Management Plan presents an overview of alternative park concepts that will provide for the preservation, rehabilitation and interpretation of the cultural resources of Lowell. We find these conceptual plans lack the level of detail required to fully evaluate the environmental impacts associated with rehabilitation/reconstruction, construction, operation and maintenance activities required to implement the various park plans. Prior to any waterway development, we believe the National Park Service in cooperation with the Massachusetts Department of Environmental Management, the City of Lowell, and the Locks and Canals should prepare a detailed report on the canal development, hydro electric development and the associated environmental impacts. This report should be submitted to both the Army Corps of Engineers and EPA for review with respect to 404 Permit requirements (Section 404 of the Clean Water Act).

We have enclosed EPA's September 18, 1979 proposed "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" for your use in preparing

COMMENTS

this report and environmental analysis. We anticipate the issuance of final guidelines in the near future; until then we recommend the use of the September 1979 proposed guidelines.

4 To clarify the distinction between the "fishable, swimmable uses" planned for in the water quality standards and the present water quality and uses, we suggest adding the following paragraph in the section on WATER QUALITY at the bottom of p. 44:

> Completion of scheduled wastewater treatment plant construction and combined sewered abatement programs will be needed to achieve Class B fishing-swimming uses of the Merrimack River and Canals.

RESPONSES

4 This suggested language has been added, see page 40.

COMMENTS

EXPLANATION OF EPA RATING

RESPONSES

Environmental Impact of the Action

LO -- Lack of Objections

EPA has no objections to the proposed action as described in the draft environmental impact statement; or suggests only minor changes in the proposed action.

ER -- Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating federal agency to reassess these aspects.

EU -- Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1 -- Adequate

The draft environmental impact statement sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 -- Insufficient Information

EPA believes that the draft environmental impact statement does not contain sufficient information to assess fully, the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft environmental impact statement.

Category 3 -- Inadequate

EPA believes that the draft environmental impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft environmental impact statement is assigned a Category 3, no rating will be made of the project or action; since a basis does not generally exist on which to make such a determination.

COMMENTS

RESPONSES

The Commonwealth of Massachusetts
Division of Fisheries and Wildlife
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

DIRECTOR

September 29, 1980

Regional Director
North Atlantic Region
National Park Service
15 State Street
Boston, Massachusetts 02109

Dear Sir: Re: Lowell National Historic Park

This agency has reviewed the Draft Environmental Impact Statement and the Draft General Management Plan for the above-referenced park. It is our view that the drafts are appropriate with the exception that within each document, recreational or sport fishing is given only cursory reference. As a matter of fact, sport fishing is now an important recreational activity on the Merrimack River and in the canals at Lowell. We would therefore recommend the inclusion, where appropriate of references to this sport. Specifically, we would suggest that fishing be regarded now as a major use that will certainly expand with improved public access, upgrading of water quality and further development of salmon and shad runs.

In the Draft EIS:

1 Page 47, under "fishing" -- we recommend striking the words, "pollution-tolerant" because water quality is now quite good. The list of fish present should also be expanded to include largemouth bass, chain pickerel, yellow perch and sunfishes.

2 Page 60 (first paragraph) -- Sport fishing should be mentioned as a major recreational activity on the river and within certain canals.

Page 71, under "development of canals" -- mention should be made of the development of fisheries, which development will be newsworthy, will involve some important fish species (salmon and shad) and will provide public recreation for a significant public.

In the Draft General Management Plan:

Page 18 (paragraph six) -- there is no mention of recreational fishing now occuring in the canals. This activity should be recognized.

1 See page 43 for change.

2 Fishing is considered an important recreational activity, see discussion on page 90.

It is anticipated that the Lowell Heritage State Park will take the lead role in developing recreational fishing activities in Lowell.

COMMENTS

3 Page 70 (after the 5th paragraph) -- we suggest adding the following: To promote use of the fisheries resource through the Urban Angler Program of the Massachusetts Division of Fisheries and Wildlife.

We appreciate this opportunity to review and comment on these documents.

Sincerely yours

Richard Cronin
Director

RC:PSM/cms
cc:Mugford, Hoyt, Oatis

RESPONSES

3 The NPS believes that the Urban Angler Program will be appropriately promoted through the anticipated endeavors of the Massachusetts Department of Environmental Management to provide for recreational fishing.

COMMENTS

The Commonwealth of Massachusetts
Division of Marine Fisheries
Leverett Saltonstall State Office Building
100 Cambridge Street, Boston 02202

Philip G. Coates
Director

September 25, 1980

Mr. David Clark
National Park Service
John F. Kennedy Building
Boston, MA 02203

Dear Mr. Clark:

The Division of Marine Fisheries has reviewed the draft general management plan and the draft environmental impact statement and offers the following comments pertaining to the fisheries sections.

Draft EIS

1 Page 47, Para. 3, Lines 3 - 5 The use of the term "recent" when referring to the decline in anadromous fish is not appropriate. Industrialization and associated municipal pollution occurred inthe mid- to late 1800's.

Page 47, Para. 3, Line 5 The dam referred to in this statement is the Essex Dam in Lawrence and should be so stated.

Page 47, Para. 3, Lines 6 - 7 This statement indicates that the last salmon observed below the Essex Dam was in 1860. We feel this is inaccurate in that Atlantic salmon were restored in the late 1800's with salmon present until 1898. Also as a result of recent efforts, adult Atlantic salmon have been recovered at the Essex Dam both in 1979 and 1980.

Page 47, Para. 3, Lines 5 - 9 This statement infers that pollution-tolerant fishes dominate in the lower River. Ten years ago this may have been quite accurate, however, in 1980 it is doubtful that this situation still exists. A dramatic increase in many warm-water fish species has been noted in recent years that are not highly pollution tolerant. We feel that the wording of this sentence does not do justice to the improving water quality of the River and the changes in species diversity that exist today.

Page 47, Para. 4, Lines 1 - 2 Reference is made to the "elimination of river obstructions." Perhaps these should be defined. Obstructions to fish passage usually infer a dam or physical barrier of some sort. To our

RESPONSES

1 We concur; see page 43 for corrections in response to your comments related to page 47 of the DEIS.

COMMENTS

knowledge, no mainstem dams have been eliminated with the exception of the Livermore Falls Dam located 145 river miles upstream of the Lowell National Historic Park.

Page 47, Para. 4, Lines 1 - 5 The current restoration efforts in the Merrimack River system are aimed at restoring and enhancing all anadromous fishes to their historic ranges. This statement inferred that only Atlantic salmon and American shad are being considered. Also, no credit is given to the National Marine Fisheries Service or the U.S. Forest Service for their cooperative effort.

Page 47, Para. 4, Lines 5 - 6 It is stated that "shad stocking began in 1969 and has been successful." This is somewhat misleading in that, although a small number of shad eggs were placed in the River in 1969, the purpose was to ascertain the viability of spawning and nursery habitat and not to generate a run of adults. The first stocking of adult shad with the intent of generating a returning run of fish took place in June 1978. The run of American shad below the Essex Dam in Lawrence reflects the impact of improved water quality conditions on a remnant shad population much more so than the miniscule contribution arising from the habitat evaluation studies.

Page 47, Para. 5 This paragraph should be either clarified to state that no known endangered fish species have been documented in the Lowell section of the Merrimack River or expanded to address all vegetation and wildlife in the Lowell area.

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Page 96, Para. 3, Lines 1 - 4 See previous comment for Page 47, Para. 4, Lines 1 - 5.

2 Page 96, Para. 3, Lines 12 - 13 The word "ensure" as it relates to fish survival should be replaced with "minimize."

3 Page 96, Para. 4, Lines 3 - 4 It is a bit premature to state that the NPS activities will have no significant impact on restoration efforts when neither flow regimes for the canal or operational schedules for possible turbine operation have been developed.

General Management Plan

4 Page 18, Para. 4 In discussing Recreational Activities we feel that the recreational fishery should be included in this section.

We hope that these comments are of assistance and help improve the accuracy of the Park plan. If we can provide further assistance, please feel free to contact the Division.

Sincerely,

Philip G. Coates
Director

PGC:HRI:mg

RESPONSES

2 This has been changed; see page 90.

3 U.S. Fish and Wildlife regulations will be complied with before any canal development takes place. Any NPS activities will be monitored to avoid adverse effects; see discussion on page 90.

4 Fishing is identified as a recreational activity; see page 16 of the GMP.

COMMENTS

RESPONSES

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Management

Lemuel Shattuck Building, Government Center

100 Cambridge Street, Boston 02202

August 1, 1980

Lewis Albert, Superintendent
Lowell National Historical Park
171 Merrimack Street
Lowell, Massachusetts 01853

Attention: Douglas Faris

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Dear Mr. Albert:

The Department of Environmental Management has completed its review of the Draft General Management Plan and the Draft Environmental Impact Statement for the Lowell National Historical Park and would like to submit the following comments:

1 1. Page 18, paragraph 1, Draft Management Plan
Revision of the second sentance to read, "Other state areas will include the Merrimack River and Pawtucket Boulevard and the Lowell-Dracut-Tyngsboro State Forest." would more accurately reflect the Department's interests.

2 2. Page 46, paragraph 1, Draft Management Plan
Some recognition of DEM's ownership of the Tremont Yards site and the already completed archaeological study of the site conducted by the Institute of Conservation Archaeology, Harvard University, would seem to be appropriately included in this section.

3. The Department wishes to express its concurrence with comments submitted by the Massachusetts Department of Environmental Quality Engineering in their letter dated July 3, 1980, a copy of which is attached.

With kind regards.

Sincerely,

Margaret D. Ackerman
Office of Planning

1 See changes on page 14 of the GMP.

2 See changes on pages 52 and 75 of the GMP.

COMMENTS

RESPONSES

Commonwealth of Massachusetts
Executive Office of Communities and Development
100 Cambridge Street Room 1404 Boston, Massachusetts 02202 (617) 727-7765

Edward J. King, Governor
Byron J. Matthews, Secretary

September 9, 1980

Mr. Lewis S. Albert, Superintendent
Lowell National Historic Park
171 Merrimack Street, Box 1098
Lowell, MA 01853

Re: A-95 Review/Draft Environmental Impact Statement
Lowell National Historical Park
State Clearinghouse Identifier: 800623-1326

Dear Mr. Albert:

The above referenced DEIS has been made available by the State Clearinghouse for review and comment by interested state agencies. No comments have been received.

Sincerely,

Byron J. Matthews
Secretary

cc: Dave Clark, NPS

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COMMENTS

ANTHONY D. CORTESE
XXXXXXXXXXXXX
COMMISSIONER

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
100 Cambridge Street, Boston 02202

JUL 9 11 19 AM '80

July 3, 1980

Superintendent
Lowell National Historic Park
171 Merrimack Street
Box 1098
Lowell, Massachusetts 01853

Dear Sir/Madam:

We would like to submit the following comments on the Draft Environmental Impact Statement for the Lowell National Historic Park General Management Plan.

1 EPA and the Massachusetts DWPC are funding the construction of a "multiple-use" bikeway on top of the interceptor that runs along the river bank on the north side of the river from the treatment plant to Beaver Brook (see #2 on enclosed map). A bikepath is also planned for #3 on the north and south sides of the river. Extensions of these bikeways over riverside interceptors are proposed for neighboring towns and could provide regional access to the park. VTN Consultants are preparing this for the City of Lowell. Consideration of this bikeway as a means of access in addition to more conventional means of transportation should be incorporated into the plan alternatives with provisions for safety, vehicle parking, etc. Thank you for your consideration.

Sincerely,

Daniel P. McGillicuddy

Daniel P. McGillicuddy
Chief Planner

DPM/SK/ecw
enclosure

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RESPONSES

1 We concur; see page 62.

COMMENTS

RESPONSES

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

September 12, 1980

Superintendent, Lowell National
Historical Park
171 Merrimac Street
Box 1098
Lowell, MA 01853

Dear Sir:

This office has reviewed both the Draft General Management Plan and the Draft Environmental Impact Report for the Lowell National Historical Park. We concur with the NPS that the preferred alternative allows for most effective visitor utilization and, at the same time, allows the most direct access by automobile with the least potential for increasing congestion in the CBD.

In general, we feel that this project is one of significant cultural and economic importance to northeastern Massachusetts and it appears that NPS is pursuing the course of least negative impact.

Sincerely,

Samuel G. Mygatt
Director, MEPA Unit

SGM:DF:cg

cc: David Clark

COMMENTS

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Department of Public Works
Office of the Commissioner
100 Nashua Street, Boston 02114

September 25, 1980

Superintendent
Lowell National Historic Park
171 Merrimack St.
P.O. Box 1098
Lowell, Mass. 01853

Dear Sir:

The Massachusetts Department of Public Works has reviewed the Draft Environmental Statement, General Management Plan for the Lowell National Historic Park so as to determine consistancy with the City requested Sampson Connector.

1 A. The Department plans to end the Sampson Connector project at the west side of Merrimack Street. The map entitled "Downtown Park Development" indicates Dutton Street will be realigned so as to line up with Archand Street.

2 B. On the map, cited in A above, it appears that the area between widened Dutton Street and the B & M R.R. will be planted with trees from Structure #2 to Market Street. The Department intended this area for signs, utility poles and street lighting standards on the typical section of Dutton Street and was set at 3'-0" between the easterly curb line of the street to the chainlink fence and the railroad.

3 C. The removal of the roadway bridge over the Merrimack Canal as well as the two existing railroad bridges as shown on the map referred in A above are not a part of the Sampson Connector project.

4 D. A major parking garage for 1,000 vehicles adjacent to Thorndike Street and the Pawtucket Canal is proposed in a second phase development. While no details are furnished on the map entitled, "Access-Circulation-Parking," this area will be somewhat isolated and access from Thorndike Street, Middlesex Street and Appleton Street will be difficult at best. Moreover, a diversion of traffic from Thorndike Street and the city street system will have an affect on the Sampson Connector design. Access ramps to this future garage should be developed so that the impact of the proposed facility on the Sampson Connector can be properly evaluated. Were other sites considered?

RESPONSES

1 The Downtown Park Development map indicates potential improvements. It is understood that the alignment of the present Sampson Connector project is as shown on page 50 of the FEIS.

2 The NPS intends to work with the DPW in determining appropriate landscaping for the roadway. The Downtown Park Development map is schematic in nature and is not intended to be a site-specific design.

3 It is understood that the bridges mentioned here will not be removed as part of the Sampson Connector project.

4 The parking facilities and development phases have been adjusted in the FEIS, see pages 62-64 and 82-85. Other sites were evaluated but considered infeasible at this point.

COMMENTS

E. The Sampson Connector, as presently conceived, is essentially a four-lane facility but it is widened, in part, due to ramp connections and left-turn lanes south of Market Street. Page 92 of the EIS states that Dutton Street is four lanes.

TRAFFIC

A. The National Park Service has developed ADT from a 1978 Route 213 Draft EIS and unpublished 1979 traffic counts from the Northern Middlesex Area Commission. The Massachusetts Department of Public Works intends to update the original traffic data published in a "Task B" report as a part of the Lowell Transportation Planning Study. Until this new data is compiled by taking new 1980 traffic counts and extrapolating them to develop peak hour and ADT projections for several years including the design year of 2005, it is not possible to reconcile the traffic projections mentioned in the EIS on Page 92, on the map of Page 95 and Appendix A. The results of the two sets of data could differ significantly. It would appear that the National Park and the Sampson Connector projects should use the same base traffic data for highway design and for the air and noise impacts based on that traffic.

B. The 1,000 vehicular parking garage to be constructed in a second phase in the development of the Historical Park at Thorndike Street as well as the Joan's Fabrics and Dutton Street lots will have to be considered in the MDPW traffic update. The closing of Shattuck Street and Kirk Street will require recirculating traffic elsewhere.

5 I suggest that close coordination and cooperation between the Mass. Department of Public Works and the National Park Service are necessary for both the Sampson Connector Project and the Lowell National Historical Park to be developed concurrently and expeditiously.

Very truly yours,

DEAN P. AMIDON
COMMISSIONER

RESPONSES

5 We will continue to work closely with your department on transportation proposals for the park.

COMMENTS

Anthony D. Cortese, Sc.D.
Commissioner

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Air Quality Control
600 Washington Street Boston, Mass. 02111

September 15, 1980

Superintendent
Lowell National Historical Park
171 Merrimack Street
Box 108
Lowell, MA. 01853

Dear Sir:

At the request of Larry Beal of the National Park Services's Mid-Atlantic Office, the Massachusetts Department of Environmental Quality Engineering (DEQE) undertook a review of the Draft Environmental Impact Statement for the Lowell National Historical Park with a particular emphasis on the air quality and parking/circulation sections. We offer for your consideration the following comments.

General Comments

1. The air analysis of the plan is consistent with that scoped out by DEQE staff during the inter-agency consultation process. A mesoscale analysis of the motor vehicle-related pollutants is an appropriate technique for measuring the relative air quality impacts of a number of management plan alternatives.

It should be kept in mind, however, that if, in finalizing this document, the decision is made to implement an alternative that includes the construction of a parking garage, a microscale (site-specific) analysis of the garage's carbon monoxide impacts needs to be done. (See enclosure). This is particularly crucial in the case of those alternatives relying on a 1000 car garage near the intersection of Thorndike Street and Pawtucket Canal. Screening of potential carbon monoxide hotspots (sites in violation of National Ambient Air Quality Standards) in Lowell, recently completed by the Northern Middlesex Area Commission, indicates a major problem at the Thorndike-Dutton Sheets intersection. While much of the causal congestion associated with this intersection may be eliminated by the proposed Sampson connector, care must be excercised in the garage siting and design so as to avoid recreating in the future the existing carbon monoxide problem. A microscale analysis will document this.

2. There are some technical problems with the mesoscale analysis, as now presented. Specifically emissions appear to have been calculated for impacted roadways assuming one speed, constant for all road links, under all alternatives, for base and future years. This was done using two speeds, 15 mph and 25 mph, amd emissions were presented for both cases. This is incorrect.

RESPONSES

Overall

The concerns of DEQE were discussed in meetings (mentioned in Consultation/Coordination section) on air quality with EPA, NPS, and DEQE, whereupon the impact analysis was revised and expanded (pages 85-89). Further, appendix A was expanded and appendix B developed. The NPS understands that DEQE's concerns have been satisfied.

COMMENTS

RESPONSES

To be a technically sound analysis, total emissions should be calculated so as to reflect actual or projected traffic flow (as measured by speed) given traffic volumes relative to roadway capacities. Except in unique circumstances, it is highly unlikely that speed will remain constant system-wide under all alternatives and over time for a number of reasons. First, the capacities of each road link tend to vary, especially in an urban community like Lowell. Second, each alternative generates different volumes of traffic which will respond to roadway capacities differently. Third, as traffic volumes increase over time, speeds tend to be reduced, unless action is taken to increase the capacity of the roadways themselves.

In the final report, the mesoscale analysis needs to be reworked. Ideally, the method described in the preceding paragraph should be used. You may, however, wish to make worst-case, simplifying assumptions and use one (or one set of) speed(s) system-wide in the base year and another, lower system-wide speed(s) in the future years for all alternatives. This analysis will then, at a minimum, show the impact on emissions of the different traffic volumes associated with each alternative in future years. Should this new analysis show, as the current one does, that emissions associated with the build alternatives, in particular the selected one are greater than the no build case, then a continued commitment to the traffic mitigating measures identified in this report is needed.

Specific Comments

Page 45, Paragraph 2: Lowell meets the standards for sulfur dioxide, nitrogen dioxide, and total suspended particulates; it violates the carbon monoxide and ozone standards.

Page 45, Paragraph 3: Massachusetts promulgated in the spring of 1979 controls on certain stationary sources of non-methane hydrocarbons (a precursor to ozone). These represent an addition to existing state air pollution regulations controlling particulate, sulfur dioxide, and nitrogen dioxide emissions from stationary sources.

Pages 45-6: What pollutants do these firms emit? Are they now in compliance with standards?

Page 92: The discussion on air quality should state at the outset that the park's major air quality impacts are motor vehicle-related and hence, a mesoscale analysis of the motor vehicle - generated pollutants, hydrocarbon, carbon monoxide, and oxide of nitrogen, was undertaken.

Page 93, Paragraph 2: The reasons for a reduction from base year emissions in the future are the Federal Motor Vehicle Emission Control Program, which requires new automobiles to meet more stringent emission limitations, and the fact that in the future the newer, less polluting vehicles will comprise an increasing proportion of the vehicle fleet. The other control strategies cited in the draft document will lead to even greater reductions than those already accounted for, although in a number of cases, the actual amount is still unquantifiable.

Page 93 Paragraph 2: The following is an incorrect statement: "Although the design year emissions are higher than the no-action alternative (alternative 2), the projected levels are well within EPA standards." Neither EPA nor the state has set standards in terms of emissions. The analysis does indicate that the higher design year emissions associated with all "build" alternatives represent further progress from base year emissions; that they are higher than the "no build" case requires the identification and commitment to all reasonable and feasible mitigating measures, such as those discussed in the remainder of the paragraph in the report.

COMMENTS

I trust that you will find these comments useful. If you have any questions or require further assistance, please feel free to contact Barbara Kwetz of my staff at (617) 727-2658. We look forward to receiving for review and comment the final document.

Very truly yours,

Kenneth A. Hagg

Kenneth A. Hagg
Acting Director

Enc:
cc: Bruce Maillet, NE/Met Boston Region
Heidi O'Brien, NE/Met Boston Region
Larry Beal, National Park Service
Thomas Wholley, U.S. EPA-Region 1

KAH/E/BKtd

RESPONSES

COMMENTS

ESSEX DEVELOPMENT ASSOCIATES
EIGHT ARLINGTON STREET BOSTON, MASSACHUSETTS 02116 (617) 536-0142

August 1, 1980

Mr. Lewis Albert
Superintendent
Lowell National Historic Park
171 Merrimack Street
Lowell, Massachusetts 01853

Dear Lew:

I have reviewed with great interest your two-volume report on the plan for the Lowell National Historic Park. I did notice several items that needed fuller elaboration, so I am taking this opportunity to make them a matter of record.

The report states that proprietors of Locks and Canals on Merrimack River control all hydroelectric generation and the canal system. In your report there are several misconceptions and omissions. First, Locks and Canals generates no electricity per se. It is a water company, and its charter provides for the development and operation of a dam and canal system for the purposes of providing transportation services and for water power generation.

Second, the water powers of the canal system are not entirely owned by Locks and Canals. In addition to Boott Mills, a company affiliated with Locks and Canals, significant blocks of millpowers are owned by (a) James Lichoulas at the Jackson Properties, and (b) the Scagels of Atlantic Associates.

A third point of clarification is hydroelectric generation itself. Not only is Locks and Canals not the only company entitled to use water power, but our company is general partner in a venture to rehabilitate the generating capacity at Atlantic Associates. We are presently in the feasibility stage of this project. In the event that it proves viable, Essex will expect to have the facility back on line by late fall of this year. We are joined in this venture by EG&G, a Fortune 500 company, which is the limited partner in the project. This particular rehabilitation project will be done in keeping with the general theme of the Lowell National Historic Park. We expect to make it available for visitor tours, should that fit into your program.

LAWRENCE OFFICE
SIX ESSEX STREET LAWRENCE, MASSACHUSETTS 01840 (617) 687-2312

RESPONSES

Overall

The FEIS and GMP texts have been corrected to indicate that Locks and Canals, in relation to the Boott Mills, generates electricity. The Park Service is aware that other companies are considering development of hydropower on Lowell's canals.

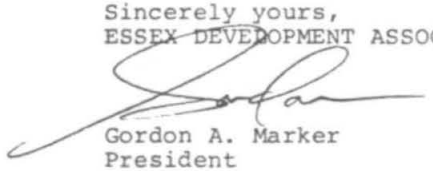
COMMENTS

RESPONSES

ESSEX DEVELOPMENT ASSOCIATES
EIGHT ARLINGTON STREET BOSTON, MASSACHUSETTS 02116 (617) 536-0142

I hope that these comments are of use to you and add some clarification to an otherwise excellent study. If additional information is required, I will be pleased to meet with you at your convenience.

Sincerely yours,
ESSEX DEVELOPMENT ASSOCIATES, INC.



Gordon A. Marker
President

GAM/rs

LAWRENCE OFFICE
SIX ESSEX STREET LAWRENCE, MASSACHUSETTS 01840 (617) 687-2312

COMMENTS

JULIUS TOFIAS & COMPANY, INC.

June 17, 1980

Mr. Louis S. Albert, Superintendent
Lowell National Historic Park
171 Merrimack Street
Lowell, MA 01852

Dear Mr. Albert:

As a member of the Moore-Heder team and a consultant to the Lowell Historic Preservation Commission, I read with interest yesterday the draft, "General Management Plan - May, 1980," and the draft, "Environmental Impact Statement - May, 1980," on the Lowell Historic National Park.

My feeling on both reports is that the individual significant members of the Moore-Heder team should be mentioned as contributors to your reports - specifically in my case, where most of my work for the Moore-Heder team and the Lowell Commission has been on developing the plan for the adaptive re-use of the Boott Mill complex.

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1 My own feeling all along has been that the emphasis should be a strong connection between the Lowell Manufacturing plant and the Boott Mill complex and an attempt to focus all the activities between these two mill complexes. I know the National Park Service is committed to Wannalancit, but I feel this effort is misdirected and will pull people away from the main focus of the park corridor - that being between the two major mill complexes.

From a management point of view, it would seem that the National Park Service will be running exhibits and activities in at least four locations. Perhaps if more thought were given to eliminating Wannalancit and utilizing more space within the Boott Mill complex, activities could be focused between Lowell Manufacturing and Boott Mill.

That leaves the problem of what to do with Wannalancit Mill. My feeling is that this mill complex and the Lawrence Manufacturing complex in front of it on the Merrimack River are

INDUSTRIAL & COMMERCIAL REAL ESTATE

Shovel Shop Square, Post Office Box 420, North Easton, Massachusetts 02356
Brockton (617) 584-0600 Boston (617) 364-5100

SOCIETY OF INDUSTRIAL REALTORS
INDIVIDUAL MEMBERSHIP

RESPONSES

1 The preferred alternative has been modified to reflect an increased emphasis on Park Service involvement at the Boott Mill.

JULIUS TOFIAS & COMPANY, INC.

ideal candidates for a major rehabilitation effort to be turned into mixed use, housing, office, and hotel space at a later date by private developers once the model complex - i.e., Boott Mill - is completed. By focusing the efforts of the National Park Service and the Lowell Commission on the two mills now in question - Lowell Manufacturing and Boott Mill - we free up more of the rest of the industrial remnants in Center City Lowell for private development at a later date. Also, with a three to five to perhaps a ten year period of time, perhaps the inappropriate low-income housing along French Street Extension will be old enough to be eliminated and, therefore, re-establish the boarding house network connecting the center of Town with the major mill yards at Wannalancit and Lawrence Manufacturing.

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On Page 139 of the draft, "Environmental Impact Statement," mention is made that there is an economic impact study which has been completed. I would appreciate a copy of that study.

I hope my comments have been constructive and helpful. If you wish to pursue them further with me, please call my office.

With kind regards,

Donald Tofias, S.I.R.
President

cc: Mr. Allen Moore
Moore-Heder Architects

Mr. Fred Faust
Lowell Historic Preservation Commission

COMMENTS

NMAC NORTHERN MIDDLESEX AREA COMMISSION

144 Merrimack St., Lowell, Mass. 01852 (617) 454-8021, Joseph P. Hannon, Director

REQUEST FOR REVIEW COMMENTS 6/24/80

TO: LOWELL: City Manager, Planning Board, Division of Planning and Development, City Engineer, NMAC Commissioners; Lowell Historic Preservation Commission; Heritage State Park Advisory Committee; National Park Service; Lowell Historical Commission; LRTA; Chamber of Commerce; Downtown Business Assoc.; Central Labor Council; UNITAS; LUPA; NAACP; Community Teamwork, Inc.

The Northern Middlesex Area Commission is currently reviewing the project proposal described in the attachment. If you wish to comment on the proposal relative to its compatibility with your community's plans, programs and objectives, please do so in the space provided below. For additional information, please contact the Commission staff.

COMMENTS DUE: July 11, 1980

NMAC REVIEW NUMBER: EIS #161 and A-95 #482

APPLICANT: Lowell National Historical Park

PROJECT: Draft Environmental Impact Statement & Draft General Management Plan (NOTE: Full Draft Environmental Impact Statement and Draft General Management Plan is available for review at NMAC Offices, Mon. thru Fri. 9 - 5).

REVIEW COMMENTS:

☐ Concur with proposal (explain below)

☒ Need more information (explain below)

☐ Cannot concur with proposal (explain below)

Explanatory comments: (continue comments on back side if necessary)

1 To date we, the Hispanic Community Lowell's newest immigrant group has been ignored by Lowell National Historical Park, even though Unitas has extended themselves in friendship.

We would like to know what part the Hispanic Community will be expected to play.

RECEIVED
JUL 14 1980
N.M.A.C.

Dalton Cohen — Executive Director — July 8, 1980
Signature — Title/Department — Date

Members: Billerica, Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, Westford.

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RESPONSES

1 All segments of the Lowell community are invited to comment and participate in development of the park; your assistance or comments are welcome.

COMMENTS

NMAC NORTHERN MIDDLESEX AREA COMMISSION

144 Merrimack St., Lowell, Mass. 01852, (617) 454-8021, Joseph P. Hannon, Director

REQUEST FOR REVIEW COMMENTS 6/24/80

TO: LOWELL: City Manager, Planning Board, Division of Planning and Development, City Engineer, NMAC Commissioners; Lowell Historic Preservation Commission; Heritage State Park Advisory Committee; National Park Service; Lowell Historical Commission; LRTA; Chamber of Commerce; Downtown Business Assoc.; Central Labor Council; UNITAS; LUPA; NAACP; Community Teamwork, Inc.

The Northern Middlesex Area Commission is currently reviewing the project proposal described in the attachment. If you wish to comment on the proposal relative to its compatibility with your community's plans, programs and objectives, please do so in the space provided below. For additional information, please contact the Commission staff.

RECEIVED
JUL 15 1980
N.M.A.C.

COMMENTS DUE: July 11, 1980

NMAC REVIEW NUMBER: EIS #161 and A-95 #482

APPLICANT: Lowell National Historical Park

PROJECT: Draft Environmental Impact Statement & Draft General Management Plan (NOTE: Full Draft Environmental Impact Statement and Draft General Management Plan is available for review at NMAC Offices, Mon. thru Fri. 9 - 5).

REVIEW COMMENTS:

☒ Concur with proposal (explain below)
☐ Need more information (explain below)
☐ Cannot concur with proposal (explain below)

1 Explanatory comments: (continue comments on back side if necessary)
Although we support the proposal in general, the proposal does not provide sufficient remedies for the impact of the Park on rents and housing stock in neighborhoods adjacent to the Park. It is not enough to monitor gentrification and displacement and then develop policies. The policies should be in effect from the beginning. A rental subsidy program would appear to be needed to assist people whose rent is raised or who are displaced to a more expensive apartment because of the Park, either directly or indirectly. If NPS lacks the funds to carry out this or any other relevant policy, it should mobilize resources from other more appropriate agencies (i.e., HUD). We would be happy to provide technical assistance in the development of such a program.

Brian E. Yates — Director/Planning & Program Development — 7/14/80
Signature — Title/Department — Date

Members: Billerica, Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, Westford.

RESPONSES

1 Technical assistance would be welcome; the Park Service will cooperate with the city on housing matters to the extent feasible under the park's legislative mandate.

NMAC NORTHERN MIDDLESEX AREA COMMISSION
144 Merrimack St. Lowell, Mass. 01852,(617)454-8021, Joseph P. Hannon, Director

602.11

July 15, 1980

Mr. Lewis S. Albert, Superintendent
Lowell National Historical Park
171 Merrimack Street
P.O. Box 1098
Lowell, MA 01853

Dear Mr. Albert,

As you are aware, NMAC has solicited comments from interested boards and agencies concerning the NPS's Draft General Management Plan and EIS for The Lowell National Historical Park, under our function as the regional A-95 clearinghouse. Although the Plan will be formally reviewed with the Commission at its next regularly scheduled meeting on July 16, 1980, we have had two responses that we feel you should be aware of. One is a comment from CTI which accompanies their concurrence, and one from UNITAS, which accompanies their lack of concurrence.

We believe that you can most likely resolve the issues brought up by speaking directly with representatives of these agencies. If we can play a role in assisting you in this matter, please do not hesitate to contact NMAC.

Very truly yours,

Joseph P. Hannon
Executive Director

BA:vm
Enclosure

Members: Billerica, Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, Westford.

COMMENTS

NMAC NORTHERN MIDDLESEX AREA COMMISSION
144 Merrimack St. Lowell, Mass. 01852,(617)454-8021, Joseph P. Hannon, Director

August 7, 1980

Mr. Lewis Albert
Superintendent
Lowell National Historical Park
P. O. Box 1098
171 Merrimack Street
Lowell, MA 01852

Dear Mr. Albert:

The Northern Middlesex Area Commission staff has reviewed the National Park Service's Draft General Management Plan and Environmental Impact Statement for the Lowell National Historical Park and is transmitting its review comments herein. As you know, NMAC and the NPS have been working cooperatively in the past year on a variety of issues that affect downtown Lowell and the region as a whole, and, therefore, most of our comments are already known to members of your staff.

Let me first say that we are pleased to see that the NPS has addressed many of the issues that we first raised in a previous letter to you in August, 1979 concerning various Park alternatives. Foremost among these was NMAC's concern that the NPS make every effort to insure that Park related activities are integrated, wherever possible, with the downtown Lowell area. It is apparent that the Park Service has attempted to do this, in spite of the fact that in some cases this may make Park visitor guidance more complex, and the NPS should be commended for this effort. It should now be clear that this integration will not only benefit downtown economic activities, but will also make for a much more interesting and "richer" tour of the City for Park visitors.

A major part of the Draft General Management Plan deals with circulation, as it should. There are a variety of circulation systems that Park visitors will be part of, including automobile traffic, pedestrian movement, transit, and water-related transportation. It is vitally important that the NPS not duplicate circulation systems that already exist or may exist in the future, and that the accommodation of the needs of the Park visitor not adversely impact those working, living, shopping or otherwise doing business in downtown Lowell.

Members: Billerica, Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, Westford.

RESPONSES

Overall

The NMAC and the NPS share concern for a broad agenda of local and regional planning initiatives affecting the park and the people of the region. We will continue to work with your agency to ensure that close coordination in all planning matters is achieved, as indicated on page 44.

NMAC has recently completed, as you are aware, a major feasibility study of an auto-restricted zone in downtown Lowell that analyzed many of these important circulation issues. In addition, we have completed a separate working paper entitled National Park Transit and Downtown Circulation Issues, which you have already received. These reports provide more in-depth analysis of circulation issues that can be addressed herein, and we hope that the comments and suggestions contained within them will be given serious consideration in the final General Management Plan. However, a few of the more important points should be mentioned here, particularly concerning NMAC's recommendation for an auto-restricted zone along a portion or all of Merrimack Street in downtown Lowell.

Many of the Park managements objectives listed in the GMP are similar to NMAC's goals,including:

- to encourage development of a streetscape in the downtown park area which complements Lowell's 19th century architectural heritage
- to promote the establishment of one or more auto-free zones within the downtown area
- to encourage and promote downtown revitalization
- to incorporate public transit as the major means of visitor circulation within the park
- to develop plans that will minimize the impact of vehicular traffic on local streets.

While the GMP does not specifically discuss NMAC's auto-restricted zone concept, it does briefly state that:

> "The development of Merrimack Street into a pedestrian mall, from Bridge Street to Dutton Street, has been proposed by public and private entities involved with planning the park and the City. Although a mall concept for Merrimack Street will require extensive evaluation and coordination before implementation, a pedestrian mall would be compatible with the objectives of Lowell's revitalization and of the historical park."

Although the recommendation does not call for a pedestrian mall as such, this statement as well as interstaff meetings indicate that the ARZ would be generally compatible with the

COMMENTS

RESPONSES

NPS Plan. However, there are a few aspects of the Plan that differ with our recommendations.

The major inconsistency is the need to restrict traffic on Shattuck Street from Middle to Market Streets. The analysis conducted during the course of the ARZ study suggests that auto-restrictions on this part of Shattuck Street appear unnecessary, given the open space plans on the west side of the street; this could restrict access to the Market Street Garage from its east. This could cause additional congestion at Merrimack/Dutton, and could limit the use of Middle Street as a "drop off" point. It is therefore suggested that this section of Snattuck Street be re-evaluated as an auto-free zone.

The other planned improvements by the NPS on Shattuck, Kirk and Merrimack Streets would complement exceptionally well a "first phase" transitway on Merrimack Street. If Palmer and Merrimack west of Palmer were to remain open, given the pedestrian treatment suggested by the NPS, this area would still have relatively little traffic (assuming no right turn from Middle to Palmer Street) and become much more pedestrian oriented, particularly in summer months. Merrimack between Kearney Square and Palmer Street would not have any private automobiles, and there would be no through traffic on any segment of the street. This would not only serve the NPS plans, but it would also enable the City to analyze the patterns of traffic exiting from the Market Street Garage. If it is later determined that Palmer and this section of Merrimack Street need to remain open to automobiles, the existing NPS pedestrianization of the street would suffice. If this does not turn out to be a critical link in the system, the transitway could be expanded as a secondary phase.

In addition to the street closings, the NPS Plan endorses a number of other recommendations that have been made by NMAC, including the redesign of the City Hall area and some restrictions on truck traffic on Merrimack Street. The NPS has also made a substantial commitment ($4.2 million) for the construction of an extensive trolley system around the downtown area, including extending the system from its current terminus at the Boott Mill past the Eastern Canal, where a connection to Merrimack Street along a transitway could connect.

Another critical concern in downtown Lowell is off-street parking needs. The ultimate Park visitor parking demand is projected to be approximately 1,500 spaces. The primary parking facility at Dutton Street will be woefully inadequate to meet these needs, and there are some additional sites

that could handle some, but not all of this demand. NMAC has been discussing with the Park Service, the City of Lowell and the LHPC, the possibility of a major parking facility in the Thorndike St./Lord Overpass/Appleton Street area. The GMP states that a major facility in this area would handle most of the peak season park related parking demand, and would like to see this site pursued. We heartily agree, and would suggest that serious consideration be given to having this facility act, if constructed, as the primary Visitor Parking area,thereby returning the Dutton Street lot to those doing business in downtown Lowell. A Visitor Parking area need not be adjacent to the Visitor Center, particularly if served adequately by transit (either bus or trolley). This has been demonstrated in other tourist areas.

Two (2) additional points concerning circulation. The first deals with the intersection at Arcand Drive, Merrimack and Dutton Streets. The GMP suggests that this intersection be redesigned to facilitate both automobile and pedestrian movement. NMAC has been suggesting this as well for quite some time, and believe that all parties should begin to actually pursue this immediately. With the Sampson Connector in final design, the City Hall area is the logical next step for improvements to this route, and discussions should begin as soon as possible in order to give the area the high priority it deserves.

Secondly, it is stated somewhat erroneously in the Plan that NMAC favors a total trucking restriction on Merrimack Street, and that we will be working with the City to implement this. NMAC has indicated that it favors a restriction on goods delivery in any ARZ area, including Merrimack Street, that would limit deliveries to certain hours of the day, not a total prohibition. If this were combined with an ARZ, it would make deliveries easier, rather than more difficult. Any restrictions on trucking, however, is totally a City of Lowell responsibility, as NMAC does not have regulatory authority.

Another important concern of NMAC deals with the question of housing. We are concerned, as are others in the City, that the development of the Park and related improvements in the area will cause property values and rents to increase dramatically in abutting neighborhoods, resulting in large scale displacement of many of the current low and moderate income residents. The NPS appears to be sensitive to this concern as well, but has not indicated that it has a program to ameliorate this problem, and there have been some criticism

COMMENTS

of the NPS raised in our A-95 review comments. While NMAC agrees that this is a potentially deleterious situation in Lowell, and one that should be given an extremely high priority, we understand also that it is not solely the responsibility of the NPS to control it. This is something that the City of Lowell and the LHPC should be actively involved with as well, and it is suggested that the NPS strengthen its commitment to work with the City on a program that is designed to ease housing pressures on City neighborhoods adjacent to the Park district.

There has been concern voiced on this point that the NPS has not communicated regularly with civic groups in these neighborhoods, and similar comments over lack of communication have been raised by some downtown businessmen. A much stronger outreach program to those areas and groups indirectly affected by Park plans must be made as well as to those directly affected, as the Park Service is now an institutional member, and an extremely powerful member of the Lowell civic community, and its actions in such an urban area carry great weight and force.

Finally, a general comment concerning the overall text of the Plan and the EIS. In many cases, it is unclear as to where the responsibility of certain actions lie. For example, the Plan states in various places that signs will be provided, traffic signals installed, maintenance improved, parking expanded, etc. Some of these will be the responsibility of the Park Service and internally funded; others, however, are the responsibility of the City and are expected to indicate the City's support of the Park. The final Plan should more clearly spell out those areas that are contingent upon non-NPS responsibility and funding, particularly as they relate to actions to be taken by the City of Lowell. Not only will this make the feasibility and implementation of the Plan more clear, but it will serve to protect the NPS from misunderstandings as to what commitments it is making at some later point in time.

As stated earlier, NMAC has been working closely with the Park Service and looks forward to continuing this cooperative arrangement through the development of the final Plan and its implementation. We were happy to see many of our suggestions incorporated into the draft Plan, and hope that the NPS will consider the comments in this letter in the development of the final Plan. Although there are still some areas where differences exist, these appear to be in areas where solutions can be worked out in a spirit of cooperation. In this spirit, we would be happy to discuss these comments further with you in the near future.

Yours very truly,

Barry Alberts
Assistant Director

BA:llr

RESPONSES

4. We have assigned responsibility where appropriate and have attempted to describe levels of responsibility as closely as possible. We will continue to coordinate with other agencies and the city of Lowell as development progresses.

NMAC NORTHERN MIDDLESEX AREA COMMISSION
144 Merrimack St. Lowell, Mass. 01852,(617)454-8021, Joseph P. Hannon, Director

CLEARINGHOUSE, HUD:601.12a

October 8, 1980

Mr. David Clark
National Park Service
North East Region Office
15 State Street
Boston, MA 02109

Re: A-95# 482

Dear Sir:

This is to advise you that the Northern Middlesex Area Commission has reviewed the following proposal in accordance with the provisions of OMB Circular A-95.

A-95 #482, Lowell National Historical Park's Draft General Management Plan

__Full Application __Incomplete Application x_Notice Of Intent

COMMENTS BY OTHERS

Comments were solicited from local officials and other interested persons and organizations and notice of the pending proposals were posted in the office of municipal clerk(s). 7 responses were received and are attached hereto. The responses were categorized as follows:

6 concur; 1 cannot concur; 0 requested more information, and we have referred this request to the applicant.

NMAC CONCLUSIONS AND RECOMMENDATIONS

In addition, the Northern Middlesex Area Commission considered this proposal, and all comments received at its meeting on September 17, 1980. The Commission has determined that the proposal is consistent with NMAC adopted plans and policies and ought to be approved. Substantial issues have not been raised by others.

Please call if there are questions.

Very truly yours,

Joseph P. Hannon
Executive Director

cc: Lowell National Historical Park

Members: Billerica, Chelmsford, Dracut, Dunstable, Lowell, Pepperell, Tewksbury, Tyngsborough, Westford.

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APPENDIX A. AIR POLLUTANT EMISSIONS

Table A-1. Number of Additional Average Daily Trips

Links	1979	1988				1990			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	34,680	1,800	500	1,800	1,800	2,150	550	2,150	2,150
2	34,170	1,800	500	1,800	1,800	2,150	550	2,150	2,150
3	41,400	1,700	500	1,700	1,700	2,050	550	2,050	2,050
4	19,890	1,250	500	1,250	1,250	1,600	550	1,550	1,550
5	18,258	450	150	950	950	800	165	1,250	1,250
6	12,036	350	20	50	1,000	500	25	53	1,150
7	11,628	450	300	1,050	50	500	360	1,150	53
8	13,000	300	10	300	300	375	12	375	375
9	21,000	600	50	800	400	660	60	900	440
10	16,320	300	10	300	300	375	12	375	375
11	16,000	500	45	600	100	600	55	650	110

Table A-2. Average Daily Trips

Links	1979	1988				1990			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	34,680	42,975	41,675	42,975	42,975	44,988	43,388	44,988	44,988
2	34,170	42,338	41,038	42,338	42,338	44,326	42,726	44,326	44,326
3	41,400	48,499	47,299	48,499	48,499	50,740	49,240	50,740	50,740
4	19,890	23,854	23,104	23,854	23,854	25,117	24,067	25,067	25,067
5	18,258	20,825	20,525	21,325	21,325	21,998	21,363	22,448	22,448
6	12,036	14,251	13,921	13,951	14,901	14,963	14,488	14,516	15,613
7	11,628	14,139	13,989	14,739	13,739	14,742	14,602	15,392	14,295
8	13,000	15,836	15,546	15,836	15,836	16,539	16,176	16,539	16,539
9	21,000	25,697	25,147	25,897	25,497	26,771	26,171	27,011	26,551
10	16,320	18,765	18,475	18,765	18,765	19,586	19,233	19,586	19,586
11	16,000	19,621	19,166	19,721	19,221	20,494	19,949	20,544	20,004

Table A-3. Vehicle Miles Traveled

Links	Link Distance in Miles	1979	1988				1990			
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	0.8	27,744	34,380	33,340	34,380	34,380	35,990	34,710	35,990	35,990
2	0.3	10,251	12,701	12,311	12,701	12,701	13,298	12,818	13,298	13,298
3	0.2	8,280	9,700	9,460	9,700	9,700	9,958	9,848	10,148	10,148
4	0.2	3,978	4,770	4,621	4,770	4,770	4,923	4,813	5,013	5,013
5	0.4	7,303	8,330	8,210	8,530	8,530	8,736	8,545	8,979	8,979
6	0.4	4,814	5,700	5,568	5,580	5,960	5,985	5,795	5,985	6,245
7	0.4	4,651	5,656	6,796	5,896	5,496	5,897	5,841	6,157	5,718
8	0.5	6,500	7,918	7,773	7,918	7,918	8,270	8,088	8,270	8,270
9	0.3	6,300	7,709	7,544	7,769	7,649	8,031	7,851	8,103	7,965
10	0.4	6,528	7,506	7,390	7,506	7,506	7,834	7,693	7,834	7,834
11	0.3	4,800	5,886	5,750	5,916	5,766	6,148	5,985	6,163	6,000
Total		91,149	110,256	108,763	110,666	110,376	115,987	111,987	115,940	115,460

Note: Average daily trips (ADT's) are based on the 1978, Route 213 Draft Environmental Impact Statement and on unpublished 1979 traffic counts by the NMAC. All trip data was converted to the base year (1979) by the incorporation of a 2.0% annual trip growth rate. The 2.0% annual growth rate was derived by modifying the 2.6% annual growth rate estimated for vehicle miles traveled to reflect the increase in fuel costs and changes in traditional travel and vacation patterns.

Where available, 1985 projections from the Route 213 Study were utilized and adjusted for 1988 and 1990 with the 2.0% annual growth rate. 1988 and 1990 average daily trips estimates were increased by the projected additional ADT's resulting from park and Preservation Commission development. Additional ADT's for each alternative were estimated based on projected visitation, location of visitor attractions, and projected visitor circulation.

Table A-4. Carbon Monoxide Emissions
(grams per day)

Links	1979	1988**				1990**			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	1,708,476	1,246,430	1,208,725	1,246,430	1,246,430	1,126,847	1,086,770	1,126,847	1,126,847
2	631,257	460,468	446,329	460,468	460,468	416,360	401,332	416,360	416,360
3	509,882	352,110	342,968	352,110	352,110	303,707	308,341	303,707	303,707
4	244,965	173,180	167,532	173,180	173,180	157,270	150,695	156,957	156,957
5	449,719	302,379	298,023	309,639	309,639	275,503	267,544	281,139	281,139
6	296,446	206,651	202,118	202,300	216,077	187,390	181,441	187,390	195,537
7	286,409	205,055	246,386	213,757	199,255	184,635	182,882	192,776	179,031
8	400,270	287,063	281,806	287,063	287,063	258,934	253,235	258,934	258,934
9	387,954	279,486	273,504	281,661	281,661	251,451	245,815	253,705	249,384
10	401,994	272,126	267,921	272,126	272,126	245,283	240,868	245,283	245,283
11	295,584	213,394	208,463	214,482	209,043	192,494	187,390	192,964	187,860
Total	5,612,956	3,998,342	3,943,775	4,013,216	4,007,052	3,599,874	3,506,313	3,616,242	3,601,019

Table A-5. Oxides of Nitrogen Emissions
(grams per day)

Links	1979*	1988**				1990**			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	99,973	66,302	64,296	66,302	66,302	65,754	63,415	65,754	65,754
2	36,898	24,494	23,742	24,494	24,494	24,295	23,418	24,295	24,295
3	29,804	18,706	18,244	18,706	18,706	17,722	17,992	17,722	17,722
4	14,319	9,200	8,912	9,200	9,200	9,177	8,793	9,159	9,159
5	26,287	16,064	15,833	16,450	16,450	16,076	15,612	16,405	16,405
6	17,328	10,992	10,738	10,761	11,494	10,935	10,587	10,935	11,410
7	16,741	10,908	13,106	11,370	10,599	10,774	10,672	11,249	10,447
8	23,397	15,270	14,990	15,270	15,270	15,109	14,777	15,109	15,109
9	22,677	14,867	14,549	14,983	14,751	14,673	14,344	14,804	14,552
10	23,498	14,475	14,252	14,475	14,475	14,313	14,055	14,313	14,313
11	17,278	11,351	11,089	11,409	11,120	11,232	10,935	11,260	10,962
Total	328,200	212,629	209,751	213,420	213,861	210,060	204,600	211,005	210,128

* An average speed of 15 miles per hour has been used to reflect a worst-case situation
** An average speed of 25 miles per hour has been used to reflect existing conditions

Table A-6. Hydrocarbon Emissions
(grams per day)

Links	1979 *	1988**				1990**			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	178,990	118,525	114,940	118,525	118,525	110,525	106,594	110,525	110,525
2	66,134	43,787	42,442	43,787	43,787	40,838	39,364	40,838	40,838
3	53,418	33,440	32,613	33,440	33,440	31,165	30,243	31,165	31,165
4	25,664	16,447	15,931	16,447	16,447	15,425	14,781	15,395	15,395
5	57,115	28,718	28,304	29,407	29,407	27,022	26,242	27,575	27,575
6	31,058	19,651	19,196	19,237	20,547	18,380	17,796	18,380	19,179
7	30,006	19,499	23,429	20,326	18,947	18,110	17,938	18,908	17,560
8	41,935	27,297	26,797	27,297	27,297	25,397	24,838	25,397	25,397
9	40,644	26,577	26,008	26,784	26,370	24,663	24,110	24,884	24,461
10	42,115	25,877	25,477	25,877	25,877	24,058	23,625	24,058	24,058
11	30,967	20,292	19,823	20,395	19,878	18,881	18,380	18,927	18,426
Total	588,046	380,110	374,960	380,522	380,522	354,464	343,911	356,052	354,579

APPENDIX B: CAPACITY ANALYSIS

A capacity analysis was conducted for several key intersections in the city of Lowell. The existing peak hour volumes (PHV) at these intersections were determined and compared to their respective service volume capacities derived from the Highway Capacity Manual. PHVs were projected to the park design year (1990), using a 2.0 percent annual growth factor. The ratios of actual PHV to service volume capacities (V/C Ratio) for the design year were then compared to the adjusted PHVs resulting from park visitation for each planning alternative.

The following key intersections were selected for analysis because the Northern Middlesex Area Council thought they would most likely be heavily impacted from park traffic route patterns.

Merrimack-Dutton-Arcand
Market-Central-Prescott
Broadway-Dutton
Fletcher-Dutton-Thorndike

It was determined that certain approaches would not be impacted by park volumes and were therefore not considered in this analysis. These included the Merrimack West approach, the Central Street approach, the Broadway approach, and the Dutton Street extension approach.

The analysis showed that the Broadway-Dutton intersection would be slightly impacted by park volumes. Level of service was determined to be C for the peak hour for 1979. Under normal growth conditions, the level of service drops to level of service E in 1990. If alternative 1 were implemented, level of service would drop to level of service F (.98 to 1.03).

In this analysis, hourly volumes were not available to determine the PHV factor at the Broadway-Dutton intersection. It was assumed that the peak hour occurred at the same time as the Merrimack-Dutton-Arcand intersection. Therefore, a peak hour of between 4:00 p.m. and 5:00 p.m. was used. Similarly, it was determined that the PHV was 6.5 percent of the total daily volume. Using the Lowell Transportation Planning Study, it was determined that 40 percent of the ADT for this link approached this intersection on Dutton Street. Therefore, the actual peak hour volume was determined to be 19,890 x .40 x .065 = 517. The peak hour factor was also assumed to be the same as the Merrimack-Dutton-Arcand intersection (.95). The Thorndike Street approach was treated in a similar manner. The Fletcher Street approach was not analyzed because park volumes do not impact this approach.

All other intersections considered in this analysis fall into the category of level of service F. During peak hours, existing volumes far exceed the service volume capacities for all intersections. This situation is more severe when existing volumes are projected for the actual design year and the volume from park visitation is added. The calculated level of service is F for the existing and future situations. The Highway Capacity Manual describes level of service E as being characterized by low speeds,

unstable flow, and brief, frequent stops. Beyond this, level of service F volume capacities are well below actual volumes. The level of service F is characterized by lower speeds, where sections of road often serve as storage areas during the peak hour. Traffic stoppages may occur for short or long periods of time due to downstream congestion. In extreme cases, both speed and volume can drop to zero. The analysis shows that, in theory, the projected volumes per hour greatly exceed the service volume capacity of the intersections. Realistically, there is a point where a capacity analysis becomes an inadequate measure of actual conditions. Volume is a measure of the number of vehicles that pass a specific point within a determined amount of time whereas capacity is a measure of the maximum amount of vehicles that use a given space within the specified time. While it is possible that actual volumes can exceed theoretical capacities, results of this analysis show existing and projected volumes to exceed capacity to such an unrealistic degree as to be of little value other than for comparative purposes. All intersections considered showed actual volumes to unrealistically exceed service volume capacities.

In the worst-case analysis, the peak hour occurred between 4:00 p.m. and 5:00 p.m. Visitor volumes at this time were determined by counting the number of visitors on park-conducted tours (including special events), assuming that visitors left the park when the tours concluded. The worst-case analysis shows that the park contributes 12 percent additional traffic volume to projected volumes. Since level of service cannot be degraded further (in theory and practice), it appears the actual impact of any additional traffic to the system may extend the exceptionally low level of service conditions throughout the peak period. Therefore, it is determined that since the level of service cannot be further degraded, the resulting impact on air quality would be nil. However, air quality could be degraded as the level of service conditions are degraded over the hours before and after the peak hour. With only a 5-percent volume increase, there would not be an appreciable impact on air quality. If the no action alternative is considered, the projected volumes at these intersections would also extend the peak period causing the same level of service and air quality degradation. Therefore, the city of Lowell would still require intersection improvements.

Although this analysis assumed that visitors left when the late afternoon tours concluded, park officials actively encourage visitors to remain in the area to patronize local shops and restaurants and to avoid peak-hour traffic. There are no statistics available to determine the percentage of visitors who actually stay; however, it appears that local business has increased substantially in the 1980 season.

SUMMARY SHEET

Intersection	Approach	V/C Ration--1979	V/C Ration--1990 Without Park	V/C Ration--1990 With Park
Merrimack-Dutton-Arcand	Merrimack East	1.04 (L.O.S.F.)	1.27	Alt 1 1.35 Alt 2 1.28 Alt 3 1.39 Alt 4 1.33
Merrimack-Dutton-Arcand	Merrimack West	0.56 (L.O.S. A)	.70 (L.O.S.A.)	
Merrimack-Dutton-Arcand	Dutton	1.43 (L.O.S.F)	1.78 (L.O.S.F)	Alt 1 1.9 Alt 2 1.8 Alt 3 1.8 Alt 4 1.8
Merrimack-Dutton-Arcand	Arcand	1.20 (L.O.S.F)	1.52 (L.O.S.F)	Alt 1 1.76 Alt 2 1.58 Alt 3 1.86 Alt 4 1.86
Market-Central-Prescott	Market	2.40 (L.O.S.F)	2.9 (L.O.SF)	Alt 1 3.0 Alt 2 2.9 Alt 3 2.9 Alt 4 3.1
Market-Central-Prescott	Central	0.98 (L.O.S.E)	1.20 (L.O.SF)	-
Dutton-Broadway	Dutton North	0.79 (L.O.S.E) 0.90 (L.O.S.D) 1.00 (L.O.S.C)	1.20 (.L.O.S.E) 1.10 (L.O.S.D) 1.23 (L.O.S.C)	- - Alt 1 1.03 Alt 2 0.99 Alt 3 0.99 Alt 4 0.99
Dutton-Broadway	Dutton South	1.2 (L.O.S.F)	1.50 (L.O.S.F)	Alt 1 1.60 Alt 2 1.50 Alt 3 1.60 Alt 4 1.60
Fletcher-Thorndike-Dutton	Dutton	1.17 (L.O.S.F)	1.42 (L.O.S.F.)	Alt 1 1.60 Alt 2 1.49 Alt 3 1.59 Alt 4 1.59
	Thorndike	1.35 (L.O.S.F.)	1.64 (L.O.S.F.)	Alt 1 1.74 Alt 2 1.67 Alt 3 1.74 Alt 4 1.74

MARKET-CENTRAL-PRESCOTT

A capacity analysis at level of service E was performed for the Market Street and Central Street approaches. The peak hour volumes were determined from unpublished data provided by the Northern Middlesex Area Council. The peak hour factor, which measures consistency of demand, was determined by comparing the number of vehicles counted during the peak hour and four times the number counted during the highest 15 consecutive minutes for each approach.

MARKET STREET APPROACH

All factors derived in this analysis were determined using the Highway Capacity Manual. Market Street is a one-way approach with three lanes and an approach width of 30 feet. Parking is allowed on both sides of the street. Using the nomographs in figure 6.7 of the manual, the service volume capacity was determined to be 1,700. The peak hour at the Market Street approach is between 2:00 p.m. and 3:00 p.m. The peak hour factor was determined to be 0.95, which is a fairly consistent demand through the peak hour.

$$\frac{1037}{(273)4} = .95$$

The peak hour volume between 2:00 p.m. and 3:00 p.m. was 1,059 for the counting day June 30, 1977. The ration of green time for the peak hour is 22 percent. The location factor was 1.0 for a central business district location. The percentage of left and right turns was calculated from the data to be 20 percent left turns with an adjustment factor of .975, and 60 percent right turns with an adjustment factor of 1.0. The V/C ration, therefore, was calculated to be 2.3, which is above the level of service E. This approach has a level of service of F. The Highway Capacity Manual describes level of service as being characterized by very low travel speeds where sections of road often serve as storage areas during the peak hour. Traffic stoppages may occur for short or long periods of time due to downstream congestion. In extreme cases, which applies here, both speed and volume drop to zero.

To determine the actual hourly park visitor volumes, the worst-case analysis used a typical July day with a scheduled special event. This day was analyzed to determine what percentage of visitors would be on the road on an hourly basis. Tour schedules and special events schedules were used to determine these figures. The following information presents the percentage of visitors arriving and departing on a typical July day.

9-10 a.m.	4%
10-11 a.m.	6%
11-12 a.m.	12%
12-1 p.m.	13%
1-2 p.m.	11%
2-3 p.m.	15%
3-4 p.m.	11%
4-5 p.m.	10%
5-6 p.m.	8%
6-7 p.m.	10%

To derive additional volumes, the additional ADTs for each design year alternative were multiplied by hourly percentages to obtain the additional hourly volumes. These were then added to projected actual volumes and again compared to the service level capacity. As was anticipated, the level of service degraded further. In this case, park visitation increased the volume by 6.9 percent. The following summary presents the capacity analysis for each intersection and each approach.

Market-Central-Prescott Intersection

Market Street Approach (one way)

Peak hour 2:00 p.m.-3:00 p.m.

Lane width		30 feet
Number of lanes (parking both sides)		3
Appoach volume (load factor)		1,700
Peak hour factor (.95) and metro size (100,000)		1.24
G/C		.22
Location		1.00
Left turn adjustment (20%)		.95
Right turn adjustment (60%)		1.00
Car-truck adjustment (5%)		1.00
Service volume capacity		440
Actual PHV (1979)		1,059
V/C ration (1979)		2.4
Actual PHV (1990) without park		1,317
V/C ration without Park		2.9
Alternative 1 Additional PHV (1990)		90
Alternative 2 Additional PHV (1990)		8
Alternative 3 Additional PHV (1990)		98
Alternative 4 Additional PHV (1990)		17
Actual PHV (1990) plus additional PHV	-Alternative 1	1,407
	-Alternative 2	1,325
	-Alternative 3	1,415
	-Alternative 4	1,334
V/C Ration (1990)	-Alternative 1	3
	-Alternative 2	2.9
	-Alternative 3	2.9
	-Alternative 4	3.1
% Volume increase due to park volume	-Alternative 1	6.4
	-Alternative 2	0.6
	-Alternative 3	6.9%
	-Alternative 4	1.2%

Central Street Approach (one-way)

Peak hour 2:00 p.m.-3:00 p.m.

Lane width		30 feet
Number of lanes (parking both sides)		3
Approach volume (load factor 1.9)		1,700
Peak hour factor and metro size (200,000)		1.24
G/C		.36
Location (CBD)		1.00
Right turn adjustment (50%)		1.00
Car-truck adjustment (5%)		1.00
Service volume capacity		759
PHV (1979)		748
V/C ration (1979)		.98
PHV		943
V/C ration (1990)		1.2
Additional PHV (1990)	-Alternative 1	not determined
Additional PHV (1990)	-Alternative 2	not determined
Additional PHV (1990)	-Alternative 3	not determined
Additional PHV (1990)	-Alternative 4	not determined

This analysis shows that under a status quo alternative, there would be a decline in level of service from level E to F. It was determined that the park would not impact this approach, so the Market-Central-Prescott intersection is considered a one-way street and not an approach.

Merrimack-Dutton-Arcand Intersection

Merrimack Street East Approach (one-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width		30 feet
Number of lanes (parking both sides)		3
Appoach volume (load factor 1.0)		1,700
PHV factor (.95) and metro size (200,000)		1.24
G/C (p.m. Peak-w/Ped)		.34
Location (CBD)		1.00
Left turn adjustment (8%)		1.005
Right turn adjustment (42%)		1.00
Car-truck adjustment (5%)		1.00
Service volume capacity (1.0)		753
Actual PHV (1979)		786
V/C ration (1979)		1.04
Actual PHV (1990) without park		958
V/C ration without park		1.27
Additional PHV (1990)	-Alternative 1	66
Additional PHV (1990)	-Alternative 2	6
Additional PHV (1990)	-Alternative 3	90
Additional PHV (1990)	-Alternative 4	44
Actual PHV (1990) plus additional PHV	-Alternative 1	1,024
	-Alternative 2	964
	-Alternative 3	1,048
	-Alternative 4	1,022
V/C Ration (1990)	-Alternative 1	1.35
	-Alternative 2	1.28
	-Alternative 3	1.39
	-Alternative 4	1.33
% Volume increase due to park volume	-Alternative 1	6.8
	-Alternative 2	.6
	-Alternative 3	9.3
	-Alternative 4	4.5

Dutton-Broadway Intersection

Dutton Street North Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width		20 feet
Lanes (parking both sides)		2
Appoach volumes (load factor 1.0)		1,250
PHV factor (.95) and metro size (200,000)		1.24
G/C ration		.50
Location (CBD)		1.00
Car-truck adjustment (5%)		1.00
Right turn adjustment (10%)		1.00
Service volume capacity		775
Actual PHV (1979)		613
V/C Ratio (load factor 1.0) (1979)		.79
(load factor 0.7) (1979)		.9
(load factor .3)		1.0
Actual PHV (1990) without park		762
V/C Ratio without park (load factor 1.0)		.98
(load factor 0.7)		1.1
Additional PHV (1990)	-Alternative 1	40
Additional PHV (1990)	-Alternative 2	8
Additional PHV (1990)	-Alternative 3	6
Additional PHV (1990)	-Alternative 4	6
Actual PHV (1990) plus additional PHV	-Alternative 1	802
	-Alternative 2	770
	-Alternative 3	768
	-Alternative 4	768
V/C Ratio (1990) with park (load factor 1.0)	-Alternative 1	1.03
	-Alternative 2	.99
	-Alternative 3	.99
	-Alternative 4	.99
% Volume increase due to park	-Alternative 1	5
	-Alternative 2	1
	-Alternative 3	1
	-Alternative 4	1

Dutton Street South Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width		20 feet
Lanes (parking both sides)		2
Appoach volumes (load factor 1.0)		1,250
PHV factor (.95) and metro size (200,000)		1.24
G/C ratio		.50
Location (CBD)		1.00
Car-truck adjustment (5%)		1.00
Left turn adjustment (23%)		.84
Service Volume capacity		651
Actual peak hour volume		776
V/C Ratio (1979)		1.2
Actual peak hour volume (1990) without park		965
V/C Ratio (1990) without park		1.5
Additional PHV (1990)	-Alternative 1	80
	-Alternative 2	28
	-Alternative 3	73
	-Alternative 4	73
Actual PHV (1990) plus additional PHV	-Alternative 1	1,045
	-Alternative 2	993
	-Alternative 3	1,038
	-Alternative 4	1,038
V/C Ratio (1990) with park	-Alternative 1	1.6
	-Alternative 2	1.5
	-Alternative 3	1.6
	-Alternative 4	1.6
% Volume increase due to park	-Alternative 1	8
	-Alternative 2	2.9
	-Alternative 3	7.5
	-Alternative 4	7.5

Fletcher-Thorndike-Dutton Intersection

Dutton Street Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width			20 feet
Number of lanes (parking both sides)			2
Appoach volume (load factor 1.0)			1,250
PHV factor (.95) and metro size (200,000)			1.24
G/C			.34
Location (CGD)			1.00
Left turn adjustment (95%)			.85
Right turn adjustment (5%)			1.025
Car-truck adjustment			1.00
Service volume capacity			440
Actual PHV (1979)			517
V/C Ratio (1979)			1.17
Actual PHV (1990) without park			630
V/C Ratio without park			1.42
Additional PHV (1990)	-Alternative 1		80
	-Alternative 2		28
	-Alternative 3		73
	-Alternative 4		73
Actual PHV (1990) plus additional PHV	-Alternative 1		710
	-Alternative 2		658
	-Alternative 3		703
	-Alternative 4		703
V/C Ratio (1990) with park	-Alternative 1		1.60
	-Alternative 2		1.49
	-Alternative 3		1.59
	-Alternative 4		1.59
% Volume increase due to park	-Alternative 1		12.6
	-Alternative 2		4.0
	-Alternative 3		11.5
	-Alternative 4		11.5

Thorndike Street Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width		30 feet
Number of lanes (parking both sides)		3
Appoach volume (load factor 1.0)		1,800
PHV factor (.95) and metro size (200,000)		1.24
G/C		.50
Right turn adjustment (58%)		1.00
Location (CBD)		1.00
Car-truck adjustment		1.00
Service volume capacity		1,116
Actual PHV (1979)		1,507
V/C Ratio (1979)		1.35
Actual PHV (1990) without park		1,837
V/C ratio without park		1.64
Additional PHV (1990)	-Alternative 1	103
	-Alternative 2	28
	-Alternative 3	103
	-Alternative 4	103
Actual PHV (1990) plus additional PHV	-Alternative 1	1,940
	-Alternative 2	1,865
	-Alternative 3	1,940
	-Alternative 4	1,940
V/C Ratio (1990) with park	-Alternative 1	1.74
	-Alternative 2	1.67
	-Alternative 3	1.74
	-Alternative 4	1.74
% Volume increase due to park	-Alternative 1	5.6
	-Alternative 2	1.5
	-Alternative 3	5.6
	-Alternative 4	5.6

Dutton Drive Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width		20 feet
Number of lanes		2
Appoach volume (load factor 1.0)		1,250
PHV factor (.95) and metro size		1.24
G/C (p.m. Peak- w/Ped)		.17
Location (CBD)		1.00
Left turn adjustment (12%)		.98
Car-truck adjustment (5%)		1.00
Service volume capacity		269
Actual PHV (1979)		385
V/C Ratio (1979)		1.43
Actual PHV (1990) without park		479
V/C ratio without park		1.78
Additional PHV (1990)	-Alternative 1	40
	-Alternative 2	8
	-Alternative 3	6
	-Alternative 4	6
Actual PHV (1990) plus additional PHV	-Alternative 1	519
	-Alternative 2	487
	-Alternative 3	485
	-Alternative 4	485
V/C Ratio (1990) with park	-Alternative 1	1.9
	-Alternative 2	1.8
	-Alternative 3	1.8
	-Alternative 4	1.8
% Volume increase due to park	-Alternative 1	8.3
	-Alternative 2	1.7
	-Alternative 3	1.3
	-Alternative 4	1.3

Dutton Street Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width		20 feet
Number of lanes		2
Appoach volume (load factor 1.0)		1,250
PHV factor (.95) and metro size		1.24
G/C (p.m. Peak- w/Ped)		.17
Location (CBD)		1.00
Left turn adjustment (12%)		.98
Car-truck adjustment (5%)		1.00
Service volume capacity		269
Actual PHV (1979)		385
V/C Ratio (1979)		1.43
Actual PHV (1990) without park		479
V/C Ratio without park		1.78
Additional PHV (1990)	-Alternative 1	40
	-Alternative 2	8
	-Alternative 3	6
	-Alternative 4	6
Actual PHV (1990) plus additional PHV	-Alternative 1	519
	-Alternative 2	487
	-Alternative 3	485
	-Alternative 4	485
V/C Ratio (1990) with park	-Alternative 1	1.9
	-Alternative 2	1.8
	-Alternative 3	1.8
	-Alternative 4	1.8
% Volume increase due to park	-Alternative 1	8.3
	-Alternative 2	1.7
	-Alternative 3	1.3
	-Alternative 4	1.3

Merrimack Street West Approach (two-way)

Peak hour 4:00 p.m.-5:00 p.m.

Lane width	20 feet
Number of lanes (parking both sides)	2
Appoach volume (load factor 1.0)	1,250
PHV factor (.95) and metro size (200,000)	1.24
G/C (p.m. peak-w/Ped)	.34
Location (CBD)	1.00
Left turn adjustment (5%)	1.05
Right turn adjusmtnet (95%)	.90
Car-truck adjustment (5%)	1.00
Service volume capacity (1.0)	530
Actual PHV (1979)	200
V/C ratio (1979) (load factor 1.0)	.38
(load factor 0.7)	.40
(load factor 0.3)	.45
(load factor 0.1)	.5
(load factor 0.0)	.56
Actual PHV (1990) without park	248

The park will not impact this approach to the Merrimack-Dutton-Arcand intersection.

APPENDIX C: REQUIRED RESEARCH PROJECTS

PROJECTS COMPLETED

Archeological Resource Study

This study evaluates the potential for significant subsurface cultural remains in NPS-related areas and the Tremont Yard. Upon completion of limited subsurface testing, the study will provide necessary data for a subsurface cultural resource management plan.

Lowell National Historical Park Cultural Properties Inventory

This report inventories 1,000 structures and sites within the boundaries of Lowell National Historic Park and Lowell Historic Preservation District. The survey will be used in developing the preservation plan mandated by the enabling legislation.

Lowell Energy Study

This study projects park energy needs, evaluates alternative energy conservation strategies, and considers a range of energy supply materials. Particular emphasis has been placed on identifying renewable energy technologies for the park.

Economic Impact Study

This study provides the existing and projected economic conditions in Lowell and the economic impact of Lowell National Historical Park. It evaluates projected impacts of the park on the downtown area, the city, and the greater Lowell community according to visitation projections, visitor spending characteristics, proposed park and preservation commission development, and retail and industrial economic activity. Future economic activity is projected for minimal NPS involvement in Lowell and park and preservation commission development plans. The study will be used for the economic impact analysis in the NPS environmental impact statement.

Architectural Data Sections, Historic Structures Report--Old City Hall, Kirk Street Agents' House, Merrimack Gatehouse, and Wannalancit Mill

In addition to other sections of the report, these architectural data sections provide data necessary for meeting requirements of federal compliance legislation and information necessary for development of historic structures.

Surface Rail Feasibility Study for Lowell National Historical Park and Lowell Historic Preservation District

This study evaluates the feasibility of using historic trolleys on existing railroad tracks as a means of circulating visitors.

PROJECTS UNDERWAY

Historic Resource Study

This study will identify major historical themes, describe the significance of cultural resources in the park, and provide data necessary for management and interpretation of historic resources.

Historic Structures Report

This report will provide historical, architectural, and archeological data sections for Francis Gate and Northern Canal, and historical and archeological sections for Swamp Locks and Lower Locks.

Historic Structure Report--History Data Section, Old City Hall

Basic Data on Archeological Resources at the Dutton Street Parking Area and the Wannalancit Millyard

ADDITIONAL STUDIES REQUIRED

History and Architecture Studies

History data sections for existing structure reports and additional historic structure reports, as required, will fulfill the mandates of Executive Order 11593, the Regulations of the Advisory Council on Hisoric Preservation, and NPS "Management Policies." In addition to studies completed or underway, historic preservation guidelines for NPS-related structures will contribute to the protection and preservation of cultural resources and will assist in avoiding adverse impacts on the resources resulting from park development actions, increasing levels of visitor use, and adaptive use of historic structures.

Administrative History for Lowell National Historical Park

A history of the origin, development, and administration of the park will serve as an administrative, management, and interpretive tool.

Special history studies for management and interpretation of the park will be programmed as appropriate.

Archeological Studies

Procedures for compliance with NPS management policies and section 106 of the Historic Preservation Act of 1966 will be followed when maintenance or development will disturb archeological resources.

Archeological resources in the Boott Mill Yard and the proposed park near the Boott Mill boardinghouse will be further evaluated for their potential as interpretive sites. Additional archeological work at the Tremont Yard may be needed to augment a DEM study conducted by the Institute of Conservation Archaeology, Peabody Museum, Harvard University.

OTHER STUDIES

Completion of canal phasing may require additional studies of bridges and other structures. Such studies will be undertaken as appropriate.

Scope of collections statements and collection management plans will be prepared for the park's library/archives and museum.

United States Department of the Interior

NATIONAL PARK SERVICE

NORTH ATLANTIC REGION
15 STATE STREET
BOSTON, MASSACHUSETTS 02109

IN REPLY REFER TO:
H42;NAR(PC)

July 21, 1980

Memorandum

To: Superintendent, Lowell National Historical Park

From: Regional Director, North Atlantic Region

Subject: Memorandum of Agreement for Draft General Management Plan

Enclosed are copies of concurrence from both the Massachusetts Historical Commission and the Advisory Council with our proposed Draft General Management Plan for Lowell National Historical Park for the purposes of the Programmatic Memorandum of Agreement which was signed last December. As you know, the agreement specifically excludes the redevelopment of the Jade Pagoda and Solomon sites. Compliance with Section 106 for that action will be sought separately at the appropriate time.

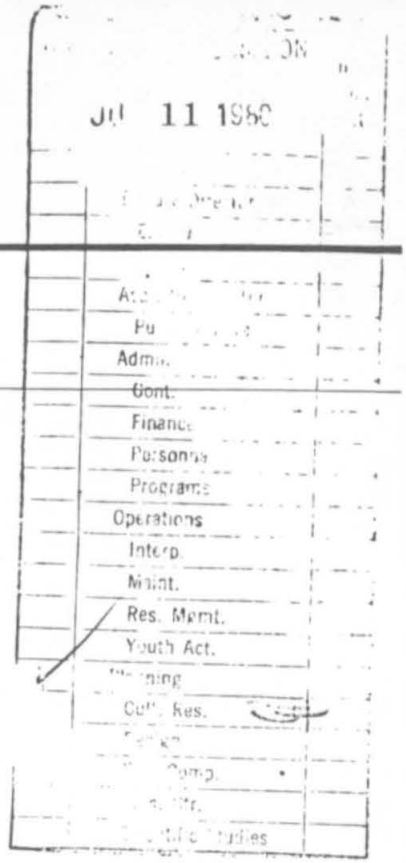
for Richard L. Stanton

Enclosures (2)

cc: WASO (560) Asst. Mgr.
DSC, G.Wall

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005



A-44
D-18

JUL 7 1980

Mr. Richard L. Stanton
Regional Director
National Park Service
North Atlantic Region
Department of the Interior
15 State Street
Boston, Massachusetts 02109

Dear Mr. Stanton:

The Memorandum of Agreement for the Draft General Management Plan for Lowell National Historic Park, Lowell, Massachusetts, has been ratified by the Chairman of the Council. This document constitutes the comments of the Council required by Section 106 of the National Historic Preservation Act and completes compliance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800). A copy of the Agreement is enclosed.

In accordance with Section 800.6(c)(2) and 800.9(e) of the regulations, a copy of this Memorandum of Agreement should be included in any environmental assessment or statement prepared for this undertaking to meet requirements of the National Environmental Policy Act and should be retained in your records as evidence of compliance with Section 106 of the National Historic Preservation Act.

The Council appreciates your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,

Jordan E. Tannenbaum
Chief, Eastern Division of
Project Review

Enclosure
MOA

United States Department of the Interior

NATIONAL PARK SERVICE

NORTH ATLANTIC REGION

15 STATE STREET

BOSTON, MASSACHUSETTS 02109

RECEIVED

MAR - 4 1980

MASS. HIST. COMM.

IN REPLY REFER TO:

H42-NAR(PC)

February 22, 1980

Draft Proposal - Memorandum of Agreement

Ms. Patricia Weslowski
State Historic Preservation Officer
Massachusetts State Historical Commission
294 Washington Street
Boston, Massachusetts 02108

Dear Ms. Weslowski:

On January 21-22, 1980, members of your staff, representatives of the Advisory Council on Historic Preservation, and the National Park Service met in Lowell to discuss the proposed General Management Plan (GMP) for the Lowell National Historical Park, an undertaking of the National Park Service that requires compliance with Section 106 of the National Historic Preservation Act. During and subsequent to that meeting, consultations were held between the various parties to establish requirements for a Memorandum of Agreement on the GMP pursuant to the Programmatic Memorandum of Agreement executed between representatives of the Council, National Park Service, and the National Conference of State Historic Preservation Officers in December, 1979, for the National Park Service planning process.

It was determined during those consultations that the following stipulations, in addition to those specified in the GMP, will be met to ensure implementation of the plan and will avoid or satisfactorily mitigate any adverse effects on cultural resources included in or eligible for inclusion in the National Register of Historic Places:

1. The National Park Service recognizes and shares the concerns expressed by the Council and Massachusetts State Historic Preservation Officer for the proposed redevelopment of the Solomon and Jade-Pagoda site. Accordingly, every effort will be made to develop a design scheme that will maintain the feeling of an urban streetscape, avoid a break in the streetscape continuum, and maintain the Old City Hall Avenue right-of-way. In an attempt to ensure these concerns are satisfactorily addressed, the State Historic Preservation Officer and the Council will be invited to participate in the design review and selection process. Every effort will be made to select a final design that will meet the needs of the park and address the above cited concerns.

Should, however, that effort fail, no action, including demolition of the existing nonhistoric structures, will be taken by the National Park Service with respect to this element of the plan until the Council and State Historic Preservation Officer have been afforded further opportunity to comment in accordance with the steps detailed in 36 CFR Part 800.

2. It is understood by all parties that the GMP submitted for review is in draft form. Therefore, any changes between it and the final plan will be brought to the immediate attention of the Council and State Historic Preservation Officer with no action being taken to implement those changes until further consultations between the Council, National Park Service, and State Historic Preservation Officer, pursuant to the Programmatic Memorandum of Agreement or the steps detailed in 36 CFR Part 800, have been completed.

If you concur in our proposal to implement the GMP in accordance with the actions described therein and with the above stipulations, please sign in the space provided below and return this letter to this office. Upon receipt of your concurrence, this letter along with a copy of the GMP will be forwarded to the Council for its review and approval for purposes of the Programmatic Memorandum of Agreement. An additional copy of this letter has been enclosed for your files.

Sincerely yours,

Richard L. Stanton

Richard L. Stanton
Regional Director

In Duplicate

Enclosure

I concur with the above statement on the GMP for the Lowell National Historical Park.

Kathleen L Westworth
Massachusetts State Historic Preservation Officer

3/6/80
Date

Advisory
Council On
Historic
Preservation

1522 K Street, NW
Washington, DC 20005

MEMORANDUM OF AGREEMENT

WHEREAS, the National Park Service (NPS), Department of the Interior, is seeking approval of its Draft General Management Plan (GMP) for Lowell National Historic Park, Lowell, Massachusetts; and,

WHEREAS, NPS, in consultation with the Massachusetts State Historic Preservation Officer (SHPO), has determined that this undertaking as proposed would have an adverse effect upon the Lowell National Historic Park, as created by Congress, and the Lowell Locks and Canals Historic District, a property included in the National Register of Historic Places; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320) and Section 800.4(d) of the regulations of the Advisory Council on Historic Preservation (Council), "Protection of Historic and Cultural Properties" (36 CFR Part 800), NPS, has requested the comments of the Council; and,

WHEREAS, pursuant to Section 800.6 of the Council's regulations, representatives of the Council, NPS, and the Massachusetts SHPO have consulted and reviewed the undertaking to consider feasible and prudent alternatives to avoid or satisfactorily mitigate the adverse effect;

NOW, THEREFORE, it is mutually agreed that the undertaking will be implemented in accordance with the Draft GMP for Lowell National Historic Park and the attached proposal from Mr. Richard L. Stanton, Regional Director, National Park Service, North Atlantic Region, to avoid adverse effects on the above-mentioned properties.

6/9/80
(date)

Acting Executive Director
Advisory Council on Historic Preservation

(date) 6-10-80

Chairman
Advisory Council on Historic Preservation

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Clark-McGlennon Associates Consultant Team, Energy Conservation Study: A Cost-Effective Plan for Energy Independence

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* * * * NOTE * * * *

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SEE DRAWING NO. 475/20004A, 120005A, 120006A ON APERTURE OR IN ORIGINAL DOCUMENTS/REPORTS.

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure 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.

Publication services were provided by the graphics and editorial staffs of the Denver Service Center. NPS 1597A



① **LOWELL MANUFACTURING COMPANY COMPLEX** • A SEGMENT OF THIS COMPLEX WILL BE LEASED BY THE NPS AS THE PARK'S PRIMARY INFORMATION/ORIENTATION CENTER.

② **MACK BUILDING AND SURROUNDING PARK SITE** • THIS WILL BE DEVELOPED BY THE DEM AS AN INTERPRETIVE CENTER THAT WILL FOCUS ON HYDROPOWER THEMES.

③ **OLD CITY HALL** • THE BUILDING WILL BE REHABILITATED BY THE NPS AND USED AS AN INTERPRETIVE CENTER ON LOWELL'S DEVELOPMENT AS AN INDUSTRIAL CITY AND AS THE PARK ADMINISTRATIVE HEADQUARTERS

④ MERRIMACK GATEHOUSE • THE STRUCTURE WILL BE USED BY THE NPS AS AN EXHIBIT TO ILLUSTRATE THE ROLE OF GATEHOUSES AND THE CONTROL OF THE CANAL SYSTEM

⑤ **KIRK STREET AGENTS' HOUSE** • THIS DUPLEX WILL BE USED BY THE NPS AS A THEME MUSEUM ILLUSTRATING THE ROLE AND SIGNIFICANCE OF THE MILL AGENTS

⑥ **H & H PAPER COMPANY (OLD BOOTT MILL BOARDINGHOUSE)** • THE PRESERVATION COMMISSION WILL DEVELOP A CULTURAL CENTER, AND THE NPS WILL INTERPRET BOARDINGHOUSE THEMES

⑦ **BOARDINGHOUSE PARK** • NPS WILL DEVELOP A PARK THAT WILL INCLUDE POSSIBLE ARCHEOLOGICAL EXHIBITS, AMPHITHEATER, AND FESTIVAL AREA

⑧ **BOOTT MILL COMPLEX** • NPS WILL UTILIZE A PORTION OF THE COMPLEX AS A MAJOR INTERPRETIVE CENTER. THE COAL POCKET WILL BE USED BY THE NPS FOR TROLLEY MAINTENANCE

⑨ **WANNALANCIT MILL COMPLEX** • NPS WILL USE THE TURBINE ROOM AS AN EXHIBIT ON HYDROPOWER

⑩ **TREMONT YARD** • DEM AND NPS WILL USE INDUSTRIAL ARCHEOLOGICAL EXHIBITS AND OTHER INTERPRETIVE MATERIAL TO ILLUSTRATE THE STORY OF THIS HISTORIC MILLYARD

⑪ **NORTHERN CANAL GATEHOUSE AND LOCK** • DEM AND NPS WILL USE THIS FACILITY AS AN INTERPRETIVE EXHIBIT

⑫ **FRANCIS GATEHOUSE COMPLEX** • SAME AS 11

⑬ **SWAMP LOCKS** • SAME AS 11

⑭ **LOWER LOCKS** • SAME AS 11

0 200 400 2000
100 300 600 1000 FEET

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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INFORMATION & INTERPRETIVE CENTERS ■■ LOWELL NHP

ON MICROFILM



LOWELL NATIONAL HISTORICAL PARK

LOWELL HISTORIC PRESERVATION DISTRICT

ACCESS

- MAJOR AUTO ACCESS
- SHUTTLE BUS

CIRCULATION

- HIKING/BIKING ROUTE
- PRIMARY PEDESTRIAN ROUTE
- SECONDARY PEDESTRIAN ROUTE
- TROLLEY ROUTE

- PHASE 1 - CANAL BARGE SYSTEM
- PHASE 2 - CANAL BARGE SYSTEM
- PHASE 3 - CANAL BARGE SYSTEM
- BARGE TERMINALS

PARKING

1. DUTTON STREET LOT
2. JOAN FABRICS LOT (INTERIM)
3. SWAMP LOCKS PARKING AREA

0 200 400 2000
100 300 500 1000 FEET

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

475/20005A
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ON MICROFILM

ACCESS · CIRCULATION · PARKING LOWELL NHP