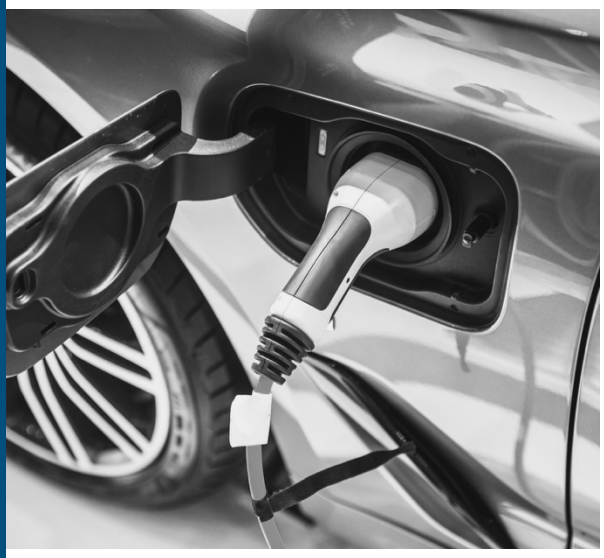
VISUALIZE 2050



Visualize 2050 Planning and Programming Process

Emerging Technologies

Part 8 of 27

National Capital Region
Transportation Planning Board

December 2025

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OVERVIEW OF EMERGING TECHNOLOGIES

Advances in technology have changed the face of transportation at a rapid pace. These advances have enabled greater optimization of systems already in place and ensure efficiency in systems being built. These changes are happening in all facets of transportation including planning, engineering, and operations. In the past few years there have been a few new technologies that stand out for how they are changing the way transportation systems are managed and operated. Keeping abreast of these changes has become more important than ever.

One of the biggest changes related to technology is the many new sources and amount of data available. This has led to the rise of "Big Data", or massive and complex datasets generated by various systems and modes, including cell phones, vehicles, public transportation, and infrastructure. Transportation professionals now have access to more data than ever before, enabling more informed decision-making at every stage, from planning and construction to ongoing operations of transportation facilities.

With the introduction of connected and automated vehicles (CAVs), how agencies accommodate and respond to incidents involving them has become a bigger topic of interest. Unmanned Aerial Vehicles (UAVs), commonly referred to as drones, are increasingly used for situational awareness by capturing a visual confirmation of a scene before responders arrive. UAVs are also increasingly being used in traffic incident response to decrease the time it can take for incident reconstruction and enabling the resumption of normal operations in drastically reduced amounts of time.

Electric vehicles (EVs) have caused a rethinking of traffic incident management as they present unique dangers not seen before by responders and the public. EV battery packs that catch fire not only require different responses than internal combustion vehicles to put out, they also have been known to reignite after they have been towed away, raising the need for specialized storage solutions. Also, because of their contents any battery fire becomes a hazardous material incident that requires specialized response leading to increased clean-up cost and increased health dangers to both responders and any bystanders. Increased EV adoption is also having effects on infrastructures—more chargers are built, more demand is placed on power grids.

Artificial Intelligence (AI) and other predictive software are in their infancy but already having big effects. Traffic operations centers are using AI software that can use video feeds to identify possible incidents and alert operators faster than operators may have found using older methods. Predictive models are being used to help predict and respond to incidents to keep facilities operating at their best.

TPB'S ROLE AND KEY STAFF

Keeping abreast of emerging technology happens across departments of both COG and TPB. Staff members in every position help keep the TPB up to speed in this fast-paced area using the best practices to incorporate emerging technology into the work process and information sharing amongst staff. Externally, TPB staff look for member agencies to share their experiences using new technologies, inviting the agencies to present at relevant TPB subcommittees so that other members can learn from their experiences. TPB points of contact for related emerging technologies work are listed in Table 8.1.

TABLE 8.1: KEY STAFF

TPB Staff	Title	Role
Kanti Srikanth	Executive Director	Staff Director for the Transportation Planning Board (TPB)
Andrew Burke	Transportation Engineer	Systems Performance Operations and Technology Subcommittee Staff
James Li	Transportation Engineer	Vehicle Probe Data Users Group Staff
Zhou Yang	Transportation Data Analyst	Big Data Users Group Staff

Role of TPB Subcommittees

The following TPB subcommittees and groups convene regional stakeholders to coordinate topics related to emerging technologies. In addition, other TPB subcommittees, such as the Safety Subcommittee or Public Transportation Subcommittee, may discuss technology even though it is not a primary focus.

Systems Performance, Operations and Technology Subcommittee

The Systems Performance, Operations and Technology Subcommittee (SPOTS) advises the National Capital Region Transportation Planning Board on matters of performance outcomes of the transportation system; transportation operations and management, including considerations of Intelligent Transportation Systems (ITS) technologies in improving those operations; and emerging transportation technologies. The Subcommittee provides a regional forum for coordination among Transportation Planning Board member agencies and other stakeholders on these topics. Staff also are active with ITS America chapters that meet in the region. TPB staff also attend forums, workshops, and working groups sponsored by member agencies that highlight emerging technologies.

In 2020, SPOTS convened a Connected and Automated Vehicle (CAV) working group to develop a white paper that presented suggested principles for use by members in planning for CAV implementation in the region.

Vehicle Probe Data Users Group

The mission of the National Capital Region's Vehicle Probe Data Users Group (VPDUG) is to enhance regional coordination, consistency, and capabilities in the use of vehicle probe-based traffic data toward performance-based transportation planning and programming. VPDUG brings together users of big data products to share how these probe data products are being used in work across the TPB region.

Travel Forecasting Subcommittee

The mission of the Travel Forecasting Subcommittee (TFS) is to "provide guidance to, review of, and oversight to the COG/TPB information, analysis, and forecasting systems, and to serve as a

forum for coordinating and enhancing such systems throughout the greater Washington region" (adopted April 21, 1995). In FY 2005, the Travel Monitoring Subcommittee merged into the TFS, so the mission of the TFS also includes oversight of travel monitoring activities.

ROLE OF KEY PLANNING AGENCIES

The Metropolitan Washington Council of Governments (COG) has conducted electric vehicle and electric vehicle infrastructure planning work for more than 10 years, publishing its first regional EV-readiness plan in 2012. COG currently facilitates the Regional Electric Vehicle Deployment (REVD) Working Group which is made up of members from COG and TPB jurisdictions and serves as a forum to collaborate and coordinate actions related to deploying EVs and EV infrastructure.

The REVD Working Group oversees the EV Deployment Clearinghouse, which is a resource to support COG member governments on EV deployment within their government operations as well as community wide. Within the EV Deployment Clearinghouse is the Regional Electric Vehicle Infrastructure Implementation (REVII) Strategy, which was published in August 2024 and was a joint effort by TPB and COG to support the implementation of the findings from the TPB's Climate Change Mitigation Study of 2021 (CCMS). REVII develops a blueprint for a robust regional network of EV chargers as a major element of the region's commitment to reducing GHG emissions from motor vehicles. Also in August 2024, a COG-led proposal for grant funding from the federal Charging and Fueling Infrastructure Program (CFI) was selected to receive $3.9 million to install EV chargers across metropolitan Washington.

Key TPB member agencies involved in incorporating emerging technologies in the region are the three departments of transportation – District DOT, Maryland DOT/SHA, and Virginia DOT. Each agency sponsors various working groups focused on emerging technologies and hosts forums for information sharing on the use of different technologies. All three DOTs are actively involved with their state chapters of ITS America and participate in meetings throughout the year sponsored by these chapters.

Other agencies that play a key role in emerging technology in the region are the Northern Virginia Transportation Authority (NVTA), and the Metropolitan Area Transportation Operations Coordination (MATOC) program.

Established by the state of Virginia, NVTA is a regional organization that develops the long-range transportation plan for Northern Virginia. With its focus on reducing congestion, NVTA uses performance-based criteria to evaluate and fund regionally significant multimodal transportation projects. NVTA developed the Transportation Technology Strategic Plan (TTSP) for Northern Virginia and established the NVTA Transportation Technology Committee. NVTA produces the NVTA Transportation Technology Strategic Plan (TTSP) that consists of strategies and an Action Plan, which were designed to proactively prepare for the use of evolving technologies to address travel demand on infrastructure while keeping congestion reduction at the forefront in northern Virginia.

To improve safety and mobility in the region through information sharing, planning, and coordination, the TPB, the Washington Metropolitan Area Transit Authority, and the District of Columbia, Maryland, and Virginia departments of transportation created the Metropolitan Area Transportation Operations Coordination (MATOC) Program. MATOC's mission is to provide situational awareness of transportation operations in the National Capital Region. MATOC established one of the first regional transportation operations centers. MATOC also brings together experts from regional agencies to coordinate and share information on topics like snow/inclement weather operations, transit operations, and information technology issues that feed the region's operations centers. MATOC is currently working with VDOT on its Regional Multi-Modal Mobility Program (RM3P) which is a collaborative and data-driven program to improve **safety, reliability,** and **mobility** for travelers in northern Virginia.

TABLE 8.2: KEY PLANNING AGENCIES

Planning Agency	Role
Metropolitan Washington Council of Governments (COG)	Convenes the Regional Electric Vehicle Deployment Working Group
District Department of Transportation (DDOT)	State DOT
Maryland Department of Transportation/State Highway Administration (MDOT/SHA)	State DOT
Virginia Department of Transportation (VDOT)	State DOT
Northern Virginia Transportation Authority (NVTA)	Regional Funding Agency
Metropolitan Area Transportation Operations Coordination (MATOC)	Regional Operations Coordination

PUBLIC ENGAGEMENT

Emerging technologies are topics of importance to both the TPB Community Advisory Committee (CAC) and the TPB Access for All Advisory Committee (AFA). The AFA in particular has been interested and involved in technologies surrounding wayfinding applications that assist the mobility-impaired. The Regional Electric Vehicle Infrastructure Implementation (REVII) deployment program has been presented to both the CAC and the AFA during their meetings, a summary of which is reported to the TPB along with any comments and recommendations the committee may want to communicate. To the extent these programs are presented to the TPB, there is an opportunity for the public to submit comments during the public comment period at each TPB meeting.