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INDEPENDENCE CENTRE MASTER PLAN

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INDEPENDENCE CENTRE MASTER PLAN

BY:

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RESEARCH PROJECT
OF

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CHAPTER I
Introduction

I. PURPOSE OF PLAN

The purpose of the Independence Centre Master Plan is to create a conceptual plan for a transit-oriented development for a 130 acre site surrounding the MBTA commuter rail station in Kingston, MA. The subdivision of lots, the location of individual parking areas, and other specific decisions are to be made by the developer of the site. This report is written to illustrate how the concept of transit-oriented development can be applied to the site in question. This plan illustrates the benefits of transit-oriented development for this specific site, including the prevention of sprawl development, and the increase in property tax revenue after development. One main purpose of this plan is to promote transit-oriented development as an alternative to conventional development practices in Southeastern Massachusetts, and elsewhere. Many of the harmful effects of sprawl development practices can be avoided through the practice of consistently creating compact village centers around light rail and other mass transit stations.

II. PLANNING OBJECTIVES

The Master Plan for Independence Centre has the following goals:

1. To create a transit-oriented development offering an alternative means of transportation for residents of the site, the Town, and the region.

2. To create a vibrant mixed-use community, on the scale of a small town center.

3. To create a community that is designed primarily for pedestrians, but can also accommodate the automobile.

4. To provide a wide range of housing types and values so that Independence Centre can be affordable to households of all income levels.

5. To provide development in close proximity to the transit station in order to manage the town's future growth, and prevent future sprawl development.

6. To increase the tax base of the town through the development of research and development, and office uses.

7. To utilize the proximity of the rail station to decrease the amount of automobile trips per day that would occur under existing buildout.

8. To provide an opportunity for neo-traditional design standards that are aesthetically pleasing and appropriate for a traditional small town center, and that foster a sense of community identity.

9. To provide a range of active and passive recreational activities on the site.

10. To preserve any natural or cultural resources in the area.

11. To phase construction and the provision of infrastructure to meet the town's needs.

12. To utilize the proposed wastewater treatment facility which will exist adjacent to the site.

13. To provide housing at a density that supports transit service.

14. To provide a opportunity for civic uses such as a community, or civic center.

15. To construct a new mixed use Kingston Station facility which provides waiting areas, convenience retail uses, office space and a hotel with conference space for the site.

III. COMPATIBILITY OF PLANNING GOALS

Kingston's 1998 Draft Master Plan lists a series of goals and proposals developed during a public participation process in 1996. The development of Independence Centre can be utilized as a key strategy in the implementation of many of these goals.

Kingston's Vision Statement lists eleven characteristics which the town hopes to possess over the next several years. At least seven of these goals can be directly or indirectly obtained through the development of Independence Centre.

The following are several of the goals listed in the town's Vision Statement followed by benefits of transit-oriented development around the Kingston Station.

The Town of Kingston envisions itself as an extremely vibrant community with...

1. *...its small town atmosphere maintained as it matures in the twenty-first century*
    - Transit-oriented development will allow for the high density, mixed use development that is critical for the establishment of a small town atmosphere. The land-use plan for Independence Centre is based on neo-traditional design which references the planning and design principals of traditional American small towns.
    - Independence Centre will provide for interaction among residents, shopper, employees, and commuters of different economic and social groups. Housing will be affordable to a wide spectrum of people. This interaction and demographic variety is key in a small town environment.
    - The formation of a transit-oriented development district will allow for undeveloped areas of the Town to avoid development. The town can use Independence Centre as an area which can absorb much of the growth projected in the future. It will be the town's responsibility to draft regulations which manage growth in other sensitive areas.

2. *...its natural system of waterways extending from Kingston Bay and the Jones River throughout the town preserved and improved through pollution abatement and open space preservation*
    - Transit-oriented development can lead to a balance between environmental protection and economic development. Development is clustered in appropriate areas around mass transit stops, while sensitive areas remain protected.
    - Independence Centre will take advantage of the proposed waste-water treatment facility on the current Kingston Sanitary Landfill. This compact, sewered development will provide an attractive alternative to piecemeal development utilizing on-site treatment of wastewater. Therefore, the potential of further pollution resulting from on-site septic systems is reduced.

3. *...the beauty of its cranberry bogs and wooded roadside character maintained*
    - Development of Independence Centre can lead to a land use pattern which emphasizes cluster development, while sensitive areas remain undisturbed.

4. *...where the town pro-actively directs its development through a planning approach which is supported by the actions of public officials, citizen boards, and town citizens who continue to develop and reinforce their consensus through public forums.*
    - The development of Independence Centre is a pro-active approach to growth management which addresses many of the town's concerns and goals. The town should gather public input from various stakeholders in the formation of any further plans.

5. *...where economic development results in expanded and new light industry and high-tech businesses in designated areas, providing*

jobs and generating an expanded tax base to provide needed public services, without increasing the tax burdens of residents.

- The Independence Centre site provides over 20 net acres of land intended for light industrial and high-tech businesses. These uses remain the farthest on the site from the train station, and are to be well screened from residential uses. Independence Centre also provides sites for office and commercial development.
- Transit-oriented development provides compact development which is less burdensome on the town's finances. Utilities are extended to one area near the wastewater treatment facility to service a multitude of uses. In many suburban communities, the tax base is drained as utilities are extended to sprawling, isolated developments all over the town.
- Independence Centre will provide an opportunity for job creation through its retail, office, and light-industrial uses. Many of these jobs will be able to be accessed exclusively by rail.
- Many companies may find a location in a transit-oriented development beneficial. Businesses may be attracted to the diverse consumer base of the neighborhood, and the commuters using the station. Companies may also be attracted to the flexibility that can be found in decreased minimum lot sizes and parking requirements. Employees also have an alternative, dependable way of getting to work. Due to its mixed use character and pedestrian orientation, Independence Centre is a convenient place to live, shop, and do business.

6. *...where different types of housing are available and affordable*
   - Transit-oriented development clearly provides an opportunity to provide affordable housing in a small town context. The site can provide for housing of various densities, styles, and price ranges. Small lot sizes, and higher floor-area-ratios create the opportunity for more affordable residences to own or rent. Affordable housing in most suburban communities consists of apartment complexes which are isolated from the remainder of the town. This pattern relegates the town's poorest residents, usually the elderly, into a "pod" of housing fit only for the most down-trodden. These isolated developments also force households without cars into immobility. Transit-oriented development gives all residents the opportunity to live near convenient places of shopping and recreation, and rely on mass transit for other trips. Some residents can also live within walking distance of their places of employment.

7. *...where a range of social and recreational opportunities are available to all residents.*
   - The mixed use atmosphere of Independence Centre creates many social opportunities which are lost in conventional suburban development. The "Main Street" design of the site's commercial areas promote public interaction through placement and design of buildings. The pedestrian orientation of the site creates a walkable community where a much greater array of social interaction is possible.
   - Recreational opportunities are created though the 22 acres of open and recreational land throughout the site. The central common area adjacent to the station can serve as a focal point for the community and a center for public recreation. Additional open space next to the "civic" portion of the site provides more opportunities for recreation. This area can hold active recreation facilities such as a basketball or tennis court.

One policy endorsed by the Kingston Master Plan Committee is to "create alternative modes within the Town other than the private automobile" (Kingston 1998). Development of Independence Centre is a clear step toward the goal of a community where the automobile is not the only option. As shown in chapter two, a large percentage of Kingston residents do not have access to an automobile. Many of these people are elderly, teenagers, or others who either cannot afford automobile ownership, or are hampered by a disability.

IV. ORGANIZATION OF PLAN

This plan is divided into six chapters. Chapter two analyses local and regional data in order to comprehend the environment in which Independence Centre will be a part. Analysis of socio-economic and land use trends helps to identify planning issues and the need for an alternative form of land development. Chapter three deals with the phenomenon of sprawl development in Southeastern Massachusetts. The chapter also introduces the concept of transit-oriented development as well as its associated benefits. Chapter four analyses the existing conditions of the Independence Centre site. Factors such as current uses, circulation, and environmental characteristics are included. Chapter five discusses the conceptual land-use plan for Independence Centre including land uses, environmental concerns, projected employment, and projected tax revenue. Chapter six deals with implementation techniques which can be used to bring the Independence Centre concept to fruition.

CHAPTER II
Existing Local Conditions

I. GENERAL OVERVIEW

The town of Kingston is located in Plymouth County, in Southeastern Massachusetts, approximately halfway between Boston and Cape Cod. The Town is bound by Plymouth Bay to the east, the town of Plymouth to the south, the towns of Duxbury and Pembroke to the north, and the towns of Plympton and Carver to the west Kingston lies 28 miles south of Boston, and 44 miles east of Providence. Kingston encompasses 19 square miles of land, with approximately 3 miles of coastline. Route 3, the only limited access highway which passes through the town, provides access north to Boston and south to Cape Cod. Route 44 serves as the primary east-west throughway in the area. Plans currently exist to reconfigure US Route 44 into a limited access highway through the southern portion of Kingston, as well as the towns of Plymouth and Carver. *Figure 1.1* shows Kingston's location in Massachusetts.

The town of Kingston is a member of the Old Colony Planning Council. The Old Colony Planning Council acts as a regional planning agency for 15 municipalities in Plymouth, Bristol, and Norfolk Counties, MA. These municipalities are the city of Brockton, and the towns of Abington, Avon, Bridgewater, Easton, E. Bridgewater, Halifax, Hanson, Kingston, Pembroke, Plymouth, Plympton, Stoughton, W. Bridgewater, and Whitman. At various points in this report, the town of Kingston will be compared to the Old Colony Region, which for the purposes of this report is considered to consist of the municipalities listed above.

The town utilizes an open town meeting system. Key government officials include a Town Manager and 5 Town Selectmen. Kingston's Planning Department consists of one professional planner. Other planning related tasks are handled by the Kingston Planning Board, as well as the Zoning Board of Appeals.

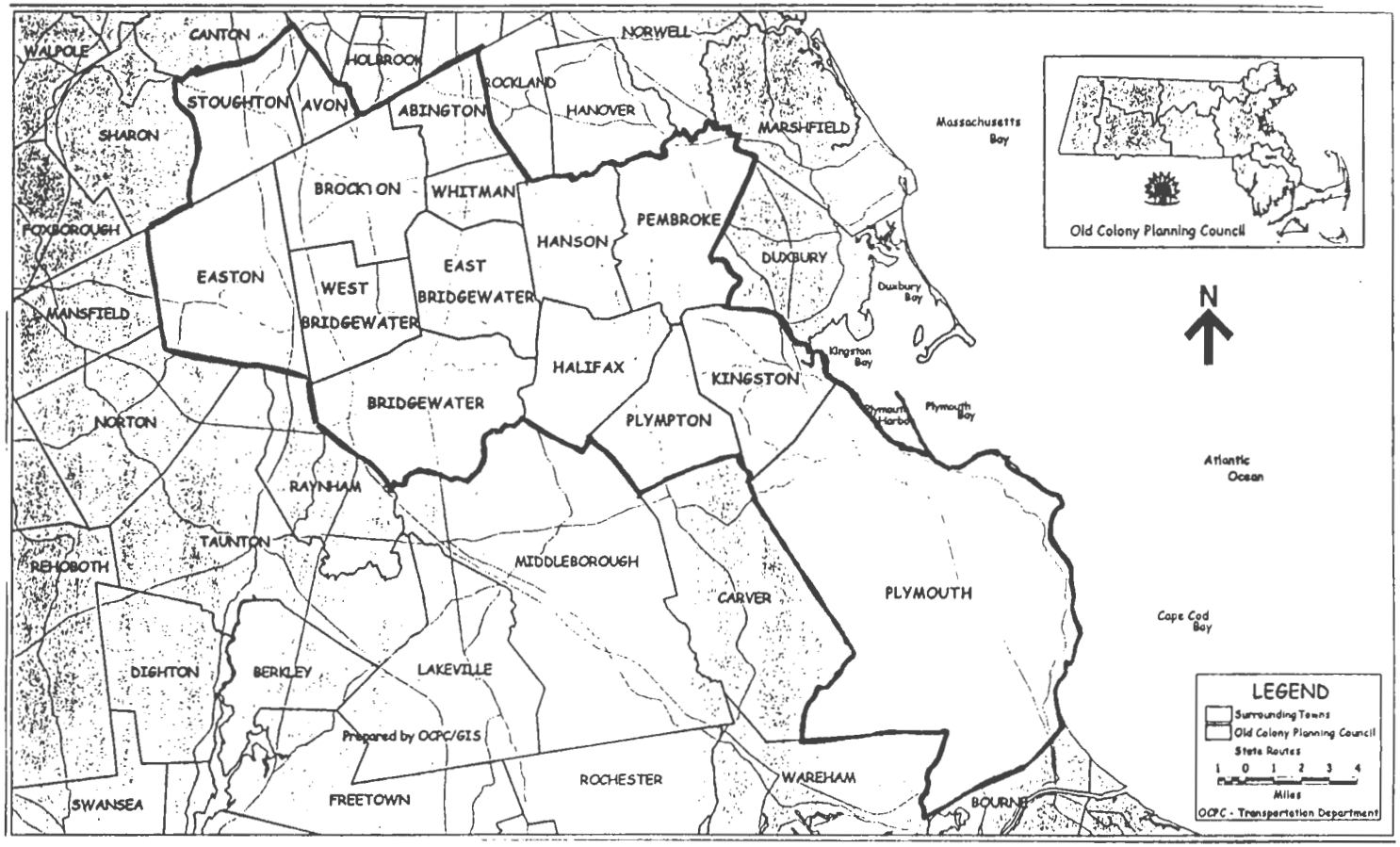
Reflecting the larger trend in Southeastern Massachusetts, the town of Kingston has been experiencing significant growth over the past 20 years. Projections indicate that currents development and demographic trends will continue into future decades.

II. HISTORY

Located only miles from Plymouth Rock, the town of Kingston has a long and rich history which has spanned several thousand years. By 1620, Native Americans had lived along the Jones River for at least 8,000 years (Kingston 1995). The town contains several significant Native American archaeological sites, and certain areas of Kingston are considered by the Massachusetts Historical Commission to have high potential for further archaeological study.

During the 17th Century, European settlement began along the Jones River through the issuance of land grants within the Plymouth Colony. The town of Kingston was incorporated in the year 1726. At the time of incorporation, forty eight families had settled in the town, the majority of these were on the shore (Pratt 1867). Early records show a diverse population of Europeans, free African Americans, as well as Native Americans (Pratt 1867). The abundant forested areas in the town supported a large shipbuilding industry. Over the course of the next century, most of the Town's forests were cleared to make way for agriculture. Most of the forested areas in Kingston today have grown up since this period of intensive agriculture. Textile, tool making, and grist mills grew up around the Jones River. An important natural resource in the history of the town of Kingston was bog iron. Local industries transformed the bog iron into shipbuilding materials and even cannonballs for the Revolutionary War (Kingston 1995). Later in the 1800's, many of these iron bogs were developed into cranberry bogs. To this day, the cranberry bogs remain a visible and lucrative sector of industry in southeastern Massachusetts.

Figure 2.1 Locus Map



Source: Old Colony Planning Council.

III. LAND USE

The town of Kingston consists of 19 square miles of land along Plymouth Bay. Development traditionally occurred on the eastern side of the town, north of the Jones River to the coast. In this area the highest density uses are found. Main Street (Rt. 3A) serves as the traditional commercial corridor of the town. Close to Main Street, the coastal Rocky Nook area is the highest density residential area. Traditionally, the majority of the Kingston has remained undeveloped. However, the past decades have seen greater amounts of development in areas of the town which have remained undeveloped for hundreds of years.

A look at land use patterns in the town of Kingston shows a great deal of growth occurring over past decades. One of the most important features of this growth is that a disproportionate amount of land has been consumed in order to accommodate the growth that has been occurring. Since 1970, the population of Kingston has grown by over 50% from 5,999 in 1970, to 9,045 in 1990. Over roughly the same twenty-year period, however, the number of acres devoted to residential use has grown by over 68% from 1,428 acres in 1971 to 2,404 in 1991. It is evident that should the existing pattern of low density development continue, an unnecessary amount of open space, and agricultural land will be consumed in the process.

Table 2.1 presents 1991 land use data for the town of Kingston and the Old Colony Region. The table shows acreage by land use, and percent of total land area. The table also shows given land uses in Kingston as a percentage of the Old Colony Region. The State of Massachusetts has not updated its land use information since 1991.

As the table indicates, over half of the land in the town of Kingston is considered "forested" according to Mass GIS land use files. However, this figure is upwardly skewed due to two factors. One factor is that additional residential and commercial development have occurred in the seven years since this survey was taken. For example construction has begun on the 324 acres, Indian Pond Estates development, which will consist of 270 units and a 50-acre golf course. Another factor in the over-counting of forested land by Mass GIS is that surveys taken from aerial photographs underestimate the amount of forested land devoted to residential use. Large single family house lots often contain forested areas within their site boundaries. When analyzing aerial photographs, it is impossible to determine whether much forested land is actually developable.

In the year 1991, there were a minimum of 2,401 acres devoted to residential use in the town of Kingston. This figure amounts to nearly 20% of the town's total land area. Low and medium-density uses each account for 9.2% of the town's land . Only 156 acres are devoted to high density residential uses, and a mere 19 acres are used for multi-family residential purposes.

Looking at the "Kingston Acreage as % of Region" column shows that the town is distinctive in its large share of both the region's salt marshes and mining facilities. Being one of only two coastal communities in the Old Colony Region, (Plymouth is the other) Kingston accounts for 30.6% of the region's salt marshes. The large amount of Carver/Gloucester soil types in Kingston lend themselves well to sand and gravel operations. As a result 18.7% of the region's mining takes place in Kingston.

Kingston's place in the Old Colony region can be better understood through the "Kingston Acreage as a Proportion of Region" column. This variable compares Kingston's land use acreage with its expected "fair share" of land uses in the region. As would be expected, Kingston has over five times its expected fair share of salt marshes. The town also possesses over three times as many acres devoted to mining as would be expected by the town's size alone. Other land uses which Kingston possesses more than its fair share of include forest land, open land, low density residential, commercial, and woody perennial (cranberry bogs, orchards, and nurseries). Land uses which the town has less than its fair share of include cropland, pasture, wetlands, recreation, multi-family, high-density, and medium-density residential, industrial, urban open, transportation, and open water.

In short, the town of Kingston can be characterized as having less agricultural land than the rest of the region, with the exception of cranberry bogs. These traits, along with the level of mining activity in the area, reflect the sandy and course soils present throughout much of the town. The town has a slightly greater percentage of forest and open land than does the entire region. Compared to the Old Colony region, Kingston shows a pattern of low-density residential uses, and a much

lower amount of multi-family residential land. As of 1994, Kingston currently had 1,110 acres of undeveloped land in permanent protection.

Table 2.2 presents land use data for the town of Kingston for the years 1971 and 1991. It should be noted that the amount of total acreage in the Town is inconsistent between the two years. The 1971 land use figures are taken from the MacConnell Land Use Survey, a study done through the Department of Forestry and Wildlife Management at the University of Massachusetts. The 1991 land use figures are taken from the Massachusetts Geographic Information System, or "Mass GIS" land use data files. The Mass GIS system is administered by the University of Massachusetts, and is a digitized extension of the original MacConnell land use survey. Therefore, although there is a lack of consistency in the total acreage for the town of Kingston, the two data sets remain the best historical comparison that can be made. The information analyzed in *Table 2.2* is intended only to serve the purpose of illustrating general land use trends, and not specific acreage figures.

As *Table 2.2* indicates, Kingston has undergone a significant increase in residential, commercial, and industrial development, at the expense of its undeveloped forest, agricultural and open lands. Residential land use has increased by 957 acres from 1,444 to 2,401 acres (66%). Commercial acreage has risen over 300% from 61 in 1971, to 248 in 1991. The number of acres in industrial use has grown from 21 in 1971, to 110 in 1991, an increase of 424%. In contrast, forest land has decreased from 7,877 to 6,729 acres over the same twenty year period (15%). During this time, 174 acres of agricultural land (not counting orchards and nurseries) have been converted to other uses.

Table 2.1

COMPARISON OF KINGSTON LAND USE TO OLD COLONY REGIONAL LAND USE: 1991

Land Use	Kingston		Old Colony Region		Kingston Acreage as % of Region	Kingston Acreage as Proportion of Region*
	Total acres	*% of Total*	*Total acres*	*% of Total*		
Cropland	59	0.5	7,305	3.3	0.8	0.1
Pasture	102	0.8	3,884	1.8	2.6	0.5
Forest	6,729	55.5	115,995	52.7	5.8	1.1
Wetland	287	2.4	6,068	2.8	4.7	0.9
Mining	314	2.6	1,677	0.8	18.7	3.4
Open Land	466	3.8	6,409	2.9	7.3	1.3
Recreation	89	0.7	3,197	1.5	2.8	0.5
Multi-Fam. Res.	19	0.2	1,376	0.6	1.4	0.3
High Dens. Res.	156	1.3	6,995	3.2	2.2	0.4
Med. Dens. Res.	1,115	9.2	26,656	12.1	4.2	0.8
Low Dens. Res.	1,111	9.2	12,580	5.7	8.8	1.6
Salt Marsh	111	0.9	364	0.2	30.6	5.6
Commercial	248	2.0	3,346	1.5	7.4	1.3
Industrial	110	0.9	2,789	1.3	3.9	0.7
Urban Open	226	1.9	4,529	2.1	5.0	0.9
Transportation	123	1.0	2,354	1.1	5.2	0.9
Waste Disposal	19	0.2	432	0.2	4.3	0.8
Open Water	335	2.8	8,781	4.0	3.8	0.7
Woody Perennial	511	4.2	5,305	2.4	9.6	1.7
Total	**12,130**	**100.0**	**220,042**	**100.0**	**5.5**	**100.0**

** Reflects Kingston's land use acreage with its expected fair share of land uses in the region. A proportion of 1.0 represents expected share.*

Source: Mass GIS. 1991. Land Use Data Files. LU 21.

Table 2.2

KINGSTON LAND USES: 1971-1991

Land Uses	Acres		Difference	% Change
	1971	*1991*		
Forest Land	7,877	6,729	-1,148	-15
Agriculture & Open Space	800	626	-174	-22
Wetlands	539	398	-141	-26
Mining & Waste Disposal	173	332	159	92
Outdoor Recreation	54	89	35	65
Commercial	61	248	187	307
Industrial	21	110	89	424
Residential	1,444	2,401	957	66
Other Urban	248	348	100	40
Woody Perennial	963	511	-452	-47
Water	303	335	32	11
Total*	**12,483**	**12,127**	**-356**	**-3**

* Kingston acreage totals are not consistent from 1971 to 1991. See above text.

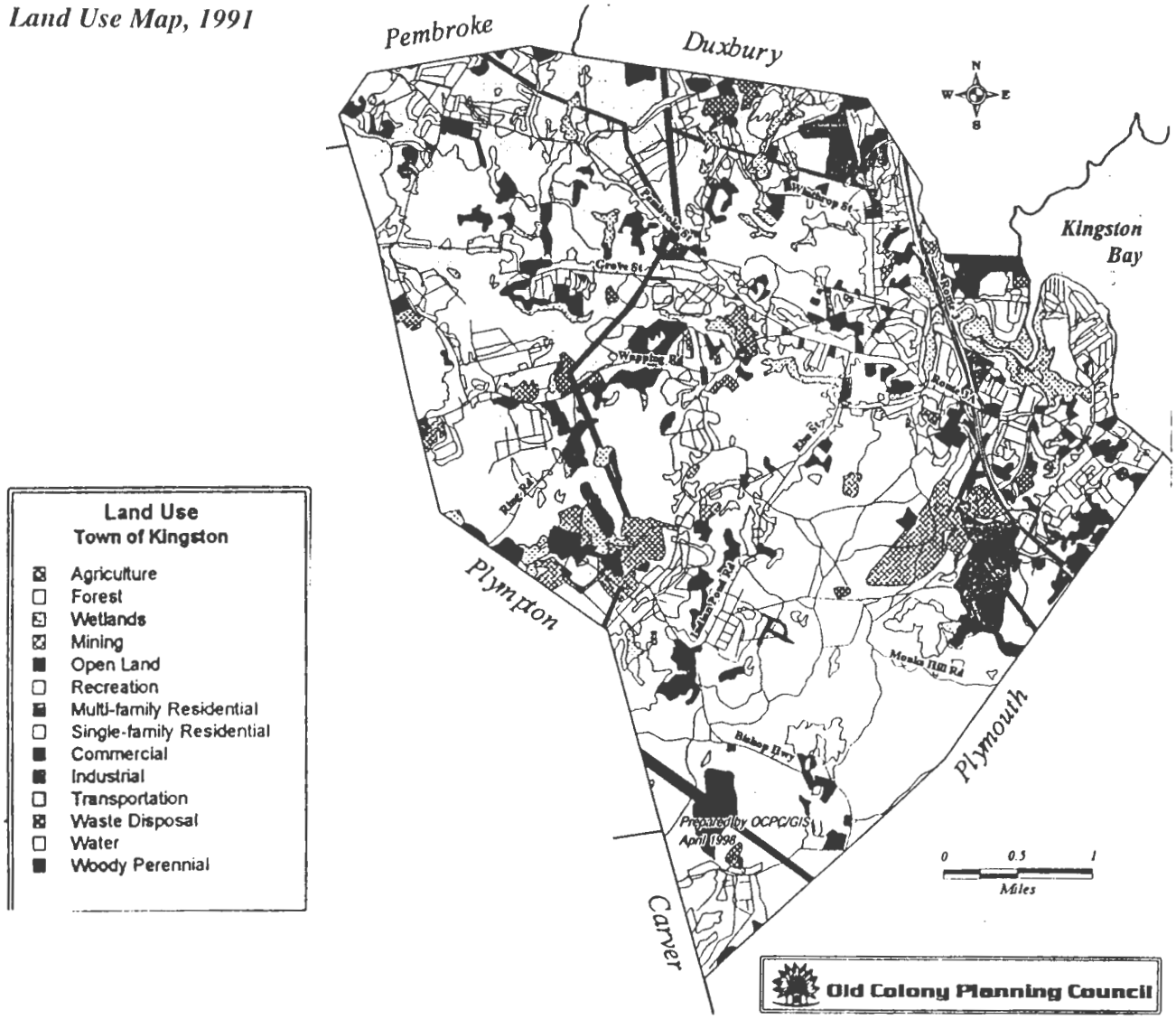
Sources: UMASS. 1971. MacConnell Remote Sensing Land Use Program, Kingston.
MASS GIS. 1991. LU 21 Land Use Data Files, Kingston.

Figure 2.2 on page 7 shows the location of land uses in Kingston.

Kingston's pattern of land use represents larger land use trends in southeastern Massachusetts. Southeastern Massachusetts has been defined as the fastest growing region in the Northeast (Harvard 1996). This fact is evident in the rapid pace of development in formerly rural towns such as Kingston. Southeastern Massachusetts is expected to experience new development due to several factors. These factors include a continuing pattern of out-migration from the Boston Metro Area, reintroduction of commuter rail service to the South Shore, and proposed improvements to Routes 3 and 44. Another relevant factor is that southeastern Massachusetts is the only area within commuting distance of Boston that has not been substantially built-out due to suburban development. Rapid development has previously occurred in areas both north and west of Boston, and on Cape Cod. Southeastern Massachusetts remains the only region in the Boston area with a substantial amount of developable land.

Southeastern Massachusetts can be defined as the 51 communities in Bristol and Plymouth Counties, as well as parts of Norfolk County. Since 1960, the population of this area has grown by over 10,000 people per year, from 637,937 to 941,601 in 1990. A Fact Sheet prepared by *Vision 2020* (a multi-regional organization formed to combat sprawl in Southeastern Massachusetts) equates 10,000 additional people per year to 3,500 additional housing units needed per year, 27,650 additional vehicle trips per day, 710,000 additional gallons of water consumed each day, and 2,157 additional new students in the region's public schools each year. The pattern of development in the region has been of low-density suburban sprawl. More of the area's land has been consumed in the past 40 years than in the first 330 years since the Pilgrims landed in Plymouth in 1620. The amount of developed land is increasing at a rate of 4.1% each year to accommodate a yearly population growth of only 1.6%. In the past thirty years, approximately one-third of the region's open space and agricultural land has disappeared in order to accommodate mostly low-density residential, and strip commercial development (Vision 2020 1998).

Figure 2.2 Kingston Land Use Map, 1991



Source: Old Colony Planning Council

IV. POPULATION

Growth Trends

Table 2.3 shows population growth trends for the town of Kingston from 1960 to 1990. Over the course of only 30 years, the Town's population grew by 110% from 4,302 to 9,045. During this time, the Town grew at an average rate of 2.5% (or 158 people) per year. A look at the "% of Total OCPC Growth" column shows Kingston's shifting role in regional growth patterns. Over the 30 year period, Kingston accounted for 3.9% of the region's growth. In the decade between 1980 and 1990, however, Kingston absorbed 8.5% of regional growth. This fact serves to illustrate Kingston's new role as one of the fastest growing communities in the region. Since 1960, many of the communities closer to the urban areas of Boston and Brockton have experienced significant amounts of sprawl development. Kingston represents the new round of small towns on the fringe of the metropolitan area, experiencing rapid growth.

Table 2.3

KINGSTON POPULATION GROWTH TRENDS 1960-1990

Year	Pop.	Growth	% Change	Rate of Yearly Growth (percent)	% of Total OCPC Growth
1960	4,302	n/a	n/a	n/a	n/a
1970	5,999	1,697	39.4	3.4	3.1
1980	7,362	1,363	22.7	2.1	2.9
1990	9,045	1,683	22.9	2.1	8.5
30 Yr. Total		4,743	110.3	2.5	3.9

Source: Town of Kingston. 1998. Draft Master Plan

Racial Distribution

Table 2.4 shows the population of Kingston broken down by race and Hispanic origin for the years 1980 and 1990. White, non-Hispanics make up the vast majority of Kingston residents. The percentage of whites grew from 97.6% in 1980, to 98.1% in 1990. The black population of Kingston grew from 47 people in 1980, to 69 people in 1990 (47%). The black population remains only 0.8% of the total. The Hispanic population of Kingston experienced rapid decreases over the same ten year period. The total Hispanic population (of any race) fell from 58 to 39 people in ten years, a decrease of 33%. The number of American Indian and Asian residents doubled over this time period, however these groups together still account for less than one percent of the total population. The number of people describing themselves as "other" also fell from 62 to 37 (40%).

The data on race and Hispanic origin shows that while the population of Kingston is growing, it is becoming increasingly white. Together, all non-whites in the town account for only 1.9% of the population. The percentage of non-white residents has also fallen by 3% since 1980. These facts reflect the larger trend of racial segregation in Massachusetts and much of the country. Residence in newly developing areas, such as Kingston, are often unattainable to many except the mostly white residents who can afford large, single family homes, and distant commutes. As Massachusetts hosts an increasing number of minority households, the town of Kingston shows the opposite trend of an increasingly homogeneous society.

Table 2.4

POPULATION BY RACE AND HISPANIC ORIGIN: 1980-1990

Race		1980		1990		% Change
		Number	*% of Total*	*Number*	*% of Total*	
Non-Hisp.	White	7,185	97.6	8,873	98.1	23
	Black	47	0.6	69	0.8	47
	Am. Indian	4	0.1	12	0.1	200
	Asian	6	0.1	15	0.2	150
	Other	62	0.8	37	0.4	-40
Hispanic	White	53	0.7	36	0.4	-32
	Black	2	0.0	0	0.0	-100
	Other	3	0.0	3	0.0	0
Subtotals	*Total Hisp.*	*58*	*0.8*	*39*	*0.4*	*-33*
	Total Non-White	*177*	*2.4*	*172*	*1.9*	*-3*
Total Pop.		**7,362**		**9,045**		**23**

Sources: US Census Bureau. 1980. *Census of Population. General Social and Economic Characteristics.*
US Census Bureau. 1990. *Census of Population. General Social and Economic Characteristics.*

Age Distribution

Table 1.5 displays the age distribution of Kingston's population in 1990. Kingston's age distribution seems typical of many low density suburban communities. A large proportion of residents are either very young children or middle-aged adults. The largest five year age group in the town of Kingston is the 40-44 group, which contains 843 people (9.3%). The largest five-year age group for children is the 0-4 group, which contains 700 people (7.7%). In newer suburbs, such as Kingston, middle-aged adults and their young children are the largest segment of the population. High housing prices lead to a pool of residents who are at the stage in their careers where they can afford a large house in the suburbs, and a dependable car for commuting. Many residents also perceive low density environments as ideal for raising young children.

As is the case in Kingston, many suburban communities are priced beyond the reach of young adults. The 20-24 age group in Kingston accounts for only 6.5% of the population, while the 25-29 age group serves as the second highest five year age group (9.0%). This pattern points to a trend of younger adults moving away to attend college, or to find more affordable housing near places of employment. Adults in their later twenties with children may account for much of the growth which Kingston has been experiencing. Senior citizens, considered those 65 and over, account for 13.5% of the population of the Town of Kingston.

Table 2.5

AGE DISTRIBUTION OF POPULATION: KINGSTON, 1990

Age	Number	% of Total
Under 4	700	7.7
5-9	628	6.9
10-14	605	6.7
15-19	603	6.7
20-24	588	6.5
25-29	812	9.0
30-34	715	7.9
35-39	790	8.7
40-44	843	9.3
45-49	540	6.0
50-54	277	3.1
55-59	335	3.7
60-64	389	4.3
65-74	736	8.1
75+	484	5.4
Total 65+	*1,220*	*13.5*
Total Pop.	**9,045**	
Median Age	***34.5***	

Source: US Census US Census Bureau. 1990. *Census of Population. General Social and Economic Characteristics.*

Income Distribution

Table 2.6 presents income distribution in the town of Kingston for the year 1990.

Table 2.6

INCOME DISTRIBUTION: KINGSTON, 1990

Household Annual Income	Number of Households	% of Total
Less than $9,999	318	9.8
$10,000-$24,999	588	18.1
$25,000-$34,999	440	13.6
$35,000-$49,999	740	22.8
$50,000-$74,999	712	21.9
$75,000-$99,999	314	9.7
$100,000 +	133	4.1
Total Households	3,245	
Median Income	***$40,872***	
State Median Income	***$36,955***	

Source: Town of Kingston. 1998. Draft Master Plan.

The greatest percentage of Kingston households earn between $35,000 and $49,999 per year (22.8%). A slightly smaller percentage of households fall into the next highest bracket of those earning $50,000-$74,999 per year (21.9%). Nearly 10% of all Kingston households earn less than $10,000 per year, while 4.1% earn over $100,000. Kingston's median income in 1990 is 111% of the State's. This figure reflects the expense of living in a low density, suburban environment far from an urban center. Long commuting times to employment centers can make Kingston an unattractive place for many with low paying jobs.

V. HOUSING

Residential Development Trends

The town of Kingston has been experiencing a trend of conventional suburban development for the past twenty years. The majority of this development takes the form of low-density, single-family housing. As previously stated, from 1970 to 1990, the town's population increased by 50%, while land devoted to residential purposes grew by 68% (this figure may be underestimated). Kingston's reliance on large lot, single-family housing has led to this disproportionate consumption of land, at the expense of open space and agricultural uses. Large lot homes also lead to a pattern of segregation based on income, where only a certain class of people can afford to buy a new house in Kingston. Many Kingston residents worry that their children will not be able to afford homes in town (Kingston 1998). Kingston's age distribution confirms this fear; there exists a small proportion of young adults in the community.

The trend of large lot, single-family homes can be attributed to several factors. Foremost of these is the Town's Zoning By-Law, which dictates minimum lot sizes for the subdivision of land. Another less tangible factor in Kingston's residential land use pattern is the perceived notion maintained by planning boards and officials across the country that low-density development provides a "small town" environment. As history shows, however, such regulations lead to rapid consumption of open land, expensive infrastructure costs, and a loss of community character.

Table 2.7 shows population density figures for Kingston. Kingston's density is almost half of the density for the entire Old Colony Region. The town has a density of 475 people per square mile, compared with a region-wide figure of 857.6 people per square mile (OCPC 1998). This low density is due to both the availability of open land, as well as the low density of existing subdivisions.

While Kingston's population increased by almost 23% from 1980 to 1990, the number of average persons per household has decreased from 2.9 in 1980, to 2.77 in 1990 (Kingston 1998). This decrease points to a nation wide trend of shrinking household sizes. Single

parent families, single person households, and an aging population are all contributing factors to this phenomenon. Conventional single family, large lot houses do not meet the needs of many segments of the population.

Table 2.7

KINGSTON POPULATION DENSITY: 1990

Total population	9,045
Square miles	19
Population density (people per sq. mile)	475

Source: Town of Kingston. 1998 Draft Master Plan

Table 2.8 shows the number of building permits issued each year until 1996. Adding the number of building permits overestimates the number of existing housing units because all issued building permits may not result in constructed or occupied housing units. However, looking at the number of building permits is a good way to note the demand for residential development.

Table 2.8

BUILDING PERMITS: KINGSTON, 1990-1996

Year	Building Permits Issued	Yearly % Change	% Change from 1990
1990	66	-	-
1991	85	28.8	28.8
1992	78	-8.2	18.2
1993	97	24.4	47.0
1994	90	-7.2	36.4
1995	71	-21.1	7.6
1996	106	49.3	60.6

Source: Town of Kingston Office of Building Inspector. 1998. Building Permit Records

As shown in Table 2.8, the number of building permits given in 1996 is over 60% of the number of building permits in 1990. The year 1996 saw the greatest increase from 71 in 1995 to 106 (49.3%).

Age of Housing Stock

Out of the 4,096 housing units documented by the town in 1997, 1,136 (28%) were built before 1940. According to the Town's Building Inspector, most of these units are in good condition (Kingston 1998). *Table 2.9* displays a breakdown of the age of Kingston's housing stock, as reported in the US Census. The table also compares the age of Kingston's housing stock to that of the State of Massachusetts.

Table 2.9

AGE OF EXISTING HOUSING STOCK: 1997

Year Structure Built	Total Units	% of Total		
	Kingston	*Kingston Including 1990's*	*Kingston Not Including 1990's*	*State Not Including 1990's*
April 1990 - 1997*	600	14.6	n/a	n/a
1989 - March 1990	37	0.9	1.1	1.6
1980 - 1988	866	21.1	24.8	12.2
1970 - 1979	489	11.9	14.0	14.1
1960 - 1969	348	8.5	10.0	12.8
1950 - 1959	373	9.1	10.7	12.5
1940 - 1949	247	6.0	7.1	8.0
< 1939	1,136	27.7	32.5	38.9
Total Not Including 1990's	**3,496**		**100**	**100**
Total Including 1990's	**4,096**	**100**		

Source: Town of Kingston. 1998 Draft Master Plan.

As is shown in the above table, Kingston experienced a surge of housing construction during the 1980's. From 1980 to 1988, 866 units were built. These units comprise the largest cohort of housing units built since 1940. Kingston's largest building boom occurred the decade after the State experienced its largest share of growth in the 1970's. Kingston has a smaller percentage of housing built before 1940, than does the entire State of Massachusetts. As the table shows, 600 housing units have already been built from 1990 to 1997. This number amounts to 14.6% of a new total of 4,096 units. No data exist regarding the number of housing units in the entire state as of 1997.

Housing Values

Table 2.10 shows residential property values by type of unit, as well as their assessed value.

Table 2.10

RESIDENTIAL PROPERTY TYPES AND ASSESSED VALUES KINGSTON, 1997

Property Type	Number	% of Total	Assessed Value	Avg. Assessed Value per Parcel
Single-Fam.	3,193	78	$469,143,800	$146,929
Condo	97	2	$9,543,800	$98,390
2 Fam.	224	5	$14,380,800	$64,200
3 Fam.	30	1	$1,376,600	$45,887
Multi Fam. (4+)	51	1	$4,486,200	$29,710
Apts. above Shops	23	1	$6,104,300	$265,404
Mobile Homes*	378	9	-	-
Total**	4,096	-	$505,035,500	-

** Mobile homes are taxed as vehicles and not as property*
***100 units are not accounted for in the total*
Source: Town of Kingston. 1998 Draft Master Plan.

Currently, there are 4,096 total housing units in the town of Kingston. The entire housing stock of the town of Kingston is valued at approximately $505,035,500. Approximately 3,193 of these homes are single-family. Their combined value is equal to $469,143,800. The average single-family parcel is valued at $146,929. Condominiums account for approximately 2% of the total housing stock (97 units) and their average value is $98,390. Multi-family uses together account for 7% of the town's housing stock (305 units). As the table indicates, average value per parcel decreases as the number of multi-family units increases. Duplexes consist of the majority of multi-family uses in Kingston; these uses account for approximately 5% of the total housing stock. Nine percent of Kingston's total housing stock consists of mobile home units. Mobile homes are taxed as vehicles and not as property.

Housing Affordability

In General, Kingston provides less affordable housing than do other communities in the Old Colony Region. *Table 2.11* shows median sale prices of housing for Kingston and for the 15 community Old Colony Region, as defined by membership in Old Colony Planning Council.

Table 2.11

MEDIAN SALE PRICES OF HOUSING: KINGSTON AND OLD COLONY REGION, 1991-1997

Year	Kingston		Old Colony Region		Kingston as % of Region	
	Single Fam.	*Condo*	*Single Fam.*	*Condo*	*Single Fam.*	*Condo*
1991	$120,900	$85,000	$125,473	$95,407	96.4	89.1
1992	$125,000	$109,000	$119,370	$86,433	104.7	126.1
1993	$132,900	$87,900	$120,723	$81,281	110.1	108.1
1994	$136,000	$93,000	$122,368	$82,847	111.1	112.3
1995	$132,900	$105,000	$127,726	$90,216	104.1	116.4
1996	$150,000	$127,500	$134,120	$93,450	111.8	136.4
1997	$176,728	-	$131,480	$78,091	134.4	-

Source: OCPC. 1998. Community Information and Data.

As shown in *Table 1.11*, for every year since 1991, Kingston has shown higher median sale prices for single family residential units, and for condominiums, than the Old Colony Region. Sale prices have increased at a more steady rate in Kingston than in the entire region. The difference between sale prices in Kingston and in the area has generally increased for both single-family houses and condominiums, between 1991 and 1997. In the latest full year of 1997 the median sale price for a single-family house in Kingston was 134.4% of the regional median sale price. There were no condominiums sold in Kingston in 1997.

There are several factors related to this trend. Several communities in the region, such as Brockton, Whitman and Stoughton provide a housing stock which is largely comprised of older units on small lots. Buying a home in the lower density environment of Kingston requires more money for larger lots. The low density of Kingston also creates its own demand as families with children desire large lots and privacy that more traditional communities cannot provide. Kingston is also one of only two coastal communities in the region. Residents can have good access to Route 3 and to waterfront amenities. Ironically Kingston's most affordable neighborhood is the waterfront Rocky Nook area. Rocky Nook is one of the oldest sections of the town and is characterized by small lots and a dense configuration of houses.

Table 2.12 presents gross rent figures for the town of Kingston in 1990.

Table 2.12

GROSS RENT: KINGSTON, 1990

Monthly Gross Rent	Number of Households	% of Total
Under $200	70	10.3
$200-$299	36	5.3
$300-$499	83	12.2
$500-$749	251	36.8
$750-$999	108	15.8
$1,000 +	80	11.7
No Cash Rent	54	7.9
Total	682	100.0
Median Rent	$658	

Source: US Bureau of the Census. 1990. *Selected Housing Characteristics.* Kingston, MA.

Median rent in the town of Kingston is $658 as of 1990. Over one-third of the 682 renting households in Kingston pay gross rent of between $500-$749. Over 10% pay under $200 per month for rent, while 7.9% pay over $1,000 per month.

Table 2.13 shows Kingston's housing affordability based on median Town income.

Table 2.13

HOUSING AFFORDABILITY: KINGSTON, 1990

Median Income	$40,872
Maximum "Low" Income	$32,698
30% of "Low" Income	$9,809
Maximum "Affordable" Rent	$817
Median Rent	$658

Source: Bureau of the Census. 1990. *Selected Housing Characteristics*. Kingston, MA.

A general formula for housing affordability states that "affordable housing" can be considered that which comprises 30% or less of the income of a household making 80% or less of the area's median income. According to these guidelines, affordable housing in Kingston would require a minimum gross rent of $817 per month. Kingston's actual median gross rent of $658 shows that the Town's housing stock generally appears to be affordable when the incomes of its residents are taken into consideration.

Table 2.14 displays gross rent as a percentage of household income.

Table 2.14

GROSS RENT AS PERCENTAGE OF HOUSEHOLD INCOME: KINGSTON, 1990

Gross Rent as % of Income	Number of Households	% of Total Renters
Under 20%	119	17.4
20%-24%	135	19.8
25%-29%	146	21.4
30%-34%	80	11.7
35% +	138	20.2
Not Computed	64	9.4
Total	682	100.0

Source: US Bureau of the Census. 1990. Selected Housing Characteristics. Kingston, MA.

The distribution of gross rent as a percentage of income is relatively even. Over 20% of the renting households are spending more than 35% of their income on rent. The largest percentage (21.4%) of rental households spend between 25%-29% of their income on monthly rent. Rental households spending under 20% of their income on rent account for 17.4% of renting households.

Public Housing

As of 1993, there are 56 public housing units in the town of Kingston. In addition 44 rental assistance certificates were used to subsidize rents (Kingston 1998). These certificates were either Federal Section 8 Vouchers or Massachusetts State Rental Vouchers. The Kingston Housing Authority also owns and operates 48 dwelling units for elderly or disabled residents of the Town.

VI. INFRASTRUCTURE

Water Supply

Approximately 95% of Kingston dwelling units are tied in to the municipal water system. The Kingston Water Department owns five wells and three storage tanks which serve the town's population. Some areas of the town, however, lack water service. The area surrounding Smelt Pond and north to the commuter rail station is one which lacks municipal water service. The total daily capacity for the five functioning wells is 4.312 million gallons per day (mgpd) (Kingston 1998). The Water Department serves approximately 3,700 water hookups. Water demand breakdown is roughly 80% residential, 10% commercial, and under 1% agricultural (Kingston 1998). About 9.5% of water usage is unaccounted for through system leakage and hydrant use. The town's water system is divided into two pressure zones, providing areas of different elevations with adequate pressure. Kingston has three water storage facilities with a total storage capacity of 2,920,000 gallons. The present reliable pumping capacity can provide 960,000 gallons per day based on 16 hours per day and 1.44 mgdp based on 24 hours per day (Kingston 1998).

A Water Resource District was adopted as part of the zoning by-laws in 1987. Designation in the district prevents construction of certain uses within a given parameter around public wells. The regulation also establishes performance standards for all uses barring single-family homes. A Water Quality Review Committee reviews non-residential activities within the water resource area, and reviews applications for building and occupation permits (Kingston 1998).

Table 2.15 shows the capacity of the Town's five wells.

Table 2.15

KINGSTON WELL CAPACITY: 1987

Well	Design Rate (3 yr. avg.)	
	G.P.M.	*G.P.D.*
South St.	750	236,000
Mill Gate	500	180,000
Soules Pond	250	111,000
Grassy Hole	800	328,000
Winthrop St.	400	134,000

Note: GPM = Gallons per minute
GPD = Gallons per day
Source: Town of Kingston. 1995 Open Space Plan.

Silver Lake, the largest lake in Kingston, is the primary source for the drinking water of the City of Brockton. Town officials are concerned with the effects of withdrawals on the Town's river systems. The town has "always had to guard against Brockton's injudicious use of Silver Lake's surface water" (Kingston 1998). Kingston itself, however, does not use Silver Lake as a resource for public water supply.

Sedimentation has been a problem in Jones River, Forge Pond and other bodies of water. Eutrophication can be attributed to inadequate septic systems, the reduction of water flow due to withdrawals at Silver Lake, as well as direct storm water discharges (Kingston 1995). Many of the town's older street drains discharge directly into water bodies, contributing to this problem.

Wastewater Treatment

Kingston voters recently approved a bond issue for construction of a new wastewater treatment facility plant on a site adjacent to the town landfill. The town is currently in the process of acquiring the necessary permits for the construction of this facility. Approximate total cost of this project is $18,000,000, and the station is expected to handle 220,000 gallons per day. (Kingston 1998). Currently, however, the town has no public sewer capacity. The treatment of waste water has

been a chronic problem. The majority of residences and businesses employ on-site treatment of waste. Certain high density areas, such as Rocky Nook have had problems with waste water discharging into the water table and local streams. New construction has led to higher standards which require a minimum separation from groundwater, distance from wetlands, and the percolation rate into naturally occurring soils (Kingston 1995). A Sewerage Advisory Committee exists to address the issue of wastewater treatment (Kingston 1998).

The adequacy of Kingston's water and sewer systems may also serve as an attraction to future development. Many communities in Southeastern Massachusetts, such as Brockton and Plymouth, have capacity issues with either water or sewage (Kingston 1998). Stringent environmental regulations in these communities may lead developers to build in towns like Kingston which can support development.

Solid Waste Disposal

The Town owned landfill has been phased out in favor of shipping solid waste to SEMASS, the regional incineration facility in the town of Rochester, MA. The sole landfill is located at the intersection of Smiths Lane and Cranberry Road. The landfill is partially capped, and the site is still being used as a transfer station. Recycling materials are still collected here. Kingston does not offer municipal waste pickup. The Massachusetts Department of Environmental Protection has ordered that the remaining six acres of the landfill be capped by Spring 1999 (Kingston 1998). Kingston is presently developing a agreement with the Town of Bourne regarding shipping Kingston's waste to their landfill.

According to the 1995 Kingston Open Space Plan, there are four hazardous waste sites in the Town. All four of these are currently in the process of being cleaned up. One site near the Kingbury Square shopping plaza forced the closure of the Town's Winthrop St. Well. Two other sites include a gas station, and a municipal fire station.

Public Schools

School age children in Kingston attend Kingston's single elementary school, and also attend Silver Lake Regional Junior High and High Schools. Only Silver Lake High School is located within Kingston. The Silver Lake Regional School District consists of the Towns of Kingston, Pembroke, Plympton and Halifax.

Table 2.16 presents the total number of pupils enrolled in Kingston Elementary School between 1987 and 1994.

Table 2.16

NUMBER OF PUPILS ENROLLED IN KINGSTON ELEMENTARY SCHOOL: 1987-1994

Year	Number	Yearly % Change
1987	715	-
1988	765	7.0
1989	810	5.9
1990	796	-1.7
1991	819	2.9
1992	852	4.0
1993	925	8.6
1994	965	4.3

Source: Town of Kingston. 1998 Draft Master Plan

Over the seven years, from 1987 to 1994, enrollment in Kingston Elementary School increased by 35% from 715 to 965 students. Enrollment is expected to increase between 1,489 and 1,537 students by the year 2005 (Kingston 1998). This trend reflects the general increase in population experienced by the Town.

Table 2.17 displays average cost per student per year in Kingston's public schools. As the table shows, cost per pupil increases along with grade level. The costs associated with school children make many communities wary of any form of residential development.

Table 2.17

KINGSTON ANNUAL SCHOOL COSTS PER PUPIL: 1995

Level	Cost per Pupil
Kindergarten	$3,363
Elementary (1-6)	$3,311
Junior High (7-8)	$6,405
High School (9-12)	$6,697

Source: Town of Kingston. 1998 Draft Master Plan

VII. TRANSPORTATION

Circulation

Route 3 serves as the sole limited access highway through the town of Kingston. The highway connects the South Shore and Cape Cod with Central Boston. As of 1996, the highway carried 59,000 vehicles per day through Kingston (OCPC 1997). From 1980 to 1992, traffic volumes on Route 3 near the Duxbury town line increased by over 130%, from 23,900 to 55,000 average vehicles per day (Old Colony Planning Council. 1997. Regional Long Range Transportation Plan).

The major east-west road in the area is Route 44, which runs from Plymouth and Carver, south of Kingston, west to Taunton and Providence. While Route 44 presently lies south of Kingston, plans exist to transform a section of the road into a limited access highway. This new section of Route 44 would be relocated north of its present location, into the town of Kingston. The proposed Route 44 would be south of the Kingston TOD study area. Of concern to some town officials is the fact that the selected route would cut through much of the town's protected open lands and wetlands. The highway would act as a barrier to the open space corridor which the town has planned for. This impediment to the town's Open Space Plan comes in addition to the new Indian Pond Estates development, which interrupts the corridor with the presence of a golf course surrounded by residential development.

Route 3A, or Main St., is the central area for the town of Kingston. This route carries 14,681 vehicles per day north of the Plymouth town line. Route 27 serves as the main road into Brockton, carrying 10,625 cars per day through the town (Old Colony Planning Council. 1997. Regional Long Range Transportation Plan).

Commuting Patterns

Table 2.18 and *Table 2.19* show journey to work data for the town of Kingston.

Table 2.18

JOURNEY TO WORK DATA: ORIGINS OF COMMUTERS TO KINGSTON, 1990

Place of Origin	Number of Commuters	% of Total
Plymouth County*	2,749	65.6
Norfolk County	140	3.3
Bristol County	113	2.7
Town of Kingston	1,000	23.9
City of Brockton	24	0.6
City of Boston	53	1.3
Other	109	2.6
Total	**4,188**	

** Excludes Kingston and Brockton*

Source: Old Colony Planning Council. 1997. *Long Range Regional Transportation Plan.*

Table 2.19

JOURNEY TO WORK DATA: DESTINATIONS OF KINGSTON RESIDENT COMMUTERS, 1990

Destination	Number of Commuters	% of Total
Plymouth County*	1,944	43.4
Norfolk County	515	11.5
Bristol County	68	1.5
Town of Kingston	1,000	22.3
City of Brockton	92	2.1
City of Boston	470	10.5
Other	395	8.8
Total	**4,484**	

** Excludes Kingston and Brockton*
Source: Old Colony Planning Council. 1997. *Long Range Regional Transportation Plan.*

A look at journey to work data illustrates Kingston's position as a suburban community in southeastern Massachusetts. As *Table 2.18* and *Table 2.19* show, a greater number of commuters leave Kingston, than enter Kingston to work. One thousand members of Kingston's labor force work within town; these workers amount to almost a quarter of the total workforce (22.3%). Over 43% of Kingston workers commute to towns in Plymouth County, excluding Kingston itself and the City of Brockton. An analysis of the destinations of Kingston residents reinforces Kingston's status as a suburb of Boston. Over 10% of Kingston commuters work in Boston, while only 2% commute to Brockton, the traditional center of the Old Colony Region. A substantially higher proportion of the work force commutes to Boston from the South Shore than from areas north and west of Boston (OCPC 1997). It is important to note that these figures are based upon 1990 Census data; the effects of the Old Colony Rail Line on regional commuting patterns has not yet been analyzed to this extent. The Plymouth Line, which terminates in Kingston, offers service to Boston. Brockton is served by the Middleboro/Lakeville Line.

The great majority of commuters into Kingston come from other towns in Plymouth County (65.6% excluding Brockton). Reverse commuting from Boston accounts for only 1.3% of the total, while reverse commuting from Brockton accounts for a mere 0.6% of the total. The effects of the MBTA commuter rail on reverse commuting into Kingston have not been studied.

Public Transportation

Some degree of service of public transportation service is offered by the Greater Attleboro-Taunton Regional Transit Authority (GATRA). The Plymouth Area Link (PAL) is an extension of GATRA's normal service and has been in operation since November, 1997. PAL service consists of three routes which mostly provide service to Plymouth Center as well as the Plymouth waterfront area. One of these PAL routes, the "Pilgrim Link," also provides service to the Kingston MBTA station, and Kingston's Independence Mall. GATRA also provides a "Dial-A-Ride" service for elderly and disabled residents in Kingston. The service provides individualized curb-to-curb transportation for those who are otherwise immobile. GATRA is currently applying for the funding to institute a "Plymouth-Kingston Area Subscription Transit Project." Under this service, residents would pay a monthly fee to be driven by GATRA shuttle buses to the MBTA Station or other local employment centers.

Commuter Rail

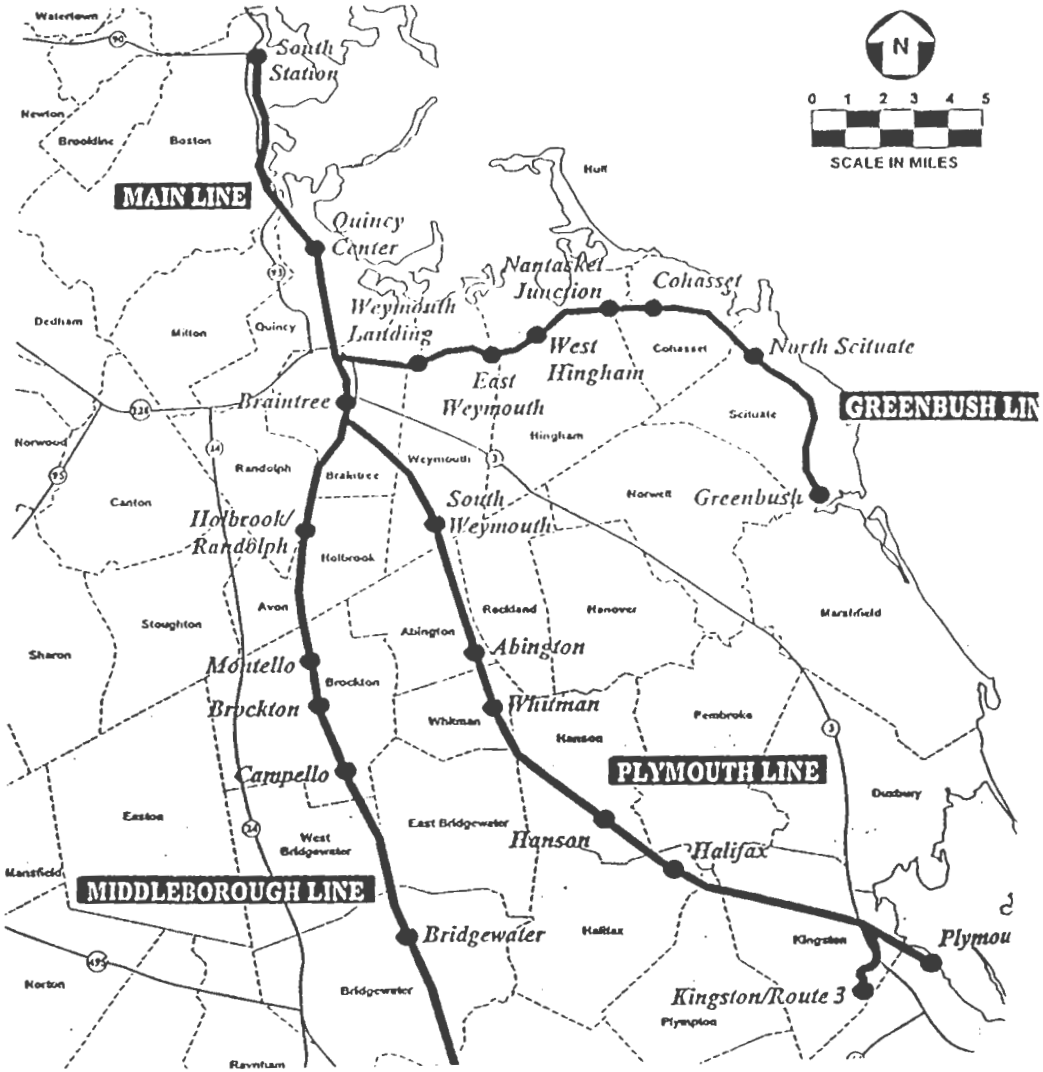
MBTA commuter rail service was reintroduced to Kingston in 1997. The Plymouth Line provides service from Kingston and Plymouth north to Boston. The Plymouth Line is twenty-five miles long and passes through nine communities, with seven stops along its length. The study area for the Independence Centre is the only commuter rail stop in Kingston. The Kingston Station also contains a lay-over facility, for the overnight storage of trains, at the end of the Plymouth Line. For the last two miles of its length, the Plymouth line splits in two. One end of the line terminates in Plymouth while the other branches off into Kingston, near Route 3. The Plymouth Line is one of two branches of the Old Colony Line, which provides rail service to much of southeastern Massachusetts. The other existing branch of the Old Colony Line is the Middleboro/Lakeville Line which serves the communities to the west of the Plymouth Line, including Brockton. A third extension, known as the Greenbush Line, is in the planning stages

by the MBTA. This route will offer commuting options to the easternmost, coastal towns. However, construction has been delayed due to local opposition by affected communities, such as Scituate and Hingham.

Specific counts of commuters from the Kingston Station, and their destinations are not available. According to MBTA research, daily boardings on the entire Plymouth Line amount to an average of approximately 7,000 per day (MHD 1998). A rough estimation of the number of people boarding at the Kingston Station can be made by analyzing parking lot utilization rates. A study done in January and June of 1998 by Old Colony Planning Council shows that, in two measurements, an average of 573 cars were parked at the Kingston Station parking lot. The station's parking capacity amounts to 1,048 spaces, resulting in an average utilization rate of 54.7%. From January to June 1998, average utilization increased by 11.4% (542 to 604 occupied spaces). Station parking lot utilization is not, however, a true indicator of ridership; the number of occupants per vehicle cannot be assumed. The possibility also exists that drivers park their automobiles in the Kingston Station parking lot, but walk to other local uses. Since its introduction in 1997, no new development has occurred around the Kingston Station.

Figure 2.3 shows the MBTA commuter rail system in Southeastern Massachusetts.

Figure 2.3 Commuter Rail System in Southeastern Massachusetts



Source: Old Colony Planning Council

Mobility Limitations

One of the major goals of the Independence Centre project is to provide an alternative mode of transportation for area residents who, due to age, income or disability, are unable to own and operate an automobile. The automobile oriented land use patterns of contemporary suburbs, such as Kingston, turns running simple errands into a burden for immobile segments of the population. Parents also find themselves in the position of driving around teenage children, who would be able to get from place on their own given a greater mix of land uses or some form of public transportation.

Table 2.20 presents the age distribution of Kingston's non-mobile population, as gathered from 1990 US Census information.

Table 2.20

AGE DISTRIBUTION OF NON-MOBILE POPULATION: KINGSTON, 1990

Group	Number	% of Total Population
Under 15	2,023	22
15-64 with Mobility Limitation	430	5
65+ with Mobility Limitation	297	3
Total Non-Mobile Population	**2,750**	**30**
Total 1990 Population	9,045	

Note: Status as "non-mobile" is based on self report from Census questionnaires.
Source: US Bureau of the Census. 1990. *Selected Social Characteristics*, Kingston, MA..

Non-mobile Kingston residents account for 30% of the town's population. As indicated in the table above, 2,750 Kingston residents, including children under 15, have mobility limitations. Children under 15 are considered immobile due to the inability to operate an automobile. Given Kingston's land use pattern and lack of public transportation, children must be driven by their parents to nearly every destination. Even the new MBTA commuter rail station, completed in 1997, must be driven to by nearly all town residents. Children under 15 represent 22% of the total population. Residents between the ages of 15 and 64 with self reported mobility limitations account for 5% of the total population. Senior citizens 65 and over with self reported mobility limitations account for 3% of the total population.

"Mobility limitations" as listed in US Census data are based on self reports. Therefore, it is impossible to know whether individuals perceive themselves as having a limitation due to lack of an automobile or a physical disability which prevents them from even walking. This analysis assumes that whatever the scope of the mobility limitation, it prevents individuals from operating an automobile.

Table 2.21 presents differences in vehicle ownership according to status as home owner or renter in the town of Kingston.

Table 2.21

VEHICLES AVAILABLE BY TENURE: KINGSTON, 1990

Tenure	Number of Vehicles	Number of Households	% of Total Tenure Type	% of Total Population
Owner Occupied	0	65	2.6	2.0
	1	543	21.4	16.8
	2	1,317	51.8	40.8
	3	391	15.4	12.1
	4	189	7.4	5.9
	5+	37	1.5	1.1
	Total Owners	2,542	100.0	78.8
Renter Occupied	0	105	15.4	3.3
	1	270	39.6	8.4
	2	296	43.4	9.2
	3	11	1.6	0.3
	4	0	0.0	0.0
	5+	0	0.0	0.0
	Total Renters	682	100.0	21.2
Total Households		3,224		100
*Total HH with no Vehicles**	0	170		5.3

** HH = Households*

Source: US Bureau of the Census. 1990. Selected Social Characteristics, Kingston, MA.

Out of 3,224 households in the town of Kingston in 1990, 2,542 are owner occupied (78.8%) and 682 are renter occupied (21.2%). When looking at the number of vehicles available by owner occupied households, the most salient feature is that over half of these households own two automobiles (51.8%). Owner occupied households with two automobiles account for 40.8% of the entire population. This segment of the population represents the type of household for which most new communities are designed: two-parent families with children and an income which allows for the automobile as the sole mode of transportation. Over 7% of owner occupied households own 4 cars, and 1.5% of these households own 5 or more automobiles.

The largest group of renters is also those who own two automobiles (43.4). However, a greater percentage of renters own one or no automobiles. The greatest discrepancy between the two groups occurs in the number of households with no automobiles. Such households are 2.6% of owner occupied households, yet 15.4% of renter occupied households. In Kingston there are a total of 170 households which do not own automobiles. These dwellings account for 5.3% of all households in town. Out of the 170 households without automobiles, 62% of these are renter occupied, while 38% are owner occupied. Those who cannot afford home-ownership in Kingston are more likely to also be those who cannot afford automobile ownership. Young adults who often desire an environment which offers public transportation are a disproportionately small percentage of Kingston's population. The transportation-oriented design of Independence Centre offers both affordable rental housing and an alternative to automobile transportation. This environment is especially suited for those segments of the community to which automobile transportation is a burden, the senior citizen and young adult population. The development is also designed for those households which desire an alternative to exclusive automobile commuting.

VIII. ECONOMICS

Along with its population, Kingston's economy is "experiencing tremendous growth" (Kingston 1998). The town's economy is one of the fastest growing in Plymouth County. Recent or planned improvements, such as the commuter rail station, Route 44 reconfiguration, and sewer installation are projected to lead to further economic development as perceived distance to Boston decreases.

Employment Trends

Table 2.22 shows employment statistics for Kingston between the years of 1986 and 1996.

As the table shows, the number of business establishments and the number of people employed in the town increased dramatically, as did the total local payroll. In ten years, the number of business establishments in the town increased from 213 to 432 (103%) at an average rate of 22 businesses per year. The number of employees working in Kingston increased from 2,716 to 5,118 (88%) at the average rate of 240 new employees per year. Average wages for people working in Kingston increased from $16,449 to $21,084 (28%). It should be noted that only about one quarter of Kingston residents actually work in the town. Total payroll for employees working in Kingston increased by 142% at an average rate of $6,323,165 per year.

One main reason for the rapid increase in businesses and jobs is the opening of the Independence Mall in 1989. The years 1989 and 1990 show large increases in both the number of establishments and the number of employees. The year 1990 shows a slight decrease in the average wage, which may be due to the sudden influx of many low paying jobs into the local payroll.

Table 2.22

AVERAGE ANNUAL EMPLOYMENT STATISTICS: KINGSTON, 1986-1996

Year	Business Establishments	Employment*	Average Wage	Total Local Payroll
1986	213	2,716	$16,449	$44,676,000
1987	236	3,198	$18,189	$58,170,898
1988	254	3,437	$19,886	$68,350,000
1989	301	3,968	$20,526	$81,447,424
1990	340	4,656	$20,347	$94,737,116
1991	329	4,499	$20,891	$93,987,820
1992	339	4,804	$21,357	$102,599,689
1993	358	5,227	$22,086	$115,442,379
1994	381	4,930	$19,709	$97,167,815
1995	393	5,002	$19,851	$99,293,067
1996	432	5,118	$21,084	$107,907,652
10 Yr. % Change	102.8	88.4	28.2	141.5
Growth Rate	21.9	240.2	$464	$6,323,165

** Number of people employed in the Town of Kingston*
Source: Kingston 1998 Draft Master Plan

Table 2.23 displays employment figures for Kingston residents in 1980 and 1990. These figures reflect residents jobs and do not represent the number of these jobs in the town of Kingston.

Table 2.23

EMPLOYED KINGSTON RESIDENTS BY OCCUPATION

Occupation	1980		1990		% Change in Number	% Change in Proportion
	Number	*% of Total*	*Number*	*% of Total*		
Managerial	939	28.2	1,166	24.8	24.2	-12.1
Technical	1,084	32.6	1,505	32.0	38.8	-1.7
Service	428	12.9	706	15.0	65.0	16.8
Agriculture	37	1.1	80	1.7	116.2	53.1
Production	471	14.1	701	14.9	48.8	5.4
Laborers	371	11.1	546	11.6	47.2	4.2
Total Employed	3,330		4,704		41.3	

Source: Kingston 1998 Draft Master Plan.

As indicated in the above table, more Kingston residents have taken jobs in agricultural and service oriented jobs than occupations in other fields. The number of Kingston residents working in service related jobs has increased by 65% from 428 to 706. The proportion of service jobs to total employment increased by 16.8% in the same ten years. The number of Kingston workers in agricultural jobs increased by 116.2% from 1980 to 1990. The absolute numbers remain low, however, as the number of agricultural workers grew from 37 to 80. Agriculture's proportion relative to total employment grew by 53% over ten years. Much of the employment in the agricultural sector is most likely to be cranberry related. Cranberry bogs have traditionally been a staple of the economy of southeastern Massachusetts. Bogs continue to be very valuable, and sought after resources.

Table 2.24 shows Kingston's total labor force and unemployment rate for the years 1990-1996.

Table 2.24

LABOR FORCE AND UNEMPLOYMENT RATES: KINGSTON, 1990-1997

Year	Labor Force	Unemp. Rate	% Change Unempl.
1990	5,045	6.2	-
1991	4,948	8.1	30.6
1992	5,212	8.8	8.6
1993	5,412	7.2	-18.2
1994	5,506	5.6	-22.2
1995	5,523	5.1	-8.9
1996	5,597	4.7	-7.8
1997	5,741	3.7	-21.3
1997 Mass.	-	4.0	-
1997 USA	-	4.9	-

Source: Commonwealth of Mass. Division of Employment and Training. in Kingston 1998 Draft Master Plan.

With the exception of the 1991-1992 recession, the 1990's have seen a growing labor force and a shrinking unemployment rate for the town of Kingston. As of 1997, the town's labor force consists of 5,741 residents, with an unemployment rate of 3.7%. Since 1992, the town's unemployment rate has fallen by 58%. Kingston's 3.7% unemployment rate in 1997 compares favorably with the State's figure of 4.0% and the national figure of 4.9% for the same year.

Table 2.25 shows the five largest employers in the town of Kingston as well as their respective employees. All employees are not from the town of Kingston.

Table 2.25

MAJOR KINGSTON EMPLOYERS AND NUMBER OF KINGSTON RESIDENTS EMPLOYED: 1995

Employer	Type of Operation	Employees
Independence Mall Group	Retail	1,300
L. Knife & Son.	Wholesale Distribution	452
Town of Kingston	Government	289
Victory Supermarket	Retail	200
R.S. Means Co.	Service	73

Source: Kingston 1998 Draft Master Plan.

The largest employment generator in Kingston is the Independence Mall. Built in 1989, the mall contains 100 individual stores with a total of approximately 600,000 sq. ft. of retail space. L. Knife & Son, a wholesale liquor distribution company employs the second largest amount of people at 452. Kingston's most well known employer is R.S. Means Co., nationally known publishers of construction and development standards. R.S. Means employs 73 people.

Tax Base

According to the town's 1998 Draft Master Plan, Kingston's 1996 tax rate was "second only to Pembroke's as the lowest for business and industry, when compared to surrounding communities with similar market conditions." The Plan states that, with the exception of Duxbury, Kingston maintained the lowest percent change in its tax rate out of all regional communities from the years 1990-1996. Approximately 75% of tax revenues are collected from homeowners. Commercial property contributes 21%, while industrial uses contribute only 2% (Kingston 1998). A concern of the town's is that the "cost of providing municipal services to households exceeds the residential taxes collected" (Kingston 1998). With population increases projected to occur, a more efficient development pattern is necessary to even out the tax burden caused by low density residential development. The town's investment in sewer capacity also serves as motivation for more efficient development practices, such as transit-oriented development.

IX. LAND USE REGULATIONS

Table 2.26 lists growth management techniques applied by the town of Kingston to help control development. The most salient growth management feature used by Kingston is their growth phasing policy. The purpose of the phasing policy is to prevent growth which is so rapid that it becomes an "undue economic burden on those involved with housing development" (Kingston 1992).

The town's residential phasing policy contains the following features (Kingston 1992):

- Not more than 70 permits shall be issued in any calendar year.
- If a subdivision contains more than 15 units, not more than 15 units can be built in one year. If a subdivision contains less than 15 units, than not more than 20% of the total units are to be built within one year.
- Approval-not-required lots of two units or less are exempt.

The town also uses a Water Resource Overlay District to prevent harmful development around water resources. Certain additional uses are permitted in the district. The By-Law lists performance standards for all uses other than single family homes. In order to receive a building permit, one must first obtain a Certificate of Water Quality Compliance from the Water Quality Review Committee. The town has also established a Flood Plain Overlay District which imposes additional restrictions on development. The town's Conservancy District provides for the "conservation of water resources and water bodies, and the preservation of open space" (Kingston 1992).

Permitted uses are mainly agricultural in nature. The Zoning Board of Appeals may grant permits for single family dwellings on over 80,000 sq. ft. lots.

The town of Kingston mostly utilizes its zoning by-law and subdivision regulations to regulate growth. The town is divided up into 12 zoning districts, two of which are overlay districts. *Table 2.27* lists a summary of Kingston zoning districts and regulations. The residential district with the largest mandatory lot size is the R 80 zone. Development in this zone requires a minimum lot of 80,000 sq. ft. Additional residential zones include the R 40, and R 20 zones. The district allowing the smallest lots for single-family residential uses is the Town Center Zone. This zone allows residential lots of 10,000 sq. ft. or more. Multi-family uses are permitted "by right" in the R 20, and Town Center districts. Multi-family uses are allowed in the R 80 and R 40 zones only as an element of a planned unit development. The Zoning By-Law allows cluster development in the R 80 and R 40 zones by special permit only. Planned unit developments are permitted in the commercial and industrial zones, as well as in the R 40 zone.

TABLE 2.26. EXISTING GROWTH MANAGEMENT TOOLS: KINGSTON, 1998

	Policy / Regulation	Yes / No*
Planning / Regulatory Documents	Community Master Plan	Yes (1998 Draft)
	Zoning By-Law	Yes (1992 amended to 1997)
	Subdivision Regulations	Yes (1970)
	Open Space Plan	Yes (1995)
Environmental	Farmland Protection Zoning	No
	Water Supply Protection Zoning	Yes
	Flood Plain Protection Zoning	Yes
	Wetlands Protection By-law	Yes
	Env. Impact Study Required in 1 or more districts	Yes
Housing	Mixed Use Zoning	Yes
	Permit Multi-family Housing	Yes
	Inclusionary Zoning for Multi-family Housing	No
	Accessory Apartments Permitted	Yes
Open Space	Greenbelt / Open Space Acquisition Program	Yes
	Land Bank / Trust	No
	Transfer of Dev. Rights	No
Infrastructure	Bicycle, Transit & Pedestrian Provisions	No
	Limited Infrastructure Expansion	No
	Adequate Facilities Conditions	No
	Reduced Off-Street Parking Requirements	No
	Reduced Pavement Widths	No
	Impact Fees	No
Design Control	Architectural Design Standards	Yes
	Historic Zoning District	No
	Signage Regulations	Yes
Development Patterns	Transit Oriented Dev.	No
	Village Center Zoning	No
	Town Center Dev. Incentives	No
	Commercial Infill in Neighborhoods	No
	Open Space / Cluster Dev.	Yes
	Planned Unit Dev. Allowed	Yes
	Mixed Use PUD's Containing On-Site Housing	No
	Linkage Programs	No
Development Phasing	Growth Phasing	Yes

Note: This table serves as a summary and does not reflect all situations. Please see town by-laws and related documents for additional information.

** "Yes" means permitted in one or more district.*

Sources: Kingston 1992 Zoning By Law.
Kingston 1998 Draft Master Plan.
Kingston 1970 Subdivision Regulations.
Kingston 1995 Open Space Plan

Format taken from: Pioneer Valley Regional Planning Agency. 1995. Valley Vision Regional Plan.

TABLE 2.27 ZONING DISTRICTS AND REGULATIONS: KINGSTON, 1998

District	R 80 *Residential 80*	R 40 *General Residential*	R 20 *Residential 20*	RM *Mobile Home Park*	TC *Town Center*	3ADD *3, 1 Design*	C *Commercial*	I *Industrial*	CIP *Commercial / Industrial Park*	CON *Conservancy*	FP *Flood Plain*	WR *Water Resource*
Minimum Lot Size (sq. ft.)	80,000	40,000	20,000	8,000 (each unit)	10,000	30,000	40,000	40,000	40,000	80,000	n/a	n/a
Single Family Detached Allowed	Y	Y	Y	N	Y	Y	N	N	N	SP	n/a	n/a
Duplex Allowed	PUD only	PUD only	SP	N	Y	Y	N	N	N	N	n/a	n/a
Multi-Family Allowed	Y	Y	SP	N	SP	N	N	N	N	N	n/a	n/a
Multi-Family Max. Density (#units; sq. ft.)	1-3; 40,000. 3+; add 10,000	1-3; 40,000. 3+; add 10,000	1-3; 40,000. 3+; add 10,000	n/a	1-3; 40,000. 3+; add 10,000	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mobile Homes Allowed	N	N	N	SP	N	N	N	N	N	SP	n/a	n/a
Cluster Allowed	SP	SP	N	N	N	N	N	N	N	N	n/a	n/a
Planned Unit Dev. Allowed	SP	Y	N	N	N	N	Y	Y	Y	N	n/a	n/a
Impact Study Required	N	N	N	N	N	N	N	N	N	N	N	Y

Y = Yes, N = No, SP = Special Permit Required.

Note: This table serves as a summary only and does not reflect all land use situations. Refer to Kingston Zoning By-Law for more information.

Source: Town of Kingston. 1992 Zoning By-Law.

X. BUILDOUT ANALYSIS

As the Town of Kingston continues to grow, it is helpful to consider the potential number of homes and residents that the Town could see under existing land use regulations. The Independence Centre Master plan offers an alternative model for growth in Kingston around a given transportation node. The buildout analysis points to one future for the Town should no alternative plans for growth be developed. For its 1998 Master Plan, the Town performed a buildout analysis for the Town up to the year 2028. The following are assumptions of the buildout analysis as taken from 1998 Kingston Draft Master Plan.

Buildout Assumptions

1. It is assumed that land use classification reflects current zoning.
2. Ten percent of undeveloped land was subtracted for roads.
3. Twenty percent of undeveloped land was subtracted for environmental constraints. The remaining acreage was divided by the minimum lot sizes allowed by the given zoning district.
4. It is assumed that all residentially zoned lots are buildable.
5. All property owned by the Town or the State is considered protected from development.
6. Only 20% of Chapter 61 lands are considered developable.
7. Residential parcels of over 3 acres have additional buildout potential which was considered in the analysis.

Table 2.28 shows the results of the Town's buildout analysis including projected building values as well as taxes collected.

Table 2.28

COMMERCIAL AND INDUSTRIAL BUILDOUT PROJECTIONS: KINGSTON, 2028

Use	Section	Acres	Building Lots	Potential Building Area*	Value / Sq. Ft.	Building Value	Taxes Collected*
Commercial	West	365	249	2,117,116	$65	$137,612,540	$2,339,413
	North	16	6	91,060	$65	$5,918,900	$100,621
	East	4	1	23,838	$65	$1,549,470	$26,341
	South	34	23	199,810	$65	$12,987,650	$220,790
	Total Comm.	**419**	**279**	**2,431,824**	**$65**	**$158,068,560**	**$2,687,165**
Industrial	West	0	0	0	$24	$0	$0
	North	45	30	541,200	$24	$12,988,800	$220,810
	East	130	66	1,565,520	$24	$37,572,480	$638,732
	South	91	32	1,086,000	$24	$26,064,000	$443,088
	Total Ind.	**266**	**128**	**3,192,720**	**$24**	**$76,625,280**	**$1,302,630**
Grand Total		**685**	**407**	**5,624,544**		**234,693,840**	**3,989,795**

* *Based on 5,800 sq. ft. building per acre.*
***Based on 1997 tax rate of $17.00 / 1,000 sq. ft.*
Note: Land located in the Commercial/Industrial Park zoning district are considered industrial.
Source: Kingston 1998 Draft Master Plan

Using the standards put forth in the buildout analysis, Independence Centre lies in the *easterly* section of Town.

Commercial / Industrial Buildout

According to the town of Kingston's buildout analysis, a total of 2,431,824 square feet of commercial space would be present upon buildout (in the year 2028). At $65 per sq. ft., this figure relates to a total building value of $158,068,560. With taxes at their current rate of $17 per 1,000 sq. ft. the Town could collect $2,687,166 per year at total buildout. According to the Town's analysis, the western section of Kingston supports the most commercial land upon buildout.

Upon total buildout, a total of 266 industrial acres will exist, consisting a total of 128 lots. Using a standard of 12,000 sq. ft. building per acre, the potential industrial building area in the town totals 3,192,720. Valued at $24 per sq. ft., total industrial building value will equal $76,625,280 in the year 2028. With taxes at their current rate of $17 per 1,000 sq. ft., annual taxes could total $1,302,630 per year for industrial uses. Together, by the year 2028, commercial and industrial uses could be worth $3,989,795 in taxes per year.

It is important to remember that the buildout analysis prepared by the Town reflects possible the maximum growth possible according to current zoning by-laws. The maximum amount of tax revenue does not necessarily correlate with the highest quality of life in the town of Kingston. Total buildout reflects the infill of all available open space and a continuation of conventional sprawl development patterns.

Much of the vacant commercial property in Kingston is found in the western section of the town. There are currently 420 acres of vacant commercial land in all of Kingston. Given one-acre lots, about 279 additional lots could be accommodated. Using an estimate of 5,800 gsf per acre, an additional 2,436,000 of commercial space could be accommodated in the town.

Over 80% of the available vacant industrial land is located in the easterly and southerly sections of Kingston. According to current zoning regulations, the Independence Centre site adjacent to the commuter rail station would be developed as industrial land. Approximately 266 acres of vacant industrial land currently exist in the Town, with the potential for 128 one-acre lots. This figure may be high, however, as many industries require larger sites. At 12,000 sq. ft. per buildable acre, an additional 3,192,000 sq. ft. of industrial space could be accommodated in Kingston.

Residential Buildout

Table 2.29

KINGSTON RESIDENTIAL BUILDOUT ANALYSIS RESULTS

Area of Town	Units/Lots at Full Buildout (by 2028)	Projected New Units by 2007	Additional Residents by 2007
West	880	357	1,071
North	679	275	826
East	190	77	231
South	642	260	781
Total	**2,391**	**970**	**2,910**

Source: Kingston 1998 Draft Master Plan.

According to the town's buildout analysis, Kingston is slated for a total of 2,910 new residents in just the ten years from 1997 to 2007. By the buildout-year of 2028, an additional 7,173 residents will have entered the town. These projections are based on the town's estimate of three persons per household. The town's buildout analysis indicates the potential for 2,391 new homes built on vacant residential land. Buildout would occur in approximately 30 years, at the rate of 100 new homes per year (300 people) until 2006, and 70 new homes per year (210 people) from that point on. Two-thirds of potential residential development occurs in both the northerly and westerly sections of town. One-quarter of all future development can be absorbed in the southerly section, while the densely populated easterly section of Kingston can only accommodate 8% of new growth.

Population Projections

The residential buildout analysis as performed by the town uses an estimate of three persons per household in an effort to approximate the total number of people the town can accommodate at buildout. *Table 1.30* presents the population projections as calculated by the town of Kingston in its 1998 Draft Master Plan. Existing 1997 population figures are taken from the Town's own Census as administered by the town Clerk. According to this Census, Kingston's 1997 population is 10,577. If current land use regulations remain in effect, the town will need to support a population of 17,750 by the buildout year of 2028. According to this analysis, the town's population will increase by 68% from 1997 to 2028, at an average rate of 2.1% per year. The number of households will increase from 4,096 in 1997 to 6,487 (58%) at an average rate of 1.5% per year.

Table 2.31 shows the town's own population projections in comparison to two other population projections by Old Colony Planning Council and the Massachusetts Institute for Social and Economic Research (MISER) based out of the University of Massachusetts. The Old Colony Planning Council estimates use a linear projection method based on US Census information. The MISER projections use a cohort trajectory approach based on more individualized demographic characteristics, such as birth rates based on racial classification.

Out of the three projections, the estimate based on Kingston's buildout analysis gives the highest population for the town in the year 2010. This is to be expected due to the fact that this projection reflects the largest number of people possible according to existing land use regulations. The town's own estimate reflects an even greater rate of growth when considering that this projection is based upon a 1990 population of 8,628, rather than 9,045 as reported in the US Census. This increase in population from 8,628 to 9,045 marks a 62.6% change in the Town's population.

The MISER projections indicate the second most generous estimate of the Town's population. According to their calculations, the town will see an increase in population of 30.8%, from 9,045 in 1990, to 11,827 in 2010. The most conservative of the projections is the analysis done by Old Colony Planning Council which shows Kingston's population as 10,994 in 2010 (21.5% change).

The Old Colony Planning Council and MISER projections also differ in their estimates of Kingston's role in the growth of the Old Colony Region. The Old Colony Planning Council projections estimate a total population of 343,959 in 2010 for its 15 member communities. In the 20 years from 1990 to 2010, Kingston is expected to absorb 4.1% of the region's total growth. The MISER estimates project a population of 345,897 for the same 15 communities in the Old Colony Region. During the same time period, Kingston is expected to absorb 5.7% of the region's growth. The town of Kingston did not include regional projections in its buildout analysis.

TABLE 2.30 POPULATION PROJECTIONS BASED ON BUILDOUT ANALYSIS

Year	Population	% Change	Households	% Change
1997	10,577	3.4	4,096	-
1998	10,877	2.8	4,196	2.4
1999	11,177	2.8	4,296	2.4
2000	11,477	2.7	4,396	2.3
2001	11,777	2.6	4,496	2.3
2002	12,077	2.5	4,596	2.2
2003	12,377	2.5	4,696	2.2
2004	12,677	2.4	4,796	2.1
2005	12,977	2.4	4,896	2.1
2006	13,187	1.6	4,966	1.4
2007	13,397	1.6	5,036	1.4
2008	13,607	1.6	5,106	1.4
2009	13,817	1.5	5,176	1.4
2010	14,027	1.5	5,246	1.4
2011	14,237	1.5	5,316	1.3
2012	14,447	1.5	5,386	1.3
2013	14,657	1.5	5,456	1.3
2014	14,867	1.4	5,526	1.3
2015	15,077	1.4	5,596	1.3
2016	15,287	1.4	5,666	1.3
2017	15,497	1.4	5,736	1.2
2018	15,707	1.4	5,806	1.2
2019	15,917	1.3	5,876	1.2
2020	16,127	1.3	5,946	1.2
2021	16,337	1.3	6,016	1.2
2022	16,547	1.3	6,086	1.2
2023	16,757	1.3	6,156	1.2
2024	16,967	1.3	6,226	1.1
2025	17,177	1.2	6,296	1.1
2026	17,387	1.2	6,366	1.1
2027	17,597	1.2	6,436	1.1
2028	17,750	0.9	6,487	0.8
Average		2.1		1.5

Source: Kingston 1998 Draft Master Plan. 1997 Data from Town Census

TABLE 2.31 OCPC, MISER, AND KINGSTON PLANNING COMMISSION POPULATION PROJECTIONS FOR KINGSTON: 1990-2010

1990	Population (US Census)	9,045
	Population (Town Census)	8,628
OCPC Projections: 2010	Population Projection	10,994
	20 Year % Change	21.5
	OCPC Regional Projection	343,959
	% of Total OCPC Growth	4.1
MISER Projections: 2010	Population Projection	11,827
	20 Year % Change	30.8
	OCPC Region Projection	345,897
	% of Total OCPC Growth	5.7
Kingston Master Plan Proj: 2010	Population Projection	14,027
	20 Year % Change*	62.6
	OCPC Region Projection	n/a
	% of Total OCPC Growth	n/a

** This figure is based on Kingston's 1990 Town Census population of 8,628.*

Sources: Kingston 1998 Draft Master Plan.
Massachusetts Institute of Social and Economic Research. 1994. *Projection of the Population: Massachusetts Cities and Towns Year 2000 and 2010.* Amherst: University of Massachusetts.
Old Colony Planning Council. 1997. *Long Range Regional Transportation Plan.*

Regardless of which projections are used the town of Kingston is in store for a large degree of growth. The following chapters will look at issues of sprawl development and how Kingston can use transit-oriented development to address these problems.

CHAPTER III
Sprawl and Transit-Oriented Development

I. INTRODUCTION

Contemporary planning literature is filled with dialogue condemning conventional suburban development practices. Sprawling development has eroded the character of many traditional small towns and rural communities across the country. A number of development policies, land use regulations, and common perceptions have all led to an outcome of seamless development outside of our major cities and town centers. This unabated development has led to increasing concern by officials as well as residents of suburban communities as to a host of problems inherent in today's development practices. These concerns touch on a number of issues which were not anticipated by officials in the 1940's, when many of these trends began. This chapter takes a look at some of the problems which have arisen from uncontrolled development. This chapter also deals with transit-oriented development as a tool in managing growth and creating healthier communities.

II. PROBLEMS WITH SPRAWL DEVELOPMENT

A. OPEN SPACE

Farmland

The amount of farmland in New England has decreased dramatically over the past few decades. Miles of agricultural land have been developed into residential subdivisions and strip commercial areas, as people move farther and farther from central cities. In Southeastern Massachusetts, families moving from Boston, Brockton and other cities relocated in suburbs which offered more spacious living arrangements. This desire to leave the cities put pressure on many struggling farmers who were offered large sums of money by real estate speculators. Many farmers sold off their land, which had been in agricultural use for hundreds of years, to developers who would subdivide the land into new house lots for young families during the Baby-Boom. Those farmers who did not sell were suddenly surrounded by new residents who considered their operations to be nuisances.

In much of the East Coast, including Massachusetts, Connecticut and Rhode Island, agriculture plays a far less important role today, than it did in the past. Many agricultural sites are "hobby farms" which are more indicative of a lifestyle than a livelihood. However, the development of agricultural land into other uses has eroded the character of many traditional New England towns. In many cases, the quality of new development is the main issue. Development which conforms to its rural surroundings, and which does not take up too much land, can be beneficial to a rural community. All too often, however, communities on the fringe of metropolitan areas are host to an uncontrolled mix of farmland, large lot residential uses, and offensive strip commercial development.

Meaningful Public Space

Thousands of families across the country relocated to the suburbs because of a perception of spaciousness, and integration with nature. However, conventional suburban development is the main factor in the decrease of open space in our country. In traditional urban areas, whether they be large cities, or small villages, dense residential and commercial development surround public open areas. These central open areas, such as Boston Commons and the Bridgewater Green provide community identity and a space for public activity. In most suburban locations, no such areas exist. Most green space is dedicated to single family residential use. Each house may sit in back of forty feet of grass, but there is usually no public open space. Ironically more meaningful open space can be found in urban areas than in suburban ones. This type of development leads to a lack of identity among sprawling communities. This phenomenon reflects the ideology of residential development patterns over the past fifty years, which stresses privacy at the expense of the public life and the greater community.

B. ENVIRONMENTAL

Wetlands

Wetlands play a vital role in the ecology of our communities for the following reasons.

- Wetlands act as natural water filters. They are critical in maintaining water quality in the water bodies which flow out of them.
- Wetlands are important natural habitats for many types of wildlife. Should the number of these species be depleted, all creatures are affected.
- Wetlands serve as natural tools for flood control. They absorb much of the water that falls in heavy rains.

Many communities have been adversely affected by the filling in of wetlands for development purposes. Before the adoption of the National Wetlands Act communities would often allow wetlands to be filled to create houses or commercial uses. The Westgate Mall in Brockton is an example of a site which was formerly a wetland. Not only did the wetlands disappear, but they were replaced with an impervious surface, leading to the displacement of the flood waters. The acres of pavement required for parking often cause flooding nearby during heavy rains.

Forestland / Critical Habitats

As is the case with agricultural land, forestland has disappeared at alarming rates in the Northeast and elsewhere. The benefits of forested land are numerous, including air quality and the protection of endangered species. The balance of the ecology is being thrown off by the deforestation of much of our lands. Recent problems in Southeastern Massachusetts involving coyote attacks speak to the problem of shrinking habitats for many creatures. Continued deforestation will lead to further pollution. Especially since continued sprawl will lead to more automobile usage.

The majority of this deforestation is unnecessary to support development. The State of Rhode Island has maintained a steady population of approximately 1,000,000 people for decades. However, the amount of agricultural and forest land has decreased over this same time period, as people leave the State's urban areas such as Providence and Pawtucket for more remote locations.

On-site development practices have also led to deforestation. Developers will often raze huge tracts of land in order to construct subdivisions or other projects. Sparsely planted trees will replace the existing vegetation. More responsible development should use as much existing vegetation as possible. This practice will lead to a more sustainable environment and also provide a more pleasing atmosphere for residents.

Water Resources

Water quality is a pressing issue in many communities due to sprawl development. Haphazard, low density development has led to a decline in water quality in many suburban areas. Ironically these communities were settled so that residents could be "closer to nature."

Low density residential development is often to blame for many water problems. Most such developments utilize on-site septic systems. In the past many septic systems were located too close to the water table, or were not in proper working condition. These conditions could often lead to contamination of the community's drinking water supply. Further contamination has occurred due to problems with run-off. Oversized suburban roads and parking lots send rain water flowing into local water bodies. The run-off often contains pollutants from automobiles that it picks up on the ground, and drinking water becomes contaminated. Increased auto usage due to suburban residency leads to more pollutants on the ground.

Zoning regulations that make small house lots illegal also contribute to water problems. In some communities, virtually every homeowner must use lawn chemicals in order to grow grass on lots with huge setbacks. Watering oversized lawns during the summer months also contributes to water shortages. Many communities without appropriate growth management techniques, have had problems with water supply, as low density development keeps spreading out into all areas of town.

A more compact-development pattern would lead to fewer water quality issues, as infrastructure would not have to be spread out in all different directions for a small number of uses.

Air Quality

Air quality has been shown to be directly linked to automobile usage. Over the past forty years, more and more people per household are driving automobiles, as people are living farther from where they work. Miles of highway have been constructed to accommodate this trend, leading to more automobile travel than ever.

Reliance on automobiles, fostered by decades of non-comprehensive land use regulations, has made air quality worse in many areas. Recent interest in commuter rail systems in many metropolitan areas has reflected this concern. In some urban areas air quality has dramatically improved as these regions have instituted mass transit systems.

C. HOUSING

Housing Affordability

Housing affordability is a key issue in combating the effects of sprawl development. One of the main problems with development in the past forty years has been its exclusiveness. Suburban and exurban land use regulations across the country dictate large lots for residential development. Large lots are forced upon people for a variety of reasons including the following.

- Communities perceive large lots as contributing to a more "rural" or "small town" atmosphere. In reality, small town living is characterized by mixed use village centers with much higher density.
- Communities perceive small house lots to be indicative of an "urban" environment.
- Many leaders and residents believe that any change from the status quo would lead to a decrease in property values.

- Communities that make it illegal for developers to build on smaller lots, force up the price of land acquisition. Developers then sell these large lots for a suitable large sum of money. As a result, many sprawling communities are unaffordable to households under a given income level. This fact further aggravates the racial and class segregation across the country. Central urban areas feel the brunt of this segregation, as, those who live in certain cities are those who cannot afford to move out. The practice of segregation through large lot zoning can be an unintentional outcome of poor planning, but can also be what is called "snob zoning." This term refers to the practice of intentionally requiring large residential lot sizes in order to keep out people with incomes below a certain level.
- Many communities have an aversion to any multi-family development. These communities feel that such development would drive down property values, and lead to a host of other problems, such as a decrease in family values, and traffic congestion. The lack of multi-family or rental units leads to a community where virtually every family must be able to afford their own home. Many communities have also outlawed accessory apartments for relatives and the elderly.

Monotony

Beginning in the years after World War II, residential subdivisions began to be developed at a rapid pace. Many large developers, maximized profit by using mass production principals to construct massive developments in minimal time. This goal required the standardization of housing types, and many developments took on a monotonous character as a result. One main criticism of sprawl development by its inhabitants is the "sameness" of residential and commercial development. Cul-de-sac after cul-de-sac displays a dulling streetscape of single family houses and garage doors. The result is an atmosphere which is unwelcoming to pedestrians, and which does not foster community pride.

D. TRANSPORTATION

Links to Land Use and Environmental Issues

After the Second World War, a housing shortage led to Federal policies that fostered suburban development, rather than urban infill or renovation. As people moved into formerly unoccupied areas, the Federal Government began its program of highway building. For decades, the Federal Government spent funds on highway and road construction, while virtually ignoring mass transit as an option for commuters. Construction of highways to reduce traffic congestion often turned out to make the problem worse. Officials lobbied for new highways to reduce congestion. Yet studies have shown that whenever highway capacity is increased, traffic volumes rise to meet the new capacity level, as more people move out to the suburbs and travel on the newly widened highways.

America relies on limited access highways more than any other country in the world (FHA 1998). Historically, the consequences of rapid highway building were not examined by planners and engineers. Increased air and water pollution are two such consequences. Another is the destruction of forestlands and wetlands in order to make way for miles of new highway across the country. The growth of highways and suburban arterials outside of central cities has also led to a preponderance of strip commercial development. Formerly rural, or village-like areas have become home to monotonous national chains who locate by following major roads into the countryside. Cities which had once been thriving due to their ports or rail facilities, are now struggling to compete now that trucking on interstate highways is the most common form of transport.

Access

Access is one of the main problems with sprawl development. Most current land use regulations dictate that uses be separate. Residential areas are to be on one side of town, while commercial areas should be on another. Since a drive toward maximum privacy characterizes residential development, many new subdivisions utilize cul-de-sacs to prevent through traffic. One problem with this type of street is that it leads to a traffic pattern where all traffic is channeled onto main arterials. The result is traffic congestion on these arterials, as is the case in many communities in Southeastern Massachusetts. Simple trips, which would require a walk to a corner store in an urban, or village setting, necessitate driving to the commercial arterial. This pattern results in traffic congestion on main roads, increased air and water pollution, and a complete reliance on automobiles by area residents (whether or not they actually have a car).

Mobility Issues

Perhaps the main social consequence of the segregation of land uses, and poorly conceived transportation planning, is that many people in sprawling communities have become immobile without the use of an automobile. In a community where every conceivable destination must be driven to, the inability to operate an automobile creates a state of helplessness which is not found in more traditional communities.

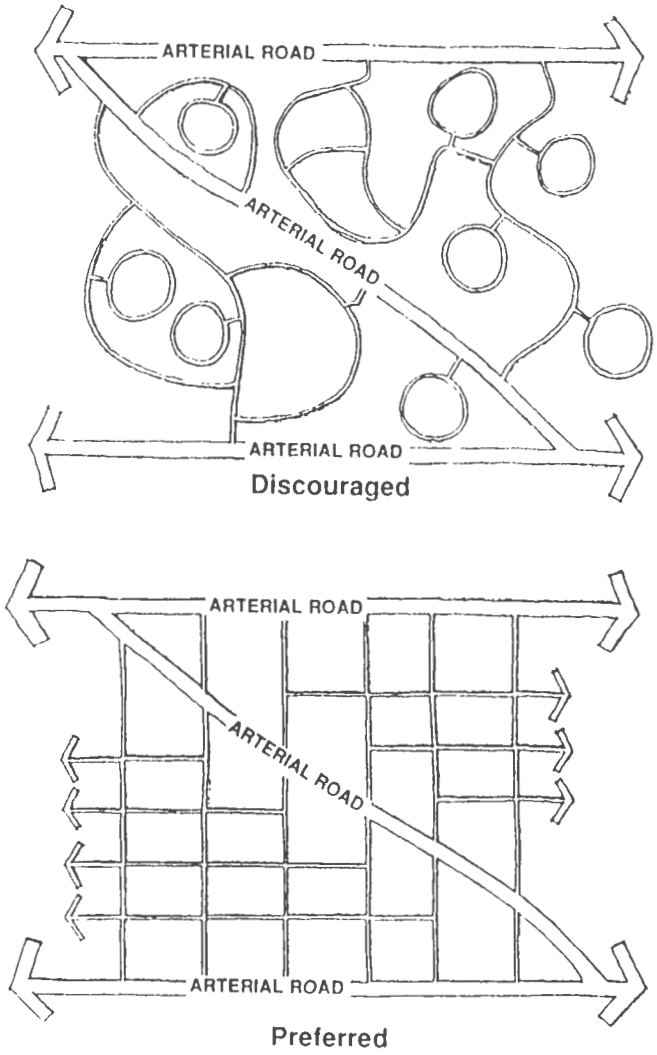
The majority of those who become immobile due to physical or financial constraints are children, teenagers, and the elderly. While many older urban dwellers may aspire to a retirement outside of the city, many have ended up in a situation where they must be driven everywhere. Many elderly housing complexes in sprawling communities are surrounded by highway-like arterial roads without sidewalks. Huge setbacks also discourage walking. The result is a virtual entrapment within the confines of a housing "pod." Teenagers and older children also experience the effects of immobility. The term "Soccer Mom" has come to symbolize the parent who spends hours every day driving children to all of destinations. The neighborhood school in sprawling communities is rarely accessible to pedestrians, as it is built down a separate access road without connections to any surrounding neighborhoods. The result of this immobility is a younger population that is excessively reliant on their parents to get to any destinations. Children in new sprawling communities lack the opportunities for mobility and experience that many of their parents had just one generation ago. Another result of poor access is that teenagers have few options but to get part-time jobs to finance automobile ownership, whether or not their studies warrant this decision.

Mass Transit

Contributing to immobility associated with sprawling development patterns is the lack of mass transit in such areas. The absence of mass transit (light rail, or bus service) is due to both the lack of supporting densities in residential areas, and the disconnected road patterns of modern subdivisions.

Figure 3.1 shows two street patterns. The top street pattern consists of a curvilinear streets with of numerous cul-de-sacs, dead ends, and meandering roads. Street patterns such as these discourages pedestrian circulation and transit use by being "difficult for buses to navigate and do not provide the shortest distance between two points..." (FTA 1994). More traditional street patterns, like the one on the bottom of *Figure 3.1*, use a grid pattern which is much more transit friendly. There are many more access points to the main road, and every site has adequate access to any point on the map. The street pattern is continuous so that transit vehicles do not have to access numerous cul-de-sacs and isolated subdivisions. Streets are straight and provide the shortest distance from one point to another.

Figure 3.1 Discouraged and Preferred Street Patterns



Source: Federal Transit Administration. 1994. *Planning for Transit Friendly Land Use: A Handbook for New Jersey Communities.*

During the course of this ninety year period, transit ridership peaked at points when auto ridership was expensive due to fuel shortages, and transit was affordable, convenient and close to residences. During the past few decades transit usage has decreased markedly, as sprawling development has spread across the country. One reason for the decline in transit usage, and consequently transit service, has been the low density of sprawl development. When development is spread out at such a low density the extension of transit services of any kind becomes impractical. Transit agencies will not extend service unless there is a significant population and density to the area. Conversely, residents will not take transit if their neighborhood is so spread out that they cannot easily get to the station or bus stop. The current paradox in many communities is one where regional planning agencies want to see suburban households have alternatives to private auto usage, but the land use patterns that have developed are built around the assumption of exclusive automobile ridership.

Table 3.1 shows U.S. personal travel by mode of transportation in 1995, as analyzed from a survey done by the Federal Highway Administration; these figures are not limited to work trips. As the tables show, despite their many adverse impacts automobiles remain the vehicle of choice for a great majority of Americans. Nearly 91% of trips made in the U.S. are done by private vehicles, while just over 2% of trips are taken by public transit. According to the survey, walking and bicycling account for less than 1% of all trips made.

Table 3.1

U.S. PERSONAL TRAVEL BY MODE OF TRANSPORTATION: 1995

Mode	% of Total
Private Vehicles	
Auto, Van	67.49%
Utility Vehicle	6.98%
Pickup	13.82%
Other Private	2.51%
Total Private	90.8%
Public Transportation	
Bus, Streetcar	1.41%
Commuter Train	0.37%
Subway	0.35%
Total Public	*2.13%*
Other Means	
Airplane	3.42%
School Bus	1.27%
Walking	0.32%
Bike	0.13%
Amtrak	0.05%
Taxi	0.09%
Other	1.82%
Total Other	7.10%

Source: Federal Highway Administration. 1995. Nationwide Personal Transportation Survey.
In Federal Highway Administration. 1998. Our Nation's Highways.

Demographics also play a role in America's high automobile usage, working parent households and split-shift marriages have "spread commuter traffic in all directions at all hours" (Edmonson 1994). Many married parents with lower-paying jobs have work hours that do not overlap at all (Edmonson 1994). The recent popularity of flexible work hours has also led to employees commuting in staggered work intervals,

and running various errands during the day (Edmonson. 1994). This trend makes utilization of mass transit more inconvenient for many people. Mass transit also becomes inconvenient for many people who work in new industrial or office parks in the suburban "edge cities." Transit routes are geared toward central city commuters. "Reverse commuting," which describes trips from the city to the suburbs is more difficult to accommodate.

Table 3.2 shows the difference in daily trip generation between the average traditional residential neighborhood and the average suburban tract development in the San Francisco Bay Area.

DAILY TRIP GENERATION IN THE SAN FRANCISCO BAY AREA

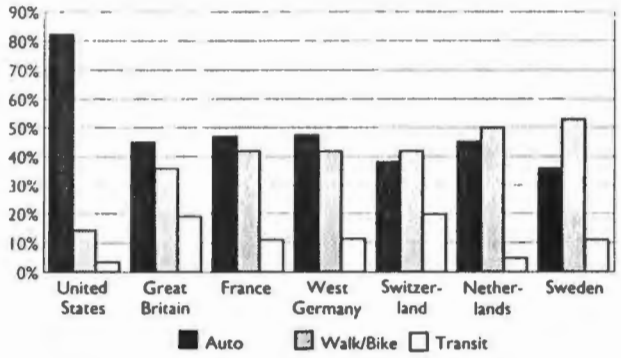
Mode of Transportation	Traditional Neighborhood	Suburban Development
Auto	64%	86%
Walk	17%	8%
Transit	17%	3%
Bike/Other	2%	3%

Source: Calthorpe, Peter. 1993. The Next American Metropolis. New York: Princeton Architectural Press.

As the table above shows, traditional neighborhoods are much less auto reliant, and depend more on walking and transit for transportation.

Contrary to popular belief, the current pattern of sprawl development in the United States is not an unavoidable consequence of a post-industrial economy. In many European counties, investment in mass transit, along with less government subsidization of highways, as well as more comprehensive land use regulations, contribute to societies where walking, bicycling, and transit are all equal partners with the automobile. *Figure 2.2* displays the percentages of trips utilizing different modes of transportation in the United States and six other industrialized countries.

Figure 3.2 Mode Split as Percent of Total Trips, 1990



Source: Calthorpe, Peter. 1993. The Next American Metropolis. New York: Princeton Architectural Press.

E. SOCIO-ECONOMIC

Segregation

Perhaps the most pressing socio-economic concern is the racial and class segregation caused by sprawl development. The lack of transit, distance to employment centers, and mandatory large lot sizes, among other features, render many suburban areas out of reach to many households on a limited income. Unfortunately, many minority groups fall within the spectrum of those who cannot afford to live in these communities. The resulting pattern is one in which central cities, and older industrial areas contain large percentages of poor and minority

households, while the surrounding suburbs remain mostly white and well-to-do. In the case of Southeastern Massachusetts, the city of Brockton is home to a disproportionate amount of the region's poor and minority households, while towns such as Kingston and Easton remain over 90% white.

Unfortunately, being homogeneous is how many communities intend on staying. In some cases, local officials have been accused of using sprawl development as a discriminatory tool. It is possible for communities to enact large lot zoning requirements, and place severe restrictions on multi-family or other affordable housing, in a veiled effort to keep poor and minority residents out. People in many affluent suburban communities have also protested the extension of commuter rail lines through their towns on the basis that "undesirables" will either move into town or visit for criminal reasons. The myth that sprawl development is "rural" development also seems to be a factor in this phenomenon. Residents of such communities may view transit as a force which takes away the perceived natural isolation of their environment. Many suburban homeowners hold the view that distance from urban centers represents success and the fulfillment of the American Dream.

According to Daniel Solomon, "sprawl development discriminates against anyone who is not in a *market sector*" (1989). Currently, developers do not build a variety of housing types in subdivisions. A subdivision usually focuses on one sector of the market. Since most new subdivisions are isolated from all other uses, even other residential ones, the result is an increasingly fragmented landscape. Residents of most new homes built in the U.S. will have neighbors with similar incomes. Development today rarely mixes income levels. This homogeneity is contrary to the nature of traditional urban environments where the opportunity exists for people with many income levels and interests to live near each other. Over the past fifty years, homeowners seem to want the assurance that *they* are living in an area where no one is less successful than they are.

The recent popularity of recreationally oriented communities, such as Indian Pond Estates in Kingston, assure that people with similar interests will live together in isolated communities. The trend of gated communities is another extension of sprawling, uncontrolled growth. A fear of crime among residents of affluent suburban communities has led to the development of private, isolated residential tracts complete with guarded entrances. Despite a falling national crime rate, this trend is evidence of the ongoing perception that privacy is the ultimate goal of residential development, no matter what the social implications.

Changing Demographics

The changing demographics of this country dictate a different sort of development than that which is still being built. The suburban dream of the 1950's was based upon the needs of nuclear families consisting of married couples, with one parent working, and their young children. However, today's households are much more diverse than those fifty years ago. The nuclear family represents only one out of four households. As of 1990, single person households constitute 30% of those in the country. Families with no children account for the largest percent of households at 36%. This category represents young families without children and "empty nesters" whose children have moved away. The least common household type in 1990 is "single parent with child," at 8% of national households.

Despite these demographic shifts, "we are still building World War II suburbs as if families were large and had only one breadwinner, as if jobs were all downtown, as if land and energy were endless, and as if another lane on the freeway would end congestion" (Calthorpe 1993). Many communities, including several in Southeastern Massachusetts, place severe restrictions on multi-family development. As a result many households do not have the same freedom of location, due to the available housing stock. The suburban real estate market fails to meet the needs of the elderly and others who do not live in a two parent - with children household. Even the older children of suburban households often cannot stay in town upon entering the job market. Many communities do not offer a range of housing prices which accommodates their needs. The typical suburban home owns 2.3 cars and generates 12 trips per day (Calthorpe 1993). A location on the fringe of the metropolitan area makes commuting for many double income families difficult. Additional time must be factored for driving children or elderly parents to most destinations.

Loss of Public Space and Social Interaction

Sprawl development results in a lack of public space. In the midst of an urban or village environment, a park, common, or green becomes a meaningful place which provides identity and common ground for public interaction. Communities have the opportunity for many forms of public events and recreational activities. Due to their low density and large setback requirements, most sprawling environments have more open space than do more urban areas. However, the majority of this space is committed to residential, office or commercial use. The oversized lawns, required for every suburban office building, serve no purpose for local residents or employees. The woodland held by the owner of a three acre single family home cannot serve as a public amenity. Since sprawling communities also have no town centers, the lack of public space further contributes to the sense of place-less-ness.

The opportunity for social interaction does not imply a utopian society where everyone greets each other while bicycling to work. However, it does entail the *opportunity* for people of different walks of life to experience the same environment together. It is especially important for young people to have experience in the real world. All social interaction is not positive social interaction. But the opportunity should exist for some semblance of a public, shared experiences on common ground. It is not a stretch to categorize sprawl development as "self centered." The lack of public space, pervasiveness of automobile usage, and isolation of households, sends the message that the only person to be concerned about is one's self. Ironically, this is one of the many negative values that people associate with urban areas.

Loss of Community Character

In many areas of Southeastern Massachusetts, as well as the rest of the country, the distinction between town and country has disintegrated. In most instances, those areas which fall into neither category are sprawling communities built since 1950. New England is a region characterized by dense, historic cities, small towns, and farmland. Over the past fifty years many communities in Southeastern Massachusetts have seen their historic character erode as uncontrolled residential and commercial developments have spread across the landscape. Traditional New England small towns consisted of a central mixed use village area surrounded by open space and farmland. Today the individuality of most of these communities is gone, as sprawling land use patterns have connected every older village with miles of large-lot residential development.

The town of Stoughton in Southeastern Massachusetts serves as an example of this loss of individuality. Stoughton Square, the town's central business district, was focus of all growth and activity for years. Development occurred around the train station and its expansion was limited due to proximity to the center of town. Today, however, strip commercial development is found throughout the major roads entering Stoughton Square. What was once a distinct and compact town is now a spread out mass of commercial development. This new development is not consistent with the historic nature of this historic New England town.

The quality and design of development over the past fifty years also contributes to the loss of community character. Development since World War II has been geared exclusively toward the automobile. Most new commercial development occurs along suburban arterials without regard to the pedestrian or bicyclist. Parking must be overabundant, and located in front of the building. Signs must be large and visible from a speeding automobile. Proximity to a highway interchange is more important than proximity to a dense residential area. The result is a blurred landscape of monotonous retail chains. On a local scale, one community is no different than any other. On a national scale, a strip commercial area in Massachusetts appears no different than one in California, Florida, or Texas.

The lack of design standards, and the loss of interest in "community" has resulted in an environment in which buildings do not conform to their surroundings. Development has consisted of strip commercial architecture, which utilizes the cheapest building practices in order to maximize profit. New development does not relate to more traditional structures nearby. Residents are left to muster pride for communities that have no center, no character, and no individuality.

Loss of Small Businesses

One effect of sprawling development is the death of many "Main Street" small businesses. Highway Commercial zoning along suburban arterials caters to national retail chains. These new chains agglomerate away from the center of town and attract more customers as people locate in peripheral areas. Owners of the traditional family store are finding it harder to compete in an age when people in sprawling subdivisions have few options but to drive to the nearest strip commercial area for all of their shopping and recreation. According to Economist Kenneth E. Stone, "within five years of a Wal-Mart's opening, small towns within a twenty mile radius find that net sales are down 19 percent" (Holtz-Kay 1994). Towns at a greater distance, but within a short drive see sales decrease by 10 percent (Holtz-Kay 1994). The loss of small businesses also leads to erosion of community character, as nearly all communities in a given region are home to the same retail giants.

Job-Housing Imbalances

The common pattern of land use in this country also results in the problem of job-housing imbalances. Traditionally, major employers were found in town centers and people settled around areas of employment. This pattern explains settlement in the city of Brockton, in which residential development grew around the linear expanse of shoe manufacturing facilities. However, as more companies locate in suburban office and industrial parks, jobs in the region are found at an increasing distance from major urban centers where most people still live. In Southeastern Massachusetts new employment generating development in towns such as Avon and West Bridgewater is not easily accessed by residents of Brockton or Boston, especially those without automobiles. This inefficient pattern leads to difficulty in offering public transportation for those who need to find employment. The desire to increase the local tax base is strong enough that exurban communities are desperate to attract new industrial development without consideration of regional commuting patterns.

The Costs of Sprawl

Perhaps the most convincing evidence to local officials is the cost of sprawl development. The pattern of land use, which has become so commonplace in our society, is becoming extremely inefficient.

A HUD study from 1974 calculated compact development at only 40% of the cost of conventional suburban development (Holtz-Kay 1994). Today the cost of sprawl has surely increased due to decreased densities and increased distances from urban centers. Denser development translates into the benefits of less air pollution, less consumed open space, fewer depleted resources, less energy consumption, and less distressed urban areas, only to name a few.

One of the main costs which is taken on by local governments is the inefficient extension of utilities and services. Municipalities must provide utilities to sparse haphazard development across the entire town rather than in a number of compact areas. Oversized residential and commercial setbacks also call for unnecessary extension of water, sewer, and gas lines. Unmanaged growth also leads to inefficiency in the provision of local services. As leapfrog development occurs in every area of town, police, fire, and rescue services need to respond to calls from sparsely located residences, rather than from a compact settlement area. The consequences to the tax burdens of local families is obvious as additional fire stations are constructed, more police officers are hired, and more children need to be bussed to school. The natural resources of a given community can also be seen as a depleted local resource, as low density development consumes a minimum of one acre per dwelling unit (Holtz-Kay 1994.). Towns often spend lofty sums trying to repair the damage done by irresponsible development. Many communities grapple with water shortages while they mandate forty foot lawns which residents must water every day.

Reliance on automobiles leads to many hidden costs to society, more specifically to taxpayers. The negative effects of automobile usage are seldom understood by local officials and residents.

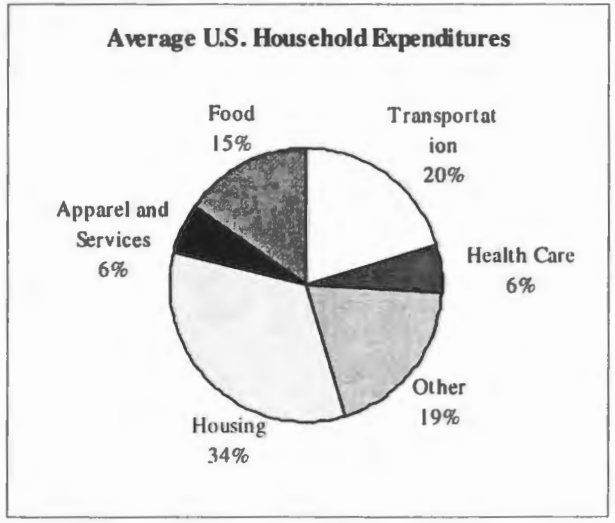
Table 3.3 shows the costs of roadway travel to society. Roadway travel includes automobiles, as well as trucks and buses.

The costs that people think of when they think of highways (road

construction and maintenance) account for only about 3 percent of the total costs to society of highway travel. Drivers fail to pay for about 60 percent of transportation related infrastructure and services (Moore and Thorsnes 1994) According to the estimates, the average cost of auto travel is 77.9 cents per mile. This figure is nearly three times the rate of 25-30 cents per mile commonly for travel reimbursement and cost projections (Moore and Thorsnes 1994). As the table shows, Americans spent approximately $1,635,800,000,000 on roadway travel in 1989. According to the table, drivers accrued only 57% of this cost. Drivers do not pay a dime for the air and noise pollution produced by their daily commutes.

The high cost of automobile reliance is also borne by American households. *Figure 3.3* shows the average percentage of expenditures spent on transportation and other costs at the household level in 1995.

Figure 3.3



Source: FHA. 1998. Our Nation's Highways. Washington: GPO

TABLE 3.3 COST OF ROADWAY TRAVEL IN 1989

Component of Cost	Cost per Mile (Cents)	Total Cost ($ Billions)	% of Total Social Cost	% Unrecovered From Drivers
Direct Costs of Highway Capital & Operation				
Roadway construction and repair	1.6	33.3	2.0	31.0
Roadway maintenance	0.9	19.7	1.2	31.0
Related services (police etc.)	3.6	75.6	4.6	88.9
Parking (lots and structures)	9.5	200.0	12.2	25.0
Subtotal	15.6	328.6	20.1	40.7
Costs that Accrue to Drivers				
Operation	6.8	142.8	8.7	0.0
Vehicle capital	18.8	394.8	24.1	0.0
Travel time	12.0	252.0	15.4	0.0
Schedule delay	6.6	138.6	8.5	0.0
Subtotal	44.2	928.2	56.7	0.0
Other Private Social Costs				
Air and noise pollution	0.9	19.0	1.2	100.0
Accidents	17.1	360.0	22.0	15.0
Subtotal	18.0	379.0	23.2	19.3
Total	**77.9**	**1,635.8**	**100.0**	**12.6**

Sources: Moore, Terry, and Paul Thorsnes. 1994. The Transportation / Land Use Connection. APA PAS No. 448/449.

Transportation costs, especially in suburban environments, are mounting for individual families. The average American family spends a fifth of its budget on its cars and their related costs (Holtz-Kay 1994). The car is "second only to the home in the family budget and close behind our mortgage fees" (Holtz-Kay 1994). The average cost of owning, insuring, repairing, and maintaining a two-year old vehicle is $6,000 per year per vehicle. The average car buyer must spend approximately half of his/her income on their automobile. Indirect costs of automobile usage equate to $3,000-$5,000 per automobile for parking facilities, law enforcement, environmental damage, registry operations, and uncompensated accidents (Holtz-Kay 1994). This money comes not only from the gas tax but from property, sales, and general taxes as well.

However, governments have been slow to support alternatives to the automobile. Officials perceive investment in highways as the solution to congestion, despite evidence that new highways bring more pollution, congestion, and uncontrolled development. Leaders usually think of mass transit as a form of welfare, to be supported only for the good of the poor. The positive economic and development impacts of transit are rarely considered. In the words of a former head of the High Speed Rail Association, we "'invest' in airports. We 'invest' in highways. But we 'subsidize' trains" (Holtz-Kay 1994). Officials often label transit as "money-losing" despite the millions of unrecovered dollars spent on road construction and maintenance, and the millions spent on other auto-related costs (Holtz-Kay 1994). Many also consider transit, especially buses, to be transportation reserved for only the most downtrodden members of society.

Sprawling, automobile-oriented development is not the result of "free market" forces. Our automobile dominated culture is heavily subsidized by the government at the Federal and State level. Virtually every new highway, or interchange receives funding from the Federal Government. The Federal Government has spent billions of dollars building the interstate highway system, while leaving mass transit up to individual areas. The free market is not at work when a suburban municipality lures a major employer from the city by offering a multi-year tax abatement. Elements in the Federal tax structure also encourage the construction of new facilities rather than the rehabilitation of older ones (Holtz-Kay. 1994).
As will be discussed later in this chapter, a more compact development pattern centered around transit stops could be a viable solution to the mounting problems associated with sprawl development and automobile reliance. A solution which has failed again and again is the widening of congested highways. Countless communities have spent public moneys on increasing the capacity of freeways only to see these roads congested within a few years.

Other costs figure in to the reliance on automobiles and sprawl development. Congestion from excessive automobile reliance has also led to a host of unseen costs. Americans spend approximately 8 billion hours a year stuck in traffic. Economists estimate that traffic congestion has led to $168 billion in productivity lost every year (Holtz-Kay 1994). Parking is another factor in calculating the cost of sprawl. Free and abundant parking is offered by many employers and shopping establishments. The cost of parking development, however, is often borne by taxpayers, not by the drivers who use it. As development consumes additional farmland every year, food must be transported at greater distances to residential areas. The cost of transportation is borne by the consumer.

Sprawl's Effects on the Central City

Perhaps the most disheartening aspect to this uncontrolled pattern of development is its effects on central cities. The landscape across our country is one of increasing segregation in our urban areas. Residents of central cities are disproportionately poor, as compared to those who can afford to buy into an automobile dependent life. Communities are also segregated by race, with a disproportionate number of minorities residing in older urban areas. It is a logical assumption that uncontrolled growth along the fringes of metropolitan areas drains the central city of development and draws residents and companies away from the city. As development spreads farther outward the trend continues. Rather than renovate property or infill in urban sites, developers find it simpler to construct new buildings on vacant parcels of land. This disinvestment leads to a cycle where the erosion of a city's tax base leads to higher rates, luring more people to leave for the suburbs. This trend may have begun with the initiation of Federal

policies such as the G.I. Bill, which supported the construction and purchase of new suburban homes. However, continued local, State, and Federal investment in highway construction and suburban office and industrial parks has led to a final decade of the twentieth century where these practices are still the norm.

The city of Brockton serves as a regional example of the erosion of a city center due to sprawl development. During the nineteenth and early twentieth centuries Brockton was a compact and thriving industrial community, with a niche in the shoe industry. For decades the central business district revolved around Main Street and the shoe factories extending from north to south. The remainder of Brockton consisted of forested and agricultural land. The city served as the cultural and economic center for the Old Colony Region. Street car service radiated from the city center to neighboring towns.

However, beginning in the 1950's the city experienced sprawling development within its own borders. The open spaces outside of the central city soon began to disappear as developers produced new subdivisions at an assembly line pace. Strip commercial uses soon appeared along major roadways. These new automobile oriented chains undermined Downtown's position as the economic center of the region, and even as the center of the city itself. Companies relocated from Downtown or were forced out of business. Residents who lived close to the center of town moved outward to the new houses on the outskirts of the city. Those who could not afford to do so were left behind as many of Brockton's working-class neighborhoods became home to only the poorest of the poor. The final step in this process was the completion of Route 24 in 1960, a limited access highway linking Boston with Southeastern Massachusetts. To this day most new development in Brockton takes place near the highway interchanges on the western-most part of the city. Since the construction of Route 24 a new mall was constructed near the highway, and even the high school was moved from its central location to a new site far from Downtown.

The result of all of this investment in automobile oriented development is a Downtown with a high vacancy rate in its historic buildings. The city's own disinvestment in its central business district has led to the disintegration of local economy as well as local character. Many areas of Brockton possess the same strip commercial landscape as do suburbs in the region. The city's urban nature, has been compromised for the sake of increasing the tax base. With a comprehensive approach to growth management the city of Brockton could have focused this growth in its central business district, as well as key areas in city neighborhoods.

III. TRANSIT-ORIENTED DEVELOPMENT

A. INTRODUCTION

America's pattern of sprawl development has become tradition in just the fifty years since 1950. However, it is evident that a new form of development is necessary in this country. Southeastern Massachusetts, with its ample land and proximity to Boston is a region in immediate need of development alternatives. If the uncontrolled growth of past decades continues, the communities of the Old Colony Region will see their natural, recreational, and historical resources undermined by strip commercial development, office parks, and land consuming subdivisions.

Transit-oriented developments, or "TOD's," are one way to accommodate growth in Southeastern Massachusetts, while minimizing its negative effects on the environment and other aspects of the community. Section B will discuss the nature of TOD's and how they can benefit the town of Kingston as well as Southeastern Massachusetts.

B. WHAT ARE TOD'S ?

Definition

Transit-oriented development, such as Independence Centre, provides an *alternative* to sprawl development. TOD's take advantage of transit stations, such as the Kingston MBTA commuter rail station, to offer a mixed use, higher density environment the likes of which have not been seen in land development since World War II. TOD's focus development around transit to create a walkable neighborhood where people are close to jobs and services. The entire site is situated within

walking distance of the train station. In TOD's residents have the option of commuting via mass transit, rather than relying exclusively on the automobile.

The TOD concept follows traditional development practices of the pre-World War II American small town. Dwelling units are built to a higher density that is more typical of a traditional village center than a suburban subdivision. Commercial uses possess higher floor area ratios to increase their densities to the level of a small town "Main Street." Buildings are placed close to the street to provide a more walkable environment for neighborhood residents, employees, and customers. A neighborhood in which people walk in public spaces brings with it an inherent degree of safety, where eyes are on the street at all times. The compact nature of these developments creates the opportunity for more usable open space, and the conservation of sensitive on-site areas.

Transit-oriented developments are not meant to stand alone. On a larger level TOD's are to be "strategic points along a regional transit system" (Calthorpe 1993). Developing a series of TOD's along multiple transit routes can accommodate regional growth in a much more compact and ordered manner, than has been seen in decades of suburban development.

C. BENEFITS OF TOD'S

Various sources cite transit-oriented development as a method of controlling growth and improving people's environments. TOD's have become a favored development alternative by many planners and scholars. Several of these developments have been successfully completed; most of these developments have been on the West Coast. However, TOD's can be used in New England as a way to foster more responsible development.

Investment in transit-oriented development will have numerous benefits for Southeastern Massachusetts. These benefits address the pervasive issues of sprawling development that threaten the region. Of course transit-oriented development cannot be the only tool in growth management. However, the implementation of this new pattern of development sets the stage for a new framework for more livable communities, and a more sustainable regional economy.

Transportation

TOD developments make maximal use of their locations near transit stations. This proximity to these stations provides residents with an opportunity to use mass transit as an alternative form of transportation supplementing or replacing the automobile. This form of development has the potential to reduce traffic congestion along arterial roads and highways and improve air quality through the reduction of automobile trips. Increased opportunities for mass transit also provides greater access to employment centers for those members of the population who do not drive due to age, income or disability.

In December of 1992 the Federal Transit Administration's Office of Technical Assistance and Safety completed their final report regarding their study on the Impact of Various Land Use Strategies on Suburban Mobility. The study verified "what had previously been only a theoretical viewpoint: that concentrating new suburban development into higher density, mixed use centers will slow the growth of regional vehicular use" (FTA 1992).

The study came to the following conclusions (FTA 1992)

- Mixed use centers can produce significant regional transportation benefits.
- Mixed use centers are a viable concept for suburban centers.
- Mixed use centers, through design and function, can have tangible local transportation benefits.
- Promoting strong urban growth along with suburban mixed use centers gives the best regional results.

The above benefits of mixed use, concentrated development, do not take into consideration the added benefits of developing within walking distance to transit. Transit utilization can reduce automobile usage to a greater extent.

Other studies, however, show the results of TOD's on automobile usage. A study done by the group, 1,000 Friends of Oregon, concluded

that TOD's could "reduce the number of vehicle trips by 7.7% and vehicle miles by 13.6% compared to a standard suburb" (Arrington 1995). A report by the California Air Resources Board concluded that "TOD's reduce solo driving mode shares or vehicle trips within the TOD area by twenty percent to fifty percent at the neighborhood level compared to conventional development patterns" (Dagang and Parker 1995).

Mixed use, higher density neighborhoods are much less reliant on automobile trips to reach their destinations. Households in traditional neighborhoods also made less total trips than did households in suburban tract developments. This fact is due to the separation and lack of access in sprawling communities. A separate automobile trip is needed for virtually every use, whereas an older business district can accommodate a number of uses within a short walking distance. One automobile trip can give someone access to a number of shops or services in the same quarter-mile area.

Safety is another benefit of transit-oriented developments. The Institute of Transportation Engineers issued a report entitled *Traffic Engineering for Neo-Traditional Neighborhood Design* which compared the circulation features of these neighborhoods with conventional suburban patterns (1995). In neo-traditional neighborhoods streets are designed to be more than throughways for cars. Streets are places of public interaction shared by pedestrians, bicyclists, and drivers. Streets in neo-traditional neighborhoods are built to traveled on at slower speeds. Roads are narrower and intersections are more frequent. On-street parking is encouraged to slow down traffic and to act as a psychological barrier for pedestrians. In most new subdivisions roads are wide and offer few intersections. Corners are wide promoting uninterrupted driving at high speeds. Tighter corners and narrower roads in neo-traditional neighborhoods also allow for easier pedestrian crossing.

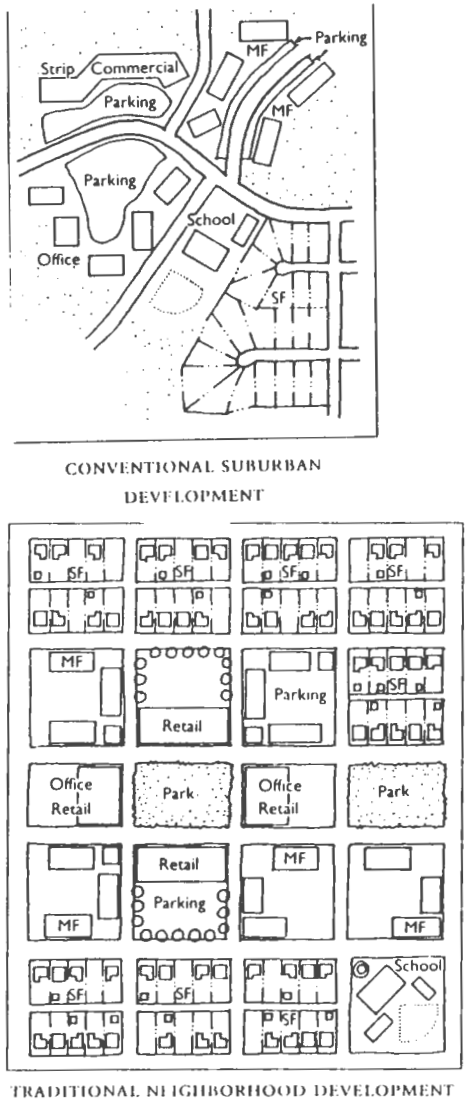
In neo-traditional developments, traffic is dispersed as drivers have more than one route to a given location. Traffic is sparse on suburban cul-de-sac roads but arterials are wide and uncrossable. Adequate sidewalks are another essential component of a neo-traditional right of way. Many suburban streets lack sidewalks altogether forcing pedestrians (mostly children) into the street. Congestion is often reduced in neo-traditional neighborhoods because most intersection "require only 'stop' signs or two-phase signals with short cycle times. With less traffic and shorter cycle times, delay time can be less as could be overall travel time" (Johnson and Stone 1992).

The interconnected road network of TOD's allows for a more efficient use of public transportation. Compact development and shorter blocks lead to shorter walking distances to bus stops. "Since the entire project is designed with pedestrian accommodation as a major design feature, adequate facilities for walking to transit are assured" (ITE 1994). This design is counter to most suburban developments where buses cannot access the scores of cul-de-sacs which adorn the landscape. The higher densities in TOD's justifies a the extension of public transportation to the area. Many public transit operators cannot efficiently extend their service to suburban areas where densities are very low, and populations are very spread out.

Figure 3.4 presents two different types of land development. The first neighborhood is a typical sprawl development with isolated land uses. Although commercial, office, and residential uses are near each other, they are not easily accessible. This neighborhood is developed for the automobile without consideration for the pedestrian.

The lower development in *Figure 3.4* is a traditional neighborhood development with an interconnected street system. Traffic is dispersed through a grid system of roads, as opposed to emptying onto one main arterial. Land uses in this neighborhood are mixed with retail, office, residential uses and a school within walking distance of each other. Neighborhood parks are provided within the framework of the neighborhood. The frequency of intersections in this neighborhood discourages speeding and encourages walking. In short, the second example in *Figure 3.4* is a much more cohesive and convenient neighborhood in which to live.

Figure 3.4 Suburban and Traditional Development Patterns



Source: Calthorpe, Peter. 1993. *The Next American Metropolis*. New York: Princeton Architectural Press.

Social

The high density and mixed use character typical of TOD's provides for a quality of life and public space which has been lacking in new developments since the Second World War. Unlike traditional suburban development, land uses are not segregated, but are related to one another, with appropriate pedestrian access. TOD's can be used to replicate desirable features of Main Street, village development, which have been shunned in contemporary development practices. TOD's are developed to be pedestrian oriented so that residents and shoppers are not forced to drive to all retail, recreational, and institutional uses. This feature is especially beneficial for those populations who may not have access to automobiles, such as the elderly, children, teen-agers, and others whose ages or incomes prohibit automobile ownership. The TOD can provide a needed alternative for the "soccer Moms and Dads" who spend hours a day commuting to work and driving their children to school and other activities.

Housing

The higher densities characteristic of TOD's dictate smaller lot sizes for residential uses, as well as multi-family uses. Due to the smaller lot sizes, developers are not encouraged to sell single family homes at the high prices associated with conventional large lot zoning. The generous inclusion of rental units also allows for a greater percentage of affordable housing for middle and low income people. Thus, a social benefits of TOD's is their potential to desegregate suburban communities. This model of development allows for people of various incomes and social status to reside in what would otherwise become upper income, low density suburbs. TOD's can provide housing for households which do not fit the mold of the traditional, two parent family. Transit oriented developments foster neighborhoods which are similar in scale to traditional villages and Main Street areas. Such communities are characterized by a mix of uses and incomes, pedestrian orientation and access, and a clear definition of public space.

Economic

Investment in TOD's can have an impressive fiscal impact on a local and regional level. Every year the Real Estate Research Corporation (RERC) publishes their analysis of current trends in the development industry called *Emerging Trends*. Every year *Emerging Trends* "takes the industry's pulse and judges its future course with the help of more than 150 leading investors, analysts, developers, advisors, and other experts" (RERC 1997). In their report for 1998, RERC call attention to "suburban red flags." In many areas development has spread as far out as it logically can. Many developers are now considering unrestricted suburban growth as too risky. Sprawling development can leave project obsolete as markets become flooded and development occurs farther and farther out.

Overdevelopment has also led to a growing number of consumers being fed-up with the suburban lifestyle. According to the report, "many people just want to be closer to work, coveting a 24-hour lifestyle whether they find it in a downtown or a suburban area" (RERC 1997). Traditional neighborhood developments, especially those centered around transit stations, are gaining favor due to their human scale and convenience. RERC analysis stresses that "regions that ignore the need to provide alternatives to the automobile will become increasingly troubled, especially in their suburbs" (RERC 1997). Investment in transit-oriented developments is a logical step as the baby-boom generation ages and demands a more convenient lifestyle, closer to work and recreation.

Development around transit can lead to higher property values. A recent study by Economics Research Associates documents significant increases in property values for medium density apartments and condominiums and commercial property located near rapid transit stations (1995). The same study also concluded that close walking distance to a transit station and office and retail values per square foot are linearly related. As more people appreciate the benefits of shopping and living near transit this relationship has the potential to become even stronger.

Tax revenues can also be increased through TOD's. Higher assessed property values result in increased revenue. Building at higher densities can also lead to a much higher value on a given tract of land. One study pointed out that highways increase the value of land near entrances and exits but lower the value of land along the rest of their routes. Rail-based transit systems, however, increase property values all along their routes (Australian Consumers Association 1992).

Guiding development near transit also reduces the negative fiscal impacts of sprawl development. Utilities and services do not need to be extended to various new pods of development. More rational and efficient extension of utilities lowers the cost of residential development, and helps in the conservation of municipal funds. Regionally, a smarter pattern of growth will prevent the countless negative impacts that built-out sprawl development can bring. The constant pressure to build and widen roads is reduced. On the level of the individual household, developing near transit leads to many economic benefits including lower taxes, and lower transportation costs.

Environmental/Growth Management

One of the main benefits of TOD's is their potential for growth management. If used in conjunction with community and region-wide growth management, this model of pedestrian-oriented development can be an effective tool in the preservation of open space and the protection of environmental resources. RERC's report also states that "the most stable investment markets-the ones that hold their value have growth controls-either government enacted or enforced by natural geographic features" (RERC 1997). If planned effectively, the TOD can absorb the projected development of a growing community. Residential, commercial and other uses can be accommodated in proximity to transit stops, while other, more environmentally sensitive areas of the community remain undisturbed.

On a region wide scale such a pattern of village scale development will lessen the further consumption of land. The current large scale consumption of land in Southeastern Massachusetts has led to the loss of many amenities and resources, such as agricultural land, wetlands, forest land, and other areas which are sensitive to development due to

environmental constraints. Development of transit-oriented developments re-enforce the boundary between "town" and "country" which has been eroded over the past 50 years. Intelligent, mixed-use development around transit stops helps preserve a region's small town atmosphere by establishing a residential and commercial center, and keeping surrounding open space from being developed.

CHAPTER IV
Current Site Conditions

I. STUDY AREA BOUNDARIES

The Independence Centre study area consists of 130 acres of land. The area includes the MBTA station, lay-over facility, and parking lot, a sand and gravel operation, as well as smaller wholesale and industrial uses. The study area is bound on the west by a steep slope, at the top of which exists the "Indian Pond Estates" subdivision (currently under construction). The study area is bound on the north by Marion Drive, on the East by Royson Drive which is adjacent to the Independence Mall site. The study area is bound on the south by forested parcels of residential land around Smelt Pond.

II. LAND USES

Of the 130 acres in the study area, approximately 24 are MBTA property, used for the train station, parking lot, and lay-over facility. A portion of MBTA owned property consists of undeveloped land to the south of the layover facility. Several parcels of land in the study area are active, industrial uses. By far, the most dominating feature of the study area is the 40 acre O'Donnell Sand and Gravel operation, directly to the East of the MBTA station. Other industrial uses include a construction company and an auto body repair shop. There are no active retail, recreational, or residential uses in the study area. Several parcels in the study area along Marion Drive remain undeveloped or vacant.

Nearby retail uses include several automobile dealerships, and a Toys R' Us store, on Gallen Rd. A regional shopping center, the Independence Mall, is located approximately 1,200 ft. from the MBTA station. Built in 1989, the mall contains 100 individual stores with a total of approximately 600,000 sq. ft. of retail space. The only nearby residential area is Copper Beach Drive. This cul-de-sac street culminates at the station parking lot, but offers no automobile access. Homes consist of large-lot, single-family dwellings. *Figure 4.1* on the next page shows an aerial view of the study area

III. ZONING

All land within the study area is zoned "industrial" as determined from the official town zoning map. According to town zoning by-laws, industrial districts allow uses such as manufacturing, warehouses, office parks, and industrial parks. Uses allowed by special permit include retail, and other specific office and service related uses. No residential uses are permitted within industrially zoned land. The subdivision of industrially zoned land requires a minimum lot size of 40,000 sq. ft. (0.92 acres). The building envelope for uses in this district consists of 250 ft. of frontage with a 50 ft. front setback, 40 ft. side setbacks, and a 40 ft. rear setback. Maximum building height is 40 ft., and the maximum floor area ratio in this zone is 1.00. Construction is limited to under 10,000 sq. ft. gross floor area, and under 3 acres of land.

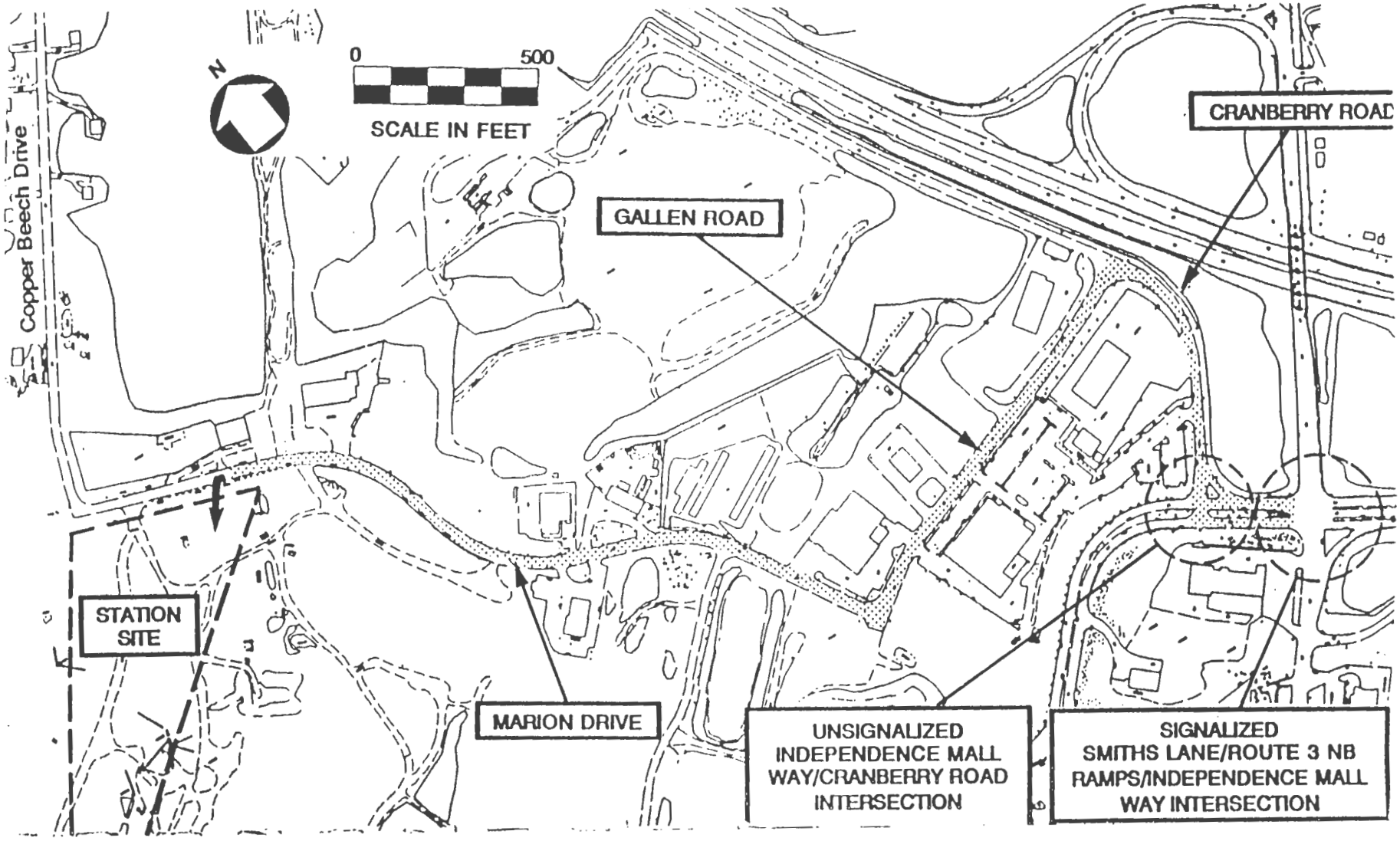
IV. TRANSPORTATION

The transportation layout in and around the study area reflects conventional suburban development practices. While many uses exist within a mile of the Kingston Station, access is inconvenient for motorists, and especially for pedestrians. Access from Route 3 to the Kingston MBTA Station can best be described as indirect and confusing to motorists. Commuters on Route 3 take Exit 8 onto Independence Mall Way. Drivers then take a left onto Cranberry Rd., and then take another left onto Gallen Rd. Drivers then bear right onto Marion Drive, which culminates at the MBTA parking lot. Signage indicates the route to the station. Station users from other areas of the town must also access the site in the same manner. *Figure 3.2* shows the layout of the station area.

An additional access route to the site exists through Copper Beach


Figure 3.1 Aerial View of the Independence Centre Study Area
Copper Beech Drive
Marion Drive
Parking Area
Station Platform
Layover Facility
N
Source: Old Colony Planning Council

Figure 4.2 Existing Street System in the Kingston Station Area



Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal*

Drive. However, the street, which was already constructed as a cul-de-sac, is now fenced off before the turn-around, to prevent automobile access to the site. The Indian Pond Estates development, which is currently under construction, sits to the North and West of the site, but will provide no access to the station. A steep slope separates the residential development from the rail station; this slope will be fenced upon completion of the development.

Currently, the station is situated in an isolated position from the main residential and commercial areas of the town. The main access to the Route 3A, Main St. area is Smith's Lane which crosses over the highway from Independence Mall Way to Route 3A. Much of the residential development on streets to the East of Smith's Lane is approximately one mile from the Kingston Station. However, the route is not suited for pedestrian use. Smith's Lane passes over Route 3, and culminates in the highway-like Independence Mall Way. Cranberry Drive, Gallen Road, and Marion Drive offer a stubbornly indirect route for pedestrians. The route offers a bleak landscape of automobile dealers, vacant industrial land, and a sand and gravel pit. Sidewalks have recently been installed along this route, however, in order to accommodate existing or future pedestrians to the station. While the MBTA station sits within a half-mile from the Independence Mall and a new residential neighborhood, access is automobile oriented and focused on channeling traffic to large arterials.

Traffic Volumes

According to the Environmental Impact Study of the Plymouth Line Terminal done by MBTA, the peak traffic hours for the station are expected to be 7:45 to 8:45 A.M. and 4:45 to 5:45. Only the P.M. peak hour will have any real traffic impacts due to Independence Mall peak traffic at roughly the same time. The Mall is not open for business during the rail stations A.M. peak hour. The Kingston station does not operate on weekends; the Plymouth Station acts as the terminus for the Plymouth Line on Saturdays and Sundays.

The Independence Mall is "clearly the principal traffic generator in the area and will remain so in the future" (MBTA 1992).

Figure 4.3 and *Figure 4.4* illustrate total future P.M. peak hour traffic volumes around the Kingston Station area, as projected by the MBTA in their Environmental Study of the Kingston Station. *Figure 4.3* shows station related traffic only, while *Figure 4.4* shows total traffic predicted.

Ridership

Specific counts of commuters from the Kingston Station, and their destinations are not available. According to MBTA research, daily boardings on the entire Plymouth Line total to an average of approximately 7,000 per day (MHD 1998). *Table 4.1* shows MBTA estimations for ridership at the Kingston Station in the year 2000, disaggregated by place of origin and mode of transportation to the station.

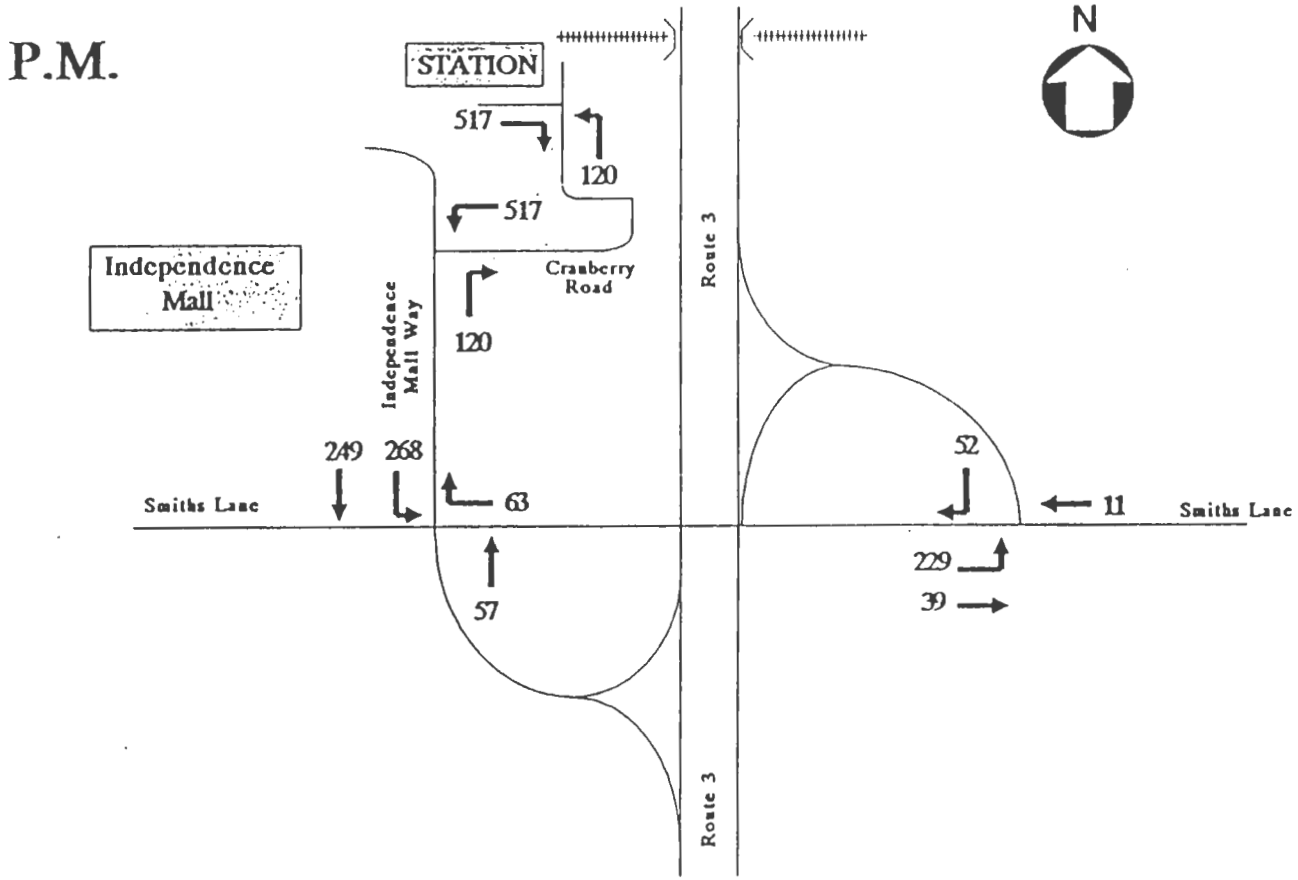
Table 4.1

ESTIMATED DAILY AM PEAK PERIOD BOARDINGS AT KINGSTON STATION: 2000

Origin	Park	Drop-Off	Other	Total	% of Total Ridership
Total Cape	134	18	12	164	20.8
Canal	28	4	3	35	4.4
Inner	48	6	4	58	7.4
Mid	47	6	4	57	7.2
Other	11	2	1	14	1.8
Carver	19	3	1	23	2.9
Duxbury	137	50	12	199	25.2
Kingston	66	29	8	103	13.1
Marshfield	48	6	1	55	7.0
Plymouth	162	65	17	244	30.9
Wareham	1	0	0	1	0.1
Total	548	168	50	789	-
% of Total	69.5	21.3	6.3	100.0	

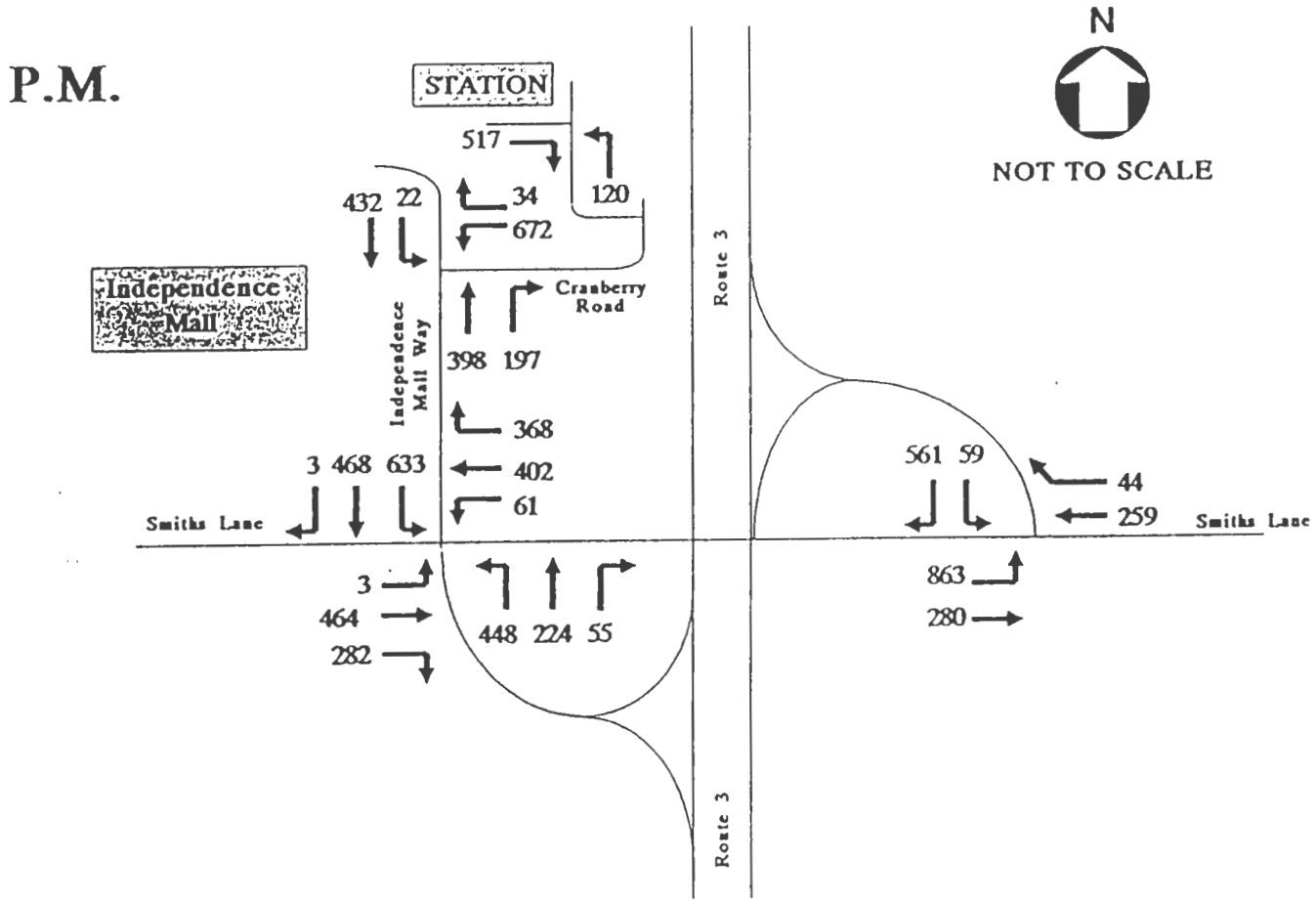
Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal.*

Figure 4.3 Station Related PM Peak Hour Traffic Volumes in the Kingston Station Area



Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal.*

Figure 4.4 Total Future PM Hour Traffic Volumes in the Kingston Station Area



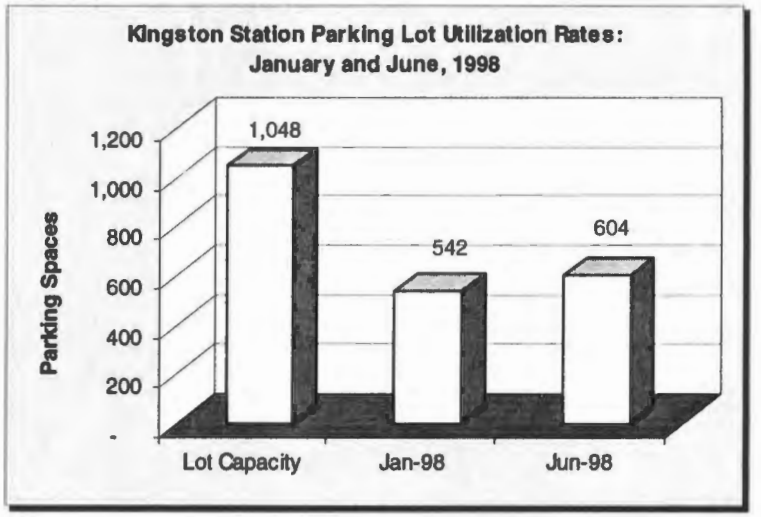
Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal*.

MBTA ridership projections for the year 2000 show the majority of commuters on the Kingston Station are coming from communities other than Kingston. Almost one-third of morning peak hour commuters will reside in Plymouth. The predominance of commuters from Plymouth relates to its proximity to the Kingston Station and its population. Out of over 350 communities, Plymouth has the largest land area in Massachusetts, and is projected to have a population of 54,116 by the year 2000 (OCPC 1997). Over 20% of commuters are expected to come from Cape Cod. The Kingston Station serves as the closest MBTA station to Cape Cod, easily accessed by Route 3. The neighboring town of Duxbury to the north also provides over a quarter of commuters.

According to MBTA projections, approximately 70% of morning peak hour commuters will drive from their homes to the train station (MBTA 1992). Another 21% will be dropped off at the station by other drivers. Only 6.3% of commuters are expected to use means other than automobiles to get to the station. "Other" means include walking, bicycling, and motorcycling. This analysis does not reflect transportation patterns should GATRA buses offer service to the train station in the future.

A rough estimation of the number of people boarding at the Kingston Station can be made by analyzing parking lot utilization rates. A study done in January and June of 1998 by Old Colony Planning Council shows that, in two measurements, an average of 573 cars were parked at the Kingston Station parking lot. The station's parking capacity amounts to 1,048 spaces, resulting in an average utilization rate of 54.7%. From January to June 1998, average utilization increased by 11.4% (542 to 604 occupied spaces). Station parking lot utilization is not, however, a true indicator of ridership; the number of occupants per vehicle cannot be assumed.

Figure 4.5



Source: Old Colony Planning Council.

V. STATION OPERATIONS

The following schedule shows departure and arrival times for the Kingston Station. Additional off-peak trains arrive and depart from the Plymouth Station.

TABLE 4.2 COMMUTER RAIL SERVICE SCHEDULE FROM KINGSTON STATION

Direction	Depart Kingston	Arrive South Station
Inbound Service	5:37 AM	6:31 AM
	6:27 AM	7:24 AM
	7:10 AM	8:06 AM
	7:34 AM	8:30 AM
	8:33 AM	9:28 AM
	10:48 AM	11:43 AM
	1:20 PM	2:15 PM
	3:40 PM	4:32 PM
	6:15 PM	7:25 PM
	7:59 PM	8:55 PM
	8:50 PM	9:45 PM
Direction	**Depart South Station**	**Arrive Kingston**
Outbound Service	7:05 AM	8:10 AM
	9:35 AM	10:27 AM
	12:10 PM	1:03 PM
	2:25 PM	3:18 PM
	4:15 PM	5:10 PM
	4:55 PM	5:50 PM
	5:30 PM	6:25 PM
	6:15 PM	7:10 PM
	7:30 PM	8:23 PM
	9:30 PM	10:23 PM
	10:40 PM	11:33 PM

Source: MBTA. 1998. *Plymouth/Kingston Line Commuter Rail Schedule.*

As the above schedule indicates, the earliest departing train from Kingston to Boston leaves at 5:37 AM. Trains run every hour until 8:33 AM, with an extra peak hour train at 7:34 AM. No additional trains leave Kingston until 10:48 AM, additional off-peak trains are available at the Plymouth Station.

Reverse commuting to Kingston is possible beginning with the 7:05 AM train from Boston to Kingston. Off peak trains run from 9:35 AM to 2:25 PM. Trains run approximately every 45 minutes from 4:15 to 7:30 PM. The last train from Boston enters Kingston Station at 11:33 PM.

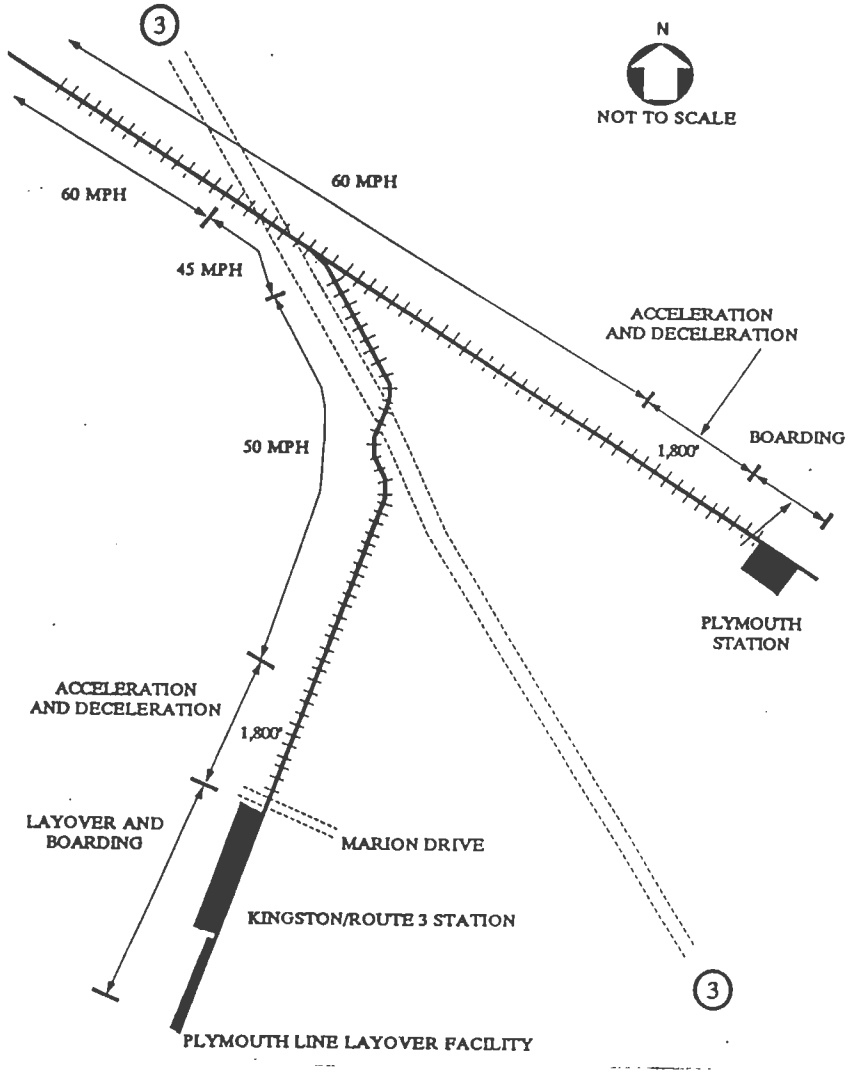
Figure 4.6 shows MBTA scheduled train speeds in the Kingston Station area.

As shown in *Figure 4.6*, MBTA trains reach speeds of up to 60 mph once the Kingston spur rejoins the main Plymouth Line. However, near the Independence Centre study area, trains are either in a state of acceleration or deceleration. This fact should be taken into consideration when analyzing noise and vibration levels from passing trains.

Standard maintenance procedures are carried out at the Kingston Station and layover facility. Procedures include the following: (MBTA 1992)

- Snow and ice removal at platforms, ramps, and stairs
- Sanding and plowing of parking lot and access roads.
- Litter clean up and cleaning of catch basins.
- Only interior cleaning of the trains occurs at the layover facility. Daily inspection and maintenance is provided at the Service and Inspection Facility near South Station in Boston.

Figure 4.6 Scheduled Train Speeds in the Plymouth Line Terminal Area



Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal.*

VI. PARKING

Given the sparsity of land uses in the study area, there is no current shortage of parking. According to current zoning by-laws, industrial uses require 1 space for every 1,000 sq. ft. of gross floor area, plus an additional 1 space for every 3 employees, as calculated during the maximum shift. General business and office uses require 1 space for every 200 sq. ft. of gross floor area. Town by-laws also necessitate "adequate loading facilities" for all commercial and industrial uses (Kingston 1997). The design of loading areas is to be reviewed by the planning board prior to construction.

As previously mentioned, parking at the Kingston MBTA Station consists of 1,048 spaces, approximately 55% of which are occupied during commuting hours. The town of Kingston prohibits on-street parking anywhere in the study area.

VII. ENVIRONMENTAL FACTORS

This study area offers the town a unique opportunity for transit oriented development, in part due to the minimal negative effects of construction on the environment. A large portion of the study area consists of the O'Donnell Sand and Gravel operation. All land in this area has been stripped of its top soil and mined to exhaustion during the course of the business' operation. An equally large portion of the study area consists of the MBTA Station, lay-over facility and commuter parking lot. Most remaining land within the study area consists of industrial or warehouse uses, which are either vacant or under utilized. A portion of MBTA owned land, south of the lay-over facility remains forested.

Air Quality

The commuter rail station represents a positive contribution to the environment by giving people an alternative to the automobile. Most of the concerns related to air quality around transit station are from the number of cars driving to these station. According the MBTA's Environmental Impact Study for the Kingston Station, the layover facility represents the area of greatest concern with regard to air pollution generated at the station. To mitigate this source of emission, MBTA policy dictates that no diesel engine can remain idle for more than five minutes. The facility will be equipped with electric heaters which can warm up the train's engines without them running. According to the MBTA, in situations of extreme cold, the heaters are not effective and the engines must run continuously overnight (1992). The MBTA quotes the National Weather Service in stating that such an occurrence takes place at an average of seven times per year (1992).

Noise Levels

The primary noise generated from the trains is from their engines, not wheel-on-rail-squealing. Noise from trains is infrequent, occurring on weekdays from 5:42 AM to 11:28 PM, on an average of once per hour during peak service hours. Off-peak service is considerably less frequent. Nearby residential uses are considered to be able to tolerate up to 65 dBA without any sort of noise mitigation. It should be remembered that trains will be traveling at slower speeds near the Station, as they begin or end their journey. The layover facility will produce noise through the idling of trains. As stated above, idling will normally occur for no more than five minutes, with the exception of extremely cold nights. Idling will create noise levels of 70 dBA at a distance of 50 ft. for a "worst case" (MBTA 1992). The MBTA also used a more sensitive measure of noise and combined the noise of idling engines at the layover facility with the noise of passing trains. The resulting distance for 65 dBA impact was 345 ft. (MBTA 1992). This scenario reflected worst case conditions where extreme cold would force the trains to be left idling all night. Within given parameters noise mitigation measures may be needed for residential construction at Independence Centre.

Vibration Impacts

Due to the planned residential development in Independence Center, levels of vibration from commuter rail operation are a factor that must be addressed. *Table 4.3* shows maximum acceptable vibration levels for various type of uses.

Table 4.3

CRITERIA FOR ACCEPTABLE LEVELS OF GROUNDBOURNE VIBRATION

Type of Damage	Adjacent Uses	Limits for Commuter Rail (db)
Structural Damage	Residential	120
	Historic Structures	100
	Office	120
	Commercial	120
	Industrial	120
Annoyance	Residential	80
	Office	85
	Commercial	90
	Industrial	90
Interference with Equipment	Hospital Operating Room	70
	Vibration Sensitive Equipment	65
	Vibration Sensitive Manufacturing	65

Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal.*

The most important vibration criteria for Independence Centre is the maximum annoyance level of 80db for residential uses. Structural damage for residential uses also may occur at 120 db's.

Water Quality

The entire Independence Centre site sits atop the Plymouth/Carver Sole Source Aquifer, which extends as far north as the Jones River. All of the developed areas near the site rely on public water and not on private wells. *Figure 4.7* shows water supply resources in the Independence Centre Study Area.

The aquifer's designation as a sole source aquifer dictates that any development with the potential to impact groundwater resources "shall be reviewed by the appropriate groundwater protection division within the Environmental Protection Agency and the Massachusetts Department of Environmental Protection to ensure that Best Management Practices are employed to prevent pollutants from contaminating the groundwater" (MBTA 1992).

The likelihood of sewer service to the site also reduces the likelihood of negative environmental impacts. Kingston voters recently approved a bond issue for construction of a new wastewater treatment facility plant on the site of the town landfill. The town is currently in the process of acquiring the necessary permits for the construction of this facility. The new facility will allow the developers of the site to finance the extension of sewer lines to serve the study area. This improvement will allow for the development of higher densities, while minimizing the negative externalities of development from wastewater and run-off.

The development of Independence Center signifies an improvement to water quality in the study area. The mining currently occurring over the Plymouth/Carver Sole Source Aquifer is possibly having negative effects on the environment. The following statement is taken from Kingston's 1995 Open Space Plan.

> *"The steep gravel hills, act like stacked sponges and supply pressure at the base of the aquifer. It is highly probable that the area's water table and the aquifer will be altered by these changes. The lowering of the water table will alter groundwater, pond and vernal pool levels. Vegetation types will change and many species that use vernal pools will presumably be affected" (Pg. 19).*

Earth removal or gravel mining have been prohibited by the town since 1970. Earth removal has been allowed on a number of occasions in order to grade proposed industrial subdivisions. The O'Donnell Site currently stands as an approved industrial subdivision. As of 1995,

2,000,000 cubic yards of gravel have been removed from this area "under the auspices of an industrial subdivision" (Kingston 1995).

Wetlands

There are no wetland areas in the study area. The majority of the study area is characterized by the O'Donnell Sand and Gravel operation.

Floodplains

No portion of the Independence Centre study area falls within the 100 year floodplain. The closest floodplain area is on the banks of the Smelt Brook, on the eastern side of Route 3.

Soil Characteristics

The entire study area consists of Gloucester/Carver type soils (Kingston 1995). These soils are characterized as containing both sand and gravel, making them prime for earth removal operations.

VII. VISUAL RESOURCES

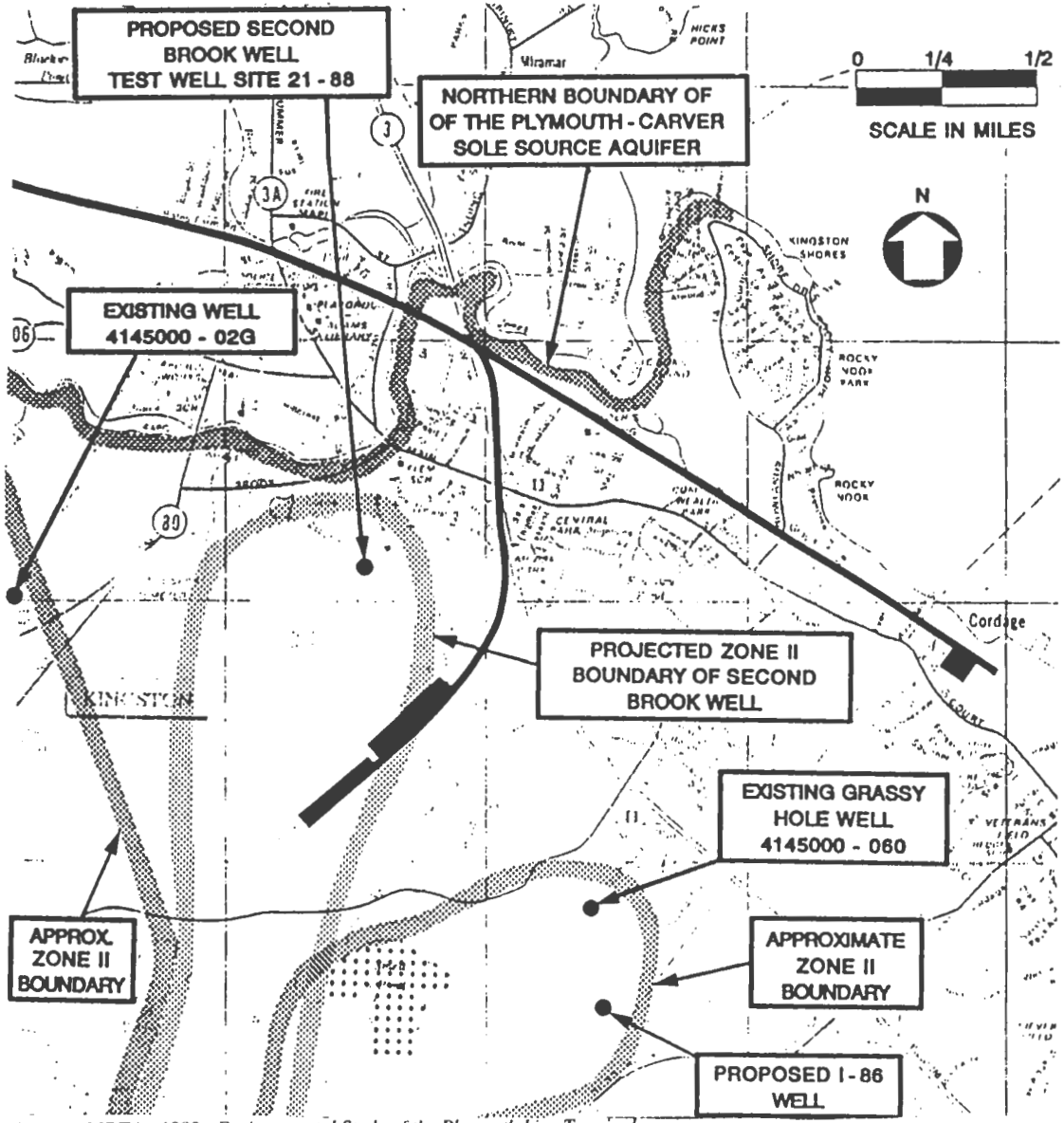
The visual landscape in and around the study area is currently a negative feature of the area. The land within the study area is at a lower elevation than both the Indian Pond Estates, and the Independence Mall. Steep slopes exist in many areas between the study area and these other uses. In the site itself, the large sand and gravel operation is the dominant feature. Other existing uses contain featureless, in some cases, temporary industrial and storage structures. Many parcels of vacant, unforested land exist along Marion Drive. Along the eastern end of Marion Drive, a cluster of automobile dealers provides a visual atmosphere which contradicts with the Town's traditional character.

Figures 4.8 through *4.11* show views of the MBTA station and its surroundings.

VIII. RECREATIONAL RECOURSES

There are currently no recreational resources in or around the study area. The main attraction to the area is the Independence Mall, which offers a selection of retail stores and restaurants. To the west of the study area exists the former Camp Nikon site. The Town of Kingston currently owns this 193 acre forested site.

Figure 4.7 Water Supply Resources In The Independence Centre Study Area



Source: MBTA. 1992. *Environmental Study of the Plymouth Line Terminal*

Figure 4.8
Copper Beach Drive Residential Area North of Kingston Station
Source: Old Colony Planning Council

Figure 4.9
View of Incoming Train at Station Platform
Source: Old Colony Planning Council

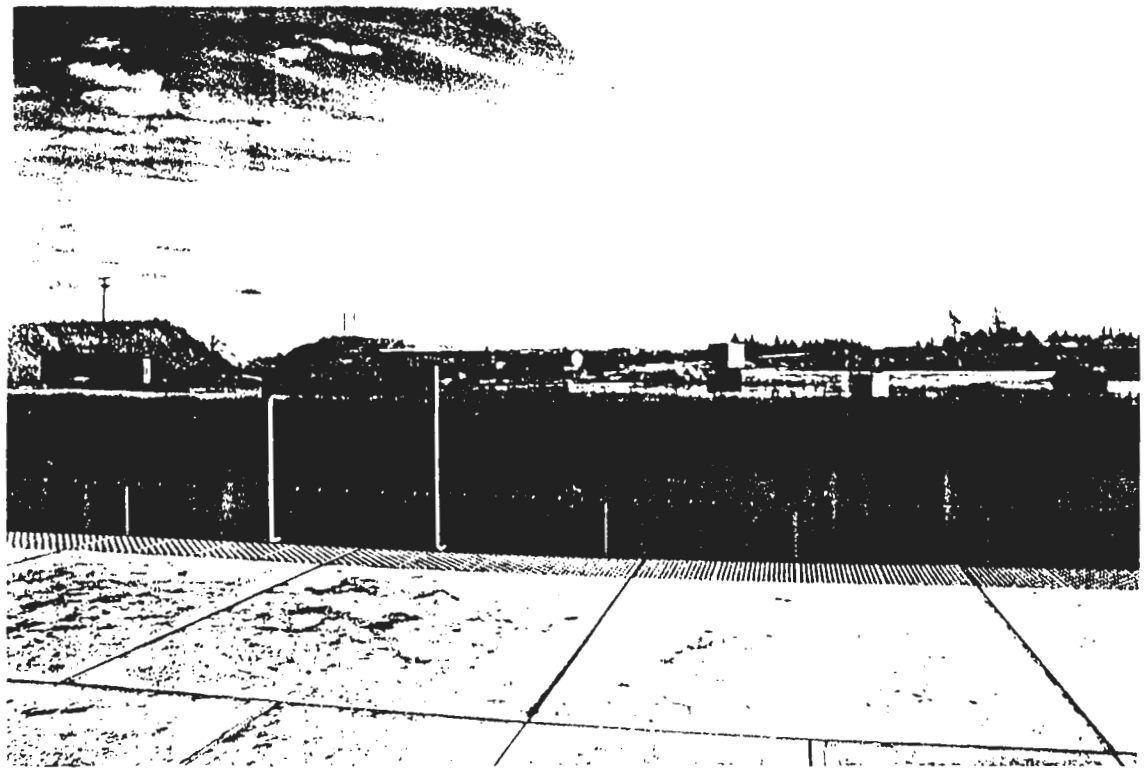


Figure 4.10
View of O'Donnell Sand and Gravel Operation from Station Platform - Facing East
Source: Southeastern Massachusetts Regional Planning and Economic Development District

Figure 4.11
View of Station Parking Lot and O'Donnell Sand and Gravel Operation - Facing East
Source: Old Colony Planning Council

CHAPTER V
Site Design for Independence Centre

I. INTRODUCTION

This chapter describes the layout of Independence Centre, as well as the development impacts of the site. The proposed land use plan for Independence Centre appears on page 3.

Independence Centre is designed according to New Urbanist principals. These principals include high densities around a transit stop, a grid system of streets, and a pedestrian oriented streetscape, among others. Independence Centre is not for those who demand to live only in single-family houses. Nor is it designed for companies which demand acres of on-site parking for their employees and their customers. The purpose of this development is to provide an environment for those who are looking for convenience and vibrancy in their community.

Experts on the relationship between transportation and land use agree that certain densities must be met in order to support mass transit. A higher than average density for the Town of Kingston will be necessary to promote transit use. Given the limited acreage of the study area, higher densities will be needed to accommodate a significant amount of residential and commercial uses. These densities will also provide opportunities for public open space within Independence Centre.

Studies indicate that a minimum of seven dwelling units per acre is necessary in order to support transit use (Morris 1996). Transit ridership can nearly triple when density increases to 30 units per acre (Morris 1996).

II. BUILDOUT ANALYSIS UNDER CURRENT ZONING

Under current Industrial zoning, the 136 acres that comprise the Independence Centre study area support much less activity than could be achieved as a transit-oriented development. Analyzing the potential for development under current zoning helps in understanding the benefits of this site as a transit oriented development. Buildout assumptions for the station area are taken from the Kingston 1998 Draft Master Plan. Parking standards for Independence Centre are taken from *Planning for Transit Friendly Land Use: A Handbook for New Jersey Communities*, by the Federal Transit Administration (1994).

Buildout Assumptions

- 20% of land is subtracted for roads and environmental constraints.
- Minimum lot size in the Industrial District is 40,000 sq. ft.
- Every buildable acre amounts to 12,000 gross floor area.
- One employee is assumed for every 600 sq. ft. gross floor area.
- One parking space is needed for every 800 sq. ft. gross floor area.
- Each parking space equals 234 gross sq. ft.
- Assessed value of industrial property is $24 per square foot of gross floor area.
- Tax value is based on the rate of $17 per $1,000 assessed value.

Table 5.1 shows the results of development around the Kingston Station under current zoning regulations.

Table 5.1

BUILDOUT FOR SITE UNDER CURRENT INDUSTRIAL ZONING

Site Acreage (net)	104
Site Sq. ft. (net)	4,540,694
Max Lots	114
Total GFA (sq. ft.)	1,135,174
Total GFA (acres)	26.1

Under current zoning regulations, the area around the Kingston Station can be divided into a maximum of 114 lots of 40,000 sq. ft. Using the assumption of 12,000 sq. ft. of gross floor area per buildable acre from the Kingston Draft Master Plan, 1,135,174 sq. ft. (26.1 acres) of industrial space can be assumed. A total of 1,892 employees can be assumed using the formula of one employee per 600 sq. ft. of gross floor area. 1,419 parking spaces can be assumed, using the current Kingston regulation of 1 space per 1,000 sq. ft. gross floor area for industrial uses. 1,419 parking spaces translates into 332,046 gross sq. ft. of parking, assuming 234 sq. ft. per parking space. The 1998 Kingston Draft Master Plan estimates an average value of $24 per square foot of gross floor area for industrial space. This assumption leads to a total of $27,244,164 of industrial space in the Kingston Station area. At the current tax rate of $17 per $1,000 of assessed value, the total amount of tax dollars generated equals $463,151.

III. BUILDOUT ANALYSIS OF INDEPENDENCE CENTRE USING TOD CRITERIA

The buildout analysis for Independence Centre assumes the availability of sewer service to the area, through the proposed wastewater treatment facility adjacent to the site. Calculations for Independence Centre use assumptions from the same sources as the buildout analysis for the site under existing conditions.

Table 5.2 shows the pattern of land uses in Independence Centre. This table corresponds to *Figure 5.1*, which is the proposed land use plan for the site.

Table 5.2

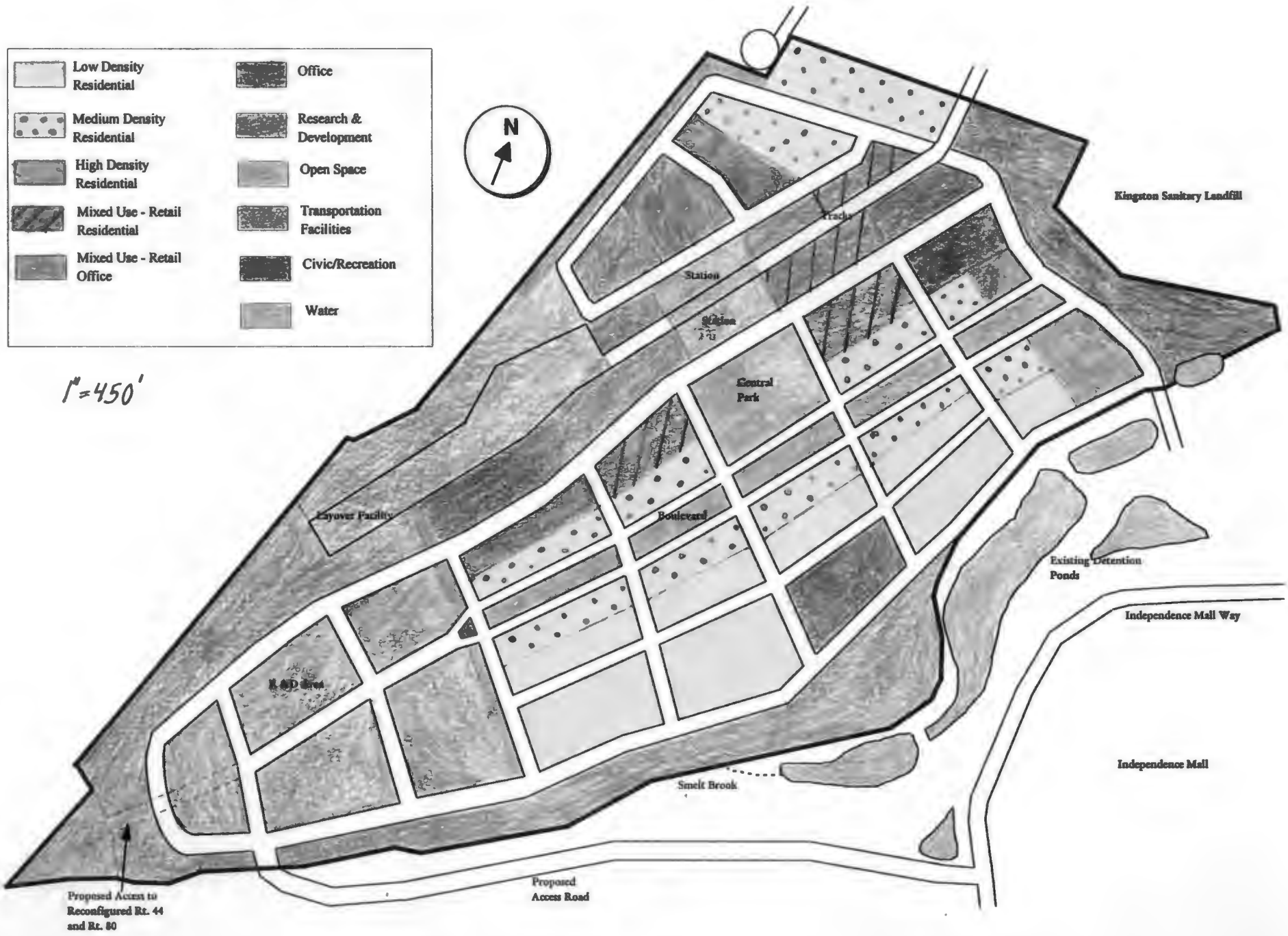
PROPOSED LAND USE PATTERN

Use	District Land Area (acres)	% of Total	Density
Mixed Use Commercial	9.7	7.2	FAR = 0.75 15 units/acre
Office	15.8	11.7	FAR = 1.5
R & D	23.5	17.3	FAR = 1.5
Residential	28	20.6	10 - 20 units/acre
Civic / Recreational	1.9	1.4	FAR = 1.0
Station	1.3	1.0	FAR = 4.8
Layover Facility	9.6	7.1	-
Open Space	19.6	14.5	-
ROW's	26.2	19.3	-
Total	135.6	100	-

Note: Land uses refer to discrete districts, and do not always refer to every instance of that use.

As shown in the proposed land use plan for the site (Figure 5.1) the Independence Centre study area is divided into districts or nodes which contain a certain land use. The district with the greatest land area is the residential district at 28.0 acres (20.6% of total land area). Open space accounts for 19.6 acres. The largest area of open space is located at the southern end of the development, buffering adjacent uses from Smelt Brook. Right of ways (ROW's) account for 26.2 acres (19.3% of total). ROW's include roads, sidewalks, and any utility or planing strips along the road.

SITE PLAN FOR INDEPENDENCE CENTRE



Independence Centre Master Plan

The amount of land devoted to certain densities can be adjusted should market analysis prove certain uses more feasible than others. Independence Centre is designed to offer a large amount of office and research and development space. This characteristic stems from the town's previous desire to turn the O'Donnell Sand and Gravel pit into an industrial park. The area has been zoned "industrial" and an approval was given for the subdivision of the land. However, the operation still remains under one owner. Commercial uses are designed to be mixed-use in nature, and oriented to pedestrians. Therefore commercial areas are found mainly along the main street near the station. Due to the recent trend in suburban back-office development, office uses play a large part in the site's design. Some office space is located on the upper stories of commercial businesses. The land-use plan was not designed to conform to a ridged TOD design. The plan takes into consideration site characteristics such as access, and adjacent uses.

Table 5.3

INDEPENDENCE CENTRE GROSS SQUARE FOOTAGE

Use	Gross Square Footage
Commercial	315,829
Office	816,750
R & D	339,343
Civic / Recreational	82,764
Hotel	122,800

Office space accounts for the greatest amount of square footage in Independence Centre at 816,750 sq. ft. Commercial, research and development, civic/recreational, and hotel uses are also included.

Table 5.4 compares the number of jobs created and the amount of annual tax revenue for the 130 acre site, based on current Kingston zoning and TOD standards.

Table 5.4

COMPARISON OF BUILDOUT SCENARIOS FOR INDEPENDENCE CENTRE SITE

	Current Zoning	Independence Centre	% Difference
Jobs Created	1,892	9,663	410.7
Annual Tax Revenue	$463,151	$2,330,401	403.2

As the above table shows, developing the site at higher densities, and with a mix of uses, allows for maximal use of the land. Additional jobs are created near transit (MBTA and PAL) where they can best be supported. Developing Independence Centre leads to the creation of 410.7% more jobs, and 403.2% more tax revenue, than if this land were developed as a conventional industrial park. The town of Kingston can clearly benefit through developing the area around the train station in a non-conventional way.

IV. RESIDENTIAL

Goals

The residential component of Independence Centre is designed with the following goals in mind:

- To offer densities which provide a critical mass for transit usage.
- To offer densities which provide a critical mass for local, neighborhood oriented businesses.
- To provide a variety of housing types for potential residents.
- To provide a vibrant community life with the characteristics of a traditional neighborhood.
- To offer neighborhoods which provide the opportunity for traditional New England housing types.
- To provide residential growth for the town of Kingston, without resulting in sprawl development.

- To provide housing which is in short walking distance to shopping, recreation, job opportunities, the MBTA station, as well as other public transit.

Layout and General Features

Residential areas in Independence Centre are laid out with a pedestrian orientation. Houses shall be oriented toward the street with little or no front setbacks. Houses shall reflect a neo-traditional standard using traditional New England residential building styles. Styles, materials and colors of houses shall complement adjacent structures, but not create a monotonous streetscape.

Despite higher than usual densities, a majority of residential units are within 400 ft. of usable open space. Other dwelling units are located over commercial uses, offering affordability and convenience. Additional medium density residential units will be provided north of the train station in order to buffer existing residential uses on Copper Beach Ave. from proposed office uses. High density uses are situated close to Marion Drive in order to better accommodate higher volumes of traffic, and to lessen traffic in lower residential areas. High density uses are also located on Marion Drive due to their compatibility with office uses on that street. High density residential structures will also serve to identify Independence Centre to motorists entering from Marion Drive. Residential areas are arranged so that streets have similar densities on both sides of the street. Therefore, one block may contain two or three different densities. Residential blocks near the research and development area will be buffered by a buffer area of 50 ft. adjacent to R & D uses.

Densities

In order to reach the above goals, densities are much higher than in most residential subdivisions. Independence Centre provides a total of 34 acres of residential land including dwelling units above retail. Independence Centre provides a total of 404 dwelling units. These dwelling units reflect a various number of densities.

Low density uses account for 12 acres of the site. These uses consist of single family dwelling units. At 10 units per acre, there are 120 low density dwelling units. Medium density uses (not including units above retail) account for 13.2 acres of the total site. At 15 units per acre, this density allows for 198 dwelling units. Medium density uses can consist of multi-plex homes, conventional town houses, or town houses around a common open space. High density uses account for 1.5 acres of the Independence Centre site. At 20 units per acre, this density allows for 30 dwelling units. High density uses consist of multi-story apartment buildings or condominiums, or higher density townhouses.

Residential uses are also found above commercial uses, projections assume 2 floors of apartments, and a commercial FAR of 0.75. These residential uses account for 2.5 acres of land area. Apartments above commercial uses are at the medium density of 20 units per acre. Fifty-six units can be built in this manner.

Projected Population

Projecting the population of Independence Centre uses the assumption of 2.3 people per household. This figure represents the average number of people per household in the town of Kingston, as calculated using data in the 1990 Census.

Table 5.5

RESIDENTIAL DENSITIES AND PROJECTED POPULATION

Density	Acres	DU/Acre	Units	% of Total Units	Total People
Low	12.0	10	120	30	276
Med.	17.0	15	254	63	585
High	1.5	20	30	7	45
Total	**30**	**-**	**404**	-	**906**

Note: 2.3 people per household assumed for low and medium densities.
1.5 people per household assumed for high densities.

Independence Centre contains a total of 404 dwelling units. The medium density units account for the largest number at 254 units (63%), while the high density units account for the smallest amount at 30 units (7%). Medium density units include those over retail. Population projections are estimated using the assumption of 2.3 people per household per dwelling unit. An exception is made for the high density units, which are assumed to have 1.5 people per unit. This figure is lower due to the smaller high density apartments, are not intended for more than two people. Out of the 906 total people in Independence Centre, 276 (31%) live in the low density areas, 585 (65%) live in the medium density areas including those above commercial uses, and 45 people (5%) live in the high density areas.

Parking

Parking standards are taken from the Federal Transit Administration's 1994 publication, *Planning for Transit-Friendly Land Use: A Handbook for New Jersey Communities*. The row labeled "assumptions," in *Table 5.6* below, lists the parking standards that were used for each residential density. For example low density units require 2.5 parking spaces per unit, with 25% of parking spaces eliminated due to the proximity of transit. All residential uses are to accommodate 25% less than would normally be required. Parking spaces are assumed to be 234 gross sq. ft. in area.

Using the parking standards mentioned above, a total of 678 residential parking spaces would be required for the residents of Independence Centre. Parking spaces would be provided in alleys, garages in alleys, or shared parking lots for town houses around a common garden area. On-street parking can accommodate visitors, and other temporary parking.

Table 5.6

RESIDENTIAL PARKING

Density	Units	Parking (sq. ft.)	Parking Spaces	Assumptions (P. spaces/unit)
Low	120	52,650	225	(2.5 / unit) - 25%
Med.	198	76,448	327	(2.2 / unit) - 25%
Med. (over retail)	56	21,718	93	(2.2 / unit) - 25%
High	30	7,898	34	(1.5 / unit) - 25%
Total	**419**	**158,713**	**678**	

Notes: *Parking standards from Federal Transit Administration. 1994. Planning for Transit-Friendly Land Use.*
1 parking space = 2.34 gross sq. ft.

V. COMMERCIAL

Goals

The commercial component of Independence Centre is designed with the following goals in mind:

- To provide convenient shopping for residents of the site, as well as local employees, and station users.
- To provide mixed-use neighborhoods for residents of Independence Centre.
- To provide an element of economic development to the town and the region, adding jobs and tax dollars to the town.
- To provide a mechanism for channeling future commercial growth, thereby avoiding harmful strip commercial development.
- To provide the opportunity for a large number of small business in a compact space, promoting a local identity and a wide range of shopping alternatives.
- To provide commercial development which reflects traditional New

England streetscapes.

- To provide shopping and employment opportunities which are pedestrian oriented, rather than automobile oriented.

Uses

Commercial uses in Independence Centre shall be limited to those which do not conflict with the pedestrian oriented nature of the development. *Table 5.7* shows various commercial uses and their transit supportiveness.

As *Table 5.7* indicates, there are several commercial uses which are not transit supportive. These uses, such as automobile sales and service centers, take up too much space, and do not contribute to a sense of a pedestrian oriented, village environment. Commercial uses in Independence Centre should be used as an asset for people who are experiencing the area on foot. Uses that are transit supportive are an asset to transit through their ability to draw pedestrian shoppers and employees. These uses are also convenient to commuters on the Plymouth/Kingston MBTA Line.

Layout

The mixed use, core commercial area of Independence Centre consists of 6.0 acres of land extending along the train tracks, on both sides of the proposed station. An additional 2.3 acres of commercial space is located across the street from the station, on both sides of the central park. This layout takes advantage of the many commuters boarding the train every day. The core commercial area is also adjacent to acres of office space on three sides. This fact is beneficial for commercial establishments because of the critical mass of office workers nearby. The core commercial area is also within easy walking distance of high, medium, and low density areas (a total of 928 people). Additional commercial space is also found in the proposed train station complex. These uses will consist of 31,600 sq. ft. of convenience retail uses for station commuters, employees, and hotel guests.

The core commercial area is split into two mixed-use areas. One of these consists of 3.5 acres of mixed use, office and commercial space. This area is located adjacent to the layover facility and the office areas to the north of the station. This layout uses non-residential uses as a buffer around the layover facility. Commercial uses will occupy the ground floor of structures, while office space will occupy the upper stories. 58,806 sq. ft. of commercial space will also be located on the ground floor of a parking structure in the mixed use office area. This commercial space will consist of half of the structure's entire ground floor.

The other commercial area consists of 4.8 acres of mixed use commercial and residential uses. This area is located to the east of the station, as well as adjacent to the central park and the medium density residential area. Commercial uses will occupy the ground floor of structures, and residential apartments will be on the upper stories. In the core commercial area, residential dwelling units are built at a "medium" density of 15 units per acre.

Table 5.8 shows commercial square footage information for Independence Centre.

As *Table 5.8* indicates, total commercial square footage is 361,567 sq. ft. Of these, 156,816 sq. ft. (43.5%) are mixed-use, commercial/residential, and 114,345 sq. ft. (31.6%) are mixed-use, commercial/office space. The commercial floor area ratio for Independence Centre is 0.75. Because other uses occupy the upper stories (office and residential), commercial floor area ratios must be calculated 1.0 or below. The 0.75 FAR accounts for the parking supply needed for shoppers and employees. A degree of on-site parking is necessary in order to meet projected demand.

TABLE 5.7 TRANSIT SUPPORTIVENESS OF SELECTED COMMERCIAL USES

Commercial Use	Group			Commercial Use	Group		
	1	2	3		1	2	3
Ambulance Services			X	Retail Services	X		
Animal Sales and Services		X		Volume Discount Retail		X	
Animal Boarding			X	Travel Services	X		
Banks with Local Drive Up Service	X			Vehicle Equipment Sales and Service			X
Building Materials and Services	X			Auto Rentals			X
Commercial Recreation and Entertainment		X		Car Washes			X
Eating and Drinking Establishments	X			Parking Garage			X
Fast Food with Drive-Through		X		Commercial Surface Parking			X
Bar and Tavern	X			Auto Service Stations		X	
Food and Beverage Sales		X		Vehicle Equipment Repair			X
Maintenance and Repair Services		X		Vehicle Equipment Sales and Rental			X
Nurseries			X	Funeral and Interment Services			X
Offices	X			Vehicle Storage			X
Personal Improvement Services		X		Visitor Accommodations		X	
Personal Services	X			Hotels	X		
Research and Development Services		X		Bed and Breakfast Inns	X		
Laboratories		X		Motels		X	

Note: *1= Transit Supportive*
2= May be transit supportive with appropriate development standards.
3= Not transit supportive

Source: Morris, Marya. 1996. *Creating Transit-Supportive Land-Use Regulations.* APA PAS No. 468. Adapted from Planning and Design for Transit. Tri-Met. March, 1993.

Table 5.8

GROSS COMMERCIAL SPACE

Location	Sq. Footage	% of Total
Mixed Use Residential	156,816	43.4
Mixed Use Office	114,345	31.6
Under Parking Structure	58,806	16.3
In Station	31,600	8.7
Total	361,567	100

Parking

The 0.75 floor area ratio used to calculate commercial square footage is intended to be flexible in its application. In practice it is not recommended that every structure occupy 75% of the lot or less. Some on-site parking

should be provided in the mixed-use commercial/residential area. Parking areas should be to the rear of structures, or if necessary, to the side. Lots to the side of structures shall be properly buffered from the street.

In order to maximize continuity of the streetscape, the majority of commercial oriented parking should be located in parking structures. These structures shall have retail uses at ground level, in order to orient the streetscape to pedestrians. Having parking structures without ground floor retail creates a deserted environment in what is to be the core commercial area.

Table 5.9 shows necessary commercial oriented parking for Independence Centre. Assumptions are taken from the Federal Transit Administration's 1994 publication, Planning for Transit Friendly Land Use.

Table 5.9

COMMERCIAL GENERATED PARKING REQUIRED

Location	Retail Space (Gross sq. ft.)	Parking Spaces	Parking Area (sq. ft.)
Mixed Use Areas	284,229	1,208	282,672
In Station	31,600	134	31,356
Total Commercial	315,829	1,342	314,028

Notes: 1 parking space per 200 gross sq. ft. and reduced by 15%
1 space = 234 gross sq. ft.
Parking standards from Federal Transit Administration. 1994. Planning for Transit Friendly Land Use.

A total of 1,342 parking spaces will be required to accommodate commercial uses. Of these 1,208 will be oriented toward the mixed use retail areas, and 134 will be for the commercial uses in the station complex. Parking standards are taken from Federal Transit Administration's *Planning for Transit Friendly Land Use*. The number of parking spaces is reduced by 15% to account for a decrease in the share of single occupancy vehicles in the TOD.

VI. OFFICE

Goals

The office component of Independence Centre is designed with the following goals in mind:

- To provide convenient employment opportunities for area and site residents.
- To increase the town's tax revenue, and create additional employment.
- To provide a critical mass of workers to support transit, as well as the retailers nearby
- To create a walkable convenient environment, rather than an isolated office park.
- To manage growth throughout town and region, by channeling future development.
- To create an aesthetically pleasing, and environmentally responsible environment.

Layout

Office areas in Independence Centre account for 15.8 acres of land (11.7% of total). Office uses are found along Marion Drive, south of the layover facility, and to the north of the station complex. Additional office space is also found in the mixed use office/retail area, and in the station complex.

Table 5.10 presents the breakdown of office space for the site.

Table 5.10

INDEPENDENCE CENTRE OFFICE SPACE

Location	Total Sq. ft.	% of Total
Office Only	705,672	58.7
Above Retail	228,690	19.0
Below Parking	158,994	13.2
In Station	108,800	9.1
Total	1,202,156	-

Total office space in Independence Centre is 1,202,156 gross sq. ft. Of this, over 58% is "office only" referring to structures which house only office uses. The office area to the south of the layover facility, serves to buffer the residential areas from the noise of idling trains. Floor area ratios for office areas are calculated at 1.5, although flexibility is encouraged.

Office space above retail is assumed to consist of two stories above one story of retail built to 0.75 FAR. This office space accounts for 19.0% of the total. Office space is also found on the ground floor of a parking structure, and on half of the ground floor of another. These locations account for 158,994 gross sq. ft. (13.2%). The station complex contains 9.1% of total office space. Office space is located on each story of the complex.

Office structures in Independence Centre are intended to contribute to the pedestrian nature of the area. Buildings are to be sited with little or no front setbacks. Any on-site parking is to be located to the rear of structures. It is recommended that more service-oriented uses occupy the ground floors of structures, in order to offer a more vibrant atmosphere.

Parking

Table 5.11 shows required parking for office uses.

Table 5.11

OFFICE GENERATED PARKING REQUIRED

Location	Office Space (Gross sq. ft.)	Parking Spaces	Parking Area (sq. ft.)
Office Only	705,672	2,258	528,407
Above Retail	228,690	732	171,243
Below Parking	158,994	509	119,055
In Station	108,800	348	81,469
Total	1,202,156	3,847	900,174

Notes: *1 space per 200 sq. ft. office, reduced by 15%.*
1 space = 234 gross sq. ft.
Parking standards from Federal Transit Administration. 1994. Planning for Transit Friendly Land Use.

A total of 3,847 parking spaces will be required in order to accommodate office uses in Independence Centre. The majority of these will be required for "office only" areas, which comprise the greatest area.

VII. RESEARCH AND DEVELOPMENT

Goals

- To provide convenient employment opportunities for area and site residents.
- To increase the tax base of the town of Kingston.
- To create an opportunity for new sectors of growth in research and development.
- To provide a critical mass of workers for transit, and for the retailers nearby
- To create a walkable convenient environment, rather than an isolated research and development park.
- To manage growth throughout town and region, and prevent the irresponsible consumption of land.

- To create a more aesthetic, and environmentally responsible environment.

Layout

The research and development (R & D) area of Independence Centre consists of 23.5 acres of land at the southwestern corner of the site. The R & D area is sited to buffer the layover facility from residential uses. This area is more isolated than the others due to the nature of the uses involved. Research and development will provide the town with tax revenues from a growing sector of the economy. However, they are not part of the traditional TOD formula, as envisioned by planners such as Peter Calthorpe. Nevertheless, with proper site planning and architectural design review, R & D uses can be an added bonus to the Independence Centre site. The town of Kingston can provide a new sector of employment, while taking advantages of the benefits of transit usage.

Research and development uses in this site differ from "industrial" uses. Rather than manufacturing plants and warehouses, R & D uses consist of bio-technological companies, and more research driven uses. R & D uses possess less of the negative externalities of industrial uses, such as pollution, noise, and truck traffic. Therefore, these uses are more compatible with residential uses nearby. A fifty-foot wide buffer area is also provided between the R & D and residential areas.

Table 5.12 shows square footage for R & D uses in Independence Centre.

Table 5.12

RESEARCH AND DEVELOPMENT SQUARE FOOTAGE

Location	Gross Floor Space (sq. ft.)	% of Total
Regular	1,359,072	92.0
Below Parking	117,612	8.0
Total	1,476,684	-

Independence Centre will contain approximately 1,476,684 gross sq. ft. of R & D space . Ninety-two percent of this square footage is contained in structures containing only R & D uses, while 8% will be found on the ground floor of a parking structure located in the R & D area. These figures total assumes a floor area ratio of 1.5. No R & D uses are found in the station complex.

Parking

Table 5.13 shows R & D generated parking for Independence Centre.

Table 5.13

RESEARCH AND DEVELOPMENT GENERATED PARKING REQUIRED

Location	Gross Floor Space (sq. ft.)	Parking Spaces	Parking Area (gross sq. ft.)
Regular	1,359,072	1,284	300,355
Below Parking	117,612	111	25,992
Total	1,476,684	1,395	326,347

Notes: *1 space per 900 sq. ft. R & D, reduced by 15%.*
1 space = 234 gross sq. ft.
Parking standards from Federal Transit Administration. 1994. Planning for Transit Friendly Land Use.

A total of 1,395 parking spaces will be needed for research and development uses. The floor area ratio of 1.5 allows for some on-site parking to the rear of buildings.

VIII. CIVIC/RECREATIONAL

Goals

- To provide space for community oriented functions in Independence Centre.
- To provide community identity for the town of Kingston.
- To provide opportunities for recreation, which are compatible with surrounding residential uses.
- To provide a possible location for municipal offices, or some other public function.
- To provide easy access to open space and residential uses.

Layout

The civic/recreation portion of Independence Centre consists of a small 1.9 acre piece of land. This section is intended to house any recreational structure which will enhance the quality of the open space near Smelt Brook. This site can also contain other small public uses, such as a library, which do not conflict with nearby residences. Uses in this area should be an asset to adjacent residents. Parking demand is assumed to be 1 space per 800 sq. ft., although demand will vary depending on the specific use. Floor area ratio is assumed to be 1.0 in order to provide a smaller building with some degree of on-site parking.

Table 5.14 shows characteristics for the civic/recreation portion of the development.

Table 5.14

CIVIC/RECREATION CHARACTERISTICS INDEPENDENCE CENTRE

Land Area (sq. ft.)	82,764
Civic Space (sq. ft.)	82,764
Parking Spaces Required	88
Parking Area (sq. ft.)	20,577

Notes: 1 space per 800 sq. ft. R & D, reduced by 15%.
1 space = 234 gross sq. ft.

IX. STATION

Goals

- To serve as a focal point for Independence Centre and the town.
- To provide various uses in one building, centered around the train stop.
- To accentuate transit usage in the area.
- To provide convenient travel for employees of Independence Centre businesses.
- To provide a variety of convenient retail uses for travelers.
- To increase the tax revenue of the town.
- To create employment within the town of Kingston.
- To manage growth in the region by concentrating development around transit stations.
- To provide accessibility to residents of the site.
- To provide hotel space which can act as an alternative to Boston and Plymouth rooms.
- To provide a station that is aesthetically compatible with traditional buildings in Kingston.

Layout

The main purpose of the station complex is to serve passengers using the commuter rail. The creation of a convenient, indoor waiting area can lead to greater ridership. Like Boston's South Station (the other terminus of the Plymouth Line), the station at Independence Centre can offer eating and

retail establishments, as well as other uses for passengers.

The station occupies a site of 1.3 acres on both sides (and above) the train tracks. It fronts both the main street bordering the central park, and the street created out of the current MBTA parking lot.

Figure 5.2 shows the design concept for the Independence Centre train station.

The station consists of six floors on both sides of the tracks. The ground floor of the station consists of an 8,000 sq. ft. atrium (not counting tracks), where patrons can wait for trains or eat. Doors will separate the atrium from the actual tracks. The north side of the tracks will contain convenience shops and restaurants, while the southern side will contain the first floor of the hotel. Beginning with the second floor, the north side of the station will contain office space. The southern side of the station will be occupied by the hotel on all of the floors. In order to maintain a sense of openness, the atrium area on the ground floor will remain open on the upper floors. The opening will expand slightly on the second floor, and expand again on the third floor. The third through sixth floors will maintain similar dimensions.

One issue with the station design concept is the movement of people from one side of the tracks to the other. This factor is important because people will want to cross the tracks to get to the shops or the hotel on the other side. Pedestrians may also use the station as a shortcut between the two streets on opposite sides of the tracks (it is a long walk to Marion Drive and around). In this design people will cross the tracks by going up to the third floor and back down to ground level (preferably by escalator). This concept uses the assumption that the third floor offers enough height to allow the clearance of the trains. Another assumption is that any noise and vibration

issues will be dealt with by the developer of the building.

Table 5.15 shows the uses present in the station complex, along with their gross square footage. *Table 5.16* shows cumulative square footage for each different use per floor.

Table 5.15

STATION COMPLEX SQUARE FOOTAGE PER USE

Use	Gross Square Footage	% of Total
Atrium	8,000	2.9
Convenience Retail	31,600	11.7
Office	108,800	40.1
Hotel	122,800	45.3
Total sq. ft.	271,200	-

Table 5.16

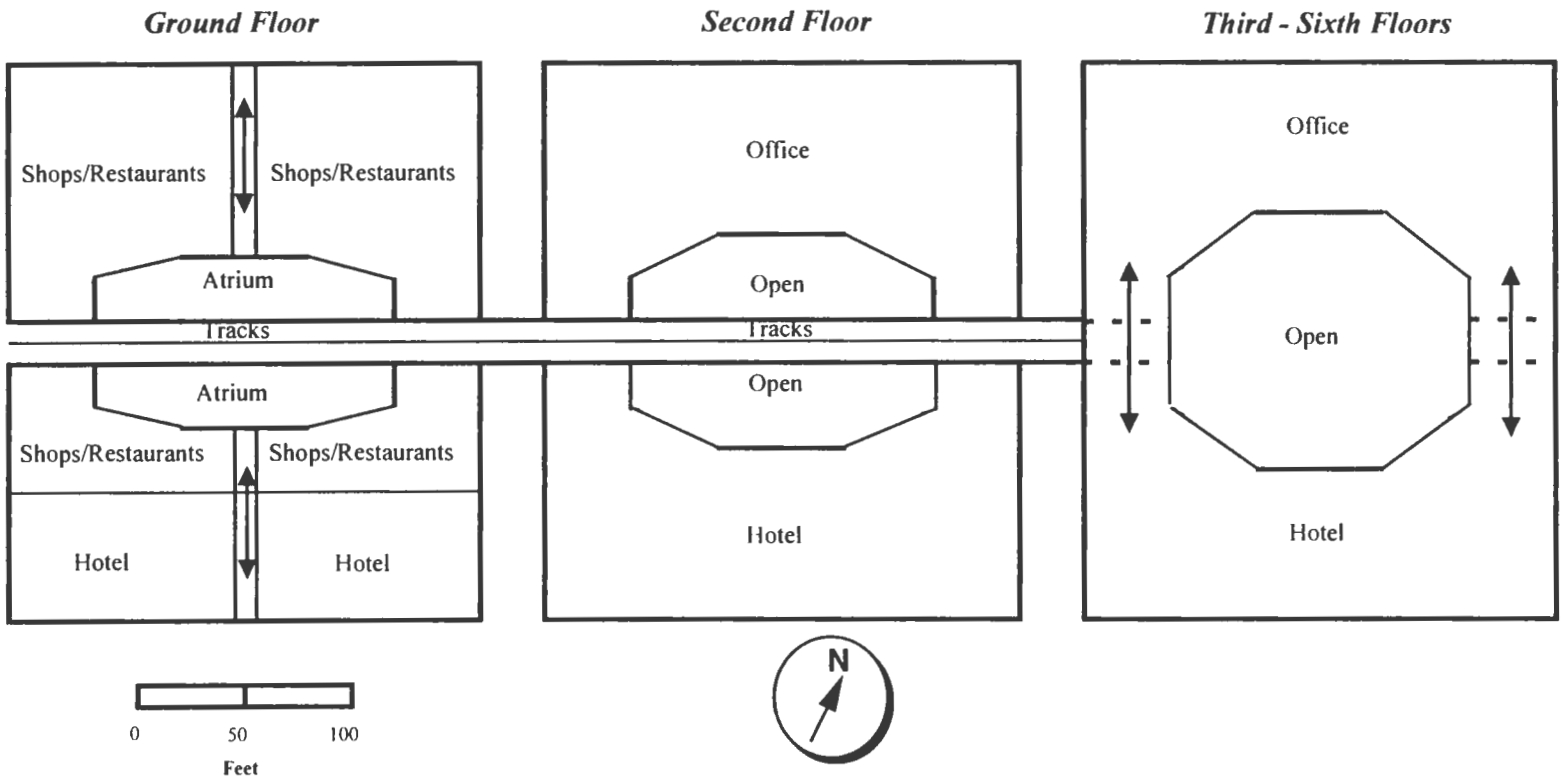
STATION COMPLEX CUMULATIVE SQUARE FOOTAGE PER FLOOR

# of Floors	Use				
	Atrium	*Convenience*	*Office*	*Hotel*	*Total*
1	8,000	31,600	-	13,200	52,801
2	-	-	22,400	36,400	98,400
3	-	-	44,000	58,000	141,600
4	-	-	65,600	79,600	184,800
5	-	-	87,200	101,200	228,000
6	-	-	108,800	122,800	271,200

Note: Second floor has 800 sq. ft. more hotel and office than other floors.

The entire complex contains 271,200 gross sq. ft. The hotel accounts for the greatest space at 122,800 sq. ft. Office space accounts for 108,800 sq. ft. The atrium and convenience sections together equal 39,600 sq. ft.

DESIGN CONCEPT FOR INDEPENDENCE CENTRE TRAIN STATION



Hotel Space

Table 5.17 shows characteristics of the hotel space in the station.

These figures are based on the following assumptions:

- The station is six stories in height.
- Net hotel area for rooms is 50% of gross hotel space. The other 50% is used for operations, walkways, and conference space.
- Hotel rooms are 400 sq. ft. each.
- Hotels employ 0.9 employees per room (FTA 1994).
- 0.7 parking spaces area required for every employee and for every room (FTA 1994).

Table 5.17

INDEPENDENCE CENTRE HOTEL SPACE

Total Hotel GFA	122,800
Net Hotel Area for Rooms	61,400
# Rooms	154
# Employees	138
Parking Spaces Required	204

X. INDEPENDENCE CENTRE PARKING

Table 5.18 shows total non-residential parking generated. The column labeled "train" refers to the 1,048 parking spaces currently serving train passengers at the MBTA station.

Table 5.18 uses the following assumptions as taken from the FTA's *Planning for Transit Friendly Land Use* (1994):

- Commercial = (1 space / 200 gross sq. ft.) – 15%
- Office = (1 space / 200 gross sq. ft.) – 15%
- R & D = (1 space / 900 gross sq. ft.) – 15%
- Hotel = (0.7 spaces / employee) + (0.7 spaces / room)
- Civic/recreation = All parking provided on-site or on-street
- Spaces are 234 gross sq. ft. each, consisting of a 9' X 18' space and a 9' X 8' travel lane.

Table 5.18

TOTAL NON-RESIDENTIAL PARKING NEEDED

Use	Parking Area (sq. ft.)	Parking Area (Acres)	Parking Spaces
Commercial	361,567	8.3	1,537
Office	900,174	20.7	3,847
R & D	326,347	7.5	1,395
Train	245,232	5.6	1,048
Civic	Provided on site, not included in total		
Hotel	47,772	1.1	204
Total	1,881,092	43.2	8,031

Using the above standards, a total of 8,031 parking spaces are required. This amounts to 1,881,092 sq. ft., or 43.2 acres of parking. With such a large amount of space required for parking (even with transit based reductions), relying on surface parking lots would consume roughly one-third of the site's land. Large tracts of land devoted only to parking would contradict the goal of the development which is to provide a high density *pedestrian oriented* environment. A design goal of the project is to keep figure ground ratios high to prevent the sight of isolated buildings in parking lots.

Therefore, in keeping with the goals of the project, parking structures, and on street parking are the main mechanisms for providing parking for non-residential uses. All parking structures will contain other uses on their

ground floors. Efforts shall be made to design the structures so that they conform to the architectural design standards of the site.

Table 5.19 shows non-residential parking provided in Independence Centre. Assumptions are listed in the right-most column.

Table 5.19

TOTAL NON-RESIDENTIAL PARKING PROVIDED

Use	Land Area	Parking Area (sq. ft.)	Parking Area (Acres)	Parking Spaces	Assumptions
On-Site Commercial	-	71,057	1.6	304	Leftover 25% of land
On-Site Office (reg only)	-	117,612	2.7	503	Leftover 25% of land
On-Site R & D	-	255,915	5.9	1,094	Leftover 25% of land
5 story garage just west of station (4 of parking)	2.7 acres	470,448	10.8	2,010	Half retail and half office on ground floor.
5 story garage north end of R & D (4 of parking)	2.7 acres	470,448	10.8	2,010	R & D on ground floor.
4 story garage on Marion (3 of parking)	2.3 acres	300,564	9.2	1,284	Office on ground floor
On-Street	-	-	-	830	
Total	-	1,686,044	41.0	8,035	

An estimated 8,035 parking spaces can be provided on the site using the current assumptions. Most of this parking is provided in multi-story garages.

Figure 5.3 shows the location of major parking areas in the site.

As shown in the map, a five story structure is present just west of the station, on 2.7 acres of land. Another structure of similar dimensions is present on a 2.3 acre tract on Marion Drive near the tracks. A third 4 story parking structure is located on a 2.3 acre tract of land in the R & D area. This structure is intended to primarily serve the employees in this area who are farthest from the train station.

In the commercial, office, and R & D areas, the combination of FAR's and building heights can lead to opportunities for some small on-site parking areas, mostly to the rear of buildings.

Table 5.20 shows the estimated amount and location of non-residential on-street parking. Estimates use the following assumptions:

- The column, "curb space," refers to both sides of the road, with intersections subtracted out.
- Spaces are 180 sq. ft. in area (10' X 18')
- Adjusted number of spaces refers the to number of spaces after 25% have been subtracted for no parking areas (20 ft. next to intersections, hydrants etc.).

As the table above shows, a total of 830 non-residential parking spaces will be available for customers and employees of the site. The presence of on-street parking will allow for an environment that is similar to the one found in traditional Main St. areas. Parked cars offer a psychological buffer between pedestrians on the sidewalk and passing cars. The cars also discourage drivers from speeding through the area.

MAJOR PARKING AREAS IN INDEPENDENCE CENTRE

P1 - 2.7 acre lot. 4 stories parking. 1 story R & D. Total 2,010 spaces.

P2 - 2.7 acre lot. 4 stories parking. 1 story office and retail. Total 2,010 spaces.

P3 - 2.3 acre lot. 3 stories parking. 1 story office. Total 1,284 spaces.

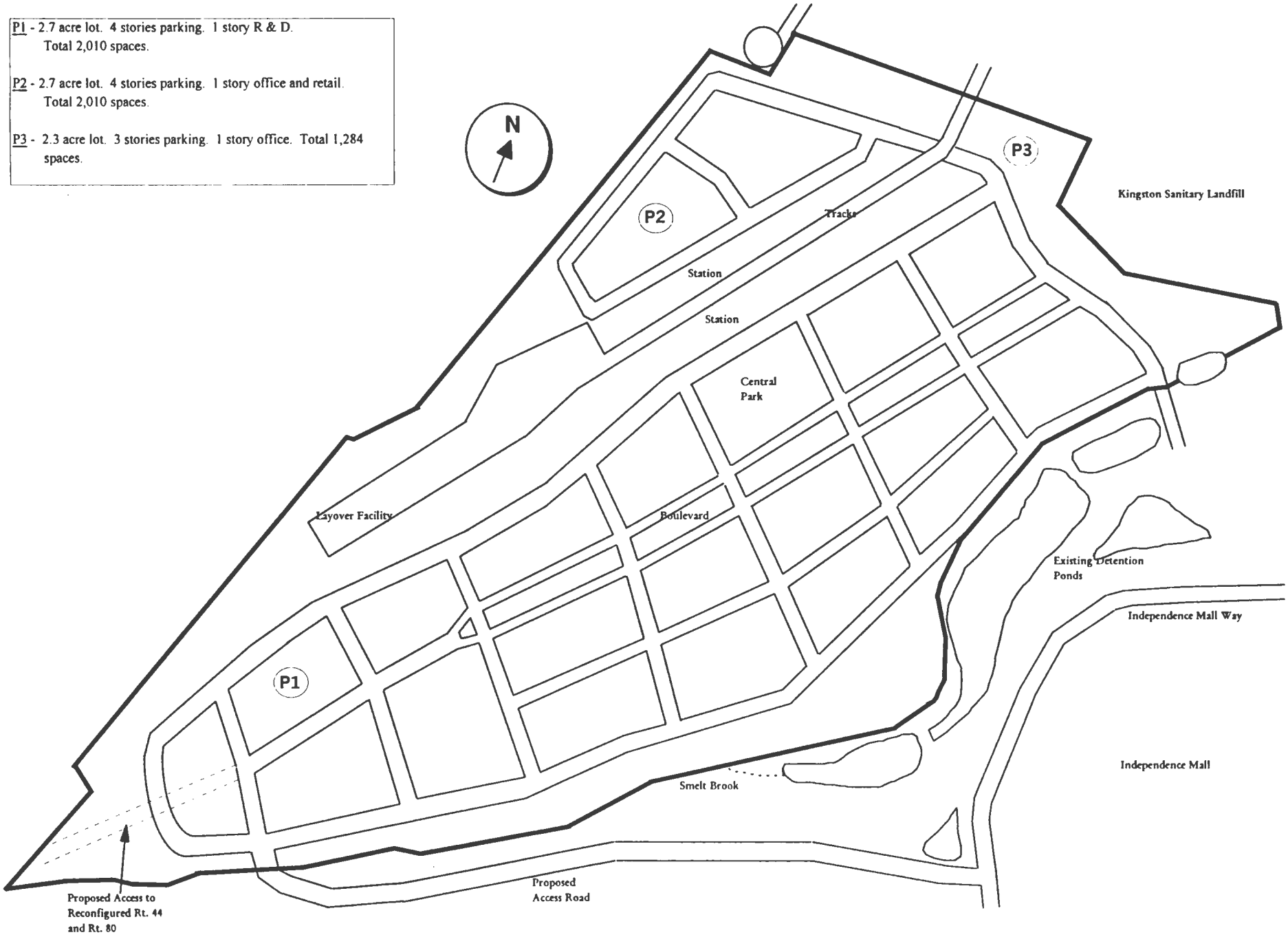


Table 5.20

TOTAL ON-STREET NON-RESIDENTIAL PARKING

Location	Linear Length of Road (ft.)	Curb Space (ft.)	Gross Number of Spaces	Adjusted Number of Spaces
Main St. between station and park	3,488	6,584	366	274
Just North of Station	981	1,906	106	79
Northern Edge	788	1,520	84	63
Southern Edge from Access Road to Res. Buffer	900	1,744	97	73
Marion Dr.	1,969	3,602	200	150
Between MBTA lot blocks	338	676	38	28
Beginning of Blvd.	844	1,576	88	66
North/South R & D Road	675	1,238	69	52
Continuation of Access Rd.	563	1,070	59	45
Total On-Street				830

XI. CIRCULATION

Roads in Independence Centre are designed in a modified grid system. This pattern is the most appropriate for this site for the following reasons:

- The system offers easy access from anywhere in the development. Different uses are not isolated from each other.
- The grid system spreads traffic out over many roads, rather than forcing it onto one main arterial.
- The grid system most closely replicates the built environments of small town centers, such as the Plymouth Central Business District.
- The increased number of intersections prevents drivers from speeding through the development.

In order to accommodate the large number of drivers that will come to the site daily, an additional access road to the site is planned. This new road will serve to alleviate traffic on Marion Drive. This road will span from the perimeter road on the southern end of the development to Independence Mall Way, which offers direct access to Rt. 3. Care must be taken in designing the road so that the environmental quality of Smelt Brook is not disturbed.

Space on the southern tip of the development is left undeveloped in order to accommodate a future access road to Route 80 and a reconfigured Route 44. Plans exist to reconfigure Route 44 as a limited access highway through the towns of Plymouth, Kingston, and Carver. This land can be developed as a small park or garden area until these plans come to fruition.

One main focus of the circulation system in Independence Centre is the central boulevard. The road serves as a focal point of many of the residential areas. In the median strip is a walking trail and generous tree plantings. Additional walking trails will exist in the open space near Smelt Brook.

XII. DEVELOPMENT IMPACTS

Jobs and Property Tax Revenues

The development of Independence Centre will have a tremendous impact on the economic well being of the town and the region, through both job creation and property tax revenue. *Table 5.21* shows the number of jobs created (not including the construction of the site).

The projection of the number of jobs uses the following assumptions, which are taken from Federal Transit Administration. 1994. *Planning for Transit Friendly Land Use*:

- Commercial – 1 employee per 300 gross sq. ft.
- Office – 1 employee per 200 gross sq. ft.
- R & D – 1 employee per 600 gross sq. ft.
- Hotel – 0.9 employees per room.

MAJOR PARKING AREAS IN INDEPENDENCE CENTRE

P1 - 2.7 acre lot. 4 stories parking. 1 story R & D. Total 2,010 spaces.

P2 - 2.7 acre lot. 4 stories parking. 1 story office and retail. Total 2,010 spaces.

P3 - 2.3 acre lot. 3 stories parking. 1 story office. Total 1,284 spaces.

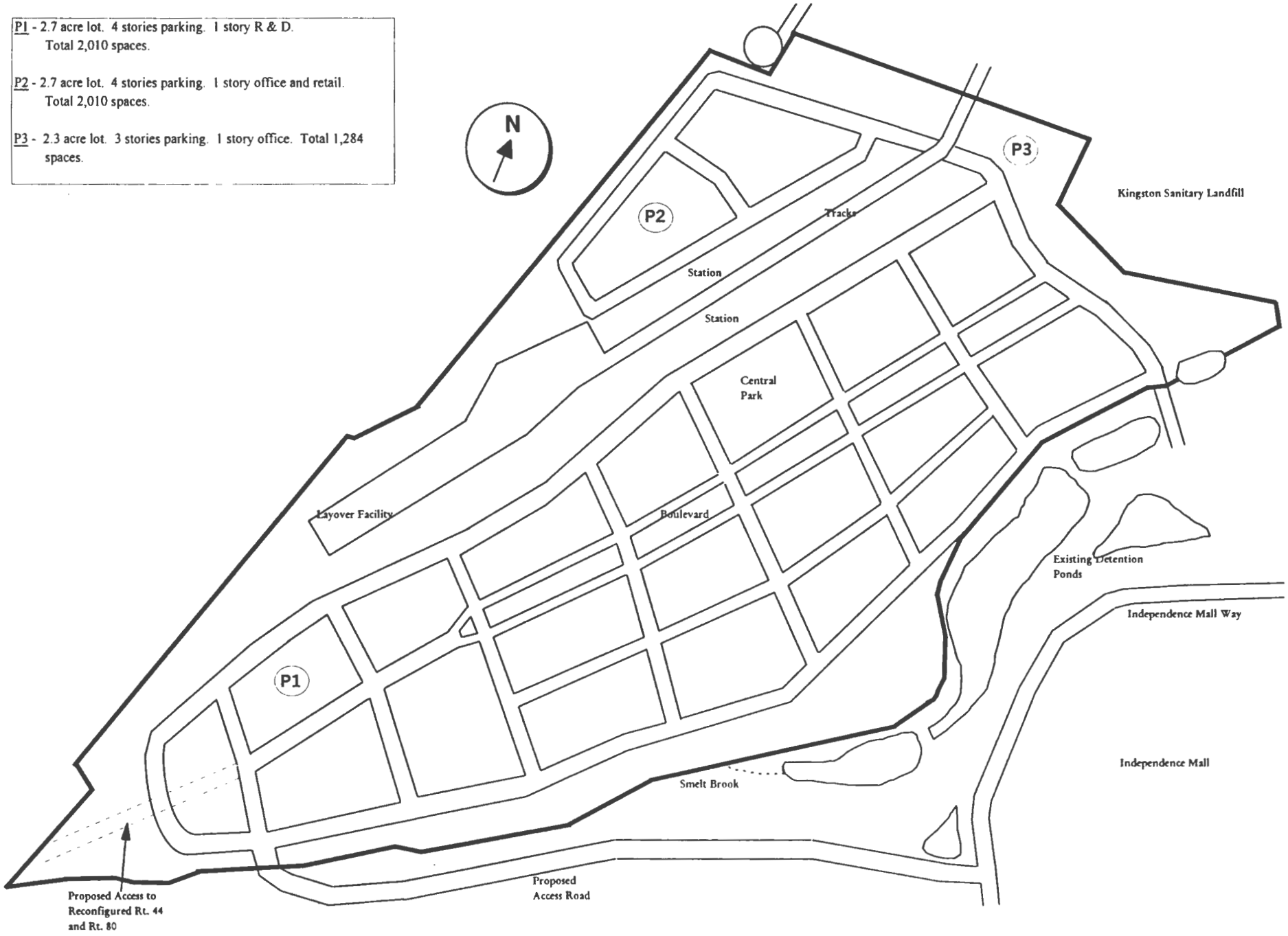


Table 5.21

INDEPENDENCE CENTRE TOTAL JOBS CREATED

Use	Gross Square Footage	Employees
Commercial	315,829	1,053
Office	1,202,156	6,011
R & D	1,476,684	2,461
Hotel	122,800	138
Total	-	9,663

Table 5.22 presents estimated annual tax revenue for Independence Centre.

Rates and assessed values are taken from Kingston's 1998 Draft Master Plan and are also used in the town's own buildout analysis. Estimations are based on the following assumptions:

- The current Kingston tax rate of $17 per $1,000 of assessed value is used.
- Office, commercial, and hotel uses are assessed at $65.00 / sq. ft.
- R &D uses are assessed at $24.00 / sq. ft.

Table 5.22

INDEPENDENCE CENTRE ANNUAL PROPERTY TAX REVENUE

Use	Annual Tax Revenue
Commercial	$399,532
Office	$1,328,382
R & D	$602,487
Hotel	$135,694
Total	$2,330,401

Annual tax revenue totals $2,330,401 with office uses being the largest contributors to the town's tax base.

Traffic

Table 5.23 lists vehicle trip generation as determined using the Institute of Transportation Engineers' *Trip Generation* (1997).

Projections use the following assumptions:

- Due to the density of the development, and the transit orientation of the uses, the number of weekday trips is reduced according to the type of use.
- The percent trip reduction is taken from the reduction in parking standards listed in the following source: Federal Transit Administration. 1994. *Planning for Transit Friendly Land Use.*
- Civic/recreation generated traffic is not included in this analysis. Uses should be selected which do not generate much traffic.

Additional research will be needed to determine if the existing road network can handle the additional traffic. The lack of land uses currently surrounding the site gives planners opportunity to widen Marion Drive if necessary.

Table 5.23

INDEPENDENCE CENTRE VEHICLE TRIP GENERATION

	Single Family Res.	Multi-Fam. Res.	Comm.	Office	R & D	Hotel	Total
Gross Floor Area (sq. ft.)	-	-	292,960	1,142,990	1,535,490	122,800	3,094,240
Res. Units & Hotel Guest Rooms	120	284	-	-	-	154	558
Number of Employees	-	-	976	5,715	2,559	138	9,388
Avg. Weekday Trips / Unit of Measurement	9.57	6.63	62.00	11.01	2.77	8.7	-
Unit of Measurement	Dwelling Unit	Dwelling Unit	1,000 gross sq. ft.	1,000 gross sq. ft.	1 Emp.	Guest Room	-
Avg. Weekday Trips	1,148	1,883	18,164	12,584	7,088	1,340	42,207
% Trips Reduction in TOD	30	30	15	25	15	30	-
Adj. Avg. Weekday Trips	804	1,318	15,439	9,438	6,025	938	33,962

Water

Table 5.24 presents projected water use estimates for Independence Centre. In dealing with commercial water and wastewater estimates, standards for many more specific commercial uses were averaged into one general standard.

Standards are taken from the following source: Commonwealth of Massachusetts Department of Housing and Community Development. 1994. *The Growth Impact Handbook.*

Table 5.24

INDEPENDENCE CENTRE WATER USE ESTIMATES

Use	Gallons per Day per Unit of Measurement	Quantity of Units	Gallons per Day
Commercial	105.4 per bedroom	1,053 Employees	110,986
R & D	192.9 per bedroom	2,461 Employees	474,727
Residential	146.7 per unit	404 Units	59,267
Office	76 per 100 sq. ft.	816,750 sq. ft.	612,563
Hotel	230.3 per employee	138 Employees	31,781
Total	-	-	1,289,324

According to the above standards, Independence Centre will use 1,291,524 gallons of water per day. Office and research and development businesses will be the primary consumers.

Table 5.25 presents wastewater flow quantities for Independence Centre.

Table 5.25

INDEPENDENCE CENTRE WASTEWATER FLOW QUANTITIES

Use	Gallons per Day per Unit of Measurement	Quantity of Units	Total Gallons per Day
Residential Single Family (2 Bed Avg.)	110 per bedroom	240 bedrooms	26,400
Residential Multi-Family (1.5 Bed Avg.)	110 per bedroom	449 bedrooms	46,860
Commercial	50 per 1,000 sq. ft.	315,829 sq. ft.	15,791
Office	75 per 100 sq. ft.	816,750 sq. ft.	612,563
R & D	15 per employee	2,461 employees	36,915
Hotel	110 per room	154	16,940
Total		-	755,469

Total wastewater flow for the site equals 757,999 gallons per day. Office uses are by far the largest contributor to this figure.

Table 5.26 presents residential solid waste generation. Standard is taken from *The Growth Impact Handbook* by the Massachusetts Department of Housing and Community Development (1994).

Table 5.26

RESIDENTIAL SOLID WASTE GENERATION
(including recycled materials)

# Residents	906
Tons per Person per Year	0.45
Total Yearly Generation (Tons)	407.7
Total Daily Generation (Tons)	1.1

Using the assumption of 0.45 tons of solid waste per person per year, total yearly generation for the site is 407.7. Total daily generation is 1.1 tons. These figures refer only to residents of the development.

Other Development Impacts

Additional research will be necessary in order to determine the impact of the development on the town's school system, as well as police and fire protection. For more responsible development to occur, negative impacts need to be mitigated as much as possible.

CHAPTER VI
Implementation Techniques

I. INTRODUCTION

Planning and analysis are meaningless without a coordinated implementation effort. Efforts need to be taken on a local level to make a project such as Independence Centre come to life. The town must begin to form the legal framework for the development of the site. Although the benefits to transit-oriented developments are well documented, permitting and application processes are usually more difficult. Most lending institutions, investors, and government officials are accustomed to the status quo, which consists of single-use developments catering toward automobile drivers. Development of a transit-oriented development takes more work on the part of all involved. However, the benefits to the community are well worth the effort.

II. DEVELOPMENT PROCESS

The following steps are suggestions for expediting the development process.

- Discussions with major property owners (O'Donnell Sand and Gravel and MBTA) must take place in order to determine the roles these parties will play in the development process. Owners may wish to sell land or development rights, or may wish to develop the land themselves. Development rights will most likely have to be acquired from the MBTA which does not deal in non-transportation land development.

- The Town and owners must begin an RFP (request for proposals) process in order to higher a consultant for further planning. Many planning and development firms specialize in neo-traditional, or transit-oriented development. Further planning will consist of market studies to determine the financial viability of different uses, engineering work, fiscal studies, and additional architectural and design planning. The consultant will develop a more specific site master plan which will deal with these issues, and prepare for actual development.

III. LAND USE REGULATIONS

Zoning

Since the 1920's zoning has remained the primary instrument for controlling growth in the United States. While zoning has often been used as a method of isolating uses, it also can serve as a method of providing for a mixed-use atmosphere. A "Station Area Zone" or "Transit-Oriented Development" zone could be approved by the planning board. This zone could set up the legal framework for development of the area.

Within the Station Area Zone, the town could regulate the location of uses within the site, or only regulate the total square footage of each uses in order to maintain a certain ratio. In the case of Independence Centre maintaining discrete districts (some with a mix of uses) within the site is the best choice. Some uses should be kept apart within the development. For instance, residential uses should not be directly adjacent to the layover facility. The zoning ordinance should specify how much of the site should remain as public open space, and where it should be located.

The zoning ordinance is also an important tool in regulating the siting of buildings within the development. The ordinance controls building setbacks, height and floor area ratios. These controls assure that New Urbanist principles are applied to all new development. The ordinance is also important in its control over density. Unlike conventional developments, higher densities are encouraged in TOD's. The zoning ordinance will become a tool for making the development focus on the benefits of transit, and live up to its full potential.

Zoning can also be used as part of a growth management strategy for other parts of the town which should be kept from development. Agricultural or Forest zoning can be used to limit land uses to farming or other non-suburban uses. The Independence Centre development makes such an approach possible by giving the town an appropriate and beneficial place for development.

The zoning ordinance can also be used to specify the phasing of the development. Developing all components of the site at once could prove to be too much of a strain on public facilities. The site could be built one land use at a time, beginning with the residential development. This would assure that later commercial development would have some sort of consumer base.

Subdivision Regulations

Subdivision regulations can be found as a distinct document or as part of a larger zoning ordinance. These regulations cover much of the same subjects as a zoning ordinance (building setback, densities). However subdivision ordinances also regulate additional factors, such road, sidewalk, and planting strip characteristics. Subdivision regulations can assist in making an environment pedestrian friendly through careful thought as to what characteristics pedestrians want and need. Lighting should be on a human scale. The development of bike and walking trails should be encouraged wherever feasible.

Site Plan Approval Process

A site plan approval ordinance "gives a planning board the power to review development applications in order to assure that they meet standards established by the ordinance" (FTA 1994). This ordinance can stand on its own or exist as a part of the zoning by-laws. This process will ensure that the goals of the development, (which have been established in chapter one) are adhered to at every level. It is recommended that a separate Independence Centre Advisory Committee be formed to assist in this process. The Advisory Committee will be discussed later in this chapter.

Architectural Review

Related to the site plan approval process is architectural review. An architectural review board can be established to review proposals for the design of individual buildings. Members are architects or planners who are experienced in the field of building design. This ensures that structures conform to traditional building styles, which are native to New England. Architectural review boards are becoming more popular among communities, as planners and officials see aesthetics as an integral part of a community's livability and economic stability.

Transfer of Development Rights

Transfer of development rights is a more recent growth management tool. The policy allows development rights on one property to be used on another property at a different location. The property from which the development rights have been removed is generally required to be protected by a conservation easement. The transfer process is voluntary on both sides. This tool is useful in that it takes into consideration both land being protected and land which is more appropriate for development. Transferring development rights can be used to "save historic structures from demolition, prevent urbanization of farmland, and preserve unique environmental areas and scenic vistas" (Nelson and Duncan 1995).

The State of Massachusetts uses an Agricultural Preservation Restriction program, in which "development rights to agricultural lands are bought and held by the Commonwealth, and future land use is limited to agriculture" (Nelson and Duncan 1995). The program has been limited, however, by high land prices and financial constraints. Through this program approximately 3% of the state's farmland has been protected (Nelson and Duncan 1995).

Impact Fees

Impact fees are another implementation tool that local officials can use in the development of Independence Centre. Impact fees refer to charges placed on developers which relate to the negative externalities of their project. Developers pay a share of the public burden which is developed by their project. Impact fees commonly relate to such public facilities as

schools, fire and police protection, and sewer and water service. In the case of Independence Centre such a program could offset the cost of additional school children or the extension of utilities.

Land Acquisition

In the case of Independence Centre, a large portion of the land is currently owned by the Massachusetts Bay Transit Authority (MBTA). Some form of land acquisition will be necessary either by the town or directly by a developer. A benefit of this project is that only two major land owners are involved. An additional benefit is that the MBTA is an organization which is devoted to the optimization of transit usage in the State of Massachusetts.

A "joint development" is a "planning and financial partnership among a developer and one or more public agencies such as a municipality and/or a transit agency" (FTA 1994). Transit agencies may lease land to developers, rather than sell off directly.

IV. PUBLIC PARTICIPATION

Why its Necessary

During the implementation process, developers and local officials need to keep public participation as a key priority. Public participation is crucial for four main reasons.

1. *Informing the public as to developments in their town*
   - While the benefits of this project can be regional in scope, the residents of Kingston deal directly with the development of the project. A lack of information can lead to feelings of mistrust.

2. *Overcoming fears and concerns*
   - Residents and officials may hold fears about higher density developments. Many associate traditional development with the worst of the city's ills.
   - Residents will rightly have concerns about the development's effect on the natural environment of the town, as well as its impact on public facilities.

3. *Getting new ideas*
   - Residents who live in the effected community may have different ideas as to what constitutes an appropriate transit-oriented development. This input from concerned citizens is extremely valuable, as it offers insight which planners or developers may not possess.

4. *Learning about other local development issues*
   - Many local residents may simply be more knowledgeable about certain local issues than are paid staff people. Residents are aware of past events are a barometer for the attitudes of the community. Local residents have a great knowledge of the interdependency of local land use issues, and how development will affect the average Kingston resident.

Independence Centre Advisory Committee

As a guide to development the formation of an Independence Centre Advisory Committee is suggested.

Possible members include representatives from the following groups:

- Kingston Master Plan Committee
- Town Planning Board
- Zoning Board of Appeals
- Conservation Commission
- Town Selectmen
- Regional Planning Agency (Old Colony Planning Council)
- Sewer Commission
- Water Commission
- Town Planning Department
- Fire and Police Departments
- Highway Department
- Town Manager
- Jones River Watershed Association
- Kingston Business Association
- MBTA

- Property Owners
- Other concerned individuals or groups

The formation of the committee will maintain the development as a priority, and will benefit from the input of many different sources.

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