

# Needham 2025

## Commercial and Residential Growth Impact Study

Final

Submitted to:  
Town of Needham, MA

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# 1. STUDY BACKGROUND

In order to gain a better understanding of the impact of commercial and residential growth on the Town's infrastructure, the Town of Needham commissioned the Needham 2025 study to assess growth impacts on traffic, transportation, water, sewer, drains, roads and bridges, technology, and school facilities; and to identify options for managing that impact. In 2019, the Town of Needham retained Urban Partners, assisted by NV5, as a consultant to complete the Needham 2025 study.

This report is a summary of preliminary findings for demographic/economic trends; land use and zoning; water and sewer systems; traffic and mobility; and technology and community growth impacts. The last two sections are comprised of a population estimate and forecast, followed by the resulting impact on public school facilities.



*Figure 1: Aerial view of Downtown Needham looking northeast*

## 2. DEMOGRAPHIC TRENDS

### Population & Households

Needham’s population reported in the U.S. Census Bureau’s 2013-2017 American Community Survey 5-Year Estimates (2017 ACS) is 30,429. From 2000 to 2017, Needham’s population grew by 5.3%, compared to 6.8% for Norfolk County and 8.7% for the Boston Region (Table 1).

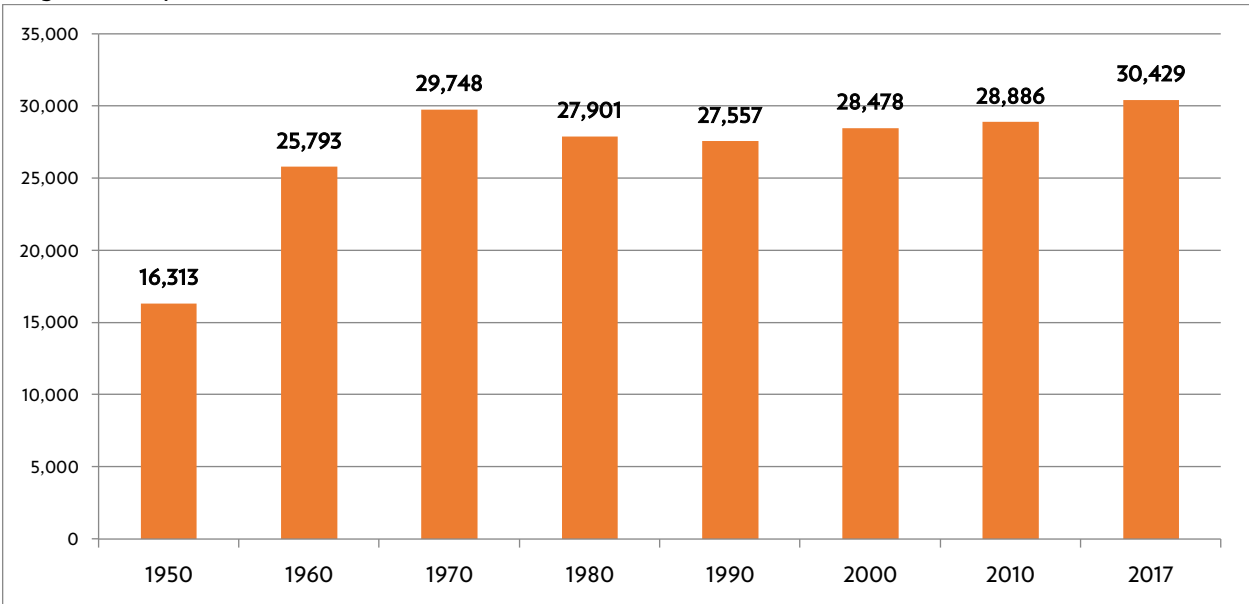
Table 1: Population Trends, 2000-2017

	2000 Census	2010 ACS	2017 ACS	% Growth (2000-2017)
Town of Needham	28,911	28,683	30,429	5.3%
Norfolk County	650,308	662,077	694,389	6.8%
Boston-Cambridge-Newton Metro Area	4,391,344	4,489,250	4,771,936	8.7%

Source: U.S. Census Bureau

As presented in a document called *Demographic, Economic and Housing Profiles* prepared by Needham Department of Planning and Community Development, Needham’s rapid growth period was from 1950 to 1970 when it doubled in population. In the ensuing decades, the Town’s population has experienced small fluctuations (Figure 2):

Figure 2: Population of Needham, 1950 to 2017



Source: U.S. Census Bureau, Needham Planning Department

There was an increase in the total number of households in Needham between 2000 and 2017, but at a much slower rate (0.4%) than the rate of population increase. The County and the Region, in comparison, experienced significant growth in households during this period, with 5.4% and 7.4% growth, respectively (Table 2 on the following page)

Table 2: Household Trends, 2000-2017

	2000 Census	2010 ACS	2017 ACS	% Growth (2000-2017)
Town of Needham	10,612	10,373	10,652	0.4%
Norfolk County	248,827	255,180	262,324	5.4%
Boston-Cambridge-Newton Metro Area	1,679,659	1,735,175	1,804,136	7.4%

Source: U.S. Census Bureau

According to the U.S. Census Bureau, the average household size for Needham has been on a steady increase since 2000. In 2017, Needham’s average household size was 2.77 persons per household, compared to 2.58 for Norfolk County (Table 3).

Table 3: Average Household Size, 2000-2017

	2000 Census	2010 ACS	2017 ACS	% Change (2000-2017)
Town of Needham				
All Households	2.63	2.67	2.77	5.3%
Owner Households	2.82	2.85	3.00	6.4%
Renter Households	1.84	1.80	1.67	-9.2%
Norfolk County				
All Households	2.54	2.52	2.58	1.6%
Owner Households	2.80	2.74	2.80	0.0%
Renter Households	1.96	2.01	2.06	5.1%

Source: U.S. Census Bureau

Compared to the County, a smaller proportion of Needham residents are in non-family households (9.1% compared to 16.7%). There are approximately 900 Needham residents living in group quarters (or 3.0% of total population), compared to 2.6% for the County (Table 4)<sup>1</sup>.

Table 4: Population by Household Type, 2017

	Town of Needham	Norfolk County
Total Population	30,429	694,389
In Households	29,525	676,032
In Households (% of Total)	97.0%	97.4%
In Family Households (% of Households)	90.9%	83.3%
In Non-Family Households (% of Households)	9.1%	16.7%
In Group Quarters (% of Total)	3.0%	2.6%

Source: U.S. Census Bureau

<sup>1</sup> The Census Bureau classifies all people not living in housing units (house, apartment, mobile home, rented rooms) as living in **Group Quarters**, of which there are two types: 1) Institutional, such as correctional facilities, nursing homes, or mental hospitals; and 2) Non-Institutional, such as college dormitories, military barracks, group homes, missions, or shelters.

**Age Distribution**

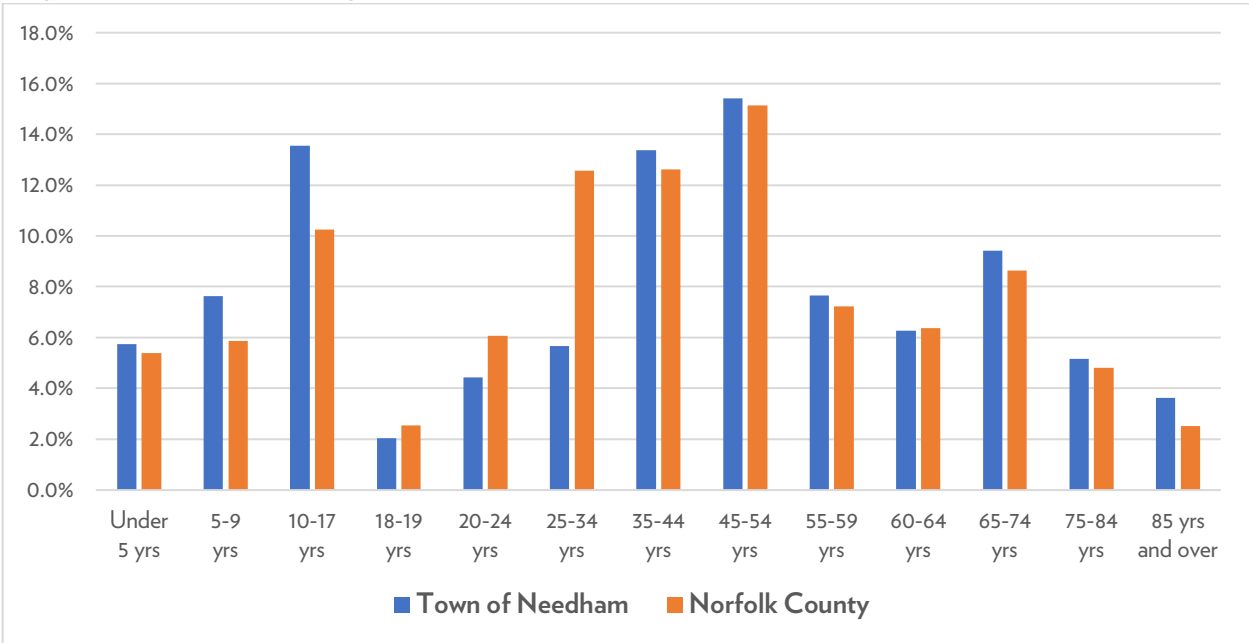
Table 5 and Figure 3 compare the age distribution patterns in Needham to the County. First, in Needham, school-age children between 5 to 17 years-of-age represent 21.2% of the total population, which is much higher than the percentage for the County (16.1%). Second, Needham has a very low percentage of 25 to 34-year-olds (5.7% compared to 12.6% for the County). Lastly, the proportion of senior citizens (65 years-of-age or older) in Needham is 18.2% compared to 15.9% for the County.

Table 5: Distribution of Age, 2010-2017

	Town of Needham 2010	Town of Needham 2017	Norfolk County 2010	Norfolk County 2017
Under 5 years	6.6%	5.7%	5.7%	5.4%
5 to 9 years	8.3%	7.6%	6.4%	5.9%
10 to 17 years	12.5%	13.5%	10.8%	10.3%
18 to 19 years	2.8%	2.0%	2.4%	2.6%
20 to 24 years	3.6%	4.4%	5.7%	6.1%
25 to 34 years	5.8%	5.7%	11.6%	12.6%
35 to 44 years	15.1%	13.4%	14.9%	12.6%
45 to 54 years	16.2%	15.4%	16.2%	15.1%
55 to 59 years	6.8%	7.7%	6.7%	7.2%
60 to 64 years	5.4%	6.3%	5.3%	6.4%
65 to 74 years	7.3%	9.4%	6.8%	8.6%
75 to 84 years	5.6%	5.2%	5.2%	4.8%
85 years and over	4.0%	3.6%	2.3%	2.5%

Source: U.S. Census Bureau

Figure 3: Comparison of Age Distribution, 2017



Source: U.S. Census Bureau, Urban Partners

## **Educational Attainment**

Table 6 shows the high level of educational attainment for Needham residents. According to the 2017 ACS, 78.9% of Needham residents 25 years-and-older have some type of college degrees, compared to 59.9% for the County. More than two-out-of-five Needham residents 25 years-and-older have graduate or professional degrees (42.7% compared to 24.0% for the County).

**Table 6: Educational Attainment (25yrs and over), 2010-2017**

	Town of Needham 2010	Town of Needham 2017	Norfolk County 2010	Norfolk County 2017
Population 25 years and over	18,969	20,270	456,151	485,216
Less than 9th grade	1.1%	0.7%	2.8%	2.7%
9th to 12th grade, no diploma	1.9%	1.6%	4.1%	3.4%
High school graduate (includes equivalency)	10.6%	11.4%	22.9%	20.0%
Some college, no degree	9.1%	7.4%	14.8%	13.9%
Associate's degree	6.3%	4.3%	7.9%	7.4%
Bachelor's degree	31.8%	31.9%	26.5%	28.5%
Graduate or professional degree	39.1%	42.7%	20.9%	24.0%

*Source: U.S. Census Bureau*

## **Household Income**

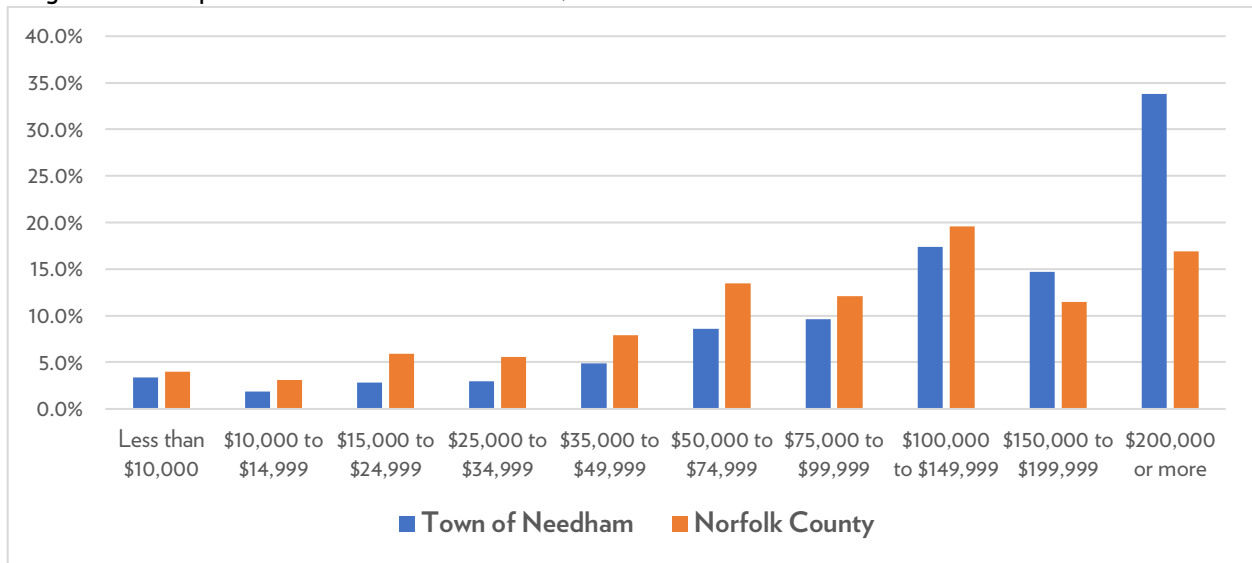
The high levels of household income for Needham residents generally correlate with high educational attainment levels illustrated below in Table 7 and Figure 4. The median household income for Needham is \$141,690, compared to \$95,668 for the County. More than a third (33.8%) of Needham households earn more than \$200,000 per year.

**Table 7: Household Income, 2010-2017**

	Town of Needham 2010	Town of Needham 2017	Norfolk County 2010	Norfolk County 2017
Less than \$10,000	2.9%	3.4%	4.7%	4.0%
\$10,000 to \$14,999	3.7%	1.9%	3.7%	3.1%
\$15,000 to \$24,999	4.8%	2.8%	6.7%	5.9%
\$25,000 to \$34,999	3.4%	3.0%	6.1%	5.6%
\$35,000 to \$49,999	4.6%	4.9%	9.6%	7.9%
\$50,000 to \$74,999	12.8%	8.6%	15.7%	13.5%
\$75,000 to \$99,999	9.4%	9.6%	13.7%	12.1%
\$100,000 to \$149,999	19.5%	17.4%	19.3%	19.6%
\$150,000 to \$199,999	10.9%	14.7%	9.4%	11.5%
\$200,000 or more	27.9%	33.8%	11.2%	16.9%
Median Household Income	\$114,365	\$141,690	\$81,027	\$95,668

*Source: U.S. Census Bureau*

Figure 4: Comparison of Household Income, 2017



Source: U.S. Census Bureau, Urban Partners

### Current Housing Characteristics

The number of housing units in Needham grew by 117 units (or 1.1%) between 2000 and 2017. The vacancy rate increased from 2.2% in 2000 to 3.9% in 2010, then dropped slightly to 2.9% in 2017. The rate of homeownership experienced a slight increase, going from 80.9% in 2000 to 82.6% in 2017 (Table 8)<sup>2</sup>.

Table 8: Housing Occupancy and Tenure, 2000-2017

	Housing Units 2000 Census		Housing Units 2010 ACS		Housing Units 2017 ACS		% Change 2000-2017
		(%)		(%)		(%)	
Total housing units	10,846	-	10,781	-	10,963	-	1.1%
- Occupied units	10,612	97.8%	10,373	96.2%	10,652	97.2%	0.4%
- Vacant units	234	2.2%	408	3.9%	311	2.9%	32.9%
Owner occupied	8,587	80.9%	8,607	83.0%	8,799	82.6%	2.5%
Renter occupied	2,025	19.1%	1,766	17.0%	1,853	17.4%	-8.5%

Source: U.S. Census Bureau

Table 9 shown on the following page is a detailed breakdown of the Age of Housing Stock for Needham based on tenure. It shows that 56.6% of all housing units in the Town were built before 1960. The U.S. Census Bureau also reports that owner-occupied homes are older than renter-occupied homes (62.0% of the homeowner housing were built 1960 or earlier, compared to 31.2% of rental homes).

<sup>2</sup> The U.S. Census Bureau's 5-Year American Community Survey is based on annual survey data collected over a 5-year period, and therefore they describe the average characteristic for that period. The most accurate and up-to-date data on the Town's housing stock comes from Needham's Department of Planning and Community Development which is documented on pages 8-10.



Table 9: Age of Housing Stock by Tenure

	All Units	%	Owner Occupied	%	Renter Occupied	%
All Units	10,652	-	8,799	-	1,853	-
Built 2014 or later	137	1.3%	137	1.6%	0	0.0%
Built 2010 to 2013	383	3.6%	203	2.3%	180	9.7%
Built 2000 to 2009	932	8.7%	772	8.8%	160	8.6%
Built 1990 to 1999	535	5.0%	402	4.6%	133	7.2%
Built 1980 to 1989	837	7.9%	524	6.0%	313	16.9%
Built 1970 to 1979	603	5.7%	378	4.3%	225	12.1%
Built 1960 to 1969	1,192	11.2%	928	10.5%	264	14.2%
Built 1950 to 1959	2,158	20.3%	1,982	22.5%	176	9.5%
Built 1940 to 1949	1,316	12.4%	1,108	12.6%	208	11.2%
Built 1939 or earlier	2,559	24.0%	2,365	26.9%	194	10.5%

Source: U.S. Census Bureau

The majority of homes (81.0%) in Needham are one-unit structures (both attached and detached types). According to the 2017 ACS, 94.1% of the homeowners live in residential structures with just one unit. Renter households are more evenly distributed in terms of units in structure, with the largest number of renters (528 households, or 28.5% of all rental units) living in structures with 50+ units (Table 10)

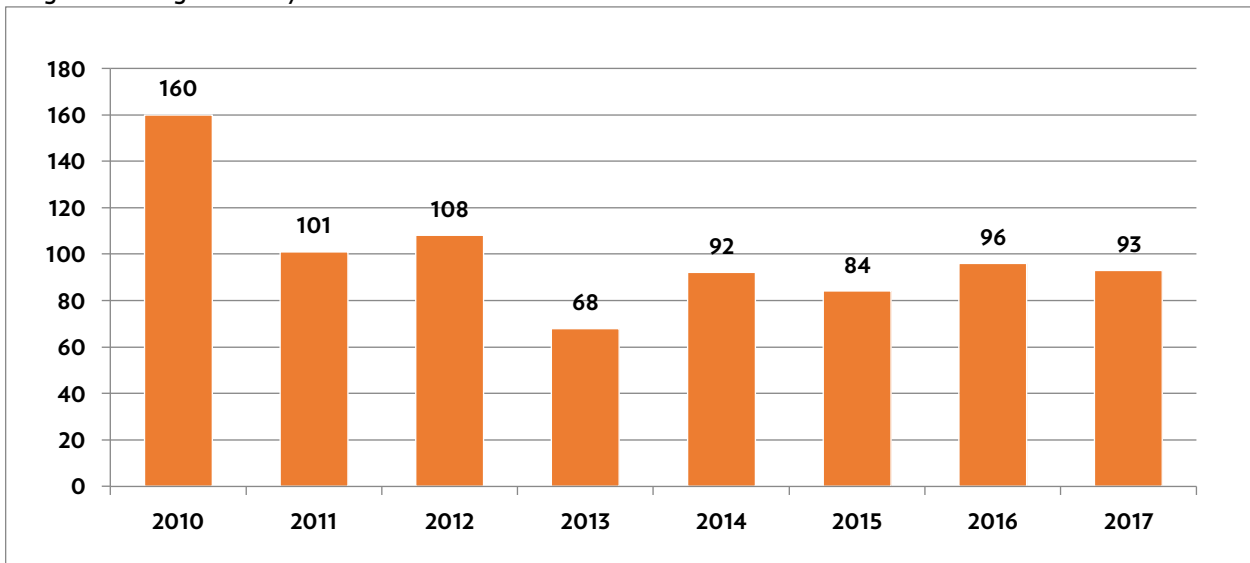
Table 10: Units in Structure by Tenure

	All Units	%	Owner Occupied	%	Renter Occupied	%
All Units	10,652	-	8,799	-	1,853	-
1 Unit, detached	8,222	77.2%	7,951	90.4%	271	14.6%
1 Unit, attached	401	3.8%	328	3.7%	73	3.9%
2 Units	443	4.2%	176	2.0%	267	14.4%
3 or 4 Units	217	2.0%	51	0.6%	166	9.0%
5 to 9 Units	218	2.0%	46	0.5%	172	9.3%
10 to 19 Units	150	1.4%	0	0.0%	150	8.1%
20 to 49 Units	327	3.1%	101	1.1%	226	12.2%
50 Units or more	674	6.3%	146	1.7%	528	28.5%
Mobile Home	-	-	-	-	-	-
Boat, RV, Van, etc.	-	-	-	-	-	-

Source: U.S. Census Bureau

The most accurate and up-to-date data on the Town’s housing stock comes from Needham’s Department of Planning and Community Development which documented a total of 706 net new housing units from 2010 to 2017. First of all, the Town saw an average of 100 so-called teardowns annually during this period (generally homes being demolished for purpose of rebuilding larger homes on the same lot, see Figure 5 and Figure 6 on the following page).

Figure 5: Single-Family Residential Demolitions or Relocations in Needham



Source: U.S. Census Bureau, Needham Planning Department

Figure 6: Case Study of Tear Down-Reconstruction Activity, 89 Bird Street



Table 11 details a total of 706 total net new units, comprising of 40 net new single-family and two-family homes (factoring demolitions and replacement homes) and 666 new units in the following multi-family developments:

- Independent living units at The Residences of Wingate: 12 units (2013)
- Mixed-use property at 50 Dedham Avenue: 10 units (2014)
- Greendale Village 40B homes: 20 units (2014)
- Webster Street Green 40B homes: 10 units (2014)

- Independent living units at One Wingate Way: 52 units (2016)
- The Kendrick: 390 units (2017)
- Modera Needham: 136 units (2017)
- Sunrise Terrace subdivision: 6 units (2017)
- Rockwood Lane subdivision: 22 units (2017)
- Belle Lane subdivision: 8 units (2017)

Table 11: Net New Residential Units, 2010-2017

Year	Net New Single-Family/ Duplex Units	New Units in Multi-Family Structures	Total Net New Units
2010	6	-	6
2011	6	-	6
2012	8	-	8
2013	-5	12	7
2014	12	40	52
2015	3	-	3
2016	9	52	61
2017	1	562	563
<b>Total</b>	<b>40</b>	<b>666</b>	<b>706</b>

Source: Needham Building Department, Needham Department of Planning and Community Development

## Home Sales

According to *Realquest*, which is a comprehensive real estate database service that was utilized for report, there were 374 home sales in Needham within the last 12 months. Sale prices ranged from \$225,400 to \$3.125 million, with a median price of \$1.1 million. In terms of average sale price per square foot (SF) of living space, the median price was \$451.26 per SF. Of the 374 home sales, 26 were new homes built in 2018. The sale prices for these new homes ranged from \$1.085 million to \$3.089 million, with a median price of \$1.69 million (Figure 7).

Figure 7: Highest Priced New Home Sales, 2018-19

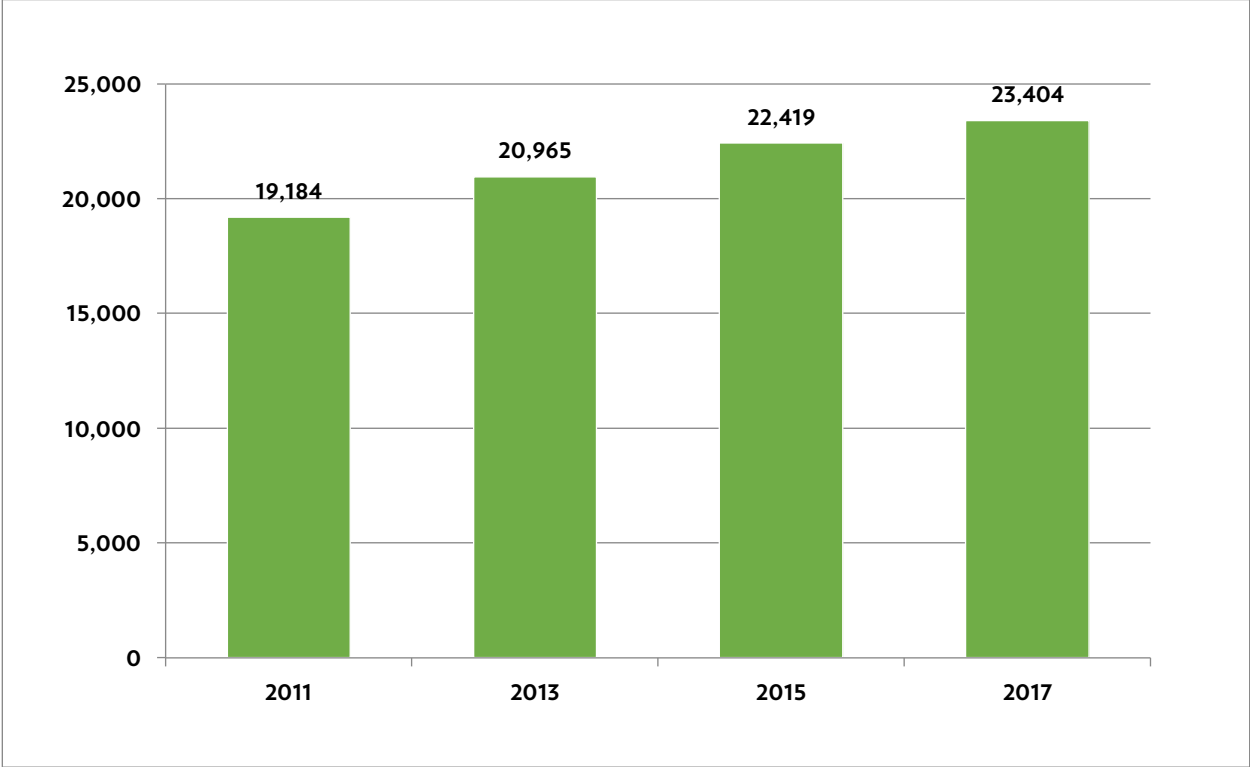


Source: Realquest, Zillow, Urban Partners

### 3. ECONOMIC TRENDS

According to the U.S. Census Bureau’s *OnTheMap* application, which uses employer payroll tax information to geo-locate jobs within a defined area, Needham has experienced a steady increase in jobs from 2011 to 2017. In 2011 Needham was home to 19,184 jobs, and in 2017 the number of jobs increased to 23,404 jobs, equivalent to an increase of 22.0% (see Figure 8).

Figure 8: Jobs Located in Needham (2011-2017)



Source: U.S. Census Bureau

The most significant employment trend for Needham during this time period has been the increase of jobs in the *Health Care and Social Assistance* sector, which experienced a growth of 1,933 positions (equivalent to a 51.8% increase). The *Administration & Support, Waste Management and Remediation* sector also experienced significant growth, adding 1,034 jobs during this period (95.7% increase).

The *Professional, Scientific, and Technical Services*, which is comprised of some of the highest paying jobs, shed 305 jobs from 2011 to 2015 (8.8% decrease, see Table 12 on the following page).

Table 12: Jobs Located in Needham by Industrial Sectors, 2011-2017

	Jobs in 2017	% of All Jobs 2017	Jobs in 2011	% of All Jobs 2011	Change 2011-17
Health Care and Social Assistance	5,668	24.2%	3,735	19.5%	1,933
Professional, Scientific, and Technical Services	3,176	13.6%	3,481	18.1%	-305
Admin & Support, Waste Management/Remed.	2,114	9.0%	1,080	5.6%	1,034
Educational Services	1,792	7.7%	1,421	7.4%	371
Accommodation and Food Services	1,614	6.9%	1,084	5.7%	530
Retail Trade	1,287	5.5%	1,328	6.9%	-41
Information	1,148	4.9%	1,077	5.6%	71
Finance and Insurance	1,093	4.7%	1,022	5.3%	71
Wholesale Trade	1,018	4.3%	794	4.1%	224
Manufacturing	980	4.2%	1,052	5.5%	-72
Other Services (excluding Public Administration)	866	3.7%	987	5.1%	-121
Construction	758	3.2%	694	3.6%	64
Management of Companies and Enterprises	558	2.4%	565	2.9%	-7
Public Administration	413	1.8%	244	1.3%	169
Real Estate and Rental and Leasing	383	1.6%	310	1.6%	73
All other sectors	536	2.3%	310	1.6%	226
<b>Total</b>	<b>23,404</b>		<b>19,184</b>		<b>4,220</b>

Source: U.S. Census Bureau

The *OnTheMap* application reports that the largest segment of workers employed in Needham live in Boston (13.6% in 2017), followed by those who stay within the Town for work (7.3%. See Table 13).

Table 13: Where Needham Workers Live 2011-2017

	Jobs in 2017	% of All Jobs 2017	Jobs in 2011	% of All Jobs 2011	Change 2011-17
Boston	3,172	13.6%	2,440	12.7%	732
Needham	1,706	7.3%	1,643	8.6%	63
Newton	819	3.5%	788	4.1%	31
Framingham	552	2.4%	475	2.5%	77
Waltham	505	2.2%	454	2.4%	51
Dedham	495	2.1%	349	1.8%	146
Norwood	442	1.9%	312	1.6%	130
Quincy	394	1.7%	340	1.8%	54
Brockton	369	1.6%	252	1.3%	117
Cambridge	344	1.5%	233	1.2%	111
All Other Locations	14,606	62.4%	11,898	62.0%	2,708
<b>Total</b>	<b>23,404</b>	<b>100%</b>	<b>19,184</b>	<b>100%</b>	<b>4,220</b>

Source: U.S. Census Bureau

According to the *OnTheMap* application, there were a total of 14,886 employed residents of Needham in 2017, an increase of 1,595 (12.0%) from 2011. *Health Care and Social Assistance*; *Professional, Scientific, and Technical Services*; and *Educational Services* remained the top three sectors in which Needham residents were employed (17.2%, 15.2%, and 12.7% employed, respectively. See Table 14).

Table 14: Employed Residents of Needham by Notable Industrial Sectors, 2011-2017

	Workers in 2017	% of All Workers 2017	Workers in 2011	% of All Workers 2011	Change 2011-17
Health Care and Social Assistance	2,564	17.2%	2,228	16.8%	336
Professional, Scientific, and Technical Services	2,260	15.2%	1,825	13.7%	435
Educational Services	1,892	12.7%	1,695	12.8%	197
Finance and Insurance	1,215	8.2%	1,289	9.7%	-74
Retail Trade	1,018	6.8%	943	7.1%	75
Accommodation and Food Services	861	5.8%	723	5.4%	138
Information	692	4.6%	568	4.3%	124
Admin & Support, Waste Management/Remed.	670	4.5%	557	4.2%	113
Manufacturing	556	3.7%	598	4.5%	-42
Other Services (excluding Public Administration)	506	3.4%	547	4.1%	-41
Public Administration	476	3.2%	405	3.0%	71
Management of Companies and Enterprises	475	3.2%	393	3.0%	82
Wholesale Trade	472	3.2%	527	4.0%	-55
Construction	406	2.7%	343	2.6%	63
All other sectors	823	5.5%	650	4.9%	173
<b>Total</b>	<b>14,886</b>		<b>13,291</b>		<b>1,595</b>

Source: U.S. Census Bureau

The *OnTheMap* application reports that the largest segment of employed Needham residents commute to Boston for work (30.4% in 2017), followed by those who stay within the Town for work (11.5%. See Table 15).

Table 15: Commuting Destination for Employed Needham Residents, 2002-2017

	Jobs in 2017	% of All Jobs 2017	Jobs in 2011	% of All Jobs 2011	Change 2011-17
Boston	4,527	30.4%	3,978	29.9%	549
Needham	1,706	11.5%	1,643	12.4%	63
Newton	1,058	7.1%	1,042	7.8%	16
Cambridge	762	5.1%	616	4.6%	146
Waltham	588	4.0%	485	3.6%	103
Wellesley	399	2.7%	435	3.3%	-36
Framingham	263	1.8%	276	2.1%	-13
Burlington	251	1.7%	243	1.8%	8
Brookline	225	1.5%	271	2.0%	-46
Dedham	214	1.4%	191	1.4%	23
All other locations	4,893	32.9%	4,111	30.9%	782

Source: U.S. Census Bureau

Shown in Table 16 below is a comparison of Needham’s In-Area Employment Efficiency, or the percentage of jobs in the Town filled by Needham residents, to other notable communities in Norfolk County. In 2017, the average In-Area Employment Efficiency for the twelve Norfolk County communities examined below were 11.4%. Needham’s 7.3% was second lowest, with only Dedham reporting higher rates of out-commuting.

Table 16: In-Area Employment Efficiency, Largest Cities and Towns in Norfolk County

	Jobs in 2017	Jobs Filled by Residents in 2017	In-Area Employment Efficiency 2017
Quincy	50,028	7,753	15.5%
Braintree	30,294	2,677	8.8%
Norwood	24,207	2,351	9.7%
Needham	23,404	1,706	7.3%
Brookline	19,482	1,958	10.1%
Dedham	19,024	1,377	7.2%
Wellesley	18,472	1,377	7.5%
Weymouth	17,761	2,976	16.8%
Stoughton	16,745	1,842	11.0%
Franklin	15,944	2,249	14.1%
Randolph	9,490	1,170	12.3%
Milton	6,857	1,175	17.1%
<b>Average</b>	<b>20,976</b>	<b>2,384</b>	<b>11.4%</b>

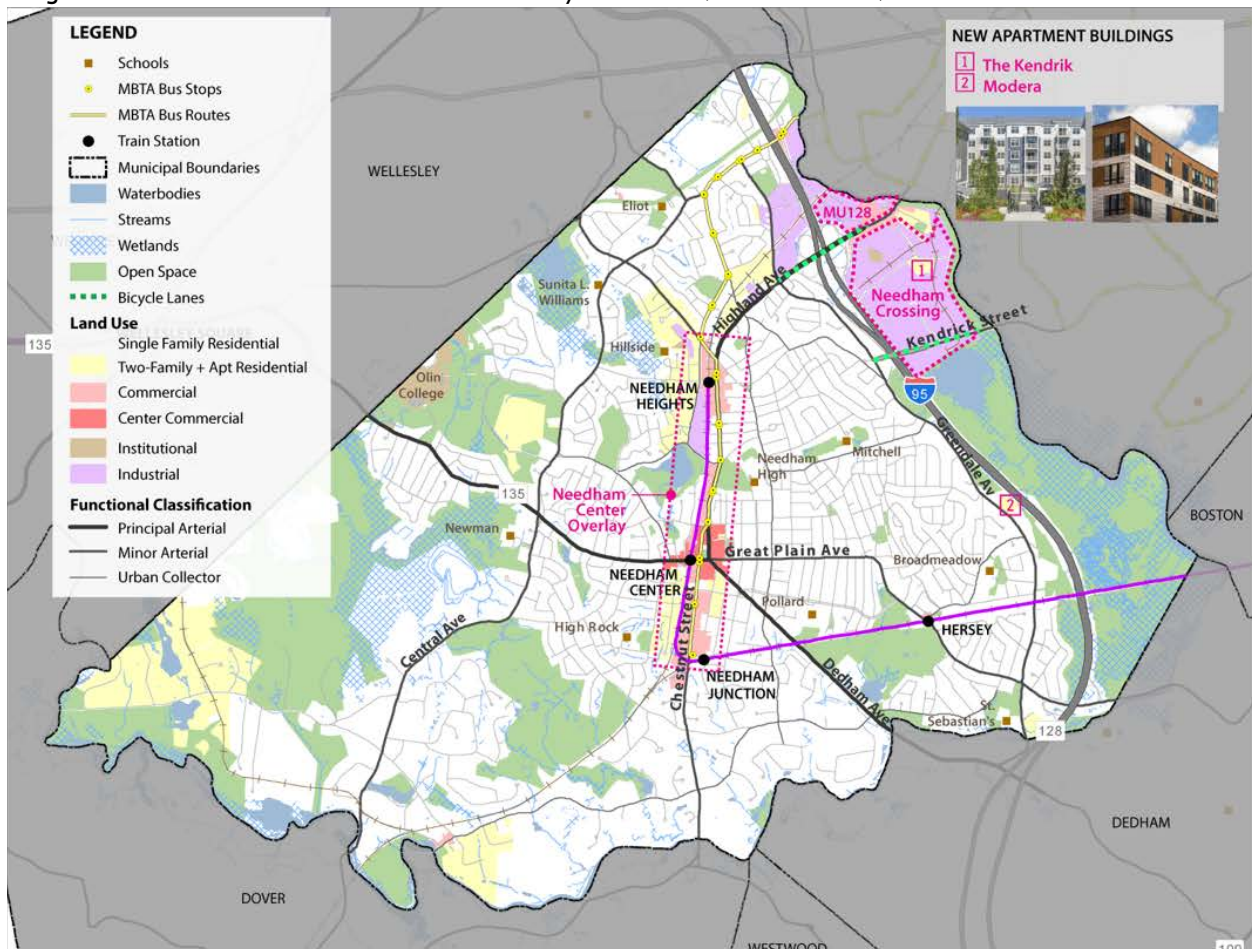
Source: U.S. Census Bureau

# 4. LAND USE AND ZONING

## Structure of the Town

The Town of Needham is approximately 13 square miles in area, bordered by Wellesley to the northwest, Newton to the east, Dover to the southwest, and Dedham to the southeast (see map of Town’s structure below in Figure 9). The main north/south spine of the town is comprised of Chestnut Street and Dedham Avenue, which change into Chapel Street and Highland Avenue, respectively, and eventually merge into Highland Avenue at the intersection of May Street. This commercial spine is approximately two blocks wide at the south end, where the hospital is located, and then becomes three blocks wide north of Great Plain Avenue before tapering down to two blocks and then one block wide (see Figure 10 on the following page). The commuter rail runs along the western side of this spine with three stations located along it and a fourth at Great Plain Avenue. Great Plain Avenue crosses Chestnut Street/Chapel Street and Dedham Ave/Highland Ave. This area is the “heart” of town. The Town Common is located on the north side of Great Plain Avenue between Chapel Street and Highland Avenue.

Figure 9: Structure of the Town as Framed by its Streets, Rail Corridor, Land Uses





I-95 passes through the eastern portion of the town. It passes over wetlands and forested area in the eastern section of town and is not much consequence to the town's structure except its likely influence in the location of industrial land uses in proximity to the highway and at the interchanges, where cars enter at or exit onto Highland Avenue. The parcel data used to create the map has not yet been updated to reflect the transitioning of land uses in the Needham Crossing District from transitioning from industrial uses to a mix of commercial and residential uses. With the exception of the spine and the I-95 corridor, the town is primarily residential and single-family in nature, with some areas containing two-family houses and apartments.

### **Redevelopment & Revitalization Efforts**

The Town launched three initiatives as part of an on-going effort to foster redevelopment and economic revitalization.

Needham Crossing District - The Town established Needham Crossing (formerly the New England Business Center) to attract companies to locate in a modern, connected, mixed-use urban layout that embraces contemporary architecture and urban design. The 2002 and 2011 rezoning of this area reflects the Town's vision of an urban, real, ready, flexible and accessible modern environment. The district is already home to of several technology businesses such as TripAdvisor and the life science company Verastem. Contributing significantly to the mixed-use environment, the Kendrick with 390 units of high quality apartments was completed in 2017.

NBCUniversal recently opened a \$125 million, 160,000 square foot facility in Needham Crossing. The new building, which houses more than 400 employees, includes a full multimedia production facility with six control rooms, six broadcast studios, and a podcasting studio. It also includes many amenities for employees, including kitchens, a fitness facility, a nursing room for new mothers, outdoor courtyards, and a doctor-on-demand room for telemedicine appointments. The company also offers a shuttle service between its facility and the Newton Highlands Green Line station and the commuter rail station in Needham Heights.

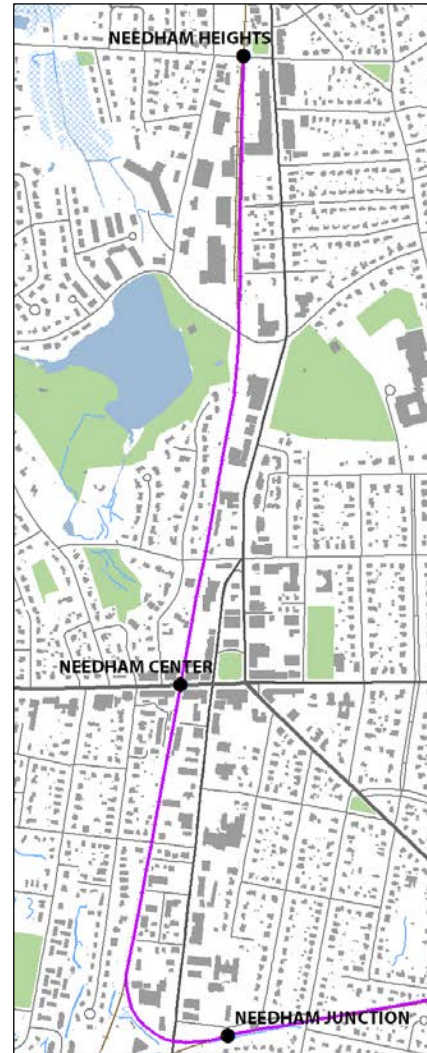


Figure 10: Map showing the block structure of Needham Center and environs.

The Town implemented a tax increment finance program that will provide NBCUniversal with approximately \$2.1 million in property tax relief over 10 years, while the Town will collect an equivalent or higher amount in personal property taxes from satellites, cameras, computers and other high-tech equipment. The agreement includes the creation of a collaborative media space in its building.



Figure 11: NBCUniversal Facilities in Needham.

Additionally, Boston Children’s Hospital recently presented interest in developing a pediatric ambulatory surgical center in Needham. The facility would include an innovation lab and educational training center and a number of clinical and therapeutic services. The facility is projected to employ 400 people. A draft zoning bylaw amendment has been written. The hospital plans to develop a new parking garage for this facility.

Most recently, co-working provider Workbar has announced plans to bring to coworking to the N2 Innovation District. It anticipates being able to accommodate 150 people in its 17,000 sq. ft. space at space at 117 Kendrick Street, with a full capacity of 450.

Investments in redesigning and reconstructing roadway infrastructure have been made to accommodate growth in this district. This includes new interchanges at Kendrick Street and Highland Avenue along with widening of roads and new traffic signals. The upgraded infrastructure will support up to 3 million square feet of new development with visibility on and access from/to Route 128.



Figure 12: TripAdvisor Building



Figure 13: Interior Courtyard at the Kendrick

It is important to mention the broader N2 Innovation District initiative that is taking place in conjunction with Needham Crossing. The N2 Innovation District is a partnership between the City of Newton, Town of Needham, the Newton-Needham Regional Chamber, area real estate holders and local businesses. This initiative aims to create an urban innovation district. Companies such as Coachup, Empow, Boston Ballet, Examity and StopShop have expanded or moved into the area. Existing businesses that have expanded include SharkNinja, NBC Universal, CyberArk and Karyopharm. Candel Therapeutics, a biotech company that just closed a \$22.5 million “C” round of financing, recently announced it will move from another part of Newton into the N2 Innovation District, citing the location and facilities as conducive to a culture of innovation and creativity.

Mixed Use 128 - the MUOD is an overlay district superimposed on the Mixed Use-128 and the abutting Highland Commercial-128 District. This district can be accessed from Highland Avenue, which forms the southern border of the district. It consists of a collection of smaller industrial businesses than those in Needham Crossing. The MUOD allows for residential development of up to 250 units with a maximum height of 84 feet by special permit.

Across I-95 from the MUOD is a site that is currently home to a car dealership. The site is currently zoned for industrial uses. A proposal to rezone the site to Highway Commercial 1 in order to facilitate future redevelopment initially did not pass but is being re-evaluated.

Needham Center Overlay - the purposes of the Needham Center Overlay District are to encourage redevelopment of existing properties and infill development of an appropriate scale, density, mix of uses and design for a suburban downtown, substantially as set forth in the Needham Center Development Plan (2009), and to establish sub-districts in which to achieve these purposes in a manner compatible with surrounding areas; to create and sustain a vibrant, walkable downtown area; and to create opportunities for housing within walking distance of goods and services, public transportation, and the civic life of the town. Toward these ends, development in the Needham Center Overlay District is permitted to exceed the density and dimensional requirements that normally apply in the underlying zoning district(s) if the development complies with the design guidelines and all other requirements.

### **Teardowns in Single Family Neighborhoods**

In 2016, in response to concerns expressed by Needham residents as to the impact new or expanded homes are having on the character of the surrounding residential neighborhood, the Needham Planning Board appointed the Large House Review Study Committee to develop recommendations on how best to ensure that new residential construction in the Single Residence B and General Residence Districts will complement existing buildings, settings and neighborhood character. The Committee also explored how the updating and

upgrading of structures in such neighborhoods can and should be done, while at the same time conserving the neighborhood's distinctive qualities as changes occur.

The demolition of older, smaller, and less expensive houses has become the principal source of lots for the construction of new single-family houses. More than 300 building permits for single-family houses were issued between January 2008 and January 2013. The 289 replacement houses, constructed on lots where an existing house has been torn down, accounted for 92% of new house construction over the past 5 years. The remaining 8% was allocated to infill construction at 6% and to subdivision construction at 3%. Needham has transitioned to a place where the majority of its new single-family home construction is derived from tear downs driven by market demand and the unavailability of infill and subdivision lots.

After significant research, the Large House Review Study Committee proposed a number of zoning revisions including modifying setbacks, changing definitions, increasing maximum lot coverage and instituting floor area ratio (FAR) into the regulations.

It is worth investigating whether the Large House Review Study Committee has tracked the number of bedrooms added in the Town through the development of new, larger houses created after the demolishing of an older, smaller house.

### **Accessory Dwelling Units**

To provide additional living options for seniors, a zoning bylaw for accessory dwelling units (ADUs) was recently approved. The bylaw defines an accessory dwelling unit as “an apartment in a single-family detached dwelling that is a second, self-contained dwelling unit and a complete, separate housekeeping unit containing provisions for living, sleeping, cooking and eating. This unit shall be subordinate in size to the principal dwelling unit on a lot and shall be constructed to maintain the appearance and essential character of the single-family dwelling.” Among the provisions of the bylaw are the following:

- Occupancy of the unit that is not owner-occupied shall be limited to a member of the owner’s family or a caregiver and such caregiver’s family; provided that occupancy of the principal dwelling unit and the ADU combined shall be limited to five persons who are not family of the owner.
- The size of any ADU is limited to 850 square feet of living space and one bedroom.
- The ADU must be located in the primary structure, not in an accessory building.

### **Neighboring Towns**

Forces outside of Needham can certainly influence land use, development, and residential choices in in Needham. The growth of employment opportunities in the N2 Innovation District (not to mention the apartment development that has taken place in the Needham Crossing District) could increase demand for housing in Needham, as could any expansion of employment in neighboring towns.

## 5. WATER, SEWER AND DRAINS

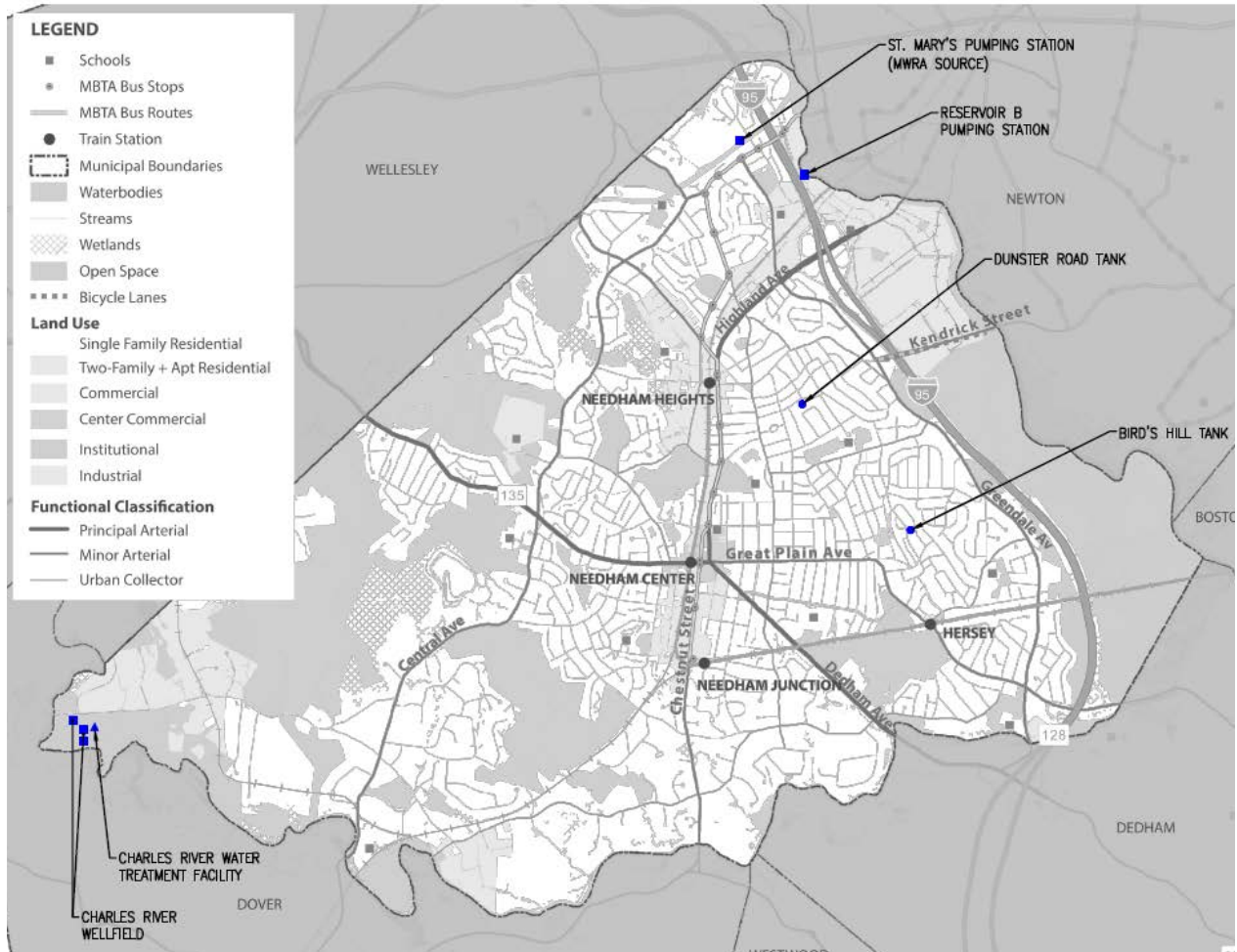
### Drinking Water

The average daily water consumption in Needham is 3.58 mgd (2018) and is met with two different potable water sources. Approximately 80-90% of the water is drawn from three gravel packed wells (Charles River Wellfield) in southeast Needham and treated at the Charles River Water Treatment Facility. When the facility was built in 1999, each well was also upgraded and a standby power generator was installed to maintain operations during power outages. The Department of Environmental Protection (DEP) has registered an average of 2.63 mgd to be drawn from the Charles River. Any additional water demand is met by Needham's secondary water supply from a State Agency, the Massachusetts Water Resources Association (MWRA). A 36" diameter MWRA pipe runs water from a surface reservoir supply through MWRA's MetroWest Tunnel in Weston to the St. Mary's booster pumping station in north Needham. Modifications to the St. Mary's pumping station were completed in 2016 and it was built for a 25 year horizon capacity according to the Department of Public Works. Water demand is higher during summer months and during emergency fire events and the agreement with the MWRA allows Needham to withdraw up to 12.5 mgd. The MWRA meters Needham's water consumption and has reported it as stable. There are no capacity issues at this time. Two water tanks with a combined storage of 4 million gallons service residents in Needham. The Dunster Road Standpipe and Bird's Hill Tank were constructed in 1950 and 1972 respectively and are located in central/southeast Needham. There are homes located within 100 feet of both storage tanks.

The Town currently has 135 miles of street water mains with 10,300 service connections and 1,245 fire hydrants. A 10" or greater diameter transmission piping system links the two water sources and the two tanks to areas of the Town with high water demand. Residential areas are supplied by distribution pipes of 6" or 8" in diameter. Pressure in the system typically ranges between 20 psi and 110 psi. However, homes in close proximity to the tanks have experienced pressure lower than the state minimum (20 psi). As a result, some have installed individual pressure boosters.

According to a report prepared by CDM in 1999, pipes installed after 1946 were cement-lined, comprising 68% of the all existing pipes. More than 7.5 miles of water main were installed prior to 1900. The Department of Public Works (DPW) repairs several water main breaks annually. The Town has an ongoing water system rehabilitation program through which it has replaced multiple outdated mains over the past decade. The Town also performs annual water main flushing and regularly scheduled testing of water quality.

Figure 14: Major Water Utility Infrastructure



### **Stormwater Runoff & Management**

Needham is located in the Charles River Drainage Basin and is comprised of four major drainage areas. Two of the areas discharge directly to the Charles River while the other two discharge indirectly to the Charles River via tributary waters through Wellesley. These sub watersheds were mapped by BETA Group, Inc. using Global Positioning System (GPS) and geographic information systems (GIS) in 2002 and again in 2019 for Needham’s Stormwater Management Plan. Currently there are 4,225 catch basins, 1,392 drainage manholes and 295 discharges. DPW conducts annual cleanings of every Town-owned catch basin. DPW’s Water and Sewer Division is also responsible for maintaining pipes, catch basins, and manholes. With a limited number of staff, DPW works efficiently to keep up with maintenance.

Needham’s Water and Sewer District administers storm drain maintenance, which is in compliance with the National Pollution Discharge Elimination System (NPDES) program. In October of 2018, the Town of Needham adopted a Stormwater By-Law to prevent the pollution

of Needham's wetlands and waters from stormwater runoff. This By-Law covers everything from the construction of single-family homes to all major developments.

BETA also modeled and identified eleven areas at risk for flooding during major storm events. Since these findings, new multi-unit developments and larger residential redevelopments have been built in Needham since these findings and are placing more stress on the Town's drainage system.

Needham's Capital Improvement Plan also identified necessary storm drainage repairs to culverts. Deteriorating retaining walls and silt build up on brooks has led to affected water flow, loss of abutting property and, in some cases, basement flooding.

### **Wastewater & Sewer**

DPW's Water, Sewer and Drain Division owns, operates and maintains 130 miles of gravity sanitary sewer pipe and 9 sewage pumping stations. The Reservoir B pumping station serving the Needham Crossarea was reconstructed in 2012. DPW reports that the development area is expanding more quickly than anticipated. The pumping station could be a limiting factor to the actual 25-year growth horizon; 1.5 million square feet of the 2.5 million square feet have already been allotted after three years. The Lake Drive pump is also in need of repairs. The pumps discharge to the MRWA Treatment Facility at Deer Island as there is no wastewater treatment facility in Needham. There is no current contractual limit on the amount of wastewater that Needham can send to Deer Island.

The MRWA has two flow meters that record the total waste from the town and the current average daily flow is 4.25 mgd. Sewage flow from Needham is collected by the Wellesley Extension of the MWRA which also services the Framingham Extension Sewer, Dedham and Wellesley.

In 1984, a State Order was put in place to mandate the removal of Inflow and Infiltration (I&I) from state sewers. Needham is now nearing the end of its necessary repairs. In 2017, BETA Group, Inc. released two Inflow & Infiltration (I&I) investigations and reports. TV inspections, manhole inspections and metering were conducted from 2014 to 2016. BETA's findings concluded that infiltration upwards of 690,000 gpd was present and that only 50% could be removed through rehabilitation. I&I projects have since been funded in town areas 2, 16, 21, 22, 24 and 26 among others. Approximately \$1.2 million dollars has been allocated to seal, line and/or replace parts of the sewer system where Infiltration has been identified. As of October 7, 2019, a contractor has been deployed to complete the necessary work. The DPW reports that the town has plans to address Inflow over the next 10 years.



Overall, the current sewer system is reliable and can accommodate development on either side of I-95. One known location identified as potentially limiting factor to future growth is the interceptor sewer on Route 128 (I-95 Corridor) between Kendrick Street and Highland Street.

## 6. TRAFFIC AND MOBILITY

The following is a brief overview of existing traffic and parking conditions in the Town of Needham. The Town is located approximately 10 miles southwest of Boston. Interstate 95 (also known as Route 128) runs in the north and south directions along eastern edge of Needham, which include highway entrance and exit ramps at Highland Avenue, Kendrick Street (new as of 2019), and Great Plain Avenue. Needham is also served by four Massachusetts Bay Transportation Authority (MBTA) Commuter Rail stations which connects the Town of Needham to South Station in Boston. As Needham is anticipating a significant amount of private development within and adjacent to the Town, there is a need to assess the combined effect of multiple new developments and general population growth on traffic and parking demand on the roadway network, as well as if the existing roadways could accommodate the anticipated combined demand. The following section is a summary of tasks performed to assess existing conditions.

### **Roadway Network**

Highland Avenue is a north-south primary arterial extending from Needham Center and continuing north into Newton over the Charles River, with a major interchange at I-95/Route 128 and access to the north side of Needham Crossing. Highland Avenue generally accommodates one travel lane in each direction with left turn bays at several intersections between Great Plain Avenue and Utica Road, while between Utica Road and 2<sup>nd</sup> Avenue Highland Avenue accommodates two travel lanes in each direction likely due to the increased traffic demand at the I-95/Route 128 interchange. Parking is permitted intermittently south of Rosemary Street, but otherwise is prohibited. The MBTA B59 bus route runs along Highland Avenue between Chestnut Street and Hunnewell Street.

Chestnut Street is a north south minor arterial starting from Highland Avenue (in Needham Center) extending south in the neighboring Town of Dover. Chestnut Street accommodates one travel lane in each direction with turn bays provided for both directions of traffic at Oak Street, School Street, and Great Plain Avenue. Parking is generally not permitted along Chestnut Street. The MBTA 59 bus route runs along Chestnut Street from Highland Avenue to Junction Street.

Great Plain Avenue is an east-west minor arterial extending across the Town of Needham from the neighboring towns of Wellesley in the northwest to Dedham in the southeast. Great Plain Avenue generally accommodates one travel lane in each direction with no parking permitted, with the exception of a few block stretch in Needham Center between Pickering Street and Washburn Avenue, where two travel lanes and parking on both sides are provided. Great Plain Avenue coincides with State Route 135 from the border of neighboring town Wellesley to Dedham Avenue.

Dedham Avenue is a northwest-southeast primary arterial extending from Great Plain Avenue in the north to the neighboring town of Dedham in the south, and is part of State Route 135. Dedham Avenue serves one travel lane in each direction with parking generally not permitted along the roadway, with the exception of a five spaces located close to Great Plain Avenue in Needham Center.

Hunting Road, Greendale Avenue, and Gould Street are a continuous set of roadways which are classified as a north-south minor arterial, extending from Central Avenue in the north to the neighboring town of Dedham in the south. These set of roadways run parallel and adjacent to I-95/Route 128 throughout Needham. All three roadways generally accommodate one travel lane in each direction with parking generally not permitted along the roadway.

Central Avenue is a north-south minor arterial extending across the Town of Needham from the neighboring community of Newton in the east to the town of Dover in the west. Central Avenue generally accommodates one travel lane in each direction with no parking permitted. The MBTA 59 bus route runs along Central Avenue between the Newton city line and Webster Street.

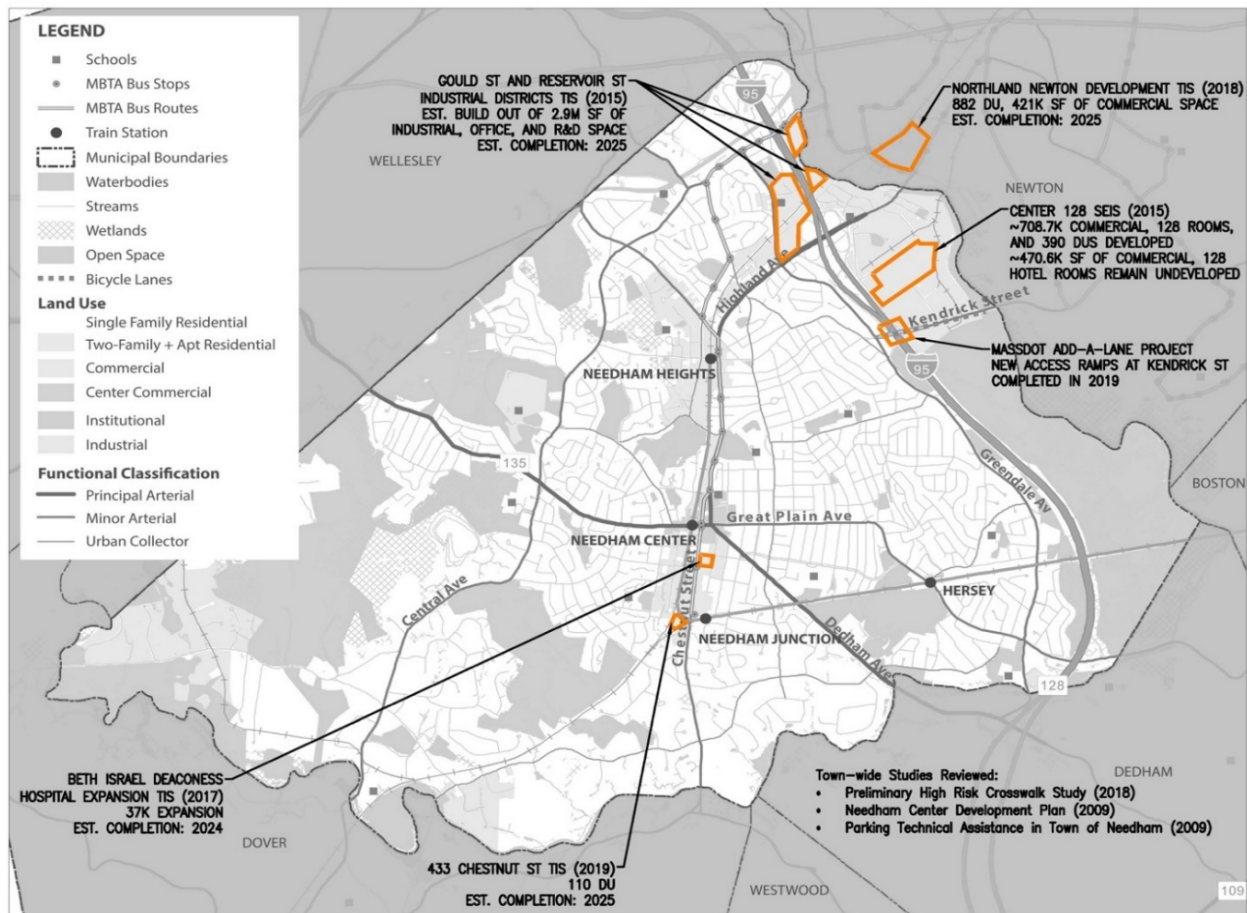
### **Existing Traffic and Parking Conditions**

As no new data would be collected as part of this study, several traffic studies completed in recent years were provided by the Town of Needham to provide documentation on existing conditions in the study area. The following recent traffic studies were reviewed to obtain peak hour traffic volumes along arterial roadways in Needham, as well as identify developments that are anticipated to be completed before the year 2025. These studies are listed below and shown on a map on Figure 15. Studies reviewed were completed between 2009 and 2018, while many of the private development traffic impact studies (TIS) were completed in the last three years, and are anticipated to be completed prior to the year 2025.

- Northland Newton Development TIS (2018)
  - Mixed-Use Development of 882 dwelling units (DUs) and 421,000 sf of commercial space with an estimated completion date of 2025
- Gould Street and Reservoir Street Industrial Districts TIS (2015)
  - Estimated development of 2.9 million sf of industrial, office, and research and design space, with an assumed redevelopment completion date of 2025
- Center 128 Supplemental Environmental Impact Statement (SEIS) (2015)
  - Large Mixed Use development anticipated to be completed by 2019, however, only a portion has been completed as of 9/2019
    - Approximately 708,7000 sf of commercial, 390 DUs and 128 hotel rooms has been completed

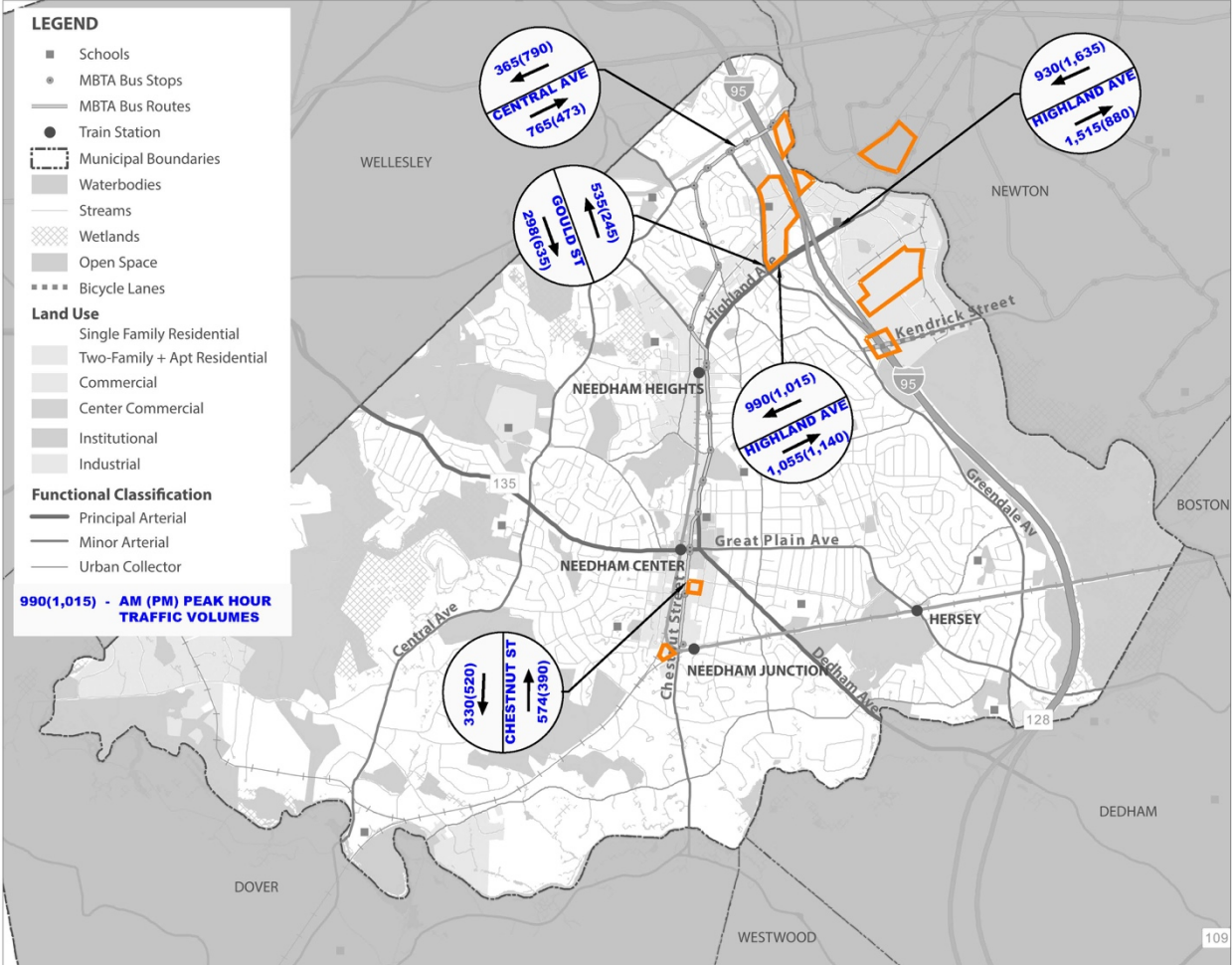
- Approximately 470,600 sf of commercial and 128 hotel rooms have yet to be developed
- Beth Israel Deaconess Hospital Expansion TIS (2017)
  - 37,000 sf expansion of existing hospital estimated to be completed by 2024
- 433 Chestnut Street TIS (2019)
  - 110 dwelling unit residential development which was ultimately not granted approval at Town Meeting.
- Preliminary High Risk Crosswalk Study (2018)
  - Pedestrian safety audit of 11 mid-block crossings
- Needham Center Development Plan (2009)
  - Comprehensive plan to guide public and private development in Needham Center including a market analysis, zoning and land use assessment, and traffic, pedestrian, and parking assessment among other topics
- Parking Technical Assistance in the Town of Needham (2009)
  - Study on parking management in Needham Center including recommendations to manage on-street and off-street parking

Figure 15: Recent Traffic and Parking Studies Reviewed



In addition, existing traffic volumes extracted from the above reports are shown on Figure 16, to provide a general idea of peak hour traffic volumes experienced by roadways in the Town of Needham. It should be noted that the MASS DOT Add-A-Lane project recently completed construction on new access ramps to Kendrick Street from I-95/Route 128 in 2019. Therefore, some of existing condition traffic volumes may not be representative of the most current conditions, especially for traffic volumes included in the Center 128 SEIS along Kendrick Street.

Figure 16: Existing Peak Hour Traffic Volume Data Extracted from Reviewed Studies



Although there have not been any recent parking utilization studies in Needham (within the past three years), the Parking Technical Assistance Report from 2009 described what appears to be available on-street and off-street parking supply in town centers, but not necessarily at the specific locations parking is desired depending on the time of day. According to a parking utilization survey conducted by the Town in 2014, parking lots adjacent to commuter railroad stations were utilized at or near capacity after the morning peak period during a typical weekday.

Beyond a review of the traffic studies discussed previously, stakeholder interviews were conducted with town officials from the Needham Department of Public Works, the Needham Transportation Committee, and the Needham Traffic Management Advisory Committee. Based on discussions with these town officials, it was determined that two of the issues concerning many Needham residents are traffic speeds and pedestrian safety, as a recent accident resulting in two fatalities has engaged the community to push the town for safer streets. In addition, residents living on roadways adjacent to the commuter railroad stations as well as high schools are concerned that spill over parking demand is utilizing on-street parking near their homes.

Lastly, an assessment of commuter mode choice trends was performed for census tracts located in the Town of Needham. U.S. Census and American Community Survey data contains historical information regarding mode choice, average vehicle occupancy for commuting periods, as well as average automobile ownership. The table below presents this information, which is from the 2000 Census and 5-year estimate data from the American Community Survey. The following is provided to aid in identifying trends in travel patterns over time, and guide what may be anticipated in the future.

**Table 17: Journey to Work Mode Choice, Vehicle Occupancy, and Auto Ownership Data (2000-17)**

Mode Choice	2000 Census	2006-2010 ACS	2010-2014 ACS	2013-2017 ACS
Auto	78.4%	79.1%	79.0%	77.4%
Taxi	0.2%	0.0%	0.0%	0.1%
Railroad	10.3%	8.9%	9.8%	9.7%
Bus	1.0%	0.3%	0.8%	0.9%
Bike	0.4%	0.6%	0.4%	0.6%
Walk	2.4%	3.5%	1.9%	2.5%
Work From Home	6.8%	7.3%	7.7%	8.7%
Other	0.5%	0.3%	0.4%	0.1%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>
Average Vehicle Occupancy (Traveling To Work)				
	-	1.03	1.05	1.04
Vehicles Per Household (Owners)				
	1.93	1.95	2.04	2.08
Vehicles Per Household (Renters)				
	1.14	1.02	1.14	1.09
Vehicles Per Household (All)				
	1.78	1.79	1.88	1.91

*Source: U.S. Census Bureau*

The table above reveals the following observations and trends:

- Automobile is the predominate mode to travel to and from work, followed by commuter railroad and working from home.
- Mode choice percentages and average vehicle occupancy has remained fairly consistent over time from 2000 to the latest ACS 2013-2017 estimates.

- Percent of automobile usage has slightly dropped to 77.4 percent in the latest 2013-2017 ACS compared to data sets from the previous years.
- Work from Home (Telecommuting) has slightly increased over time, from 6.8 percent in the 2000 Census to 8.7 percent in the latest ACS estimates.
- Vehicle ownership per household for homeowners has slightly increased over time from 1.93 in the 2000 Census to 2.08 in the latest ACS estimates, with a similar increase for vehicles per household for both owners and renters from 1.78 in the 2000 Census to 1.91 in the latest ACS estimates.

### **Multimodal Transportation**

The Town adopted a Complete Streets policy in 2018. This is an important step because it is an official recognition by the Town that pedestrians of all age and abilities, bicycles, buses, cars, vans, and trucks are all legitimate users of streets within the Town and deserve safe facilities where appropriate. The policy requires that the Town incorporate Complete Streets design recommendations into all transportation infrastructure and street design projects.

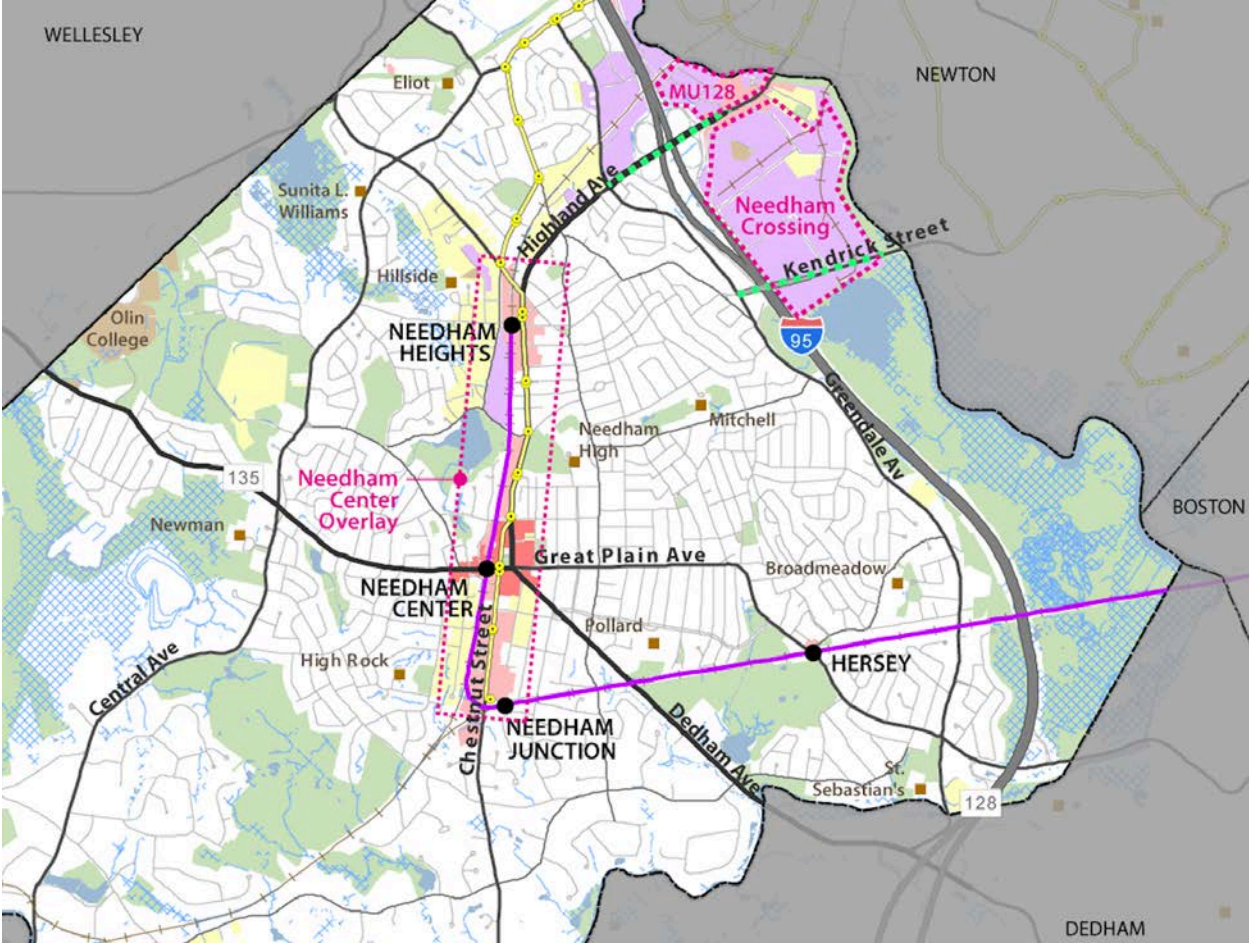
The Town currently has two sections of bicycle lanes applied during improvements made to Highland Avenue and Kendrick Street, which serve Needham Crossing. There is currently no formal bicycle facilities plan that would extend facilities to connect to these bicycle lanes. The Metropolitan Area Planning Council (MAPC) produced a 2007 Regional Bicycle Plan. The plan suggests criteria specific to bicycle projects and contains a listing of priority projects and programs to guide state, regional, and local action.

Despite the lack of a formal bicycle facilities network in Needham, Lime Bike introduced in 2018 dock-less bike sharing to Needham and 15 other cities and towns in Metro Boston. The initial plan called for the introduction of 100 bicycles in Needham. According to the data from 2019, Lime Bike was utilized in Needham by 543 riders taking a total of 1,941 trips, with a median distance per trip of 0.8 miles. The total miles traveled was just over 2,000. In January 2020, Lime Bike announced that its contract with the MAPC to provide dock-less bikes to Needham and other communities in the region will not be renewed. Currently there are no plans for other bike sharing operators to service Needham.

In 2008, the Town published the Needham Trails Plan that aims to create a unified trail system that links conservation and recreation land within the town and to adjacent towns, and encourages and informs residents of its use. A multi-use path was recently constructed in Needham through the Bay Colony Rail Trail Project, which aims to convert an unused rail line between Needham and Medfield into a multi-use path. The 1.7-mile section of trail extends from the Needham Town Forest to Red Wing Bay. The trail does not connect to Chestnut Street, which could provide access to the Needham Junction train station.

With respect to transit, Figure 17 on the following page shows the location of the four MBTA Commuter Rail train stations in Needham that provide service to Boston’s South Station along with MBTA Bus Service through Bus Route 59, which connects Watertown Square in Watertown with Needham via Newtonville. The bus routes currently do not travel directly to or through Needham Crossing, nor are there any light rail or commuter rail stations within walking distance (1/4-mile). The Eliot and Newton Highlands stations on the Green Line are the nearest T stations, each about 2 miles from the center of the area. Needham Heights is the closest commuter rail station, located 1.5 miles from the center. MBTA bus routes 59 and 52 serve portions of the area and provide connections to rail.

Figure 17: Location of the Four T Stations in Needham



In 2013, MAPC collaborated with the Town of Needham and the City of Newton to develop a concept of operations for providing a transit service on an unused MBTA rail right-of-way (ROW) in order to explore its use as shuttle service to serve future growth and economic development in Needham Crossing and Needham Street in Newton. MAPC consulted with the 128 Business Council to explore the possibility of a rapid shuttle service in conjunction with bicycle and/or pedestrian uses that could provide connections to transit and other trails



in the area. The resulting Needham/Newton Rail Right-of-Way Transit Concept study estimated that only a 5 or 10 minute savings of time would be achieved. It also estimated only a modest increase in business shuttle ridership, despite the considerable capital costs required to address the roadway and ROW access ramp needs.

Though public transit options do exist for workers that commute into and out of Needham, most people drive alone to work. According to the 2017 ACS, 77.4% of employed Needham residents commute by private automobiles and 92.2% of those individuals drive alone.

As for workers that commute from other communities including Boston, Needham joins other suburban employment centers in absorbing a large number of reverse commuters. The Boston Region Metropolitan Planning Organization released the report *Reverse Commute Areas Analysis* in September 2019 to analyze the reverse commuting trend from Boston to work locations in the suburbs. The report cites the U.S. Census Bureau's data that indicates more than 15% of all commuting trips in the region are reverse commutes, but relatively few of these trips are made by transit. The report features Needham as one of several case studies. The report highlights several significant statistics on reverse commuting to Needham:

- Of the 16,548 jobs in Needham held by residents of the Boston region, 2,972 (18 percent) were held by Boston residents and 2,731 (just over 16% percent) were held by residents of other core cities and towns.<sup>3</sup>
- According to the American Community Survey, no more than 13% of work trips from Boston to Needham were made by transit.

In an effort to reduce the impact of private automobiles coming into Needham, and to encourage the use of public transit, the 128 Business Council operates the Needham Shuttle between the Newton Highlands T Station and seven companies located in or near the Needham Crossing area, running during morning and afternoon commuting hours. It is available to employees and tenants of member companies at no charge, and charges a fare of \$4.00 per ride for non-members. In 2018, this shuttle carried an average of 50 weekday outbound AM peak passengers, according to the Boston Region MPO report.

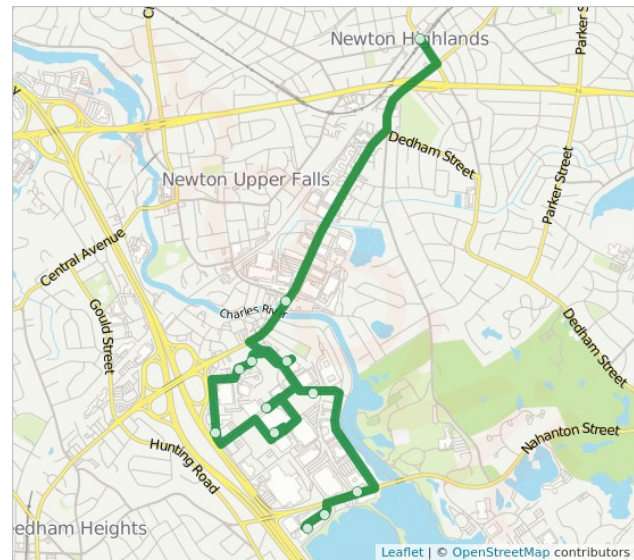


Figure 18: Needham Shuttle Bus Route Map

<sup>3</sup> Urban Partners' analysis of the OntheMap application indicates 13.6% (3,172) of all jobs in Needham (total of 23,404 in 2017) are held by Boston residents.

In an interview with Urban Partners, an official with TripAdvisor surmised that most of its 1,000 employees drive to work. Though the Needham headquarters campus is equipped with many in-house amenities, including a cafeteria and fitness center, that encourage workers to stay in the building and thus resulting in minimal mid-day traffic impact, TripAdvisor has made efforts to encourage public transit usage. The company operates its own private shuttle, and a possible shuttle servicing Wells Avenue Office Park is currently under discussion.

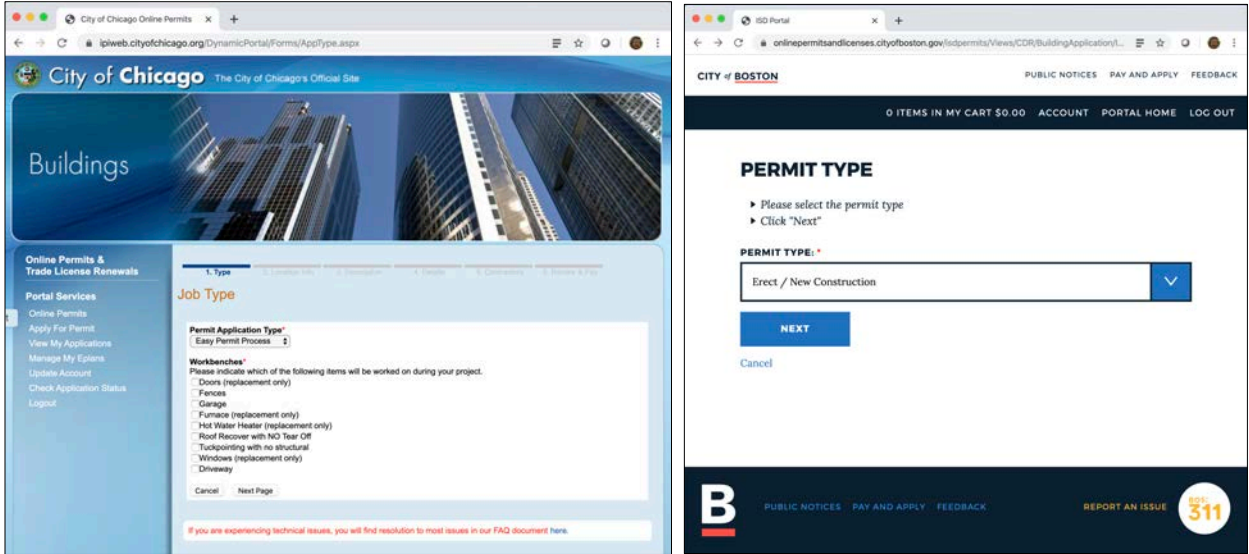
As an incremental step toward further alleviating rush hour traffic, the Boston Region MPO report recommends an expanded bike-share program in Newton that could provide an additional option for travel between Newton Highlands Station and the densest employment areas in Needham. Additionally, in conversations with Urban Partners, various Needham area community stakeholders have expressed interest in pooling resources to expand the shuttle service as opposed to each company running its own service.

# 7. TECHNOLOGY AND COMMUNITY GROWTH

There are several technologies that Needham might consider as its population grows through new residential developments and its local economy and workforce expands through new commercial development, especially within Needham Crossing.

A growing community with significant real estate development can benefit from implementing online permitting systems (see examples in Figure 19). Such systems allow online entry and submittal of online building permit applications in addition to attachments—such as building plans, photos and specifications. Once reviewed by a building inspector, the completed applications can be forwarded to the other departments that are required to sign off on a permit request. Online permitting systems can offer convenience for customers because they can submit applications through the Internet as opposed to visiting the office in-person during business hours. This, in turn, allows Town staff to focus on other critical duties such as reviews and inspections.

Figure 19: Examples of Online Permit Application/Review Systems



Source: City of Chicago, City of Boston

Technology is also frequently utilized for monitoring sewer systems. CCTV inspections provide video and images of the interior of sewer lines and also monitor continuous flow at certain locations. The Town of Needham contracted with a firm that performed an extensive Sewer Inflow/Infiltration Investigation Program. Services included CCTV inspections which were performed on over 160,000 linear feet of sewer line in selected sewer subareas located throughout the town. Detailed inspection reports were generated using WinCan Software and were provided in both hard copy and DVD format.

Technology holds the potential for managing the increase in traffic from growth and also for reducing motor vehicle emissions. App-based car-sharing, ride-hailing, and bike-sharing services are already changing travel habits, especially in urbanized areas. On-demand and scheduled micro-transit services along with autonomous shuttles are appearing on campuses and as pilot projects in some communities. Cities are starting to utilize technology integrated into traffic management systems to monitor traffic flow and make signaling and other types of adjustments to reduce traffic jams and optimize travel patterns. Such technology also allows cities to collect data and track trends over time.

### **Needham's IT Capabilities**

Needham's Information Technology Center (ITC) has a staff of six that provide the following services: Administration and Finance, User Services and Desktop Support, Network Services, Information Systems for Town Departments, Public Safety, Database Services, Enterprise Support Applications, Voice and Office Services. The goal of the ITC is to maintain a stable, up-to-date network and end-user environment that enables and enhances user productivity. While large cities and counties tend to get most of the attention for their utilization of technology and data for municipal operations and management, smaller communities are also increasingly deploying technology as well. With an ITC department in place, Needham has the professional staff in place to evaluate hardware and software applications that have the potential to enhance efficiencies and data collection as the Town continues to develop and grow in population.

### **5G Wireless Technology**

5G represents the next step in the evolution of wireless telecommunications. The following timeline depicts the evolution of wireless telecommunications technology since the 1980s:

- 1G. 1980s: Phone calls
- 2G. 1992: Phone calls, text messaging
- 3G. 2001: Phone calls, text messaging, Internet browsing
- 4G. 2012: Phone calls, text messaging, Internet browsing, video streaming (increased bandwidth, 10x faster speeds, LTE)
- 5G. 2020: Phone calls, text messaging, Internet browsing, video streaming, "Smart City" technology (5-20x faster speeds than 4G, greater reliability, 100% coverage, 1,000x bandwidth, 1 millisecond latency, or response time)

5G offers up to 20 times faster speeds than 4G, increased responsiveness, and the ability to connect with more devices at once than older generations. These advances would enable new and emerging technologies, marketed under the "Smart City" moniker, such as automated vehicles and sensors that monitor and manage municipal systems such as water supply and traffic operations. For the average resident, 5G could improve telecommuting by enabling

faster Internet tasks such as online sales and file sharing, especially when accessing or working on company servers.

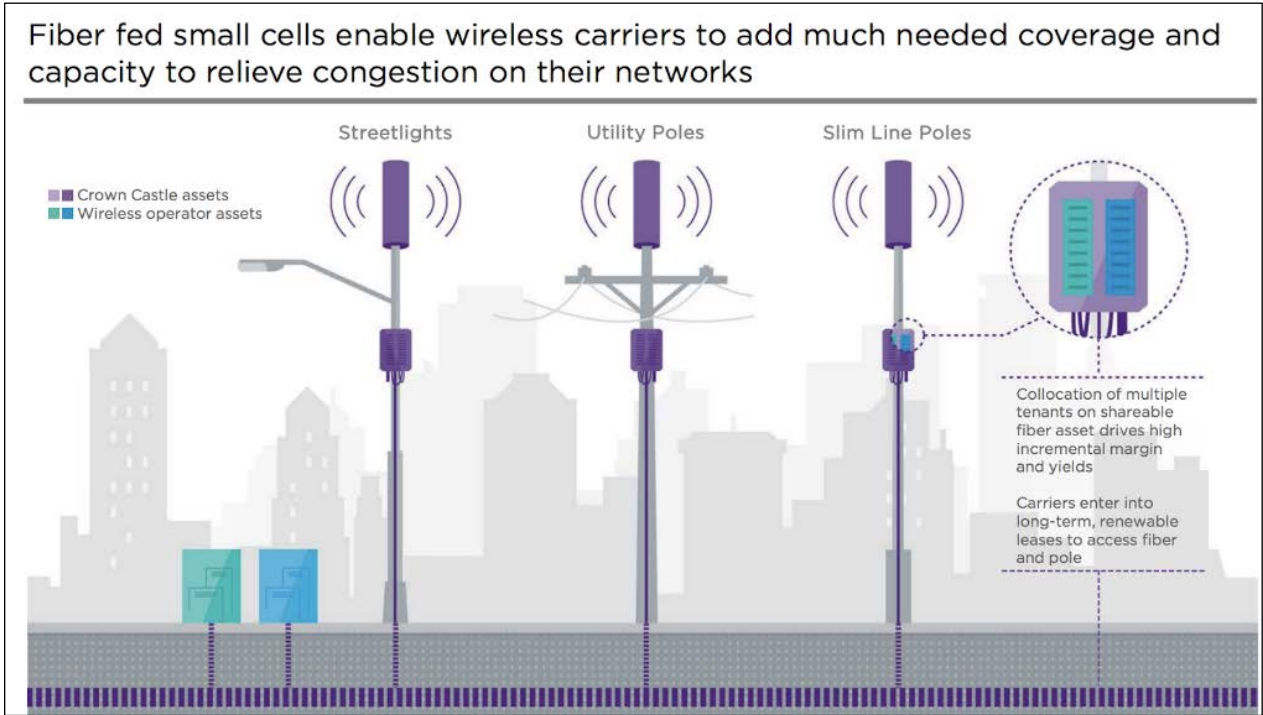
**5G Infrastructure & Municipalities**

5G’s high-band spectrum does not penetrate objects well and tends to have shallow coverage areas. Therefore, it requires small antenna systems to be installed in frequent intervals and close to one another—approximately 600 feet apart. By law, small cell facilities are allowed in the public right-of-way just like other utilities.

In September 2018, the FCC adopted the Declaratory Ruling and Third Report and Order, which limits the ability of municipalities to regulate 5G infrastructure and, thereby, facilitates wireless providers’ efforts to install 5G infrastructure. With the new FCC rules, municipalities face tighter deadlines to approve or reject the installation of 5G equipment and also are limited in the amount that they can charge companies for installing equipment in public rights-of-way.

Concerned about the appearance and frequency of 5G infrastructure within their communities, several cities such as Washington, DC and Aspen, CO have developed design guidelines for small cell infrastructure.

Figure 20: Explanation of Small Cells



Source - Crown Castle

To protect community character, the City of Aspen, CO is proactively developing standards for small cell installation in the public right-of-way. Aspen reports that it has some control over the appearance of poles and distances between them, so it recently amended its land use code with [design guidelines](#) for small cell facilities. Aspen also recognizes the benefits of 5G, noting that mobile networks can be more reliable in mountainous areas than phone connections and that small cells can enhance emergency services and early warning systems for natural disasters.

Washington, DC, believes that 5G coverage and connectivity are drivers for the economic growth, the innovation of businesses, and the education of its residents. The District developed streamlined processes and [design guidelines](#) for the installation of small cells.

### **Small Cells & Public Safety**

Besides the impact of small cell infrastructure on community character, many communities are also concerned about the potential health consequences of wireless radiation and hope to prevent or slow the deployment of 5G infrastructure within their boundaries. The Commonwealth of Massachusetts Legislature is currently in the process of reviewing a bill that would create a commission to study the environmental and health effects of evolving 5G technology.

Another concern is cybersecurity. Brookings reports in a July 9, 2019 article titled “5G in five (not so easy) pieces” that the security of 5G is an ecosystem that must be protected in its whole.”

The report continues: “The supply chain that makes up 5G runs the gamut from radio networks, to the integrated chipsets in that network, and the devices that will use the network (not just phones, but also billions of IoT devices). Each device has their own component parts supply chain that introduces risk. And, of course, the services that ride the new network are themselves vulnerable.” Unfortunately, the FCC has scaled back policies on cybersecurity for 5G.

### **5G in the Boston Region & Needham**

All four major mobile carriers currently have some form of 5G wireless, but it has only been deployed in several cities and requires special phones. More widespread deployment will take several years. This year, Verizon deployed a 5G Ultra Wideband cellular network in parts of Boston. This 5G service area is concentrated in Fenway along Brookline Avenue and near Beth Israel Hospital. It will also be available around Fenway Park, Emmanuel College, Northeastern University, Simmons College and Harvard Medical School.

One company located in Needham Crossing is involved in many industry conversations about future applications of 5G. Bigbelly produces “smart,” sensor-equipped waste and recycling containers that communicate real-time status to collection crews. They are cloud-connected and come with a web-based platform that provides information on waste operations. Bigbelly has developed a platform for the public right-of-way that utilizes public waste receptacles to host technology, applications, and equipment, which the company says could ease logistics and declutter streetscapes.

5G has applications in healthcare also, which could be of interest to the Town because Needham has a large and likely growing medical sector. Rush System for Health, an academic health system in Chicago, is on track to become one of the first hospitals to deploy 5G. Working with AT&T to install 5G into parts of the hospital, Rush will use 5G to connect applications, devices, robotics, and people to streamline hospital operations. It will also explore internet-connected mobile devices in technology-driven therapies such as telehealth. 5G would make transferring and downloading CT scans and MRIs, which are typically very large files, many times faster. In terms of direct clinical impacts in healthcare 5G would enable robot-assisted tele-surgery. Some analysts believe that 5G would be more affordable to hospitals because they would not need to upgrade their existing wired infrastructure, which can be costly.

From a municipal regulation standpoint, *§6.7 Wireless Communications Facilities* of Needham’s bylaws are in place “to minimize the adverse visual effect of wireless communication equipment towers, facilities and devices, by providing safeguards for the general public, by avoiding potential damage to adjacent properties, by maximizing the use of existing towers and buildings, by concealing new equipment within or on existing towers or buildings, and by encouraging co-location of equipment to accommodate the needs of wireless communication in order to reduce the number of towers needed to service the community.”

In Needham, Verizon proposed to install a micro-cell antenna next to a school, but ultimately denied its petition due to lack of demonstrated need.

# 8. POPULATION ESTIMATE AND FORECAST

In this section, we show the preliminary population forecast for 2020 and 2025. This analysis is informed by the 2010 Decennial Census and the 2017 ACS (5-year estimate).<sup>4</sup> Examining the demographic changes from 2010 to 2017, it's evident that there's been a direct impact from the Charles River Landing development, as well as the senior/independent living projects at the Wingate Residences and the North Hill Retirement Community.

Utilizing the standard cohort survival projection method and adjusting for migration patterns for different age groups, we estimate that Needham's population in 2020 will be **31,250** (2.7% increase from the reported population figure in the 2017 ACS. See Table 18). We assume that the Kendrick and the Modera developments will be fully occupied by 2020 and will add approximately 1,000 residents combined.

Table 18: Population Estimates & Forecast Through 2025

Age Group	2010 Census	American Community Survey 2013-2017	Urban Partners Forecast 2020	Urban Partners Forecast 2025
Under 5 years	1,871	1,749	1,790	1,820
5 to 9 years	2,488	2,324	2,390	2,420
10 to 14 years	2,467	2,484	2,370	2,410
15 to 19 years	1,863	2,256	1,940	1,910
20 to 24 years	981	1,346	1,270	1,100
25 to 29 years	713	704	1,160	1,010
30 to 34 years	979	1,019	1,200	1,640
35 to 39 years	1,755	1,856	1,670	1,750
40 to 44 years	2,293	2,214	2,110	1,770
45 to 49 years	2,523	2,151	2,260	2,150
50 to 54 years	2,419	2,538	2,100	2,230
55 to 59 years	2,045	2,334	2,420	2,050
60 to 64 years	1,801	1,911	2,210	2,330
65 to 69 years	1,185	1,571	1,870	2,070
70 to 74 years	874	1,292	1,400	1,670
75 to 79 years	830	850	1,180	1,270
80 to 84 years	776	723	790	1,100
85 years and over	1,041	1,107	1,120	1,120
<b>Total</b>	<b>28,904</b>	<b>30,429</b>	<b>31,250</b>	<b>31,820</b>

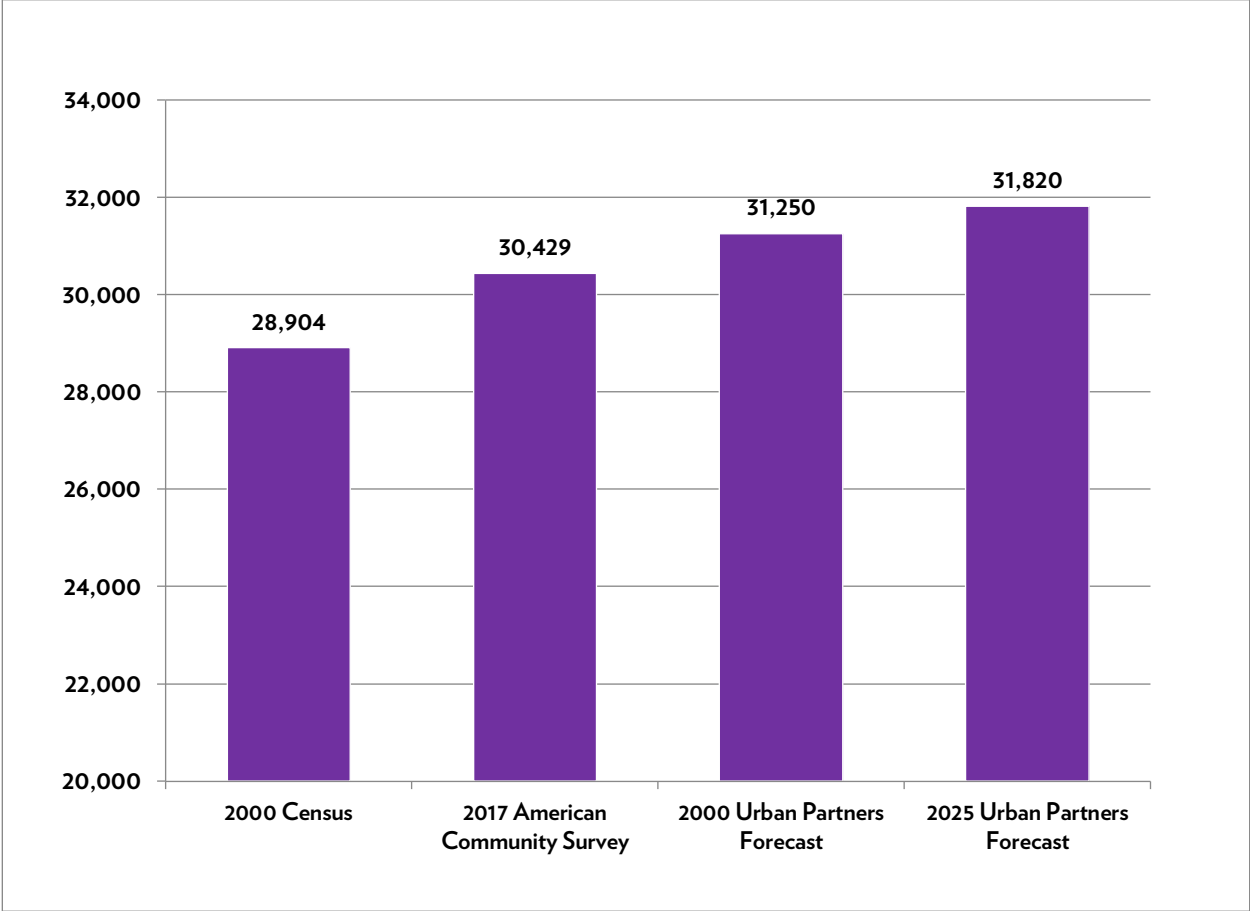
Source: U.S. Census Bureau

<sup>4</sup> The population and housing unit data for the 2010 Decennial Census are based on a sample size of 100% of the households whereas the 2017 ACS 5-Year Estimates are based on a sample size of approximately 1 out of 8 addresses. It is problematic to assume 100% reliability in ACS data due to the small sampling size. Based on the timing of the Charles River Landing project, the growth in senior residents within the census block groups where the age-restricted housing units are located, and anecdotal evidence of sale of homes from empty nester households to buyers in middle-age households (34 to 45 years of age) suggest that ACS data may be reasonable accurate for this analysis.



Continuing with the cohort survival projection and adjustments for migration patterns by age groups, we estimate that Needham’s population in 2025 will be **31,820**. At the time of this report, there is no current proposal being considered by the Town, but for the purpose of this forecast we assume that the 250-unit residential development in the Mixed-Use 128 Overlay District will have been completed by 2025. We estimate that the 250-unit project will generate 450 additional residents.

Figure 21: Population Forecast Through 2025



Source: U.S. Census Bureau, Urban Partners

# 9. SCHOOL FACILITIES

## Current Capacity

Table 19 shows the current physical capacity of Needham Schools. These capacities include space for 44 students at Mitchell and 200 at Pollard housed in modular classrooms.

Table 19. Physical Capacity, Needham Public Schools

	Grades	Current Capacity	2019-20 Enrollment	Current Available Capacity
Broadmeadow Elementary	K-5	544	549	-5
Eliot Elementary	K-5	408	413	-5
Williams Elementary	K-5	444	518	-74
Mitchell Elementary	K-5	430	481	-51
Newman Elementary	K-5	682	634	48
High Rock Elementary	6	477	503	-26
Pollard Middle School	7-8	1,058	903	155
Needham High School	9-12	1,800	1,675	125

Source: Needham Public Schools

- Elementary Schools - As of September 2019, 2019-20 student enrollment in most of the elementary schools as well as High Rock School (6th Grade) exceeded design capacity. Only Newman School has any excess current capacity; in the aggregate current enrollment from K through sixth grade exceeds capacity by 113 students.

In an effort to accommodate the need for general classroom space, there have been conversions of specialty classrooms and administrative space to general classroom use. The current deficit of 113 spaces is in addition to these conversions. From the Needham Public Schools’ perspective, this has negatively impacted their efforts to maintain quality education—lack of space is their biggest constraint:

- Needed staff cannot be added because of the tight facility situation;
- “Core” administrative, dining, service area is undersized for most schools;
- There is little or no room for specialized programs—music, art, foreign languages, technology, therapeutic programming.

A capacity analysis performed by Dore & Whittier architects in February 2018 identified a classroom deficit at the Broadmeadow, Eliot, and Mitchell schools. This classroom deficit is despite the conversion of administrative and specialty space noted above. The study recommended the construction of two modular classrooms at Mitchell (completed in September 2019), the addition of six modular classrooms at Eliot School, and the conversion of a technology room to a classroom at both the Eliot and Broadmeadow

Schools. The projects at Broadmeadow and Eliot School currently are identified in the FY20-25 Capital Improvement Plan:

- Eliot Modular Classrooms: Sept '23 (FY24)
- Broadmeadow Tech Room Conversion: Sept '22 (FY23)
- Eliot Tech Room Conversion: Sept '21 (FY22)

- **Grades 7-8 (Pollard School)** - Pollard has a nominal capacity of 858 students in regular classrooms and 200 in the modular classrooms, for a total capacity of 1,058 students. However, the actual capacity of the school is viewed as less since classroom and core spaces at Pollard are undersized relative to current standards of the Massachusetts School Building Authority (MSBA). Pollard was designed for 45 classrooms, varying from 723 SF to 907 SF; current MSBA standards for junior high/middle school regular classrooms are 850 SF to 950 SF. Pollard's science classrooms range in size from 539 SF to 1,011 SF--below the MSBA's 1,200 SF standard.

Other undersized spaces include: lack of spectator space in the gym, few special education spaces, administrative space at only 1,400 SF (40% below the MSBA standard of 2,400 SF), and shortage of storage, prep space, meeting rooms, and specialized space for meetings, small groups, or pull out instruction.

In addition, the modular classrooms housing 200 students will reach the end of their 20-year useful life in 2022 and require replacement.

- **Needham High School** - Needham High School was recently expanded to add both cafeteria and classroom space to accommodate the larger projected enrollments. This expansion, completed in September 2018, added a new ten-classroom wing at the Webster Street entry to the school. Capacity has been increased to 1,800 students.
- **Other Current Facility Issues** - Needham Schools have an overall lack of space for training and professional development. In performing arts, they lack adequate venues (including parking) as well as adequate rehearsal space. There is also a shortage of adequate playgrounds at the schools.

All these issues are being considered in a now-underway Master Plan process, which will be completed by June 2020.

### **Forecasts and Facility Needs through 2025-26 School Year**

McKibben Demographics has prepared demographic and enrollment forecasts for Needham Public Schools through the 2033-34 school year. Two scenarios were prepared: the "Best" Scenario assumes that all currently approved development proposals in Needham are constructed by 2032; the "High" Scenario assumes these proposals are constructed by 2032 and that an additional 250 multi-family housing units will be constructed in the "Overlay"

project area by 2033, but not before the 2025-26 school year. The “Overlay” project area is served by Eliot School. Therefore, by the 2025-26 school year, both the “Best” and “High” Scenarios yield the same estimated number of students.

Needham Public Schools compared the McKibben enrollment forecast for 2019-20 with the actual enrollment in September 2019. This comparison found actual overall school enrollment to be only 0.3% less than the McKibben forecast; however, elementary school enrollment was 38 students (1.4%) less than the forecast:

- 18 fewer students at Broadmeadow
- 11 more students at Eliot
- 4 fewer students at Williams
- 22 fewer students at Mitchell
- 5 fewer students at Newman

Table 20 compares these McKibben enrollment forecasts with the capacity of individual schools assuming the scheduled modifications to Broadmeadow and Eliot occur.

**Table 20. Physical Capacity Comparison Based on McKibben Forecasts**

	Capacity with Anticipated Changes	Forecast Peak Enrollment thru 2026 (Highest Enrollment Year)	Capacity Available at Peak Enrollment thru 2026	Expected 2025-26 Enrollment	Capacity Available for 2025-26
Broadmeadow Elementary	566	616	-50	598	-32
Eliot Elementary	562	419	143	419	143
Williams Elementary	444	535	-91	512	-68
Mitchell Elementary	430	503	-73	476	-46
Newman Elementary	682	650	32	615	67
High Rock Elementary	477	504	-27	479	-2
Pollard Middle School	1,058	941	117	941	117
Needham High School	1,800	1,820	-20	1,820	-20

*Source: Needham Public Schools*

Most elementary schools will face space deficits during this period, but these deficits will be declining by the 2025-26 year. On the other hand, with the anticipated addition of seven classrooms, Eliot will have surplus capacity by the end of this period in anticipation of enrollment increases after 2025-26 due to development in the Overlay District. If, as appears possible, development in the Overlay District occurs during the 2020-2025 period rather than later as anticipated by McKibben, then some of this added capacity at Eliot will be utilized before 2025-26.

Forecast high school enrollment will grow by 145 students through 2025-26, utilizing the current surplus space for 125 students and creating a modest deficit of 20 spaces.

As noted in the population forecast section of this report, American Community Survey data from 2013-2017 and the anticipation that the Overlay District development will be completed by 2025 suggest that Needham’s population in 2025 will exceed the McKibben forecasts by about 2,800. 450 of this 2,800- person increment results from accelerating the impact of the Overlay District to the pre-2025 period. The remaining 2,350 includes population increments in two demographic segments: older households that have no or little impact on school enrollment and apartment dwellers (Modera, Kendrick) that yield very modest increments in school-age population. We should also note that the McKibben forecasts assume 80 school-age children in the Overlay District developments, while the population forecast section of this report utilizes typical factors for the mix of multi-family housing found in developments such as the Kendrick, which yields 44 school-age children for the 250 Overlay District units.

In short, other than the deficit of 20 spaces at the High School, there is nothing in the forecast period through the 2025-26 school year that suggests additional facility needs beyond those already apparent in current school operations. This conclusion assumes that the current plans to add classrooms at Broadmeadow and, especially, Eliot are implemented.

**Forecasts and Facility Needs from the 2026-27 to 2033-34 School Years:**

The McKibben Demographics demographic and enrollment forecasts for 2026-2034 indicate that only Eliot, Pollard, and Needham High can anticipate enrollments higher than those for 2025-26. Eliot, in particular, will be impacted by growth of multi-family housing in the Kendrick development and in the Overlay District (see Table 21).

Overall gaps in capacity will decline during this period, though Needham High School will face increasing demands for space through the 2030-31 school year. These short-term pressures (in the 2025 to 2034 period) on the High School suggest projected enrollment exceeding capacity by as much as 71 students. This peak excess demand may be even larger in the 2030-2032 period—perhaps as many as 80 students—if Overlay District development occurs in the 2020 to 2025 period.

Table 21: Physical Capacity Comparison Based on McKibben Forecasts

	Capacity with Anticipated 2020-25 Changes	“High” Forecast Peak Enrollment 2026-34 Period	Capacity Available at Peak Enrollment thru 2034	Expected 2033-34 Enrollment (“High”)	Capacity Available for 2033-34
Broadmeadow Elementary	566	590	-24	546	20
Eliot Elementary	562	492	70	478	84
Williams Elementary	444	508	-64	490	-46
Mitchell Elementary	430	472	-42	444	-14
Newman Elementary	682	608	74	577	105
High Rock Elementary	477	474	3	464	13
Pollard Middle School	1,058	954	104	926	132
Needham High School	1,800	1,871	-71	1,838	-38

Source: Needham Public Schools

## **Overview and Priority Needs**

Throughout the forecast period, overall school enrollment (excluding Pre K) is anticipated to remain very flat—growing from 5,676 currently to 5,890 in 2025-26, peaking at 5,877 in 2027-28, and declining to 5,763 by 2033-34. As a result, current priority concerns will remain the key facility needs of the Public Schools from now to 2033-34. These concerns include:

- The need to ease generally tight facilities;
- The undersized “core” administrative, dining, and service areas at almost all schools;
- Little or no room for specialized programs;
- The obsolete size of Pollard classroom spaces; and
- The need (by 2024) to house 376 students (6% to 7% of total enrollment) in modular classrooms.

As noted above, all these issues are being considered in a now-underway Master Plan process. Given these enrollment forecasts, resolving these current concerns will also likely deal with priority issues for the next fifteen years.

One scenario being considered by Public Schools officials—both to deal with these facility issues and to create a better quality organization of education within the overall system—is to reconstruct Pollard School as a true 6-8 middle school. This new facility would free up High Rock School as another elementary school, which, with refinements to attendance boundaries, would ease physical constraints at all current elementary schools.

We should also note that there may be potential for the Public Schools to accommodate some additional housing growth in the Needham community, particularly if those developments are multi-family complexes similar to the Modera, Kendrick, and Overlay District developments. Developments coming on line in 2028 or later would generate incremental school demand after the currently anticipated peak for elementary and middle schools in 2027-28. This potential may be enlarged if the potential middle school reconstruction/reorganization occurs. As a general rule-of-thumb, 100 new multi-family units could result, on average, in an enrollment increase of 17 students, with 3 or 4 of those new students in the High School.