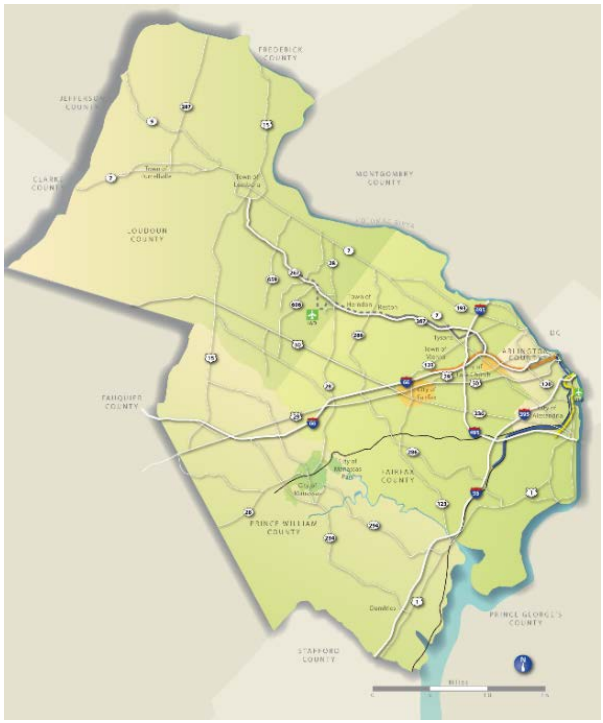
TransAction Plan—2022 Update

Draft Summary

Draft for Public Comment - Released August 2022

1. What is TransAction?

TransAction is the long-range multimodal transportation plan for Northern Virginia addressing regional transportation needs through 2045. TransAction ("the Plan") includes this plan document as well as an associated list of transportation projects identified to reduce congestion and improve travel throughout the region. The results of TransAction are used to inform the NVTA's Six Year Program for regional revenue funding, guiding decisions about which transportation improvements the NVTA should prioritize for investment. TransAction itself does not recommend or prioritize any projects or modes of transportation. TransAction is also not fiscally constrained – meaning the plan includes more projects than can realistically be funded.



What is NVTA?

The Northern Virginia Transportation Authority (NVTA) is a regional body that is focused on delivering transportation solutions and value for Northern Virginia's transportation dollars by bringing Northern Virginia jurisdictions and agencies together to plan and program regional multimodal transportation projects focused on relieving congestion.

NVTA's TransAction
Transportation Action Plan for Northern Virginia

What has changed since the last update to TransAction?

- The COVID-19 pandemic has had significant effects on travel in the region, as teleworking has dramatically increased and traditional peak-period commuting has declined. The long-range implications of this "new normal" are still uncertain, as of the update to TransAction in 2022.
- NVTA formalized its commitment to three Core Values of Equity, Sustainability and Safety. This action comes as there is a heightened awareness and desire within the region to address climate change and promote sustainability and resiliency, and to integrate equity and safety considerations into all phases of transportation planning, while NVTA continues to strive to reduce traffic congestion.
- NVTA adopted its inaugural Transportation Technology Strategic Plan (TTSP), as a tool for establishing a proactive approach to innovation, which also keeps congestion reduction top of mind.

TransAction Vision Statement
(Adopted December 2020)

"Northern Virginia will plan for, and invest in, a safe, equitable, sustainable, and integrated multimodal transportation system that enhances quality of life, strengthens the economy, and builds resilience."

2. What Does NVTA Do?

The Northern Virginia Transportation Authority was created in 2002 by the Virginia General Assembly to set regional transportation policies and priorities with the primary objective of reducing traffic congestion. NVTA's member jurisdictions include the counties of Arlington, Fairfax, Loudoun and Prince William, and the cities of Alexandria, Fairfax, Falls Church, Manassas and Manassas Park. NVTA has two primary and interlinked responsibilities—Planning and Programming:

- Every five years: Update TransAction, which identifies the region's transportation needs and evaluates multimodal projects that will support NVTA's vision.
- Every two years: Program—and invest in—regional multimodal transportation projects through NVTA's Six Year Program.

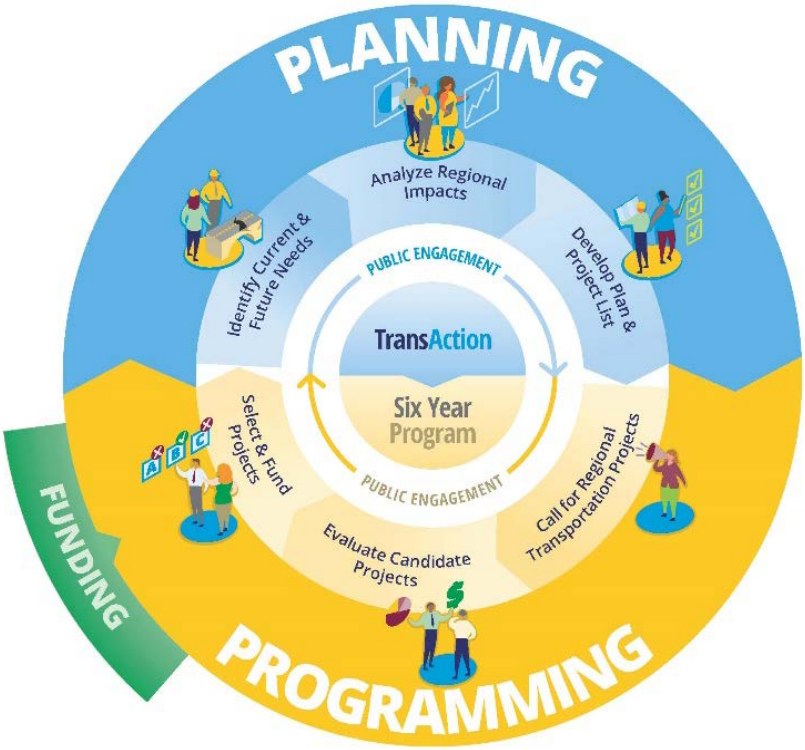
TransAction

- *Long-Range Transportation Plan for NoVA*
- *Updated every five years*
- *Plan last updated and adopted in October 2017*

Six Year Program (SYP)

- *Allocates NVTA's Regional Revenues to regional transportation projects*
- *Updated every two years*
- *Most recent FY2022–2027 SYP adopted in July 2022*

To be eligible for funding consideration, SYP candidate projects must be included in the current TransAction Plan and located in Northern Virginia. Through six SYP funding cycles, NVTA has made investments totaling $3.12 Billion across 122 regional multimodal transportation projects, which were included in the previous version of TransAction (adopted in October 2017) or TransAction 2040 (adopted in December 2012). Throughout all phases of planning and programming, NVTA embraces and seeks equitable participation and outcomes in all aspects of planning and programming. See what goes into the Planning and Programming process, in the chart below.

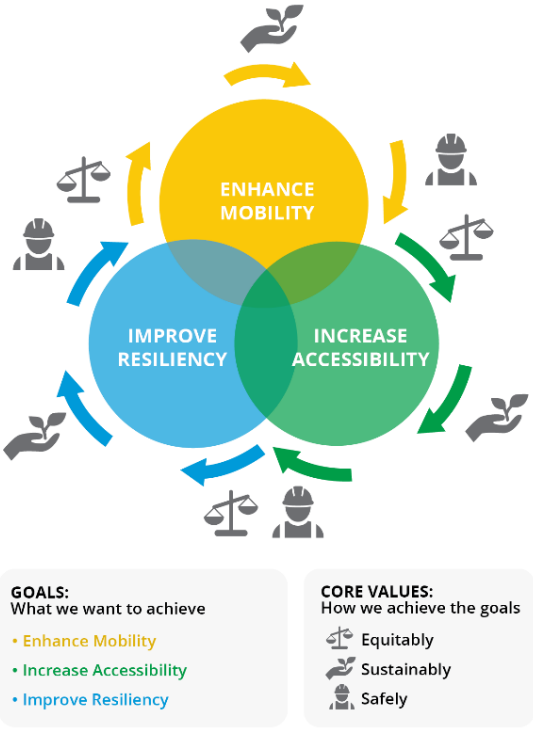


3. How Is Performance Evaluated?

TransAction uses a performance-based planning approach that allows policies and goals to be expressed in quantifiable terms and applies an analytical framework to determine the degree to which different projects and investment packages meet the goals.

To achieve NVTA's vision for the future of transportation in the region, NVTA adopted the goals of improving **mobility, accessibility and resiliency** across all modes, including roads, transit, walking, bicycling and more.

There are many ways to achieve the TransAction goals, while aligning with NVTA's Core Values ensure that they will be achieved **equitably, sustainably and safely**. The goals express what the region wants to achieve, and the Core Values indicate how the region will achieve the goals.



Potential transportation improvement projects are evaluated based on their ability to improve the region's transportation system across the three TransAction goals, which are further defined by a more specific set of seven objectives and ten performance measures. These performance measures, each with a corresponding weight, are shown in the table below, and are applied to develop an overall rating for each project. Ultimately, NVTA is pursuing a set of projects that have broad benefits and are modally balanced, in addition to helping achieve the regional transportation vision.

Goal	Objective	Performance Measure	Weight	Alignment with Core Values
Mobility: Enhance quality of life of Northern Virginians by improving performance of the multimodal transportation system	A. Reduce congestion and delay	A1. Total person-hours of delay in autos	10	Sustainably
		A2. Total person-hours of delay on transit	10	Equitably
	B. Improve travel time reliability	B1. Duration of severe congestion	10	Sustainably, Safely
		B2. Transit person-miles in dedicated/priority ROW	10	Equitably, Sustainably
Accessibility: Strengthen the region's economy by increasing access to jobs, employees, markets and destinations for all communities	C. Improve access to jobs	C1. Access to jobs by car, transit and bike	10	Sustainably
		C2. Access to jobs by car, transit and bike for EEA populations	10	Equitably
	D. Reduce dependence on driving alone by improving conditions for people accessing transit and using other modes	D1. Quality of access to transit and the walk/bike network	15	Equitably, Sustainably, Safely
Resiliency: Improve the transportation system's ability to anticipate, prepare for and adapt to changing conditions and withstand, respond to and recover rapidly from disruptions.	E. Improve safety and security of the multimodal transportation system	E1. Potential for safety and security improvements	10	Safely
	F. Reduce transportation related emissions	F1. Vehicle emissions	10	Equitably, Sustainably
	G. Maintain operations of the regional transportation system during extreme conditions	G1. Transportation system redundancy	5	Equitably, Safely

Transit may include HOV.

4. What Are the Region's Transportation Needs?

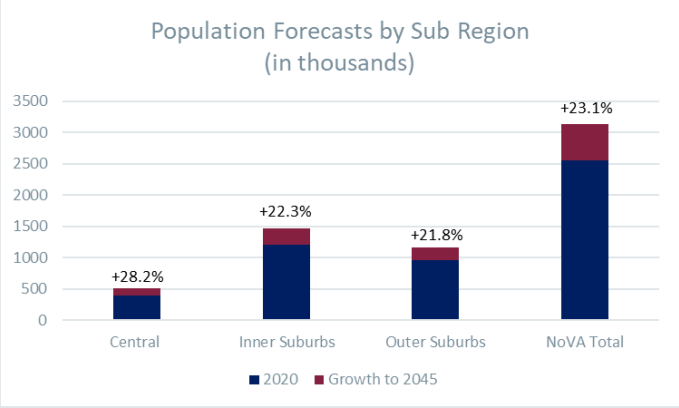
In the initial phase of updating TransAction, an assessment was conducted to identify current and future transportation needs to be addressed by the plan. The assessment reviewed socioeconomic conditions and travel patterns, interpreted public input received through a multifaceted outreach program (including digital survey and focus groups), and analyzed existing and future transportation performance to inform multimodal needs across the three goals—mobility, accessibility, and resiliency.

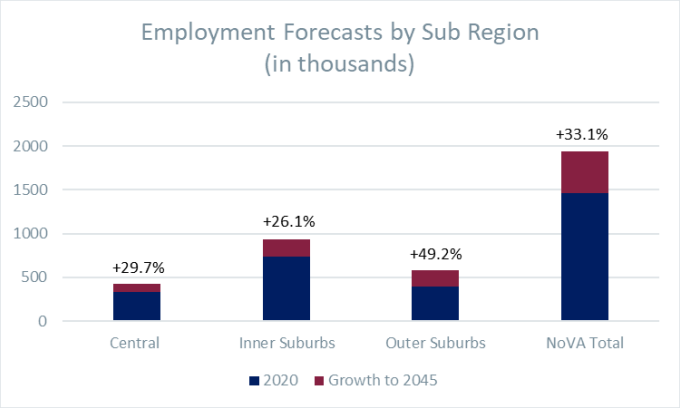
Continuing Growth

Over the last decade (2010 to 2020), Northern Virginia grew by 14.3% to a population of 2.55 million people while Virginia's statewide population grew 7.9%. One factor contributing to this growth is that Northern Virginia continues to be a very attractive place to live for highly educated and/or experienced workers from all over the world, given the growing and diverse job market in the region.

As NVTA looks ahead to 2045, the TransAction plan update relies on the latest approved long-range Cooperative Forecasts of population, employment and household growth that are prepared by the Metropolitan Washington Council of Governments (MWCOG). The Cooperative Forecasts are based on the land use plans and growth forecasts of local jurisdictions. The population of Northern Virginia is projected to grow by 23%, from 2.55 million people today to 3.14 million people by 2045. Total employment in Northern Virginia is projected to grow by 33%, from 1.46 million jobs today to 1.94 million jobs by 2045. NVTA is looking at how to accommodate this growth through multimodal transportation infrastructure and other complementary means.

Not all areas of Northern Virginia are expected to grow in the same way between 2020 and 2045. Population forecasts show that the central jurisdictions (Arlington County/City of Alexandria) are expected to have the highest percentage growth, but the inner suburban jurisdictions (Fairfax County/City of Falls Church/City of Fairfax) are expected to have the highest increase in absolute terms. Employment forecasts show that the outer suburbs (Loudoun County/Prince William County/City of Manassas/City of Manassas Park) are expected to have the highest percentage growth, but roughly the same job increase as the inner suburbs in absolute terms.

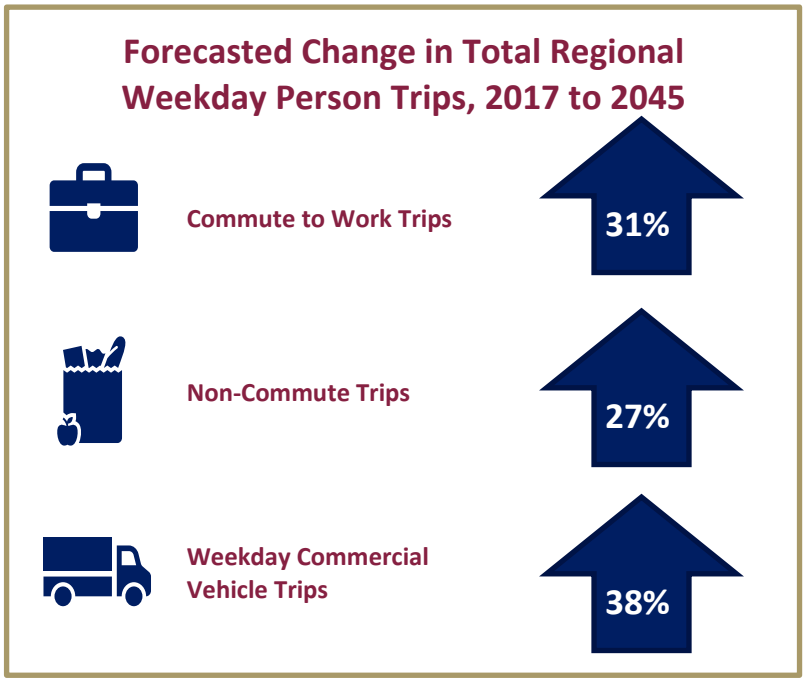




Changing Travel Patterns

Recent population and employment growth and future growth patterns impact where and how people and goods travel. Travel forecasts for 2045 were compared against 2017 conditions. Total person trips during the weekday, for all travel modes that start or end in the region, are expected to increase by 28% between 2017 and 2045. Total commuting to and from Northern Virginia will increase by 470,000 daily trips, or 31%, from 2017 to 2045.

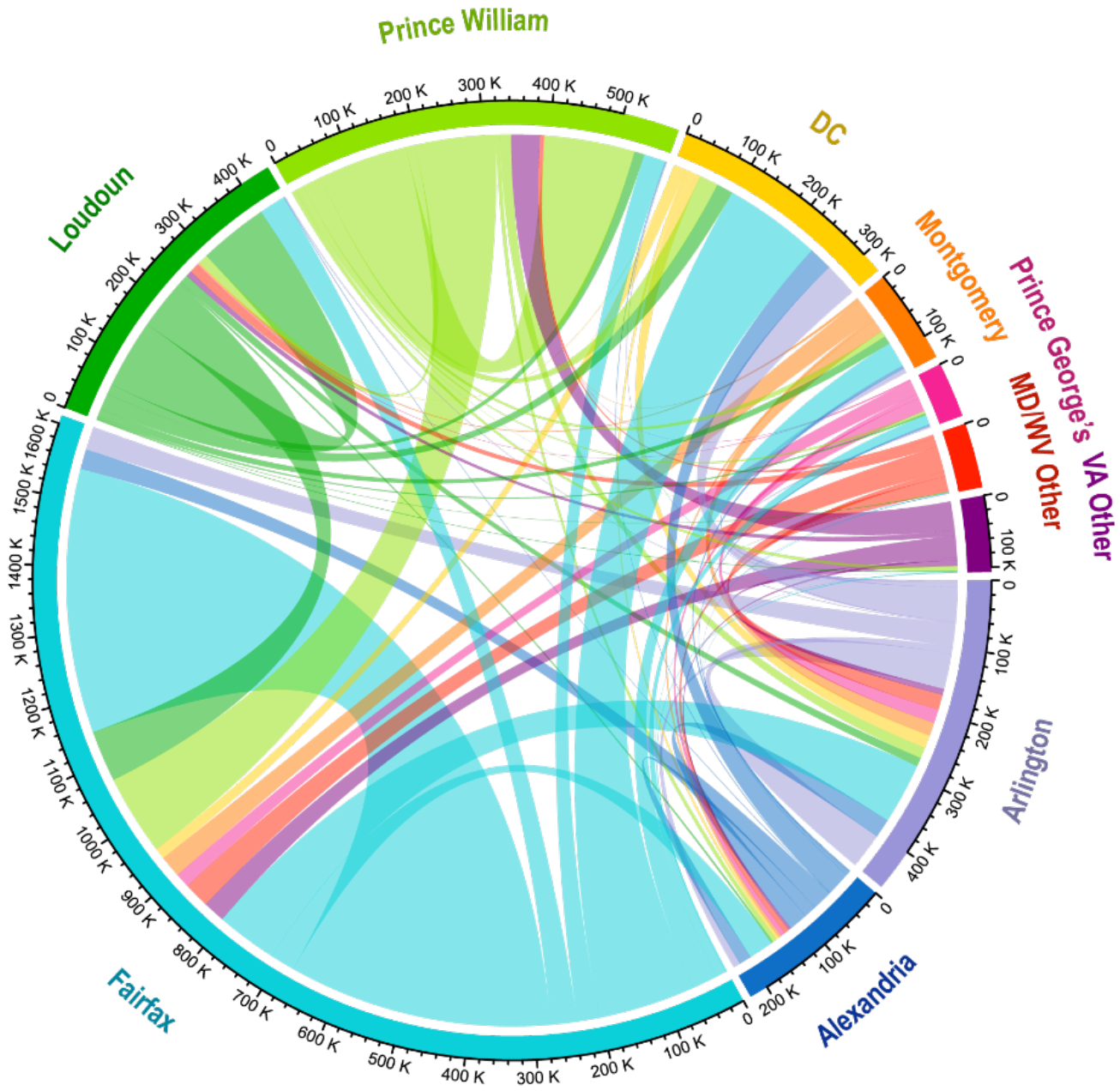
Non-commute trips are anticipated to grow by 27% through 2045. Commercial vehicle trips are projected to grow by a greater percentage, at 38%. This is consistent with increased online shopping volumes and home delivery of goods. Long-term uncertainty of travel patterns, including changes to commuting associated with a continued commitment to remote work post-pandemic, is considered in the scenario analysis section of the TransAction plan.



Commute trips represent only about 18% of daily trips in Northern Virginia, but have a disproportionate impact on traffic congestion since they tend to be longer trips and occur during the peak periods. The chart on the next page shows the 2045 forecasts of commute trips that begin or end in Northern Virginia. Of 1.7 million total commute trips that start in Northern Virginia, the jurisdiction of residence includes Fairfax County/City of Falls Church/City of Fairfax (48%), Prince William County/City of Manassas/City of Manassas Park (20%), Loudoun County (15%), Arlington (10%), and Alexandria (7%). The percentage of commute trips starting in Northern Virginia that remain in Northern Virginia increases from 73% in 2017 to 76% (or 1.3 million trips) by 2045.

Some Northern Virginia commute trips are still expected to leave the region to work including 17% with a destination in D.C., 6% with a destination in Maryland, and 1% with a destination in other parts of Virginia. The presence of the federal government in Washington, D.C. has shaped commuting in the region for decades, posing unique challenges and opportunities for the Northern Virginia transportation system. As some federal job locations have shifted to the suburbs in areas not served by Metrorail, such as the shift in Department of Defense jobs to the Mark Center and to Fort Belvoir, this can make these jobs harder to serve with public transportation.

2045 Northern Virginia Commute Trip Patterns



Source: TPB Regional Model

Future Baseline Conditions and Needs

Enhance Mobility

Person Hours of Delay—The growth in total travel is projected to increase total daily vehicle miles traveled (VMT) by 27% from 2017 to 2045 within Northern Virginia. This increase impacts hours of delay.

From 2017 to 2045, person-hours of delay in the peak periods are forecasted to approximately double (or more) on four corridors: VA 267/VA 7/VA 9 (despite the Silver Line extension to Ashburn), I-95/I-395/U.S. 1, I-495 Beltway, and Loudoun County Parkway/VA 234.	**Delay remains a significant and growing challenge on key corridors.**

Transit Ridership—Public transit is also expected to see growth in ridership through 2045, outpacing growth in VMT.

Within Northern Virginia, total weekday boardings in 2017 were 293,000 riders. Total daily ridership is projected to increase by 57% through 2045, totaling nearly 460,000 daily transit boardings.	**Transit ridership increases faster than VMT, indicating that regional growth patterns, increased congestion levels, and expanded transit service are resulting in a greater share of trips made by transit instead of by auto.**

Increase Accessibility

Accessibility to Jobs—A goal of the TransAction update is improving accessibility, or how well residents of Northern Virginia can reach their destinations by multiple modes.

Based on a population-weighted average, residents of Northern Virginia have access in 45 minutes to approximately four times more jobs by car than by transit. This is in part due to only 27% of Northern Virginia's population living within a ¼ mile of frequent or all-day transit.	**Significant disparities for access to jobs by driving versus transit will continue through 2045. New transit projects will help access between key destinations, however growing suburban areas of the region will continue to see disparities.**

Improve Resiliency

Safety—NoVA motor vehicle fatality and serious injury rates are 40 to 50% lower than the statewide average from 2017 through 2020. However, the nation has seen an increase during and post-COVID.

Emissions—VMT and congestion will continue to increase in the region even as vehicle technologies continue to help reduce criteria pollutant and Greenhouse Gas (GHG) emissions.

Infrastructure Resiliency—About 5% (43 miles) of TransAction corridors intersect with 500-year flood zones.

Crashes are a major source of delay in Northern Virginia. Growth in total travel will lead to more interactions between vehicles, pedestrians and cyclists. While technology will help mitigate or reduce emissions, the true reduction potential is somewhat limited by the growth-driven VMT and congestion increases. Of particular concern is the continued faster growth of commercial vehicle VMT within the region. Priority corridors with substandard assets, sections in proximity to 500-year flood risk zones and sections experiencing recurring delays during daily peak periods, represent particular concerns.	**Northern Virginia's fatality and serious injury rates for motor vehicle crashes have increased over the past four years and may continue to increase as overall travel increases. Resilience of the transportation system is threatened by increased emissions and extreme weather events.**

Public Input on Transportation Needs

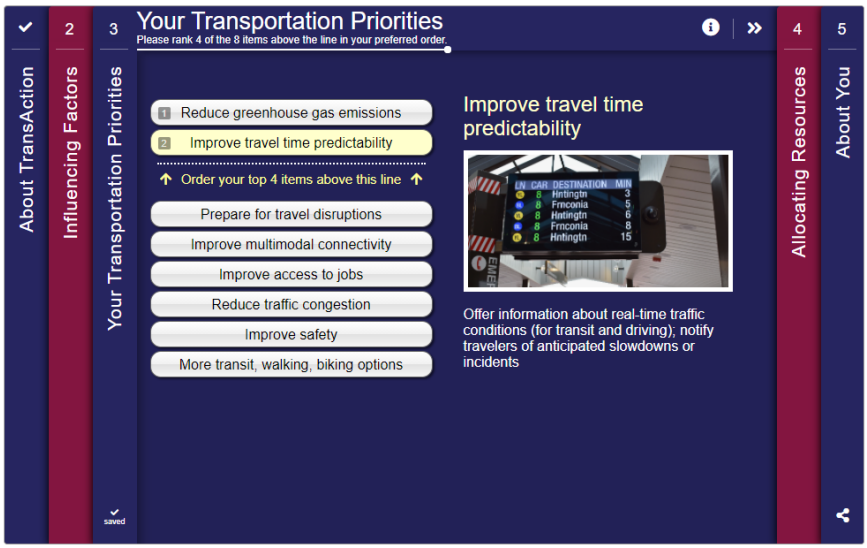
Between July and October 2021, the NVTA conducted an extensive public outreach program, including focus groups, community pop-up events, and an online survey (with more than 2,300 responses), to build awareness of TransAction and gather input on regional needs and priorities. The top priorities were "more transit, walking, biking options," "reduce traffic congestion" and "improve travel time predictability", but the order varied by geographic area:

- *Residents of central jurisdictions, including Arlington County and City of Alexandria, selected "more transit, walking, biking options" as the top priority.*
- *Residents of outer suburban jurisdictions, including Prince William County, Loudoun County, and cities of Manassas and Manassas Park, selected "reduce traffic congestion" as top priority.*

Other objectives showed less variability between different geographic areas – "improve travel time predictability" and "improve safety" were generally supported by all geographic areas.

The public input was incorporated into a number of steps in the plan development process. Feedback was used to finalize the structure and wording of the TransAction goals, objectives, and performance measures. The priorities that survey respondents placed on different performance factors were tabulated and shared with the Authority prior to adoption of the performance measure weights. Public input on the transportation needs and potential improvement strategies was documented in the needs assessment phase of the study, and helped identify additional types of projects for inclusion in the TransAction project list.

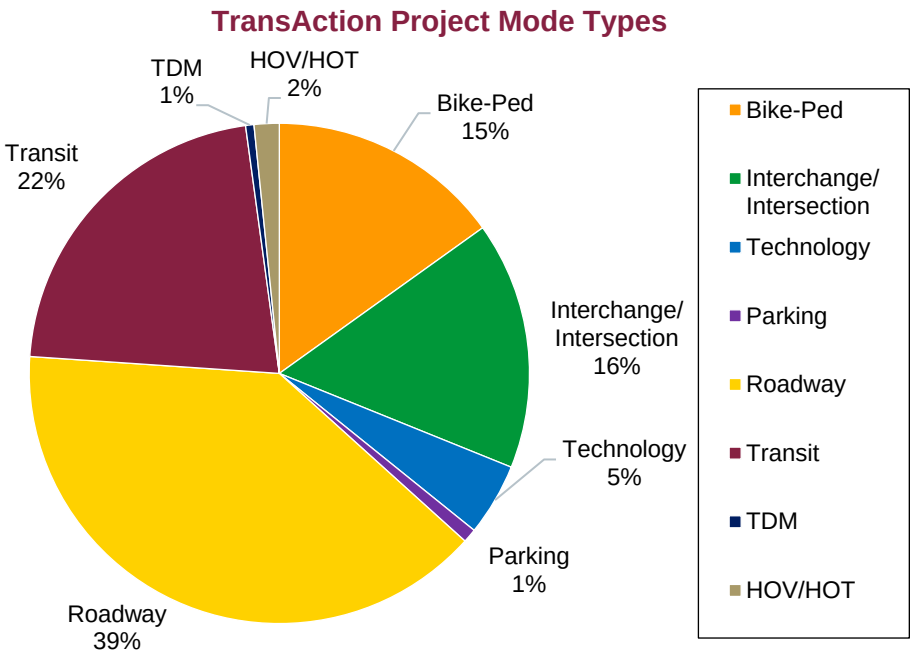
2021 TransAction Online Survey and Community Pop-Up Events



5. What is Included in the Plan?

Overview of the Project List

A variety of projects and programs are required to meet the complex transportation needs of Northern Virginia. With **111 new projects and a net increase of 77 project**s since the 2017 TransAction Plan, this TransAction Plan update includes 429 regionally significant projects and programs. These **429 projects and programs** would cost an **estimated $75.7 billion** (in $2021). Approximately $30 billion of this cost estimate is attributed to projects that extend beyond Northern Virginia, requiring funding and implementation in partnership with external jurisdictions and agencies.



Note acronyms: High-occupancy vehicle (HOV), high-occupancy toll (HOT), and transportation demand management (TDM).

Many projects encompass elements from more than one mode type, which are displayed in the chart above. For example, 39% of the 429 projects include a roadway element and 22%of projects include a transit element. The 429 projects included in this plan range from the construction of new multi-use trails, new interchanges transit expansions and enhancements, and programs to encourage alternative modes of transportation. Projects range from smaller facility improvements to large infrastructure investments and system-wide programs. This variety is also reflected in the range of estimated project costs, with 19 projects costing under $1 million and ten projects costing more than $1 billion, with the average project cost between $25 to $50 million. **The more-than-$75-billion cost of all the projects in the plan is well beyond NVTA's available funding.**

The following pages of this section provide an overview of the different project types included in the Plan. Two new plan elements have also been highlighted in greater detail – building a regional BRT system, and leveraging technology to address regional transportation issues.

At a Glance:

429 **total projects**

More than **$75B** **in total estimated cost for all projects**

Plan Elements

Roadway

Includes the construction of new roads, capacity improvements on existing roads, and/or reconfiguration of existing roads; often includes multimodal elements such as pedestrian and bicycle improvements, intersection improvements, and technology.

$20.6B

191 roadway projects

1,050 new lane miles added

Example Projects:

- Construct Route 28 bypass to improve regional connectivity
- Route 50 widening and interchanges
- Widen southbound I-95 to four lanes between the Occoquan River Bridge and Dumfries Road
- Loudoun County Parkway widening from Route 50 to Braddock Road

Intersections & Interchanges

Includes grade-separated interchanges as well as at-grade intersection improvements that are intended to reduce traffic delay; many of these projects include pedestrian improvements and/or technology enhancements.

$6.9B

54 intersection/interchange projects

Example Projects:

- Construct grade-separated interchange at Loudoun County Parkway and Arcola Boulevard
- New and modified interchanges on Fairfax County Parkway
- Improve Interchange at Route 28 and Old Ox Road (Route 606)
- Construct Interchange on Route 234 at Sudley Manor Drive and Wellington Road

Transit

Includes a range of projects necessary to improve transit service in Northern Virginia, including Metrorail extensions, capacity and service enhancements for VRE, new High-Capacity Transit services that could be Bus Rapid Transit (BRT) lines, and improvements to bus services. Transit facilities, new transit vehicles, and station access improvements are also included.

$44.5B

104 transit projects

370 miles of prioritized transit right-of-way

Example Projects:

- Implement regional bus rapid transit (BRT) system on multiple corridors including Route 7, Richmond Highway, and Duke Street and West End Transitway in Alexandria
- Metrorail core capacity and Blue/Orange/Silver core realignment
- VRE rail capacity and service enhancements
- Station access improvements (multiple stations)
- Enhanced bus service and facilities

Transportation Demand Management (TDM)

A set of services designed to provide commuters with alternative options to driving alone by providing information, programs, and incentives to encourage a change in traveler mode.

$63.9M

3 TDM projects

Example Projects:

- Implement and expand TDM initiatives and programs in major employment centers within Northern Virginia
- Improve and expand the commuter assistance and other programs provided by Arlington County Commuter Services
- Implement and expand TDM initiatives and programs in the City of Falls Church

Non-Motorized

Includes bicycle and pedestrian improvements that provide connectivity in the region. Some projects also include technology elements.

$1.5B

51 non-motorized projects

Example Projects:

- Connect multi-use trail along Route 29 from Merrifield to Haymarket via Centreville
- Connect Landmark and Manassas Park with trail segments along the VRE Manassas Line
- Construct trail along Route 7 from Leesburg to Alexandria
- Improve bicycle and pedestrian infrastructure in and around the Columbia Pike corridor
- Multimodal access improvements for the East Falls Church and West Falls Church Metrorail Stations

Technology

Includes a range of technologies, such as Intelligent Transportation Systems (ITS), transit signal priority, real-time traveler information, electric vehicle charging infrastructure, and Connected and Automated Vehicle (CAV) enabling technologies. Technology projects can serve travelers using all modes.

$721.1M

17 technology projects

Example Projects:

- Provide charging/fueling infrastructure for low or zero emission cars and trucks
- ITS, adaptive traffic control, and hard shoulder lanes on I-95
- Implement ITS and integrated corridor management strategies on key regional corridors and parallel facilities

Parking

Includes parking improvement projects that can add capacity or technology-based enhancements to parking facilities, including park-and-ride lots.

$10M

1 parking project

Example Project:

- City of Falls Church "Park Once and Walk" garage network

High-Occupancy Vehicle/Toll (HOV/HOT)

Travel lanes designated for a minimum number of passengers (HOV) or lanes that allow a toll to be paid in lieu of meeting the minimum number or passengers (HOT).

$1.4B

8 HOV/HOT projects

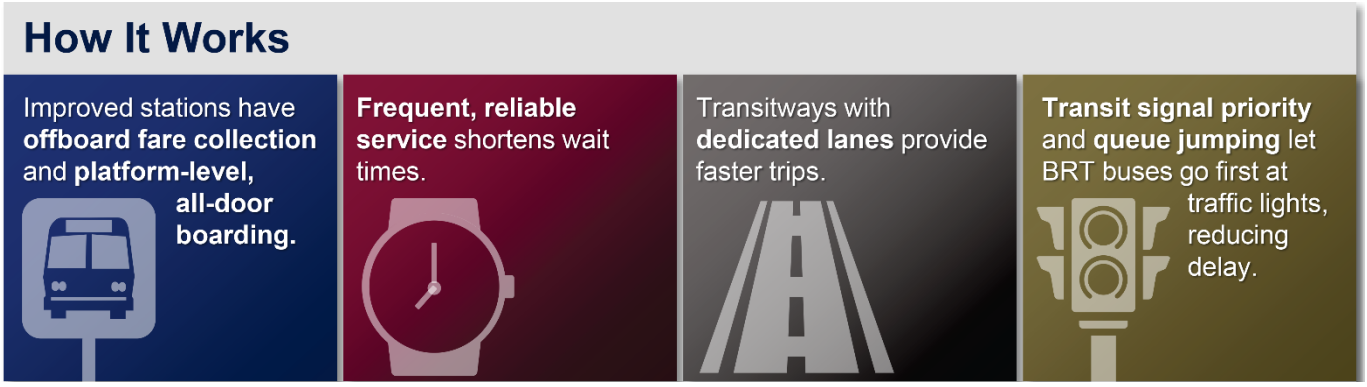
Example Projects:

- Implement reversible HOV lanes on Route 28 between I-66 and the Dulles Toll Road during AM and PM peak periods
- Implement HOT/HOV lanes on four bridges across the Potomac River
- Widen, upgrade, or convert Fairfax County Parkway (Route 286) to include HOV lanes from Dulles Toll Road (Route 267) to I-66
- Add HOV lanes to Franconia-Springfield Parkway (Route 289)

Building a Regional Bus Rapid Transit System

TransAction includes two types of transit projects that will bridge the gap between the region's backbone rail network (Metrorail and VRE) and the many local and commuter bus services provided throughout Northern Virginia, Bus Rapid Transit (BRT) and High-Capacity Transit (HCT). BRT is a high-quality and high-capacity bus-based transit system that delivers fast, comfortable, reliable, and cost-effective transit service. HCT is used in TransAction to signify that a preferred modal technology (BRT, light-rail transit, heavy rail transit) has not yet been selected. This potential network of BRT and HCT will provide new transportation options that offer vital alternatives to personal and single occupancy vehicles. While BRT and HCT projects have been included in prior versions of TransAction, this update has highlighted the importance of a regional BRT system to provide needed connections.

BRT provides an experience similar to a rail system through fast and frequent operations in dedicated transit lanes, branded stations and buses, off-board fare collection, and real time information. BRT is designed to provide bus service that is fast, frequent and reliable by minimizing typical causes of delay such as traffic congestion, intersection delay and boarding delay. BRT is often more flexible and less costly than a fixed-guideway heavy/light rail system.



Why a Regional Bus Rapid Transit Network Is Important for Northern Virginia:

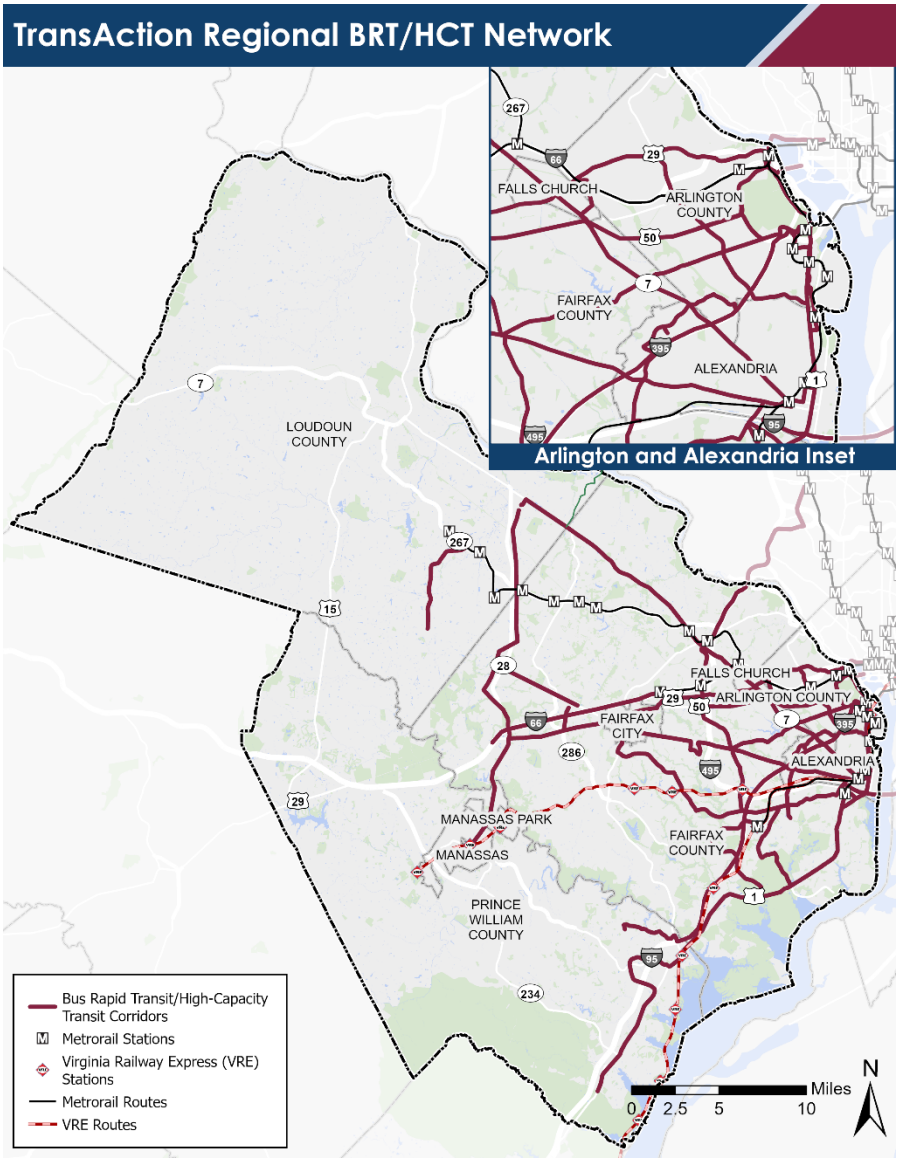
- Improves resiliency, can provide equitable travel options and is economically, environmentally and socially sustainable.
- Reduces travel times and creates easier transfers, improving access to jobs and destinations.
- Leverages existing infrastructure and investments (roads, rail, transit centers, toll facilities).
- Has a proven positive impact on economic development.

NVTA convened a BRT Planning Working Group consisting of planners and project sponsors from Northern Virginia, as well as Montgomery and Prince George's Counties in Maryland, and the District of Columbia, to review the current plans and implementation status of BRT projects in the region. Five BRT projects, each of which are partly funded by NVTA, are in the project development process or under construction: Metroway/Crystal City Transitway (in operation), Richmond Highway BRT, Envision Route 7, West End Transitway, and Duke Street Transitway. TransAction has identified additional corridors that will address gaps and provide regional connections.

Planned BRT or HCT Corridors Included in TransAction:

TransAction includes 90 miles of BRT and 280 miles of HCT, including:

- Columbia Pike (Annandale to Crystal City)
- Route 7 (Tysons to Mark Center and Sterling to Tysons)
- Richmond Highway / Route 1 (Huntington to Ft. Belvoir; Extension to Potomac Mills/Triangle)
- Duke Street Transitway and West End Transitway (City of Alexandria)
- U.S. 50 (DC to Chantilly)
- U.S. 29 (DC to Centreville)
- I-66 Corridor (Vienna to Centreville)
- Glebe Road (US 29 to Potomac Yards)
- Annandale to Merrifield-Tysons
- City of Fairfax to Springfield/Huntington
- Route 28 Corridor (Manassas to Dulles Town Center)
- Ashburn Station to US 50 via Brambleton
- Wilson Bridge (Franconia-Springfield to Branch Avenue)
- American Legion Bridge (Tysons to North Bethesda)



Leveraging Technology to Address Regional Transportation Issues

TransAction recognizes technology and innovation offer a wide range of ways to address transportation issues by improving the efficiency of our existing infrastructure and providing new and better travel choices to the region's residents. It is informed by NVTA's own Transportation Technology Strategic Plan (TTSP), which is a living document that was developed as a tool for establishing a proactive approach to innovation, while keeping congestion reduction top of mind.

TransAction includes 17 projects that are primarily focused on implementing various types of technologies across Northern Virginia, and dozens more that include a technology element. Some types of technology projects include:

- Intelligent Transportation Systems (ITS), which can help improve operations in a number of ways:
  - » Directly improve the operations of roadways and transit through coordination of traffic signals, or metering freeway ramps.
  - » Dynamic and real-real time monitoring and response technologies, allowing for better and faster responses to crashes and other emergencies.
  - » Improving the information available to travelers regarding all transportation modes, such as real-time parking availability for park-and-ride lots, next bus arrivals, implementing ramp metering, and improving emergency responses.
- Low/ zero-emission vehicles (ZEV) charging/ fueling infrastructure, which will support the transition of the region's vehicle fleet to electric or other low/ZEV technologies.
- Improvements that enable use of Connected and Automated Vehicle (CAV) technologies, which can reduce crashes, increase the carrying capacity of roads, and provide first mile/last mile connections to transit and activity centers.
- Transit Signal Priority (TSP) which helps transit vehicles move faster and spend less time delayed at traffic signals.

Many of these technologies are most effective when they are applied on a wide scale – along entire corridors or even across the whole region. To make the most of these technologies, it will be necessary to coordinate their implementation and ensure interoperability. When applied in an intentional way, these technologies can have major impacts on all aspects of the transportation system, including congestion equity, sustainability and safety. NVTA's Transportation Technology Strategy Plan (TTSP) identifies strategies and related actions to maximize the potential benefits and minimize any negatives of innovation in a manner that is highly consistent with NVTA's Core Values.

6. What are the Impacts of the Plan?

Plan Performance

Between 2017 and 2045, total person trips are expected to increase by 27%, vehicle miles traveled (VMT) increase by 26% and transit trips increase by 48% under the 'No-Build' (if no projects were built) conditions. Thus, the 2045 'No-Build' scenario has significantly more travel on roadways and transit than current conditions. Overall, the results of this model-based analysis show the improvements included in the 'Build' network (if all projects proposed in TransAction were built) benefit the entire Northern Virginia region and improve travel conditions when compared to the 2045 'No Build' conditions.

Performance of the regional transportation system in 2045 with the 'Build' network improvements, measured across key travel indicators and with the TransAction performance measures, shows significant improvement across most of Northern Virginia:

- Total person trips remain essentially the same between the 2045 No-Build and 2045 Build analysis, but the number of transit trips increases by 12% due to the significant investment in proposed in transit projects.
- Vehicle miles traveled (VMT) increase by 3.6% between the 2045 No-Build and 2045 -Build analysis, as highway capacity improvements and reduced travel delay lead to some increases in the length of auto trips.
- The 2045 Build analysis significantly improves the performance of the transportation system, relative to the No-Build analysis:
  - » Person hours of delay decrease by 19.5% for auto trips and by 31.4% for transit trips representing significant improvements in congestion across the region.
  - » Hours of severe congestion decrease by 29.7%. Accessibility to jobs improves for 20.0% overall, and slightly more (26.9%) for Equity Emphasis Areas (EEA)[1] residents.

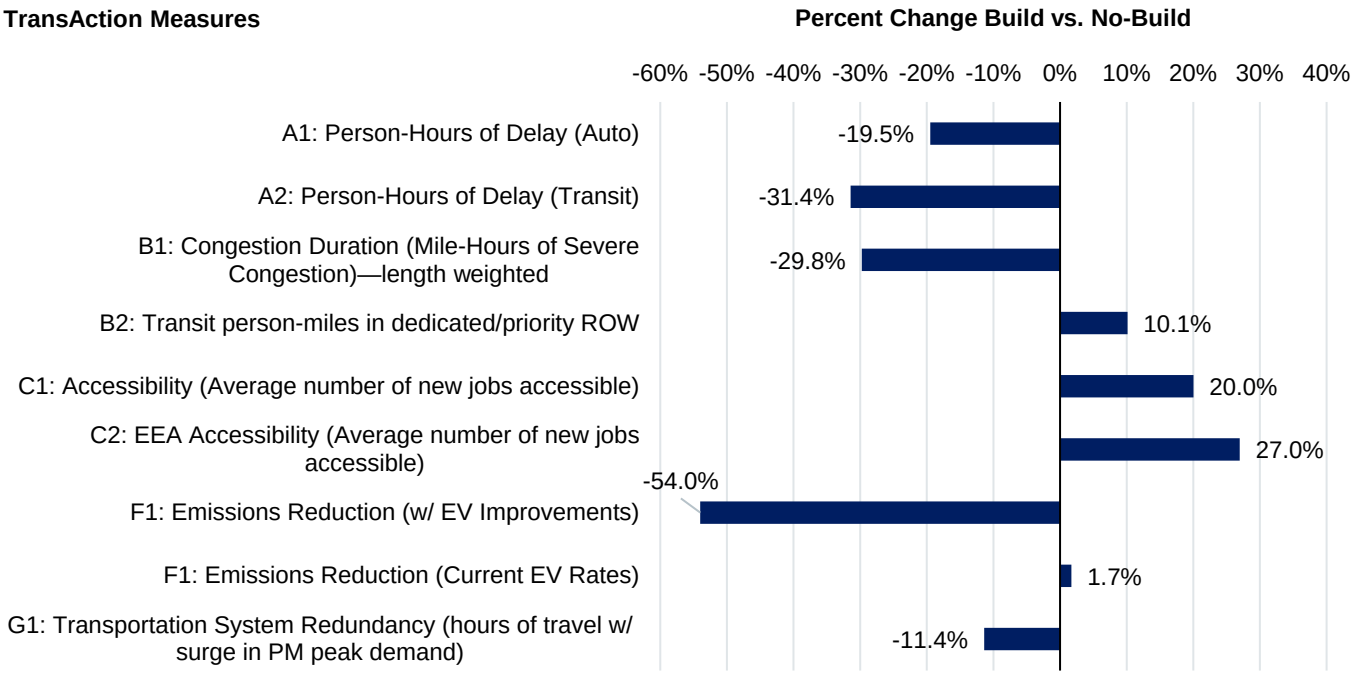
Weekday Travel Forecasts—Northern Virginia Regional Totals

Daily Travel	2017 Base	2045 No-Build	2045 Build	% Change 2017 to 2045 No-Build	% Change 2045 Build vs. 2045 No-Build
Auto Person Trips	6.74 M	8.22 M	8.15 M	22.0%	-0.8%
Transit Person Trips	0.26 M	0.39 M	0.43 M	47.5%	12.1%
Non-Motorized Person Trips	0.85 M	1.36 M	1.35 M	59.3%	-0.2%
Total Person Trips	7.86 M	9.97 M	9.94 M	26.9%	-0.2%
Person Miles Traveled (PMT)	70.69 M	91.16 M	94.70 M	29.0%	3.9%
Vehicle Miles Traveled (VMT)	52.42 M	66.12 M	68.53 M	26.1%	3.6%

Note: M indicates values in millions

1 For TransAction, EEAs are defined as any TAZ that is defined as either an MWCOG regional EEA or as a Northern Virginia Equity Area. The MWCOG EEAs were defined using average low-income and minority concentrations for the whole metropolitan region, while the Northern Virginia EEAs were identified using Northern Virginia specific averages.

Evaluation Results—TransAction Measures



Notes: See section 3 for full list of performance measures. D1 (quality of access to transit and walk/bike network) and E1 (potential for safety and security improvements) measures are evaluated at the project-level only.

Different patterns are observable across the region, as the projects included in the Plan have different impacts by Northern Virginia sub-region[2]:

- Transit trips show the largest percentage increase (22.2%) in the Outer Suburbs as transit options expand.
- VMT changes vary considerably by sub-region, with a decrease (-3.1%) in the Central jurisdictions; modest increase (+1.1%) for Inner Suburbs; and a larger increase (+9.2%) in the Outer Suburbs.
- Reductions in total person hours of delay (the combined total of A1 and A2 measures as listed in the graph above) are distributed more evenly throughout Northern Virginia, as each of the sub-regions decreases congestion through different means.

Highway and transit projects were also tested separately and the results for these Highway-Only and Transit-Only

Electrification and Emissions

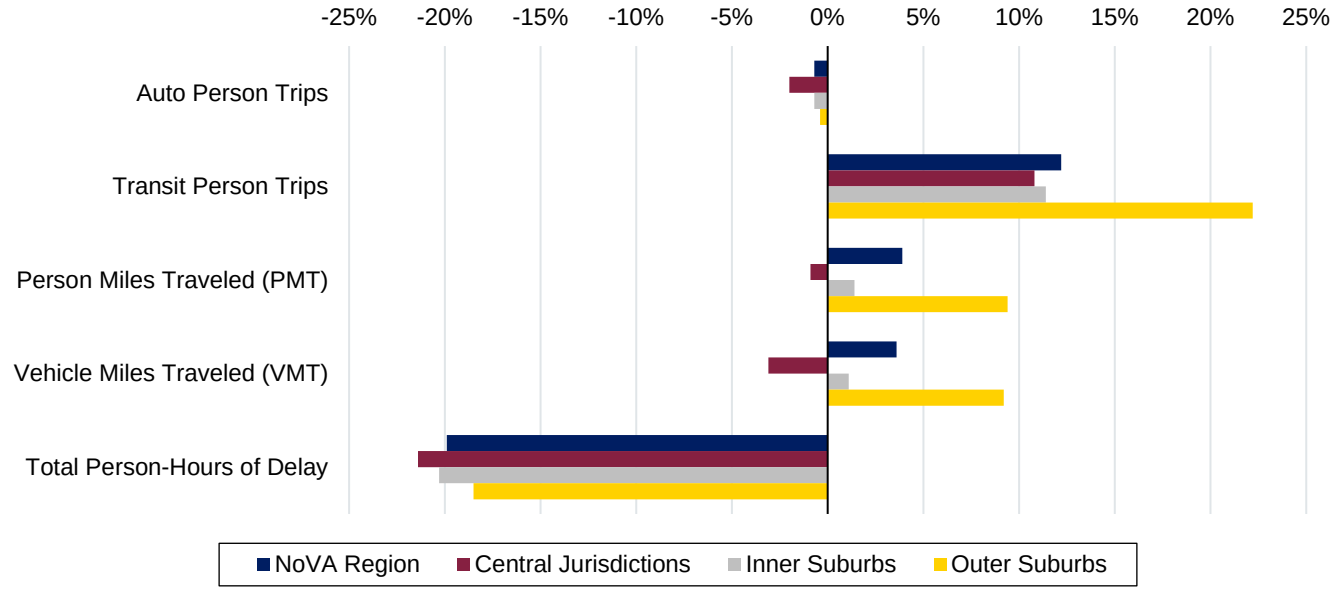
TransAction includes three projects specifically designed to increase access to charging/fueling infrastructure for low/Zero emissions vehicles of all types. This infrastructure will encourage adoption of these vehicles, helping them become more widespread on Northern Virginia's roads. The level of electrification of the vehicle fleet, along with the sources used to generate the power they use, will have a major impact on the level of greenhouse gas (GHG) emissions (generated by motor vehicles) expected in 2045. If more progress can be made on electrifying trucks, buses and private cars, and the composition of the energy sources utilized in the Commonwealth is maintained, emissions could be reduced by up to 54%. The impact of the TransAction projects on emissions will depend heavily on how much electrification can be achieved, and from what sources, by 2045.

[2] Central: Arlington, Alexandria; Inner: Fairfax, Falls Church, Fairfax City; Outer: Loudoun, Prince William Co, Manassas, M Park.

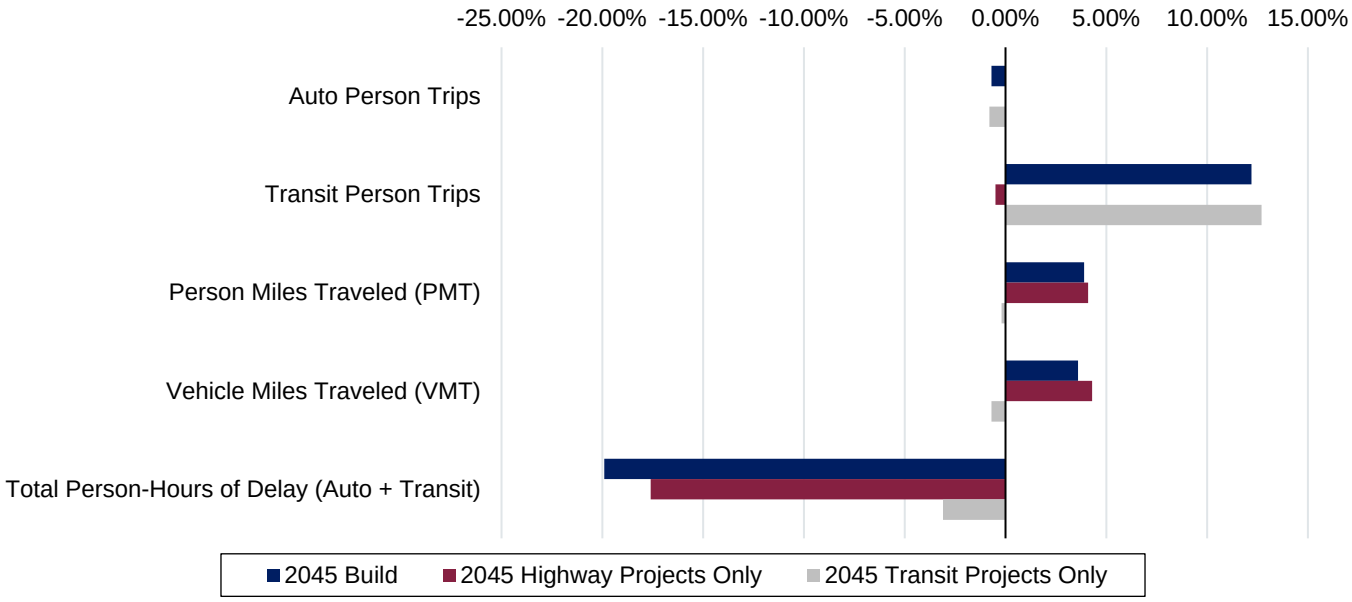
tests are shown below in comparison with the -Build results:

- Transit projects and highway projects appear to be serving very different markets and are only in competition with one another in very limited cases. For example, the analysis of the transit-only network shows only a small percentage increase in transit trips relative to the Build network (12.6% vs. 12.1%) that shift from driving when the highway projects are removed from the Build network, reducing VMT in the region by less than 1%.
- Roadway projects have a bigger impact on reducing congestion in the region than other modes. The roadway projects alone reduce delay by 17.6%, while the addition of the remaining projects further reduces congestion to a total of 19.9%.

Percent Change in 2045 Build Relative to No-Build, Regional and Subregional Results



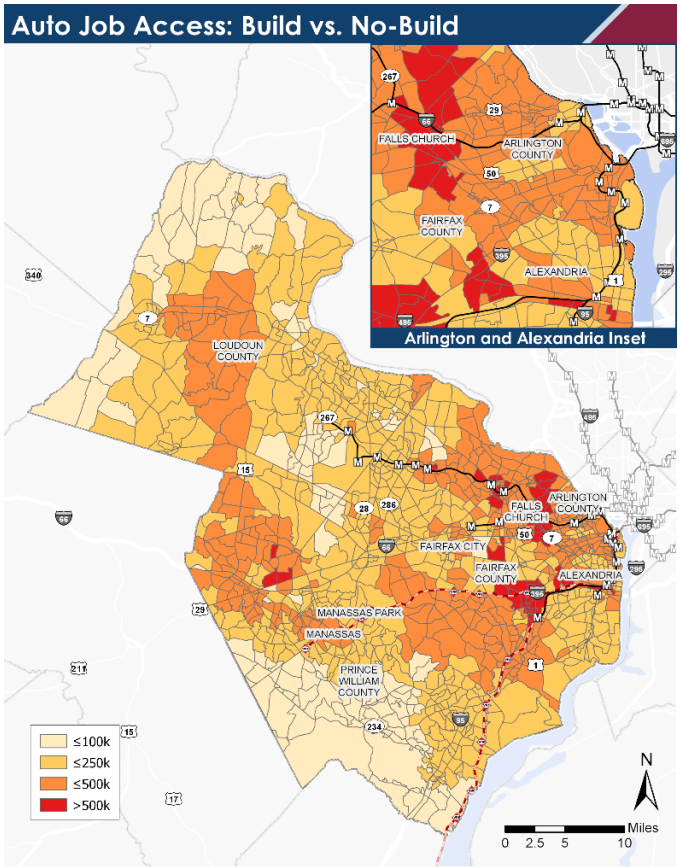
2045 Build Relative to No-Build, Compared with Highway-Only and Transit-Only Results

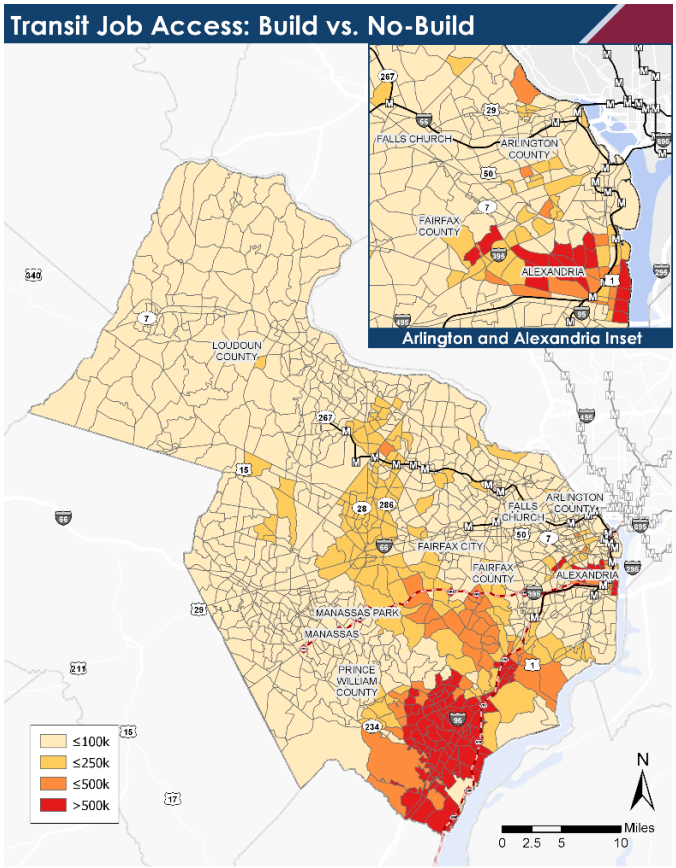


Improved Access to Jobs

Accessibility is measured by calculating the increase in the average number of regional jobs accessible from households in Northern Virginia within a 45-minute drive, a 60-minute transit ride, and a 30-minute bike ride. The plan results in widespread improvements in auto accessibility to jobs throughout the region. Overall, accessibility to jobs by all modes is expected to increase by 20% with the TransAction plan (Build network) projects, when compared with no-build conditions. When only the residents of EEAs are considered, the average gain is 27%, indicating that the Plan improves accessibility for EEA residents more than the region as a whole. This would represent an improvement in the equity of the transportation network as EEAs currently have lower job access than the rest of the region, on average, and a significant portion of the people that live there are included in NVTA's definition of under-served populations.

The maps below show the areas where accessibility improves (increase in jobs that are accessible) with the TransAction projects. Improvements in auto accessibility are widespread throughout the region reflecting the geographic distribution of the projects, with larger improvements along I-495, Dulles Toll Road, and Route 28 corridors. Improvements in transit accessibility to jobs are more prevalent in eastern parts of the region including Alexandria, the Richmond Highway corridor of Fairfax County, and eastern Prince William County. Accessibility improvements are also shown in the Route 28 and Fairfax County Parkway corridors where the Plan fills major gaps in the regional transit network. Bike accessibility gains (not shown on the maps) are more focused on areas inside the Beltway where densities allow for more jobs to be reached within a 30-minute bike ride.

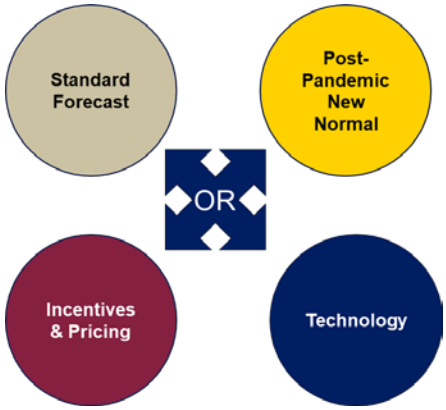




7. What Happens if the Future is Different Than Expected?

The TransAction analysis discussed so far is based on forecasts that are built assuming that travel behaviors in the future are similar to travel behaviors in the recent past. This includes growth assumptions for the region along with some changes to the transportation network, but does not fully consider the many ways life and travel behaviors could change between now and 2045. What if the future is significantly different in some important ways? To test TransAction's robustness and adaptability to an uncertain future, sensitivity tests that looked at three alternative scenarios were performed, each analyzing TransAction's performance under potential futures. Each scenario is a plausible future, but not necessarily preferred visions; they are also not the only potential futures.

TransAction Scenario Analysis



NVTA developed three scenarios, in addition to the standard travel forecasts for the No-Build and Build conditions, to answer some of the "what if" questions and understand the future of transportation in Northern Virginia if major changes in technology, travel behavior, and/or policy across multiple levels of government were to occur. The three scenarios tested include:

Post-Pandemic 'New Normal' -- Illustrates a future in which many of the behavioral changes observed during the COVID-19 pandemic continue into the long-term future. This scenario is not assuming that an ongoing pandemic continues to shape travel patterns in 2045, but rather that the convenience associated with some of the new behaviors makes them attractive for people in the future. ***Key assumptions:*** reduction of work-related trips, reduction of shopping trips, increase in delivery trips, increase in non-motorized trips.

Technology -- Focuses on adoption of connected, automated, shared, and electric (CASE) vehicles. The scenario evaluates how travel behavior and the operations of the transportation system might change with the adoption and integration of these emerging technologies. ***Key Assumptions:*** increased market penetration of CASE vehicles, changes in operating costs for automated vehicles (shared and privately owned), increases in effective roadway capacity, changes in trip generation, and automated transit shuttles at all rail stations.

Incentives/Pricing -- Centers on policy strategies to change travel behavior to mitigate congestion and its negative impacts to NoVA residents. The scenario will incorporate a number of monetary inducements designed to encourage a reduction/reversal on our dependance on driving alone, while providing meaningful transportation choices. ***Key assumptions:*** VMT pricing on all roads with discounts for lower-income households, increase in parking costs across the region, free transit (no fares), and shift in travel times from peak hours.

All three scenarios are assumptions-based and it is acknowledged that significant planning, policy and technology progress would be necessary for any of them to actually occur, along with sufficient funding. Note that land use changes were not assumed in any of the three scenarios for the TransAction analysis, but it is acknowledged that land use changes may in fact be influenced by the same trends and factors shaping these scenarios.

Scenario Results

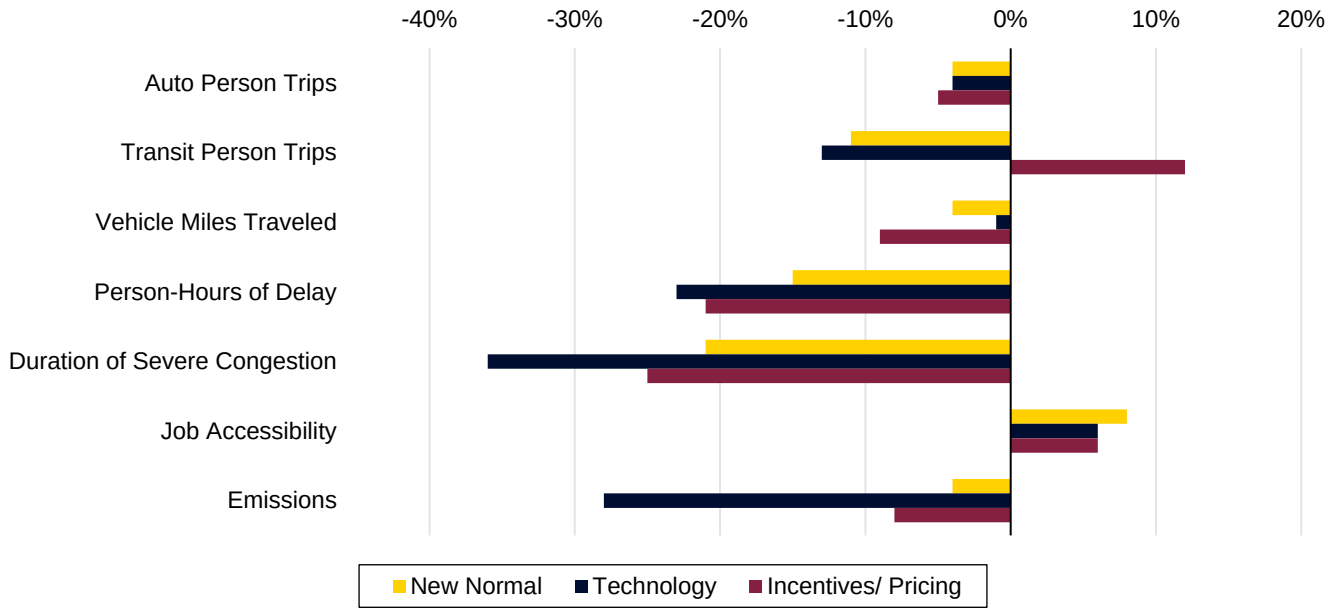
Each of these scenarios were analyzed using the TransAction model. Scenarios were tested for no-build conditions (i.e., without TransAction projects), and for build conditions (including all 429 projects in the TransAction project list). The first analysis, using the No-Build conditions, highlights how transportation needs in the region might change if these futures came to pass. For example, peak hour congestion needs could be reduced in a future with significantly fewer commute trips. Alternatively, transit capacity could be identified as a new need in some corridors where free transit and other incentives encourage growth in transit ridership.

Changing Needs

The chart below shows the results when the three scenarios were tested with the No-Build network (i.e., without the TransAction projects). Some of the changes observed based on the scenario assumptions include:

- **Post-Pandemic 'New Normal'** scenario: Fewer commute trips in the peak period results in less congestion. Decrease in total daily auto trips (-4%) and a somewhat larger decrease in transit trips (-11%), as a larger portion of transit trips are commute trips. Decreases are also seen in VMT (-4%) and person-hours of delay (-15%) reducing congestion during the peak periods and overall emissions.
- **Technology** scenario: Increased efficiency of the roadway network significantly improves operations of the transportation system. Decreases in person hours of delay (-23%) and in duration of severe congestion (-36%), as the roadway capacity increases facilitated by CASE vehicles reduces delay and allows the same roads to carry more vehicles. Transit trips decrease (-13%) due to shifting to CASE vehicles, including automated shuttles. Emissions decrease by 28% as a result of electrification.
- **Incentives/Pricing** scenario: Pricing travel encourages shifts from driving alone to transit and carpool use, or other non-SOV modes, improving the efficiency of the transportation system. Large increase in transit trips (+12%) due to free transit and increased costs for driving. Significant decreases in VMT (-9%), person hours of delay (-20%) and in duration of severe congestion (-25%) as pricing provides a disincentive to driving.

Percent Change in 2045 No-Build Results Under Each Scenario

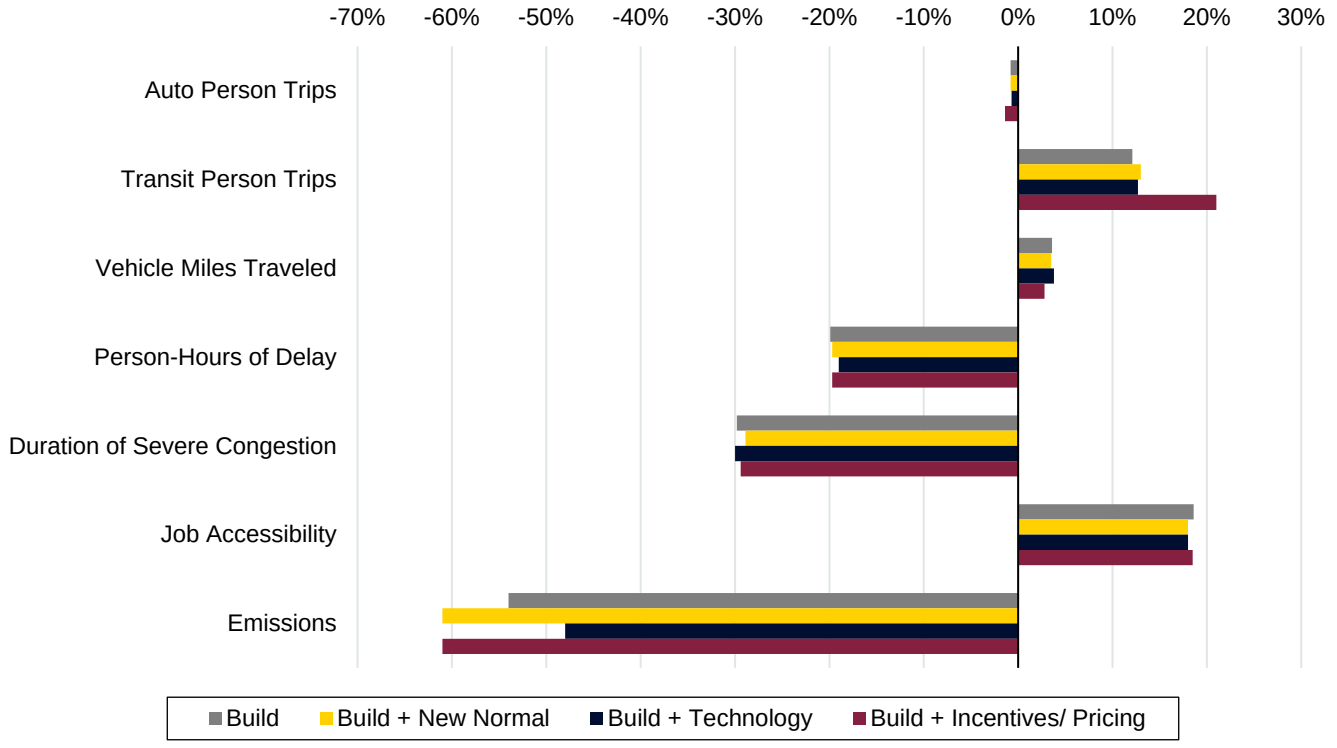


Robustness of TransAction Investments

NVTA also tested how well the TransAction projects would perform in each of these potential futures. This analysis helps to understand if the projects in TransAction are still necessary if the future plays out differently than the standard forecasts for the region. In all three of the scenarios, the TransAction projects provide tangible benefits to the region, helping to decrease congestion, improve accessibility and reduce emissions. Some key findings from this analysis include:

- The TransAction Plan has a larger increase in transit trips in all three scenarios (12.7 - 21% increase) than in the standard forecast (12.1%). This indicates that the transit projects included in the TransAction Plan are more attractive under the assumptions of the scenarios.
- The TransAction projects have a slightly smaller impact on congestion in the alternative future scenarios. Even considering that there is less congestion to begin with in the No-Build versions of these scenarios, the TransAction projects are still effective at reducing congestion as a group. However, this may not be true for each individual project, and NVTA will continue to monitor and evaluate changes in travel patterns and performance to ensure that each project selected for funding as part of the Six Year Program will be beneficial for the region in the long-term.
- The TransAction projects have the biggest impacts in the Incentives/Pricing scenario; increasing transit trips by 21%, decreasing emissions by 61% and resulting in the smallest increase in VMT of any of the four futures considered. The assumptions of this scenario, such as free transit and discounted VMT charges for low-income households, make many of the transit projects in TransAction more attractive while, at the same time, support more equitable impacts.

Performance of TransAction Plan Projects by Scenario



8. How will TransAction Benefit the Region?

TransAction Enhances Mobility

- **Reduces congestion and delay** – The combined effects of the multimodal investments in TransAction are projected to decrease person-hours of delay by 20% and reduce the duration of severe congestion by 30%. The Plan adds 1,050 additional lane miles of roadway, numerous interchanges and intersection improvements, HOV/HOT lanes, and ITS improvements that reduce bottlenecks on the road system and move people more efficiently. A reduction in delay also benefits transit riders as well, with a 31% decrease in delay on transit.
- **Addresses growth** - Northern Virginia will face continued growth, adding to the travel demand and delay experienced today. The TransAction Plan provides improvements in mobility while meeting the needs of the growing population and job market in Northern Virginia.
- **Builds regional connections** – The Plan addresses gaps in the current transportation system for roads, transit and trails. In particular, the Plan continues to invest in a regional Bus Rapid Transit (BRT) network and includes 90 miles of BRT and 280 miles of High-Capacity Transit routes to create a truly regional system that expands the reach of the current transit system and provides critical suburban-to-suburban connections. The Plan also includes improvements to fill gaps in the network of regional trails and making connections to activity centers and to multimodal hubs at transit stations.
- **Provides transportation choices** – The Plan provides alternatives to driving through meaningful multimodal travel choices. Transit ridership increases by 12% with the TransAction projects. The Plan includes 51 nonmotorized projects intended to support biking and walking around the region.

TransAction Increases Accessibility

- **Connects people to jobs and opportunities** – The Plan creates a multimodal transportation network that is more accessible, providing a 20% increase in the jobs that can be reached within a reasonable commute across all modes, whether via transit, roadway or bike/pedestrian trail.
- **Provides equitable access** – Accessibility gains are even greater (29%) for communities that fall within the region's Equity Emphasis Areas. These neighborhoods can benefit significantly from having additional travel choices, as they currently have lower access on average.

TransAction Improves Resiliency

- **Improves transportation safety** – Provides continued investment in multimodal projects that put safety first, reducing conflicts on roadways and pedestrian/bike facilities in the region and reducing risk for the most vulnerable users, i.e., pedestrians and bicyclists.
- **Support reduction of vehicle emissions** – TransAction includes significant alternatives to driving in single-occupancy vehicles. The two most common ways to reduce transportation greenhouse gas (GHG) emissions are less driving and use of low/zero emission vehicles. TransAction supports both, but the analysis shows that supporting widespread electrification leads to the largest decreases in transportation emissions.

Other Considerations

- No single project, program or policy will address all of the region's transportation needs.
- TransAction does not make recommendations on project funding or prioritization of the project list.
- Emerging trends in technology and travel preferences, many outside of NVTA's control, may change travel conditions and transportation performance by 2045.
- Some elements of the Plan may warrant further study including the development of a regional BRT system and opportunities and challenges associated with a regional approach to incentives/pricing. Complementary transportation technologies and other supportive policies can enhance the effectiveness of the Plan.
- The future is uncertain, and TransAction, NVTA, member jurisdictions and partnering agencies must remain nimble in planning transportation improvements to address the region's needs as conditions evolve.

It takes a region.

The 429 candidate regional projects identified in the Plan exceed the region's expected funding available through 2045. Other funding sources, including federal, state, local, and private dollars, may be available to help close the gap. Regional collaboration and the ability to work beyond jurisdictional lines is key to keeping the D.C. metropolitan area moving.

For more info about the TransAction Plan including the TransAction Project List:
nvtatransaction.org