TRANSPORTATION TECHNOLOGY COMMITTEE
Wednesday, November 30, 2022
8:30 AM
(Virtual and livestreamed via YouTube)

AGENDA

I.	**Call to Order/Welcome**	Councilmember David Snyder, Chair

Action

II.	**Summary Notes of July 6th, 2022 Meeting**	Councilmember David Snyder, Chair

Recommended action: Approve meeting notes

Discussion/Information

III.	**Transportation Technology Committee (TTC) Membership Update**	Mackenzie Love, Regional Transportation Planner
IV.	**Transportation Technology Strategic Plan (TTSP) Progress Update**	Mackenzie Love, Regional Transportation Planner
V.	**TransAction Update**	Keith Jasper, Principal, Transportation Planning and Programming
VI.	**NVTA Updates**	Monica Backmon, CEO
VII.	**Member Updates**	

Adjournment

VIII.	**Adjourn**

Next Meeting
TBD

TRANSPORTATION TECHNOLOGY COMMITTEE
Wednesday, July 6, 2022, 8:30 am
Electronic meeting and livestreamed on YouTube

MEETING SUMMARY

I. **Call to Order/Welcome**
- Chairman Snyder called the meeting to order at 8:30 am.
- Attendees:
  - **TTC Members:** Councilmember/Chairman David Snyder (City of Falls Church and Authority Member); Mayor Jeanette Rishell (City of Manassas Park and Authority Member); Mike Garcia (FCDOT); Andrew Meese (Transportation Planning Board); Dr. Robert Schneider (Potomac and Rappahannock Transportation Commission) Hari Sripathi (VDOT) and Reginald Viray (Virginia Tech Transportation Institute).
  - **NVTA Staff:** Monica Backmon (Chief Executive Officer); Keith Jasper (Transportation Planning and Programming Lead); Dr. Sree Nampoothiri (Senior Transportation Planner) and Mackenzie Love (Regional Transportation Planner).

Action

II. **Summary Notes of April 13th, 2022, Meeting**
The meeting summary was approved unanimously, with abstention from members not present.

Discussion/Information

III. **Transportation Technology Strategic Plan Content and Progress Update**
This was the first meeting of the TTC since the first anniversary of the adoption of the TTSP. For that reason, the Committee received updates on both major developments in the field, as well as an update on the implementation of the TTSP itself.

In the April 2022 TTC meeting, the Committee requested that NVTA staff make recommendations for integrating three topics into the TTSP going forward:

- Topic: Connected and Automated Vehicles (CAVs) and related infrastructure
  - Staff recommended incorporating this topic into the existing TTSP strategy #4 - Minimize Potential for Zero Occupancy passenger Vehicles. They also recommended changing its title to reflect this change.
  - The committee and staff discussed that the nature of the recommended change would expand the strategy from focusing on minimizing

potential negatives, to also maximizing potential benefits, taking a more comprehensive approach to CAVs.

- o The committee voted unanimously to adopt the expansion of the scope of TTSP strategy #4 and to update its title to "Enhance operations of the multimodal transportation system through connectivity and automation."
- Topic: hydrogen propulsion systems
  - o Staff recommended incorporating this topic, along with content on other synergistic technologies that could improve overall resiliency, like Vehicle to Grid (V2G), into the existing TTSP strategy #8 - Advance Decarbonization of the Transportation System.
  - o The committee noted that this approach increases the flexibility of strategy #8 to incorporate other technologies, as appropriate, in the future.
  - o The committee voted unanimously to adopt the expansion of this strategy.
- Topic: Transit innovations, such as microtransit
  - o Staff recommended creating an entirely new strategy to focus on transit, due to the number of technologies currently available to enhance this impactful mode. Additionally, this approach would allow flexibility to address any new technologies that may emerge in the future. Topics that could be covered immediately include microtransit and Bus Rapid Transit (BRT), which would synergize with the work of NVTA's BRT Working Group.
  - o The committee discussed how to best scope a new strategy of this type, with twin objectives of being well-aligned with the current structure and intention of the TTSP, and effectively complementing the ongoing update to TransAction, without duplication.
  - o The committee voted unanimously to adopt this new strategy, under the title "Enhanced mobility in the region through innovation and emerging technologies in transit."

Based on this discussion of the TTSP, its implementation thus far and the collaborative decision to expand the content it covers, the committee determined there would be value in NVTA staff exploring ways to facilitate the advancement of transportation technology projects. This could include convening a meeting with local and regional staff involved in transportation planning, funding, and operations.

IV.   **TransAction Update**

Mr. Jasper provided the committee with an overview of the draft Project List developed through the ongoing process to update TransAction which includes 429 projects, 17 of which are technology focused. He said that in past funding programs not many technology projects have been submitted. He noted that in the current funding cycle NVTA received its first application for a technology project outside of the City of Alexandria and Arlington County for an ITS project on Rte. 7 submitted by Loudoun County. He went on to explain that technology projects have historically performed very well, particularly in terms of Congestion Reduction Relative to Cost

(CRRC.) This was followed by a discussion of potential action the committee and NVTA could take to convey this history of success for technology projects to funding applicants going forward, and staff were requested to make recommendations for this during the next TTC meeting.

Next, Mr. Jasper explained the use of scenario analysis in the update of TransAction, including one scenario that focuses on transportation technologies. Three key takeaways include that if these technologies were adopted in accordance with assumptions made they could generate a 25% fall in Person-Hours of Delay, a 37% reduction in duration of severe congestion, and 28% less emissions. Separately he noted that only the scenario that addressed pricing and incentives showed a potential to increase transit trips, which would require multi-layer government policies to realize.

V.   **NVTA Update**
Ms. Backmon informed the committee that NVTA received 26 applications for funding in the FY2022 – 2027 Six Year Program (SYP), with a total ask of $1.2 billion. She indicated that staff have made recommendations to NVTA's committees to fund 20 of these projects, for a total of $626 million. Each of the committees unanimously approved recommending Authority approval of the staff recommendations. She anticipates that the Authority will take action on these recommendations during their July 14th meeting. She added that the Authority would also be asked to approve the public comment period and public hearing date for the TransAction update at that same meeting.

VI.   **Member Updates**
Three TTC members also provided updates:
- Andrew Meese of the Metropolitan Washington Council of Governments' Transportation Planning Board (TPB) announced that Visualize 2045, the long-range transportation plan for the National Capital Region, was recently passed. This plan incorporates the TPB's CAV principles.
- Hari Sripathi of VDOT shared progress on CAV related initiatives including initiation of a data mapping project, concerted efforts to maximize the potential of CAVs to address the needs of people who may have limited mobility, and updating roadway design standards. He also informed the committee that VDOT was working with Virginia Tech Transportation Institute and a maintenance contractor to develop an automated crash attenuation vehicle.
- Dr. Schneider indicated that OmniRide is continuing with its ongoing Zero Emission Bus Study. The agency is also seeking approval to provide Sunday service in the Eastern side of Prince William County for the first time.

<u>Adjournment</u>
- The meeting adjourned at approximately 9:54 am.

Transportation Technology Strategic Plan (TTSP) Update

November 30, 2022

Mackenzie Love, AICP
Regional Transportation Planner

TTC Membership Update

| Name	Entity	Status
Councilmember David Snyder	City of Falls Church	TTC Chair and Authority member
Mayor Jeanette Rishell	City of Manassas Park	TTC Vice Chair and Authority member
Jim Kolb	Summit Strategies Government Affairs	Authority member
Brad Stertz	Audi and PAVE (Partners for Automated Vehicle Education)	New
Dr. Richard (Dick) Mudge	Compass	
Chris Bast	Electrification Coalition	New
Superisor Walter Alcorn	Fairfax County Board of Supervisors	New
Mike Garcia	Fairfax County Department of Transportation	
Joe McAndrew	Greater Washington Partnership	
Greg Rogers	Nuro	
Dr. Robert (Bob) Schneider	Potomac and Rappahannock Transportation Commission	
Andrew Meese	Transportation Planning Board	
Michele Blackwell	Uber	Alternate
Nicholas Zabriskie	Uber	
Hari Sripathi	Virginia Department of Transportation	
Kamal Suliman	Virginia Department of Transportation	Alternate
Reginald (Reg) Viray	Virginia Tech Transportation Institute	
Myra Blanco	Virginia Tech Transportation Institute	Alternate
Zac Doerzaph	Virginia Tech Transportation Institute	Alternate
Mike Fontaine	Virginia Transportation Research Council	New

TTC Membership Update
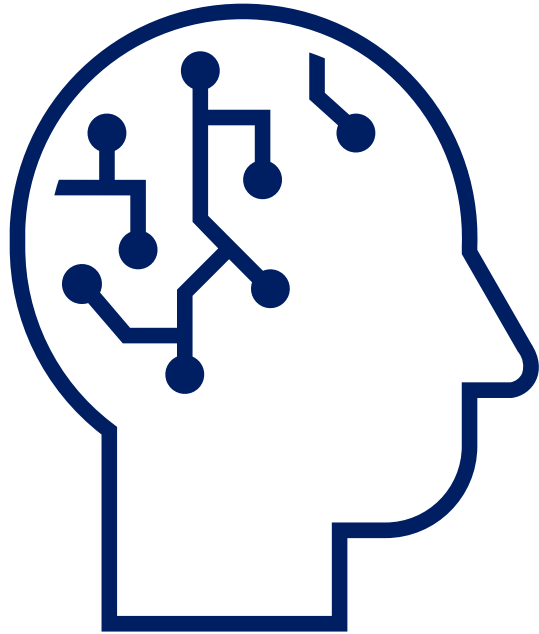
Brad Stertz

Director of Government Affairs for Audi and Co-Founder | Chairman of PAVE

TTC Membership Update
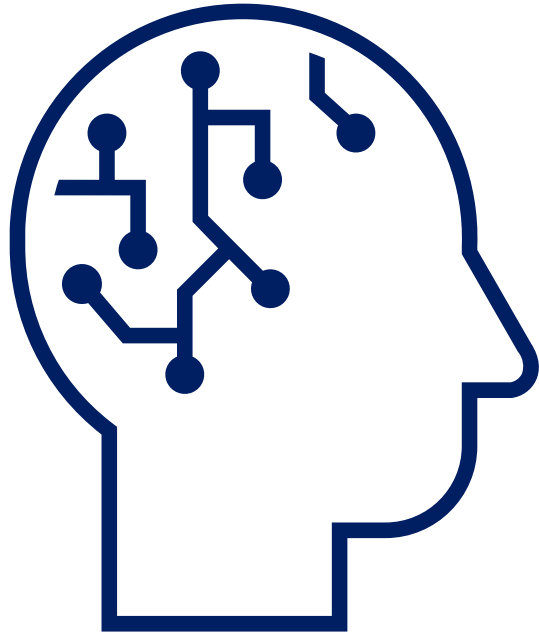
Chris Bast

Director of EV Infrastructure Investments

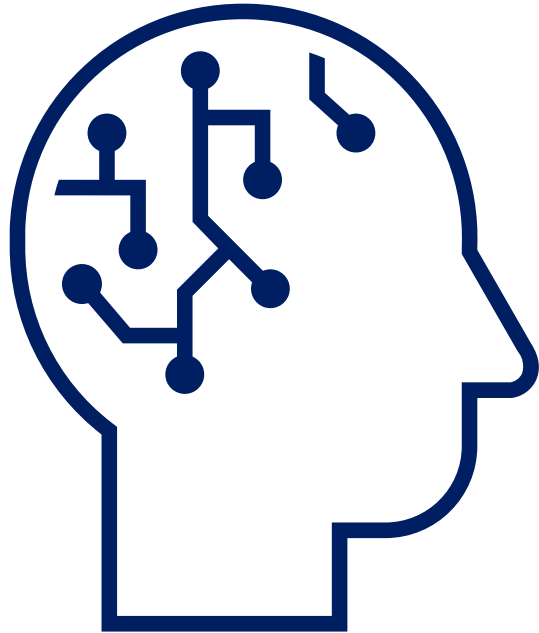Electrification Coalition

TTC Membership Update

Mike Fontaine
Associate Director
Virginia Transportation Research Council

Walter Alcorn
Supervisor, Hunter Mill District
Fairfax County

History of the Transportation Technology Strategic Plan (TTSP)

The TTSP describes **strategies** for advancing the beneficial use of technology in transportation, in **alignment with NVTA Core Values**, and identified **roles the NVTA can take** in pursuit of them.

It also recognizes that the objectives of the TTSP cannot be achieved by NVTA alone and relies on the **strong coordination and partnerships** that are foundational to NVTA's work in the region.

Year	Month	Milestone
2017	October	•An update to TransAction was adopted, which contained the genesis of the Transportation Technology Committee (TTC).
2018	October	•TTC established by the NVTA CEO.
2019	January	•First meeting of the NVTA Transportation Technology Committee.
2020	December	•Draft TTSP "core content" (8 strategies, 9 NVTA roles and 3 core values) shared with the TTC.
2021	January	•Draft structure for the TTSP (minus Action Plan) proposed to the TTC.
	February/ March	•First full draft of the TTSP and draft structure for the Action Plan presented to the TTC.
		•Draft structure for the TTSP shared with TAC, PCAC and PPC.
		•TTSP mini-session at the 6th annual NoVA Transportation Roundtable.
	April	•TTC, PCAC and PPC all recommend the Authority adopt the 8 strategies and Action Plans of the TTSP.
	May	•The Authority adopted the inaugural NVTA Transportation Technology Strategic Plan's Action Plan and 8 Strategies within.
	Summer	•TTSP-related topics included in TransAction outreach and survey.
	October	•TTC receives an update on the first six months of implementation of the TTSP.
	November	•The Authority receives an update on the first six months of implementation of the TTSP.
	December	•The Authority unanimously adopted the 2022 State and Federal Legislative Program and Legislative Priorities, which included a new position to "Support use of effective transportation technology".
2022	February	•The format of NVTA's Driven By InNoVation was updated and now includes monthly features of TTSP-related content.
	July	•The TTC unanimously voted to endorse expansion of the scope of strategies 4 and 8, and to add a 9th strategy.
	October	•Trial run of a series of InNoVation Lunch and Learn begins.
	November	•The Authority unanimously approved expansion of the scope of strategies 4 and 8, and addition of a 9th strategy.

Updates to TTSP Technology Timeline

Year	Technology Milestone	
	Event	**Description**
2022	Biden-Harris Administration approves NEVI plans for all 50 states, D.C and Puerto Rico	"The Biden-Harris Administration today announced it has approved Electric Vehicle Infrastructure Deployment Plans for all 50 States, the District of Columbia and Puerto Rico ahead of schedule under the National Electric Vehicle Infrastructure (NEVI) Formula Program, established and funded by President Biden's Bipartisan Infrastructure Law."
2022	Greenhouse Gas Inventory from DEQ	• https://lis.virginia.gov/cgi-bin/legp604.exe?212+ful+SB1282 • https://www.deq.virginia.gov/air/greenhouse-gases
2022	Governor Youngkin releases an update to the Virginia Energy Plan	"The plan focuses on an all-of-the above approach that harnesses nuclear, natural gas, renewables, and new energy sources to satisfy the increasing energy needs of the Commonwealth. The Plan also outlines an increase in nuclear energy and an objective to make Virginia the world's leading nuclear innovation hub. "

Other updates to watch:

• Ongoing - Developments in Advanced Air Mobility (AAM).

Progress on TTSP Implementation

Ongoing coordination with VDOT Signal Operations group

- In this Committee's most recent meeting (July 2022), the members directed staff to explore ways to facilitate the advancement of transportation technology projects, potentially by fostering coordination between planning and operations teams across the region.

- In September 2022 Mackenzie Love had an informal conversation with VDOT's Operations Engineering Manager and will attend upcoming quarterly Signal Manager's Meeting(s).

Participation in a FHWA Listening Session on Emerging Trends and Technologies

- The FHWA is working to develop a framework for integrating Emerging Trends and Technologies (ETTs) into Transportation Systems Management and Operations (TSMO) efforts.

- Mackenzie Love was invited to participate in a listening session in September 2022, along with 8 other state and local agencies from across the country.

Progress on TTSP Implementation

Trial run of an InNoVation Lunch and Learn series

- Fully virtual, 45-minute-long sessions that focus on topics supported by the TTSP.

- Designed to provide opportunities to exchange pragmatic information practitioners could use in their day-to-day responsibilities or upcoming proposals.

- **October 20th, 2022, at 11:00am**
  - Speaker: John Zarbo, Operations Section Chief, FCDOT
  - Topic: Lessons Learned from the Relay Shuttle project in Merrifield

- **November 17th, 2022, at 11:00am**
  - Speaker: Joe Stainsby, Chief Development Officer, OmniRide
  - Topic: Lessons Learned in Preparing for the Launch of Microtransit

- **December 15th, 2022, at 11:00am**
  - Speaker: Alvaro Villagran, Director of Federal Programs, Shared Use Mobility Center
  - Topic: Best Practices for Mobility Hubs

Progress on TTSP Implementation

Trial run of an InNoVation Lunch and Learn series, continued...

Topic		October Automation and Connectivity in Transit	November Microtransit	December Mobility Hubs
Attendance	Total	20	20	
	Jurisdictions	45%	25%	
	Transit Agencies and Rail	0%	15%	TBD
	Regional Entities	10%	5%	
	State Agencies	20%	20%	
	Larger Region	0%	0%	
	Researchers	0%	0%	
	NVTA Staff and Contractors	25%	35%	
Reason for interest (for all registrants)	The subject matter	51%	46%	
	The speaker(s)	0%	8%	
	They were a speaker	3%	4%	TBD
	The host organization	26%	4%	
	Interest in innovative transportation solutions	18%	31%	
	Other	0%	4%	

Progress on TTSP Implementation

NVTA 2023 Legislative Program under development

- Current draft content for the Legislative Program includes four priority areas:
  1. Protect dedicated revenue sources and powers of the Northern Virginia Transportation Authority
  2. Restore annual long-term funding to the Authority to pre-2018 levels
  3. Protect Virginia's dedicated transportation funding
  4. **Support use of effective transportation technology**

- The next steps are:
  - December 8, 2022 – Authority is anticipated to adopt the 2023 Legislative Program

Progress on TTSP Implementation

- On July 7th, 2022, the TTC endorsed these updates to the TTSP

- On November 10th, 2022, the Authority approved them

	Strategies	Intent of Strategy (long term)
1	Reduce congestion and increase throughput	Support deployment of transportation technologies that improve performance and optimize efficiency of the regional multimodal transportation system
2	Maximize access to jobs, employees and housing	Support deployment of transportation technologies that increase travel options and awareness of them
3	Maximize cybersecurity and privacy for members of the public	Monitor concerns on behalf of Northern Virginians, and leverage NVTA processes where appropriate and feasible
4	Original title: Minimize potential for Zero Occupancy passenger Vehicles **Approved revision**: Enhance operations of the multimodal transportation system through connectivity and automation	**Approved expansion**: To maximize the potential benefits of Connected and Automated Vehicles, while addressing avoidable increases in passenger vehicle miles traveled.
5	Develop pricing mechanisms that manage travel demand and provide sustainable travel options	Identify technology-related measures at a regional scale to dynamically address congestion, including incentives; revenues will be re-invested in equitable solutions
6	Maximize the potential of physical and communication infrastructure to serve existing and emerging modes	Support adaptation of existing resources to support desirable technologies such as CASE vehicles, travel apps, micro modes and robust data collection
7	Enhance regional coordination and encourage interoperability in the transportation system	Leverage regional synergies in the deployment of transportation technologies
8	Advance decarbonization of the transportation system	**Approved expansion**: Support deployment of transportation technologies that reduce greenhouse gas emissions and synergistic technologies that improve resiliency.
9	**Approved addition**: Enhanced mobility in the region through innovation and emerging technologies in transit	**Approved intent**: support an array of transit innovations, in a manner that is flexible enough to adapt to future innovation.

Next Steps for TTSP Implementation

- Incorporate updates endorsed by the TTC and approved by the Authority

- Contribute to finalization of NVTA's 2023 Legislative Program

- Complete trial run of InNoVation Lunch and Learn concept

- Inform development of the agenda for the 8th Annual Northern Virginia Transportation Roundtable

TTC Input Sought on Topics for the 8th Annual Northern Virginia Transportation Roundtable

- Do you have any thoughts on the ideas listed here?

- Do you have any suggestions for speakers?

- Do you have any suggestions for additional/ different topics?

Topic	Ideas/ Questions
Federal funding and innovation	• Are there new funding opportunities? • Are there new requirements or possibilities to feature innovation? • What could Justice40 could mean for technology projects?
Electrification	• How could we cover this in a way that is new or useful to the region? • Should we address hydrogen or wait until more progress is made?
Bus Rapid Transit	• Do you have contacts for BRT systems outside the region? • Are there specific technology components that would be timely to cover?
Traffic signal technology	• Potential topics could include TSP (Transit Signal Priority), LPI (Leading Pedestrian Interval) and preemption.

TransAction (TA) Update

November 30, 2022

Keith Jasper
Principal, Transportation Planning and Programming

TransAction is…

» A long-range multimodal transportation plan (horizon year 2045) that includes a list of 424 multimodal candidate projects, whose performance related to congestion reduction and other factors is evaluated using ten weighted performance measures, approved by NVTA in November and December 2021

» Fiscally unconstrained, meaning that TransAction intentionally includes more projects – focused on transportation needs – than can be reasonably funded by the region

» Geographically unconstrained, meaning that TransAction intentionally includes projects beyond NoVA that, if funded, would support the plan's vision and goals

» Compliant with the Code of Virginia

TransAction is not…

» A land-use plan, although it does incorporate MWCOG's cooperative planning forecasts

» A road-building plan

» A funding document and does not commit NVTA to funding any project (NVTA's Six Year Program selects projects for funding using NVTA's regional – 70% – revenues)

» A project/modal prioritization or ranking tool, but TransAction does provide information that could subsequently be used for project evaluation
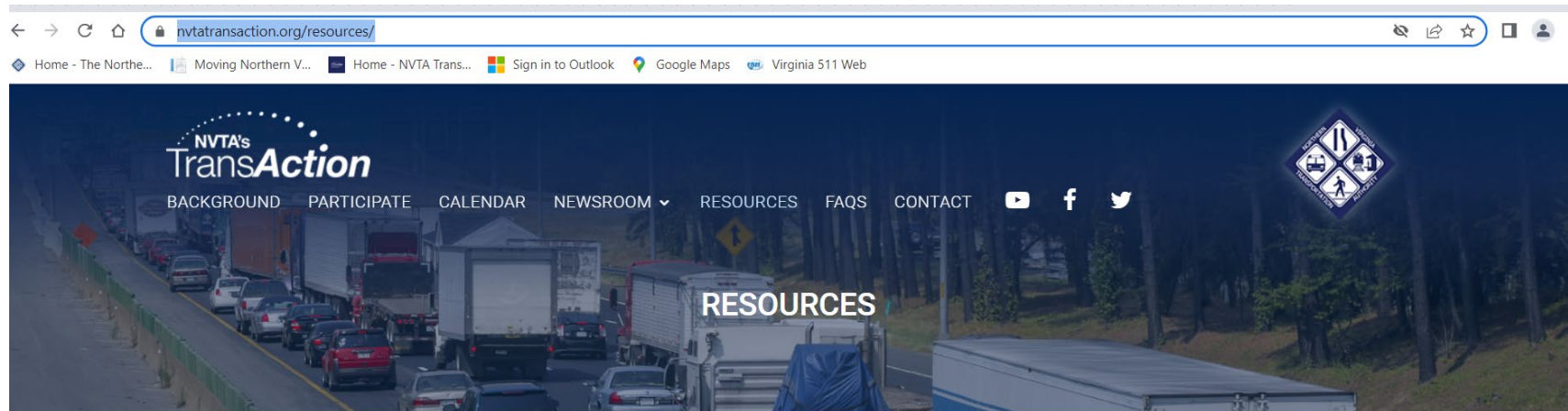
TransAction Activities and Schedule

» Nov/Dec 2021: NVTA approved TransAction goals, objectives, performance measures, and weights

» Winter/Spring 2022: Transportation Perception Survey, web post series, TransAction project modeling and analysis

» Summer 2022: Public comment period – August 1 – September 18th

» Fall 2022: Finalization of plan and project list based on public comments and NVTA/committee feedback

» November 2022: Anticipated committee endorsement of final draft of TransAction Plan and Project List

» December 2022: Anticipated NVTA adoption of TransAction

More Information

https://nvtatransaction.org/resources/

Thank you!

Supplementary Slides

TTSP Report Card, as of November 2022

Key

Symbol	Meaning
(gray)	No role identified for NVTA
○	Role identified for NVTA
◔	Some progress has been made
◑	Moderate progress has been made
◕	Substantial progress has been made
●	Task has been completed

	Strategy	NVTA Roles								
		Authority Roles			Shared Roles			Staff Roles		
Number	Name	Funding	Policy	Advocate	Champion	Facilitate	Stakeholder	Planning	Outreach/ Education	Observer
1	Reduce congestion and increase throughput	◔	(gray)	◕	◕	◕	(gray)	◕	◕	(gray)
2	Maximize access to jobs, employees and housing	○	(gray)	(gray)	◕	◕	(gray)	◕	◕	(gray)
3	Maximize cybersecurity and privacy for members of the public	○	(gray)	(gray)	(gray)	(gray)	◔	(gray)	(gray)	◔
4	Minimize potential for Zero Occupancy passenger Vehicles	(gray)	○	◑	◔	◔	(gray)	◑	○	(gray)
5	Develop pricing mechanisms that manage travel demand and provide sustainable travel options	(gray)	○	◑			○	◕	○	(gray)
6	Maximize the potential of physical and communication infrastructure to serve existing and emerging modes	○	(gray)	(gray)	◑	◑	(gray)	◑	◔	(gray)
7	Enhance regional coordination and encourage interoperability in the transportation system	○	(gray)	(gray)	◕	◕	(gray)	◕	◕	(gray)
8	Advance decarbonization of the transportation system	◔	◕	◕	◕	◑	(gray)	◕	◑	(gray)

What is the Transportation Technology Strategic Plan (TTSP)?

- Tool that will inform a proactive approach to adoption of transportation technology;

- TTSP considers how transportation technologies support the region's vision, i.e. needs-driven NOT technology-driven;

- Includes eight strategies, and up to nine NVTA roles for each strategy;

- TTSP is a living document that will be updated as transportation technologies evolve;

- TTSP Action Plan enables NVTA to think big, start small, and build momentum with respect to adoption of transportation technologies in the region.

Inaugural Strategies

	Recommended Strategies	Intent of Strategy (long term)
1	Reduce congestion and increase throughput	Support deployment of transportation technologies that improve performance and optimize efficiency of the regional multimodal transportation system
2	Maximize access to jobs, employees and housing	Support deployment of transportation technologies that increase travel options and awareness of them
3	Maximize cybersecurity and privacy for members of the public	Monitor concerns on behalf of Northern Virginians, and leverage NVTA processes where appropriate and feasible
4	Minimize potential for Zero Occupancy passenger Vehicles	Identify measures to address avoidable increases in passenger vehicle miles traveled
5	Develop pricing mechanisms that manage travel demand and provide sustainable travel options	Identify technology-related measures at a regional scale to dynamically address congestion, including incentives; revenues will be re-invested in equitable solutions
6	Maximize the potential of physical and communication infrastructure to serve existing and emerging modes	Support adaptation of existing resources to support desirable technologies such as CASE vehicles, travel apps, micro modes and robust data collection
7	Enhance regional coordination and encourage interoperability in the transportation system	Leverage regional synergies in the deployment of transportation technologies
8	Advance decarbonization of the transportation system	Support deployment of transportation technologies that reduce greenhouse gas emissions

Inaugural TTSP Strategies and NVTA Roles

Strategy		NVTA Roles								
		Authority Roles			Shared Roles			Staff Roles		
Number	Name	Funding	Policy	Advocate	Champion	Facilitate	Stakeholder	Planning	Outreach/ Education	Observer
1	Reduce congestion and increase throughput	✔		✔	✔	✔		✔	✔	
2	Maximize access to jobs, employees and housing	✔			✔	✔		✔	✔	
3	Maximize cybersecurity and privacy for members of the public	✔					✔			✔
4	Minimize potential for Zero Occupancy passenger Vehicles		✔	✔	✔	✔		✔	✔	
5	Develop pricing mechanisms that manage travel demand and provide sustainable travel options		✔	✔			✔	✔	✔	
6	Maximize the potential of physical and communication infrastructure to serve existing and emerging modes	✔			✔	✔		✔	✔	
7	Enhance regional coordination and encourage interoperability in the transportation system	✔			✔	✔		✔	✔	
8	Advance decarbonization of the transportation system	✔	✔	✔	✔	✔		✔	✔	

Inaugural TTSP Action Plan
Consolidated Actions Table

Technologies Mapped to Inaugural TTSP Strategies

Key

Symbol meaning	Symbol
Will definitely be helpful	●
Potential to be helpful	◕
Equal potential to be helpful or detrimental	◑
Potential to be detrimental	◔
Likely to be detrimental	○
Not applicable or Insuffecient Information Available	(blank)

Number	Name	Automated/ Autonomous vehicles	Shared Mobility Devices (SMDs)	Signal technologies	Apps	System optimization	Drones	Changes to delivery and freight systems	Surveillance/ monitoring (including telematics)	Data generation/ collection/ sharing	Improvements to mass transit (including BRT)	Smart technologies/ cities and IoT
1	Reduce congestion and increase throughput	◑	◕	●	◑	◕	◑	◕	◕	●	●	◕
2	Maximize access to jobs, employees and housing		◕	◔	◕	●	◔	◔	◑	●	●	●
3	Maximize cybersecurity and privacy for members of the public	◔	◔	◑	◔	◑			◔	◑		◑
4	Minimize potential for Zero Occupancy passenger Vehicles	◑	◕	●	◑	◕	◑	◕	◕	●	●	◕
5	Develop pricing mechanisms that manage travel demand and provide sustainable travel options	◑	◕		◑	●	◑	◕	◕	●	●	●
6	Maximize the potential of physical and communication infrastructure to serve existing and emerging modes	●	●	●		◕	◕	◑			●	●
7	Enhance regional coordination and encourage interoperability in the transportation system	●	◑	◕	◑	◕	●	◑	◑	●	●	◕
8	Advance decarbonization of the transportation system	●	◑			◑						