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The Economic Impact of Northern Virginia Transportation Authority Capital Investment

Prepared for Northern Virginia Transportation Authority
November 26, 2018

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About Chmura Economics & Analytics

We have a data-driven culture. We are a group of published scientists contributing to innovations with big data analytics on the forefront of applied economics and technology solutions. We have a very diverse team of people with backgrounds such as PhD economists, statisticians, computer scientists, and transformation strategists. We serve a cross section of decision makers from the defense, government, public, and private sectors.

As data scientists, we help our clients quickly answer big data questions. We provide a reliable picture of economic trends on both a macro and micro level. Our clients rely on the historical, current, and predictive market reports we provide to cut through the confusing information they receive on a daily basis from the media, politicians, and industry resources.

Our clients view us as trusted economic advisors because we help them mitigate risk and prepare for growth by understanding the why, the how, and the what about their local economy. As the nation's preferred provider of labor market data, we help our clients understand both the demand for and the supply of available data. Our clients benefit from our expertise by better understanding their own bottom line costs, sustainability issues, and associated risks.

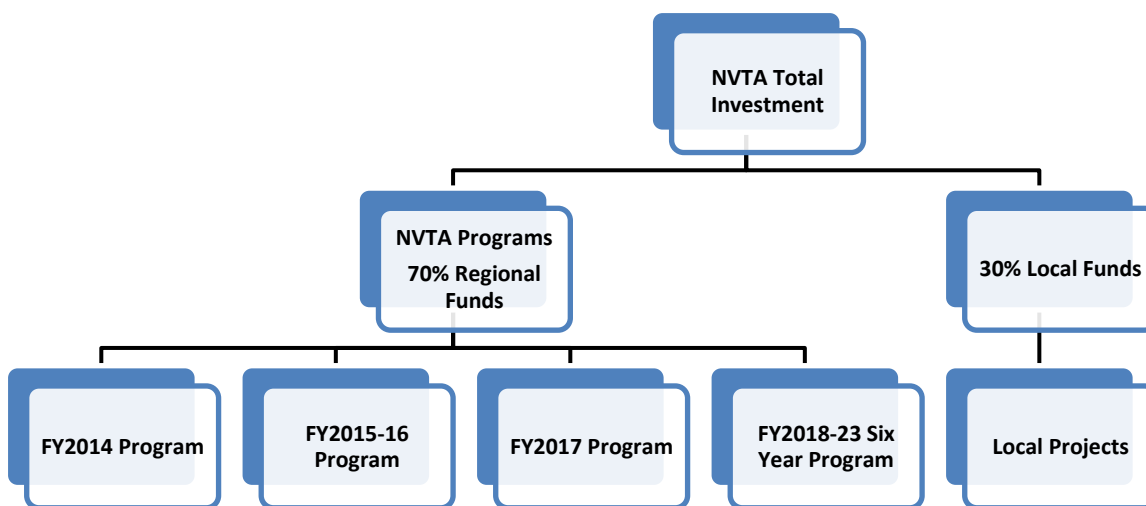
Background

Northern Virginia Transportation Authority (NVTA or the Authority) was created by the General Assembly of Virginia in 2002. The Authority is responsible for long-range planning of multimodal transportation projects in Northern Virginia.¹ The member jurisdictions of NVTA include the counties of Arlington, Fairfax, Loudoun, and Prince William, and cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park.²

In 2013, the Virginia General Assembly passed legislation that authorized a dedicated funding stream—through regional increases in sales tax, transient occupancy tax, and grantor's tax—for transportation projects in Northern Virginia. In 2018, the General Assembly redirected the proceeds of the regional increase in transient occupancy tax and grantor's tax to meet funding commitments to the Washington Metropolitan Area Transit Authority.

In this report, this dedicated funding stream authorized by the General Assembly is referred to as NVTA total investment. All funds received by NVTA must be used for transportation purposes within the region. The Authority develops the regional multimodal transportation plan called TransAction. Of the funds received annually, 70% must be used for projects in TransAction (NVTA Programs). After completing an annual certification process through the Authority, member jurisdictions receive their proportionate share of the remaining 30% of funding for transportation purposes under their discretion (Local Projects). Figure 1 illustrates the funding structure for NVTA total investment.

Figure 1: NVTA Funding Structure



¹ Source: NVTA website at: <http://thenovaauthority.org/about/the-authority/>.

² These cities and counties are collectively referred to as Northern Virginia in this report.

Since the legislation took effect, it was reported that \$1.1 billion in regional transportation projects were funded through NVTA (NVTA Total investment). This is a combination of projects under NVTA's own FY2014, FY2015-16, and FY2017 programs and local projects.³ On June 14, 2018, NVTA approved its inaugural Six Year Program. The Six Year Program includes 44 multimodal transportation projects totaling \$1.3 billion of investment.⁴ In addition, local governments are planning their own project investments as well.

NVTA seeks an analysis of the economic and fiscal impact of its FY2014 through FY2017 programs, the Six Year Program, as well as its total investment (including local projects) in Northern Virginia and the Commonwealth of Virginia. Chmura Economics & Analytics (Chmura) was retained to conduct such an analysis. This study only quantifies the economic impact of capital expenditure activities, as broader data on the ongoing benefits of the NVTA investment are not available.⁵

The economic impact of capital expenditures from NVTA's transportation investment is analyzed in the following three categories: direct, indirect, and induced.⁶ Direct impact measures the actual dollar amount spent on transportation projects in Northern Virginia and Virginia. Indirect and induced impacts measure the secondary benefits of NVTA capital spending for state and regional businesses. For example, indirect effects are attributed to state and regional industries supporting construction activities, such as site development and heavy equipment deployment. Induced effects occur when individuals hired by the construction firms spend their income at regional or state businesses (such as retailers or doctor's offices), thus injecting more money into the regional and state economy.

The indirect and induced effects are estimated with IMPLAN Pro⁷ software after the direct impact is estimated. IMPLAN Pro is an economic impact assessment modeling system that allows the user to build economic models to estimate the impact of economic changes in states, counties, and communities. It is one of the most widely-used economic impact software packages. IMPLAN is updated annually and is customized for individual localities—thus providing a realistic picture of the impact of an economic change on local economies.

³ From page 2 of the 2016 Annual Report of NVTA. Source: <http://www.thenovaauthority.org/wp-content/uploads/2016-annual-report-flip/NVTA-2016-Annual-Report.html>.

⁴ This amount does not include 30% of funding which is allocated to local jurisdictions.

⁵ This report includes a qualitative discussion of such benefits.

⁶ Appendix 1 of this study provides a glossary including these terms.

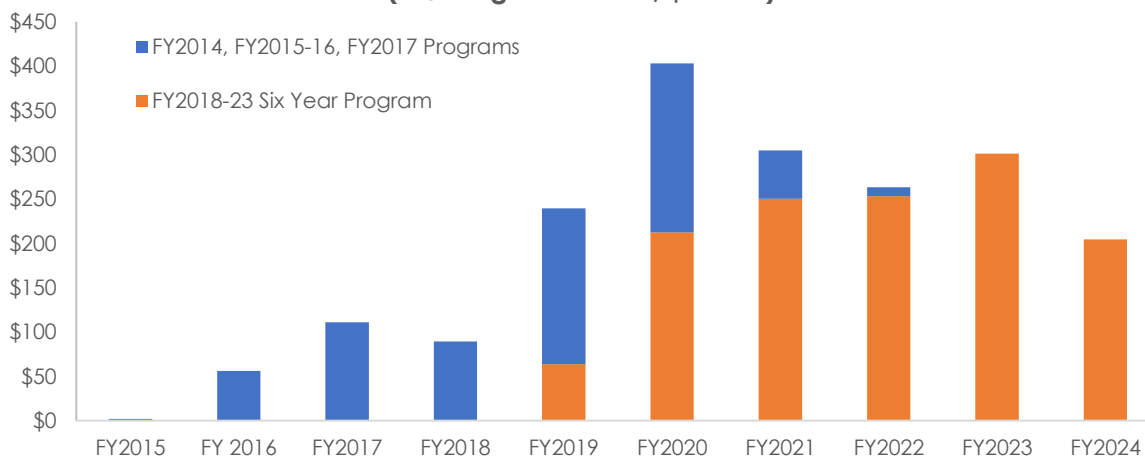
⁷ IMPLAN Pro is one of two major software packages used by economists to evaluate the effects of an economic event.

Economic Impact of NVTA Total Investment

Economic Impact of NVTA Programs

NVTA's FY2018-23 Six Year Program involves investment totaling \$1.3 billion (in 2018 dollars) for multimodal transportation projects. The funding for this plan is expected to be spent from FY2019 through FY2024 (Figure 2).⁸ Prior to the Six Year Program, NVTA's FY2014, FY2015-16, and FY2017 programs included projects with a total investment of \$689.2 million, which is allocated from FY2015 to FY2022.⁹ These programs overlap in certain years. For example, the total investment in FY2020 is expected to reach \$403.0 million, and this counts projects carried over from the FY2014 through FY2017 programs as well as the FY2018-23 Six Year Program. NVTA projects from those programs cover a variety of activities across Northern Virginia, including construction of transit facilities, bike and pedestrian facilities, parking, transit equipment installation, road and bridge construction, transportation technology deployment, and capital asset acquisition.¹⁰

**Figure 2: Total Capital Expenditure for NVTA Programs
(70% Regional Funds, \$Million)**



Source: NVTA

The total investment outlined in Figure 2 only includes projects under NVTA programs with 70% regional funds, and it does not include funding allocated to local jurisdictions from the 30%. The available data indicate that from FY2015 to FY2018, total investment for the local projects amounted to \$474.6 million. In addition, the anticipated funding for local projects is projected to be \$409.9 million from FY2019 to

⁸ Please note that while the plan is called the Six Year Program, actual spending of funds may occur over more than six years. Similarly, the FY2014 through FY2017 programs involve actual spending beyond FY2017.

⁹ In the impact analysis, the impacts are estimated based on the year in which the project spending occurs, not the program year. For example, the NVTA FY2018-23 Six Year Program includes capital expenditures from FY2019 to FY2024.

¹⁰ Please note that the actual spending in FY2015 was \$2.0 million, and there was no actual spending in FY2014.

FY2023.¹¹ Adding NVTA programs and local projects, the total actual and planned investment of NVTA will reach \$2.9 billion from FY2015 through FY2024.

Economic Impact of NVTA FY2018-23 Six Year Program

Table 1 presents the estimated economic impact of NVTA's FY2018-23 Six Year Program. The total planned investment is \$1.3 billion. Chmura excludes 62% of the right-of-way cost from analysis, as it involves a property transfer and whose economic impact is difficult to quantify. 38% of the right-of-way cost is related to utility work, which was included in the analysis.¹² Chmura further excludes the estimated spending outside the region, and direct spending in Northern Virginia is estimated to be \$1.1 billion (in nominal dollars).¹³ From FY2019 through FY2024, it is estimated that the capital expenditure from NVTA's Six Year Program will generate a total economic impact (direct, indirect, and induced impacts) of \$1.7 billion (in nominal dollars) in Northern Virginia, supporting a total of 9,078 cumulative jobs.¹⁴ Of the total economic impact, \$1.1 billion is estimated to be direct spending within Northern Virginia, with direct cumulative jobs amounting to 5,306 from FY2019 through FY2024 (or 884 per year). The cumulative indirect impact in Northern Virginia is estimated to be \$265.7 million that can support 1,238 cumulative jobs (or 206 per year) in industries related to construction, such as site preparation, road and transit facilities, truck transportation, and congestion relieving technologies. The cumulative induced impact is expected to total \$319.1 million with 2,534 cumulative jobs (or 422 per year) in the region; these jobs will be concentrated in consumer service-related industries such as restaurants, hospitals, and retail stores. From FY2019 through FY2024, the annual average economic impact of NVTA's capital expenditure is estimated to total \$275.4 million that can support 1,513 jobs in Northern Virginia.

Table 1: Economic Impact of NVTA Six Year Program

			Direct	Indirect	Induced	Total Impact
Northern Virginia	Cumulative	Spending (\$Million)	\$1,067.9	\$265.7	\$319.1	\$1,652.7
	(FY2019-24)	Employment	5,306	1,238	2,534	9,078
	Annual Average	Spending (\$Million)	\$178.0	\$44.3	\$53.2	\$275.4
	(FY2019-24)	Employment	884	206	422	1,513
Virginia	Cumulative	Spending (\$Million)	\$1,078.6	\$371.7	\$377.3	\$1,827.5
	(FY2019-2024)	Employment	5,354	1,635	3,082	10,071
	Annual Average	Spending (\$Million)	\$179.8	\$61.9	\$62.9	\$304.6
	(FY2019-24)	Employment	892	272	514	1,679

Note: Numbers may not sum due to rounding

Source: IMPLAN Pro 2016 and Chmura

¹¹ Source: NVTA. The annual amounts are not available for local projects from FY2014 to FY2018.

¹² Source: NVTA.

¹³ In addition, Chmura used the consumer price index (CPI) to convert the investment from fixed dollars to nominal dollars. The average annual CPI from 2010 to present is 1.7%. Source: Bureau of Labor Economics.

¹⁴ Please note that the cumulative jobs are the sum of jobs in each year. For example, if a construction worker is involved in the project for two years, cumulative jobs will be two.

The economic impact of NVTA's Six Year Program in Virginia is larger than in Northern Virginia, as businesses elsewhere in the state will also benefit from the investment activities. It is estimated that from FY2019 through FY2024, the annual average statewide impact will reach \$304.6 million (direct, indirect, and induced) that can support 1,679 jobs in Virginia.¹⁵

Economic Impact of All NVTA Programs (FY2014 through FY2018-23 Programs)¹⁶

Combining economic impacts from the FY2018-23 Six Year Program, and those from NVTA's FY2014, FY2015-16, and FY2017 programs, Table 2 summarizes the economic impact of all NVTA programs since NVTA started receiving dedicated funding. In Northern Virginia, for FY2015 through FY2024, the estimated capital expenditure can generate a total economic impact (direct, indirect, and induced impacts) of \$2.6 billion, supporting 14,536 cumulative jobs. On an annual average basis, the economic impact of all NVTA programs is estimated to be \$260.9 million that can support 1,454 jobs in Northern Virginia from FY2015 through FY2024.

Table 2: Economic Impact of all NVTA Programs (FY2014 Through FY2018-23 Program)

			Direct	Indirect	Induced	Total Impact
Northern Virginia	Cumulative	Spending (\$Million)	\$1,685.0	\$423.7	\$500.1	\$2,608.8
	(FY2015-24)	Employment	8,484	2,005	4,047	14,536
	Annual Average	Spending (\$Million)	\$168.5	\$42.4	\$50.0	\$260.9
	(FY2015-24)	Employment	848	201	405	1,454
Virginia	Cumulative	Spending (\$Million)	\$1,701.3	\$593.9	\$591.4	\$2,886.6
	(FY2015-24)	Employment	8,559	2,653	4,935	16,148
	Annual Average	Spending (\$Million)	\$170.1	\$59.4	\$59.1	\$288.7
	(FY2015-24)	Employment	856	265	494	1,615

Note: Numbers may not sum due to rounding

Source: IMPLAN Pro 2016 and Chmura

The economic impact of NVTA projects in Virginia is larger than in Northern Virginia, and the annual average statewide impact is estimated to reach \$288.7 million (direct, indirect, and induced) that can support 1,615 jobs in Virginia.

Economic Impact of NVTA Total Investment, Including 30% Local Fund Projects

The economic impact analyzed above includes only NVTA programs funded with regional funds, which account for 70% of the total funding stream allocated by the state legislation. The 30% funding allocated to local jurisdictions also generates a sizable impact in Northern Virginia and Virginia.

Adding the impact from local projects, Table 3 summarizes the economic impact of total NVTA investment. In Northern Virginia, for FY2015 through FY2024, it is estimated that capital spending from NVTA total investment can generate a total economic impact (direct, indirect, and induced impacts) of

¹⁵ The economic impact in Virginia is inclusive of the impact in Northern Virginia.

¹⁶ A separate analysis of the impact of the FY2014 through FY2017 programs was conducted by George Mason University in 2016. As a result, this section only presents the aggregate impact.

\$4.0 billion, supporting 23,420 cumulative jobs in the region. On an annual average basis, the economic impact of NVTA total investment is estimated to be \$397.1 million that can support 2,342 jobs in Northern Virginia from FY2015 through FY2024. The economic impact of NVTA total investment in Virginia is larger than in Northern Virginia, and the annual average statewide impact will reach \$438.1 million (direct, indirect, and induced) that can support 2,602 jobs in Virginia.

Table 3: Economic Impact of NVTA Total Investment

			Direct	Indirect	Induced	Total Impact
Northern Virginia	Cumulative	Spending (\$Million)	\$2,510.1	\$647.2	\$813.3	\$3,970.5
	(FY2015-24)	Employment	13,654	3,089	6,676	23,420
	Annual Average	Spending (\$Million)	\$251.0	\$64.7	\$81.3	\$397.1
	(FY2015-24)	Employment	1,365	309	668	2,342
Virginia	Cumulative	Spending (\$Million)	\$2,532.5	\$891.4	\$956.9	\$4,380.8
	(FY2015-24)	Employment	13,758	4,052	8,211	26,021
	Annual Average	Spending (\$Million)	\$253.2	\$89.1	\$95.7	\$438.1
	(FY2015-24)	Employment	1,376	405	821	2,602

Note: Numbers may not sum due to rounding

Source: IMPLAN Pro 2016 and Chmura

Fiscal Impact

NVTA investment will also generate tax revenue for local and state governments. In order to be conservative, only tax revenue from the direct impact is estimated in this section.¹⁷

For capital expenditure activities, the business, professional, and occupational license (BPOL) tax is collected for local governments, and individual and corporate income taxes are collected for the state government. Chmura used the average BPOL tax rates of all local governments in Northern Virginia to calculate BPOL tax revenue, which is an estimated \$1.7 million for the Six Year Program. Including NVTA programs from FY2014 through FY2017, the total BPOL tax is estimated to be \$2.6 million from FY2015 through FY2024. Finally, adding local projects, local tax revenue from all NVTA investment is estimated to be \$3.6 million from FY2015 through FY2024 (Table 4).

Table 4: State and Local Fiscal Impacts (\$Million)

NVTA Funds/Programs	Impact Years	Northern Virginia		Virginia	
		Cumulative	Annual Average	Cumulative	Annual Average
NVTA FY2018-23 Six Year Program	FY2019-24	\$1.7	\$0.3	\$24.5	\$4.1
All NVTA Programs (FY2014, FY2015-16, FY2017 & Six Year Program)	FY2015-24	\$2.6	\$0.3	\$38.1	\$3.8
NVTA Total Investment (NVTA Programs & Local Projects)	FY2015-24	\$3.6	\$0.4	\$57.1	\$5.7

Source: Chmura

¹⁷ This approach is recommended by Burchell and Listokin in *The Fiscal Impact Handbook*.

For the Virginia state government, revenue originates from individual and corporate income taxes as a result of new employment and profits from capital expenditure. The total state tax revenue is estimated to be \$24.5 million from FY2019 through FY2024, from planned investment based on the FY2018-23 Six Year Program. Including NVTA programs from FY2014 through FY2017, total state tax is estimated to be \$38.1 million. Finally, adding local projects, total NVTA investment can generate an estimated tax revenue of \$57.1 million from FY2015 through FY2024.

Other Benefits of Transportation Investment

The economic impact of capital expenditure from the NVTA transportation investment does not only occur during the construction phase. After the projects are completed, improvements in Northern Virginia's regional multimodal transportation infrastructure can lead to other sustained benefits. An assessment of the broader economic benefits to the Northern Virginia region and Commonwealth is not in the scope of this study. However, these impacts are discussed qualitatively in this section.

The transportation investments will increase the capacity of Northern Virginia's transit, roadways, and all modes of the public transportation network, which will provide time savings for businesses and residents. The time savings can translate into higher productivity and growth opportunities for state and regional businesses.

NVTA's transportation investment will also replace and rehabilitate transit facilities and equipment as well as roads and bridges, as part of capacity expansion. This investment will also have safety benefits. For example, expanded road capacity, improved road conditions, and improved incident management systems can reduce traffic congestion and accidents on Northern Virginia's roads and transit systems.

Furthermore, investment in transportation infrastructure can also bring other benefits to Northern Virginia. It can help attract businesses and stimulate job growth. Investment in transportation infrastructure can also boost tourism in Northern Virginia. Studies have found that traffic congestion, poor road conditions, and absent or confusing signage decrease the drawing power of a tourist attraction. On the other hand, transportation investments help to increase tourist volume, length of stay, and spending per visitor—thus benefiting state and regional economies.

Finally, transportation investments can also improve quality of life for regional residents. Improved road and transit capacity can make it more convenient for residents to reach destinations for work, shopping, recreation, and entertainment. Further, it can increase the appeal of the region to future businesses and residents. This investment can also improve air quality, which will not only provide improved quality of life for residents, but will also reduce their healthcare costs.

Appendix 1: Impact Analysis Glossary

IMPLAN Professional—an economic impact assessment modeling system. It allows the user to build economic models to estimate the impacts of economic changes in states, counties, or communities. It was created in the 1970s by the Forestry Service and is widely used by economists to estimate the impact of specific events on the overall economy.

Input-Output Analysis—an examination of business-business and business-consumer economic relationships capturing all monetary transactions in a given period, allowing one to calculate the effects of a change in an economic activity on the entire economy (impact analysis).

Direct Impact—economic activity generated by a project or operation. For construction, this represents activity of the contractor; for operations, this represents activity by tenants of the property.

Overhead—construction inputs not provided by the contractor.

Indirect Impact—secondary economic activity that is generated by a project or operation. An example might be a new office building generating demand for parking garages.

Induced (Household) Impact—economic activity generated by household income resulting from direct and indirect impacts.

Ripple Effect—the sum of induced and indirect impacts. In some projects, it is more appropriate to report ripple effects than indirect and induced impacts separately.

Multiplier—the cumulative impacts of a unit change in economic activity on the entire economy.