NASHUA-MANCHESTER 40818 (CAPITOL CORRIDOR)

APPENDIX H
Socioeconomic Technical Report

Prepared for:

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PRE-DECISIONAL

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Prepared by:
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1. Executive Summary

The Capitol Corridor Project represents an opportunity not only for enhanced mobility between Boston and southern New Hampshire, but for significant economic benefits in the bi-state region. These benefits would arise from two primary sources:

- Construction and operation of the new and improved rail infrastructure and commuter rail service; and
- New development in the four station areas to be created in southern New Hampshire at Manchester, Bedford/MHT Airport, Crown Street in Nashua, and the South Nashua commercial area just north of the Massachusetts state line.

These new stations will be connected not only to the primary regional economic generator of central Boston, but to the northern arc of Route 128, to the employment and institutional center of Lowell, and to each other. Nashua and Manchester are potentially not only commuting origins, but commuting and special event destinations as well. The compactness of Southern New England creates a natural market for regional and intercity rail. Two emerging trends--a decarbonizing economy in response to climate change, and a gravitation to smaller, well-connected cities in response to COVID-19—would reinforce and amplify the outcomes projected in this report.

An economic impact assessment was conducted at both a local and a regional level on these potential benefits. The *local analysis* focused on the station area development potential, deriving high-level estimates of residential and commercial buildout as well as the property value changes associated with existing and future development. The regional analysis focused on how building and operating the Project would impact such regional economic factors as employment, earnings, and economic output. This regional analysis included, as applicable, both New Hampshire and Massachusetts.

Local analysis: station area development. The local analysis estimates that approximately 689,000 square feet of retail space, 567,000 square feet of office space, and 979,000 square feet of industrial and/or “flex” development space would be generated in the proposed station areas by 2040. In addition, approximately 1,960 residential units would be added around the proposed stations by 2040. These estimates cover a portion of each station area defined by the study team, located largely but not entirely within a half-mile radius of each station.1 The estimates are thus conservative, in that development influenced by the train but occurring outside the analytic boundary is not captured.

The estimates represent the combination of “natural” or “background” growth which might occur anyway and “net new” growth reasonably attributable to the Project. The estimates do not attempt to quantitatively separate the two; however, based on interviews with planning officials and other stakeholders, observation of recent trends on the ground, and other factors explained in this report, much of the estimated growth can be reasonably attributed to the addition of rail service and the cumulative effects of transit-oriented development.

Table 1 summarizes the estimated development potential by station area; as explained in Section 2.2, these estimates are intentionally conservative.

[1] The delineation of the analytic boundaries is explained in Section 2.2, Future Development.

Table 1. Summary – Development Potential by Station Area by 2040

	Retail (sqft)	Office (sqft)	Industrial/Flex (sqft)	Residential (units)
Manchester	341,000	543,000	184,000	910
Bedford/MHT	1,000	3,000	4,000	20
Crown Street	9,000	5,000	50,000	20
South Nashua	338,000	16,000	741,000	1,010
Total	**689,000**	**567,000**	**979,000**	**1,960**

Source: AECOM 2022; sqft rounded to the nearest thousand; residential units rounded to the nearest ten.

The economic impact of this future development will be felt in several ways. The estimates in Table 1 amount to about 4,500,000 square feet of built space.[2] Creating these residential, commercial, and industrial buildings will generate thousands of construction-related jobs, and hundreds of millions of dollars in payroll and spending, during the years in which they are being built. Then, once the commercial buildings open for business, their employee payrolls, the reinvestment of those payrolls, and the purchase and sale of goods and services by individuals and other businesses will send about ***one billion dollars*** rippling through the local and regional economy recurringly, year after year.[3]

Station area development also translates into significantly higher property values, most obviously on the affected parcels but also on other, nearby properties whose value would be enhanced by the surrounding investment. Moreover, there is an established body of research demonstrating that properties near rail stations experience an "uplift" in value simply as a result of the enhanced amenity and mobility. It is estimated that the lands [within a half-mile radius of the four stations]/[within the area corresponding to the development estimates] would gain approximately $563.5 million in increased property value. ***This is an increase of 50% over the existing cumulative valuation of $1.1 billion.*** This gain in valuation represents not only an addition of wealth and capital in the corridor, but a dramatic increase in the tax base of the affected municipalities.

Table 2 summarizes the forecasted property value increase by 2040.

Table 2. Summary - Incremental Property Value By Land Use Type by 2040 (2021$)

	Retail	Office	Industrial	Residential	Total
Manchester	$62,000,000	$78,800,000	$25,200,000	$173,000,000	$339,000,000
Bedford/MHT	-	-	-	$3,700,000	$3,700,000
Crown Street	$1,100,000	$1,100,000	$2,300,000	$900,000	$5,400,000
South Nashua	$84,000,000	$2,100,000	$39,100,000	$90,200,000	$215,400,000
Total	**$147,100,000**	**$82,000,000**	**$66,600,000**	**$267,800,000**	**$563,500,000**

Source: AECOM; property values rounded to the nearest hundred-thousand

[2] Future station-area residential development is assumed to be multifamily, with an average unit size of 1,150 gross square feet.

[3] See the explanation in Section 3.4.

Regional analysis: construction and operation of the Project. AECOM's regional economic analysis evaluated the economic impacts from the Project's initial capital construction, on-going operations and maintenance (O&M), and future infrastructure renewal expenditures. Cost inputs were entered into the IMPLAN economic model, and results were reported separately for New Hampshire and Massachusetts.

These annualized impacts of the rail investment are shown in Table 3. The outputs are all expressed as annual amounts in constant FY 2022 dollars. As indicated in the "expenditure type" column:

- The capital expenditure occurs only during the Project's construction period of 2027-2030. During that period, the Project's total annual economic output in New Hampshire and Massachusetts, respectively, is estimated to be $278.8 million and $88.7 million.
- The annual O&M expenditure recurs *continually*, throughout the service life of the Project after 2030; the estimated total annual economic output in New Hampshire and Massachusetts, respectively, is $17.8 million and $12.1 million.
- The infrastructure renewal expenditure occurs periodically, on a schedule corresponding to the useful life of each infrastructure component. This activity will additional millions to the regional economy on an average annual basis.

Table 3. Summary - Annual Economic Impacts from Project Expenditures

Expenditure Type	Employment	Labor Income (2022$)	Total Value Added (2022$)	Output (2022$)
New Hampshire				
Capital (annual, 2027-2030 only)	1270	$110,621,000	$110,326,000	$278,772,000
Operation & Maintenance (continual)	240	$8,322,000	$10,767,000	$17,902,000
Infrastructure Renewal (periodic)	30	$2,971,000	$2,963,000	$7,487,000
Massachusetts				
Capital	340	$30,495,000	$42,532,000	$88,646,000
Operation & Maintenance (continual)	140	$5,192,000	$7,278,000	$12,085,000
Infrastructure Renewal (periodic)	10	$550,000	$767,000	$1,598,000

Source: IMPLAN; dollar values rounded to the nearest thousand; employment values rounded to the nearest ten

Detailed discussions of the analysis on development potential around the proposed stations, impacts on property value, and regional economic impacts from project expenditures are presented in the following sections.

2. Station Area Development

2.1 The Stations

The potential economic benefits of the Capitol Corridor project arise in large part from the opportunity for new development in the four station areas to be created by the project in southern New Hampshire. These consist of:

- two stations in the mixed-use urban centers of Manchester and Nashua; and
- two others serving major regional destinations outside those centers: the Manchester-Boston Regional Airport (MHT) and its surrounding lands, and the large commercial area in South Nashua immediately north of the Massachusetts state line. These two locations have direct regional highway access from Routes I-293 and Route 3, respectively.

The high-level characteristics of each station area are summarized in Table 4.

Table 4. Station Area Development Overview

Station	Overview
Manchester	• Station site is just south of downtown core, near South Millyard, Delta Dental stadium, and SNHU Arena. • 2020 TOD Plan envisions a mixed-use TOD district centered on the station and mostly located within a half-mile of it. Multiple sub-area TOD opportunities. • TOD Plan envisions station as multimodal, with bus stops and a district circulator.
Bedford/MHT	• Station site is in Bedford, at airport access road, about a mile from Airport Terminal Building. Station area straddles Bedford, Manchester, other municipalities. • Station area has regionally unique combination of highway, rail, and air access. • Opportunity for commercial, industrial, and flex development attracted to airport, with workforce served by rail.
Nashua Crown Street	• Station site is in a rail/industrial area just east of downtown and Crown Hill neighborhood. • A TOD Overlay district covers the non-residential area within a half-mile, allowing downtown-type uses and multifamily housing, as well as continued industrial use. • An infill-scale rather than transformative TOD opportunity.
South Nashua	• Station site is at Pheasant Lane Mall, immediately north of MA state line off Route 3, in a large area of auto-dependent commercial use and associated surface parking. • Nashua's TOD Overlay zoning applies to the NH portion of the station area, allowing long-term shift toward denser, mixed-use development taking advantage of rail. • Substantial vacant land available in Tyngsborough, MA, as well, directly adjacent to station site.

The opportunity for transit-oriented (in this case, rail-oriented) development reflects two conditions: the land use and transportation context of each station, and the larger connectivity of the corridor itself. The four new stations will be connected not only to the primary regional economic generator of central Boston, but to the northern arc of Route 128, to the employment and institutional center of Lowell, and to each other. Nashua and Manchester are potentially not only commuting origins, but work, school, and special event destinations as well. The compactness of Southern New England creates a natural market for regional and intercity rail. Two emerging trends--a decarbonizing economy in response to climate change, and a gravitation to smaller, well-connected cities in response to COVID-19—would reinforce and amplify the outcomes projected in this report.

The four subsections that follow (2.1.1-2.1.4) provide high-level descriptions of each station area in terms of its:

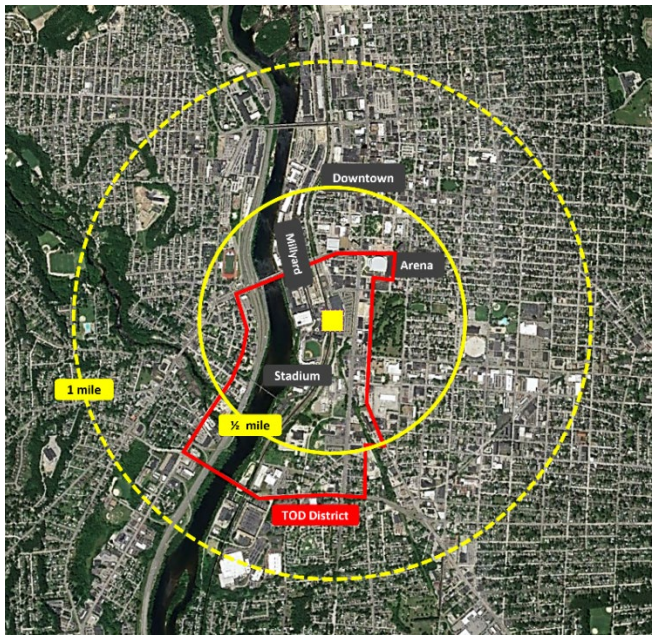
- location, as illustrated by a Google Earth aerial photograph with reference radii of one-half mile and one mile superimposed, along with relevant planning or zoning districts;
- existing land use within a half-mile radius of the station site, exclusive of single-family homes, as summarized in a pie chart based on 2022 Costar data;[4]
- a brief narrative on future development potential, reflecting jurisdictional plans, the study team's experience and knowledge of similar rail settings, and interviews conducted in 2014 and 2022 with local and regional planning officials, landowners, developers, and other stakeholders.

Section 2.2 then presents quantitative estimates of future development that can reasonably be forecast to occur by 2040.

2.1.1 Manchester Station

The proposed Manchester Station would be located on the southern edge of downtown, just east of the Merrimack River, near the historic Millyard redevelopment area as well as Manchester's Delta Dental baseball stadium and multi-purpose SNHU Arena. The station site, with reference radii of one-half mile and mile, is shown in Figure 1. Existing land use within the half-mile radius is summarized in Figure 2.

Figure 1: Location of Downtown Manchester Station

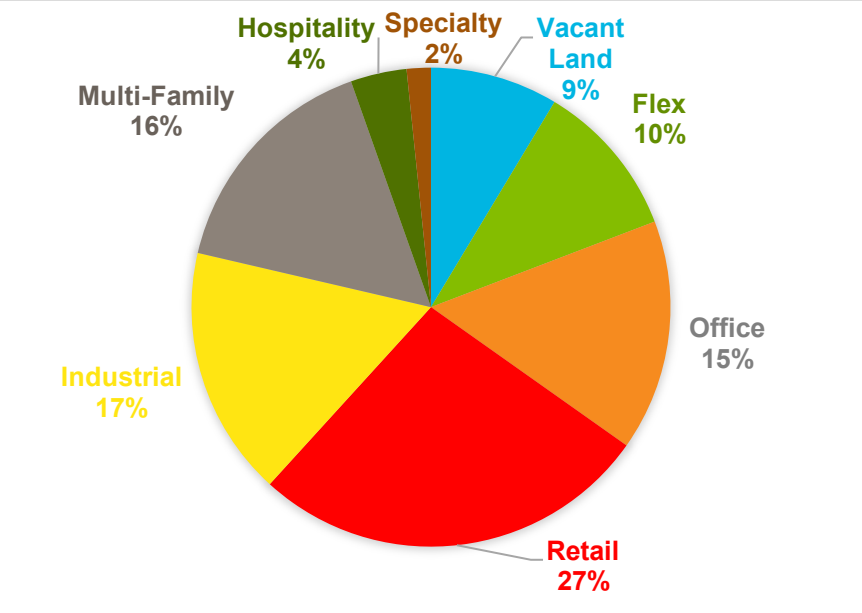


Source: AECOM

[4] The percentages are of land use by land square feet. Single-family homes are excluded because the analysis assumed that Manchester, Nashua, Bedford, and the other affected municipalities do not consider single-family neighborhoods as appropriate for Project-related redevelopment.

Also note that: (i) the pie charts include a "vacant land" category, which includes both restricted land (parklands, state forests, wetlands, etc.) and land considered developable, and (ii) surface parking lots associated with specific commercial or industrial properties are generally counted as part of the corresponding primary use.

Figure 2: Existing Land Use Within ½ Mile Radius of Manchester Station



Source: CoStar 2022

The pie chart reflects a diversity of activity typical of an established regional city center. There are large percentages of multifamily residential, retail, and office use, as well as industrial uses historically associated with the railroad. There is little vacant land.

In 2020, the Southern New Hampshire Planning Commission published a TOD plan for a roughly 300-acre district between the Queen City and Granite Street bridges. Centered on the proposed station site, the TOD district lies mostly within its half-mile radius, as shown in Figure 2. While the plan anticipates the implementation of passenger rail, it calls for a regional bus hub and district circulator to be created in any event. Without rail, the plan foresees a meaningful amount of mixed-use TOD; with rail this opportunity is significantly enhanced.[5]

The TOD district encompasses several distinct opportunity areas—South Millyard (where Southern New Hampshire University has established a downtown headquarters), South Elm, Riverview, the Gaslight District, the Switchyard. The latter is the area immediately surrounding the station site where the existing urban fabric is disrupted by the rail corridor, the irregular pattern of the old rail yard, and extensive surface parking. Along with the circulator, a transformed Switchyard would help unify all the development areas into a coherent, interconnected TOD district. Essential to this evolution is a series of street and ped-bike improvements, for which the City received a $25 million RAISE grant from the US Department of Transportation in 2021.[6]

2.1.2 Bedford/MHT Station

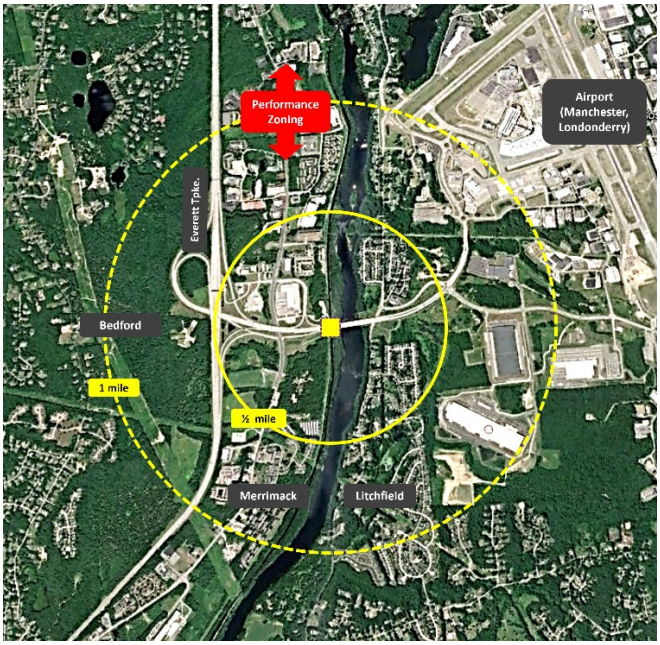
The proposed Bedford/MHT station, serving the Town of Bedford, the Manchester-Boston Regional Airport (MHT), and adjacent communities, would be located in Bedford just west of the Merrimack River, about a mile southwest of the airport terminal building. The station would be built beneath the overpass of Raymond Wieczorek Drive, the access road connecting the airport

[5] https://www.snhpc.org/transportation/multimodal/pages/manchester-transit-oriented-development-tod. The plan was developed in collaboration with the City of Manchester, NHDOT, and other key stakeholders.

[6] https://www.transportation.gov/sites/dot.gov/files/2022-02/RaiseGrants_Capital%20Fact%20Sheets.pdf

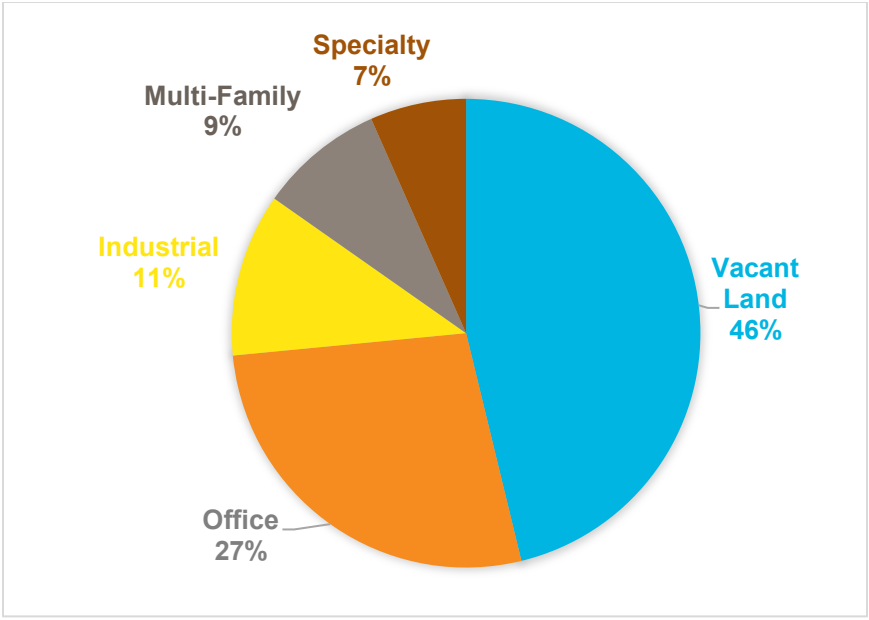
to the Everett Turnpike and nearby I-293. The station area would thus enjoy exceptional access by highway, rail, and air.

Figure 3: Location of Bedford/MHT Station



Source: AECOM

Figure 4: Existing Land Use Within ½ Mile Radius of Bedford/MHT Station



Source: CoStar 2022

As shown in Figure 3, the station area straddles the Merrimack River and includes parts of several municipalities. West and north of the station, the land within a half-mile, a full mile, and beyond is located entirely in Bedford. East of the station, both the half-mile and one-mile radii

extend into Manchester and Londonderry, where the airport is located.6F7 To the south, both radii extend into Merrimack and Litchfield.

The pie chart shows that most of the land within a half-mile-radius of the station site is either in industrial or commercial use or vacant. Some of the vacant land is developable, but much of it is restricted. There is some existing residential land as well, including what appear to be low-rise apartments on the Bedford side of the Merrimack River and single-family subdivisions on the Manchester side. These residential areas are presumably fixed for the foreseeable future.

The economic development value of the rail connection lies only partly (and perhaps not primarily) in improved passenger access to MHT, although a dedicated, platform-side shuttle to and from the airport should be a given. The greater benefit lies in the ability of development attracted by and related to the airport to enjoy rail access to Boston, Route 128, and other places along the corridor.[8]

This development opportunity is most likely to consist of commercial, industrial, and “flex” uses, whether on existing low-density commercial properties or on buildable vacant land. A 14-acre site immediately northwest of the station is occupied by a truck rental and public storage business; this could be an ideal site for more intensive, airport-related development in the future if its owners are so inclined. Otherwise, most of the potentially buildable land lies outside the station’s half-mile radius, including sites on the airport property.

In 2012, the Town of Bedford adopted the South River Road Performance Zoning District along its entire riverfront east of the Everett Turnpike, including the Bedford portion of the station area and extending well to the north. This district is seen as a principal target area for industrial and commercial development, as well as workforce housing, which is also allowed under the overlay.[9]

2.1.3 Nashua – Crown Street Station

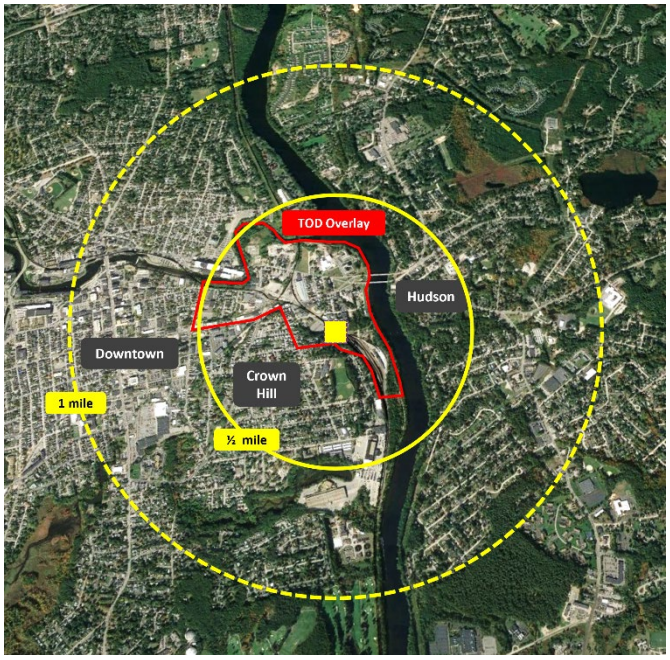
The proposed station in central Nashua would be located off the end of Crown Street, in a largely industrial area east of downtown and the Crown Hill neighborhood. The town of Hudson is directly across the Merrimack River. The station location, with the usual reference radii, is shown in Figure 5, and the summary of existing land use in the inner, half-mile radius, in Figure 6.

[7] Owned by the City of Manchester, the airport’s location straddles the Manchester-Londonderry border.

[8] A similar logic is reflected in the discussion of Bradley International Airport, located in Windsor Locks, CT, between Hartford and Springfield and to be served by shuttle connections from the Windsor Locks regional rail station. See “The Economic Benefits of Regional Rail Investment in Metro Hartford-Springfield” (2021), https://crcog.org/wp-content/uploads/2021/04/CRCOG_Final-Report_V6_042921.pdf.

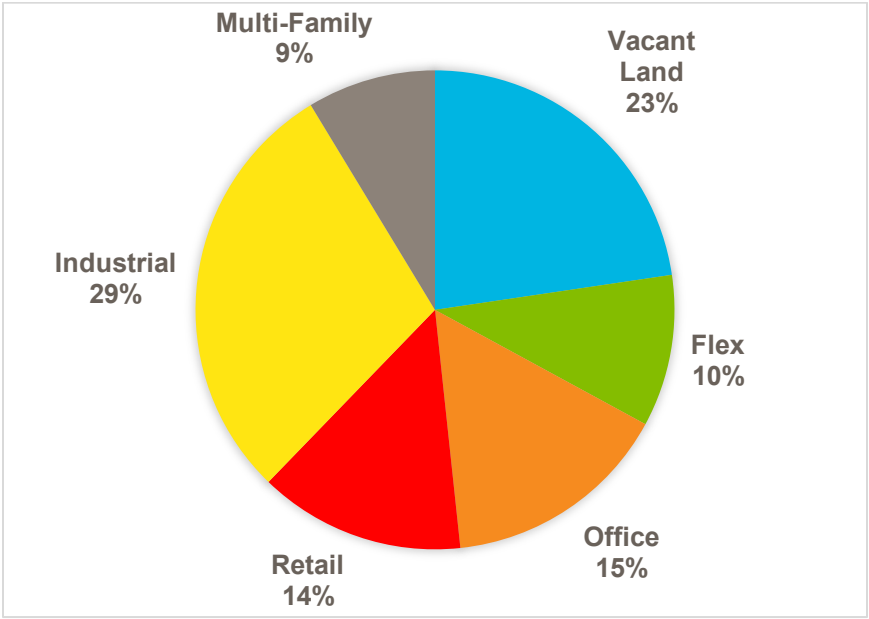
[9] See, in the Bedford Zoning Code, https://ecode360.com/14330805, and the Bedford Zoning Map, https://www.bedfordnh.org/DocumentCenter/View/557/2015-Zoning-Map-PDF?bidId=. Route 3 (South River Road) runs between, and parallel to, the Everett Turnpike and the River, serving the existing and future commercial and industrial development.

Figure 5: Location of Crown Street Station



Source: AECOM

Figure 6: Land Use Within ½ Mile Radius of Crown Street Station



Source: CoStar 2022

As indicted in the pie chart, single-family homes aside, existing land use within a half-mile radius of the station site is mostly industrial (the single largest use, including the railyard), commercial, and “flex”. Nearly a quarter of the non-single-family land is vacant.

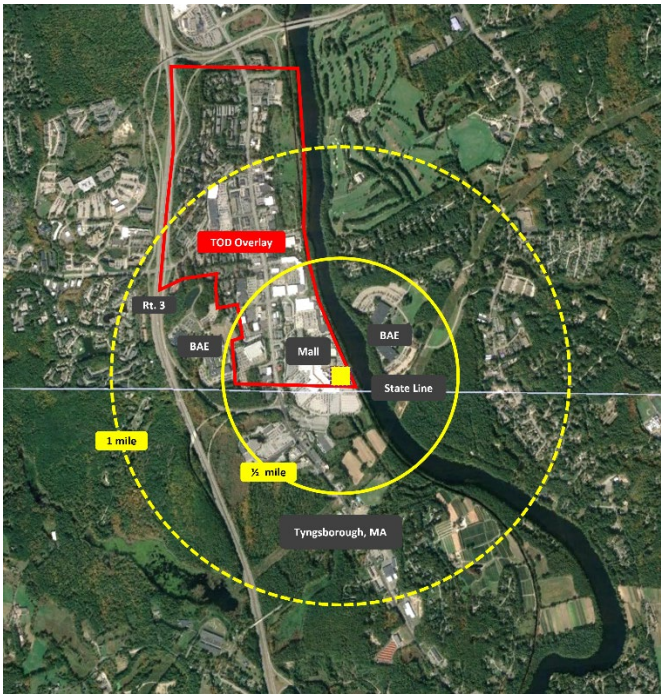
As shown in Figure 5, the industrial portion of the station area constitutes a TOD Overlay District established by the City in 2015. The Crown Hill neighborhood, representing most of the remaining half-mile area, is a traditional, built-out residential neighborhood and is not part of the TOD Overlay.

The TOD overlay makes allowable, as of right, a full menu of downtown-style uses, including multifamily housing, office, retail, hospitality, and traditional "residential over commercial" mixed-use. It permits zero lot-line front setbacks, a characteristic of urban streetscapes, and uses TOD-friendly criteria as a basis for site plan review.[10] The intent is not to push out viable industrial uses, whose association with the railroad is long-standing, but to facilitate TOD opportunities on vacant land, parking lots, and industrial sites that may become available—an infill-scale opportunity. The TOD overlay could also encourage mixed-use, pedestrian-friendly transitions among the station, Crown Hill, and downtown.

2.1.4 South Nashua Station

The fourth and southernmost new station would be in South Nashua—specifically, at a site just west of the Merrimack River and immediately adjacent to the Pheasant Lane Mall. The station's park-and-ride lot is expected to occupy excess surface capacity in the Mall's parking area. Located immediately north of the Massachusetts state line, the site is served by the South Nashua Route 3 interchange.

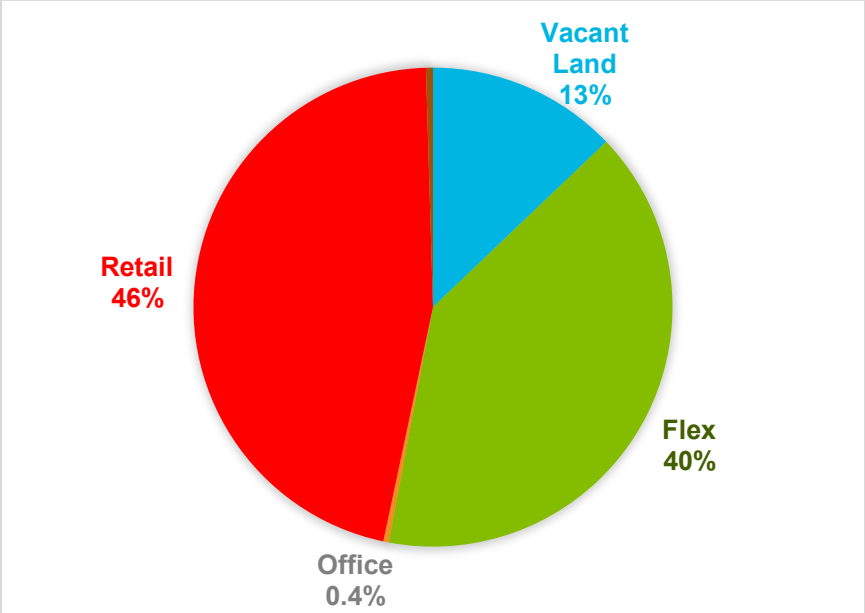
Figure 7: Location of South Nashua Station



Source: AECOM

[10] Zoning map: https://nashuanh.gov/DocumentCenter/View/3832/Zoning-Map-PDF?bidId=; zoning description: Nashua Land Use Code, https://ecode360.com/31684806.

Figure 8: Land Use Within ½ Mile Radius of South Nashua Station



Source: CoStar 2022

As shown in the pie chart, there are currently no residential units within a half-mile of the proposed station. Much of the land, including the areas closest to the station, is dedicated to retail uses, including shopping, cinemas, restaurants, and various service businesses.[11] As noted previously, the vast areas of surface parking for the malls and other auto-dependent businesses are generally counted as part of those primary uses rather than as vacant land. In the aerial view or on the ground, it is obvious that surface parking—including seasonal overflow that often goes unused—is a principal consumer of land.

Nashua's TOD Overlay zoning (described above with respect to Crown Street) has also been adopted for the quadrant of the South Nashua station area west of the river and north of the state line.[12] As shown in Figure 7, the Overlay includes virtually all the land in the northwest quadrant within a half-mile of the station site, while extending north through the one-mile radius and beyond to the Circumferential Highway bridge.

The TOD Overlay allows the existing pattern of low-density, stand-alone, auto-dependent commercial uses to be replaced, over time, by mixed-use development that is denser, more walkable, more balanced between highway access and transit, and less dominated by surface parking. Such redevelopment and intensification would benefit from South Nashua's unique state line location, combining multimodal access to metro Boston with New Hampshire's traditional tax advantage.[13]

[11] The large percentage of land classified as "flex" consists of two facilities belonging to BAE systems, a major aerospace employer. These uses are classified as "flex" in the Costar database. As shown in Figure 7, one is on the state line west of the station, the other across the river.

[12] Zoning map: https://nashuanh.gov/DocumentCenter/View/3832/Zoning-Map-PDF?bidId=; zoning description: Nashua Land Use Code, https://ecode360.com/31684806.

[13] New Hampshire does not have a general state income or sales tax and has long been understood to have a lower combined state/local tax burden than Massachusetts. This is offset in part by New Hampshire's having the highest property tax burden in the United States, including a state property tax component that Massachusetts does not have. Even with this offset, the state/local tax burden in New Hampshire is measurably lower than in Massachusetts; neither, however, is an outlier. According to the Tax Foundation, in Calendar year 2022, the New Hampshire burden

Like many other shopping malls, Pheasant Lane is experiencing significant challenges, including the closing of its anchor Sears store. The decline of traditional malls was underway well before the Covid pandemic, reflecting the rise of on-line retail. Some large US mall sites are being redeveloped as denser mixed-use districts; a well-known example, spurred in part by new transit connections is Northgate in Seattle, whose lead owner, the Simon Property Group, is lead owner of Pheasant Lane as well. Simon representatives interviewed for this study in 2022 saw a potential repositioning opportunity at Pheasant Lane, supported by the rail project, as did representatives of Seritage Growth Properties, owner of the former Sears real estate portfolio.[14]

A significant percentage of the station area is located across the state line in Tyngsborough, MA, separated from the future train platform only by the invisible border. The New Hampshire tax advantage notwithstanding, vacant land within a five-minute walk of the train to Boston is a valuable commodity. Tyngsborough would have the opportunity to promote TOD on its side of the line, gaining property tax revenues, and perhaps hotel and meals tax revenues as well, with less traffic than would otherwise be possible and a commuting experience superior to driving on Route 3. Tyngsborough is also home to several warehousing/logistics centers, for which the Route 3 location, nearby access to I-495, and a location central to Southern New Hampshire, the Merrimack Valley, and the northern arc of Route 128 is highly attractive.

2.2 Future Development

The development potential for each station area was measured by the estimated demand for new commercial, industrial, and multifamily residential space by 2040, ten years after the projected opening of Capitol Corridor rail service in 2030. The demand estimates were conducted within an analytic boundary consisting, for each station, of one or two Traffic Analysis Zones (TAZ) selected by the study team for purposes of a tax increment financing (TIF) analysis conducted for this Project. The selected TAZs lie principally, but not entirely, within each station's half-mile radius, with some spillover into the one-mile radius. The resulting estimates of future development are thus conservative, in that development influenced by the train but occurring outside the analytic boundary is not captured. The selected TAZs contain virtually no single-family residential development.

Our estimates represent the combination of "natural" or "background" growth which might occur anyway and "net new" growth reasonably attributable to the Project. The estimates do not attempt to quantitatively separate the two; however, based on interviews with planning officials and other stakeholders, observation of recent trends on the ground, and site-specific factors explained below, much of the estimated demand can be reasonably attributed to the addition of rail service and the cumulative effects of transit-oriented development.

Moreover, to the extent that some of the projected development might indeed occur in the Manchester-Nashua corridor without the Project, it can reasonably be assumed that it would be more dispersed, more automobile-dependent, less equitable and sustainable, and slower to materialize. Strategically located train stations can affect not only the amount of future development, but its location, form, and timeframe.

was effectively 9.6% of income, 16th-lowest in the country; the Massachusetts burden was 11.5%, 37th-lowest. It should also be remembered that employees who li9ve in New Hampshire but commute to work in Massachusetts pay Massachusetts state income tax. See, among other annual analysis, The Tax Foundation, https://taxfoundation.org/publications/state-local-tax-burden-rankings/.

[14] The study team's discussions with Simon and Seritage were high-level in nature; no specific plans or commitments were expressed.

Population and employment growth factors were estimated based on TAZ-level forecasts and were applied to the existing 2021 population and employment figures to estimate growth by 2040.[15] Employment growth was segmented into retail, office, and industrial components based on Workplace Area Characteristics (WAC) employment distribution data by industry, provided by Longitudinal Employer-Household Dynamics (LEHD).

To translate future retail, office, and industrial employment growth into a corresponding demand for built space, the forecasted increase in employees was multiplied by the corresponding average anticipated availability of square feet per retail, office, and industrial employee, adjusted by an occupancy rate of 95%. To estimate future demand for residential units, the forecasted population increase in 2040 was divided by the population per occupied dwelling unit, based on ESRI Business Analyst data. The analysis assumed a 5% decrease in average household size between 2021 and 2040.

Additional considerations reflected in the analysis include:

- For Manchester Station, the TOD Plan published in 2020 and described previously predicted a total of 1,802 multifamily residential units, including a set of catalytic projects with 861 units and subsequent, follow-on projects adding 941. The Plan estimated an initial 92,000 square feet of retail development and a total of 198,000, and an initial 363,000 square feet of office space in the catalytic phase and a total of 785,000.[16] Our estimate assumed, conservatively, that the "catalytic" phase of development would be built by 2040, and the Manchester estimates in Table 4, based on the population and employment demand methodology described above, include those numbers.
- For the South Nashua station area, based on professional estimates from the larger Project team, future development of 1,000 multifamily units (in Nashua) and 520,000 square feet of new warehouse/logistics development (in Tyngsborough) was assumed. The warehouse estimate is included in the somewhat larger "industrial/flex" number in Table 4.
- For Crown Street, the low estimates produced by our analysis are consistent with the largely infill nature of the TOD opportunity. That said, it would be reasonable to expect more development by 2040 than these results indicate.[17]

Table 5 presents the estimated retail, office, industrial, and residential development potential for each station area—a projection amounting to about 4,500,000 square feet of built space in the aggregate.[18] About half of this potential future buildout is multifamily residential, half commercial and industrial. The long-term regional economic impacts of the commercial/industrial component are addressed later, in Section 3.4.

[15] Employment and population growth were forecasted based on a TAZ analysis developed my AECOM for the Tax Increment Financing analysis conducted for this Project.

[16] https://www.snhpc.org/sites/g/files/vyhlif5006/f/pages/final_tod_plan_sept-20.pdf

[17] The potential for reinvestment in industrial uses may also be understated; the methodology recognizes new industrial construction on unused land, but not modernization of existing industrial uses.

[18] The multifamily units are assumed to have an average size of 1,150 gross square feet.

Table 5. Station Area Development Potential by 2040

	Retail (sqft)	Office (sqft)	Industrial/Flex (sqft)	Residential (units)
Manchester	341,000	543,000	184,000	910
Bedford/MHT	1,000	3,000	4,000	20
Crown Street	9,000	5,000	50,000	20
South Nashua	338,000	16,000	741,000	1,010
Total	**689,000**	**567,000**	**979,000**	**1,960**

Source: AECOM 2022; sq ft rounded to the nearest thousand; residential units rounded to the nearest ten

The methodology used in this analysis was intentionally conservative, given that one of its purposes was to forecast property valuation increases and associated real estate tax increments as part of the Project's financial analysis. The resulting development projections are conservatively low for Manchester and South Nashua and very low for Bedford-MHT and Crown Street. This is largely a function of existing land use patterns as they are reflected in the TAZ-level population and employment projections developed by the study team.

A second data point is available in the form of the future development estimates created as part of the Project's 2014 Alternatives Analysis.[19] Using land use and zoning data and a less conservative set of assumptions, the 2014 analysis produced the following estimates for the three comparable station sites:

Table 6: Station Area Development Potential, 2014 Analysis

	Commercial (sqft)	Residential (units)
Manchester	567,000	1,360
Bedford/MHT	245,000	0
Crown Street	155,000	1,110

Source: Capitol Corridor Rail Transit Alternatives Analysis (2014), Appendix 7.

Estimates of future development should always be understood as approximations, in terms of volume, mix of uses, and timeframe. Taken together, the 2022 analysis reported here and the earlier one completed in 2014 suggest that Manchester and South Nashua represent regionally significant opportunities for mixed-use transit-oriented development. Crown Street is an opportunity to strengthen the east side of Nashua's central core. Bedford-MHT is an opportunity to attract and reinforce airport-related growth.

2.3 Impacts on Property Value

Station area development translates into higher property values, most obviously on the affected parcels but also on other, nearby properties whose value would be enhanced by the surrounding investment. Moreover, there is an established body of research demonstrating that

[19] New Hampshire DOT, Capitol Corridor Rail Transit Alternatives Analysis (2014), Appendix 7, Detailed Evaluation of Alternatives (https://www.nh.gov/dot/org/aerorailtransit/railandtransit/documents/fr-app-7-detailed-eval.pdf). For South Nashua, the 2014 report assumed that the preferred station site would be a location north of Spit Brook Road; a significant commercial development potential was projected, much of which is now under construction. The Pheasant Lane Mall site was assumed to remain principally in its established use, with minimal potential for new development. The 2014 projections are for a horizon year of 2030, reflecting the then assumed 2022 completion date for the rail project.

properties near rail stations experience an "uplift" in value simply as a result of the enhanced amenity and mobility.

2.3.1 Literature Review

One attribute that often influences housing values is proximity to public transit. A 1994 study examining single-family home prices near rail stations in metropolitan Boston, MA found that communities with rail stations had 6.7% higher property values.[20] Debrezion et al. found a strong relationship between station distance and property values, with residential buildings costing 4.2% more in station-adjacent regions than those in areas without station access.[21] Cervero and Duncan found a 10-46% residential premium in San Diego for properties near commuter rail stations.[22]

The proximity to transit has also been shown to influence the value of commercial properties. Nelson et al. found significant office rent premiums in Dallas (TX) near commuter rail stations, with almost a quarter of the premium extending out nearly one mile from the station.[23] In addition, Cervero and Duncan found a 72-91% increase in premiums of commercial parcels in San Diego for properties near light rail stations.[24] Debrezion et al. found that commercial properties within a quarter-mile of a station cost 16.4% more than buildings outside the quarter-mile range.[25]

A report on the use of TOD-related value capture financing in Massachusetts cited a body of research in which transit proximity exerts a positive effect on property values, typically in the range of 5-15%.[26] A study conducted by the American Public Transportation Association (APTA) and National Association of Realtors (NAR) analyzed the relationship between access to transit and property values in seven US metro regions, including Greater Boston, between 2012 and 2016—the years of emergence from the Great Recession. The results found that median commercial sales prices in the MBTA "transit shed" rose 24% more than those outside the transit shed over the study period. During the same period, median residential sales prices in the transit shed rose 45% more than those outside the transit shed. Transit shed average rents rose by 4%, while rents outside the transit shed fell by 1%. A similar pattern was found in all seven metro regions.[27]

[20] Armstrong Jr, R. J. (1994). Impacts of commuter rail service as reflected in single-family residential property values. *Transportation Research Record*, (1466).

[21] Debrezion, G., Pels, E., and Rietveld, P. (2007). The impact of railway stations on residential and commercial property value: A meta-analysis. *The journal of real estate finance and economics*, *35*(2), 161-180.

[22] Cervero, R., and Duncan, M. (2002). Land Value Impacts of Rail Transit Services in San Diego County. June 2002.

[23] Nelson, A. C., Eskic, D., Hamidi, S., Petheram, S. J., Ewing, R., & Liu, J. H. (2015). Office rent premiums with respect to light rail transit stations: Case study of Dallas, Texas, with implications for planning of transit-oriented development. *Transportation Research Record*, *2500*, 110-115.

[24] Cervero and Duncan, *loc. cit.*

[25] Debrezion et al., *loc. cit.*

[26] Strategic Economics. Expanding the Use of Value Capture for Transportation and TOD in Massachusetts. January 20, 2017. https://www.mapc.org/resource-library/expanding-the-use-of-value-capture-for-transportation-and-tod-in-massachusetts/

[27] https://cdn.nar.realtor/sites/default/files/documents/the-real-estate-mantra-locate-near-public-transportation-10-14-2019.pdf. The transit sheds defined in the APTA/NAR study are the aggregate of all half-mile station radii or "buffers" within a particular metro region. In each of the metro regions, the study considered the combined transit shed incorporating all modes, as well as the modal transit sheds for rapid rail, commuter rail, bus rapid transit, etc.

2.3.2 Property Value Analysis

The study team has estimated property value impacts in the areas surrounding the Project's four proposed stations. The station area covered by this property value analysis is the same TAZ-based analytic boundary as that used previously for estimating station area development potential. Table 7 shows the existing valuation of the properties in each station area by property type.

Table 7. Existing Property Values by Land Use Type (2021$)

	Retail	Office	Industrial	Residential	Total
Manchester	$141,400,000	$91,700,000	$77,800,000	$98,000,000	$408,900,000
Bedford/MHT	$7,000,000	$2,000,000	$15,900,000	$30,000,000	$54,900,000
Crown Street	$11,200,000	$200,000	$32,600,000	$48,200,000	$92,200,000
South Nashua	$486,900,000	$11,800,000	$50,400,000	$32,700,000	$581,800,000
Total	**$646,500,000**	**$105,700,000**	**$176,700,000**	**$208,900,000**	**$1,137,800,000**

Source: AECOM 2022; Manchester, Nashua, CAMA GIS data; CoStar; values rounded to the nearest hundred-thousand. [28]

A 5% baseline premium was applied to the future values of existing property in each land use type, to represent the across-the-board "uplift" derived from the introduction of rail service. This percentage is at the low end of the range for generalized proximity premiums.

To estimate anticipated increases in residential property valuation due to *future* development, the estimated demand for multifamily housing of five or more units around each station was applied to the average value per multifamily unit; this was calculated by dividing the total value of multifamily properties by the number of multifamily dwelling units. Similarly, to estimate the increase in commercial valuation due to future development, the estimated demand for retail, office, and industrial space around each station was applied to the value per square foot of each respective commercial land use type, calculated by dividing the total value of properties in that type by the total number of square feet.

A new development premium for each type of property, as shown in Table 8, was applied to the projected future development, reflecting the increased attractiveness of transit locations once the market has begun to respond.[29]

[28] Also: Nashua, New Hampshire's Gate City, *FAQ – Assessing – Point 1*. Values collected 6/9/22. https://www.nashuanh.gov/Faq.aspx; The City of Manchester, NH, *Tax Rates.* Values collected 6/9/22. https://www.manchesternh.gov/departments/assessors/tax-rates; Town of Bedford, NH, *Assessing*. Values collected 6/9/22. https://www.bedfordnh.org/149/Assessing.

[29] The retail, office, and residential premiums are in the range identified in the several studies cited above. For new industrial development, the premium applied was 50%—not because industrial development is particularly attracted to, or advantaged by, rail transit, but because new industrial facilities are likely to be more modern, efficient, and productive than older ones, whether near a train station or not.

Table 8. New Development Premium

Property Type	Premium
Retail	15%
Office	25%
Industrial/Flex	50%
Residential	15%

Source: AECOM 2022

Applying the approach described above, an aggregate increase of $563.5 million in property valuation was estimated to occur by 2040. Table 9 summarizes the impacts on property value by land use type around each proposed station. This $563.5 million estimate represents ***an increase of 50%*** over the existing cumulative valuation of $1.1 billion (see Table 7 above). This gain in valuation represents not only an addition of wealth and capital in the corridor, but a dramatic increase in the tax base of the affected municipalities.

Table 9. Incremental Property Value By Land Use Type by 2040 (2021$)

	Retail	Office	Industrial	Residential	Total
Manchester	$62,000,000	$78,800,000	$25,200,000	$173,000,000	**$339,000,000**
Bedford/MHT	-	-	-	$3,700,000	**$3,700,000**
Crown Street	$1,100,000	$1,100,000	$2,300,000	$900,000	**$5,400,000**
South Nashua	$84,000,000	$2,100,000	$39,100,000	$90,200,000	**$215,400,000**
Total	**$147,100,000**	**$82,000,000**	**$66,600,000**	**$267,800,000**	**$563,500,000**

Source: AECOM; property values rounded to the nearest hundred-thousand.

3. Regional Economic Benefits

3.1 IMPLAN

AECOM used IMPLAN modeling software to estimate the broader economic benefits to be generated by the Project. IMPLAN derives its data, ratios, and multipliers from the U.S. Department of Agriculture (USDA); the U.S. Department of Commerce Bureau of Economic Analysis' (BEA) Regional Economic Accounts; U.S. Bureau of Labor Statistics (BLS) data; U.S. Census Bureau data; and the Leontief inversion of the IMPLAN data matrices (i.e., the input-output methodology).

To forecast the impacts of the rail project itself, this analysis used IMPLAN model version 6.7, released June 8, 2022. The study area for this analysis included the State of New Hampshire and the Commonwealth of Massachusetts. The types of impacts examined in this analysis included:

- short-term benefits as a result of spending on construction for the new stations, track, and a layover facility in New Hampshire; as well as the construction of new track and related infrastructure upgrades in Massachusetts on the MBTA owned portion of the line between Lowell station and the NH state line;
- long-term recurring benefits as a result of spending on O&M of the proposed stations, facilities and track;
- future, periodic benefits from investment in infrastructure renewal as each major component approaches the end of its useful life.

IMPLAN captures the economic impacts described above in the following categories:

Employment: The total annual average jobs include self-employed and wage and salary employees, and all full-time, part-time, and seasonal jobs, based on a count of full-time/part-time averages over twelve months. (This is the same definition used by Quarterly Census of Employment and Wages, Bureau of Labor Statistics, and Bureau of Economic Analysis nationally). Employment effects are expressed in job-years, which are defined as one job per person per year. For example, three job-years (hereafter "jobs") are equal to three people performing a job for one year, or one person performing a job for three years.

Labor Income: Labor income represents all forms of annual employment earnings; it is the sum of employee compensation and proprietor (self-employed) income.

Value Added: Value added consists of employee compensation, proprietary income, other property type income (which includes industry profits), and indirect business taxes. Value-added is an estimate of the gross regional or state product.

Economic Output: In IMPLAN, annual sales or revenues are equivalent to annual economic output or the value of production by industry. Output can be measured either by 1) total value of purchases by intermediate and final consumers, or by 2) intermediate outlays plus value added. Economic output is the sum of intermediate inputs - the materials and services (other than employment) required by an industry to create its products - and value added.

Impact measures include direct effects, secondary (multiplier) effects and the total economic effects (the sum of the direct and the secondary effects). The secondary effects include both indirect and induced effects, as defined below:

Direct Effect: In the impact area in which a project or economic activity is located, the "direct output (i.e., sales or revenues) effect" represents that proportion of the spending or sales in each industry that flows to material and service providers in the impact area. For employment, labor income, and Gross Regional Product measures, the direct effect represents the jobs, labor income, and gross regional product associated with the directly affected industry.

Indirect Effect: The indirect effects include the backward-linked industry suppliers for goods and services that support the directly affected industries, supporting indirect jobs, labor income, value added, and economic output. For example, if construction activity is the direct effect, indirect business supporting construction would include architectural and engineering, lumber suppliers, trucking, steel manufacturers, among others; these are considered backward-linked industries supporting the construction activity.

Induced Effect: The induced effect occurs from household expenditures or consumer spending associated with the direct and indirect workers spending their earnings within the impact area, supporting induced economic output, jobs, labor income, and gross regional product.

3.2 Impacts from Capital Expenditures

The analysis describes the impacts from the capital spending of the Project. All four proposed stations and the layover facility will be constructed in New Hampshire; therefore, all construction costs associated with the proposed stations and the layover facility will occur in New Hampshire. Costs of Guideway and Track Elements, Sitework and Special Conditions and

Systems were allocated based on the track length to be constructed in New Hampshire and Massachusetts to represent the construction in the two states, respectively.[30]

Table 10 summarizes the capital cost inputs to IMPLAN. Costs of Right-of-Way (ROW) and Trackage Rights are excluded from the analysis as no economic impacts would be associated with these activities. Fifteen percent (15%) of the costs of Rolling Stock (bi-level coaches) were included in this analysis for Massachusetts to account for the costs associated with coach procurement.

Table 10. Capital Cost Allocation (millions of 2022$)

Cost Elements	Costs	Percentages of Total Costs by State		Costs by State	
		NH	MA	NH	MA
Guideway and Track Elements	$91.6	70%	30%	$64.1	$27.5
Stations	$36.1	100%	0%	$36.1	$0.0
Layover Facility	$13.5	100%	0%	$13.5	$0.0
Sitework and Special Conditions	$60.4	70%	30%	$42.3	$18.1
Systems	$90.2	70%	30%	$63.1	$27.1
Construction Subtotal	$291.8			$219.1	$72.7
Contingency (25% of Construction Subtotal)	$73.0			$54.8	$18.2
Construction Total	$364.8			$273.9	$90.8
Professional Services/Soft Costs	$109.4			$82.2	$27.2
ROW and Trackage Rights*	$26.0			$8.0	$18.0
Rolling Stock	$42.9	0%	100%	$0.0	$42.9
Project Subtotal	$543.1			$364.1	$179.0
Unallocated Contingency (10%)	$54.3			$36.4	$17.9
Total Project Costs	$597.4			$400.5	$196.9

* Costs of ROW and Trackage Rights are site-specific and are excluded from the IMPLAN analysis
Source: AECOM April 2022; all costs rounded to the nearest tenth

Total capital costs were annualized over the construction period (2027-2030), as all economic impacts reported by IMPLAN are in annual terms. As shown in Table 11, activities associated with capital expenditures would support approximately 470 direct jobs in railroad construction and transportation-related activities, 410 indirect jobs, and 390 induced jobs, leading to a total of 1,270 jobs for New Hampshire annually. Direct labor income associated with capital expenditures is estimated to be $57.4 million per year over the construction period. Indirect labor income and induced labor income associated with capital expenditures amount to $30.8 million and $22.4 million, respectively. In all, $110.6 million in labor income would be generated per year in New Hampshire from the construction of the Project. The annual total value added associated with capital expenditures is $110.3 million, and the ***total annual economic output is $278.7 million***.

[30] The Project includes approximately 9 miles and 21 miles of track improvements in Massachusetts and New Hampshire, respectively.

Table 11. Annual Impacts from Capital Expenditures in New Hampshire

Impact Type	Employment	Labor Income (2022$)	Total Value Added (2022$)	Output (2022$)
Direct Effect	470	$57,419,000	$23,649,000	$133,358,000
Indirect Effect	410	$30,803,000	$46,870,000	$80,414,000
Induced Effect	390	$22,399,000	$39,807,000	$65,000,000
Total Effect	**1270**	**$110,621,000**	**$110,326,000**	**$278,772,000**

Source: IMPLAN; dollar values rounded to the nearest thousand; employment values rounded to the nearest ten

Impacts from capital expenditures in Massachusetts are summarized in Table 12. Activities associated with capital expenditures would support approximately 130 direct jobs, 110 indirect jobs, and 100 induced jobs, leading to a total of 340 jobs for Massachusetts annually. Direct labor income associated with capital expenditures is estimated to be $14.2 million per year. Indirect labor income and induced labor income associated with capital expenditures amount to $9.3 million and $7.1 million, respectively. In all, $30.5 million in labor income would be generated per year in Massachusetts from the construction of the Project. The annual total value added associated with capital expenditures is $42.5 million, and the ***total annual economic output in Massachusetts is $88.7 million***.

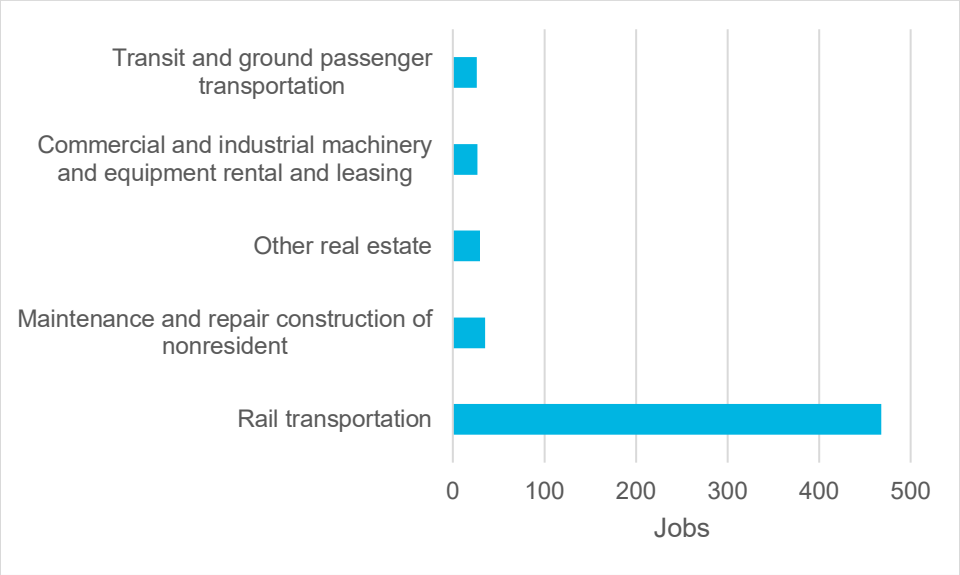
Table 12. Annual Impacts from Capital Expenditures in Massachusetts

Impact Type	Employment	Labor Income (2022$)	Total Value Added (2022$)	Output (2022$)
Direct Effect	130	$14,164,000	$16,362,000	$46,627,000
Indirect Effect	110	$9,278,000	$14,246,000	$23,050,000
Induced Effect	100	$7,053,000	$11,924,000	$18,968,000
Total Effect	**340**	**$30,495,000**	**$42,532,000**	**$88,646,000**

Source: IMPLAN; dollar values rounded to the nearest thousand; employment values rounded to the nearest ten

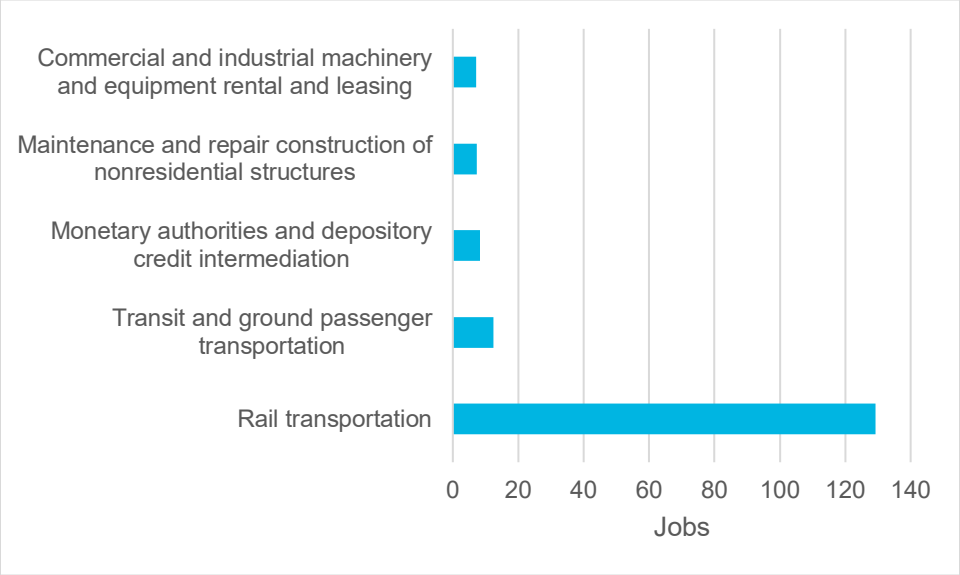
Figures 9 and 10 the top five industries with the highest employment impacts (direct, indirect, and induced) associated with the Project's capital expenditures. The industry with the highest employment impacts is Rail Transportation, with approximately 420 and 120 jobs created annually in New Hampshire and Massachusetts, respectively.

Figure 9. Top Five Construction Employment Industries in New Hampshire



Source: IMPLAN

Figure 10: Top Five Construction Employment Industries in Massachusetts



Source: IMPLAN

3.3 Impacts from Other Project Expenditures

3.3.1 O&M Impacts – Infrastructure and Labor

The IMPLAN analysis considered the immediate direct impacts of the O&M expenditure, as well as the long-term impacts associated with the ongoing O&M activities. O&M costs associated with train crew, spare crew, added daily coach cleaning, locomotive fueling, overnight supervision and layover maintenance would be incurred in New Hampshire. O&M expenditures

associated with train dispatch, maintenance labor, maintenance materials and added monthly coach cleaning would occur in Massachusetts. Costs of station and layover facility maintenance have been allocated to New Hampshire, where all four proposed stations and the layover facility would be located. Costs of maintenance-of-way would be incurred primarily in New Hampshire, where over two-thirds of the route mileage is located. The costs of rail tests and grinding were estimated based on the length of track to be constructed in each state (approximately 70% in New Hampshire and 30% in Massachusetts). Costs of weekend services by state were estimated based on the share of the total weekday costs of transportation, maintenance of rolling stock, and maintenance-of-way in each respective state.

Since the types of economic impacts generated from labor and non-labor activities differ, O&M cost elements were re-organized into two cost categories – labor and infrastructure. Table 13 summarizes the annual O&M cost inputs to IMPLAN by state.

Table 13. Cost Inputs for O&M Impacts - Infrastructure and Labor (millions of 2022$)

O&M Cost Elements	States	
	NH	MA
Labor	$7.4	$3.8
Infrastructure	$2.3	$2.8

Source: AECOM 2022; all values rounded to the nearest tenth

Table 14 shows the aggregated impacts from labor and non-labor O&M activities. O&M activities would support an annual total of approximately 240 and 140 jobs in New Hampshire and Massachusetts, respectively; $8.3 and $5.2 million in labor income, respectively; and $17.9 million and $12.1 million in total economic, respectively—all on a recurring basis, year after year.[31]

Table 14. Annual O&M Impacts - Infrastructure and Labor

Impact Type	Employment	Labor Income (2022$)	Total Value Added (2022$)	Output (2022$)
New Hampshire				
Direct Effect	200	$5,562,000	$6,078,000	$9,946,000
Indirect Effect	20	$1,048,000	$1,651,000	$2,994,000
Induced Effect	30	$1,712,000	$3,038,000	$4,961,000
Total Effect	**240**	**$8,322,000**	**$10,767,000**	**$17,902,000**
Massachusetts				
Direct Effect	110	$3,177,000	$3,972,000	$6,665,000
Indirect Effect	10	$777,000	$1,224,000	$2,108,000
Induced Effect	20	$1,238,000	$2,082,000	$3,312,000
Total Effect	**140**	**$5,192,000**	**$7,278,000**	**$12,085,000**

Source: IMPLAN; dollar values rounded to the nearest thousand; employment values rounded to the nearest ten.

[31] The impacts of casualty and liability insurance payouts on the regional economy were also calculated. These are projected to add about $1.5 million in annual economic outputs in New Hampshire and $0.7 million in Massachusetts.

3.3.2 Infrastructure Renewal Impacts

Infrastructure renewal consists of replacement of deteriorating elements along the route that are anticipated to occur at the end of useful life of each construction component. These differ from the annual O&M costs (discussed in the previous section), as these costs are composed of expenditures to improve the existing condition of the infrastructure, as well as the estimated future expenditures on capital replacement, thus representing an estimated annual average cost for capital replacement over the useful life for each construction component.

Table 15 presents the economic impacts from periodic infrastructure renewal expenditures, which would support an average annual total of approximately 30 and 6 jobs in New Hampshire and Massachusetts, respectively. Annual total economic output associated with infrastructure renewal is estimated to be $7.5 million and $1.6 million in New Hampshire and Massachusetts, respectively.

Table 15. Annual Infrastructure Renewal Impacts

Impact Type	Employment	Labor Income	Total Value Added	Output
New Hampshire				
Direct Effect	10	$1,542,000	$635,000	$3,582,000
Indirect Effect	10	$827,000	$1,259,000	$2,160,000
Induced Effect	10	$602,000	$1,069,000	$1,746,000
Total Effect	**30**	**$2,971,000**	**$2,963,000**	**$7,487,000**
Massachusetts				
Direct Effect	2	$255,000	$295,000	$841,000
Indirect Effect	2	$167,000	$257,000	$416,000
Induced Effect	2	$127,000	$215,000	$342,000
Total Effect	**6**	**$550,000**	**$767,000**	**$1,598,000**

Source: AECOM 2022; dollar values rounded to the nearest thousand; employment values are rounded to the nearest ten

3.4 Impacts from Future Development

Finally, IMPLAN was used to estimate the regional economic impacts of future station area development, based on the buildout projections presented in Section 2.2. As noted previously, this development, by our conservative estimation methodology, amounts to about 4,500,000 square feet of built space, to be realized over time in response to market conditions. Creating these residential and commercial buildings will generate thousands of construction-related jobs, and hundreds of millions of dollars in payroll and spending, during the years in which they are being built. Then, once the commercial buildings open for business, their employee payrolls, the spending of those payrolls, and the purchase of goods and services by individuals and other businesses will send about ***one billion dollars*** in annualized economic output rippling through the regional economy *recurringly*, year after year.

This estimate reflects the set of IMPLAN output metrics described previously, including direct, indirect, and induced effects. For the projected retail development, the estimated annualized

economic output, in constant 2022 dollars, is $493 million; for the office component, $464 million.[32]

[32] AECOM 2022. Regional average annual outputs per square foot of retail and office space were used as inputs for IMPLAN to estimate the aggregate impacts of commercial activities.