



Cape Cod Bridges Program

Bourne, Massachusetts

Appendix 4.5
Socioeconomics Technical Report

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
MassDOT	Massachusetts Department of Transportation
NAICS	North American Industry Classification System
Program	Cape Cod Bridges Program
VHT	vehicle hours traveled
VMT	vehicle miles traveled

1 Introduction

This technical report provides a socioeconomic profile of the Cape Cod Bridges Program Limits, including the census tracts within the immediate Project Limits; the towns of Bourne, Sandwich, and Plymouth; as well as Barnstable, Dukes, and Nantucket Counties. Potential impacts of the No Build Alternative are discussed in qualitative terms. Regional and local economic impacts of the Build Alternative are assessed quantitatively for the Project Limits and Barnstable, Dukes, and Nantucket Counties.

2 Methods for Effect Evaluation

2.1 Regulatory Context

The Massachusetts Department of Transportation (MassDOT) prepared this socioeconomic assessment in accordance with Federal Highway Administration Technical Advisory T6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(F) Documents*.

2.2 Methodology and Study Area

The Massachusetts Department of Transportation (MassDOT) used the data in this analysis from the following sources:

- U.S. Census Bureau's American Community Survey (ACS) historical and most recent 5-year estimates (2018-2022). The ACS offers detailed demographic, economic, and housing data, allowing for a comprehensive look at population trends, income, housing, and employment within the Program Study Area.
- Employment and wage data were compiled from the Massachusetts Executive Office of Labor and Workforce Development (2001-2023).
- Traffic analyses done by MassDOT were used in the assessment of local and regional economic impacts.
- Additional data regarding market conditions, including tax revenues and projections, are sourced to the Massachusetts Department of Revenue, Massachusetts Office of Travel and Tourism, and the Cape Cod Commission.
- Population, household, and employment projections are based on estimates from the UMass Donahue Institute.
- Data on real estate market conditions and trends are from the CoStar Property Information System.
- The assessment of impacts of the Build Alternative compared to No Build Alternative employment within Barnstable, Dukes, and Nantucket Counties in 2050 was accomplished using the TREDIS economic impact assessment model.

- The assessment of travel-time savings impacts on potential labor force and consumer sales access from the Local Project Area uses data from Claritas Site Reports, and a retail opportunity gap/surplus analysis.

The analysis examines data for 10 geographic areas (**Figure 3-1**):

- Census Tracts: 137, 138, and 139 are in the town of Bourne (Local Project Area for the purposes of the socioeconomic analysis)
- Towns: Bourne, Plymouth, and Sandwich
- Counties: Barnstable, Dukes, and Nantucket
- State: Massachusetts

3 Existing Conditions

3.1 Population

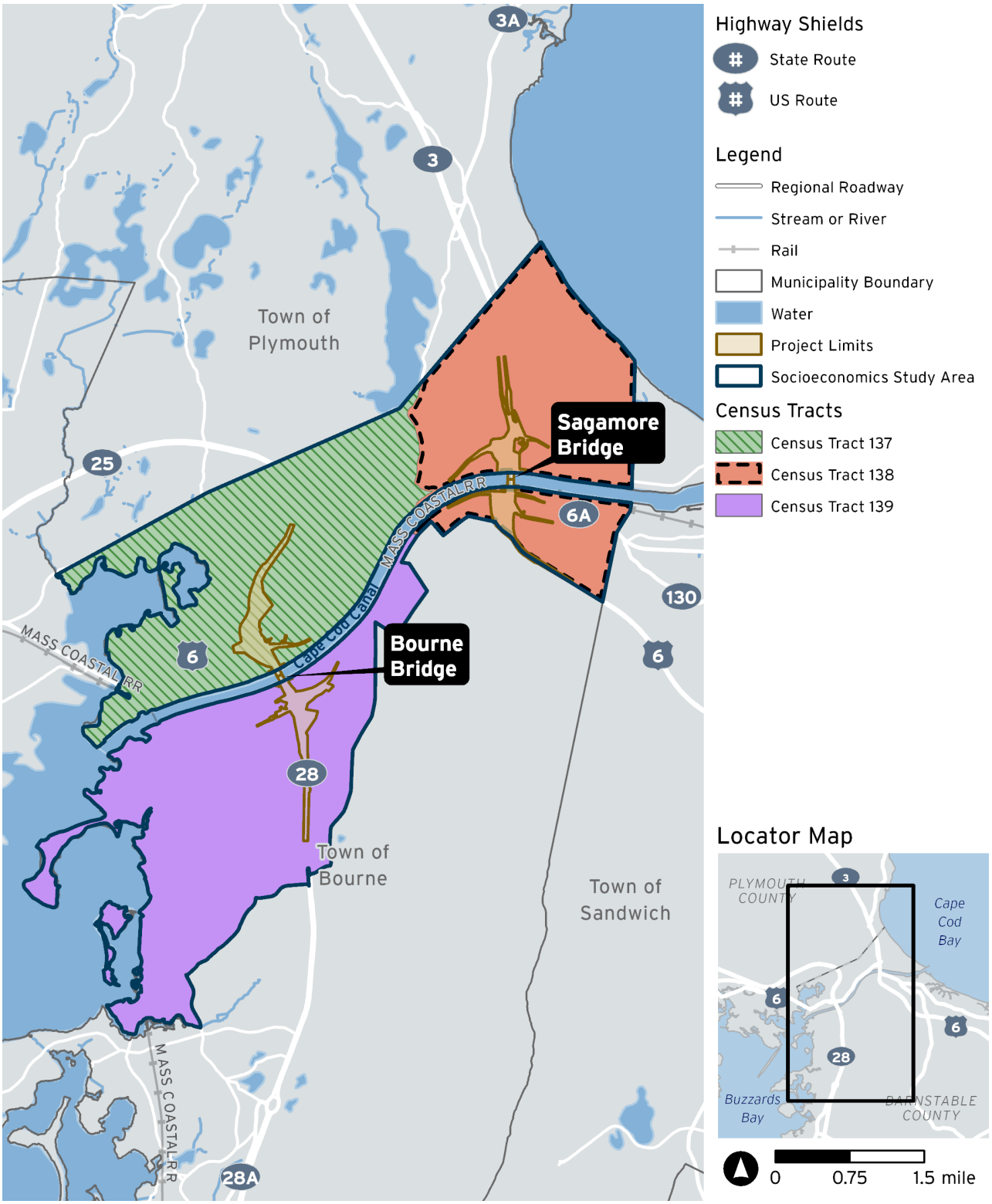
Table 3-1 presents population changes across each geographic area between 2010 and 2022. Most areas experienced population growth during this period. Dukes County at 27% and Nantucket County at nearly 40% experienced the greatest increases—three and five times more, respectively—than the statewide growth rate of 8%. Population in the town of Sandwich declined while the other areas increased.

Table 3-1. Population, 2010 and 2022

Geographic Area	2010	2022	Change (2010-2022)
Census Tract 137 (Bourne)	4,865	4,285	-11.9%
Census Tract 138 (Bourne)	4,968	5,504	10.8%
Census Tract 139 (Bourne)	4,497	5,046	12.2%
Town of Bourne	19,577	20,455	4.5%
Town of Plymouth	55,606	61,628	10.8%
Town of Sandwich	20,628	20,419	-1.0%
Barnstable County	217,483	229,436	5.5%
Dukes County	16,155	20,543	27.2%
Nantucket County	10,069	14,065	39.7%
Massachusetts	6,477,096	6,984,205	7.8%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP05

Figure 3-1. Socioeconomic Study Area



Source: Massachusetts Department of Transportation, 2024

3.2 Population Projections

The town of Plymouth and Dukes County are expected to experience overall population growth, with increases of 14.3% and 14.2%, respectively (**Table 3-2**), over the full period. Nantucket County indicates moderate growth initially, but by 2050 it is projected to decline by 12.8% from 2040 levels, with the largest population decrease occurring between 2030 and 2050. In contrast, Barnstable County exhibits the steepest overall decline, with a projected 17.4% population decrease by 2050, and a continuous downward trend from 2030 onward.

Table 3-2. Population Projections, 2019-2050

Geographic Area	2019	2030	2040	2050	Change (2019-2050)	Change (2030-2050)	Change (2040-2050)
Town of Bourne	19,762	18,032	21,352	18,916	-4.3%	4.9%	-11.4%
Town of Plymouth	61,528	71,487	64,342	70,312	14.3%	-1.6%	9.3%
Town of Sandwich	20,169	19,387	21,412	19,893	-1.4%	2.6%	-7.1%
Barnstable County	212,990	216,048	190,000	176,007	-17.4%	-18.5%	-7.4%
Dukes County	17,332	20,923	19,975	19,793	14.2%	-5.4%	-0.9%
Nantucket County	11,399	15,873	14,000	12,212	7.1%	-23.1%	-12.8%

Source: Estimates are from UMass Donahue Institute V2024 Population Projections, May 2024.
Data for census tracts are not available.

3.2.1 Median Age

Table 3-3 highlights a demographic shift in many of the reference areas. Each of the census tracts, communities, and counties experienced aging in their populations exceeding the statewide average. While Massachusetts experienced only a slight increase in median age from 2010 to 2020, areas like Barnstable County and towns such as Bourne, Sandwich, and Plymouth are experiencing a greater relative aging of the population. Dukes County has also seen a rise in the age of its residents, although not as pronounced as in some of the other areas. Nantucket County, on the other hand, indicates a relatively stable population in terms of age, with only a small increase in median age over the period, about the same as the statewide average.

The population of residents under 18 has declined across most areas, with the largest relative loss of people under 18 in Census Tract 138 and the town of Sandwich. In contrast, the population of residents 65 and older has grown in all areas. The general trend suggests an aging of the population exceeding the statewide average increase. Nantucket County is an exception, showing a slight increase in the under-18 population, while Massachusetts saw overall declines in the younger population and modest growth in the older age group (**Table 3-4**).

Table 3-3. Median Age, 2010 and 2022

Geographic Area	Median Age (2010)	Median Age (2022)
Census Tract 137 (Bourne)	36.2	53.8
Census Tract 138 (Bourne)	39.7	49.3
Census Tract 139 (Bourne)	48.5	54.7
Town of Bourne	42.0	52.7
Town of Plymouth	41.2	47.7
Town of Sandwich	42.5	51.9
Barnstable County	48.7	54.5
Dukes County	44.3	49.2
Nantucket County	39.1	40.5
Massachusetts	38.7	39.8

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP05

Table 3-4. Change in Age Group, Under 18 and 65 and Older, 2010-2022

Geographic Area	Under 18 Years of Age, Percentage Change (2010-2020)	65 years of Age and Older, Percentage Change (2010-2020)
Census Tract 137 (Bourne)	-3.6%	11.3%
Census Tract 138 (Bourne)	-8.3%	8.4%
Census Tract 139 (Bourne)	0.1%	18.0%
Town of Bourne	-3.6%	10.6%
Town of Plymouth	-5.1%	10.9%
Town of Sandwich	-9.4%	14.3%
Barnstable County	-3.4%	7.5%
Dukes County	-1.6%	9.6%
Nantucket County	1.0%	4.6%
Massachusetts	-2.5%	3.6%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP05

Race/Ethnicity

Most regions have a predominantly White population, particularly in areas like the towns of Sandwich and Plymouth, where over 90% of residents identify as White. However, Dukes and Nantucket Counties show more racial diversity, with a larger percentage of residents identifying as Black/African American, Hispanic, or Two or More Races. Massachusetts overall is also more racially and ethnically diverse, with a higher proportion of Black/African American, Asian, and Hispanic residents compared to the smaller local project area census tracts, towns, and counties (**Table 3-5**).

Table 3-5. Race and Ethnicity, 2022

Geographic Area	White, one Race	Black or African American	American Indian, Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Some Other Race	Two or More Races
Census Tract 137 (Bourne)	92.4%	0.3%	1.1%	1.5%	0.0%	0.3%	4.5%
Census Tract 138 (Bourne)	94.1%	0.9%	0.0%	3.8%	0.0%	0.0%	1.2%
Census Tract 139 (Bourne)	90.0%	0.0%	0.0%	1.0%	0.0%	8.0%	1.0%
Town of Bourne	90.7%	1.0%	0.3%	2.1%	0.0%	2.2%	3.7%
Town of Plymouth	90.4%	1.2%	0.1%	1.1%	0.1%	1.9%	5.1%
Town of Sandwich	93.7%	1.2%	0.2%	1.4%	0.0%	0.6%	2.9%
Barnstable County	87.9%	2.8%	0.4%	1.5%	0.0%	2.2%	5.2%
Dukes County	82.5%	3.1%	0.9%	1.5%	0.0%	3.0%	9.0%
Nantucket County	75.0%	11.1%	0.0%	1.8%	0.0%	4.9%	7.1%
Massachusetts	72.7%	7.1%	0.2%	7.0%	0.0%	5.0%	8.0%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP05

Hispanic individuals can belong to any of the racial categories mentioned in **Table 3-5**. In 2022, the proportion of Hispanic residents varied across the geographic areas. Massachusetts had a Hispanic population of 12.6%, with Nantucket County higher at 15.1%. In comparison, Barnstable County (3.5%), Dukes County (3.6%), and Plymouth (3.1%) reported smaller Hispanic populations, though these figures still represent growing Hispanic communities in those regions. Between 2010 and 2022, Nantucket County experienced the most growth in its Hispanic population, with a 9.3 percentage point increase (**Table 3-6**).

Table 3-6. Residents Identifying as Hispanic (of Any Race), 2010 and 2022

Geographic Area	Hispanic (of Any Race) 2010	Hispanic (of Any Race) 2022	Change (2010-2022)
Census Tract 137 (Bourne)	2.1%	1.9%	-0.2%
Census Tract 138 (Bourne)	0.5%	3.6%	3.1%
Census Tract 139 (Bourne)	0.0%	0.1%	0.1%
Town of Bourne	2.0%	2.4%	0.4%
Town of Plymouth	1.7%	3.1%	1.4%
Town of Sandwich	2.3%	2.1%	-0.2%
Barnstable County	2.1%	3.5%	1.4%
Dukes County	0.6%	3.6%	3.0%
Nantucket County	5.8%	15.1%	9.3%
Massachusetts	9.0%	12.6%	3.6%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP05

3.2.2 Foreign-Born Residents and Language Ability

The percentage of foreign-born residents in Massachusetts is higher than in the study regions, at 17.6%. In comparison, Dukes County (14.7%) and Nantucket County (13.1%) also have notable foreign-born populations but fall below the state average. Between 2010 and 2022, most regions saw an increase in foreign-born populations, with Dukes County experiencing the highest increase (**Table 3-7**).

Table 3-7. Foreign-Born Residents and Language Spoken at Home, 2010-2022

Geographic Area	Foreign Born (2022)	Foreign Born Change (2010-2022)	Speak Language Other than English at Home (2022)	Speak Language Other than English Change (2010-2022)
Census Tract 137 (Bourne)	5.4%	1.0%	7.6%	0.6%
Census Tract 138 (Bourne)	7.5%	4.9%	6.5%	4.4%
Census Tract 139 (Bourne)	1.1%	-1.6%	0.5%	-1.8%
Town of Bourne	4.6%	1.0%	5.7%	1.4%
Town of Plymouth	6.1%	1.3%	7.0%	0.2%
Town of Sandwich	4.1%	0.2%	4.8%	-0.6%
Barnstable County	9.4%	2.7%	10.6%	3.1%

Geographic Area	Foreign Born (2022)	Foreign Born Change (2010-2022)	Speak Language Other than English at Home (2022)	Speak Language Other than English Change (2010-2022)
Dukes County	14.7%	7.2%	16.9%	9.8%
Nantucket County	13.1%	-1.7%	15.6%	0.5%
Massachusetts	17.6%	3.1%	24.5%	3.5%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP02

In terms of linguistic diversity, Massachusetts reports the highest percentage of residents who speak a language other than English at home (24.5%), followed by Dukes County (16.9%) and Nantucket County (15.6%). Other regions, such as the town of Plymouth and Barnstable County, show lower numbers but are still above areas like the towns of Sandwich and Bourne (**Table 3-7**).

3.3 Households

Household growth trends clearly diverge across geographic areas between 2010 and 2022. The census tracts and towns have experienced growth in the number of households, with some areas seeing increases of over 20%. In contrast, the counties and the Commonwealth of Massachusetts have shown more moderate growth, with only marginal changes in household numbers in certain areas (**Table 3-8**).

Additionally, average household sizes vary notably. Smaller household sizes in areas like Barnstable County and the Islands—Dukes County and Nantucket County—likely reflect demographic factors such as an aging population and single-person households while larger household sizes in towns like Plymouth and Sandwich indicate more family-oriented communities with younger residents.

Table 3-8. Number of Households and Household Size, 2010 and 2022

Geographic Area	Total Households (2010)	Total Households (2022)	Change (2010-2022)	Average Household Size
Census Tract 137 (Bourne)	1,587	1,916	20.7%	2.11
Census Tract 138 (Bourne)	1,879	2,217	18.0%	2.64
Census Tract 139 (Bourne)	1,943	2,314	19.1%	2.31
Town of Bourne	7,730	8,715	12.7%	2.34
Town of Plymouth	21,177	25,217	19.1%	2.52
Town of Sandwich	7,635	7,977	4.5%	2.66
Barnstable County	98,164	99,969	1.8%	2.17
Dukes County	5,530	6,899	26.2%	2.92

Geographic Area	Total Households (2010)	Total Households (2022)	Change (2010-2022)	Average Household Size
Nantucket County	3,623	4,659	28.6%	2.17
Massachusetts	2,512,552	2,740,995	9.1%	2.48

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP02

3.3.1 Household Projections

The household projection data from 2019 to 2050 show variation across the study area. Dukes County and the town of Plymouth are projected to see increases of 38.3% and 29.7%, respectively. Nantucket County is also projected to experience growth initially, but then decline, leading to an overall 28.7% increase by 2050. In contrast, Barnstable County and the town of Bourne are projected to experience declines, with Barnstable County losing 12.7% of households and the town of Bourne decreasing by 4.8%. The town of Sandwich is projected to see growth of 4.4% (**Table 3-9**).

Table 3-9. Number of Households, Projections 2019-2050

Geography	2019	2030	2040	2050	Change (2019-2050)	Change (2030-2050)	Change (2040-2050)
Town of Bourne	8,611	8,289	8,960	8,200	-4.8%	-1.1%	-8.5%
Town of Plymouth	23,345	28,869	28,465	30,283	29.7%	4.9%	6.4%
Town of Sandwich	7,818	7,991	8,232	8,159	4.4%	2.1%	-0.9%
Barnstable County	94,323	100,263	86,173	82,313	-12.7%	-17.9%	-4.5%
Dukes County	6,765	9,085	9,170	9,359	38.3%	3.0%	2.1%
Nantucket County	3,713	6,026	5,875	4,780	28.7%	-20.7%	-18.6%

Source: Estimates are the latest data from UMass Donahue Institute Population, Household, and Employment Projections 2010-2050, Statewide Model Run 97, July 2023. No projections available at the Census Tract level.

3.3.2 Median Household Income

Median household incomes vary widely across geographic areas. Nantucket County stands out with the highest median income, followed by the towns of Sandwich and Plymouth. In contrast, Dukes County and Census Tract 139 (in the town of Bourne) have the lowest median income, falling below $80,000, while Massachusetts has a median income of just under $100,000.

In terms of nominal median household income changes from 2010 to 2022, Census Tract 137 (in the town of Bourne) and Nantucket County saw the largest percentage increases. Barnstable County and Massachusetts also experienced substantial nominal growth, with increases of around 50%. In comparison, Dukes County and Census Tract 139 (in the town of Bourne) saw the smallest changes, with more modest increases of 24.0% and 21.7%, respectively (**Table 3-10**).

Table 3-10. Median Household Income

Geographic Area	Median Household Income (2010$)	Median Household Income (2022$)	Nominal Change (2010-2022)
Census Tract 137 (Bourne)	$53,274	$88,370	65.9%
Census Tract 138 (Bourne)	$68,597	$100,152	46.0%
Census Tract 139 (Bourne)	$70,197	$85,429	21.7%
Town of Bourne	$61,418	$90,640	47.6%
Town of Plymouth	$74,767	$107,067	43.2%
Town of Sandwich	$83,325	$121,038	45.3%
Barnstable County	$60,317	$90,447	50.0%
Dukes County	$62,407	$77,392	24.0%
Nantucket County	$83,347	$135,590	62.7%
Massachusetts	$64,509	$96,505	49.6%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP03

3.3.3 Per-Capita Income

Per-capita income patterns mirror those of median household income, with Nantucket County showing the highest levels, while the towns of Sandwich and Plymouth also report comparatively high figures. Dukes County and Barnstable County show lower moderate-income levels compared to these regions.

In terms of nominal growth from 2010 to 2022, most areas saw increases, with the towns of Bourne and Plymouth and other regions showing strong gains. Nantucket County, despite having the highest income, experienced the smallest percentage growth, while other areas, such as Dukes County, saw more moderate increases (**Table 3-11**).

Table 3-11. Per-Capita Income

Geographic Area	Per-Capita Income (2010$)	Per-Capita Income (2022$)	Nominal Change (2010-2022)
Census Tract 137 (Bourne)	$26,339	$45,448	72.6%
Census Tract 138 (Bourne)	$29,700	$51,191	72.4%
Census Tract 139 (Bourne)	$34,556	$54,509	57.7%
Town of Bourne	$30,299	$52,301	72.6%
Town of Plymouth	$33,163	$55,811	68.3%
Town of Sandwich	$35,372	$59,623	68.6%
Barnstable County	$35,246	$55,940	58.7%
Dukes County	$33,390	$51,354	53.8%
Nantucket County	$53,410	$62,153	16.4%
Massachusetts	$33,966	$53,513	57.5%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP03

3.3.4 Families Below Poverty Level

Poverty rates within the study area fall below the statewide average, with Barnstable County being the highest within the region at 4.1%. Families with children experienced higher poverty rates overall, except for Nantucket County and the town of Sandwich.

From 2010 to 2022, most areas saw a decline in poverty rates for both families and families with children. The highest reductions were observed in Census Tract 138 (in the town of Bourne) and the town of Bourne for all families, and Census Tract 138 also saw the largest decline for families with children. The town of Sandwich was one of the few places to show a slight increase in poverty rates during this period. Compared to the state, most localities experienced a more pronounced decline in family poverty rates (**Table 3-12**).

Table 3-12. Families Below Poverty Level and Families with Children Below Poverty Level

Geographic Area	All Families (2022)	All Families Change (2010-2022)	Families with Children (2022)	Families with Children Change (2010-2022)
Census Tract 137 (Bourne)	4.7%	-1.2%	8.7%	5.0%
Census Tract 138 (Bourne)	1.9%	-8.0%	5.0%	-9.2%
Census Tract 139 (Bourne)	4.2%	-6.5%	4.6%	-4.9%
Town of Bourne	2.9%	-4.7%	5.9%	-3.3%
Town of Plymouth	3.2%	-1.7%	6.9%	0.8%
Town of Sandwich	3.5%	2.1%	3.4%	1.5%
Barnstable County	4.1%	-0.9%	7.8%	-0.6%
Dukes County	2.3%	-3.2%	3.0%	-1.8%
Nantucket County	1.0%	-2.6%	0.0%	-4.1%
Massachusetts	6.5%	-1.0%	9.9%	-1.6%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP03

3.4 Housing

Table 3-13 indicates a clear increase in the number of occupied housing units across all regions from 2010 to 2022. Among the towns and counties, the town of Plymouth experienced the largest rise, adding more than 4,000 housing units, followed by Barnstable County with 1,805 additional units. Nantucket and Dukes Counties also saw notable increases in housing occupancy, despite their smaller size.

Table 3-13. Occupied Housing Units

Geographic Area	Occupied Housing Units (2010)	Occupied Housing Units (2022)	Absolute Change (2010-2022)	Change (2010-2022)
Census Tract 137 (Bourne)	1,587	1,916	329	20.7%
Census Tract 138 (Bourne)	1,879	2,217	338	18.0%
Census Tract 139 (Bourne)	1,943	2,314	371	19.1%
Town of Bourne	7,730	8,715	985	12.7%
Town of Plymouth	21,177	25,217	4,040	19.1%
Town of Sandwich	7,635	7,977	342	4.5%
Barnstable County	98,164	99,969	1,805	1.8%
Dukes County	5,530	6,899	1,369	24.8%
Nantucket County	3,623	4,659	1,036	28.6%
Massachusetts	2,512,552	2,740,995	228,443	9.1%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP04

When looking at the percentage change, Nantucket and Dukes Counties stand out with the highest growth rates, at 28.6% and 24.8%, respectively. The town of Plymouth also experienced strong growth, nearing 20%. In contrast, Barnstable County and the town of Sandwich showed much more modest increases.

3.4.1 Owner- Versus Renter-Occupied Housing Units

Owner-occupied housing dominates in most areas, particularly in the town of Sandwich and Barnstable County, where over 80% of housing units are owner-occupied. Nantucket and Dukes Counties have relatively higher proportions of renter-occupied units, yet most regions show a clear preference for homeownership, particularly when compared to the statewide average (**Table 3-14**).

Table 3-14. Owner- Versus Renter-Occupied Housing Units

Geographic Area	Owner-Occupied Housing Units (percentage)	Renter-Occupied Housing Units (percentage)
Census Tract 137 (Bourne)	73.8%	26.2%
Census Tract 138 (Bourne)	79.8%	20.2%
Census Tract 139 (Bourne)	81.5%	18.5%
Town of Bourne	76.5%	23.5%
Town of Plymouth	79.7%	20.3%
Town of Sandwich	88.9%	11.1%
Barnstable County	81.4%	18.6%
Dukes County	76.6%	23.4%
Nantucket County	71.1%	28.9%
Massachusetts	62.4%	37.6%

Source: American Community Survey 5-year estimates 2018-2022, Table DP04

3.4.2 Median Home Value

Most areas experienced a substantial increase in median home values from 2010 to 2022. Dukes County stands out with the most dramatic rise, where median home values surged by 154.2%, far exceeding other regions. Nantucket County, while already having the highest median home values, saw a moderate increase of 26.6% over the 12 years, reflecting slower growth compared to Dukes County but still maintaining the highest absolute home values. Other areas experienced more modest growth over this period (**Table 3-15**).

Table 3-15. Median Home Value

Geographic Area	Median Home Value (2010$)	Median Home Value (2022$)	Nominal Change (2010-2022)
Census Tract 137	$306,300	$441,600	44.2%
Census Tract 138	$373,800	$488,300	30.6%
Census Tract 139	$370,900	$473,900	27.8%
Town of Bourne	$364,000	$482,600	32.6%
Town of Plymouth	$354,500	$461,500	30.2%
Town of Sandwich	$381,200	$482,300	26.5%
Barnstable County	$392,700	$519,100	32.2%
Dukes County	$392,700	$998,100	154.2%
Nantucket County	$1,000,000	$1,265,600	26.6%
Massachusetts	$352,300	$483,900	37.4%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP04

3.4.3 Age of Housing Stock

Table 3-16 reveals that Massachusetts has an older housing stock, with 36.3% of homes built in 1949 or earlier. This pattern of older homes is also seen, though to a lesser extent, in areas like Census Tract 137 and Dukes and Nantucket Counties, where a large portion of homes were constructed before 1950. In contrast, areas like Barnstable County and the town of Sandwich have a large share of homes built during the 1970s and 1980s. In terms of recent construction (2010-2022), Plymouth County stands out with 11.7% of homes built during this period.

Table 3-16. Year Structure Built

Geographic Area	Built (2010-2022)	Built (1990-2009)	Built (1970-1989)	Built (1950-1969)	Built (1949 or (Earlier
Census Tract 137 (Bourne)	7.5%	22.2%	21.7%	19.7%	29.0%
Census Tract 138 (Bourne)	2.0%	32.5%	38.1%	17.5%	9.9%
Census Tract 139 (Bourne)	2.9%	21.2%	37.4%	19.7%	18.8%
Town of Bourne	3.5%	24.0%	32.9%	19.7%	19.9%
Town of Plymouth	11.7%	20.0%	33.7%	15.4%	19.1%
Town of Sandwich	2.5%	24.3%	46.9%	15.9%	10.5%
Barnstable County	3.4%	18.4%	40.8%	22.7%	14.8%
Dukes County	4.7%	25.5%	38.0%	11.8%	20.1%
Nantucket County	5.0%	32.6%	31.0%	10.2%	21.0%
Massachusetts	5.6%	14.7%	22.2%	21.1%	36.3%

Source: American Community Survey 5-year estimates 2018-2022, Table DP04

3.4.4 Housing Cost-Burdened Households

The U.S. Department of Housing and Urban Development defines cost-burdened families as those "who pay more than 30 percent of their income for housing." In general, the percentage of renters burdened by housing costs is higher than that of owners across most areas (Table 3-17). Dukes County and Barnstable County report particularly high-cost burdens for both renters and owners, with Dukes County showing the highest percentage of cost-burdened owners. In contrast, Nantucket County has a notably high percentage of cost-burdened owners, but a lower percentage of burdened renters compared to other regions. In Census Tract 139, almost three-quarters of renters are cost burdened.

The prevalence of second homes and seasonal residences in areas like Barnstable, Dukes County, and Nantucket Counties has created distinct economic and social dynamics. In some towns, more than half of the housing stock is used for seasonal purposes, leading to population fluctuations between summer and winter. This high concentration of vacation homes drives up property values and exacerbates

housing affordability issues for year-round residents, while also straining local infrastructure during peak tourist months. In addition, there has been a decline in the number of seasonal workers, which poses challenges for businesses trying to meet the needs of the increasing summer population.

Many towns in these counties have been designated as "seasonal communities" under Massachusetts law. The "seasonal community" designation is a legal and planning term that applies to areas where a large proportion of homes are used seasonally, such as vacation homes. This designation has specific implications for housing policy and community planning, especially in areas like Cape Cod, Martha's Vineyard (Dukes County), and Nantucket County.

Table 3-17. Housing Cost-Burdened Households, 2022

Geographic Area	Renters Burdened (2022)	Owners Burdened (2022)
Census Tract 137 (Bourne)	54.0%	36.6%
Census Tract 138 (Bourne)	48.5%	31.1%
Census Tract 139 (Bourne)	73.7%	46.6%
Town of Bourne	62.6%	34.8%
Town of Plymouth	52.3%	33.5%
Town of Sandwich	36.9%	29.5%
Barnstable County	58.0%	36.8%
Dukes County	57.3%	55.3%
Nantucket County	35.7%	54.7%
Massachusetts	50.2%	29.8%

Source: American Community Survey 5-year estimates 2018-2022, Table DP04

3.5 Employment and Workforce Characteristics

3.5.1 Educational Attainment

Overall, most of the areas show a level of education equal to or greater than the statewide average of bachelor's degrees or higher. Nantucket County stands out for having the highest proportion of residents holding a bachelor's degree or higher. All areas experienced an increase in the proportion of residents with bachelor's degrees from 2010 to 2022, with Nantucket County and the town of Plymouth experiencing the largest increases (**Table 3-18**), aside from Census Tracts 138 and 139.

Table 3-18. Educational Attainment, Residents Aged 25 and Older with Bachelor's Degree or Higher

Geographic Area	Bachelor's degree or higher (2010)	Bachelor's degree or higher (2022)	Change (2010-2022)
Census Tract 137 (Bourne)	28.6%	30.8%	2.2%
Census Tract 138 (Bourne)	37.1%	50.8%	13.7%
Census Tract 139 (Bourne)	37.0%	51.3%	14.3%
Town of Bourne	36.2%	46.2%	10.0%
Town of Plymouth	32.6%	44.4%	11.8%
Town of Sandwich	47.2%	49.5%	2.3%
Barnstable County	40.5%	46.1%	5.6%
Dukes County	40.0%	43.2%	3.2%
Nantucket County	40.2%	57.4%	17.2%
Massachusetts	38.3%	45.9%	7.6%

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP02

3.5.2 Employment Status

In 2022, the percentage of the employed workforce showed some variation across the region, with Census Tract 138, Nantucket County, and Dukes County having relatively higher percentages of employed individuals. In contrast, Barnstable County overall and the town of Bourne had lower employment percentages, though they were still comparable to statewide averages. The share of those not in the labor force also varied, with Barnstable County and Census Tract 139 showing a higher proportion compared to other areas.

When comparing changes from 2010 to 2022, several geographic areas saw increases in the percentage of the workforce not in the labor force, particularly Nantucket County (**Table 3-19**).

Table 3-19. Employment Status

Geographic Area	Employed	Unemployed	Armed Forces	Not in Labor Force	Percentage Change Not in Labor Force (2010-2022)
Census Tract 137 (Bourne)	61.2%	1.1%	1.0%	36.7%	-6.3%
Census Tract 138 (Bourne)	71.6%	2.6%	0.3%	25.5%	-8.6%
Census Tract 139 (Bourne)	56.5%	0.8%	0.0%	42.7%	3.9%
Town of Bourne	59.8%	1.3%	1.4%	37.5%	0.0%
Town of Plymouth	60.7%	3.8%	0.1%	35.4%	3.1%
Town of Sandwich	63.4%	2.1%	0.3%	34.2%	4.6%
Barnstable County	56.8%	2.7%	0.3%	40.3%	1.0%
Dukes County	60.3%	4.6%	0.1%	35.1%	2.1%
Nantucket County	66.4%	3.9%	0.0%	29.6%	5.9%
Massachusetts	63.5%	3.6%	0.1%	32.9%	0.6%

Source: American Community Survey 5-year estimates 2018-2022, Table DP03

3.5.3 Class of Worker

Of those who were employed, most worked in the private sector, although the percentage employed for all areas was below the statewide average, except from Census Tract 139. Dukes County and Nantucket County exhibited relatively high rates of self-employment, with most other areas also showing self-employment levels exceeding the state average (**Table 3-20**).

Table 3-20. Class of Worker

Geographic Area	Private Wage and Salary Workers	Government Workers	Self-Employed	Unpaid Family Workers
Census Tract 137 (Bourne)	75.2%	16.9%	6.7%	1.2%
Census Tract 138 (Bourne)	78.4%	10.6%	11.0%	0.0%
Census Tract 139 (Bourne)	87.6%	10.9%	1.5%	0.0%
Town of Bourne	78.8%	12.7%	8.3%	0.3%
Town of Plymouth	77.1%	13.7%	9.0%	0.2%
Town of Sandwich	76.5%	16.7%	6.7%	0.1%
Barnstable County	78.3%	12.7%	8.8%	0.3%
Dukes County	70.8%	10.7%	18.0%	0.5%
Nantucket County	69.5%	13.8%	16.4%	0.3%
Massachusetts	81.8%	12.5%	5.6%	0.2%

Source: American Community Survey 5-year estimates 2018-2022, Table DP03

3.5.4 Method of Commute

The study region's geographic areas show a reliance on driving alone to work greater than the statewide average. Public transportation use is quite low compared to Massachusetts overall. Walking is also uncommon in many areas, though it is more prevalent in Nantucket County, where over 7% of people walk to work. Notably, the percentage of people working from home has increased across all areas between 2010 and 2022 (**Table 3-21**).

Table 3-21. Method of Commute, 2022

Geographic Area	Car, truck, or van -- drove alone	Car, truck, or van -- carpooled	Public Trans.	Walked	Other means	Worked from home	Worked from Home Change (2010-2022)
Census Tract 137 (Bourne)	73.4%	5.1%	1.4%	3.1%	1.5%	15.5%	12.5%
Census Tract 138 (Bourne)	81.0%	5.8%	0.3%	0.7%	1.4%	10.7%	9.6%
Census Tract 139 (Bourne)	88.6%	7.9%	0.0%	0.0%	0.0%	3.6%	2.7%
Town of Bourne	79.0%	7.0%	0.6%	1.0%	1.3%	11.1%	8.2%
Town of Plymouth	71.1%	8.7%	1.8%	2.1%	1.8%	14.4%	9.1%
Town of Sandwich	76.8%	7.0%	1.1%	0.4%	2.8%	11.9%	5.2%
Barnstable County	74.7%	7.1%	1.2%	2.1%	1.8%	13.1%	7.5%
Dukes County	66.2%	7.5%	1.5%	3.3%	1.9%	19.6%	10.8%
Nantucket County	69.7%	8.9%	1.4%	7.1%	2.6%	10.3%	0.7%
Massachusetts	64.2%	7.0%	7.6%	4.3%	2.3%	14.6%	10.6%

Source: American Community Survey 5-year estimates 2018-2022, Table DP03

3.5.5 Mean Travel Time to Work

Table 3-22 highlights differences in average travel times to work across the geographic areas. Overall, commute times reflect labor market areas, which are, as expected given their geographic isolation, fewer in Barnstable, Dukes, and Nantucket Counties. Average commute times declined slightly between 2010 and 2022 except for workers in the town of Plymouth and in Census Tract 138.

Table 3-22. Mean Travel Time to Work, 2010 and 2022

Geographic Area	Mean Travel Time to Work (minutes) (2010)	Mean Travel Time to Work (minutes) (2022)	Change (2010-2022)
Census Tract 137 (Bourne)	29.7	31.1	-1.40
Census Tract 138 (Bourne)	29.2	25.7	3.50
Census Tract 139 (Bourne)	29.7	31.4	-1.70
Town of Bourne	27.3	28.4	-1.10
Town of Plymouth	33.7	30.9	2.80
Town of Sandwich	27.6	28.2	-0.60
Barnstable County	23.9	25.0	-1.10
Dukes County	16.0	15.7	-0.30
Nantucket County	10.3	13.7	-3.40
Massachusetts	27.3	29.4	-2.10

Source: American Community Survey 5-year estimates 2006-2010 and 2018-2022, Table DP03

3.5.6 Number of Vehicles

Table 3-23 illustrates the distribution of vehicle availability among households across the study areas. In most areas, the majority of households have access to either one or two vehicles. In contrast, Massachusetts has a higher percentage of households without vehicles.

Table 3-23. Number of Vehicles per Household

Geographic Area	Zero Vehicles Available	One Vehicle Available	Two Vehicles Available	Three or More Vehicles Available
Census Tract 137 (Bourne)	6.7%	41.5%	32.1%	19.7%
Census Tract 138 (Bourne)	1.5%	29.0%	42.8%	26.8%
Census Tract 139 (Bourne)	2.5%	35.6%	50.2%	11.8%
Town of Bourne	4.4%	33.3%	42.9%	19.4%
Town of Plymouth	4.7%	30.4%	46.8%	18.1%
Town of Sandwich	2.0%	26.9%	42.5%	28.6%
Barnstable County	5.0%	33.3%	41.2%	20.5%
Dukes County	3.9%	32.0%	37.3%	26.8%
Nantucket County	4.0%	27.1%	44.7%	24.2%
Massachusetts	11.9%	35.5%	35.9%	16.7%

Source: American Community Survey 5-year estimates 2018-2022, Table DP04

3.5.7 Total Employment and Business Characteristics

From 2010 to 2022, employment increased across all listed areas, with Nantucket County experiencing the highest percentage growth at 39.6% (2,259 jobs). Other notable increases include the town of Sandwich (16.9%) and Dukes County (16.1%). The town of Plymouth saw the largest absolute growth among the towns, adding 3,297 jobs (14.5%), while Barnstable County added 6,076 jobs (6.9%). Massachusetts as a whole experienced a 14.1% increase in employment, with 444,943 new jobs (**Table 3-24**).

Table 3-24. Employment, 2010 and 2022

Geographic Area	2010	2022	Absolute Change (2010-2022)	Percentage Change (2010-2022)
Town of Bourne	7,273	8,101	828	11.4%
Town of Plymouth	22,779	26,076	3,297	14.5%
Town of Sandwich	5,291	6,185	894	16.9%
Barnstable County	88,699	94,775	6,076	6.9%
Dukes County	7,735	8,981	1,246	16.1%
Nantucket County	5,704	7,963	2,259	39.6%
Massachusetts	3,151,206	3,596,149	444,943	14.1%

Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset. Data for census tracts are not available. ES202 measures employment in the geographic areas regardless of where a person resides.

3.5.8 Average Annual Wage

While most areas fall below the state's wage level, particularly the towns of Plymouth and Sandwich, the gap has narrowed. The state's 2022 average wage still stands higher than all of the Study Areas.

In terms of nominal wage growth, all regions have experienced increases from 2010 to 2022, with Dukes County showing the most increase, more than doubling its average wage over this period. Similarly, the town of Bourne, and Barnstable and Nantucket Counties have also posted gains, with nominal growth rates close to or exceeding 100% (**Table 3-25**).

Table 3-25. Annual Average Nominal Wages, 2010 and 2022

Geographic Area	Average Wage (2010$)	Average Wage (2022$)	Percentage Change (2010-2022)
Town of Bourne	$41,080	$63,648	54.9%
Town of Plymouth	$43,056	$58,708	36.4%
Town of Sandwich	$38,844	$54,028	39.1%
Barnstable County	$39,156	$57,980	48.1%

Geographic Area	Average Wage (2010$)	Average Wage (2022$)	Percentage Change (2010-2022)
Dukes County	$41,912	$66,716	59.2%
Nantucket County	$45,552	$75,296	65.3%
Massachusetts	$57,824	$89,804	55.3%

Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset. Data are not inflation adjusted. Data for census tracts not available.

3.5.9 Establishments

Overall, the entire Cape and Islands region is experiencing increases in the number of business establishments compared to statewide trends, particularly over the last decade. Nantucket County and the town of Plymouth had the largest increases from 2001 to 2023, while Dukes County experienced the largest recent growth, with the number of business establishments rising 26.0% between 2014 and 2023 (Table 3-26).

Table 3-26. Number of Establishments, 2001, 2014, and 2023

Geographic Area	2001	2014	2023	Establishments Added (2001-2023)	Change (2001-2023)	Change (2014-2023)
Town of Bourne	654	725	797	143	21.9%	9.9%
Town of Plymouth	1,277	1,704	2,060	783	61.3%	20.9%
Town of Sandwich	523	628	736	213	40.7%	17.2%
Barnstable County	8,554	9,191	10,057	1,503	17.6%	9.4%
Dukes County	1,093	1,201	1,513	420	38.4%	26.0%
Nantucket County	821	1,064	1,326	505	61.5%	24.6%
Massachusetts	193,547	234,695	291,125	97,578	50.4%	24.0%

Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset. Data for census tracts not available.

3.5.10 Largest Industries by 2-Digit NAICS

The North American Industry Classification System (NAICS)[1] is a standardized system used by the U.S., Canada, and Mexico to categorize businesses based on the type of work they do. Each industry is assigned a six-digit code that helps organize businesses into broad sectors (like Manufacturing or Retail) and then into more specific categories (such as Food Production or Electronics Stores). This system makes it easier for governments, researchers, and businesses to collect and analyze economic data, track trends like employment and growth, and compare industries across North America. Updated every five years, NAICS ensures it reflects changes in the economy, such as new technologies and emerging industries.

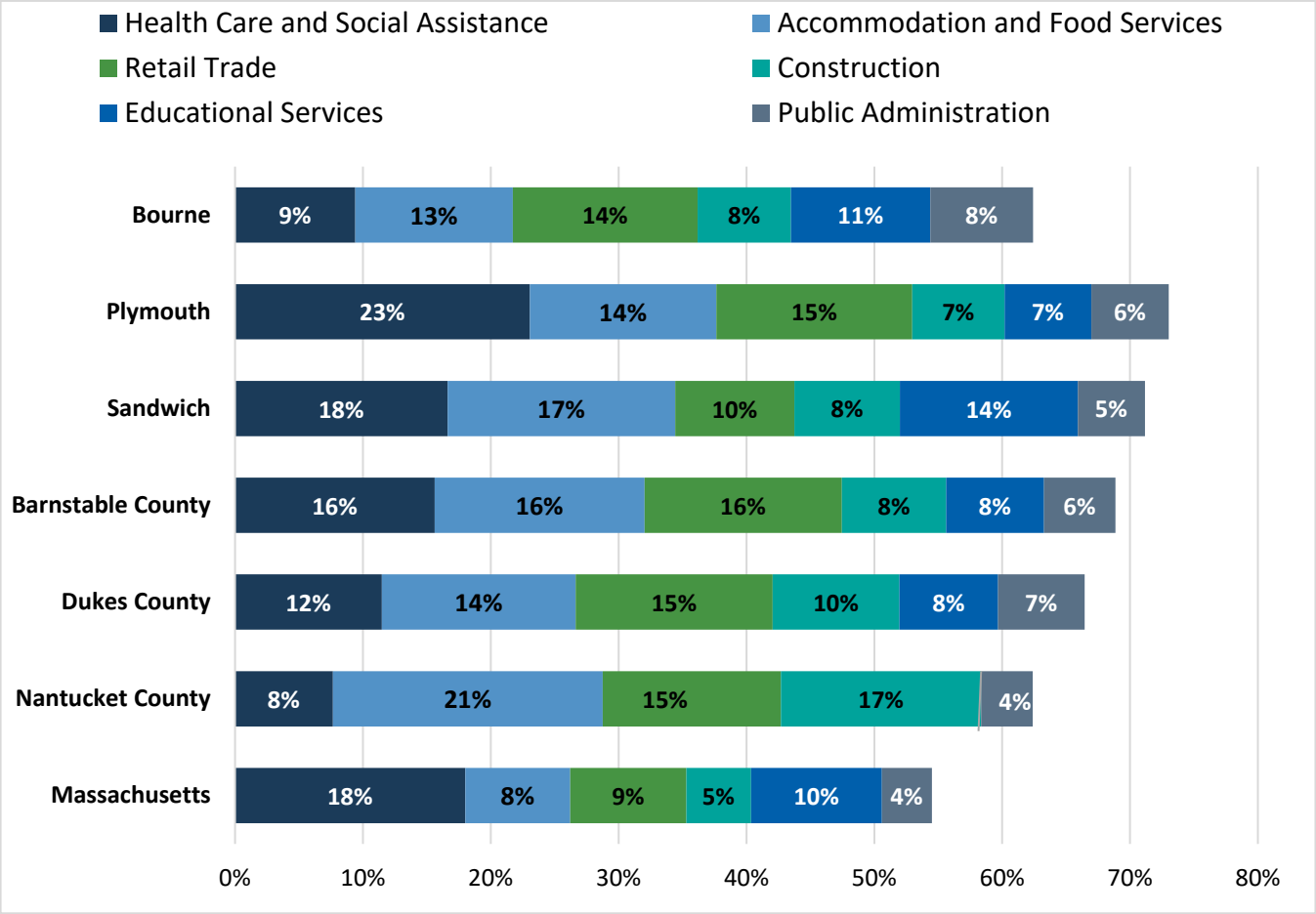
Figure 3-2 describes the percentage distribution of total employment for each area, highlighting the leading industry sectors according to their 2-digit NAICS codes. These sectors are shown based on their relative contribution to overall employment in each geographic area.[2]

Employment patterns in Barnstable, Dukes, and Nantucket Counties reveal a reliance on tourism-related industries—particularly accommodation, food services, and retail—compared to Massachusetts overall. Nantucket County includes relatively large employment in construction as well as tourism, reflecting its ongoing development and seasonal demand. In contrast, Barnstable County's employment distribution is more balanced, with health care and retail also playing measurable roles. Dukes County follows a similar trend, relying heavily on tourism but with a slightly more diverse employment base.

[1] The North American Industry Classification System (NAICS) is a standardized system used by the U.S., Canada, and Mexico to classify businesses and industries for the purpose of collecting, analyzing, and publishing statistical data related to the economy.

[2] The top industries were identified based on employment for Barnstable County, Dukes County, and Nantucket County combined.

Figure 3-2. Percentage of Total Employment for Top Employment Industries by 2-Digit NAICS, 2022

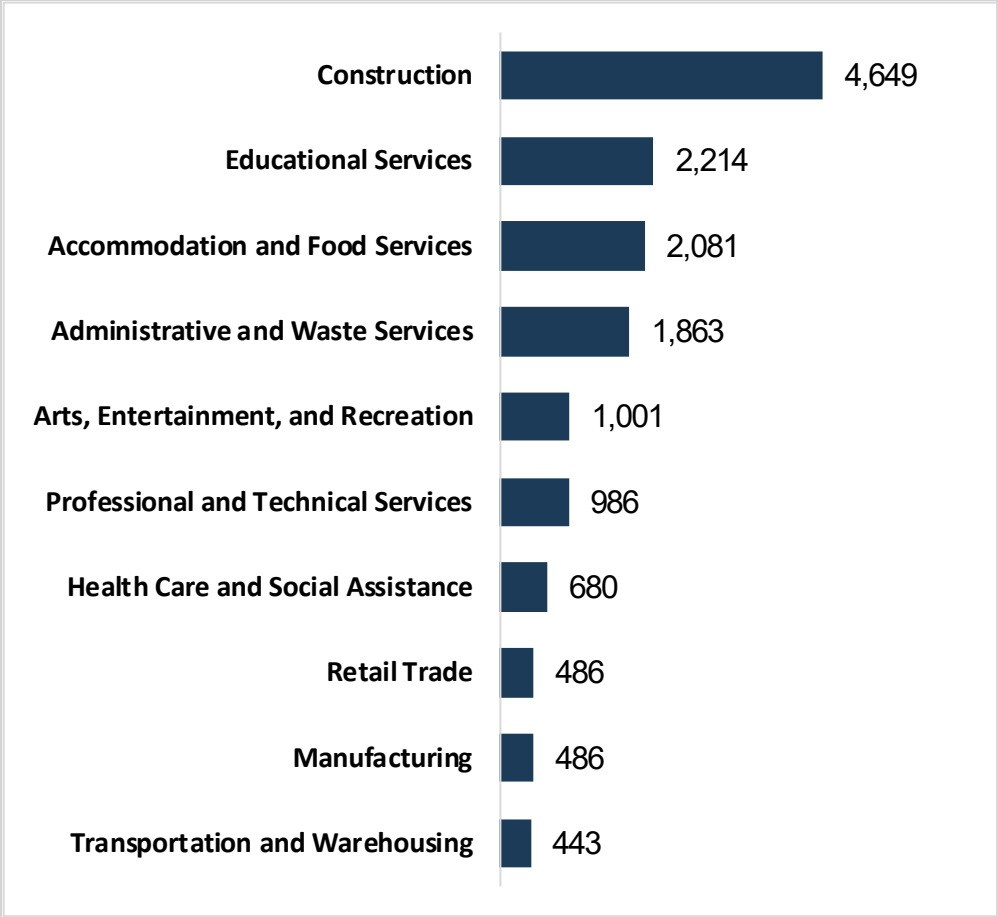


Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset.
Data for census tracts not available.

3.5.11 Most Jobs Added, 2010-2022, Major Sectors (2-Digit NAICS)

Figure 3-3 describes the number of jobs added between 2010 and 2022 by sector for the Cape and Islands (Barnstable County, Dukes County, Nantucket County), and the town of Plymouth combined. The largest increase in jobs is in the Construction (4,649 jobs) sector, which is not surprising given the ongoing development and demand for housing and infrastructure in these areas. Growth in the Accommodation and Food Services (2,081 jobs) and Arts, Entertainment, and Recreation (1,001 jobs) sectors reflects the strong tourism-driven economies in most of these geographic areas. Expansion of jobs in the Educational Services (2,214 jobs) and Health Care and Social Assistance (680 jobs) sectors, a major growth sector in the state, indicates support for year-round as well as seasonal residents.

Figure 3-3. Most Jobs Added, 2010-2022, 2-Digit NAICS



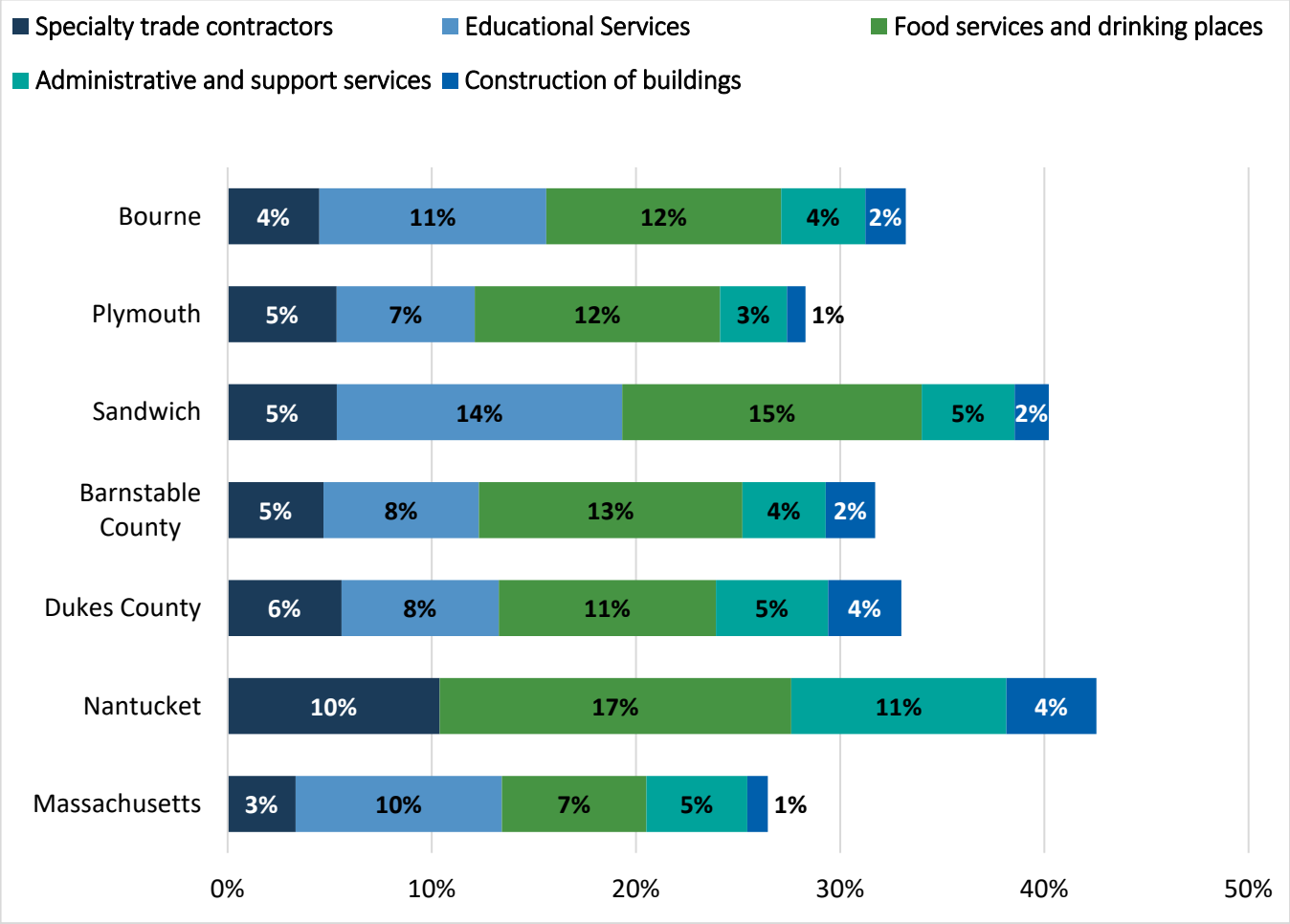
Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset. Data for census tracts not available.

3.5.12 Percentage of Total Employment for 3-Digit NAICS Sectors

Figure 3-4 describes the percentage distribution of total employment for each area, highlighting the leading industry sectors according to their 3-digit NAICS codes. These sectors are shown based on their relative contribution to overall employment in each geographic area.[3]

The data show the Food Services and Drinking Places (mostly restaurants) sector to be the largest employers in each geographic area.

Figure 3-4. Percentage of Total Employment for Top Employment Industries by 3-Digit NAICS, 2022



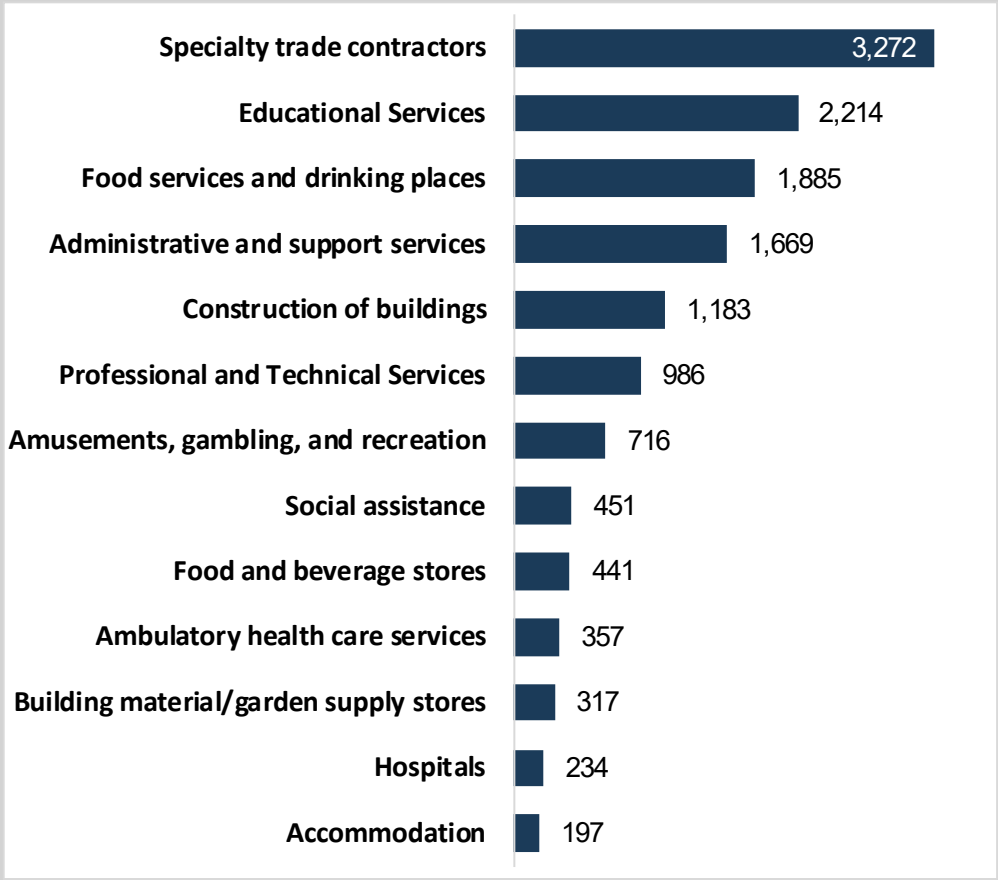
Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset.
Data for census tracts not available.

[3] The top industries were identified based on employment for Barnstable County, Dukes County, and Nantucket County combined.

3.5.13 Most Jobs Added, 2010-2022 by 3-Digit NAICS

Figure 3-5 describes the number of jobs added between 2010 and 2022 by 3-digit NAICS sector for the Cape and Islands (Barnstable County, Dukes County, Nantucket County), and the town of Plymouth combined. The largest increase in jobs is in the Specialty Trade Contractor sector, which added 3,272 workers. Educational Services is another substantial sector, which added 2,214 workers, followed by Food Services and Drinking Places with 1,885 workers, reflecting labor requirements in the hospitality and service industries.

Figure 3-5. Most Jobs Added, 2010-2022, 3-Digit NAICS

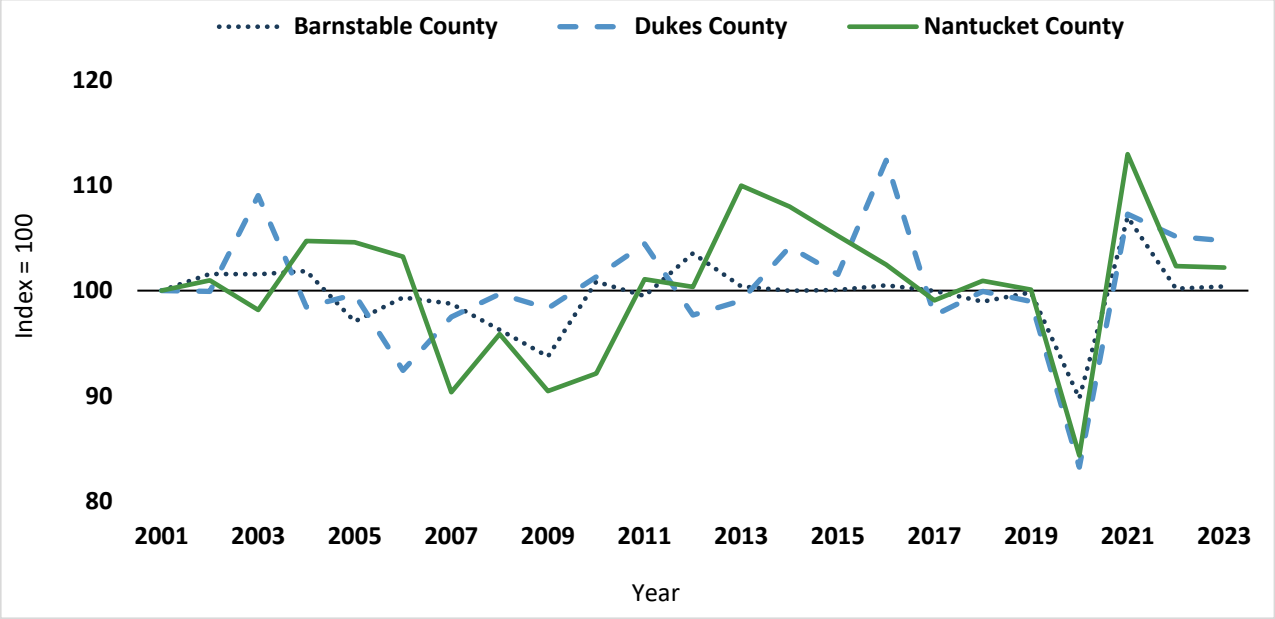


Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset. Data for census tracts not available.

3.5.14 Employment Trends in Retail Trade

From 2001 to 2023, retail employment in Barnstable, Dukes, and Nantucket Counties fluctuated, notably during the 2007–2009 recession and the 2020 COVID-19 pandemic. Barnstable County reached a peak of 17,210 retail jobs in 2004, declining to 13,762 jobs by 2020—a 20.0% drop from its peak. Dukes County's retail employment was stable until 2020, when it fell 16.4% from a 2017 high of 1,489 to 1,197 jobs. Nantucket County's retail jobs decreased from 1,115 in 2005 to 831 in 2010, with a similar drop in 2020, reaching 911 jobs—a 20.1% decrease from its peak. Barnstable County began a recovery in retail employment from 2021 to 2023, while Dukes and Nantucket Counties leveled out (**Figure 3-6**).

Figure 3-6. Employment Trends in Retail Trade



Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset.
Data for census tracts not available.

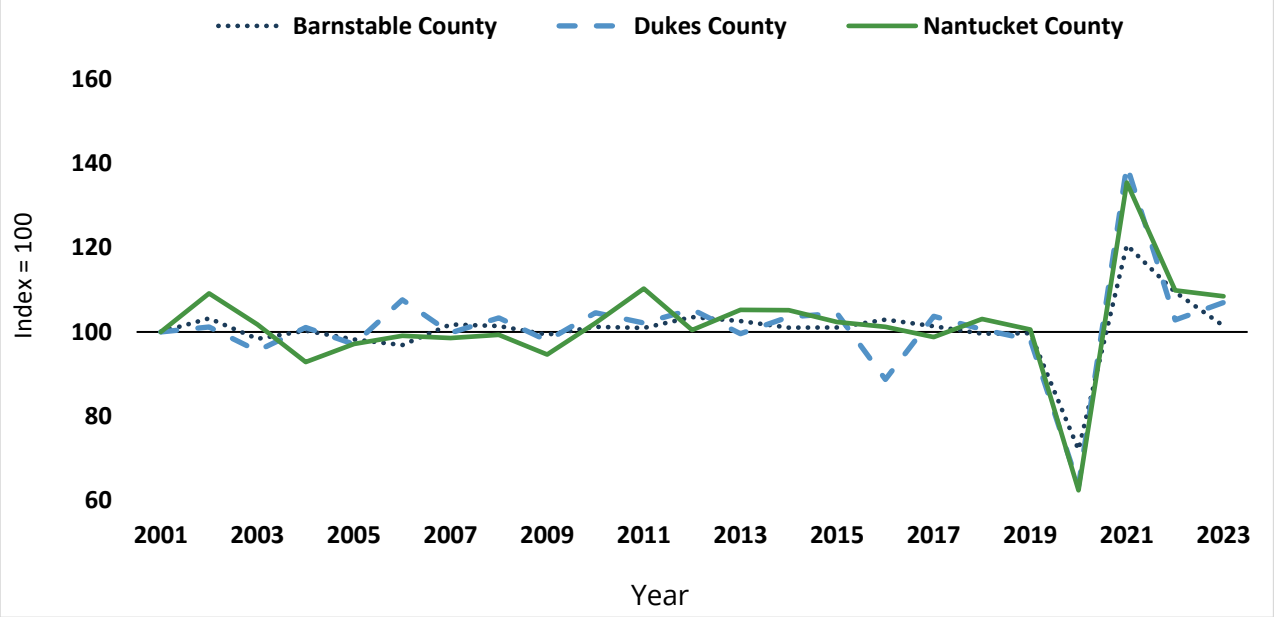
3.5.15 Employment Trends in Accommodation/Food Services

From 2001 to 2023, employment in the Accommodations and Food Services sector in Barnstable, Dukes, and Nantucket Counties saw notable fluctuations, particularly due to the 2020 COVID-19 pandemic. In Barnstable County, employment grew steadily from 14,317 in 2001 to a peak of 16,445 in 2017 but then dropped sharply to 11,765 in 2020—a 28.4% decline from 2019. Recovery efforts brought employment back up to pre-pandemic level—15,759 by 2023.

Dukes County's employment rose consistently until 2019, reaching 1,445 jobs before falling 36.5% to 906 in 2020. By 2023, employment had rebounded to 1,391, nearing pre-pandemic levels.

Similarly, Nantucket County's employment grew from 1,324 in 2001 to 1,618 in 2019, then dropped 37.6% to 1,010 in 2020. By 2023, employment had not only recovered but slightly surpassed pre-pandemic levels, reaching 1,630 (**Figure 3-7**). The spike shown in 2021 is a consequence of stimulus payments to households and businesses.

Figure 3-7. Employment Trends in Accommodation/Food Services

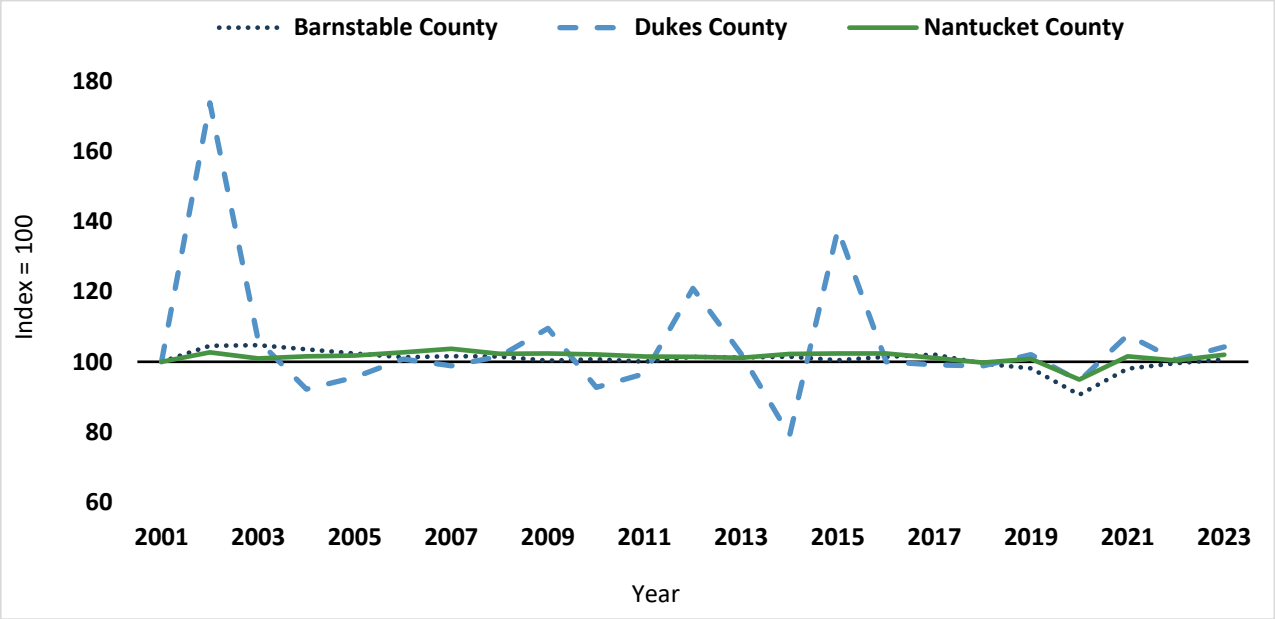


Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset.
Data for census tracts not available.

3.5.16 Employment Trends in Healthcare

From 2001 to 2023, healthcare employment in Dukes County grew steadily, despite COVID-19 pandemic-related impacts in 2020. In Barnstable County, which has seen more variability, employment increased from 10,843 in 2001 to a peak of 14,386 in 2018, then declined 12% to 12,731 in 2020. Recovery has been slow, with employment reaching 12,431 in 2023. Dukes County saw growth from 160 jobs in 2001 to a high of 355 in 2023, despite a dip to 252 jobs in 2014 and a minor decline in 2020. Overall, the healthcare sector has shown resilience, although the pace of recovery since 2020 differs across these regions (**Figure 3-8**).

Figure 3-8. Employment Trends in Healthcare



Source: Massachusetts Executive Office of Labor and Workforce Development, ES202 dataset.
Data for census tracts not available.

3.5.17 Room and Meals Tax Revenues

Room taxes and meals taxes represent revenue generated from taxes on hotel, motel, and short-term rental accommodations (room taxes) and taxes on restaurant meals and beverages (meals taxes). These taxes provide insight into the level of tourism and hospitality activity, as they reflect the volume of visitors staying in paid accommodations and dining at establishments.

In Fiscal Year (FY) 2024, Barnstable County led the way in rooms tax collections, bringing in $38.3 million. Nantucket and Dukes Counties followed, with collections of $13.7 million and $9.3 million, respectively. Among towns, Plymouth collected the most, with just over $3.1 million, while Sandwich and Bourne brought in $1 million and nearly $1 million each (**Table 3-27** and **Figure 3-9**).

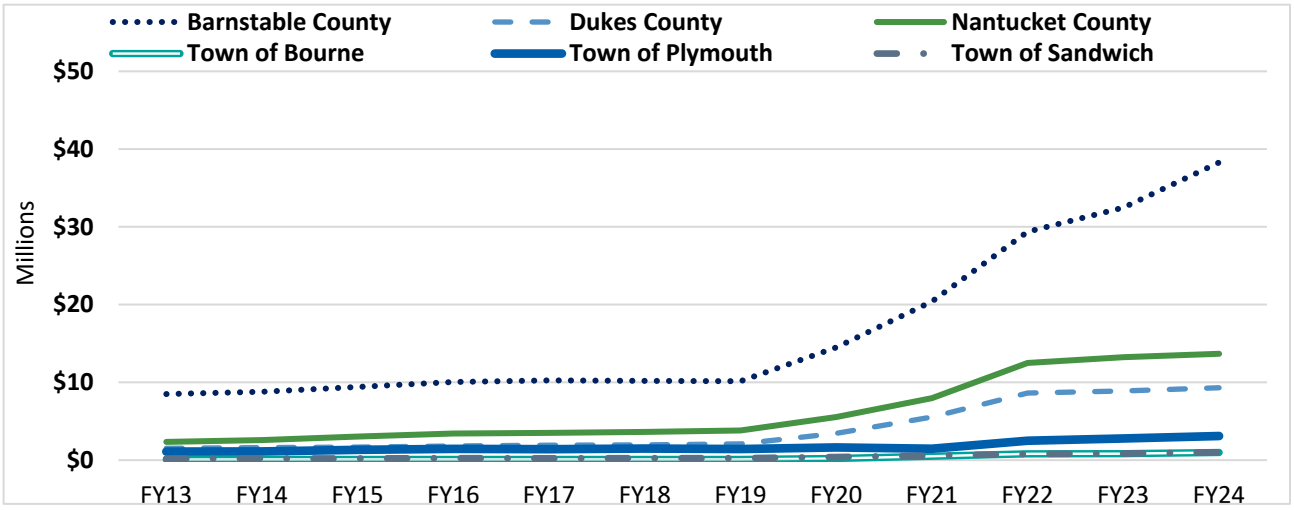
Table 3-27. Room Tax Revenues, FY 2013 and FY 2024

Geographic Area	FY 2013	FY 2024	Change (2013-2024)
Town of Bourne	$79,198	$983,819	1,142%
Town of Plymouth	$1,100,264	$3,101,984	182%
Town of Sandwich	$206,651	$1,002,734	385%
Barnstable County	$8,499,649	$38,279,898	350%
Dukes County	$1,525,328	$9,309,458	510%
Nantucket County	$2,346,122	$13,678,172	483%
Massachusetts	$154,787,140	$358,837,702	132%

Source: Massachusetts Office of Travel and Tourism from Massachusetts Department of Revenue Data

FY = Fiscal Year

Figure 3-9. Room Tax Revenues by Fiscal Year, FY 2013 to FY 2024



Source: Massachusetts Office of Travel and Tourism from Massachusetts Department of Revenue Data

The percentage change from FY 2013 to FY 2024 indicates growth across all areas. The town of Bourne saw the largest increase, with a remarkable 1,142% growth, an average annual growth rate of over 100%. Dukes and Nantucket Counties also experienced substantial increases, with 510% and 483% growth, respectively. Barnstable County saw its collections grow by 350%, while the towns of Sandwich and Plymouth recorded increases of 385% and 182%, respectively. This growth highlights a sharp rise in tourism and lodging activity in these regions over the period.

3.5.18 Meal Tax Revenues

In FY 2024, Barnstable County collected the highest amount of meals tax revenue, totaling $8.3 million. Nantucket County followed with $1.7 million, and Dukes County collected $758,677. Among the towns, Plymouth generated the most revenue with $2.16 million, while Sandwich and Bourne collected $586,786 and $619,052, respectively. The percentage change from FY 2013 to FY 2024 indicates notable growth across all areas. Dukes County experienced the largest increase, with a 224% rise, while the town of Sandwich saw 140% growth (**Table 3-28** and **Figure 3-10**).

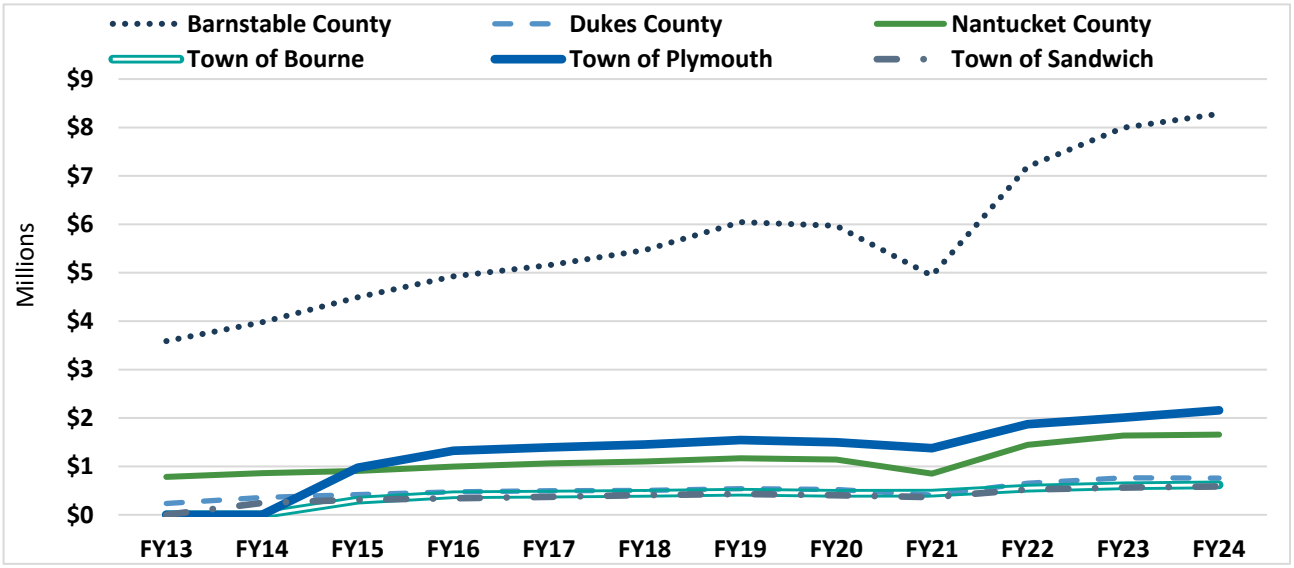
Table 3-28. Meal Tax Revenues, FY 2013 and FY 2024

Geographic Area	FY 2013	FY 2024	Change (2013-2024)
Town of Bourne	303,340	619,052	104%
Town of Plymouth	973,426	2,158,419	122%
Town of Sandwich	244,506	586,786	140%
Barnstable County	3,588,128	8,281,969	131%
Dukes County	234,152	758,677	224%
Nantucket County	783,557	1,657,018	111%
Massachusetts	89,257,234	186,410,402	109%

Source: Massachusetts Office of Travel and Tourism from Massachusetts Department of Revenue Data

FY = Fiscal Year

Figure 3-10. Meals Tax Revenues by Fiscal Year, FY 2013 to FY 2024



Source: Massachusetts Office of Travel and Tourism from Massachusetts Department of Revenue Data

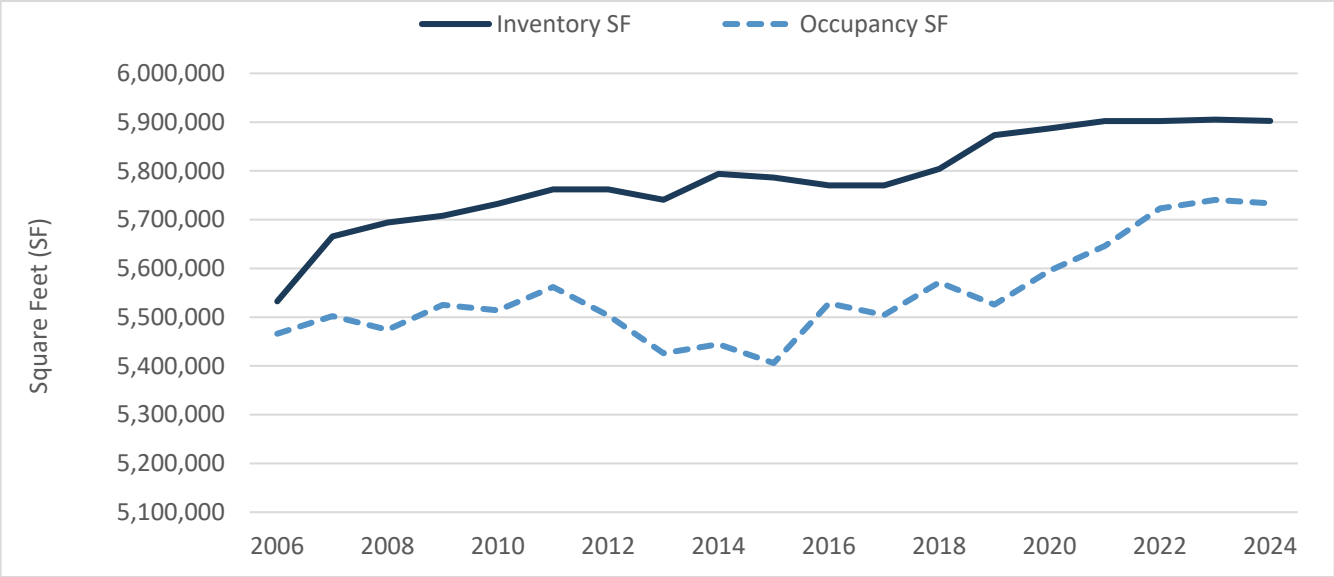
3.6 Commercial Real Estate

This section examines conditions and trends in the supply of commercial real estate on Cape Cod (Barnstable County), including office, retail, and industrial space. The towns of Bourne and Sandwich are shown for the relative contribution of these communities nearest the bridges. The source of the data used in this analysis is the subscription service CoStar Property Information Systems, the most widely used industry source of information on commercial real estate.

3.6.1 Office Space

Figure 3-11 indicates trends in the inventory and occupancy of office space in Barnstable County.

Figure 3-11 Historical Inventory and Occupancy in Square Feet Office Space, 2006-2024 (Barnstable County)

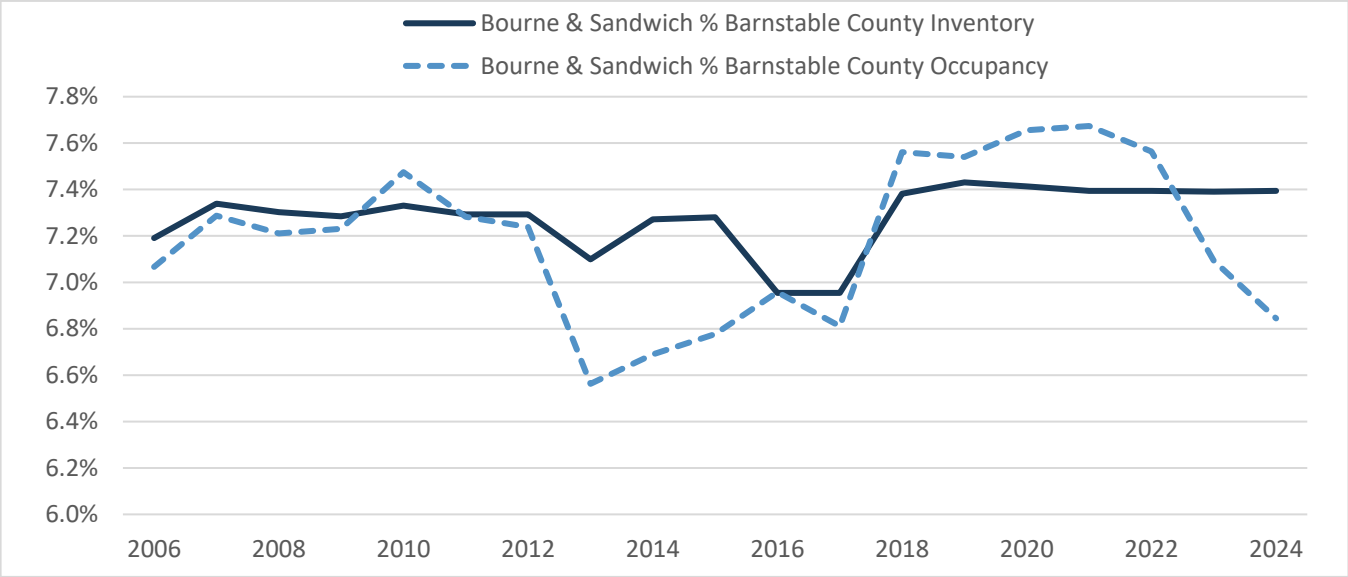


Source: Massachusetts Department of Transportation, 2024

The supply of office space in Barnstable County totaled approximately 5,900,000 square feet in 2024, an increase of 370,000 square feet, or 7%, since 2006. The average annual historical increase of 20,000 square feet per year is somewhat higher than a trend-line projected growth of 17,000 square feet per year. Occupied square feet increased by 267,000 square feet, or 5%, over the same period, and about 15,000 square feet per year. As with projected inventory growth, occupancy is also projected to grow less—by 10,500 square feet per year—based on a least-square linear extrapolation of historical trends. Vacancy rates have average about 4% since 2006 with only minor variations in a given year.

Figure 3-12 compares the relative shares of office inventory and occupancy held in the towns of Bourne and Sandwich. These have remained consistent over the historical period with minor fall offs from the historical average of relative occupancy of office space in 2013 and 2024.

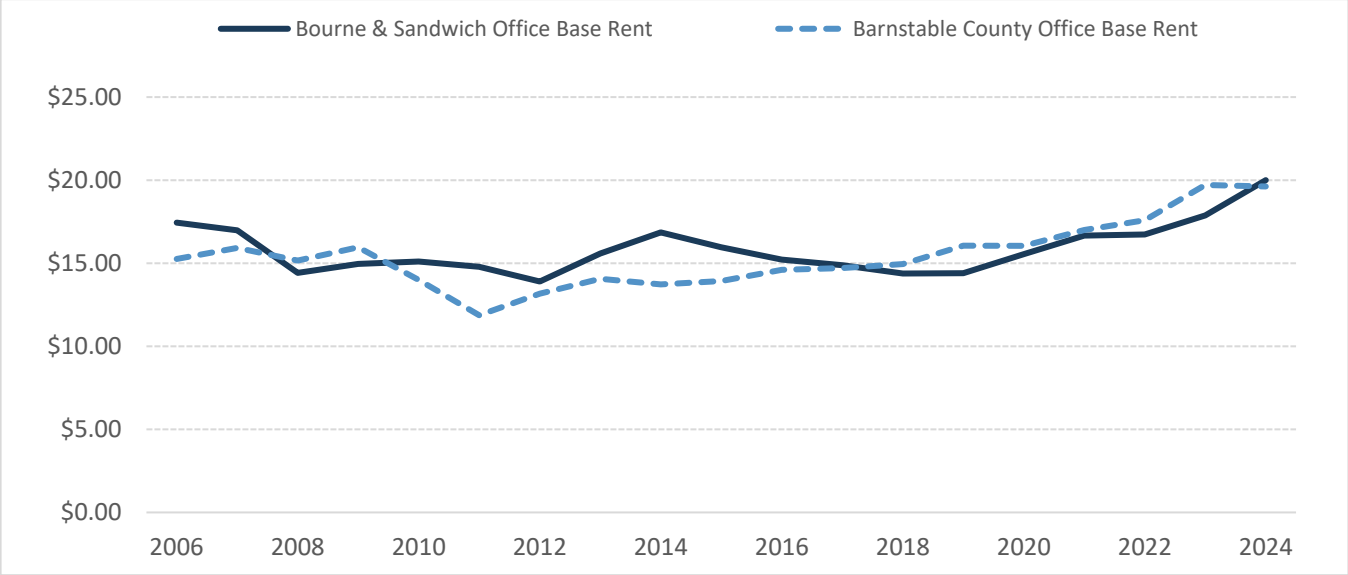
Figure 3-12. Office Space Inventory and Occupancy Percentage, 2006-2024 (Towns of Bourne and Sandwich and Barnstable County)



Source: Massachusetts Department of Transportation, 2024

Figure 3-13 compares office space rents (per square foot per month) in the towns of Bourne and Sandwich to Barnstable County overall. As the data show, there have been only minor increases in the lease rates for office space since 2006.

Figure 3-13. Office Rents, 2006-2024 (Towns of Bourne and Sandwich Compared to Barnstable County Overall)



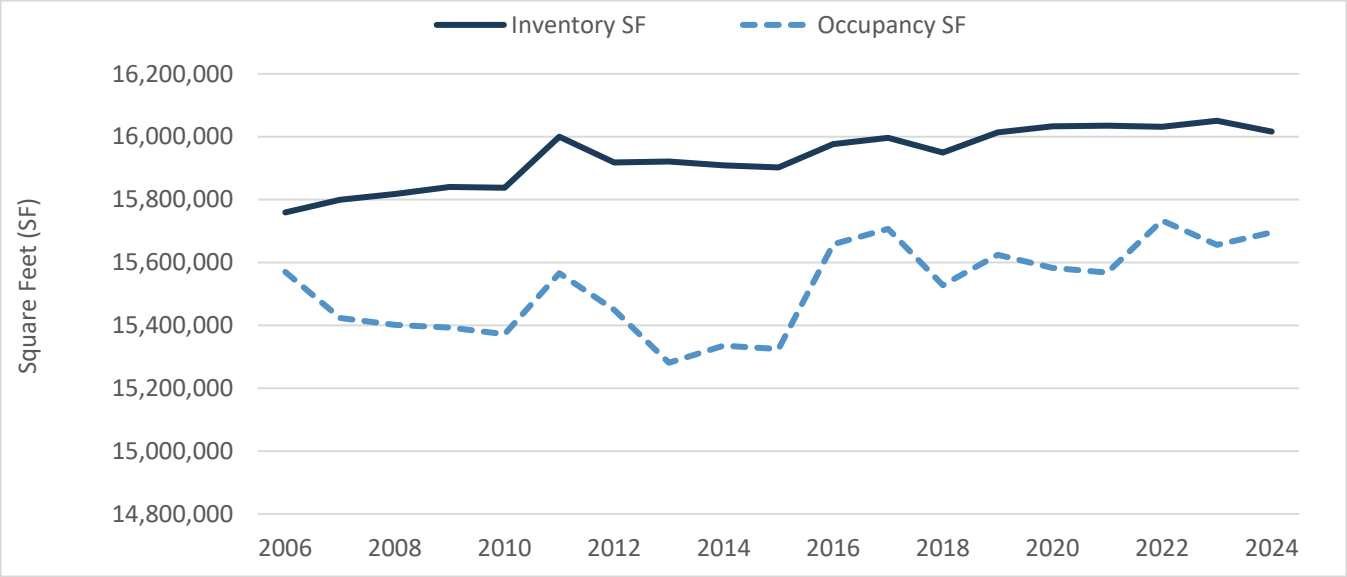
Source: Massachusetts Department of Transportation, 2024

The overall picture that emerges from these data is that the market for office space on Cape Cod has grown negligibly over the past 18 years—in terms of supply, occupancy, and rents. Continuation of long-term and recent historical trends suggests only very modest new demand or development of office space in the foreseeable future.

3.6.2 Retail Space

Figure 3-14 indicates trends in the inventory and occupancy of retail space in Barnstable County.

Figure 3-14. Historical Inventory and Occupancy in Square Feet Retail Space, 2006-2014 (Barnstable County)

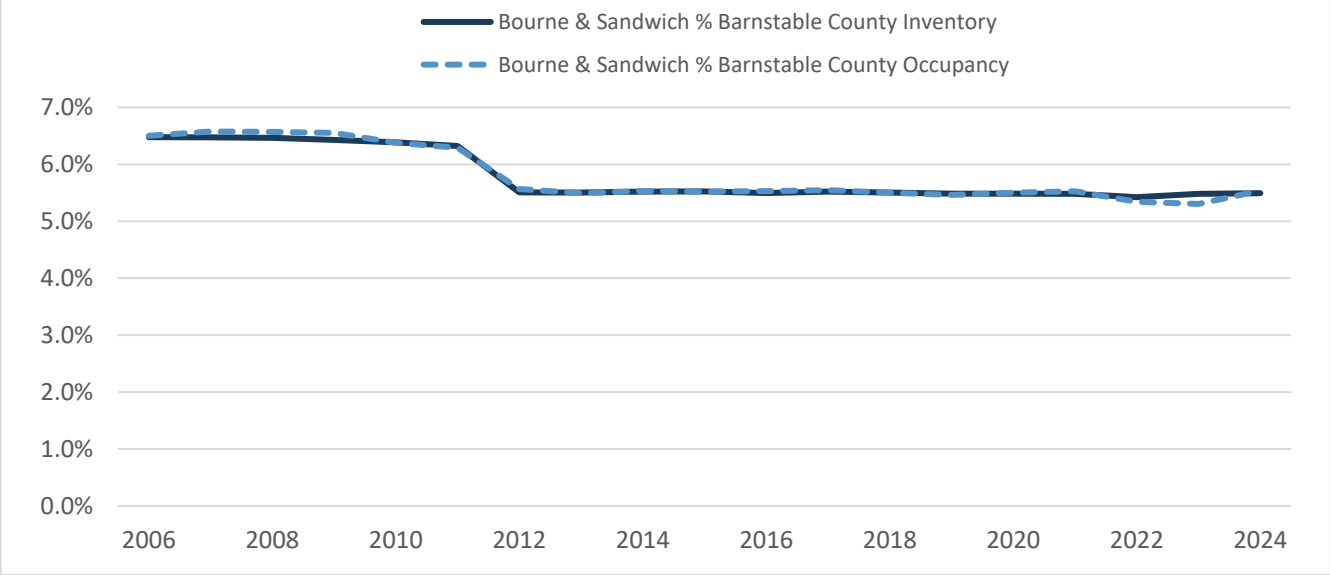


Source: Massachusetts Department of Transportation, 2024

The supply of retail space in Barnstable County totaled approximately 16,000,000 square feet in 2024, an increase of 257,000 square feet, or 2%, since 2006. The average annual historical increase of 14,000 square feet per year is slightly lower than a trend-line projected growth of 16,000 square feet per year. Occupied square feet increased by 125,000 square feet, or 1%, over the same period, and about 7,000 square feet per year. As with projected inventory growth, occupancy is also projected to grow slightly more—by 14,000 square feet per year—based on a least-square linear extrapolation of historical trends. Vacancy rates have averaged about 2.6% since 2006, with a slight downturn in recent years (currently 2.0%).

Figure 3-15 compares the relative shares of retail space inventory and occupancy held in the towns of Bourne and Sandwich. These have remained consistent over the historical period and are a lower relative share of the Barnstable County totals of retail (average 5.5%) compared to office space (7.4%).

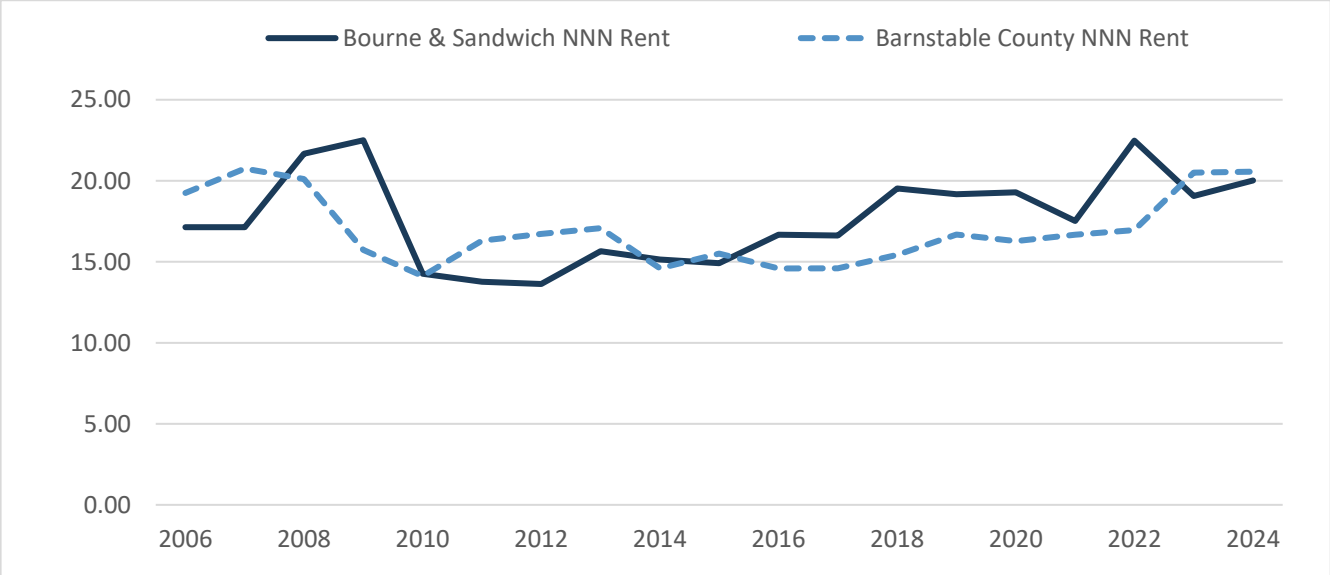
Figure 3-15 Percentage of Retail Inventory and Occupancy in Square Feet, 2006-2014 (Town of Bourne and Sandwich)



Source: Massachusetts Department of Transportation, 2024

Figure 3-16 compares office space rents (per square foot per month) in the towns of Bourne and Sandwich to Barnstable County overall. As the data show, there has been almost no increase in the average lease rates for retail space since 2006 in either of the towns closest to the bridges or the county overall. NNN, or "triple net," is rent net of taxes, insurance, and operating expenses.

Figure 3-16. Retail Space Rents (Towns of Bourne and Sandwich Compared to Barnstable County)



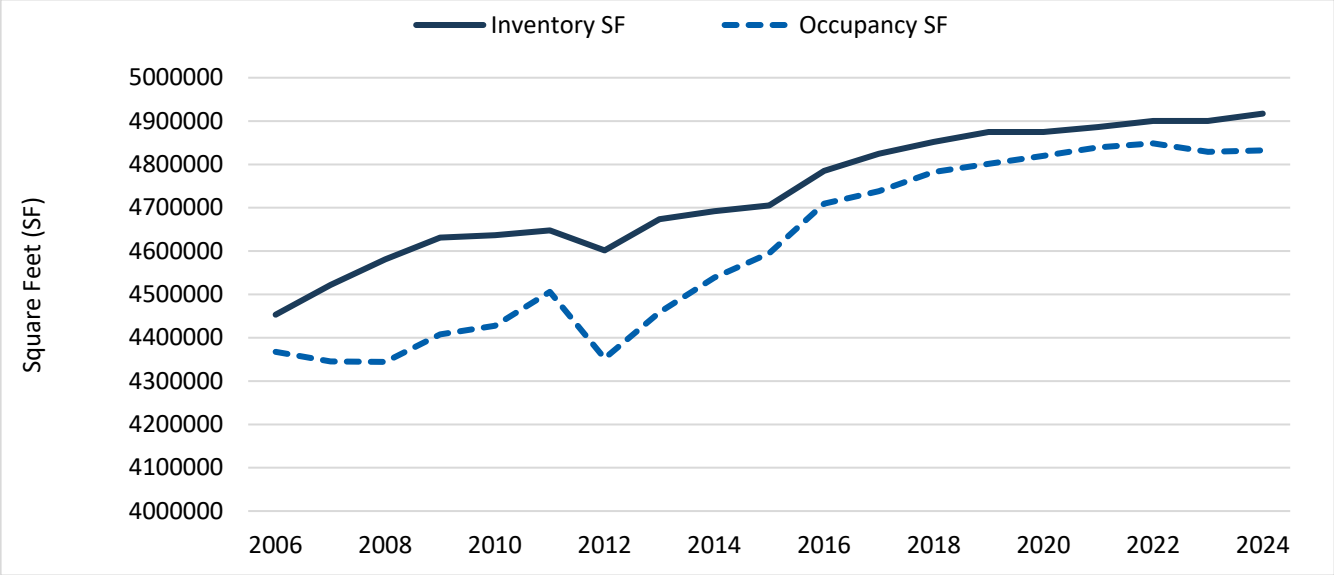
Source: Massachusetts Department of Transportation, 2024

The picture that emerges from these data for retail space is that growth has been almost flat since 2006, in terms of supply, occupancy, and rents. Continuation of long-term and recent historical trends suggests negligible new demand or development of retail space in the foreseeable future.

3.6.3 Industrial Space

Figure 3-17 indicates trends in the inventory and occupancy of industrial space in Barnstable County.

Figure 3-17. Inventory and Occupancy in Square Feet Industrial Space, 2006-2024 (Barnstable County)

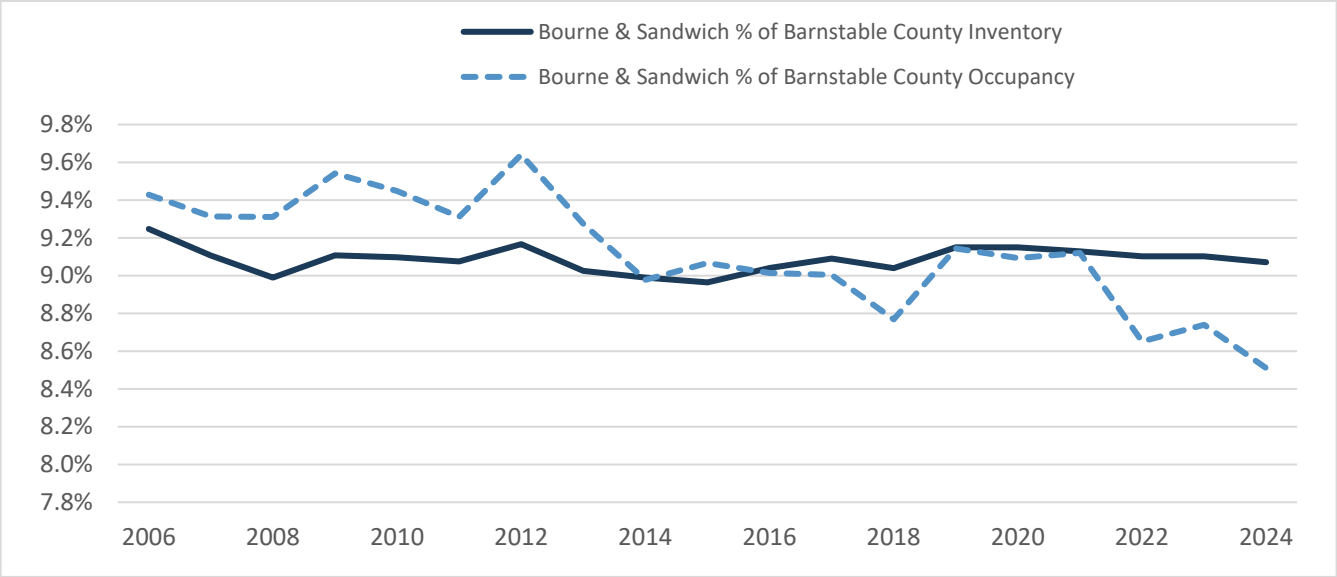


Source: Massachusetts Department of Transportation, 2024

The supply of industrial space in Barnstable County totaled nearly 5,000,000 square feet in 2024, an increase of 464,000 square feet, or 10%, since 2006. The average annual historical increase of 26,000 square feet per year is similar to a trend-line projected growth of 26,500 square feet per year. Occupied square feet increased by 465,000 square feet, or 11%, over the same period, and about 26,000 square feet per year. Occupancy is projected to grow by 37,000 square feet per year—based on a least-square linear extrapolation of historical trends. Vacancy rates have averaged about 2.7% since 2006, declining in recent years to a current 1.7% vacancy rate.

Figure 3-18 compares the relative shares of industrial space inventory and occupancy held in the towns of Bourne and Sandwich. The supply proportion has remained consistent over the historical period while occupancy shares have declined slightly in recent years. The two towns' relative share of the Barnstable County totals of industrial space (average 9.1%) are higher than retail (average 5.5%) and office space (average 7.4%).

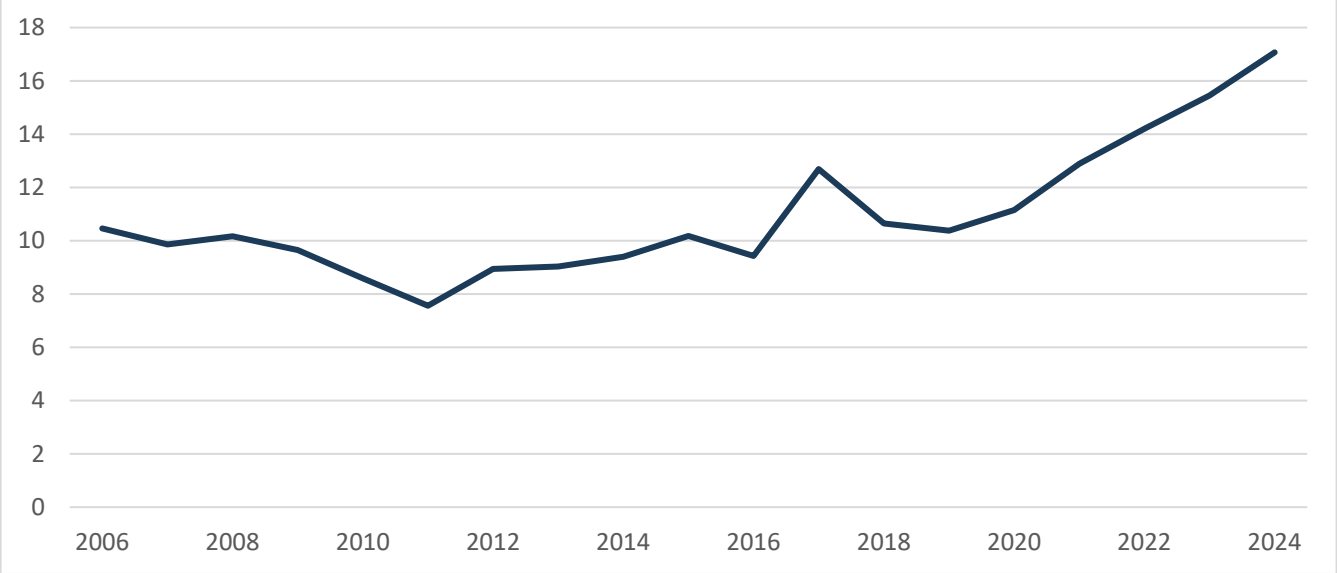
Figure 3-18. Percentage of Industrial Space Inventory and Occupancy (Towns of Bourne and Sandwich Compared to Barnstable County)



Source: Massachusetts Department of Transportation, 2024

Figure 3-19 presents historical lease rates for industrial space in Barnstable County (data are insufficient for comparisons to rents in Bourne and Sandwich). NNN, or "triple net," is rent net of taxes, insurance, and operating expenses. Average rents for industrial space have increased by nearly 60% over the past 5 years, far more than those for office or retail space.

Figure 3-19. Triple Net (NNN) Rent for Industrial Space (Barnstable County)



Source: Massachusetts Department of Transportation, 2024

The overall picture for industrial space in Barnstable County is more favorable for potential new development than for either office or retail space. Rents are increasing and are as high as they are for office or retail space where buildings are costlier and assessments typically higher. Demand for industrial space on Cape Cod parallels that for industrial space nationally, which is mostly wholesale and distribution space supporting e-commerce as well as brick and mortar retail.

4 Impacts of the No Build Alternative

A survey of local officials intended to elicit their views on the need for replacement of Sagamore Bridge and Bourne Bridge describes the overwhelmingly negative impacts the current bridge conditions already have on the quality of life on Cape Cod, Martha's Vineyard, and Nantucket. The report on the survey was prepared by Senator Elizabeth Warren, Senator Ed Markey, and Representative Bill Keating, together representing the Congressional Delegation for Cape Cod, Martha's Vineyard, and Nantucket.[4] The officials' responses centered on the detrimental impacts of the current bridges' limitations on their communities' and constituents' economic and social lives. When imagining these conditions made even worse by more frequent lane closures, and possibly bridge closures, these officials struggled to describe them in sufficiently dire terms. Conversely, replacing the structures was viewed as having entirely positive impacts on the Cape and Islands.

4.1 Cape Cod Bridges Replacement: An Urgent Need (the Report)

Senator Warren, Senator Markey, and Representative Keating prepared the subject report (dated October 2023). The Congressional delegation for this region of Massachusetts has been working to secure funding for bridge replacement for several years, most recently by supporting the Infrastructure Investment and Jobs Act, which contains $17 billion in new funding for the U.S. Army Corps of Engineers, with $9 billion in formula funding for Massachusetts.[5] Now their advocacy centers on the U.S. Department of Transportation and other federal agencies to fund the bridges project from this source.

The report's direct quoting from respondents' replies is particularly useful for respondents' insights into how closely the bridges are linked to the economic life and health of Cape Cod.

[4] Senators Elizabeth Warren and Ed Markey and Representative Bill Keating, *Cape Cod Bridges Replacement: An Urgent Need*, October 2023.

[5] *Cape Cod Bridges Replacement: An Urgent Need*, October 2023, p. 4

4.2 Methodology (the Report)

The Senators and Representative sent 36 "letters of inquiry" to stakeholders on July 21, 2023, including state elected officials, local elected officials, Tribal leaders, and community organizations. The letters asked respondents about the following:

- Impacts on communities of the state of disrepair of the bridges to date—including economic impacts to tourism, local workers, businesses, families, and community members—and impacts to supply chains and the availability and accessibility of goods.
- The potential future impacts if the bridges continue to deteriorate.
- The benefits of replacing the bridges, including the job creation and economic benefits of the bridges replacement project.

Of the 36 letters sent, the following entities responded:

- Cape Cod Region Chamber of Commerce
- Cape Cod Chamber of Commerce
- Town of Bourne
- Town of Oak Bluffs
- Town of Provincetown
- Town of Sandwich
- Association to Preserve Cape Cod
- Cape Cod Commission
- State Senator Julian Cyr
- State Senator Susan Moran
- Barnstable County Board of Regional Commissioners

Clearly, for those who replied, the replacement of the bridges is of paramount importance to their constituents and members. The commonality of congestion-related issues, across towns and across agencies and institutions, strongly supports the fundamental arguments that underpin the report.

4.3 Elements of the Report

Elements of the report that concern the qualitative impacts of the No Build Alternative are grouped here using the following numbered "Findings" headings (bold and italicized) in the report.

4.3.1 The Cape Cod Bridges Are of Significant Importance to Businesses and Communities[6]

The Cape Cod Commission reported that about 31,000 jobs off Cape Cod were filled by workers residing on Cape Cod; 21,000 jobs on Cape Cod (50% of the workforce serving Cape Cod) are filled by workers living off Cape Cod (U.S. Census 2020). This means around 50,000 workers depend on Sagamore and Bourne Bridges for their daily commutes.

State Senator Moran's letter notes that the bridges are "the sole access points for the more than 35 million vehicles that cross the Canal each year and for the 260,000 residents" of the Cape and Islands.

The Cape Cod Commission estimates that, in 2021, Barnstable County workers working outside the county earned $2.9 billion, while out-of-county workers with jobs in Barnstable County earned $814 million. Per the commission, "Nearly all industries rely in one way or another on timely and successful crossing for employees, goods, and visitors."

Given that Cape Cod Canal bisects the towns of Bourne and Sandwich, the two bridges are necessary for providing basic municipal services, in addition to their role in worker travel, business operations, and tourism and recreational travel (Bourne Select Board Chair Mary Jane Mastrangelo).

Island communities also cited their dependency on the bridges for the movement of people, goods, services, and supplies (Oak Bluffs Town Administrator Deborah Potter). The bridges play an essential role in the supply chain for tourism, which in turn is a vital part of the Town of Oak Bluffs' finances.

Tourism was a major focus of attention for respondents, citing it as "the main driver of the Cape's economy, and if fact, the economy of the Commonwealth." (Mark Forest, Chair of Barnstable County Board of Regional Commissioners). The Board's letter noted a report from the National Park Service that estimated that the Cape Cod National Seashore brought 4 million visitors to the Cape each year. Their economic impact was estimated at over $750 million.

Provincetown's tourist industry is valued at over $250 million annually, according to Provincetown officials. Most of Provincetown's economy depends on traffic over the bridges, despite ferry service from Boston, which operates only for half the year.

The Cape Cod Commission sees tourism as a critical component for Cape Cod's economy as a whole and the bridges as the access points for most of those visitors. The industry also brings in state tax revenues.

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[6] Senators Elizabeth Warren and Edward Markey and Representative Bill Keating, *Cape Cod Bridges Replacement: An Urgent Need*, October 2023, p. 6.

4.3.2 The Current State of the Bridges Is Hurting Cape Cod Businesses and Communities

The frequent need for maintenance and repairs on the bridges disrupts local businesses. The Cape Cod Chamber of Commerce pointed out the issues of timeliness of product shipments, commutes, and customer access to members' businesses. Further, the disruptions discourage potential new customers as well as new business development.

The closing of one lane in each direction in April and May 2023 had serious implications for Cape Cod businesses. Some customers said they would wait until the work was done to come to Cape Cod. Sales volumes fell, as did lodging occupancies compared to the same period in 2022. Doing business became more costly, with overtime expenses mounting for hours spent in traffic. Cape Cod businesses have already had problems attracting labor because of the high cost and limited availability of workforce housing. Added to this were problems attracting and retaining staff from off Cape Cod during the repair period.

The Town of Sandwich also reported that its local labor market is shrinking, adding bridge insecurity to the growing costs of transportation, energy, and goods and services.

Senator Moran noted that bridge congestion exacerbates workforce shortages occurring statewide. The state's extreme housing shortage is reflected in her district, where employees cannot afford to live in the communities in which they work, and are forced into lengthy commutes. The Senator's letter estimated that 50% of Cape Cod's workforce lives off Cape Cod because of the housing crisis, meaning that any traffic disruption has regional economic implications.

The Cape Cod Regional Chamber of Commerce cited the "untenable traffic congestion" as negatively affecting the economy, causing traffic waits of over 2 hours that have also become a public safety issue. As well, residents "cannot shop or will not leave their homes." Truck deliveries are late—UPS, FedEx, U.S. Postal Service—because of traffic congestion.

Town of Bourne officials shared the problems for the many workers living off Cape Cod and commuting daily over the bridges. Late arrivals at work for employees have daily implications for them and for school pickups as well. Building in excess travel times to make appointments after work adds to the bridge delay times themselves. In addition to their economic impacts on businesses and employees, the lane closures must also be evaluated for their effect on the employees' quality of life.

4.3.3 The Current State of the Bridges Is Negatively Impacting Residents

This section deals with many of the points made earlier in the report regarding the costs of delays and congestion because of the substandard design of the bridges and the increasing need for maintenance on the bridges. With lanes only 10 feet wide and lacking any "modern safety features such as lane separation, shoulders, and pedestrian or bicycle separations,"[7] the bridges cause not only crashes, but fear for personal safety among drivers, bikers, and pedestrians alike.

[7] Cape Cod Region Chamber of Commerce

The letter from the Town of Bourne pointed out that during the Sagamore Bridge closure for rehabilitation of abutments in 2023, approximately 420,000 person-hours of delay meant an estimated $10 million in lost time. The same rehabilitation of Bourne Bridge is expected to be even worse.

Senator Moran cited the impacts of the closures on congestion, noise pollution, and access to services, as well as adding financial burdens to residents. The Cape Cod Canal Regional Chamber of Commerce highlighted the fact that, for area residents, congestion and gridlock are year-around conditions. Further, under the worst traffic conditions in the summer, drivers are "getting out of their cars and screaming at each other in the streets."[8] Human costs included delays of emergency services and school buses.

Other costs noted by respondents included secondary impacts on businesses of delays in employee arrivals, of late shipment deliveries, and of supply-chain disruptions. The latter affects the availability and costs of goods and services on the Cape and Islands. Cape Cod depends almost entirely on the private auto for transport. Services such as healthcare, education, and childcare are often limited on Cape Cod, making residents dependent on crossing the bridges to access them.

The bridges especially affect the town of Bourne, which Cape Cod Canal divides in two, and residents living near the bridges are "trapped in their homes" because they cannot get out of their driveways. Community services are on both sides of Cape Cod Canal, and residents are isolated from them, as they are from other residents of their own community, even after COVID-19 restrictions have disappeared.

The Cape Cod Commission summarized the situation as one in which public confidence in the bridges, both from a safety standpoint and from reliability, is low. The impacts are local, but also regional, with the lack of reliable movement of goods and people to and from the Cape and Islands. They term the situation "untenable."

4.3.4 The Current State of the Bridges Impacts Emergency Services and Access to Healthcare and Is a Public Health and Public Safety Risk

The bridges are the only route off Cape Cod, and in an emergency, the usual congestion presents dangerous delays for emergency vehicles needing to get from one side of the town of Bourne to the other. The town of Sandwich, also divided by Cape Cod Canal, relies on mutual aid from the town of Bourne to respond to service calls because of bridge congestion. Because of limited medical facilities on Cape Cod, some emergencies require transport off Cape Cod, for which ambulances and helicopters are needed, the latter being required when ambulances cannot get off Cape Cod quickly enough. But even flight services can be affected by bad weather, and patients must go by ambulance regardless of traffic conditions.

Bridge congestion also affects routine travel for medical care off Cape Cod, particularly for specialties not dealt with by local medical facilities. The report noted that this is particularly relevant for the aging

[8] Town of Bourne

population on Cape Cod, where towns' shares of residents over 60 approach or exceed 50%, and the trend is projected to continue through 2035.

The Barnstable County Sheriff's Office provided a detailed explanation of how bridge congestion affected their employees, who live on both sides of the bridges. It makes hiring and retention difficult in the tight labor market. It affects the "wellbeing, safety, and security of their employees and inmates." Commuting delays affect shift workers by requiring some to work double shifts to cover for employees who cannot make it to work on time. For corrections officers and dispatchers, normal time off is essential for their ability to work safely. Inmates needing to go off Cape Cod for court appearances are also affected, as are the transport teams, with all being placed under additional stress.

The Association to Preserve Cape Cod raised the issue of climate change, which would increase storm intensity and other climate threats. Cape Cod residents would be placed in dire situations if such threats required evacuation during a time of bridge lane closures.

Bourne Bridge is part of the Federal Highway Administration- and U.S. Department of Defense-designated Strategic Highway Network (STRAHNET) for military transportation, national security, and emergency preparedness (Cape Cod Commission).

4.3.5 Failure to Replace the Bridges Would Be Catastrophic

Continuing the current state of affairs would result in ever-worsening conditions, culminating in a permanent reduction to single-lane traffic on the bridges in the 2030s, according to Senator Julian Cyr. Senator Moran termed this the creation of "unfathomable congestion…impacting the regional economy of Cape Cod as well as the public safety of its residents."

Escalating repair needs that force weight limits would cause disruption to, and increased costs of, the movement of the goods that Cape Cod residents rely on for everyday life. Air pollution would increase, and tourism would be negatively affected.

Projected lane closures, should the bridges not be replaced soon, would add billions of dollars in travel delay costs plus secondary economic impacts. The possibility of a total bridge closure, should its condition eventually become an immediate safety threat, is not unprecedented (Cape Cod Commission).

The Cape Cod Chamber of Commerce says the business community sees "disastrous" impacts of failure to replace the bridges, citing the following litany of already-serious business impacts that would be exacerbated by continuing the "fix-it-as-it-fails" approach:

- Increased commute times for staff
- Higher overtime costs for workers stuck in traffic
- Late deliveries
- Supply-chain disruptions
- Reduced confidence in Cape Cod as a destination and place to do business, which in turn would impact the many small businesses that serve the destination market.

Timely evacuations in the event of weather or other emergencies would be severely compromised because residents would have only the two exit routes.

The Town of Sandwich called attention to its unique situation: the northern section of town, where the business and historic centers are located, is subjected to traffic backups of as much as 10 miles during routine maintenance of bridges, effectively isolating them from the rest of town. As maintenance closures increase on the aging bridges, this situation will become increasingly untenable for both businesses and residents.

Any major rehabilitation of the bridges would affect the timing and cost of municipal wastewater construction projects, required to clean up coastal waters and ponds. Other natural resources could suffer from disinvestment as municipal budgets are squeezed by declining revenues from businesses adversely affected by congestion.

If congestion becomes bad enough, the short-term vacation rental market could contract, reducing public revenues from the fees charged and used for wastewater infrastructure, a large issue on its own for Cape Cod.

4.3.6 Replacing the Bridges Would Have Significant Benefits for Residents and the Economy

Given the foregoing descriptions of the impacts of current and future congestion, it hardly seems necessary to cite the benefits of replacing the bridges. For some businesses, the benefits would be simple survival, with more reliable access to workers, supplies, and customers. For some older residents, dependent on medical services off Cape Cod, they could mean literal survival.

For residents, quality of life would be hugely improved. They would enjoy more reliable travel times both on and off Cape Cod, and reduced stress of getting to and from work and appointments. School children would spend less time getting to and from school and more time in school or home. Residents would have improved access to healthcare off Cape Cod. Air quality would improve with less idling time on the bridges. Public safety would be enhanced, and emergency services would be more reliable. As climate change progresses, the likelihood of extreme weather events grows. If such a weather or other emergency necessitated evacuation of all or parts of Cape Cod, residents would at least not have the added burden of fear that they would be caught in a life-threatening traffic jam.

For tourism, an industry that is second in the state only to Greater Boston, the improvements in traffic flows and, most importantly, reliability, would enhance the popularity of Cape Cod as a destination. Not only would travel in and out be facilitated but travel on Cape Cod would be easier and a benefit to local businesses that cater to tourists.

For all businesses, improved ease of travel would broaden the labor pool by making it easier to reach, hire, and retain employees and would make it faster and less frustrating to reach suppliers and customers.

For pedestrians, bicycles, and disabled persons, improved facilities on the bridge would open up more possibilities for travel, exercise, and social interaction.

Most critical, according to the Cape Cod Chamber of Commerce, is that the long-term viability of Cape Cod, closely linked to the condition of Bourne and Sagamore Bridges, would be secured by the replacement project.

Another relevant document is a technical memorandum that analyzes the economic impacts on Cape Cod, Nantucket, and Martha's Vineyard from lane and bridge closures on the two bridges. The Cape Cod Commission requested the quantitative and qualitative analysis, which ERG, a consulting firm, carried out. The memorandum covers assumptions, data sources, methodologies, and results.[9] It posits two scenarios:

- A complete shutdown of one bridge for six months and 16 months of lane closures
- Complete shutdown of one bridge for two to five years.

The memorandum also includes results of interviews with local stakeholders, local officials, and emergency responders. Their responses tracked closely with those of the officials interviewed for the "Warren Report" regarding the increasingly serious social and economic impacts they foresaw for the two scenarios. The Cape Cod Commission provides a publicly available overview of the results described in the technical memorandum.[10]

5 Program Impacts

5.1 Operational Impacts

5.1.1 Regional Economic Impacts

5.1.1.1 Methods and Results

TREDIS software was used to evaluate and compare predicted economic impacts for the No Build Alternative and Build Alternative for the year 2050. To isolate the regional economic impacts that would result in response to the Build Alternative, the induced economic impacts were estimated using TREDIS. This analysis considered the amount of "ripple effect" economic activity that would be created because of a bridge replacement. The induced economic impacts of a potential bridge replacement for the No Build Alternative would be zero, as the No Build Alternative does not propose replacing the bridges. The induced economic impacts of a potential bridge replacement for the Build Alternative are provided in **Table 5-1.**

[9] ERG, Technical Memorandum to the Cape Cod Commission. August 9, 2024.

[10] Cape Cod Commission. Cape Cod Canal Bridge Closure Economic Impact Analysis. September 2024. https://tobweb.town.barnstable.ma.us/TownmanagerCommunicatrions/2024-10-08%20TMReport%20-%202024-09-10%20CIBC%20-%20Cape%20Cod%20Commission%20Bridge%20Closure%20Economic%20Analysis.pdf

Table 5-1. Economic Impacts: TREDIS Analysis, 2050

Region	Output (2022 dollars)	Value Added (2022 dollars)	Jobs (headcount)	Labor Income (2022 dollars)
Cape Cod and Islands	$10,380,000	$4,570,000	21	$2,610,000
Plymouth County	$3,360,000	$1,650,000	8	$1,030,000
Rest of Massachusetts	$7,370,000	$3,960,000	11	$2,440,000
Total Massachusetts	$21,100,000	$10,180,000	40	$6,080,000

Source: TREDIS analysis

As presented in **Table 5-1**,[11] the results of this analysis show that for 2050 there would be a net increase in economic output, value added, jobs, and labor income for the Cape and Islands, Plymouth County, and the Rest of Massachusetts for the Build Alternative when compared to the No Build Alternative. The net increase in economic output within the Cape and Islands is 49% of the total increase for Massachusetts, attributable to the Build Alternative. While the net increase in the total headcount of jobs for the Cape and Islands in 2050 comprises over half of the total increase in Massachusetts (attributable to the Build Alternative), the increase in labor income generated from these jobs is estimated to be only 43% of the total increase in labor income for Massachusetts, attributable to the Build Alternative.

The TREDIS analysis also compares tax collection for state and local taxes, including those levied on both households and businesses, for the No Build Alternative and Build Alternative. As presented in **Table 5-2**, net tax collections for the Build Alternative would be about $426,000 (in 2022 dollars) greater than that of the No Build Alternative. Of this, 49% would be garnered from Cape Cod and Islands.

Table 5-2. State and Local Tax Impacts, 2050 (2022 dollars)

Region	Tax Revenue
Cape Cod and Islands	$209,000
Plymouth County	$90,000
Rest of Massachusetts	$127,000
Total Massachusetts	$426,000

Source: TREDIS analysis

TREDIS estimates total social benefits as well as economic impacts. The social benefits include cost savings that are adapted and used to inform the economic impact analysis but also benefits that do not result in monetary transfers. These savings—in the form of saved time, crashes, and pollutants emitted—are monetized following U.S. Department of Transportation guidance. Some social benefits are enjoyed directly by travelers, but others, such as environmental benefits or business time savings, are enjoyed by other stakeholders, such as local firms or the community.

[11] These and other tables may not total due to rounding, especially in the case of jobs measures.

Among monetary benefits, households—and to some degree businesses—would enjoy savings in vehicle maintenance costs and fuel. Businesses would also benefit from saved shipping costs. These items—represented by the Vehicle Operating Costs, Business Time, and Shipper/Logistics Costs categories in **Table 5-3**—were used as inputs for the economic analysis model that produced the results shown in **Table 5-1** and **Table 5-2**.

Table 5-3. Social Benefits in 2050 (2022 dollars)

Benefits Category	Value
Vehicle Operating Costs Saved	$8,600,000
Business Time Saved	$11,600,000
Shipper/Logistics Costs Saved	$200,000
Value of Personal Time	$82,100,000
Safety Cost Saved	$10,300
Environmental Costs Saved	$4,100,000
Total	**$116,900,000**

Source: TREDIS analysis

At the same time, all system users would enjoy time savings (valued under the categories Value of Personal Time and Business Time). Averted crashes—which result in saved lives, injuries, and property damage—were monetized per the U.S. Department of Transportation guidance to find a total Safety Cost category. Finally, reduced volumes of pollutants in the environment were monetized and reported in the Environmental category.

5.1.2 TREDIS Software Background

Economic impacts are estimated using the TREDIS transportation economics suite—the most widely used system for economic impacts of transportation projects in the U.S. and Canada.[12] Embedded within TREDIS is baseline economic data from IMPLAN,[13] along with future projections of industry growth by sector for each county in the U.S., from Moody's Analytics. TREDIS adds to and optimizes this economic data for measurement of transportation's impacts on the economy.

When conducting a TREDIS analysis, users enter information on transportation performance changes and project cost and timing. TREDIS uses federal data sources (annually updated) to attribute costs to performance changes in several categories, including vehicle operating costs, the value of time for both personal and commute travel, shipping logistics costs, environmental impacts, and the impact on safety.

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[12] For more information, visit TREDIS Transportation Analysis Tools (www.tredis.com).

[13] IMPLAN is the most widely used input-output economic modeling system in the U.S. This system uses industry- and region-specific economic data to translate direct effects into indirect and induced impacts. More information is available at www.implan.com.

When direct impacts from spending or performance-driven cost savings occur in the economy, there is always additional economic activity because businesses make purchases from their suppliers and employees re-spend income in the economy. These benefits are referred to as multiplier effects.

When businesses reduce their transportation costs, they utilize those savings to 1) reinvest in more productive capital, 2) increase research and development expenditures, 3) reduce the prices paid by their customers, or 4) retain profits for disbursement to shareholders. These uses increase the productivity and competitiveness of the business, leading to economic growth. When households reduce their transportation costs, they have additional income to spend on other goods, leading to the growth of local businesses where they spend money. Reducing the stress and length of commuters' travel also has some effect on business productivity and their ability to attract and retain talent. These household and business impacts can also change regional supply chains.

There are three main monetary measures of economic impact. The three measures are nested within each other and cannot be added.

- Output is the broadest measure of impact. Depending on what is appropriate for the sector, output represents total revenue, total sales, or the total final value of all goods and services produced.
- Value added is output minus the cost of intermediate inputs, such as the value of inputs other than labor and capital. Value added consists of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus.[14] Value added is the contribution of businesses to gross domestic product.
- Labor income consists of wage and salary disbursements and of supplements to wages and salaries, including benefits, as well as proprietor income.[15] The Jobs measure is the employment headcount, including both full- and part-time jobs by place of employment.

The results for each of these measures includes the impacts of the multiplier effects.

5.1.3 Development of TREDIS Inputs

The MassDOT design team developed the transportation system performance inputs for the TREDIS analysis of the Program, and FXM Associates led the economic analysis in conjunction with EBP.

Economic characteristics were considered for three regions defined in the TREDIS model:

- The Cape and Islands (Barnstable, Dukes, and Nantucket Counties)
- Plymouth County
- Other counties in Massachusetts

[14] Value added definitions are defined in the national income and product accounts from the Bureau of Economic Analysis and implemented by IMPLAN, Inc. Gross operating surplus includes proprietors' income, corporate profits, net interest, business transfer payments, rental income, etc.

[15] Proprietor income includes payments received by self-employed individuals and unincorporated business owners and includes the capital consumption allowance.

The MassDOT design team produced estimates of vehicle trips, vehicle miles traveled (VMT), and vehicle hours traveled (VHT) for three-hour-long periods for 2050:

- Fall weekday AM
- Fall weekday PM
- Summer weekend midday

The vehicle trips, VMT, and VHT provided were provided for both the No Build Alternative and Build Alternative with the purpose of understanding how capacity improvements for the replacement bridges and improved approaches would reduce the delay produced by the capacity and efficiency constraints for the existing bridges.

These travel measures were further expanded using factors to represent full days of travel, using factors that differentiated VMT and VHT reflecting the non-linear growth of VHT in response to increased volumes of traffic in the network. These figures were further expanded to represent the full year—all periods of each day in every season—by applying scaling factors based on the observed volumes of traffic across the bridges from September 2023 through August 2024.

5.1.4 Key Valuation Parameters

These factors represent best estimates or assumptions about the value associated with different aspects of transportation. Data sources are documented in footnotes.

5.1.5 Mode Share

MassDOT provided data on mode share per hour across each bridge (in each direction) among four categories:

- Autos
- Motorcycles
- Medium-duty trucks
- Heavy-duty trucks

These categories were collapsed to relative percentages for each category (counting autos and motorcycles as passenger vehicles) for each period used in the study:

- 6 AM – 9 AM (“AM”/3 hours)
- 9 AM – 3 PM (“Midday”/6 hours)
- 3 PM – 6 PM (“PM”/3 hours)
- 6 PM – 6 AM (“Nighttime”/12 hours)

5.1.6 Visitors Versus Locals

Using data collected by AirSage from cellphone service providers in 2014 and used for the Cape Cod Canal Area Transportation Study, four geographies were modeled:

- Cape Cod and Islands

- Plymouth County
- Rest of Massachusetts
- External

It was assumed that all trips into or out of Cape Cod were matched by a return trip. The TransCAD simulation that informed the Major Rehabilitation Evaluation Report and covered all of Barnstable and Dukes Counties as well as portions of Plymouth and Bristol Counties was used to determine the percentage of these trips made by visitors, defined as tourists and second-home residents. These trip counts and visitor versus local percentages were applied to the relevant time periods identified in the other parameters.

5.1.7 Vehicle Occupancy

Passenger occupancy allows vehicle characteristics to be accurately converted to person-hour benefits. MassDOT provided counts of occupancy for select time periods across the existing bridges. Assuming that truck crews were a single driver and using the share of trucks discussed in **Section 5.1.5**, Mode Share, EBP calculated that the average occupancy for passenger vehicles was 1.47 travelers, including the driver. By comparison, U.S. Department of Transportation Benefit Cost Analysis Guidance from December 2023 cites NHTS 2017 for Passenger Vehicles at Weekday Peak to give the number 1.48 people per vehicle for passenger vehicles.[16] To calculate the cost of freight, service default factors stored in TREDIS were also applied. MassDOT assumed 1 crew member per tractor trailer and an average load in 17.50 U.S. tons.[17] Medium-duty trucks are expected to have only 1 driver and 4.15 tons of freight. Vehicle movements themselves have limited economic value without considering what is moving. Based on the volume of goods moved, TREDIS also applies information on the industry-use of freight and the commodity mix present on freight vehicles in the region to estimate industry-specific benefits.

5.1.8 Vehicle Operating Costs

Vehicle operating costs are a key factor for calculating benefits and economic impacts from both households and businesses. When households reduce their spending on transportation, they are able to purchase other goods and services, and when businesses reduce transportation expenditures, they identify ways to more efficiently utilize those resources. Vehicle operating costs are split between fuel

[16] U.S. Department of Transportation. (2023). Benefit-Cost Analysis Guidance for Discretionary Grant Programs. December. U.S. Department of Transportation. Citing NHTS 2017 for passenger vehicles at weekday peak, reporting 1.48 people per vehicle. https://www.transportation.gov/sites/dot.gov/files/2024-11/Benefit%20Cost%20Analysis%20Guidance%202025%20Update%20%28Final%29.pdf

[17] TREDIS software group analysis based on Hernandez, S. (2017). Estimation of average payloads from weigh-in-motion data. Transportation Research Record, 2644(1), 39-47.

purchases and other costs in TREDIS. **Table 5-4** identifies the other costs.[18] As an example, for cars this includes maintenance and tire purchases, and mileage-based depreciation and insurance payments.

Table 5-4. Vehicle Operations and Maintenance Costs (2022$)

Mode	Value per Uncongested Mile
Passenger Auto	$0.176
Medium/Heavy Trucks	$0.675

Source: TREDIS software group

The second component of vehicle operating costs in the TREDIS system is fuel consumption. Based on national fleet averages fuel use is calculated based on distance or time traveled. **Table 5-5** lists the fuel consumption rates in gallons per mile.[19] Again, walking and biking have no fuel consumption costs, and transit analysis has been deferred to a later analysis that can provide more detail on the topic.

Table 5-5. Vehicle Fuel Consumption

Mode	Gallons per Mile
Passenger Auto	0.0437
Light-/Medium-Duty Truck	0.1337
Heavy Truck	0.1678

Source: TREDIS software group

Fuel consumption imposes costs on households and businesses, dependent on the price of fuel, which is indicated in **Table 5-6**. It is worth noting that an analysis such as this one is sensitive to the assumed fuel costs.

Table 5-6. Fuel Prices

Mode	Cost per Gallon (2022$)*
Gasoline	$3.42
Diesel	$4.54

* Values derived by the TREDIS software group, based on January 16, 2024, prices as reported by AAA.

[18] Values derived by the TREDIS software group, using multiple sources: Vehicle operating cost per mile is defined for cars as an average of small, medium, and large cars, SUVs, and vans and adjusted by average speeds; source AAA (2023). Vehicle operating costs per mile for trucks were drawn from American Trucking Research Institute (ATRI) 2023 data on costs per mile for truck/trailer lease or purchase payments, repair and maintenance, truck insurance premiums, permits and licenses, and tires and adjusted by average speeds.

[19] Values derived by the TREDIS software group, using Highway Statistics 2021 Table VM-1.

5.1.9 Value of Time

The per-person-hour values of time used for the analysis are derived based on the U.S. Department of Transportation value of time guidance. Values are adjusted from national averages based on information from the Bureau of Economic Analysis. Business time includes wages and benefits and is estimated based on industry sector. Commuter time is only wages, with half being household time and half being industry cost in terms of wage premiums for burdensome commutes. Personal time is valued at half of the average wage rate. **Table 5-7** lists passenger and truck operator value of time.

Table 5-7. Value of Travel-Time Savings and Travel-Time Reliability Savings by Mode and Purpose

Mode – Purpose	Value
Passenger – Commute	$29.29
Passenger – Personal	$14.64
Medium-Duty Truck – Freight	$28.23
Heavy-Duty Truck – Freight	$34.87

Source: TREDIS software group

5.1.10 Value of Freight Logistics Delay

The value of freight logistics time in TREDIS varies by commodity type for the modeled regions. The values used here range from about 7.7 cents to 74.6 cents per ton-hour of delay, depending on the regions involved. These are not an important source of savings in this study, however, totaling only approximately $226,000 in savings for the year in 2050 (in 2022 dollars).

5.1.11 Detailed Results

By 2050, the Build Alternative is projected to generate over $21 billion in business output and support for 40 jobs across Massachusetts. The greatest impacts are seen in Professional and Business Services, Financial Activities, Manufacturing, and Education and Health Services. Most major industry sectors experience positive gains, with the exception of Other Services, which shows a net decline (**Table 5-8**).

Table 5-8. Impacts by Major Industry Sector in 2050 (Total Massachusetts)

NAICS	Industry	Business Output (2022 $M)	Value Added (2022 $M)	Jobs	Labor Income (2022 $M)
111-115, 211-213	Agriculture & Extraction	0.394	0.187	1	0.119
221	Utilities	0.467	0.248	0	0.095
230	Construction	0.829	0.437	3	0.409
311-339	Manufacturing	5.870	1.909	6	1.189
420	Wholesale Trade	1.132	0.582	2	0.333
441-454	Retail Trade	0.323	0.137	5	0.003
481-488	Transportation	0.559	0.291	1	0.197
491-493	Postal & Warehousing	0.244	0.196	4	0.157
511-519	Media and Information	1.155	0.455	0	0.239
521-525, 531-533	Financial Activities	3.728	2.261	7	0.724
541, 551, 561-562	Professional & Business Services	4.308	2.545	17	2.062
611, 621-624	Education & Health Services	2.378	1.567	13	1.418
711-713, 721-722, 811-814	Other Services	-0.375	-0.486	-23	-0.958
920	Government	0.092	-0.154	0	0.092
	Total	**21.104**	**10.175**	**40**	**6.079**

Source: TREDIS analysis

By 2050, the Build Alternative is projected to generate $7.4 billion in business output and support 11 jobs in the rest of Massachusetts. The most significant impacts occur in Professional and Business Services, Financial Activities, Manufacturing, and Education and Health Services. While most sectors see positive impacts, Other Services experiences a net decline across all measures (**Table 5-9**).

Table 5-9. Impacts by Major Industry Sector in 2050 (Rest of Massachusetts)

NAICS	Industry	Business Output (2022 $M)	Value Added (2022 $M)	Jobs	Labor Income (2022 $M)
111-115, 211-213	Agriculture & Extraction	0.054	0.027	0	0.018
221	Utilities	0.153	0.085	0	0.029
230	Construction	0.169	0.093	1	0.086
311-339	Manufacturing	1.972	0.711	2	0.442
420	Wholesale Trade	0.447	0.257	1	0.146
441-454	Retail Trade	0.032	0.002	1	-0.020
481-488	Transportation	0.179	0.092	0	0.070
491-493	Postal & Warehousing	0.071	0.054	1	0.044
511-519	Media and Information	0.541	0.246	0	0.125
521-525, 531-533	Financial Activities	1.383	0.903	2	0.335
541, 551, 561-562	Professional & Business Services	1.732	1.181	5	0.951
611, 621-624	Education & Health Services	0.806	0.542	4	0.489
711-713, 721-722, 811-814	Other Services	-0.209	-0.197	-8	-0.318
920	Government	0.038	-0.040	0	0.041
	Total	**7.37**	**3.96**	**11**	**2.44**

Source: TREDIS analysis

By 2050, the Build Alternative is expected to generate $21.1 billion in business output, $10.2 billion in value added, and support 40 jobs across Massachusetts. The largest gains are projected in Professional and Business Services, Financial Activities, Manufacturing, and Education and Health Services. Other Services is the only sector to experience a decline, with negative impacts across all categories (**Table 5-10**).

Table 5-10. Impacts by Major Industry Sector in 2050 (Total Massachusetts)

NAICS	Industry	Business Output (2022 $M)	Value Added (2022 $M)	Jobs	Labor Income (2022 $M)
111-115, 211-213	Agriculture & Extraction	0.394	0.187	1	0.119
221	Utilities	0.467	0.248	0	0.095
230	Construction	0.829	0.437	3	0.409
311-339	Manufacturing	5.870	1.909	6	1.189
420	Wholesale Trade	1.132	0.582	2	0.333
441-454	Retail Trade	0.323	0.137	5	0.003
481-488	Transportation	0.559	0.291	1	0.197
491-493	Postal & Warehousing	0.244	0.196	4	0.157
511-519	Media and Information	1.155	0.455	0	0.239
521-525, 531-533	Financial Activities	3.728	2.261	7	0.724
541, 551, 561-562	Professional & Business Services	4.308	2.545	17	2.062
611, 621-624	Education & Health Services	2.378	1.567	13	1.418
711-713, 721-722, 811-814	Other Services	-0.375	-0.486	-23	-0.958
920	Government	0.092	-0.154	0	0.092
	Total	**21.104**	**10.175**	**40**	**6.079**

Source: TREDIS analysis

5.1.12 Local Area Economic Impacts

The travel-time savings afforded by the Build Alternative would have impacts on the reach of retailers, employers, and employees. These impacts vary somewhat by bridge, but the Build Alternative would increase the employment pool by about one-third from each bridge. **Table 5-11** summarizes the impact of a 3-minute reduction in travel time from Sagamore Bridge. Extending the number of employers commuters could reach from the bridges would more than double the number of potential job opportunities in the Manufacturing sector, for example, and similarly increase the size of the labor pool for employers in the Manufacturing sector.

Table 5-11. Increase in Access to Jobs with 3-minute Travel-Time Savings (Sagamore Bridge)

Sector	No Build Alternative - Jobs within 30-Minute Drive	Build Alternative - Jobs within 33-Minute Drive	Number Increase	Percentage Increase
11: Agriculture, Forestry, Fishing and Hunting	721	790	69	10%
21: Mining, Quarrying, and Oil and Gas Extraction	53	70	17	32%
22: Utilities	838	945	107	13%
23: Construction	7,233	9,377	2,144	30%
31-33: Manufacturing	5,968	12,006	6,038	101%
42: Wholesale Trade	4,576	5,963	1,387	30%
44-45: Retail Trade	20,903	24,861	3,958	19%
48-49: Transportation and Warehousing	3,740	4,343	603	16%
51: Information	3,082	3,608	526	17%
52: Finance and Insurance	4,448	5,303	855	19%
53: Real Estate and Rental and Leasing	4,351	5,111	760	17%
54: Professional, Scientific, and Technical Services	7,945	13,421	5,476	69%
55: Management of Companies and Enterprises	156	180	24	15%
56: Administrative and Support and Waste Management and Remediation Services	4,169	5,449	1,280	31%
61: Educational Services	9,987	11,475	1,488	15%
62: Health Care and Social Assistance	26,137	36,368	10,231	39%
71: Arts, Entertainment, and Recreation	3,931	5,016	1,085	28%

Sector	No Build Alternative - Jobs within 30-Minute Drive	Build Alternative - Jobs within 33-Minute Drive	Number Increase	Percentage Increase
72: Accommodation and Food Services	15,232	19,291	4,059	27%
81: Other Services (except Public Administration)	12,055	14,033	1,978	16%
92: Public Administration	8,968	12,144	3,176	35%
99: Unassigned	908	1,007	99	11%
Total	**145,401**	**190,761**	**45,360**	**31%**

Source: Environics Analytics Claritas Reports, 2024; and FXM Associates

Table 5-12 contains the same information for Bourne Bridge. Here the increases are more evenly distributed, with "office-using" sectors (NAICS 51 through 55) and the health care sector receiving the largest access benefits of the savings in travel times.

Table 5-12. Increase in Access to Jobs with 3-minute Travel-Time Savings (Bourne Bridge)

Sector	No Build Alternative - Jobs within 30-minute Drive time	Build Alternative - Jobs within 33-minute Drive time	Number Increase	Percentage Increase
11: Agriculture, Forestry, Fishing and Hunting	1,083	1,257	174	16%
21: Mining, Quarrying, and Oil and Gas Extraction	87	102	15	17%
22: Utilities	909	990	81	9%
23: Construction	8,689	11,752	3,063	35%
31-33: Manufacturing	17,253	17,461	208	1%
42: Wholesale Trade	10,273	11,663	1,390	14%
44-45: Retail Trade	26,049	34,219	8,170	31%
48-49: Transportation and Warehousing	5,802	6,569	767	13%
51: Information	2,825	4,343	1,518	54%
52: Finance and Insurance	5,260	6,465	1,205	23%
53: Real Estate and Rental and Leasing	4,527	6,587	2,060	46%
54: Professional, Scientific, and Technical Services	11,643	18,347	6,704	58%

Sector	No Build Alternative - Jobs within 30-minute Drive time	Build Alternative - Jobs within 33-minute Drive time	Number Increase	Percentage Increase
55: Management of Companies and Enterprises	209	215	6	3%
56: Administrative and Support and Waste Management and Remediation Services	5,410	7,251	1,841	34%
61: Educational Services	10,525	13,288	2,763	26%
62: Health Care and Social Assistance	31,802	49,365	17,563	55%
71: Arts, Entertainment, and Recreation	5,120	6,824	1,704	33%
72: Accommodation and Food Services	18,200	23,960	5,760	32%
81: Other Services (except Public Administration)	14,536	18,385	3,849	26%
92: Public Administration	11,020	16,009	4,989	45%
99: Unassigned	920	1,047	127	14%
Total	**192,142**	**256,099**	**63,957**	**33%**

Source: Environics Analytics Claritas Reports, 2024; and FXM Associates

Further benefits accruing from the Build Alternative would extend market areas for retailers. Retailers typically define market areas in terms of drive times, with a 20-minute drive time considered the maximum time consumers would be willing to drive for all but the largest stores and store types. A travel-time savings of 3 minutes would enable retailers to expand their market areas, and their customers to expand their consumption opportunities. **Table 5-13** quantifies how that benefit would play out from Sagamore Bridge.

Table 5-13. Increase in Access to Jobs with 3-minute Travel-Time Savings (Sagamore Bridge)

Sector	No Build Alternative - Retail Expenditures within 20-minute Drive time (2024$)	Build Alternative - Retail Expenditures within 23-minute Drive time (2024$)	Difference (2024$)
Motor Vehicles & Parts (441)	413,935,246	572,169,070	158,233,824
Furniture & Home Furnishings (442)	42,715,096	58,923,574	16,208,478
Electronics & Appliances (443)	29,619,809	41,080,340	11,460,531

Sector	No Build Alternative - Retail Expenditures within 20-minute Drive time (2024$)	Build Alternative - Retail Expenditures within 23-minute Drive time (2024$)	Difference (2024$)
Building Materials & Garden Equipment & Supplies (444)	141,611,004	195,700,823	54,089,819
Food & Beverages (445)	286,221,995	397,515,519	111,293,524
Health & Personal Care (446)	118,474,954	164,331,820	45,856,866
Gasoline Stations (447)	114,172,137	158,680,915	44,508,778
Clothing & Clothing Accessories (448)	102,138,870	141,542,439	39,403,569
Sporting Goods, Hobby, & Musical Instruments (451)	28,614,342	39,659,874	11,045,532
General Merchandise (452)	251,342,608	348,660,477	97,317,869
Miscellaneous Store Retailers (453)	44,048,366	61,024,789	16,976,423
Food Services & Drinking Places (722)	271,380,536	376,154,392	104,773,856
Total Retail Trade (incl. Food & Drink)	**1,844,274,963**	**2,555,444,032**	**711,169,069**

Source: Environics Analytics Claritas Reports, 2024; and FXM Associates

In this case, total consumer spending would increase by over $500 million with the savings of 3 minutes of travel time from Sagamore Bridge.

Table 5-14 presents these data for Bourne Bridge. Here, the increase in consumer expenditures would approach $1 trillion.

Table 5-14. Increase in Access to Consumer Expenditures with 3-minute Travel-Time Savings (Bourne Bridge)

Sector	No Build Alternative - Retail Expenditures within 20-minute Drive time (2024$)	Build Alternative - Retail Expenditures within 23-minute Drive time (2024$)	Difference (2024$)
Motor Vehicles & Parts (441)	417,655,340	607,642,790	189,987,450
Furniture & Home Furnishings (442)	43,465,506	63,338,346	19,872,840
Electronics & Appliances (443)	30,003,152	43,627,007	13,623,855
Building Materials & Garden Equipment & Supplies (444)	142,882,637	208,087,766	65,205,129
Food & Beverages (445)	288,296,289	419,717,746	131,421,457
Health & Personal Care (446)	119,654,266	174,158,766	54,504,500
Gasoline Stations (447)	114,680,368	166,832,056	52,151,688
Clothing & Clothing Accessories (448)	103,309,228	150,376,272	47,067,044
Sporting Goods, Hobby, & Musical Instruments (451)	28,932,221	42,113,140	13,180,919
General Merchandise (452)	253,749,126	369,398,679	115,649,553
Miscellaneous Store Retailers (453)	44,756,753	65,085,808	20,329,055
Food Services & Drinking Places (722)	274,610,175	399,449,425	124,839,250
Total Retail Trade (incl. Food & Drink)	**1,861,995,061**	**2,709,827,801**	**847,832,740**

Source: EnvironicsAnalytics Claritas Reports, 2024; and FXM Associates

5.1.13 Right-of-Way Analysis

5.1.13.1 Introduction

This analysis evaluates the potential loss in property tax revenue to the Town of Bourne resulting from proposed property acquisitions for the Build Alternative. The analysis compares assessed property values before and after the acquisitions, utilizing tax parcel data from the Town of Bourne and a list of potential properties to be acquired from MassDOT.

5.1.13.2 Methodology

The Build Alternative has the potential to affect 62 properties, including 28 slated for full acquisition and 34 for partial acquisition. Partial acquisitions range from as little as 0.3% of the parcel to as much as 47.7% of the parcel.

The total FY24 assessed value of the 62 properties is $162.66 million, encompassing a combined land area of 37,554,541 square feet. Of this,2,048,294 square feet—equivalent to 5.5% of the total land area of the 62 properties—would be directly affected by the acquisitions.

Properties that would be fully acquired would result in a 100% loss of property tax revenue for the Town of Bourne. For partial acquisitions, MassDOT assumed that only land would be acquired and that buildings would remain (although some of these parcels have no buildings). Accordingly, MassDOT multiplied the percentage of the parcel to be acquired by the FY24 assessed land value to account for lost property tax revenue for partially acquired properties.

5.1.13.3 Results

The total FY24 assessed value of the 62 affected properties is $162,658,800 prior to acquisition. After the proposed acquisitions, this value is projected to drop to $140,169,392, reflecting a total decrease of $22,489,408 in assessed value (**Table 5-15**).

The total reduction in assessed property value is expected to result in an annual tax revenue loss of $180,365. This estimate is calculated using Town of Bourne's FY24 property tax rate of $8.02 per $1,000 of assessed value (**Table 5-16**).

Table 5-15. Assessed Values Before and After Potential Acquisition

Type of Property	FY 24 Assessed Value	Assessed Value After Acquisition	Assessed Difference
Building	$52,159,600	$46,699,000	-$5,460,600
Land	$94,889,900	$78,057,892	-$16,832,008
Detached	$3,583,600	$3,456,100	-$127,500
Other	$12,025,700	$11,956,400	-$69,300
Total Value	$162,658,800	$140,169,392	-$22,489,408

Source: Town of Bourne Assessor Database and FXM Associates

Table 5-16. Potential Property Tax Loss Due to Property Acquisition

FY 24 Property Tax	Property Tax After Acquisition	Assessed Difference
$1,304,524	$1,124,159	-$180,365

Source: Town of Bourne Assessor Database and FXM Associates

5.2 Construction Impacts

MassDOT estimated the total direct, indirect, and induced economic impacts of construction expenditures for the two bridges.[20] These data were used in applying the R/ECON Input-Output (I-O) Model[21] to estimate total direct, indirect, and induced impacts of these expenditures on business output, household earnings, employment, gross domestic product, and state, local, and federal taxes.

The replacement of the Cape Cod Bridges is projected to generate $5.76 billion in total economic output in Massachusetts, supporting approximately 27,870 jobs and contributing $2.92 billion to the state's Gross Domestic Product (GDP). The largest impacts are expected in the construction, manufacturing, and professional and business services sectors (**Table 5-17**).

Table 5-17. Economic and Fiscal Impacts in Massachusetts of Cape Cod Bridges Replacement (both bridges) Conceptual Program Expenditure Estimates: Total Impacts (Direct + Indirect/Induced)

Category	Output ($1,000)	Employment Jobs	Earnings ($1,000)	Gross Domestic Product ($1,000)
1. Agriculture, Forestry, Fishing, and Hunting	2,125.3	36	842.3	516.8
2. Mining	22,987.6	65	5,193.9	12,277.1
3. Utilities	57,815.0	55	14,114.2	32,803.2
4. Construction	1,910,688.0	10,521	983,282.6	951,932.6
5. Manufacturing	1,357,265.7	4,601	333,259.5	515,346.5
6. Wholesale Trade	237,177.9	669	66,152.4	124,476.8
7. Retail Trade	141,500.4	1,230	52,002.6	69,279.8
8. Transportation and Warehousing	124,945.8	844	46,442.3	56,872.0

[20] Cape Cod Bridges Program (Both Bridges) Conceptual Program Estimates-May 2024

[21] Input-Output (I-O) models are used by professional and academic economic analysts to trace out the full range of effects (including indirect and induced) of business sales, employment, or income directly attributable to existing economic activities or planned new ones on single or multiple regions or states. The technique derives from the national income and product accounts, which trace money flows within and between industries and sectors within the national economy, with adjustments made for the specific makeup of industries and wages and taxes within individual regions and states. R/ECON I-O (formerly PCIO) was originally developed by the Regional Science Research Institute and has been in continued use for over 50 years. It is presently updated regularly by the Center for Urban Policy Research at Rutgers University and tailored to the Massachusetts economy for the purposes of this study. R/ECON I-O is one of three widely used regional I-O modeling systems in the U.S.; RIMS II (US Bureau of Economic Analysis) and IMPLAN are the other two.

Category	Output ($1,000)	Employment Jobs	Earnings ($1,000)	Gross Domestic Product ($1,000)
9. Information	113,193.6	185	22,588.1	50,346.3
10. Finance, Insurance, Real Estate, Rental, and Leasing	578,121.9	1,115	89,109.7	342,697.7
11. Professional and Business Services	789,116.3	4,431	430,996.9	507,211.2
12. Educational Services, Health Care, and Social Assistance	231,971.3	1,916	126,348.8	141,555.3
13. Arts, Entertainment, Recreation, and Hospitality	91,311.0	1,125	40,591.9	56,169.7
14. Other Services (including Government)	98,592.2	1,078	62,456.4	56,251.8
Total Impacts	**5,756,812.1**	**27,870**	**2,273,381.7**	**2,917,736.7**

Source: R/ECON I-O Model and FXM Associates

Table 5-18 indicates the distribution of the Cape Cod Bridges replacement's economic impacts by type: direct, indirect, and induced. Direct impacts reflect immediate impacts from construction and related activities. Indirect impacts capture the supply chain response, while induced impacts reflect increased household spending from wages earned. Direct impacts account for $3.24 billion in output and 16,000 jobs, while indirect impacts add $1.27 billion in output and 5,154 jobs. Induced impacts contribute an additional $1.25 billion in output and 6,717 jobs. Multipliers indicate that for every $1 in direct output, the total output impact is $1.78; for every direct job, 1.74 total jobs are supported; and for every $1 in direct earnings, the total earnings impact is $1.60.

Table 5-18. Economic and Fiscal Impacts in Massachusetts of Cape Cod Bridges Replacement (both bridges) Conceptual Program Expenditure Estimates: Distribution of Impacts and Multipliers

Category	Output ($1,000)	Employment Jobs	Earnings ($1,000)	Gross Domestic Product ($1,000)
1. Direct Impacts	3,242,081.6	16,000	1,418,259.2	1,521,945.8
2. Indirect Impacts	1,268,506.0	5,154	437,377.8	662,378.5
3. Induced Impacts	1,246,224.4	6,717	417,744.6	733,412.4
Total Impacts	**5,756,812.1**	**27,870**	**2,273,381.7**	**2,917,736.7**
Multipliers (= 4 / 1)	1.776	1.742	1.603	1.917

Source: R/ECON I-O Model and FXM Associates

The Cape Cod Bridges replacement is expected to contribute $2.92 billion to Massachusetts' GDP. Of this, $1.83 billion (63%) comes from worker compensation, $110 million (4%) from taxes—split between local ($14.7 million), state ($27.4 million), and federal ($68 million)—and $976.7 million (33%) from profits, dividends, rents, and other income (Table 5-19).

Table 5-19. Economic and Fiscal Impacts in Massachusetts of Cape Cod Bridges Replacement (both bridges) Conceptual Program Expenditure Estimates: Composition of Gross Domestic Product

Category	Total Gross Domestic Product ($1,000)
1. Compensation	1,830,923.1
2. Taxes	110,097.5
a. Local	14,698.2
b. State	27,440.8
c. Federal	67,958.5
3. Profits, Dividends, Rents, and Other	976,716.1
Total (= 1 + 2 + 3)	**2,917,736.7**

Source: R/ECON I-O Model and FXM Associates

The Cape Cod Bridges replacement is expected to generate $1.83 billion in labor income from businesses and $1.97 billion from households. The Program is also expected to generate $604.1 million in total tax revenue. Of this, $110.1 million comes from businesses and $494 million from households. Local taxes will total $70.0 million (12%), state taxes $128.6 million (21%), and federal taxes $405.5 million (67%) (Table 5-20).

Table 5-20. Economic and Fiscal Impacts in Massachusetts of Cape Cod Bridges Replacement (both bridges) Conceptual Program Expenditure Estimates: Tax Accounts

Category	Business	Household	Total
1. Labor Income	1,830,923.1	1,974,308.0	—
2. Taxes	110,097.5	493,999.7	604,097.2
a. Local	14,698.2	55,339.0	70,037.3
b. State	27,440.8	101,153.9	128,594.7
c. Federal	67,958.5	337,506.8	405,465.2

Source: R/ECON I-O Model and FXM Associates

Table 5-21 indicates the estimated economic and fiscal impacts in Massachusetts per $1 million spent on the Cape Cod Bridges replacement. For every $1 million in initial expenditure, the Program is expected to support 6.1 jobs, generate $493,719 in earnings, and contribute $633,656 to Massachusetts' GDP. The replacement will also produce $27,927 in state taxes and $15,210 in local taxes per $1 million expended. Total initial expenditures are projected at $4.6 billion.

Table 5-21. Economic and Fiscal Impacts in Massachusetts of Cape Cod Bridges Replacement (both bridges) Conceptual Program Expenditure Estimates: Impacts per Million Dollars of Initial Expenditure (in dollars)

Category	Total
Employment/Jobs	6.1
Earnings	$493,718.6
State Taxes	$27,927.4
Local Taxes	$15,210.2
Gross Domestic Product	$633,655.5
Initial Expenditure (in Dollars)	$4,604,610,474.0

Source: R/ECON I-O Model and FXM Associates