Economic Trends and Opportunities in the Hampton Roads Region – Technical Memo

Introduction

To support development of economic drivers for use in the construction of scenario narratives, the project team reviewed and analyzed several sources of information on economic trends and opportunities for the Hampton Roads region. This memo summarizes the information reviewed in this effort and explains how this information provides the understanding of current and forecast economic conditions (including key trends and drivers of future economic conditions) necessary to support informed scenario analysis.

The following principles, developed in concert with HRTPO and the Regional Connector Study working group, were used to guide the economics research:

- **Exploring Greater Growth:** HRTPO's 2045 growth forecasts represent a baseline from which to pivot the scenario analysis. The alternative future scenarios will be developed to explore the implications of plausible *additional* growth.
- **A Focus on Different Economic Futures:** Incremental growth is to be held constant across the three alternative scenarios in order to focus on the implications of different visions of economic futures.
- **Relevance to Land Use and Travel Behavior:** Alternative economic futures used to structure the scenarios should be sufficiently different so as to result in different spatial patterns and types of development, with associated implications for travel patterns and modal reliance.

This memo is organized into the four areas of analysis:

- **Economic Risks and Opportunities:** This section reviews economic trends and performance in the region to identify risks and opportunities that should shape the scenario planning process.
- **Alternative Growth Rates:** This section reviews historic and forecast economic (job) growth for the region in order to select an appropriate level of incremental employment growth to test in alternative scenarios (and from which other demographic indicators are drawn).
- **Existing Industrial Base and Anticipated Growth Industries:** This section refines the growth outlook from the first section to add greater detail on an industry sector-basis,

anticipating which sectors could be expected to absorb job growth in future possible scenarios.

- **Outlook for Ports and Freight:** Because of the importance of maritime trade to the overall regional economy, this section provides detail on possible alterative port growth assumptions to provide differentiation between scenarios in terms of port competitiveness, truck/rail mode split, and growth in freight transportation.

Finally, the conclusion section explains how the project team distilled this information on economic trends into the three distinct alternative scenarios analyzed according to the methodology presented in the *Scenario Planning Methodology White Paper*.

Economic Risks and Opportunities

The Hampton Roads economy has faced several challenges in the past decade and a half. According to data published in HRPDC's 2018 Hampton Roads Regional Benchmarking Study, the region lost about 50,000 civilian jobs during the Great Recession (approximately July 2007-February 2010). Although the economy has since recovered this job loss, the region has only gained 3,600 jobs since 2007, despite growing in population by 82,000 in the same period.[1] The region has also lost approximately 30,000 military personnel since peaking around 130,000 personnel in 2003.[2] As is the case nationwide, Hampton Roads is currently experiencing decelerating population growth, an aging population, and decreasing labor force participation.

Beyond these high-level trends, the Hampton Roads Regional Benchmarking Study highlights several risks faced by the region, as revealed through benchmarking comparisons to other regions and the United States as a whole. These include:

- Weak growth
- An economy that remains highly reliant on military and civilian defense employment
- Income and wages that lag behind the United States as a whole

The employment to population ratio in Hampton Roads has not returned to its pre-recession peak. This sustained period of weak employment growth may signal underlying economic issues. In particular, employment in Hampton Roads is highly reliant on military personnel, federal civilians, and private employees in industries related to the Department of Defense (DoD), with a striking military location quotient of 8.14 (Figure 1).[3] Government employment constituted 25 percent of regional employment in 2013, of which half is uniformed military personnel and DoD

[1] Hampton Roads Regional Benchmarking Study, 13th Edition. Hampton Roads Planning District Commission (HRPDC). October 2018, pp. 24-28. Weblink.

[2] Ibid, p. 42.

[3] Local quotients identify comparative advantages by comparing regional employment distributions to national employment distributions. An LQ of greater than one suggests a comparative advantage.

civilians. However, regional government employment has experienced a gradual decline over the past several decades and even more so since the last recession. Furthermore, since the 1980s, regional employment has constituted a diminishing share of national employment due to declining military spending relative to economic growth. In the last decade, minimal enterprise growth and job creation in the Hampton Roads market have limited competitive economic growth within private industries. As such, the Hampton Roads Region has been confronted with the difficult challenge of developing well-paying employment opportunities that simultaneously meet the needs of existing regional employers (particularly in the military sector) while also supporting a greater strategic diversity of industry clusters in the region.

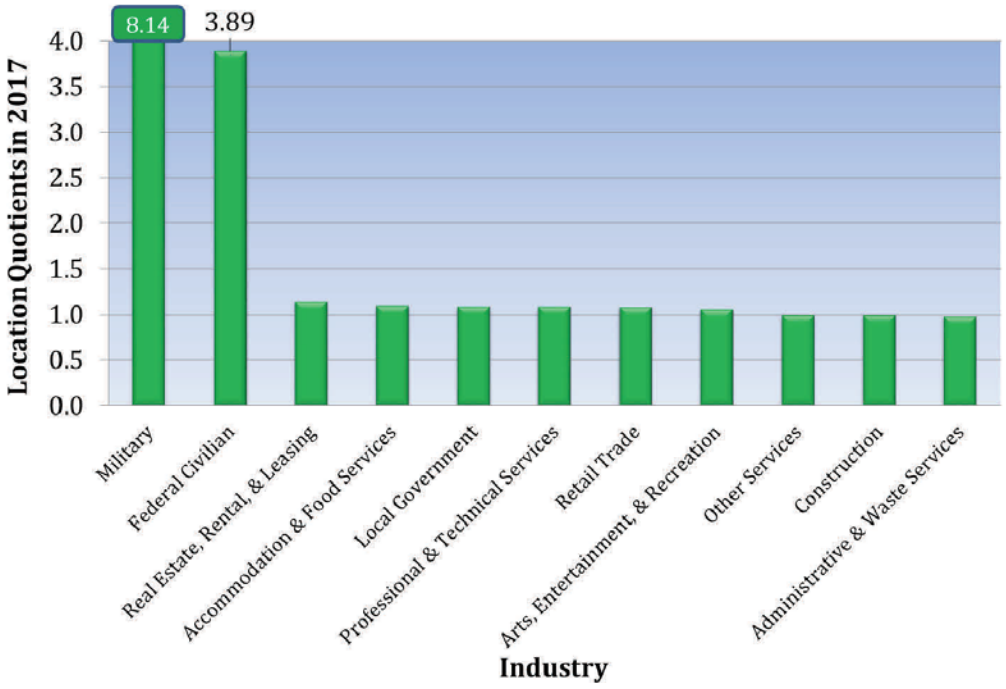

Figure 1 Current Industry Clusters – Hampton Roads Location Quotients by Industry. Source: Bureau of Labor Statistics, HRPDC Regional Benchmarking Study.

Despite these job growth challenges, the regional unemployment rate (including employed military personnel) declined to 3.0 percent in July 2017 and Hampton Roads' labor market continues to be very tight. Nonetheless, regional per capita incomes are $3,000 lower than the U.S. metropolitan area average, as of 2016. Average weekly wages have lagged the U.S. average since 2011. Additionally, income from wages and salaries have declined since the beginning of the Great Recession, even as total incomes have grown as the result of growth in other income categories, particularly personal transfers (i.e., government benefits).

While the Hampton Roads Region has experienced some growth since 2010, that growth has been slight compared to many similar sized metropolitan areas, as well as the average growth for U.S. metropolitan areas. Gross product growth (the value of all the goods and services produced within a geographic in a year) in Hampton Roads has lagged employment and labor income. Between 2001 and 2007, real gross product grew at annualized rate of 3.3 percent; however, since the recession, the regional economy has declined by an annualized rate of 0.24

percent when controlling for inflation. From 2014 to 2017 annualized growth in gross product in the Hampton Roads Region has lagged nearly all other metropolitan areas with population between 1 and 4 million.

Dependence on a handful of industries is frequently identified as a risk to the Hampton Roads regional economy. The HRPDC's Regional Economic Development Strategy identifies the need for a regional transformation that overcomes such dependency.[4] To do so, the report recommends a two-fold strategy:

1. Maintaining and growing three pillars of the regional economy (federal, port/maritime, and tourism/arts & culture), and
2. Nurturing regional assets that have the most realistic chance of diversifying the economy.

Similarly, HRTPO's 2019 State of the Region Report[5] identified the following strategies for combating industry dependency in Hampton Roads:

- Diversifying the economic base and developing new industry for the future
- Gaining public support for and appreciation of the economic value of our regional assets
- Maintaining and growing the three pillars of the regional economy – the Port, Tourism and our Federal assets
- Building on defense-related competencies that can be utilized in other industries
- Leveraging technologies developed at local colleges, universities and federal labs as well as commercial entities
- Improving commerce derived from industry, all of which is dependent on transportation infrastructure; we must make it easier for people and products to move within the region
- Significantly increasing quality of life for residents by leveraging the variety of attractions, arts and culture, venues and performances and recreational opportunities that exist in the region

Alternative Growth Rates

In the context of the risks and opportunities described above, the scenario planning process seeks to explore potential greater growth trajectories that could shape future transportation needs in the region. To construct these alternative scenarios, the project team first addressed two basic

[4] Hampton Roads Regional Economic Development Strategy (REDS), Hampton Roads Planning District Commission (HRPDC). September 2015. Weblink.

[5] As quoted in ibid. p. 34.

questions. First, what amount of additional employment growth over the 2045 baseline forecast is both plausible and sufficiently significant to test the impact of greater growth on regional connectors? Second, what might the composition of this growth look like? This section addressed the first question, while the next section addresses the second.

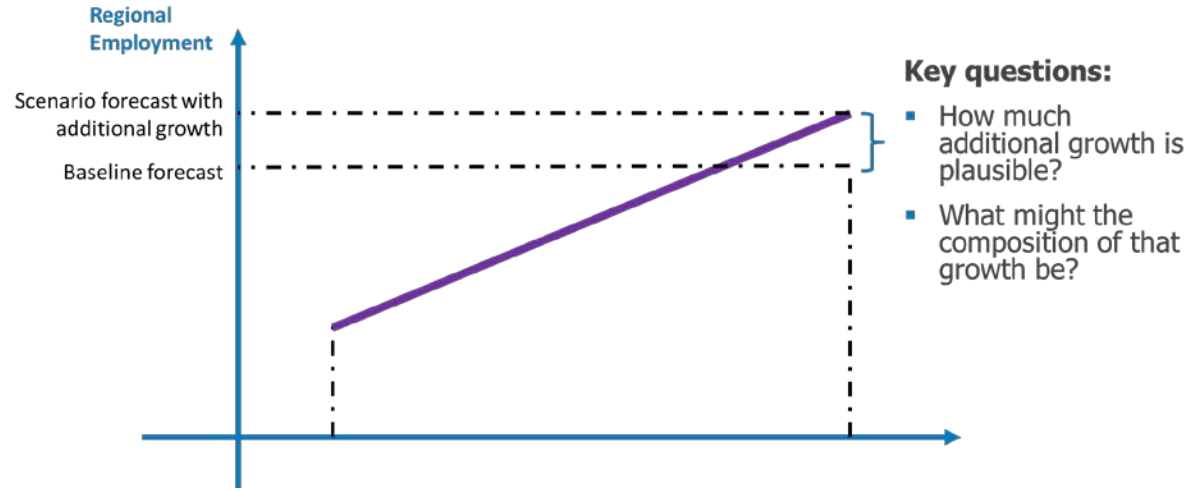

Figure 2. Stylized representation of incremental regional employment growth above HRTPO's 2045 baseline. This amount of growth will be held constant across all alternative scenarios, although the location and composition will vary.

To answer the first question, the project team followed an approach that leveraged alternative forecasts to provide guidance on the range of uncertainty inherent to long-term forecasting. The goal was to identify a single level of growth that offered a sufficient increment to "move the needle" in the land use and travel demand modeling, but also provided a believable narrative for the region's economy. This level of growth will serve as a constant control total for the alternative "Greater Growth" Scenarios. This level of growth is not meant to predict actual future growth, but rather to establish a level of additional growth against which to stress test the regional transportation system and ultimately the connector alternatives. The analysis focused on first on the potential for additional employment in order to explore possible future scenarios where the region becomes more competitive. Additional population growth would then follow from that employment growth – as greater demand for labor drives in-migration.

The project team considered the following inputs to identifying an appropriate control total for employment:

1. Retrospective employment growth in the region, compared to Virginia and the United States
2. HRTPO's 2045 Baseline forecast
3. Alternative future growth forecasts for the region, the state, and the country
4. Exploration of what a major "shock" to the economy—e.g., the opening of an employer the size of Amazon's "HQ2" in the region—might look like in terms of changes in growth trajectory and added regional employment

5. Travel model sensitivity testing

Beginning with the first step, the project team found that, relative to HRTPO, employment in the Commonwealth of Virginia has grown significantly faster, and the U.S. as a whole has grown slightly faster in the aggregate, as shown in Figure 3. Whereas the Hampton Roads region grew at an average annual rate of 1.35 percent from 1980 to 2010, Virginia grew 1.78 percent annually, and the United States grew 1.4 percent annually. The next 30 years of employment growth are forecast to be slower at all three geographies, as discussed below.

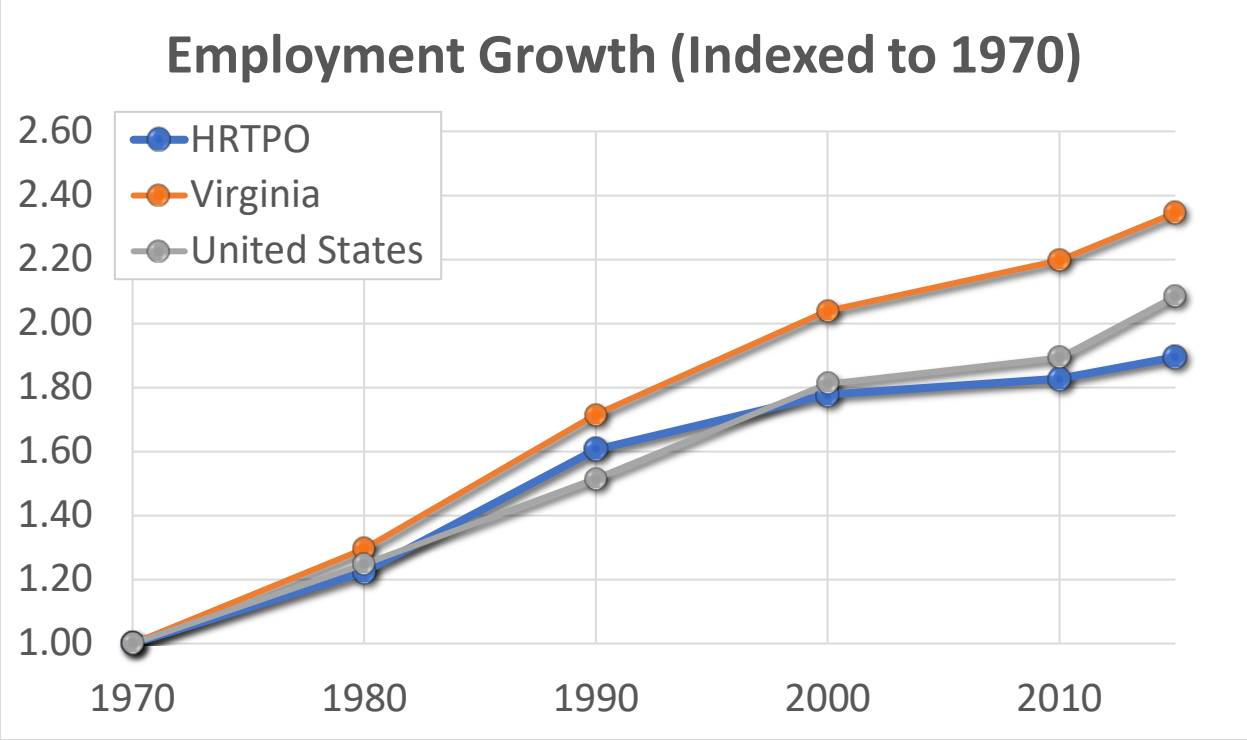

Figure 3. Regional, state, and national employment growth since 1970. Source: Bureau of Economic Analysis (HRTPO data as reported in 2045 Socioeconomic Forecast Report[6])

Continuing further in the process of choosing a control total growth rate, the project team considered HRTPO's 2015 employment (just over 1.0 million jobs) and the baseline employment growth through 2045 (approximately 81,000 jobs), as shown in the first column of Figure 4. These forecasts were generated using a REMI© model customized to the Hampton Roads region. The project team also compared these numbers to regional, state, and national growth rates from Moody's Analytics (columns 2 through 4 in Figure 4).[7] Finally, the project team illustrated the effect of a major employer opening in the region using expected employment estimates from the recent announcement of the Amazon "HQ2" location in Northern Virginia. That project is

[6] Hampton Roads TPO. Hampton Roads 2045 Socioeconomic Forecast and Transportation Analysis Zone Allocation. February 2019. Weblink.

[7] Moody's Analytics is another widely recognized provider of economic and industry research services, including region-specific long-range growth forecasts. Weblink.

currently estimated at 25,000 new jobs, but incentives from the Commonwealth of Virginia are approved for up to 37,850 jobs.[8] These job ranges are shown in columns 5-6 of Figure 4. The last column in Figure 4 illustrates potential multiplier (indirect and induced) effect on top of the higher estimate of direct jobs, based on research published by Chmura Economics.[9] This multiplier effect represents an upper bound estimate as it is based on multiplier effects calculated for the entire Virginia economy, rather than a single region.

With input from the working group, the project team chose to focus on the plausible greater growth boundaries of 12 to 21 percent growth in employment above 2015 levels as established by the more optimistic regional and Virginia growth forecast from Moody's. The "catalyst" effect of a major new employer is of a similar magnitude, further validating this range of consideration.

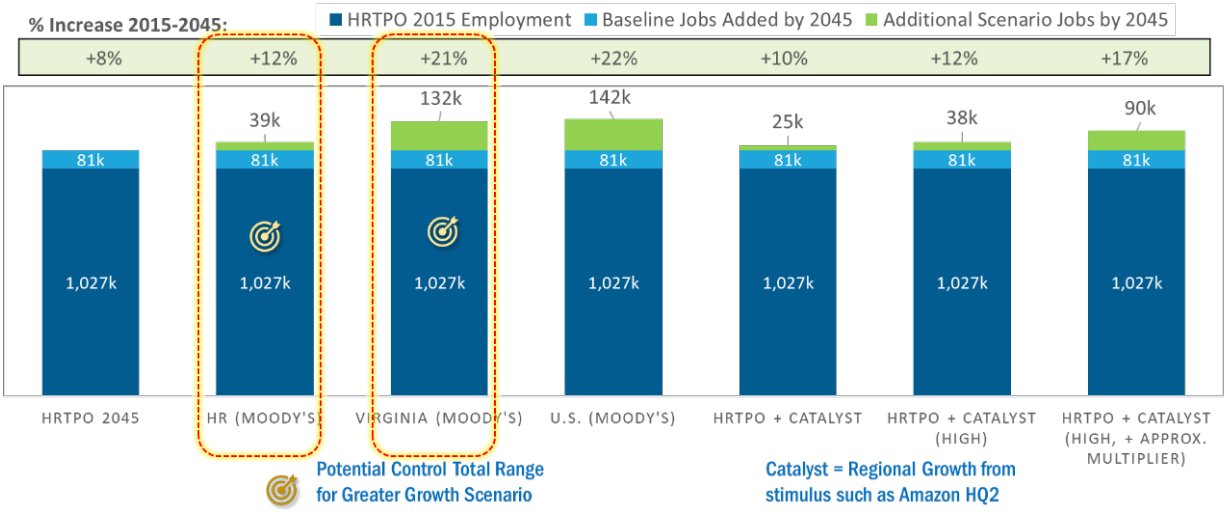

Figure 4. Comparison of HRTPO 2045 employment forecasts (i.e., 2015 employment plus baseline job growth) to multiple forecasts of stronger job growth. Based on input from the working group, the project team ultimately decided to set a control total growth rate in between the forecasts circled in orange (i.e., 12-21%).

Finally, the project team performed travel demand model sensitivity analysis to test the approximate effect of alternative control totals for greater employment growth on vehicle-hours level of travel at various levels of congestion, as shown in Figure 5. Considering the substantial regionwide congestion under the 2045 Baseline with the existing and committed network (shown in the callout box in Figure 5), the project team's sensitivity testing in the travel model showed that 12 percent growth above 2015 has only a mild effect relative to the baseline, while 21 percent growth above 2015 shows a much more significant (i.e. non-linear) increase in severe congestion.

[8] Schrott, Missy. "Northern Virginia Amazon HQ2 plans still on track." Alexandria Times. February 21, 2019. Weblink; SB 1255 Major Headquarters Workforce Grant Fund, Virginia's Legislative Information System, Weblink.

[9] Implied multiplier of 2.37 calculated based on the ratio between 25,000 direct jobs and 59,308 total jobs as cited in: Chmura, Chris. Economic Impact: How much will Amazon's new second headquarters benefit Virginia? Chmura. Weblink.

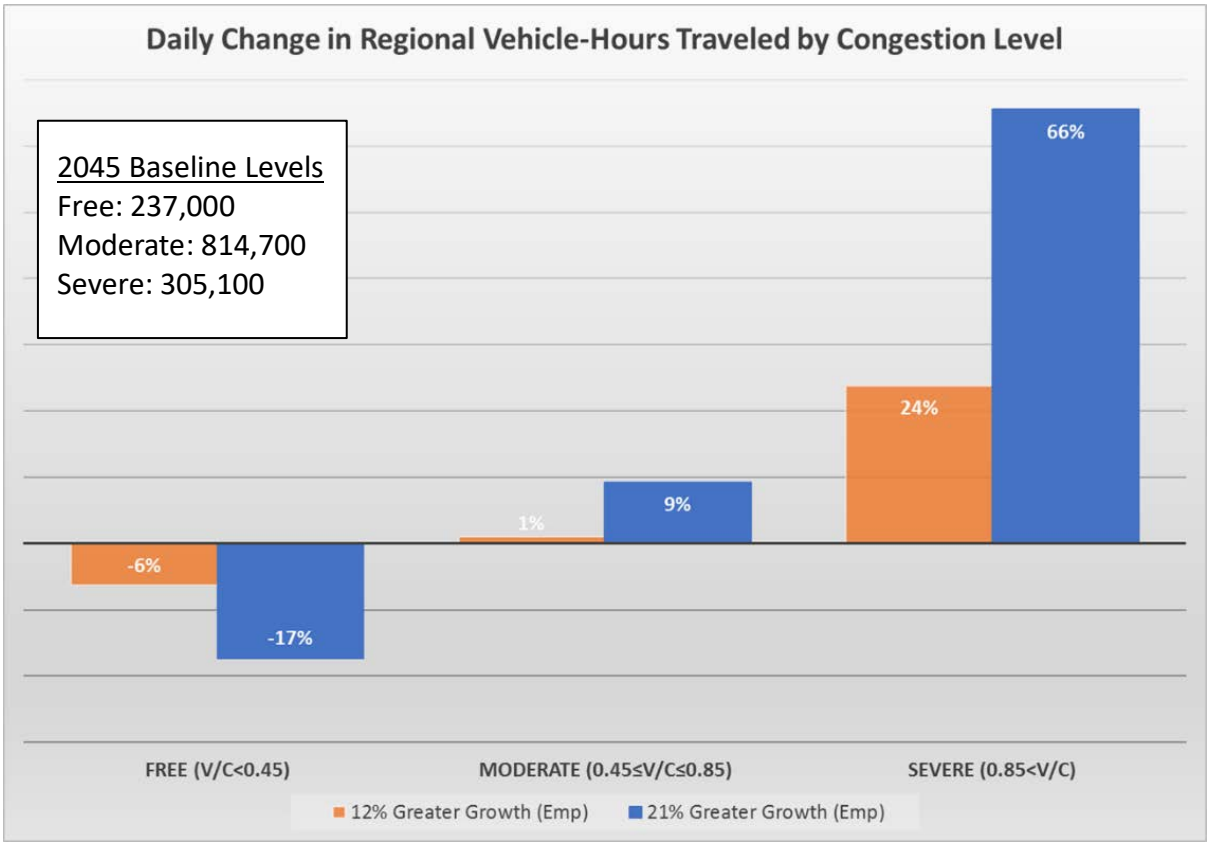

Figure 5. Effect of two levels of employment growth (12% and 21% above 2015 levels) on congestion in 2045. Derived from Hampton Roads Model (Ver. 1.2), September 2014.

The project team reviewed these inputs with the working group and steering committee and considered various goals and risks of selecting each possible control total, including the overall goal of providing enough differentiation between the scenarios. The goal was to set a growth rate that was not too low (which could dilute differences between scenarios) nor too high (which could result in widespread, severe congestion that would mask differences between scenarios). Furthermore, a 21 percent employment growth would imply that the region would keep pace with Virginia (and Northern Virginia) over the next 30 years, which seemed implausible given the risks and challenges presented in the previous section, as well as historic precedent. For that reason, the project team proposed a middle ground growth rate of 16 percent growth above 2015 employment, which roughly doubles the 2045 baseline employment growth forecast (i.e., it adds approximately 81,000 jobs for a total of 162,000 jobs over 2015 employment). This level of "greater growth" will subsequently be tested and refined if needed through the scenario modeling process.

Existing Industrial Base and Anticipated Growth Industries

As noted in the introduction to the previous section, in addition to setting an employment growth level, the project team was tasked with understanding how future economic development in the Hampton Roads region might affect industrial patterns of long-term regional growth, including employment by sector, in several alternative future scenarios. To help answer that question, the

following section summarizes economic development opportunities in the Hampton Roads Region, including information on identified target industries, their potential for growth, and major implications for regional industrial patterns of long-term growth.

To begin, the project team reviewed HRTPO's 2015 profile of socioeconomic data and its 2045 regional socioeconomic forecasts. Figure 6 provides an overview of the industry growth changes projected in the region between 2015 and 2045 according to HRTPO. Certain trends are immediately evident. First, the largest sources of employment growth forecast between 2015 and 2045 are *Health Services* and *Other Professional and Related Services*. Second, there is forecasted contraction of the region's dominant sector, *Government*, which according to its definition includes both the military and federal civilian employment as well as local government.

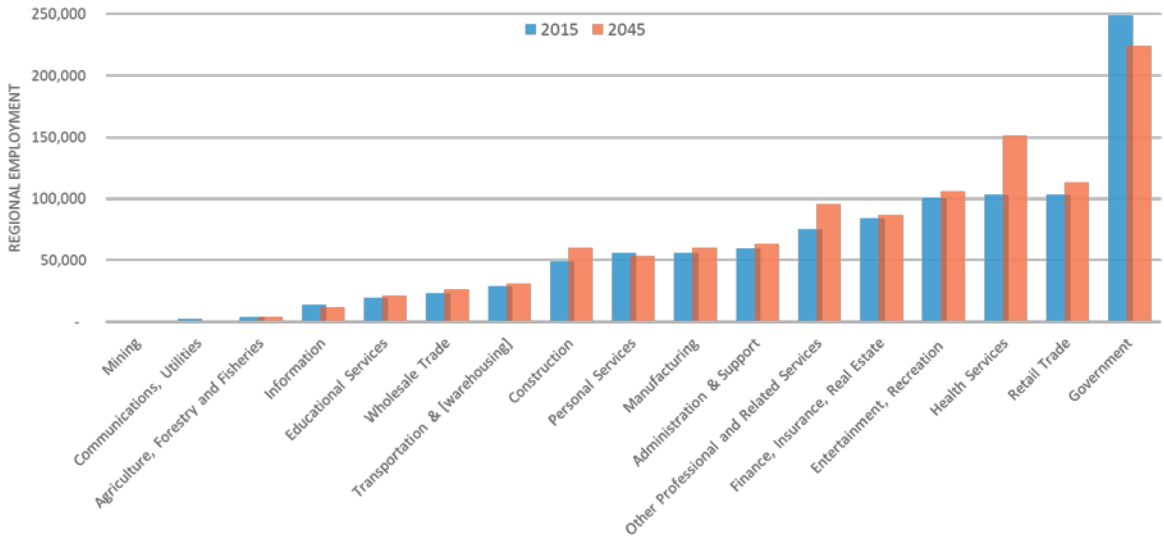

Figure 6. Forecast change in regional employment by sector, 2015-2045 Baseline. Source: HRTPO 2045 Forecast (developed using REMI).

In terms of present-day civilian employment, the three largest industry sectors in the Hampton Roads Region are professional and business services (including many government contractors), healthcare and social assistance, and leisure and hospitality, with the fastest job growth in recent years seen in healthcare and social assistance. From 2007 to 2017, the sectors with the sharpest loss in employment have been local government, manufacturing, and construction, largely due to a weak real estate market.

Looking forward, the Hampton Roads Economic Development Alliance's (HREDA) Go-to-Market Strategy[10] identifies five target business sectors for economic development in the Hampton Roads region: shared (business) services, software and information technology (IT), transportation technology, distribution, and food and beverage processing. The project team considered these sectors alongside the established pillars of the regional economy (federal, port/maritime, and tourism/arts & culture) as identified by HRPDC's most recent Regional

[10] 2019 Business Plan: Delivering Process Improvement and Competitive Priorities for the Region of Hampton Roads, Virginia Hampton Roads Economic Development Alliance (HREDA). September 2019. Weblink.

Economic Development Strategy (REDS) and Regional Benchmarking Study. Based on input from the working group, the project team also considered the following sources of information to identify potential opportunities for economic diversification in the Hampton Roads region:

- The 2017 Go Virginia Region 5 Growth and Diversification Plan[11]
- Documentation of opportunities associated with a potential "digital port" to take advantage of a new transatlantic data cable landing at Virginia Beach[12]
- Bureau of Labor Statistics on national industry trends[13]

This information provided a basis for defining potential scenario economic drivers that are specific to the Hampton Roads Region, with particular attention given to different potential economic diversification futures. From a synthesis of these sources, the project team identified nine target industry sectors or clusters to consider in creating three alternative greater growth scenarios:

- **Federal/military:** Includes armed services installations, civil servants supporting military operations, private defense contractors, and other federal agencies and contractors.
- **Maritime/transportation technology:** Specialized manufacture, assembly, and repair for maritime equipment, railcars, buses, trucks, sensors, aerospace, etc. Includes ship repair/shipbuilding, advanced materials and components, and unmanned systems/aerospace.
- **Water technologies:** Architecture, planning, and engineering for coastal areas/climate research. Includes engineering and technical consulting, as well as creative design.
- **Shared services:** High value internal support functions to corporate operations, including finance and human resources. Includes management and operations services.
- **Software development and IT:** Development of software applications, support and consulting services for U.S. and international markets. Includes cyber security, data analytics, and modeling and simulation.

[11] Go Virginia Region 5 Growth and Diversification Plan Biennial Update 2019. Prepared for the Region 5 Council by The Dragas Center for Economic Analysis and Policy at Old Dominion University. August 2019. Weblink.

[12] Glose, Bill. Transatlantic Cables Anchored in Virginia Beach Make the Area a Digital Port. The Business Magazine of Coastal Virginia. 2018 August 22. Weblink; Moss, Sebastian. Globalinx Data Centers moves forward with Virginia Beach campus. Data Center Dynamics. 2019 January 25. Weblink; Sawers, Paul. Google announces its first private transatlantic subsea cable, stretching from Virginia to France. Venture Beat. 2019 July 17. Weblink; Virginia Beach Dept. of Economic Development. Transoceanic Fiber Cables to Connect North America to Brazil and Europe from Virginia. Accessed 2019 February 22. Weblink.

[13] U.S. Department of Labor, Bureau of Labor Statistics, Employment Projection Data Tables, Industries. Tables 2.1-2.7. Accessed, November 2019. Weblink.

- **Data port-oriented development:** Includes data centers and data analytics. Offers a mix of job opportunities includes software engineers and data scientists, but also jobs with lower educational requirement (sales, security, service, etc.).
- **Distribution:** Regional distribution/logistics centers for the eastern U.S. market. Includes port operations, logistics, and warehousing.
- **Advanced manufacturing:** Specialized food and beverage manufacturing, medical equipment manufacturing, or other manufacturing from employers with high R&D spending and >20% of jobs requiring a STEM education.
- **Tourism/arts & culture:** Includes hospitality, entertainment, culinary businesses, traveler engagement, arts & culture, sporting events, and outdoor recreation.

These nine industry clusters together represent potential growth opportunities for the Hampton Roads Region that are both grounded in existing regional strengths and represent opportunities for economic diversification.

Outlook for Ports and Freight

The final economic driver for the project team to consider in its construction of scenarios was the regional outlook for port activity and related surface transportation freight flows. In this area, the project team reviewed expected trends at Port of Virginia facilities, including container volume growth and landslide mode share forecasts from the Port of Virginia's 2065 Master Plan.[14] The goal of considering port-related scenario drivers is both to address uncertainty in port growth trends by exploring greater growth and to understand the implications of alternative growth trajectories for the regional transportation network. Therefore, the scenario process considers not only the magnitude of goods movement through regional port terminals, but also opportunities for mode shift away from the road network. Adding a port element to the scenarios also is intended to help explore the spatial implications of different patterns of regional growth alongside port-related travel demand, in order to "stress test" the transportation system under plausible alternative futures.

Figure 7 shows the Port of Virginia's containerized volume forecasts for each the four major terminals in the region. The scenario development process focuses primarily on containerized volumes as these are represented as a distinct lever within the HRTPO travel demand model and also represent the greatest opportunities for growth. As shown in the charts, between 2015 and 2045, overall volumes are expected to more than double in the baseline scenario—which is built into HRTPO's baseline 2045 travel demand model. The Port of Virginia has also developed a high demand forecast that would add another 11 percent on top of that baseline growth.

[14] Data provided by the Port of Virginia.

Figure 8 shows the mode share for port flows in 2015 as well as forecast mode share in the 2045 baseline. Between 2015 and 2045, rail mode share across all terminals is forecast to hold steady at 32 percent, barge share is forecast to drop from 4 percent to 3 percent, and truck traffic is forecast to remain the dominant mode for handling goods movement in and out of the port terminals. There is some differentiation at the terminal level based on differences in landside transportation capacity. While this is the baseline forecast mode split, the Port of Virginia's has established a long-term target of achieving a 50% landslide rail mode share. Achieving this goal depends on a number of exogenous factors such as overall market conditions, relative costs across modes, and where and when the railroads (particularly Class I railroads) choose to make rail capacity investments. Scenario planning offers the opportunity to explore these uncertainties.

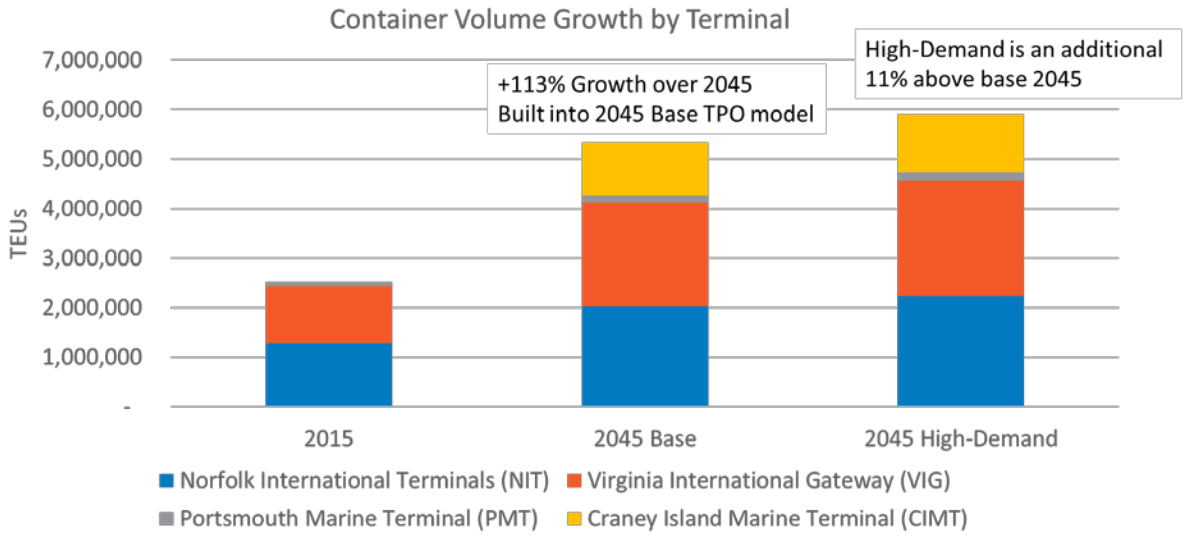

Figure 7. Container volume forecasts at four different Port of Virginia terminals. Source: Port of Virginia.

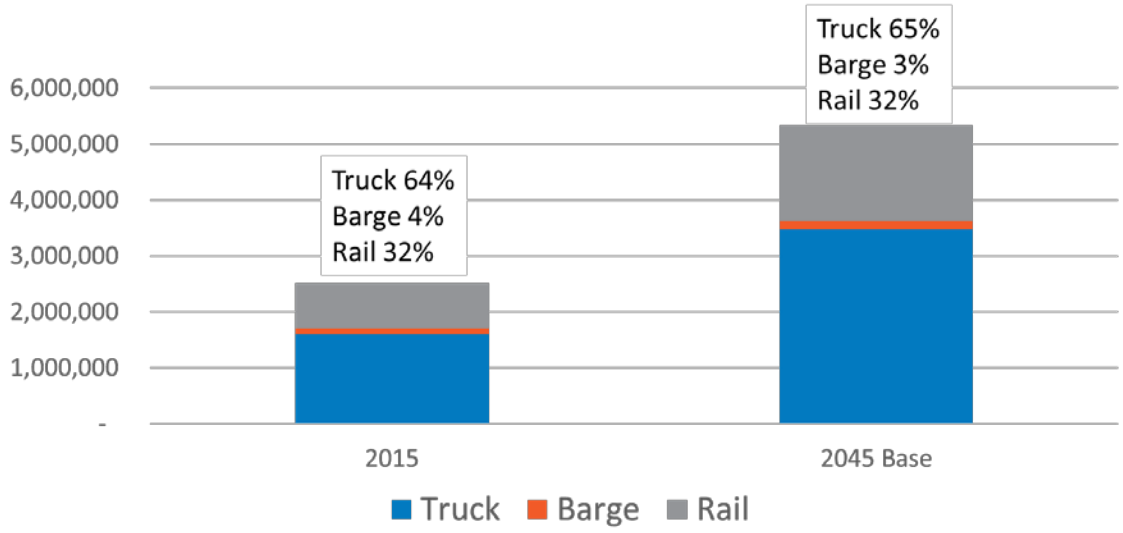

Figure 8. Forecast landslide mode share at Port of Virginia. Source: Port of Virginia.

Considering these possible outcomes at the Port of Virginia, the project team decided to incorporate the following port drivers into the scenario definitions: Containerized volumes (TEUs) at the port terminals and rail, barge, and truck mode share for associated landside traffic. These drivers are aligned with the industry drivers in the following section.

Conclusion: Relevance to Scenario Development

Bringing together the analysis and literature review from the preceding sections, this conclusion defines three greater growth scenarios that are unified in their level of employment growth (16 percent over 2015 regional employment), but divergent in their other characteristics, particularly employment composition and port activity. The population control total is also uniform across the three scenarios and will be derived based on the employment total using HRTPO's REMI economic model.

As described in the Scenario Planning Methodology White Paper, the employment composition of the three greater growth scenarios is one important way that the land use allocation model can allocate the increment of additional growth differently for each scenario. In selecting industry composition, the exact breakdown of employment is not as important as defining scenarios that will meaningfully differ in terms of spatial patterns of growth and travel behavior or trip-generation. The mechanism by which this happens is the assignment of place type preferences and employment suitability factors (e.g., port access, access to highway ramps, proximity to institutions of higher education) that are based on the rough expected composition of job growth in each scenario. Some of these location factors may be tuned specifically to amplify spatial difference between scenarios, but their definition begins by considering different site selection preferences of industries in each of the three scenarios.

To support the definition of these suitability factors, the project team developed the economic profile of each scenario presented in Figure 9. **Greater Growth on the Water** involves growth in water-oriented sectors, with the Port of Virginia becoming even more competitive in terms of annual container volume. Core sectors represented include the Military, Port Employment, and Tourism (i.e., sectors that already thrive in the region), while target sectors include Maritime and Transportation Technology, Water Technologies, and Distribution (i.e., sectors primed for growth in the region). **Greater Growth in Urban Centers** involves employment growth from significant economic diversification in industries with low space requirements per employee, likely in urban settings. Target sectors here include Shared Services, Software Development and IT, Data Centers, and Water Technologies. Finally, **Greater Suburban/Greenfield Growth** involved growth in suburban/exurban areas. In this scenario, the Port of Virginia becomes more even more competitive and a Virginia Beach data port brings additional jobs. Core sectors include marine/transportation technologies, with target sectors such as advanced manufacturing and distribution.

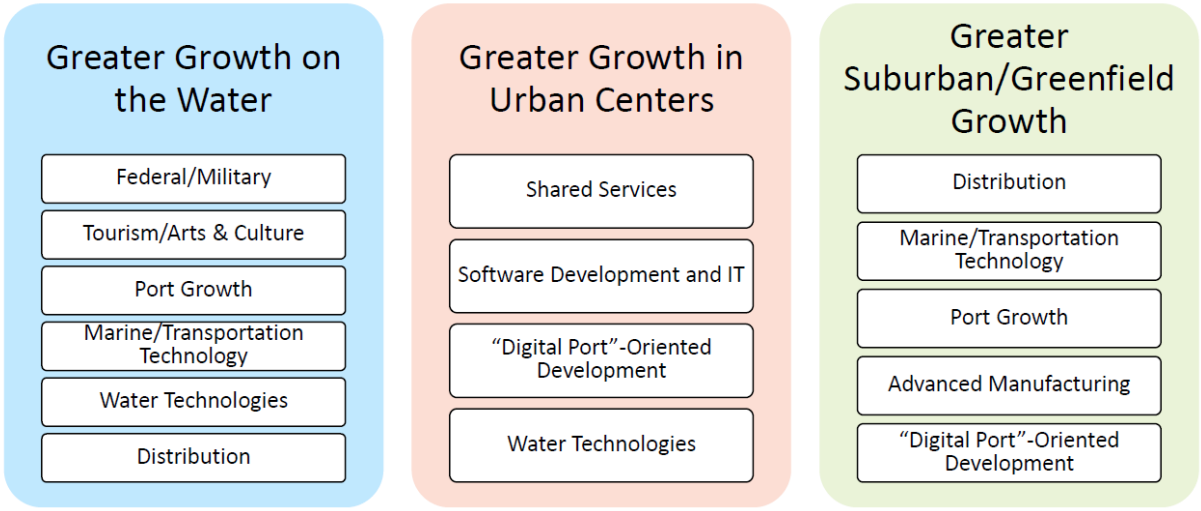

Figure 9. Sectors and industries assigned to each of the three greater growth scenarios, based on the project team's analysis of economic development strategies and likely direction for regional job growth.

Table 1 further shows how three combinations of port drivers correspond to the three different greater growth scenarios. The first scenario pairs greater port volume growth with success in achieving mode shift away from trucking, to mitigate the burden placed on the road network. The second scenario does not see greater containerized volume growth above the 2045 baseline but does achieve some limited modal diversion. This scenario is intended to allow exploration of the baseline 2045 port growth with overlap between urban and port growth pressures. The third scenario has both greater volumes at the port and an increased reliance on trucking. This scenario will allow exploration of truck-intensive growth effects on the network.

Table 1. High-level combinations of port scenario drivers for greater growth scenarios.

Port Driver	Greater Growth on the Water	Greater Growth in Urban Centers	Greater Suburban / Greenfield Growth
Containerized volume (TEUs)	↑	–	↑
Rail mode share	↑↑	↑	↓
Barge mode share	↑	–	–
Truck mode share	↓	↓	↑↑

Given these profiles, the construction of these three scenarios allows the project team to test three different futures and answer the questions outlined in Figure 10.

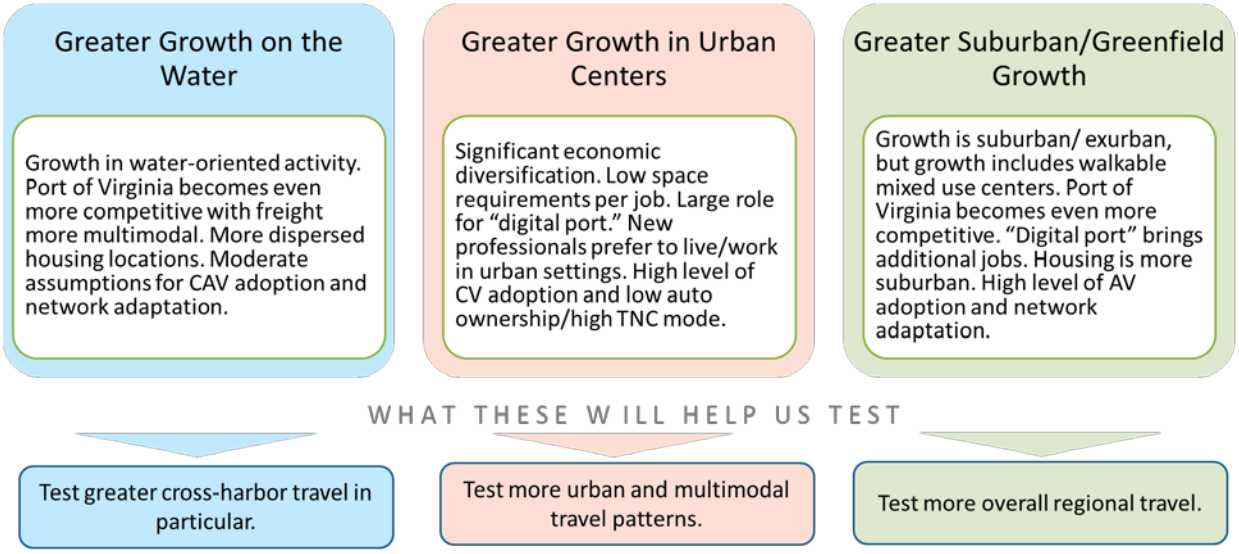

Figure 10. Summary of three greater growth scenarios, with intention for analysis. Figure also includes technological factors discussed in the Scenario Planning Methodology White Paper.