



Needs Assessment

Transportation Systems Management & Operations (TSM&O) Master Plan



CONTENTS

1	TSM&O Master Plan Needs Assessment.....	1
2	Florida Department of Transportation – District 5 Gap Analysis	6
3	Orange County Gap Analysis	8
4	Osceola County Gap Analysis	13
5	Seminole County Gap Analysis.....	18
6	City of Orlando Gap Analysis.....	23
7	Florida Department of Transportation – Florida’s Turnpike Enterprise Gap Analysis	29
8	LYNX Gap Analysis	31
9	Central Florida Expressway Gap Analysis	35

FIGURES

Figure 3-1: Fiber Optic Network and ITS Device Gaps in Orange County	12
Figure 4-1: Fiber Optic Network and ITS Device Gaps in Osceola County.....	17
Figure 5-1: Fiber Optic Network and ITS Device Gaps in Seminole County	22
Figure 6-1: Fiber Optic Network and ITS Device Gaps in City of Orlando	28
Figure 8-1: LYNX Eligible Transit Improvement Network in MetroPlan Orlando Region.....	34

TABLES

Table 1-1: Strategies & Operations Gap Analysis	4
Table 1-2: Agency & Organizational Gap Analysis.....	5

1 TSM&O Master Plan Needs Assessment

To define Transportation Systems Management and Operations (TSM&O) needs within the region, an assessment was performed to obtain a project and programmatic view of respective needs for each stakeholder agency. This Needs Assessment was developed with consideration of the Master Plan's Goals and Objectives and based upon the following:

- TSM&O Master Plan Steering Committee Input
- Existing Conditions Review (**Appendix 2**)
- Regional Intelligent Transportation Systems Architecture (RITSA) Review (**Appendix 4**)
- Stakeholder Agency Interviews

The Needs Assessment for each stakeholder agency is organized to address the following categories related to TSM&O Needs:

- Gap Analysis
 - Current Status
 - Desired Outcomes
 - Identified Gap(s)
- Data Collection Summary

The Needs Assessment focuses on primary dimensions of a TSM&O program. These dimensions were drawn from broader categories defined by AASHTO and modified to address all levels of stakeholders. These categories are:

- Infrastructure & Systems
- Strategies & Operations
- Agency & Organizational

1.1 INFRASTRUCTURE & SYSTEMS – EXISTING AND PLANNED

While implementing the infrastructure and systems that support TSM&O strategies, the use of appropriate practices for design and implementation is essential. Applying an agency's project development process with a systems engineering analysis will include regional needs and ensure they are appropriately addressed. Using the defined data flows and system elements identified in the RITSA, systems should be implemented in as identified to promote efficiencies. Interoperability will be more easily achieved by utilizing the RITSA and systems engineering process.

The recommendation under this category is to address the collective system gaps across agencies as defined in each agency assessment on the following pages.

1.2 STRATEGIES & OPERATIONS

Various strategies and systems support an agency's overall TSM&O program. Following from the Federal Highway Administration Capability Maturity Framework, these strategies and systems can be categorized as Business Processes, Performance Measurement, and Collaboration.

Business processes, as they relate to TSM&O, include activities such as planning and programming agency project development processes. This includes any organizational aspects that provide technical or administrative functions like training, resource management, procurement, and information technology. Often, the business process associated with TSM&O are involved in much more than the day-to-day operational activities. With appropriate procurement processes, partnering agreements, sustainable funding, and internal understanding, an agency can provide real-time value and long-term success.

Operations performance measures will help identify and sometimes define the extent of transportation problems. They can be used to define needed operational improvements to address those issues. Performance measurement is fundamental to determining program effectiveness, defining how actions are impacting performance, and guiding decision-making. These performance measures can also inform decision-makers when the principles and outcomes are conveyed effectively. Additionally, the traveling public can see what is being accomplished with public funding within the transportation network.

Collaboration is an essential component to the development and implementation of TSM&O. The success of most strategies will be dependent on improving the coordination with partners. MetroPlan Orlando's TSM&O Advisory Committee and the Central Florida TSM&O Consortium are existing efforts that continually enhance collaboration. Two key objectives of this Master Plan encourage agency partners to:

- Collaborate to enhance and expand the region's ITS, adaptive, and actively managed traffic systems to improve reliability and support effective corridor management.
- Collaborate regionally to improve access for all users to essential services across all modes of transportation.

1.2.1 STRATEGIES & OPERATIONS RECOMMENDATIONS

Based on the input received and analysis performed for this Needs Assessment, recommended strategies were defined to be considered by stakeholder agencies. These strategies were synthesized from stakeholder agency input during development of the Existing Conditions Review and this Needs Assessment. **Table 1-1** includes a matrix defining which strategies represent a gap for an agency and provide an opportunity for strengthening the TSM&O program. The strategies are as follows:

- Develop an annual financial plan that incorporates TSM&O capital investments within the budget process – including operations and maintenance (O&M)
- Educate agency staff and leadership on benefits of active traffic management and multi-modal enhancements supported by technology
- Develop an organizational approach for assessing changes in system performance for routes of regional significance
- Establish center-to-center connectivity between traffic management centers in the region and identify connection points between jurisdictions
- Identify the output and outcome measures useful for determining agency efficiency in traffic management strategies
- Use regional architecture to identify data to be measured
- Create standard performance reports for use in assessing impacts of operational improvements on a project-level basis
- Establish performance benchmarks and targets for traffic management
- Develop procedures to standardize data from various sources and improve the data management system to support multiple data sources
- Develop agency policy that ties performance measures to operational objectives
- Create action plan to utilize performance measures for managing the system to achieve target performance
- Establish shared data feed requirements, including security, formats, archiving, etc.
- Develop roles, responsibilities, and conditions/rules for sharing data and resources
- Expand business models to involve new private-sector partnerships for data collection, analysis, and traveler information
- Identify remaining corridor programs and data feeds still operating in stand-alone mode that should be considered in a multi-agency sense

1.3 AGENCY & ORGANIZATIONAL

Staff who support an agency's TSM&O are critical to reaching goals for mobility and safety. TSM&O staff's functional understanding of the agency's systems, networks, and devices will be predicated on the technical knowledge. For the purposes of this planning effort, each agency was assessed based on two primary factors: Organization/Workforce and Culture.

Under Organization/Workforce, efficient execution of processes supporting effective programs requires the appropriate combination of coordinated organizational functions and technical qualified staff with clear management authority and accountability.

The Culture within an organization is defined based on a combination of values, assumptions, knowledge, and expectations of the agency.

1.3.1 AGENCY & ORGANIZATIONAL RECOMMENDATIONS

Based on the input received and analysis performed for this Needs Assessment, recommended agency and organizational strategies were defined to be considered by stakeholder agencies. **Table 1-2** includes a matrix defining which strategies represent a gap for an agency and provide an opportunity for strengthening the TSM&O program. The strategies are as follows:

- Develop a comprehensive list of traffic management roles and responsibilities across the organization and identify cross-linkages to facilitate coordination
- Develop high-level training mechanisms for TSM&O staff related to all critical traffic management functions within the agency
- Develop an immediate action plan to address vacancies in critical traffic management program roles/capabilities
- Assemble basic Professional Capacity Building activities with critical supporting material for specific traffic management functions
- Devise a training program that periodically cross-trains all staff on critical functions and is regularly updated as roles, responsibilities, duties, and/or functions change
- Establish a retraining program for staff to facilitate job reassignment for traffic management needs (e.g., systems engineering, modeling, software development/procurement, ITS hardware maintenance).
- Establish a program that tracks TSM&O projects and documents measured benefits and lessons learned
- Create a library of resources related to all aspects of TSM&O and incorporate into operations training plans
- Establish a process for reporting critical performance measures to key staff within the organization
- Ensure that agency strategic plan includes linkages between traffic management and core functions

Table 1-1: Strategies & Operations Gap Analysis

Strategy	FDOT D5	Orange	Osceola	Seminole	Orlando	Turnpike	LYNX	CFX
Annual Financial Plan with TSM&O Capital Improvements	●	○	●	◐	◐	●	◐	●
Education of Staff/Leadership on Benefits of Technology-Supported Enhancements	●	○	●	◐	◐	●	◐	●
Organizational Approach for Assessing System Performance	●	◐	○	◐	○	◐	●	◐
Regional Traffic Management Center-to-Center Connectivity	◐	◐	◐	◐	○	◐	○	◐
Identification of output and outcome measures for determining agency efficiency	●	○	●	○	○	●	◐	◐
Use regional architecture to identify data to be measured	●	○	●	●	◐	●	◐	●
Standardized Performance reports to Assess Project-Level Impacts	◐	○	◐	◐	○	◐	◐	◐
Establish Performance benchmarks and targets for traffic management	●	●	○	◐	○	●	◐	●
Procedures for Data Standardization	●	◐	◐	○	○	◐	○	◐
Agency Policy Linking Performance Measures to Operational Objectives	◐	●	○	○	○	○	○	●
Action Plan to Utilize Performance Measures for Managing the System	●	○	◐	◐	◐	◐	◐	◐
Establish Shared Data Feed Requirements	◐	○	○	◐	○	◐	◐	◐
Develop roles, responsibilities, and conditions/rules for sharing data and resources	●	◐	●	●	◐	●	○	●
Expand business models to involve new private-sector partnerships	●	○	●	◐	◐	●	◐	●
Identify corridor programs and data feeds to be considered in multi-agency context	●	○	●	◐	◐	●	◐	●

○ = Gap Identified

◐ = Partial Gap Identified

● = No Gap Identified

Table 1-2: Agency & Organizational Gap Analysis

Strategy	FDOT D5	Orange	Osceola	Seminole	Orlando	Turnpike	LYNX	CFX
Comprehensive List of Roles and Responsibilities	●	◐	◐	◐	◐	●	◐	●
High-Level Training Mechanisms for TSM&O Staff	●	◐	◐	◐	○	●	◐	●
Immediate Action Plan to Address Critical Vacancies	◐	○	○	○	○	◐	○	◐
Professional Capacity Building Activities and Materials	●	◐	◐	◐	◐	◐	◐	◐
Regular Cross-Training of Staff on All Critical Functions	◐	○	○	○	○	◐	○	●
Staff Retraining to Facilitate Job Reassignments	●	◐	◐	◐	◐	◐	◐	●
Documentation of TSM&O Project Benefits and Lessons Learned	●	◐	○	◐	○	●	○	●
TSM&O Resource Library for Training Plans	◐	○	○	◐	○	◐	○	●
Performance Measure Reporting Process	●	◐	○	◐	○	●	●	●
Link Agency Strategic Plan with Traffic Management and Core Functions	●	◐	○	◐	○	●	◐	●

○ = Gap Identified

◐ = Partial Gap Identified

● = No Gap Identified

2 Florida Department of Transportation – District 5 Gap Analysis

2.1 CURRENT STATUS

The gap analysis performed for Florida Department of Transportation (FDOT) District 5 is based on a review and analysis of the agency's current TSM&O resources including the following:

- FDOT TSM&O Strategic Plan (2017)
- FDOT District Five TSM&O Implementation Plan (2014)
- Planning for TSM&O Guidebook
- FDOT 5-Year Work Program (2023-2028)
- FDOT District 5 ITS Master Plan (2016)
- FDOT District 5 TSM&O Budget (FY 2022)
- FDOT Regional ITS Architecture – District 5

In addition to the resources identified above, an interview was conducted with FDOT District 5 TSM&O staff. Interview input was considered in the gap analysis and needs assessment and included the following actions:

- Educate external partners on the needs associated with cyber-security management
- Identify opportunities to optimize collaborative operations
- Institute interoperable systems and management software to ensure seamless integration and end-user experiences
- Continue collaboration with other agencies such as Orange County, Osceola County, Seminole County, and LYNX to advance effective TSM&O implementation

2.2 DESIRED OUTCOMES

Through this TSM&O Master Planning effort, the following focus areas were reviewed to identify potential process and implementation improvements.

2.2.1 INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

Based on the analysis of the existing conditions and status of FDOT District 5's TSM&O infrastructure and systems, gaps related to systems and infrastructure are identified below. These gaps will assist FDOT in ensuring their systems and technology are routinely upgraded and utilized to improve coordination with stakeholders and efficiencies within the region. FDOT District 5 has a well-defined work program that considers the next 5-years of projects to be implemented by the agency. For the purposes of this TSM&O Master Plan needs assessment, the projects related to traffic operations, ITS, and other TSM&O related improvements within the 5-Year Work Program will be considered potential opportunities for future improvements desired by local traffic signal maintaining agencies.

Due to the mature TSM&O environment FDOT District 5 has established, a focus of the program moving forward can be to utilize the architectures and activities with integrated performance measures on a regular basis. This can be achieved by:

- Outlining a regional architecture action plan to monitor ongoing system developments as well as changing needs to ensure that the architecture is followed
- Continue to develop System Engineering Analysis (SEA) resources for both internal and external use. This may include the development of training programs that showcase the TSM&O philosophy, associated procedures, and how to convey the benefits
- Create and publish cohesive standards that will promote interoperability by ensuring senior level leadership of the region is acquainted with the costs and benefits of regional interoperability

2.2.2 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

FDOT District 5's business processes are industry leading and can therefore be leveraged by others to implement similar, scaled programs to fit the needs of their agencies. By integrating new operational objectives and strategies into their processes as standard operating procedures, partner agencies can leverage this information to define ways to update internal processes and gain understanding of how the District allocates resources.

PERFORMANCE MEASUREMENT

FDOT District 5 has a well-established performance measurement process that analyzes their systems from multiple aspects of operations, including:

- Integrated Corridor Management (ICM) Performance Measures
- Expressway Mobility Reports
- Monthly Freeway Management Reports
- Monthly Arterial Management Reports

Using these performance reporting activities as a foundation for improving program performance will allow the District to begin reporting on targeted outputs. This will also provide a mechanism to identify new data necessary for routine management activities, as well as directed operational improvements that can occur on a smaller scale to demonstrate value both internally and externally.

COLLABORATION

FDOT District 5 is a champion at facilitating collaboration within the MetroPlan Orlando region. The region has an established TSM&O Consortium to promote coordinated decision-making and information sharing for project development. This includes the planning, design, development, and evaluation of TSM&O strategies within the region. Continued interaction among stakeholders within the region will be paramount in promoting a high level of operations coordination. To maintain the success of this group, the region should continue to cooperate and establish effective roles and clear responsibilities regardless of each agency's priorities, resources, and objectives.

OBJECTIVES

Recommended strategies that are a gap and serve as an opportunity for FDOT District 5 are identified in **Table 1-1**.

2.2.3 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

FDOT District 5 has an established workforce that includes a well-rounded group of professional and technical employees and resources. The District utilizes private sector support to augment staff and execute operational programs. FDOT has demonstrated the capability to develop and execute highly technical projects. In the future, the District's TSM&O staff can ensure continued success by evaluating program status on regular intervals and ensuring staff development needs are continuing to be met.

CULTURE

Within FDOT District 5's TSM&O program, the culture is well-established and recognized as a model for other programs. This has been achieved by ensuring TSM&O values and goals are not only understood but promoted within the TSM&O program and beyond. By conveying the TSM&O principles and outcomes to others within the organization, value will be added to the program by providing multiple ways for external agencies, or the public, to become aware of the value that TSM&O can provide.

Recommended strategies that are a gap and serve as an opportunity for FDOT District 5 are identified in **Table 1-2**.

3 Orange County Gap Analysis

3.1 CURRENT STATUS

The gap analysis performed for Orange County considered the current status of the agency's TSM&O resources based on a review of the following:

- Orange County Budget (FY 2022-2023)
 - Operating Expenses
 - Capital Improvements
- MetroPlan Orlando – Prioritized Project List
 - Off-System Construction Assistance/TRIP Projects
- FDOT Regional ITS Architecture
- Orange County Transportation Technology Improvements White Paper
- Orange County Transportation Projects
- Orange County 2030 Long Range Transportation Plan
- Orange County GIS Datahub
- Orange County Comprehensive Plan 2010-2030 (amended May 2022)

3.2 DESIRED OUTCOMES

Based on prior research and staff interviews, desired outcomes for Orange County are described below:

3.2.1 INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

Orange County's TSM&O program supports not only the deployment, operations, and maintenance of Intelligent Transportation Systems (ITS) networks, but also operational improvements, like turn lane upgrades and other non-technology-based enhancements. Signal improvements are also under the TSM&O program. ITS improvements are typically considered at a corridor level, whereas safety and mobility improvements will typically be determined at the intersection level.

This needs assessment considers the use of the appropriate processes for design and implementation of systems to ensure that the needs of the region are appropriately addressed. The deployment of ITS projects within Orange County are planned from a corridor perspective. The County is engaged in adopting new technologies and has an emerging capability to assess and adopt new systems.

Project funding is often considered in MetroPlan Orlando's Metropolitan Transportation Plan (MTP) with some ITS components like Fiber Optic Communications (FOC) and Closed-Circuit TV (CCTV) cameras being included in a typical new roadway improvement project. Other ITS deployments or more advanced systems to support signal operations are implemented in targeted efforts based on operational goals. In areas where FOC is not available, cellular communication is used.

In partnership with FDOT District Five, Orange County has implemented more than \$20 million in federally-funded ITS projects since 2000. Moving forward, Orange County has outlined a project list for future deployment in the *Orange County Transportation Technology Improvements White Paper*. The goals of these projects will focus on:

- Reducing Congestion
- Improving Safety – Focusing on all modes of travel
- Improving Travel Time Reliability
- Promoting Mobility Options for Disadvantaged Communities and Populations
- Reducing Carbon Emissions

Based on the analysis of the existing conditions and current status of Orange County's TSM&O infrastructure and systems, the following gaps have been identified:

- **Traffic Signals**
 - Advanced Traffic Controller (ATC)

- To fully utilize the evolving signal control and arterial management technologies, the existing outfitted with ATC traffic signal controllers should be considered for detection and advanced detection upgrades to obtain high-resolution data.
 - Adaptive Signal Control Technology (ASCT)
 - Currently only 81 out of 642 County maintained traffic signals have ASCT. More deployment is needed especially along the major arterials where a more frequent signal retiming analysis is needed.
 - Automated Traffic Signal Performance Measures (ATSPM)
 - ATSPM's show real-time and historical functionality at signalized intersections. This allows traffic engineers to directly measure what previously could only be estimated and modeled.
 - Since some measures have different detection requirements than others, elements such as detection technology, detection zones, and data to be collected should be considered early in the project scoping phase.
 - In addition, data storage and server requirement for high resolution data files will have an impact on project scope and cost.
 - Currently, Orange County has completed one project in design, as of 2023, that upgraded 160 traffic signal controller cabinets to allow ATSPM functionality. This project is funded for construction in FY 2025.
 - Moving forward, the County could prioritize upgrading traffic signal controllers, cabinets, and ancillary equipment to ensure they are prepared for ATSPM expansion. These upgrades may include:
 - Compatible Controllers (e.g., ATC)
 - Data Aggregators
 - Detection Upgrades/ Advanced Detection
 - The County could prioritize improvements necessary for ATSPM as standalone projects or by utilizing existing projects making general signal improvements that will also improve the County's ability to adopt more CAV technology.
 - Emergency Vehicle Preemption (EVP)
 - Currently, 445 intersections are equipped with Infrared EVP. Implementing EVP at all 642 traffic signals should be considered. In addition, installing both optical and GPS system EVP at each traffic signal will provide the optimal operational benefits.
 - Transit Signal Priority (TSP) and Freight Signal Priority (FSP)
 - Currently, only 58 intersections are equipped with TSP. Further study and analysis will be performed for the LYNX Needs Assessment to determine transit-focused areas and transit routes for improvements.
 - Routes with large demand, high stop density, and connections to major activity centers will be considered appropriate for TSP implementation.
 - Freight signal priority uses a concept similar to TSP and provides freight vehicles special operational consideration as they approach the intersection. Further study is needed to determine the popular freight routes and analyze the costs and benefits for deploying FSP.
- **Fiber Optic Coverage**
 - The following routes currently do not have or only partially have fiber optic coverage and are identified as candidates to deploy backbone fiber optic. These locations are depicted in **Figure 3-1**.
 - US 441 within County limits
 - SR 429 within County limits – Available through agreement with CFX
 - SR 417 within County limits – Available through agreement with CFX
- **ITS Devices**
 - CCTV Cameras and Arterial Dynamic Message Signs (DMS) should be placed at major intersections and interchanges, such as the following which are depicted in **Figure 3-1**:
 - I-4 Interchanges
 - Florida's Turnpike Interchanges
 - Major diverging routes such as SR 429, SR 417, and US 441
- **Bicycle/Pedestrian Safety Improvements**

- Install visible/audible pedestrian pushbuttons and passive pedestrian detection
- Adjust/optimize signal timing and phasing to minimize conflicts between bicycles/pedestrians and vehicles
- **Connected and Automated Vehicles (CAV) Technology**
 - Many of the aforementioned system upgrades or infrastructure needs may be achieved through CAV, such as EVP, TSP/FSP, vehicle data collection, and bike/ped safety applications. Penetration rate should be kept in mind as scoping and developing ways to replace and upgrade these systems with CAV strategies.

In total, more than \$70 million in projects were identified for the next 5 years in the *Orange County Transportation Technology Improvements White Paper*. For all the projects identified by the County, the O&M costs were estimated at 10% of the project costs. In Orange County, this is a standard amount that is considered when introducing a new project, although funding resources for the O&M are often more constrained.

3.2.2 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

Orange County has established business processes that allow them to plan and design projects that fit their traffic management needs. Moving forward, the County would benefit from establishing processes that allow them to properly scope projects to ensure they are leveraging all opportunities to improve their infrastructure. Additionally, by identifying a more robust budgeting process, the County will be able to more clearly articulate the needs that support TSM&O strategies, starting at the planning process and into the operations and maintenance phases of a project. This can be accomplished by determining short-term local/regional-level funding strategies (capital, maintenance, and staffing) by budget categories and timeframes.

PERFORMANCE MEASUREMENT

Orange County has the desire to conduct more targeted performance measurement and plans to utilize TSM&O dashboards for real-time monitoring. Additionally, Orange County will introduce more ATSPM to obtain the most useful data to improve signal operations. Overall, Orange County would like to use performance measures to drive agency-level decision-making for current and future investment decisions.

COLLABORATION

Orange County takes part in various TSM&O planning activities facilitated through MetroPlan Orlando and FDOT. The County engages in cross-jurisdictional traffic management activities supported by business plans, concept of operations, or other formal documentation. Currently, operational linkages including ability to monitor operations regionally exist, although there is a desire to operate a more integrated system. Based on the County's coordination, there are some common operational objectives that are agreed upon regionally. Agency data and information are shared regionally typically for specific traffic management needs relating to situational awareness and information dissemination.

Recommended strategies that are a gap and serve as an opportunity for Orange County are identified in **Table 1-1**.

3.2.3 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

Currently, Orange County has the capabilities to support system development, design, and deployment, with increasing abilities with software applications development. Overall, the agency's staff has a high capability to manage the systems and technology projects envisioned for the future. However, some additional training and resources will need to be identified as systems advance.

Orange County has processes and procedures in place that allow it to retain personnel and/or capabilities within the organization, although they have had challenges hiring new employees to support the TSM&O program and often utilize consultants to support their program. This introduces additional funding and resources constraints. The agency's knowledge is captured to ensure it is not lost with personnel transitions or shifts in business models. To ensure County staff is positioned to take on new systems and technology, they have protocols, procedures, and guidelines in place for new staff. Additionally, the County utilizes new projects to incorporate training opportunities for their staff.

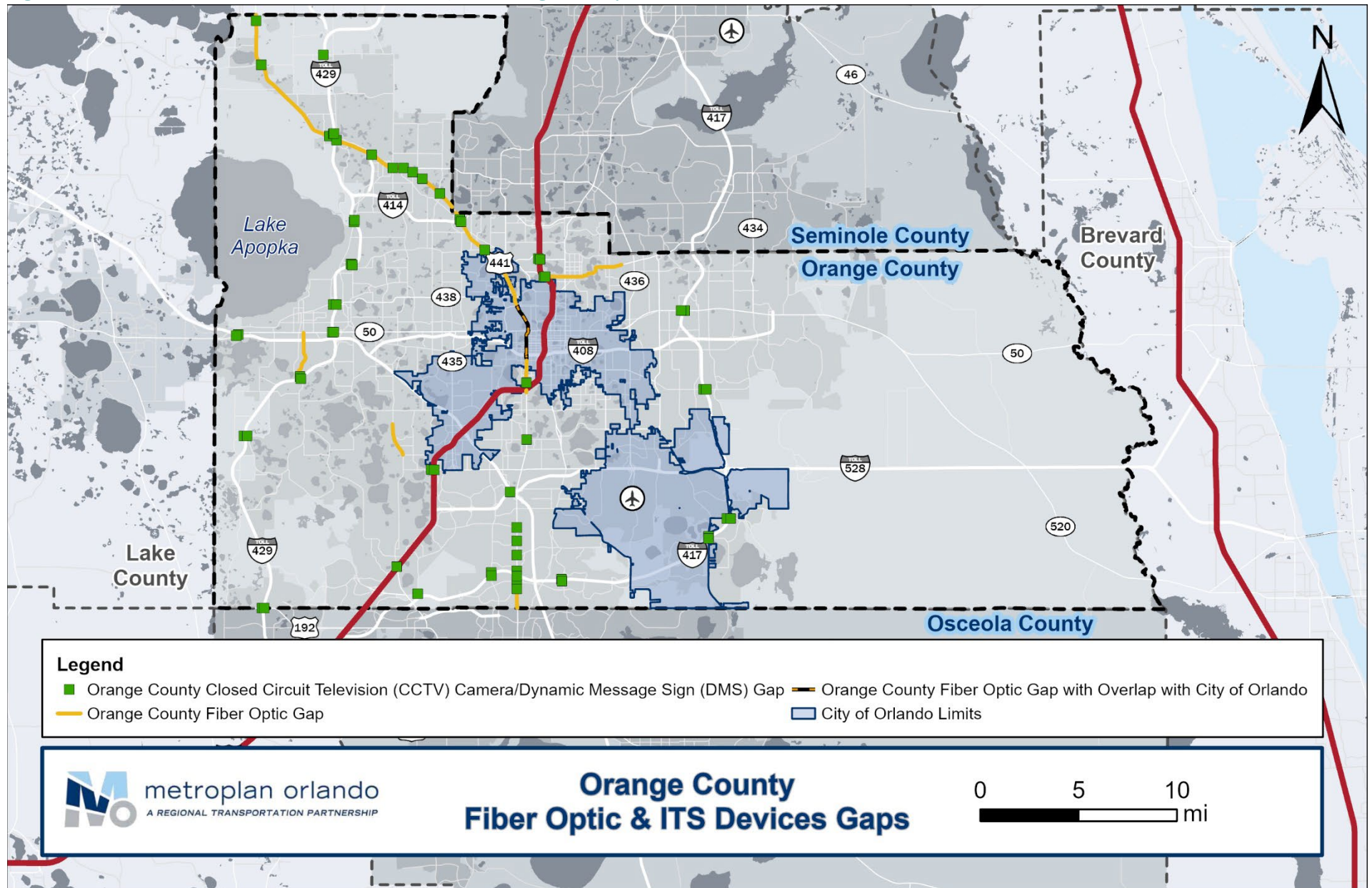


CULTURE

In Orange County, TSM&O is currently set apart as a separate program to coordinate with other projects and activities. The TSM&O staff and project managers lead efforts for traffic management projects when they are a standalone effort.

Recommended strategies that are a gap and serve as an opportunity for Orange County are identified in **Table 1-2**.

Figure 3-1: Fiber Optic Network and ITS Device Gaps in Orange County



4 Osceola County Gap Analysis

4.1 CURRENT STATUS

The gap analysis performed for Osceola County is based on a review and analysis of the agency's current TSM&O resources including the following:

- Osceola County Comprehensive Plan 2040
- Osceola County Transportation Maps
- Osceola County Transportation Projects
- FDOT RITSA
- TSM&O Strategic Plan

Planned Osceola County TSM&O projects identified in the FDOT RITSA include the following:

- ATTAIN Central Florida
 - Comprised of three interrelated programs that connect through an on-going FDOT initiative SunStore: PedSafe, GreenWay and SmartCommunity.
- FDOT Active Arterial Management System (Osceola County)
 - Adjust signal timing related to predictable traffic conditions, especially during special events or construction. Traffic information will be provided to drivers via DMS and FL511.
- FDOT D5 Regional Integrated Corridor Management System
 - Select pre-agreed response plans in response to events within the region.
- FDOT District 5 I-4 FRAME
 - Florida's Regional Advanced Mobility Elements (FRAME) is a regional, intercity ICM project running from the Central Business District in Tampa to the southwest side of Orlando at the Florida Turnpike.
- Greater Orlando Signal Priority and Preemption
 - Installing TSP and EVP equipment throughout Orange, Osceola, and Seminole Counties.
- Osceola County Advanced Traffic Management Systems (ATMS) Expansion
 - Expand current ATMS system.

In addition to the resources, an interview was conducted with Osceola County Traffic Operations Division staff. Key lessons learned provided by the staff during the interview were considered in the gap analysis, which include:

- Work to mainstream TSM&O strategies early in the project development phase of projects
 - Standardize the deployment of TSM&O infrastructure such as fiber and traffic controller cabinet upgrade in roadway widening projects
- Plan for O&M budget in advance
- Explore and implement technologies for multimodal considerations, such as
 - Transit Signal Priority (Opticom)
 - Preemption for school busses
 - Improvements for pedestrians and bicyclists such as Rectangular Rapid Flashing Beacons at crossings and connected vehicle (CV) technologies with phone applications such as PedSafe
- Move forward with connected CV/automated vehicle (AV) initiatives such as the County's ongoing CV/AV readiness study
- Collaborate with other agencies such as FDOT, FTE, CFX, City of Kissimmee and LYNX

4.2 DESIRED OUTCOMES

Based on the analysis of the existing conditions and status of Osceola County's TSM&O infrastructure and systems, gaps are identified below:

4.2.1 INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

Osceola County's Transportation and Transit Department includes all transportation-related projects in Osceola County. This Department plans, designs, and constructs projects for roadways, bridges, and other public transportation infrastructure. This department works towards expanding public transit options, bike paths, and recreational trails throughout the County. A primary focus of this department focuses on optimizing the efficiency with traffic operations. This includes monitoring real-time traffic conditions using ITS and ATMS.

To ensure that the requirements of the region are appropriately met, this needs assessment considers the utilization of the appropriate procedures for the design and implementation of systems based on the feedback provided by County staff. Osceola County's implementation of ITS projects is primarily planned from a corridor perspective. The agency tries to prioritize new advancements and is positioning themselves to take on more advanced systems and operational strategies.

The MTP developed by MetroPlan Orlando identifies project funding to be considered. It is common for new roadway improvement projects to include ITS components. Fiber Optic Communication (FOC) is often included within projects that are able to accommodate it. Targeted efforts are made to implement additional ITS deployments or more advanced systems to support signal operations based on operational objectives.

Osceola County has invested in the deployment, operations, and maintenance of their signal system, ITS devices, and communications networks within the transportation network.

- **Traffic Signals**

- Advanced Traffic Controller (ATC)
 - The existing traffic signal controllers in the County are Econolite Cobalt series and ASC/3 series. Upgrade to ATC with NEMA TS 2 Standards will be needed to support future Active Arterial Management strategies such as ATSPM, ASCT and CV applications throughout the County.
- Adaptive Traffic Signal Control (ATSC)
 - Currently, 58 out of 230 traffic signals operated and maintained by the County are adaptive. Additionally, two corridors are being planned in the future for ATSC application. Expansion of ATSC along major arterials with frequent retiming needs should be considered.
- Automated Traffic Signal Performance Measures (ATSPM)
 - The County currently does not have any ATSPM implemented. ATSPM should be considered at critical intersections as a suite of performance measures to support traffic signals O&M. Corridors to be considered for ATSPM will be identified in the prioritization process.
- Emergency Vehicle Preemption (EVP)
 - The County currently uses Opticom devices for EVP at most of the signalized intersections, with the exception of approximately 32 out of 230 traffic signals that do not have EVP. Equipping EVP at all traffic signals should be considered.
- TSP and/or Freight Signal Priority (FSP)
 - TSP and FSP have not been implemented by the County yet. Further analysis will be performed to determine the appropriate transit/freight-focused areas for deployment.
 - Special consideration should be applied to the transit corridors identified in the Transit System (2040) and Premium Transit Corridors (2040) maps developed by the County in May 2019.
 - County expressed interest during the interview in preemption for school buses. CV applications should be considered as well.
 - Coordination and collaboration with other agencies on the Greater Orlando Signal Priority and Preemption Project will benefit and may accelerate TSP/FSP deployment.

- **Fiber Optic Coverage**

- The following routes currently do not have or only partially have fiber optic coverage and are identified as candidates to deploy with backbone fiber optic. These locations are depicted in **Figure 4-1**:
 - US 441/192 from SR 15 to County Line

- Neptune Road
- Nolte Road
- **ITS Devices**
 - Closed-Circuit TV Cameras and Arterial Dynamic Message Signs should be placed at major intersections and interchanges, such as the follow which are depicted in **Figure 4-1**:
 - SR 530/W Vine Street within City of Kissimmee Limits
 - N Orange Blossom Trail within City of Kissimmee Limits
 - US 441
 - US 192
 - SR 60
- **Bike/Ped Safety Improvements**
 - TSM&O consideration and treatment should be provided to enhance the overall safety and efficiency for all roadway users, including multimodal opportunities such as the following:
 - Visible/audible pedestrian pushbutton signals
 - Adjustment and optimization of signal timing and phasing so that the conflict between bike/ped and vehicles can be minimized
- **Connected and Automated Vehicles (CAV) Technology**
 - Many of the aforementioned system upgrades or infrastructure needs may be achieved through CAV, such as EVP, TSP/FSP, vehicle data collection, and bike/ped safety applications.
- **Artificial Intelligence (AI)**
 - The County is working with a TAPS-LA grant on a pilot program deploying AI technology.

In addition to the resources identified above, an interview was conducted with Osceola County’s Traffic Operations and Transportation Management staff. Key lessons learned provided from the staff during the interview were considered in the gap analysis and needs assessment, which include:

- Better educate internal staff on how TSM&O can be leveraged to promote mobility and safety
 - Build on the current recognition of County staff of the levels of operations and management that are necessary to support a TSM&O
 - Continue to build value in establishing internal partners to advocate for the outcomes associated with TSM&O
- Establish a budget for technology-based infrastructure
 - Identify resource needs for both operation and maintenance, separately
- Identify potential collaborations with neighboring agencies to ensure interoperability and enhance collaboration
- Establish a process for estimating project costs that will be appropriate for future programming (5+ years)
- Streamline project input processes to ensure ITS infrastructure is being considered early in the project development process for implementation and/or upgrades
- Move forward with developing event management standard operating guidelines
 - Collaborate with other agencies, departments, and the private sector to minimize the impacts of the County hosting major events
- Collaborate with other agencies such as FDOT, FTE, CFX, Orange County, and LYNX

In 2023, more than \$110 million in projects were identified in the Osceola County adopted budget. Within the budget, the advancement and deployment of ITS in the County with construction of the Osceola Parkway Tolling conversion and fiber installation project was identified as a strategic objective for the Transportation Department.

4.2.2 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

By establishing a more comprehensive planning process, Osceola County could more fully advance TSM&O strategies. This process could be established to determine short-term local- and regional-level funding strategies (capital, maintenance, and staffing) by budget categories and timeframes. By arranging program components into specific project/resource budgets, the County could support all TSM&O program needs. The County has established

certain business processes that provide for planning and designing projects that fit traffic management and operations goals. Osceola County understands the benefits that could come from incorporating a more comprehensive process to enable better scoping for TSM&O projects. The goal would be to ensure the County is leveraging all opportunities to improve infrastructure.

PERFORMANCE MEASUREMENT

Osceola County currently utilizes performance measurement to address real-time traffic conditions. The performance measures that are tracked are used in certain cases to justify new projects and/or resources for future projects. The County is interested in developing a more targeted performance measurement process. This would enable them to develop and use TSM&O dashboards for real-time monitoring, convey benefits to internal and external partners, and create a historical catalog for more detailed performance tracking and accountability. Other systems the County has considered implementing include ATSPM. This would help the County to obtain the most useful data possible to improve signal operations and maintenance. Performance measures would also help the County to inform its staff, Board, and the public how the agency prioritizes projects.

COLLABORATION

Osceola County is a primary stakeholder involved with TSM&O planning activities facilitated through MetroPlan Orlando and FDOT within the Central Florida region. Regional objectives are tracked using business planning activities for larger, cross-jurisdictional projects. Nonetheless, the County recognizes that there is opportunity to improve coordination with adjacent agencies to ensure the end user is provided a more consistent approach on the traffic network. More specific integrated systems could be utilized to advance the County's interest in working more closely with neighboring agencies. Ultimately, the goal would be to have the capability to not only collaborate for projects and implementation but to also maintain consistent data sharing practices as well.

Recommended strategies that are a gap and serve as an opportunity for Osceola County are identified in **Table 1-1**.

4.2.3 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

Currently, Osceola County has the capabilities to support system development, design, and deployment. Their staff is equipped to keep up with the current operations and maintenance activities. However, the County does recognize there are opportunities to identify efficiencies within their standard operating procedures to streamline maintenance activities. Based on the current trajectory of the transportation industry's standard practices, the ability to become more agile in the development of software applications will be something for which the County will need to identify additional resources. Overall, the agency's staff is very knowledgeable of the current system that is being operated and maintained for the County. With the advancements of technology occurring regularly, training and resources to advance the agency's staff can be prioritized to ensure they are not reliant solely on contractors to assist with maintenance.

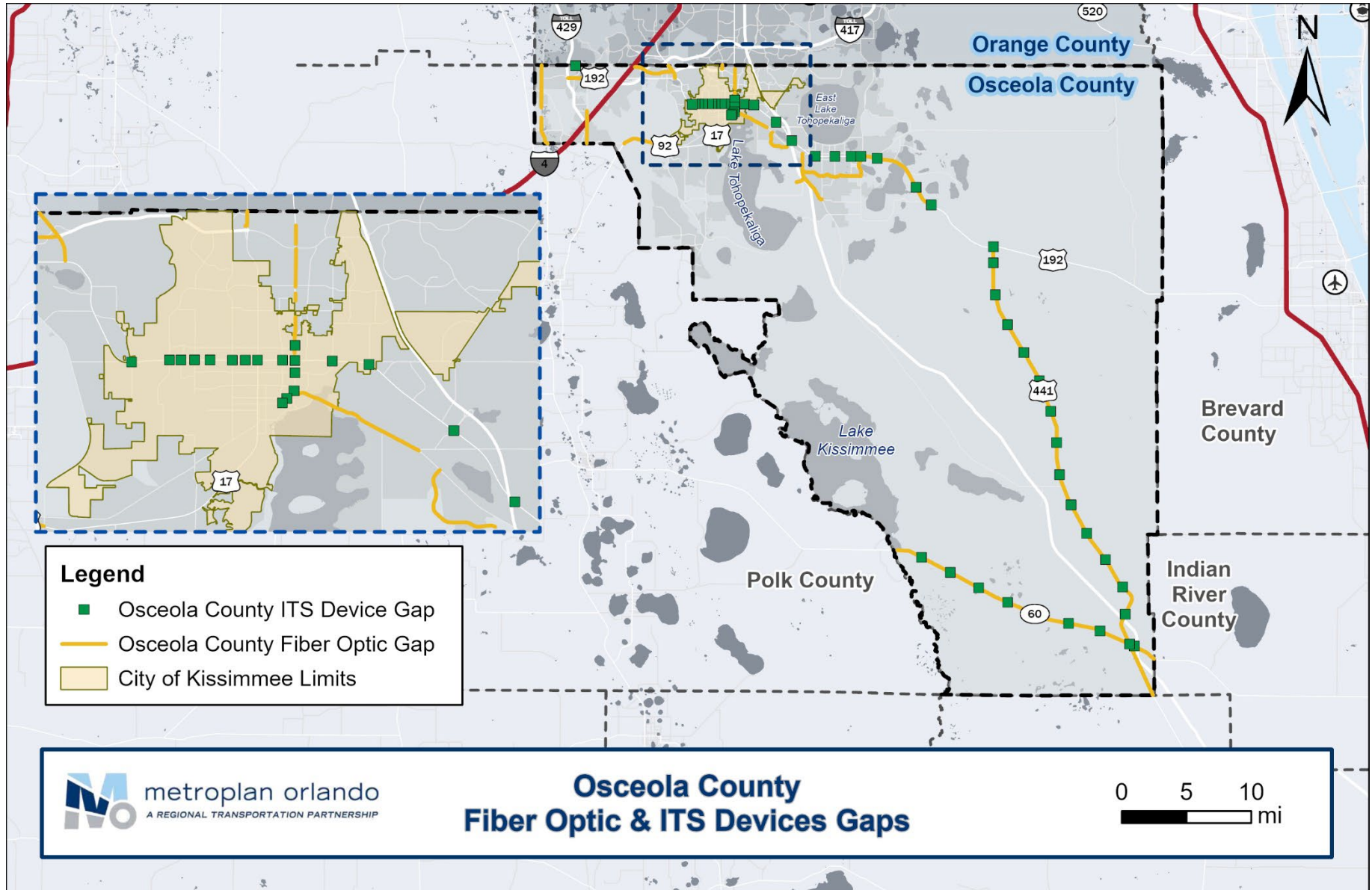
Key information is well-documented to ensure that it is not lost due to personnel transitions or changes in the organization. The County has also established processes and procedures that allow it to retain personnel and ensure turnover is not a major concern. Their team is well-organized and maintains databases of how procedures are carried out. With newer, more advanced technology being implemented regularly, the County understands that the need for more technical knowledge will be important to address internally to avoid additional funding and resources constraints. To ensure County staff is positioned to take on new systems and technology, they leverage new projects as training opportunities for staff.

CULTURE

In Osceola County, TSM&O is currently viewed as the traffic signal system and the ITS devices they operate, and as a means to be aware of transportation network incidents and situations. The concept of transportation management and operations being a more intentional comprehensive program is becoming a greater focus. Consistent with this, the County's traffic signal project manager now provides TSM&O scoping elements for new projects.

Recommended strategies that are a gap and serve as an opportunity for Osceola County are identified in **Table 1-2**.

Figure 4-1: Fiber Optic Network and ITS Device Gaps in Osceola County



5 Seminole County Gap Analysis

5.1 CURRENT STATUS

The gap analysis performed for Seminole County is based on a review and analysis of the agency's current TSM&O resources including the following:

- Seminole County 2040 Transportation Plan (2/23/2018)
- Seminole County Comprehensive Plan – Transportation Element (10/8/2019)
- Seminole County 2045 Transportation Mobility Plan (under development)
- Seminole County Public Works GIS Maps
- 2022 Seminole County Travel Time and Delay Study
- FDOT Regional ITS Architecture

In addition to the resources identified above, an interview was conducted with Seminole County's Traffic Operations and Transportation Management staff. Interview input was considered in the gap analysis and needs assessment and included the following actions:

- Continue educating internal staff on how TSM&O can be leveraged to promote mobility and safety
 - County staff are starting to recognize the levels of operations and management necessary to support TSM&O
 - The County sees value in establishing internal partners to advocate for the outcomes associated with TSM&O
- Establish a budget for technology-based infrastructure
 - Identify separate resource needs for both operation and maintenance
- Identify potential collaborations with neighboring agencies to ensure interoperability and enhance collaboration
- Establish a process for estimating project costs that will be appropriate for future programming (5+ years)
- Streamline project input processes to ensure ITS infrastructure is being considered early in the project development process for implementation and/or upgrades
- Enhance knowledge and practices related to cybersecurity and data sharing
- Move forward with developing event management standard operating guidelines
 - Collaborate with other agencies, departments, and the private sector to minimize the impacts of hosting major events
- Collaborate with other agencies such as FDOT, FTE, CFX, Orange County and LYNX

5.2 DESIRED OUTCOMES

Based on the analysis of the existing conditions and status of Seminole County's TSM&O infrastructure and systems, gaps are identified below:

INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

- **Traffic Signals**
 - Advanced Traffic Controller (ATC)
 - The County currently uses Trafficware (Cubic) ATC controllers and central software (ATMS.now) for traffic signals. According to the County, all 400 signals within the County have ATC controllers and are capable of ATSPM, ASCT, and CV applications. The County has considered trending towards upgrading the current NEMA TS2 cabinets to ATC cabinets for future expandability, beginning with a pilot program of 50 ATC cabinets.
 - Adaptive Traffic Signal Control (ATSC)
 - The County is using both Trafficware's SynchroGreen and Rhythm's InSync systems for ATSC at approximately 62 locations. Expansion of ATSC along major arterials with frequent retiming needs should be considered. This project has been identified in the FDOT RITSA.

- Automated Traffic Signal Performance Measures (ATSPM)
 - Most of the signals within the County currently have ATSPM integrated on the FDOT Central Florida Smart Road platform. As new traffic signal deployments are constructed, the County should continue to equip the intersection with ATSPM capabilities as a best practice when suitable.
- Emergency Vehicle Preemption (EVP)
 - The County currently uses GTT infrared detection and GPS devices for EVP at most of the signalized intersections, with exception of approximately 47 out of 400 traffic signals that do not have EVP. Equipping EVP at all traffic signals should be considered.
- Transit System Priority and/or Freight System Priority
 - The County currently has TSP at 78 traffic signal locations. Further analysis will be performed to determine the transit/freight-focused areas for deployment.
 - Coordination and collaboration with other agencies on the Greater Orlando Signal Priority and Preemption Project will benefit and accelerate TSP/FSP deployment.
- Intersection Movement Counts
 - The County is currently planning projects to allow for the collection of Intersection Movement Counts (IMC) at 111 intersections along the following corridors:
 - HE Thomas Pkwy
 - Howell Br
 - Lk Mary Blvd
 - Red Bug Lk Rd
 - Seminola Blvd
 - SR 436
 - US 17-92
- **Fiber Optic Coverage**
 - The following routes currently do not have or only partially have fiber optic coverage and are identified as candidates to deploy with backbone fiber optic. These locations are depicted in **Figure 5-1**.
 - SR 46 within County Limits
 - SR 434 from W Magnolia St to Tuskawilla Road
 - W Seminole Blvd from I-4 to SR 46
 - SR 46/US 17 from MLK Blvd to S French Avenue
 - SR 427 from US 17 to SR 417/Central Florida Greenway
- **ITS Devices**
 - CCTV Cameras and DMSs are located at targeted locations, and should be considered for future placement at major intersections and interchanges, such as the following which are depicted in **Figure 5-1**:
 - CR 427
 - HE Thomas Pkwy
 - Howell Branch Rd
 - Lake Mary Blvd
 - Montgomery Rd
 - Red Bug Lake Rd
 - Seminola Blvd
 - Tuskawilla Rd
 - Wekiva Springs Rd
 - Wymore Rd
 - SR 434 from Broadway St to Mitchell Hammock Rd
 - Sand Lake Rd from Hickory Dr/Lake Bentley Rd to Lake Brantley High School Driveway
 - Longwood Lake Mary Rd from Lake Mary Blvd to Lake Way Rd
 - Winter Park Dr from Seminola Blvd to Wilshire Dr
 - Bunnell Rd from Bear Lake Rd to Eden Park Rd
 - North St from Palm Springs Dr to Ronald Reagan Blvd

- Palm Springs Dr from S of North St to Central Pkwy
- Orange Ave from SR 434 to Semoran Blvd
- West Town Pkwy from SR 434 to Orange Ave
- St Johns Pkwy from Rinehart Rd to Upsala Rd
- Celery Ave from Sanford Ave to Mellonville Ave
- **Bike/Ped Safety Improvements**
 - TSM&O consideration and treatment should be provided to enhance the overall safety and efficiency for all roadway users, including multimodal opportunities such as the following:
 - Visible/audible pedestrian pushbutton
 - Adjust/optimize signal timing and phasing so that the conflict between bike/ped and vehicles can be minimized
- **Connected and Automated Vehicles (CAV) Technology**
 - Many of the aforementioned system upgrades or infrastructure needs may be achieved through CAV, such as EVP, TSP/FSP, vehicle data collection, and bike/ped safety applications.
 - The County currently has 126 Roadside Units (RSUs) deployed which are used to collect and share Signal Phase and Timing (SPaT) information. Future applications should be developed using the existing infrastructure.
 - Additional corridors that should be considered for C-V2X technologies include the following:
 - CR 427
 - HE Thomas Pkwy
 - Howell Bridge
 - Lake Mary Blvd
 - Red Bug Lake Road
 - Seminola Blvd
 - SR 434
 - SR 436
 - US 17/92
 - SR 434 from Broadway St to Mitchell Hammock Rd
 - Sand Lake Rd from Hickory Dr/Lake Bentley Rd to Lake Brantley High School Driveway

5.2.1 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

Seminole County understands that business processes are fundamental to the success of operations and management activities. It is important to constantly improve their TSM&O planning and project programming processes to better inform decision-making processes. Moving forward with the TSM&O program, the County can standardize development and deployment processes for a more comprehensive system-wide approach that is well-documented.

This can be achieved for planning and project scoping by implementing a process for identifying operations strategies in response to performance measures. Additionally, developing a regional data clearinghouse to support a full range of transportation data for planning and operations will assist with project scoping. Ultimately, advancing performance-based facility design that represents a willingness to be flexible will allow the County to adopt more advanced dynamic applications.

Other potential actions for improvement of business processes may include developing a risk-based approach to maintenance of traffic management systems and developing a financial plan that incorporates capital investments and TSM&O within an integrated budget process. More targeted improvements for traffic management practices may also include integrating real-time data and historical data into analysis and modeling simulations to provide predictive capabilities.

PERFORMANCE MEASUREMENT

Seminole County currently utilizes performance measurement to address real-time traffic conditions. The performance is tracked using monthly dashboards that document metrics like travel time information and index, crashes, road ranger support, and throughput volumes. In order to improve their performance measure practices,

Seminole County could identify desired outcome measures and consistently utilize performance measure analyses to improve strategy deployment and overall operations.

Improvements to performance measurement can be made regarding data acquisition and performance management. This can be achieved through development of a working definition of performance measures that considers both corridor-level and systemwide factors and a full range of performance indicators. Additionally, this could extend to other impacts being measured like sustainability and livability.

COLLABORATION

Seminole County is engaged early and often in regional transportation planning and operations activities, and works with both MetroPlan Orlando and FDOT to achieve project goals. Key takeaways for needs associated with collaboration include improving public awareness, enhancing private sector participation, and identifying best practices for meaningful partner data sharing. This can be achieved by developing a pilot business model that is focused on private-sector partnerships. Additionally, the County can develop guidelines for using tools like social media to fill gaps in existing information delivery.

Recommended strategies that are a gap and serve as an opportunity for Seminole County are identified in **Table 1-1**.

5.2.2 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

Seminole County has a team of proficient professional staff and technicians who support the various aspects of their TSM&O program. In order to achieve continuous improvement among TSM&O staff and maximize other opportunities to collaborate internally, the County should consider ways to enhance staff's professional capacity. Additionally, mechanisms to recruit new staff and expand resources as systems advance should also be integrated into overall organizational strategies.

Seminole County can achieve these goals by identifying detailed training courses for all core functions to address the knowledge, skills, and abilities necessary to perform specific traffic management roles and responsibilities identified as future needs. One short-term way of improving knowledge within the TSM&O staff is to establish a comprehensive plan that includes procedures for sharing all traffic management resources across organizational units.

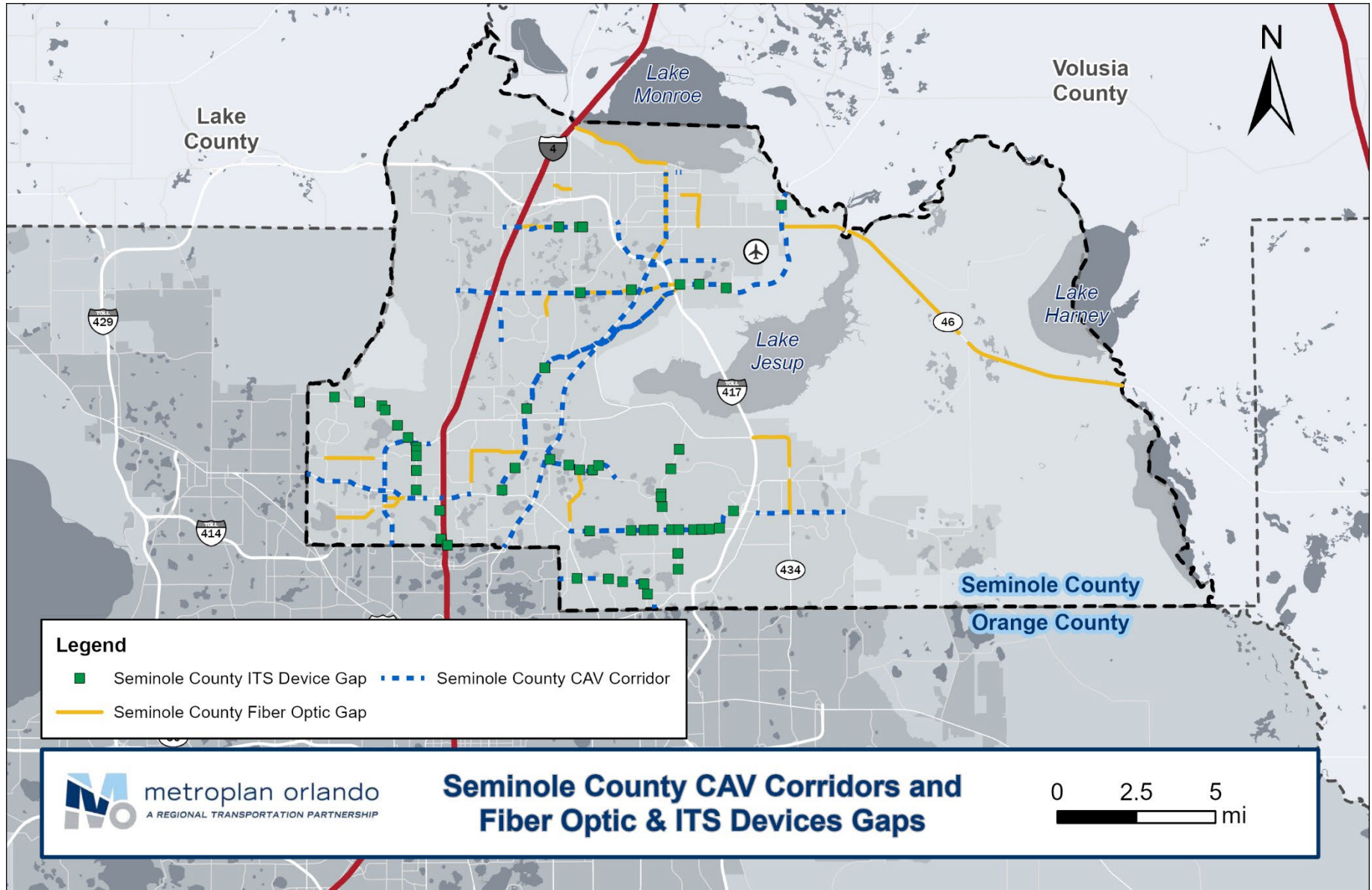
CULTURE

Within Seminole County, the staff and personnel who support the TSM&O program know that it is recognized as valuable and a key role of the agency. Additionally, agency managers and some elected officials lead efforts to promote TSM&O. Moving forward, Seminole County can consider ways to improve outreach, develop a better understanding of leadership's role, and how to best leverage TSM&O champions.

These outcomes can be realized by incorporating a strong customer focus in strategic planning efforts. This will help establish programmatic activities to support the customer focus. Also, a comprehensive outreach program can incorporate a mechanism to share critical performance measures and related messages to target audiences. This can be done through a variety of platforms for overall agency activities related to TSM&O.

Recommended strategies that are a gap and serve as an opportunity for Seminole County are identified in **Table 1-2**.

Figure 5-1: Fiber Optic Network and ITS Device Gaps in Seminole County



6 City of Orlando Gap Analysis

6.1 CURRENT STATUS

The gap analysis performed for the City of Orlando is based on a review and analysis of the agency's current TSM&O resources including the following:

- City of Orlando Growth Management Plan
- MetroPlan Orlando – Prioritized Project List
 - Off-System Construction Assistance/TRIP Projects
- Orange County Transportation Technology Improvements White Paper
- City of Orlando Capital Improvement Plan 2023-2027 Transportation Projects
- Orange County 2030 Long Range Transportation Plan
- FDOT RITSA

Planned City of Orlando TSM&O projects identified in FDOT RITSA include the following:

- ATTAIN Central Florida
 - Comprised of three interrelated programs that connect through an on-going FDOT initiative SunStore: PedSafe, GreenWay and SmartCommunity
- City of Orlando Airport Traveler Information
 - This project would connect the City of Orlando with the Orlando International Airport for the purposes of sharing traveler information. The airport would send estimated arrival times of planes, which could then be posted on DMS on airport approaches.
- City of Orlando ATMS Upgrade
 - This project would connect the City of Orlando to the FDOT SunGuide system. This would allow Orlando to share video with FDOT.
- City of Orlando CCTV Expansion
 - This project would add additional devices to expand the City of Orlando CCTV capability.
- City of Orlando DMS Expansion
 - This project would add additional devices to expand the City of Orlando DMS capability.
- City of Orlando Multimodal CV and Pedestrian Safety Solutions
 - Installation of ATSPM technology at 21 intersections, CV RSU and 13 intersections, CV on-board units (OBU) on 16 bus rapid transit BRT LYMMO transit vehicles, and 17 MSPT intersections for grid timed signals systems that are compatible with CV applications.
- City of Orlando Parking Management
 - This project would create a parking management system for the City of Orlando. The City plans on hiring a private contractor who will provide parking information directly to the public through a smartphone application.
- City of Orlando Travel Time System
 - This project would establish a travel time system in the City of Orlando. The project will integrate this into the regional travel time system.
- FDOT Active Arterial Management System (City of Orlando)
 - Adjust signal timing related to predictable traffic conditions, especially during special events or construction. Traffic information will be provided to drivers via DMS and FL511.
- FDOT D5 Regional Integrated Corridor Management System
 - Select pre-agreed response plans in response to events within the region
- FDOT District 5 I-4 FRAME
 - FRAME is a regional, intercity ICM project running from the Central Business District in Tampa to the southwest side of Orlando at the Florida Turnpike.
- Greater Orlando Signal Priority and Preemption

- Installing TSP and emergency vehicle preemption equipment throughout Orange, Osceola, and Seminole Counties
- GreenWay Program
 - GreenWay is a FDOT project for the East Orlando region to connect Advance Sensor Technology, Conditional TSP, Adaptive Deployment Traffic Signal Interface with Track Positive Train Control (SunRail), Smart Parking technology with Signal Performance Metrics (SPM), ICM, and Signal Control Analytics and Visualization.

In addition to the resources identified above, an interview was conducted with City of Orlando Traffic Engineering Division staff. Key lessons learned provided from the staff during the interview were considered in the gap analysis, which include:

- Better educate internal staff on what TSM&O is and how it can be leveraged to promote mobility and safety
 - Most staff currently view the transportation technology systems within the City as being the traffic signal system
 - It will be important to inform key internal staff of the useful strategies available through deployment of TSM&O infrastructure, such as fiber, CCTV cameras, and traffic controller cabinet upgrades
- Develop a plan for Operations & Maintenance budgeting for technology-based infrastructure in advance of project implementation
- Place primary focus on building out the fiber optic communications network to support future growth and new systems or devices
- Allocate staffing resources to appropriately manage traffic signal timing and active operational management
- Create synergies with neighboring agencies to ensure interoperability and enhance collaboration
- Streamline project input processes to ensure ITS infrastructure is being considered, implemented, and/or upgraded
- Move forward with developing event management standard operating guidelines
 - Collaborate with other agencies, departments, and the private sector to minimize the impacts of the City hosting major events
- Collaborate with other agencies such as FDOT, FTE, CFX, Orange County and LYNX

6.2 DESIRED OUTCOMES

Based on prior research and staff interviews, desired outcomes for the City of Orlando are described below:

6.2.1 INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

The City of Orlando's Transportation Systems Division supports the deployment, operations, and maintenance of the signal system, ITS devices, and communications networks within their network. Traffic signal improvements are facilitated through the City's capital improvements program and are installed or upgraded as needed. Safety and mobility improvements will typically be determined at the intersection-level based on the results of a study or funding to address a known issue. Although ITS deployments or upgrades are typically considered on a case-by-case basis, they may not make it to final plans due to a variety of factors.

The most recent focus of City staff has been a pilot project focused within the downtown core, providing TSP, implementing Roadside Units and within LYNX buses. This project required coordination with LYNX. The City is interested in considering additional opportunities to work with LYNX to develop projects serving the transit network.

Based on the analysis of the existing conditions and status of Orlando's TSM&O infrastructure and systems, the following gaps are identified:

- **Traffic Signals**
 - Advanced Traffic Controller (ATC)
 - The existing traffic signal controllers in the City are Econolite Cobalt series and ASC/3 series. Upgrading to ATC with NEMA TS 2 Standards will be needed to support future Active Arterial Management strategies such as ATSPM, ASCT and CV applications throughout the City.
 - Adaptive Signal Control Technology (ASCT)

- Currently, 58 out of 230 traffic signals operated and maintained by the City are adaptive. Additionally, two corridors are being planned in the future for ATSC application. Expansion of ASCT along major arterials with frequent retiming needs should be considered.
 - Automated Traffic Signal Performance Measures (ATSPM)
 - The City currently does not have any ATSPM implemented. ATSPM should be considered at critical intersections as a suite of performance measures to support traffic signal O&M. Corridors to be considered for ATSPM will be identified during the prioritization process.
 - Emergency Vehicle Preemption (EVP)
 - The City uses Opticom devices for EVP at most of the signalized intersections, with exception of approximately 32 out of 230 traffic signals that do not have EVP. Equipping EVP at all traffic signals should be considered.
 - TSP and/or Freight Signal Priority (FSP)
 - Other than the pilot project described above, the City currently does not have any TSP or FSP implemented. Further analysis will be performed to determine the transit/freight-focused areas for deployment.
 - Special consideration should be applied to the transit corridors identified in the Transit System (2040) and Premium Transit Corridors (2040) maps developed by the City in May 2019.
 - The City is interested in exploring preemption for school buses. Connected vehicle applications should be considered as well.
 - Coordination and collaboration with other agencies on the Greater Orlando Signal Priority and Preemption Project will benefit and accelerate TSP/FSP deployment.
- **Fiber Optic Coverage**
 - The following routes currently do not have or only partially have fiber optic coverage and are identified as candidates to deploy with backbone fiber optic. These locations are depicted in **Figure 6-1**.
 - SR 438/SR 416/Silver Star Road within City limits (Pines Hills Road to N Rio Grand Ave)
 - SR 438/W Smith Street/W Princeton Street from N Rio Grand Ave to N Westmoreland Dr
 - US 441 within City Limits
 - N Tampa Ave from SR 50/Colonial Dr to Orange Center Blvd
 - S Division Street from W Gore Street to W Michigan Street
 - W Michigan street from S Orange Ave to Rio Grand Ave
 - Airport Access Road from SR 417 to Jeff Fuqua Blvd
 - Jeff Fuqua Blvd – Entire corridor
- **ITS Devices**
 - CCTV Cameras, Bluetooth, and Arterial DMSs should be considered for placement at major intersections and interchanges, such as the following which are depicted in **Figure 6-1**:
 - SR 438/SR 416/ Silver Star Road within City limits (Pines Hills Road to N Rio Grand Ave)
 - SR 438/W Smith Street/W Princeton Street from N Rio Grand Ave to N Westmoreland Dr
 - US 441 within City Limits
 - N Tampa Ave from SR 50/Colonial Dr to Orange Center Blvd
 - S Division Street from W Gore Street to W Michigan Street
 - W Michigan street from S Orange Ave to Rio Grand Ave
 - Airport Access Road from SR 417 to Jeff Fuqua Blvd
 - Jeff Fuqua Blvd – Entire corridor
- **Bike/Ped Safety Improvements**
 - TSM&O consideration and treatment should be provided to enhance the overall safety and efficiency for all roadway users, including multimodal opportunities such as the following:
 - Passive Pedestrian/Bicycle Detection
 - Lead Pedestrian Intervals
 - Bicycle Signals
- **Connected and Automated Vehicles (CAV) Technology**

- Many of the aforementioned system upgrades or infrastructure needs may be achieved through CAV, such as EVP, TSP/FSP, vehicle data collection, and bike/ped safety applications.
- The City is working with a TAPS-LA grant on a pilot program deploying CV technology.

Operations and maintenance resources are challenged and allocated as requested, however staff are capable of keeping up with the current system. City staff leverage current resources to optimize the efficiency of the signal system, although there are concerns about meeting the staff needs associated with incorporating new devices or systems.

6.2.2 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

The City of Orlando is in the process of establishing more business processes that will allow them to execute all project phases to address traffic management needs. This assessment considers the use of the appropriate processes for design and implementation of systems to ensure that the needs of the City are appropriately addressed. The deployment of traffic signal system and ITS projects within the City are planned at an intersection level, with some projects addressing corridor-wide issues. The City is interested in adopting new technologies and, with the proper operations and maintenance resources, could adopt new systems and enhance their transportation management capabilities.

Project funding for the City's transportation improvements is included in MetroPlan Orlando's MTP. Projects incorporating ITS components like FOC and CCTV cameras are typically included with other project types. Currently, the City is focused on building out their fiber optic cable network. The City has over 50 transportation projects budgeted over the next 5 years, although there are not many targeted ITS improvements programmed. Therefore, capitalizing on opportunities made by collaborating internally will be critical.

Additionally, by identifying a more robust budgeting process, the City will be able to more clearly articulate the needs that support TSM&O strategies. Early adoption of project concepts can start at the planning level and include all project phases, including operations and maintenance. This can be accomplished by determining short term, local needs (capital, maintenance, and staffing) by budget categories and timeframes.

PERFORMANCE MEASUREMENT

The City of Orlando has the desire to conduct more targeted performance measurement and recognizes that performance measurement is essential in determining transportation systems effectiveness. The goal would be to determine how changes are affecting performance and guiding decision-making. Additionally, the City is interested in utilizing dashboards for real-time monitoring and helping other staff understand the value of TSM&O strategies. In order to establish a performance management program to support TSM&O goals, the City could begin by identifying operational activities to be monitored. The City could develop an initial strategy for performance measures that uses existing and available data. Additionally, the City could utilize existing goals that are monitored at a regional level to establish a baseline for performance.

COLLABORATION

The City of Orlando is involved in the various TSM&O planning activities facilitated through MetroPlan Orlando and FDOT. The City operates within Orange County which requires regular cross-jurisdictional traffic management activities. These activities included master planning activities, operational procedures, and signal timing coordination. The City would like to collaborate more frequently with other stakeholders in the region including hearing feedback regarding the City's current situation. By establishing relationship with the stakeholder agencies, the City can begin identifying operational efficiencies. The City can also begin to identify mutual objectives with its operational stakeholders and share key challenges currently observed with respect to transportation management.

Recommended strategies that are a gap and serve as an opportunity for the City of Orlando are identified in **Table 1-1**.

6.2.3 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

Currently the City of Orlando has the capabilities to support the system development, design, and deployment for the projects that they are required to oversee. Overall, the agency's staff is familiar with their existing signal system and the deployed ITS components. The City contracts with outside resources for additional support when necessary. However, some additional training and resources will need to be identified as systems advance. Maintenance staff will have to adapt their skills and knowledge to work on new devices. Therefore, the City is interested in identifying training resources that are readily available or provided to public agencies. Other options for new training include leveraging construction contracts that incorporate signal system components and ITS equipment by requiring training for any devices or systems.

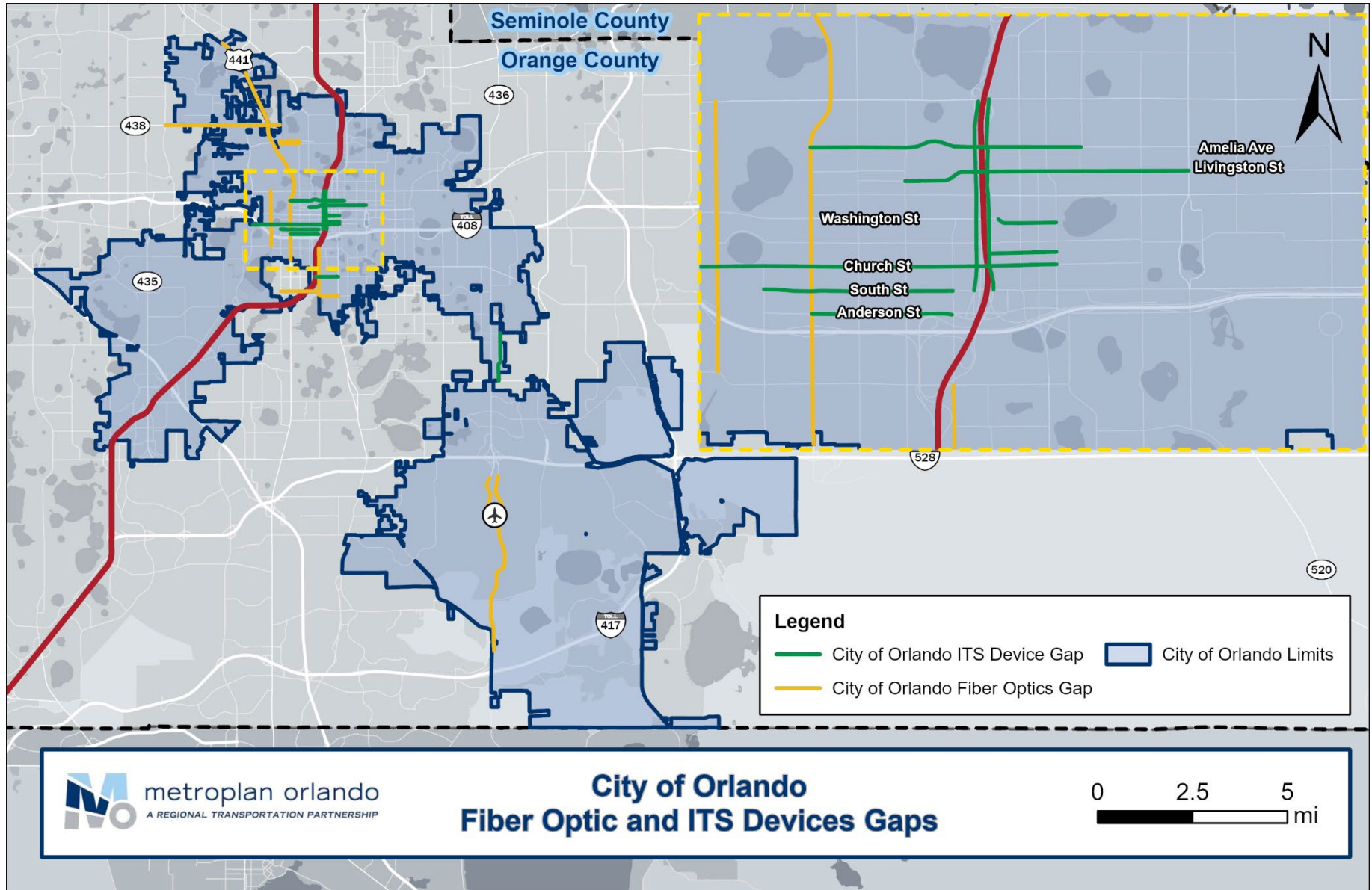
The City would like to expand operational capabilities building on their real-time response to congestion from both planned and unplanned events. Additional opportunities to plan for major events would benefit the City's resources planning for real-time monitoring and response. Ultimately, the City would like to focus on how to make their employees jobs easier so they can take on needed initiatives and expand capabilities.

CULTURE

Within the City of Orlando, there is the ability to better inform internal staff about the Transportations Systems division and its ability to be a resource for them to help address key concerns of the City. By informing staff of the capabilities of transportation technology, the City can collaborate more closely. By expanding their influence, the transportation department will have the ability to provide greater value to projects.

Recommended strategies that are a gap and serve as an opportunity for the City of Orlando are identified in **Table 1-2**.

Figure 6-1: Fiber Optic Network and ITS Device Gaps in City of Orlando



7 Florida Department of Transportation – Florida’s Turnpike Enterprise Gap Analysis

7.1 CURRENT STATUS

The gap analysis performed for Florida’s Turnpike Enterprise (FTE) is based on a review and analysis of applicable TSM&O resources including the following:

- FDOT Statewide TSM&O Strategic Plan (2017)
- Florida's Turnpike Enterprise TSM&O Strategic Plan (2019)
- Florida's Turnpike Enterprise Performance Dashboard (December 2022)
- FTE 5-Year Adopted Work Program (2023-2028)
- FDOT Regional ITS Architecture – Florida’s Turnpike Enterprise

In addition to the resources identified above, an interview was conducted with FTE TSM&O staff. Interview input was considered in the gap analysis and needs assessment and included the following actions:

- Implement targeted maintenance budget planning efforts that consider ITS and other resources to support TSM&O strategies
- Educate external partners on the FTE project delivery process as it relates to potential collaborative opportunities
- Refine practices to ensure that TSM&O feedback is incorporated into the Project Development and Environment (PD&E) phase
- Incorporate ITS device deployment into push-button project program
- Identify opportunities to optimize collaborative operations
- Institute interoperable systems and management software to ensure seamless integration and end-user experience
- Continue to identify and implement traffic management strategies in coordination with other agencies such as Orange County, Osceola County, and Seminole County

7.2 DESIRED OUTCOMES

Through this TSM&O Master Planning effort, the following focus areas were reviewed to identify potential process and implementation improvements.

INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

Based on the analysis of the existing conditions and status of the FTE TSM&O infrastructure and systems, gaps related to systems and infrastructure are identified below. These gaps will assist FTE in ensuring their systems and technology are properly considered in the project development process. This includes ITS device lifecycle planning for the purposes of O&M budgeting. FTE has an adopted work program that considers the next 5 years of projects to be implemented by the agency. For the purposes of this TSM&O Master Plan, needs assessment projects related to traffic operations, ITS, and other TSM&O related improvements were identified within the 5-Year Work Program. These will be considered potential opportunities to collaborate with other agencies to identify any infrastructure necessary to facilitate improved operations at exit and entrance points along Florida’s Turnpike.

7.2.1 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

There is opportunity to advance FTE's business processes by focusing on programming, budgeting, and other project development details. This can be achieved by creating a standardized process for TSM&O project input and documenting methods for collaboration. Additionally, by identifying and adapting procurement procedures to be suitable for various TSM&O strategy deployments, FTE can accelerate advanced transportation technology deployments.

PERFORMANCE MEASUREMENT

FTE has established processes for reporting, measuring, and managing performance throughout their managed facilities. Primary reporting currently relates to the needs of the Turnpike's reliability and tolling system. Moving forward, FTE should consider how they can identify and begin policy accountability and reporting for systems operational performance. FTE could also benefit from developing public outreach campaigns that better help their travelers understand the performance of their facility and how FTE is continuously improving operations. In order to demonstrate the TSM&O program's value within FTE, the agency can develop formal data and performance management processes. This will allow the agency to utilize performance reports to measure the effectiveness of TSM&O strategies they implement.

COLLABORATION

FTE's opportunities for collaboration are more limited due to their facilities being limited access tollways. However, they understand the role they play within the MetroPlan Orlando regional transportation network and are dedicated to participating in the various coordination efforts in the region. FTE will continue to explore opportunities to execute formal agreements with local agencies to support enhanced operations within the transportation network. This can be achieved by developing collaborative interagency agreements that adapt to the various roles and responsibilities taken on by partner agencies. FTE can also look to continue growing their partnerships with the private sector by outsourcing new initiatives based on business models that support the role, costs, and benefits associated with these partnerships.

Recommended strategies that are a gap and serve as an opportunity for FTE are identified in **Table 1-1**.

7.2.2 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

The FTE TSM&O section operates with a lean staff of in-house personnel who are responsible for managing the various contracts and projects that support the development of FTE's TSM&O program. This includes staffing for the operations and maintenance activities associated with ITS network and devices. Therefore, a focus among TSM&O staff at FTE could be centered on ensuring their leadership and core staff have an understanding of the value that TSM&O provides and the resources needed to continue the program's success.

CULTURE

FTE's TSM&O program is supported by consultant resources, so the culture among FTE staff is shared with the private sector staff. Needs associated with advancing the program culture will be tied to providing an environment where both employees and consultant staff know how to collectively promote the successes of TSM&O. This can be achieved by establishing a vision of the TSM&O program at full implementation based on the current and future state of the practice.

Recommended strategies that are a gap and serve as an opportunity for FTE are identified in **Table 1-2**.

8 LYNX Gap Analysis

8.1 CURRENT STATUS

The gap analysis performed for LYNX is based on a review and analysis of the agency's current TSM&O and ITS resources as defined in the following:

- LYNX 2022 ITS Strategic Plan Update (April 2022)
- Seminole County Comprehensive Plan – Transportation Element (10/8/2019)
- Orange County Transportation Technology Improvements White Paper
- Orange County Transportation Projects
- Orange County 2030 Long Range Transportation Plan
- Osceola County Comprehensive Plan 2040
- FDOT Regional ITS Architecture – LYNX D5 Workbook (2019)
- City of Orlando Capital Improvement Plan 2023-2027 Transportation Projects

In addition to the resources identified above, an interview was conducted with LYNX Program Administration staff. Input provided during the interview was considered in the gap analysis and needs assessment and includes the following actions:

- Identify dedicate funding sources for ITS to support transit performance goals
 - These funding sources will also have to consider operations and maintenance funding
- Continue to prioritize the best service for customers by creating more ways to share real-time information related to trip planning
- Identify ways to prioritize upgrades and improvements to the following systems or processes:
 - Fare payment systems/mobile applications
 - Real-time passenger information
 - Preliminary integration with SunRail
 - Fleet electrification
 - Employee education programs
 - Computer-Aided Dispatch upgrades/integration to new systems
 - Continued deployment of Transit Signal Priority based on performance
- Explore opportunities to incorporate automated braking and collision avoidance systems for transit vehicles
- Leverage the agency's Innovation Group to evaluate new systems to determine how they can assist in achieving agency goals
- Identify ways to integrate new software more rapidly
- Collaborate with other agencies such as FDOT, FTE, CFX, City of Orlando and other Cities, Osceola County, Orange County, and Seminole County

8.2 DESIRED OUTCOMES

Based on the analysis of the existing conditions and status of LYNX's ITS and TSM&O infrastructure, gaps are identified below:

8.2.1 INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

The eligible transportation network where transit needs will be identified for project prioritization is shown in **Figure 8-1**. This network is based on current transit routes that are operating along roadways, or through intersections, that have been identified in the gap analysis performed for each County within the MetroPlan Orlando region. Infrastructure and system upgrades needed to implement TSM&O strategies are identified below:

- **Traffic Signals**
 - Transit Signal Priority
 - Continue to identify opportunities to implement active TSP at more locations

- Coordination with the signal maintaining agencies and FDOT will be required
 - LYNX buses are all equipped with TSP transponders
 - Queue Jump
 - **ITS Devices**
 - Leverage needs to deploy more CCTV cameras for security purposes.
 - These devices can all provide situational awareness at bus stops to better understand how activity at stops may impact performance
 - **Bike/Ped Safety Improvements**
 - TSM&O consideration and treatment should be provided to enhance the overall safety and efficiency at bus stop locations and multimodal hub opportunities such as the following:
 - Visible/audible pedestrian pushbutton
 - LiDAR based collision avoidance systems
 - **CAV Technology**
 - Many of the aforementioned system upgrades or infrastructure needs may be achieved through CAV, such as TSP, vehicle data collection, mobile applications, and bike/ped safety applications
 - Pursue Global Positioning System (GPS) Data Integration
 - **Transit Infrastructure and Technology**
 - Define systems to support and optimize:
 - Connections and transfers to SunRail
 - LYMMO – Bus Rapid Transit (BRT) operations
 - Predictive Traveler Information
 - Transit Traveler Information

8.2.2 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

In order for LYNX to improve its business practices regarding the deployment of ITS and implementation of TSM&O, business planning efforts should incorporate these technologies and strategies. The agency’s planning and program budgeting process for these deployments could benefit from certain action items. By identifying agency operational objectives and other related priorities, LYNX can streamline implementation of standard TSM&O strategies along key corridors. Additionally, the agency would benefit from identifying internal and external processes needed to implement operational concepts.

PERFORMANCE MEASUREMENT

LYNX has various data sources and meaningful metrics that are currently used to help inform their decisions related to route management and service needs. By utilizing these data sources and performance measures in new ways, they will be able to identify ways to leverage this data for targeted transit technology deployments. This can be achieved by establishing or refining their data acquisition plan, clearly defining the measures that are tracked and used for planning, and performing regular assessments to ensure performance measures are being leveraged for the purposes of prioritizing technology solutions.

COLLABORATION


LYNX is familiar with the outcomes provided to them by collaborating with their partners. By serving three separate county agencies within the region, collaboration is critical to advance new technologies. In certain cases, this collaboration is not only aspirational, but is often necessary. In order to refine their current collaborative partnerships, LYNX should consider how they can establish additional targeted formal interagency agreements for a cooperative approach to deploy new technology.

Recommended strategies that are a gap and serve as an opportunity for LYNX are identified in **Table 1-1**.

8.2.3 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

The staff involved with the deployment of transit supportive technologies is limited within the LYNX organization. While many staff members understand the concepts and benefits that are provided by TSM&O strategies, they often



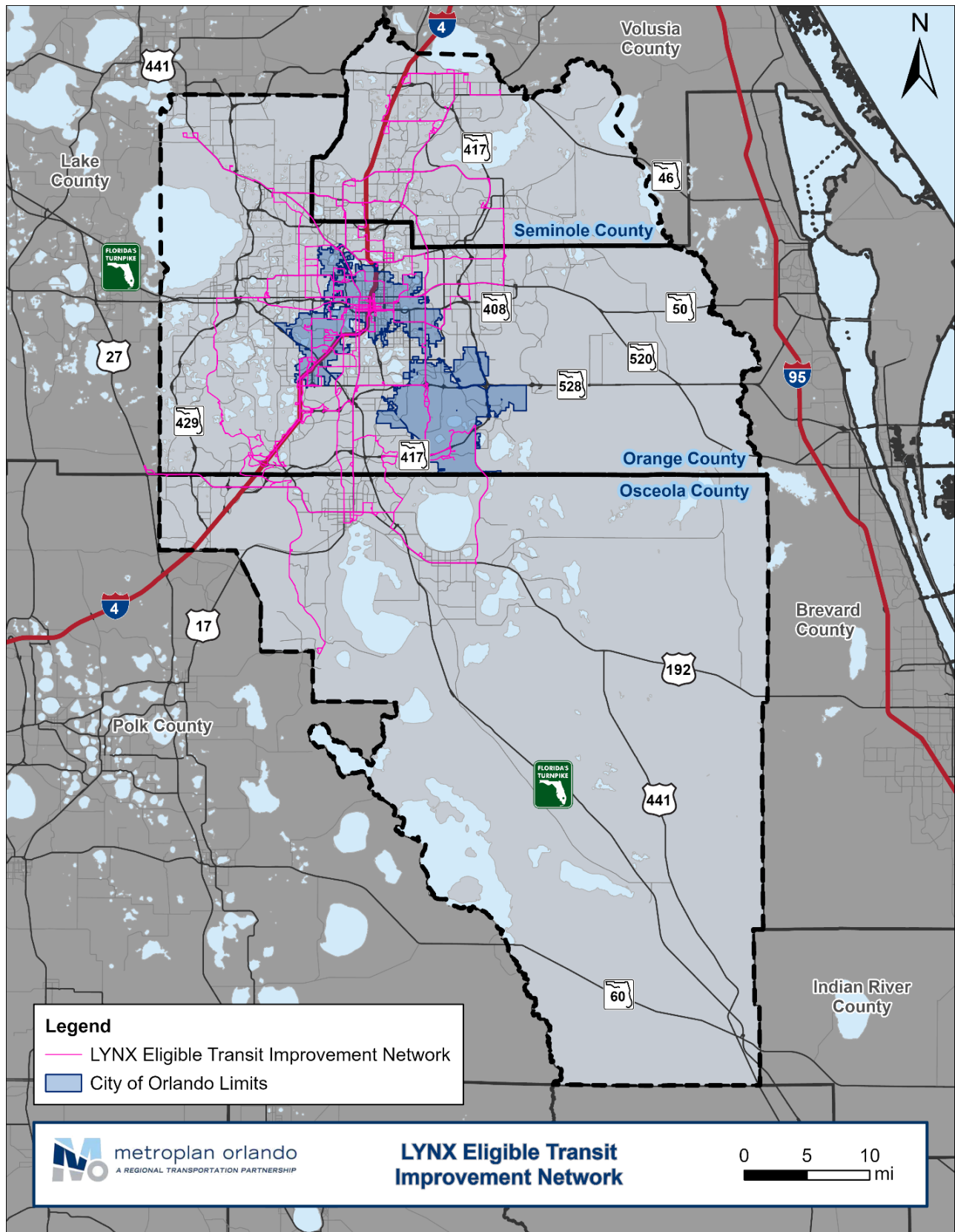
do not realize the requirements to establish new technology. Staff with limited knowledge of these processes will benefit from learning more about these efforts and gain a better understanding of the organizational structure and how interactions with other agencies play a large role in the successful deployment of these technologies.

CULTURE

The ability to impact culture within LYNX will be based on the agency’s staff and their ability to provide technical understanding to others within the organization. Other opportunities to champion related efforts can be leveraged to show cross-discipline coordination.

Recommended strategies that are a gap and serve as an opportunity for LYNX are identified in **Table 1-2**.

Figure 8-1: LYNX Eligible Transit Improvement Network in MetroPlan Orlando Region



9 Central Florida Expressway Gap Analysis

9.1 CURRENT STATUS

The gap analysis performed for the Central Florida Expressway Authority (CFX) is based on a review and analysis of the agency's current TSM&O resources including the following:

- CFX ITS Master Plan (2022)
- Florida's Turnpike Enterprise TSM&O Strategic Plan (2019)
- Florida's Turnpike Enterprise Performance Dashboard (December 2022)
- CFX 5-Year Adopted Work Program (2023-2027)
- Regional ITS Architecture – CFX

In addition to the resources identified above, an interview was conducted with CFX TSM&O staff. Interview input was considered in the gap analysis and needs assessment and included the following actions:

- Educate internal staff on the principles behind TSM&O strategies and how ITS devices are a tool to support the larger TSM&O strategies
- Streamline project delivery by integrating more ITS devices to support TSM&O strategies within the traditional project planning process
- Identify opportunities to optimize collaborative operations at interchanges and access points to promote safety or all travelers
 - Educate external partners on the CFX project delivery process as it relates to potential collaborative opportunities
- Promote the use and successes of TSM&O as it relates to the CFX network to the general public
- Improve and update budgeting processes to consider new technology and deployments that require additional O&M budgeting
- Continue to identify and implement traffic management strategies in coordination with other agencies such as Orange County, Osceola County, and Seminole County

9.2 DESIRED OUTCOMES

As a result of this TSM&O Master Planning effort, the following focus areas were reviewed to identify potential process and implementation improvements.

INFRASTRUCTURE & SYSTEMS GAP ANALYSIS

This section identifies TSM&O infrastructure and systems gaps based on the analysis of the existing conditions and status of CFX's TSM&O network. In addition to the considerations being made for ITS capital improvements, a focus on device lifecycle planning for the purposes of O&M budgeting can be emphasized. The CFX adopted work program includes the next 5 years of projects to be implemented by the agency. Transportation technology projects, system expansion, and interchange projects identified within the work program will be considered opportunities for TSM&O. These are potential opportunities to collaborate with other agencies to identify any potential infrastructure needs.


9.2.1 STRATEGIES & OPERATIONS GAP ANALYSIS

BUSINESS PROCESSES

By focusing on project programming that considers O&M budgeting for TSM&O to be integrated into the project delivery process, CFX can institute refined business practices. This can be achieved by creating a standardized process for TSM&O project input and documenting methods for collaboration. Additionally, by identifying and adapting procurement procedures to be suitable for various TSM&O strategy deployments, CFX can accelerate advanced transportation technology deployments.

PERFORMANCE MEASUREMENT

Performance measurement and reporting is integral to the CFX business process, and it allows the agency to understand the needs of travelers using their facilities. However, much of the data that is collected and reported is used to better inform capital project delivery and system expansion. With this foundation of performance



measurement tools and processes defined, CFX can leverage this to expand their performance measurement. By expanding these practices to collect and manage data, they can better understand the traveler's complete trip and how to maximize the value of interchanges and access points to their facilities.

COLLABORATION

CFX is aware of the opportunities that can be leveraged for their agency and the traveling public through a focus on improved collaboration with neighboring agencies. This can be achieved by undertaking collaborative planning and budgeting activities for priority improvements to ensure projects are planned for at the proper time. Additionally, by executing interagency agreements that support real-time TSM&O operational activities that consider the objectives of all parties, agencies involved are able to commit to performance-based improvements on a regular basis.

Recommended strategies that are a gap and serve as an opportunity for CFX are identified in **Table 1-1**.

9.2.2 AGENCY & ORGANIZATIONAL GAP ANALYSIS

ORGANIZATION/WORKFORCE

The CFX TSM&O section operates with limited in-house personnel. They are responsible for managing the various contracts and projects that support the development of the CFX TSM&O program. Operations and maintenance activities associated with their ITS network and devices are typically outsourced to consultants and contractors. Moving forward, CFX can consider ways to optimize the services and needs they outsource by entering into multi-party agreements that serve their needs as well as those of other agencies that manage and operate transportation network connections to CFX. Additionally, CFX can continue to ensure their executive management and core staff understand the value that TSM&O provides.

CULTURE

The needs associated with advancing the TSM&O program culture within CFX will be established by continuing to educate internal staff involved with general project delivery on how and when to consider TSM&O as a solution. This can be achieved by providing an environment where employees know how to promote the successes of TSM&O, while also being cognizant of its limitations. CFX's TSM&O program is also heavily supported by the private sector. CFX can leverage these resources and connections to advance the internal culture toward deeper understanding of the uses and successes of TSM&O.

Recommended strategies that are a gap and serve as an opportunity for CFX are identified in **Table 1-2**.



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