Smart Mobility

How the City incorporates technology into the transportation system to better manage traffic.

Introduction

Smart mobility is a broad term that incorporates the application of technology to streets, traffic signals, vehicles, parking systems, and other transportation infrastructure to make them more efficient and safe, while providing data that can help improve long-term decision-making about where and what changes to make to our streets. In the coming decade, converging innovations and technology are likely to play a transformative role in transportation. Given the limited ability to expand the street network, smart mobility initiatives will be instrumental in improving traffic flow. Alexandria's 2018 ***Smart Mobility Framework Plan*** describes a range of efforts that the City is taking to prepare for and incorporate technology into its transportation assets. Through these efforts, the City is working to lay the groundwork for future technology that will help better manage traffic on local streets.

Key Context

250+

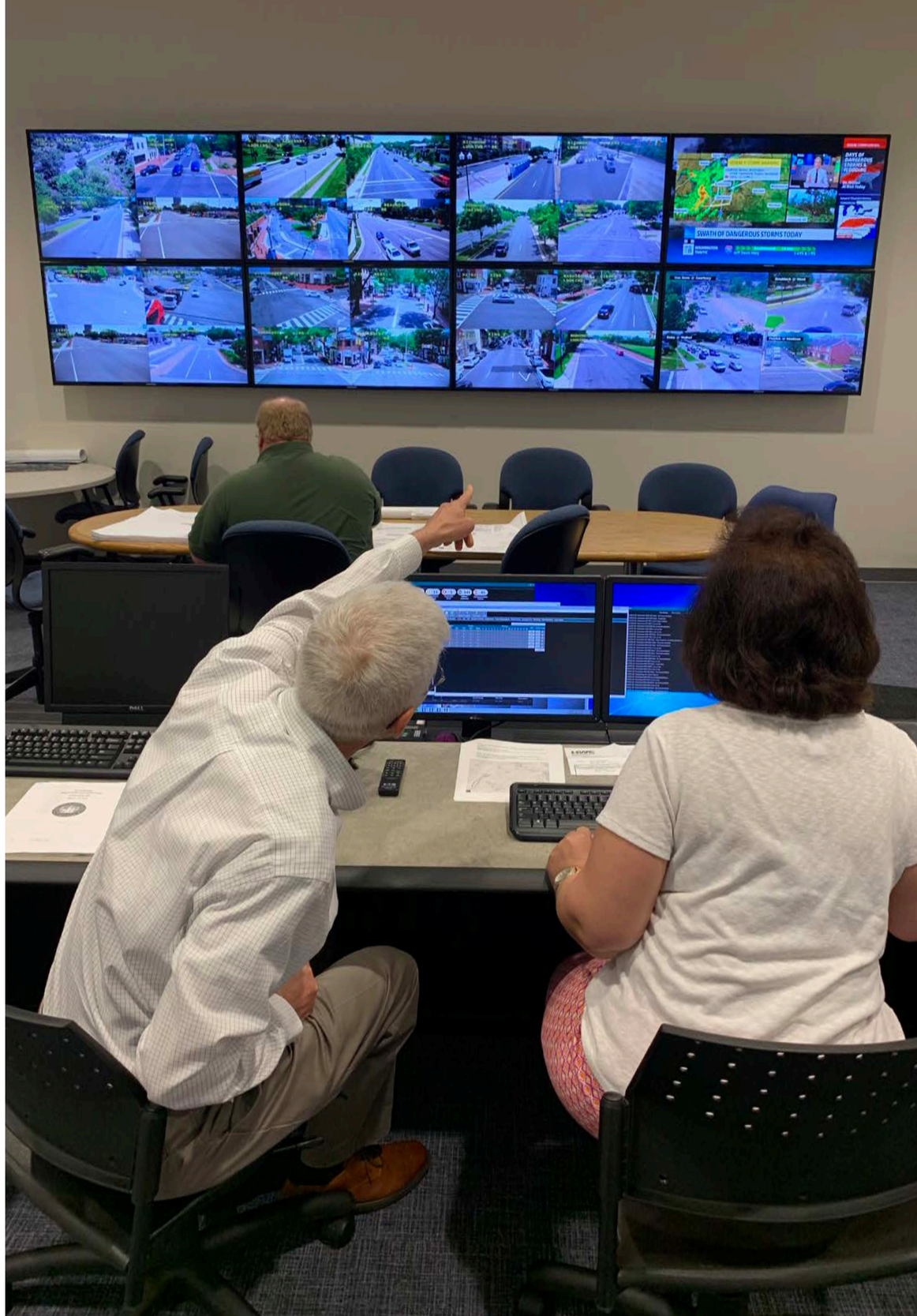
traffic signals

200 of which are 'connected' for central monitoring and control.[1]

5

corridors with transit signal priority (TSP) and emergency vehicle preemption (EVP) installed

TSP and EVP allows vehicles such as buses, fire trucks, and other emergency vehicles to get through traffic signals quicker, keeping buses on schedule and improving response times for emergency vehicles.[2]



1. Smart Mobility Framework Plan, 2018, https://www.alexandriava.gov/uploadedFiles/tes/info/Smart%20Mobility%20Framework.pdf.
2. *Smart Mobility*, City of Alexandria, https://www.alexandriava.gov/SmartMobility.html.

Existing Programs, Policies, and Initiatives

Smart Mobility Program

Alexandria's Smart Mobility program represents an investment in the future of transportation. The City is actively creating infrastructure for future advancements, such as autonomous and connected vehicles, which will make traveling by car, bus, bike, and foot faster, more efficient, and safer than ever. While the City is laying the foundation for innovations that may be 20 years into the future, some are just 5 to 10 years away—and some, such as real-time travel information collection and technologies that help emergency vehicles reach people faster and buses stay on schedule, are already in place. To date, the City has installed more than 145,000 feet of fiber-optic cable, 27 traffic cameras, and 30 smart traffic sensors. These investments ensure that Alexandria is at the forefront of a global movement to make cities as connected, innovative, and smart as possible.

Fiber-Optic Cable

The laying of fiber-optic cable is a key initiative of the City's intelligent transportation system (ITS) initiative. The resulting fiber-optics network will become a conduit of real-time communications—linking traffic signals, weather stations, and other devices with the Traffic Management Center. These updates will allow the City to better manage and respond to delays and incidents, plan for special events, share critical alerts and data to better inform the public, and support new mobility technologies as they come online.

Passive Optical Networks

The City of Alexandria recently conducted a pilot project using Passive Optical Networks (PON) for traffic signal control. PON is a technology developed by cable companies to connect fiber-optic networks to homes and is much less expensive and easier to maintain than traditional signal control technology. The PON pilot was a success, and the City is deploying this technology through its ITS Integration Phase III and IV projects. Alexandria is one of the first municipalities in the country to use this technology.

Policies

The Smart Mobility chapter policies will guide the City's decision-making around technology improvements that will make streets safer, more efficient, and prepared for the future.

Policy A: Improve safety and efficiency

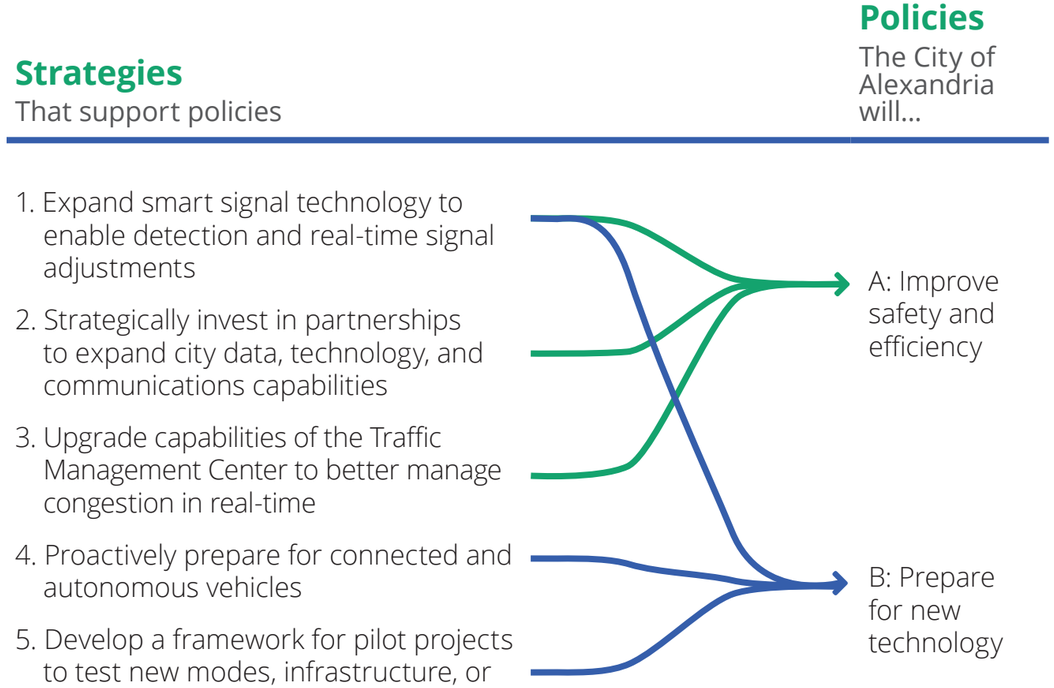
Use technology to manage congestion for safe and efficient city streets and protect the character of neighborhoods.

In the past, cities have relied on physical infrastructure such as pavement markings, curbs, and signage to manage their transportation networks. As transportation moves into a new digital age, it is critical to incorporate technology and data into management practices. The City of Alexandria will apply technology to its streets, traffic signals, transit vehicles, and other transportation infrastructure to help make the best and most efficient use of our streets.

Policy B: Prepare for new technology

Plan proactively and flexibly to ensure cost-effective investment in technology that can improve travel choices.

By taking a forward-looking approach, the City of Alexandria will position itself to keep pace with rapidly advancing technology and lay the groundwork for integrating future technologies. Planning flexibly will enable the City to adapt to the latest technologies as they continue to evolve.



Managing Congestion: A Multifaceted Approach

The policies and strategies outlined in this chapter are part of a **multifaceted approach to addressing the challenge of congestion management** in Alexandria. While all strategies aimed at increasing options—particularly transit—can have a positive impact on congestion, strategies from other chapters that directly aim to reduce and manage traffic include:

- Develop a comprehensive program to reduce speeding and cut-through traffic on local streets (Streets Chapter)
- Ensure new development minimizes negative impacts to the street network (Streets Chapter)
- Work with regional, state, and private sector partners to develop tools to keep traffic on highways and reduce regional cut-through traffic (Streets Chapter)
- Pursue regional approaches to reduce traffic and congestion, particularly during peak times (Supporting Travel Options Chapter)

Strategies

Strategy 1. Expand smart signal technology to enable detection and real-time signal adjustments

Actions

- Integrate transit signal priority (TSP) and emergency vehicle preemption (EVP) into more of the City's corridors. This involves upgrading the City's traffic signals as well as the fleet of transit and emergency vehicles with preemption equipment
- Enable the use of vehicle detection at signals for more responsive timing through adaptive signal technology. Duke Street and Van Dorn Street will be the first two corridors to be prioritized for this effort
- Improve data collection through new platforms and technologies to better understand how people use the transportation system and improve decision-making

Addressing the Need

By installing signal technology that can respond and adapt to real-time vehicle location and movement data, the City can meet the need to manage traffic flow and move more people, transit, and emergency vehicles faster and safer while avoiding costly changes to the roadway network.

The City's **Adaptive Traffic Signal Control project** aims to install smart detection equipment on traffic signals to respond to real-time conditions. This effort will optimize traffic flow, decrease delays, and reduce stops at intersections to help traffic move better on arterial streets and reduce traffic on local streets .

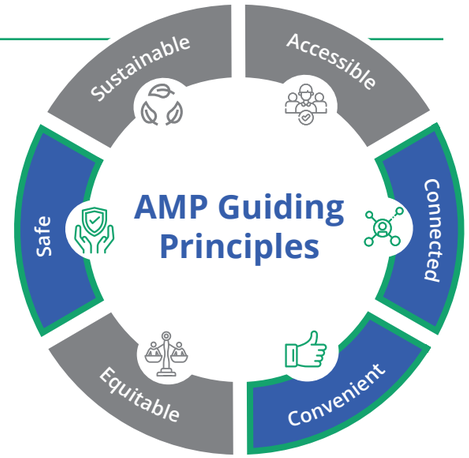
Advancing City Plans and Goals

Smart Mobility Framework Plan

- Install Intelligent/Adaptive and Traffic Responsive Traffic Signal Systems and Install TSP and EVP Equipment on Signals
- Install TSP and EVP Equipment on Buses and Fleet Vehicle

Vision Zero Action Plan

- Improve Data Collection and Evaluation



Strategy 2. Strategically invest in partnerships to expand city data, technology, and communications capabilities

Actions

- Develop a template for evaluating partnership opportunities and coordinating with neighboring jurisdictions, state agencies, and private companies to improve regional collaboration and safe, protected, and transparent data sharing
- Identify potential partnerships to improve information and communication about parking availability, gain a better understanding of how the curb space on City streets is being utilized, obtain anonymized travel pattern data from private mobility operators, and collect and analyze real-time data to inform traffic management and street design
- Utilize platforms and engage in regional coalitions to make transportation data more transparent and improve decision-making

Alexandria has joined the WAZE for Cities Program, providing the City access to **real-time information** on incidents and slow-downs and providing drivers access to **advance notice on construction, crashes, and road closures.**

Addressing the Need

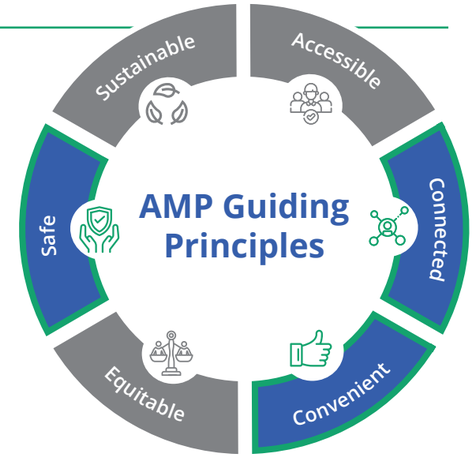
Partners are often needed to help expand a city's data, technology, and communications capabilities. The key to effective partnerships is to assess how transportation needs align across partners and identify specific opportunities for addressing shared goals that benefit all parties. Potential partners can include non-profits, schools or other institutions, nearby jurisdictions, regional bodies, or private companies. Bringing parties to the table that have similar needs or a different perspective can be beneficial in solving problems.

There is an increasingly large amount of data that can be generated from public-private partnerships. Processing and understanding this data requires a shift in thinking, more data analytics capabilities and resources, and increased collaboration.

Advancing City Plans and Goals

Smart Mobility Framework Plan

- Facilitate Data Exchange and Integrate Real-Time Data into Decision-Making Model

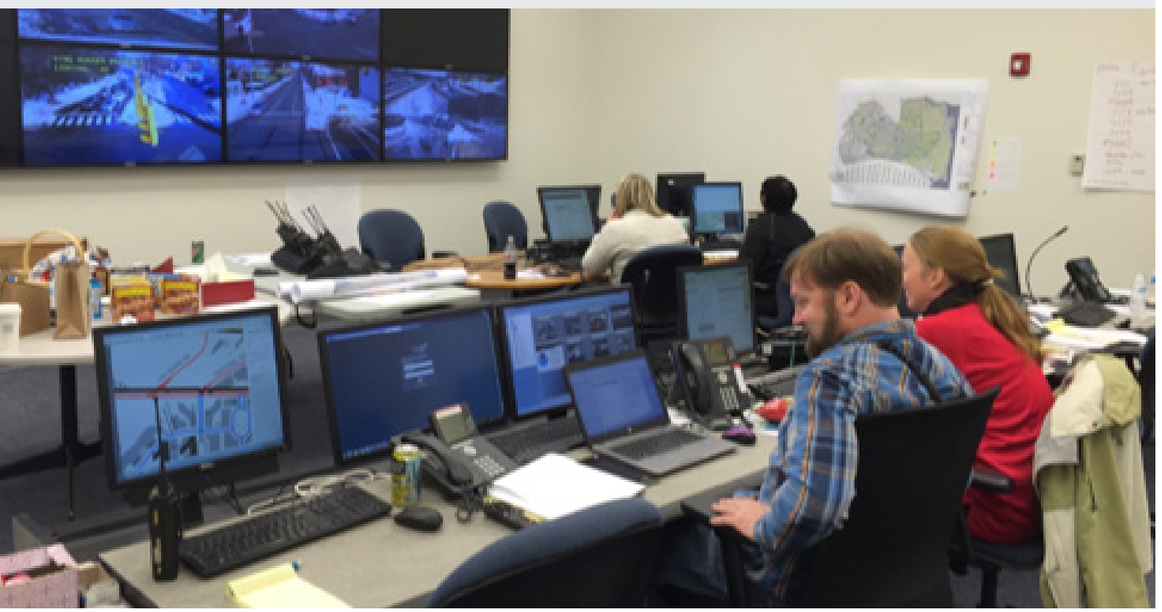


One of the key considerations when gathering and sharing data with private partners is how to ensure the **transparency and privacy** of data sharing processes. People want to know what information about them is being tracked and how it is being used. Keeping data anonymous, developing data management plans and procedures with partners prior to beginning any program, and being clear and deliberate to the user of how their information may or may not be used will benefit all parties involved.

Strategy 3. Upgrade capabilities of the Traffic Management Center to better manage congestion in real-time

Actions

- Equip Alexandria's Traffic Management Center (TMC) to allow it to manage on-street traffic equipment, monitor overall system status including pavement condition during weather events, configure devices remotely, and analyze data
- Expand coverage of closed-circuit television (CCTV) cameras and improve traffic visualizations for more efficient management of traffic incidents
- Incorporate resiliency and redundancy measures, such as a virtual backups in the event of failures



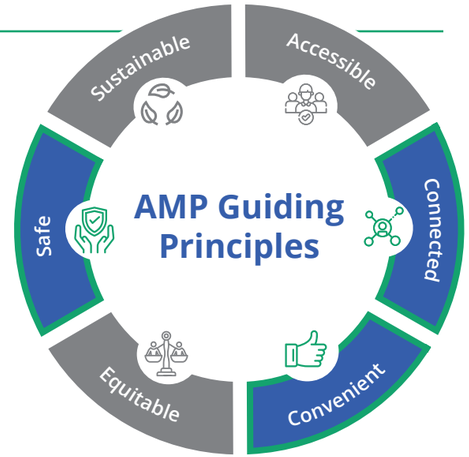
Addressing the Need

As Alexandria grows and technology changes, the TMC will require greater capabilities to control signal timing and phasing, dispatch and track City vehicles, and monitor real-time conditions and incidents. These increased capabilities will allow the City to better manage and respond to delays and incidents, plan for special events, share critical alerts and data to better inform the public, and support new mobility technologies as they come online.

Advancing City Plans and Goals

Smart Mobility Framework Plan

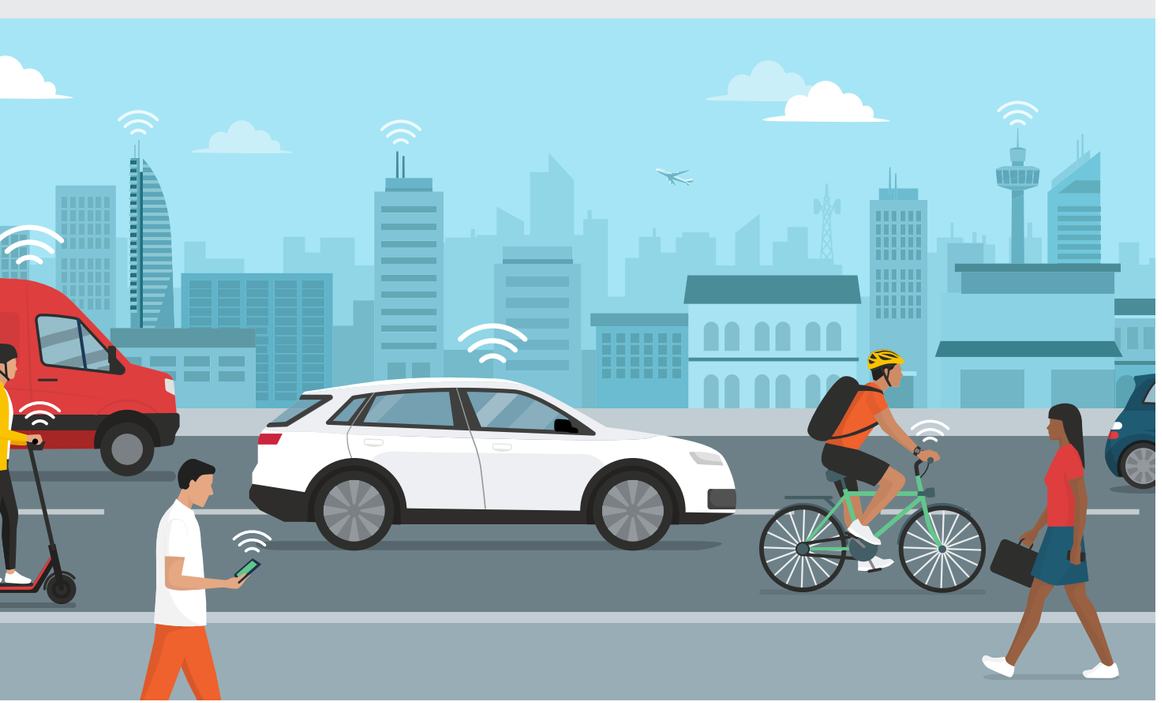
- Upgrade TMC, Facilitate Data Exchange, and Create Automated Interactive Maps
- Increase Coverage of CCTV
- Expand Network of Weather Sensor Stations / Pavement Sensor Technology



Strategy 4. Proactively prepare for connected and autonomous vehicles

Actions

- Consider pilot projects to lay the groundwork for and evaluate the effectiveness of various new technologies
- Prepare for connected vehicles by developing maintenance and infrastructure plans to ensure street readiness
- Prepare for autonomous or self-driving vehicles by developing policies to manage potentially significant increases in miles driven and traffic volumes within the city, including limiting zero-passenger miles and incentivizing shared use
- Ensure that safety is a priority when testing and implementing new technologies



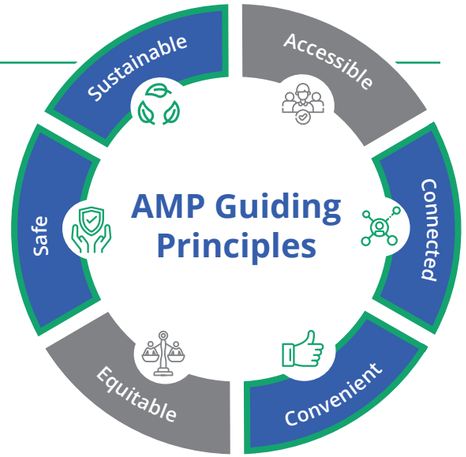
Addressing the Need

Autonomous and connected vehicles have the potential to improve roadway safety, enhance mobility for persons with disabilities, and potentially reduce congestion. Vehicle technology is advancing quickly, and the City needs to be well-positioned to adapt to these changes. It is important to prepare for connected vehicle technology through strategic investments that accommodate vehicle-to-infrastructure and vehicle-to-vehicle communications, which will help travelers find parking spaces, avoid traffic and crashes, navigate hazardous conditions, and more. Proactive policy making and monitoring will be needed to address potential for increased travel and congestion associated with the development and deployment of autonomous vehicles.

Advancing City Plans and Goals

Smart Mobility Program (20-Year Goals)

- Accommodate Self-Driving Vehicles and Connected Vehicles
- Accommodate Vehicle-to-Infrastructure Communications
- Accommodate Vehicle-to-Vehicle Communications



Strategy 5. Develop a framework for pilot projects to test new modes, infrastructure, or initiatives

Actions

- Create standards for appropriate use of pilot projects, including timeframes, public process, evaluation, and opportunities to make adjustments
  - Build upon lessons learned from the Dockless Mobility Pilot as well as national best practices from peer cities
  - Promote a framework that ensures transparency in pilot project execution

A pilot project is a small-scale, preliminary project or test that is conducted to evaluate feasibility, cost, effects, and improvements prior to the implementation of a full-scale or more expensive, resource-intensive project.

To date, transportation and smart mobility pilot projects haven taken many forms in Alexandria, such as Passive Optical Networks (PON) for traffic signal control, testing of shared bicycles and scooters (Dockless Mobility Pilot), conversion of on-street parking to sidewalk extensions (Parklet Pilot Program), and testing zero-emissions hydrogen fuel cell bus technology.

Addressing the Need

Flexible planning and a standard citywide framework are needed as new mobility options and technologies become available to ensure Alexandria is testing them with consistency, transparency, and a focus on equity.

Advancing City Plans and Goals

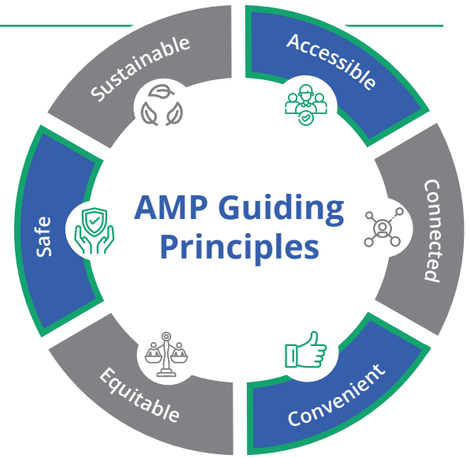
Smart Mobility Framework Plan

- Improve Accessibility, Plan for Emerging and Future Transportation Technologies

Environmental Action Plan 2040

- Adopt Permanent Regulations for Shared Mobility Devices Such as Dockless Bikes, Electric Scooters, and Other Personal Mobility Devices by Fiscal Year 2023

Vision Zero Action Plan



Credit: The Center for Transportation and the Environment (CTE)

Metrics

The strategies and policies in this chapter are intended to move the needle on the following measurable metrics. Additional details on metrics, including applicable targets for future years, can be found in **Appendix II - Monitoring, Reporting, and Key Performance Indicators**.

Metric

Number of intersections with smart signal technology

Percent of intersections with smart signal technology* in Equity Emphasis Areas

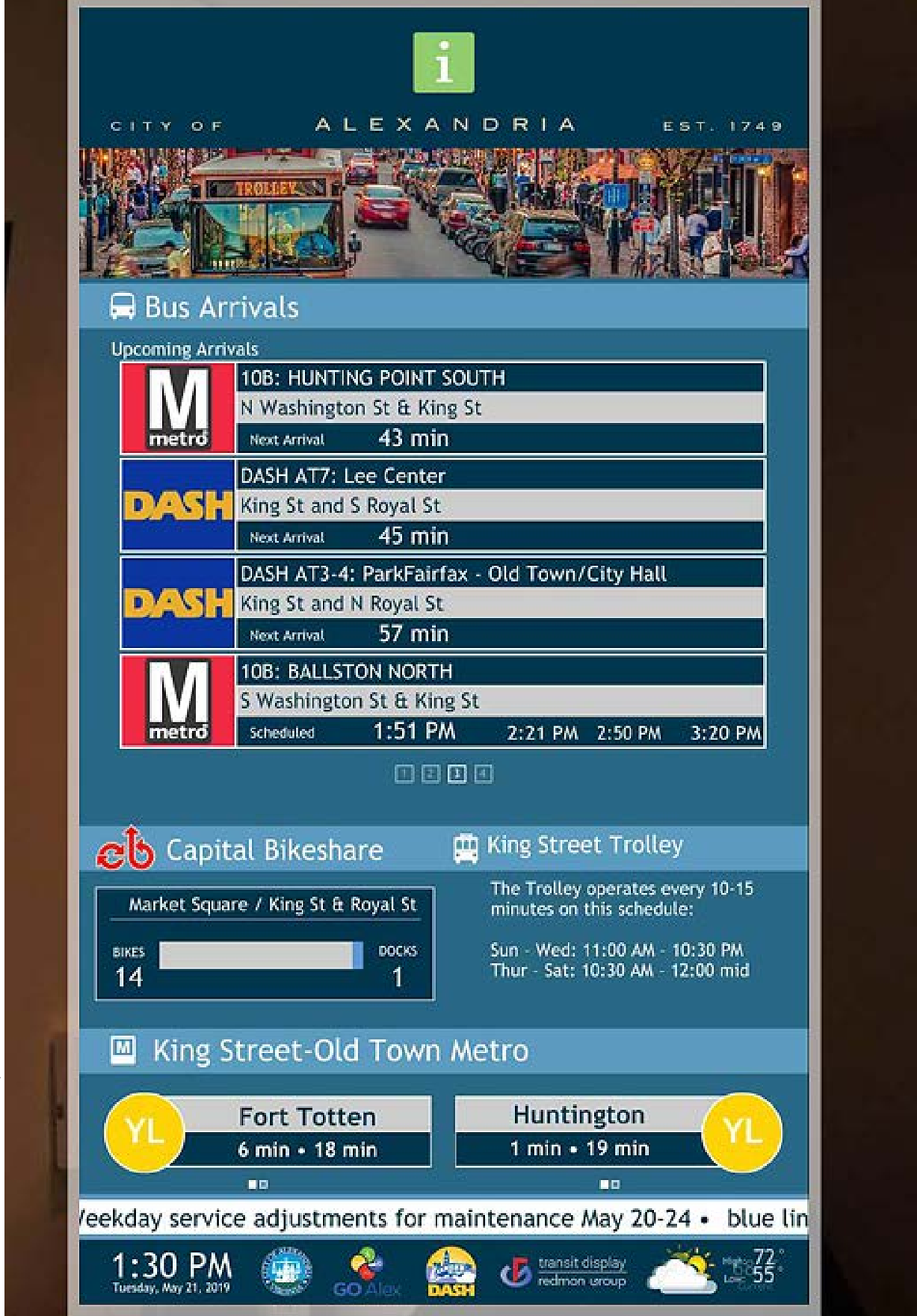
Positive rating of traffic flow on major streets (Resident Survey) **

Transit travel times on Duke Street, Van Dorn Street, and upper King Street

Equity Emphasis Areas were developed by the Metropolitan Washington Council of Governments using tract-level Census data to identify communities that have significant concentrations of low-income and/or minority populations. For more information, see **Appendix I - Monitoring, Reporting, and Key Performance Indicators.**

* Intersections with "smart signal technology" include those with traffic signals that are equipped with transit signal priority, emergency vehicle preemption, and/or activated adaptive signals.

** The Alexandria Resident Survey reports results based on race/ethnicity, income, and age in addition to all residents.



Credit: Redmon Group, Inc.