Scenario Analysis for TransAction

Long Range Transportation Plan Update in Northern Virginia

September 23, 2022

presented to

COG/TPB Travel Forecasting Subcommittee

presented by

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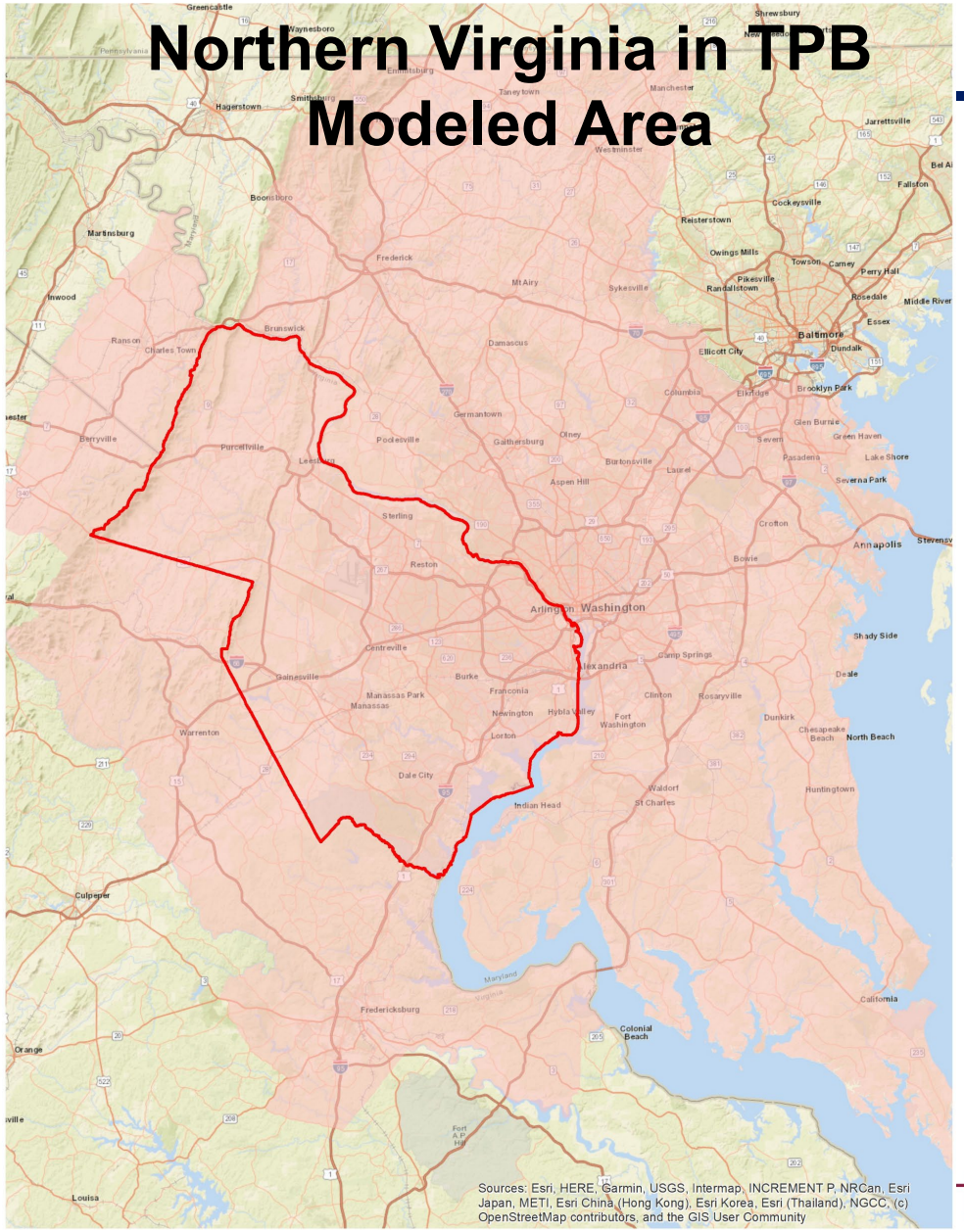
NVTA's TransAction
Transportation Action Plan for Northern Virginia

Agenda

1. Who we are, our planning/programming process
2. Project List and Build network
3. New modeling framework and Results
4. Scenario Analyses

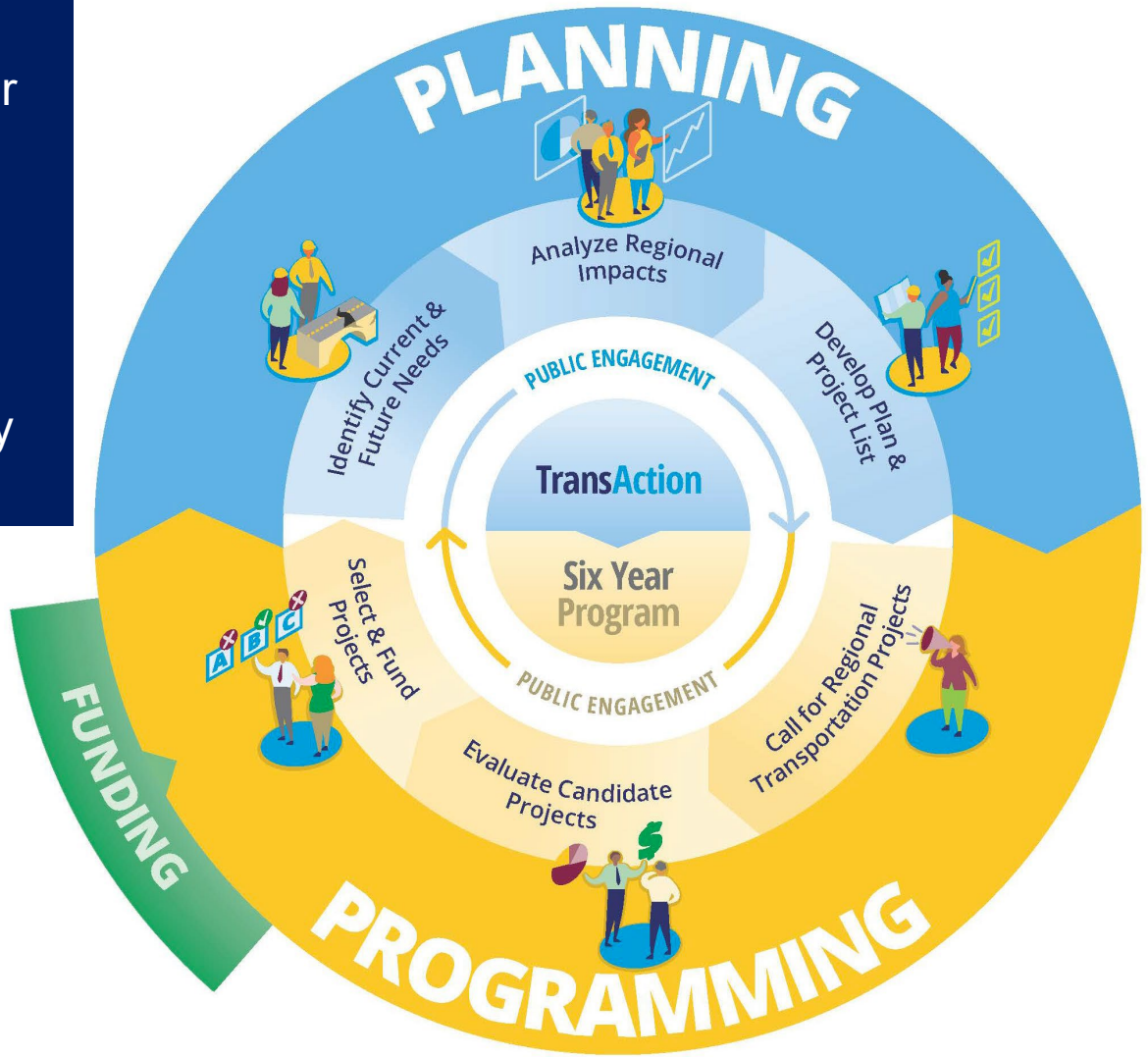
Who we are?

- Created by Virginia General Assembly Senate Bill 576 on July 1, 2002, to:
  - Prepare a regional transportation plan
  - Evaluate all regionally significant transportation projects according to the degree to which each project is expected to reduce congestion
- Works with Northern Virginia's jurisdictions to develop regional transportation priorities and policies.
- An advocate for the transportation needs of Northern Virginia before the state and federal governments.
- Two primary responsibilities – Long Range Plan (TransAction), and Six Year Program (funding).



Planning + Programming

TransAction
- Long-Range Transportation Plan for NoVA
- Updated every five years
- Current plan adopted in October 2017
- Fiscally/geographically unconstrained



Six Year Program (SYP)
- Allocates NVTA's Regional Revenues to regional transportation projects
- Updated every two years
- Most recent SYP adopted in July 2022

NVTA's TransAction

TransAction Vision Statement

"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."

Core Values:

Overarching principles for TransAction that are part of the Vision statement and should be incorporated into the process and resulting plan.

Vision statement approved by NVTA in December 2020.

Goals and Core Values

Goals:
What we want to achieve

- **Enhance Mobility**
- **Increase Accessibility**
- **Improve Resiliency**

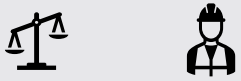
Core Values:
How we achieve the goals

- **Equitably**
- **Sustainably**
- **Safely**

Core Values are associated with multiple goals, objectives, and performance measures.

NVTA's TransAction

Approved Goals, Objectives and Performance Measures

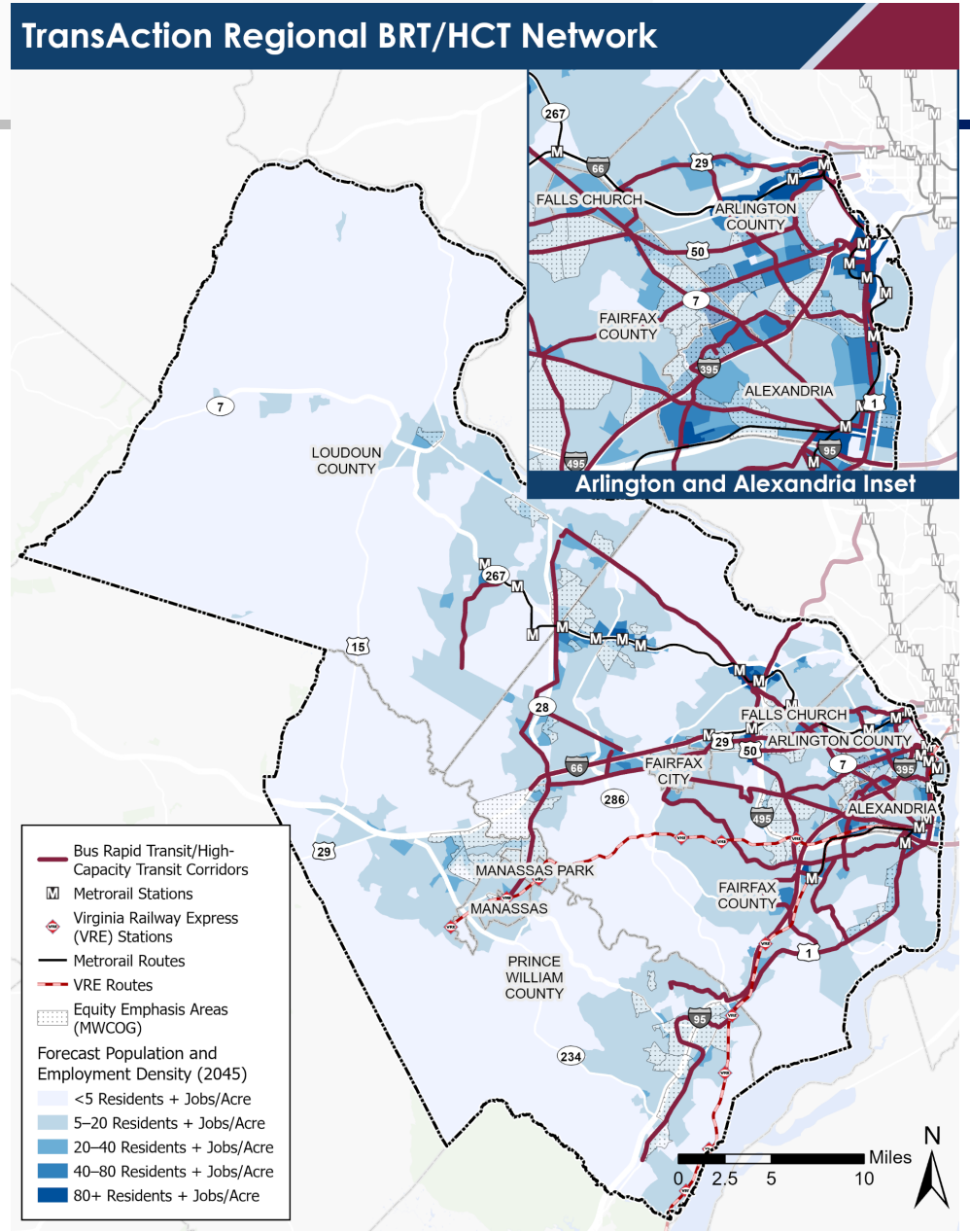
Goal	Objective	Performance Measure	Weight	Alignment with Core Values
Mobility: Enhance quality of life of Northern Virginians by improving performance of the multimodal transportation system	A. Reduce congestion and delay*	A1. Total Person-Hours of Delay in autos	10	
		A2. Total Person-Hours of Delay on Transit	10	
	B. Improve travel time reliability*	B1. Duration of Severe Congestion	10	
		B2. Transit person-miles in dedicated/priority ROW	10	
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	
		C2. Access to jobs by car, transit, and bike for EEA populations	10	
	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	
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	
	F. Reduce transportation related emissions	F1. Vehicle Emissions	10	
	G. Maintain operations of the regional transportation system during extreme conditions*	G1. Transportation System Redundancy	5	

Transit may include HOV.

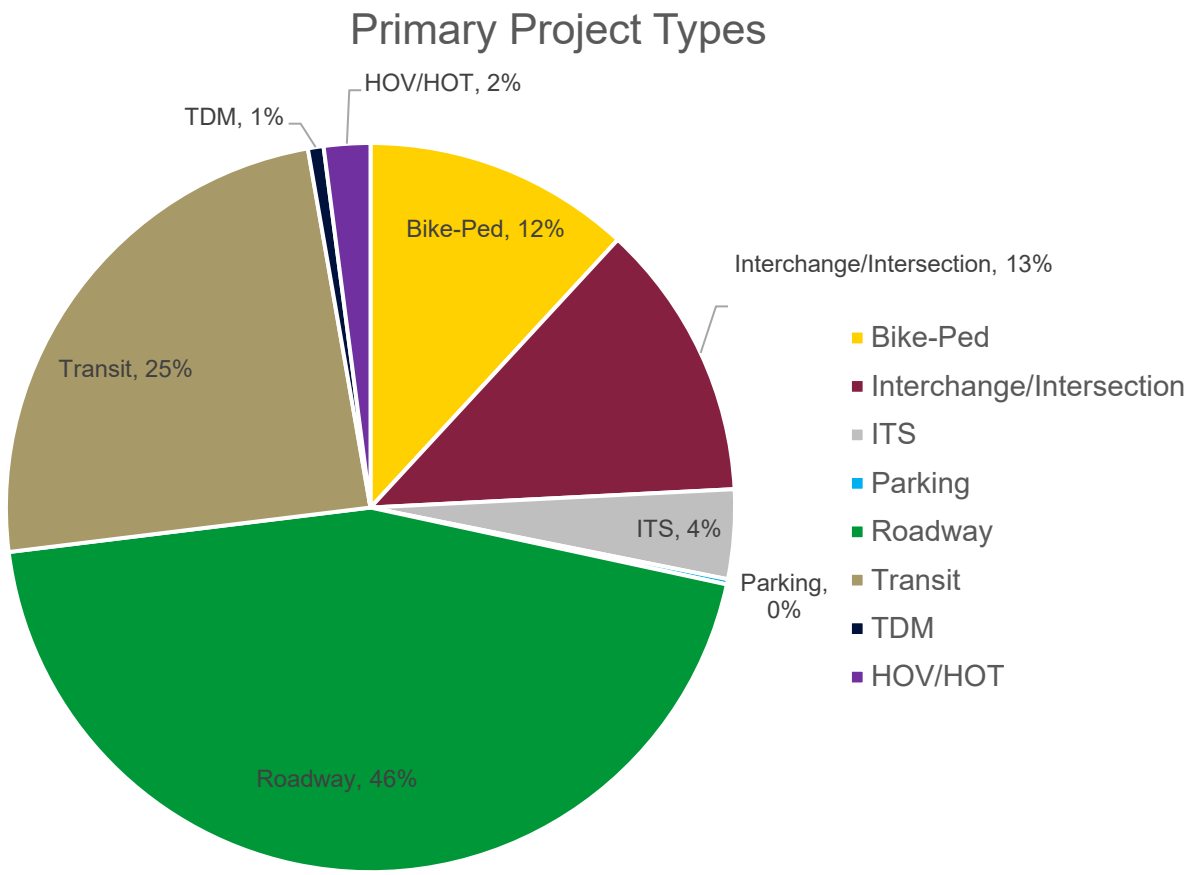
* Measure included in HB 599 rating process.

TransAction Project List

- A set of programmatic and project solutions to transportation needs and priorities identified during planning process.
- Bottom up – projects identified in jurisdictions and agencies' plans and programs.
- Top down – Other state and regional agencies, regional gap analyses. For example – NVTA BRT Planning Working Group.
- Forms the Build network (horizon year 2045).
- No-Build = TPB CLRP minus projects fully funded/scheduled to be completed by 2045 in Northern Virginia.

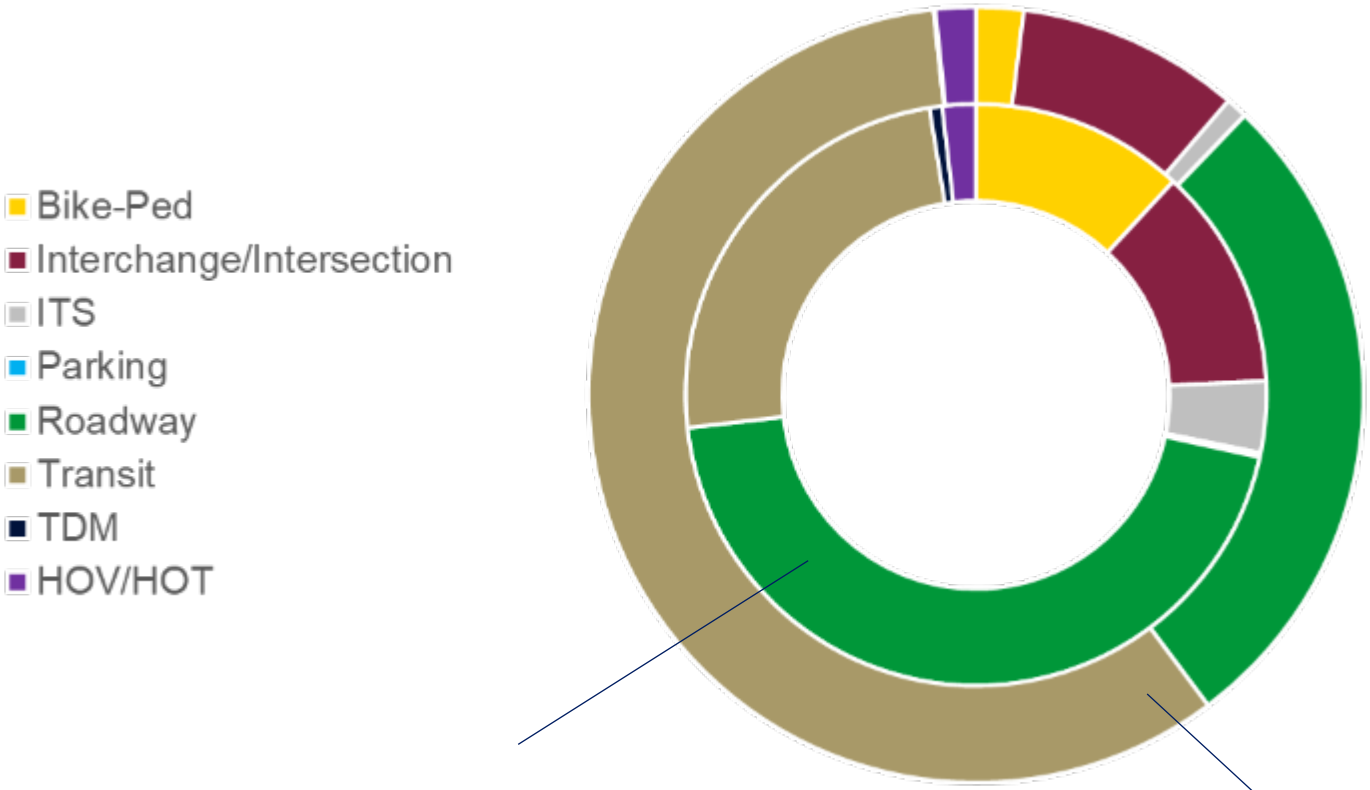


TransAction Projects by Type



Primary Project Types	Count
Bike-Ped	51
Interchange/Intersection	53
ITS	17
Parking	1
Roadway	192
Transit	104
TDM	3
HOV/HOT	8
TOTAL	**429**

Project Costs by Project Type



Inner circle is # projects

Outer circle is total cost of projects

Average Cost	
Bike-Ped	$ 27.9M
Interchange/ Intersection	$125.1M
ITS	$ 37.3M
Parking	$ 10.0M
Roadway	$102.1M
Transit	$399.8M
TDM	$ 18.3M
HOV/HOT	$149.5M

NVTA's TransAction

TransAction Modeling

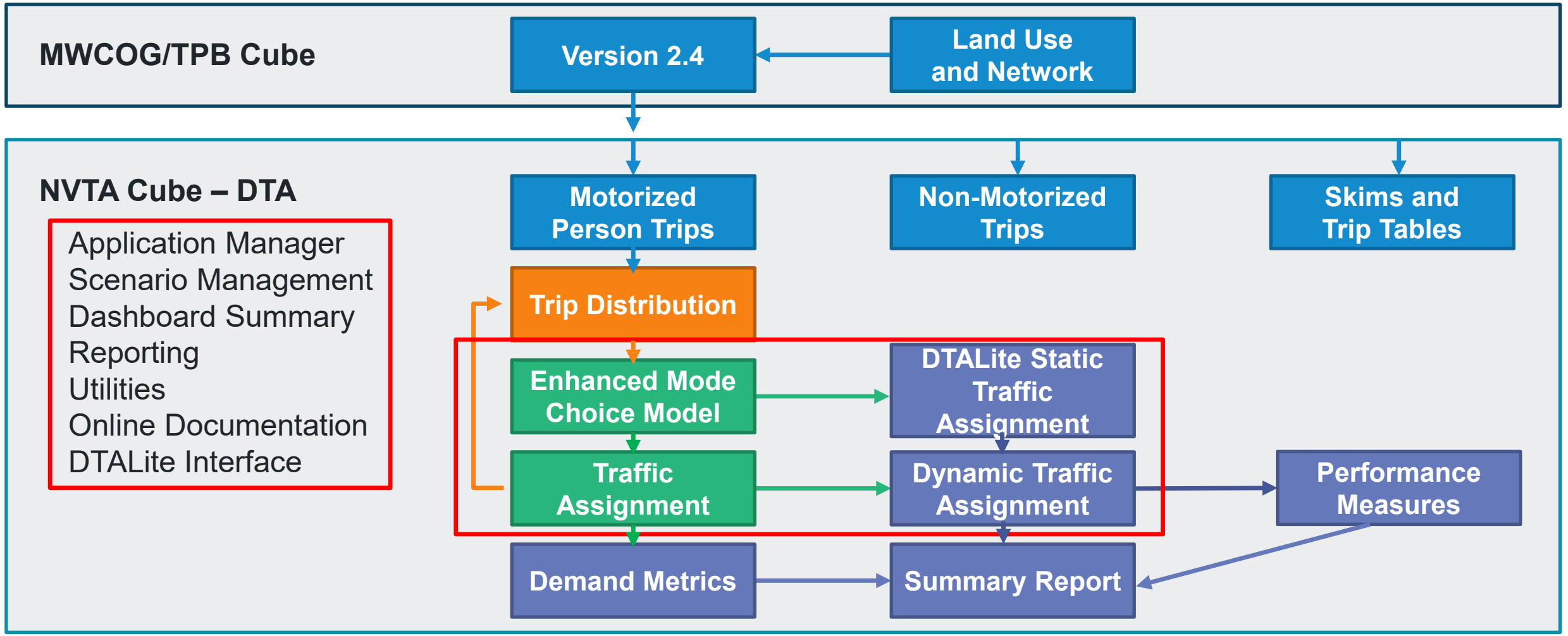
NVTA's TransAction

Transportation Action Plan for Northern Virginia

New TransAction Modeling Process

- NVTA Modeling System:
  - Macroscopic modeling using an enhanced version of the COG/TPB regional model with new functionality of CAV and TNC modeling (Cube)
  - Mesoscopic modeling leveraging dynamic traffic assignment (DTA) techniques (DTALite)
  - User-friendly interface with scenario management and dashboard for reporting
- Off-model analysis:
  - Bicycle accessibility
  - Qualitative assessment of D1 and E1 measures

Modeling Framework



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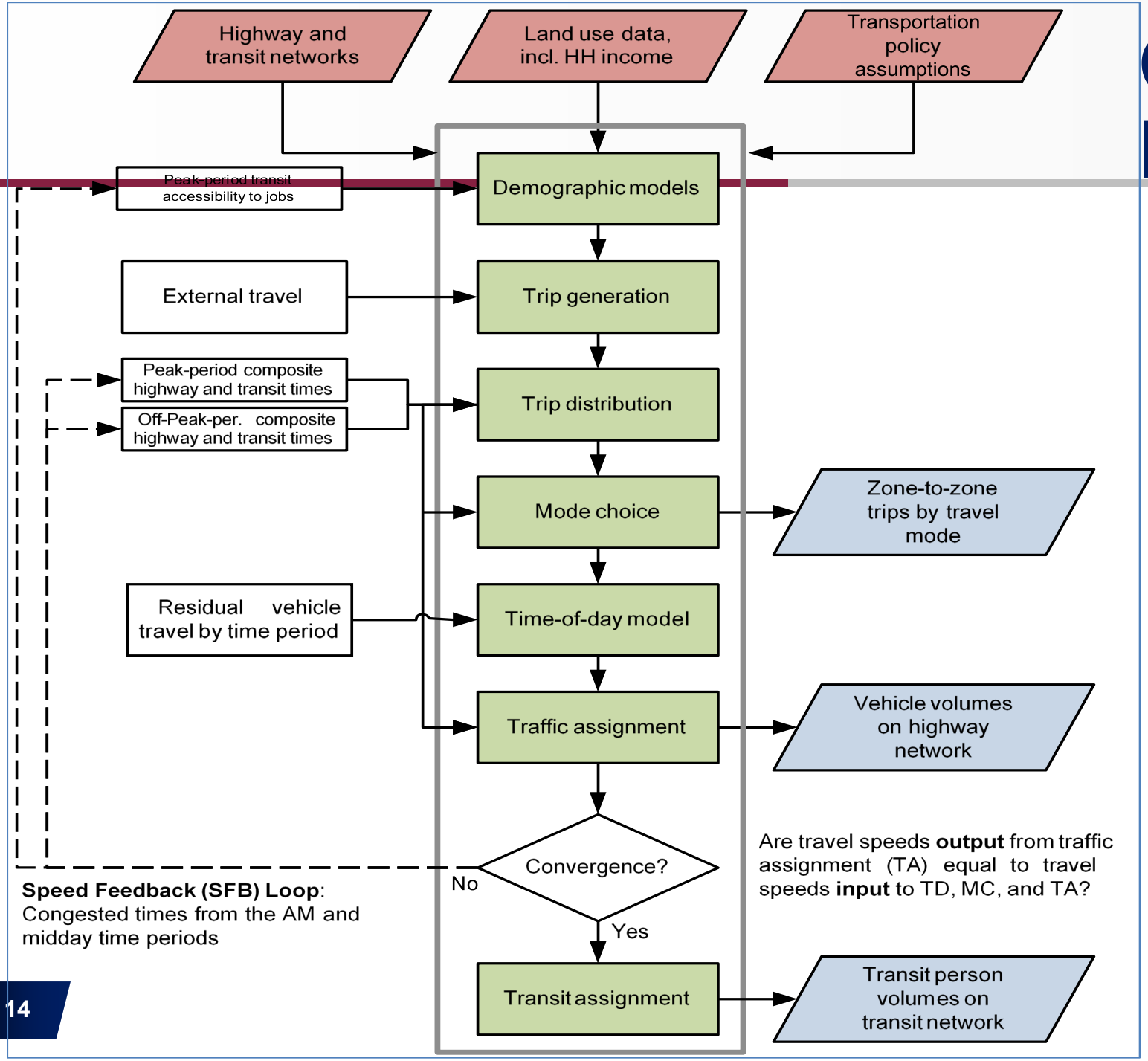
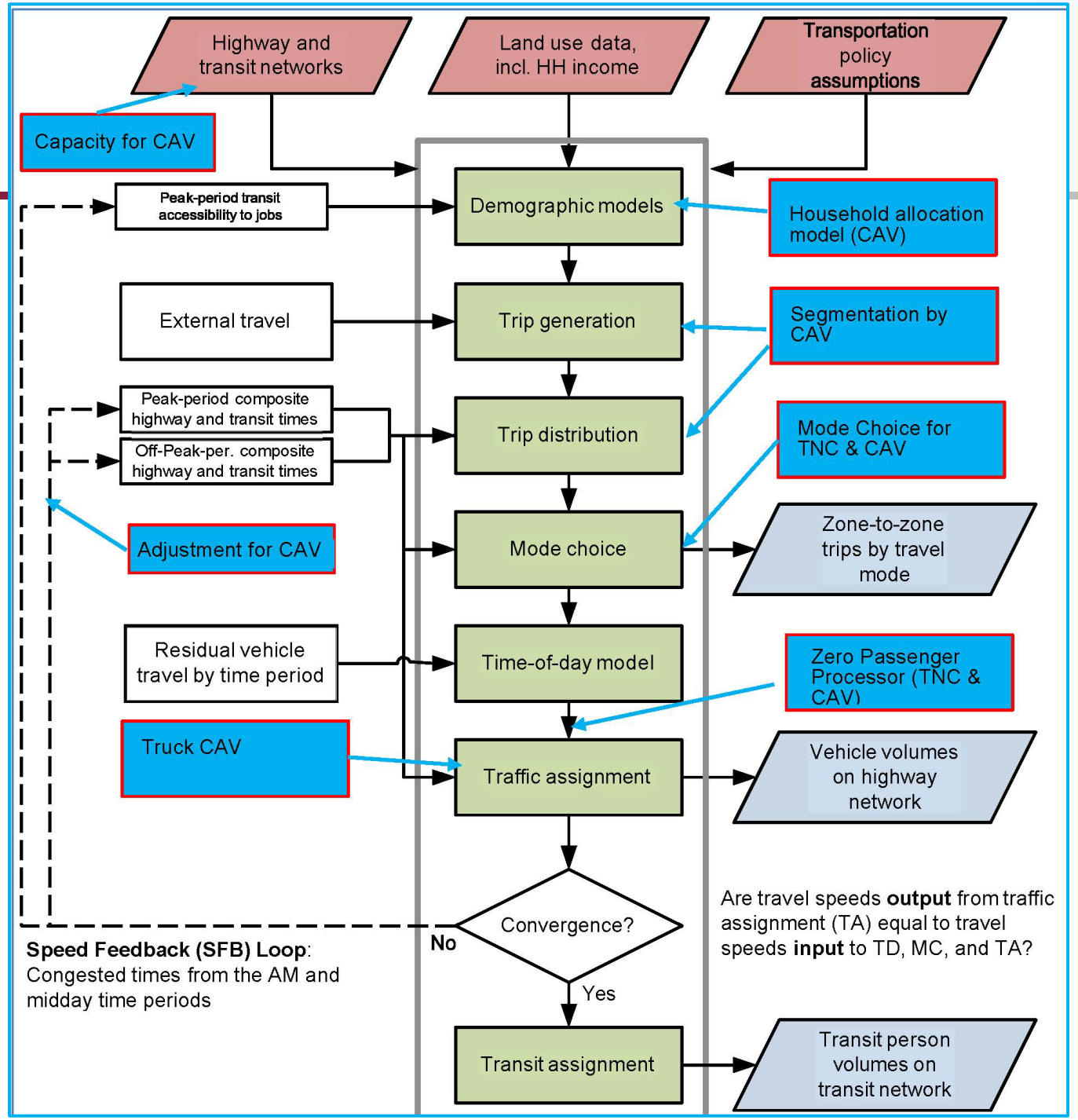
COG/TPB Model Structure



Source: COG/TPB

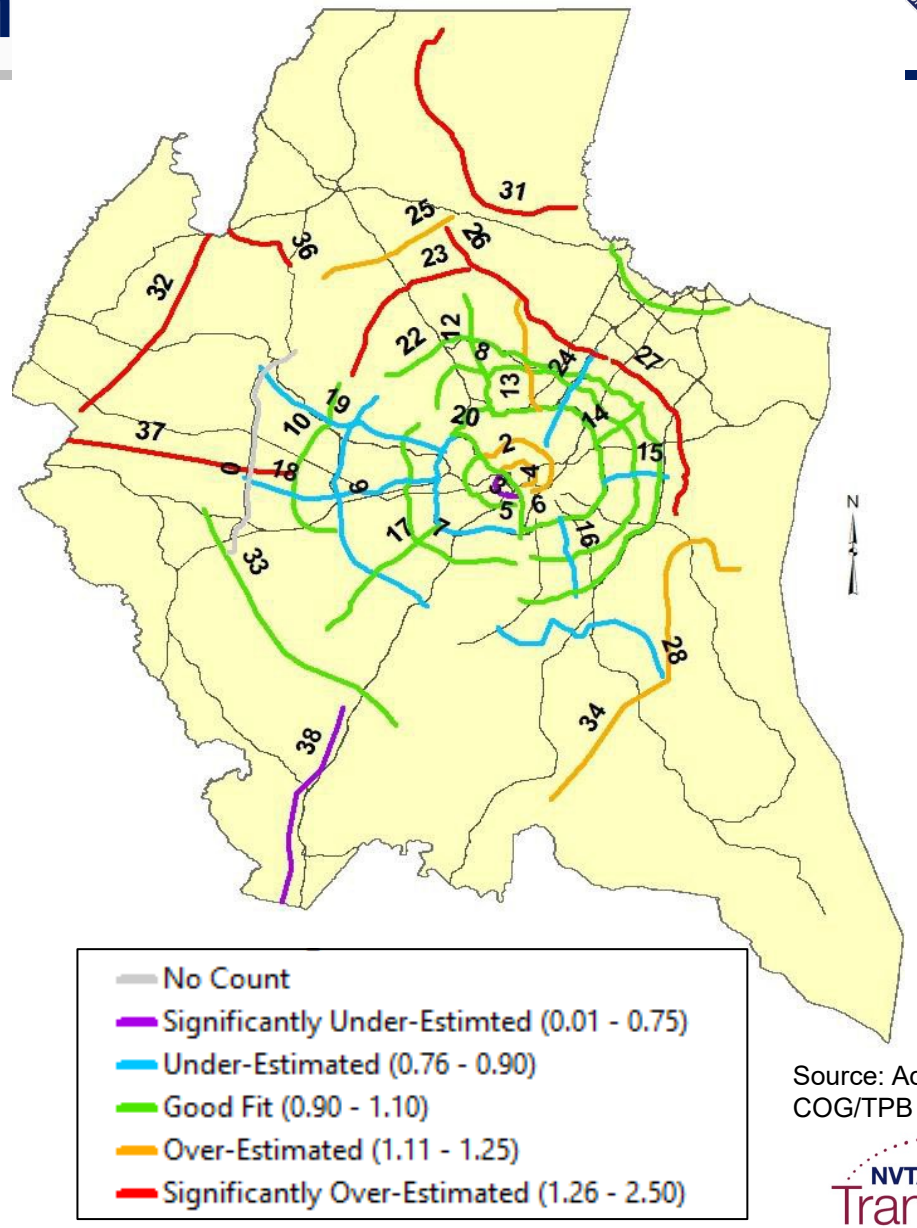
Functionality Enhancements



Source: Adapted from COG/TPB

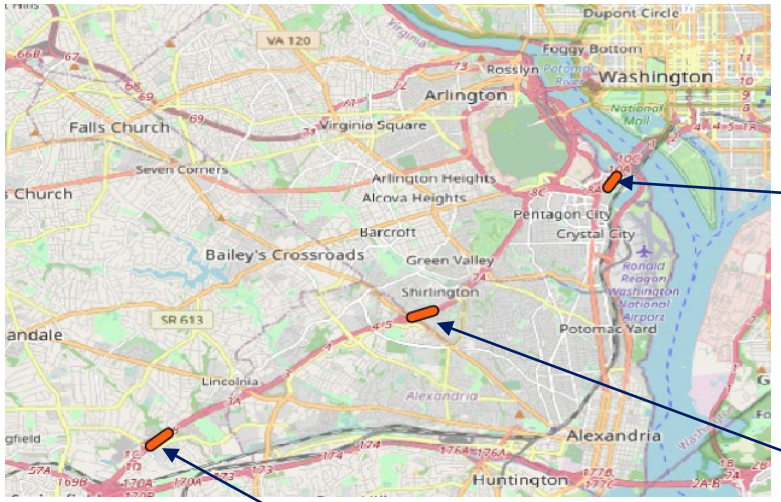
Traffic Assignment Validation

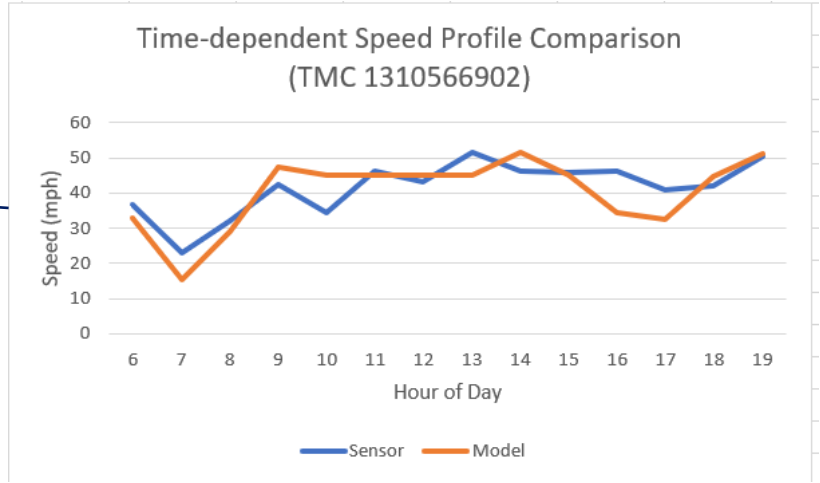
- 35 Screenlines/Cutlines
  - 7 better
  - 4 worse
  - 24 similar
- Potomac River Crossing
  - -4% vs -10% in V2.4

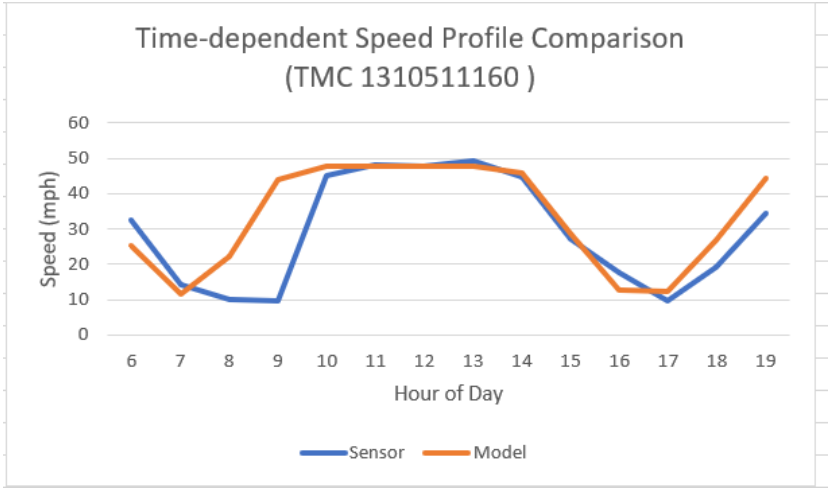


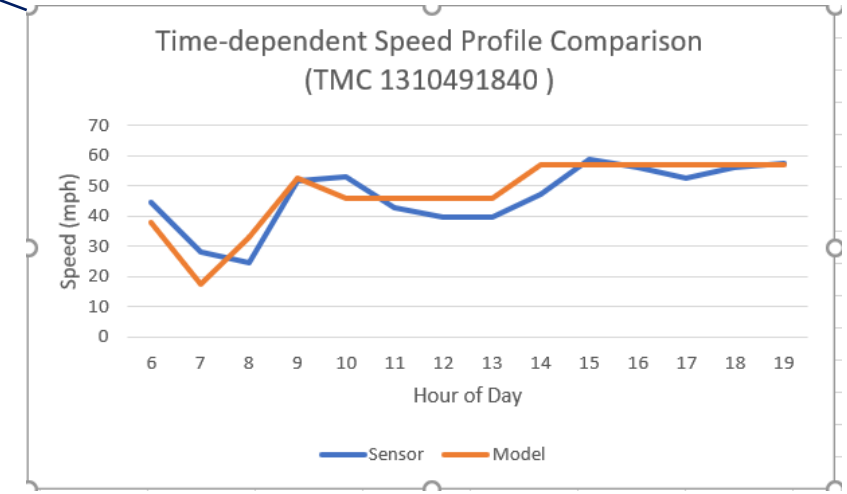
Source: Adapted from COG/TPB

Link- and Corridor-Level Validation



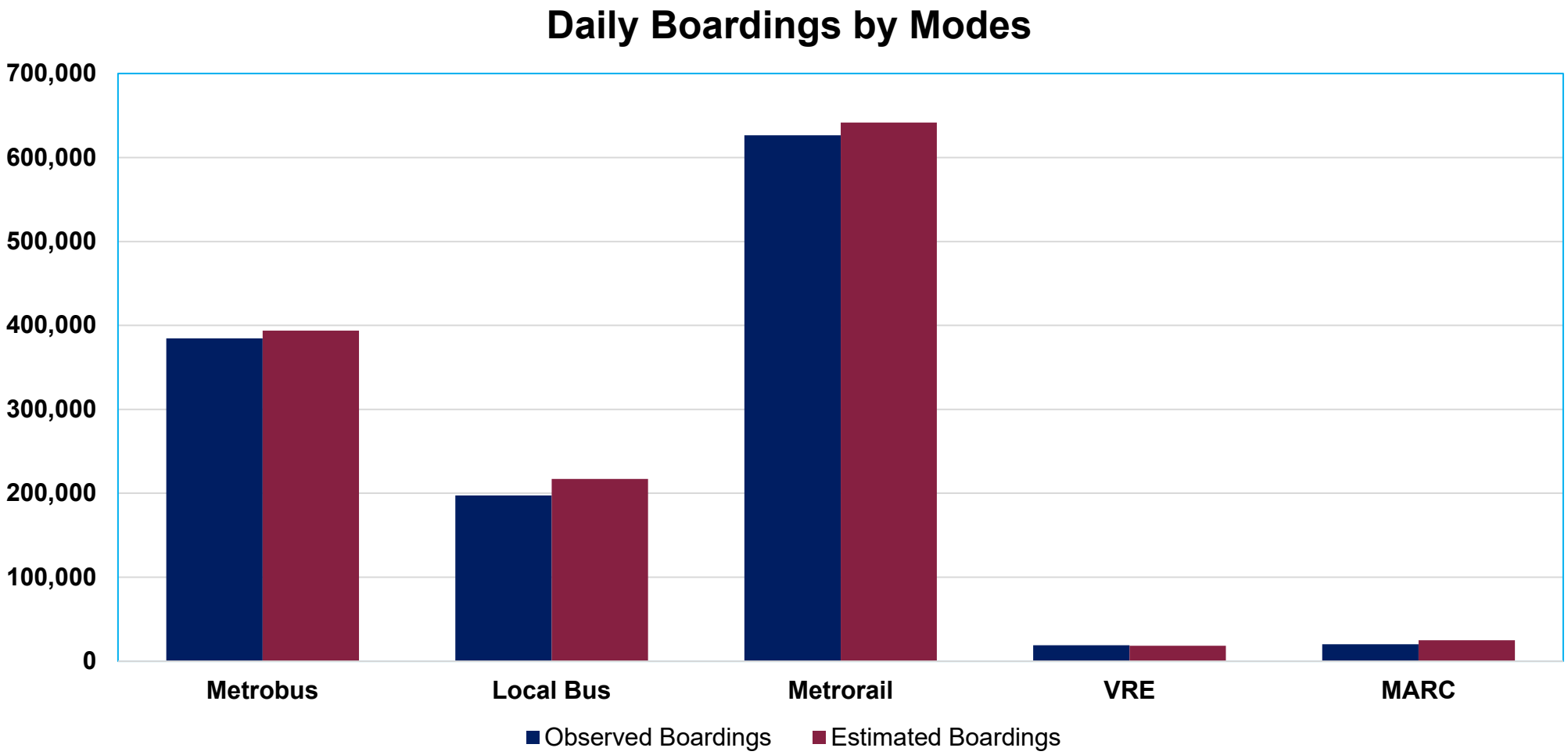




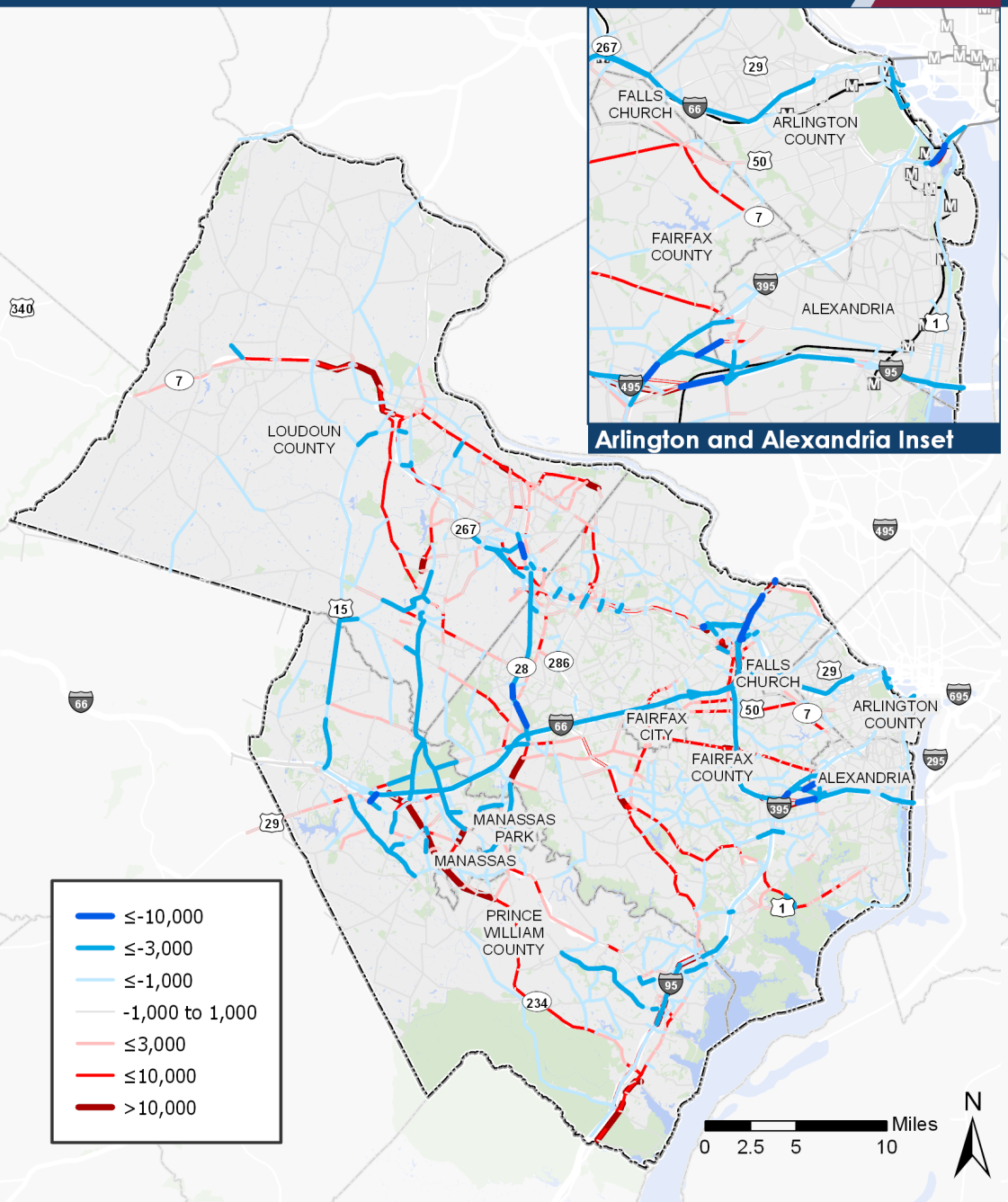


I-395 N Direction

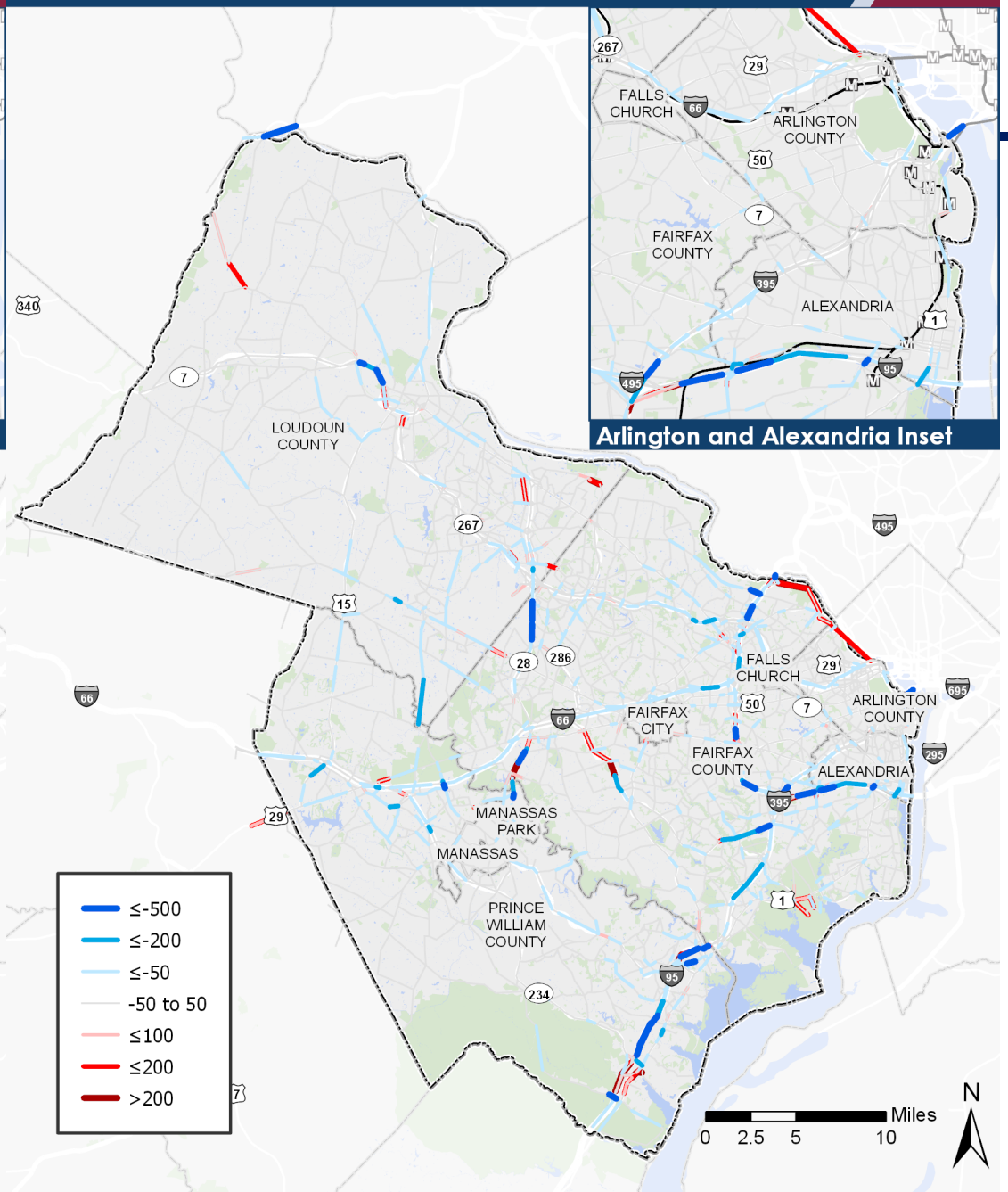
Transit Ridership



Change in 2045 Daily Highway Traffic Volumes
Build vs. No-Build

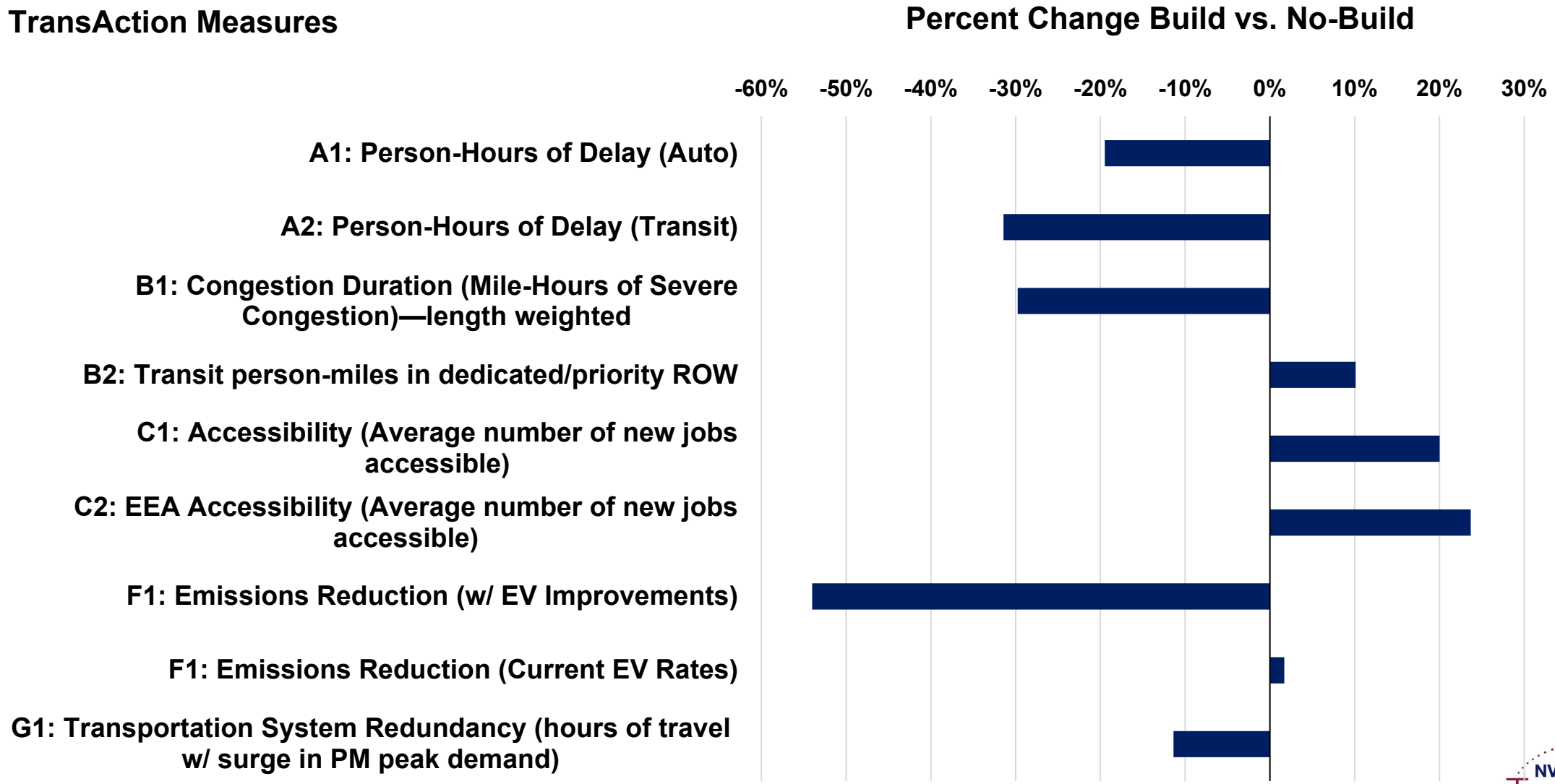


Change in 2045 Daily Vehicle Hours of Delay
Build vs. No-Build



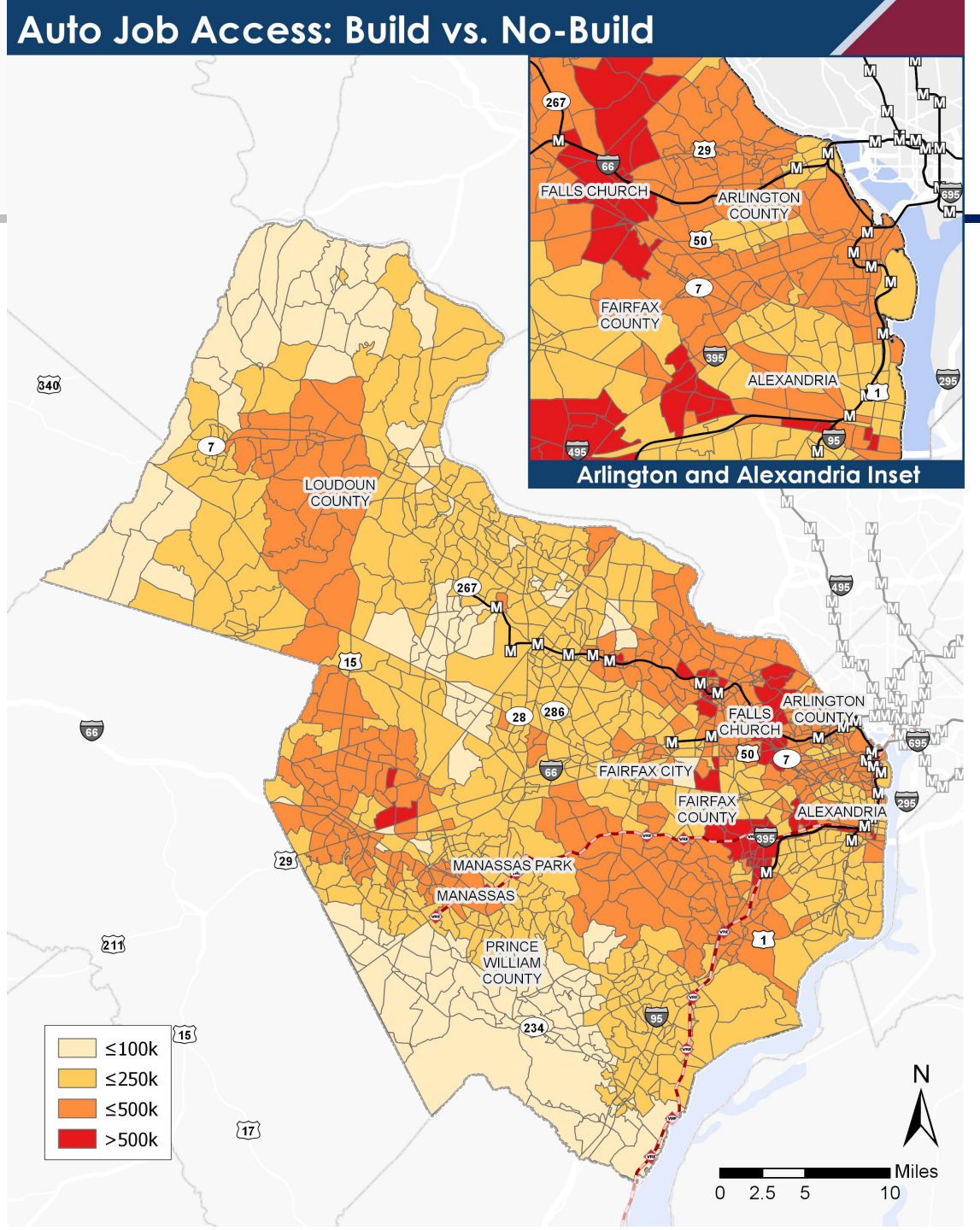
NVTA's TransAction

TransAction Performance Measures (2045 BD vs NB)



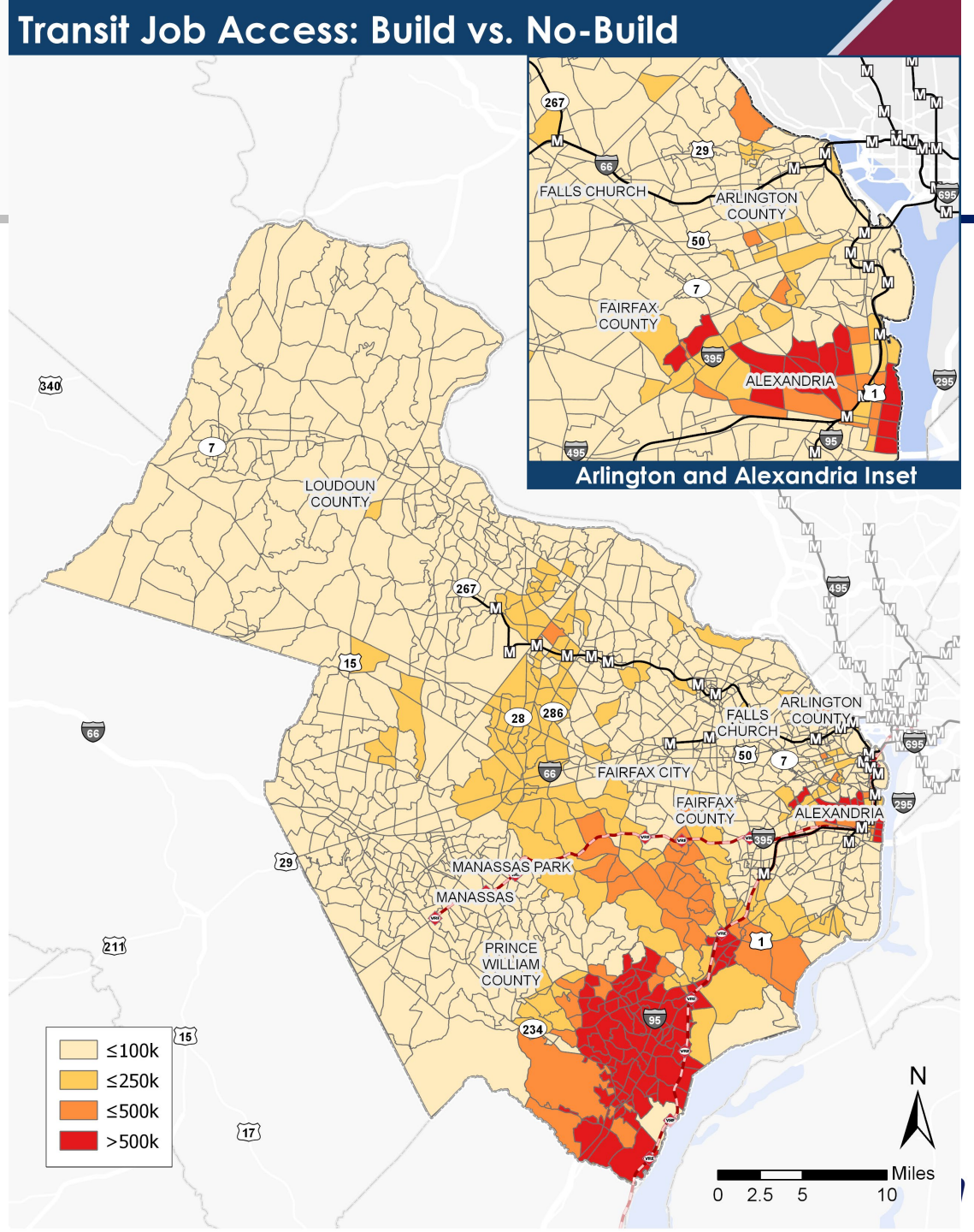
Accessibility: Auto

- Locations where the number of jobs accessible by auto within 45 minutes increases (in 2045).
  - On average, increases in the region by 18%
  - In Equity Emphasis Areas, increases by 18%
- Auto access considers all roads available to SOVs, including paid HOT/toll facilities



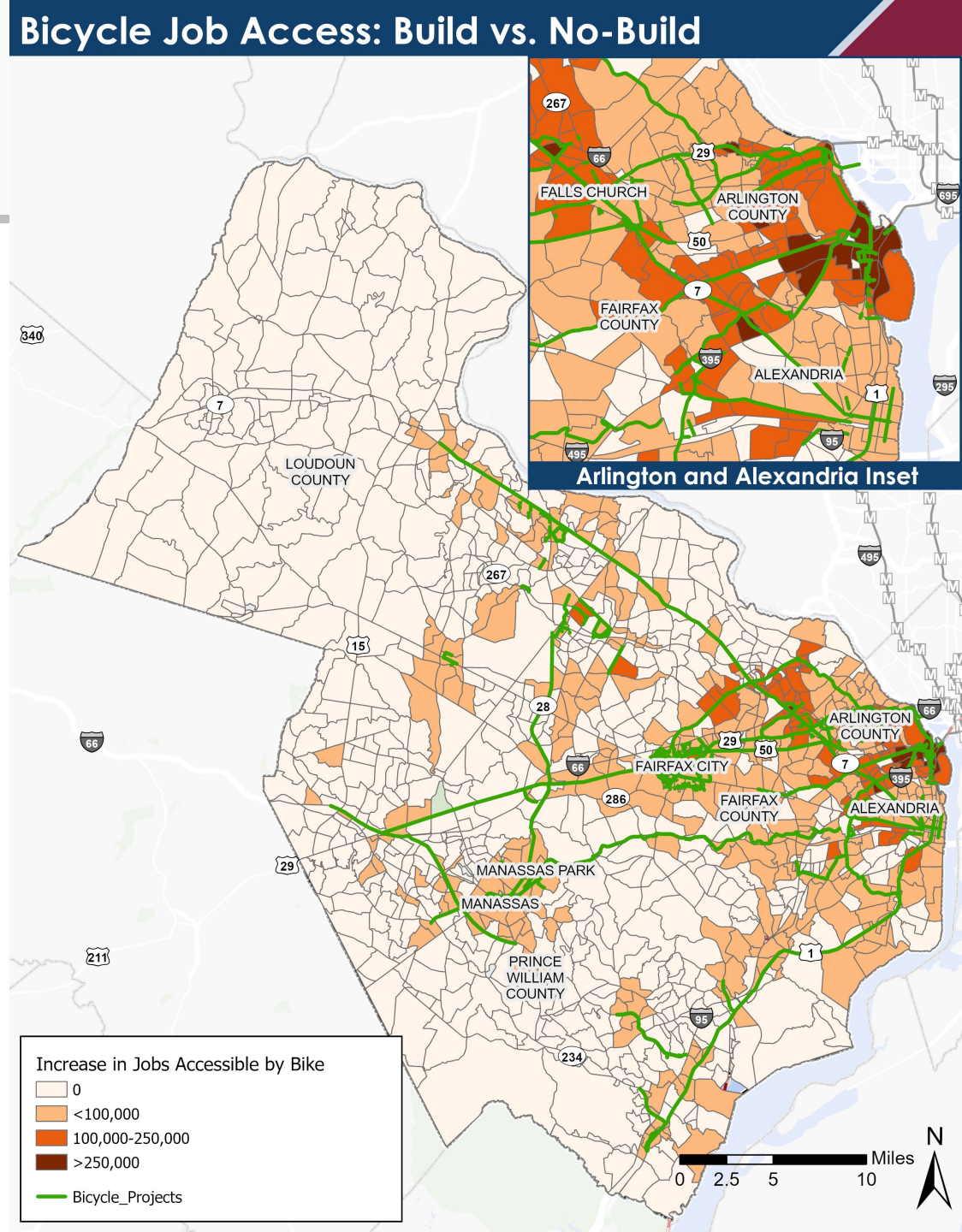
Accessibility: Transit

- Locations where the number of jobs accessible by transit within 60 minutes increases (in 2045).
  - On average, increases in the region by 20%
  - In Equity Emphasis Areas, increases by 29%
- Includes all modes of transit, and allows for drive-access to stations



Accessibility: Bike

- Locations where the number of jobs accessible by bike on the low-stress bike network within 30 minutes increases (in 2045).
  - On average, increases in the region by 80%
  - In Equity Emphasis Areas, increases by 113%
- Low-stress bike facilities include dedicate bike lanes, grade separated paths & trails



Scenario Analysis

NVTA's TransAction

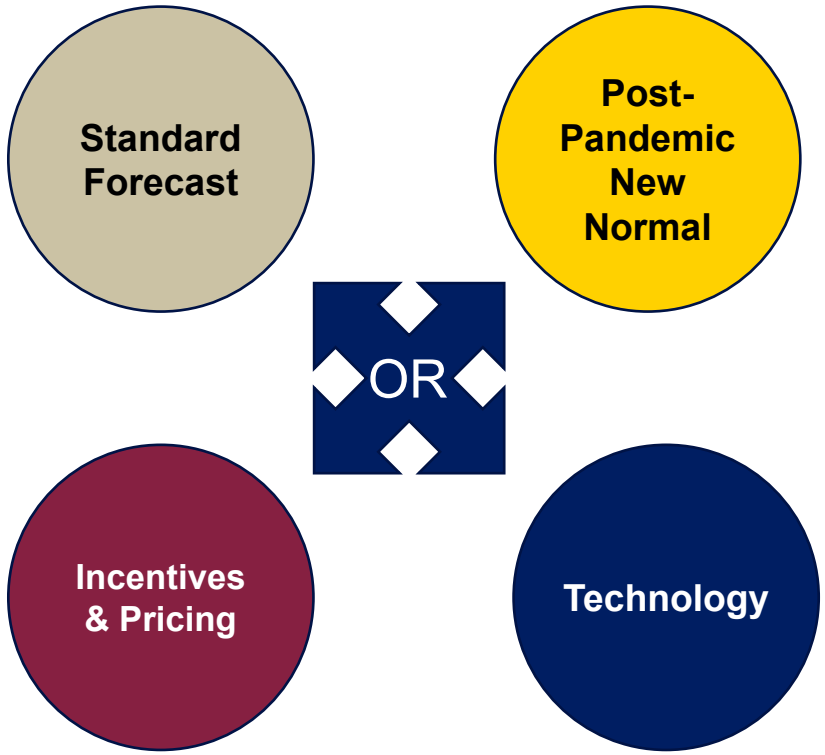
Transportation Action Plan for Northern Virginia

Dealing with Uncertainty

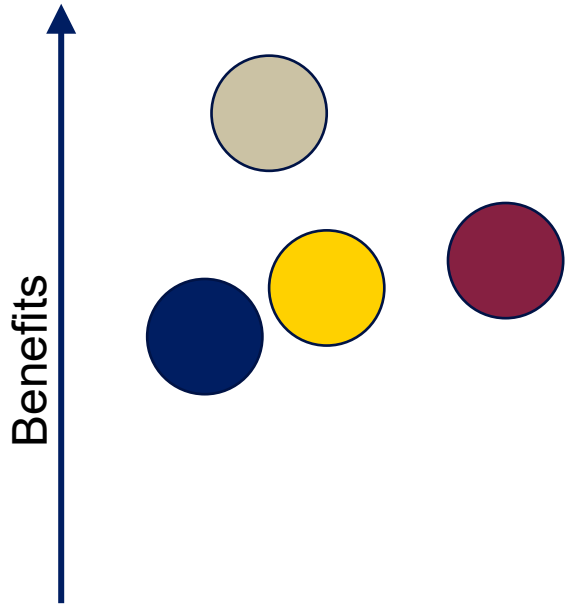
- The TransAction process includes analysis to better understand uncertainty:
  - Beyond “standard forecasts”
  - Plausible futures, but not necessarily preferred or predicted
  - Assumptions-based using proxy metrics than can be modeled
  - May identify potential investment obsolescence
- Three specific alternative futures (scenarios):
  - Pandemic-created ‘New Normal’
  - Transportation Technology
  - Transportation Policy/Mechanisms

Scenario Analysis

What could happen to transportation in Northern Virginia by 2045?



What are the potential benefits of the TransAction projects?



NVTA's TransAction

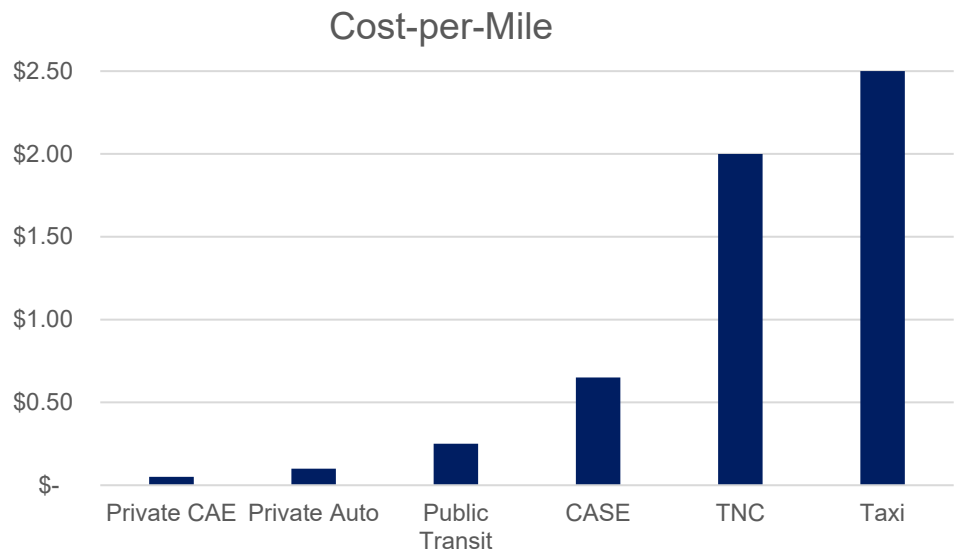
1 Post-Pandemic New Normal Scenario

- What if trends observed during the pandemic continue into the long-term future?

- Key Assumptions:
  - Reduction of work-related trips (HBW, NHW) by 21%
  - Reduction of shopping trips by 5.6%
  - Increase in delivery trips (1 delivery for every 3 shopping trips removed)
  - Increase in non-motorized trips by 5%
  - No land use changes assumed

2 Technology Scenario

- Focus on implementation of Connected/ Automated/ Shared/ Electric vehicles (CASEs)
  - Market Penetration:
    - Private Vehicles: 20%
    - TNCs: 100% fully automated within Northern Virginia, DC, Montgomery & Prince George's
    - Large Trucks: 33%
    - Transit Buses: not automated
    - Shuttle buses: 100% automated
  - All automated vehicles are assumed to also be Connected and Electric
  - Lower operating costs



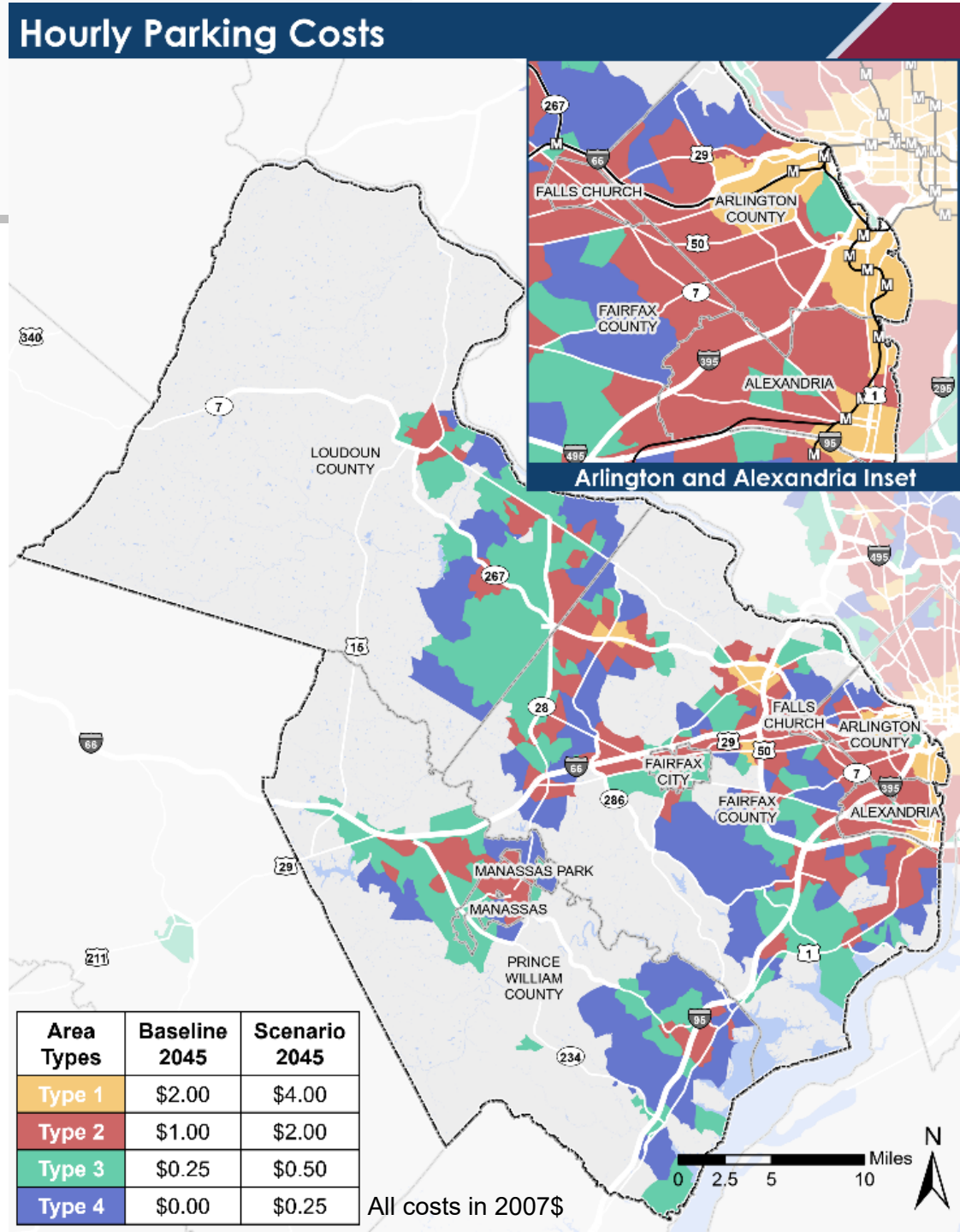
NVTA's TransAction

2 Technology Scenario (cont.)

- Focus on implementation of Connected/ Automated/ Shared/ Electric vehicles (CASEs)
  - Changes to trip making:
    - CAE owners make more trips
    - CAE owners make longer trips
  - Zero-Occupancy Vehicle (ZOV) trips:
    - Remote parking of private vehicles
    - CASE relocation between passengers
  - Capacity Increase:
    - Freeways: 15%
    - Major Arterials: 5%
  - Automated Shuttles available at all rail stations (FM/LM)
  - No Land Use changes assumes

3 Incentives/Pricing Scenario

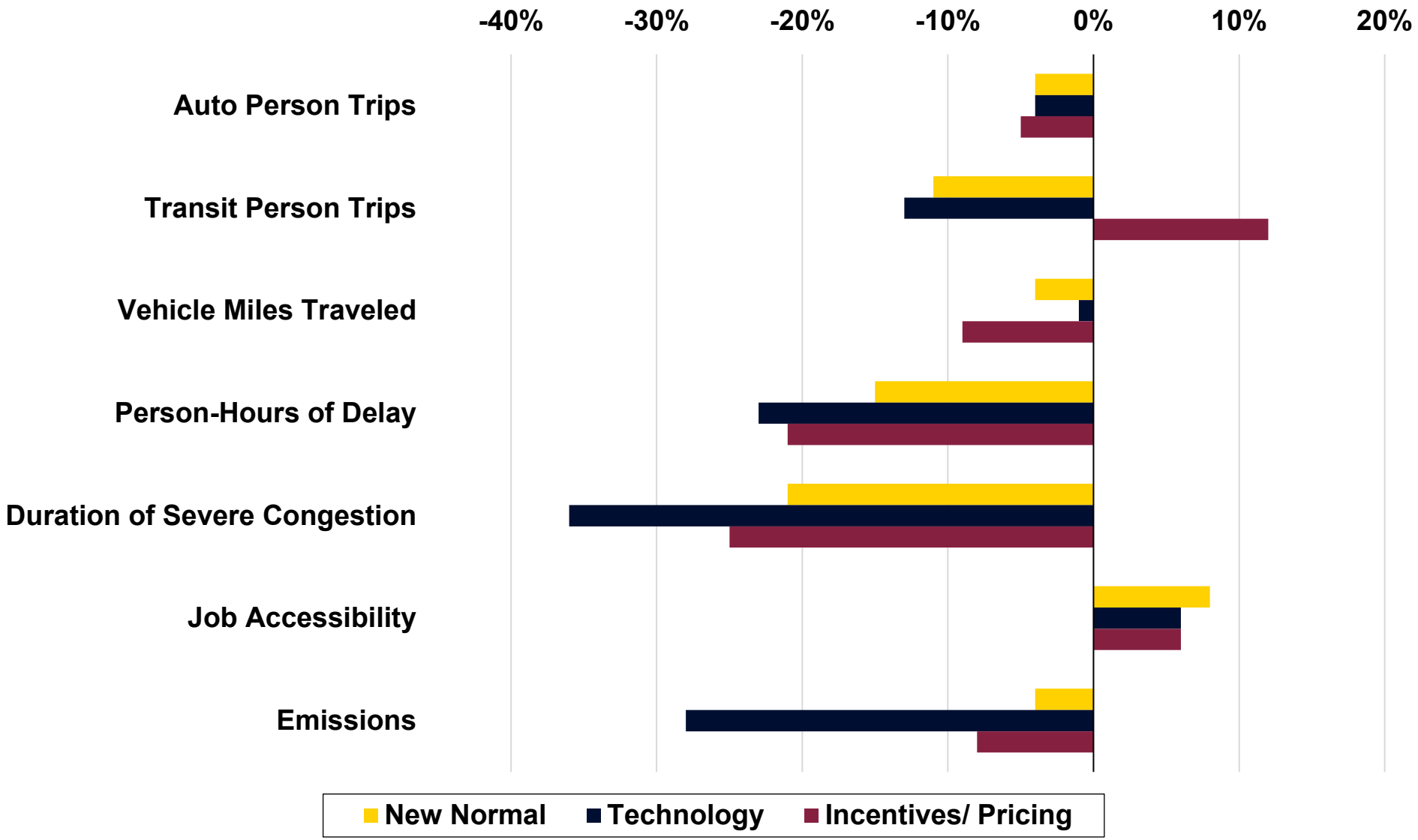
- Implementing transportation pricing and incentive mechanisms to manage travel demand
- Key Assumptions:
  - VMT Pricing on all roads: 25¢ peak, 12¢ off-peak
    - Discounts for lower-income households
  - Increase in parking costs across the region
  - Free transit



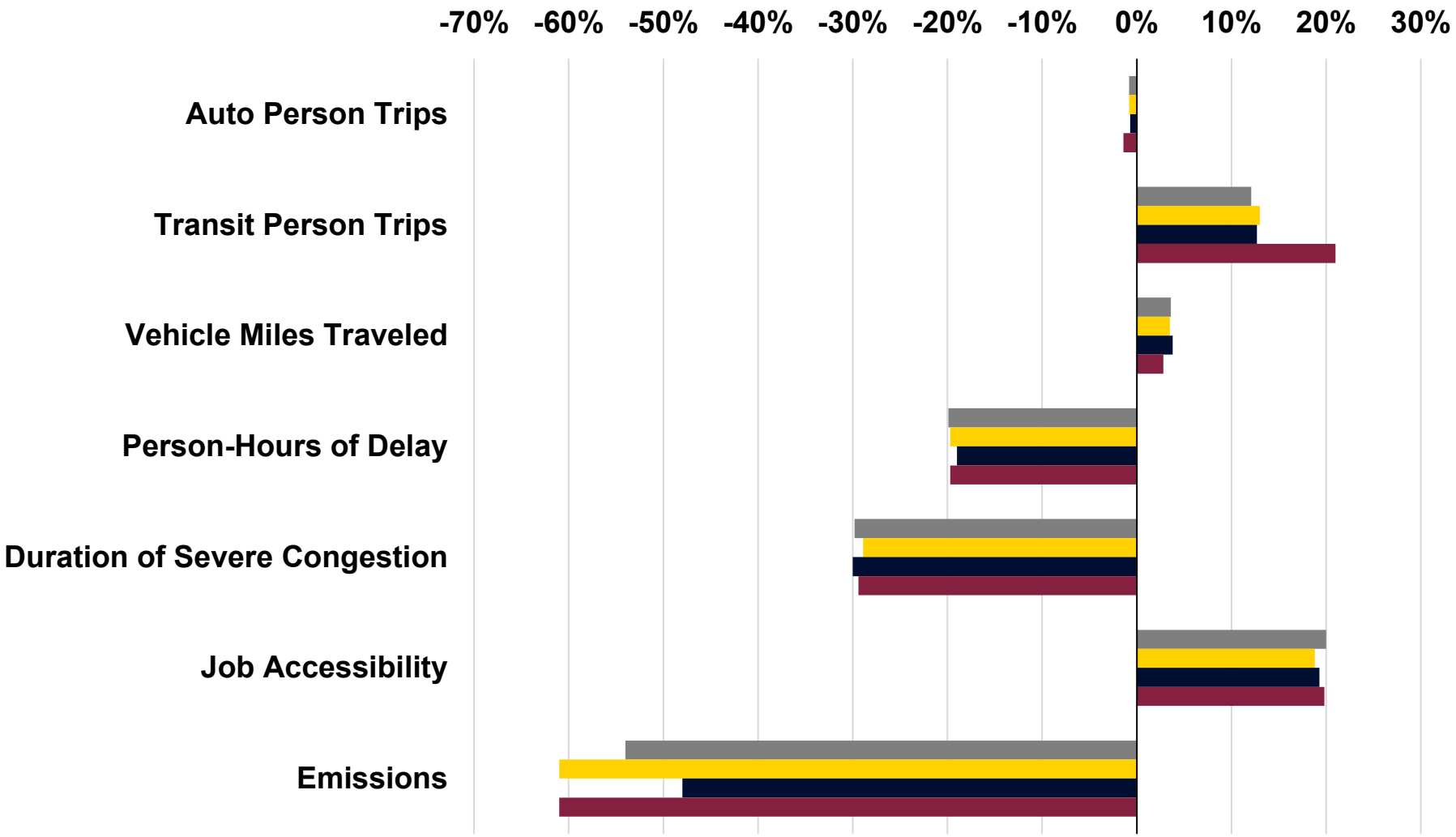
Area Types	Baseline 2045	Scenario 2045
Type 1	$2.00	$4.00
Type 2	$1.00	$2.00
Type 3	$0.25	$0.50
Type 4	$0.00	$0.25

All costs in 2007$

TransAction Performance Measures (2045 No-Build)



Performance Measures (Same Scenario Comparisons, 2045 Build vs No Build)



Take-away….

- Both the No-Build and Build conditions with scenario assumptions have potential to improve mobility, accessibility, and resiliency. But many of these assumptions/policy directions are outside of NVTA's control (emerging trends in technology, pricing, land use, etc.).
- No single project, program or policy will address all of the region's transportation needs.
- The 429 candidate regional projects identified in the Plan exceed the region's expected funding available through 2045.
- Regional collaboration and the ability to work beyond jurisdictional lines is key to keeping the D.C. metropolitan area moving.

Next Steps

- **August 1, 2022** Public Comment Period started
- **September 8, 2022** Authority hosted Public Hearing
- **September 18, 2022** Public Comment Period ended

- **October 2022** NVTA staff combine and review public comments
- **November 2022** NVTA staff finalize analysis, request feedback and endorsement from:
  - Technical Advisory Committee (TAC)
  - Planning Coordination Advisory Committee (PCAC)
  - Planning and Programming Committee (PPC)
- **December 8, 2022** Authority anticipated to adopt TransAction

Thank you…..

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