MetroPlan Orlando CAV Readiness Study

Task 2 Memorandum - Final

Evaluation of Local Existing Capabilities

November 28, 2019 (Updated)

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1 Introduction

This technical memorandum provides a review of existing connected vehicle (CV) and automated vehicle (AV) infrastructure and practices in the Central Florida area, with a special focus on building an inventory of existing connected and automated vehicle (CAV) efforts and projects within Orange, Seminole, and Osceola counties. The memorandum contains the following sections:

- Section 2 identifies CV-enabling roadway infrastructure
- Section 3 identifies staffing proficiency at each of the interviewed agencies
- Section 4 identifies system and network capabilities
- Section 5 identifies potential locations for CAV testing within the MetroPlan Orlando area
- Section 6 identifies agency-wide training plans for CAV awareness
- Section 7 identifies potential equity challenges in CAV testing and implementation
- Section 8 concludes the document and presents next steps

A list of the interviewed maintaining jurisdictions is identified in **Table 1** – interviews were conducted either via phone or in person.

Table 1 – Maintaining Jurisdictions Interviewed

Jurisdiction/Agency	Primary Contact	
Orange County	Hazem El-Assar	Chief Engineer
City of Apopka	Pamela Richmond	Senior Planner
City of Maitland	Alyssa Eide	Public Works Director
City of Orlando	Benton Bonney	Transportation Systems Manager
City of Winter Garden	Jon Williams	Assistant City Manager, Public Services
City of Winter Park	Don Marcotte	Assistant Director, Public Works
Seminole County	Frank Consoli	Deputy Public Works Director
City of Altamonte Springs	Brett Blackadar	Director of Growth Management
City of Casselberry	Chris Bowley	Community Development Director
City of Lake Mary	Krystal Clem	City Planner
City of Longwood	Shad Smith	City Engineer
City of Oviedo	Anoch Whitfield	Public Works Director
City of Sanford	Michael Cash	Planning Engineer
City of Winter Springs	Bryant Smith	City Engineer
Osceola County	Tawny Olore	Transportation & Transit Executive Director
City of Kissimmee	Nabil Mulhaisen	Traffic & Projects Engineer
City of St. Cloud	Kevin Felbringer	Engineering Manager
FDOT District Five (D5)	Jeremy Dilmore	District TSM&O Engineer
Greater Orlando Aviation Authority (GOAA)	Brad Friel	Transportation Planning Manager
Central Florida Expressway Authority (CFX)	Bryan Homayouni	Manager of Traffic Operations
Florida's Turnpike Enterprise (FTE)	John Easterling	District Traffic Operations Engineer
Central Florida Regional Transportation Authority (LYNX)	Doug Jamison	Senior ITS Developer
Reedy Creek Improvement District (RCID)	Lee Pulham	Planner

2 Roadway Infrastructure

This section identifies existing technology and roadway infrastructure within each of the three counties – Orange, Seminole, and Osceola counties – in terms of readiness for CAV. The analysis considers deployed roadway infrastructure, ITS devices, and planned ITS/CV deployments, and concludes with a high-level discussion regarding what modifications would improve the CAV-readiness of the MetroPlan Orlando planning area.

2.1 Roadway Infrastructure

There is a wide variety of development across the region in terms of roadway infrastructure to accommodate CAVs. By far, the majority of agencies are taking a measured approach to CAV infrastructure, due to the rapid (and sometimes unpredictable) evolution of devices and technologies. Most are focusing on infrastructure improvements that serve dual purposes - not just readiness for CAV, but for immediate needs such as roadway safety deployments (wrong way detection, curve warning systems, etc.) and improvements in operational capacity and monitoring (CCTV, Bluetooth readers, etc.).

In general, the larger agencies in the MetroPlan Orlando planning area (FDOT D5, LYNX, CFX, FTE, Orange, Seminole, and Osceola Counties, and the City of Orlando) have more advanced and robust levels of investment in roadway infrastructure with deployed ITS and CAV-ready devices, and many continue to maintain signals on behalf of their local jurisdictions.

To prepare for AV implementation on roadways, the majority of agencies indicated their pavement markings should be more than suitable for AV deployments in terms of lane control and automated steering, due to FDOT design guidelines being comprehensive and state-of-the-practice. However, several agencies indicated the need for improved maintenance programs to keep pavement markings in a well-maintained state.

Agency-specific initiatives are summarized below:

- **FDOT D5** is very well positioned in leading the region towards CAV. FDOT D5 is taking on the bulk of the costs for technical overhead, data management/storage, and pilot projects to allow local jurisdictions to focus on maintaining existing systems. FDOT D5 is working to ensure interoperability between CAV devices, security standards, and safety. FDOT D5 is providing equipment and working with local agencies to upgrade equipment to allow for CAV, such as advanced transportation controllers (ATCs). FDOT D5 has recently transitioned to a new traffic management center (TMC), which has additional functionality and systems which it believes will better position it for future CAV operations and data management.
- **CFX** is well prepared to accommodate CAV technologies in terms of fiber-optic network capacity and redundancy, with backbone fiber cable located along each side of their facilities. CFX has an extensive deployment of ITS devices including vehicle detection, Closed Circuit TV (CCTV) cameras, dynamic message signs (DMS), and digital cellular service (DCS) antennas. CFX maintains some of the interchange traffic signals and has a mixture of equipment based on the adjacent agencies' preference.
- **LYNX** does not deploy traffic signal equipment, but has enabled their buses with Opticom 2101 TSP equipment using 4G communications in the field. LYNX does not use DSRC or 5G communications. LYNX also plans to use SPaT information at stops along LYMMO (Bus Rapid Transit) routes, potentially in partnership with AV transit vehicles. LYNX is also planning to define a roadway "ecosystem" certification that reviews land use, roadway design, signaling, etc. to identify roadway segments that are "ready for CAV."

- **Orange County** is in the process of moving from Siemens traffic signal controllers to Intelight traffic signal controllers, which have the capability to broadcast CV-ready J2735 formatted signal phase and timing (SPaT) messages directly from the controller. And as a result of the County's actions, many partner agencies are also considering a change (CFX, local jurisdictions, etc.). CV roadside devices are planned for deployment in Orange County in the coming year as part of a FDOT D5 pilot project. The County has numerous ITS devices deployed including CCTV cameras, Bluetooth/Wi-Fi readers, passive pedestrian detection, and microwave vehicle detection systems (MVDS). The County also has a TMC and advanced traffic management system (ATMS) for both Siemens (TACTICS) and Intelight (MaxView). The County has also deployed adaptive signal system operation on numerous roadways.
    - The **City of Apopka** uses Siemens traffic signal controllers and maintains their signals in-house. They have limited ITS facilities within the City.
    - The **City of Winter Garden** uses Siemens traffic signal controllers, which are maintained by Control Specialists. They have limited ITS facilities within the City.
    - The **City of Maitland** uses Siemens traffic signal controllers, maintained by Control Specialists. Within the City, there is some fiber-optic and wireless communications infrastructure. There are Bluetooth readers and MVDS deployed within the City along the state road corridors.
    - The **City of Winter Park** uses Siemens traffic signal controllers and maintains their signals in-house. They are moving towards adding fiber-optic connections to all of their signals. FDOT D5 is working with the City on the SR 426 adaptive signal system from Phelps Avenue to Balfour Drive as an extension of an Orange County adaptive system to the east.
- The **City of Orlando** has a mixture of Trafficware controllers including ATCs. The City has a TMC and Trafficware ATMS platform. The City has purchased the CV module for the ATMS platform which allows for the transmission of traffic signal data from the central system. The City has numerous ITS devices deployed including CCTV cameras, Bluetooth/Wi-Fi readers, intersection movement count (IMC), and microwave vehicle detection systems (MVDS).
- **Seminole County** recently transitioned all of their traffic signal controllers to ATCs and uses the Trafficware ATMS platform. Seminole County uses CCTV cameras, Bluetooth/Wi-Fi readers, and adaptive signal control across the county. As part of the SR 434 CV pilot project with FDOT D5, Seminole County will deploy roadside units (RSU) with Dedicated Short Range Communications (DSRC) at six intersections. Seminole County is also working on centralized CV applications and is planning to deploy additional BlueToad combination BlueTooth/DSRC radios within the county.
    - The **City of Altamonte Springs**' traffic signals are maintained by Seminole County. The City has remote read-only access to the County's ATMS platform and CCTV cameras. The City is working with the County to deploy additional equipment as new signals are installed or rebuilt.
    - The **City of Longwood** and the **City of Winter Springs** traffic signals are maintained by Seminole County. The **City of Winter Springs** has remote read-only access to the County's ATMS platform and CCTV cameras, and the **City of Longwood** is working to setup similar access.
    - The **City of Casselberry's**, **City of Lake Mary's**, **City of Oviedo's**, and **City of Sanford's** traffic signals are maintained by Seminole County.
- **Osceola County** uses Econolite traffic signal controllers and is currently working to deploy real-time data collection using video detection at signalized intersections. The Osceola County TMC uses Econolite's Centracs ATMS platform, and uses CCTV cameras and Bluetooth/Wi-Fi readers to monitor traffic.

  - The **City of Kissimmee's** and **City of St. Cloud's** traffic signals will be maintained by Osceola County as the agencies transition responsibility over the coming months.
- **RCID** uses Siemens traffic signal controllers, video detection, dynamic message signs (DMS), Blincsy travel time readers, and is looking to upgrade all of their controllers from Siemens M50 to M60 so RCID can output SPaT data (13 of their intersections already have the M60 controllers). RCID is looking to add Blincsy DSRC at each of their intersections.
- **GOAA** has ten signalized intersections, all of which are maintained by the City of Orlando. They have CCTV cameras on a closed system and their signal controllers are not connected to an ATMS platform for security reasons.
- **FTE** does not have signalized intersections as part of their system. They have extensive ITS deployments including CCTV cameras, MVDS, tolling systems, and dynamic message signs. FTE has two TMCs: one in Orlando and one in Pompano Beach.

2.2 Planned ITS/CV Deployments

Several agencies in the MetroPlan Orlando region have begun or are planning ITS/CV deployments in the next few years, and many are preparing for future deployments by upgrading their existing roadway, system, or network infrastructure. Agency-specific initiatives related to CAV deployments are summarized below:

- **FDOT D5** and **Seminole County** are participating in the **SR 434 CV Pilot**, which uses DSRC RSUs to broadcast SPaT data, and will include Transit Signal Priority (TSP) and Emergency Vehicle Preemption (EVP) applications along the corridor.
- **LYNX** has several planned ITS/CAV deployments - most notably, a planned one-year AV Concept of Operations study in partnership with the City of Orlando and MetroPlan Orlando that will examine incorporating AV into transit service, particularly on their LYMMO (Bus Rapid Transit) service.
- **Seminole County** is looking to install BlueToad combination Bluetooth/DSRC RSUs along Lake Mary Boulevard.
- **FDOT D5** and **Orange County** are participating in the **PedSafe/Greenway CV Pilot Project** at the University of Central Florida and along SR 50. This project will deploy 33 RSUs to provide SPaT, TSP, EVP and pedestrian/bicycle collision avoidance applications utilizing CV technologies. This project will also work to upgrade equipment at signalized intersections in Volusia, Brevard, Orange, Seminole, and Osceola Counties so that they are CV ready.
- The **City of Orlando** is planning to deploy one to two RSUs as part of a Beep AV shuttle deployment.
- **FTE** is planning a CV pilot in South Florida to test both on-board units (OBUs) and RSUs.
- **RCID** is planning to install Blincsy DSRC at each of their intersections.
- The **City of Altamonte Springs** is pursuing a CAV pilot project this year, after being selected as a "City Possible" by the *MasterCard Smart Cities* competition.

2.3 Improvements Needed for CAV Readiness

The agencies within the MetroPlan Orlando region are at various states of CAV readiness, and each agency will need different improvements to move forward with the implementation of CAV technologies. A review of each agency's existing equipment indicates the following general improvements are needed for broad based CAV readiness.

- Traffic signal controllers need to be upgraded to ATC models that can enable CAV applications (data output in standard SAE J2735 formats).
- Signal controller cabinets need to be upgraded to provide additional space within the cabinet for new equipment and improved interfaces.

- CV communications interfaces will be needed to allow vehicles to communicate with roadway infrastructure. There are multiple manufacturers and technologies competing to gain market share in this area, and agencies will need guidance on what systems should be deployed for long term benefit and interoperability.
- Improved maintenance programs for pavement markings should be implemented to maintain visibility.

3 Staffing Proficiency

This section identifies staffing proficiency at each of the maintaining agencies within the MetroPlan Orlando planning area. The maintenance and operation of CAV infrastructure will require several new skills for both the signal maintenance personnel and the maintaining agencies. This section concludes with an evaluation of existing and future resources each agency needs to create a "CAV-ready workforce".

3.1 Staffing Proficiency

In general, the majority of the agencies interviewed indicated their staff (or contractors) had established proficiency in signal installation, maintenance, and repair; however, they lacked specific training in CV applications, since much of the software, equipment, and technologies are new and evolving rapidly. Agency-specific initiatives are summarized below:

- **FDOT D5** staff is very confident in their CAV/ITS related group - the entire department is supportive of CAV and its benefits. FDOT D5 is planning to take charge of developing CAV training modules, since many local jurisdictions have expressed a need for additional technical training. FDOT D5 believes working with vendors is critical to provide hands-on training and create how-to video tutorials for others to view.
- **CFX** staff has a focus on maintaining their existing ITS systems (through staff and contractors), and staff receives training on new and innovative technologies through Team Florida, the Florida AV Summit, Transportation System Management and Operations (TSM&O) Consortium Meetings, and vendor presentations. CFX would be open to and encourages CV-specific training offered by a regional entity.
- **LYNX** staff focus on the vehicle side of the system, particularly the installation, configuration, maintenance, and debugging of TSP equipment on buses. Training is provided to LYNX operations staff on a project-by-project basis, in a "train the trainer" format, but LYNX would like to provide consistent training to operators and supervisors on working with a partially or fully implemented AV system. In addition, LYNX recognizes the importance of ongoing training for any new system or technology – from "generation to generation."
- **FTE** staff is focused on maintaining existing systems, and is typically trained at FDOT D5, ITE, or ITS Florida trainings – occasionally, vendors will provide trainings. There is an agency-wide need for additional training on CAV technologies, software, and equipment as the industry evolves.
- **Orange County** signal maintenance group is IMSA-certified, and is hopeful for additional training opportunities through FDOT D5 or a regional entity on CAV.
    - The **City of Apopka** is focused on maintenance of existing signals and has limited staff training opportunities, but would welcome basic training on CAV practices and CV applications.
    - The **City of Winter Garden** has contracted out signal maintenance but believes that a top-down approach on staff education would be best.
    - The **City of Winter Park** signal maintenance group is IMSA-certified and is hoping that IMSA provides CAV training.
    - The **City of Maitland** has contracted out signal maintenance to Control Specialists.
- The **City of Orlando** signal maintenance group receives IMSA and vendor training, and the City believes in training all staff to the same level so that all personnel can perform the same functions. The City staff needs additional training on network management. The City would like to receive formal training on CAV and believes that regional training is needed.
- **Seminole County** has signal maintenance responsibility for all jurisdictions within the County. The majority of existing staff training comes from IMSA seminars, vendor training, or in-house

staff training. Seminole County is currently working to improve computer-based staff training and is working with FDOT D5 on vocational training programs at local technical schools. The County would like to see FDOT D5 or regional training offered on new/emerging technologies.

- **Osceola County** has signal maintenance responsibility for the entire County and all jurisdictions within the County. The majority of existing staff training comes from vendors or demonstrations, but the County would welcome regional hands-on training on CAV.
- **RCID** handles minor maintenance items in-house and has contracted out larger maintenance tasks and aerial work but is interested in CAV-specific training and best practices from other agencies.

3.2 Staff Training Needed for CAV Readiness

Through interviews with the agencies within the MetroPlan Orlando planning area, it was widely noted that a regional training effort is needed to support CAV deployment. Most agencies are familiar with CAV concepts, but lack awareness and training on specific technologies or applications. The following initiatives should be considered:

- Each agency that employs traffic signal technicians noted they need additional staff to meet current needs, and as there is an increase in CAV deployments, additional staff will be needed.
- Regional CAV awareness & training with local agencies and FDOT D5.
- Device specific training to assist with operations and maintenance of CAV equipment.
- Technical training on systems and networks related to both CAV and non-CAV equipment and applications.

4 System & Network Capabilities

This section identifies existing communications and network infrastructure for each of the maintaining agencies, to help determine where CAV can be prioritized and where additional network enhancements might be required. CAV infrastructure is heavily reliant on high-speed and low-latency data exchange and will require a robust and stable backhaul communications network. Much of the new equipment also relies on new standards and protocols (e.g., IPv6), introducing potential changes to the entire network architecture.

4.1 Communications/Network Infrastructure

Overall, the majority of jurisdictions in the MetroPlan Orlando region have fully implemented or are moving towards the use of fiber-optic cable (FOC) networks within their jurisdiction. While the implementation of communications is often straight-forward, anticipating data storage and server needs for agencies is a bit trickier, as many Central Florida jurisdictions have partnered with vendors to store data on cloud servers instead of in-house. Agency-specific initiatives are summarized below:

- **FDOT D5** uses a ring topology for its FOC network, with all existing equipment IPv4 and IPv6 compatible. To prepare for data/system requirements from local jurisdictions, FDOT D5 built a new Regional TMC with a 100-amp circuit, 2 new air handlers, 15 petabyte storage, and 3 sources of power. From a data perspective, FDOT D5 is more concerned about ease of use/viewability rather than adequate storage and is taking on the technical side and data management of CAV for the region so that local jurisdictions can focus on staffing.
- **CFX** has a FOC network (currently being upgraded with Layer 3 switches), with a redundant FOC backbone located along each side of their facilities, and they have sufficient server/data storage capacity at their TMC. CFX feels that in the near-medium term, minimum upgrades to their infrastructure are required; however, as CAV applications mature, their network will need to be reevaluated for data storage, archival, and extent of analytics required.
- **LYNX** will be focusing their AV/CV efforts on transit vehicle preparedness, relying upon jurisdictions for infrastructure and non-vehicle network connectivity.
- **FTE** uses an extensive FOC network, with shared fiber between FDOT D5 and CFX to connect across highway segments, and their goal is to attain 10 Gbps across the network.
- **Orange County** uses an extensive FOC network with connection to 95% of the signalized intersections within the County.
    - The **City of Apopka** have no existing network infrastructure.
    - The **City of Winter Garden** has limited network infrastructure, primarily along SR 50 which is maintained by the County.
    - The **City of Maitland** and the **City of Winter Park** have a mixture of FOC and wireless communications, which provide a connection to the Orange County TMC.
- **The City of Orlando** has an extensive FOC network with some point-to-point wireless communications. They are working to replace old FOC incrementally as part of new projects. Overall, approximately 95% of their signalized intersections are connected to the network. The City needs to improve redundancy within the network and better manage their network. The City would like to have a network engineer. Improvements are needed to the network infrastructure, such as upgrading switches.
- **Seminole County** uses an extensive FOC network, with all of their intersections connected to the network; however, they have a limited amount of server/data storage. As a result, the County recently transitioned their Bluetooth data to the cloud, to increase storage capacity and reduce the server load. The County also has a limited number of spare FOC pairs on their existing cables, which limits expansion of the network bandwidth.

  - The remaining jurisdictions in Seminole County have limited network infrastructure related to transportation. Most have connections between agency buildings and police/fire stations.
- **Osceola County** has an extensive FOC network and is working to further expand their network through on-going projects. The County is working with FDOT D5 to integrate their existing systems into SunGuide.
  - The remaining jurisdictions in Osceola County have limited network infrastructure related to transportation. Most have connections between agency buildings and police/fire stations.
- **RCID** uses a FOC communications network and stores intersection data on the cloud through a vendor.
- **GOAA** uses a FOC ring topology and is currently working to upgrade network capacity. They have a closed network for security reasons.

4.2 Improvements Needed for CAV Readiness

A review of each agency's existing communications/network indicates the following improvements are needed for CAV readiness:

- Local agencies and FDOT D5 should continue to work together to establish communications at all signalized intersections within the MetroPlan area. This will be required to maximize the effectiveness of CAV technologies.
- FOC cables with limited or no spare pairs should be replaced to allow for additional capacity within the network.
- Agencies with existing FOC communications should work to establish redundancy in their networks.
- Network infrastructure, such as switches, should be upgraded to improve network capacity and provide additional ports for connection of CAV equipment.

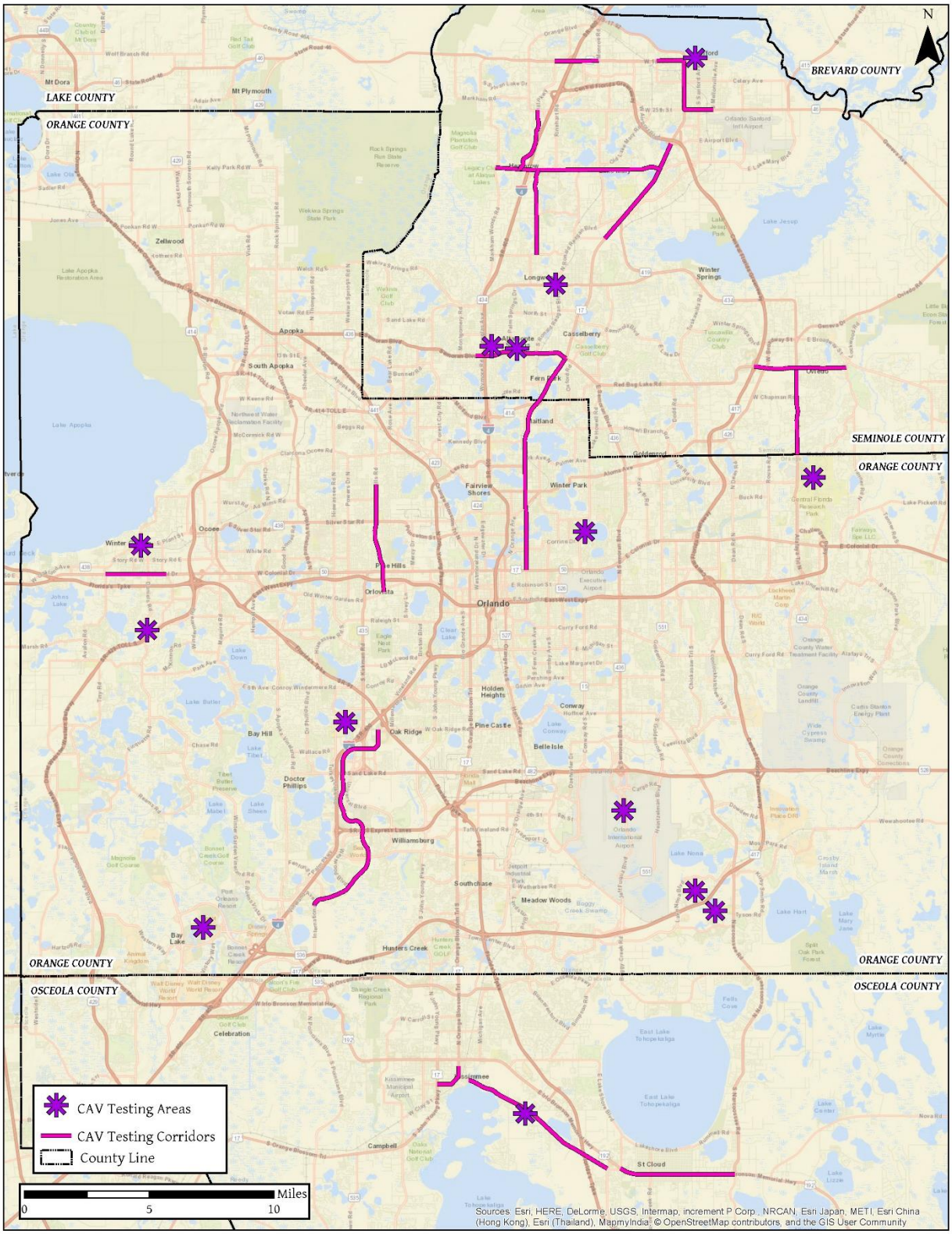
5 Potential Locations for CAV Testing

This section identifies potential locations for CAV testing within the MetroPlan Orlando planning area where minimal infrastructure improvements might be needed so that momentum can be built by achieving early success in CAV deployment. While there are two primary locations in the MetroPlan Orlando planning area where existing CAV testing is currently underway, there are several other potential locations that agencies have identified for near-term, mid-term, and long-term improvement testing timelines. The locations are shown in Figure 1, and the agency-specific initiatives are summarized below:

- **FDOT D5** is working on three current pilot projects: the SR 434 CV Pilot (Seminole County), PedSafe/Greenway (Orange County), and the I-75 FRAME project (Marion & Sumter Counties). FDOT believes that investments in infrastructure readiness and staff training for CAV should take financial precedence over CAV testing/pilot projects.
- **CFX** is targeting their highest-congestion corridors as potential locations for mid- and long-term CV testing, most notably: SR 408, SR 417, and SR 528. CFX is also examining smaller-scale deployments for more near-term testing.
- **LYNX** is targeting the use of exclusive LYMMO lanes in downtown Orlando for CAV testing and revenue service, and is targeting non-revenue service testing at the SunTrax CAV Test Bed in Polk County.
- **FTE** is currently working on a CV pilot in South Florida and is leading the development of the SunTrax CAV Test Bed in Polk County. For future CV testing, FTE would likely target parking lots or interchanges close to existing FTE facilities.
- **Orange County** is targeting locations for CAV testing where pedestrian safety has been a major issue, most notably the UCF area, International Drive, and Pine Hills.
    - The **City of Apopka** does not yet have any targeted locations for future CAV testing.
    - The **City of Winter Garden** is targeting SR 50, Daniels Road in front of Winter Garden Village, and along Plant Street in downtown Winter Garden as potential long-term locations for future CAV testing locations; however, these locations would need significant infrastructure investments.
    - The **City of Winter Park** and **the City of Maitland** are targeting US 17/92.
- The **City of Orlando** will be broadcasting signal data city-wide through 2 third party vendors in the coming months. They are also participating in a near-term AV shuttle pilot in Lake Nona. The City is targeting International Drive, the Universal resort area, and Baldwin Park as potential opportunities for both CV and AV deployments in the mid- and long-term.
- **Seminole County** is targeting near-term CV deployment along Lake Mary Boulevard and long-term testing at SunRail crossings, along US 17/92 (pedestrian safety), along SR 436, and at the Park Side development. They are also examining placing AV shuttles on the County's trail system.
    - The **City of Altamonte Springs** is targeting a near-term AV deployment between the Advent Health campus, Uptown Altamonte, and Crane's Roost. They have identified the SR 436 corridor adjacent to the Altamonte Mall as a potential location to test CV-based pedestrian safety applications.
    - The **City of Casselberry** is targeting the US 17/92 and SR 436 corridors within the City, particularly intersections with pedestrian safety issues.
    - The **City of Lake Mary** is targeting International Parkway and Lake Emma Road due to their proximity to commercial and office uses and high numbers of pedestrian activity.
    - The **City of Longwood** is targeting SR 434 at Ronald Reagan Boulevard as a potential location to address issues with the railroad crossings.
    - The **City of Oviedo** is targeting Mitchell Hammock Road for testing in the long-term.

  - The **City of Winter Springs** is targeting the intersection of SR 434 and Tuskawilla Road to improve safety and operations.
  - The **City of Sanford** is targeting SR 46 and SR 46A adjacent to the Seminole Town Center and also Downtown Sanford and the Riverwalk.
- **Osceola County** is targeting the Neptune Road corridor and the NeoCity development as potential locations for future CAV testing, since both are technology corridors. In addition, smaller-scale safety deployments could target school zones and SunRail crossings within the County.
  - The **City of Kissimmee** is targeting Main Street onto Neptune Road and east to Partin Settlement Road as a potential location that is faced with numerous challenges. They also see the Kissimmee Circulator as a potential conversion to an AV shuttle operation.
  - The **City of St. Cloud** is targeting US 192 to test CAV technologies.
- **RCID** is planning to deploy Blincsy DSRC radios at all of their intersections within Walt Disney World and looks to make long-term improvements to their system to prepare for potential CAV testing in the future. They believe that route guidance is an area of opportunity.
- **GOAA** believes there is an opportunity to partner with rental car agencies located at the airport to assist in route guidance to and from their facilities. They also see the opportunity to implement AV shuttles between the terminals and parking lots.

Figure 1 – Potential Locations for CAV Testing



6 Training Plans

This section identifies existing training plans in place within the MetroPlan Orlando planning area which have been or are being developed to train agencies on how to configure and operate CAV systems. In addition to operations and maintenance, training in place (or planned) to learn the benefits of the system and how data can be leveraged to improve road users experience will be identified. Agency-specific initiatives are summarized below:

- **FDOT D5** believes that around 25 percent of existing D5 staff know how to work with CAV technologies, and FDOT D5 plans to use them to share knowledge amongst other control groups. There is broad support for CAV technologies from the top down, but agencies need to understand that CAV is a long-term solution that will take time to mature. FDOT D5 is working to develop training materials that other agencies can use.
- **CFX** is allowing CAV technologies to mature so that a roadmap can be established for training in the future.
- **LYNX** is evaluating what training is needed to further CAV knowledge for operators and supervisors, as well as maintenance staff for TSP and CAV technologies on transit vehicles.
- **FTE** utilizes a large consultant work force to maintain and operate their systems. These consultants also provide training to FTE staff on new and emerging technology. Overall there is an agency-wide need for training on CAV technologies and equipment, in addition to training on new software. FTE is working to determine what types of training should be used to enhance CAV knowledge and if a specific role is needed for CAV operations.
- **Orange County** is evaluating what training is needed to further CAV knowledge. In the future, the County believes that additional specialists will be required to maintain the CAV infrastructure.
    - The **City of Apopka** needs some basic training on CAV practices. This training should focus on the City's needs across various agencies within the City to prioritize CV applications. Further, the City feels that information technology, planning, engineering, and public safety could be interested in some form of basic training.
    - The **City of Winter Garden** believes that a top-down approach would be beneficial to expanding the understanding of CAV. It is important to gain the support of the Mayor and City Manager.
    - The **City of Winter Park** needs an overview of CAV technologies to expand their working knowledge. They are looking for industry associations such as IMSA to provide training. There has been discussion within the City on potential AV shuttles.
    - The **City of Maitland** does not currently have in-house traffic staff, but the expansion of CAV systems may require the City to bring someone in. The City would like additional training specifically targeted at interacting with the public on CAV technologies and issues.
- The **City of Orlando** has a directive from the Mayor to incorporate CAV into the City's comprehensive plan in the coming years. The City needs formal CAV training and additional staff and consultant support. They are looking for regional training opportunities and want to leverage the D5 Transportation Systems Management and Operations (TSM&O) Consortium.
- **Seminole County** would like regional training opportunities on CAV technologies and additional training resources from FDOT D5. On a higher level, the County believes it is important to establish champions on the County Commission to further CAV deployments.
    - The **City of Altamonte Springs** embraces new technologies and innovation at all levels. They are actively working to further CAV within the City. They plan to rely on the private sector for AV shuttle operations. The City also sees the opportunity to expose students to CAV through their AS2I program.

  - The **City of Casselberry** needs an overview of CAV technologies to expand their working knowledge. They also need to review City policy to determine the impacts on CAV deployment.
  - The **City of Lake Mary** would like to participate in regional conferences/workshops to further their understanding of CAV technologies.
  - The **City of Longwood** needs an overview of CAV technologies to expand their working knowledge. Their primary sources for information on CAV are MetroPlan's TSM&O and TAC committees.
  - The **City of Oviedo** is not familiar with CAV technologies and needs additional training. One of their main concerns is with the impacts to land uses and planning.
  - The **City of Winter Springs** staff is excited at the opportunities presented by CAV; however, they need additional training.
  - The **City of Sanford** has had limited discussion on CAV but would like to increase discussions with City Council. The City would like training, webinars, and conferences to improve CAV knowledge, not just status updates. Internal training should start with public works group then branch out.
- **Osceola County** would like regional training opportunities on CAV technologies and believes that hands on training is needed.
  - The **City of Kissimmee** believes there is a need for regional training and to define goals and timeframes for implementation. Currently most of their CAV knowledge has come from MetroPlan and conferences.
  - The **City of St. Cloud** is not familiar with CAV technologies and needs additional training.
- **RCID** supports CAV technologies throughout the agency but is trying to determine a path forward with a quickly changing marketplace. A regional focus is needed, specifically in regard to RCID which is surrounded by larger agencies that have an impact on how traffic enters the agency.
- **GOAA** obtains CAV training through their consultants, and this training includes senior level staff. GOAA also participates in FDOT D5 training efforts.

7 Equity Challenges

This section identifies potential equity challenges in CAV testing and implementation and documents how other peer agencies have balanced equity issues in approaching CAV pilot testing and eventual deployment. Maintaining equity is necessary to ensure the broadest possible cross-section of Central Floridians have an opportunity to see, touch, and experience the positive benefits CAV can bring to the future transportation environment. The analysis also assesses potential shortcomings for equitable deployment between jurisdictions and impacts on under-served communities, i.e. low-income, minorities, and disabled communities.

In terms of equity, several of the agencies indicated they anticipate equity challenges as they implement CAV applications, particularly equity within the transportation sector in a vertical sense. Agency-specific initiatives are summarized below:

- **FDOT D5** anticipates there will be some equity challenges in CAV implementation, namely a further stratification of existing trip types, and sees potential in balancing trip chaining using subsidies to balance out the benefits of CAV for those who cannot afford a new vehicle with CAV technologies. FDOT D5 believes that policy changes are needed to improve equity between users in the region.
- **CFX** anticipates the vehicle penetration of OBUs could be a potential equity issue, but proper outreach could minimize disparities in the region.
- **FTE** roadways pass through multiple FDOT Districts, counties, and local jurisdictions, and as a result, they anticipate equity challenges between regions in terms of CAV implementation, equipment, and preferred vendors/software.
- **LYNX** provides transit service to the entire Central Florida region, and as such, is committed to ensuring that CAV benefits would be equally distributed by all users, including meeting Title VI and ADA requirements. CAV deployments need to consider fleet-wide deployments and system-wide applications so the benefits of CAV are "marketable" to boards and funding partners, and so CAV is quickly integrated into Central Florida's transportation system holistically, not just as an "add-on."
- **Orange County** has a diverse population and anticipates some equity challenges, particularly in the low-income and rural areas of the County. In addition, the County anticipates potential equity challenges if their local jurisdictions do not use the same signal equipment as the County (Intelight).
    - The **City of Apopka's** main challenge is funding for infrastructure improvements. They see the opportunity to partner with Orange County on CAV efforts, with the City playing a supporting role.
    - The **City of Winter Garden's** main challenge is funding for infrastructure improvements. They also see the potential for challenges due to generational gaps in the City, which has a median age of 45/46.
    - The **City of Maitland** is separated by the physical barrier of I-4. This may lead to challenges unifying the City's efforts in CAV implementation.
- **Seminole County** has a diverse population and anticipates that residents may demand CAV technology before the County and local jurisdictions are ready. The County has concerns about how end users will deal with multiple applications and interfaces based on the CAV equipment and manufacturer's requirements, and associated equity challenges.
    - The **City of Altamonte Springs** understands that Americans with Disabilities Act (ADA) compliance will be an issue with AV shuttles. They plan to deploy CAV technologies based on population density to maximize use and reach as many people as possible.
    - The **City of Lake Mary** would need to analyze the population in the City now to see how low-income areas would benefit from CAV. The City sees its partnership with the County

as helpful to the City from a budgetary approach. Being suburban, they are more car-centric, but CAV may be more beneficial to a locale such as Lake Mary.
    - The **City of Longwood** is open to working with adjacent jurisdictions and has done so in the past on other projects. The City has small areas of lower income.
    - The **City of Oviedo** has challenges with the limited number of east/west corridors within the City. In addition, lower income residents within the City are limited in mobility choices.
    - The **City of Winter Springs** sees the potential for equity issues if CAV technologies are only deployed in certain areas and would like to see the technology spread throughout the City.
    - The **City of Sanford** sees the potential for equity challenges created by access to CAV technologies. The City will need to balance maintaining existing systems versus installing new technologies. The City is on the outer area of the MetroPlan region.
- **Osceola County** has a diverse population and anticipates some equity challenges, particularly in the low-income and rural areas of the County. The County understands that all road users should benefit from CAV.
    - The **City of Kissimmee** believes there will be numerous equity challenges. They are trying to set aside money each year to improve ITS within the City. The City is also concerned with how CAV will impact land use codes.
    - The **City of St. Cloud** believes the US 192 corridor will have no equity challenges. The City has not had many major challenges.
- **RCID** doesn't anticipate the same type of equity challenges as other adjacent jurisdictions, because they serve tourist populations rather than residents. They are primarily concerned with how changes to adjacent jurisdictions will impact traffic entering their jurisdiction.
- **GOAA** serves a leisure market which creates pressure to keep user fees low. AV may reduce parking revenue and lead to user fees for access to the facilities. They are concerned with how different modes will interact and keeping balance amongst all modes.

8 Conclusions

This section provides a conclusion of the findings of the memorandum and presents recommended next steps for MetroPlan Orlando and its partner agencies.

8.1 Roadway Infrastructure

In general, the MetroPlan Orlando region and its partner agencies have shown a demonstrated interest in CAV technology with the implementation of the two major pilot projects; the SR 434 CV Pilot and the PedSafe/Greenway Deployment. However, there seems to be a lack of consistency between the large jurisdictions on roadway infrastructure needs, even within counties and their local city jurisdictions. It is recommended that a region-wide CAV consortium be developed, for the purposes of providing a central group for each jurisdiction to send their related operations/signal staff to receive region-wide training, network with other jurisdictions, and collaborate on best practices in terms of equipment, software, and other testing/implementation issues.

8.2 Staffing Proficiency

The majority of the local jurisdictions in the MetroPlan Orlando area indicated their staff (or contractors) had established proficiency in signal or TSP device installation, maintenance, and repair; however, they lacked specific training in CAV applications, since much of the next generation software, equipment, and technologies are new and evolving rapidly. However, since there is no CAV-specific training being currently offered at the regional or state level, many agencies are training their existing operations and signal maintenance staff to different training levels, leading to a lack of consistency amongst jurisdictions.

Many of the jurisdictions requested that a region-wide training program on CAV be developed, to promote consistency between counties and city jurisdictions on CAV testing, equipment, software, and deployment. In addition to serving as a common training, the collaboration of the region's operations and signal staff could provide an open forum for discussion and collaboration between jurisdictions on CAV-related issues that will arise as testing and deployment begins.

8.3 System & Network Capabilities

Overall, the majority of jurisdictions in the MetroPlan Orlando region have fully implemented or are moving towards the use of FOC networks within their jurisdiction. It is recommended that all partner jurisdictions within the MetroPlan Orlando move to the use of FOC networks within the next five (5) years to enable consistent communication and testing grounds for region-wide CAV deployment.

While the implementation of communications networks are often straight-forward, anticipating data storage and server needs for agencies is a bit trickier, as many Central Florida agencies have partnered with vendors to store data on cloud servers instead of in-house.

8.4 Potential Locations for CAV Testing

While there are two primary locations in the MetroPlan Orlando planning area where existing CAV testing is currently underway, there are several other potential locations that jurisdictions have identified for near-term, mid-term, and long-term improvement timelines. To facilitate partnerships and the advancement of near and mid-term CAV testing locations, it is recommended that a region-wide CAV consortium be created, with the purposes of providing a forum for jurisdictions involved in CAV to collaborate and share best practices. As part of the consortium, it would be ideal for agencies to provide feedback on other jurisdiction's testing projects and learn from best practices. In addition,

the LYNX AV Concept of Operations study will provide key insights into integrating AV with transit service in the region.

8.5 Training Plans

Consensus between agencies within the MetroPlan Orlando planning area is to identify necessary training, to expand their working knowledge of CAV systems. The jurisdictions believe that regional training is needed to ensure interoperability and consistency when deploying CAV systems, and LYNX is planning to define a roadway "ecosystem" certification to identify roadway segments that are CAV-ready. Plans are being developed by FDOT D5 to train jurisdictions on how to configure and operate CAV systems. In addition to operations and maintenance, training in place (or planned) to learn the benefits of the system and how data can be leveraged to improve road users experience will be identified.

8.6 Equity Challenges

In terms of equity, several of the jurisdictions indicated they anticipate challenges as they implement CAV technologies, particularly equity within the transportation sector in a vertical sense (agency-to-agency). Going forward, ensuring equity for each agency's and jurisdiction's residents and visitors will be critical to the success of CAV implementation and deployment across the MetroPlan planning area. Agencies must collaborate and work together to ensure that all members of Central Florida's communities have equal access to the benefits of CAV technology or demonstrations, and that all sectors of their community have equal access to CAV implementations, going above and beyond Title VI and ADA requirements. FDOT D5 anticipates CAV implementation could lead to further stratification of existing trip types and sees potential in balancing trip chaining and directing subsidies to balance out the benefits of CAV.

In addition, for statewide jurisdictions like FDOT D5 and FTE, cross-regional collaboration will be imperative to ensure that CAV testing and implementation is most effective and duplicative efforts are not required, not only within the metropolitan areas of Orlando, but the more rural jurisdictions and roadway segments in between.

Appendix A: Interview Notes

Central Florida Expressway Authority

May 10, 2019

Attendees: Bryan Homayouni, Manager of Traffic Operations (CFX), Ron Pati (WSP), Doug Petty (FDA)

General CAV Readiness

- CFX is well prepared to accommodate CAV technologies in terms of fiber-optic network capacity and redundancy, with backbone fiber located along each side of their facilities.
- They have sufficient capacity not only in terms of communications network bandwidth but also computer servers and data storage at the CFX TMC.
- They are actively participating in the Central Florida AV Proving Ground pilot and coordinating closely with MetroPlan and FDOT D5, for regional participation as well.
- CFX has evaluated the following technologies:
    - FDOT Central Office signed an agreement with TrafficCast for the use of their license statewide. CFX has considered but feels their own transponder-based travel time system (DCS) is superior. However, they are considering a technology demonstration of TrafficCast's BlueTOAD Spectra RSU unit with DSRC capabilities.
    - CFX is satisfied with DCS as it has the highest accuracy due to high tolling data saturation when compared to other vendors such as BlueTOAD or ITERIS Vantage Velocity systems using Bluetooth data.

Roadway Infrastructure

- CFX has an extensive deployment of ITS devices including vehicle detection, CCTV cameras, DMS, DCS antennas, and interchange traffic signals along its corridors but no CV deployment yet.
- They are taking a measured approach due to the evolution of devices and technologies.
- They are focusing on safety deployments such as wrong way detection and curve warning systems as a priority (non-CV approach) but interested in migrating to CV based systems in future.
- They have no immediate plan to install CV equipment; however, CFX is participating in a LIDAR testing (small $100,000 budget pilot study) with FDOT D5, Florida Highway Patrol (FHP), and Orlando Police Department (OPD).
- They will consider SPaT deployment on the interchange signals in collaboration with Orange County.
- CFX roadways are currently CV capable with superior 3M striping and lane markings suitable for CAV deployments for AV lane control and automated steering.
- They are considering a change to Intelight as Orange County transitions.

Staff Proficiency/Training Plans

- Their focus is on maintaining existing ITS systems.
- CFX has a staff of approximately 60, but much of the work is contracted out to consultants. So, they are well prepared to manage the CAV work and do not envision the need for extensive training immediately.
- Currently, they are getting industry feedback through seminars, conferences. CFX represents Team Florida, Florida Automated vehicle (FAV) summit etc.
- Once CAV technologies mature and the roadmap established, CFX will determine if any additional training would be required.
- In the medium or long term when CAV lanes become a reality, training needs could be reassessed.

- Main sources are conferences, TSM&O meetings organized by FDOT D5/MetroPlan, and vendor meetings.
- CFX is actively involved with the wider transportation community in the region and reviewing lessons learned. Also, they are welcoming of testing opportunities in a small scale for evaluation of measures of effectiveness.

System and Network Capabilities

- CFX feels that in the near to medium term, minimum to no upgrade to their communications and network infrastructure is required.
- When AV applications mature, the network needs to be reevaluated for data storage, archival, and extent of analytics required.
    - They are not there yet, however, monitoring actively and cooperating with regional partnership.
- CFX has a geographically redundant fiber-optic network (144 strand cable on each side of their corridors), with enough spare strands for future use.
    - Further, CFX is in the process of upgrading their network to Layer 3. The network capacity will be significantly improved to accommodate future CV technologies.

Potential CAV Testing Locations

- Potential locations for CAV testing could be urban areas along the key SR 408/417/528 corridors.
- They have average annual daily traffic (AADT) counts to prioritize based on the number of users.
- CFX has earmarked about $2.6 billion in construction funding, so due to on-going construction, work zone safety applications are a priority.
- The DSRC range is a concern for some systems but with the evolving 5G standards and C-V2X applications, a solution can be developed.
- Overall, CFX has other opportunities for low cost CV deployments but such applications are being reviewed under another project.
- The CFX CV Needs Study was provided and recommended for review.
- CFX feels that CAV technologies will revolutionize the entire industry and all CFX divisions will be impacted in some way including tolling.

Equity Challenges

- CFX is a large agency with a mission to serve its patrons equally. Currently CFX has made electronic tolling available for everyone, but still there are 20% of the users who choose to use cash.
- CFX has introduced “reload lanes” which is a drive-thru service where motorists can get a free E-PASS Sticker or add funds (reload) to their E-PASS account using cash or credit/debit card. Due to CAV application, penetration of OBUs could be an issue with this group, but with a proper outreach effort, such disparities could be minimized.

City of Altamonte Springs

May 21, 2019

Attendees: Brett Blackadar, Director of Growth Management; and Alisha Maraviglia, Senior Planner (City), Laura Minns (WSP), Nick Spatola (FDA)

General CAV Readiness

- The City is well positioned to accommodate both CV and AV technologies.
- Have a partnership agreement with surrounding cities to provide mobility solutions.
- Working with regional partners including MetroPlan, FDOT D5, and Seminole County on CAV initiatives.
- Interested in the impacts of CAV on development, specifically parking as AV becomes a reality.
- Have transit easements in place with developments within the City that allow for transit to operate in neighborhoods, which can provide an operating area for AV shuttles.
- Working on SmartCities initiatives.

Roadway Infrastructure

- Seminole County maintains the traffic signals for the City
- The City has access to the County's ATMS platform, ATMS.now.
    - Access is read only.
- The City can access, view, and control the County's CCTV cameras at intersections.
    - Have lower priority for camera control.
    - Useful during storm events and to help address complaints.
- There is an existing adaptive system within the City along SR 436.
- The City handles signing and pavement marking on City roads.
    - Typically done with resurfacing projects.
    - There is not a restriping program in place at this time.

Staff Proficiency/Training Plans

- In regards to AV shuttles, will rely on private sector to operate and maintain.
- Doesn't see City buying/maintaining vehicles.
- City embraces technology & innovation.
- AS2I program developed by the City to work with school students.
    - Allows student to tour different City facilities.
    - Sees the potential to add CAV to this program as it develops.

System and Network Capabilities

- No transportation fiber outside of the county that is not managed by the county.
- The City has a dedicated connection to Seminole County.
- Public Works and the Police Department have communications infrastructure.
- Seminole County's FO network is the primary transportation communications infrastructure.
- The City is having on-going discussions related to 5G.
    - Currently in talks with private providers.
    - Determining how to handle with R/W.
    - Some 5G deployed on private development.
- City ordinance passed to manage placement and aesthetics of small cell towers.
- City understands the need for data management in regards to CAV.
- City Manager very interested in leveraging data generated by CAV and Smart City technologies. Interested in partnerships with MetroPlan/FDOT/Private Sector.

- Potential interest in use of Blockchain for transportation security

Potential CAV Testing Locations

- Currently working on an AV shuttle project.
  - Will operate on Advent Health campus, Uptown Altamonte, and Crane's Roost.
  - Will require $2 million on infrastructure improvements including redesigning some existing transit stops.
  - Working with private companies to provide shuttles.
- Planning department required developers to include transit easements for circulators/mass transit. Potential to use for AV pilot.
- City is interested in deploying FDOT D5 technology from PedSafe project on SR 436 near the Altamonte Mall. Frequent mid-block crossings in this area.
- Would like to implement SPaT data.
- Advent Health, Altamonte Springs Mall, Emerson (three largest land owners) – all would be supportive of CAV implementation.
- Gateway Drive between Seminole State College (SSC) and Maitland Center would be a good AV shuttle pilot. Adventist Health and RDV Sports Complex are two large trip generators within Maitland Center.
- Existing Municipal Mobility Working Group – Altamonte Springs, Sanford, Maitland, Longwood, and Seminole County created as part of Uber pilot. Spells out a procurement framework that can be used by all participating agencies/local governments.
- Bike share and scooter share has been discussed – studied City of Orlando for lessons learned and best practices.
- Interested in MAAS (mobility as a service) – working with UCF to have single payment platform for interoperability for all modes – bike share, SunRail, scooters, etc.
- Partner with MetroPlan and FDOT D5 as much as possible to support CAV opportunities. Currently shares information in terms of vendors contacting the City vs. FDOT D5 and others.
- City views interoperability as an issue with respect to implementing and maintaining CAV.
- Superstop at Mall being moved, and they are adding additional bays. Could be used for AV. Working with LYNX.

Equity Challenges

- Accessibility/ADA – needs to work for senior and disabled populations.
- East town area near SunRail has plan for redevelopment. Currently low density and low income.
- Apartment complexes off North Lake – City has built wider sidewalks and trails to provide connection to the Altamonte Mall.
- Not a lot of low-income areas within City but some in the County adjacent to City.
- Have good working relationship with FDOT D5, Seminole County, and adjacent jurisdictions.
- Five Cities Agreement – Existing intergovernmental procurement process. Started in response to Uber pilot and 1st mile/last mile.
- Interested in development impacts of AV and potential for redevelopment
- Interested in reliable data – who's using them, percent of trips, justification for parking waivers.

City of Apopka

May 13, 2019

Attendees: Pamela Richmond, Senior Planner (City), Ron Pati (WSP), Nick Spatola (FDA)

General CAV Readiness

- The City feels that they are behind in regard to all technology-based infrastructure.
- Do not believe that CAV will be a priority for the City.
- Maintain approximately 32 signals, and a majority are for FDOT D5 and CFX.

Roadway Infrastructure

- The City currently uses Siemens traffic signal controllers.
  - They are aware that Orange County is transitioning to Intelight traffic signal controllers.
  - Believe that Intelight traffic signal controllers have been specified as part of some on-going signal reconstruction projects.
- Any equipment that the City has is provided by FDOT D5.
- Police Department has more advanced infrastructure in place, such as CCTV cameras.
- Public Works has used the Police Department's cameras on occasion to review video.

Staff Proficiency/Training Plans

- The City currently has one maintenance person and one supervisor to maintain the signals within the City.
  - Their main priority is to keep the signals operational and address issues as they arise.
  - Limited training and/or the opportunity to receive training.
- Acknowledged that training is needed but can't identify who the right person is given limited knowledge in CAV.
- Feels that some basic training on CAV practices would be a good start mainly focusing on the City's needs across various agencies within the City to prioritize CV applications.
- Further, the City feels that information technology, planning, engineering, and public safety could be interested in some form of basic training.
- Understands that regional integration of CV systems is needed.

System and Network Capabilities

- No existing network infrastructure within the City.

Potential CAV Testing Locations

- Do not see the potential for CAV testing in the City currently.

Equity Challenges

- Main challenge is funding for infrastructure improvements.
- Would like to look for opportunities to partner with other agencies, such as Orange County. The County could lead the effort and the City would support.

City of Casselberry

May 22, 2019

Attendees: Chris Bowley, Community Development Director (City), Laura Minns (WSP), Nick Spatola (FDA)

General CAV Readiness

- Still an emerging technology and need additional experience.
- No technology beyond Seminole County's infrastructure.

- No plans to deploy technology beyond what Seminole County has at this time.

Roadway Infrastructure

- Seminole County maintains the traffic signals for the City.
- Public Works Department maintains signing and pavement marking within the City R/W.

Staff Proficiency/Training Plans

- Typically purchase training with equipment.
- Attend workshops and training through associations.
- Need to update policy.

System and Network Capabilities

- Emergency operations communications only at this time.
- 5G being deployed by private companies.
    - Pre-approval process to verify locations.
- Integrate CAV data into GIS database.
- Allow for tracking of improvements.

Potential CAV Testing Locations

- As complete streets are implemented, consider adding alternative routes along major arterials.
- Consider supplementing pedestrian and bike mobility.

Equity Challenges

- 7.5 square miles within the City that are surrounded by four major corridors which provides good access to the City.
- City is fairly homogeneous.

City of Kissimmee

June 13, 2019

Attendees: Nabil Mulhaisen, Traffic & Projects Engineer (City), Alan Danaher (WSP), Doug Petty (FDA)

General CAV Readiness

- Limited exposure and knowledge of CAV at this time.
- Most agencies have not pursued CAV.

Roadway Infrastructure

- The City has six or seven arterial dynamic message signs (ADMS) and CCTV cameras at every major intersection.
- Use Econolite traffic signal controllers.
- Osceola County will be taking over maintenance of the signalized intersections.

Staff Proficiency/Training Plans

- Minimal staff training on CAV.
- Foreseeable that staff who would have been trained may leave.
- Need to better understand what training is needed.

- Current understanding of CAV through MetroPlan and conferences.
- Need regional training and to define goals and timeframes for implementation.

System and Network Capabilities

- Have an existing FOC network and communications with the County.
- FOC has been updated in the last three to five years.
- Most newly installed intersections have FOC communications.

Potential CAV Testing Locations

- Main Street onto Neptune Road and east to Partin Settlement Road.
    - There are a lot of challenges that need to be addressed.
    - Need to implement communications.
    - Mixed maintenance between the City and County.
- Kissimmee Circulator would be a potential AV path.

Equity Challenges

- Numerous equity challenges.
- Working to set aside money each year for ITS.
- How will CAV impact land use codes.

City of Lake Mary

May 21, 2019

Attendees: Krystal Clem, City Planner (City), Laura Minns (WSP), Nick Spatola (FDA)

General CAV Readiness

- Last few years dealing with upgrading wireless technologies for 5G.
- Supportive of CAV but don't necessarily have specific policies or urban design guidelines.
- Not actively seeking 5G providers only ensuring City complies with statutes.
- Most concerned with aesthetic/impacts to urban design and/or land development regulations.

Roadway Infrastructure

- Signals maintained by Seminole County.
- Rinehart Road and Lake Mary Boulevard are two key roadways.
    - Rinehart Road has 200' right of way with path for Seminole Wekiva trail. City does not support going beyond four lanes.
    - Lake Mary Boulevard has four lanes within the City. Administration does not support 6 lanes. LYNX Route 45 on corridor. ITS, intersection improvements, turn lane improvements.

Staff Proficiency/Training Plans

- Defers to Seminole County.
- City maintains signage and pavement markings.
- If there were a pilot or training available, the City would be interested.
- Planning/Transportation would participate in training/conferences within region.
- Police and fire departments would rely on City Transportation Planning staff to share information.
- Traffic maintenance would need to be involved in training for CAV deployment for striping/signage.

System and Network Capabilities

- Not sure what City's role would be given the County's maintenance of the system.
- May want access to data in the future. City does not currently monitor system based on data being pulled by County.

Potential CAV Testing Locations

- International Parkway and Lake Emma Road.
  - International Parkway is the main roadway to I-4 on the west side. Major office complexes, numerous homes, Heathrow area, etc. Has part of Seminole Wekiva trail.
  - Lake Emma Road is parallel to I-4 within/near City's high-tech corridor. This is a high growth/high traffic area.
- Safety benefits on Lake Mary Boulevard and Rinehart Road. Help with high school traffic, middle schools, library, and elementary schools. Large multiuse project nearing completion built in urban form that will increase pedestrian traffic.

Equity Challenges

- The areas of the City with low income population have access to transit and major corridors. Would need to analyze population in City now to see how those areas would benefit.
- Partnership with County is helpful to the City from a budgetary approach. Being suburban, they are more car-centric, but CAV may be more beneficial to a locale such as Lake Mary.
- City's size and population is a challenge in that it's suburban/spread out.

City of Longwood

June 7, 2019

Attendees: Shad Smith, City Engineer (City), Amy Dunham & Laura Minns (WSP), Nick Spatola (FDA)

General CAV Readiness

- Keeping up with CAV through MetroPlan TSM&O and TAC committees.

Roadway Infrastructure

- Seminole County maintains the traffic signals for the City.
- No additional infrastructure outside of County's infrastructure.
- Working to set-up access to CCTV cameras.
  - Has requested that the County install CCTV cameras at all City intersections.
- City handles signing and pavement markings.
  - Currently in poor condition but working to improve.
  - Understand that these items are important to AV.

Staff Proficiency/Training Plans

- Maintains and operates emergency generators for the traffic signals.
- Do not receive training on signal equipment.
- Have a basic understanding of CAV; no widespread knowledge throughout City.
- Part of Uber pilot with other local cities.

System and Network Capabilities

- Have FOC between City buildings.

- Fire department and police department have additional facilities for their operations.
- No data management for roadway infrastructure.

Potential CAV Testing Locations

- Top priority is addressing railroad issues along US 17/92.
- SR 434 at Ronald Reagan Boulevard, applications to improve operations when there are rail grade crossings. Drivers use neighborhoods as a cut through during back-ups, which is creating issues with the homeowner associations (HOAs).

Equity Challenges

- Open to working with nearby cities on projects, such as Flex Bus.
- Small areas of lower income within the City.
- Some locations have good transit ridership, and see the opportunity to continue this with CAV.

City of Maitland

May 30, 2019

Attendees: Alyssa Eide, Public Works Director (City), Amy Dunham & Ron Pati (WSP), Nick Spatola (FDA)

General CAV Readiness

- Not currently prepared for CAV technologies.
- Main corridors (US 17/92 and SR 414) are handled by FDOT.

Roadway Infrastructure

- No existing ITS equipment outside of state road corridors.
- No planned expansion of ITS/communications infrastructure.
- Most infrastructure improvements are handled through construction projects.

Staff Proficiency/Training Plans

- Control Specialists maintains the traffic signals for the City.
- Control Specialists does not currently have experience working with CV equipment but will gain exposure through Reedy Creek deployments (the City and RCID use the same vendor).
- No in-house traffic staff with the City.
- Expansion of systems and CAV may require City to hire traffic staff.
- Need to continue learning and awareness of CAV systems, specifically on interactions with the public on CAV technologies.

System and Network Capabilities

- Network infrastructure limited to state road corridors.
- Working to set-up access from the City's office to the CCTV cameras along US 17/92.

System and Network Capabilities

- US 17/92 would be a good location.
- Potential opportunities at the rail grade crossings along the US 17/92 corridor.

Equity Challenges

- City separated by I-4, which creates a physical barrier that will need to be overcome.

City of Orlando

June 11, 2019

Attendees: Benton Bonney, Transportation Systems Manager; Mark Hess, Smart City Project Director; Gus Castro, Project Manager; Charles Ramdatt, Deputy Director of Public Works; Chris Cairns, Transportation Systems Management; and Claudia Korobkoff, Planning Manager (City), Alan Danaher (WSP), Nick Spatola (FDA)

General CAV Readiness

- The City has a directive from the Mayor to incorporate CAV into the City's comprehensive plan in the coming years.
    - Looking to grow technology ecosystem and further economic development.
- The City is working to develop a Smart Cities plan which will include mobility as a major component. A portion of the mobility plan with include CAV.
- Looking at impacts of CAV on land development code.
- The City will be bringing SPaT data online in the near future.

Roadway Infrastructure

- The City uses Trafficware signal controllers and ATMS platform.
    - There are a mixture of Trafficware 980 and 980 ATC controllers.
    - They currently have the CV module for ATMS.now, which provides SPaT data.
    - SPaT data will be provided to vendors as CAV data becomes available through pilots and permanent installations.
- Traffic Technology Services and Connected Signals will be using data from ATMS.now to broadcast SPaT data.
    - Vendor will be responsible for setup and operation. Currently in test mode.
- Working to implement a CyberLock system on signal cabinets.
- Need to upgrade cabinets to Type 6 and add UPS.
- Have an extensive pre-emption system.
    - Use both GPS and optical.
    - Maintaining optical for other agencies that go through the City.
    - Working with LYNX on transit signal priority to provide reliable transit.
- Integration of Smart Parking system with FDOT travel time system.
- City maintains signing and pavement markings.
    - Need to perform an evaluation of existing conditions.
    - Currently on a continuous maintenance schedule.
    - Priority given to school zone markings and signs.

Staff Proficiency/Training Plans

- Operations are the key point for the City.
- Need to have staff trained in network management.
- No formal CAV training at this time.
    - Believe that training with other systems such as GTT will help with transition to CV applications.

  - Training will heavily depend on devices selected.
- Need additional staff and consultant support.
- Most training on new equipment is provided by vendors.
- Traffic signal technicians receive IMSA training.
- Technicians are trained to be able to perform all of the same functions.
  - Allows for flexibility in staff assignments.
  - Some become experts on specific topics.
- Looking for regional training and to leverage the D5 TSM&O Consortium.
- On-demand tutorials needed to supplement active training.
- Orlando Tech had initiated signal tech education program – do not know current status.

System and Network Capabilities

- Have an extensive network, primarily comprised of FOC with some wireless point to point.
  - Major routes through the City have good FOC in place.
- New standard is to install 72 SM FOC on all projects.
- Working to replace old 24 SM/12 MM FOC.
- Over 95% of the signalized intersections are connected with FOC.
- TMC has 144 SM FOC into and out of the building to the north and south.
- Need to add redundancy to the network to provide two independent paths and Layer 3 switches.
- May have to move to a dynamic IP scheme (DHCP).
- Working with FDOT D5 on data storage and management.
- Currently use physical servers but may be transitioning to virtual servers.
- Need a network engineer, may be a good role for a consultant to fill.
- Potential consortium for network support.

Potential CAV Testing Locations

- Looking at parking management systems connected to travel time systems for route guidance.
- Working with D5 on DSRC compatibility.
- Looking to deploy 1 or 2 DSRC radios as part of Beep AV deployments.
- Lake Nona AV shuttle.
  - This will be the City's first exposure to CAV.
  - Shuttle vendor compatible with TrafficWare.
- Potential test areas:
  - Universal Resort – AV shuttle between areas
  - Baldwin Park – low speed limited number of traffic signals
  - I-Drive – improve mobility and safety – I-Drive TSP demo for 2011 ITS America Annual Meeting
- Identify high crash corridors within the City that could be addressed with CAV applications.
- Address pedestrian conflicts.
- Need policy change to be ready for testing.

Equity Challenges

- Look for opportunities to improve mobility: first and last mile, elderly road users, etc.
  - Provide connections between modes.
- Look to spread CAV throughout the City to maximize exposure and address real issues.
- MetroPlan should develop a vision.
- Believe that counties should play a major role in getting smaller jurisdictions on-board.

City of Oviedo

June 3, 2019

Attendees: Anoch Whitfield, Public Works Director (City), Amy Dunham (WSP), Nick Spatola (FDA)

General CAV Readiness

- Not familiar with CAV technologies.
- Concerned with planning and land uses in relation to CAV.

Roadway Infrastructure

- Seminole County maintains signals within the City.

Staff Proficiency/Training Plans

- Limited knowledge of CAV.
- Interested in CAV technologies.
- Would be interested in participating in MetroPlan or FDOT D5 regional training on CAV.

System and Network Capabilities

- Seminole County has the existing system and network facilities.

Potential CAV Testing Locations

- SR 434 CV Pilot within Seminole County – City of Oviedo CV equipment. Mitchell Hammock Road or SR 434 – Alexandria Road, Chapman Road.
  Will be one of the first to have that equipment in the region. FDOT D5 funding the project.
- Mitchell Hammock Boulevard is the main arterial through the City.
- Oviedo Boulevard would be a good location, but not a lot of signal infrastructure.

Equity Challenges

- Would MetroPlan want a financial commitment from the City?
- Transportation as a whole is a challenge in the City due to the lack of east/west routes.
- Lower income residents are limited in mobility.

City of Sanford

June 10, 2019

Attendees: Michael Cash, Planning Engineer (City), Alan Danaher (WSP), Nick Spatola (FDA)

General CAV Readiness

- Basic knowledge of CAV primarily through TSM&O and TAC committee meetings.
- Do not see a need to change land use requirements to accommodate CAV.
- Mobility is a critical issue for the City.
- Do not believe that CAV is coming as quickly as people believe.

Roadway Infrastructure

- Seminole County maintains the traffic signals for the City.
- Electric charging stations installed in downtown and in park areas through a grant for public use.

- City handles signing and pavement markings.
  - Maintenance program through the City and on request.
  - Local roads are lagging.

Staff Proficiency/Training Plans

- City responds to public input, if the public wants CAV the City would move to invest.
- Limited discussion related to CAV, would like to increase discussion with City Council.
- Would like to have training, webinar, conference etc., not just status updates. Training currently through MetroPlan TSM&O and TAC.
- Monthly public works meetings would allow for training staff.
  - Start with public works group.

System and Network Capabilities

- Network between City facilities, police, fire, public works, etc.
- Limited data management capabilities.
  - Working to transition items to the cloud.
  - Continually dealing with data management issues.
- 5G installations on-going near the Seminole Town Center – Rinehart Road.

Potential CAV Testing Locations

- Downtown Sanford and the River Walk.
- Area by the mall, along SR 46 and SR 46A.

Equity Challenges

- Potential equity issues created by access to technologies.
- Outer area of MetroPlan region.
- Have to balance maintaining existing systems vs installing new systems.
- Look for federal money or grants to implement CAV.

City of St. Cloud

June 13, 2019

Attendees: Kevin Felbringer, Engineering Manager (City), Laura Minns (WSP), Doug Petty (FDA)

General CAV Readiness

- Traffic signals owned by FDOT D5 and maintained by City of Kissimmee.

Roadway Infrastructure

- City of Kissimmee maintains City signals (10 all on US 192)
  - City of Kissimmee is transferring maintenance to Osceola County.
- No ITS they're aware of for their 10 signals.
- County looking to add fiber to US 192. Not sure if in St. Cloud sections.
- Signals are coordinated and were retimed several years ago.
- Signal coordination is time based, not interconnected.

Staff Proficiency/Training Plans

- Staff has certification but does not work on signals.

- Certification for traffic signal technician is Level 2 IMSA.
- No training in CAV currently.

System and Network Capabilities

- Need to interconnect 10 signals to the TMC.
- Would be good with upgrading equipment to be CAV ready.

Potential CAV Testing Locations

- US 192 corridor would be the primary candidate.
- Critical intersections with the City:
    - Neptune & Old Canoe Creek Road
    - Neptune & Brown Chapel
    - Vermont & Canoe Creek

Equity Challenges

- Not along US 192 corridor.
- Have not had many major challenges.

City of Winter Garden

May 14, 2019

Attendees: Jon Williams, Assistant Public Services City Manager (City), Amy Dunham and Ron Pati (WSP), Nick Spatola (FDA)

General CAV Readiness

- The City has had limited exposure to CAV.
- Interested in learning about the potential benefits.
- It was agreed that each region has their own priority CV applications to evaluate.
- Interested in learning which technology, cellular or DSRC, would be chosen for regional wide deployment.
- Enquired if Central Florida Expressway (CFX) Authority is on-board with any CAV applications. CFX is participating actively with regional partners and will evaluate key CV applications important for them such as work zone safety, wrong way detection, and curve warning systems in the future.
- The City is aware of 5G and is considering the impacts.

Roadway Infrastructure

- The City currently uses Siemens traffic signal controllers.
    - They just heard about a week ago that Orange County is transitioning to Intelight traffic signal controllers.
    - Not sure what the impacts of Orange County transitioning will be on the equipment the City uses.
- SR 50 is most likely the closest section of roadway within the City that is CAV ready.
- The City did not realize the importance of pavement markings on CAV operation.
- Understands that CAV deployments would need inter-jurisdictional compatibility.

Staff Proficiency/Training Plans

- Currently, the traffic signals with the City are maintained by Control Specialists.
- Believe that a top down approach to CAV buy-in would be beneficial, starting with the Mayor and City Manager.

System and Network Capabilities

- The City has limited network infrastructure, with a majority of the communications infrastructure located along SR 50.

Potential CAV Testing Locations

- SR 50 would be a good candidate for CV applications.
- Daniels Road in front of the Winter Garden Village is another possible location.
- Downtown, along Plant Street, would be a potential for an AV shuttle. However, this would require significant upgrades to the existing infrastructure.

Equity Challenges

- Main challenge is funding for infrastructure improvements.
- Generational gap within the City, the median age is approximately 45 or 46.
- Will older road users be willing to adopt the technology?

City of Winter Park

May 16, 2019

Attendees: Don Marcotte, Assistant Public Works Director (City), Laura Minns (WSP), Nick Spatola (FDA)

General CAV Readiness

- Only generally familiar with CAV. Aware of study and happy to participate.
- Have attended MetroPlan meetings with discussion of CAV.
- The City asked for an overview of CAV to gain a better understanding.

Roadway Infrastructure

- Moving towards adding fiber connections to all signals.
- US 17/92 is part of the Integrated Corridor Management (ICM) project.
    - Receives daily feed and weekly summary from FDOT D5.
- FDOT D5 is working with the City on SR 426 adaptive system from Phelps Avenue to Balfour Drive.
    - This would tie into Orange County's adaptive system to the east.
- Would like to upgrade systems along SR 426 and US 17/92 (two FDOT D5 roads in City).
- Upgraded equipment as needed.

Staff Proficiency/Training Plans

- City has one senior signal technician.
    - Two other technicians serve under him.
- Don will discuss what training they receive and regarding the use of new technologies and tech-based maintenance.
- The City asked if IMSA will eventually provide training on CAV.

System and Network Capabilities

- Current network limited to US 17/92 but working to interconnect other intersections.

Potential CAV Testing Locations

- No discussion to date for testing locations. Complicated by being a 'cut through' City with multiple jurisdictions along the same corridors.
- SR 426 at US 17/92 and Orange Avenue at US 17/92 may be the most challenging intersections but provides multi-jurisdictional example and interoperability. Could be supported by City.
- Downtown Winter Park for automated shuttles suggested by Nick – Don – New Library/Event Center approximately one-half mile to the east of downtown Winter Park.
    - Morse Boulevard could connect downtown and library.
    - Mayor had mentioned to Don that he is interested in AV shuttle along Morse Boulevard connecting new library & downtown. Construction of new library to begin in 2020.

Equity Challenges

- Don suggests further discussion from planning department to understand potential equity issues within the City.

City of Winter Springs

June 11, 2019

Attendees: Bryant Smith, City Engineer (City), Amy Dunham (WSP), Doug Petty (FDA)

General CAV Readiness

- Working with the County on deployment of SPaT through Traffic Technology Services (TTS) and Connected Signals.
- The City has been very open to making modifications/adding equipment for CAV, but it really depends on the County.
- City has been working with TTS to add equipment to the signals for CV testing in partnership with Audi.
    - Hasn't been adopted yet.
    - Should be adopted in the fall, and the County will maintain once installed.
- Generally, the City is supportive and excited about CAV, but the Commission needs more information.

Roadway Infrastructure

- Seminole County maintains the traffic signals for the City.
- Seminole County maintains signals on state/county roads, but City of Winter Springs owns them. There are 11 signalized intersections within the City, with two more planned.

Staff Proficiency/Training Plans

- No training at this time, since County maintains the systems.
- City staff is excited about CAV but have limited knowledge.

System and Network Capabilities

- Utilizes the County's FOC network.
- The City has fiber connections into the City Hall building as well as police department.
- System and network data are stored within the County.

Potential CAV Testing Locations

- Generally, State Road 434 through Winter Springs and at Tuskawilla Road.
    - Three schools, parks, and town center in the area.

Equity Challenges

- Since the City is relatively small, the key to ensuring equity would be incorporating the schools into testing and implementation.
- Issues would be created if certain sections have equipment installed and other don't.
    - Would like to see deployments spread throughout the City.

Florida Department of Transportation (FDOT) District Five (D5)

June 7, 2019

Attendees: Jeremy Dilmore, District TSM&O Engineer; and Tushar Patel, Project Manager (FDOT D5), Amy Dunham (WSP), Nick Spatola (FDA)

General CAV Readiness

- FDOT D5 is very well positioned in leading the region towards CAV.

Roadway Infrastructure

- FDOT D5 is taking on the bulk of technical overhead costs, data management/storage, and pilot projects to allow locals to focus on staff training to prepare for CAV and to ensure interoperability, security standards, and safety.
- Working with local agencies to upgrade equipment to allow for CAV applications, such as providing ATC controllers.
    - Have equipment in stock waiting for deployment.

Staff Proficiency/Training Plans

- FDOT D5 has good in-house IT staff.
- FDOT D5 is very confident in their CAV/ITS related staffing group, and the entire department is supportive of CAV and its benefits.
- FDOT D5 is planning to take charge of developing CAV/ITS training modules, since many locals need additional signal technical training.
    - Not a lot of existing training is CAV-specific, most is general signal/ITS.
- Local agencies need to increase the number of staff and provide better training for technicians.
    - Need training on how to maintain and manage networks.
- Only around 25% of existing staff know how to work with CAV technologies, and FDOT plans to use them to share knowledge amongst signal control groups.
    - Need to understand DSRC network.
    - Need to have training in Linux.
- Working with vendors and hands on training is critical.
    - Creating how to video tutorials for others to view

- In the future, contractors will be able to maintain/repair all CAV devices.

System and Network Capabilities

- Hardware is up to speed – FDOT D5 received $4.5 million from MetroPlan Orlando.
- Currently reviewing network to determine what additional changes are need for CAV deployment.
- FDOT D5's network structure has been converted to a ring topology from a spur topology (what most cities have currently) for fiber-optic systems.
- OSPF/routes need to be upgradable to 10 GB switches.
- All existing equipment is IPv4 and IPv6 compatible. Transmission over the air is a bad idea.
- To prepare for data/system requirements, FDOT D5 built a new RTMC with a 100-amp circuit, 2 new air handlers, 15 petabyte storage, and 3 sources of power.
- From a data perspective, FDOT D5 is more concerned about ease of use/viewability rather than adequate storage.
- FDOT D5 is working with local agencies on network structures.

Potential CAV Testing Locations

- Working to invest in infrastructure readiness and staff training.
    - Infrastructure readiness and staff training for CAV should take financial precedence over CAV testing/pilot projects.
- Currently have the following pilots in construction:
    - SR 434 CV Pilot
    - PedSafe/Greenway
    - I-75 FRAME
- CAV will provide long term benefits, not short term.
- Learn through experience with pilot projects.
- UCF is working on a review of CV applications; most are vehicle to vehicle.

Equity Challenges

- It's unlikely that CAV will solve short-term safety problems.
- FDOT D5 anticipates there will be some equity challenges in CAV implementation – further stratification of existing trip types.
- Potential for balancing trip chaining and directing subsidies to balance out the benefits of CAV for those who can afford.
- Policy changes are needed to improve equity between users.
- Look for opportunities to subsidize cost of use over more projects.
- FDOT D5 is looking to take on technical side and data management so that agencies can focus on staffing.
- Working on interoperability between vendors.

Greater Orlando Aviation Authority (GOAA)

June 14, 2019

Attendees: Brad Friel, Transportation Planning Manager (GOAA), Alan Danaher (WSP), Doug Petty (FDA)

General CAV Readiness

- Familiar with CAV concepts.

- Believe that there will be a slower implementation within GOAA due to security concerns.

Roadway Infrastructure

- Currently have 10 signalized intersections that are maintained by the City of Orlando.
  - GOAA designs and installs the signals with City of Orlando review and approval.
  - Signals meet City of Orlando's standards.
- Have CCTV cameras at select locations, but no cameras along Jeff Fuqua Boulevard.
- Working on DMS, but no additional ITS deployments planned.

Staff Proficiency/Training Plans

- City of Orlando staff maintains the signals.
- HDR and HNTB are consultants that work with GOAA on signal timing issues.
  - Work through City of Orlando to make timing changes.
- Have CV training through consultants at a high level, which included senior staff at GOAA.
- Involved in FDOT D5 global training efforts.

System and Network Capabilities

- Have a FOC ring.
  - Consultants working to upgrade network infrastructure and increase capacity.
- Data sharing may be an issue with outside agencies due to security concerns.
- GOAA is a secure environment, limit access to outside agencies due to security concerns.

Potential CAV Testing Locations

- Unique environment, with 175,000 vehicles per day.
- Opportunity to assist with wayfinding.
  - Potential to work with rental car companies to assist in wayfinding.
  - Most drivers have trouble finding where to go.
  - Focus on Jeff Fuqua Boulevard.
- Not interested in other CV applications, such as SPaT.
- Believe that AV would operate best in a curb separated lane due to driver tendencies within the airport environment.
- AV from parking to terminal and discussing opportunities with Lake Nona circulator.

Equity Challenges

- Leisure market, which leads to pressure to keep rates low.
- Incorporates numerous modes, SunRail, transit, AV, light rail, ride share, etc.
  - User fees for access to the facilities, need to be fair to all modes.
- AV may reduce parking revenue for GOAA.
- How will drop off work with AV and other modes and AV impacts on LOS of other modes.

LYNX

October 14, 2019

Attendees: (via email) Doug Jamison, Senior ITS Developer

General CAV Readiness

- Kicking-off a Concept of Operations study for the deployment of Automated Vehicles in an existing LYNX transit service. LYNX will then use the Concept of Operations to develop a scope that will be used for a future Request for Proposals for a demonstration of automated vehicles in transit revenue service.

Roadway Infrastructure

- LYNX has Trapeze Computer Aided Dispatch (CAD), GTFS files and GIS files are available through our website. GTFS-RT is scheduled to be added to the LYNX website in FY2020.
- LYNX does not deploy traffic signal equipment. Buses do have Opticom 2101 TSP equipment integrated into the CAD system with requests for priority triggered when the bus is 3 minutes or more behind schedule.
- Vehicle communications in the field occur over 4G. Some systems communicate via Wi-Fi in the depot, with the fare system probed manually over IR probe. LYNX does not use DSRC or 5G communications.
- Planned ITS/CV deployments:
    - Battery Electric Buses – deploy 1 on LYMMO approximately May 2020, additional 7 in Fall 2020
    - Automated Vehicle Concept of Operations – LYNX, City of Orlando and MetroPlan Orlando, one year study to be completed Fall 2020 to examine how to incorporate Automated Vehicles into transit service
    - Update of Fleet to Trapeze Ranger 4 (mobile data terminal) – upgrade of older version of Computer Aided Dispatch equipment on buses – Spring 2020
    - Upgrade fareboxes from GenFare Odyssey to GenFare FastFare, enables Mobile Applications, SmartCards, NFC
    - 100% of the fixed route fleet will be enabled with Automated Passenger Counter (APC)s in FY2020
- To improve CAV readiness, LYNX plans to:
    - Continued coordination of TSP deployments, currently lead by FDOT (Opticom 2101 on bus, triggered priority request when bus is 3 minutes or more behind schedule, turned off when door opens)
    - SPaT information at intersection on BRT (LYMMO) routes for future AV deployments
    - Focus on infrastructure as standards are still developing. Reliable power, fiber runs
    - Focus on land use and zoning to design in safety, mass transit, bikes, pedestrians and personal vehicles
    - Define a roadway “ecosystem” certification that reviews land use, roadway design, current signaling, etc. and identifies roadway clusters that are ready for CAV

Staff Proficiency/Training Plans

- On the Job Training regarding Transit Signal Priority installation and configuration
- LYNX doesn’t have feedback on operation of TSP to ensure units are operating as expected. FDOT is installing feedback lights near LYNX facilities to provide that feedback.
- Training is on a project by project basis, normally in “Train the trainer” format.

- Training is normally limited to the LYNX side of any system. LYNX staff doesn't normally see the other side and relies on jurisdictions to ensure interoperability.
- Formal training is needed for LYNX Electronics Staff on Transit Signal Priority equipment installation, configuration, maintenance and debugging.
- Training will need to be provided for any new technology installation using a connection other than cellular (installation, configuration, maintenance, monitoring)
- Bus operators and supervision will need training on how to operate in a partially implemented system at first then after full implementation they will need training on how to operate if the system is offline
- LYNX normally provides "Train the trainer" staff training. This includes all training material and "technology in a box" samples for training and hands-on experience.
- Follow up ongoing training is recommended for any systems to ensure proper procedures are handed down "generation to generation" in training programs. This would also include new capabilities.

System and Network Capabilities

- LYNX would be vehicle-based and would rely on project related installations to install the proper telecommunications.
- LYNX relies on the jurisdictions for infrastructure and non-vehicle network connectivity.
- Infrastructure would be required to provide a means of verification of proper installation and operation of any CAV vehicle technology. How does a mechanic verify that a component is working during a PM or when installed during a repair of a wrecked vehicle?
- Data storage location with data analytic support (people and tools) to review the CV data and continuously tune sensor and signal interaction adjusted to run times.
- Our current thinking is to leverage and extend FDOTs investment in "SunStore" from a technologies standpoint. We would need to consider statewide acquisition of data analyst support for mass transit as these resources are scares and quite expensive for anyone agency to maintain long term.

Potential CAV Testing Locations

- LYNX assumes that the LYMMO exclusive lanes could be used for revenue service (passenger carrying) tests.
- LYNX assumes that it would be able to work with SunTrax for non-revenue service testing if needed.
- LYNX has an issue with rear-end collision of stopped buses. It is expected that future CAV technology would provide information to other drivers or driverless vehicles that would mitigate or prevent rear-end collisions. In many cases the driver responsible for hitting the back of the bus reports not seeing the bus.
- All transit trips start and end as pedestrian trips. CAV technologies that improve the safety of passengers during the pedestrian portion of the trip in addition to safety while waiting near the roadway for the arrival of a transit vehicle are needed.

Equity Challenges

- Deployments in transit would need to consider fleet-wide deployments and system-wide applications. Benefits need to be equally distributed by all users and cannot be confined by jurisdictional boundaries.
- Benefits of CAV will need to be "marketable" to boards and local funding partners and not compete with financial resources needed to provide equitable service to customers. LYNX

should not have to allocate resources to deploy and maintain CAV technologies at the expense of reliability and frequency of service.
- CAV technologies and infrastructure as soon as experimentation and standards are developed needs to be quickly integrated into transportation systems and transit holistically. It cannot be an add-on. It has to be integrated in functionality and funding.
- Equity of users is considered in all projects and deployments. Analysis is done to ensure equity for all demographics including meeting Title VI and ADA equity.
- LYNX participates on the MetroPlan committees and seeks to remain involved in the regional projects and studies. This includes a position in the Central Florida Automated Vehicle Partnership.
- LYNX provides the services requested by the jurisdictions in our region. LYNX staff and jurisdictional staff work together to coordinate these services.

Orange County

May 29, 2019

Attendees: Hazem El-Assar, Chief Engineer; Humberto Castillero, Transportation Manager; Brian Sanders, Chief Planner; Renzo Natasi, Transportation Planning Manager; Roger Smith, Traffic Engineering; and Christy Lofye, Traffic Engineering Manager (County), Amy Dunham (WSP), Doug Petty (FDA)

General CAV Readiness

- The County is preparing for CAV by updating their roadway and system infrastructure.
- There is no CV module included in the standard Orange County Intelight signal controller.
- One of the focus areas that would be funded by the proposed County sales tax is ITS/CAV infrastructure.
- Opportunity zones and curbside management are being evaluated by County Planning.
- DSRC planned for deployment as part of PedSafe project adjacent to UCF.

Roadway Infrastructure

- Out of the County's 600 signals, 91 intersections are running adaptive control, and the County is moving to using InSync adaptive.
- Extensive system with CCTV cameras, FOC network, ADMS, Bluetooth readers, MVDS, and preemption/priority.
- 58 intersections have TSP – plans for 50 more intersections with TSP.
    - Coordination with LYNX on-going.
    - Certain intersections are excluded from TSP due to congestion.
- The County is switching to Intelight controllers.
    - CV module is sold for each controller, not system.
    - Most municipalities within the County are also changing to Intelight controllers.
- The County would like to update their cabinets as well, but this would likely come after the controllers.
    - Moving to NEMA TS2 Type 1.
- If the sales tax is passed, it would be possible to implement cabinet upgrades at the same time as the controller upgrades.
- The County wants to expand Integrated Corridor Management (ICM) on I-4 and SR 408, in addition to other interstates.

Staff Proficiency/Training Plans

- County staff is primarily trained by vendors and through IMSA.
- The topic of CAV/signal maintenance was raised at a recent FDOT D5 TSM&O Consortium, but never went anywhere.
- County staff is annually skill-tested and has to maintain their ISMA certification
- It takes two years from entry level to become an advanced signal staff.
- Overhead basic signal maintenance will be contracted out, and specialized CAV/ITS signal specialists will remain within the County.
- The County would like to specialize their technicians more than currently, to lower signal downtime.
- Even as specialized as CAV technology gets, or TSP gets, the County will still need to use signal timings.
- Looking for opportunities to work with local schools to train new technicians.
- Will require higher level programming knowledge.
- Have not been fully staffed in 15 years.
- Need to improve network downtimes for CAV operations.

System and Network Capabilities

- The County has an existing fiber-optic network covering 95% of the County, and the other 5% is wireless.
    - Will expand FOC network with next ATMS project
- In terms of ITS devices, the County is working on a CAV White Paper currently – they have existing CCTV cameras, DMS, Bluetooth devices, video detection, TSP, railroad preemption, etc.
- The County is trying to determine how much data storage they will need.
- Automated traffic signal performance measures (ATSPM) data from upgraded Intelight controllers is stored on the cloud.
- County also determining how long they will need to store data for (red light cameras store data for 60 days).

Potential CAV Testing Locations

- The County is focusing CAV improvements at locations where pedestrian safety has been an issue namely, the UCF Corridor, the I-Drive Corridor, and Pine Hills area.
    - Will use insights obtained from FDOT D5 PedSafe project to expand to other corridors.
- The FDOT D5/UCF PedSafe project has included OBU's on shuttles to interface with signals.

Equity Challenges

- The County relies upon funding from MetroPlan Orlando and FDOT D5.
- How will the FDOT D5 LAP policy change the management of smaller signal/ITS/CAV projects?
- Potential equity challenges in the more rural areas of the County.
- FDOT D5 is looking for other agencies to change from Siemens to Intelight.

Osceola County

May 9, 2019

Attendees: Tawny Olore, Transportation & Transit Executive Director; Kathy Lee, Traffic Operations Engineer; and Alex Laffey, Signal Timing Engineer (County), Alan Danaher (WSP), Nick Spatola (FDA)

General CAV Readiness

- The County is generally familiar with CAV.
- Understand the basics of CAV and are interested in the impacts to both the County's infrastructure and land use.
- Want to gain an understanding of the standards that should be implemented, so that the requirements for CAV can be included in future projects.
    - Would like to see recommendations for design that include equipment that should be installed and roadway features to consider for AV.
- The County is interested in the land use code changes that should be considered for CAV.

Roadway Infrastructure

- Almost all of the signals within the County are interconnected with FOC.
- The County uses Econolite traffic signal controllers and the Centracs ATMS platform.
- Traffic signal operations are monitored from the Osceola County TMC.
- Network of devices including CCTV cameras, Bluetooth readers, and GPS pre-emption systems.
- Currently working to deploy real-time data collection using video detection at signals.

Staff Proficiency/Training Plans

- The County will be taking over maintenance responsibility for the traffic signals from the City of Kissimmee and St. Cloud in the coming months.
- Currently working to hire signal maintenance staff.
- Majority of their training comes from vendors or demos.
- Would be interested in regional training between MetroPlan jurisdictions.
- Believe that hands on training is need.

System and Network Capabilities

- The County has an extensive FOC network and are working to further expand.
- Working with FDOT D5 to integrate their existing systems into SunGuide.
- Working on TSM&O master plan for the County.

Potential CAV Testing Locations

- New corridors in planning that may be good candidates for testing such as Neptune Road.
- The NeoCity development is currently underway and may be a good location to test both CV and AV, since it is a technology corridor.
- School zones and SunRail crossing at Neptune Road would also be good locations for testing safety applications.
- Interested in the timeframe for widespread deployment.

Equity Challenges

- How is CAV included in redevelopment projects?
- Understand that all road users should benefit from CAV technologies.

Reedy Creek Improvement District (RCID)

May 24, 2019

Attendees: Lee Pulham, Planner; and Steven Elliott; Planner (RCID), Amy Dunham (WSP), Nick Spatola (FDA)

General CAV Readiness

- RCID is well prepared to accommodate CAV technologies.
- CAV is a focal point of the region.
- Currently looking to deploy SPaT.

Roadway Infrastructure

- Signals are monitored in-house and most small maintenance items are handled in-house.
- Larger jobs are handled by a contractor, typically Control Specialists.
- Use Siemens controllers and TACTICS ATMS platform.
    - 36 signalized intersections with 23 m50 controllers and 13 m60 controllers.
    - Working to change over to m60 to allow for CV applications.
- DMS signs and electronic display signs. 24 CCTV cameras.
- All intersections have video detection and Blincsy Bluetooth/Wi-Fi readers.
- All signing and pavement markings and roadway improvements handled with planned projects.
    - Infrastructure is well maintained to meet aesthetic requirements.

Staff Proficiency/Training Plans

- Majority of training provided by product vendors.
- Numerous vendors want to have equipment deployed within the RCID.
- Attend conferences and seminars.
- Staff of three people, including two TMC operators.
- Trying to determine a path forward with a quickly changing marketplace in regards to CAV.
- RCID supports CAV technology.

System and Network Capabilities

- Existing FOC network throughout the area.
- Currently planning for 5G deployment.
- Using cloud networks for data management to reduce impact to FOC network
    - Currently all data from Blincsy sent to the cloud.
- Data increase from CAV would require upgrades to FOC network.

Potential CAV Testing Locations

- Looking to replace existing Blincsy units with DSRC version.
- Trying to set-up SPaT applications.
- No discussion on AV yet, but open to testing.
- Expect that most of the current efforts will be focused on the traffic signals.
- Would like to look for applications at mid-block locations.
- Safety applications would be a good option.

Equity Challenges

- Small jurisdiction surrounded by major arterials that are managed by other larger agencies.
- Main focus when working with adjacent agencies is managing how traffic enters the RCID.

Seminole County

May 10, 2019

Attendees: Frank Consoli, Deputy Public Works Director; Charlie Wetzel, County Traffic Engineer; and Mary Moskowitz, Transportation Planning Manager (County), Alan Danaher (WSP), Nick Spatola (FDA)

General CAV Readiness

- The County has a good working knowledge of CAV and is well positioned to implement CAV technologies.
- They currently have a pilot project underway along SR 434 to deploy DSRC at six intersections.
- Currently handling requests from 5G providers to install small cell towers throughout the County.
    - Currently installing on utility poles but have had requests to install on traffic signal structures.
- Working with two companies to provide SPaT data from ATMS.now.
    - The end user has access to the data through a cellular application.
    - Currently being tested in-house only. The data is not available to the general public.
    - Connected Signals - https://connectedsignals.com/
    - Traffic Technology Services - https://www.traffictechservices.com/
- The County is looking to replace existing BlueToad Bluetooth units with BlueToad RSUs.
    - The specifications for the BlueToad RSU have been added to the County standards.

Roadway Infrastructure

- Almost all of the signals within the County are interconnected with FOC.
- The County recently finished transitioning all of their traffic signal controllers to ATCs.
- The County uses Trafficware as their ATMS platform, and they have the CV model for the platform.
- The County has numerous devices deployed countywide including CCTV cameras, BlueTooth readers, and adaptive signal control, amongst other technologies.
- Recent 5G regulations established by Florida Legislature.
- County doesn't want 5G mounted on signal mast arm poles.

Staff Proficiency/Training Plans

- The County's staff currently maintains all of the traffic signals with Seminole County.
- They currently receive a majority of their training through IMSA seminars, vendor training, or in-house staff training.
- Understand the need for technology training, and they are currently working to improve computer-based training for staff.
- The goal is to add one person to the signal staff per year; however, this is not always possible due to shortage of qualified applicants.
    - Working with FDOT D5 on vocational training programs at the local technical schools.
- Would like to have training through FDOT D5 on new and emerging technologies.
- Gain champions within the County Commission to further CAV.
- Need to work with FDOT D5 on maintenance agreements.

System and Network Capabilities

- The County has an extensive FOC network; however, they have a limited number of spare pairs if additional connections are needed.
- Load on servers and data storage is also an issue.

  - Recently transitioned their Bluetooth data to the cloud, which increase storage capacity and reduced server load.
  - See the potential of hosting data in the cloud or having FDOT D5 store the data generated by CAV.
  - A similar approach was taken with the County's ATSPM data.
  - FDOT D5 has the ability to use outside resources to assist with data management that the County does not.

Potential CAV Testing Locations

- Currently planning to deploy BlueToad RSUs along Lake Mary Boulevard.
- Potential test locations could include the following:
  - At railroad crossings, specifically warning for vehicles stopped on tracks
  - Along US 17/92, specifically pedestrian in roadway warnings
  - SR 436
  - Five Points development
  - Regan Center/Parkside Place
  - Potential to place AV shuttles on extensive trail system
- The County believes that AV shuttles will be taken up at the City level, and the County would support from the infrastructure end.
- Look for opportunities to demonstrate CAV applications to the public, such as news stories, presentations to County Commission, and press releases.
- Look for early successes.

Equity Challenges

- How is CAV included in redevelopment projects, specifically parking?
- Brought up that people may demand CAV technology before the local agencies are ready.
- Have concern about how end users will deal with multiple applications and interfaces based on the CAV equipment and manufacturer's requirements.

Florida's Turnpike Enterprise (FTE)

May 31, 2019

Attendees: John Easterling, District Traffic Operations Engineer (FTE), Amy Dunham (WSP), Nick Spatola (FDA)

General CAV Readiness

- In general, the FTE is preparing for CV technology and has general buy-in across the agency for embracing and supporting CV.
- In terms of AV, there isn't as much focus on it since that will be tackled primarily by jurisdictions and vehicle manufacturers.
- FTE is working on a similar CAV Readiness Document, being performed by Metric Engineering, and should have a final draft of their Best Practices document by July.

Roadway Infrastructure

- There are no signals on the FTE system, just freeway miles, so their infrastructure focuses upon cameras, processing information, etc.
- The ITS system at FTE has been updated over the past few years (much of it was over 10 years old), but FTE doesn't have DSRC on any of their roadways yet.

  - Upgrades to the ITS system are on-going.
- After the CV pilot in South Florida, FTE anticipates specific recommendations on places they need to make other roadway infrastructure improvements to prepare for CV.
- To prepare for AV use on FTE roadways, striping is more than adequate (using FDOT D5 guidance), but FTE is unsure if their existing signage conforms to AV recommendations.
  - Existing maintenance contracts to maintain striping.
- Preference is to deploy low risk proven systems.

Staff Proficiency/Training Plans

- Majority of the staff is provided by consultants.
- Limited exposure to CAV.
- Existing FTE staff are usually trained at FDOT D5, ITE, or ITS Florida trainings, but nothing yet has been extremely CAV-specific. However, FTE would welcome CAV-specific trainings.
- Consultant working for FTE sometimes receive additional vendor trainings or other conference trainings (Cisco) on new systems.
- There is an agency-wide need for additional training on CAV technologies and equipment.
- Software training will be needed for staff for CAV applications.
- Working to determine the appropriate types of training to enhance CAV knowledge.
- Need to determine if a specific role will be required for AV operations.
- Starting to plan for the future:
  - Installing EV charging stations.
  - Reviewing the potential to use express lanes for AV.

System and Network Capabilities

- The entire FTE system has a fiber-optic background and shares fiber with FDOT D5 and CFX to connect across other gap areas in their system.
- Working to upgrade network equipment, replacing switches, etc.
- Goal is to get 10 Gbps speed across network.

Potential CAV Testing Locations

- FTE is currently preparing for a CV pilot in South Florida (in a parking lot – five vehicles) and will be using Cohda for the pilot (based on recommendations from FDOT D5 staff).
  - One key element that FTE is looking at will be data flow and management from CV.
- FTE is constructing the SunTrax facility, an off-system CAV testing facility in Polk County.
  - FTE will have an operator that will oversee SunTrax operations.
  - Test bed for CV and AV technologies in the region.
- For future CV testing locations, FTE would likely choose locations closest to FTE offices or parking lots, since their focus is freeway operations, or interchanges, and many of the places where CV would be helpful involve curve warnings, wrong way detection, etc.
- Numerous vendors approach FTE for testing.
  - Have tested automated truck platooning.
  - Approach by AV companies for testing.

Equity Challenges

- All FTE facilities are constructed and maintained using toll revenues collected on the FTE system.
- Provide ease of access and mobility to and within the FTE system.
- Consider state, regional, and local impacts, since FTE operated across multiple FDOT districts.
- Board support with FTE for CAV technologies.

- FTE will definitely collaborate with FDOT D5 and other agencies on providing recommendations on vendors, equipment, etc.

Appendix B: Equipment Inventory

Maintaining Agency Contacts & Signal Equipment Manufacturer							
Maintaining Agency	**Contact**	**Phone**	**Email**	**Signal Controller Manufacturer**	**Existing Equipment**	**CV Compatibility**	**Notes**
City of Orlando	Benton Bonney	407-246-3626	benton.bonney@cityoforlando.net	Trafficware	980	No	
					980 ATC	Yes	
Greater Orlando Aviation Authority	Brad Fricl	407-825-3139	bfricl@goaa.org	Trafficware			
Orange County	Hazem El-Assar	407-836-7866	Hazem.El-Assar@ocfl.net	Siemens	M50 (4 mg flash memory)	No	Siemens controllers to be replaced with Intelight controllers. Each controller requires a CV module.
					M50 (8 mg flash memory)	No	
					M50 with InSync	No	
					Eagle 3000	No	
				Intelight	ATC	Yes	
City of Apopka	Pam Richmond	407-703-1718	PRichmond@apopka.net	Siemens		No	
						No	
City of Maitland	Alyssa Eide	407-875-3693	aeide@itsmymaitland.com	Siemens		No	
						No	
City of Winter Garden	Jon Williams	407-656-4111	jwilliams@cwgdn.com	Siemens		No	
						No	
City of Winter Park	Don Marcotte	407-599-3424	dmarcotte@cityofwinterpark.org	Siemens		No	
						No	
Osceola County	Alex Laffey	407-742-0551	Alex.Laffey@OSCEOLA.ORG	Econolite	ASC3	Yes	
					Cobalt	Yes	
City of Kissimmee	Nabil Muhaisen	407-518-2275	nmuhaisen@kissimmee.org	Econolite	ASC3	Yes	
					Cobalt	Yes	
City of St. Cloud	Kevin Felblinger	407-597-7344	kfelblinger@stcloud.org	Econolite	ASC3	Yes	
					Cobalt	Yes	
Seminole County	Charles R. Wetzel	407-665-5686	cwetzel@seminolecountyfl.gov	Trafficware	980 ATC with Synchro Green	No	Each controller requires a CV module.
					980 ATC with InSync	No	
					980 ATC	Yes	
					ATC	Yes	
City of Altamonte Springs	Brett Blackadar	407-571-8538	BBlackadar@altamonte.org	Trafficware			
City of Casselberry	Kelly Brock	407-262-7725 x1235	kbrock@casselberry.org	Trafficware			
City of Lake Mary	Krystal Clem	407-585-1412	kclem@lakemaryfl.com	Trafficware			
City of Longwood	Shad Smith	407-585-1412	ssmith@longwoodfl.org	Trafficware			
City of Sanford	Mike Cash	407-688-5148	Michael.Cash@Sanfordfl.gov	Trafficware			
City of Oviedo	Bobby Wyatt	407-971-5648	bwyatt@cityofoviedo.net	Trafficware			
City of Winter Springs	Bryant Smith	407-327-8979	bsmith@winterspringsfl.org	Trafficware			
Central Florida Expressway	Bryan Homayouni	407-690-5333	bryan.homayouni@cfxway.com	Varies			Meet standards of agency/jurisdiction where the intersection is located.
Reedy Creek Improvement District	Max Elliott	407-848-8124	Selliott@RCID.org	Siemens	M50	No	All M50 controllers to be replaced with M60 controllers within one year.
					M60	Yes	
Florida's Turnpike	John Easterling	954-934-1620	John.Easterling@dot.state.fl.us	N/A			

(*) Did not specify
7/3/2019

Equipment Deployments													
Maintaining Agency	Roadside Units (RSU)	On-board Units (OBU)	Centralized CV Applications	Autonomous Shuttles	Intersection Movement Count Cameras	Adaptive Signal Systems	CCTV Cameras	Passive Pedestrian Detection	ATSPM	EVP/TSP	Remote Power Management	Bluetooth/Wi-Fi Detection Units	MVDS
City of Orlando	Pending	Pending	Yes (SPaT)	Pending	Yes	TBD	Yes	No	No	Yes	No	Yes	TBD
Greater Orlando Aviation Authority	No	No	No	No	No	No	No	No	No	No	No	No	No
Orange County	Pending	Pending	No	No	No	Yes (InSync)	Yes	Pending	Yes	Yes	No	Yes	Yes
City of Apopka	No	No	No	No	No	No	No	No	No	Yes	No	No	No
City of Maitland	No	No	No	No	Yes	No	Yes	No	No	Yes	No	Yes	Yes
City of Winter Garden	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No
City of Winter Park	No	No	No	No	Yes	No	No	No	No	Yes	No	TBD	TBD
Osceola County	No	No	No	No	Yes	No	Yes	No	No	Yes	No	Yes	*
City of St. Cloud	No	No	No	No	No	No	No	No	No	Yes	No	No	No
City of Kissimmee	No	No	No	No	No	No	No	No	No	Yes	No	No	No
Seminole County	Pending	Pending	Yes (SPaT)	No	Pending	Yes (InSync, Synchro Green)	Yes	Pending	Yes	Yes	Yes	Yes	Yes
City of Altamonte Springs	No	No	No	No	No	Yes (Synchro Green)	Yes	No	Yes	Yes	No	Yes	No
City of Casselberry	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No
City of Lake Mary	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No
City of Longwood	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No
City of Sanford	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No
City of Oviedo	Pending	No	No	No	No	Yes (InSync)	Yes	No	Yes	Yes	No	Yes	No
City of Winter Springs	No	No	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No
Central Florida Expressway	Yes	No	No	No	No	No	Yes	No	No	No	No	No	Yes
Reedy Creek Improvement District	No	No	No	No	Yes	No	Yes	No	Yes (some locations)	Yes	Yes	Yes	*
Florida's Turnpike	No	No	No	No	N/A	N/A	Yes	No	N/A	N/A	-	Yes	Yes

(*) Did not specify
7/3/2019

Communications & Network Infrastructure										
Maintaining Agency	Traffic Management Center	ATMS Platform	Communications	Type of Communications	Switch Type	Switch Port Capacity	Network Type	Network Structure	IP Standard	Available IP Addresses
City of Orlando	Yes	ATMS.now	Yes	FOC	TBD	TBD	TBD	TBD	TBD	TBD
Greater Orlando Aviation Authority	No	No	Yes	FOC	*	*	*	*	*	*
Orange County	Yes	TACTICS/MaxView	Yes	FOC/Wireless/ Cellular	Layer 3: Juniper EX4300 32F Layer 2: ITS Express 3416	Yes	Gigabit Ethernet	Layer 3/Layer 2	FDOT Statewide	Yes
City of Apopka	No	No	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Maitland	Connected to Orange County TMC	No	Yes	FOC/Wireless	TBD	TBD	TBD	TBD	TBD	TBD
City of Winter Garden	No	No	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Winter Park	Connected to Orange County TMC	No	Yes	FOC/Wireless	TBD	TBD	TBD	TBD	TBD	TBD
Osceola County	Yes	Centracs	Yes	FOC	Etherwan	Yes	Ring Topology	Unknown	10.39 Subnet	Yes
City of Kissimmee	Connected to Osceola County TMC	N/A	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of St. Cloud	No	No	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Seminole County	Yes	ATMS.now	Yes	FOC	TS2 Layer 2 Cabinet Ethernet Switch with built in Optical Fiber Bypass Switch, built in Dual Redundent Power Supplies	Yes	MAN - connects all traffic signals, ITS devices, etc. throughout Seminole County which also connects to FDOT D5	Layer 3/Layer 2	10.46.X.X segment	Yes
City of Altamonte Springs	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of Casselberry	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of Lake Mary	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of Longwood	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of Sanford	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of Oviedo	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
City of Winter Springs	Connected to Seminole County TMC	No	Yes	FOC	N/A	N/A	N/A	N/A	N/A	N/A
Central Florida Expressway	Yes	N/A	Yes	FOC	*	*	*	*	*	*
Reedy Creek Improvement District	Yes	TACTICS	Yes	FOC	ITS Express	Yes	IP	Layer 2	172.19.1XX.XXX	*
Florida's Turnpike	Yes	N/A	Yes	FOC	TBD	TBD	TBD	TBD	TBD	TBD

(*) Did not specify
7/3/2019

Staffing & Training							
Maintaining Agency	Maintenance	Number of Signals	Number of Technicians	CAV Training	IMSA Training	Industry Training	Manufacturer Training
City of Orlando	In-house	TBD	TBD	No	Yes	Yes	Yes
Greater Orlando Aviation Authority	City of Orlando	N/A	N/A	N/A	N/A	N/A	N/A
Orange County	In-house	618	20	No	Yes	Yes	Yes
City of Apopka	In-house	TBD	2	No	TBD	TBD	TBD
City of Maitland	Consultant/Contractor	N/A	N/A	N/A	N/A	N/A	N/A
City of Winter Garden	Consultant/Contractor	N/A	N/A	N/A	N/A	N/A	N/A
City of Winter Park	In-house	TBD	TBD	No	Yes	TBD	TBD
Osceola County	In-house	210	6	No	Yes	Yes	Yes
City of Kissimmee	In-house	10	6	No	Yes	Yes	Yes
City of St. Cloud	City of Kissimmee	N/A	N/A	N/A	N/A	N/A	N/A
Seminole County	In-house	397	17	No	Yes	Yes	Yes
City of Altamonte Springs	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
City of Casselberry	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
City of Lake Mary	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
City of Longwood	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
City of Sanford	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
City of Oviedo	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
City of Winter Springs	Seminole County	N/A	N/A	N/A	N/A	N/A	N/A
Central Florida Expressway	In-house	49	*	*	*	*	*
Reedy Creek Improvement District	In-house/Contractor	38	3	None	Traffic Signal Lv 2, Advanced Inspector	Advanced MOT, Fiber Tech	Iteris, Blyncsy, Siemens, Daktronics, Trafficware
Florida's Turnpike	Consultant/Contractor	N/A	N/A	Yes	N/A	Yes	Yes

(*) Did not specify
7/3/2019