

Land Use, Zoning & Traffic Study

for the

Needham Business Center, Highland Avenue Corridor, & Wexford/Charles Street Industrial District



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Final report to the
Town of Needham
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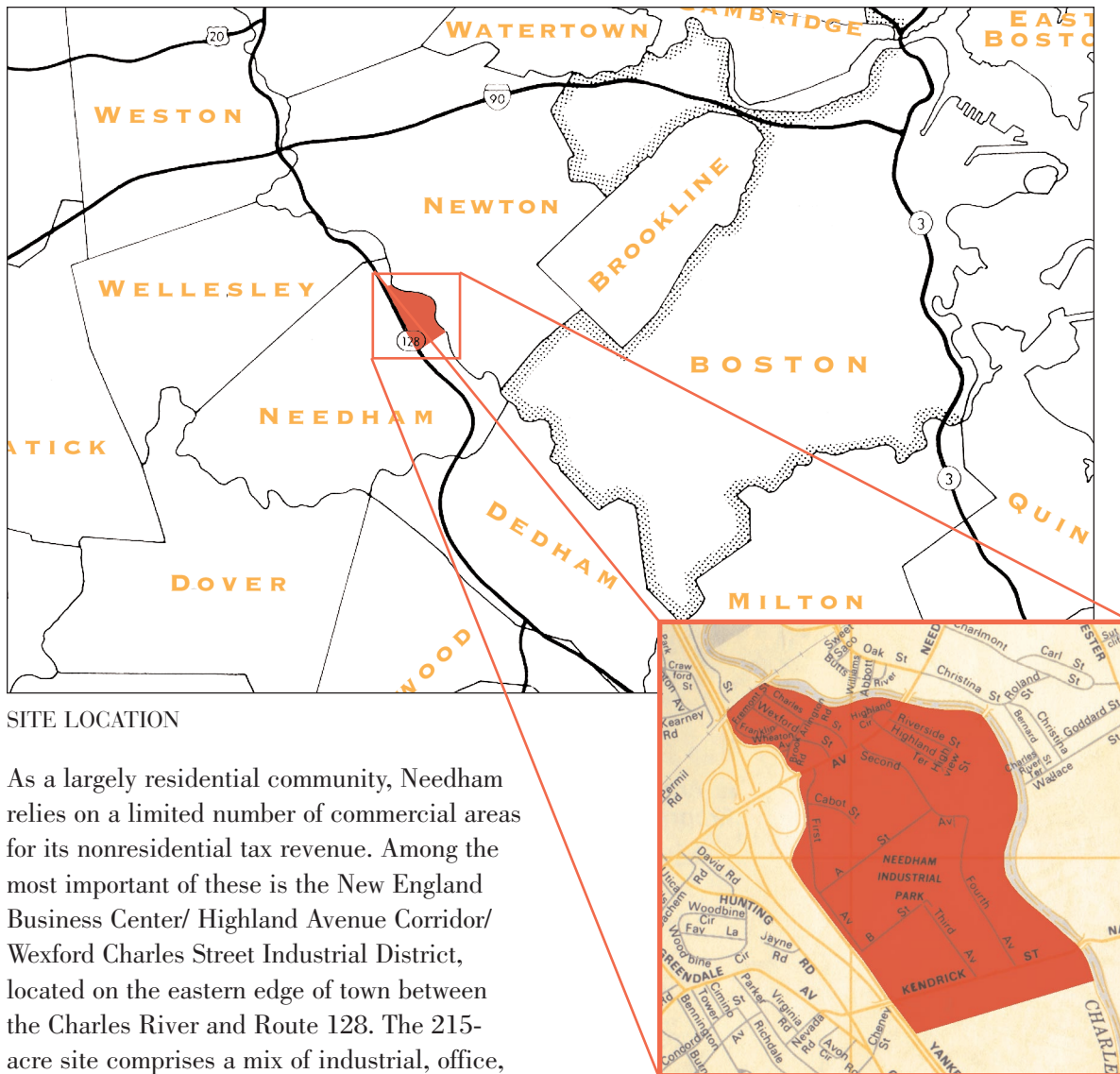
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In an era of increasing employer, consumer and household mobility, Needham has emerged as a community of choice for families and businesses in the Boston metropolitan region. The town's location, welcoming residential neighborhoods, low commercial tax rates, and pleasant green spaces have made it a highly desirable place to live and work. As a result, the town has experienced increasing development pressure over the past decade. Current projections suggest that the town's population will increase by ten percent from 1990 to 2020; employment is projected to rise by nearly twelve percent over the same period.

1 Introduction





SITE LOCATION

As a largely residential community, Needham relies on a limited number of commercial areas for its nonresidential tax revenue. Among the most important of these is the New England Business Center/ Highland Avenue Corridor/ Wexford Charles Street Industrial District, located on the eastern edge of town between the Charles River and Route 128. The 215-acre site comprises a mix of industrial, office, and retail uses; it represents 8 percent of the town's total assessed valuation and yields approximately 12 percent of all property tax revenue. Managing growth in this emerging office district is essential, as the pace of development threatens to overwhelm the site's capacity for traffic, parking and infrastructure.

The need for coordinated and comprehensive planning is given added urgency by the convergence of residential neighborhoods, open space, industrial, commercial and office uses in a compact space that also serves as a major thoroughfare and key entryway to the town.

The overarching goal of the plan is to unlock the site's economic potential and create significant benefits for town residents, business and property owners, and employees. At the same time, the plan seeks to control the impact of development on adjacent neighborhoods and to address increasing regional traffic on major roadways. To achieve this, the plan and zoning are designed to:

- give the town greater control over development;
- create new funding to help resolve long-standing traffic problems;
- provide incentives for the private sector to create public benefits;
- improve environmental quality;
- create an attractive gateway to the town; and
- develop a unified sense of character for each of the districts and sub-areas within the site.

2 Project goals

Zoning

The zoning plan should first and foremost give the town more control over future development. To achieve this, the Planning Board should be given greater authority to evaluate development applications based on potential impacts and benefits. The

zoning should also create a dedicated funding source to improve traffic conditions in and around the site.

The zoning should establish new regulations for land use, density, site and building design that will contribute to

creating the desired build-out and associated infrastructure improvements over time. In order to trigger redevelopment of existing properties, the zoning should create opportunities to increase property values significantly through changes in land use and density. The zoning should also create incentives for parcel assembly, particularly in the Wexford/ Charles Street district.

In addition to governing density and land use, the zoning should reflect the desired scale and character of new development. Building height, massing, setbacks, parking regulations, and open space requirements should be designed to encourage a pedestrian-friendly environment with a coherent sense of identity and character. The zoning should include sufficient incentives for granting public roadway and open space easements on private property, since many of the potential public realm improvements are contingent on cooperation with private landowners.

Traffic

The core traffic objective is to ensure that new development is accompanied by traffic improvements that increase the accessibility of business properties while relieving the impacts presently affecting residential neighborhoods. Recognizing the impact of development in the study area on adjacent neighborhoods, the plan seeks to provide a strategy and financing mechanism for both site-based and neighborhood improvements.

The plan should also encourage continued and increased use of traffic-demand-management measures such as carpools, transit passes, and shuttle buses. Over a ten-year period, efforts should be made to increase the public transit mode share to ten percent of all trips.

Street Improvements

Street improvements are essential to creating a more attractive visual environment and a safer, more comfortable experience for drivers, pedes-

EXISTING FIGURE GROUND



PROPOSED FIGURE GROUND



trians, and cyclists. Street improvements should help to create a stronger sense of place and orientation through the treatment of sidewalks, crosswalks, landscaping and lighting. The plan should support a street layout that contributes to improved vehicle, pedestrian and bicycle access through the re-orientation of existing streets and the addition of new streets. The new street network should provide better access to the river and proposed open spaces. Existing and new streets should be designed to create a hierarchy of regional roads, frontage roads, secondary roads, and boulevards that give a

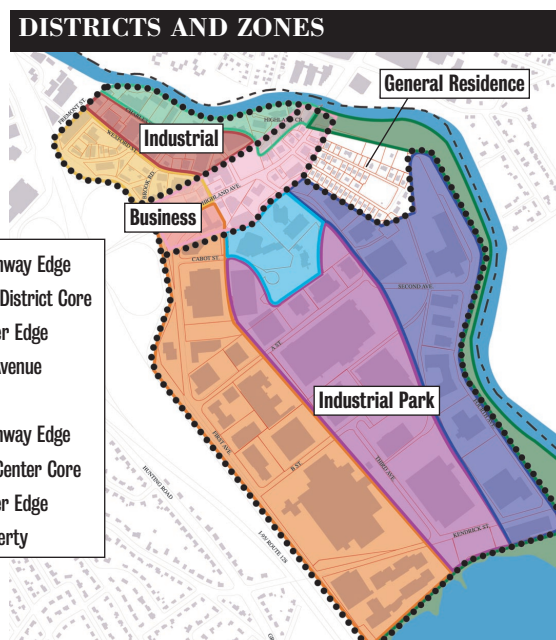


STREETSCAPE IMPROVEMENTS CAN CONTRIBUTE TO A MORE ATTRACTIVE ENVIRONMENT THROUGHOUT THE PROJECT AREA.

greater sense of character and identity to each of the sub-areas within the site. Wherever possible, improvements in existing streets should be achieved within the existing rights-of-way. New streets should follow existing property lines or split properties into usable parcels to retain land values.

Urban and Landscape Design

The design of buildings, lots, streets, and open spaces should contribute to defining three core districts and smaller sub-areas within the site. Each of these districts and sub-areas has unique characteristics and development opportunities, and should be treated accordingly. At the same



time, the study area as a whole should retain a unity and continuity of design. The key design goals for the districts and sub-areas follow.

DISTRICT I: NEW ENGLAND BUSINESS CENTER

- Create a high-quality office park that meets the space and infrastructure needs of the regional office market.
- Create a “campus-like” character for the district through the design of buildings, streets and public spaces.
- Increase the amount of pervious surface and green space throughout the district.
- Improve pedestrian access and views to the Charles River and Cutler Lake.
- Design streets and open spaces to create a “sense of address” in each of the sub-areas:



along Route 128, in the center of the site, and along the river.

- Locate parking garages on the interior of blocks and away from public open spaces.
- Design sidewalks, landscaping, lighting, signage, and street furnishings to create a unified sense of character and define a clear hierarchy of streets throughout the district.

SUB-AREA 1A: SOUTH HIGHWAY EDGE

- Create a consistent edge to the district that provides an attractive face to Route 128.
- Permit taller buildings with massing and height appropriate to the scale of the highway.
- Create spaces between buildings that allow views into the site from Route 128.

SUB-AREA 1B: BUSINESS CENTER CORE

- Develop a new gateway entrance to the business center from Kendrick Street.
- Improve north-south and east-west connections through the site.
- Create a campus-like environment with mid-



THIRD AVENUE COULD BECOME A TREE-LINED BOULEVARD, CREATING A NEW GATEWAY TO THE BUSINESS CENTER FROM KENDRICK ST.

rise buildings framing streets and open spaces.

- Create a signature open space at the heart of the business center.
- Create smaller courtyards to the rear of buildings.

SUB-AREA 1C: SOUTH RIVER EDGE

- Develop a permeable edge to the river with increased vehicle and pedestrian connections.
- Improve the existing walking path along the river and create more visible access points.
- Develop new playing fields adjacent to the river for use by workers and residents.
- Reduce the height and massing of buildings adjacent to the river and residential neighborhood.
- Encourage the creation of small courtyards fronting the river edge.

SUB-AREA 1D: HILLSIDE

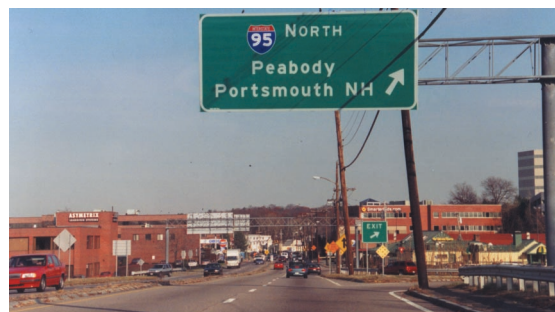
- Improve vehicle and pedestrian access to the hillside.
- Create a new park and overlook on the south side of the hill to take advantage of the excellent views.

DISTRICT 2: HIGHLAND AVENUE CORRIDOR

- Create a safe and pedestrian-accessible street with a mix of commercial uses including



HIGHLAND AVENUE IS A MAJOR COMMERCIAL CORRIDOR THAT SERVES BOTH THE BUSINESS CENTER AND THE REGION.



office, retail, services, and restaurants.

- Maintain low- and mid-rise buildings along most of the avenue.
- Create larger “gateway” buildings adjacent to the river and the highway.
- Encourage uses that serve local workers and residents.
- Encourage active ground floor uses (e.g., retail, restaurants, cafes)
- Consolidate curb cuts to reduce traffic conflicts.
- Locate surface and structured parking behind buildings where possible.
- Use sidewalks, landscaping, lighting, signage, and street furnishings to create a unified and visually appealing streetscape.

DISTRICT 3: WEXFORD/ CHARLES STREET

INDUSTRIAL DISTRICT

- Create incentives to develop a lively and walkable district with a mix of uses including office, retail, light manufacturing, services, restaurants, and multifamily housing.
- Create a pedestrian character for the district with buildings that line the sidewalks and



NEW DEVELOPMENT IN THE WEXFORD/CHARLES STREET DISTRICT SHOULD INCLUDE A VARIETY OF USES, SUCH AS OFFICES, STORES, RESTAURANTS AND HOUSING.

include active ground-floor uses.

- Encourage uses that serve local workers and residents.
- Improve access and views to the Charles River.
- Create small informal open spaces linked to the river.
- Improve traffic circulation patterns.
- Use sidewalks, landscaping, lighting, signage, and street furnishings to create a unified streetscape and define the public right-of-way.



PARKING LOTS ALONG THE CHARLES COULD BE TRANSFORMED INTO A NEW PUBLIC PATHWAY NORTH OF HIGHLAND AVENUE.

SUB-AREA 3A: NORTH HIGHWAY EDGE

- Create a consistent edge to the district that provides an attractive face to Route 128.
- Permit taller buildings with massing and height appropriate to the scale of the highway.

SUB-AREA 3B: INDUSTRIAL DISTRICT CORE

- Improve entrances from Highland Avenue.
- Create a small park at the heart of the district.

SUB-AREA 3C: NORTH RIVER EDGE

- Encourage high-quality residential development along the river edge, including affordable housing.
- Develop a new public pathway along the river with access for pedestrians and cyclists.
- Develop a permeable building edge adjacent to the river, with multiple access points for pedestrians.



RIVER EDGE AND CUTLER LAKE

- Create a maintenance fund for walking paths and open spaces.
- Maintain the existing natural setting of the river's edge and preserve the riparian corridor.
- Create well-marked entrances to walking paths.
- Create new river overlooks.
- Install appropriate directional signage.
- Develop recreational amenities along the river (e.g., canoe and kayak rental).

THE EXISTING M.D.C. WALKING TRAIL IS A VALUABLE AMENITY FOR WORKERS AND TOWN RESIDENTS.

Economic Development

As the single largest source of commercial tax revenue in Needham, the site should be zoned primarily for high-yield commercial uses. The zoning should respond to existing market forces by providing new opportunities and incentives for office, research, and retail development. Despite strong demand for housing in the Boston region, new residential development should be limited to sites along the river in the Wexford/Charles Street District. In order to provide sufficiently large floor areas, parcel assembly should be strongly encouraged. Investments in the public environment, including streetscape

improvements and open space, directly influence land values and should be a core component of the economic development strategy.

Redevelopment of the study area will provide significant financial benefits to the town through



THE BUSINESS CENTER TODAY IS CHARACTERIZED BY LOW INDUSTRIAL BUILDINGS AND LARGE PARKING LOTS..

increased taxes and special permit fees. The town should dedicate a portion of this increased tax revenue to site improvements, with a particular focus on streetscape improvements. For new projects, special permit fees should be established at a level that maximizes revenue but does not discourage development. Individual property owners should also contribute to funding and implementing site-based improvements through a business improvement district or other mechanism.

Parking

The large surface parking lots that currently occupy much of the study area are the product of an earlier era, when land was less valuable and low-density industrial development was the predominant use. In order to support structured

parking, higher-density commercial development is required. The zoning should encourage the development of structured parking in order to reduce the amount of asphalt, increase the amount of open green space across the site, and reduce stormwater runoff. Along Highland Avenue, where lots are narrow and retail is the predominant land use, surface

parking may be necessary. To minimize its visual impact should be located behind buildings and landscaped with trees and shrubs.

Marketing

In order to market the site regionally, the town and current property owners should work together to generate marketing materials and target potential developers. Although the strong demand for commercial space in the region will naturally attract developer interest, the town should focus on seeking developers who will contribute to achieving the vision and goals for the area. The plan can be used as a key tool to illustrate future site improvements and compete for high-end commercial tenants.

The New England Business Center, Highland Avenue Corridor and Wexford/Charles Street Industrial District are undergoing a transformation from manufacturing and industrial park to highly sought-after office district. This transformation reflects larger shifts in the regional economy, most notably strong demand for Class A office space along Route 128. The demand is most apparent south of Highland Avenue in the Industrial Park district, where several large redevelopment projects are under way, including the new Parametrics headquarters at 140 Kendrick Street and the Level 3 Communications building at Cabot and A streets. The Highland Avenue corridor, traditionally dominated by smaller-scale office, retail and restaurant uses, is also experiencing development pressure. The construction of a Staples/Petco store shows the strong demand for retail as well as office space in the area

3 Analysis of Existing Conditions





NEW STAPLES AND PETCO STORES ON HIGHLAND AVENUE.



NEW CLASS A OFFICE SPACE IN THE NEW ENGLAND BUSINESS CENTER.

The Wexford/Charles Street Industrial district, although subject to the same regional economic pressures, has not yet experienced significant redevelopment. This is due in part to lot sizes in the district, which are too small to accommodate new office uses. In total, the study area contains five million square feet of commercial space, of which two million is Class A office/ R&D.

In an era when corporate offices and research facilities seek attractively landscaped sites with a variety of amenities and services, current zoning encourages large, low buildings with extensive surface parking and little open space. As a result, buildings and asphalt cover approximately 90 percent of the site, creating an unappealing visual environment and contributing to stormwater runoff. Under



AMENITIES SUCH AS THIS DAY CARE CENTER ARE INCREASINGLY IMPORTANT FOR NEW CORPORATE OFFICE DEVELOPMENT.

existing zoning, written more than 40 years ago, no building can rise higher than three stories or cover more than 35 percent of its lot. This is a significant obstacle to change, since greater densities are required to offset the cost of redevelopment. For those few lots where new construction can occur, the existing zoning provides no guidelines or incentives to ensure good site design. Finally, despite its immediate proximity to the Charles River and Cutler Lake, the area has little usable open space and offers few attractive routes for pedestrians and cyclists.

Under current zoning, the town lacks the authority to deny permits for new development. If the zoning is not amended, approximately 600,000 square feet of new development is likely to occur over the next five to ten years. The town will not be able to prevent this new development, despite the additional traffic impacts it would create. At the same time, the town lacks the financial resources to pay for traffic improvements that would be needed to accommodate this growth.

In order to address these problems—as well as the large volume of regional traffic affecting the site and adjacent neighborhoods—new development must be linked to traffic improvements. In particular, dedicated funding is required to

expedite the construction of the Route 128 Add-a-Lane project in Needham, which would include a new interchange at Kendrick Street. This project, which will not be completed in the near term without additional funding, is the single most important measure that can be taken to improve local traffic conditions, keep commuter traffic off of

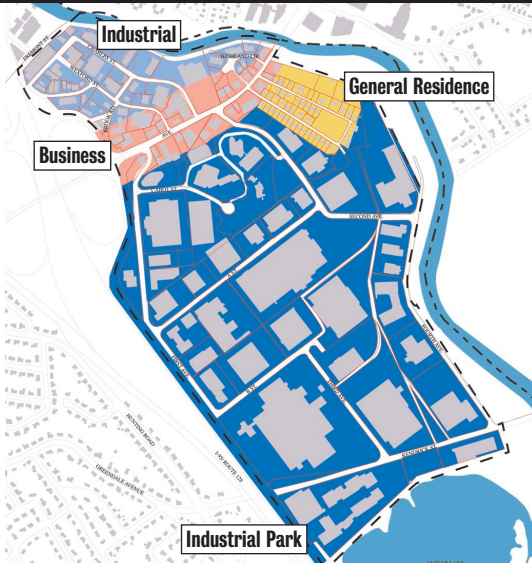
neighborhood streets, and unlock additional development capacity on the site

Zoning

Existing Regulations

The study area currently comprises three zoning districts. The area south of Highland Avenue, bounded by Route 128 to the west, Cutler Lake to the south, and the Charles River

EXISTING ZONING DISTRICTS



to the east, is zoned *industrial park*. The area north of Highland Avenue, bounded by Route 128 to the west, the rail line to the north, and the Charles River to the east, is zoned *industrial*. Highland Avenue from Route 128 to the Charles River is zoned *business*. The following uses are permitted in these districts:

INDUSTRIAL PARK

By right:

- All agricultural uses
- All public, semipublic, and institutional uses
- Single family detached dwellings
- Manufacturing and industrial uses
- Wholesale storage or distribution facilities
- Offices and banks
- Industrial services
- Scientific laboratories
- Radio or television stations

By special permit

- Commercial garages, gasoline filling stations, trucking terminals, truck rental agencies, commercial parking facilities
- Laundry, dry cleaning, car washes
- Junk or salvage yards
- Hotels and motels
- Eat-in or take-out restaurants
- Veterinary offices and medical clinics
- New or used car lots
- Welding or stonecutting shops
- Auto body or auto paint shops
- Truck service or repair
- Food processing primarily for wholesale use
- Genetic biological research
- Medical reference laboratories, dental prosthesis laboratories

INDUSTRIAL

Same as industrial park above, with the following additions:

By right

- Retail establishments serving the general public containing less than 5750 gross square feet of floor area
- Retail trade or shop for custom work or the making of articles to be sold at retail on the premises
- Theaters, indoor moving picture shows, bowling alleys, skating rinks, billiard rooms

By special permit

- Retail establishments serving the general public containing 5,750 or more gross square feet of floor area

BUSINESS

By right

- All agricultural uses
- Most public, semipublic and institutional uses
- Single family detached dwellings and two-family detached dwellings
- Shared elderly housing, boarding houses
- Retail establishment serving the general public if containing 10,000 or more gross square feet of floor area

- Grocery stores
- Retail trade or shop for custom work or the making of articles to be sold at retail on the premises
- Manufacturing incidental to a retail use
- Offices and banks
- Theaters and indoor moving picture shows, pool and billiard rooms, electronic games and amusement arcades, bowling alleys, skating rinks
- Equipment rental service
- Automobile service stations, commercial garages, gasoline filling stations, trucking terminals, truck rental agencies, commercial parking facilities
- Car wash
- Laundry, dry cleaning, car washes
- Junk or salvage yards
- Hotels and motels
- Eat-in or take-out restaurant
- Veterinary offices, medical clinics
- Wholesale storage or distribution facilities
- Industrial services
- Scientific laboratories, medical reference laboratories, dental prosthesis laboratories
- Radio or television stations
- Light non-nuisance manufacturing

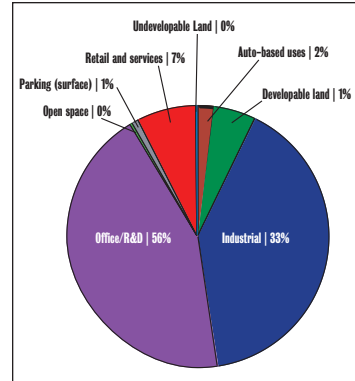
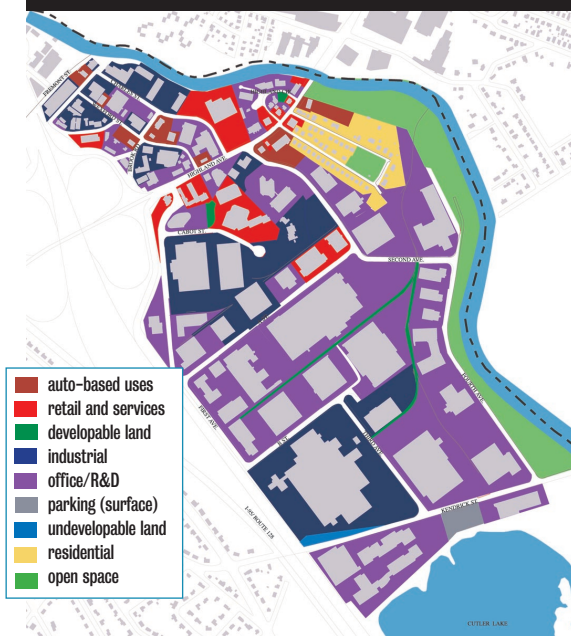
By special permit

- Private schools, nurseries kindergartens
- Convalescent or nursing homes, hospitals
- Cemeteries
- Private clubs not conducted as a business
- Outdoor parking, storage or display of motor vehicles in conjunction with the sale or leasing of new or used motor vehicles

The chart below lists the existing dimensional requirements for each of the three districts.

USE DISTRICT	MAXIMUM HEIGHT (STORIES)	MAXIMUM LOT COVERAGE	PARKING REQUIREMENT (SF PER SPACE)	MINIMUM LOT AREA (SF)
B (Business)	3	—	300	10,000
Interior lot	3	—	300	10,000
1-story	3	25-40%	300	10,000
2-story	3	25-35%	300	10,000
3-story	3	25%	300	10,000
Corner lot	3	—	300	10,000
1-story	3	35-50%	300	10,000
2-story	3	35-45%	300	10,000
3-story	3	35%	300	10,000
IND (Industrial)	3	—	300	10,000
Business (same requirements as above)				
Manufacturing	3	—	300	10,000
Interior lot	3	50%	300	10,000
Corner lot	3	60%	300	10,000
Other Use	3	no restriction	300	10,000
IND-P (Industrial Park)	3	—	300	43,560
Business (same requirements as above)				
Manufacturing	3	—	300	43,560
Interior lot	3	50%	300	43,560
Corner lot	3	60%	300	43,560
Other Use	3	no restriction	300	43,560

EXISTING LAND USE



Density

The existing floor area ratio (FAR) for the entire site is 0.54.

The FAR for individual parcels ranges from zero to 2.1. The majority of parcels (60 percent) are between FAR 0.1 and 0.5. The table below summarizes the existing distribution of density.

PERCENT OF TOTAL LAND AREA	FAR
14%	0 to 0.1
60%	0.1 to 0.5
20%	0.6 to 1.0
6%	1.1 to 2.1

Site Conditions

Land Use

The study area currently comprises a mix of uses. Commercial and office/research & development predominate, occupying 56 percent of total land area; industrial uses occupy 33 percent. The site is mostly built out, with few undeveloped parcels and virtually no open space. The table at left summarizes the existing distribution of land uses.

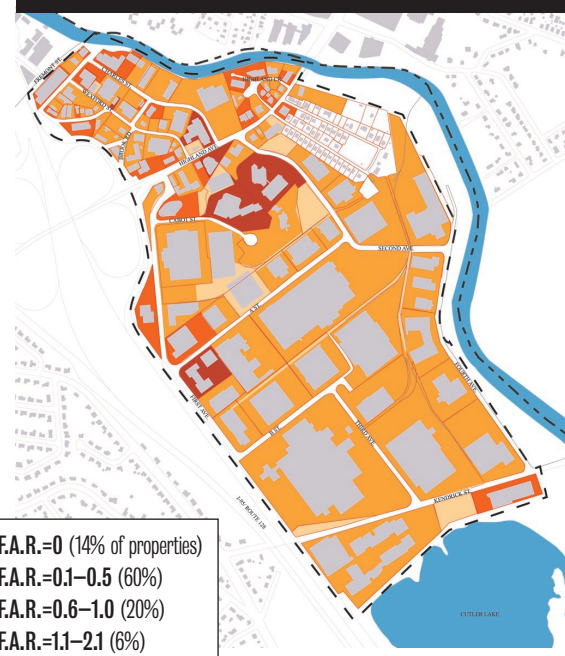
PERCENT OF TOTAL LAND AREA	USE
56%	Office/R&D
33%	Industrial
7%	Retail and services
2%	Auto-based uses
1%	Developable land
1%	Surface parking*
<1%	Undevelopable land
<1%	Open space

* Does not include surface parking ancillary to another use.

Lot Sizes

The existing lots range in size from less than 4,000 square feet to more than one million square feet. In general, larger lots characterize

EXISTING DENSITY

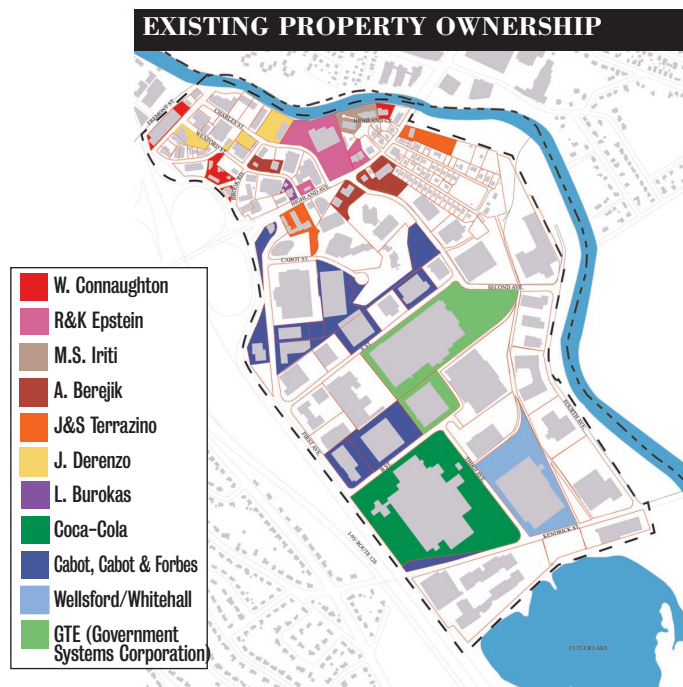


the industrial park district, while the industrial and business districts have smaller lots. This chart shows the median lot size for the three districts:

DISTRICT	MEDIAN LOT SIZE
Industrial Park	45,000 square feet (1 acre)
Industrial	15,000 square feet (0.3 acres)
Business	12,000 square feet (0.5 acres)

Property Ownership

There are several large landowners in the study area. Cabot, Cabot & Forbes owns multiple parcels in the industrial park district, including contiguous lots on First Avenue, A Street, and Cabot Street. Other large land holdings include



the Coca-Cola property on Third Avenue and Kendrick Street, comprising slightly more than one million square feet, and two parcels owned by GTE on A Street and B Street. On Highland Avenue, land holdings are typically smaller and more fragmented. The largest landowner in this district is Winhall Company, whose properties include the recently constructed Staples/Petco store. In the industrial district north of Highland Avenue, property ownership is also fragmented, with smaller lots and fewer assembled parcels.

Build-out Potential

To assist in evaluating future redevelopment options, a build-out analysis was conducted to determine how much additional development would likely occur under existing zoning. This analysis, which includes a detailed inventory of all parcels in the study area, shows that approximately 600,000 square feet of new development could be accommodated under the existing zoning. This would bring the site total to approximately 5.6 million square feet, raising the overall FAR from 0.54 to approximately 0.6.

Methodology

To assess the total build-out under the existing zoning, the following calculations were made for each parcel in the study area (see attached table):

- *Existing Floor Area Ratio (FAR):* This column represents the existing floor area divided by the existing lot area.
- *Effective FAR under existing zoning:* This column represents the maximum FAR that can be achieved under the existing zoning, based on height and lot coverage. The calculations assume that parking would be provided in surface lots, since it is less feasible to develop structured parking with a three-story height limit and 25 to 35 percent lot coverage.
- *Percent of maximum square feet currently built under existing zoning:* This column represents the existing floor area divided by the potential floor area. The potential floor area is the product of the existing lot area and the effective FAR.
- *Soft site:* To determine which properties would likely be redeveloped, several criteria were used. First, it was assumed that existing industrial uses would be redeveloped for offices, since the value per square foot is considerably higher. Second, properties in poor physical condition would likely be redeveloped, since the value of the building

PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	EFFECTIVE FAR UNDER EXISTING ZONING (ASSUMES 100% SURFACE PARKING)	% OF MAX. SF CURRENTLY BUILT UNDER EXISTING ZONING	SOFT SITE ^P	INCREASE IN TOTAL SF AFTER REDE- VELOPMENT
HIGHLAND AVENUE CORRIDOR								
199/073.0-0017-0000.0	Automotive Vehicles	4,074	—	0.0	0.6	0%	N	
199/073.0-0018-0000.0	Automotive Vehicles	32,499	13,940	0.4	0.6	71%	N	
199/073.0-0020-0000.0	Retail Hardware/Building	5,223	1,976	0.4	0.6	63%	N	
199/073.0-0021-0000.0	Automotive Vehicles	6,164	—	0.0	0.6	0%	N	
199/073.0-0022-0000.0	Small Retail	12,881	9,562	0.7	0.6	124%	N	
199/073.0-0058-0000.0	Fuel Service Areas	53,700	3,569	0.1	0.6	11%	N	
199/074.0-0001-0000.0	Medical Office Buildings	7,470	3,600	0.5	0.6	80%	N	
199/074.0-0002-0000.0	General Office Buildings	10,345	7,220	0.7	0.6	116%	N	
199/074.0-0003-0000.0	Small Retail	5,658	2,408	0.4	0.6	71%	N	
199/074.0-0004-0000.0	General Office Buildings	5,586	1,959	0.4	0.6	58%	N	
199/074.0-0005-0000.0	Restaurants /Bars	8,268	4,566	0.6	0.6	92%	N	
199/074.0-0019-0000.0	Bank Buildings	20,453	2,838	0.1	0.6	23%	N	
199/074.0-0022-0000.0	General Office Buildings	29,184	24,960	0.9	0.6	143%	N	
199/074.0-0030-0000.0	Warehouse	45,668	19,278	0.4	0.6	70%	Y	8,123
199/074.0-0031-0000.0	Comm Storage/Warehouse	42,877	22,978	0.5	0.6	89%	Y	2,748
199/074.0-0035-0000.0	Fuel Service Areas	11,960	60	0.0	0.6	1%	N	
199/074.0-0036-0000.0	Fuel Service Areas	7,718	4,238	0.5	0.6	92%	N	
199/074.0-0037-0000.0	General Office Buildings	8,080	2,490	0.3	0.6	51%	Y	2,358
199/074.0-0038-0000.0	General Office Buildings	12,233	9,000	0.7	0.6	123%	N	
199/074.0-0039-0000.0	General Office Buildings	27,104	17,012	0.6	0.6	105%	N	
199/074.0-0043-0000.0	General Office Buildings	51,680	98,976	1.9	0.6	319%	N	
199/300.0-0054-0000.0	Restaurants / Bars	35,161	8,150	0.2	0.6	9%	N	
199/300.0-0058-0000.0	Restaurants / Bars	5,529	2,213	0.4	0.6	67%	N	
199/300.0-0059-0000.0	Shopping Center	45,752	15,179	0.3	0.6	55%	N	
199/300.0-0060-0000.0	General Office Buildings	15,185	9,900	0.7	0.6	109%	N	
199/300.0-0061-0000.0	General Office Buildings	31,452	49,828	1.6	0.6	264%	N	
199/300.0-0064-0000.0	Comm Storage/Warehouse	43,560	12,730	0.3	0.6	49%	Y	13,406

PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	EFFECTIVE FAR UNDER EXISTING ZONING (ASSUMES 100% SURFACE PARKING)	% OF MAX. SF CURRENTLY BUILT UNDER EXISTING ZONING	SOFT SITE?	INCREASE IN TOTAL SF AFTER REDE- VELOPMENT
WEXFORD/CHARLES STREET INDUSTRIAL DISTRICT								
199/074.0-0006-0000.0	General Office Buildings	5,728	3,629	0.6	0.6	106%	N	
199/074.0-0007-0000.0	General Office Buildings	5,722	2,506	0.4	0.6	73%	N	
199/074.0-0008-0000.0	Developable Land	6,420	—	0.0	0.6	0%	Y	3,852
199/074.0-0009-0000.0	General Office Buildings	17,940	9,360	0.5	0.6	87%	N	
199/074.0-0011-0000.0	General Office Buildings	31,565	22,866	0.7	0.6	121%	N	
199/074.0-0014-0000.0	General Office Buildings	29,100	28,800	1.0	0.6	165%	N	
199/074.0-0016-0000.0	General Office Buildings	10,764	4,231	0.4	0.6	66%	N	
199/074.0-0023-0000.0	Chain Retail	185,438	26,408	0.1	0.6	24%	N	
199/074.0-0027-0000.0	Warehouse	63,750	9,892	0.2	0.6	26%	Y	28,358
199/074.0-0028-0000.0	Auto Repair Facilities	15,787	9,050	0.6	0.6	96%	N	
199/074.0-0029-0000.0	Auto Repair Facilities	19,961	2,160	0.1	0.6	18%	Y	9,817
199/074.0-0032-0000.0	Auto Repair Facilities	11,142	4,940	0.4	0.6	74%	N	
199/074.0-0033-0000.0	General Office Buildings	46,647	19,980	0.4	0.6	71%	Y	8,008
199/075.0-0001-0000.0	General Office Buildings	8,175	8,452	1.0	0.6	172%	N	
199/075.0-0002-0000.0	General Office Buildings	33,588	6,684	0.2	0.6	33%	N	
199/075.0-0003-0000.0	Small Retail	32,858	29,909	0.9	0.6	152%	N	
199/075.0-0004-0000.0	Auto Repair Facilities	6,897	3,000	0.4	0.6	72%	N	
199/075.0-0005-0000.0	Comm Storage /Warehouse	9,988	4,000	0.4	0.6	67%	Y	1,993
199/075.0-0006-0000.0	Manufacturing Operations	4,280	2,780	0.6	0.6	108%	N	
199/075.0-0008-0000.0	Comm Storage /Warehouse	8,842	4,554	0.5	0.6	86%	Y	751
199/075.0-0009-0000.0	Auto Repair Facilities	5,224	1,400	0.3	0.6	45%	N	
199/075.0-0010-0000.0	Manufacturing Operations	32,940	7,500	0.2	0.6	38%	Y	12,264
199/075.0-0011-0000.0	Manufacturing Operations	8,740	3,738	0.4	0.6	71%	Y	1,506
199/075.0-0012-0000.0	Comm Storage /Warehouse	8,390	1,440	0.2	0.6	29%	Y	3,594
199/075.0-0013-0000.0	General Office Buildings	4,640	7,126	1.5	0.6	256%	N	
199/075.0-0014-0000.0	Manufacturing Operations	55,299	39,908	0.7	0.6	120%	N	

PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	UNDER EXISTING ZONING (ASSUMES 100% SURFACE PARKING)	CURRENTLY BUILT UNDER EXISTING ZONING	SOFT SITE?	INCREASE IN TOTAL SF AFTER REDE- VELOPMENT
199/075.0-0015-0000.0	Comm Storage /Warehouse	35,218	21,008	0.6	0.6	99%	Y	123
199/075.0-0016-0000.0	Auto Repair Facilities	8,611	4,546	0.5	0.6	88%	N	
199/075.0-0017-0000.0	General Office Buildings	44,424	22,112	0.5	0.6	83%	N	
199/075.0-0018-0000.0	Manufacturing Operations	26,107	12,425	0.5	0.6	79%	Y	3,239
199/075.0-0019-0000.0	General Office Buildings	16,213	6,560	0.4	0.6	67%	N	
199/075.0-0021-0000.0	Comm Storage /Warehouse	74,000	25,470	0.3	0.6	57%	Y	18,930
199/075.0-0023-0000.0	Comm Storage /Warehouse	40,390	41,984	1.0	0.6	173%	N	
199/075.0-0024-0000.0	Comm Storage /Warehouse	6,110	4,627	0.8	0.6	126%	Y	(961)
199/075.0-0025-0000.0	Auto Repair Facilities	4,100	2,030	0.5	0.6	83%	Y	430
199/075.0-0026-0000.0	Auto Repair Facilities	7,667	3,030	0.4	0.6	66%	Y	1,570
199/075.0-0037-0000.0	Automotive Vehicle	24,669	2,400	0.1	0.6	16%	Y	12,401
199/075.0-0038-0000.0	General Office Buildings	4,599	5,880	1.3	0.6	213%	N	

NEW ENGLAND BUSINESS CENTER

199/300.0-0001-0000.0	General Office Buildings	550,070	400,000	0.7	0.6	121%	N	
199/300.0-0003-0000.0	Parking Lots	71,332	—	0.0	0.6	0%	N	
199/300.0-0004-0000.0	General Office Buildings	120,000	68,120	0.6	0.6	95%	N	
199/300.0-0006-0000.0	General Office Buildings	261,360	79,134	0.3	0.6	50%	N	
199/300.0-0007-0000.0	General Office Buildings	157,076	78,970	0.5	0.6	84%	N	
199/300.0-0009-0000.0	General Office Buildings	167,163	53,688	0.3	0.6	54%	N	
199/300.0-0010-0000.0	Potentially Develop Land	42,600	—	0.0	0.6	0%	Y	25,560
199/300.0-0011-0000.0	Comm Storage/Warehouse	191,468	82,254	0.4	0.6	72%	Y	32,627
199/300.0-0012-0000.0	General Office Buildings	478,396	208,180	0.4	0.6	73%		
199/300.0-0013-0000.0	Undevelopable Land	20,810	—	0.0	0.6	0%	N	
199/300.0-0014-0000.0	Manufacturing Operations	1,031,086	408,199	0.4	0.6	66%	Y	210,453
199/300.0-0015-0000.0	General Office Buildings	96,960	36,247	0.4	0.6	62%	Y	21,929
199/300.0-0016-0000.0	General Office Buildings	180,000	81,224	0.5	0.6	75%	Y	26,776
199/300.0-0017-0000.0	Office Build/Manufacture	160,000	80,640	0.5	0.6	84%	N	
199/300.0-0018-0000.0	Research & Development	340,000	170,000	0.5	0.6	83%	N	
199/300.0-0019-0000.0	Potentially Develop Land	31,376	—	0.0	0.6	0%	N	
199/300.0-0020-0000.0	Office Build/Manufacture	45,051	17,025	0.4	0.6	63%	N	

PARCEL ID	UNDER EXISTING	CURRENTLY EXISTING USE	LOT AREA (SF)	INCREASE BLDG. AREA (SF)	EXISTING FAR	ZONING (ASSUMES 100% SURFACE PARKING)	BUILT UNDER EXISTING ZONING	SOFT SITEP	IN TOTAL SF AFTER REDE- VELOPMENT
199/300.0-0021-0001.0		MDC Easement	30,000	—	0.0	0.6	0%	N	
199/300.0-0022-0000.0		Research & Development	45,094	16,167	0.4	0.6	60%	N	
199/300.0-0023-0000.0		Warehouse	66,615	23,180	0.3	0.6	58%	Y	16,789
199/300.0-0024-0000.0		Manufacturing Operations	345,700	116,507	0.3	0.6	56%	Y	90,913
199/300.0-0026-0000.0		General Office Buildings	233,033	86,814	0.4	0.6	62%	N	
199/300.0-0027-0000.0		General Office Buildings	658,831	316,029	0.5	0.6	80%	N	
199/300.0-0028-0000.0		Research & Development	240,750	99,223	0.4	0.6	69%	N	
199/300.0-0029-0000.0		Research & Development	78,000	35,435	0.5	0.6	76%	N	
199/300.0-0030-0000.0		General Office Buildings	105,178	194,793	1.9	0.6	309%	N	
199/300.0-0031-0000.0		General Office Buildings	103,710	92,418	0.9	0.6	149%	N	
199/300.0-0032-0000.0		Manufacturing Operations	60,000	25,500	0.4	0.6	71%	Y	10,500
199/300.0-0033-0000.0		Internet Switching Facility	354,200	462,220	1.3	0.6	217%	N	
199/300.0-0034-0000.0		General Office Buildings	60,000	22,960	0.4	0.6	64%	N	
199/300.0-0035-0000.0		Health Spas	80,000	39,600	0.5	0.6	83%	N	
199/300.0-0056-0000.0		Potentially Develop Land	15,200	—	0.6		0%	Y	9,120
199/300.0-0037-0000.0		Day Care	40,000	20,000	0.5	0.6	83%	N	
199/300.0-0038-0000.0		Research & Development	74,514	30,887	0.4	0.6	69%	N	
199/300.0-0039-0000.0		General Office Buildings	82,204	28,062	0.3	0.6	57%	Y	21,260
199/300.0-0040-0000.0		Parking Lots	34,562	—		0.6	1%	Y	20,597
199/300.0-0041-0000.0		General Office Buildings	173,314	206,846	1.2	0.6	199%	N	
199/300.0-0042-0000.0		Radio-TV Trans Facilities	178,379	9,363	0.1	0.6	9%	N	
199/300.0-0047-0000.0		General Office Buildings	74,328	36,710	0.5	0.6	82%	Y	7,887
199/300.0-0048-0000.0		General Office Buildings	96,555	61,728	0.6	0.6	107%	N	
199/300.0-0053-0000.0		Manufacturing Operations	243,000	120,787	0.5	0.6	83%	Y	25,013
199/300.0-0055-0000.0		General Office Buildings	71,888	50,970	0.7	0.6	118%	N	
199/300.0-0065-0000.0		Radio-TV Trans Facilities	72,708	—	0.6		0%	N	
199/300.0-0066-0000.0		Hotel	202,597	417,778	2.1	0.6	344%	N	
TOTAL			9,312,505	5,042,813	0.5	0.6			639,533

*Increase in total SF, assuming uniform upgrade from FAR .54 to FAR .6 = 535, 409

is low relative to the value of the land. Third, properties were considered likely to be redeveloped if the existing floor area is 50 percent or less of the potential floor area.

- *Increase in total square footage after redevelopment:* This column represents the net new floor area for properties that would likely be redeveloped.

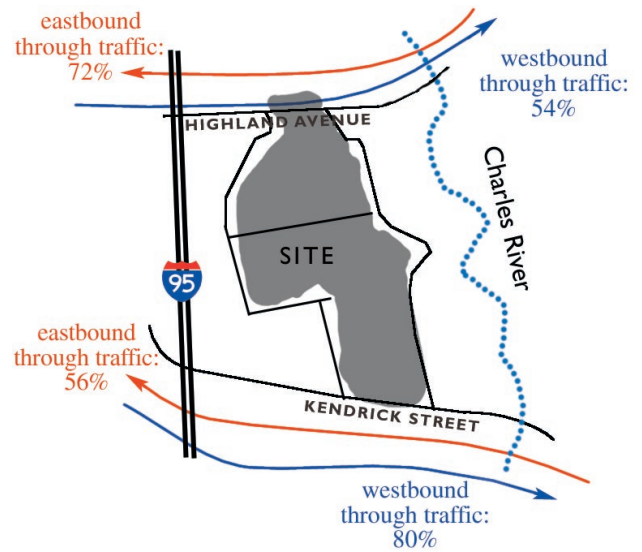
Traffic and Transportation

Situated on the eastern edge of Needham between Route 128 and the Charles River, the New England Business Center has excellent access from surrounding communities and the highway. At the same time, the area inevitably suffers from the regional through traffic that uses its roadways. The purpose of this study is to identify opportunities to unlock the development potential in the New England Business Center, while maintaining acceptable transportation conditions and making improvements where possible in the nearby neighborhoods, in the business center itself, and on adjacent roadways.

Site Traffic vs. Through Traffic

Access to the site is limited to two roads, Highland Avenue and Kendrick Street, both of which are major regional routes. The roadway capacity serving the site is, therefore, based upon the capacity of these two roadways. In the morning peak hour, through traffic (*i.e.*, traffic not bound for the site) constitutes 72 percent of all westbound trips and 54 percent of all eastbound trips on Highland Avenue within the study area. Similarly, more than half of the morning traffic entering the area on Kendrick Street is through traffic: 56 percent of westbound trips and 80 percent of eastbound trips during the morning peak.

A.M. Peak-Hour Through Traffic



Traffic Distribution

Using the latest traffic study, conducted in March 2000 by Rizzo Associates, the AM and PM peak traffic distributions into the site can be compared with the number of through trips in the surrounding area. Commuter patterns can be determined by comparing the entry points with the highest percentage of vehicles. In the morning peak, most vehicles enter the region from the west from the direction of the interstate at Highland Avenue (43 percent). Likewise, the majority of vehicle trips into the business center come from the right turn at Highland Avenue into First Avenue (42 percent). In the evening, the majority of vehicles leave the area returning westbound toward the interstate (38 percent). However, the majority of vehicles leave the site at Highland Avenue and Second Avenue (54 percent). Of these vehicles leaving at Second Avenue in the P.M. peak, 84 percent of them are taking a left turn toward the interstate. These percentages illustrate the necessity of taking a left turn out of the site and the impact of the left turn restriction onto First Avenue.

The distribution entering and leaving Kendrick Street also paints a picture of the travelers passing through the site. In the morning, most who enter the area via Kendrick do so from the west (29 percent). Those who enter the site off of Kendrick do so from the east (18 percent). In the evening, the majority of vehicles exiting both the site and the area (19 and 28 percent, respectively) use the westbound route from Third Avenue and across the interstate on Kendrick. It is impossible to determine how many of these trips are choosing to travel westbound on Kendrick to cut through on Greendale Avenue or Hunting Road to reach the interstate ramps.

Future trip growth will be directly associated with development within the site. The following table shows the trip generation rates for the existing land uses within the site. In the morning, the highest numbers of generated trips are those entering the site. Conversely, those exiting the site are at critical volumes during the evening peak. The A.M. peak entering trips are more densely concentrated for the site than those exiting P.M. peak trips. Therefore, for the planning purposes of this study, the A.M. peak hour entering trips were

used to determine the capacity of the roadways serving the site. Existing land use (2000) generates approximately 3,100 trips during the A.M. peak hour.

Mode Share

Not all trips accessing the site are by private automobile. According to the 1990 CTPP Census data, 87 percent of people who work in Needham arrive in a single occupant vehicle (SOV). Approximately 8 percent of workers travel in a carpool with two or more workers per vehicle. The transit share for Needham workers is 1.5 percent. The rest of the working population travels by taxi, motorcycle, bicycle, or on foot.

The New England Business Center transit mode split is higher than the town of Needham average. According to the Route 128 Business Council, between 60 and 70 people ride the Green Line shuttle service from Newton Highlands to the New England Business Center daily. The New England Business Center shuttle has nearly 100 regular riders. The volume of riders on the shuttle constitutes approximately a 1.9 percent transit share on

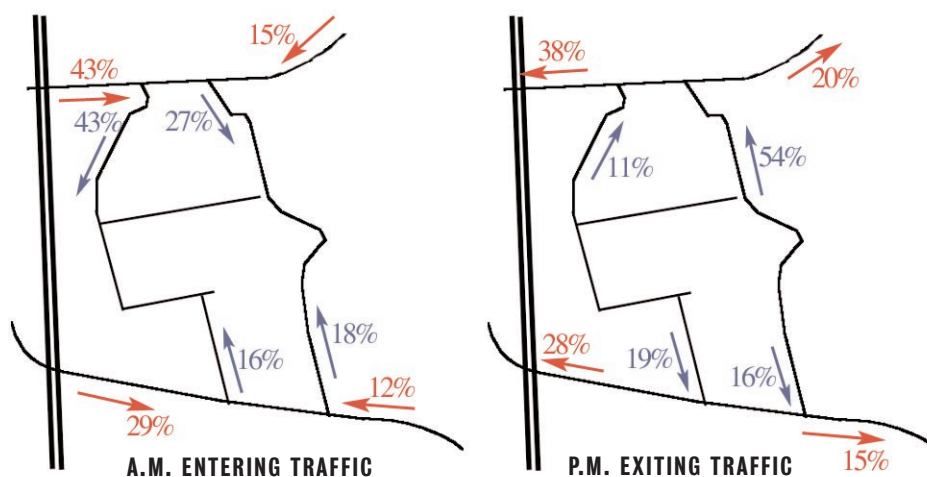
1998 Entering Traffic

LOCATION	1998 A.M.		1998 P.M.	
	AREA	SITE	AREA	SITE
Highland Avenue/First Avenue	43%	42%	31%	24%
Highland Avenue/Second Avenue	15%	27%	27%	42%
Kendrick Street/Third Avenue	29%	13%	12%	7%
Kendrick Street/Fourth Avenue	12%	18%	30%	27%

1998 Exiting Traffic

LOCATION	1998 A.M.		1998 P.M.	
	AREA	SITE	AREA	SITE
Highland Avenue/First Avenue	23%	8%	38%	11%
Highland Avenue/Second Avenue	26%	59%	20%	54%
Kendrick Street/Third Avenue	11%	9%	28%	19%
Kendrick Street/Fourth Avenue	39%	25%	15%	16%

A.M. Entering and P.M. Exiting Traffic Analysis



the shuttle. A second shuttle began operating between the Wellesley Hills transit stop and the business center in late November 2000, but a ridership profile has not been established for the new service at this time.

The New England Business Center has its own transportation management association (TMA). The TMA began offering a shuttle service in Needham in March 2000. The TMA shuttle operates between the Newton Highlands MBTA station and the New England Business Center

every Monday through Friday in both the morning and evening. The TMA also coordinates a comprehensive carpool-matching system to assist commuters in finding someone with whom to share a ride. The TMA encourages companies to offer preferred carpool parking and other incentives to promote commuting. Additionally, the TMA provides a “guaranteed ride home” service to those who carpool, vanpool, or ride the shuttle regularly.

Trip-Generation Rates for Land Uses on Site

LAND USE (VEHICLE TRIPS PER 1000 OCCUPIED SF)	WEEKDAY	A.M. PEAK HOUR			P.M. PEAK HOUR		
		RATE	IN	OUT	RATE	IN	OUT
Manufacturing Operations	3.82	0.73	77%	23%	0.74	36%	64%
Commercial Storage/Warehouse	4.96	0.45	82%	18%	0.51	24%	76%
Office Build/Manufacture	3.82	0.73	77%	23%	0.74	36%	64%
Warehouse	4.96	0.45	82%	18%	0.51	24%	76%
Hotel*	8.23	0.56	61%	39%	0.61	53%	47%
Health Spa	NA	0.30	46%	54%	4.30	61%	39%
Day Care	79.26	13.02	53%	47%	13.62	47%	53%
General Office Building	11.01	1.56	88%	12%	1.49	17%	83%
Research & Development	8.11	1.24	83%	17%	1.08	15%	85%
Restaurant	130.34	9.27	52%	48%	10.86	60%	40%
Retail	40.67	NA	NA	NA	2.59	43%	57%
Residential/Condo	4.18	0.34	19%	81%	0.38	62%	38%
General Light Industrial	6.97	0.92	88%	12%	0.98	12%	88%

* Hotel vehicle-trip-generation rates are based upon the number of guest rooms

SOURCE: TRIP GENERATION, ITE

Existing Mode Split of Needham Work Trips

MODE TO WORK	PERCENT
Single-occupant vehicle	87.1%
2-occupant vehicle	7.5%
3-occupant vehicle	0.6%
4-occupant+ vehicle	0.6%
Transit	1.5%
Other*	2.7%

* includes taxi, motorcycle, bike, and walk trips to work

SOURCE: 1990 CTPP CENSUS, JOURNEY TO WORK DATA

Level-of-Service Analysis

Given that approximately 96 percent of trips occur by vehicle, it is necessary to assess the existing vehicular conditions on the surrounding roadways to determine the current levels of roadway service and the capacity of the roadways. The typical assessment of vehicular travel quality is through intersection level of service (LOS) analysis. LOS analyses were conducted as part of the traffic impact and access studies that were prepared by parties interested in developing within the business center.

Level-of-service analyses provide a standardized indication of how well an intersection will accommodate traffic demands. The LOS provides an index to quality of traffic flow in terms such as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. The six levels of service are given letter designations from A to F, with LOS A representing the best operating conditions and the LOS F, the worst.

Level-of-service designations for a signalized intersection are based on the criterion of average stopped delay per vehicle. Delay is a measure of driver discomfort, frustration, fuel consumption, and added travel time. HCS relates the delay with the LOS by accounting the effects of the signal type, phasing, progression, vehicle mix, and intersection geometry.

Most of the intersections providing unacceptable levels of service occur on Highland Avenue and Kendrick Street. Intersection improvements will help to raise the level of service, but the quality of service at an intersections is influenced by the capacity of the roadway

LOS at Intersections in the Study Area

(NA=information not available)

INTERSECTION	EXISTING (1998,1999)		SOURCE
	A.M.	P.M.	
Highland Avenue/First Avenue	B	B	Rizzo, VHB
Highland Avenue/Second Avenue	F	E	VAI, VHB
Highland Avenue/Charles Street	F	E	RDV
Highland Avenue/Wexford Street	NA	NA	
A Street/First Avenue	B	B	Rizzo, VHB
A Street/Second Avenue	C	F	Rizzo, VHB
Kendrick Street/Third Avenue	F	F	Rizzo, VHB
Kendrick Street/Fourth Avenue	F	F	Rizzo, VHB
First Avenue/Cabot Drive	C	B	Rizzo
Great Plain Avenue/128 southbound ramps	E	C	VAI
Highland Avenue/128 northbound ramps	F	B	VAI
Kendrick Street/Hunting Road	F	C	VAI
Highland Avenue/Hunting Road/Gould Street	F	D	VAI
Great Plain Avenue/Greendale Avenue	C	B	VAI

Intersection Level-of-Service Criteria

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (SECONDS)	STOPPED DELAY PER VEHICLE (SECONDS)
	SIGNALIZED	UNSIGNALIZED
A	≤ 5.0	≤ 5.0
B	> 5.0 and ≤ 15.0	> 5.0 and ≤ 10.0
C	> 15.0 and ≤ 25.0	> 10.0 and ≤ 20.0
D	> 25.0 and ≤ 40.0	> 20.0 and ≤ 30.0
E	> 40.0 and ≤ 60.0	> 30.0 and ≤ 45.0
F	> 60.0	> 45.0

SOURCES: HCM SPECIAL REPORT 209, TRB 1998; HIGHWAY CAPACITY MANUAL, 1997

serving it. If the intersections could be rebuilt to provide more capacity to the users, the adjacent roadways (Highland Avenue and Kendrick Street) would have to absorb those additional trips.

Highland Avenue currently serves nearly 3,900 vehicles between First Avenue and the interstate during the morning peak hour. Nearly 2,700 of those are eastbound trips. Roadway improvements are necessary to expand the roadway capacity and allow additional trips to enter the business center.

Street and Intersection Issues

HIGHLAND AVENUE

Highland Avenue has an average daily traffic (ADT) volume of approximately 46,000 vehicles between the interchange and First Avenue.¹ Currently, Highland Avenue consists of one lane in each direction crossing the

Charles River. Between the Charles River and Second Avenue, Highland Avenue widens to two lanes in each direction. Highland Avenue continues with the four-lane cross section through the business center and over the interstate. Highland Avenue becomes Needham Street as it crosses the Charles River travels into Newton.

HIGHLAND AVENUE/SECOND AVENUE INTERSECTION

The intersection at Highland Avenue and Second Avenue is a four legged, signalized intersection. The westbound Highland Avenue approach consists of a shared left-through lane and a through-right lane. The westbound approach receives the leading phase for through, right, and left turns before the signal allows the eastbound traffic to proceed through the intersection. Northbound Second Avenue is a two-lane approach with an exclusive left-turn lane and an all-move lane. The south approach comes from the Staples/Petco parking lot. The southbound approach is activated with a shared through-left turn lane and right turn lane. Right turns on red are allowed.

Second Avenue provides the only allowable left turn out the north side of the site. Due to safety concerns about interstate ramp queues, no left turns are allowed from First Avenue onto Highland Avenue. Studies show 950 left turns from Second Avenue to Highland Avenue during the P.M. peak hour in 1998.² The volume of left turns is projected to reach as many as 1,200 in 2003.³

Highland Avenue Peak Hour Travel Volumes

	A.M. E'BOUND	W'BOUND	P.M. E'BOUND	W'BOUND	VOL. PER LANE
1998					
West of First	2,683	1,209	1,321	2,426	1,340
West of Second	1,304	1,681	2,309	1,224	1,155
Newton Line	1,217	1,049	1,165	1,355	680
2000					
West of Wexford	1,356	825	429	2,336	1,160
East of Wexford	1,285	703	372	2,402	1,200

TRAFFIC COUNTS FROM NORFOLK COUNTY

The westbound capacity on Highland Avenue is restricted by the shared through-left turn from Highland serving Second Avenue. The shared left-through lane serves predominantly as a left turning lane. The queues waiting to turn left prohibit this lane from serving through traffic.

Highland Avenue Accidents (1993-1998)

INTERSECTION	NUMBER OF ACCIDENTS
First Avenue	5
Wexford Street	19
Charles Street	6
Second Avenue	9
Highland Circle (W)	1
Highland Terrace	1
Riverside Street	1
Highland Circle (E)	2

SOURCE: TOWN OF NEEDHAM ENGINEERING DEPARTMENT

Highland Avenue in the New England Business Center has a number of curb cuts serving restaurants, delis, gas stations, banks, and other commercial businesses requiring frequent access. The access and egress create conflicts as vehicles merge into the Highland traffic.

WEXFORD STREET

The intersection of Highland Avenue at Wexford Street had the highest number of accidents for intersections within the New England Business Center. These accidents are most likely due to the high proportion of vehicles attempting to make U-turns at the intersection. Due to the left turn prohibition at First Avenue, vehicles desiring to travel westbound make a right turn onto Highland Avenue and quickly take a left turn or U-turn at the Wexford intersection.

Historically, the Wexford/Highland intersection has been identified as a “problem” intersection. The Highland Avenue/Needham Street Corridor Traffic Study prepared by CTPS in 1986 said this about the Wexford intersection:

Left turn demand...is predominantly focused at the intersections of Charles Street and Wexford Street. High volumes of through traffic in all four travel lanes make left turn movements into and from these intersections extremely difficult and unsafe. Conditions are worst at the Wexford

Street intersection, where between 10 and 15 percent of eastbound Highland Avenue traffic turns left, depending on the time of day. The intersection has the worst accident history in the study.

Today the same comments may be made about the left turns onto Wexford and Charles streets. These left-turning vehicles reduce the roadway capacity of Highland Avenue and create safety issues.

FIRST AVENUE

First Avenue has limited access and egress. A concrete median begins on Highland Avenue to the east of First Avenue. This concrete median prohibits left turns from accessing First Avenue from westbound Highland Avenue. Additionally, the concrete median prohibits left turns from First Avenue onto Highland Avenue. Morning volumes entering the business center match those volumes turning left at Second Avenue in the evening. 1998 volumes were recorded at 967 vehicles in the A.M. peak hour and were projected to be 1,337 in 2003.

KENDRICK STREET

Entering the business park from the westbound direction, the Kendrick Street bridge over Route 128 is a 40-foot span carrying two lanes eastbound and one westbound. Kendrick Street over the Charles River is 40 feet wide and is currently marked for one travel lane in each direction.⁴

Parametric Corporation is currently building a 400,000-square-foot office on the south side of Kendrick Street between the interstate and Third Avenue. The site projects an additional 367 A.M. trips and 463 P.M. trips above existing traffic volumes. Among the mitigation measures planned for this site are driveway consolidation, addition of a signal at the Kendrick Street/Third Avenue intersection, Kendrick Street widening to four lanes at Fourth Avenue, and an MDC access drive.⁵

WELLS AVENUE

Wells Avenue intersects with Kendrick Street in Newton and serves a 1.6-million-square-foot business park, approximately half of which is office buildings. Wells Avenue generates a significant portion of trips in both the A.M. and P.M. peak hours. Due to its proximity to the New England Business Center, a considerable number of vehicles arrive at Wells Avenue via Kendrick Street in Needham, First, Second, and Fourth avenues.

THIRD AVENUE

Wellsford/Whitehall Holdings, LLC has rebuilt the intersection of Third Avenue and Kendrick Street as part of the mitigation measures associated with the building of a 400,000SF office development to be occupied by Parametric. Kendrick Street has been widened at Third Avenue, and the site driveway has been relocated and signalized. The reconstruction provides a left-turn lane, two through lanes, and a right-turn lane in the eastbound direction. The westbound approach comprises a left-turn lane, a through lane, and a shared

through/right-turn lane. The driveway, located across from Third Avenue, has two entry and two exit lanes. The southbound approach has been modified to include a channelized right-turn lane and a shared through/left-turn lane. Kendrick Street has two lanes in each direction between Third and Fourth Avenues.

Residential Neighborhood Concerns

Cut-through traffic is a concern for the neighboring residents on Greendale Avenue, Hunting Road, and adjacent streets. Greendale Avenue and Hunting Road are both minor north-south arterials that provide access between Highland Avenue and Kendrick Street. Many vehicles are likely to try to avoid the delays on Highland Avenue, the queues at the Second Avenue intersection, and the left-turn prohibition on First Avenue by exiting the New England Business Center on Kendrick Street, traveling northbound on Greendale Avenue or Hunting Road and entering the interstate by traveling eastbound on Highland Avenue. In the morning, commuters traveling from westerly suburbs

may find it convenient to travel through these neighborhoods to reach Kendrick Street.

Overview: Street and Intersection Issues

LOCATION & NAME	ISSUE(S)
1 Highland Avenue	Curb cuts, traffic volumes, left turns
2 Highland/Second Avenue	Volume of left turns, westbound approach
3 Wexford Street	Accidents, U-turns, left turns, safety
4 Charles Street	Left turns
5 Hunting Road & Greendale Avenue	Cut-through traffic
6 Parametric site	Intersection reconstruction
7 128 NB Off-Ramp (proposed)	Collector and distributor roads
8 128 Add-A-Lane (proposed)	Additional access to New England Bus. Ctr.
9 Wells Avenue	Major generator
10 First Avenue	Prohibited left turns, right turns only
11 Third Avenue	New signal
12 Residential	Pedestrian, bicycle access
13 Wexford connection to Reservoir St.	Possible connection under RR
14 First Avenue & Wexford	Possible alignment
15 Kendrick Bridge	40' cross section
16 Highland Avenue Bridge	40' cross section

Route 128

Add-a-Lane project

A redesign of the Highland Avenue Interchange is part of the I-95/I-93 Transportation Improvement Project. Based on the recommendation by CTPS in the 1986 study, interchange improvements include the construction of a frontage road system along I-95 (Route 128) with new

ramps at Kendrick Street. According to the FEIR prepared by the FHWA, the proposed redesign would include:

- Realignment of the existing Highland Avenue where it extends over I-95 (Route 128)
- Adjustments to the existing interchange ramps
- Construction of a four-span bridge at Highland Avenue
- Addition of collector/distributor roads along I-95 (Route 128) to allow the entering, exiting, and merging of interchange traffic at reduced highway speeds without affecting through traffic
- Addition of a diamond interchange at Kendrick Street that would include new ramps and a new bridge with increased horizontal clearance to accommodate additional collector/distributor roads and greater vertical clearance.⁶

Businesses in the New England Business Center have recently formed a 6320 corporation, whose purpose is to initiate the design and, potentially, the construction contracts for the northbound off-ramp from I-95 to Kendrick Street. The corporation plans to fund the ramp privately to “fast track” the construction, therefore serving the traffic needs of existing and the future development.

NOTES

- ¹ Norfolk County Engineering Department Traffic Counts, October 1998.
- ² A.M. peak hour is 7:30 to 8:30; P.M. peak hour is 4:30 to 5:30.
- ³ *Traffic Impact and Access Study*, Rizzo Associates, 2000 and *Traffic Impact and Access Study*, VAI, 1999.
- ⁴ *Traffic Impact and Access Study*, Rizzo Associates, 2000 and *Traffic Impact and Access Study*, VAI, 1999.
- ⁵ *Traffic Impact and Access Study*: 140 Kendrick Street, VAI, 1999.
- ⁶ *Environmental Assessment/Final Environmental Impact Report (EOEA No. 5072)*, Federal Highway Administration and Massachusetts Highway Department. February 1999, p. II-42.

Market Overview

Demand Overview

This discussion serves to summarize the local and regional market patterns and trends that underpin our analysis of the development potentials within the study area.

Regional Job Growth

The city of Boston is the economic hub of both the Commonwealth of Massachusetts and the New England region, providing governmental, professional, business, financial, higher educational and medical services, as well as important transportation, communications, export, cultural and entertainment activities. Boston is the twentieth largest city in the U.S. and the center of the seventh largest Consolidated Metropolitan Statistical Area (CMSA). Boston had a 1998 population of 555,447 with 671,023 jobs, as reported by the U.S. Department of Commerce’s Bureau of the Census, the U.S. Bureau of Economic Analysis and the Massachusetts Department of Employment and Training. This ratio of jobs to population indicates that the city provides a direct source of employment and income for an area, which extends well beyond its borders. Measured in terms of jobs, the city’s economy constitutes approximately 21% of the Massachusetts economy and 10% of that of the six New England states.

The Boston metropolitan area accounts for about two-thirds of the Massachusetts economy, which is interrelated with the economies of the other New England states. As such, the city’s job changes over the last three cycles of growth (1982-1988), recession (1989-1992), and growth (1992 to present) must be viewed in a regional context. This table charts employment changes over the three regional business cycles. The job figures show both the impact of the

Job Change in the New England Region 1982-1997

AREA	1982-1988		1988-1992		1992-1997		1982-1997	
	TOTAL JOB CHANGE	PERCENT CHANGE	TOTAL JOB CHANGE	PERCENT CHANGE	TOTAL JOB CHANGE	PERCENT CHANGE	TOTAL JOB CHANGE	PERCENT CHANGE
New England	1,404,603	21.0	(455,210)	(5.6)	737,125	9.7	1,686,513	25.2
Massachusetts	622,312	19.7	(260,215)	(6.9)	404,501	11.5	776,598	24.3
Metropolitan Boston*	427,573	19.7	(193,671)	(7.4)	283,039	11.7	516,941	23.8
Boston	79,005	14.0	(67,311)	(10.5)	76,494	13.3	88,188	15.6

*This metropolitan area includes the Massachusetts counties of Essex, Middlesex, Norfolk, Plymouth and Suffolk

SOURCE: U.S. BUREAU OF ECONOMIC ANALYSIS (BEA) FOR NEW ENGLAND & MASSACHUSETTS FROM SEPTEMBER 1998 REVISED SERIES. METROPOLITAN BOSTON 1982-1997 FROM REIS, MAY 1998 SERIES.

recession (1988-1992) and the strong recovery since 1992. The city of Boston, Massachusetts and New England have all experienced net job growth over the 15-year period.

Unemployment

Unemployment rates for Boston, Greater Boston, Massachusetts and New England generally exceeded the national average in the 1990-1992 recessionary period for the first time in more than a decade. Since 1993 though, these regional rates have again gone below the national rate. November 1999 data show that the city's unemployment rate of 3.0% was just below the Massachusetts rate of 3.0% and better than the national rate of 3.8%.

For example, employment growth within the manufacturing, trade, and transportation/communications/utilities sectors would suggest growth in demand for industrial space. Similarly, growth in finance, insurance and real estate and services employment would be indicators of office space demand. Boston PMSA employment trends by industry sector appear below.

Annual Average Unemployment Rates

	1990	1991	1992	1993	1994	1995	1996	1997	1998
City of Boston	5.6%	8.4%	8.0%	6.6%	5.8%	5.4%	4.4%	4.3%	3.3%
Metro Boston	5.1%	7.8%	7.5%	5.9%	5.2%	4.7%	3.7%	3.4%	2.8%
Massachusetts	6.0%	9.0%	8.5%	6.9%	6.0%	5.4%	4.3%	4.0%	3.3%
New England	5.7%	8.0%	8.0%	6.8%	5.9%	5.4%	4.8%	4.4%	3.5%
United States	5.5%	6.7%	7.4%	6.9%	6.1%	5.6%	5.4%	4.9%	4.5%

SOURCE: FEDERAL RESERVE BANK OF BOSTON, NEW ENGLAND ECONOMIC INDICATORS (3/94, 6/96, 2/98 & 6/99).

Sector Trends

Review of employment by industry sector provides insight into demand for various types of property. Demand for commercial property is a function of economic growth (specifically employment growth) within a market. Employment growth within industries that use office space increases demand for such space. Demand analysis, therefore, must focus on historic, current, and projected future employment trends.

Total employment within the metropolitan area reached a high of 1.75 million in 1988 before declining to 1.55 million in 1992. Employment subsequently increased to 1.94 million in 1998, reflecting the steady growth the regional economy has experienced since 1992. Employment data indicate that Boston metropolitan area employment is heavily concentrated in the FIRE industries, which, combined, account for approximately 47.5% of total nonagricultural employment. Both services and FIRE industries are typical occupants of office space. Critical to the evaluation of the subject is the steady and significant employment increases in these two industry sectors.

Employment Forecasts

Analysis of historic employment trends provides a picture of current market demand. Future demand potential, generated by employment growth in specific industry sectors, provides the basis for understanding the viability of both existing supply and future additions to supply.

Employment projections prepared by the New England Economic Project (NEEP) have been used within this analysis of future demand for commercial space. NEEP is a nonprofit corporation comprising New England businesses, state governments, and educational institutions dedicated to providing objective economic

The impact of the Asian financial crisis on the state's export-oriented manufacturing sectors appears nearly over. Productivity growth, however, has pushed the trend in manufacturing employment down. Manufacturing employment is expected to decline by 0.7% over the forecast period. Service employment is projected to grow 2.0% annually, twice the growth rate of overall employment. Business services, engineering and consulting will lead this sector with a 3.3% growth rate over the forecast period. Employment in the construction sectors should decline slightly over the forecast period. NEEP identifies the major risk to the state's economy as accelerated inflation in wage rates and housing prices, which could make the state too expensive for

Boston PMSA 11-Year Historic Trends by Industry Sector

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Manufacturing	269,600	257,300	240,000	222,300	207,700	224,500	225,000	222,900	220,600	222,700	223,800
Trans/Comm/Utilities	77,200	74,300	75,000	72,500	71,600	72,300	80,500	80,600	80,600	82,400	84,400
Trade	393,100	392,300	369,700	340,000	332,700	374,400	389,900	398,800	403,500	411,200	416,900
F.I.R.E.	151,200	148,200	146,400	140,300	135,200	142,200	149,400	149,000	154,400	158,000	162,800
Services	581,300	595,700	588,800	566,900	580,300	611,400	659,300	692,100	721,700	746,300	764,300
Construction	73,300	64,600	51,700	40,300	36,800	44,700	48,400	50,600	52,800	56,700	61,300
Government	204,400	203,300	199,900	195,000	186,700	220,600	214,900	216,700	226,700	227,800	231,300
Total	1,750,100	1,735,700	1,671,500	1,577,300	1,551,00	1,690,100	1,767,400	1,810,700	1,860,700	1,905,500	1,945,200

SOURCE: MASSACHUSETTS DEPARTMENT OF EMPLOYMENT AND TRAINING

analysis and forecasts. Published in October 1999, the statewide employment projections by industry cover the period 1999–2003. These form the basis for understanding near-term demand for office space in the Boston market.

According to the NEEP analysis, the Massachusetts economy is slowing, principally due to a shortage of skilled labor resulting from years of strong, sustained regional and national consumer and investment demand. Despite this slowing, the outlook through 2003 is optimistic. Nonagricultural employment growth for 1999 was expected to slow to 1.4%, down from 2.2% growth in the prior year. In 2000 through the end of the forecast period, annual growth was projected at approximately 1.0%.

firms to expand business in and too expensive for households to stay in. The state economy also has some downside risk on the demand side.

The concentration of money management, financial services and business-investment-supply industries in Massachusetts leaves the state vulnerable to an economic downdraft from either stock market losses or a rise in interest rates.

In conclusion, projected growth in services and FIRE industries through 2003 suggests significant statewide employment. This trend indicates continued demand for office/R&D space, albeit at more moderate levels.

Massachusetts Employment Forecast, 1999–2003

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	ANNUAL GROWTH RATES		
												88–93	93–98	98–03
Employment (x1,000)	2,839.9	2,904.4	2,978.0	3,036.1	3,108.3	3,176.0	3,221.9	3,258.3	3,291.8	3,328.7	3,365.5	-1.9%	2.3%	1.2%
% change	1.6	2.3	2.5	1.9	2.4	2.2	1.4	1.1	1.0	1.1	1.1			
Manufacturing	454.8	447.3	446.3	444.9	447.8	448.3	435.4	433.8	430.1	426.7	422.8	-4.9%	-0.3%	-1.2%
% change	-2.3	-1.6	-0.2	-0.3	0.7	0.1	-2.9	-0.4	-0.9	-0.8	-0.9			
Construction	79.9	86.0	89.9	93.9	100.2	107.7	114.3	113.2	111.6	110.1	108.8	-10.9%	6.2%	0.2%
% change	8.7	7.6	4.6	4.5	6.7	7.5	6.1	-0.9	-1.5	-1.3	-1.2			
FIRE	201.5	206.9	205.4	208.2	212.2	216.8	221.7	224.6	226.0	227.7	229.2	-1.9%	1.5%	1.1%
% change	2.5	2.7	-0.8	1.4	1.9	2.1	2.3	1.3	0.6	0.7	0.7			
Services	942.8	976.0	1,025.1	1,063.8	1,102.7	1,133.5	1,160.8	1,180.9	1,202.1	1,226.6	1,252.5	1.0%	3.8%	2.0%
% change	3.2	3.5	5.0	3.8	3.7	2.8	2.4	1.7	1.8	2.0	2.1			
Trade	648.3	669.3	687.7	695.2	706.7	720.8	734.9	747.4	760.0	773.2	785.8	-2.6%	2.1%	1.7%
% change	1.2	3.2	2.8	1.1	1.6	2.0	2.0	1.7	1.7	1.7	1.6			
TCU	124.0	127.5	127.2	129.1	132.9	135.9	138.0	139.9	141.8	142.9	143.8	-1.5%	1.9%	1.1%
% change	2.1	2.8	-0.2	1.5	3.0	2.3	1.5	1.4	1.4	0.7	0.6			
Government	387.4	390.1	395.2	399.8	404.6	411.7	415.5	417.1	418.8	420.2	421.2	-1.2%	1.2%	0.5%
% change	1.3	0.7	1.3	1.2	1.2	1.8	0.9	0.4	0.4	0.3	0.3			

SOURCE: THE NEW ENGLAND ECONOMIC PROJECT: ECONOMIC OUTLOOK 1999-2003 (OCTOBER 1999).

SUPPLY OVERVIEW

Metropolitan Office Trends

Office space supply, occupancy and vacancy trends for the market area mirror the demand trends, showing the impacts of the recession during the early part of the decade with gradual, then escalating improvement in the most recent years. The urban market tiers fared best during the recession and were quickest to recover, while more distant suburbs, notably those on Route 495 felt the impacts the most and have been slower to improve. The western suburban Route 128 communities have been the strongest performers in the suburban markets.

Cushman & Wakefield's second quarter 2000 market statistics are found in the following tables and charts. The figures represent overall market averages for Class A, B and C buildings in the entire Boston metropolitan market.

Vacancy rates are at all-time lows in almost every submarket. Boston's Central Business District, with a total supply of 51,473,846

square feet, has only one million square feet of space directly available, or only 2.0% of supply. Boston's suburban office market totals 58,819,669 square feet, of which 3,152,801 square feet are directly available, or only 5.4%.

Route 128 West Submarket

The subject property is located in the Route 128 West office submarket. Total supply is 17,713,172 square feet. Only 462,219 square feet are directly available, or just 2.6% of supply. The Route 128 West submarket displays the lowest direct vacancy rate among the seven suburban submarkets.

Route 128 West's direct average rental rate is \$31.18 per square foot, which is 32% above the average suburban rate of \$23.66. Route 128 West's average rental rate compares with rental rates in many CBD submarkets.

Most striking is the dynamic leasing activity in the Route 128 West submarket. Almost 1.2 million square feet of space have been leased this year, according to the Cushman &

New Office Supply— Route 128 West Submarket

Between 1997 and 1999, 1,537,940 square feet of new or rehabilitated office space was added to the Route 128 West office submarket. All of this space is leased or committed.

Needham Market Positioning and Potentials

Needham represents the southernmost point in the Route 128 West market. Of 18.0 million square feet of space that constitutes the West suburban competitive supply, Needham accounts for approximately 2.0 million square feet of Class A office/R&D space, the majority of it in

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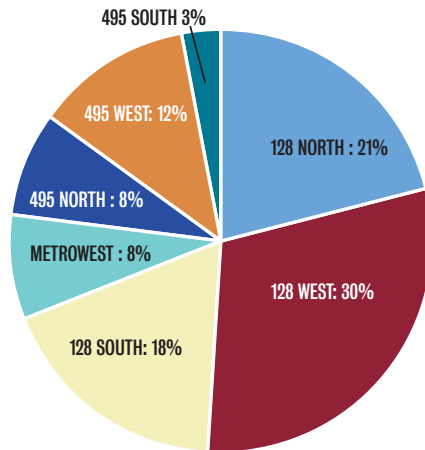
Boston Non-CBD Office Market, second quarter 2000												
CBD SUBMARKET	TOTAL INVENTORY	DIRECT AVAILABILITIES	OVERALL AVAILABILITIES	2000 DIRECT VACANCY	2000 OVERALL VACANCY	2000 OVERALL VACANCY	2000 OVERALL VACANCY	YTD CONSTRUCTION COMPLETIONS	AVERAGE RENTAL RATE	YTD LEASING ACTIVITY	YTD SALES ACTIVITY	YTD NET ABSORPTION
Alewife/Fresh Pond	1,594,339	30,373	30,373	1.9%	1.9%	1.9%	1 3.7%	0	\$47.94	N/A	0	(53,788)
Mass. Ave./Harvard Square	1,853,054	1,320	1,320	0.1%	0.1%	0.1%	2.4%	0	\$34.50	N/A	95,185	125,140
Kendall Square/E. Cambridge	8,460,253	28,050	62,550	0.3%	0.7%	0.3%	3.2%	0	\$47.50	N/A	1,375,000	277,024
Cambridge Total	11,907,646	59,743	94,243	0.5%	0.8%	0.8%	4.7%	0	\$47.43	N/A	1,470,185	348,376
Somerville/Medford/Malden	1,397,349	79,702	79,702	5.7%	5.7%	5.7%	5.4%	0	\$37.58	N/A	0	297,622
Allston/Brighton/Waterstown	2,061,435	38,200	38,200	1.9%	1.9%	1.9%	1.2%	0	\$40.20	N/A	0	658,431
Inner Suburbs Total	3,458,784	117,902	117,902	3.4%	3.4%	3.4%	3.4%	0	\$38.43	N/A	0	956,053
128 North	12,295,154	502,232	760,563	4.1%	6.2%	6.2%	15.9%	75,000	\$26.31	N/A	284,000	703,239
128 West	17,924,672	358,216	488,587	2.0%	2.6%	2.6%	7.3%	300,000	\$33.80	N/A	1,269,186	595,234
128 South	10,516,003	829,977	940,758	7.9%	8.9%	8.9%	6.4%	0	\$27.57	N/A	246,609	(179,015)
Metrowest	4,911,116	223,623	301,623	4.6%	6.1%	6.1%	7.9%	0	\$26.48	N/A	0	116,481
495 North	4,722,166	65,058	108,113	1.4%	2.3%	2.3%	22.9%	120,000	\$21.78	N/A	634,407	595,701
495 West	7,332,049	442,095	558,230	6.0%	7.6%	7.6%	8.6%	0	\$21.84	N/A	114,000	223,856
495 South	1,640,009	123,344	128,497	7.5%	7.8%	7.8%	14.3%	75,000	\$17.64	N/A	0	1,388
Suburban Total	59,341,169	2,544,545	3,266,371	4.3%	5.5%	5.5%	10.5%	570,000	\$26.40	N/A	2,548,202	2,056,884
Non-CBD Total	74,707,599	2,722,190	3,478,516	3.6%	4.7%	4.7%	9.2%	570,000	\$27.40	N/A	4,018,387	3,361,313
Massachusetts Total	126,282,386	3,623,105	4,492,426	2.9%	3.6%	3.6%	7.8%	570,000	\$32.40	N/A	7,638,264	3,501,256

Route 128 West Office Market—New and Proposed Developments

BUILDING	CITY	DEVELOPER/OWNER	TOTAL SIZE	STATUS	COM- MITTED	COM- PLETE	2000	2001	SF AVAILABLE
201 Spring Street	Lexington	Boston Props.	102,500	C	102,500	1997	1,570,940	1,570,940	0
400-2 Totten Pond	Waltham	LMP	160,000	C/R	160,000	1997			0
10 Maguire Road	Lexington	Nordic	287,000	C/R	287,000	1998			0
Cabot Place	Waltham	CC&F	94,440	C/R	94,440	1998			0
250 First Avenue	Needham	Bulfinch	73,000	C	73,000	1998			0
55 Hayden Avenue	Lexington	S&S	75,000	C	75,000	1998			0
1050 Winter Street	Waltham	Shorenstein	164,000	C	164,000	1998			0
Waltham Woods I	Waltham	LMP/DLJ	220,000	C	220,000	1998			0
70 Kendrick Street	Needham	Cont. Wingate	103,000	C/R	103,000	1998			0
117 Kendrick Street	Needham	Wellsford	206,000	C	206,000	1999			0
181 Spring Street	Lexington	Boston Props.	53,000	C	53,000	1999			0
			1,537,940		1,537,940				
200 West Street	Waltham	Boston Props.	248,000	C	248,000	2000	248,000		0
Waltham Woods II	Waltham	LMP/DLJ	200,000	UC	200,000	2000	200,000		0
52 Second Avenue	Waltham	Beal/Cargill	200,000	UC	200,000	2000	200,000		0
Cabot Place II	Waltham	CC&F	100,000	UC	100,000	2000	100,000		0
Depot Site	Wellesley	Drucker	270,000	UC	270,000	2000	270,000		0
275 Grove Street	Newton	Equity	503,000	UC/R	446,000	2000	503,000		57,000
140 Kendrick Street	Needham	Wellsford	450,000	UC	450,000	2000	450,000		0
830 Winter Street	Waltham	Kolbren	170,000	UC	170,000	2000	170,000		0
			2,141,000		2,084,000		2,141,000		57,000
130 Rumford Avenue	Waltham	Capasso	51,200	UC	0	2001	51,200	51,200	
Wyman Street	Waltham	Arkwright	210,000	A	0	2001	210,000	210,000	
175 Wyman	Waltham	Equity	400,000	A	0	2001	400,000	400,000	
1396 Main Street	Waltham	Kolbren	52,000	A	0	2001	52,000	52,000	
Fourth Avenue	Waltham	Nelson	197,500	UC	0	2001	197,500	197,500	
600 Lincoln Street	Waltham	Arkwright	100,000	UC	0	2001	100,000	100,000	
Jones Road/Main St.	Waltham	Boston Props.	303,000	A	0	2001	303,000	303,000	
275 Second Avenue	Waltham	CC&F	105,000	UC	105,000	2001	105,000	0	
1560 Trapelo Road	Waltham	Cornerstone	65,000	P	0	2001	65,000	65,000	
870 Winter Street	Waltham	Mass. Med.	180,000	UC	0	2001	180,000	180,000	
			1,663,700		105,000		1,663,700	1,558,700	
TOTALS			5,342,640		3,726,940		2,141,000	1,663,700	1,615,700

R=rehab; C=completed; U=under construction; A=approval process; P=proposed

Boston Non-CBD Inventory Distribution



the Needham Business Center, Highland Street Corridor and Wexford Industrial districts. The current Needham supply represents slightly more than 10% of the competitive submarket total.

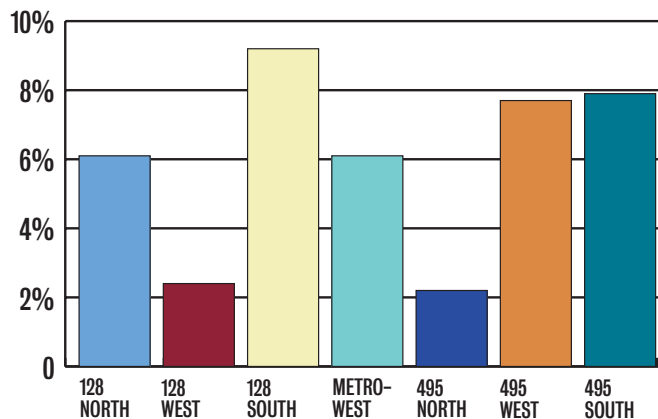
Historically, new development and absorption within the submarket have concentrated in the central portion of the district, but the trend is expected to continue moving to the south as opportunities in the core Waltham locations become more scarce.

At the current rate of growth within the submarket, roughly 10.0 to 15.0 million square feet of new space will likely be delivered and absorbed district-wide over the next 10 years. As the markets build out to the north, Needham can expect to play a larger role. Including the new

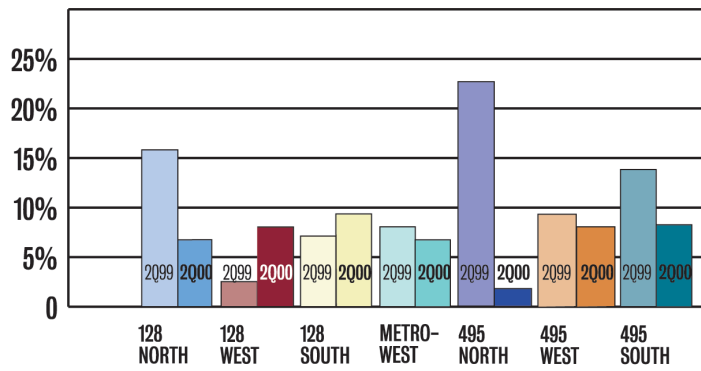
projects expected for delivery in 2001, Needham's share of new development and absorption during the most recent five-year period from 1997-2001 has averaged just under 10%, or roughly 500,000 square feet of the 5.3 million square feet built or due for near-term delivery.

The continuation of this capture ratio suggests that a minimum of 1.0 to 1.5 million square feet could be captured in Needham over the next ten years. Under the most aggressive set of assumptions, Needham's share of the future market growth, might approach 25%, averaging as much as 15% to 20% over a ten-year time-frame. This translates to a maximum estimate for expansion in the Needham market over the next ten years of between 2.25 million and 3.0 million square feet.

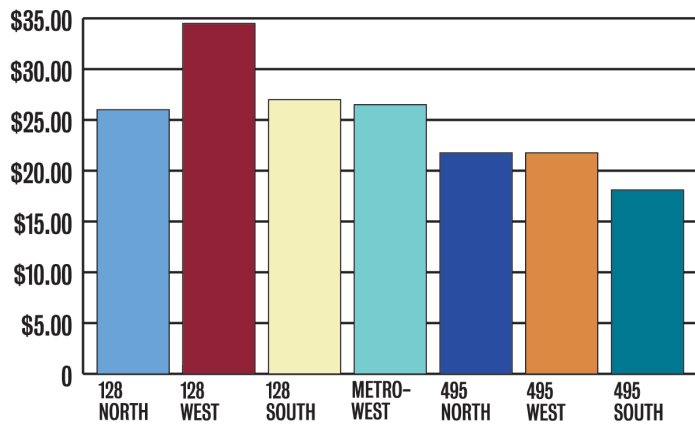
Boston Non-CBD Overall Vacancy Rates



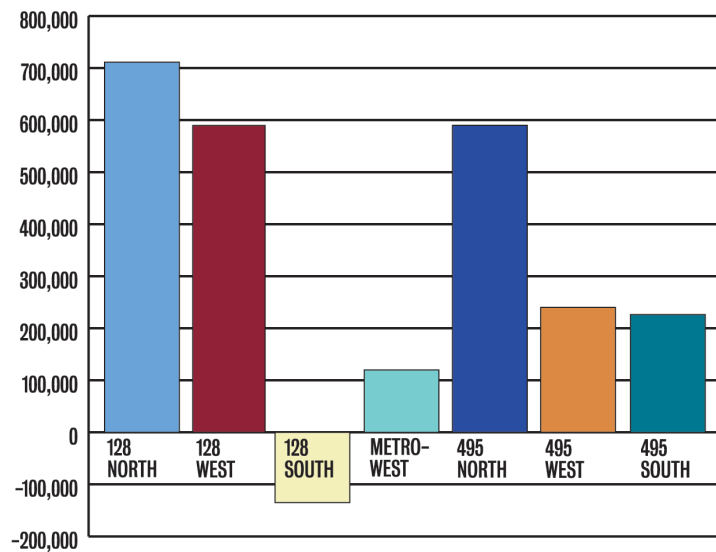
2000 vs. 1999 Office Vacancy Rates



Boston Non-CBD Overall Direct Weight Average Asking Rental Rates



Boston Non-CBD Net Absorption



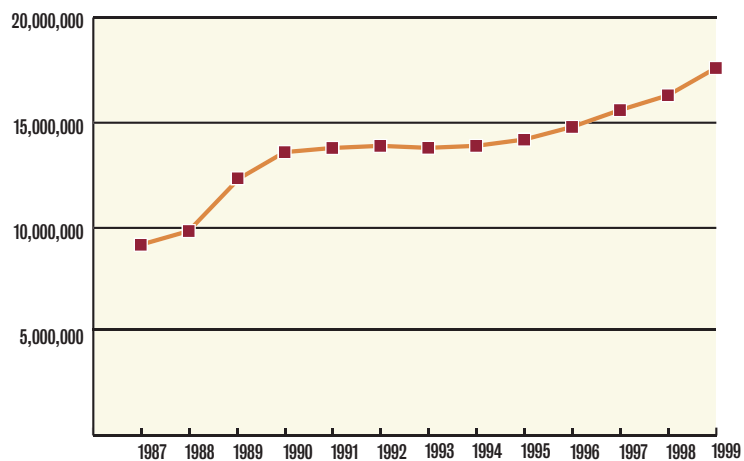
Route 128 Markets Overall

YEAR	EXISTING INVENTORY	YTD NEW CONSTRUCTN	YTD RENOVTN	OVERALL SPACE AVAILABLE	OVERALL VACANCY RATE	DIRECT SPACE AVAILABLE	DIRECT VACANCY RATE	YTD LEASING ACTIVITY	YTD NET ABSORPTION	AVG. DIRECT RENT
1987	21,085,627	1,614,792	N/A	2,904,859	13.8%	N/A	N/A	N/A	1,041,935	N/A
1988	23,381,481	2,015,778	N/A	3,595,683	15.4%	N/A	N/A	N/A	1,499,267	\$20.01
1989	27,621,972	2,058,197	N/A	5,237,102	19.0%	N/A	N/A	N/A	791,989	\$19.84
1990	29,235,223	1,574,051	N/A	6,196,379	21.2%	N/A	N/A	N/A	978,314	\$20.47
1991	29,498,308	0	N/A	6,106,538	20.7%	N/A	N/A	N/A	177,063	\$28.54
1992	30,092,453	0	N/A	4,731,659	15.7%	N/A	N/A	N/A	1,325,953	\$17.08
1993	30,983,425	105,000	N/A	4,306,461	13.9%	N/A	N/A	N/A	825,713	\$15.93
1994	31,374,585	0	N/A	3,872,018	12.3%	2,974,255	9.5%	N/A	851,466	\$18.32
1995	31,745,161	0	N/A	3,357,089	10.6%	2,703,038	8.5%	4,107,261	154,551	\$19.89
1996	32,431,864	112,000	82,726	2,409,451	7.4%	1,766,511	5.4%	4,646,163	1,307,653	\$20.52
1997	34,147,648	392,121	255,919	2,609,865	7.5%	1,878,374	5.5%	4,111,460	831,556	\$23.15
1998	37,271,750	1,193,659	1,419,323	3,410,200	9.1%	2,427,312	6.5%	4,619,418	2,211,565	\$24.17
1999	39,645,562	1,654,578	54,000	3,528,409	8.9%	2,210,328	5.6%	4,971,320	2,453,414	\$25.74
2000	40,735,829	300,000	371,500	2,169,908	5.3%	1,690,425	4.1%	N/A	1,119,458	\$28.52

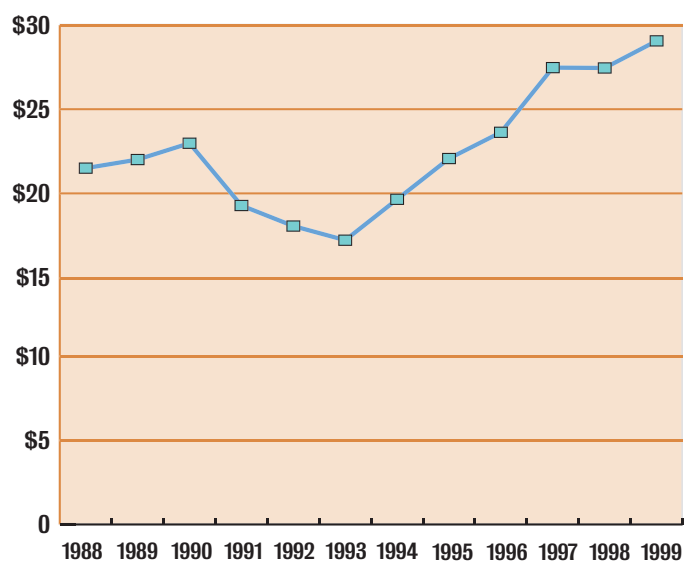
Route 128 West

YEAR	EXISTING INVENTORY	YTD NEW CONSTRUCTN	YTD RENOVTN	OVERALL SPACE AVAILABLE	OVERALL VACANCY RATE	DIRECT SPACE AVAILABLE	DIRECT VACANCY RATE	YTD LEASING ACTIVITY	YTD NET ABSORPTION	AVG. DIRECT RENT
1987	9,038,993	268,000	N/A	1,022,331	11.3%	N/A	N/A	N/A	437,678	N/A
1988	9,829,712	790,719	N/A	1,237,099	12.6%	N/A	N/A	N/A	690,115	\$21.50
1989	12,703,949	473,611	N/A	2,130,659	16.8%	N/A	N/A	N/A	(86,229)	\$22.01
1990	13,336,066	653,000	N/A	2,439,246	18.3%	N/A	N/A	N/A	455,676	\$22.98
1991	13,468,141	0	N/A	2,592,826	19.3%	N/A	N/A	N/A	(6,944)	\$19.28
1992	13,751,782	0	N/A	2,151,827	15.6%	N/A	N/A	N/A	493,838	\$18.06
1993	13,703,370	0	N/A	1,882,921	13.7%	N/A	N/A	N/A	170,055	\$17.22
1994	13,665,270	0	N/A	1,642,552	12.0%	1,264,346	9.3%	N/A	128,365	\$19.65
1995	13,832,148	0	N/A	1,268,436	9.2%	1,119,137	8.1%	1,856,759	340,939	\$22.07
1996	14,195,332	39,000	62,726	700,7906	4.9%	478,629	3.4%	2,323,573	904,081	\$23.63
1997	14,760,026	102,121	175,919	991,350	6.7%	513,262	3.5%	1,785,633	324,965	\$27.47
1998	16,300,212	447,831	831,269	953,075	5.8%	736,706	4.5%	2,983,292	1,146,843	\$27.45
1999	17,267,372	786,506	0	1,098,353	6.4%	601,962	3.5%	2,358,495	1,114,300	\$29.06
2000	17,924,672	300,000	211,500	468,587	2.6%	358,216	2.0%	N/A	595,234	\$33.80

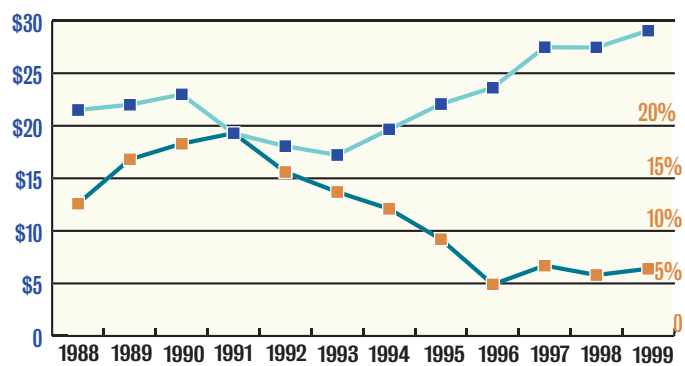
128 West Inventory Levels (square feet)



128 West Offices Rental Rates



128 West Overall Vacancy vs. Asking Rent



The proposed zoning is designed to give the town more control over development, create new funding for traffic improvements, and bring significant benefits to the town, to business and property owners, and to residents. The zoning recommendations incorporate six key components, described in detail below

4 Zoning Recommendations

New Zoning Districts

To maintain the integrity of the business, industrial and industrial park districts for use in other parts of the community, we propose three new zoning districts designed to address the needs and objectives of the project area. These new districts follow the existing zoning boundaries. Each district has a unique character and market potential based on the existing use mix, lot sizes and property ownership pattern.

NEW ENGLAND BUSINESS CENTER (NEBC)

This district is bounded by Route 128 to the west, Cutler Lake to the south, the Charles River to the east, and the rear lot line of properties on Highland Avenue to the north. The NEBC district matches the zoning boundaries of the previous industrial park zone.

HIGHLAND COMMERCIAL 128 (HC-128)

This district includes all properties fronting on Highland Avenue between Route 128 and the Charles River. The district boundary typically follows the rear

PROPOSED ZONING DISTRICTS



lot lines of properties along Highland Avenue, to a depth of 150 to 200 feet on either side of the public right-of-way. The HC-128 district matches the zoning boundaries of the previous business district.

MIXED-USE 128 (MU-128)

This district is bounded by Route 128 to the west, the rear lot line of properties on Highland Avenue to the south, the Charles River to the east, and the elevated rail line to the north. The MU-128 district matches the zoning boundaries of the previous industrial district.

Permitted Uses

The permitted uses for each district are summarized below.

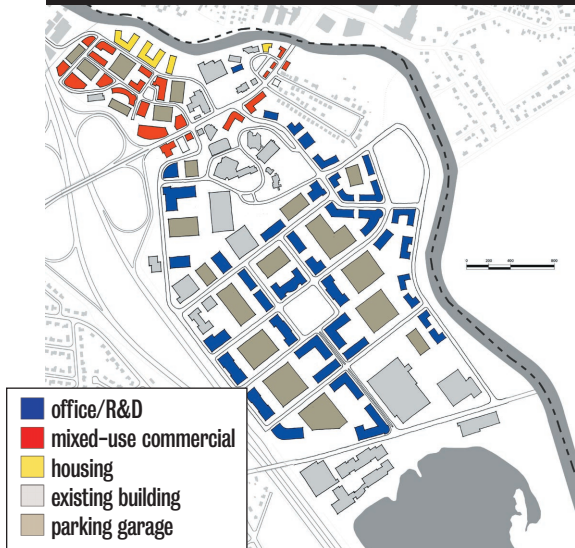
NEBC: The overall objective for this area is to create a high-quality office park with a campus-like character. The district is zoned primarily for office development, with supporting restaurant, retail and service uses permitted to serve nearby businesses. Large-scale destination retail is not allowed in the NEBC district. Permitted uses as of right include offices and banks, research and development facilities, and hotels. Retail uses permitted as of right include restaurants,

business service centers, coffee shops, recreation / health facilities, day care, and similar uses, if these uses do not occupy more than 20 percent of the total ground floor area or 10,000 square feet per building (whichever is less). When multiple buildings occupy one lot, such as a corporate campus, the total allowable area for retail uses can be provided in up to two freestanding structures. One of the benefits of providing retail and services on site is a reduction in the number of daily vehicle trips, as employees can go to lunch and run errands without leaving the immediate area.

HC-128: The overall objective for this area is to create an attractive commercial street serving local employees and residents. The HC-128 district is zoned exclusively for commercial uses, including offices, research and development facilities, retail, restaurants and services. All business uses are permitted as of right except for garages and similar auto-oriented facilities; gasoline filling stations, however, are permitted.

MU-128: The overall objective for this area is to create a lively mixed-use center that encourages pedestrian activity. The MU-128 district is zoned for a broad mix of uses, including offices, research and development facilities, retail, restaurants and services, and light industrial. A residential overlay district also permits multifamily housing within 350 feet of the river. The district provides a density bonus for developments that provide 20% affordable housing. New multifamily housing can provide additional support for retail, services, restaurants and cafes nearby, and create an active and pleasant edge along the river.

PROPOSED USES



Density and Dimensional Requirements

Each district has different density and dimensional requirements, based on the desired scale and character of future development. Within each district, the specific requirements vary according to location and proximity to special features such as the river, lake, and Route 128.

NEBC

The density and dimensional regulations for this district are designed to accommodate large-floor-plate office development with greater height and more open space than current zoning allows. Increasing the height limit will make development of structured parking more feasible, reducing paved area and increasing green space. In addition to creating a more attractive site, additional green space will reduce stormwater runoff.



THIRD AVENUE (ABOVE) COULD BE TRANSFORMED INTO A GREEN BOULEVARD LINED WITH NEW OFFICE BUILDINGS. POTENTIAL NEW DEVELOPMENT ALONG FIRST AVE. (BELOW) COULD CREATE AN ATTRACTIVE FACE TO ROUTE 128.



IMPROVEMENTS ALONG KENDRICK STREET WILL MAKE THE AREA MORE ACCESSIBLE FOR PEDESTRIANS AND CYCLISTS.

• HEIGHT

The standard height limit for the NEBC district is 5 stories. Buildings within 350 feet of a general residence zoning district boundary are limited to three stories, to mediate the transition in scale from smaller dwellings to larger commercial structures. Within 350 feet of the river and/ or lake, buildings may not be more than four stories. Within 350 feet of Route 128, six stories are permitted, consistent with the larger scale of the highway. To prevent these six-story buildings from creating the appearance of a “wall,” front and side yard setbacks of 30 feet are required. This will create a larger gap between buildings and open up views into the site.

PROPOSED BUILDING HEIGHTS



- **LOT COVERAGE**

The maximum lot coverage in the NEBC district is 50 percent. At least 40 percent of the lot area must be covered by pervious surfaces, such as grass or other material through which water can easily drain. 30 percent of the lot area must be landscaped with ground cover such as grass or shrubs.

- **FLOOR AREA RATIO**

Density is regulated by the floor area ratio (FAR), which is defined as the total floor area of the building (excluding parking structures) divided by the total lot area. For the NEBC district, the maximum as-of-right FAR is 0.4. For projects receiving a special permit, the FAR may be no more than 1.5. Many of the lots in this district would not be built to the maximum FAR, however, because of the accompanying height and lot coverage restrictions (see above). Part of the reason for this is that parking structures count toward lot coverage, effectively reducing the ground area that is available for the main building. As a general rule, parking structures for office development need a footprint of approximately the same size as the building itself. Thus if the maximum lot coverage is 50 percent, approximately 25 percent will likely be dedicated to a parking structure.



THE PROPOSED ZONING MANDATES GREATER SETBACKS BETWEEN COMMERCIAL DEVELOPMENT AND THE ADJACENT RESIDENTIAL NEIGHBORHOOD.

- **MINIMUM LOT SIZE**

To encourage the assembly of parcels large enough for redevelopment, the minimum lot size is 40,000 square feet (slightly less than one acre).

- **SETBACKS**

Front, rear, and side yard setbacks in the NEBC district are 20 feet. For six-story buildings along Route 128, the front and side yard setbacks are 30 feet (see description above). A 50-foot setback is required from general residence zoning district boundaries.

- **PARKING**

The proposed zoning includes specific regulations designed to mitigate the visual impact of parking structures. In the NEBC district, parking structures are subject to a 50-foot front yard setback. To encourage the development of shared parking, no side or rear setbacks are required for shared parking structures between adjacent lots. In addition, parking structures may not be located on corners or fronting on public parks. Surface parking may not be located directly fronting a public street. The Planning Board may, however, permit a limited number of parking spaces (not more than 20% of total off-street parking required, or not more than six spaces, whichever is less) for short-term drop-off parking and if the board finds that the overall design will be improved. Parking structures may be attached to the primary building they serve if they meet all fire and safety regulations.

- **FAÇADES**

As commercial floorplates have increased in size, building facades have become correspondingly longer. These long facades are often visually monotonous, and prevent good visual and pedestrian connections across the site. To prevent this type of development pattern in the future, the proposed zoning limits the maximum façade length to 300 feet. Within 350 feet of a general residence zoning district boundary, the lake, and the river, the maximum uninterrupted façade length is 200 feet.



STREETSCAPE IMPROVEMENTS ON HIGHLAND AVENUE (TOP) COULD ENHANCE THIS GATEWAY TO NEEDHAM. HIGHLAND CIRCLE COULD BE DEVELOPED WITH NEW RESTAURANTS AND HOUSING ADJACENT TO THE RIVER.

• ENTRANCES

To support the creation of active public streets, all street-facing facades must have at least one public entrance.

HC-128

The density and dimensional regulations for the HC-128 district are designed to accommodate a range of commercial office, retail, restaurant and service uses. To encourage the redevelopment of smaller lots, the zoning permits greater density and lot coverage than in the NEBC district.

• HEIGHT

The standard height limit for the HC-128 district is three stories. Buildings within 350 feet of a general residence zoning district boundary are limited to three stories, to mediate the transition in scale from smaller dwellings to larger commercial structures.

Within 350 feet of the river and/ or the lake, buildings may be five stories. Within 350 feet of Route 128, five stories are also permitted. The increased height limit in these locations will encourage development of significant new gateway buildings at the major entrances to the site and the town.

• LOT COVERAGE

The maximum lot coverage in the HC-128 district is 80 percent. A minimum of 10 percent of the lot area must consist of pervious surfaces, such as grass or other materials through which water can easily drain. Ten percent of the lot area must be landscaped with ground cover such as grass or shrubs.

• FLOOR AREA RATIO

Density is regulated by the floor area ratio (FAR), which is defined as the total floor area of the building (excluding parking structures) divided by the total lot area. For the HC-128 district, the maximum as-of-right FAR is 0.3. For projects receiving a special permit, the FAR may be no more than 2.0. Many of the lots in this district would not be built to the maximum FAR, however, because of the accompanying height and lot coverage restrictions (see above).

• MINIMUM LOT SIZE

To encourage the assembly of parcels large enough for redevelopment, the minimum lot size is 15,000 square feet (approximately one-third of an acre).

• SETBACKS

The front setback in the HC-128 district is five feet, and the rear and side yard setbacks are ten feet. The front setback is designed to encourage lively and active street frontage by bringing buildings closer to the sidewalk. A 50-foot setback is required from general residence zoning district lines.

- **PARKING**

In the HC-128 district, all parking structures fronting on a public street are required to have active ground-floor uses such as shops, restaurants, or cafés. In addition, surface parking may not be located directly fronting a public street. To encourage the development of shared parking, no side or rear setbacks are required for shared parking structures between adjacent lots. Parking structures may be attached to the primary building they serve if they meet all fire and safety regulations.

- **FAÇADES**

In the HC-128 district, the maximum façade length is 300 feet. Within 350 feet of the river, the maximum façade length is 200 feet.

- **ENTRANCES**

To support the creation of active public streets, all street-facing facades must have at least one public entrance.

MU-128

The density and dimensional regulations for the MU-128 district are designed to accommodate a mix of commercial uses and create a lively pedestrian environment. To encourage the redevelopment of smaller lots, the zoning permits greater density and lot coverage than in the NEBC district.



ZONING INCENTIVES FOR OPEN SPACE COULD HELP TO CREATE A NEW WALKWAY ALONG THE RIVER NORTH OF HIGHLAND AVENUE.



THE INDUSTRIAL DISTRICT COULD BE TRANSFORMED INTO A WALKABLE MIXED-USE CENTER ANCHORED BY A NEW PARK.

- **HEIGHT**

The standard height limit for the MU-128 district is four stories. Within 350 feet of Route 128, five stories are permitted consistent with the larger scale of the highway. To encourage the creation of new housing along the river, residential development is permitted up to six stories.

- **LOT COVERAGE**

The maximum lot coverage in the MU-128 district is 60 percent. A minimum of 20 percent of the lot area must consist of pervious surfaces, such as grass or other materials through which water can easily drain. Ten percent of the lot area must be landscaped with ground cover such as grass or shrubs.

- **FLOOR AREA RATIO**

Density is regulated by the floor area ratio (FAR), defined as the total floor area of the building (excluding parking structures) divided by the total lot area. For the MU-128 district, the maximum as-of-right FAR is 0.3. For commercial projects receiving a special permit, the FAR may be no more than 1.8. Residential development in the overlay district is limited to an FAR of 1.0 as of right. A residential FAR of 2.0 is allowed by special permit, provided that 20% of the development is affordable. Many of the lots in this

district would not be built to the maximum FAR, however, because of the accompanying height and lot-coverage restrictions (above).

- **MINIMUM LOT SIZE**

To encourage the assembly of parcels large enough for redevelopment, the minimum lot size is 20,000 square feet (slightly less than half an acre).

- **SETBACKS**

The front setback in the MU-128 district is five feet, and the rear and side yard setbacks are ten feet. The front setback is designed to encourage lively and active street frontage by bringing buildings closer to the sidewalk.

- **PARKING**

Parking structures and surface lots may not be located fronting on public parks. All parking structures fronting on a public street are required to have active ground floor uses such as shops, restaurants, or cafés. To encourage the development of shared parking, no side or rear setbacks are required for shared parking structures between adjacent lots. Parking structures may be attached to the primary building they serve if they meet all fire and safety regulations.

- **FAÇADES**

The maximum façade length is 300 feet. Within 350 feet of the river, the maximum façade length is 200 feet.

- **ENTRANCES**

To support the creation of active public streets, all street-facing facades must have at least one public entrance.

Incentives to Create Public Benefits

The proposed zoning includes a variety of incentives designed to encourage the creation of public benefits such as new roads and open

space. Since most of the area is under private ownership, these improvements will only occur if property owners choose to take advantage of these incentives. At the same time, there is a common recognition that new roads and open space would benefit all businesses in the park, and significantly increase value for adjacent sites. Specific incentives to create new roads and open space in each of the three districts are described below.

NEBC

Property owners would receive an FAR bonus of 1.5 square feet by right for every 1.0 foot dedicated to public open space or roads, up to a maximum of 15,000 square feet of development. Any easement provided for open space or additional roadways would be counted as part of the total lot area in calculating FAR. Similarly, any easement provided for open space would be counted as pervious surface in calculating lot coverage. In addition, if a project is designed so that at least 65 percent of the required landscaped area immediately abuts at least 65 percent of the required landscaped area of an adjoining project, the maximum lot coverage may be increased to 60 percent.

HC-128

Property owners would receive an FAR bonus of 2.0 square feet by right for every 1.0 foot dedicated to public roads, up to a maximum of 15,000 square feet of development. Any easement provided for roadways would be counted as part of the total lot area when calculating FAR.

MU-128

Property owners would receive an FAR bonus of 1.5 square feet by right for every 1.0 foot dedicated to public open space or roads, up to a maximum of 15,000 square feet of development. Any easement provided for open space or additional roadways would be counted as part of the total lot area when calculating FAR. Any easement provided for open space would be

counted as pervious surface when calculating lot coverage. In addition, if a project is designed so that at least 65 percent of the required landscaped area abuts at least 65 percent of the required landscaped area of an adjoining project, the maximum lot coverage may be increased to 70 percent.

Special Permit Fees

The special permit feature is one of the most important aspects of the proposed zoning. The special permit fulfills two of the plan's key objectives: to give the town greater control over development, and to create new funding to help resolve long-standing traffic problems. In essence, the proposed zoning establishes a two-tiered system, with lower densities allowed by right and higher densities allowed by special permit. As-of-right densities are slightly lower than what is possible under current zoning, while special-permit densities are higher to create a strong incentive for redevelopment that conforms to traffic improvement and site requirements. In order to grant a special permit, the Planning Board must determine that the benefits to the town outweigh the costs after considering infrastructure, traffic, and fiscal and environmental impacts.

The special permit zoning also creates a direct link between new development and traffic improvements. Under the proposed zoning, the town can assess a special permit fee for all new development above the as-of-right density (based on FAR). For every parking space above those associated with the as-of-right portion of a development, the town will assess a special permit fee of \$1,500—equivalent to approximately \$5 per square foot of additional floor area allowed under the special permit. The fee is paid into a Traffic Mitigation Fund, to be used by the town to implement long-term traffic improvements. Payment of the fee does not exempt developers from on-site or access-

related improvements, or from costs associated with other forms of infrastructure improvements, such as water, sewer, and drainage.

In order to create a direct link between new development and traffic improvements, the proposed zoning includes a special permit fee to be assessed for all new development above the as-of-right FAR. This fee is in addition to procedural and filing fees required by the special-permit application process. For every parking space above those associated with the as-of-right portion of the development, the town will assess a special-permit fee of \$1,500. For example:

In the NEBC district, the as-of-right FAR is 0.4. For a proposed development of 150,000 square feet on a 100,000-square-foot lot, the FAR would be 1.5. The difference between the as-of-right FAR of 0.4 and the special permit FAR of 1.5 is 110,000 square feet. For most commercial development, the Needham Zoning Bylaw requires a minimum of one parking space for every 300 square feet. The added area above the as-of-right FAR limit would require approximately 367 parking spaces, generating special permit fees of \$550,000 (367 x \$1,500).

The special permit fee is paid into a Traffic Mitigation Fund, to be used by the town to implement long-term traffic improvements. Payment of the fee does not exempt developers from on-site or access-related traffic improvements required by the special permit or site plan review process. In addition, payment of the fee does not exempt developers from costs associated with other forms of infrastructure improvements, such as water, sewer, and drainage.

The developer may choose to pay the entire fee within seven days after receipt of the building permit, or may pay in two installments: half

within seven days after receipt of the building permit, and half within seven days after the receipt of the occupancy permit. Interest on the second installment will accrue at 12 percent per year from the date of the first installment and must be paid with the second installment.

Traffic Mitigation Fund

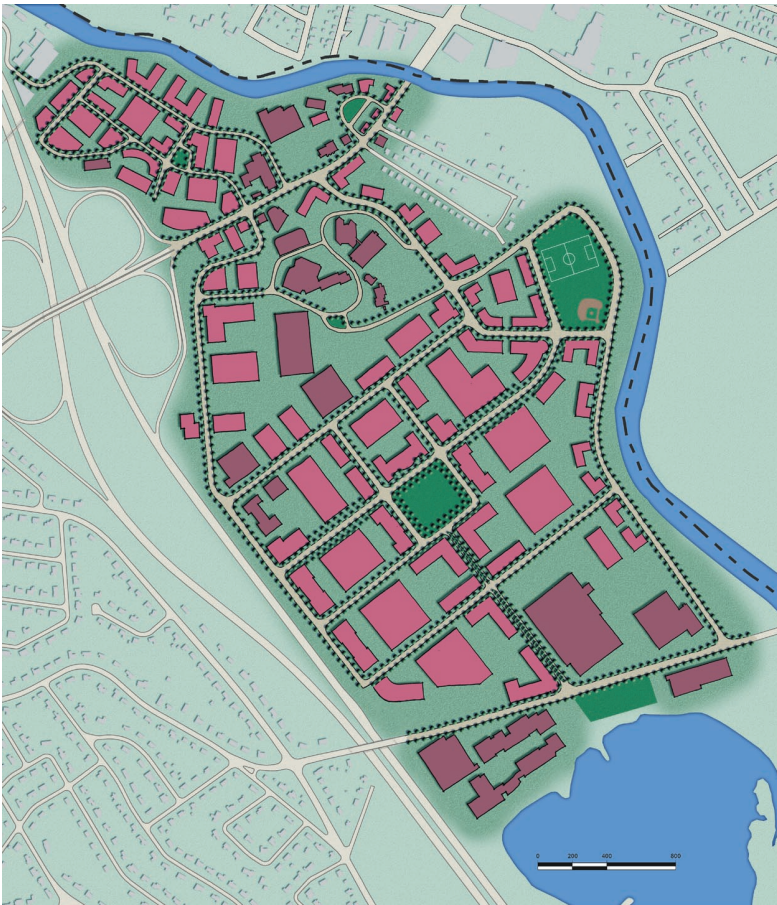
The Traffic Mitigation Fund, to be established as part of this zoning proposal, would create a dedicated funding source for traffic improvements in the study area and adjacent neighborhoods. Special permit fees associated with new development, as described above, would primarily support the fund. Monies in the fund are to be used exclusively for traffic improvements as recommended in the plan, and/or other traffic improvements directly related to the study area and adjacent neighborhoods, as approved by the Planning Board. Expenditures from the fund require a majority vote of Town

Meeting, after receiving recommendations from the Board of Selectmen. Private individuals or groups may also donate money to the fund to be used for the same purposes and under the same restrictions as the special permit fees. The town of Needham may also transfer public monies into the fund to expedite traffic improvements. The town Treasurer will be the custodian of the fund, and may deposit the proceeds in a bank or invest all or part of the Fund.

All special permit fees deposited into the fund will remain in the fund for a period not to exceed 15 years. If the fee has not been spent within this time and no contract committing it exists, the money will be refunded to the appropriate parties with all accrued interest. At the discretion of the appropriate parties, money may remain in the fund for an additional three years. After this extension the money must be refunded.

To determine the amount of new development that could be created under the proposed zoning, a build-out analysis was conducted for the study area. This analysis, which includes a detailed inventory of all parcels, shows that approximately 65 percent of existing properties are likely to be redeveloped in the next ten to fifteen years. Redevelopment of these properties would yield a maximum net increase of approximately 2.7 million

5 Build-out Analysis



square feet, bringing the site total to approximately 7.7 million square feet and increasing overall density from an FAR of 0.55 to approximately 0.85.

New England Business Center—Sample Build-out for 100,000SF Lot

LOT AREA	BUILDING FOOTPRINT	HGHT (STORIES)	FLOOR AREA	EFFECTIVE FAR	PARKING SPACES REQUIRED	SF REQUIRED FOR PARKING GARAGE	PARKING DECKS REQUIRED	GARAGE FOOTPRINT	LOT COVERAGE
100,000	25,000	3	75,000	0.8	250	87,500	4	25,000	0.5
100,000	25,000	4	100,000	1.0	333	116,667	5	25,000	0.5
100,000	25,000	5	125,000	1.3	417	145,833	6	25,000	0.5
100,000	25,000	6	150,000	1.5	500	175,000	7	25,000	0.5

Mixed-use 128—Sample Build-out for 100,000SF Lot

LOT AREA	BUILDING FOOTPRINT	HGHT (STORIES)	FLOOR AREA	EFFECTIVE FAR	PARKING SPACES REQUIRED	SF REQUIRED FOR PARKING GARAGE	PARKING DECKS REQUIRED	GARAGE FOOTPRINT	LOT COVERAGE
100,000	30,000	3	90,000	0.9	300	105,000	4	30,000	0.6
100,000	30,000	4	120,000	1.2	400	140,000	5	30,000	0.6
100,000	30,000	5	150,000	1.5	500	175,000	6	30,000	0.6
100,000	30,000	6	180,000	1.8	600	210,000	7	30,000	0.6

Highland Commercial 128—Sample Build-out for 100,000SF Lot

LOT AREA	BUILDING FOOTPRINT	HGHT (STORIES)	FLOOR AREA	EFFECTIVE FAR	PARKING SPACES REQUIRED	SF REQUIRED FOR PARKING GARAGE	PARKING DECKS REQUIRED	GARAGE FOOTPRINT	LOT COVERAGE
100,000	40,000	3	120,000	1.2	400	140,000	4	40,000	0.8
100,000	40,000	4	160,000	1.6	533	186,667	5	40,000	0.8
100,000	40,000	5	200,000	2.0	667	233,333	6	40,000	0.8

Traffic capacity and market absorption will also affect the maximum build-out. The traffic improvements recommended in this plan would add capacity for approximately 2.5 million square feet of new development, which is consistent with the expected build-out. The market survey shows that 1.0 to 3.0 million square feet could be developed over the next ten years, based on the site's projected share of regional commercial development.

Methodology

To assess the total build-out under the proposed zoning, the following calculations were made for each parcel in the study area (see table):

EXISTING FLOOR AREA RATIO (FAR): This column represents the existing floor area divided by the existing lot area.

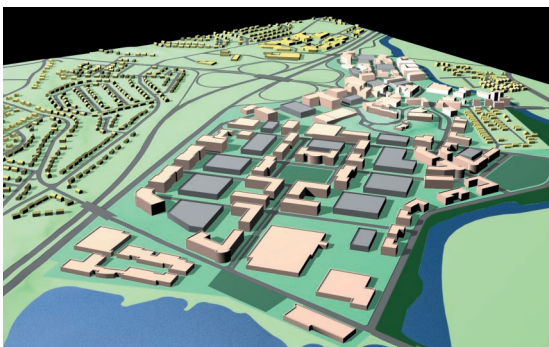
EFFECTIVE FAR UNDER PROPOSED ZONING: This column represents the maximum FAR that would likely be achieved under the proposed zoning, based on height, lot coverage, and parking requirements. In most cases, the permitted FAR is higher than what could be achieved with these additional requirements. The chart above illustrates the effective FAR for a sample lot of 100,000 square feet in each of the three districts. As a general rule, parking structures for commercial development require a total floor area equal to the building itself.

ACTUAL FAR BASED ON SITE REQUIREMENTS: In addition to the restrictions of height, lot coverage, and parking, the build-out potential for any given parcel is affected by setback requirements and lot configuration. Since buildings must be set back a certain distance

from lot lines and from adjoining structures, the total build-out potential will be reduced to some extent. In addition, the shape of the lot will affect build-out potential, since it is more difficult to satisfy zoning and dimensional requirements on an irregularly shaped lot. In order to account for these additional variables, our build-out analysis includes a second column, *Actual FAR based on site requirements*. These numbers represent 70 percent of the previous column, *Effective FAR under proposed zoning*.

PERCENT OF MAXIMUM SQUARE FEET CURRENTLY BUILT UNDER PROPOSED ZONING: This column represents the existing floor area divided by the potential floor area. The potential floor area is the product of the existing lot area and the Actual FAR.

A PERSPECTIVE OF THE SITE FROM THE SOUTH (*immediately below*) SHOWS THE PATTERN OF EXISTING BUILDINGS AND STREETS. THE RENDERING BENEATH IT SUGGESTS HOW THE SITE MIGHT APPEAR WITH A FULL BUILD-OUT UNDER THE PROPOSED ZONING. THE RENDERINGS AT RIGHT SHOW THE SAME COMPARISON FROM THE NORTH.



SOFT SITE: To determine which properties would likely be redeveloped, several criteria were used. First, it was assumed that existing industrial uses would be redeveloped as offices, since the value per square foot is considerably higher. Second, properties in poor physical condition would likely be redeveloped, since the value of the building is low relative to the value of the land. Third, properties were considered likely to be redeveloped if the existing floor area is 50 percent or less of the potential floor area.

INCREASE IN TOTAL SQUARE FOOTAGE AFTER REDEVELOPMENT: This column represents the net new floor area for properties that would likely be redeveloped.



PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	EFFECTIVE		ACTUAL FAR BASED ON SITE REQUIREMENTS	% OF MAX SF		INCREASE IN TOTAL SF AFTER REDEVELOPMENT
					FAR UNDER PROPOSED ZONING	FAR UNDER PROPOSED ZONING		CURRENTLY BUILT UNDER PROPOSED ZONING	SOFT SITE?	
HIGHLAND AVENUE CORRIDOR										
199/073.0-0017-0000.0	Developable Land	4,074	—	0.0	1.2	0.8	0%	Y	3,422	
199/073.0-0018-0000.0	Automotive Vehicles	32,499	13,940	0.4	1.2	0.8	51%	Y	13,359	
199/073.0-0020-0000.0	Retail Hardware / Building	5,223	1,976	0.4	1.2	0.8	45%	Y	2,411	
199/073.0-0021-0000.0	Developable Land	6,164	—	0.0	1.2	0.8	0%	Y	5,178	
199/073.0-0022-0000.0	Small Retail	12,881	9,562	0.7	1.2	0.8	88%	N		
199/073.0-0058-0000.0	Fuel Service Areas	53,700	3,569	0.1	1.2	0.8	8%	Y	41,539	
199/074.0-0001-0000.0	Medical Office Buildings	7,470	3,600	0.5	2.0	1.4	34%	Y	6,858	
199/074.0-0002-0000.0	General Office Buildings	10,345	7,220	0.7	2.0	1.4	50%	Y	7,263	
199/074.0-0003-0000.0	Small Retail	5,658	2,408	0.4	1.2	0.8	51%	Y	2,345	
199/074.0-0004-0000.0	General Office Buildings	5,586	1,959	0.4	1.2	0.8	42%	Y	2,733	
199/074.0-0005-0000.0	Restaurants / Bars	8,268	4,566	0.6	1.2	0.8	66%	Y	2,379	
199/074.0-0019-0000.0	Bank Buildings	20,453	2,838	0.1	1.2	0.8	17%	N		
199/074.0-0022-0000.0	General Office Buildings	29,184	24,960	0.9	1.2	0.8	102%	N		
199/074.0-0030-0000.0	Warehouse	45,668	19,278	0.4	1.8	1.3	34%	Y	38,264	
199/074.0-0031-0000.0	Comm Storage/Warehouse	42,877	22,978	0.5	1.2	0.8	64%	Y	13,039	
199/074.0-0035-0000.0	Fuel Service Areas	11,960	60	0.0	1.2	0.8	1%	Y	9,986	
199/074.0-0036-0000.0	Fuel Service Areas	7,718	4,238	0.5	1.2	0.8	65%	Y	2,245	
199/074.0-0037-0000.0	General Office Buildings	8,080	2,490	0.3	1.2	0.7	37%	Y	4,297	
199/074.0-0038-0000.0	General Office Buildings	12,233	9,000	0.7	1.2	0.8	88%	Y	1,276	
199/074.0-0039-0000.0	General Office Buildings	27,104	17,012	0.6	2.0	1.4	45%	Y	20,934	
199/074.0-0043-0000.0	General Office Buildings	51,680	98,976	1.9	1.2	0.8	228%	N		
199/300.0-0054-0000.0	Restaurants / Bars	35,161	8,150	0.20	1.2	0.8	28%	Y	21,385	
199/300.0-0058-0000.0	Restaurants / Bars	5,529	2,213	0.40	1.2	0.8	48%	Y	2,431	
199/300.0-0059-0000.0	Shopping Center	45,752	15,179	0.30	1.2	0.8	39%	Y	23,253	
199/300.0-0060-0000.0	General Office Buildings	15,185	9,900	0.70	1.2	0.8	78%	N		

PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	EFFECTIVE FAR UNDER PROPOSED ZONING	ACTUAL FAR BASED ON SITE REQUIREMTS	% OF MAX SF CURRENTLY BUILT UNDER PROPOSED ZONING	INCREASE IN TOTAL SF AFTER SOFT SITE? REDEVELOPMENT
199/300.0-0061-0000.0	General Office Buildings	31,452	49,828	1.60	1.2	0.8	189%	N
199/300.0-0064-0000.0	Comm Storage/Warehouse	43,560	12,730	0.30	1.2	0.8	35%	Y 23,860
WEXFORD/ CHARLES STREET INDUSTRIAL DISTRICT								
199/074.0-0006-0000.0	General Office Buildings	5,728	3,629	0.6	1.3	0.9	70%	Y (new park)
199/074.0-0007-0000.0	General Office Buildings	5,722	2,506	0.4	1.3	0.9	48%	Y (new park)
199/074.0-0008-0000.0	Developable Land	6,420	-	0.0	0.8	0.6	0%	Y 3,595
199/074.0-0009-0000.0	General Office Buildings	17,940	9,360	0.5	2.0	1.4	37%	Y 15,756
199/074.0-0011-0000.0	General Office Buildings	31,565	22,866	0.7	2.0	1.4	52%	N
199/074.0-0014-0000.0	General Office Buildings	29,100	28,800	1.0	2.0	1.4	71%	N
199/074.0-0016-0000.0	General Office Buildings	10,764	4,231	0.4	1.3	0.9	43%	Y 5,564
199/074.0-0023-0000.0	Chain Retail	185,438	26,408	0.1	1.2	0.8	18%	N
199/074.0-0027-0000.0	Warehouse	63,750	9,892	0.2	1.3	0.9	17%	Y 48,121
199/074.0-0028-0000.0	Auto Repair Facilities	15,787	9,050	0.6	1.2	0.8	68%	Y 4,211
199/074.0-0029-0000.0	Auto Repair Facilities	19,961	2,160	0.1	0.6	0.4	26%	Y 6,224
199/074.0-0032-0000.0	Auto Repair Facilities	11,142	4,940	0.4	1.2	0.8	53%	Y 4,419
199/074.0-0033-0000.0	General Office Buildings	46,647	19,980	0.4	1.2	0.8	51%	N
199/075.0-0001-0000.0	General Office Buildings	8,175	8,452	1.0	1.5	1.1	98%	N
199/075.0-0002-0000.0	General Office Buildings	33,588	6,684	0.2	1.5	1.1	19%	Y 28,583
199/075.0-0003-0000.0	Small Retail	32,858	29,909	0.9	1.5	1.1	87%	N
199/075.0-0004-0000.0	Auto Repair Facilities	6,897	3,000	0.4	1.5	1.1	41%	Y 4,242
199/075.0-0005-0000.0	Comm Storage/Warehouse	9,988	4,000	0.4	1.5	1.1	38%	Y 6,487
199/075.0-0006-0000.0	Manufacturing Operations	4,280	2,780	0.6	1.5	1.1	62%	Y 1,714
199/075.0-0008-0000.0	Comm Storage/Warehouse	8,842	4,554	0.5	1.2	0.8	61%	Y 2,873
199/075.0-0009-0000.0	Auto Repair Facilities	5,224	1,400	0.3	1.2	0.8	32%	Y 2,988
199/075.0-0010-0000.0	Manufacturing Operations	32,940	7,500	0.2	1.2	0.8	27%	Y 20,170
199/075.0-0011-0000.0	Manufacturing Operations	8,740	3,738	0.4	1.2	0.8	51%	Y 3,604
199/075.0-0012-0000.0	Comm Storage /Warehouse	8,390	1,440	0.2	1.5	1.1	16%	Y 7,370
199/075.0-0013-0000.0	General Office Buildings	4,640	7,126	1.5	1.5	1.1	146%	Y (2,254)
199/075.0-0014-0000.0	Manufacturing Operations	55,299	39,908	0.7	1.2	0.8	90%	Y 4,608

PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	EFFECTIVE FAR UNDER PROPOSED ZONING	ACTUAL FAR BASED ON SITE REQUIREMENTS	% OF MAX SF CURRENTLY BUILT UNDER PROPOSED ZONING	SOFT SITE? REDEVELOPMENT	INCREASE IN TOTAL SF AFTER REDEVELOPMENT
199/075.0-0015-0000.0	Comm Storage/Warehouse	35,218	21,008	0.6	1.2	0.8	71%	Y	8,575
199/075.0-0016-0000.0	Auto Repair Facilities	8,611	4,546	0.5	1.2	0.8	63%	Y	1,482
199/075.0-0017-0000.0	General Office Buildings	44,424	22,112	0.5	1.2	0.8	59%	N	
199/075.0-0018-0000.0	Manufacturing Operations	26,107	12,425	0.5	1.2	0.8	57%	Y	9,505
199/075.0-0019-0000.0	General Office Buildings	16,213	6,560	0.4	1.2	0.8	48%	Y	7,059
199/075.0-0021-0000.0	Comm Storage/Warehouse	74,000	25,470	0.3	1.8	1.3	47%	Y	67,770
199/075.0-0023-0000.0	Comm Storage/Warehouse	40,390	41,984	1.0	1.8	1.3	82%	Y	8,907
199/075.0-0024-0000.0	Comm Storage/Warehouse	6,110	4,627	0.8	1.3	0.9	83%	Y	933
199/075.0-0025-0000.0	Auto Repair Facilities	4,100	2,030	0.5	1.3	0.9	54%	Y	1,701
199/075.0-0026-0000.0	Auto Repair Facilities	7,667	3,030	0.4	1.3	0.9	43%	Y	3,947
199/075.0-0037-0000.0	Automotive Vehicles	24,669	2,400	0.1	1.2	0.8	12%	Y	18,322
199/075.0-0038-0000.0	General Office Buildings	4,599	5,800	1.3	1.2	0.8	152%	N	
NEW ENGLAND BUSINESS CENTER									
199/300.0-0001-0000.0	General Office Buildings	550,070	400,000	0.7	1.2	0.8	87%	N	
199/300.0-0003-0000.0	Parking Lots	71,332	-	0.0	1.0	0.7	0%	Y	(new park)
199/300.0-0004-0000.0	General Office Buildings	120,000	68,120	0.6	1.0	0.7	81%	N	
199/300.0-0006-0000.0	General Office Buildings	261,360	79,134	0.3	1.0	0.7	43%	N	
199/300.0-0007-0000.0	General Office Buildings	157,076	78,970	0.5	1.0	0.7	72%	Y	30,983
199/300.0-0009-0000.0	General Office Buildings	167,163	53,688	0.3	1.0	0.7	46%	Y	63,326
199/300.0-0010-0000.0	Potentially Develop Land	42,600	-	0.0	1.3	0.9	0%	Y	38,766
199/300.0-0011-0000.0	Comm Storage/Warehouse	191,468	82,254	0.4	1.3	0.9	47%	Y	91,982
199/300.0-0012-0000.0	General Office Buildings	478,396	208,180	0.4	1.3	0.9	48%	N	
199/300.0-0013-0000.0	Undevelopable Land	20,810	-	0.0	1.5	1.1	0%	Y	21,851
199/300.0-0014-0000.0	Manufacturing Operations	1,031,086	408,199	0.4	1.4	0.9	42%	Y	566,177
199/300.0-0015-0000.0	General Office Buildings	96,960	36,247	0.4	1.5	1.1	36%	Y	65,561
199/300.0-0016-0000.0	General Office Buildings	180,000	81,224	0.5	1.3	0.9	50%	Y	82,576
199/300.0-0017-0000.0	Office Build/Manufacture	160,000	80,640	0.5	1.3	0.9	55%	Y	(new park)
199/300.0-0018-0000.0	Research & Development	340,000	170,000	0.5	1.3	0.9	5%	Y	139,400
199/300.0-0019-0000.0	Potentially Develop Land	31,376	-	0.0	1.3	0.9	0%	Y	28,552
199/300.0-0020-0000.0	Office Build/Manufacture	45,051	17,025	0.4	1.0	0.7	54%	Y	14,511

PARCEL ID	EXISTING USE	LOT AREA (SF)	BLDG. AREA (SF)	EXISTING FAR	EFFECTIVE FAR UNDER PROPOSED ZONING	ACTUAL FAR BASED ON SITE REQUIREMTS	% OF MAX SF CURRENTLY BUILT UNDER PROPOSED ZONING	INCREASE IN SOFT TOTAL SF AFTER SITE? REDEVELOPMENT
199/300.0-0021-0001.0	Developable Land	30,000	-	0.0	1.0	0.7	0%	Y 21,000
199/300.0-0022-0000.0	Research & Development	45,094	16,16	0.4	1.0	0.7	51%	Y 15,399
199/300.0-0023-0000.0	Warehouse	66,615	23,180	0.30	1.0	0.7	50%	Y 23,451
199/300.0-0024-0000.0	Manufacturing Operations	345,700	116,507	0.30	0.9	0.6	53%	Y 101,284
199/300.0-0026-0000.0	General Office Buildings	233,033	86,814	0.40	1.0	0.7	53%	Y 76,309
199/300.0-0027-0000.0	General Office Buildings	658,831	316,029	0.50	1.3	0.9	53%	Y 283,507
199/300.0-0028-0000.0	Research & Development	240,750	99,223	0.40	1.3	0.9	45%	Y 119,860
199/300.0-0029-0000.0	Research & Development	78,000	35,435	0.50	1.5	1.1	43%	Y 46,465
199/300.0-0030-0000.0	General Office Buildings	105,178	194,793	1.90	1.5	1.1	176%	N
199/300.0-0031-0000.0	General Office Buildings	103,710	92,418	0.90	1.5	1.1	85%	N
199/300.0-0032-0000.0	Manufacturing Operations	60,000	25,500	0.40	1.3	0.9	47%	Y 29,100
199/300.0-0033-0000.0	Internet Switching Facility	354,200	462,220	1.30	1.3	0.9	143%	N
199/300.0-0034-0000.0	General Office Buildings	60,000	22,960	0.40	1.3	0.9	42%	Y 31,640
199/300.0-0035-0000.0	Health Spas	80,000	39,600	0.50	1.3	0.9	54%	Y 33,200
199/300.0-0037-0000.0	Day Care	40,000	20,000	0.50	1.3	0.9	55%	Y 16,400
199/300.0-0038-0000.0	Research & Development	74,514	30,887	0.40	0.8	0.6	74%	Y 10,841
199/300.0-0039-0000.0	General Office Buildings	82,204	28,062	0.30	0.8	0.6	61%	Y 17,972
199/300.0-0040-0000.0	Parking Lots	34,562	140	-	0.8	0.6	1%	Y 19,215
199/300.0-0041-0000.0	General Office Buildings	173,314	206,846	1.20	1.3	0.9	131%	N
199/300.0-0042-0000.0	Radio-TV Trans Facilities	178,379	9,363	0.10	1.3	0.9	6%	N
199/300.0-0047-0000.0	General Office Buildings	74,328	36,710	0.50	1.5	1.1	47%	Y 41,334
199/300.0-0048-0000.0	General Office Buildings	96,555	61,728	0.60	1.3	0.9	70%	N
199/300.0-0053-0000.0	Manufacturing Operations	243,000	120,787	0.50	1.5	1.1	47%	Y 134,363
199/300.0-0055-0000.0	General Office Buildings	71,888	50,970	0.70	1.5	1.1	68%	Y 24,512
199/300.0-0056-0000.0	Potentially Develop Land	15,200	-	-	1.3	0.9	0%	Y 13,832
199/300.0-0065-0000.0	Radio-TV Trans Facilities	72,708	-	-	1.3	0.9	0%	N
199/300.0-0066-0000.0	Hotel	202,59	417,778	2.10	1.3	0.9	227%	N
TOTAL		9,312,505	5,042,813					2,749,507

The approach used in this report differs from traditional fiscal-impact studies because it incorporate state aid and local receipts along with property taxes in estimating net revenue gains or losses for various land uses. This approach provides a more accurate picture of the cost of development, since not all local revenue is derived from property taxes.

6 Fiscal Impact

(Property taxes provide about 63% of Needham's revenues.) Additionally, the consulting team considered the special-permit impact fee as an additional source of revenue for project-related transportation improvements.

The fiscal impact analysis reflects these data and assumptions:

1. Total commercial assessed value in Needham is 17% of total assessed value, and it yields 24% of all property taxes. Commercial development significantly reduces residential taxpayer's burden.
2. The community has an Aa3 bond rating, but excess levy capacity is almost nonexistent, meaning there is very little potential tax capacity (in the absence of a Proposition 2½ override) to fund major infrastructure improvements.
3. Property taxes constitute 63% of Needham's local revenue sources, higher than the statewide average of 51%.
4. The net municipal cost for the average commercial/industrial development is 37 cents per square foot per year. Nonresidential municipal costs are approximately 20% of total municipal expenditures.
5. The revenue ratio for the average new commercial/industrial development in Needham is 4.1 to 1.
6. A typical new 250,000-square-foot development in the Needham Industrial Park can be expected to pay \$472,000 in annual taxes, of which \$379,000 would be net revenue to the town.

7. Assuming a 2.5-million-square-foot build-out over a ten-year period, the project has the potential of yielding \$4.72 million per year in gross taxes by 2010, or an additional \$472,000 per year, and \$25 million in taxable new growth per year over ten years, for a total of \$250 million in new growth over ten years.
8. Given the net tax return (after municipal service cost) and the estimated \$6.25 million in special permit fees, the proposed project has a potential infrastructure bonding capacity of between \$30 million and \$35 million.
9. Over a ten-year period the project can add \$250 million to total assessed valuation, shifting the nonresidential share of total valuation from 17% to 23%, and the non-residential tax yield from 24% of total tax yield to between 30% and 32%. This shift would provide a considerable subsidy to the residential ratepayer and would broaden the tax base.
10. Multifamily development in the project area can be expected to have a positive revenue ratio of approximately 2 to 1, depending on the value per unit.

Overview

There is little debate that the near-universal reliance on real estate taxes as the primary method of municipal finance in the United States has created a strong relationship between land-use planning and fiscal stability. Questions remain, however, about municipal ability to assure long-term fiscal stability through land-use policies.

The term “fiscal impact” is commonly employed to describe the “net fiscal impact” of a development project. In essence, will the municipal service costs be greater or less than the generated real estate taxes and other

municipal receipts? While this is an important fiscal consideration, it is a project specific measure of fiscal impact; the long-term and/or community-wide implications are not addressed, by this question. To address long-term fiscal impact, an understanding of municipal land use policies and development potential is necessary. Our approach includes an analysis of the relationship between project-specific measurements of fiscal impact, and the likely long-term consequences of build-out, based on the application of existing and anticipated zoning regulations.

Methodology

Our methodology divides municipal service costs into two broad categories: residential and nonresidential. Costs associated with various residential development types are more apparent and generally easier to assign. The problem confronting an analyst is how to distill nonresidential costs from total municipal expenditures, since they can and do vary widely, depending on the type of use being considered. Our methodology comes from the Fiscal Impact Handbook by Robert Burchell and David Listokin. The method selected, the “proportional valuation method,” takes into account community character by analyzing the relationship between nonresidential real property value and average real property value. Field data assembled through decades of surveys provide the basis of a refinement co-efficient scale used by the authors. This scale, which we employ in our calculations, essentially compensates for differences in community size and character, allowing any community to use the proportional-valuation method. The co-efficient scale does not, however, take into account the impact of development “mitigation agreements” that are often negotiated between a community and a developer, agreements that can significantly reduce associated service costs. In our opinion, the co-efficient scale, although necessary, often

produces estimates at the high end of the nonresidential cost range. In this instance we have a known mitigation agreement in the form of the proposed pay-as-you-go special permit fee, a fact our final conclusions take into account.

Proportional Valuation Method

The proportional-valuation approach uses the relationship between nonresidential property value and total residential property value to estimate service costs for nonresidential development. After nonresidential municipal service costs are computed, the remainder represents residential. The formula below is the initial step in any cost-of-development analysis. As noted above (section 3.2), the “coefficient” accounts for community type and commercial development intensity. It comes from The Fiscal Impact of Development Handbook and refines the figure for estimated nonresidential service.

$$\text{TOTAL NON-RESIDENTIAL SERVICE COST} = \frac{\text{TOTAL MUNICIPAL EXPENDITURES} \times \text{TOTAL NON-RESIDENTIAL ASSESSED VALUE}}{\text{TOTAL ASSESSED VALUE} \times \text{OVERALL COEFFICIENT}}$$

In general terms, nonresidential service costs for Needham can be determined by plugging current town data into the formula:

$$\$11,910,000 = \$57,000,000 \times \$621,000,000 / 3.777 \times 1.1$$

The approximately \$11.9 million in nonresidential service costs represents 20% of the total \$57,700,000 municipal expenditures for fiscal 2000 (FY00). The remainder, \$45.8 million or 80%, represents residential service costs. In our experience, this ratio is consistent in communities with land-use and tax-base characteristics similar to those in Needham. These communities tend to have a 3-to-1 or 4-to-1 municipal expenditure ratio in favor of residential uses.

To determine the fiscal impact of commercial/ industrial uses requires an estimate of the average service cost associated with a

nonresidential development typical for the community or, in this instance, typical for the project area. We have selected a hypothetical 250,000-square-foot research/office facility with an assessed value of \$100 per square foot. These figures yielded an assessed development value of \$25,000,000. Using this value, the following formula yields gross service costs for commercial/industrial uses.

$$\text{ESTIMATED PROJECT SERVICE COST} = \frac{\text{TOTAL MUNICIPAL NONRESIDENTIAL EXPENDITURES} \times \text{PROPOSED ASSESSED VALUE}}{\text{TOTAL COMMERCIAL ASSESSMENT} \times \text{PROJECT COEFFICIENT}}$$

The resulting figure will in turn contribute to more refined estimates of municipal costs associated with the development.

$$\$110,000 = \$11,900,000 \times \$25,000,000 / \$621,000,000 \times 0.25$$

Commercial/Industrial Revenue Ratios

Based on our earlier example (section 3.3), we

assign to a hypothetical 250,000-square-foot research and office park an assessed value of \$100 per square foot. Taxed at the FY00 rate

of \$18.88 per \$1,000, the hypothetical development would yield gross taxes of \$472,000 per year. As noted, Needham’s current nonresidential service cost is estimated at 44 cents per square foot. In this example, the associated service cost would be approximately \$110,000. As noted in Section 2.0, however, 37% of all municipal expenditures are derived from non–real-estate tax resources. The 44 cents per square foot cost estimate reflects only the ratio of real estate taxes to service cost. For a more accurate picture of average nonresidential municipal service cost, we need to assign a portion of the non–real-estate tax revenues to the commercial development equation. We have seen that 20% of expenditures support commercial activities in Needham. Thus we need to assign 20% of non–real-estate taxes to the commercial- development cost analysis to achieve a net revenue ratio for commercial development. In this instance, 20% of the

37 cents from non-real-estate tax resources equals 7 cents; subtracting this figure, we can adjust the 44 cents-per-square-foot gross-cost figure downward to 37 cents per square foot.

Building upon our example, the gross service cost of \$110,000 is reduced to \$92,500. Subtracting the \$92,500 net service costs from the \$472,000 in gross taxes yields \$379,500 “net” tax dollars per year, or a return of \$4.10 for every \$1.00 expended, or a revenue-to-cost ratio of 4.1 to 1. This is a strong rate of return, even without additional special-permit-fee monies.

Further, we know that our hypothetical project would also be subject to special permit fees for all development over an FAR of 0.5. For this example we assumed that half of the 250,000-sf project is subject to these fees. The development would yield an additional \$625,000 over a five-year period, or \$125,000 per year. Put in perspective, the special permit fee would cover all anticipated annual municipal costs of development for 6.75 years. Further, during and beyond this period the project will have a positive revenue ratio of 4.1 to 1.

Fiscal Impact of the Potential Build-out

Based on proposed zoning, the build-out analysis for the project area could theoretically produce 2,707,823 sq. ft of new development. However, traffic capacity standards in the proposed zoning would limit future development to approximately 2.5 million square feet.

Estimating a time line for commercial development—almost wholly contingent on regional and national economic conditions—is difficult. For this analysis we selected a ten-year and 2.5-million-square-foot build-out scenario.

Assuming 2.5 million square feet of new development over ten years, the project area could generate approximately \$4.72 million per

year in taxes (current values) from year ten onward. Development will not take place all at once, however, and if it occurs at an annualized rate of 250,000 sq. ft. per year, the annual tax increment would be approximately \$472,000. Using approximately 25% of the net yield to cover normal cost increases of local government during a ten-year period and assuming a net fiscal return of 4 to 1, it is possible that the town could issue a series of \$3.5 million bonds over ten years without changing the tax rate. The total value of these bonds could be in the range of \$30 million to \$35 million. The proposed project can provide a major fiscal benefit to the community and, depending on local fiscal policy, it can be a major source for funding for significant traffic improvements in the project area and surrounding neighborhoods.

It is important to note that in addition to the strong annual fiscal returns, the proposed project will generate approximately \$6.25 million in special permit fees over a ten-year period to help defray the cost of traffic infrastructure improvements. It is conceivable that the proposed project will generate total supporting revenues of between \$35 million and \$40 million that can be used to support traffic improvements without a negative impact on the local tax rate (the figure reflects the addition of \$6 million in special permit fees to \$30 million in tax revenues to support bond issues).

Finally, the infrastructure-supported redevelopment of the Needham Industrial Park will add at least \$250 million to the town’s total assessed valuation over ten years, or an increase of approximately 6%. An increase of this amount would have significant beneficial consequences for the residential property owners, since the commercial tax base would shift from 17% of total assessed valuation to 21% to 23% (depending on residential growth trends). The resulting tax yield from nonresidential development would increase from 24% to approximately 30% to 32%. This shift would

considerably reduce the future residential tax burden and significantly broaden the local tax base and the Needham's ability to provide quality services.

Impact of Nonresidential Uses on Various Community Departments

As noted earlier, numerous land uses are covered by the phrase "nonresidential." The average nonresidential service cost per square foot is a useful general guideline, but it should be noted that different nonresidential uses create different service demands, and communities may wish to duplicate the analysis in section 3.3 for each use. An alternate approach to determining nonresidential cost is to use the information in Tables 1 and 2 below, drawn from *The Fiscal Impact Handbook* by Burchell and Listokin, and reflecting typical cost impacts from thousands of examples. The cost impacts in Table 1 are medians, however, and can vary among communities.

Table 2 suggests the likely distribution among municipal departments in Needham of the estimated 37 cents per square foot of service cost, as discussed in section 3.3. This approach provides an additional perspective to the average nonresidential cost of service estimate and provides the community with the ability to make better decisions concerning the needs of various departments. Note: the information below does not reflect the additional \$625,000 per year that would accrue to the town during the five-year special permit fee payment period.

Percent of Service Costs by Department and Development Type

DEPARTMENT	INDUSTRIAL RANGE (AVG.)		COMMERCIAL RANGE (AVG.)	
General Government	4-8	(6)	4-8	(6)
Public Safety	35-55	(45)	60-90	(75)
Public Works	35-55	(45)	10-20	(15)
Health and Welfare	2-4	(3)	1-3	(2)
Recreation and Culture	0-2	(1)	1-3	(2)

In general terms, light industrial uses tend to be at the lower end of the industrial range presented in Table 1, while materials-reduction and or materials-reconfiguration facilities that use large amounts of power or water tend to fall at the high end of the industrial range. Similarly, office and research and development will be at the lower end of the commercial range, and retail uses such as shopping centers at the high end. In our example of a 250,000-square-foot research/office use, using the midpoints of the commercial range, we would expect the \$92,500 in annual service costs to break out as shown in Table 2:

Service Costs: Hypothetical Office/Research Use (numbers rounded)

TOWN DEPARTMENT (GENERAL)

Government	\$5,000
Public Safety	\$69,000
Public Works	\$13,000
Health and Welfare	\$2,000
Recreation and Culture	\$2,000

Revenue Ratios Multifamily and Elderly Housing

Non-single-family residential development has a different municipal cost structure than single-family development primarily because of lower incremental school costs (this type of housing generates fewer school-age children per unit). The Massachusetts Department of Housing and Community Development's *Growth Impact Handbook* estimates that garden apartments generally generate 0.26 school-aged children per unit; attached townhouses, 0.14; and elderly units, 0.0. The following table indicates the combined revenue ratios for a group of communities studied by Connery Associates over the past three years. Based on this survey we assume that multifamily housing will also have a positive revenue ratio if developed in the project area. Our experience has shown that one- and two-bedroom multifamily units

(whatever the design type) produce fewer than 1.0 school-aged children per 20 units. If multifamily units were designed as one- and two-bedrooms and the units were high quality, the revenue ratios below would likely rise by a factor of at least 1.00 per development type.

Revenue Ratios for Multifamily Development Types

MULTIFAMILY TYPE (100 UNITS)	NET REVENUE RATIO	(LOSS)GAIN PER \$1
garden apartments	1.13	0.13
townhouses	1.29	0.29
assisted living	2.66	1.66

COMMUNITIES SURVEYED: HOPKINTON, SOUTHBORO, BURLINGTON, LEOMINSTER, TEWKSBURY, HOLLISTON, NORWOOD, PEABODY, OTIS, DALTON.

New multifamily development, then, is a revenue-positive development type. The governing factors are the low number of school-age children per unit and the assessed value per unit. Regionwide, the higher the value of the multifamily unit, the stronger the net revenue return to the community. Based We would estimate that Needham's residential units would be at the high end of the regional price scale and most likely would have revenue ratios in excess of 2 to 1.

Following the analysis of existing conditions, this

7 Recommended Traffic Improvements

report identifies a series of traffic improvements that can address current problems and future capacity needs. We have outlined these recommendations and provided references for the supporting data here.

Capacity Needs and Development Relationships

Development potential within the site is constrained by the number of trips occurring during the critical peak hour. Development beyond this critical capacity would create safety problems and congestion on site roadways, in adjacent neighborhoods, and for roadway users. Based upon the findings of previous studies, the morning peak (7:30 to 8:30 AM) is the critical time for the area. Morning peak-hour trips are more concentrated because of specific work start times. Evening trips tend to be more spread out.

For the purposes of this study, we assumed that the percent of through traffic (traffic not bound for the site) passing through the area would remain constant over time. Analysis shows that through traffic entering the area during the morning peak hour on Highland Avenue from the east (Newton) over the Charles River is 72 percent of total traffic. Similarly, more than half of the morning traffic entering the area on Kendrick Street (56 percent entering from the east and 80 percent entering from the west over the Kendrick Street bridge) is through traffic. This traffic originates in

residential communities such as Newton, Brookline, Cambridge, and Waltham, and heads for job centers in Norwood, Milton, Wellesley, and Dedham. Through traffic accounts for more than half the westbound trips on Highland Avenue during the morning peak hour.

Recommended Improvements

The recommended traffic improvements are divided into three phases, with the least expensive and most immediately feasible ones falling in earlier phases. Phase One and Two improvements would be paid for with special permit fees obtained from the first 500,000 square feet of new development, in combination with funds provided by the town and the 6320 corporation. Under the current zoning, this amount of new development would be permitted as of right, with no funding provided for traffic improvements. Completion of Phase Two traffic improvements would unlock the potential for additional new development, providing funds for Phase Three improvements. In this way, each phase of development would pay for the next round of traffic improvements, ensuring that development does not significantly outpace traffic capacity.

Phase One

1.1 Traffic mitigation in adjacent neighborhoods. In cooperation with local residents, the town would work to identify and implement traffic-calming measures and other improvements designed to reduce the impact of through traffic on neighborhood streets adjacent to the business center. For a more detailed description of neighborhood traffic management, see Appendix A.

1.2 Route 128 northbound off-ramp. The New England Business Center Route 128 Improvements Association, Inc., is coordinating contributions from businesses on site for a fund that would be used to expedite and facilitate design and implementation of long-term transportation improvements in the area. Specifically, the corporation is focusing on the northbound off-ramp to Kendrick Street as proposed by the Route 128 Add-a-Lane project.

1.3 Intersection improvements at Highland Avenue and Second Avenue. This would include an exclusive westbound left turn and northbound right-turn lanes on Highland at 2nd Avenue. This recommendation was first recorded in the 1986 CTPS Highland Avenue/Needham Street Corridor Traffic Study. Expanding the westbound approach from Highland Avenue to three lanes (two through lanes and an exclusive left-turn lane) would greatly improve the flow of the intersection. The westbound approach presently consists of two lanes: a shared through/left lane and a shared through/right lane. The shared through/left lanes serves as an exclusive left-turn lane, diminishing the flow capacity of the second through.

1.4 Consolidation of curb cuts on Highland Avenue. Consolidating curb cuts along Highland Avenue would reduce the number of conflict points and improve travel flow.

Phase Two

2.1 A comprehensive traffic study. To further refine the recommendations made in this report, a comprehensive traffic study should be completed for the area. The study should include:

- comprehensive data collection
- analysis of existing conditions
- analysis of a no-build scenario
- analysis of build scenario(s)
- conceptual development of proposed improvements and mitigation measures

Comprehensive data collection should include peak-hour counts for all intersections within the site as well as those affected by site traffic, particularly critical intersections in the neighborhoods along Greendale Street and Hunting Avenue. The existing levels of build-out, number of parking spaces available within the site, and transit availability and ridership should all be reassessed at that time.

The analysis of existing conditions will provide valuable information about the existing levels of service for vehicular and truck traffic, pedestrian and bicycle needs, the unique truck interests of the area, and parking availability and deficiencies. Comparatively, the analysis of the no-build and build scenarios will pinpoint the areas needing additional improvement and the remaining capacity available for development. The study would provide further recommendations for infrastructure improvements as well as potential mitigation measures that might be adopted by future developers.

2.2 Kendrick ramp to Route 128 southbound. Coordinating the construction of the Kendrick Street ramp to Route 128 southbound would be a necessary partner to the Route 128 northbound ramp to Kendrick Street. Residents in the area are worried that traffic generated by the northbound ramp would use residential streets to reach Route 128 southbound at the Great Plain Avenue ramps. A southbound ramp onto 128 at Kendrick would prevent neighborhood cut-through traffic.

2.3 Highland Avenue reconstruction.

Highland Avenue reconstruction, currently planned for completion in December 2002, will improve the roadway from Webster Avenue to Gould Street. Reconstruction also includes improvements in Highland Avenue from the Charles River to First

Avenue, including a four-lane roadway cross-section and sidewalk improvements, scheduled for completion in 2004.

2.4 Kendrick Street reconstruction.

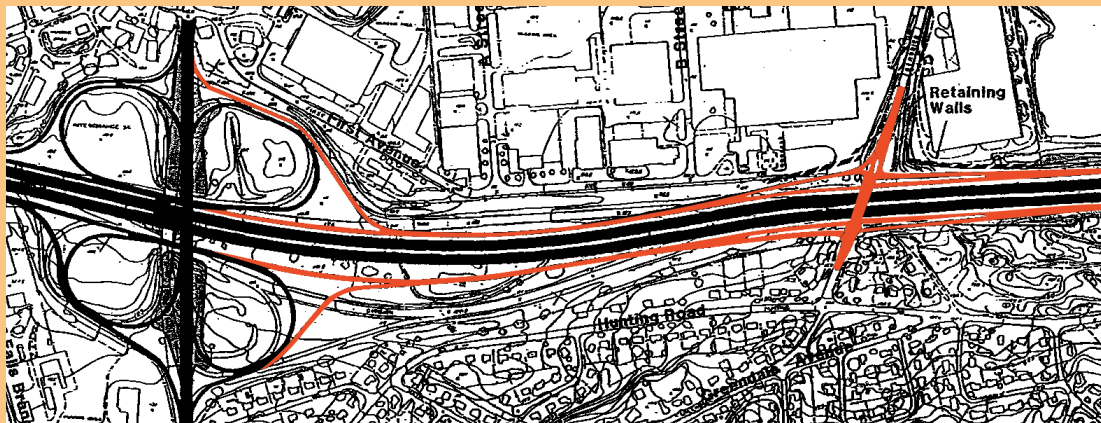
This involves roadway improvements from Fourth Avenue to Hunting Road. The reconstruction includes the provision for a four-lane cross section. The town already has plans to implement this improvement.

Phase Three

3.1 I-95/I-93 (Route 128) Transportation Improvement Project. This regional project has the potential to improve access dramatically through a comprehensive reconfiguration of the Route 128 roadways,

Route 128 Transportation Improvement Project:

Scheduled roadway, interchange and bridge improvements



SCHEDULED IMPROVEMENT

Route 128/Kendrick Street Interchange

- Add a diamond interchange at Kendrick Street: two northbound ramps, two southbound ramps and a new bridge with extra horizontal clearance to accommodate an additional collector/distributor road.
- Add collector/distributor roads along Route 128 to allow interchange traffic to enter, exit and merge without affecting through traffic.

Route 128/Highland Avenue Interchange

- Realign existing Highland Avenue where it extends over Route 128.
- Adjust existing interchange ramps.
- Build four-span bridge at Highland Avenue.

EXPECTED START DATE

State has scheduled a start date of 2006; Needham Selectmen have requested a start date of 2002.

State has scheduled a start date of 2006; Needham Selectmen have requested a start date of 2002.

including the Highland Avenue interchange, added frontage roads between Highland Avenue and Kendrick Street, and added northbound and southbound ramps to/from Kendrick Street. (A northbound off-ramp and southbound on-ramp at Kendrick Street are recommended in earlier phases).

3.2 Signal at Fourth Avenue and Kendrick Street. Under the full-build scenario, signal installation at the intersection of Fourth Street and Kendrick Street may be necessary.

3.3 Connection of Wexford Street to Reservoir Street. By connecting Reservoir and Wexford, the site would gain access to and from the north—and no longer be restricted by east/west-only access. Site surveys show enough lateral clearance to connect the roadways without disrupting the railroad tracks.

3.4 Alignment of First and Wexford streets. The realignment of First Street at Highland Avenue to create a four-way intersection with Wexford Street would potentially make it possible to install a traffic signal at that intersection. Moving the First Street intersection to the east helps to create a longer queuing area for traffic exiting the ramp and reduces conflicts with queue/intersection traffic. The signal would create the opportunity for a safe and efficient left turn from First Avenue onto Highland Avenue, and might reduce the number of accidents due to U-turns taken at Wexford Street.

Related Improvements

TRANSPORTATION MANAGEMENT ASSOCIATION. The transportation management association should continue to promote trip-reduction programs and to aid new and existing businesses in their trip-reduction efforts. Financial incentive programs might include transportation allowances, bicycle and walk subsidies, carpool or vanpool subsidies, or transit subsidies. Parking programs could be implemented with preferential reserved parking for carpools, restricted parking, or parking charges. Finally, flexible work schedules may help minimize peak-hour commute, distributing arrivals and departures over an expanded time period.

HIGHLAND AVENUE ITS. Using intelligent transportation systems (ITS) technology, the signal timing along Highland Avenue in Needham could be coordinated with the green phase of the Highland Avenue signals.

PEDESTRIAN ACCESS AND FACILITIES. Wide, clearly marked sidewalks are needed to provide good public access to services and amenities, including green space, within the project area.

BICYCLE ACCESS AND FACILITIES. Bicycle lanes or wide outside lanes on new roadways would help to encourage cycling as an alternate form of transportation to the area. Secure bicycle storage should be provided, with shower and changing facilities, for bicycle commuters.

Scheduled Roadway and Intersection Improvements

The town is planning to implement a variety of traffic improvements that will contribute to easing traffic on local streets adjacent to the business center.

WEBSTER STREET/HIGHLAND AVENUE INTERSECTION. Signal improvements and intersection reconstruction at the Webster Street and Highland Avenue intersection.

Level-of-Service Standards

V/C RATIO	LOS	ROADWAY CONDITION
0.00–0.20	A	Free flow
0.21–0.40	B	Free flow—maneuverability slightly impeded
0.41–0.70	C	Stable flow—maneuverability noticeably restricted
0.71–0.79	D	Stable flow—reduced speed, maneuverability limited
0.80–0.95	E	Near capacity—speeds low but relatively uniform
>0.96	F	At or near capacity—significantly reduced speeds

WEBSTER STREET RECONSTRUCTION. Webster Street reconstruction includes roadway improvements between Central Avenue and Greendale Avenue.

GOULD STREET/HIGHLAND AVENUE/HUNTING ROAD. Signal improvements and intersection reconstruction at the Greendale Avenue, Highland Avenue, and Hunting Road intersection.

GREENDALE AVENUE/HIGH STREET. Intersection reconstruction at the Greendale Avenue/High Street intersection.

Trip Distribution

The initial trip distribution was assumed to be the same as the proportions in the 1998 traffic counts. Therefore, the percentage of trips entering the site and the percentage of through traffic would remain constant, with the same rate of growth for both types of trips.

Future Capacity

Future capacity was estimated based on the recommended roadway and intersection improvements. For these calculations, ideal lane capacity is assumed to be 1400 vehicles per lane per hour. A factor of 0.85 was applied to this “ideal” capacity to take into consideration the impacts of signal delay, access and egress conflicts, and peak-hour volumes. The factor is based on the volume-to-capacity ratio (v/c) used to evaluate the level of service of arterial flows. The total future trip capacity was then adjusted to account for trips through the area and trips to the business center. Assuming that a v/c ratio of 0.85 was maintained on all

improved roadways, the recommended traffic improvements would add capacity for 3,400 new AM peak-hour trips. As shown in the attached Development Phasing Chart, approximately 650 of these trips would be accommodated in Phase One, 975 in Phase Two, and 1,625 in Phase Three.

Development Potential

Based on the predicted use mix, a maximum build-out of 2.5 million square feet of new development could be accommodated with the proposed improvements. This calculation includes the increase in traffic generated by the conversion of existing space. Calculations are based on A.M. peak-trip-generation rates for each type of land use.

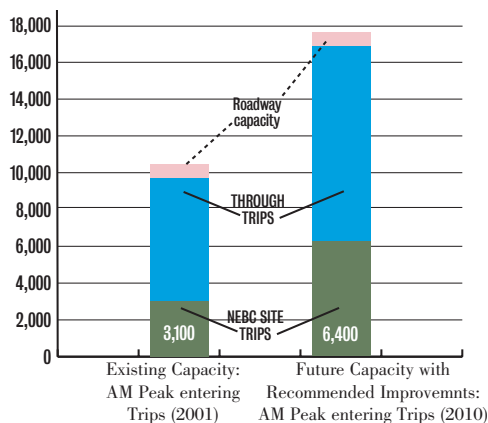
As in the capacity analysis, the A.M. peak-hour trips were considered to be the critical travel times. The figure below illustrates the variations of vehicle volumes into and away from the site during the morning and evening peak hours. Entering trips in the morning peak provide the most intense traffic hour.

Future Capacity

(A.M. Peak Hour Entering Trip Ends)

	FUTURE DVMNT. (1000 SF)	PERCENT OF TOTAL	A.M. PK-HR VEHICLE ENTER'G TRIPS
Net new development			
Residential/condominium	125	5%	10
Corporate headquarters	750	30%	1,025
Research & development	750	30%	775
General office	125	5%	170
Specialty retail	125	5%	0
Quality restaurant	125	5%	600
Telecom	500	20%	150
Total	2,500	100%	2,730
Conversion of existing uses	2,500	n/a	580
TOTAL			3,310

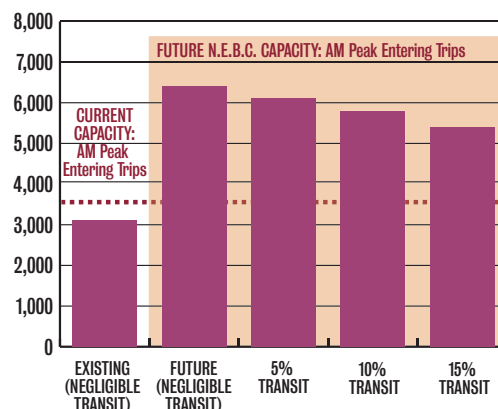
Traffic Capacity on Roadways Serving the New England Business Center



Existing and Future Capacity

The existing 3,100 A.M. peak trips into the site are a significant portion of the existing capacity serving the site (approximately 3,300 A.M. peak trips). These 3,100 trips are, however, only a fraction of the total A.M. peak trips currently traveling through the area and the total capacity of existing roadways. In the future, the number of trips through the area is expected rise at the same rate as the number of trips into the site—assuming that future development in Needham is competitive with that of surrounding towns.

Reduction in Trips from Transit Shares



Transit Effect on Future Trip Generation

Although Needham does not have direct control over the trip behavior patterns of the travelers driving through the area, an increase in the transit share of New England Business Center employees would make a difference on the roadways. The figure at right shows the reduction of trips that would occur if the transit share increased to 5 percent, to 10 percent, or to 15 percent.

Projected Development Impact of Traffic Recommendations

PHASE	RECOMMENDATION	NEW USABLE VOLUME*	APPROXIMATE NEW DEVELOPMENT ACCOMMODATED**
1.1	Undertake traffic mitigation in adjacent neighborhoods		
1.2	Build Route 128 northbound off-ramp		
1.3	Upgrade Highland Avenue/Second Avenue intersection		
1.4	Consolidate curb cuts on Highland Avenue		
Total Phase 1		650 trips	500,000 sf
2.1	Conduct comprehensive traffic study		
2.2	Build Kendrick Street ramp to Route 128 southbound		
2.3	Undertake planned Highland Avenue reconstruction		
2.4	Undertake planned Kendrick Street reconstruction		
Total Phase 2		975 trips	750,000 sf
3.1	Complete Route 128 Transportation Improvement Project		
3.2	Install Signal at Fourth Avenue and Kendrick Street		
3.3	Connect Wexford Street to Reservoir Street		
3.4	Realign First Avenue and Wexford Street		
Total Phase 3		1,625 trips	1,250,000 sf
TOTAL ALL PHASES		3,250 trips	2,500,000 sf

* ADDED CAPACITY IN TERMS OF A.M. ENTERING TRIPS

** NEW DEVELOPMENT THAT COULD BE SUPPORTED BASED ON A.M. PEAK HOUR TRIP-GENERATION RATES FOR PROJECTED LAND USE MIX

Sources

Environmental Assessment/Final Environmental Impact Report (EOEA No. 5072): I-95/I-93 (Route 128) Transportation Improvement Project. Federal Highway Administration, Massachusetts Highway Department. February 1999.

Expanded Environmental Notification Form: Office Redevelopment Project, 140 Kendrick Street. Wellsford/Whitehall Holdings LLC. November 1998.

Highland Avenue/Needham Street Corridor Traffic Study: Existing Conditions. CTPS Technical Report 56a. August 1986.

Highland Avenue/Needham Street Corridor Traffic Study: Future Conditions. CTPS Technical Report 56b. July 1987.

Industrial Park Study Committee Report, Town of Needham, Massachusetts. January 1989.

Traffic Impact and Access Study: Proposed Office Development, 117 Kendrick Street. Vanasse & Associates, Inc., for Saracen Companies, Inc. August 1998.

Traffic Impact and Access Study: Proposed Office Development, 140 Kendrick Street. Vanasse & Associates, Inc., for Wellsford Whitehall Holdings, LLC. March 1999.

Traffic Impact and Access Study: Proposed Office Development, 250 First Avenue. Vanasse Hangen Brustlin, Inc., for the Bullfinch Companies, Inc. May 1997.

Traffic Impact and Access Study: Proposed Retail Development, Highland Avenue. Robert D. Vanasse & Associates, for Winhill Companies. December 1997.

Traffic Impact and Access Study: Proposed Telecommunications Facility, 64-80 A Street and 99-111 Cabot Street. Rizzo Associates, Inc., for Cabot, Cabot, & Forbes of New England, Inc. March 2000.

Traffic Impact and Access Study: Renovation of 155 Fourth Avenue. Vanasse Hangen Brustlin, Inc., for Bluestone Capital Partners, LLP. June 1997.

Traffic Counts, Norfolk County Engineering Department:

- Highland Avenue south of Second Avenue, October 1998.
- Highland Avenue north of Route 128, October 1998.
- Highland Avenue at Newton town line, October 1998.
- Highland Avenue west of Wexford Street, March 2000.
- Highland Avenue east of Wexford Street, March 2000.
- Wexford Street north of Highland Avenue, March 2000.

The following appendices are available for review at the Needham Planning Department:

- Appendix A: Traffic Turning Movement Volumes
- Appendix B: LOS Analyses
- Appendix C: Trip Generation: Existing and Future
- Appendix D: Transit Memo
- Appendix E: Traffic Counts

8 Design Guidelines

Streetscape

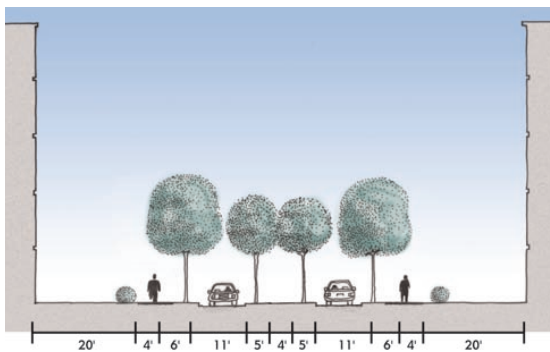
Comprehensive streetscape improvements can play a critical role in improving the character and identity of each district, and enhancing pedestrian and cycle access through the site. In general, new sidewalks, curbs, street trees, and lights are recommended throughout the area. The existing public rights of way could accommodate these improvements without any

land takings. Providing designated on-street parking in some locations would reduce the need for visitor parking on individual

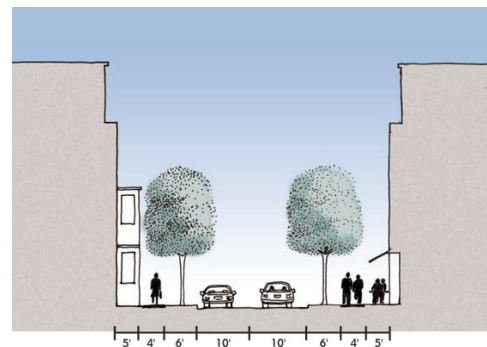
sites, and would serve the short-term parking needs of nearby retail and service businesses. North of Highland Avenue, where the existing rights of way are narrower, creating one-way streets in key locations would ease traffic flow and provide more space for pedestrians. The street sections illustrated here show how these improvements could be implemented, contributing to a more walkable and attractive site.

Recommendations: Streetscape

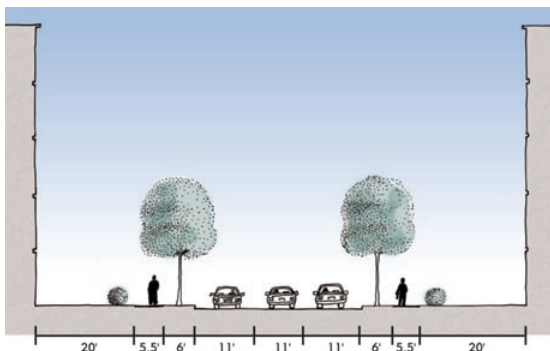
CUTLER BOULEVARD



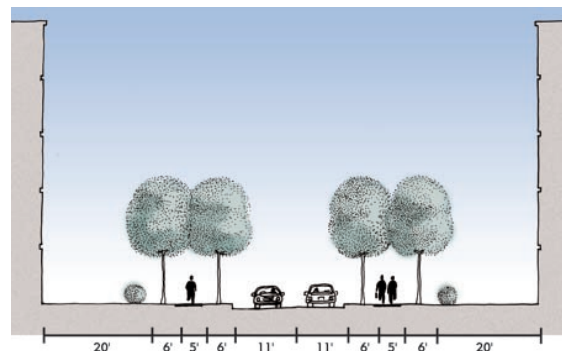
WEXFORD/CHARLES STREET



NEW ENGLAND BUSINESS CENTER



PARK STREET

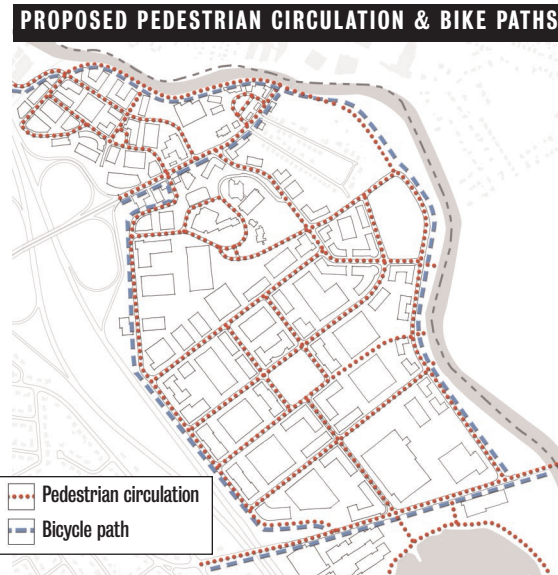
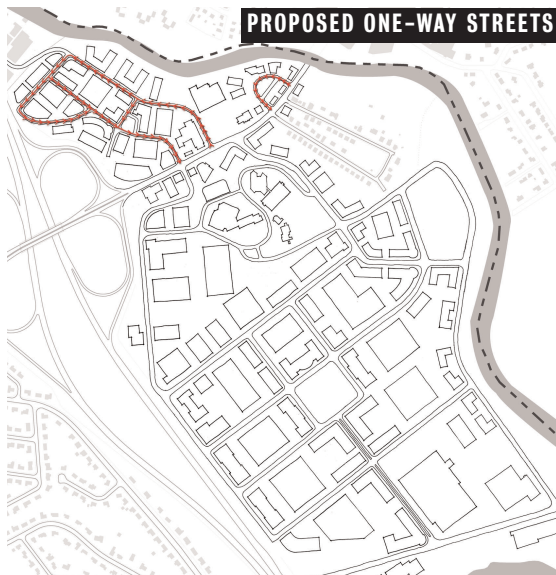
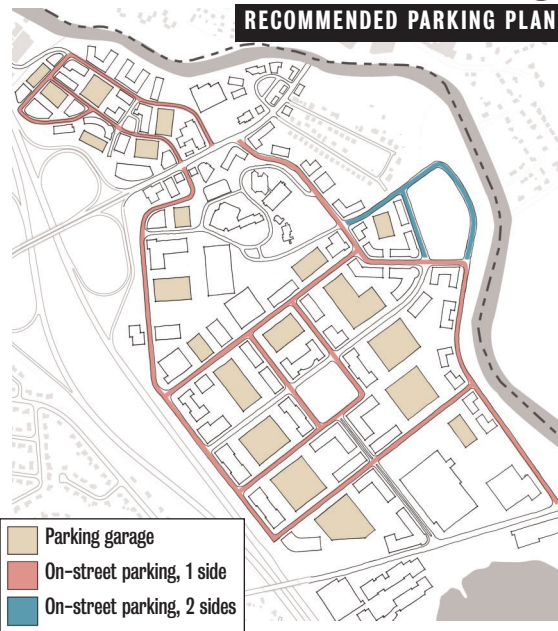
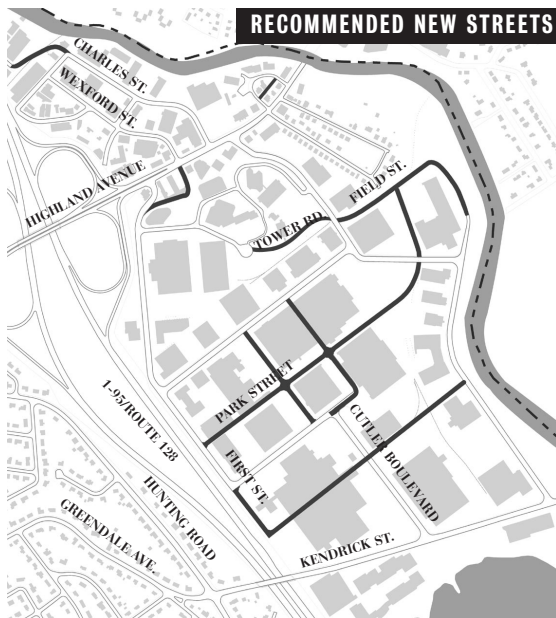


Road Network

In addition to streetscape improvements, the site would benefit from the creation of new streets linked to the existing network. These will only be created, however, if property owners choose to take advantage of the zoning incentives for their construction. The recommended roads are intended to create a more logical development pattern and create new

opportunities for street frontage. If appropriately designed, these streets could improve access for vehicles, pedestrians, and cyclists, and add value to adjacent properties. Adding new streets would also improve traffic flow by distributing trips through a larger system. As shown in the plan, new roads should run along existing property lines or through the center of larger sites to avoid the creation of splinter parcels.

Recommendations: Circulation/Parking



Recommended Streetscape Improvements

STREET NAME	WIDTH OF PUBLIC RIGHT OF WAY	DESCRIPTION
Fremont Street	50'	30' wide roadway, including two 10' driving lanes and one 10' parking lane. 6' planted strip with trees and streetlights at 30' on center and a 4' sidewalk along both sides.
Wexford & Charles Street	40'	20' wide roadway, including one 10' driving lane and one 10' parking lane. 6' planted strip with trees and streetlights at 30' on center and a 4' sidewalk along both sides.
Highland Circle	20'	10' wide roadway. 6' planted strip with trees and streetlights at 30' on center and a 4' sidewalk along one side.
First Ave., Second Ave., B Street	56'	33' wide roadway, including two 11' travel lanes and one 11' parking lane. 6' planted strip with trees and streetlights at 40' on center and a 5.5' sidewalk along both sides.
Tower Road (proposed) (represents typical design for new streets not listed below)	40'	30' wide roadway, including two 11' travel lanes and two 4' shoulders. 5' sidewalk along both sides, trees at 40' on center along north side of the street.
Field Street (proposed new street)	60'	44' wide roadway, including two 11' travel lanes and two 11' parking lanes. 6' planted strip with trees and streetlights at 40' on center and a 5' sidewalk along one side. 5' sidewalk along the other side.
Park Street (proposed new street)	44'	22' wide roadway, including two 11' travel lanes. Two 6' planted strips with trees and streetlights at 40' on center and a 5' sidewalk along both sides.
Cutler Boulevard (currently Third Ave.)	56'	Two 10' wide roadways separated by a 12' median. Median includes plantings and trees at 40' on center. 6' planted strip with trees and streetlights at 40' on center and a 6' sidewalk along both sides.
4th Avenue	48'	30' wide roadway, including two 11' travel lanes and two 4' shoulders. 6' planted strip with trees at 40' on center and a 4' sidewalk along one side. 8' planted strip with trees and streetlights at 40' on center and shrubs at 10' on center along the other side.

Open Space

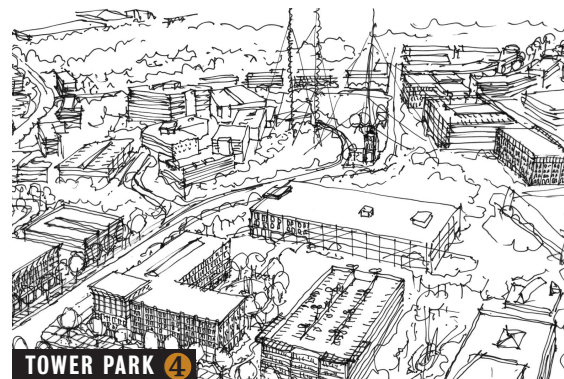
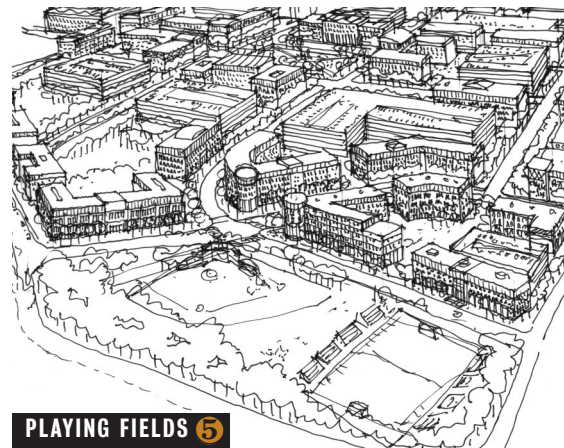
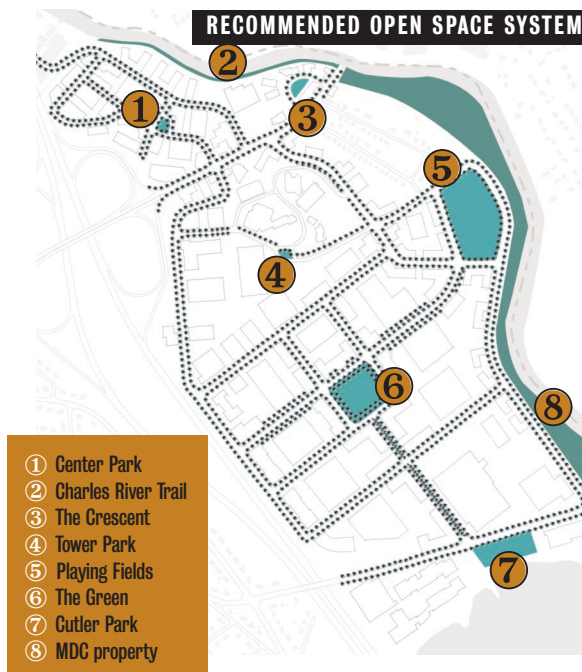
creating new open spaces throughout the site will contribute significantly to environmental quality and increase the area's attractiveness for residents, workers, and visitors. In particular, new open spaces adjacent to the river and lake can help to create a comprehensive system of parks, pathways and trails linking the entire site. New open spaces will also significantly increase property values for adjacent sites. As with new public streets, the decision to create new open spaces will be made by individual property owners in consultation with the town.

The recommendations for open space include a variety of options, from large formal parks to smaller greens, recreational fields, and an interpretive park describing the history of the

site. The open space plan shows potential location for these sites; however, other locations may be equally suitable, particularly as opportunities arise through the redevelopment process.

To enhance and highlight the river as a unique amenity, improvements are needed in the existing MDC pathway in the New England Business Center. These improvements should maintain the natural quality of the area and preserve the river's edge as a riparian corridor. Several small overlooks could also be created, providing better visual connections to the water. On the north side of Highland Avenue, a new pathway could be created next to the river if adjacent property owners choose to grant an easement on their land. Ideally, the entire river's edge should be accessible to pedestrians and cyclists, creating a continuous path from Kendrick Street north to the elevated rail bridge.

Recommendations: Open Space



Recommended Open Spaces

NAME	DESCRIPTION	TOTAL AREA (SF)
Center Park	Informal green space with lawn, trees, pedestrian pathways, sculpture	9,000
The Crescent	Informal green space with lawn, trees, pedestrian pathways	12,800
Tower Park	Interpretive park illustrating history of the site, including lawn, trees, signage, special paving	5,000
Playing Fields	Athletic fields (one regulation soccer field, one regulation baseball diamond)	205,000
The Green	Formal green space with lawn, trees, flower trellis and rose garden	145,000
TOTAL		376,800

Summary of Cost Estimates for Public Improvements

Road work and streetscape improvements \$18,000,000

- > *Estimate for new construction and improvements to existing roads*
- > *Cost includes paving, curbs, sidewalks, lights, and landscaping*

Proposed Parks

- > *Cost includes demolition of existing buildings, landscaping, benches, lights, and signage*

Center Park	\$ 82,000
The Crescent	100,000
Tower Park	70,000
Playing Fields	1,100,000
The Green	900,000
PARKS TOTAL	\$ 2,252,000

River Walk

- > *Estimate for new construction + improvements to existing path*

New England Business Center	\$ 150,000
Wexford/Charles Street District	200,000
RIVER WALK TOTAL	350,000

TOTAL COST OF PUBLIC IMPROVEMENTS **\$ 20,602,000**

Implementation

Successful implementation of the design guidelines will require a long-term partnership between business owners and the Town. Some improvements, such as the installation of new sidewalks and street trees, can be implemented by the Town. Other improvements, such as the creation of new roads and parks, rely on the initiative of private property owners. In all cases, it is important to coordinate public and private investment to achieve the full benefit of these improvements.

To assist in the implementation of public improvements, business owners in the area may choose to establish a business improvement district (BID). A BID essentially functions as a merchants' association but allows members to impose a self-tax that is used to fund local services and capital improvements. BIDs are traditionally used in downtown commercial areas, but they can be effective in a variety of locations where business owners seek more control over the public environment. BID members decide how funds are spent, and can direct money toward the projects or services they feel are most important. A BID is typically governed by a committee that includes representatives from both the business community and the local municipality.

The Massachusetts Department of Housing and Community Development describes how BIDs work in a guide on establishing one:

According to the International Downtown Association, a nonprofit organization dedicated to downtown revitalization and a national clearinghouse of BID information, in 1994 Massachusetts joined more than 40 other states when it passed legislation enabling the local formation of BIDs. Hundreds of BIDs are currently operating in the United States. A BID is a downtown

management strategy and financing tool that allows commercial districts to develop, fund, and administer programs and services targeted solely within the district. The key to their success is the participation by the private-sector businesses and property owners who recognize the benefit of a private-sector solution to downtown management and improvement. Downtown property owners within the district add an assessment to their existing real estate property tax to fund the additional services and programs that they have designated and the BID will implement to improve the development climate. The municipality provides its power to raise and collect revenues to operate the BID, thus making the BID a true public-private partnership.”¹

In Massachusetts, a BID can be formed in any geographical area in which at least 75% of the land is zoned or used for commercial, retail, industrial or mixed uses. A petition to establish a BID must contain the signatures of the owners of at least 60% of the real property and of at least 51% of the assessed valuation of the property within the BID. Within 30 days after the BID is established, any property owner may choose to “opt out.” By opting out, the property owner is neither subject to the BID fee nor eligible to receive any of the benefits or services of the BID.

In general, BIDs have proven to be a highly successful tool for improving the public environment, increasing property values, and boosting sales. The existing New England Business Center at Needham Economic Advisory Committee, which includes many of the business and property owners in the area, serves as an excellent foundation for creating a BID. The committee has already implemented

a variety of improvements, including the recent installation of new signage throughout the park. Establishing a BID would allow the committee to expand its activities by providing additional financial and political support.

¹ From *A Guide to Establishing a BID in Massachusetts*, published by the Massachusetts Department of Housing and Community Development. The full document is available online at <http://www.magnet.state.ma.us/dhcd/sitemap.htm>

appendix

Neighborhood Traffic Management Concerns

- > Excessive speeds
- > High traffic volumes
- > Accidents/safety
- > Children
- > Pedestrian/bicycle routes

Speed Control/Cut-Through Reduction Measures

• TEMPORARY

- > police enforcement
- > police presence
- > speed limit signs
- > radar trailers

• PERMANENT

- > raised crosswalks
- > raised intersections
- > speed humps
- > speed tables
- > chicane/serpentine
- > choker (mid-block, segment)
- > road closure (partial, half, full/dead-end)
- > mid-block islands
- > narrowing lanes
- > neckdown/curb extensions
- > on-street parking
- > cul-de-sacs
- > diverters (diagonal, semi-, full)
- > gateways
- > median barriers/island diverters
- > one-way streets
- > traffic circles/roundabouts

Neighborhood Process

1. Initiate study: identify problems and issues
2. Develop plan
 - > assess problems/needs
 - > identify goals/objectives
 - > identify evaluation criteria
 - > develop alternatives
 - > select a plan
3. Review the plan
4. Trial installation (temporary construction)
5. Project evaluation
6. Design and construction
7. Project monitoring
8. Follow-up evaluation

Further Issues to Consider

- > Emergency services (fire/ambulance)
- > Adjacent neighborhoods
- > Maintenance
- > Liability/safety
- > Drainage
- > Costs/financing

credits

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John H. Cogswell, Needham Board of
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- **Byrne McKinney & Associates:** Pamela S. McKinney, *economic development*
- **Connery Associates:** John W. Connery, *land use and zoning*

FINANCIAL CONTRIBUTIONS TO THE BUSINESS CENTER PLANNING STUDY

Bluestone Realty Trust

Bulfinch Companies

Lucille Burokas

Cabot, Cabot & Forbes of New England

J. Derenzo Company

Petrini Corporation

Pip Printing

Eliot Ravech

Samuel Terrazzino

Mary Lou Twickler

Wellsford/Whitehall Properties

The Winhall Company

