OSCEOLA COUNTY
TSM&O STRATEGIC PLAN

METRIC ENGINEERING

DOCUMENT CONTROL PANEL		
File Name:	Osceola County TSMO Strategic Plan	
File Location:	R:\PROJECT\OSCEOLA CO. CONT SERVICES\ITS Strategic Plan\Task 5	
Deliverable Number:	1	
Version Number:	1.0	
	Name	Date
Created By:	Mohammad Akber, P.E. (Metric)	May 7th, 2020
Reviewed By:	Dale W. Cody, P.E., PTOE (Metric)	May 7th, 2020
	Dale W. Cody, P.E., PTOE (Metric)	May 25th, 2020
	Dale W. Cody, P.E., PTOE (Metric)	June 2nd , 2020
Modified By:	Mohammad Akber, P.E. (Metric)	May 12th, 2020
	Mohammad Akber, P.E. (Metric)	May 22nd, 2020
	Mohammad Akber, P.E. (Metric)	June 2nd , 2020
Approved By:		

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Appendix A – Standard Operating Guidelines (SOG)
Appendix B – City of Kissimmee Meeting Minutes
Appendix C – LYNX Vision 2030 Network Maps
Appendix D – Intersection Improvement Lists
Appendix E – Future Land Use Maps
Appendix F– Opportunity Cost Formulas
Appendix G – Deployment Cost Estimates
Appendix H– Deployment Maps
Appendix I –Standard Operating Procedure (SOP)
Appendix J – ConOps
Appendix K – PSEMP
Appendix L– RITSA

LIST OF ACRONYMS

AAA ..... Authentication, Authorization, and Accounting
ATMS ..... Advanced Traffic Management Systems
AFV ..... Alternative Fuel Vehicle
APC ..... Automated Passenger Counter
ASN ..... Autonomous System Numbers
ATIS ..... Advanced Traveler Information Systems
ATDM ..... Active Transportation and Demand Management
ATMS ..... Advanced Traffic Management Systems
ATS ..... Adaptive Traffic Signal
AVL ..... Automated Vehicle Locations
BEBR ..... Bureau of Economic and Business Research
BGP ..... Border Gateway Protocols
BSM ..... Basic Safety Messages
CAC ..... Citizen's Advisory Committee
CAV ..... Connected and Autonomous Vehicles
CBRAS ..... Citizens Band Radio Advisory System
CCTV ..... Closed Circuit Television
CFX ..... Central Florida Expressway Authority
ConOps ..... Concept of Operations
CV ..... Connected Vehicle
DOT ..... Department of Transportation
DMS ..... Dynamic Message Sign
D-RIDE ..... Dynamic Ridesharing
DSRC ..... Dedicated Short-Range Communications
EEBL ..... Emergency Electronic Break Light
EVAC ..... Emergency Communications and Evacuation
FCW ..... Forward Collision Warning
FAR ..... Floor Area Ratio
FDOT ..... Florida Department of Transportation
FLHSMV ..... Florida Highway Safety and Motor Vehicles
FMS ..... Freeway Management Systems
FOC ..... Fiber Optic Cable
FRATIS ..... Freight Advanced Traveler Information System
HAR ..... Highway Advisory Radio
HAWK ..... High Intensity Activated Cross Walk
ICM ..... Integrated Corridor Management
IMA ..... Intersection Movement Assist

IMC ..... Intersection Movement Counts
INC-ZONE ..... Incident Scene Work Zone Alerts for Drivers and Workers
IP ..... Incident Scene Work Zone Alerts for Drivers and Workers
I-SIG ..... Intelligent Traffic Signal System
ITS ..... Intelligent Transportation Systems
ITSFM ..... ITS Facility Management
iVEDDS ..... Interagency Video and Event Data Distribution Software
JPA ..... Joint Participation Agreements
LRTP ..... Long Range Transportation Plan
MIMS ..... Maintenance and Inventory Management System
MDSS ..... Maintenance Decision Support System
MOU ..... Memorandums of Understanding
MPLS ..... Multiprotocol Label Switching
MSDP ..... Multicast Service Discovery Protocol
MVDS ..... Microwave Vehicle Detection Systems
O&M ..... Operations and Maintenance
PeDM ..... Probe Enabled Data Monitoring
PD&E ..... Project Development and Environment
PREEMPT ..... Emergency Vehicle Preemption
PSEMP ..... Project Systems Engineering Management Plan
Q-WARN ..... Queue Warning
RADIUS ..... Remote Authentication Dial-in User Service
RCI ..... Reliable Change Index
RESP-STG ..... Incident Scene Pre-Arrival Staging Guidance for Emergency Responders
RISC ..... Rapid Incident Scene Clearance
RITSA ..... Regional ITS Architecture
RRFB ..... Rapid Rectangular Flashing Beacons
SLA ..... Service Level Agreement
SOG ..... Standard Operating Guidelines
SOP ..... Standard Operating Procedures
TAC ..... Technical Advisory Committee
TACACS+ ..... Terminal Access Controller Access-Control System Plus
T-DISP ..... Dynamic Transit Operations
TIA ..... Traffic Impact Analysis
TIM ..... Traffic Incident Management
TMP ..... Transportation Management Plan
TNC ..... Transportation Network Companies
TSM&O ..... Transportation Systems Management and Operations
TSM ..... Transportation Systems Management

TSP ..... Transit Signal Priority
UCF ..... University of Central Florida
USDOT ..... United Stated Department of Transportation
VDS ..... Video Detection System
VDTO ..... Vehicle Data for Traffic Operations

OSCEOLA COUNTY
TSM&O STRATEGIC PLAN

SECTION 1
Executive Summary

1. EXECUTIVE SUMMARY

1.1 Background Information

Osceola County is centrally located within the state of Florida and is one of the fastest growing counties, with a projected growth rate of 4.42%, according to the most recent United States census data. Most of the residents of the County travel to and from their destinations (work, shopping, recreation, etc.) using personal vehicles, creating heavy traffic on the roadways. Osceola County will continue to face many challenges with regards to the transportation network within the region. As more homes, commercial businesses, and attractions are starting to gain desirability in the County, this will lead to recurring congestion at peak travel times (morning and evening rush hours) and traffic incidents, both of which decrease the capacity of the roadways. Transportation Systems Management and Operations (TSM&O) is an innovative way of managing and maintaining the roadways using technology to maximize the potential of infrastructure investments that the County already has. Implementing TSM&O technologies more onto the arterials will aid in the reduction of congestion by giving more powerful tools to roadway operators and providing traffic information to motorists so that they can make informed route and mode choice solutions.

As Osceola County expands with population growth due to increased development in the County and urban sprawl from the Greater Orlando area, an improved transportation network using TSM&O tools, including Intelligent Transportation Systems (ITS), will allow the County to better accommodate the congestion brought on by this growth. Using these tools adequately will allow the County to move away from accommodating more vehicles exclusively through roadway widening. TSM&O has proven to be a tried and true way of providing unmatched service to freeway management agencies within Florida. If applied correctly, TSM&O can do the same for the arterial roadway network saving the County and its residents millions of dollars annually in terms of delay reduction, fuel consumption, gas emissions, and safety benefits, ultimately resulting in what is being called Active Arterial Management (AAM).

The Federal Highway Administration (FHWA) has been promoting the approach of using TSM&O to improve the overall performance of the transportation network (Freeway and Arterial). TSM&O is a performance driven approach for solving traffic related problems and minimizing congestion through the utilization of ITS, signal system control, and other management and operational strategies to locate and minimize the causes of delays in real-time. The objective of the TSM&O program is to improve the efficiency of the existing transportation network through performance monitoring and coordinating freeway and arterial management strategies, such as incident management. The TSM&O Program also considers future technologies and the importance of improving the overall efficiency of the transportation network.

The Osceola County TSM&O Strategic Plan provides the framework for improving the roadway network of the County in the future using effective TSM&O strategies. The plan will assess the existing conditions of the County, determine the needs, identify applicable TSM&O strategies/deployments, provide a Benefit/Cost analysis, and detail the operations and maintenance needs of the County.

1.2 Causes of Congestion

A main goal of the TSM&O Strategic Plan effort was effective stakeholder input. Several stakeholders (see Section 3.5) were met with at one-on-one interviews to determine their assets and individual needs, and also were invited to periodic meetings to hear the progress of the Strategic Plan and provide input regarding their individual needs. Across the board, it was determined that inadequate funding for Operations and Maintenance (O&M) of individual stakeholder assets is a critical concern. All signals within the County are operated and maintained by Osceola County Traffic Operations. Through the use of TSM&O improvements, leading to the ultimate goal of AAM, Osceola County will be able to optimize their transportation network and perform to performance-based standards.

1.3 Recommendations

After consulting with stakeholders and identifying the causes of congestion, a summary of all TSM&O strategies, both recommended and optional, have been proposed as a part of this Strategic Plan, including recommended early deployments and optional expansion tactics. These are detailed in Section 6.

1.4 Opportunity Cost

The previously described shortage of O&M resources has generated costs to the motorists that can otherwise be avoided. The absence of these resources can be considered an Opportunity Cost, meaning how much the traveling public will pay if improvements are not made. It has been determined that should the improvements recommended by this Strategic Plan not be put in place, the cost incurred by the residents of Osceola County will be an estimated **$79.1 million per year.**

1.5 Cost of Improvements/Solutions

To identify what size of an investment will be required, a high-level cost analysis was performed to estimate the capital investments required and the amount of O&M funding required for each deployment. These investments aim to bolster the TSM&O infrastructure for the County to accommodate inevitable population growth that will come as the region becomes more developed. The estimated cost to build out the recommended deployments and operate and maintain them adequately for 10 years is $19,984,479. See Table 8 for a detailed breakdown of this cost.

1.6 Benefit/Cost Analysis

Because the TSM&O improvements will be funded via taxpayer funds, a Benefit/Cost Analysis was performed in order to demonstrate how much benefit would be brought to motorists for every public dollar spent. This analysis was performed by comparing the 10-year opportunity cost of not implementing TSM&O improvements (see Section 6.1.3) to the 10-year improvement cost, and representing this as a ratio. The total benefit/ratio for the Strategic Plan is estimated to be **18.8:1**.

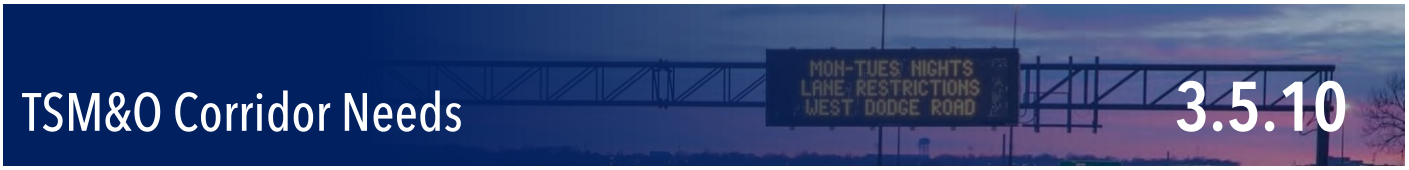
1.7 TSM&O Benefits

With the difficulty of expanding capacity on the roadways in Osceola County due to increasing funding needs and challenges, TSM&O improvements will allow the County to increase return on large investments already put in place (i.e. roadway network, traffic signals, etc.). They will also allow for increased coordination between user agencies due to the

increase in communications and surveillance technologies that will be deployed. These factors will lead to the following potential benefits:

- Increased safety for motorists
- Increased safety for first responders
- Increased real-time management of roadway network
- Reduced motorist delays
- Greater travel time reliability
- Fewer secondary incidents
- Fuel savings/reduced negative environmental impacts.

KEY RECOMMENDATIONS



TSM&O Corridor Needs **3.5.10**

Effective Security Measures **3.6.1**

TSM&O Strategies for an Improved Transportation Network **4.1**

Connected Vehicles **4.2**

Preparing the Roadway for CAV (Intersection Standardization) **4.3.2**

Expanding TSM&O in Osceola County **5.1**

Deployment Projects **6.1.2**

Staffing Analysis **7.1**

TMC Staffing **8.1**

SECTION 2

Overview of MetroPlan Orlando ITS Master Plan

2. OVERVIEW OF METROPLAN ORLANDO ITS MASTER PLAN

2.1 Introduction

This section of the Strategic Plan will be reviewing the MetroPlan Orlando – ITS Master Plan and will provide an overview of all ITS existing conditions and planned expansions. It will also verify if these existing conditions are still valid or need to be updated.

2.2 Stakeholders & Steering Committee

2.2.1 Steering Committee

The following is a list of the steering committee members for the overall ITS Strategic Plan:

a. Kathy Lee,407-742-0553: kathy.lee@osceola.org
b. Lindsey Giovinazzo, 407-742-9166: lindsey.giovinazzo@osceola.org
c. Marianne Arneberg, 407-492-0836: marianne.arneberg@osceola.org
d. Gary Yeager, 407-742-7516: gyea@osceola.org

2.2.2 Stakeholders

The following page provides a table of all the stakeholders.

Table 1 – Stakeholders

#	Stakeholder	Contact	Phone #
1	Central Florida Expressway Authority	Bryan Homayouni	407-690-5000
2	City of Kissimmee	Nabil Muhaisen	407-518-2275
3	City of St. Cloud	Christopher Mills	N/A
4	City of St. Cloud	Eka Febrina	407-957-7259
5	FDOT D5	Jeremy Dilmore, P.E.	800-780-7102
6	Florida's Turnpike Enterprise	John Easterling, P.E.	954-934-1620
7	Kissimmee Fire Department	Jeremy Donovan (Chief Donovan)	407-518-2222
8	Kissimmee Police Department	Mariam Habibzadegan	407-846-3333
9	Kissimmee Public Works & Engineering	Robert Masiku	407-518-2174
10	LYNX	Rose Hernandez	407-254-6063
11	MetroPlan Orlando	Eric Hill	407-481-5672
12	Osceola County 911/Emergency Communications (Handled through Sheriff's Office)	N/A	407-742-5911
13	Osceola County Emergency Management / Emergency Operations Center	Richard Halquist	407-742-9016
14	Osceola County Fire Rescue & EMS	Larry Collier	407-742-7000
15	Osceola County Sheriff's Office	Daniel Caban	407-348-2222
16	Osceola Fleet Management	Daniel Bean	407-742-7526
17	Osceola Public Works	Danielle Slaterpryce	407-742-0699
18	School District of Osceola County Florida - Transportation	N/A	407-483-3673
19	St. Cloud Emergency Manager	Bill Johnston	407-957-7150
20	St. Cloud Fire Rescue	N/A	407-957-8488
21	St. Cloud Police Department	Sgt. Anthony Miller	407-891-6700
22	Sunrail	N/A	855-724-5411

2.3 Existing Conditions Shown in the MetroPlan Orlando ITS Master Plan

The following sections (2.3.1 through 2.3.7) identify the existing conditions shown in the MetroPlan ITS Orlando Master Plan for Osceola County.

2.3.1 ATMS Systems & Equipment

Per the MetroPlan Orlando ITS Master Plan, the existing conditions show that Osceola has 116 signals which are interconnected using approximately 80 miles of fiber optic cabling. In addition, the Master Plan identifies 71 Closed Circuit Television (CCTV) Cameras, 6 Dynamic Message Signs (DMS) and 10 Bluetooth readers, and 18 miles of fiber optic cable along Poinciana Parkway in use by the County. Please note, effective as of January 1st, 2019, Central Florida Expressway (CFX) has taken ownership of Poinciana Parkway.

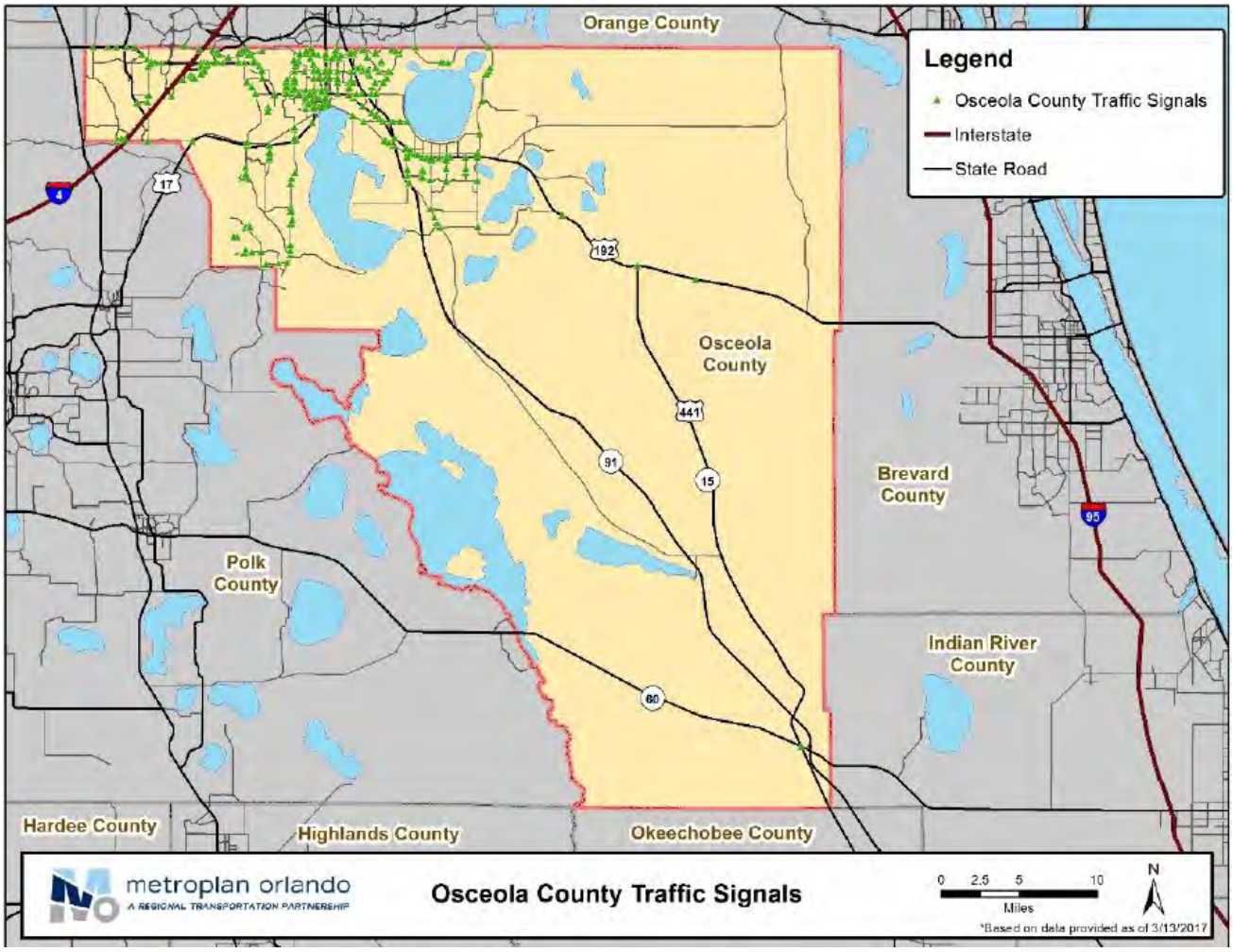


Figure 1 - Osceola County Traffic Signals

(Source: MetroPlan Orlando ITS Master Plan)

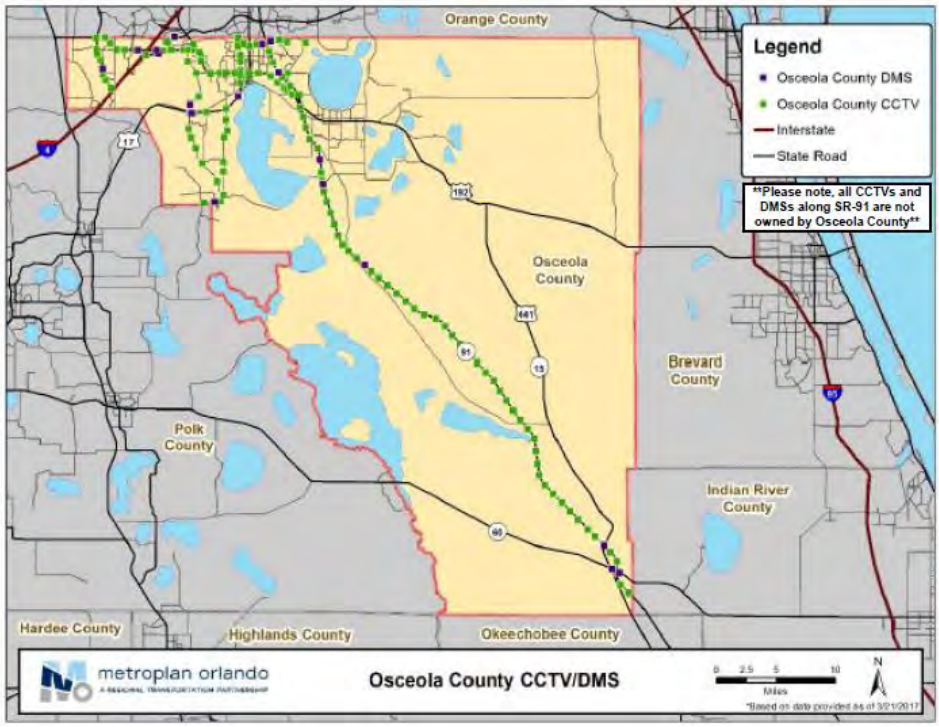


Figure 2 - Osceola County CCTV & DMS Locations

(Source: MetroPlan Orlando ITS Master Plan)

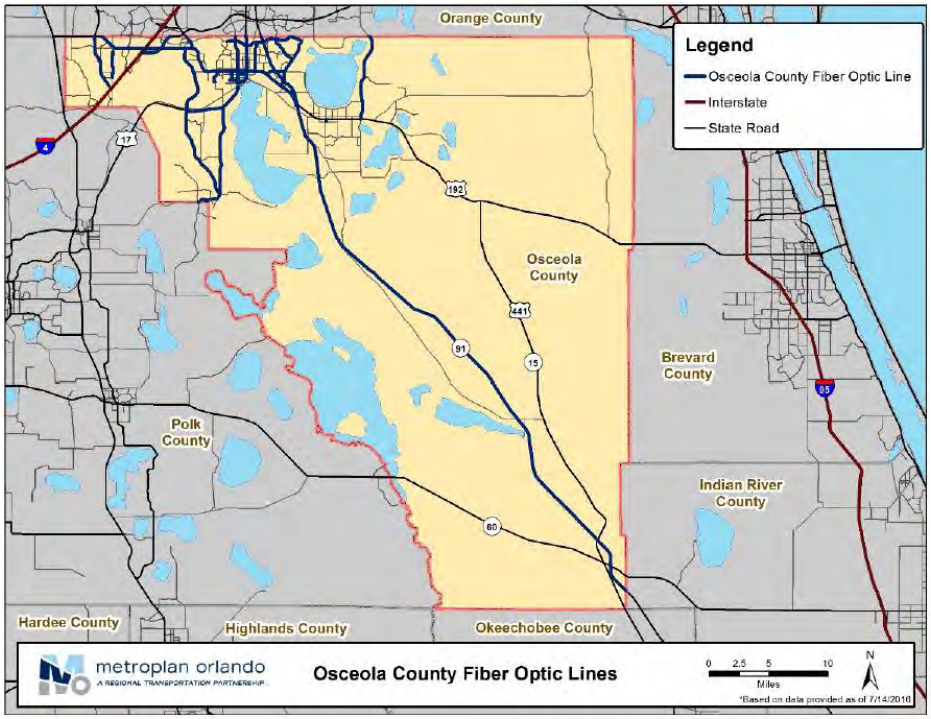


Figure 3 - Osceola County Fiber Optic Lines

(Source: MetroPlan Orlando ITS Master Plan)

2.3.2 Major Traffic Generators

Major traffic generators are not addressed in the MetroPlan Orlando ITS Master Plan.

2.3.3 Park and Ride Facilities

Park and ride facilities are not addressed in the MetroPlan Orlando ITS Master Plan.

2.3.4 Intermodal Facilities

The one intermodal facility addressed in the MetroPlan Orlando ITS Master Plan is the LYNX inventory of existing LYNX bus routes, which is shown in the Figure below.

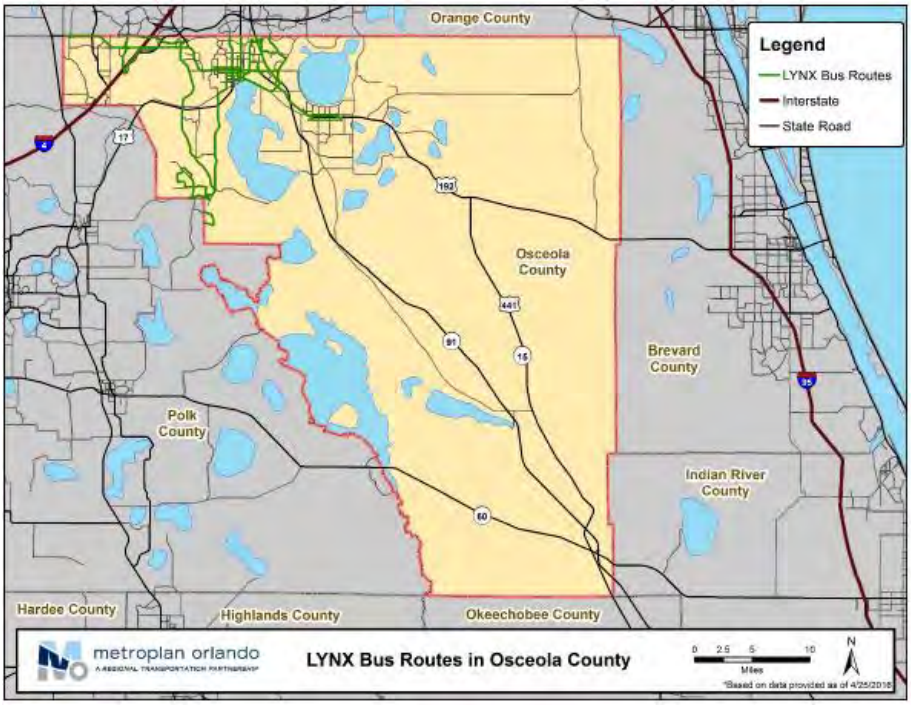


Figure 4 - LYNX Bus Routes in Osceola County

(Source: MetroPlan Orlando ITS Master Plan)

2.3.5 Evacuation Routes

Evacuation routes are not addressed in the MetroPlan Orlando ITS Master Plan.

2.3.6 Diversion Routes for Emergency Evacuations

Diversion routes for emergency evacuations are not addressed in the MetroPlan Orlando ITS Master Plan.

2.3.7 Standard Operating Procedures (SOP) and Standard Operating Guidelines (SOG)

The ITS SOP and SOG are not addressed in the MetroPlan Orlando ITS Master Plan.

2.4 Existing Conditions Since Development of the MetroPlan Orlando ITS Master Plan

The following sections (2.4.1 through 2.4.7) provide an overview of all existing conditions since the development of the MetroPlan ITS Orlando Master Plan.

2.4.1 ATMS Systems and Equipment

Since the development of the MetroPlan Orlando ITS Master Plan, Osceola County currently maintains 205 signals, 128 of which are connected to an ATMS. In addition, Osceola County went through a slight increase regarding their ITS inventory; currently the County maintains 85 CCTVs, 19 BT Readers and 6 DMS's. The miles of Fiber Optic Cable have remained the same, approximately 80 miles. The following is a breakdown of the miles of fiber optic cable located in Osceola County:

OSCEOLA/FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT) FIBER IN GOOGLE EARTH DISTANCE

US 192 – 19 miles
John Young Parkway – 10 miles
US 441 – 5 miles
Oak Street – 1.5 miles
Michigan – 2.6 miles
Osceola Parkway – 7 miles
Simpson Rd – 4.5 miles
Fortune Rd – 1.5 miles
SR 535 – 1 mile
Poinciana Blvd – 15 miles
Pleasant Hill – 9.5 miles
Buenaventura – 2.5 miles
Orange Ave – 0.5 miles

2.4.2 Major Traffic Generators

In Osceola County, the facilities that appear to have the greatest potential to generate major traffic are in the northwest corner of the County. Figure 5 identifies locations with major traffic generators.

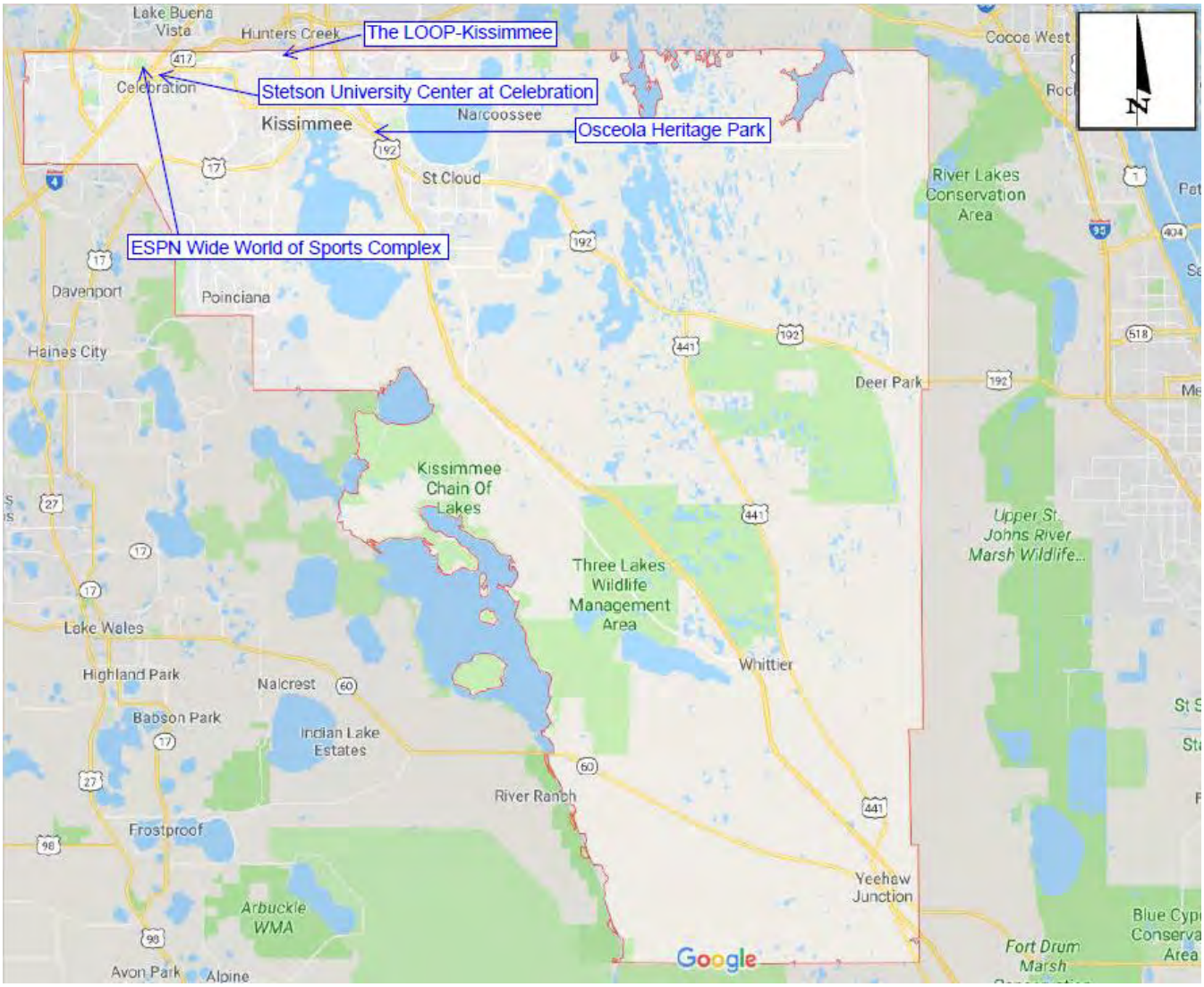


Figure 5 - Facilities That Generate High Traffic

Figure 6 - Walt Disney World Resort Area Map

(Source: High Point World Resort Website)

Walt Disney World Resort, also called Walt Disney World is located in both Orange County and Osceola County. Walt Disney World covers nearly 25,000 acres, 2/3 of it in Orange County and 1/3 in Osceola County (refer to Figure 6). Walt Disney World brings in approximately 52.5 million people annually, with 24 hotels, four theme parks, two water parks, and numerous recreational venues. All year-round tourist flock to Osceola County, making it the #1 tourist destination in the world. Walt Disney World is also the #1 reason for traffic congestion in Osceola County.

ESPN Wide World of Sports Complex is a 220-acre athletic sports complex located off US 192 (E Irlo Bronson Memorial Hwy) at 700 S Victory Way. It's owned and operated by Walt Disney World and hosts a variety of nationally and local sporting events both in the amateur and professional level. The sports complex includes 9 venue areas which host events for professional organizations that attract a large crowd. The location of the facility is very close to many Disney owned resorts, hotels and theme parks, making it prone to generate traffic when a large-scale event is hosted at the site.

Stetson University Center at Celebration is a large institution that is 36,000-square-feet is size and is located on 1.1 acres at 800 Celebration Ave. in downtown Celebration. Stetson is a nationally recognized campus and is one of the "America's Best Colleges" in the southeast according to U.S. News and World Report. Since the university is in downtown Celebration, it's used for large gatherings such as seminars, workshops and conferences for small to large groups. Coupled with the student population, these events can cause disruptions in traffic patterns, especially since many of the roads leading into and out of the campus are only 2 lanes.

Osceola Heritage Park is located off of US 192 (E Irlo Bronson Memorial Hwy) at 1875 Silver Spur Lane and covers 150 acres. It's one of the largest venues, in terms of area, in Central Florida. Osceola Heritage Park includes an Arena and Conference Center, it's used for conferences, concerts, outdoor events, and philanthropic events. As a premier venue for large gatherings, Osceola Heritage Park can generate significant traffic depending on the scale of the event.

The Loop-Kissimmee is a large shopping plaza located at the intersection of W Osceola Parkway and N John Young Parkway. The Loop holds many retail stores, restaurants, and also has a 16-screen movie theater. The Loop covers an area of 840,000 sq. ft, and is broken up into two sections, Loop East and West. Just south of Hunters Creek and at the corner of a busy intersection, the Loop is positioned in the middle of a popular suburban area in Central Florida.

2.4.3 Park and Ride Facilities

Park and Ride facilities serve as locations for motorists to collect and transfer to higher occupancy modes of travel such as transit, carpools/vanpools, and ridesharing. In Osceola County there is a Park & Ride facility at the following location:

- Kissimmee/St. Cloud Turnpike Lot, located at Shady Lane & SR 192, exit 244 (behind Speedway gas station) 901 Shady Lane Kissimmee, FL 34744

Additionally, FDOT provides a few more Park & Ride facilities at the following SunRail location:

- Tupperware SunRail station, located at 3205 Orange Avenue, Kissimmee, FL 34744
- Kissimmee/Amtrak SunRail station, located at 320 Pleasant Street, Kissimmee, FL 34741
- Poinciana SunRail station, located at 5025 S. Rail Avenue, Kissimmee, FL 34746

2.4.4 Intermodal Facilities

Intermodal facilities play an important role in improving mobility within the current transportation network. Intermodal forms of transportation involve the moving of resources via airports, transit, rail and freight, in addition to vehicular traffic. This section will cover the facilities in the region that contribute to improve the transportation network.

Kissimmee Gateway Airport is located 16 miles southwest of the central business district of Orlando and is owned and operated by The City of Kissimmee. The airport covers an area of 892 acres and accommodates general aviation air service 24 hours a day with two paved airport runways, 5,000 ft and 6,000 ft, respectively. The airport is designated as a reliever airport for the Orlando International Airport, accommodating corporate jets and other aircrafts (private and commercial).

The Kissimmee Amtrak station is a commuter rail system that serves the Greater Orlando area. It's located in the heart of Downtown Kissimmee and 13 miles southeast of Walt Disney World. The rail system served approximately 34,700 passengers in 2018, according to the website www.railpassengers.org.

The Kissimmee Connector is a local commuter rail and bus system located in Downtown Kissimmee. The Kissimmee Connector started operations on January 29, 2019 and is a free shuttle service that operates Monday – Friday between 6:30AM – 8:09AM as a continuous loop. The connection serves all SunRail trains through 8:15AM at the Kissimmee Amtrak Station. The following stops are:

- Kissimmee Lakefront Park
- Downtown Kissimmee
- Kissimmee City Hall
- AdventHealth Kissimmee
- Osceola County Courthouse Complex
- Osceola Regional Medical Center
- Hart Memorial Central Library

2.4.5 Evacuation Routes

I-4 is a selected evacuation route by the Florida Division of Emergency Management. I-4 (eastbound), SR 528 (westbound), and Florida's Turnpike (northbound) are also identified by FDOT as one-way evacuation routes.

From the Florida Disaster Preparedness Maps, Figure 7 shows all the evacuations routes located in Osceola County.

Figure 7 - Osceola County Evacuation Routes

(Source:www.FloridaDiaster.org)

2.4.6 Diversion Routes

As the County is continuing to grow, diversion of traffic is vital to reducing major congestion problems due to events, roadway accidents and evacuations. When identifying a diversion route, it's important to note that all toll roads must be avoided as these roads will charge the driver a fee unless tolls have been lifted. Additionally, residential and local streets should not be used as a detour, as these streets are not designed for truck traffic. Lastly, when diverting traffic, it's advised to use state and county roads similar in volume for better traffic flow. Currently, the County utilizes an ad-hoc method for diversion routes, with the exception of I-4.

2.4.7 Standard Operating Procedures (SOP) and Standard Operating Guidelines (SOG)

The ITS SOG for Osceola County is provided in Appendix A. The ITS SOP for Osceola County is provided in Appendix I.

2.5 Planned Expansions Shown in the MetroPlan Orlando ITS Master Plan

The following sections (2.5.1 through 2.5.7) will go over planned expansions shown in the MetroPlan ITS Orlando Master Plan.

2.5.1 ATMS System and Equipment

Per the MetroPlan Orlando ITS Master Plan, Osceola County has several planned projects that will expand the current Advanced Traffic Management System (ATMS) infrastructure. The list below details the project name and description of each project as well as current status:

- Osceola County ATMS Phase 4 (Project ID # 6) – This county wide project will expand the existing ATMS as well as add additional Bluetooth readers.
    - Current Status:
        - Notice to Proceed (NTP) occurred on August 2019
        - In Construction as of August 2019
        - Start Date: 8/29/19
        - End Date: 8/19/20
- The City of Kissimmee ATMS Phase 1 (Project ID # 19) - This project will add 15 ATMS traffic signals.
    - Current Status: N/A
- The City of Kissimmee ATMS Phase 2 (Project ID # 34) – This project is a general expansion of the ATMS system.
    - Current Status: N/A
- US 192 Adaptive Signal System Phase 2 (Project ID # N3) – This project will install an Adaptive Signal System from Avalon Rd. to Columbia Ave.
    - Current Status: N/A
- Osceola Parkway Adaptive Signal System (Project ID # N7) – This project is an Adaptive Signal System deployment from Dyer Rd. to Florida's Turnpike.
    - Current Status: N/A
- Osceola County ATMS Phase 5 (Project ID # N15) – This county wide project is an expansion of the ATMS system from Osceola Pkwy to I-4. This project will also include upgrades to the Shingle Creek Toll Plaza.
    - Current Status:

    - At 100% Design of ATMS
    - Letting Date: TBD
- Osceola County ATMS Phase 6 (Project ID # N25) – This project is an expansion of the ATMS system. Includes City of St. Cloud, Nolte Rd., and Old Canoe Creek Rd.
    - Current Status: N/A
- Poinciana Parkway Adaptive Signal System (Project ID # N30) – This project is identified as an adaptive signal deployment. Note, this project is considered as needed from interviews.
    - Current Status: N/A

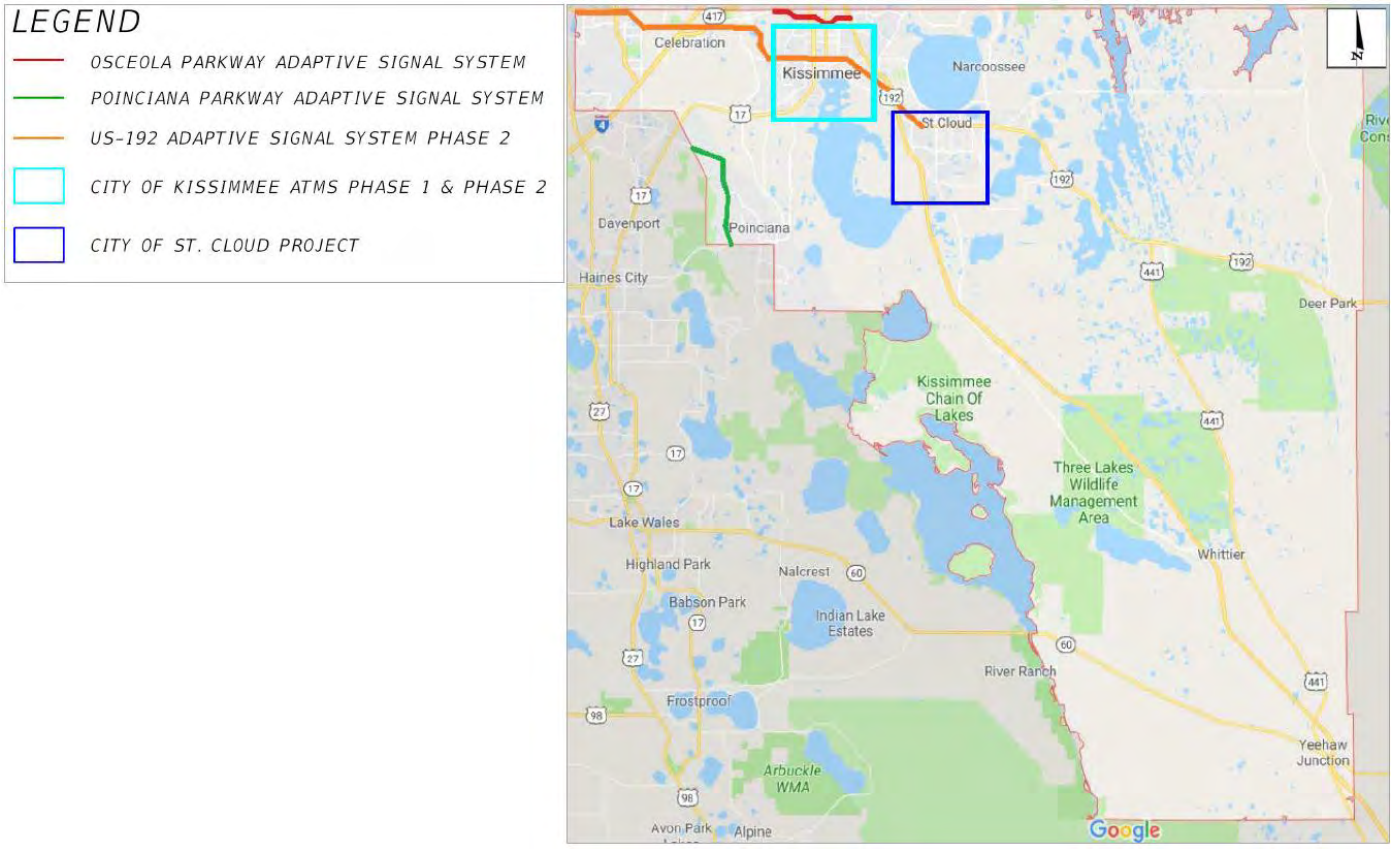


Figure 8 - Future ITS Projects for Osceola County

2.5.2 Major Traffic Generators

Planned expansion for major traffic generators is not shown in the MetroPlan Orlando ITS Master Plan.

2.5.3 Park and Ride Facilities

Planned expansion for the Park and Ride Facilities is not shown in the MetroPlan Orlando ITS Master Plan.

2.5.4 Intermodal Facilities

Planned expansion for the intermodal facilities is not shown in the MetroPlan Orlando ITS Master Plan.

2.5.5 Evacuation Routes

Planned expansion for evacuations routes is not shown in the MetroPlan Orlando ITS Master Plan.

2.5.6 Diversion Routes

Planned expansion for the diversion routes is not shown in the MetroPlan Orlando ITS Master Plan.

2.5.7 Standard Operating Procedures (SOP) and Standard Operating Guidelines (SOG)

Planned expansion to the SOP and SOG is not shown in the MetroPlan Orlando ITS Master Plan

2.6 Planned Expansions Since Development of the MetroPlan Orlando ITS Master Plan

The following sections (2.6.1 through 2.6.7) will go over planned expansions since the development of the MetroPlan ITS Orlando Master Plan.

2.6.1 ATMS System and Equipment

Per the Long Range Transportation Plan (LRTP), the list below provides the following Transportation System Management and Operations (TSM&O) prioritized projects:

- Connected Vehicle Pilot US 17/92 – This is a regionwide project to test connected vehicles strategies and guidelines.
- Traffic Signal Coordination – This is a regionwide project to test coordinate traffic signals timing on various corridors.
- Osceola County Adaptive Travel Time System – This is a countywide project to improve ITS Adaptive Systems Equipment West of US 192 Pedtrax.

Per the Five-Year Work Program on the FDOT Website, the list below provides the following TSM&O projects:

- Osceola County ATM – This is a countywide project to upgrade traffic control devices at various intersections in Osceola County
- Osceola County Video Detection Upgrades Traffic Control Devices – This project entails upgrades to the video detection and traffic control devices.
- Osceola Traffic Engineering Contracts – This is an on-going traffic engineering project which covers various traffic engineering tasks mandated by the county.

Per the Osceola County Website, the list below provides the following TSM&O projects:

- Intersection Safety & Efficiency Projects – This is considered as a Transportation System Management (TSM) project which entails a traffic study and a review of safety and operations data at intersections in Osceola County.
- Traffic Control Equipment – This project entails replacement of existing traffic control equipment not covered in the traffic signal maintenance agreement with the City of Kissimmee. This project also includes the ITS equipment replacement of 30 CCTV and ethernet switches per year for the next 3 years and 10 per year thereafter.

Lastly, below provides additional TSM&O projects not listed from the sources above:

- Poinciana Parkway ITS Fiber Project – This project entails upgrades to the existing fiber infrastructure in conjunction with adding CCTVs, DMSs, and Bluetooth readers along Poinciana Parkway.

2.6.2 Major Traffic Generators

Not applicable.

2.6.3 Park and Ride Facilities

No additional expansions are planned at this time.

2.6.4 Intermodal Facilities

Per the LRTP, Osceola County is planning to create a highly connected public transportation system. The list below details the SunRail and Bus Rapid Transit (BRT) projects envisioned before the year 2026:

- SunRail: Phase 3 – Rail service from Meadow Woods Station to OIA Intermodal Terminal.
- Transit Signal Priority (TSP) Phase 3 – County wide LYNX project that allows their bus fleet to receive preferential treatment at intersections.

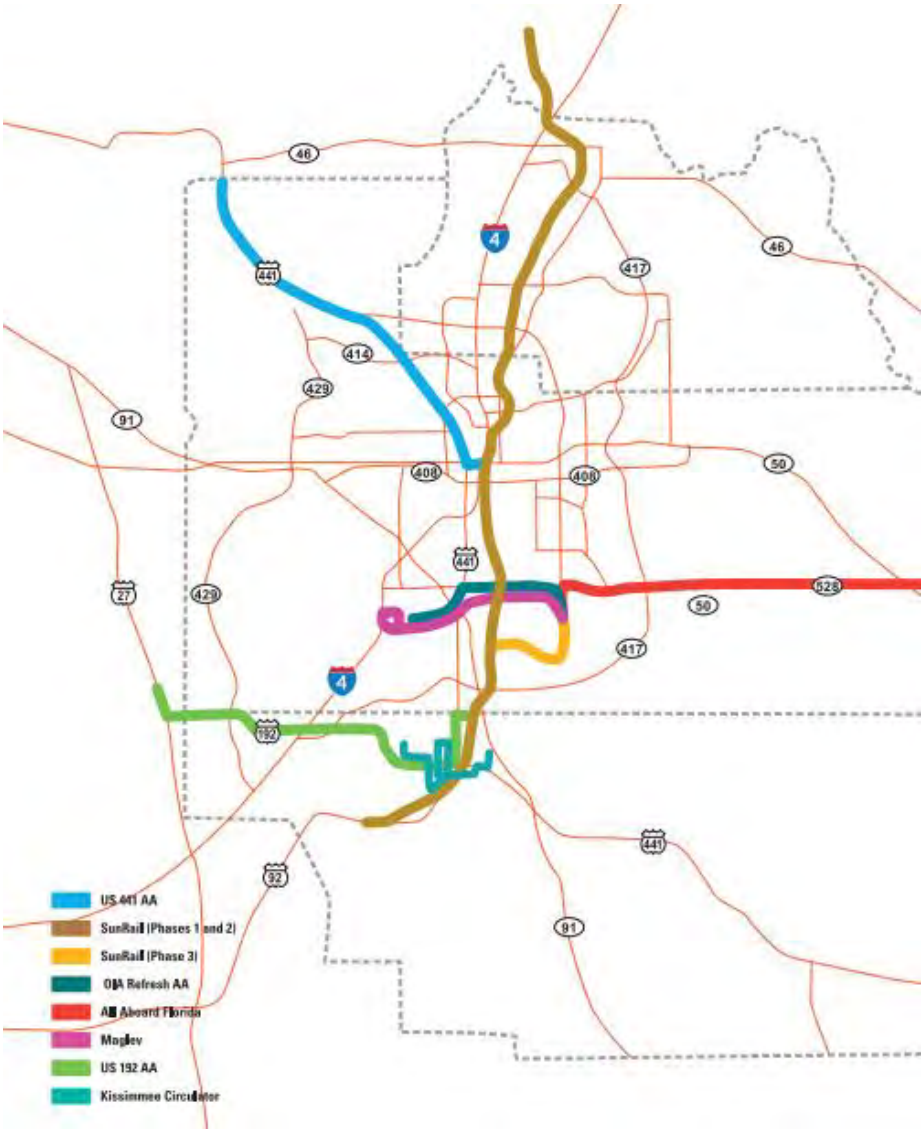


Figure 9 - Map of Planned Intermodal Projects

(Source: LRPT)

Per the LYNX Transit Development Plan, two upgrades to the existing system are identified to help support their presence in Osceola County.

Fixed Route & NeighborLink Transit App – LYNX Bus Tracker mobile application allows customers to see real-time location of buses operating along the routes. A second mobile application, PawPass, allows customers to pay for their trip via smart phone, desktop or another mobile device.

Mobility Services – LYNX is continuing to partner with Transportation Network Companies (TNCs) and local taxi companies to provide alternatives means of transportation AccessLYNX customers who have specific needs to arrive at their destination.

Per the LYNX Vision 2030 Report, various corridors within Osceola County were investigated and studied for planned modal improvements up to year 2030. The methodology was broken into six steps:

- Mode identification
- Segmentation
- Evaluation
- Preliminary modal assignment
- Final modal assignment
- Prioritization

Table 2 provides the proposed improvements for each corridor within the County. Appendix C provides LYNX Network Maps which illustrate location of route along with mode identification for years 2015 through 2030.

Table 2 – Implementation Plan and Prioritization for Osceola County

Corridor	Segment	Implementation Year (Prioritization)							
		2015		2020		2025		2030	
US 192: Disney to Kissimmee	2-1	Exclusive BRT	19	Exclusive BRT	18	Exclusive BRT	14	Exclusive BRT	10
	2-2	Exclusive BRT	19	Exclusive BRT	18	Exclusive BRT	14	Exclusive BRT	10
	2-3	Local Bus	1	Local Bus	1	Local Bus	1	Streetcar	28
		Exclusive BRT	19	Exclusive BRT	18	Exclusive BRT	14	Exclusive BRT	10
	2-4	Local Bus	1	Local Bus	1	Local Bus	1	Streetcar	28
		Mixed BRT	19	Mixed BRT	18	Mixed BRT	14	Mixed BRT	10
US 192: Lake County to St. Cloud	3-1	Exclusive BRT	17	Exclusive BRT	17	Exclusive BRT	15	Exclusive BRT	11
	3-2	Exclusive BRT	17	Exclusive BRT	17	Exclusive BRT	15	Exclusive BRT	11
	3-3	Local Bus	1	Local Bus	1	Local Bus	1	Streetcar	28
		Exclusive BRT	17	Exclusive BRT	17	Exclusive BRT	15	Exclusive BRT	11
	3-4			Express	25	Express	21	Express	18t
US 441/17-92: Florida Mall to Kissimmee	13-1	Express	20	Express	20	Express	19	Express	20
	13-2	Express	20	Express	20	Express	19	Express	20
	13-3	Express	20	Express	20	Express	19	Express	20

2.6.5 Evacuation Routes

No additional expansions are planned at this time.

2.6.6 Diversion Routes

No additional expansions are planned at this time.

2.6.7 Standard Operating Procedures (SOP) and Standard Operating Guidelines (SOG)

The Standard Operating Procedures are in development.

SECTION 3

Overview of TSM&O Needs and Conditions

3. OVERVIEW OF TSM&O NEEDS AND CONDITIONS

This technical memorandum of the Osceola County Transportation Systems Management and Operations (TSM&O) Strategic Plan will build upon the conditions identified from the MetroPlan Orlando ITS Master Plan and will provide insight into specific strategies and construct a framework for potential deployments of TSM&O improvements.

3.1 Overview of TSM&O Strategies

Osceola County is faced with the challenge of increasing the movement of people and goods in the area, while under financial and geographical restrictions. Consequently, it is becoming more difficult to increase transportation system capacity through traditional methods, such as roadway widening. Application of TSM&O strategies provide an alternative means to meet the transportation system challenges Osceola County faces, through the use of cost-effective advanced technologies that maximize the capacity and efficiency of roadways without increasing the roadway footprint. The remainder of this section summarizes TSM&O strategies in use today and in the foreseeable future.

3.1.1 Transportation Management Center

Traffic Management Centers (TMCs) are provided up to the minute data which is collected via Intelligent Transportation System (ITS) field devices. The data collection serves a significant importance to the TMC staff once it is combed through and processed. The data gathered from the ITS devices in the field such as roadway sensors, signals, and Closed-Circuit Television (CCTV) Cameras are essential to providing a beneficial return to the traveling public. Additional information, such as tracking technologies via Bluetooth signals provide travel times which develop further effective measures of traffic flow. The overall goal of a well-organized TMC is to act as a central source for the region's transportation needs and improving traffic flow.

The Osceola County TMC is currently located and operates at the Emergency Operations Center. The center currently operates and monitors approximately 222 signals, 96 CCTVs, 7 Dynamic Message Signs (DMSs), and 17 Bluetooth travel time readers. All of the ITS devices are connected using an approximately 80-mile fiber optic network. It should be noted, Metric Engineering contractually maintains the fiber optic network while Osceola County operates the ITS devices and signals.

The monitoring and tracking of traffic incidents on the corridors within Osceola County are managed using SunGuide™, TMC Data Entry Software, and/or other software programs. The importance of the tools and software is to optimize the performance of the corridors via detection and signal timing, while creating a more efficient and safer transportation system. Regardless of the software system utilized, data will be accessed for measurability of performance.

3.1.2 Fiber Optic Communication System

Fiber optic communications is essential for the various ITS technologies along a roadway to function. Information running through the fibers has many benefits; for example, information sharing between stakeholders. The Fiber Optic Communication system interconnects Traffic Signals, CCTV video and pan-tilt-zoom control signal transmission, Arterial Dynamic Message Signs (ADMS) message transmission, and Vehicle Detection System data transmissions.
Osceola County uses Fiber Optic Cables (FOC) to link their communication system. The information transmitted from the system is sent back to the regional TMC and other agencies to improve and monitor regional TSM&O needs.

3.1.3 Visual Surveillance

CCTVs provide the required tools to allow TMC staff to visually monitor the roadway for traffic, weather conditions, work zones, and incidents/accidents. Having eyes on the road can help TMC staff to properly assess an incident on the road and call for emergency response to attend to the scene. Not only can CCTVs monitor the traveling public, but they apply another important benefit, which is to confirm functionality of ITS devices. CCTVs confirm the functionality of Arterial Dynamic Message Signs, Traffic Signals, and other field equipment; resulting in decreased troubleshooting response times. Sharing of roadway surveillance CCTV streams with the media is a common practice in the State of Florida.

3.1.4 Video Detection Systems

It's important to note, Video Detection Systems (VDSs) differ from video surveillance from a use perceptive. VDSs collect real-time traffic data and perform vehicle presence detection through probing the roadway. Traffic data detection and probe data detection systems work in concert to provide an accurate picture of transportation system performance.
Traffic data detection systems provide presence, volume, occupancy, and speed data for the lanes they monitor. Common types of traffic data detection technologies include the following: microwave vehicle detectors, inductive loop detectors, video detectors, and wireless magnetometers. These detectors collect instantaneous spot readings of prevailing traffic conditions at the sensor location, and do not perform unique vehicle identification. Traffic data detection systems strive to detect 100% of vehicles within the lanes they monitor.

Probe data detection systems provide speed and travel time information for a road segment. Common types of probe data detection technologies include: MAC address-based device identification using Bluetooth and Wi-Fi capable devices; vehicle identification using Radio-Frequency Identification (RFID) transponders mounted to vehicles; and license plate recognition. Probe data detection systems detect and record the exact time a unique vehicle passes a sensor location. Once the vehicle passes two such sensor locations, the detection system software determines segment travel time and average speed, by comparing the distance between probe sensors and respective vehicle passing times. Probe data detection systems typically only capture a fraction of the vehicles that pass by the sensor, then create approximations of the prevailing traffic conditions.

The TMC in Osceola County can gather the information from the sensors to help identify incidents along a roadway. For example, if an arterial segment commonly has a travel time of 10 minutes at a given time of day, but is currently operating at a 20 minute travel time at that time today, a signal can be sent to TMC operators notifying them of a potential problem, allowing them to react by instituting changes to the arterial ATMS system.

3.1.5 Advanced Traveler Information Systems (ATIS)

ATIS are essentially guides which update drivers on current roadway conditions, the various technologies applied to them make each ATIS unique. ATIS informs drivers on the roadway to make informed travel decisions about travel modes, route selection, and departure times. Better informed drivers tend to more efficiently utilize existing surface transportation system capacity, through avoidance of congested areas and use of underutilized routes or travel modes. This section will describe the various of ATIS technologies on roadways.

Dynamic Message Signs (DMS)

DMS signs are the most effective and widely used ATIS equipment within the State of Florida, these signs are manufactured in various shapes and sizes which display changeable messages. The messages are controlled by the staff in the TMC and can range from estimate travel times between intersections to upstream incident warning and alternative route guidance. DMS are utilized along freeways, highways, interstates, and toll roads. As dynamic tolling is becoming more prevalent within the State of Florida, DMS signs also work in conjunction with guide signs to display current toll rates.

As stated in section 1.2, the County of Osceola is growing at steady rate, there are more drivers on Osceola roadways now than in years past. Through the various stakeholder meetings, some stakeholders have expressed interest in putting up more DMSs to alert drivers regarding changing road conditions and provide safe travels in and out of places such as Disney World.

Highway Advisory Radio (HAR)

HAR systems broadcast AM and FM radio messages regarding current travel conditions to the traveling public. Messages to be broadcasted are created at the TMC, then uploaded to transmitter locations in the field for broadcasting. Since AM and FM radios are standard features in vehicles, the potential for a high percentage of travelers to listen to the message exists. To alert drivers that an important message is being broadcast, HAR systems employ static signs displaying the frequency information fitted with flashing beacons that are activated to bring attention to the sign.

Citizen Band Radio Advisory System (CBRAS)

CBRAS are similar in function to HAR systems but use Citizens Band (CB) radio frequencies (channels) to broadcast travel condition information. CB radios are commonly found within semi-tractor trailers, so these systems are particularly useful in areas with high percentages of such vehicles.

FL511 Traveler Information System

FL511 is a system that provides travel information collected by ITS to travelers via phone, web site, and mobile applications. FDOT operates FL511, which is fed data collected by FDOT's Vehicle Detection System, the TMC and third-party sources. Historically this service has primarily been used for freeway travel information but is being expanded to arterial roadways.

In-vehicle Dynamic Route Guidance

A combination of in-vehicle navigation systems and dynamic traffic information, that adapt to the recommended travel route based on real-time travel conditions, selecting alternate routes on the fly to decrease travel times. Examples of such systems are Google Maps and Waze mobile applications.

3.1.6 Incident Management & Highway Assistance

Incidents on the many roadway within Osceola County will inevitably occur. Therefore, putting together a coordinated effort to properly and effectively respond is critical. Effective communication between the numerous parties, such as: law enforcement agencies, medical personnel, towing companies, hazardous material clean-up companies, contracted service providers, and roadway maintenance crews is vital for safer roadways within the County of Osceola. Proper management of all parties to respond appropriately will help clear disabled vehicles, debris, and cargo from the roadway.

Traffic Incident Management (TIM)

FDOT's TIM teams bring together all agencies involved in responding to and clearing incidents from the roadway; working together to reduce the impacts of incidents on motorists and increasing incident management safety. TIM teams are active in all FDOT Districts–these teams conduct monthly meetings and educational seminars to improve team synergy. In the past, TIM teams have focused their efforts on the State Highway System, in support of the State of Florida Open Road Policy Agreement1.

Road Ranger Service Patrols

Road Ranger Patrols provide free highway assistance services during incidents with the goal of reducing delay and improving safety for the motoring public and incident responders. The program was started in 2000 and has since made over 4.3 million service assists. Road Rangers are vehicles that patrol congested areas and high incident locations and respond to specific service calls, providing an array of services including the following: tire change assistance, providing a limited amount of fuel, incident clearance, and performing other minor emergency repairs to vehicles. The historical focus area of Road Rangers has been freeways. However, their service could potentially be expanded to the arterials.

---

1 An agreement between Florida Highway Patrol (FHP) and FDOT that establishes a policy for FHP and FDOT personnel to expedite the removal of vehicles, cargo, and debris from the State Highway System.

Rapid Incident Scene Clearance (RISC)

RISC is an initiative by FDOT to provide monetary incentives for private partners, through the auspices of contracted services, to clear major incidents quickly in support of the State of Florida Open Road Policy Agreement. Activation of RISC is primarily reserved for incidents of complete roadway closures on limited access highways, where typical wreckers are incapable of clearing the incident. Florida's Turnpike Enterprise was the first FDOT District to implement RISC. Due to the program's success, FDOT expanded the practice statewide, allowing each FDOT District to implement their own RISC program. RISC has traditionally been on the freeway system but could be expanded to the arterial system.

3.1.7 Traffic Signal Systems

As Osceola County is becoming more urbanized, traffic congestion will certainly occur, the coupling of these two stir a demand to operate the Counties roadways with maximum efficiency. Emerging technologies such as adaptive traffic signal systems or Active Arterial Management using advanced surveillance, will become increasingly critical for the County to meet transportation needs. This section will discuss various TSM&O techniques and technologies used to improve operations of Traffic Signal Systems.

Traffic Signal Retiming and Coordination

Stated within the name, this Traffic Signal System is a tool that provides the ability to retime multiple intersections to enhance the operations of one or many directional movements along a roadway. Adjustment to traffic signal timings enable optimization of performance for traffic patterns that change over time–a process conducted on a periodic basis for heavily traveled signalized roadways. A connected traffic signal retiming system will allow Osceola County the ability to monitor performance, adjust timings and implement different timing plans remotely, monitor equipment failures, and assess performance measures. Currently, FDOT is required to retime traffic signal systems every three years for urban areas and every five years for rural areas on State Roads.

Adaptive Traffic Signal (ATS) Control Systems

ATS is a more modern solution to solve todays traffic congestion problems in Osceola County. Unlike conventional Traffic Signal Systems which utilize pre-programmed timing plans, selected based on time-of-day and day of the week; ATS systems allow Traffic Signal Systems to modify signal timings in real-time to accommodate changing traffic patterns, resulting in reduced congestion and decreases in travel time. Within Osceola County, these systems are best suited in urbanized arterials due to the unpredictability of traffic demands or that experience large variations in traffic demands. Osceola County Stakeholders have expressed interest to implement ATS systems along high capacity signalized corridors.

Transit Signal Priority (TSP)

TSP is a traffic solution strategy which essentially reduces transit vehicle travel time by holding a green signal longer or shortening a red interval upon approach of transit vehicles. TSP systems require four major components: emitter mounted on transit vehicles; on-vehicle or centrally located priority request generator; priority request strategy; and a TSP management system. Two System Architectures exist for TSP systems: Centralized where a central system organizes and manages priority request from many vehicles; and distributed where all priority decisions are made at the intersection level. Currently, Lynx buses in the City of Orlando use TSP at numerous intersections. Currently, Osceola County is included in FDOT's Phase 3 TSP deployment project.

Traffic Signal Vehicle Detection

These sensors detect the passing or presence of vehicles for use by actuated traffic signals. Common technologies used for this type of detection include the following: inductive loops, magnetic sensors, microwave vehicle detectors, radar detection, video image processors, wireless magnetometers, ultrasound vehicle detectors, and infrared vehicle detectors. The most common detector technologies in use in Osceola County are inductive loops, video image processors, and microwave vehicle detectors. Detector inputs are used by the traffic signal controller to truncate or extend green intervals, and determine which movements need to be served. Vehicle detectors in advance of signalized intersections can also be used to provide dilemma zone protection. Recent advances in detector technology have seen the advent of vehicle detectors that track estimated time of arrival for oncoming individual vehicles and provide enhanced dilemma zone protection beyond what older systems were capable of.

Traffic Signal Preemption

A method that allows normal operation of traffic signals to preempt normal traffic signal operations; the most ubiquitous use is to alter traffic signal timings for the approach of trains, marine vessels, and emergency vehicles to clear cars from their path. In the case of emergency vehicles these systems result in reduced response times and increased safety for first responders when traveling to an incident scene. The most common types of preemption devices for emergency vehicles are infrared and radio/GPS based, with the latter being the modern incarnation capable of additional features.

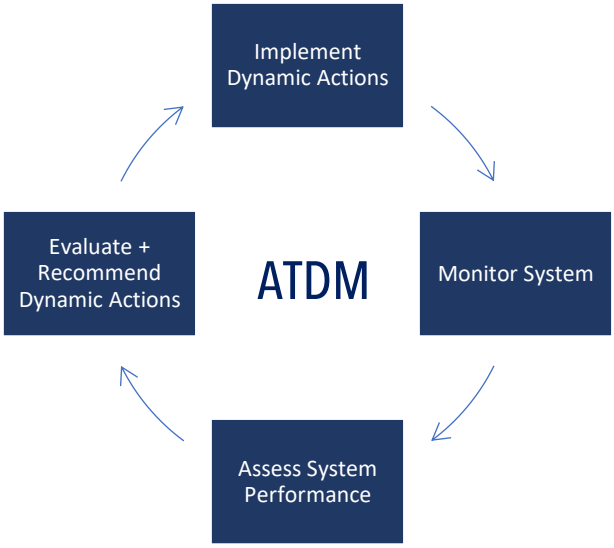
3.1.8 Advanced Railroad-Highway Intersections (Grade Crossings)

Rail is becoming a popular mode of transportation within Osceola County and Florida as a whole. With this popularity comes added safety concerns, hence new methods and protocols have been developed to improve the performance of traffic signal train preemption systems, the most notable of which is the IEEE 1570 Protocol. This protocol provides connection between grade crossing active warning systems and the traffic signal controller using serial communications and ensures that both equipment sub-systems speak a common language. Support for four different types of messages are provided:

- Operational state of the rail crossing
  - Train presence, entrance and exit gate status, warning system activation
- Approaching train information
  - Train classification, time of arrival and departure, train length, direction of travel
- Railroad and Traffic Signal equipment status
- Obstacles in the roadway where is crosses the railroad tracks
- User specified messages

3.1.9 Active Transportation and Demand Management (ATDM)

ATDM is means by which to control and/or manage the dynamic traffic demands and traffic flow that occur within the roadways. The goals of ATDM are to improve safety, promote sustainable travel modes, reduce emissions, and maximize system efficiency. In order to achieve these goals, the transportation system is continuously monitored, then using archived data and/or predictive models, control actions are performed to improve system performance. The remainder of this section will describe a series of common ATDM systems and strategies.



Ramp Metering

Traffic signals installed on freeway on-ramps that control the rate at which vehicles enter the freeway traffic flow. Ramp metering results in reduced congestion on the freeway by both breaking up the on-ramp merging platoons and managing the number of vehicles entering the freeway. When ramp metering is activated on an on-ramp, vehicles enter the on-ramp from an arterial, queue at the ramp meter stop bar, and then are released, either individually or in pairs, at a rate typically dependent on freeway traffic conditions and ramp queue length.

Wrong Way Driving Detection

Wrong way driving collisions occur when a moving vehicle has not seen a posted traffic sign or any forms of markings on the road and continues to proceed on a lane going in the wrong direction. These types of collisions are especially dangerous at night due to limited lighting along roadways. According the Florida Highway Safety and Motor Vehicles (FLHSMV) Crash Fact Sheet, 75 Fatalities occurred on Florida roadways in 2017.

Wrong way driving detection systems provide a means to detect vehicles traveling in the wrong direction, then warn and deter these drivers and notify the TMC of the event, allowing TMC operators to initiate the appropriate responses before collisions occur. Warning and deterring wrong way drivers is often achieved through the use of flashing beacons activated upon detection of wrong way vehicles. These systems are especially beneficial when installed on freeway on-ramps in an attempt to prevent wrong way access to the freeway mainline. The Central Florida Expressway Authority has deployed wrong way driving detection systems on a number of on-ramps leading to facilities they operate and maintain.

Managed Lanes

Managed lanes is a strategy by which the operating agency proactively manages systems demands and available capacity on a freeway. This concept is a "freeway-within-a-freeway" where a set of lanes are separated from the general-purpose lanes. The agency defines the operational objectives for the managed lanes, along with what actions to take once the pre-defined performance thresholds are met. Implementation of the strategies can be categorized into three groups: pricing, vehicle eligibility, and access control.

3.1.10 Work Zone Management

Utilizing effective strategies during roadway construction will help reduce congestion, maintain full alertness, promote worker and traveler safety, and maintain access for business and residents. Development of strategies for reducing work zone impacts begins with assessing the anticipated impacts, then developing solutions in a Transportation Management Plan (TMP)–FHWA's Work Zone Safety and Mobility Rule requires TMPs for all Federal-aid highway projects. TSM&O strategies and technologies can play a major role in managing work zone areas on the roadways; for example, temporary work zone ITS equipment can be installed to supplement the existing ITS infrastructure as needed to support work zone management objectives. FDOT currently posts construction information to the public using FL511.

3.1.11 Integrated Corridor Management (ICM)

ICM is a strategy which helps alleviate impacts on roadways with high vehicle congestion, and in turn, helps redistribute travelers on roadways with underutilized capacity. Travelers are encouraged to change transportation route or mode choice in response to changing traffic conditions. Strategies such as modal choice suggestion, ramp metering rate adjustment, and traffic signal timing adjustment support ICM by accounting for fluctuations in demand. ITS devices along the roadways help local agencies use ICM data to actively manage and make operational decisions to benefit mobility. ICM is currently being utilized by FDOT on the I-4 corridor in downtown Orlando to help mitigate the impacts of increased volumes along parallel arterials during construction.

3.1.12 Active Parking Management

Within Osceola County, Active Parking Management can be of significant help especially in Urban areas with limited parking, during special events, for public parking (such as park and ride), for public transportation parking facilities (bus stations, train stations, etc.), and for freight facilities. If utilized properly, Active Parking Management strategies can improve parking capacity, ticket dispensing and payment, and improved driver guidance. This section will touch on some TSM&O strategies that will help improve Active Parking Management.

Dynamic Parking Guidance and Reservation

Parking reservations can now be made in the palms of ours hands, dynamic parking guidance, also dynamic wayfinding, provides automated guidance of drivers to parking facilities with open spaces. Dynamic parking reservation allows drivers to reserve a parking space in advance to guarantee availability, in some instances using smart phones apps.

Another beneficial application of dynamic parking guidance and reservation is for truck parking management systems. Truckers can determine if spaces are available, or reserve a space in advance, prior to exiting the freeway. Since semi-tractor trailers create a large amount of wear and tear on the roadway surface, and contribute substantially to carbon emissions, large benefits can be reaped from efficiency improvements in parking space locating. FDOT's "Truck Parking Availability System" has been deployed on I-10, I-75, I-4 and I-95–the system distributes parking space availability information to truckers using DMS panels, in-cab equipment, FL511, as well as third party data feeds. Parking space occupancy will be monitored using in-pavement sensors, and CCTV cameras will be used for system monitoring

Dynamic Overflow Transit Parking

Dynamic Overflow Transit Parking opens overflow parking facilities in the vicinity of transit stations when the standard parking areas are at or near capacity. Overflow parking areas are typically underutilized parking lots, such as large shopping map parking lots, for which transit agencies enter into an agreement with the proprietor for occasional use of designated areas. Transit station parking capacity is constantly monitored by a central control system, which dynamically opens overflow parking spaces when required.

Dynamic Priced Parking

Dynamically calculated parking fees based on demand and availability in order to influence arrival time choice and parking facility selection to maximize parking utilization, reduce peak period trips, and reduce impacts of parking spot searching by drivers. Space occupancy is constantly monitored, and prices are adjusted as a means to dynamically manage demand and influence parking facility choice.

3.1.13 Public Transportation Management

TSM&O strategies can help public transport be more secure, assessible, and convenient. As this is gaining more popularity within Osceola County, this section will include ITS technologies applicable to improving public transportation.

Automatic Vehicle Locations (AVL) and Automatic Passenger Counter (APC)

AVL and APC systems allow transit agencies to precisely track the location and ridership of their vehicles. Using this information, transit agencies can provide optimized routing and scheduling. Security of the transit system is also improved when the location of all vehicles is known at all times. Activation of TSP is contingent upon information provided by AVL and APC systems. Lynx currently uses AVL and APC systems on their busses.

Transit Traveler Information

A means to disseminate transit related travel information to the public, such as current vehicle locations, occupancy levels, routes, stops, schedules, and travel options. AVL and APC systems allow up-to-date information to be collected for use by transit traveler information systems. Examples of such systems include mobile applications and websites.

Personalized Public Transit

Personalized Public Transit offers on-demand, flexibility routed, transit vehicles. Passengers place reservations with the transit agency, who dispatches a vehicle. Applying TSM&O strategies, the transit agency attempts to optimize the number of passengers per transit vehicle per trip. Reservations are placed using web services or mobile phone applications. Personalized public transit is particularly useful for passengers that have difficulties using traditional transit systems, due to physical disabilities. Uber and Lyft are examples of this type of service.

3.1.14 Public Travel Security

Security is a hot topic item as advances in technology keep improving the roadways systems for the traveling public. Components commonly used include motion detectors, CCTV cameras, explosion sensors, and AVL devices that generate alarms when certain events occur. An example system is the I-4 St. Johns River Bridge Security System, where thermal imaging cameras are deployed to establish a secure perimeter around sensitive bridge elements, that when crossed will notify the FDOT District 5 RTMC of a breach event.

3.1.15 Electronic Payment Services

Electronic payment is becoming a popular alternative for many travelers due to the convenience and ease in which it can be done. This section will cover the forms of payment systems currently happening in Florida and other states within the US.

Regional Payment Systems

Allows regional travelers to remit payment for transit tickets, parking fees and tolls through a common mean without the use of cash. Payment methods such as mobile phone applications, RFID toll tags, and smart cards are used to improve efficiency and traveler convenience. In the State of Florida, the SunPass program is an example of such a system that permits all electric tolling without the need to stop and pay at a toll booth.

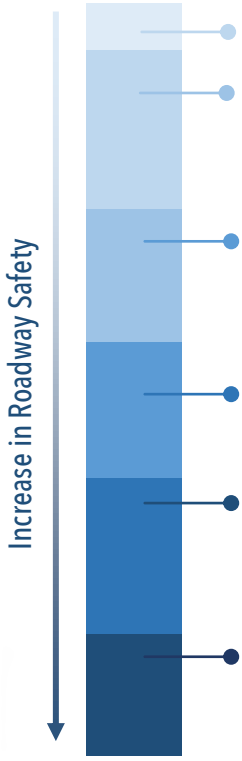
Electronic Transit Ticketing

A means for transit passengers to take a defined number of pre-purchased trips, or unlimited trips within a fixed period of time, through the use of a mobile phone application or electronic card. Such ticketing systems increase customer convenience for buying and displaying tickets and passes and decrease ticket sales personnel burden for the transit agency. New Jersey Transit operates the MyTix mobile application, which allows passengers to purchase and display tickets from their mobile phones.

3.1.16 Connected, Automated, and Autonomous Vehicles

The field of connected, automated, and autonomous vehicles is one of the most researched fields in the automotive technologies sphere. Some connected and automated vehicle technologies are in use today, examples include self-parking functions and auto-collision avoidance; however, in the future these technologies are expected to see widespread deployment and significant improvements in capabilities. It is important to understand the distinction between the three terms connected, automated, and autonomous as they apply to vehicles; therefore, brief definitions have been provided below:

- **Connected Vehicles** – use a range of technologies and systems to communicate with the driver, to other vehicles (vehicle-to-vehicle or V2V), to roadside infrastructure (vehicle-to-infrastructure or V2I), and to the cloud. The vehicle does not make choices for the driver, instead it supplies information to the driver, allowing the driver to make more informed decisions.
- **Automated Vehicles** – vehicle operation occurs without direct driver input. The National Highway Traffic Safety Administration (NHTSA) has adopted SAE International's automated vehicle classification standard:



Level 0 - Automated system has no vehicle control but may issue warnings.

Level 1 - Driver must be ready to take control at any time. Automated system may include features such as Adaptive Cruise Control (ACC), Parking Assistance with automated steering, and Lane Keeping Assistance (LKA) Type II in any combination.

Level 2 - The driver is obliged to detect objects and events and respond if the automated system fails to respond properly. The automated system executes accelerating, braking, and steering. The automated system can deactivate immediately upon takeover by the driver.

Level 3 - Within known, limited environments (such as freeways), the driver can safely turn their attention away from driving tasks but must still be prepared to take control when needed.

Level 4 - The automated system can control the vehicle in all but a few environments such as severe weather. The driver must enable the automated system only when it is safe to do so. When enabled, driver attention is not required.

Level 5 - Other than setting the destination and starting the system, no human intervention is required. The automatic system can drive to any location where it is legal to drive and make its own decision. This level is also referred to as Autonomous Vehicles.

- **Autonomous Vehicles** – the definition of autonomous: acting independently or having the freedom to do so. In the context of vehicles, autonomous vehicles are "driverless" and therefore meet the Level 5 classification of automated vehicles defined above. It is important to note that connected vehicle technologies are required for autonomous vehicles to function, so there is overlap between to two technologies.

3.1.17 Freight Advanced Traveler Information Systems (FRATIS)

FRATIS uses ITS strategies to facilitate more efficient movement of goods. This section provides two major FRATIS applications.

Freight-Specific Dynamic Travel Planning and Performance

Provides freight specific enhancements to traveler information systems; provides enhanced communication between drayage companies, drivers, and intermodal facilities; and provides real-time travel information and dynamic rerouting for drivers.

Drayage and Truck Routing Optimization

Optimizes truck and load movements between freight facilities, by assigning optimal time windows for pick-up and drop-off. Also uses port terminal and travel information to optimize operations and provide best route guidance to freight facilities for drivers.

3.1.18 Traffic Data Information Management

Data management is critical among the agencies in Florida, proper use of this information provides beneficial uses which range from future planning to deployed system validation. This strategy uses transportation data analytics, archived data,

and data management technologies to the benefit of transportation agencies in determining results proven improvements and to effectively guide future planning. FDOT District 5 and FDOT Central Office are in the process of studying the use of data analytics techniques in the transportation sphere.

3.1.19 Event Management

Event Management uses ATDM, traveler information system, and parking management strategies to optimize surface transportation system performance during special events with large attendance numbers. Generally, pre-determined event management plans are developed and implemented during the special event–with oversight and active management occurring from a TMC. Daytona Beach and the City of Orlando are examples of Florida cities that institute special event management procedures.

3.1.20 Asset Management

With increasing transportation system scope and complexity comes a need to optimize and automate management of inventory and maintenance requests. ITS requires perpetual maintenance following deployment, up until system retirement, to ensure proper system functionality; therefore, it is critical to protect the investment in ITS by ensuring that good maintenance practices are implemented. FDOT has its own such system: Maintenance and Inventory Management System (MIMS), which can be used by Osceola County at minimal cost.

3.1.21 Innovative Bicycle & Pedestrian ITS Solutions

Technologies that target improving bicycle and pedestrian safety. This section includes brief descriptions of two such technologies. The Complete Streets policy requires streets to be planned in a manner that allows safe travel for those walking and bicycling; ITS solutions can be deployed to assist in meeting this objective.

Pedestrian Crosswalk Systems

Typically deployed at mid-block crossings to provide high intensity flashing lights or beacons that alert drivers to the presence of crossing pedestrians. Examples of such systems include High Intensity Activated Cross Walk (HAWK), in-pavement flashing LED lights, and Rapid Rectangular Flashing Beacons (RRFB). Activation of such system can be manual, through the use of pushbuttons, or automatic, by using microwave, infrared, or pressure sensing pedestrian detectors.

Accessible Pedestrian Signals

Accessible Pedestrian Signals provide audible tones to aid hearing impaired pedestrians in crossing signalized intersections. The audible tone can either be "beeps" or spoken word. Deployment of these systems has occurred throughout the State of Florida.

Bicycle Warning System

Bicycle warning systems use bicycle detectors to detect bicycle traffic in advance of a roadway crossing, and then notify motorists that a bicyclist is approaching the crossing. Motorist notification is typically automated and achieved through electronic signs activated by the bicycle detectors.

3.2 ATMS Planning

In Florida, extensive planning is needed to allow many of the transportation programs, initiatives, and projects to get off the ground and running. This section will provide insight into the planning processes that have developed many of the TSM&O programs FDOT has today.

MetroPlan ITS Master Plan

Please see Section 2 for information regarding the MetroPlan ITS Master Plan.

Overview of the Metroplan Orlando 2040 Long Range Transportation Plan (LRTP)

The vision of the 2040 LRTP is to develop "A regional transportation system that safely and efficiently moves people and goods through a variety of options that support the region's vitality". The plan is broken into 7 primary goals over the next 20 years:

1. **Safety** – Consider public safety in the development of the transportation for all users.

2. **Balanced Multi-Modal System** – Provide a diverse and balanced multi-modal transportation system which ensures the local and regional movement of people, freight, and services; in addition, one that promotes public transit.

3. **Integrated Regional System** – Provide an integrated transportation system which is safe and efficient for the movement of goods by auto, truck, aviation, rail, bus, bicycle, and pedestrian modes.

4. **Quality of Life** – Provide a visually pleasing transportation system which improves the relationship between public transportation and land use development; in addition, promotes the quality of life for the community.

5. **Efficient & Cost Effective** – Ensure that the transportation system in efficient and cost effective.

6. **Energy and Environmental Stewardship** – Promote sustainable systems and programs that minimize greenhouse gas emissions, impacts to air quality, and to the natural habit of endangered species; in addition, promote alternative fuel sources.

7. **Economic Vitality** - Ensure that the transportation system further the economic vitality within the region.

The Metroplan Orlando 2040 LRTP is divided into multiple chapters. Figure 10 represents revenues for all agencies regarding transportation, including Osceola County. The projections came from various sources. For Osceola County, it shows a total of $4.5 billion is projected for transportation over a 22-year period.

System, Agency, Local Government	State/ Federal Funds	Local Revenues	Total
MetroPlan Orlando (TMA)	$542.1 M	n/a	$542.1 M
Strategic Intermodal System (SIS)	$1.956 B	n/a	$1.956 B
SunRail [1]	$337.9 M	$459.9 M	$797.8 M
Florida's Turnpike	n/a	n/a	See Projects
Osceola County Expressway Authority (OCX)	n/a	n/a	See Projects
Central Florida Expressway Authority (CFX)	n/a	n/a	TBD
LYNX	$1.117 B	$1.461 [2]	$2.578 B
Orange County	$1.006 B	$1.967 B	$2.973 B
Osceola County	$249.1 M	$4.548	$4.797 B
Seminole County	$336.9 M	$786.7 M	$1.123 M
City of Orlando	n/a	$249.9 M	$249.9 M
Transportation Alternatives	$53.2 M	n/a	$53.2 M
Total	$5.598 B	$9.473 B	$15.072 B

[1] The SunRail revenue total in this table excludes the revenue from usage fees. The main objective for addressing these projects in the development of the LRTP is to consider their impact to the transportation system and their effects on other transportation needs.

[2] Local revenues do not include funding from Orange, Osceola, or Seminole counties. To avoid double counting revenues, those funds are included in each county's funding.

Figure 10 - Metroplan Orlando LRTP 2040 Projected Revenues (Source: 2040 LRTP)

Also included in the report are performance measures regarding ITS.

- Vehicle Miles Traveled
- Percent of Travel in Generally Acceptable Operating Conditions (peak hour)
- Travel Time Reliability
- Percent Miles Severely Congested
- Combination Truck Travel Time Reliability
- Combination Truck Delay
- Combination Truck Percent Miles Severely Congested
- Percent of Congested Roadway Centerline Miles with Transit Service
- On-Time Performance
- Signal retiming cost/benefit
- Peak-hour travel speed – indicated as a percent of the posted speed limit
- Incident duration

Figure 11 illustrates the dominant mode of transportation for each performance measure (refer to the Intelligent Transportation System column).

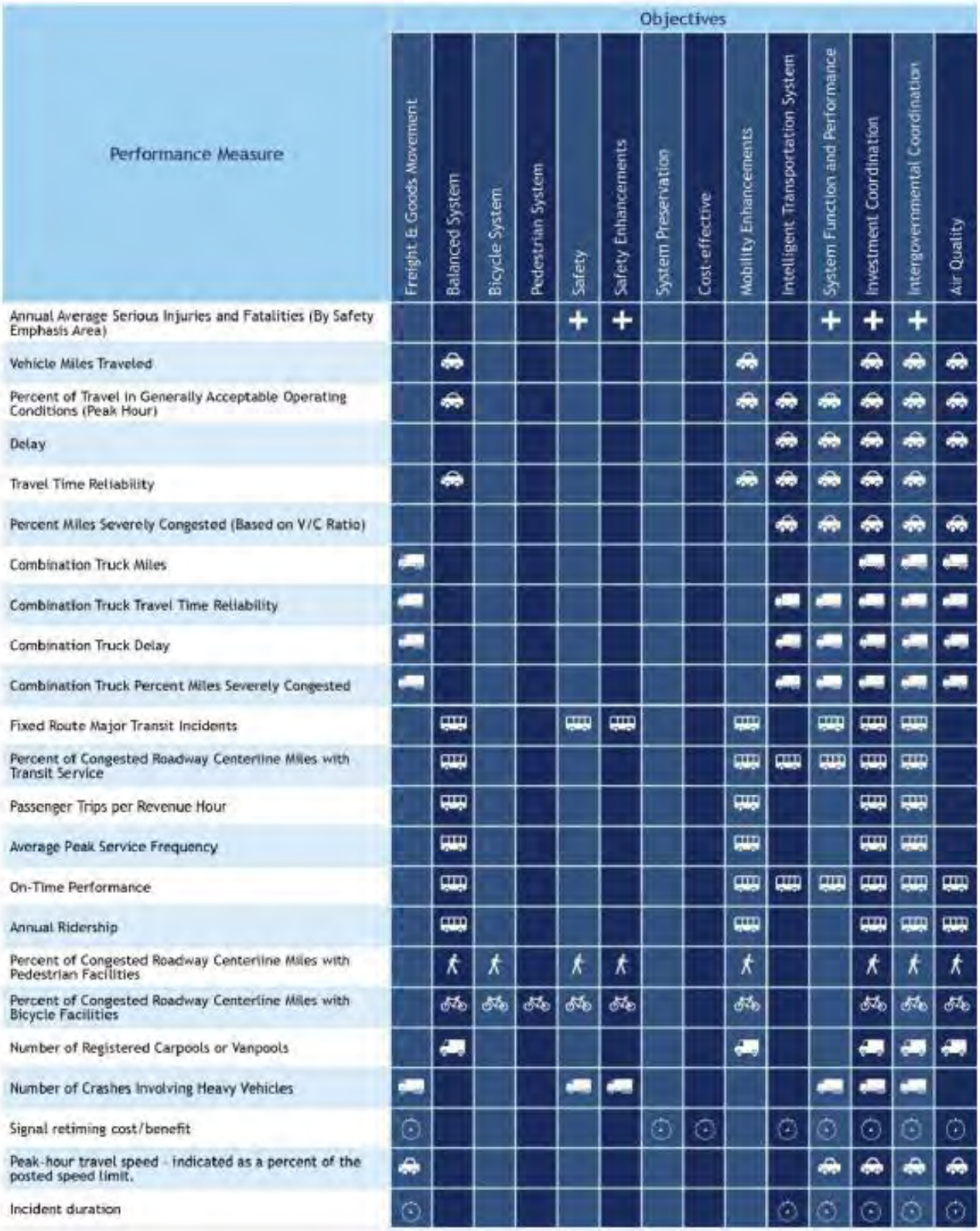


Figure 11 - Metroplan Orlando LRTP 2040 Performance Measures and Objective Relationship (Source: 2040 LRTP)

It should be noted that the Metroplan Orlando 2040 LRTP does not have the authority to propose operations and maintenance funding. In addition, the LRTP did not have TSM&O as a specific program included, although some of the proposed ITS projects would fall within the scope of the TSM&O program. Lastly, the LRTP simply highlights existing efforts that are on-going nationally, statewide, and locally regarding TSM&O.

Ten Year ITS Cost Feasible Plan

Operations and maintenance funds are a combination of Central Office and District managed funds and requirements that can generally be projected accurately with historical data. The allocated funding for ATMS/ITS maintenance is determined from a Reliable Change Index (RCI) formula based on the number of devices provided to Central Office while a certain amount is taken off the top for ITS Operations and Equipment Replacement costs. However, due to insufficient funding from the RCI, it is imperative that District managed funds are used to supplement the funds from Central Office.

ITS Operations contracts are covered under phase 82 funding; while equipment replacement projects/periodic maintenance are covered under phase(s) 92, 93 and/or 98; and routine maintenance as part of the Preventative Maintenance Plan of the Operations & Maintenance Contract comes from phase 72 funding. In addition, it should be noted that the Ten-Year ITS Cost Feasible plan does not currently include arterials.

Intelligent Transportation Systems (ITS) and Work Program Interaction

ITS projects are governed by Statewide Programs that are administered by Central Office. The funds are allocated by either Central Office or by the Districts' leaders based on statewide priorities. Other programs that fall within the same purview are as follows:

- Strategic Intermodal System/Florida Interstate Highway System
- Rest Area and Weigh Stations
- Bridge Replacement

It should be noted that the ITS Strategic Plan dictates most of the ATMS/ITS investments for FDOT. ITS projects are part of both the Schedule A and Schedule B portions of the work program. Schedule A contains apportionments, obligating constraints, state und allocations and federal fund allocations. Schedule B document covers the allocations of program targets (an established level of funding to be committed in order to meet specific program objectives) by District/Turnpike and fiscal year. ITS projects in recent years have been often funded out of Schedule B. Examples of this are the long established 10 Year Deployment Cost Feasible Plan which set aside approximately $496 Million for ITS Deployments throughout the State back in 2002 by approval of the Executive Committee. A similar set aside was established for the operations and maintenance of the deployed equipment in 2004.

In addition, ITS projects have also been receiving funding from the more traditional Schedule A portion of the Work Program, including for example: Congestion, Mitigation, and Air Quality (CMAQ) projects, for which any project justifying an improvement of air quality can compete.

3.3 Osceola County Traffic Operations ATMS

A common and powerful tool used for TSM&O applications is an Advanced Traffic Management System. An ATMS refers to a collection of individual ITS tools that manage different portions of a transportation network. For the County, this is accomplished through software called Centracs that collects, processes, and analyzes traffic information. The existing ATMS tools currently being utilized and managed by Osceola County (formerly the City of Kissimmee) include the following:

- Signalized intersections
- Signalized intersections on-line, fiber optic interconnected to Traffic Management Center (TMC)
- Fiber interconnected signalized intersections (Fiber routes and groups)
- Traffic monitoring camera locations
- Coordinated corridors
- TMC with traffic monitoring camera software
- TMC with traffic monitoring software
- Opticom emergency preemption on high volume corridors

3.3.1 Potential Upgrades to System

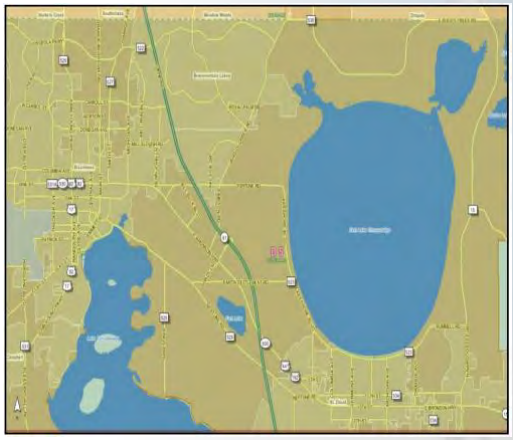
As ATMS technology is continuing to advance, below shows a list of recommendations which can help improve the current system that is in place for Osceola County.

- Adaptive Traffic Signal (ATS) systems on high capacity corridors
    - Technology that will allow equipment at signals to communicate with equipment at other nearby signals and adapt signal times based on traffic flow at the time, limiting time delays by prioritizing traffic volume
- Proposed radio or fiber optic infrastructure to connect signalized intersections to TMC
    - Either additions of new radio connections between signalized intersections and the TMC or improvements to existing fiber optic connections
- Add Miovision or similar cellular technology
    - Adding this hardware to existing traffic control cabinets that will provide communication to a TMC and provide constant traffic analysis reporting.
- Intersection Improvements
    - Addition of new signals which are warranted for reasons due to long queues, delays, and crash risks. (Refer to Appendix D for a prioritized list)

3.4 Current and Future ATMS Projects

3.4.1 Current TSM&O Projects

Osceola County currently has a few projects programmed under TSM&O strategies and/or have an ITS component as part of the project, all projects listed have been fully scoped.



Project one is titled, ATMS Phase 4, and the project number is 4301. The project is located in Northern Osceola County and consists of the deployment of: Four (4) ADMSs, twenty-seven (27) CCTVs, fifteen (15) Bluetooth Readers, seventeen (17) GPSs and approximately 13.26 miles of fiber optic cable. It should be noted that this project is currently under construction.

The second project is titled, Traffic Control Equipment, and the project number is 3780. This project is County wide and entails upgrades to existing traffic control equipment (including but not limited to traffic controllers, vehicle detection equipment, control cabinets, etc.). Also included are replacements of 15 CCTV and 20 Ethernet switches per year for the next 3 year and 10 years thereafter.

The third project is titled, ATMS, and the project numbers is 4307. This project is a Countywide multi-year infrastructure project which consists of the following improvements:

- Equipment upgrades
- Installation of additional CCTV cameras
- Implementation of TSP or upgraded emergency preemption system
- Travel time and Delay studies
- Bluetooth technology for updating travel time messaging on the County's DMSs
- Annual maintenance on Sunguide software/hardware

Budget for this project has been approved.

The table below provides a summary of the projects stated above, as well as all the individual ATMS projects described in the narrative of the project titled, ATMS (project number 4307).

Project Name	Location/Segment	Work Description	Project Status	Planned FY
ATMS Phase 4	Multiple roadways in Osceola County	Project consists of installing various ITS devices and equipment along multiple corridors	Design has been signed and sealed. Construction is anticipated to be complete in April 2020.	2018
ATMS Phase 5	Dyer Rd. to I-4	Project consists of installing various ITS devices and equipment	Design has been signed and sealed. No confirmed date has been set for construction.	2018
ATMS Phase 6	Boggy Creek Rd. from Simpson Rd. to Narcoossee Rd.	Project consists of installing various ITS devices and equipment	Preliminary/conceptual design	2022
ATMS Phase 7	Canoe Creek Rd. and Old Canoe Creek Rd. from US-192 to Pine Tree Rd.	Project consists of installing various ITS devices and equipment	Preliminary/conceptual design	2023
ATMS Phase 8	US 17/92 from Poinciana Blvd to I-4	Project consists of installing various ITS devices and equipment	Preliminary/conceptual design	2025
ATMS Phase 9	N Old Lake Wilson Rd. from Westgate Blvd to Osceola Polk Line Rd.	Project consists of installing various ITS devices and equipment	Preliminary/conceptual design	2027
Traffic Controller Equipment	County Wide	Projects consists of County wide upgrades to existing traffic controllers, vehicle detection equipment, control cabinets, etc. Also included are replacements of 30 CCTV and Ethernet switches per year for the next 3 year and 10 years thereafter	In progress Testing is going on now, deployment mid Jan 2020	2019

Table 3 - Current and Future ITS Projects for Osceola County

3.4.2 Road Widening Projects

Per meetings with the County, a push to add fiber optic cable along major road widening projects has started. In fact, within the scope of many road widening projects that are under development, verbiage has been added to install fiber optic cable and conduit. The road widening projects that have been scoped to add fiber are Neptune Road, Simpson Road, Boggy Creek Road, and Partin Settlement Road. To see the full lists of road widening projects, please refer to the County website, www.osceola.org/osceola-roads.

The addition of fiber optic cable and conduit for road widening jobs is a step in the right direction for the County. This will set the stage to add various TSM&O strategies along the roadways as the County sees fit. There have been efforts, and should continue to be efforts from the County to add additional TSM&O strategies to the scope of applicable road widening jobs, if feasible. If additional TSM&O strategies are allowed, it is recommended the County seek to implement Automated Traffic Signal Performance Measures (ATSPM) standards, which are explained in more detail in section 4.3.2.

3.5 Individual Stakeholder ATMS

This section details tools, future infrastructure projects, and planned studies from each of the stakeholders involved in the Strategic Plan. It should be noted, while many of the tools that will be discussed are not currently being used to manage the traffic system of Osceola County, they may be able to be used to bolster the Osceola County ATMS and encourage inter-agency resource sharing.

3.5.1 Osceola County Schools

There are currently no potential ATMS resources or planned projects by Osceola County Schools.

3.5.2 Facilities and Fleet Management

There are currently no potential ATMS resources or planned projects by Facilities and Fleet Management.

3.5.3 911 Emergency Communications

The potential ATMS resources employed by 911 Emergency Communications are the following:

- Motorola communications system
    - Communication with first responders

No planned ATMS projects have been identified by 911 Emergency Communications.

3.5.4 Osceola County Emergency Management

The potential ATMS resources employed by Osceola County Emergency Management are the following:

- Ambulances, police vehicles, and fire trucks
    - Equipped with mobile data router and tablet
    - Provides turn-by-turn information
- Mutualink
    - A platform where video feeds can be shared to other agencies

No planned ATMS projects have been identified by 911 Emergency Communications.

3.5.5 City of Kissimmee

Currently, there are no planned ATMS projects within the City limits. The potential ATMS resources employed by City of Kissimmee are the following:

- Signalized intersections
  - Approx. 37 Signals, 22 interconnected signals, and 31 coordinated signals

It should be noted that the City of Kissimmee will transition over maintenance responsibilities to Osceola County over the next several months. All interconnected signals in the City of Kissimmee are operated from the Osceola County TMC.

3.5.6 City of St. Cloud

The potential ATMS resources employed by City of St. Cloud are the following:

- 10 Signals that will be connected per ATMS Phase 4
- 6 Signals that will be connected per ATMS Phase 7

3.5.7 SunRail

SunRail has recently expanded into Osceola County. Regarding ATMS tools, the following are installed on all cars:

- AVL
- Automatic Announcement System (AAS)
- Bike racks
- Promoting mode choice

3.5.8 Lynx

Per the Lynx Vision 2030 Report[2], studies were conducted along 22 corridors, 2 of which are in Osceola County. Below provides the corridor and description:

- US 192: Disney to Kissimmee - This corridor runs from the proposed SunRail station in downtown Kissimmee to the Disney Transportation Center at Walt Disney World via US 192 and World Drive. This is the second least densely populated corridor, but it connects with nine facilities that are designated as part of the Strategic Intermodal System (SIS).
- US 192: Lake County to St. Cloud - This corridor runs along US 192 from US 27 through Kissimmee to St. Cloud. This corridor is the second longest corridor at 27 miles long. As such, it has the third highest population, but the third lowest population density.

The following ATMS tools are either currently installed or will be installed in the near future on all buses and paratransit vehicles:

- APC
- AVL
- Automatic Announcement System (AAS)
- Bike racks

[2] https://www.golynx.com/core/fileparse.php/97390/urlt/Vision%202030%20-%20Final%20Report.pdf

- Promoting mode choice
- TSP
- Computer aided dispatch system
- Eco-friendly buses
    - It is anticipated approximately half of their fleet will go battery electric

3.5.9 Central Florida Expressway (CFX) Authority

Per the CFX 2040 Master Plan[3], the various projects CFX has planned and/or under development within the County are the following:

- Osceola Parkway Extension
    - Project Limits: Boggy Creek Rd. to Northeast District
    - Project Length: 9 miles
    - Status: PD&E Study underway
- Northeast Connector Expressway
    - Project Limits: Southport Connector/Florida's Turnpike to Osceola Parkway Extension
    - Project Length: 25 miles
    - Status: No formal studies completed
- Southport Connector Expressway
    - Project Limits: Poinciana Parkway to Florida's Turnpike/Northeast Connector
    - Project Length: 13 miles
    - Status: PD&E Study underway

The following ATMS tools are currently installed along CFX roadways:

- DMSs
- CCTVs
- Microwave Vehicle Detection Systems (MVDSs)
- Fiber interconnect
- Bluetooth
- 511 traveler information
- Electronic payment system

3.5.10 TSM&O Corridor Needs

Based on interviews with Osceola County, it was determined that the greatest concerns/needs are in the following areas in which the County can enhance TSM&O strategies and technologies to provide the most optimum benefits.

Table 4 reflects a high-level view of the overall goals for the County. Please note, all of the needs are not listed in priority order.

[3] https://www.cfxway.com/wp-content/uploads/2016/06/2040MasterPlan-5_5_16.pdf

Osceola County TSM&O Needs	
Communications	Incident Management
Expand existing traffic operations communications (fiber)	Interagency incident management (TIM/RISC)
Traffic Operations and Management	Emergency Management
Active Arterial Management system	Remote monitoring/information sharing (Mutualink)
Regional signal coordination	Coordination with EOC and Police
Expanded video surveillance	Automatic incident detection
Regular signal retiming	Information Management
Enhanced traffic control capabilities	Expanded interagency data sharing
Automatic detection of traffic equipment malfunctions	GIS based equipment management
Adaptive Signal System	Maintenance and Construction
Automated Traffic Signal Performance Measures (ATSPM)	Work zone management
Travel time, speed and volume vehicle data information	Performance Measurement of equipment
Signal pre-empt for emergency vehicles	Regular preventive maintenance
Traveler Information	Airports, Ports and Freight
DMS installation	FRATIS
Dynamic detour route development and management	Traveler information sharing
Expand 511 to Arterial System	
Parking management system	

Table 4 - Summary of Osceola County Needs

3.6 Storing and Sharing of Data

3.6.1 Effective Security Measures

Effective security measures need to be put in place to prevent endangerment to the overall communication network. Additional encryption is highly recommended since the transportation system should be as secure as possible. Attack and/or threats to the communication network could bring down the efficiency of the system and endanger other users as well. The following ITS standards are recommended to the County pending stakeholder approval (Please note that these are consistent with the District 5 ITS Master Plan):

- Communications
  - Adopt the hub and spoke topology with FDOT
    - Firewall or a Service Level Agreement (SLA) that gives FDOT the right to manage
    - Firewall at the FDOT D5 Carrier Ethernet Switch
  - Static routing for now; gradually migrate to Border Gateway Protocols (BGP) with unique Autonomous System Numbers (ASN)
  - Fiber connection between agency router and D5 Carrier ethernet switch (Master Hubs)
  - Use of Multiprotocol Label Switching (MPLS)
  - Unique assigned Internet Protocol (IP) address ranges
  - Use of Multicast Service Discovery Protocol (MSDP)
- Security
  - Firewall at the FDOT D5 Carrier Ethernet Switch or an SLA that gives FDOT the right to manage
  - Each stakeholder to centrally manage user account database (i.e. Microsoft Active Directory)
  - Authentication, Authorization, and Accounting (AAA)
    - Remote Authentication Dial-in User Service (RADIUS) or Terminal Access Controller Access-Control System Plus (TACACS+)
- Common clock
  - Allows for ease of signalization coordination across jurisdictional boundaries
  - Ensures that all systems can be tied to a common sync point
- Discontinued use of #2 keys on cabinets with network communications
  - #2 keys can be easily obtained by other parties
  - Should be replaced with Cyberlocks or padlocks (stainless steel)

3.6.2 Information Management Data Sharing

A critical aspect of the abundant data flow within transportation is to effectively collaborate and work together to expand data sharing. Data sharing amongst transportation stakeholders will be essential to the overall success of the Strategic Plan. Data sharing will allow the County to reduce cost and ultimately benefit the transportation network user. Also, data sharing will prove to be low maintenance, which in turn is a win-win to all user due to the ability to access vital information. To share the data between the agencies, the first step is to collect all of the equipment already deployed over the year and work on creating a database, which is to be updated as new projects get deployed. Two ways of effective data sharing amongst users will be mentioned in the following paragraphs.

One way of effective documenting and data sharing between local and state agencies would be to utilize FDOT's ITS Facility Management (ITSFM) software. The software is GIS based, it allows the County to store and document all their ITS devices with pinpoint accuracy using latitude and longitudinal points. This software can also store information for all existing communications and power infrastructure. In addition, it provides details of the stored data; such as, manufacturer, installation date, model number, and warrant information. Within Florida, all FDOT District ITS groups and has been offered to local agencies at a cost of $4,000 as an initial fee and a cost of approximately $5,000 per year for Operations and Maintenance of the software.

A second alternative for data and video sharing is the Data Integration and Video Aggregation System (DIVAS). DIVAS is a software created with capabilities that allow it to provide access to video streams of multiple CCTV cameras on a roadway network, while also providing a list of all active and recently active network events and all pertinent details. This application is recommended as it presents this information on an easily accessible webpage. The program can be accessed and monitored by the Districts and configured and back ended using Coder-Decoder (CODEC) data compression software by Central Office. The following are the main capabilities of DIVAS:

- Provides real-time video stream of individual or multiple CCTVs
- Allows administrators to customize if and how each stream is accessed
- Supports maximum viewing periods
    - Configurable at user group level
- Displays CCTV information in map form
- Activity reports describing system usage in a chosen timeframe

3.6.3 SunStore

In the near future, Osceola County will have a wide variety of technology to support CAV, and with it, will come an endless stream of data. In support of this, District 5 has been researching ways to manage the data. SunStore is a data management platform where the user can search, browse, interact, and download District 5 ITS data. According to FDOT, SunStore is the Department's "central data storage for all the transportation system management and operations information. SunStore includes Master Data Management, Data Fusion, and Sensor Fusion for increased data quality. It will be used to make the information widely available to universities, research institutions, and businesses to encourage innovation". To help push this platform forwarded, it is recommended that Osceola County start coordination efforts with District 5 to help feed data into SunStore from the various devices along the roads. The benefits of this will help steer the District away from capacity building to proper management and operations of the data. In addition, this will have enormous benefit to the congestion management process.

SECTION 4

Identification of Applicable TSM&O Strategies

4. IDENTIFICATION OF APPLICABLE TSM&O STRATEGIES

This section shifts the focus from possible TSM&O improvements to specific strategies and provides the framework for their strategic deployment.

4.1 TSM&O Strategies for an Improved Transportation Network

4.1.1 Transportation Network Deficiency Causes

Traffic in Osceola County is mainly generated by tourism and national attractions. In fact, the City of Kissimmee is seeing traffic demands increase due to increases in population, Figure 12 illustrates Annual Average Daily Traffic (AADT), updated as of the 3rd quarter in 2019.

Through intensive research and consulting studies already performed by other agencies (primarily through the County's website, Metroplan Orlando Reports, and the District 5 ITS Master Plan) all the data pointed to congestion as the main culprit for traffic delays. Upon further investigation, the reason for delays are as followed:

- AM/PM Peak Hour Traffic
  - Morning and evening rush hours
- Tourist Attractions
  - Disney World
- Special Events
  - Osceola Heritage Park
  - ESPN Wide World of Sports Complex
- Motorist Distractions
- Seasonal Population Changes
  - "Snowbirds"
  - Tourist traffic

If the reasons above are not properly mitigated, congestion can negatively affect many things within the County, which includes but is not limited to air quality, economy, business activity, and quality of life.

Osceola County's transportation network has room for improvement once TSM&O is fully suited into the County's organizational structure (see section 8 for more information). In general, once proper funding levels are achieved, it is recommended the following be addressed to ensure a high Return on Investment (ROI):

- Interconnect signals on all major corridors
- Routine infrastructure maintenance
- Data Management
- Coordination with other roadway operating agencies

- System performance measures
- Expansion/Introduction of TSM&O infrastructure in more urban or rural areas (as appropriate)

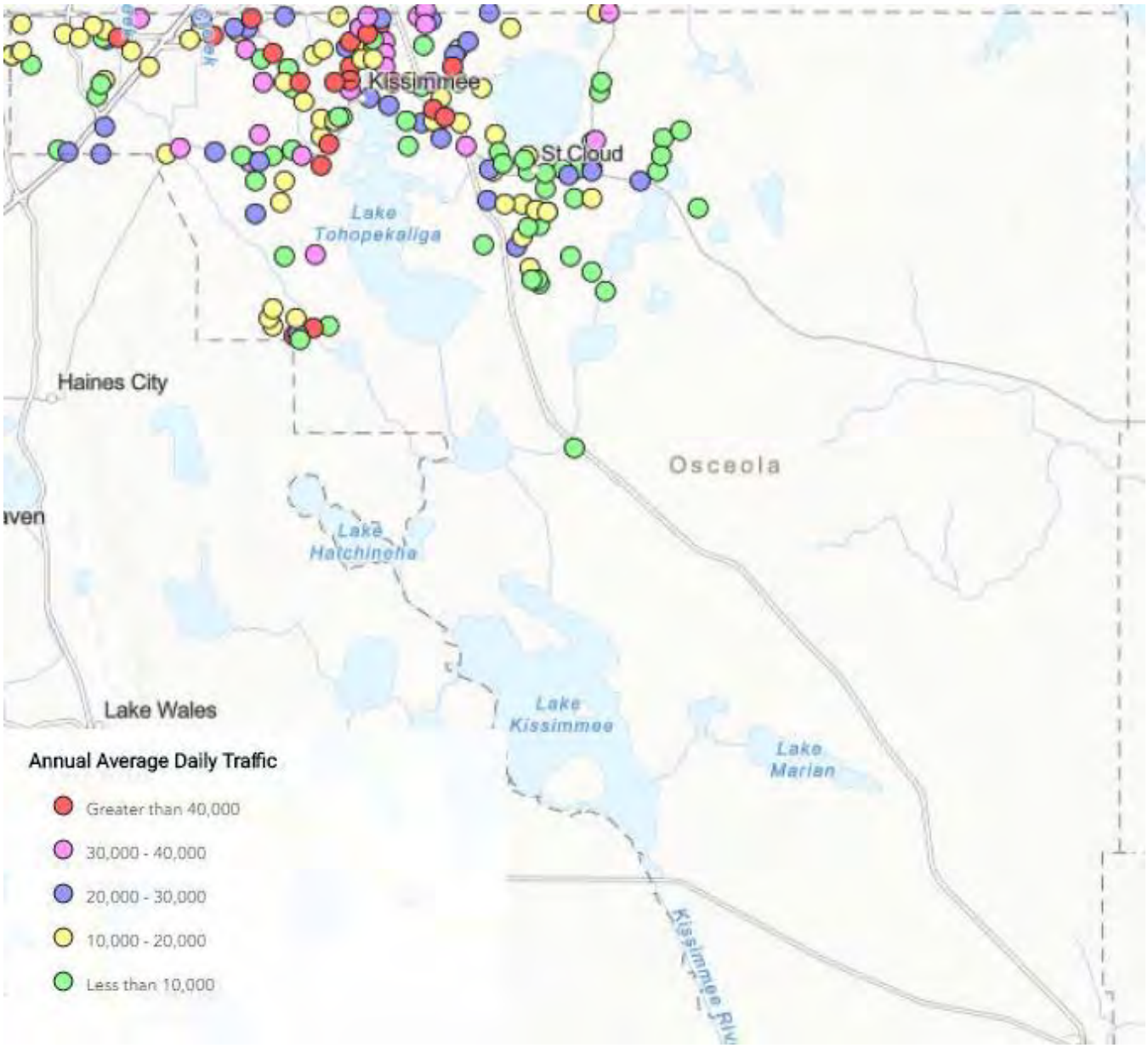


Figure 12 - AADT Counts for Osceola County

(Source: www.Osceola.org)

4.1.2 Applicable TSM&O Infrastructure Expansion

The following TSM&O improvements have been identified as overall strategies to allow Osceola County to improve traffic operations:

- Regional Integrated Corridor Management
  - Emergency Management
  - Information Management
  - Traveler Information
  - Event Management
  - Asset Management
- Systems Communication and Interconnectivity
  - Proposed Fiber
- Maintenance of TSM&O System
- Emerging Technologies

4.1.3 Regional Integrated Corridor Management

Osceola County's ICM program is not just focused on one specific approach but many, in fact, through meetings with the County and items listed in the D5 ITS Master Plan, the County has expressed interest in following: active traffic management, traveler information, incident management, emergency management, and information management.

To ensure a successful ICM program for the County, the gathering and management of data collected through the various ITS devices along the roads is vital. As mentioned in this plan, funding of TSM&O relies heavily on a need, and through data collection a need can be determined. For example, at signalized intersection, ITS devices such as Bluetooth, CCTVs, and Video Detection, can provide counts which help the County determine signs of congestion and crashes.

Therefore, the first recommended step for the County is to ensure data collection efforts are increased. This can be done by deploying additional ITS devices (CCTVs, Bluetooth, VDS, etc.) in and around congested intersections to ensure appropriate management of the arterials. Please refer to the ITS Deployment Maps shown in the Deployment section in this document.

The second recommended step is to properly manage the data that is coming in from the various sources. The current software system the County uses is Centracs, this software has the ability to provide automated performance counts and even set performance metrics, along with other added benefits. However, with all the data Centracs can provide, it also has the potential to contain errors, duplications or overlapping values. Additionally, duplicate and/or overlapping data may conflict with one another. With that said, it would be desirable for the County to develop a database template that recognizes the benefit of comparing the existing data derived from the software.

The third recommended step is to continue coordination efforts with the District to allow input from the data provided. Working in conjunction with the District will ensure an integrated approach to operations though out the County. Per meetings with the County, coordination has started, the topics addressed were the following:

- Creating a database template
- Setting of Controller Alarms
- Phase Labels on ATMS
- Assist with setup of scheduler for database and compare
- Diversion route timings

4.1.4 Systems Communication and Interconnectivity

Systems connectivity is vital to optimize the transportation network. A healthy interconnected transportation network has the ability to detect both major and minor traffic incidents, relay travel information to the public, make timing adjustments, and alert emergency response. With that said, filling in the communication gaps is essential for the County.

It is recommended to install/upgrade to a 96-single mode fiber optic cable throughout strategic parts of the County. Also, any other fiber deployments separate from those mentioned within this Strategic Plan be at minimum 96-single mode fiber as well in order to maintain continuity throughout the region. Refer to the Deployments section that is recommended as part of this Strategic Plan for more information.

4.1.5 Maintenance of TSM&O System

Regular maintenance is essential to the success of TSM&O improvements for the County. In order to ensure the necessary maintenance is preformed, funding should be secured strictly for maintenance services. The County currently utilizes maintenance contracts to support and maintain the ITS/ATMS maintenance and network trouble shooting. The ITS/ATMS maintenance contractor performs four types of responses: routine, preventative, emergency and special project response. All of which are outlined below:

- Routine maintenance
  - Includes response to device failures and non-critical issues.
- Preventative maintenance
  - Performed on system components and infrastructure to prevent device failure.
    - Tasks include, but are not limited to cleaning cabinets, bug and pest removal, and ensuring electrical connection are tight.
- Emergency Response
  - Required when critical failure occurs, during or after work hours.
  - Response must be prompt; repair is generally less than a routine maintenance work order.
- Special Projects
  - Includes work to expand or improve the system
  - Projects are low effort and low cost but provide maximum benefit to the system

- These projects are paid on a per hour basis
- Personnel, equipment, and needed materials are paid at the contractor's cost.

It is recommended that Osceola County perform periodic reviews on non-TSM&O roadway characteristics, such as signage, striping, and markings. As one of the goals of the Strategic Plan is to improve the overall efficiency of the transportation network, any maintenance funds gathered can be contributed to these types of basic roadway needs if they will contribute to better service for motorists.

4.1.6 Emerging Technologies

The topic of emerging technologies is wide reaching and complex. Regarding automotive technologies, three forms of innovative technologies that will prove to be the primary focus over the next number of years: connected vehicles, automated vehicles, and autonomous vehicles. It is recommended that the County embrace these concepts as they are a major portion of the District 5 ITS Master Plan, and they will contribute to the increased safety and reliability of the transportation system.

4.2 Connected Vehicles

Connected vehicles will play a large part in the future of transportation due to the increased applications of wireless technology. Many travelers on the roads today have a desire to be connected since wireless technology has provided users the ability to access information in a matter of seconds, this concept holds valid within the transportation network as well. According to USDOT[4], "In the future, your vehicle and most other vehicles on the road will likely be using some wireless technology and GPS to attain 360-degree awareness of nearby vehicles. This equipment will continually transmit your position, direction, and speed (e.g., whether you were turning or putting on your brakes), as well as other information, to other vehicles around you. This technology will also empower vehicles to "talk" to equipment installed in the road itself and other infrastructure, such as traffic signals, stop signs, toll booths, work or school zones, and railroad crossings." The potential benefits of this technology will help:

- Reduce Crashes – Due to improved vehicle safety features in newer model cars.
- Reduce Travel Times – Emerging technologies will have the capability to predict real-time traffic and provide alternative routes.
- Increased Productivity – Through the use of emerging travel times technology.
- Reduce Greenhouse Emissions – Through reducing energy consumption by means of efficient driving and more fuel-efficient vehicles.

It is vital that Osceola County considers Connected Vehicle applications and strategies as part of its future TSM&O goals, especially since it's a significant part of the District 5 ITS Master Plan.

4 https://www.its.dot.gov/cv_basics/cv_basics_how.htm

4.2.1 Connected Vehicle Preparedness

According to an article in the Osceola News-Gazette, "Osceola is named the 7th fastest growing County in the U.S from years 2017-2018", this trend is only going upward. Many of Osceola's neighboring counties have the infrastructure in place to support Connected Vehicle readiness. In fact, according to the District 5 ITS Master Plan, "District 5 can support the hardware and software to outfit CV/AV systems. Through the use of the existing software, SunGuide, an operator at the RTMC can send BSMs directly to vehicles traveling within the CV network to provide various safety messages". District 5 already has the proper foundations in place to deploy potential CV/AV systems; therefore, it is absolutely imperative that Osceola County starts to stay ahead of most counties in Florida due to the increasing rates of tourism and motorist.

Table 5 provides a list of applicable strategies, stated from the District 5 ITS Master Plan, for CV readiness. It should be noted, Osceola County has already started to roll out some strategies listed in Table 4. Also, the "*" denotes strategies that would require a significant number of On-Board Units (Vehicular) to be cost effective and lead to delays in implementation, due to automobile manufacturers.

With the strategies recommended from Table 4 along with recommendations from the FHWA, it is vital Osceola County takes the appropriate actions listed below to prepare for the application of CV technologies:

- Incorporating connected vehicles in the planning process
- Upgrade the RITSA
- Upgrade existing systems (such as communication systems) and consider making them Connected Vehicle ready.
  Purchase USDOT Connected Vehicle certified equipment.
  Consider how automated vehicles may enter your system: platoons, low speed urban, etc.

Connected Vehicle Strategies				
V2I Safety	Road Weather	Agency Data	Mobility/Environment	Smart Roadside
Red Light Violation Running*	Motorist Advisories and Warnings	Probe-Based Pavement Maintenance	Advanced Traveler Information System – Eco*	Wireless Inspection
Curve Speed Warning	Enhanced MDSS	Probe-Enabled Traffic Monitoring*	I-SIG – Eco*	Smart Truck Parking
Stop Sign Gap Assist*	Weather Response Traffic Information	Vehicle Classification-Based Traffic Studies*	Signal Priority (Transit, Freight) – Eco*	
Spot Weather Impact Warning*		CV-Enabled Turning Movement & Intersection Analysis*	Eco-Approach and Departure at Signalized Intersections*	
Reduced Speed/Work Zone Warning		CV-Enabled Origin-Destination Studies*	Mobile Accessible PED-SIG	
Pedestrian in Signalized Crosswalk		Work Zone Traveler Information	PREEMPT	
Warning (Transit)			Q-WARN*	
			RESP-STG*	
			INC-ZONE*	
			Eco-Ramp Metering*	
			EVAC	
			T-DISP - Eco	
			D-RIDE*	

			Freight-Specific Dynamic Travel Planning and Performance - Eco	
			AFV Charging/Fueling Information	
			Eco-Smart Parking*	
			Eco-ICM Decision Support System*	

Table 5 - Connected Vehicle Strategies

4.3 Intersection Treatment Standards

The importance of TSM&O standards is to ensure TSM&O projects within the region are interoperable, seamless, and consistent. This holds true for all ITS devices and systems as well. Osceola County's existing ATMS system includes many CCTVs, blue tooth readers, MVDSs, traffic controllers, miles of fiber, traffic cabinets, etc. Therefore, it is important to ensure consistent maintenance activities and procedures are put in place to avoid confusion and/or any discontinuity.

4.3.1 Building a Smarter City

The goal of every region in Florida is to build a smart transportation infrastructure that uses data, applications, and emerging technologies to help move people and goods more quickly, cheaply, and efficiently. In the Central Florida region, the University of Central Florida (UCF) is taking full initiative of this by developing a Smart Cities program which combines two hot topic items in transportation: emerging technologies and connected and autonomous vehicles (CAV). Smart City planning is a concept which encompasses the following elements:

- Smart energy grids, roadway electrification and electric vehicles
- Social and telecommunication networks
- Smart governance, connected, involved citizens
- Urban analytics and modeling
- User focused mobility services and choices
- Urban delivery and logistics management
- Strategic business models and partnering
- Adoption of architecture and standards

In order for Smart City planning to be effective within a region, an overall objective, vision, and the concept of operations must be properly planned out and developed. The following section will describe how District 5 is preparing its counties for CAV.

4.3.2 Preparing the Roadway for CAV (Intersection Standardization)

According to FDOT, "Connected and autonomous vehicles (CAV) are expected to trigger a paradigm shift in transportation, improving safety and mobility. Additionally, engineering techniques build around the concept of using small, affordable datasets to approximate diverse situations can be rethought with ubiquitous, real-time data, transforming planning and operations". With collaboration between other agencies in the region, District 5 has covered a variety of topic related to TSM&O and CAV. From the meetings District 5 held with other agencies, a larger emphasis has been imposed to deploy consistent infrastructure improvements while setting the necessary technologies to enable CAV and Smart City planning.

Through various project studies and the fact that 55% of crashes occur at intersections, the deployments of standards for the Central Florida region are centered around the following:

- Cabinet Size and Channels
- Standard Intersection Detection
- Standard wiring of Intersections
- Advanced Traffic Signal Performance Measures
- Modified Special Provisions for Detection
- Modified Special Provisions for Data Collection
- Architecture to support both Dedicated Short-Range Communications (DSCR) and C-V2X technologies

From the FDOT Smart Signal Treatment Document[5], points 1 through 5 (as seen below) provide intersection treatment standards for all regions within District 5, this includes Osceola County.

1. All Intersections:

- **Controllers** - Current Spec 671 required ATC Controllers; ensure controller meets this specification. It is important to note that most controllers within the District communicate to a Central Software determined by the maintaining agency. These require Synchronization with Existing to function properly with the Central Software and will require a Proprietary Product Certification. If you would like examples or have any questions about the proprietary product certification process, please contact the FDOT Traffic Operations Department.

- **Advanced Traffic Signal Performance Metrics (ATSPM)** will be needed for counting vehicles, detecting crashes, grouping signals, and adjusting timings. To achieve these functions there is a need for stop bar and advanced detection on all lanes all approaches assigned to standard channels. Refer to ATSPM Guidance[6].
    - Stop Bar Detection – There are multiple considerations here. Stop Bar Detection can either function as presence or pulse. Traditional Stop Bar detection typically functions in presence meaning that it goes on and stays on until it no longer detects a vehicle. Pulse stop bar detection functions in an on-off manner similar to an advance loop and is more common in some adaptive signals.
        - IMC (Intersection Movement Counts) – IMC detection provides real-time turning movement counts (left, thru, right, and u-turn by lane split by turn type) at an intersection. They use strategically placed emulated loops/zones or vehicle trajectory tracking to generate these tuning movement counts. The device can serve as both IMC as well as the traditional presence/pulse detection at the Stop Bar. MSP 660 provides a spec for the hardware. The IMC Data typically can come through two different paths. The first is through an API call for an XML or JSON file to the device server. The Second is by using un-used detector channels with pulse loops/zones near

[5] http://www.cflsmartroads.com/projects/smartsignals/Smart%20Signal%20Treatment%20Overview.pdf

[6] http://www.cflsmartroads.com/projects/smartsignals/ATSPM%20Guidance.pdf

the stop bar to and recording the detector data to into the controller using high resolution logging from the ATSPM system. Consideration for data accessibility must be made by the engineer. These do NOT substitute for the need to add Advanced "loops." Note all isolated intersections turning movement counts should be gathered using IMC devices.

- IMC Examples of Wiring Diagrams (PedSafe Wiring Diagram[7]), sample plans (PedSafe[8]), and MSP (PedSafe MSP TSP[9]) are provided.

- **Advanced Loops/Zones** – These will need to be in major and minor arterials. The cost will vary based on the technology used to provide this detection. It is important to consider the speed limit and the maximum detection capability from the device in this decision. With advance detection provided on both the major and minor roadway, typical FDOT detection specifications can be used and the IMC could be approximated for select intersections (~1/3 of intersections) on coordinated corridors using ITSIQA approximation.

2. For intersections on Principle Arterials, Hurricane Evacuation Routes, and Detour Routes (KMZs are available for some of these at Diversion Route Resources[10]):

- **CCTV for confirmation** – PTZ for operations observation, locate for visibility of approaches, generally on a mast ar m over the major street. Use judgement for spans on all signal-ized intersections.

- **Bluetooth** - Speed and Origin-Destination – Bluetooth devices should be placed to gather speed and origin-destination information. Devices should be located outside of queues between intersections. One Bluetooth device for every third signal is an approximate density for large arterial roadways. Smaller facilities will likely require more devices, due to increased signal spacing; possibly at every signal. Devices should attempt to bookend controlling intersections. These are the intersections where major turning movements or delays occur. Block Diagrams (AAM Phase 3[11]), sample plans (AAM Phase 3 plans[12]), sample plans (AAM Phase 3 plans[13]), and MSPs (AAM Phase 3 MSP TSP[14]) are provided.

3. Contextual Data - These devices supply a good deal of data to the Traffic Management Center, but in order to make sense of it all, engineers need to understand what devices are configured on each intersection to understand which Standard

---

7 http://www.cflsmartroads.com/projects/smartsignals/IMC%20Wiring%20Diagrams.pdf

8 http://www.cflsmartroads.com/projects/smartsignals/440821-1-52-01%20PedSafe%20Plans.pdf

9 http://www.cflsmartroads.com/projects/smartsignals.html

10 http://www.cflsmartroads.com/projects/smartsignals.html

11 http://www.cflsmartroads.com/projects/smartsignals/AAM%20Phase%20III%20Block%20Diagrams.pdf

12 http://www.cflsmartroads.com/projects/smartsignals/AAM%20Phase%20III%20Plans.pdf

13 http://www.cflsmartroads.com/projects/smartsignals/AAM%20Phase%20III%20Plans.pdf

14 http://www.cflsmartroads.com/projects/smartsignals.html

Operating Procedure (SOPs) can be applied. This contextual data needs to be gathered in part by the engineer at the TMC and in part by the contractor. MSP 611 (Signal Inventory Tool) should be used in all jobs to have the contractor collect the field data to operationalize the data. The Department is currently in development of a Signal Inventory Tool web application to be used to make collecting the data easier and to have a seamless tie-in with the existing maintenance inventory database program. (See Signal Inventory Tool Application Design – Draft[15]) While this tool web application is in development, an interim local software application version is available for download and use. Instruction for getting access to this interim software program can be found on the Cflsmartroads website. (See Signal Inventory Tool Interim Application Procedure[16]).

4. Network Connectivity – Fiber is preferred. It allows for CV architecture that accommodates C-V2X and DSRC communications. If not possible, design should accommodate cell backhaul. It is important to ask who maintains and who operates the equipment in developing the network connectivity plan. How is the network connected outside the project limits? Does it communicate back to the local agency traffic management center or does it communicate back to the D5 ITS network? Is there logical connectivity between the local agency and the department?

- **Logical Connectivity** – How does the data get back to the network it needs to outside the limits of your project/region? Work with FDOT Network personnel to figure it out.

- **Physical Connectivity** – Open pull boxes to ensure Physical Connectivity to demark.

Cabinets - The layout of the cabinets and space needed will depend on, but not be limited to: existing devices within the cabinet, additional devices to provide ATSPM (detection devices selected to include detection on all approaches), and coordination with maintaining agencies. The designer should provide options to the maintaining agency, taking into account available alternatives and costs associated with deployment and maintenance. Cabinet Type 6 determination should be conducted during design. If a cabinet is replaced or newly installed, a Type 6 cabinet should be used.

Regarding the County's field ethernet switches, it is recommended that the number of ports provided be 16, this will support the County for CAV readiness when the time necessary to use additional ports for RSUs, secondary Bluetooth units, etc. The proposed port assignments are shown below.

16-port Switch
- Port 1 – Traffic Signal Controller / DMS Controller
- Port 2 – CCTV Camera / Encoder
- Port 3 – MMU / CMU
- Port 4 – Opticom / Pre-emption Device

---

[15] http://www.cflsmartroads.com/projects/smartsignals/Signal%20Inventory%20Tool%20Application%20Design%20Draft.pdf

[16] http://www.cflsmartroads.com/projects/smartsignals/Signal%20Inventory%20Tool%20Interim%20Application%20Procedure.pdf

- Port 5 – Video Detection
- Port 6 – RPM / PDU
- Port 7 – UPS
- Port 8 – Video Access Port
- Port 9 – Bluetooth
- Port 10 – Spare CCTV Port
- Port 11 – Maintenance Port
- Port 12 – RSU
- Port 13 – Bluetooth (Secondary Unit, if required)
- Port 14 – RSU (Secondary Unit, if required)
- Port 15 – Cellular Modem
- Port 16 – Spare

It is also recommended that Osceola County follow the intersection treatment standards stated above for the following reasons:

- Consistency among the District/Central Florida Region
- Allow for future deployments of necessary technologies to enable CAV and Smart City Planning.

SECTION 5

TSM&O Expansion and Coordination in Osceola County

5. TSM&O EXPANSION AND COORDINATION IN OSCEOLA COUNTY

This section will focus on the necessary steps to extend the reach of TSM&O benefits and maintain a successful transportation system network.

5.1 Expanding TSM&O in Osceola County

To expand TSM&O in Osceola County, proper protocols and channels must be set to maintain a successful TSM&O network of the transportation system. It goes without saying, a lot of capital is needed to deploy the various TSM&O improvements that the County is wanting. Therefore, it is critical that Operation and Maintenance (O&M) is set as a high priority by the County and all stakeholders.

As of FY 2019, funding sources for capital transportation projects and operating budget for the County is provided in Figure 13 and Figure 14, which is directly from the County website. According to the County website, an increase in the one-cent surtax is expected to increase the budget. If approved, the increase will put additional revenue back into O&M and has the potential to slowly close the gap between funding and O&M.

Funding Source:		FY19 Adopted Budget:
Transportation Trust Fund 1 to 6 Cents Local Option Fuel Tax County Voted Ninth-Cent Fuel Tax County 7th Cent Gas Tax General Fund Support	$	18,080,463
Red Light Camera Revenue	$	625,300
Constitutional Gas Tax Fund Constitutional Gas Tax Support from General Funds	$	6,750,000
1 to 5 Cents Local Option Fuel Tax	$	10,627,886
Total:	**$**	**36,083,649**

Figure 13 - Osceola County Funding (Revenue) Sources for FY 2019 Capital Projects

Funding Source:		FY19 Adopted Budget:
Transportation Trust Fund	$	98,600
Mobility Fee - East Zone	$	2,200,600
Mobility Fee - West Zone	$	3,771,500
State and Federal Grant Funding	$	8,657,150
Local Option Infrastructure Sales Surtax (Transportation Portion)	$	4,881,846
Total:	**$**	**19,609,696**

Figure 14 - Osceola County Funding (Revenue) Sources for the FY 2019 Operating Budget

Through meetings with the County, other avenues to gather funding for TSM&O can be achieved by 1.) refinancing bonds from local toll roads (i.e. Osceola Parkway) and 2.) leveraging developers. In 2014, County Commissioners approved an $83.5 million refinancing of bonds which helped fund various projects within the region. There is a possibility the refinancing of bonds can occur again, if so, this has the potential to aid TSM&O strategies if the County acts upon it. Since 2016, there have been many developers coming in and building neighborhoods, subdivisions, shopping plazas, and more. Many of the developed areas are along framework streets that require improvements. Per the County, developers are required to provide recommendations to the impacted roadways; therefore, this can also serve as another opportunity to aid TSM&O improvements along the affected roads.

It is recommended that the County put in place a procedure in which funding, standards, and O&M resources work in conjunction with any deployments. A way in which this can be achieved is by ensuring the County creates a list of capital improvement projects (done yearly or semi-yearly) along with a budget that includes the recommended TSM&O strategies/deployments. Lastly, cooperation among the various agencies in the County will be beneficial in allowing

resources to be allocated in ways that will benefit all agencies. It is recommended that a clear understanding be reached among operating agencies as to who will have access to other agencies' assets, what information can be shared, and where demarcation points will be.

5.1.1 Inter-Agency Coordination

Currently, both Osceola County and FDOT have FOC interconnecting the various ITS devices within the region. However, in order to maintain smooth operations of existing and future TSM&O infrastructure, it is essential that Osceola County continues to coordinate with FDOT to share the infrastructure.

5.1.2 Funding

Adequate funding for TSM&O can be a challenge for reasons due to cost of deployments, need for maintenance and support of the system, new technology, and staffing. However, as stated in the beginning of this section there is potential to put additional funding back into the County's TSM&O program through the increase in surtax, refinancing of bonds, and leveraging developers. Another alternative would be through interlocal agreements, Joint Participation Agreements (JPA), and Memorandums of Understanding (MOU). These agreements will officially transfer responsibility and identify funding as well as performance requirements tied to that funding. It is recommended that the County introduce the benefits of implementation of the TSM&O program to FDOT, County officials, and City officials.

5.1.3 Planning and Permitting for TSM&O Strategies

As discussed previously within this Strategic Plan, planning and permitting is key to sustaining a highly efficient and robust network of roads within the County. Per meetings with the County's Planning and Permitting Department, needs and funding availability are the two most important factors to be determined before the County outlines a list of roads that may be considered for capital improvements. The list of roads also depends on several factors, which include but are not limited to congestion, connectivity, multimodal options for transportation, and land use. The most up-to-date list of roads are itemized in the County website under Transportation and Transit. Other ways in which roads are listed in terms of priority are either development driven or reactionary, with much emphasis put towards development driven.

Once a roadway is considered and put into the County's priority list, the next step is to implement a Project Development and Environment (PD&E) study or a Traffic Impact Analysis (TIA). A TIA is similar to a PD&E in many ways, with the main difference being a TIA is required for development reasons and therefore is completed by the developer. The County does have a thorough review process for both PD&E's and TIA's; however, through discussions with the County, the levels of review vary.

The County is taking great strides in planning, prioritizing, reviewing, and studying the various corridors for future roadway expansion projects and improving existing roadways. Per the information discussed in this section and from meeting with the County's Planning and Permitting Department, the following should be considered to expand awareness of TSM&O within the region:

- Ensure TSM&O is considered early in the planning stages
- Ensure TSM&O strategies are considered alongside traditional roadway projects

- Ensure TIA's use innovative methods (i.e., additional fiber, signal retiming, innovative intersection design, etc.) as a part of TIA negotiations
- Re-evaluate the TIA review process
    - Ensure TSM&O strategies are considered in the methodology and SOP
- Ensure PD&E's incorporate TSM&O strategies
- Have a point person who is aware of TSM&O
    - Ensure that him/her is holistically looking at roadways, planning models, and TSM&O strategies
- Ensure scheduled meetings are conducted among the County's transportation and planning/permitting department

5.2 Land Use

This section will detail the importance of planning for land use as it relates to future improvements to the transportation network within the region.

5.2.1 Florida's Community Planning Act

The purpose of this act is to ""manage future development consistent with the proper role of local government." §163.3161(2), F.S. The 2011 revision of this act shortened the review period for agencies but did not reduce the planning requirements for Florida's county governments.

Regarding transportation, FDOT's community planning responsibilities[17] include:

- Providing technical assistance to local governments to address the impacts of land use on the transportation system and provide guidance in advance of the adoption of comprehensive plans and plan amendments.
- Supporting implementation of the Department's Complete Streets Policy[18].
- Supporting collaborative planning approaches that bring together the Department and its partners to address transportation-related challenges and opportunities in a continuing, comprehensive, and cooperative manner.
- Providing expertise to the state on transportation policy, planning, and implementation.
- Providing technical support to local governments to identify context sensitive solutions.
- Coordinating with local governments to better align transportation plans with existing and proposed land use plans.
- Conducting workshops on a variety of community planning topics.
- Participating in meetings with developers and local governments and conducting courtesy "pre-reviews" of proposed comprehensive plan changes to avoid potential adverse impacts in advance of submission of the proposed comprehensive plan amendment.

17 Https://www.fdot.gov/planning/policy/growthmanagement/default.shtm

18 http://www.flcompletestreets.com/

- Encouraging local governments to incorporate context-sensitive solutions in their transportation planning activities, which helps balance safety and mobility with local priorities and promotes FDOT's Complete Streets Policy[19].
- Participating in regional and community visioning projects and offering transportation guidance as part of these initiatives.

To satisfy this act, it is recommended that Osceola County adopt a comprehensive plan to guide future development to include TSM&O priorities, as well as ensure coordination of planning and development with the intent to promote economic growth.

5.2.2 Sustainable Land Use Forecast

In January 2016, Metroplan Orlando created the 2040 Sustainable Land Use Forecast [20]report. The intent of the report is for Seminole, Orange, and Osceola County to use as a base for traffic and transit forecasting. The report was developed with large amounts of data and coordination with partnering jurisdictions. The goals of the report are to: promote smart growth, transit-oriented development, redevelopment, infill, walkable urban spaces, and mixed-used neighborhood development. To achieve the goals, forecasts have been developed along corridors, employment charts have been researched, and traffic studies have been conducted.

Figure 15 illustrates sustainable development areas within Osceola County. The areas identified as sustainable are mixed use development areas, areas which show the red transit-oriented nodes, and areas where special district sheds overlap development parcels.

19 http://www.flcompletestreets.com/

20 https://metroplanorlando.org/wp-content/uploads/2040-LRTP-TR1-Sustainable-Land-Use-Forecast.pdf

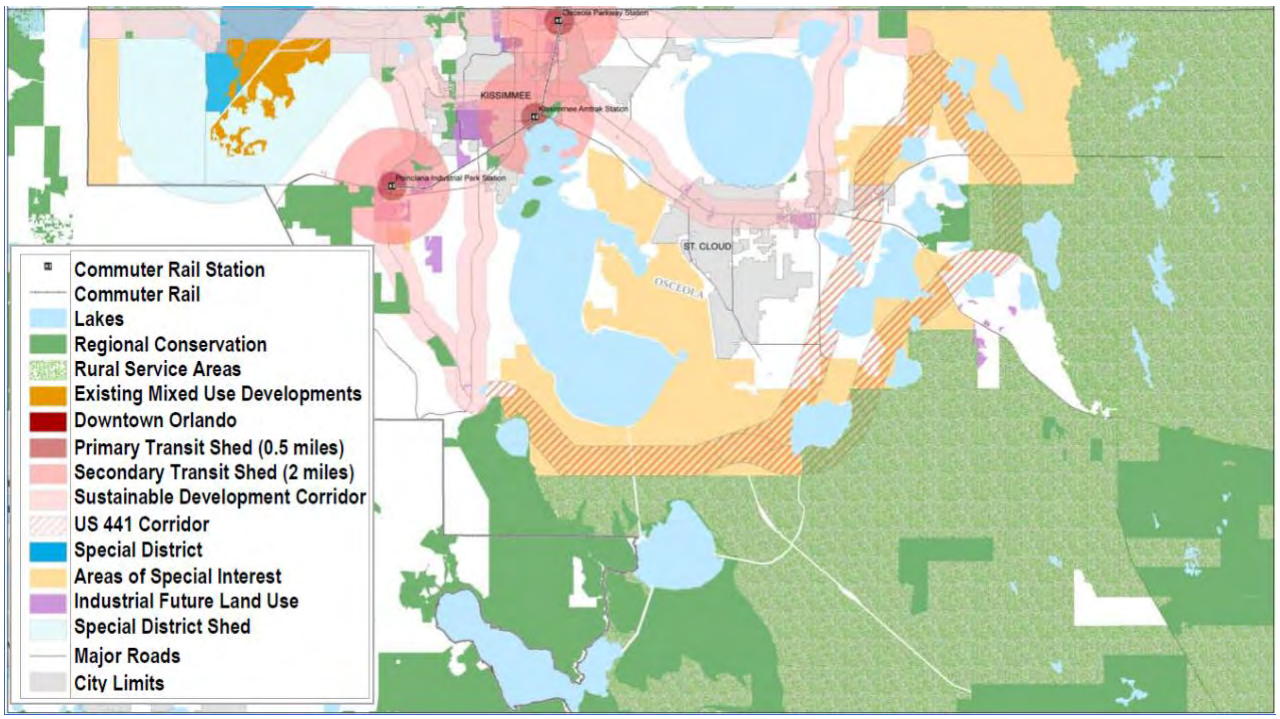


Figure 15 - Osceola County Land Use Framework
(Source: LRTP)

Also, within the report, Metroplan Orlando calculated densities and intensities for the following reasons:

1.) To permit sustainable land development
2.) To share best practices among jurisdictions.

Table 6 demonstrates how much area each form of land takes up in measurements of acre and FAR. Before analyzing Table 6, the following should be noted.

- Floor Area Ratio (FAR) is the ratio of useable floor area permitted in a building and the area of lot on which the building stands.
- The term "stacking allowed" means that the same acreage can be used to calculate residential density and commercial intensity.
- All calculations were based off of survey responses sent to various jurisdictions from members of Metroplan Orlando.

As an example, if 25 units per acre is permissible and 1.0 FAR is permissible, then on 2 acres it would be possible to build 50 units and approximately 87,000 square feet of non-residential. If stacking is not allowed, then the yield on 2 acres would be 25 units and approximately 43,000 square feet (or some other combination that exchanges square feet for units).

Type	What is the Denominator in "Units per Acre" and FAR Calculations?	Mixed Calc	FAR	Units / Acre	Min FAR	Min U/A	Other
City	Developable Land - Net of dedicated ROW, undevelopable areas (e.g. flood plains, wetlands)	% of acreage	1	50	n/a	n/a	
City	Gross acres; Non-residential calculation does not include surface parking areas	FAR includes residential	3 - 7	20 - 40	.15 - 1.25	4 - 6	Additional bonuses available
City	Gross acres	No answer	4	18	n/a	n/a	
City	Gross acres with provisions for clustering	FAR discounted if residential is maxed	3 (35 ft - 8 floor)	8 - 16	n/a	n/a	Achievable density limited by height, landscaping, stormwater
City	Buildable land - Net of wetlands, water	Not determined	1.5	30	n/a	n/a	Mix of uses required; 80 hotel rooms / acre
City	Developable Land - Net of roads, rights of way, & water bodies. Included in acreage wetlands, private parks.	Stacking allowed	0.6 - 8	40 - 400	Vary	Vary	Bonuses Included
County	Developable Land - Net of unbuildable acreage (wetland, floodplain, rights-of-way, utility easements)	Stacking allowed	.35 - 1	1 - 50	0.5	20	
County	Developable Land - Net of unbuildable acreage (wetlands, natural waters, stormwater) & public facilities in excess of county minimums (land for regional, public recreation and open space area)	Not determined	.35 - 2.5	5 - 25		3 - 13	
County	Varies. Net developable - Net of natural waters, wetlands. "Net, net" - Also net of public facilities (roads, water, sewer, solid waste, recreation, stormwater, schools), public open space, upland greenbelts, & amenitized stormwater. Parking structures, common areas, & non-leasable areas not considered "building" for FAR calculation in certain zones.	% of acreage	0.4 - 3	20 - 100	0.3 - 0.4	5 - 12	Achievable density limited by trips & landscaping requirements (estimate 2.0 max FAR)

Table 6 - Density Results
(Source: LRTP)

Finally, the report identified employment categories and population totals in 2040 with a margin of error of approximately 10 units. The numbers were produced by the University of Florida Bureau of Economic and Business Research (BEBR). Control totals for Osceola County are shown in the table below.

County	Dwelling Units	Population	Industrial	Commercial	Service
Seminole	250,935	564,318	35,743	78,845	250,678
Orange	719,779	1,704,566	89,277	307,837	759,017
Osceola	230,461	609,032	37,781	79,027	153,020
Total	1,201,175	2,877,916	162,801	465,709	1,162,715

Table 7 - Population and Control Totals for 2040

(Source: LRTP)

From the information provided in Table 6, a forecast model was developed which illustrates a mixed-density measure of "units + jobs" per each Traffic Analysis Zone (TAZ) within Osceola County, please refer to Figure 16. Darker shades represent higher concentration of mixed-use development. Three areas to note for future ITS planning within Osceola County is the Northwest District, Northeast District, and the areas just south of Lake Tohopekaliga.

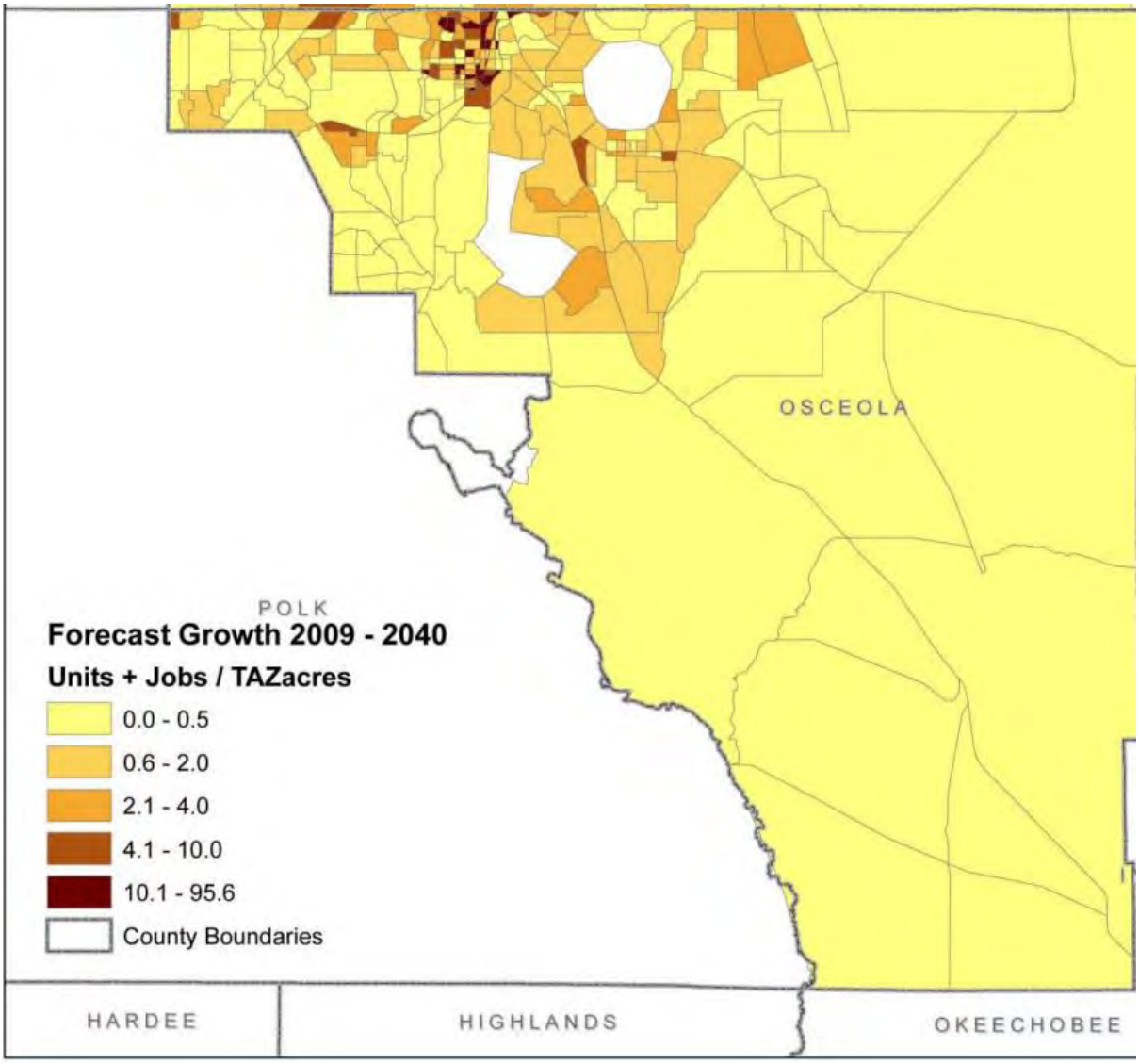


Figure 16 - Osceola County 2040 Forecast Growth in Units and Jobs
(Source: LRTP)

5.2.3 Land Use Planing

In order for Osceola County to properly plan TSM&O strategies and build the necessary infrastructure that it may require, the County is recommended to first refer to the Future Land Use Element Report [21] which discusses in great detail the goals, objectives, and policies for future transportation improvements. The report also provides various land use maps (shown in Appendix E) which forecast out to year 2040. The topics discussed in the report are:

- Growth Management
- Rural land Stewardship

[21] https://www.osceola.org/core/fileparse.php/2731/urlt/071119_Future-Land-Use-Element-thru-2040-thru-CPA18-0009.pdf

- Transfer of Development Rights
- Sustainable Development

In addition, a report titled, Transportation Element [22], details how to coordinate, establish, manage, and fund future transportation infrastructure build outs while in the planning phases. The topics discussed in the report are:

- Internal Coordination
- Intergovernmental Coordination
- Establishment of a Multimodal Transportation System
- Management of a Multimodal Transportation System
- Funding and Implementation

5.3 Potential for CAV Pilot Projects

The increasing rates of tourism in Osceola County brings in millions of people annually, this in turn effectively cripples efficient travel and increases congestion, especially in the City of Kissimmee and North West Osceola County. According to a 2019 U.S. Census estimate, approximately 367,990 people call Osceola home. However, out of the 126 million[23] out-of-state visitors in 2018, over 8.8 million[24] visited Osceola County. Therefore, it makes sense why Osceola County reported approximately 12,000[25] crashes in 2018, with the majority being in the City of Kissimmee. The County wants to eagerly put a stop to vehicular crashes, decrease congestion, and improve safety on their roadways for not just motorists but for first responders and pedestrians as well. Through discussion with the County, they have expressed interest in welcoming CAV technology along their roadways, as well as identifying a viable testing area.

[22] https://www.osceola.org/core/fileparse.php/2731/urlt/060216_TransportationElement.pdf

[23] http://www.aroundosceola.com/news/florida-breaks-tourism-record-again-with-m-visitors-in/article_07ffe00c-3c3f-11e9-8c96-536fabae4627.html

[24] http://www.aroundosceola.com/news/florida-breaks-tourism-record-again-with-m-visitors-in/article_07ffe00c-3c3f-11e9-8c96-536fabae4627.html

[25] https://s4.geoplan.ufl.edu/

5.3.1 NeoCity and Neptune Road

The County is positioning itself to become an innovation epicenter for cutting edge technology and high-wage jobs by quickly moving forward with NeoCity. NeoCity is a 21st Century idea to help the County position itself to become the most significant and technologically advanced city in North America. According to the NeoCity Master Plan[26], Osceola County is poised to be a comprehensive global center for smart sensor, photonics, and nano-technology research and development. NeoCity will radically change the way transportation is perceived by integrating smart sensors, mobile devices, and real-time data to interpret and understand our environment in new ways.

The County sees this as an opportunity to start discussions regarding the use of CAV technologies. As stated in the NeoCity Master Plan, the envisioned TSM&O strategies include but are not limited to the following:

- Cameras and Integrated Sensors - To observe road for changes and unexpected hazards
- Monitoring Movements – Devices along road that gather data, allowing analysis and adjustments to mitigate congestion
- Smart Lighting - Sensor controlled lighting

Based on the information provided from the NeoCity Master Plan, the sort of applications Osceola County is anticipated to see will require V2I and V2V enabled technology, this means OBU's and RSU's will be essential to apply the applications required, such as:

- Forward Collision Warning (FCW)
- Emergency Electronic Brake Light (EEBL) Warning
- Intersection Movement Assist (IMA)
- Intelligent Traffic Signal System (I-SIG)
- Probe Enabled Data Monitoring (PeDM) or Vehicle Data for Traffic Operations (VDTO)

5.3.2 US-192 Tourism Corridor

U.S. Route 192 (US-192) is an extremely popular highway in Osceola County, the highway runs east to west, with the western strip accommodating a lot of vehicular and pedestrian traffic due to Walt Disney World Resorts, timeshares, gift shops, attractions, and other resorts/hotels. At any given time of day, traffic delays on US-192 can abruptly occur for many reasons, the biggest of which is due to Walt Disney World. The Average Annual Daily Traffic (AADT) along West US-192 is just above 60,000, which makes it the busiest roadway within the County.

26 https://www.osceola.org/neocity/

A high density of vehicular collisions occurs along the tourism corridor, which is 15-mile stretch of US-192. The corridor starts at Westside Blvd and US-192 and ends at Vine St. and US-192. According to 2018 crash data from Signal Four Analytics, approximately 1300 crashes were reported within the limits of County's tourism corridor.

The time to invest in CAV technology is now, in fact, according to a report in GrowthSpotter, Osceola County's West US-192 Development Authority is considering new design standards that will provide a whole new look to the Tourism Corridor, the plan is set to go to the board in September 2019. The County believes this is a great opportunity to work side-by-side with planners and start enacting CAV readiness to support the new look of the tourism corridor. Although nothing has been finalized, the connected vehicle strategies Osceola County would like to see are the following:

- Pedestrian in Signalized Crosswalk
- AV shuttle operation
- Motorist Advisories and Warnings
- Intersection Movement Assist
- Probe Enabled Data Monitoring (PeDM) or Vehicle Data for Traffic Operations (VDTO)

SECTION 6

TSM&O Strategies Cost Requirements

6. TSM&O STRATEGIES COST REQUIREMENTS

High-level cost analyses were performed to determine approximate funding requirements for all deployments detailed in this Strategic plan. Included in these analyses were capital costs, O&M costs, and lifecycle replacement costs. It is recommended that the County implement a policy requiring developers to contribute (either monetarily or by installing equipment themselves) to the improvement of the TSM&O infrastructure, thereby reducing costs incurred directly by the County.

6.1 Capital Improvements

6.1.1 TSM&O Equipment and Infrastructure

Due to the wide reaching TSM&O needs of the County, the Strategic Plan recommends four deployments of varying size and cost. The capital cost unit prices used for these calculations were from the FDOT six months average prices, and 12-month averages for any items not included in the six-month averages. In addition, as a part of the capital cost, a 5% cost of mobilization for the early deployment, 10% for all subsequent deployments, a 5% cost for MOT for the early deployment, 10% for all subsequent deployments, a 10% cost of design, and a 10% contingency for the early deployment was included, with a 20% contingency for all subsequent deployments. See Appendix G for cost estimates of deployments and Appendix G for deployment maps. Below is a list of the primary items that were included in the estimates:

- Fiber Equipment Infrastructure (Fiber Optic Cable, conduit, pull boxes, etc.)
- Power service system (power service, service wires, grounding, etc.)
- CCTV Cameras (digital)
- DMS
- Travel Time System (TTS) – Bluetooth
- Ethernet Switches
- Cabinets

6.1.2 Deployment Projects

Deployment 1 – Northwest Osceola County

- Project Limits:
  - US 192 from Westside Blvd to Seaview Castle Dr.
  - Old Lake Wilson Rd. from US 192 to Osceola Polk Line Rd.
  - Griffin Rd. from US 192 to World Dr.
  - World Dr. from US 192 to Celebration Blvd.
  - Celebration Blvd from World Dr. to Celebration Pl.
  - Osceola Polk Line Rd. from Masters Blvd to US 17-92
  - US 17-92 from Osceola Pole Line Rd. to Poinciana Blvd.
  - Osceola Pkwy from S Victory Rd. to East of Polynesian Isle Blvd.

  - Celebration Pl from Celebration Blvd to Celebration Ave
  - Celebration Ave from Celebration Blvd to US 192
  - Sunclair Rd. from Old Lake Wilson Rd. to Connector Rd.
  - Seralago Blvd from US 192 to Osceola Pkwy

- Proposed TSM&O Equipment installed for deployment:
  - 96 count FOC
  - 24 count FOC for drop cables
  - CCTVs at all signals
  - DMS
  - Bluetooth detectors (approximately every 2 miles)

Deployment 2 – City of Kissimmee

- Project Limits:
  - Poinciana Blvd from US 192 to South of Robert McLane Blvd
  - US 192 from Seaview Castle Dr. to Old Canoe Creek Rd.
  - FL 535 from Polynesian Isle Blvd to US 192
  - Osceola Pkwy from East of Polynesian Isle Blvd to CR 530
  - John Young Pkwy from Thacker Ave to Pleasant Hill Rd.
  - US 17-92 from Pleasant Hill Rd. to Poinciana Blvd
  - US 441 from North of Centerview Blvd to US 192
  - Main St. from US 192 to Neptune Rd.
  - Broadway Ave from Neptune Rd. to Stewart Ave
  - Emmett St. from Stewart Ave to John Young Pkwy
  - Neptune Rd. from Main St. to Old Canoe Creek Rd.
  - Oak St. from Main St. to John Young Pkwy
  - Thacker Ave from US 192 to Patrick St.
  - Hoagland Blvd from US 192 to Columbia Ave
  - Armstrong Blvd from US 192 to Columbia Ave
  - Columbia Ave from Hoagland Blvd to John Young Pkwy
  - Carroll St. from John Young Pkwy to Dyer Blvd
  - Dyer Blvd from Osceola Pkwy to US 192
  - Fortune Rd from US 192 to CR 530
  - CR 530 from Fortune Rd. to Boggy Creek Rd.
  - Buenaventura Blvd from Osceola Pkwy to CR 530
  - Lakeside Dr. from Fortune Rd. to Westlake Dr.
  - Boggy Creek Rd. from CR 530to Narcoossee Rd.
  - Narcoossee Rd. from Boggy Creek Rd. to South of Disston Dr.
  - Orange Ave from Orange/Osceola County Line to Osceola Pkwy

  - Partin Settlement Rd. from Neptune Rd. to Remington Blvd
  - Mill Slough Rd. from Michigan Ave to Dean John Ln
  - Denn John Ln from US-192 to Mill Slough Rd
  - Michigan Ave from Osceola Pkwy to Vine St.

- Proposed TSM&O equipment installed for deployment:
  - 96 count FOC
  - 24 count FOC for drop cables
  - CCTVs at all signals
  - DMS
  - Bluetooth detectors (approximately every 2 miles)

Deployment 3 – City of St. Cloud

- Project Limits:
  - US 192 from Old Canoe Creek Rd. to Holopaw Rd.
  - Old Canoe Creek Rd. from Neptune Rd. to Canoe Creek Rd.
  - Narcoossee Rd. from Ralph Miller Rd. to US 192
  - Canoe Creek Rd. from US 192 to Deer Run Rd.
  - Kissimmee Park Rd. from Florida's Turnpike to Canoe Creek Rd.
  - Deer Run Rd. from Canoe Creek Rd. to Hickory Tree Rd.
  - New Notle Rd. from Canoe Creek Rd. to Hickory Tree Rd.
  -
- Proposed TSM&O equipment installed for deployment:
  - 96 count FOC
  - 24 count FOC for drop cables
  - CCTVs at all signals
  - DMS
  - Bluetooth detectors (approximately every 2 miles)

Deployment 4 – Poinciana

- Project Limits:
  - Poinciana Blvd from South of Robert McLane Blvd to Pleasant Hill Rd.
  - Pleasant Hill Rd. from Chad Ln. to Poinciana Blvd
  - Cypress Pkwy from Poinciana Blvd to Poinciana Pkwy
  - Marigold Ave from Cypress Pkwy to KOA St.

- Proposed TSM&O equipment installed for deployment:
  - 96 count FOC
  - 24 count FOC for drop cables

- CCTVs at most signals
- Bluetooth detectors (approximately every 2 miles)

Table 8 below shows a summary of all costs associated with the various deployments:

Deployment	Capital Costs	O&M Costs Per Year*	Total 10 Year O&M Cost*	Life Cycle Replacement Cost*
1 – NW Osceola	$5,734,162.51	$431,881.08	$4,728,977.31	$2,000,596.29
2- City of Kissimmee	$7,068,010.62	$977,782.80	$10,706,448.89	$4,137,385.44
3 – City of St. Cloud	$5,390,678.40	$317,357.91	$3,474,980.61	$1,010,725.05
4 – Poinciana	$511,416.96	$98,091.30	$1,074,072.40	$327,513.24
Totals	$18,704,268.49		$19,984,479.22	$7,476,220.02

Table 8 – Overall TSM&O Strategic Plan Cost Summary

**Includes existing infrastructure*

6.1.3 Opportunity Costs

To see the overall effects of TSM&O improvements within the County, an opportunity cost table has been developed which also shows calculated costs. Opportunity cost is defined as the cost of NOT implementing the recommendations. In this case, the opportunity cost will be the cost should none of the deployments be carried out. This will represent the cost to the traveling public if TSM&O improvements were not put into place. The following opportunity costs were considered as a part of this Strategic Plan. (refer to Appendix F for a complete explanation of all opportunity cost considerations):

- Traffic Signal Detector Failure Opportunity Cost
- Signal Retiming Opportunity Cost
- Arterial Management Opportunity Cost
- Adaptive Signal Opportunity Cost
- Crash Reduction Opportunity Cost

Table 9 below shows each of the calculated opportunity costs.

Opportunity Cost Type	Calculated Cost
Traffic Signal Detector Failure	$14,026,853.62
Signal Retiming	$3,117,938.64
Arterial management	$555,453,.51
Adaptive	$1,169,226.99
Crash Reduction	$61,382,556.38
Total	$79,141,263.49

Table 9 – Opportunity Cost

6.1.4 Benefit/Cost Ratio

The benefit to cost ratio measures the public benefit of all deployments. This measure quantifies the public benefit in dollars. This represents the dollar benefit the public receives for every public dollar spent, meaning the dollar amount saved by the taxpayers for every tax dollar spent. This ratio is crucial when generating funding. It is calculated by dividing the 10-year opportunity cost by the total strategic plan cost (capital costs, 10-year O&M cost, and lifecycle replacement costs). The Osceola County TSM&O Strategic Plan benefit cost ratio is shown in the equation below:

$$\frac{\$866,574,754.79}{\$46,164,967.73} = 18.8$$

Ultimately, this ratio demonstrates that TSM&O improvements are an extremely effective investment of funding for transportation purposes.

OSCEOLA COUNTY
TSM&O STRATEGIC PLAN

SECTION 7
Operations, Maintenance, and Management

7. OPERATIONS, MAINTENANCE, AND MANAGEMENT

7.1 Staffing Analysis

The most effective way to deploy proper TSM&O improvements is to ensure proper staffing and procedures are in place. In 2016, staffing guidelines were created as part of the FDOT D5 ITS Master Plan[27]. However, since three years have passed, Table 10 provides current staffing numbers for the TMC based on the organizational chart shown in Figure 17.

Osceola County	
Position	Current Staff (2019)
Traffic Engineering Operations Manager	1
Traffic Signal/ITS Engineer	1
Traffic Signal Analysts/Technician	1
Traffic Signal Maintenance/ITS Fiber Technician	2
Network Specialist	0
Electronics Specialist (L2 Network Tech)	1
TMC Manager	0
Supervisor	1
TMC Operators	2

Table 10 – Osceola County TMC Staffing

[27] FDOT District 5 ITS Master Plan, Metric Engineering, Inc. October 2016.

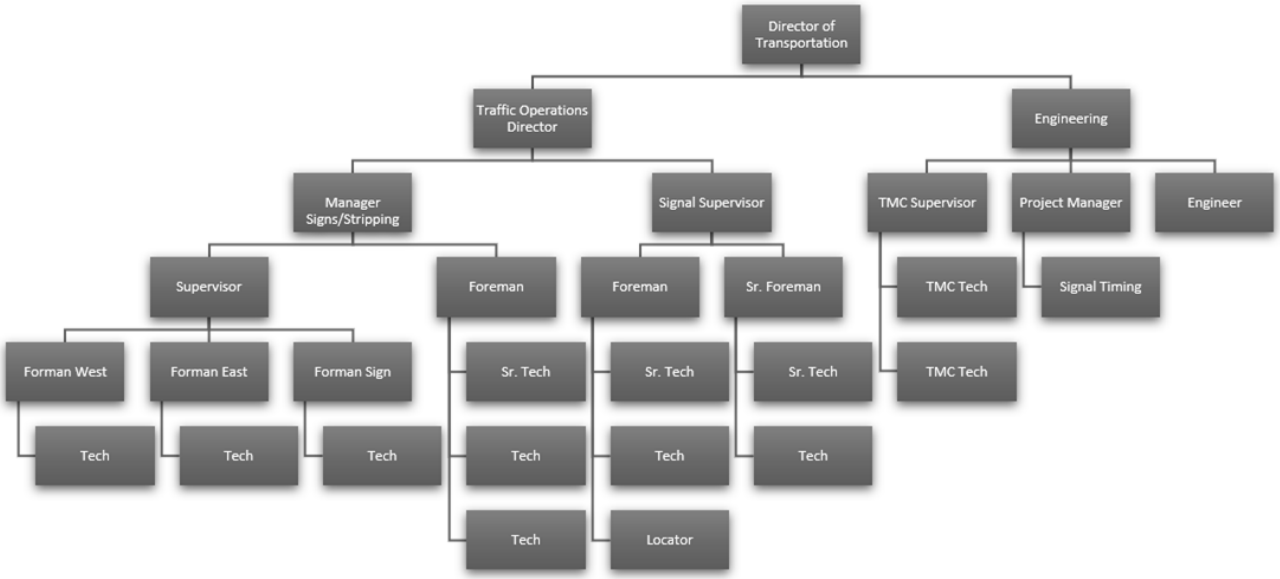


Figure 17 – Osceola County Traffic Operations Organizational Chart

The USDOT FHWA June 2008 Signal Timing Manual[28] provides general guidelines on staffing requirements for a traffic signal system as it relates to signal retiming. This information can be found in the Table 11 and forms a portion of the basis for the needs analysis identified in the tables that follow.

Position	<50 Signals	<100 Signals	<200 Signals	<500 Signals	<1000 Signals
Traffic Signal Engineer	0 to 1	1	1 to 2	2 to 5	5 to 10
Traffic Signal Analyst/Technician	0 to 1	0 to 1	1	1 to 3	3 to 5
ITS Engineer	-	-	0 to 1	1	1 to 3
Traffic Signal Maintenance Technician	1 to 2	2 to 4	4 to 7	7 to 17	17 to 33
Electronic Specialists	1	1	1 to 2	2 to 4	4 to 9
TMC Operators	-	-	2	2 to 4	4 to 9

Table 11 – USDOT Recommended Staffing Guidelines

28 http://www.ops.fhwa.dot.gov/publications/fhwahop08024/fhwa_hop_08_024.pdf

Table 12 illustrates how agencies should operate and maintain traffic signal systems and ITS end devices with a TMC. It should also be noted, there are no United States Department of Transportation (USDOT) recommended staffing guidelines for ITS operations and maintenance. Therefore, through FDOT and Maintaining Agencies interviews as well as separate interviews from the FDOT District 5 ITS Master Plan, it was determined that employing two TMC monitoring personnel per 350 signals and/or end devices (i.e. CCTVs, DMSs, etc.) was a reasonable staffing level.

Position	Number of Signals + ITS End Devices				
	<100	<200	<350	<700	<1400
Traffic Engineering Operations Manager	0	0-1	1	1	1
Traffic Signal Engineer	0-1	0-1	1-2	2-3	3-6
Traffic Signal Analysts/Technician	0-1	1	1-2	2-4	2-5
Traffic Signal Maintenance/ITS Fiber Technician	1-3	3-5	4-10	8-16	15-30
Network Specialist	*	0-1	1	1-2	2-3
Electronics Specialist (L2 Network Tech)	0-1	0-1	1	1-3	2-7
TMC Manager	*	0-1	1	1	1-2
Supervisor**	*	0-1	1	1-2	2-3
TMC Operators**	0-1	1	1	2-4	4-6

Table 12 – Recommended Staffing Guidelines (Signal Systems, ITS, and TMC)

* This position is desirable, but not necessarily required.
** This position is required 14 hours a day (Weekdays Only). Note that FDOT and the City of Orlando are 24 hours a day/7 days a week/365 days a year.

A breakdown of salaries per staffing position was gathered from the tables provided in the D5 ITS Master Plan, as shown in the tables below. The 2.15 multiplier assumes consultant services. It should be noted, a cumulative inflation rate of 6.5% was assumed (2.16% per year), since the D5 ITS Master Plan was created in 2016.

Average Annual Pay for Operations and Maintenance Staff		
Position	Average Pay Without Multiplier	Average Pay (Includes 2.15 Multiplier)
Traffic Engineering Operations Manager (Local)	$133,125	$286,218
Traffic Signal/ITS Engineer	$99,684	$214,320
Traffic Signal Analysts/Technician	$66,456	$142,880
Traffic Signal Maintenance/ITS Fiber Technician	$55,590	$119,520

Table 13 – Average Annual Pay for O&M Staff

Average Annual Pay for IT Staff		
Position	Average Pay Without Multiplier	Average Pay (Includes 2.15 Multiplier)
Network Specialist	$90,525	$194,628
Electronics Specialist (L2 Network Tech)	$57,253	$123,094

Table 14 – Average Annual Pay for IT Staff

Average Annual Pay for TMC Operations Staff		
Position	Average Pay Without Multiplier	Average Pay (Includes 2.15 Multiplier)
TMC Manager	$85,200	$183,180
Supervisor	$39,937	$85,865
TMC Operators	$26,625	$57,243

Table 15 – Average Annual Pay for TMC Operations Staff

Table 16 illustrates recommended staffing based on the guidelines established from Tables 11, 12, 13, 14 and 15.

Position	Existing Staff	Current Recommended Staff	Current Additional Staff Needed	Average Pay (with 2.15 multiplier)	Total Proposed Cost
Traffic Engineering Operations Manager	1.0	1.0	0.0	$286,218	$0
Traffic Signal/ITS Engineer	1.0	1.0	0.0	$214,320	$0
Traffic Signal Analyst/Technician	1.0	1.0	0.0	$142,880	$0
Traffic Signal Maintenance/ITS Fiber Technician	2.0	4.0	2.0	$119,520	$293,040
Network Specialist	0.0	0.0	0.0	$194,628	$0
Electronics Specialist (L2 Network Tech)	1.0	1.0	0.0	$123,094	$0
TMC Manager	0.0	1.0	1.0	$183,180	$183,180
TMC Supervisor	1.0	1.0	0.0	$85,865	$0
TMC Operator	2.0	2.0	0.0	$53,243	$0
				Total	$476,220

Table 16 – Recommended Staffing for Osceola County O&M

Equipment Replacement

The TSM&O program is heavily technology based; Therefore, it is required that equipment replacement should be done on a cyclical basis. Optimal efficiency of all TSM&O equipment is essential to the success of a transportation network. As such, it is necessary for the region to plan for technology upgrades as they become available. For the purposes of this Strategic Plan, a lifecycle of 10 years will be assumed for all TSM&O devices. The fiber optic cable has an approximately 20-year life expectancy. It should be noted that replacement lifecycle estimates for ITS deployments area high level guide. Several factors including the rapidly changing pace of technological advancement; changing technology standards and legislation; required upgrades to supporting infrastructure; and the difference between functional and operational obsolescence may affect the actual lifecycle of the equipment.

The Ten Year ITS Operations and Replacement Cost Feasible Plan was updated in fiscal year 2015/2016 (refer to Figure 18) by the FDOT Traffic Engineering and Operation Office. There is a total set aside of at least $12.2 million[29] for the District five Equipment Replacement in the next five years. It should be noted, this is principally for the Freeway Management System (FMS); also, District five incorporates nine (9) counties with Osceola being one of them. The allocation of funds is established by the Traffic Engineering and Operations Office.

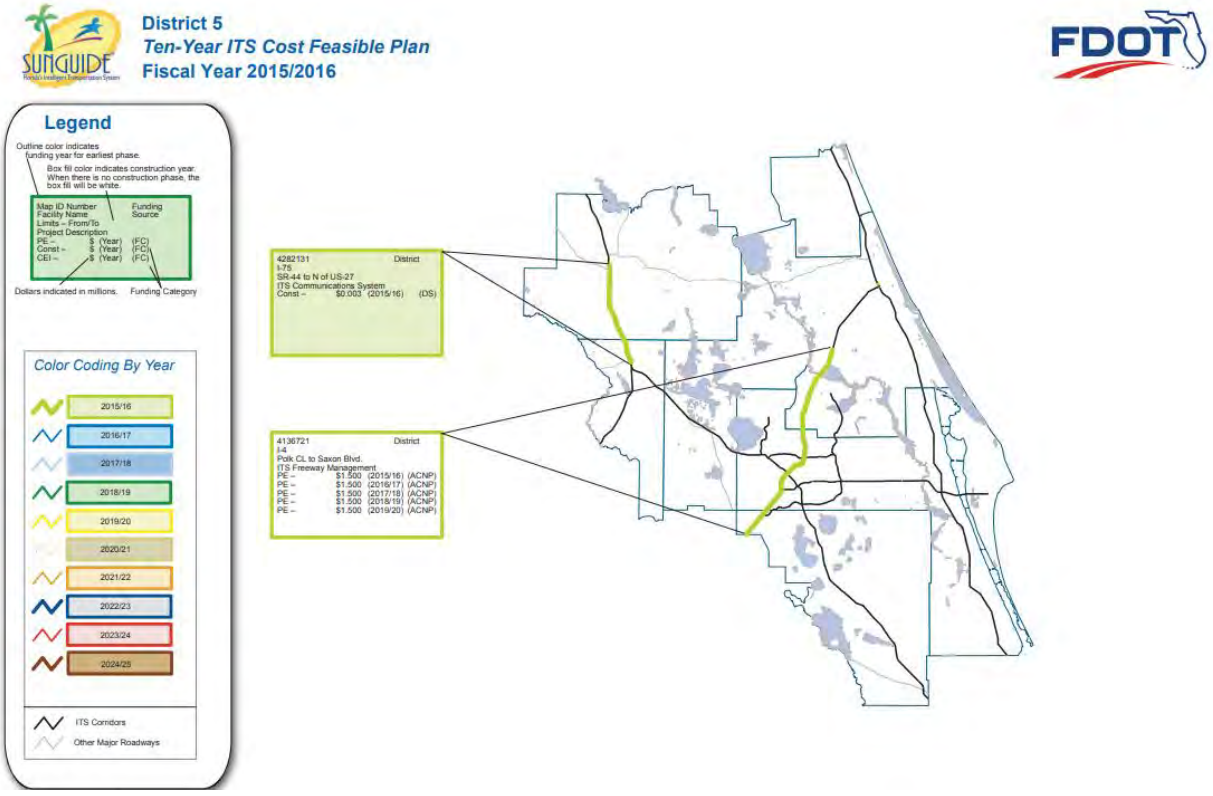


Figure 18 - District 5 Ten-Year ITS Cost Feasible Plan
(Source: FDOT)

7.2 SunRail Handoff Operations

The SunRail line stretches approximately 9.6 miles within Osceola County, there is one station located in Downtown Kissimmee and another station in Poinciana. In addition, 96-count fiber runs along the entire line which ends at Clay St. and Poinciana Blvd. Through various stakeholders meetings, it is anticipated that on May 1, 2021[30] a handoff of operations, control, and maintenance to local partners, including Osceola County will occur. As of now, limited to no information has been provided regarding the SunRail operations and maintenance agreement with the County. Therefore, it is recommended that the County has adequate staffing in place for the operation and maintenance of the existing SunRail infrastructure.

29 https://www.fdot.gov/traffic/its/projects-deploy/ten-year-cfp.shtm

30 https://www.bizjournals.com/orlando/news/2019/07/17/volusia-county-may-challenge-sunrail.html

SECTION 8

Implementing TSM&O Within Organizational Structure

8. IMPLEMENTING TSM&O WITHIN ORGANIZATIONAL STRUCTURE

To effectively implement the various TSM&O strategies discussed in this Strategic Plan, it is important to understand the roles and responsibilities of the operations process as it directly correlates with the FDOT process. A review of the Counties organizational structure is recommended in order to determine which roles/positions will take on TSM&O activities. Reshuffling of the organization structure is also recommended to spark collaboration and project authority. It's vital to consider all roles/responsibilities within the County structure when identifying TSM&O responsibilities to improve engagement in TSM&O activities.

8.1 TMC Staffing

Due to costs, the staffing of the TMC should be appropriate to maximize the overall return on investment. The following are some possible recommendations:

- 6:00 AM – 8:00 PM Monday through Friday
    - Weekend hours as needed
    - Can be increased/decreased depending on:
        - Peak and off-peak times of day
        - Special events
            - Festivals
            - Evacuations
        - Number of monitored roadways

Operator Responsibilities

The following will be the responsibilities of TMC operators:

- Log congestion data
    - Recurring and non-recurring
- Notify proper responding agency of any incidents
- Notify signal timing operators of any incidents
- Perform device checks and record results
    - Signals
    - CCTV cameras
    - ADMS
    - Bluetooth
    - Etc.

Supervisor Responsibilities

The following will be the responsibilities of the TMC Supervisor:

- Analyze results of device checks
- Fill in for operators at break times as needed

- Prepare daily, weekly, and monthly reports as requested by Osceola County
- Attend meetings

8.2 Organizational Management

Planning and operations are two critical components within an organizational structure. The day to day operations of all the ITS devices throughout Osceola County are the responsibility of the operator/maintainer agency, unless it's been documented otherwise through an agreement. Within the current organizational structure of the County, it is recommended that an operations team is developed whose daily activities will be centered around the utilizations of the tools available to them. The activities of team will include at a minimum:

- Signal systems monitoring and reporting
- ITS device systems monitoring and reporting
- Roadway monitoring and reporting
- Event management
- Performance monitoring
- Review of organizational structure

In addition, the County's SOPs must document all policies and procedures which entail duties for the staff to maximize the benefits of the tools available to them. It is critical that all staff within the TMC are familiar with the SOPs for their position, please refer to Appendix I for the most current SOP. Training standards are equally important, a standardized approach is vital to encourage counited growth of TSM&O. Every personnel in team should know their position and what they are required to oversee and/or manage. For a detailed training plan of all positions, it's recommended the County refer to the District 5 ITS Master Plan[31]. Within the District 5 ITS Master Plan, Section 7.5 outlines the responsibility of each position, as well as provide recommended training courses.

In order for Osceola County to prepare for the advances in technology, having the adequate staffing and operational procedures is critical. It is recommended for the County to develop a planning team, with the purpose of this team to bridge coordination efforts with the operations team to avoid a disconnect between design and construction later in the project development process. In addition, it is recommended that a representative from the County planning department be included on this planning team to ensure that operations and maintenance are a considered at the planning level.

31 http://www.cflsmartroads.com/docs/District%205%20ITS%20Master%20Plan_FINAL.pdf

OSCEOLA COUNTY
TSM&O STRATEGIC PLAN

SECTION 9
Conclusion

9. CONCLUSION

In establishing a vision, goals, and objectives for TSM&O improvements in Osceola County, this Strategic Plan provides the foundation for improvements to the roadway network that will benefit all users. These improvements are recommended to be put in place to allow the County to have a greater return on large capital roadway investments that have already been made. These improvements include capital investments that will allow the County to bolster their TSM&O infrastructure, that will create an efficient and widespread network, as well as increased funding for O&M to ensure that any additional investments do not go to waste. This O&M funding should be tied to how well the system meets performance measures, allowing the funding to be maintained (or potentially increased) as the improvements prove to decrease congestion in the County. With full stakeholder buy-in, this Strategic Plan will allow the County to improve their transportation system by increasing system performance, increasing safety for both motorists and first responders, increasing travel time reliability, and reducing negative environmental effects.

Appendix A – Standard Operating Guidelines (SOG)

Osceola County
Advanced Traffic Management System (ATMS)

Standard Operating Guidelines

OSCEOLA COUNTY ENGINEERING DEPARTMENT
1 Courthouse Square, Suite 1100
Kissimmee, FL 34741
407-343-2600

Table of Contents

1. Introduction

These Standard Operating Guidelines are for the Osceola County Traffic Management Center (TMC). They are intended to be supplemented by more detailed instructions provided in Centracs training and supporting documents and other reference material such as the Manual on Uniform Traffic Control Devices (MUTCD), FDOT Traffic Engineering Manual, FDOT Design Standards and any other applicable reference material. These guidelines should be referenced regularly by operations staff.

NOTE: This guide will often refer to concepts by established acronyms or short names. For a complete list of acronyms and short names, please reference the glossary of terms. The terms “Osceola County” and “County” are used interchangeably throughout this document.

2. TMC General Overview

2.1 TMC Mission Statement

The mission of the Osceola County Traffic Management Center is to provide Osceola County with accurate traveler information through different avenues using Intelligent Transportation System devices.

2.2 Scope of Work

The Osceola County TMC is tasked with the monitoring and reporting of traffic conditions on important highways within Osceola County. This facility operates in conjunction with a state law enforcement communications center, and as such, it operates at all hours of the day and on all days of the year.

Work is performed using a variety of devices, systems, and software to detect and respond to planned and unplanned events that arise on the roadways, and to mitigate their effects. Because roadways in the district are the primary source of conveyance for goods and people, it is imperative to the economic vitality and general wellbeing of the region to ensure that traffic flows safely and efficiently.

The Osceola County TMC provides coverage for selected roadways within Osceola County including, but not limited to County Roads, Toll Roads, State Roads, and US Highways. Currently, the Osceola County TMC provides real-time traffic information for:

- Interstate 4 (SR-400), through FDOT D5 RTMC
- SR-417 (Toll), through FDOT D5 RTMC
- SR-429 (Toll), through FDOT D5 RTMC
- Florida’s Turnpike, through FDOT FTE TMC

- Osceola Parkway (Partial Toll)
- US 192
- John Young Pkwy
- US 441
- Pleasant Hill Rd
- Poinciana Blvd
- Cypress Pkwy
- Boggy Creek Rd
- Michigan Ave
- Narcoossee Rd (to be included in phase IV)

2.2.1 TMC Layout

The TMC is collocated with the Osceola County Sherriff's Department Emergency Operations Center. The TMC has 2 rows in the front of the room that face a videowall. The first row contains 2 Operator workstations, which are used for daily operations. The second row consists of an additional workstation that can be utilized as back-up workstation for TMC operations when needed.

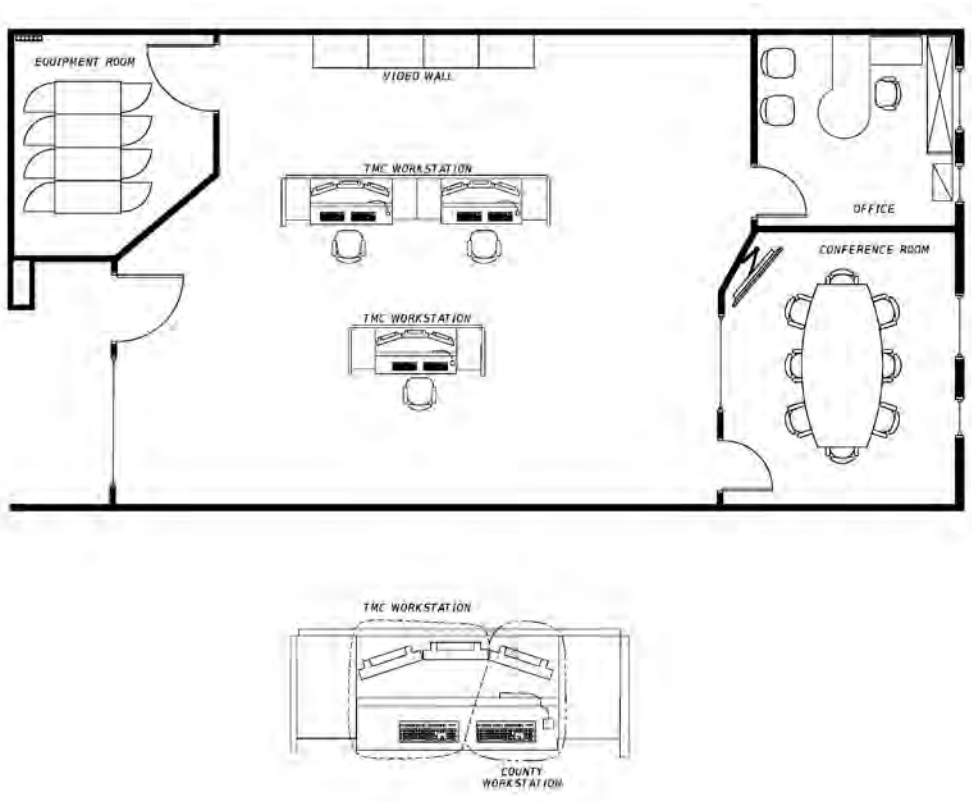


Figure 1: TMC Layout

2.2.2 TMC Staff

TMC Manager/Supervisor

Matthew Wilson, PE, the TMC Manager, is responsible for overseeing the daily operations of the TMC. His responsibilities consist of all work necessary to provide for the general management, oversight, QA/QC, and administration of the contract by the Vendor's management and management support personnel. The TMC manager is responsible for the development of protocols, standard operating procedures, and ensuring compliance with the FDOT and County guidelines and practices. In addition, the TMC Manager oversees operations, directing TMC Operator(s) and assures all incidents are handled according to FDOT and County policies. Additionally, the Manager assists Operator(s) during busy times, checks all paperwork checks all data entry and verifies TIS Devices and systems are working properly. At this point, the TMC manager will also act as the TMC supervisor. As TMC needs expand, the role of TMC supervisor will be added as a separate position.

TMC Operator

The TMC Operator is responsible for operating the various TMC system workstations and monitoring traffic conditions. The TMC Operator is also responsible for the principal monitoring of the roadways including detecting, confirming, updating and responding to scheduled and unscheduled traffic events, congestion and travel time imbalances in the geographical coverage area with monitoring and/or surveillance capabilities. The Operator also provides quality assurance on the day-to-day handling of all events in the TMC. All of which is reported to the TMC Manager.

2.3 Security and Access

The TMC is a secure area and entrance requires the use of an electronic passkey. No keys will be issued to non-operational personnel. Lost passkeys shall be reported immediately to the TMC Manager so that the card can be deactivated. For visitors and other personnel (contractors, consultants, etc.) to enter the communications or equipment rooms, they will be required to contact the TMC Manager for access. Visitors and/or other personnel must be escorted by someone from Osceola County with access to the TMC. Prior approval must be granted from TMC Manager. Appointments shall be made for all maintenance and installation work involving the equipment or communications rooms. All visitors to the equipment or communications rooms must sign in and sign out.

2.3.1 TMC Center Access

An escort is required for any non-approved personnel entering the Osceola County EOC. Those individuals who have completed the Osceola County Sherriff's Office Background Check for access into TMC do not need an escort.

All TMC staff, Osceola County employees and Osceola County Sherriff personnel have completed the background investigation and can enter the room without signing the log. All other personnel must log in when entering the facility.

Location of the log in sheet:

The log in sheet is located on the TMC workstation row with two workstations (the row closest to the videowall).

**If you are ever unsure on what to do please consult the TMC Manager for guidance.

To obtain an electronic passkey, each employee must complete the background check required by Osceola County Sherriff's office.

2.4 Appearance Guidelines

The TMC is a professional environment, and employees are expected at all times to present a professional, business-like image. Acceptable personal appearance, as well as proper maintenance of work area is an ongoing requirement of employment at the TMC.

TMC shall wear collared shirts. TMC Staff should wear business casual attire Monday through Thursday. Neat blue jeans will be permitted on Fridays, weekends, and holidays.

TMC staff is expected to be well-groomed and manicured. Hairstyles, wigs, moustaches, sideburns, and other grooming effects should be neat and well kept. Any employee who does not meet the standards of this guideline will be required to take corrective action, including but not limited to leaving the TMC. Violations of this guideline may also result in disciplinary action.

2.5 Decorum

2.5.1 Operator Conduct

Employees of the TMC are expected to present a professional image and demeanor. Common courtesy and respect for all personnel within the building is expected of all TMC employees. Loud talking, yelling, and other disruptive behaviors are not permitted at any time. Remember the TMC is co-located with a county law enforcement dispatch center and such disruptive behaviors can have serious implications on dispatch operations.

2.5.2 Computer and Internet Policy

Employees are granted use of state computers and the Internet to carry out the mission of the County and to promote efficiency and improved communications with our internal and external customers. The Internet should be used for business purposes, and any personal usage must be brief, infrequent, and in compliance with the expectations described in the County's policy. Internet access is only authorized through the County's proxy server unless specifically approved and documented by the Information Security Manager.

The Office of Information Technology will maintain detailed records of all internet usage for use in detecting abuse or misuse of this resource without notice to employees.

OSCEOLA COUNTY'S POLICY

The public places considerable confidence in Osceola County to ensure the integrity, accuracy and security of information stored, managed and shared by the County. The intent of an Information Security Acceptable Use Policy is not to impose restrictions that are contrary to Osceola County's established culture of openness, trust and integrity, or that unduly impact the County's operations in a negative way. Osceola County is committed to protecting itself, its citizens, employees, and partners from illegal or damaging actions by individuals, either knowingly or unknowingly. Appropriate measures must be taken to ensure the confidentiality, integrity and availability of information and that access to information is restricted to authorized users. All TMC employees are required to read and follow Section 2.6-6 Information Security and Acceptable Use of the Policies and Procedures of the Osceola County Handbook.

2.5.3 Telephone Etiquette

The staff of the TMC will receive calls from a variety of sources including agencies and the public. All calls will be handled in a courteous and professional manner, regardless of the content of the call and/or the attitude of the caller.

When answering any incoming calls from the outside line, the operator should answer:

"Osceola County TMC, this is _____. How may I help you?"

2.5.4 Contact with Media and the Public

At no time is it permissible for TMC staff to comment to the media without prior authorization. The TMC Manager cannot give authorization to contact media. All media inquiries shall be forwarded to the TMC Manager. The TMC Manager will forward all requests to the PIO office. All TMC employees are required to read and follow Section 2.6-10 Information Management of the Policies and Procedures of the Osceola County Handbook.

Most calls received directly from the public will be for Road Ranger service. When this happens, the employee should take down all pertinent information including a name and call back number, then dispatch the next available Road Ranger. If no Road Rangers are in service, refer the call to the appropriate law enforcement agency, or the state law enforcement dispatch center.

2.5.5 Smoking Policy

The Osceola County TMC is a non-smoking facility. No one is allowed to smoke inside the center. Smoking is allowed in designated smoking areas only. Operators are allowed to smoke before work, after work and during lunch only.

2.5.6 Drug-Free Workplace

The Osceola County TMC is committed to providing a safe work environment, fostering the well-being and health of its employees. That commitment is jeopardized when any Osceola County TMC employee illegally uses drugs or alcohol on the job, comes to work with these substances present in his/her body, or possesses, distributes, or sells drugs in the workplace. Therefore, the Osceola County TMC has established the following drug-free procedures:

OSCEOLA COUNTY'S POLICY

County employees are prohibited from using, selling, dispensing, distributing, possessing, or manufacturing illegal drugs and alcoholic beverages on County premises, work sites, or in County vehicles. Employees are prohibited from off-premise possession, use, or sale of illegal drugs. In addition, employees are prohibited from off-premise use of alcohol and drugs when such activity adversely affects job performance, job safety, or interferes with the County's ability to carry out its mission. It is a violation of TMC procedures for any employee to possess, sell, trade, or offer for sale illegal drugs or otherwise engage in the illegal use of drugs, intoxicants, or alcohol on the job. It is a violation of TMC procedures for anyone to report to work under the influence of illegal drugs, intoxicant or alcohol. It is a violation of the TMC procedures for anyone to use prescription or over the counter medications illegally. Inappropriate use of legally prescribed medications will be viewed in the same manner as illegal drugs. However, nothing in this procedure precludes the appropriate use of legally prescribed or over the counter medications. A violation of this procedure is subject to disciplinary action up to and including termination of employment. All TMC employees are required to read and follow Section 2.6-9 Drug and Alcohol Free Workplace of the Policies and Procedures of the Osceola County Handbook.

2.5.7 Professional Conduct and No Harassment Policy

Osceola County expects all employees to behave in a professional manner and demonstrate respect for others at all times. Osceola County prohibits unlawful harassment, whether based on race, color, religion, gender, national origin, disability, citizenship status, marital status, age,

sexual orientation or other legally protected status. Harassment in all forms, whether verbal, written or physical, is strictly prohibited. All TMC employees are required to read and follow Section 2.1-4 Anti-Harassment Policy of the Policies and Procedures of the Osceola County Handbook.

2.6 Scheduling

2.6.1 Time off Requests

TMC employees who plan on taking time off must request time off via Stromberg (or if in initial probation period, time off requests will be through Source 2's timesheet). The form must be completed at least two 2 weeks prior to the time off and must be approved by the TMC Manager. Requests for time off less than 2 weeks prior to the time off may not be approved. Time off will be approved on a case-by-case basis within two 2 days of the submittal. Time off may be canceled if significant event (such as a hurricane) is forecasted within 24 hours of the beginning of the time off.

Unplanned time off, such as for a death in the family, must be brought to the TMC Manager's attention immediately. If the TMC Manager observes abuse in unplanned time off requests, documentation may be requested.

For detailed information regarding Osceola County's policies on Leave/Time Off please access the Osceola County's employee handbook sections for Policies and Procedures, Section 2.5-1 Vacation Leave.

2.6.2 Sick Leave

Operators who are ill must call the TMC Manager at least 8 hours before the beginning of their shift. Operators who call in before, during, or after a Holiday or those who call in sick less than 8 hours prior to the beginning of their shift are required to provide documentation of their illness.

For detailed information regarding Osceola County's policies on sick time please access the Osceola County's employee handbook sections for Policies and Procedures, Section 2.5-2 Sick Leave.

2.6.3 Normal Working Hours

Normal working hours are to be 8:00 am to 5:00 pm, Monday through Friday. Working hours during emergencies are to be as deemed necessary until the emergency clears. In the event of an emergency, an emergency schedule will be posted. Additional County employees trained to operate the TMC will report to the TMC for the duration of the emergency.

2.6.4 Lunch

Employees are encouraged to take lunch during the course of their shift. The lunch period is 60 minutes and shall be taken by all full-time employees during their shift. The lunch period will be restricted to the TMC area due to the immediate availability required of the position and nature of the job duties unless leaving is approved by the TMC Manager.

2.6.5 Overtime

Employees may be required to remain past their regularly assigned schedule on a case by case basis. If this results overtime, then the employee is compensated at time-and-one-half their hourly salary. All overtime must be approved by the TMC Manager prior to working the overtime hours. Overtime hours logged without prior approval from the TMC Manager will result in disciplinary actions.

2.6.6 Compensation Time

In the event of an emergency where the TMC is required to be staffed on a 24 hour basis, compensation time will be given to the employee in lieu of overtime payment once the emergency is secured. All compensation time must be approved by the TMC Manager prior to taking the compensation time. Compensation time without prior approval from the TMC Manager will result in disciplinary actions.

2.7 Incident Command System and the National Incident Management System

All employees working for the State of Florida, any of its 67 counties, or any of its 400+ municipalities, must receive training from the FEMA Institute on the Incident Command System (ICS) and the National Incident Management System (NIMS). These topics were developed in the 1970's during a reign of destructive wildfires in California as a way of keeping large-scale incidents manageable. Although ICS and NIMS were born from large-scale events, they have been refined over the years to become scalable. ICS and NIMS can be used for any response, no matter how large or small.

Operators are responsible for the following FEMA Institute Courses:

- IS-700.a National Incident Management System (NIMS), An Introduction
- IS-100.b - (ICS 100) Introduction to Incident Command System
- IS-200.b (ICS 200) ICS for Single Resources and Initial Action Incidents

2.8 Florida Statute 119: Florida's Public Records Laws

Pursuant to Florida State Statute 119 (FSS 119)

> FSS 119.01 (1): It is the policy of this state that all state, county, and municipal records are open for personal inspection and copying by any person. Providing access to public records is a duty of each agency.
>
> FSS 119.011 (12): “Public records” means all documents, papers, letters, maps, books, tapes, photographs, films, sound recordings, data processing software, or other material **regardless of physical form**, characteristics, or means of transmission, made or received pursuant to law or ordinance or in connection with the transaction of official business by any agency.

Employees of the TMC will be using County computers and interacting on phone lines which are recorded. It is of the utmost importance that each individual employee familiarizes themselves with the broad and sweeping public records laws of the State of Florida. Any phone contact with the co-located EOC center is recorded and subject to disclosure to the public. When calling other agencies by phone, be conscious of the fact that their line may also be recorded. Files stored on County computers become public record which must be retained by the state for inspection by the public upon demand.

2.8.1 Cameras and Public Record

It is the policy of the County that cameras are not to be recorded for any reason. Any type of video recording may also be considered public record, furthermore recordings depicting an incident as it happens can be subpoenaed during a civil or criminal proceeding, and the operator in question may be called to testify. In order to avoid the costs and duties associated with retaining video recordings, no employee at any time, or for any reason, may record any video from a County camera. Incident screenshots, however, are an excellent tool in deciphering positive and negative aspects of incident response and management, and are often used during meetings with other agencies to point out key strengths and areas for improvement. While incident screenshots are also public record, their retention and maintenance is much simpler.

3. System Design

3.1 Overview

The TMC is the central hub for a number of systems both physical and technological. I-4, Turnpike toll roads, and various arterial highways comprise the physical system, while Centracs, ITS systems, and the multitude of devices along the physical system feeding information to the TMC comprise a technological network.

3.2 Centracs and other Operating Software

The TMC uses Centracs as the primary interface between operators and the intersections installed on the network. CCTV PTZ is utilized by the impath operating software. Travel time information is displayed on the DMS signs via the software provided by Daktronics.

3.3 Interstate Highways

The interstate highways are not covered by the Osceola County TMC. The District 5 RTMC covers all interstate highways throughout District 5. The RTMC will provide the Osceola County TMC information from the interstates that pertain to the operation of the local state and county roads located in Osceola County.

3.4 Toll Road Systems

Central Florida has one of the largest networks of toll roads in the nation. Florida's Turnpike (SR-91) passes directly through Central Florida, and even intersects important roadways in this County. However, the TMC is only responsible for incidents on those toll roads under the jurisdiction of the Osceola County Expressway Authority (OCX), currently the only road is the Osceola Parkway.

Incidents on Florida's Turnpike (SR-91) and toll roads outside of Osceola County, such as SR 417 and SR 429 come under the jurisdiction of the Turnpike TMC or Orlando Orange County Expressway Authority (OOCEA). Frequent communication with either TMC regarding major incidents on these networks is necessary to facilitate proper incident management.

3.5 Arterial Highways

Arterial highways are major thoroughfares which are not limited access. While they carry large amounts of vehicular traffic, they are also traveled by pedestrians and often have businesses and residences alongside the right of way. Travel times on these roadways are calculated by Bluetooth readers, when a vehicle passes through a segment, the time between reading devices is calculated and a travel time computed.

Arterial highways which fall under the jurisdiction of the TMC present unique challenges in incident management because information is typically less complete (regarding directions and lane blockage) and there is often no way to verify with devices.

It is the responsibility of the operator to monitor the Florida Highway Patrol live crash report website for incidents on arterial highways. If information is limited, the operator should kindly ask a dispatcher to update the TMC when a trooper arrives on scene. Some crashes may be handled by local police or sheriff agencies, if this is the case, the operator should find the appropriate contact information for that agency in the workstation handbook.

Arterial highways are served by camera devices at major intersections and along predetermined segments of arterials throughout the County. These device locations provide a great deal of support for major incidents both on arterial and interstate highways. For example, a major incident on an interstate may require a detour onto arterial highways, the use of DMS signs helps motorists avoid the incident. This particular example would require the coordination with FDOT via the D5 RTMC.

4. System Operations

Centracs is the primary operating software for the monitoring of the signals throughout Osceola County. All Centracs operator features are accessible by either clicking on the operator map or by utilizing the entity tree from the program. When this is done, a menu will appear over the map, from which the operator can select the desired feature to work with.

4.1 General Use

Centracs is set up in such a way that the user can customize their desktop with a variety of windows. At a minimum, the TMC operator shall have the entity tree and an overall map of the system for their Centracs viewing area.

4.1.1 Entity Tree

The entity tree is a window that lists all of the signals that are connected to the network and Centracs in a tree type format. This tree will give the user a snapshot of the status of the signal in a quick reference format. The operator can open up each individual intersection by double clicking on the location (this can be accomplished by double clicking on the location on the map as well); a screen will then appear that will give more options. The operator shall notify the TMC manager and the senior signal technician before any modifications are made to the intersection.

4.1.2 Map

The Map is a window that shows all of the signals that are connected to the network and Centracs in their physical location. Similar to the Entity Tree, the map will give the user a snapshot of the status of the signal in a quick reference format. The operator can open up each individual intersection by double clicking on the location; a screen will then appear that will give more options. The operator shall notify the TMC manager and the senior signal technician before any modifications are made to the intersection.

4.2 Incident Detection

4.2.1 System Generated Alerts

Centracs is able to set up alerts and who shall receive the alerts. Alerts can range from loss of communication to the intersection going to flash. These alerts are set up so the TMC operator, TMC Manager, Senior Signal Tech, City of Kissimmee and on call City of Kissimmee signal tech can receive them. When an alert comes in, if it is informational only, the operator can close the alert. If it is an alarm, the alert must be acknowledged and then closed.

4.2.2 Externally Generated Alerts

Currently the TMC has no means of receiving externally generated alerts. It is up to the TMC operator to visit the websites below and others deemed necessary to post applicable information to DMS signs as the situation warrants.

- FHP Alerts – These alerts can be accessed from the FHP Live Crash Conditions website. Only refer to alerts on I-4, the location descriptor, this means they can also be pulled if that roadway is only referenced as a cross street. FHP alerts have valuable information associated with them, such as trooper dispatch and arrival times, dispatcher comments, and incident location. Because FHP alerts operate off of GPS coordinates, creating events directly from these alerts can result in incorrect direction or reference point (usually by 1 or 2 miles). In this respect, it is always recommended that the operator check for accuracy with events created directly from FHP alerts.

- NWS Alerts – alerts generated by the National Weather Service (NWS). They are created for the following types of weather:
    - Tornado Watch or Warning
    - Fog
    - Hurricane
    - Tropical Storm

    - When a weather alert is received, it is the responsibility of the operator to verify conditions via camera. In areas where camera coverage is limited or non-existent, no response shall be taken, this is because there is no way to verify when the weather conditions have subsided.

    - When responding to weather events concerning fog or smoke, and conditions are verifiable via camera, the operator should take the following actions:

        - Enter pertinent event details such as specific location.
        - Post message to applicable DMS
        - When alert clears, remove message from DMS

- Hurricane and Tropical Storm will typically involve direction from the TMC manager.

- Tornadoes and severe thunderstorms present another unique challenge when responding to weather events. In very rare circumstances it may be necessary to alert motorists to dangerous conditions which may pose a threat to motorist safety. In these rare instances an operator may post an approved severe weather message with approval from the TMC manager.

4.3 Cameras

4.3.1 Camera Operations

The Osceola County TMC operates over 60 Closed Circuit Television Cameras (CCTV). CCTV operations are particularly useful in determining the details of traffic incidents, and to monitor scenes to identify and help mitigate the effects of incidents on roadway traffic.

Cameras which are directly available to the TMC have pan, tilt, and zoom features, as well as aperture and focus controls.

GENERAL CAMERA POLICIES

- Do not direct the camera towards a light source, such as the sun or highway luminaries. This will damage the camera after prolonged or repeated occurrences.
- The height and zoom level of a camera will alter the operator's perception of how fast traffic is moving.
- When using CCTV cameras and working with other operators, do not override a camera without asking permission from the operator who is currently using that camera.
- The City of Kissimmee, FDOT's D5 RTMC and Turnpike's TMC is able to view our cameras. Whenever a viewable incident of moderate to severe impact occurs, it is necessary to switch these feeds to the applicable agency for viewing.
- Do not zoom into an incident in such a manner that all details of the incident can be seen on the camera feed. News agencies are able to use camera feeds at all times. The camera feed needs to be "G" rated, if there is any question, zoom out.

CCTV PROTECTION OF PRIVACY POLICY

The Protection of Privacy Policy predominantly addresses the usage of CCTV camera images but is not meant solely for this purpose. Usage of the CCTV cameras is the most visible and remains the highest concern regarding the collection and dissemination of the general public's personal identifying information. The Protection of Privacy Policy creates a set of specific rules, that when implemented, provide a high standard of professionalism in managing personal information profiles. These rules are important to TMC Operations, because they apply to the

collection, use and disclosure of any personal information that may be present in normal TMC operations with or without CCTV cameras.

The Privacy Policy is based upon two principles:

- That an individual has a right to control the dissemination of his/her own personal information.
- That standards and controls in the collection, retention, use and disclosure of personal information are mandatory.

The following is the Osceola County TMC Protection of Privacy Policy as it relates to CCTV Camera Usage:

1. The CCTV system shall be operated by authorized operators only. Operation of this equipment when in service by any other person is strictly prohibited.

2. Closed Circuit Television (CCTV) cameras and related equipment (surveillance equipment) in the TMC shall be used for traffic and incident management and information purposes only. This includes, but is not limited to, verification of incidents and traffic congestion, maintenance of traffic, disabled vehicles, environmental conditions, and emergency assistance. No one, including TMC operators and their supervisors, shall use the system for any other purpose.

3. The authorized operators shall obey all federal and state privacy laws. For example, surveillance of private property and use of the system with the intent of invading privacy of those individuals that could be observed through surveillance cameras is strictly prohibited, even as a demonstration of the system's technical capabilities.

4. All requests from the media or general public for incident information shall be forwarded to the TMC Manager. The TMC operator shall not reply to the public without approval from Osceola County.

5. Recording of CCTV video is not permissible. No recording devices shall be allowed to be connected to computer equipment or raw video feeds. In the event that FDOT or any agency, including Osceola County request a camera be recorded please inform the TMC manager and then use the Stream Player utility to record. The following are general guidelines to assist staff in the implementation of this policy:

Zooming in of CCTV Cameras

- CCTV cameras must not be zoomed in during routine traffic monitoring to the extent that license plates and persons are identifiable.

- When personal injuries or a hazardous materials spill are suspected in a traffic accident, zoom in to collect the information required by local and/or state law enforcement and EMS operators.
- Immediately after an incident is cleared, return camera to a wide-angle view to observe traffic conditions. Return to Pre-Set image.

4.3.2 TMC Video Wall

The TMC video wall is a valuable piece of technology which helps operators detect, respond to, and monitor incidents. The video wall is comprised of 6 flat screen television monitors.

Camera feeds can be changed on the video wall by using the Video Wall Control. To do this, an operator selects a camera they wish to view on the wall, and drops it into the square they choose.

4.3.4 TMC Video Switching Control

The Video Switching Control allows the TMC to remotely share live feeds with other locations. This tool is most commonly used to share video feeds with Emergency Operations Center. Feeds can be shared with the City of Kissimmee and FDOT's D5 RTMC and Turnpike's TMC.

4.4 Electronic Signage

4.4.1 Dynamic Message Signs (DMS)

Dynamic Message Signs are the most visible aspect of TMC capabilities. Like their static counterparts, dynamic message signs are highly visible and relay valuable information to motorists. However the advantage with dynamic signs is the ability to change the message. Dynamic Message signs have a wide array of use. The purpose of the DMS is to enhance motorist safety; therefore incident related messages have precedence of any other uses.

The Detailed DMS status window integrates many features of DMS control. The detailed status allows the operator to send messages to and blank the sign. From this window the operator may also set the sign active or out of service. It also allows the operator to view the sign's queue, where it is possible to merge messages together.

4.4.2 Dynamic Message Signs – Priority Levels

Dynamic Message Signs have a feature which allows the operator to prioritize certain messages. Only the highest priority message will display, unless a lesser priority message is merged with the high priority message, all other messages will be queued. Using the proper priority for messages makes the message process much more efficient.

Message Type	Priority Level	Notes
Unplanned Incidents w/ Lane Block	1-2	Crash, DAV, Etc.
Planned Incidents w/ Lane Block	3-4	Road Work
Congestion, Visibility & Weather	5-7	Congestion before Weather/Visibility
Amber/Silver/LEO Alert	8-10	Use With Timer Feature
Safety Campaign & Other Requested Uses	11-14	Use With Timer Feature
Daily Message	15	Changed Daily
Travel Time Message	255	Default Priority

EXAMPLE 1:

- A sign has a daily message (priority 15) and travel time merged together.
- Congestion begins to form 3 miles beyond the sign, a congestion message (priority 5) is sent to the sign and merged with the travel time. Now the congestion/travel time show and the daily message is queued.
- A crash with lane block occurs within the congestion, 2 miles ahead of the sign. A crash message (priority 1) is sent to the sign and merged with the travel time. Now the crash/travel time show, the congestion and daily messages are queued.
- When the lane block clears, the crash message is removed via the queue dialogue box, the congestion message is the next highest priority and it is merged with the travel time. Now the daily message is queued.
- Congestion clears, the message is removed via the dialogue box and the daily message is merged with the travel time.

EXAMPLE 2:

- A sign group has daily messages (priority 15) and a travel times merged together.
- A Silver Alert is activated at 12:15 PM, an alert message (priority 9) is sent to the sign group with a 6 hour timer. The daily messages and travel times are queued.
- A second Silver Alert is activated at 1:30 PM. (When multiple alerts are activated, alternate messages by using every other sign.)
- Sign Group 1 retains the original alert message; send the new alert message to these signs with a priority 10 and a 6 hour timer, so they do not show over the original alert message.

- Sign Group 2 uses the new alert message; send the new alert message to these signs with a priority 8 and a 6 hour timer, so they show over the original alert message.
- When the original alert expires after 6 hours, the new alert message will automatically display on sign group 1, because it is the next highest priority.
- When the new alert expires after 6 hours, the daily message merged with the travel time will display on all signs.

4.5 Travel Time Readers

4.5.1 Travel Time Readers

The Osceola county TMC utilizes Bluetooth readers for travel time. This information is transferred to the DMS signs via a plug in provided by Daktronics. Travel time for corridors can be monitored on the software provided by the manufacturer.

5. Incident Management

5.1 Standard Incidents

The vast majority of incidents encountered on a daily basis are quite standard. Those types of incidents have predefined procedures to ensure quick, efficient, and uniform response. These incidents can be divided into two categories, planned and unplanned.

Planned incidents are defined as events that are known in advance and may cause congestion or abnormal traffic patterns on area roadways. Examples of planned incidents include road work or maintenance activities or events such as concerts and sporting events. If DMS messages will be displayed for a planned incident, the TMC Manager will develop a DMS plan that will outline the TMC response.

Unplanned incidents are defined as non-recurring events on or near the roadway that cause a reduction in roadway capacity or an abnormal increase in demand. Unplanned incidents include disabled vehicles, crashes, spilled cargo, or emergencies. Unplanned incidents are placed into one of three classifications depending on the severity of the incident. Incident classifications are covered in section 5.3.

5.2 Mass Casualty and High Impact Incidents

A mass casualty incident (MCI) is an incident which overwhelms the capabilities of medical services and medical responders. Although MCIs are generally associated with catastrophic events such as building collapses and acts of terror, an actual MCI can be as simple as having three paramedics but four severely injured patients.

High impact incidents are similar to MCIs in magnitude but differ in meaning. Such incidents include a high impact to the physical roadway or the flow of traffic. These types of incidents can close a roadway for long periods or indefinitely while repairs or investigations take place. The term "high impact incident" is a TMC-specific term and may not be recognized by other agencies. High impact incidents include:

- Crash involving any of the following:
  - Fatality
  - Multiple Vehicles or "Pile Ups"
  - Physical Damage to the Roadway
- Fire
- Removal of Top Layer
- Compromising Guardrails and Barrier Walls
  - Structural Damage to Infrastructure
- Severe Damage to Support Columns
- Collapse
- Acts of Terror
  - Attacks which disrupt the safe and orderly flow of goods and services on roadways.
  - Attacks which are perpetrated to inflict death and serious injury.
- Acts of Nature
  - Visibility issues relating to fog, smoke, or smog.
  - Flooding
  - High Winds (such as Hurricane Force Winds)

5.3 Levels of Incidents

Unplanned incidents are categorized by severity and are placed into one of the following three levels:

Level I: Impact to the traveled roadway is estimated to be less than 30 minutes with no lane blockage – or – impact to the traveled roadway is estimated to be less than 30 minutes with minor lane blockage.

Level II: Impact to the traveled roadway is estimated to be more than 30 minutes but less than 2 hours with lane blockage, but not a full lane closure.

Level III: Impact to the traveled roadway is estimated to be more than 2 hours – or – the roadway is fully closed in any single direction. Significant area-wide congestion can be expected.

5.4 Incident Response

Responding to incidents is the primary focus of the TMC. The majority of incidents which the TMC will respond to occur on fairly common basis and, because of their frequency, procedures have been put in place to ensure quick, efficient, and uniform response to these incidents. Below are many response procedures for common events.

5.3.1 Vehicle Crash & Vehicle Fire

- Log information into "Vehicle Crash or Vehicle Fire" so that all response may be documented. (Use excel document template provided, Incident Template)
- Confirm the crash via camera or an on-scene responder.
- Activate all necessary DMS if lane block or hazardous situations exist.
- Page out any lane blockage. When paging these incidents, use the terms "Crash", "Vehicle Crash", or "Vehicle Fire" only.
- Post a floodgate and banner if a ramp or all lanes are blocked. Remember to post an approved detour route as necessary.
- Use the comments section to convey relevant and detailed information.
- Monitoring phase:
    - Republish event every 30 minutes when lane blockage exists.
    - Republish event as lane blockage changes.
    - Page out every change in lane blockage.
    - Update each DMS to reflect proper lane blockage, congestion, etc.
- Remove as necessary.

5.3.2 Road Work (Scheduled) and Pacing Operations (Rolling Roadblocks)

- Check the construction document for current projects and closures.
- Verify road work via camera, local law enforcement, or contractor. Often road work may be postponed without notice due to unfavorable conditions or unforeseen circumstances.
- Once verified, input information into "Scheduled Road Work" (Use excel document template provided, Incident Template).
    - For road work that is scheduled from a reliable source but not visible on camera, the operator should still create an event and include any lane blockage.
    - Reliable sources include reports from local and state law enforcement agencies, maintenance emails, CFLRoads.com, or another source deemed as reliable.
    - Do not create events for pacing operations as reference points will change. If pacing operations are scheduled as part of a scheduled road work project, you should use the comments section of that event to indicate pacing operations.
- Activate all necessary DMS.
    - When road work in not visible,

    - When pacing operations are scheduled, use the “rolling roadblocks” predefined message in the DMS library.
- Post a floodgate and banner if a ramp or all lanes are blocked. Remember to post an approved detour route.
- Monitoring Phase:
    - Watch for additional lane closures and lane switching. For example, road work which starts in the right lane and then adds the center lane a few hours later, or road work which starts in the left lane then switches to the right lane.
    - For road work which is hard to see at night, use a light source such as an arrow board, or the reflective area of a cone to help verify continued lane blockage.
    - Republish as lane blockage changes.
- Remove as necessary.

5.3.3 Road Work (Emergency)

Sometimes road work is necessary to rectify an urgent problem, in many cases this work may not be scheduled. Here is a guide on how to handle these incidents:

- Verify road work via camera.
- Input information into “Emergency Road Work” (Use excel document template provided, Incident Template)
- Activate all necessary DMS.
- Page out any lane blockage. When paging these incidents, use the term “Emergency Road Work” only.
- Post a floodgate and banner if a ramp or all lanes are blocked. Remember to post an approved detour route.
- Monitoring Phase:
    - Monitor the scene and any congestion which may be associated with it.
    - Page out every change in lane blockage.
    - Keep relevant and detailed comments on any information you receive from sources on scene.
    - Republish event every 30 minutes or as lane blockage changes.
- Remove as necessary.

5.3.4 Disabled Vehicles

- Verify via camera if possible.
- Input information into “Disabled Vehicle” (Use excel document template provided, Incident Template)

- Contact with Orlando RTMC to verify that a road ranger has been dispatched if the vehicle is on I-4 or one of the OOCEA toll roads during operating hours. If disabled vehicle is on Osceola County roads, contact Sherriff's office
- Page out any lane blockage. When paging these incidents, use the terms "Disabled Vehicle" or "DAV" only.
- If the vehicle will remain abandoned for a period of time, change the event type to abandoned vehicle and change the status to unresolved. Find the vehicle on camera and ask a lead or supervisor to make a preset. Make a note of that camera and preset in the event comments section.
- If the vehicle drives away, close the event. If a road ranger has serviced the vehicle successfully, that ranger will close the event.

5.3.5 Police Activity and Emergency Vehicles

Occasionally, events such as police pursuits, felony take-downs, and medical emergencies will occur on covered roadways. These events can block lanes or even pose hazards to normal traffic flow. Here is a guide on how to handle these situations.

- For Police Activity
    - Input information into "Police Activity and Emerg. Veh." for any pursuit, felony take-down, or traffic stop on the covered roadway (Use excel document template provided, Incident Template)
    - Page out any lane blockage. When paging these incidents, use the terms "Police Activity" or "Incident" only.
    - Activate any necessary DMS*.
    - Monitor and remove as necessary.
- For Emergency Vehicles
    - If a road ranger, police officer or individual is informing you of a medical emergency, take down the following information then call the appropriate 911 dispatch center, if viewed through camera try to provide as much information as possible to 911:
        - Accurate location.
        - Vehicle description.
        - Age range, gender, and race of victim.
        - Description of symptoms.
    - Input information into "Police Activity and Emerg. Veh." (Use excel document template provided, Incident Template)
    - Page out any lane blockage. When paging these incidents, use the terms "Emergency Vehicles" or "Incident" only.
    - Activate any necessary DMS*.
    - Monitor and remove as necessary.

***** When activating a DMS for police activity or emergency vehicles and all responders are on the shoulder, it is appropriate to use the Emergency Vehicles message on the closest DMS.

5.3.7 Weather

- Verify that inclement weather conditions exist. If conditions are not verifiable via camera they may not be posted.
    - When fog or smoke conditions exist:
        - Activate all necessary DMS using the approved message. You must receive approval prior to posting any weather related DMS.
        - Monitor and remove as necessary.
    - When any other weather conditions exist.
        - Activate any necessary DMS at the request of an agency. (FHP, FDOT, County and Emergency Operations Centers, etc.)
            - You must receive approval prior to posting any weather related DMS requested by an agency.
        - Monitor and remove as necessary.

5.3.8 Vehicle Alert

- See section 5.5 under FDLE Missing & Endangered Persons for complete details.

5.5 Interagency Coordination

5.5.1 Clear Speak/Plain Language

Employment at the TMC exposes one to a system of codes and signals used by law enforcement, Road Rangers, and dispatchers. It is acceptable to speak in codes and signals within the bounds of the TMC, some codes and signals are almost necessary to know. However, when interacting with other agencies outside of the TMC, it is absolutely necessary to use what is known as clear speak or plain language, that is, speaking without codes or signals, in plain language that anyone could understand.

The reason for using clear speak or plain language when communicating with other agencies is because there is no uniform standard for codes and signals, and one code or signal used by the RTMC may mean something completely different to a local police or fire department. Clear Speak or Plain Language is a requirement of the National Incident Management System and the Incident Command System when agencies communicate with each other.

For purposes of clarification, the code and signal system used by the TMC is the same code and signal system used by FHP and Road Rangers.

5.5.2 Law Enforcement Agencies

The TMC receives calls daily from local law enforcement agencies to assist in a variety of capacities. Often, motorists with a disabled vehicle may call 911 or a non-emergency line and receive a local police department or county sheriff; this is the nature of the bulk of law enforcement calls. Law enforcement agencies also request Road Ranger assistance for maintenance of traffic (MOT) at accident scenes, or may have a DMS request.

5.5.3 FDLE Missing & Endangered Persons

The Florida Department of Law Enforcement issues missing & endangered persons alerts for children (Amber), the elderly (Silver), and suspects who have harmed law enforcement officers (LEO). The criteria for issuing alerts are listed below:

Amber Alert	Silver Alert	L.E.O Alert
Is there a missing and endangered child?	Is there a missing and endangered elderly person?	Is there a suspect wanted for assaulting or killing a law enforcement officer in the line of duty?
Is there a vehicle involved?		
Is there a complete vehicle description, including a Tag?		

It may be evident after seeing the criteria that a vehicle with a complete description must be involved for the TMC to activate an Alert. When an Alert is activated, there are several key steps to responding properly:

The Orlando RTMC will send out AMBER and/or SILVER alerts. Post the AMBER alerts on all county DMS signs. Only post SILVER and LEO alerts if the alert applies to Osceola County.

THE 6-HOUR RULE

The TMC will keep an alert activated initially for 6 hours, at which point the alert expires deactivation process begins. FDLE can at any time before the 6 hours, request an extension, to which request the TMC will continue activation for another 6 hours from the time of revision.

After 6 hours, the deactivation process begins. The RTMC will give notification to remove the alert. If the alert expires after the end of the shift, set up the message software to automatically change the alert on the DMS signs at the end of the six hours to a pre-approved message.

5.5.4 Fire & Rescue

The TMC will at times receive calls from, or make calls to, a county or municipal fire rescue department. Often, county and municipal departments pair their dispatch center with a small scale local traffic management center; this is the case with Seminole and Volusia counties as

well as the City of Orlando. Those dispatch centers have access to the TMC camera feeds but cannot control them. When these agencies call the TMC, they are typically requesting assistance in moving the cameras to find incidents; it is the responsibility of the operator to assist these agencies in finding the incidents.

When contacting a Fire Rescue line, be prepared, it will most likely be an emergency line. Have all pertinent information written down and ready to be disseminated to the dispatcher or call taker. If an operator is calling because that operator saw an incident happen, or because a Road Ranger requested fire rescue, it is necessary to explain that circumstance. Operators seeking information about an incident should NOT call a fire rescue line, instead they should call a county sheriff or municipal police non-emergency line and in most cases these entities operate joint dispatch centers.

5.4.5 Maintenance Contractors

Many incidents will require the notification of maintenance contractors, whether they are required to provide maintenance of traffic, assist in closing roadways, or to repair the roadway it is the responsibility of the TMC to notify them. When notifying these contractors, be sure to notify the correct contractor, some roadways have multiple contractors for different segments. It is also necessary to have all information ready to be disseminated to the contractor.

When a roadway needs to be shut down, it is necessary to inform the contractor where the road is to be shut down, and any ramps that may need to be shut down to prohibit access to a scene. Failure communicate such information can prolong incidents and closure times.

Maintenance should be immediately notified for incidents that are likely to last more than 30 minutes or when roadway damage has occurred.

5.4.6 Emergency Operations Centers (EOC)

The Osceola County TMC is in the business of incident management. Traffic incidents are managed by the TMC much like emergencies are managed by Emergency Operations Centers. When large scale incidents happen, such as wildfires, hurricanes, hazmat incidents, and severe traffic crashes, the Emergency Operations Center is activated. EOCs are a focal point where resource coordination and incident management occur and it is where NIMS and the National Response Framework happen.

EOCs activate according to the severity of an incident, when a hurricane strikes, all emergency support functions (ESFs) are activated. Emergency support functions are groups of like categories, such as fire, EMS, and search and rescue or public works, FDOT, and lynx. Each department or agency which has a stake in that jurisdiction sends a designee to the EOC during activation. That designee handles all requests for their respective departments and makes

requests of other departments, effectively; incident management and resource coordination are facilitated here.

The TMC may not have much contact, if any with EOCs during standard operations. However, during full activations, or partial activations with regards to roadways monitored by the TMC, communication with the activating EOC may be frequent.

Under Florida State Statute 252 (FSS 252), all counties in Florida are required to have a designated Emergency Operations Center. Therefore there are 67 designated EOCs in Florida, 9 of which are within D5, one of which is located in Osceola County.

5.4.7 Other Traffic Management Centers

There are a total of 10 Regional Traffic Management Centers in the State of Florida. There are also many county and municipal traffic management centers. The Osceola County TMC will regularly communicate with the Orlando RTMC and Turnpike TMC for various reasons.

5.6 Road Rangers – A Free Service

5.6.1 Purpose and Role

Road Rangers are a free service provided to motorists along the entire stretch of I-4 in District 5 (From MM 58 to MM 132). The Road Ranger program operates under a contract between FDOT and Central Florida Regional Transportation Authority (CFRTA) more commonly known as LYNX.

The purpose of the Road Ranger service is to render aid to stranded motorists on the interstate. Road Rangers fix flat tires, make small repairs, dispense limited quantities of gasoline, and help motorists with more severe issues contact a wrecker. Road Rangers can also transport motorists and pedestrians off the interstate at their discretion.

In addition to motorist aid, many agencies request Road Ranger assistance at the scene of a vehicle crash, and often Road Rangers are the first to arrive. By deploying cones and activating special arrow boards on the truck, a Road Ranger can warn approaching traffic of a hazardous situation.

The role of the Road Ranger is to continuously ensure roadway safety by helping stranded motorists get back on their way, and by assisting agencies in the maintenance of traffic when incidents occur. The Road Ranger sections for Osceola County fall under Sector 2 (SR 417) and Sector 4 (SR 429) and the section of the Turnpike.

5.6.2 Notice of Non-Emergency Vehicle

Pursuant to Florida State Statute 316.2397 Subsection 3, "Vehicles of the… Department of Transportation… may operate emergency lights and sirens." However, "…emergency vehicles of governmental departments… may show or display amber lights when in actual operation or when a hazard exists provided they are not used going to and from the scene of a hazard without specific authorization of a law enforcement officer or law enforcement agency."

The Road Ranger vehicle qualifies as an emergency vehicle of the Department of Transportation, so the above statute applies to the Road Ranger vehicle. Although each Road Ranger vehicle has lights and sirens, it is not permissible for them to operate lights and sirens en route to the scene of an emergency, unless specifically authorized by law enforcement.

5.7 Maintenance Contractors

5.7.1 Maintenance Contractors

When damage has occurred to the roadway or an incident involves a lengthy closure, the TMC contacts area Contractors to assist.

The TMC also has access to local Traffic Engineering companies which can assist in many tasks, one being Signal Timing. If such an incident occurs, contact the TMC manager and the proper channels will be utilized to properly respond to the incident.

6. Quality Control

6.1 Hourly

Every hour a complete quality control check must be done for all roads monitored. This includes the following:

- Visual check of all displayed messages on DMS
- Visual check of all DMS signs via camera
- Call and listen to all 511 messages
- Monitor CF511 website
- Visual check of Centracs devices on Operator Map

Checklists located on server

APPENDICES

Appendix of Employment-Related Documents

- TMC Position Descriptions

Appendix of Operations Materials

- Osceola County Sherriff's Department Signals and 10-Codes

Appendix of Contact Information

- TMC Employee Contacts
- List of TMC Employees and Email Addresses

Appendix B – City of Kissimmee Meeting Minutes

Osceola County ITS Strategic Plan
Meeting Minutes – City of Kissimmee Traffic Division
July 24th, 2019 from 10:30AM – 11:00AM

Nabil Muhaisen	City of Kissimmee	☒	Mohammad Akber	Metric Engineering	☒
Lindsey Giovinazzo	Osceola County	☒			
Dale Cody	Metric Engineering	☒			

I. Project Overview

Overview of the Osceola County ITS Strategic Plan, including goals and objective.

II. Review of Current Stakeholder Assets

Dale asked for information regarding the following:

- Details on ATMS
  - According to Nabil, there is a signal maintenance transition happening in the Department (effective Oct 1, 2019) to Osceola County. That said, the City of Kissimmee is keeping the re-timing activities.
- Details on TMC
  - Nabil said the City of Kissimmee relies on Osceola County's TMC (this is the hub for the entire city)
- Details on any existing/planned major ITS infrastructure
  - Nabil mentioned there are video detection cameras at every intersection in the City. Any other questions we can email him, and he could find out for us.
- Agreements for data collection and dissemination with any other agencies
  - No. This is on an ad hoc basis.

III. Other Stakeholder Questions

A discussion of the following general questions occurred:

- What are your top five transportation needs?
  1. Signal Timing
  2. Automated Vehicles (CV/AV readiness)
  3. Wrong way driving systems, especially at SR 417
  4. Cyber security for the traffic systems
  5. Real time traffic, Active Arterial Management

- What specific goals/objectives do you have?
  - Multimodal transportation system and complete streets. The city is conducting complete streets studies to help achieve this goal.

- Do you have:
  - Experience with Regional ITS Architecture (RITSA) or Concept of Operations?
    No

- Any GIS files for infrastructure? Can you please provide?
  Yes, Nabil said he will provide to us upon request.

- Life cycle replacement plans for equipment?
  No. More of an ad hoc basis. That said, the City is beginning to plan for life cycle of all equipment. They will budget for lifecycle expected cost.

- Traffic diversion plans? Can you please provide?
  No. This is done ad hoc.

- Planned future ITS/signalization projects?
  Yes, they have planned and future projects. The City hires consultants. Right now, they have Kimley Horn working on re-timing the signals for Lakeshore Blvd.

  Most projects include… Adding signals and flashing beacons.

  Nabil mentioned a unique project called The Quiet Zone Project – This project involves a lot of striping, signage, and putting in medians to slow traffic down. Goals is to prevent trains from having to blow their horns in some areas.

- Methods for information sharing with the public?
  City website that is constantly updated, new releases, and social media platforms (Twitter and Facebook) via the Public Information Office.

- Staffing for ITS/IT/traffic signalization? Can you please provide?
  1 Traffic Engineer (Nabil Muhaisen) supported by Traffic Operations (1 supervisor, 1 admin, and about 10 maintenance tech), total of 13 people. That said, eight technician positions are slated to be reduced due to the transition of the signal maintenance to the County. They also have an on-going (contractual basis) network engineer/tech that manages network. Techs do signals, lights, and maintain the signs. Lighting is a street function, therefore Streets and Sidewalks Division take care of this.

- Asset management?
  Yes, they have an asset management program. However, Nabil was not aware of the name of program.

- Maintenance protocols?
  Yes, they have a spreadsheet.

- Data resources?
  No

- Any other specific needs or issues regarding transportation systems?
  1. Managed lanes
  2. GIS based inventory to manage all ITS equipment

- Can ordinances/growth be updated to include technology?
  N/A

- Transit Only:
  - Fixed route transit? Are there buttons at bus stops?
    Yes, they have a City specific system in conjunction with Sunrail. A free bus and rail system that connects many locations in the City (e.g. ORMC, Downtown Kissimmee, etc..) as a continuous loop. About 3-4 miles.

- Bimonthly meetings
  - Would you be able to meet?
    Yes, bi-monthly

  - Best Location/time?
    In the Osceola County office, time has not been confirmed yet.

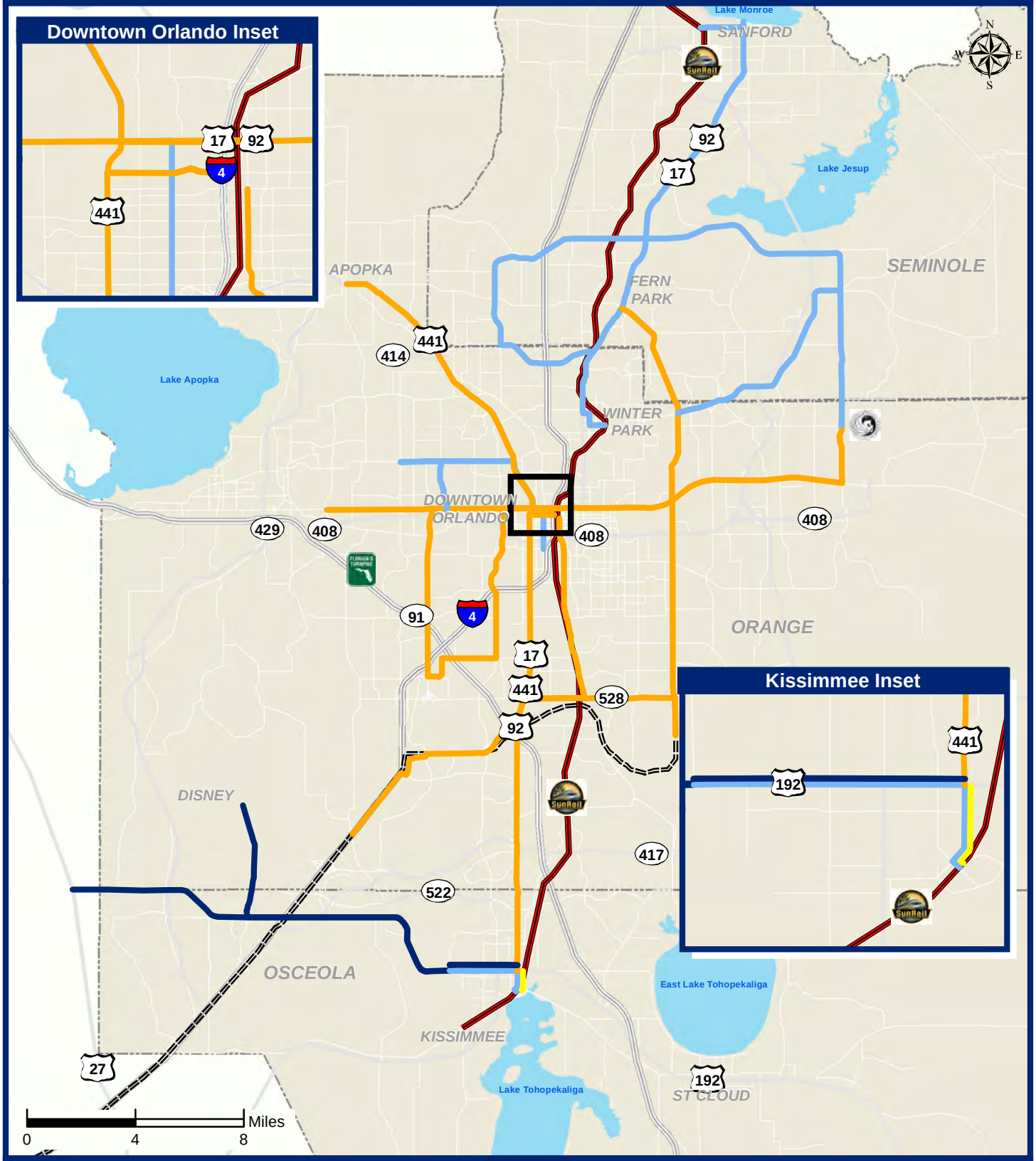
IV. Open Discussion

Dale asked at this point if there was anything other questions before wrapping up the meeting.

Nabil asked, how a city like Kissimmee will be able to be ready for the future of Automated Vehicles. He wanted to know how the City can do a GIS based inventory management program for ITS system. Dale mentioned a software called ITSFM and the required field work. Dale also emphasized the upkeep of the data.

Appendix C – LYNX Vision 2030 Network Maps

LYNX Vision 2030



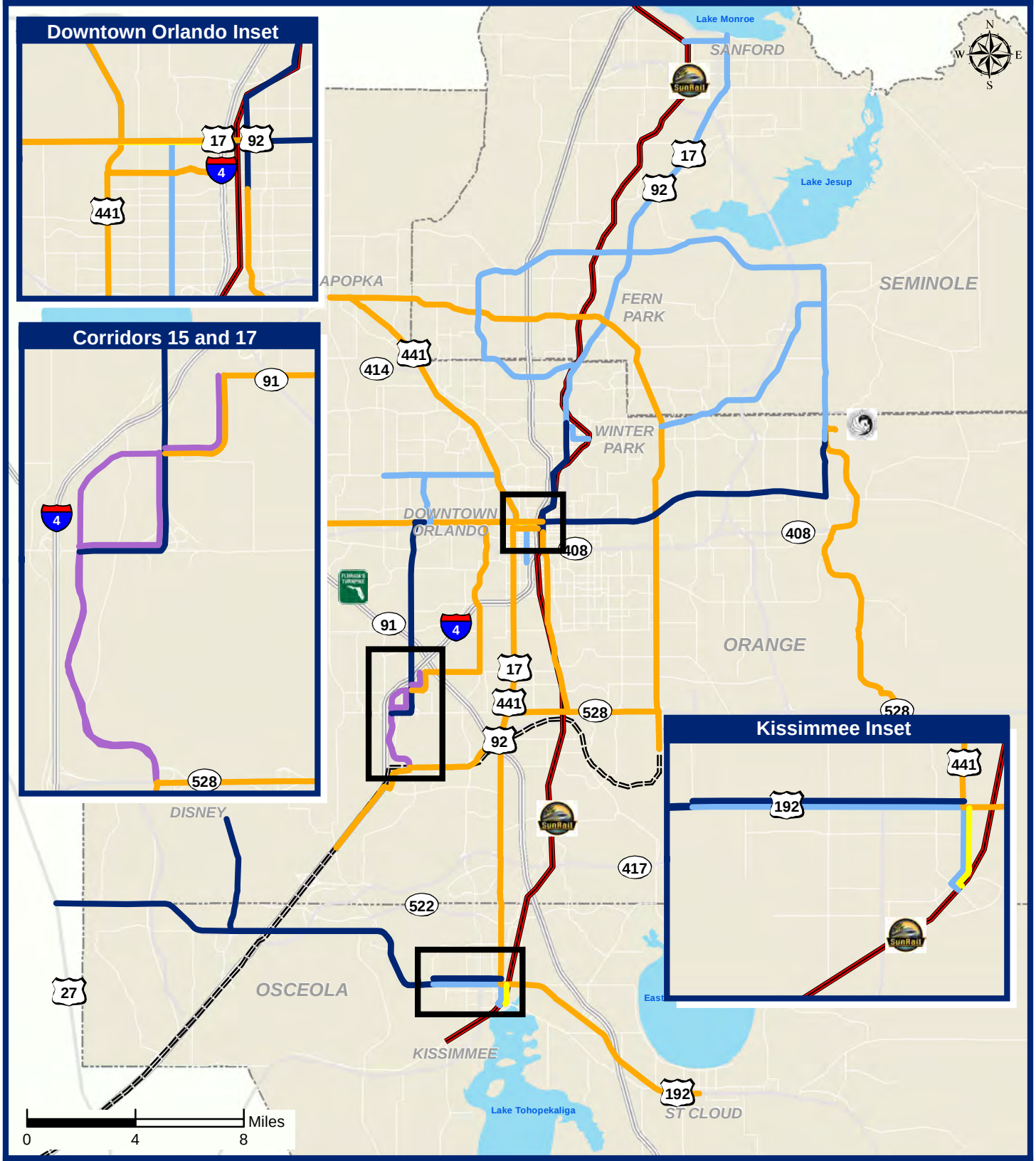
Map 4-3 2015 Network

Legend

- Mixed BRT
- Exclusive BRT
- Express Bus
- Local Bus
- SunRail
- Potential Future High Speed Rail Corridor
- Interstates
- Toll Roads

LYNX VISION 2030

LYNX Vision 2030



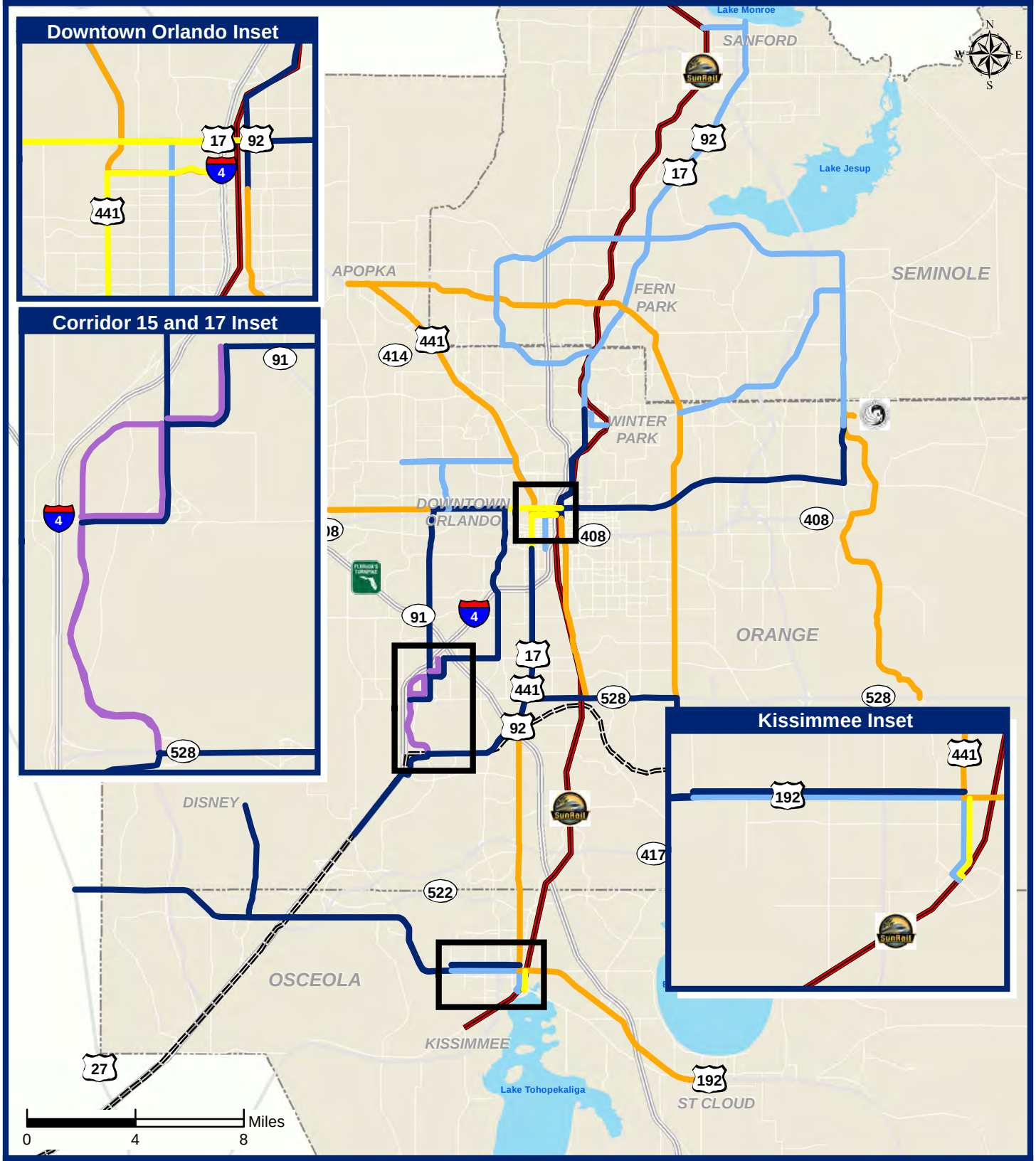
Map 4-4 2020 Network

Legend

- Exclusive BRT
- Express Bus
- Local Bus
- Mixed BRT
- Streetcar
- SunRail
- Potential Future High Speed Rail Corridor
- Interstates
- Toll Roads

LYNX VISION 2030

LYNX Vision 2030



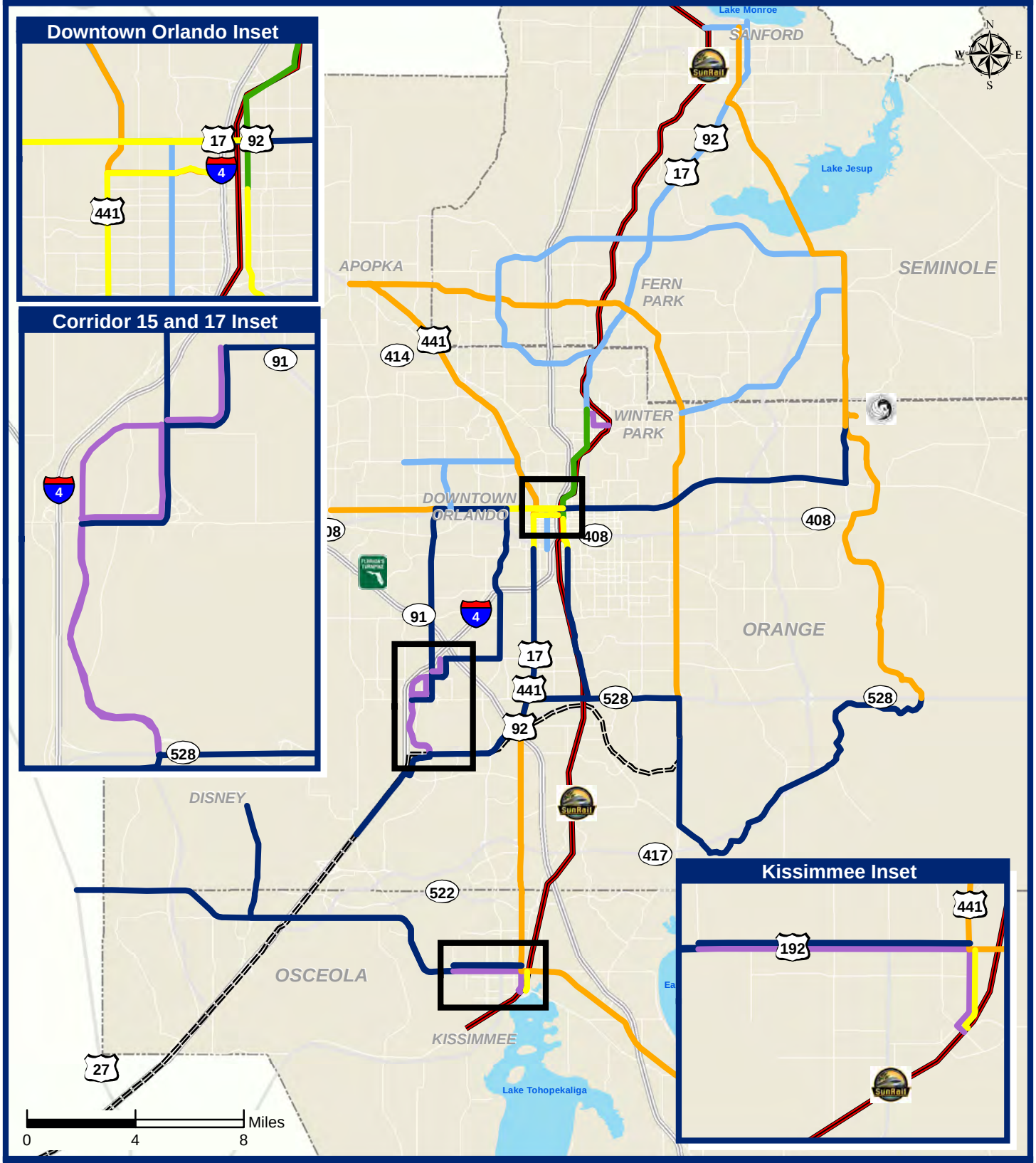
Map 4-5 2025 Network

Legend

- Exclusive BRT
- Express Bus
- Local Bus
- Mixed BRT
- Streetcar
- SunRail
- Potential Future High Speed Rail Corridor
- Interstates
- Toll Roads

LYNX VISION 2030

LYNX Vision 2030



Map 4-6 2030 Network

Legend

- Exclusive BRT
- Mixed BRT
- SunRail
- Express Bus
- Streetcar
- Interstates
- Local Bus
- Light Rail
- Toll Roads

LYNX VISION 2030

Appendix D – Intersection Improvement Lists

Warranted Signals

Location	Priority	Type	Cost	Comments
N. Old Lake Wilson Road at Livingston Road	1	Traffic Signal	$ 450,000.00	Warranted - Alex ranked top priority due to longest queues, delays and crash risk
Westside Blvd. @ Goodman Road - Florence Villa Grove Road	2	Traffic Signal/roundabout	$ 450,000.00	Was warranted for signal 9/24/2018 and sent to Kimley Horn for roundabout analysis on 10/01/2018
N. Central Avenue @ West Donegan	3	Traffic Signal	$ 450,000.00	Warranted and sent to Kimley Horn for roundabout analysis 10/1/2018
Canoe Creek Road at Creek Woods Drive	4	Traffic Signal	$ 450,000.00	Warranted but no confirmation from Joedel; Alex performed site visit and did not recommend a signal based on observed traffic patterns, but will revisit once school is back in session fall 2019.
Brown Chapel Road @ Lakeshore Blvd.	5	Traffic Signal	$ 450,000.00	Data collection received 5/4/2019 and signal is warranted. Need funding. Alex conducting an analysis for a three-way stop at this location, in lieu of a signal. HNTB conducting roundabout analysis 8-20-2019. Pending removal from the list per Kathy 7-25-2019.
Pleasant Hill Road @ Bellalago Drive	0	Traffic Signal	$ 450,000.00	Data received 7/25/2018 and is warranted. Need funding. However, Kathy said that the community already has a signalized access at its south driveway, so a second signal is not needed. This project should be removed from the list.

Intersection Improvements

5-29-2019

Location	PM	Priority	Cost Estimate	Comment
Fortune / Simpson Intersection Improvements			$1.3 million design fyi 2020 and $4.4 million construction in fy 2023	LAP Project/ moving forward
Carroll Street / JYP to Michigan	Todd			30% plans for intersection improvements due April 2019. Kimley Horn design contractor
Right hand turn lane at South Old Lake Wilson Road and CR 532	Alex			Traffic congestion complaints pending Polk County improvements and Poinciana Parkway extension
Create E-W road from Old Lake Wilson to Goodman Road or to CR 532	Alex			Traffic congestion complaints pending Polk County improvements and Poinciana Parkway extension
192 @ Black Lake Road	Alex			Supplemental head needed for traffic coming around the sharp urve on Black Lake Road
Simpson Road @ Buenaventura Blvd	Alex			Poor signal design; only one arrow head controlling two NB left turn lanes. Need southbound FYA.
Pleasant Hill Road @ Southport Road	Alex			Poor signal design; only one overhead signal for two thru lanes. Need to change location of supplemental head for greater visibility.
Pleasant Hill Road @ S. Poinciana Blvd.	Alex			Existing supplemental head confusing to motorists and causing unneccessary stops. Recommend changing to 5-section with permanently on right turn arrows.
S. Poinciana Blvd. @ various locations	Alex			Convert protect-only heads to FYA to allow permissive left turns to motorists during off-peak hours
Osceola Parkway @ Centerview Parkway, Greenwald Way and Thacker Avenue	Alex			No ped crossings across Osceola Parkway at 3 of the busiest shopping center intersections near The Loop. Use pushbutton contract to complete.
N. John Young Parkway @ Regatta Bay Blvd.	Alex			No ped crossing across John Young Parkway. Nearest crossings 2000 ft plus in either direction.
192 @ Michigan Avenue				Fix the trap lane situation. Of the two southbound lanes on Michigan Ave, one leads to a left turn lane and the other a thru lane to the Oak St Extension. Once the Oak St Extension was completed, the Michigan Ave side of the intersection was never reconfigured to allow for 2 thru lanes into the 2 receiving lanes. Two options to solve this problem are 1) restripe the southbound right turn lane as a thru/right, or 2) do a lane shift utilizing the existing NB merge lane to allow for another southbound thru lane.
Osceola Parkway @ Florida Parkway	Alex			A supplemental head is needed for westbound traffic on Osceola Parkway approaching intersection.
Neptune Road @ Partin Settlement Road	Alex/Kevin			Supplemental head needed for Neptune road westbound traffic due to sight-restricting foliage in median; Kevin suggests 4-laning Partin Settlement Road and adding dual lefts east to north; and add right only drop lane South to West, and add separate through left and a left only South.
Dyer Blvd. @ US 192	Alex			Need sight-restricting foliage trimmed on northbound approach. Recommend adding W3-3 sign in advance of signal.
Rhode Island Woods Circle @ Landstar Blvd.	Kathy			Big back-ups 4/17/2019 per TO
Old Canoe Creek Road @ Canoe Creek Road/Pine Tree	Kevin			Add second left turn NB onto Old Canoe Creek road with widening of old Canoe Creek Road, due to development out east. Add restrictive 3 section head in SB direction due to curve and speed of vehicles not yielding heading north.
Old Canoe Creek Road @ Kissimmee Park	Kevin			Widening of Old Canoe Creek Road from Canoe Creek Road to Kissimmee Park Road, add second left to northbound turn onto Kissimmee Park Road. Separate the right turn lane southbound on Old Canoe Creek Road and extend to the turnpike -- or -- move turnpike exit to a non-signalized entrance and exit ramp by Friars Cove.
Michigan Avenue @ Osceola Parkway	Kevin			Add R3-4 (No U-Turn sign) west to south and double cycle lefts and right turns
Osceola Parkway at Thacker Avenue	Kevin			Add R3-4 (No U-Turn sign) westbound, double cycle by time of day
CR 532 @ Champions Gate	Kevin			Add 2nd lane off of 1-4 wetbound ramp; one lane for right turns into Champions Gate and one lane for left turns only.
192 @ Partin Settlement Road	Kevin			Add 2nd right turn lane SB and double cycle with left turn EB during morning peak
Old Canoe Creek Road @ Neptune road	Kevin			Open 2nd left turn north to west when Neptune is widened
Poinciana Blvd. @ US 192	Kevin			Extend existing left turn lane and add 2nd left turn by removing Solivita sign in median for north to west direction
Narcoossee Road @ Boggy Creek Road	Kevin			Extend storage for left turn, remove 5-section head and add restrictive 3-section head for north to west direction due to speed of vehicles southbound from Orange County
Nolte Road at Old Hickory Tree Road	Kevin			Add street light lumineers at intersection -- intersection is too dark at night.
Canoe Creek Road @ Nolte Road	Kevin			EB has a blind spot due to Sweet Water fountain and trees in east and south directions.
Fortune road @ 192	Kevin			Double cycle EB left turn for time of day due to backups in the afternoon

Warranted Signals

Location	Priority	Type	Cost	Comments
N. Old Lake Wilson Road at Livingston Road	1	Traffic Signal	$ 450,000.00	Warranted - Alex ranked top priority due to longest queues, delays and crash risk
Westside Blvd. @ Goodman Road - Florence Villa Grove Road	2	Traffic Signal/roundabout	$ 450,000.00	Was warranted for signal 9/24/2018 and sent to Kimley Horn for roundabout analysis on 10/01/2018
N. Central Avenue @ West Donegan	3	Traffic Signal	$ 450,000.00	Warranted and sent to Kimley Horn for roundabout analysis 10/1/2018
Canoe Creek Road at Creek Woods Drive	4	Traffic Signal	$ 450,000.00	Warranted but no confirmation from Joedel; Alex performed site visit and did not recommend a signal based on observed traffic patterns, but will revisit once school is back in session fall 2019.
Brown Chapel Road @ Lakeshore Blvd.	5	Traffic Signal	$ 450,000.00	Data collection received 5/4/2019 and signal is warranted. Need funding. Alex conducting an analysis for a three-way stop at this location, in lieu of a signal. HNTB conducting roundabout analysis 8-20-2019. Pending removal from the list per Kathy 7-25-2019.
Pleasant Hill Road @ Bellalago Drive	0	Traffic Signal	$ 450,000.00	Data received 7/25/2018 and is warranted. Need funding. However, Kathy said that the community already has a signalized access at its south driveway, so a second signal is not needed. This project should be removed from the list.

Intersection Improvements

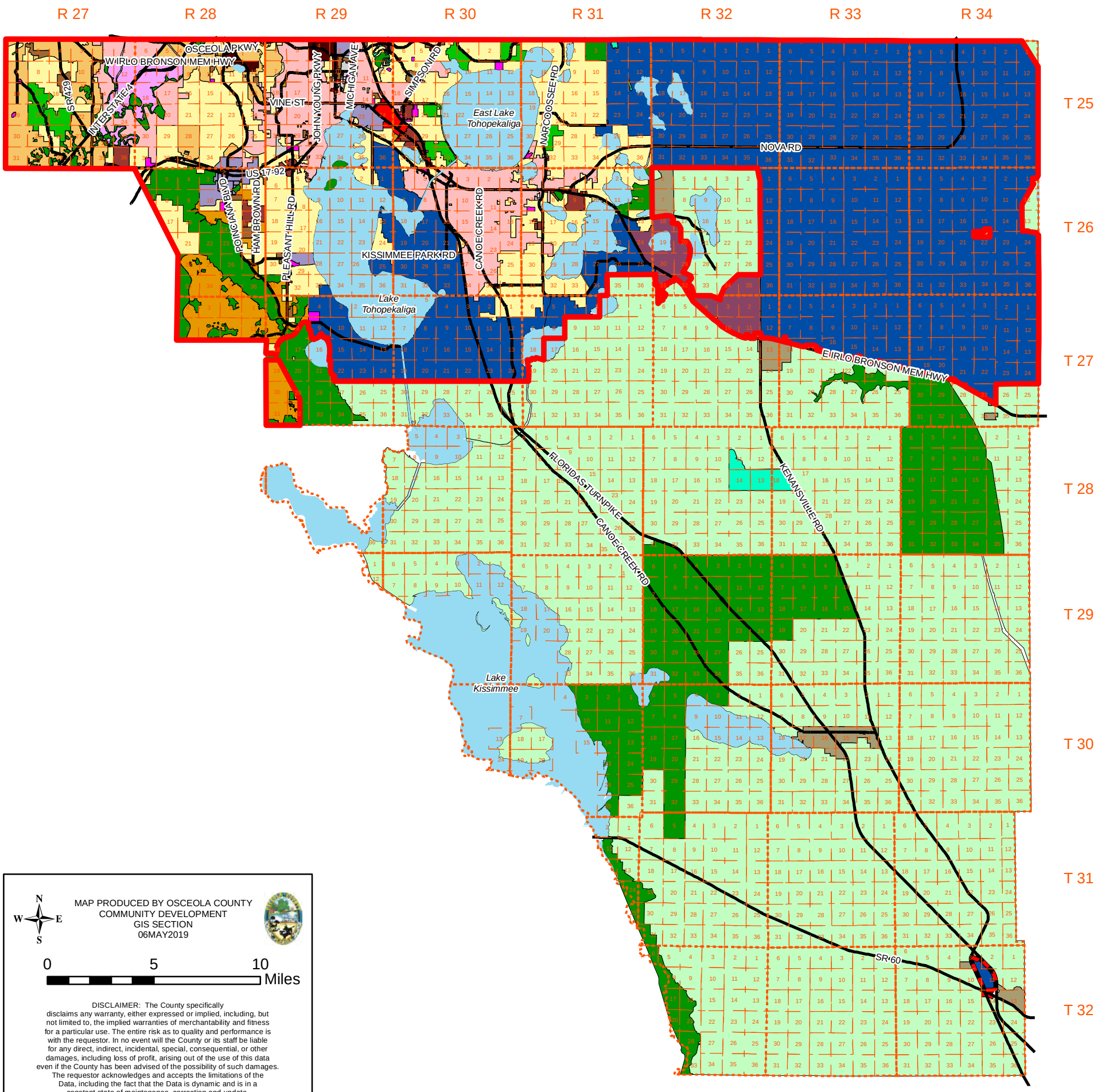
5-29-2019

US 192 @ Simpson Road	Kevin			Open 2nd left turn on 192 EB when Simpson is widened to remove backup of buses onto 192; add second left turn SB, add right only lane SB
Osceola Parkway @ Bill Beck Blvd	Kevin			Add pork chop islands to restrict cross traffic (right only) due to high accident rates
Neptune @ Partin Settlement	Gary			Neptune EB Turn LANE EXTENSION storage for NB traffic onto Partin Settlement
Osceola Parkway @ Michigan	Gary			Osceola Parkway WB Turn LANE EXTENSION storage for SB traffic onto Michigan Ave
Neptune Middle School	Gary			Turn lane extension for storage of vehicles turning into School edge of road is currently used
Old Canoe Creek Rd @ Nolte Rd	Gary			Old Canoe Creek Rd SB Turn LANE EXTENSION storage for WB turning traffic onto Nolte Rd
Old Pleasant Hill Rd @ Pleasnat Hill Rd	Gary			Pleasant Hill Rd Turn LANE EXTENSION storage for SB traffic turning onto Old Pleasant Hill Rd
Osceola Parkway @ OBT	Gary/Kevin			Extend existing merge area for WB traffic coming off of OBT; add streets lighting to the intersection as it's a four-way ped crossing.
Boggy Creek High	Gary			Extend Turn lanes into school for more vehicles to keep them off the grass and roadway.
S. Poinciana Blvd. @ S. Rail Avenue (Poinciana SunRail Station)	Kathy			install traffic lights or open the median at S. Rail Avenue to a directional median, allowing just SB lefts into the SunRail station. Exiting raffic could be directed to make a right turn followed by a u-turn at the next median opning to eliminate the stacking of vehicles.

Appendix E – Future Land Use Maps

FLU 1A: Future Land Use Map - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_21_CPA18-0010\FLU_1A.mxd



N
W E
S

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
06MAY2019

0 5 10 Miles

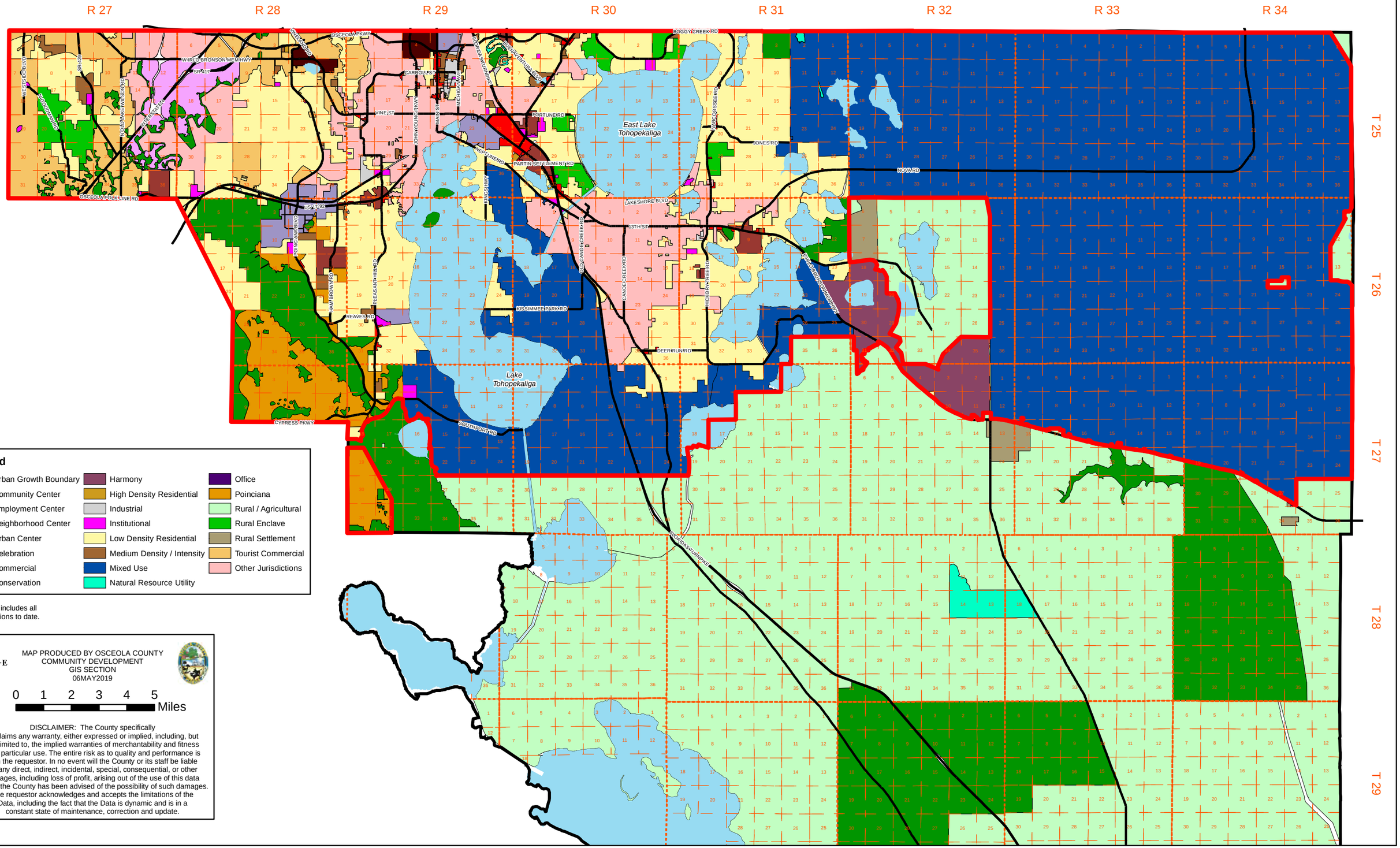
Legend

- Urban Growth Boundary
- Yeehaw Transportation Distribution Center
- Community Center
- Employment Center
- Neighborhood Center
- Urban Center
- Celebration
- Commercial
- Conservation
- Harmony
- High Density Residential
- Industrial
- Institutional
- Low Density Residential
- Medium Density / Intensity
- Mixed Use
- Natural Resource Utility
- Poinciana
- Rural / Agricultural
- Rural Enclave
- Rural Settlement
- Tourist Commercial
- Other Jurisdictions

* This map includes all city annexations to date.

FLU 1B: Future Land Use Map UGB - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_21_CPA18-0010\FLU_1B.mxd



Legend

- Urban Growth Boundary
- Community Center
- Employment Center
- Neighborhood Center
- Urban Center
- Celebration
- Commercial
- Conservation
- Harmony
- High Density Residential
- Industrial
- Institutional
- Low Density Residential
- Medium Density / Intensity
- Mixed Use
- Natural Resource Utility
- Office
- Poinciana
- Rural / Agricultural
- Rural Enclave
- Rural Settlement
- Tourist Commercial
- Other Jurisdictions

* This map includes all city annexations to date.

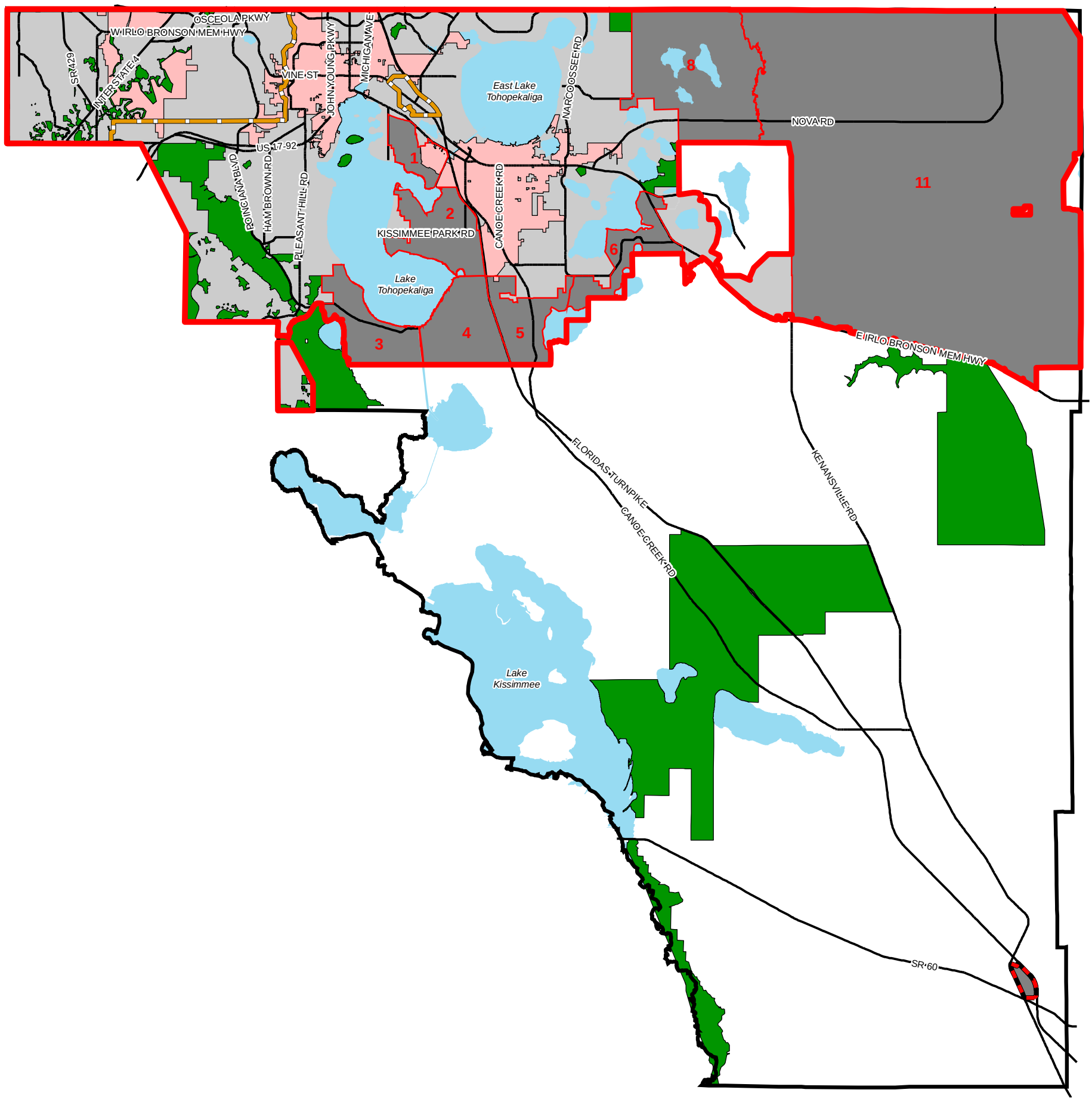
N
W E
S

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
06MAY2019

0 1 2 3 4 5 Miles

FLU 2A: Urban Infill/Expansion and Overlay Areas - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_2A.mxd



Legend

- Urban Growth Boundary
- Short Term Rental Overlay
- #1-11 Yeehaw Transportation Distribution Center
- Mixed Use Districts
- Conservation Area
- Urban Infill Area
- Other Jurisdictions

* This map includes all city annexations to date.

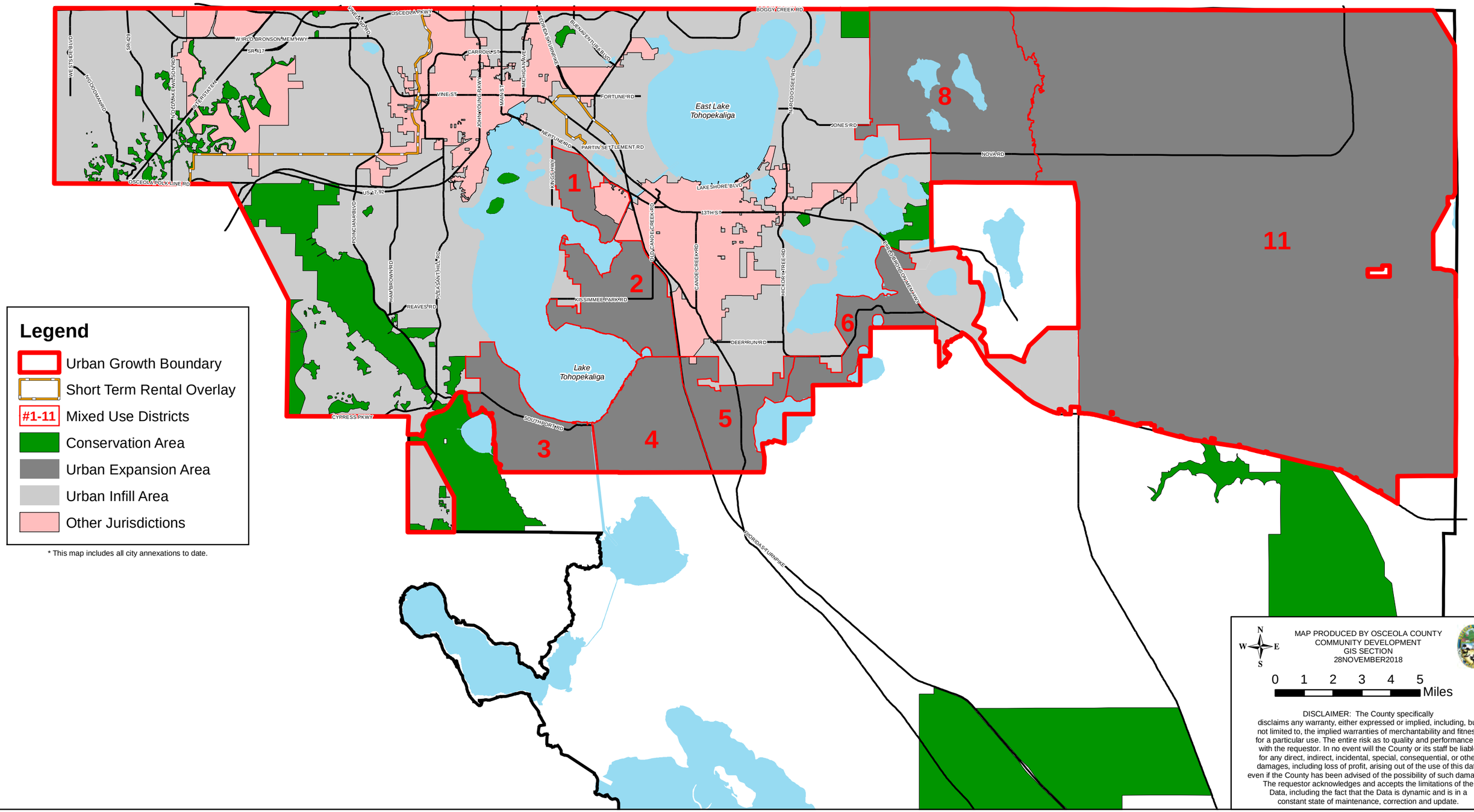
MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
28NOVEMBER2018

N W E S

0 5 10 Miles

FLU 2B: Urban Infill /Expansion and Overlay Areas UGB - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_2B.mxd



FLU 3A: Natural Resource Utilization Sites - 2040

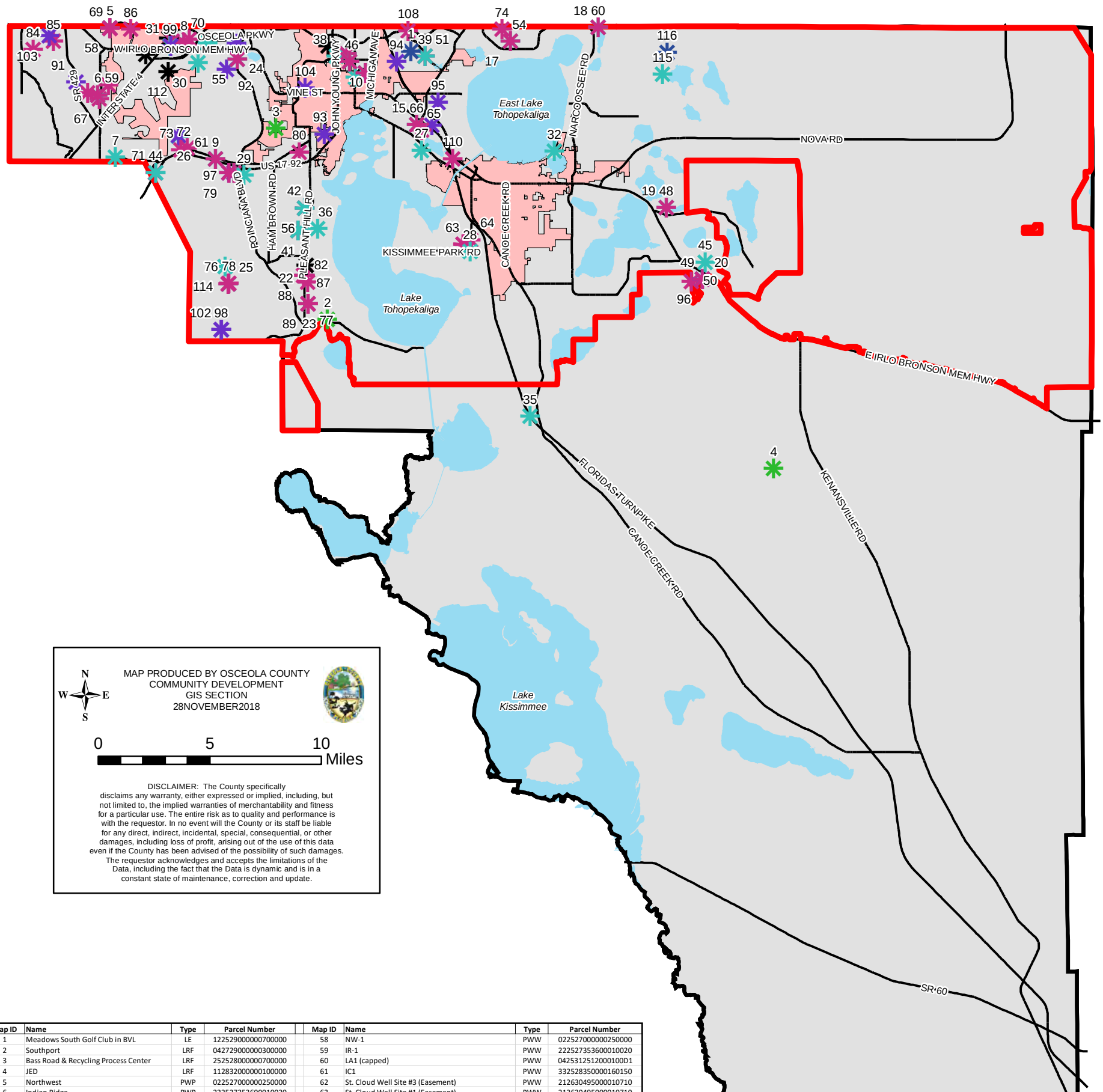
G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_3A.mxd

Legend

Urban Growth Boundary

Other Jurisdictions

* This map includes all city annexations to date.



MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
28NOVEMBER2018

N W E S

0 5 10 Miles

DISCLAIMER: The County specifically disclaims any warranty, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular use. The entire risk as to quality and performance is with the requestor. In no event will the County or its staff be liable for any direct, indirect, incidental, special, consequential, or other damages, including loss of profit, arising out of the use of this data even if the County has been advised of the possibility of such damages. The requestor acknowledges and accepts the limitations of the Data, including the fact that the Data is dynamic and is in a constant state of maintenance, correction and update.

Map ID	Name	Type	Parcel Number	Map ID	Name	Type	Parcel Number
1	Meadows South Golf Club in BVL	LE	122529000000700000	58	NW-1	PWW	022527000000250000
2	Southport	LRF	042729000000300000	59	IR-1	PWW	222527353600010020
3	Bass Road & Recycling Process Center	LRF	252528000000700000	60	LA1 (capped)	PWW	042531251200100D1
4	JED	LRF	112832000000100000	61	IC1	PWW	332528350000160150
5	Northwest	PWP	022527000000250000	62	St. Cloud Well Site #3 (Easement)	PWW	212630495000010710
6	Indian Ridge	PWP	222527353600010020	63	St. Cloud Well Site #1 (Easement)	PWW	212630495000010710
7	Southwest	PWP	3525273160000D0135	64	St. Cloud Well Site #2	PWW	212630495000010030
8	Camelot West	PWP	052528000000160000	65	P-3	PWW	302530000000350000
9	Intercession City	PWP	332528350000160150	66	P-1	PWW	302530000000210000
10	Tropical Park 1	PWP	0925295290000B0105	67	IR-2	PWW	222527354200010D1
11	Tropical Park 2	PWP	0925295310000L0055	68	IR-3	PWW	1525273537000100A0
12	Windsong	PWP	152529547100010290	69	NW-3	PWW	022527000000250000
13	Pineridge	PWP	18262947740001WTP0	70	CW-2	PWW	052528000041110010
14	The Fountains	PWP	192629000000800000	71	HG1	PWW	0626283313000100D0
15	Parkway	PWP	302530000000210000	72	SW1	PWW	322528000000150000
17	Spring Lake Village	PWP	0225305062000010WP0	73	SW2	PWW	322528000000250000
18	Lake Ajay	PWP	042531251200100D1	74	MS1	PWW	0325304208000100A0
19	Bay Lakes	PWP	132631259500010171	75	45584	PWW	2526286180000E001A
20	Harmony	PWP	312632000000240000	76	45618	PWW	2526286100000P0010
21	Poinciana 1	PWP	2526286180000E001A	77	45624	PWW	0527295493000100C1
22	Poinciana 3	PWP	2526286160000B0015	78	30486	PWW	2526286100000Q0015
23	Poinciana 4	PWP	0527295493000100C1	79	45617	PWW	2526286180000G0010
24	Fountain Park	PWP	112528000003400000	80	Kissimmee Good Samaritan Retirement Village	PWW	3125290000005A0000
25	Poinciana 2	PWP	2526286100000P0010	81	Hyatt Orlando Hotel	PWW	052528000000100000
26	Cane Island Power Park	PWP	292528000000100000	82	Poinciana Utilities	PWW	2926294646000010050
27	FGUA W.P. #3	PWP	312530426100010080	83	Braningham PUD	PWW	1425272629000100A0
28	FGUA W.P. #4	PWP	282630495000010040	84	Fisher Island Utility Company	PWW	0825273963000100B0
29	FGUA W.P.#1	PWP	2526286184000H0010	85	Northwest Water Service Area	PWW	0525273162TRAC0020
30	Tropical Palms Resort	PWP	092528000000600000	86	Reedy Creek Improvement District	PWW	012527000000100000
31	Hyatt Orlando Hotel	PWP	052528000000100000	87	6-1	PWW	2526286160000B0015
32	Lake Runnymede Mobile Home Park	PWP	292531491001030130	88	6-2	PWW	2526286160000B0015
33	Port O Call RV Resort	PWP	022528307300010750	89	45623	PWW	0527295493000100C1
34	Tropical Park Water System	PWP	1525292830000C0040	91	Sandhill	WRF	1625273160000A0010
35	Canoe Creek Service Plaza	PWP	3627300000004A0000	92	Camelot	WRF	102528000000150000
36	Pleasant Hill Lakes S/D	PWP	202629476600010071	93	South Bermuda	WRF	292529106200010010
37	Falcon Fire Make Up Well For Reuse	PWP	032528495400010H10	95	Parkway	WRF	172530315000050060
38	R.McLaughlin WTP	PWP	09252900U001700000	96	Harmony	WRF	312632000000240000
39	Buenaventura Lakes WTP	PWP	072530000000400000	97	Poinciana Industrial Park #1	WRF	2526286180000G0010
41	Fountains WTP	PWP	192629000000800000	99	Orlando Hyatt Hotel	WRF	052528000000100000
42	Pineridge WTP	PWP	18262947740001WTP0	100	Poinciana STP #3	WRF	022528307300010740
44	Hidden Glen	PWP	0626283313000100D0	101	Cane Island Power Plant (Kissimmee Utilities)	WRF	292528000000100000
45	Harmony Irrigation Tank	PWP	302632264200GC0010	102	WWTP NO. 2	WRF	2526286136000A0020
46	Tropical Park 2	PWW	0925295290000B0105	103	UNK 1	WRF	05252740990001COMM
47	Tropical Park 1	PWW	0925295310000L0055	105	UNK 3	WRF	302530496000010060
48	Bay Lakes	PWW	132631259500010171	106	NB-4	NV	042529000000650000
49	Harmony 2	PWW	312632000000240000	108	Buenaventura Lakes PWS	PWW	012529302500010020
50	Harmony 1	PWW	312632000003C0000	109	Poinciana Utilities	NV	2926292644TRACW040
51	BVL	PWW	072530000000400000	110	St. Cloud Municipal Service Area	PWW	322530000002250000
52	Windsong Inactive	PWW	152529547100010290	111	Reedy Creek Improvement District	NV	072528000000200000
53	The Fountains	PWW	192629000000800000	112	Reedy Creek Improvement District	NV	0725282783TRAC1530
54	M-1	PWW	0225305062000010WP0	113	Reedy Creek Improvement District	NV	052528000000250000
55	FP 1 Inactive	PWW	112528000003400000	114	Poinciana W.P.#2	PWP	2526286100000M0010
56	PR2	PWW	18262947740001WTP0	115	Northeast District Water Treatment Plant	PWP	022531000000100000
57	CW-1	PWW	052528000000160000	116	Northeast District Soil Excavation	LE	122531000000100000

NRU Legend:

NATURAL RESOURCE UTILIZATION (NRU) CATEGORIES:

Water & Wastewater Facilities
- ✳ PWP – POTABLE WATER PLANTS
- ✳ WRF – WASTEWATER RECLAMATION FACILITIES

Mining, Landfill Activities, Etc.
- ✳ LRF – LANDFILL & RECYCLING FACILITIES

Agricultural Wells
- ✳ AW – AGRICULTURAL WELLS

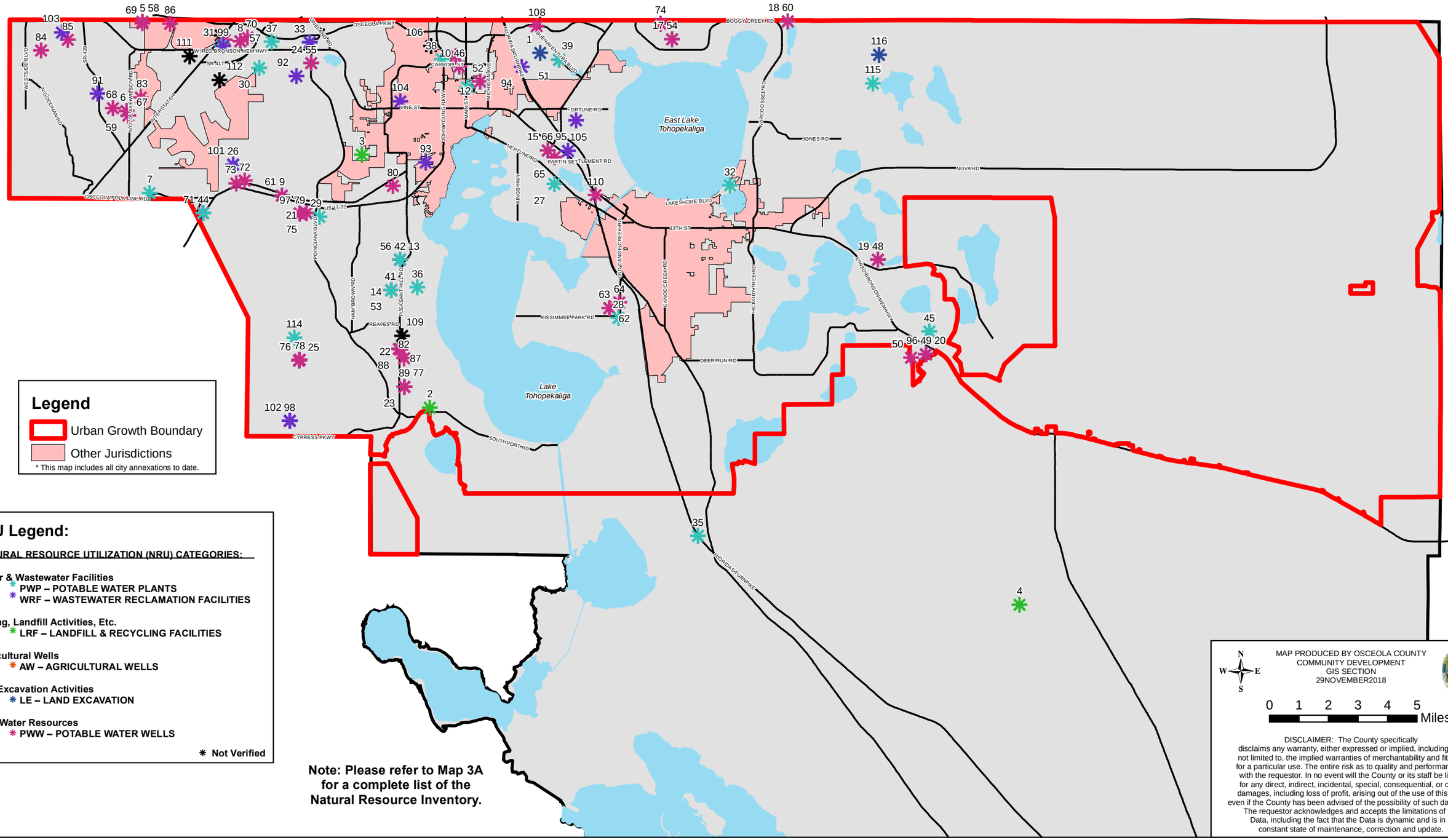
Soil Excavation Activities
- ✳ LE – LAND EXCAVATION

Raw Water Resources
- ✳ PWW – POTABLE WATER WELLS

✳ Not Verified

FLU 3B: Natural Resource Utilization Sites UGB - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_3B.mxd



Legend

- Urban Growth Boundary
- Other Jurisdictions

* This map includes all city annexations to date.

NRU Legend:

NATURAL RESOURCE UTILIZATION (NRU) CATEGORIES:

Water & Wastewater Facilities
- PWP – POTABLE WATER PLANTS
- WRF – WASTEWATER RECLAMATION FACILITIES

Mining, Landfill Activities, Etc.
- LRF – LANDFILL & RECYCLING FACILITIES

Agricultural Wells
- AW – AGRICULTURAL WELLS

Soil Excavation Activities
- LE – LAND EXCAVATION

Raw Water Resources
- PWW – POTABLE WATER WELLS

* Not Verified

Note: Please refer to Map 3A for a complete list of the Natural Resource Inventory.

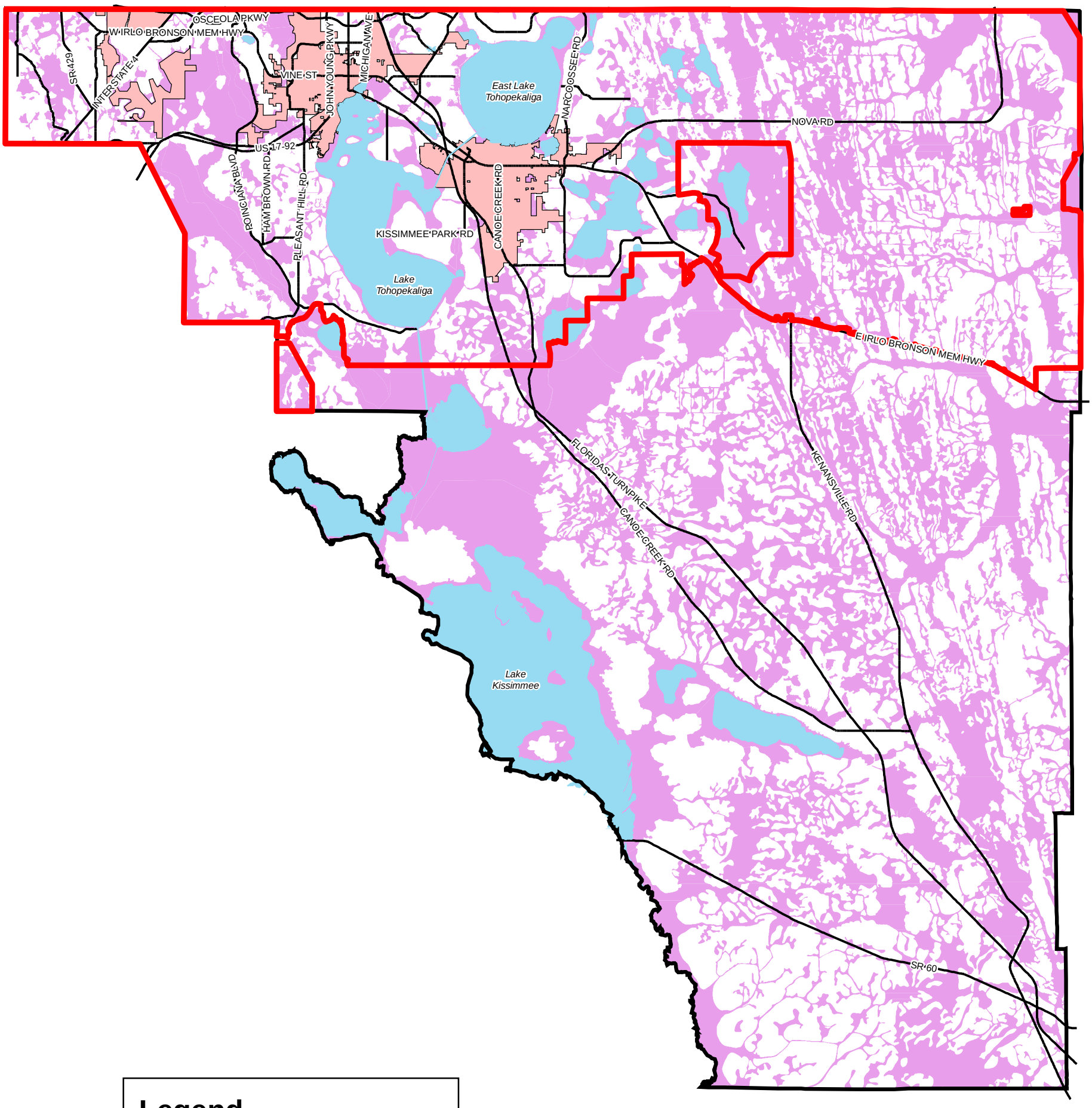
N W E S

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
29NOVEMBER2018

0 1 2 3 4 5 Miles

FLU 4A: Floodplain - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_4A.mxd



Legend

- Urban Growth Boundary
- 100 Year Floodplain
- Other Jurisdictions

* This map includes all city annexations to date.

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
29NOVEMBER2018

N
W E
S

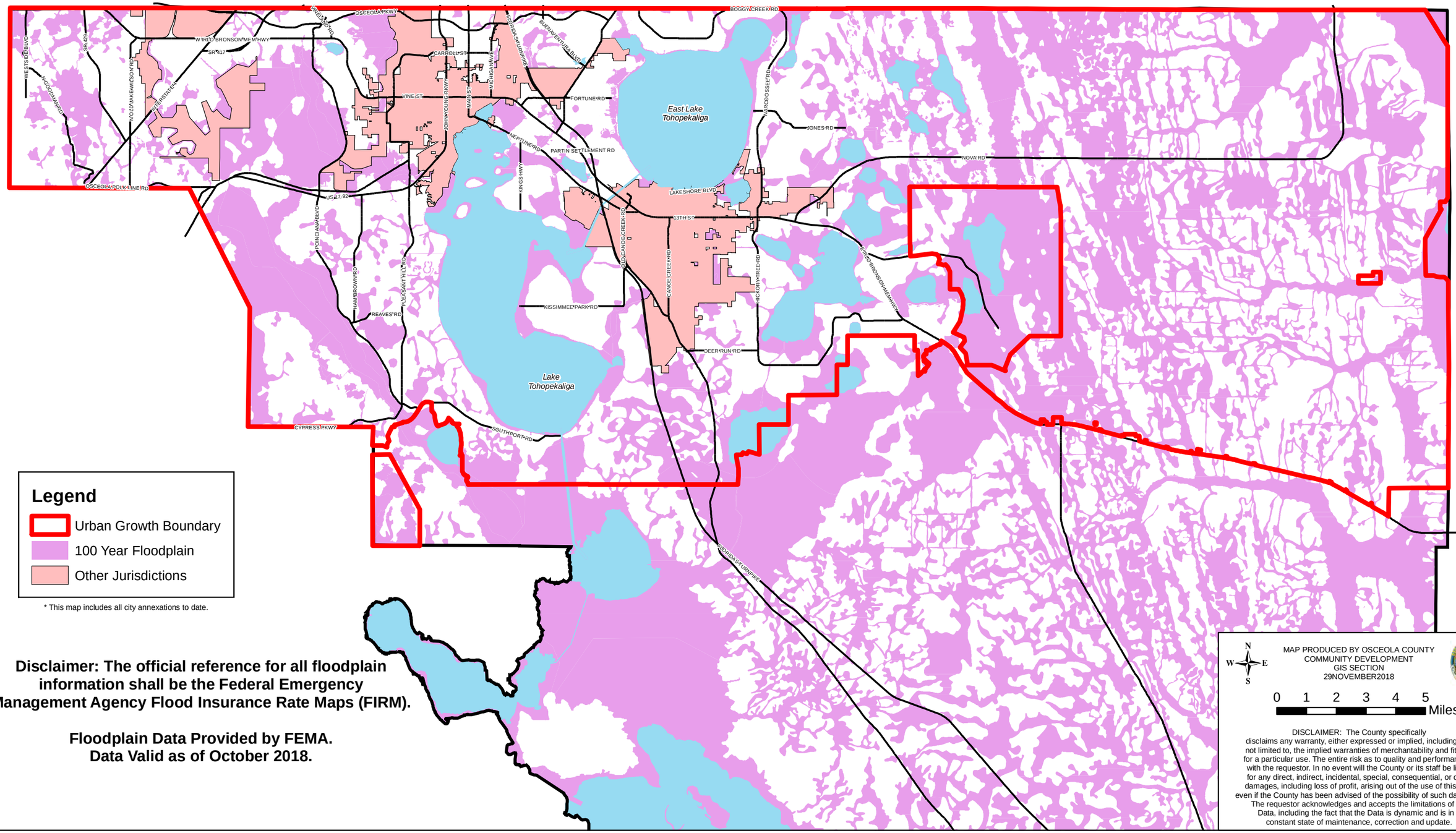
0 5 10 Miles

Disclaimer: The official reference for all floodplain information shall be the Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM).

Floodplain Data Provided by FEMA.
Data Provided Valid as of October 2018.

FLU 4B: Floodplain UGB - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_4B.mxd



Legend

- Urban Growth Boundary
- 100 Year Floodplain
- Other Jurisdictions

* This map includes all city annexations to date.

Disclaimer: The official reference for all floodplain information shall be the Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM).

Floodplain Data Provided by FEMA.
Data Valid as of October 2018.

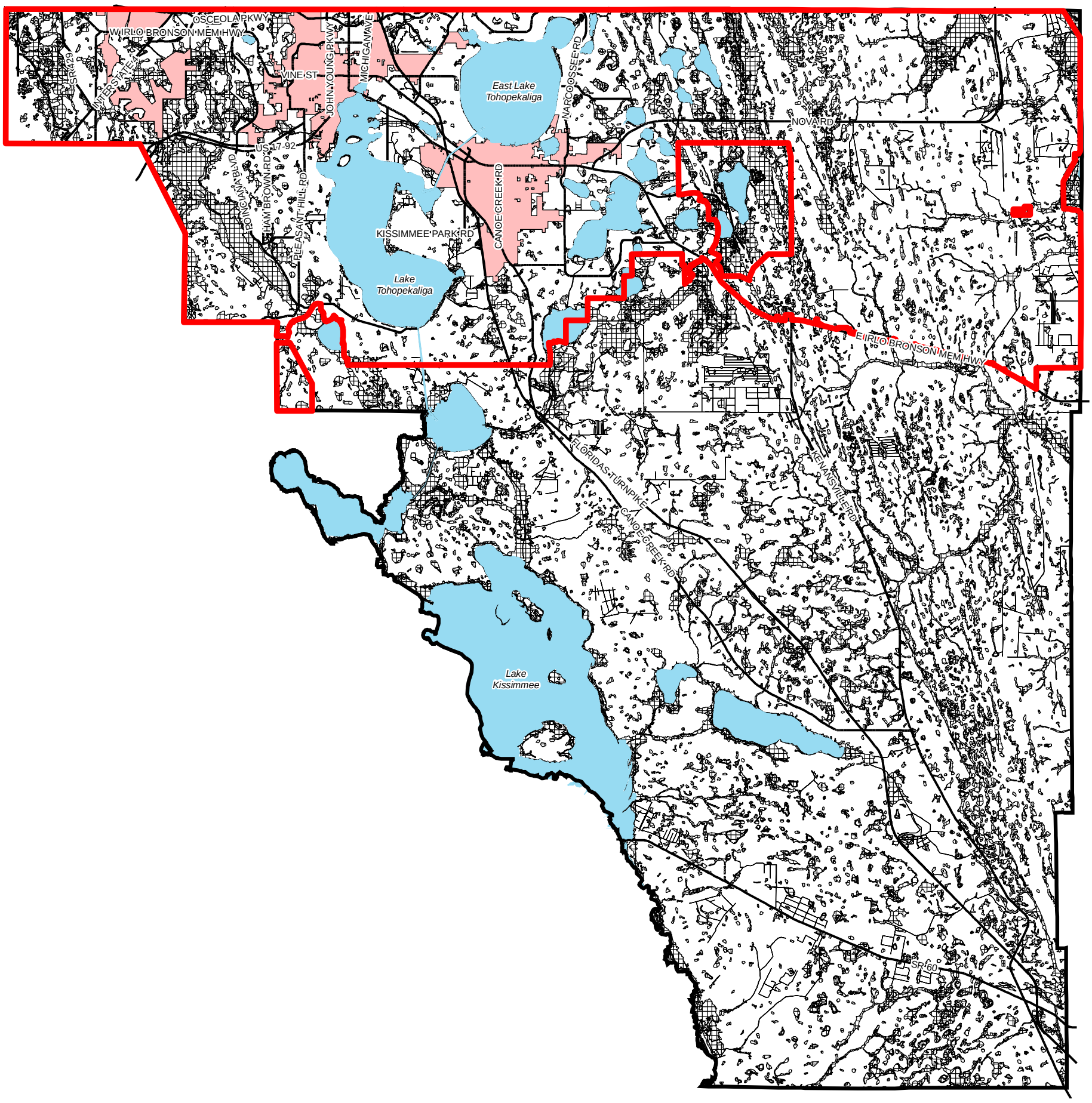
MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
29NOVEMBER2018

N W E S

0 1 2 3 4 5 Miles

FLU 5A: Wetlands - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_5A.mxd



Legend

- Urban Growth Boundary
- Wetlands ≥ 5 acres (Palustrine)
- Other Jurisdictions

* This map includes all city annexations to date.

Wetland Data Provided by NWI.
Data Valid as of March 2016.

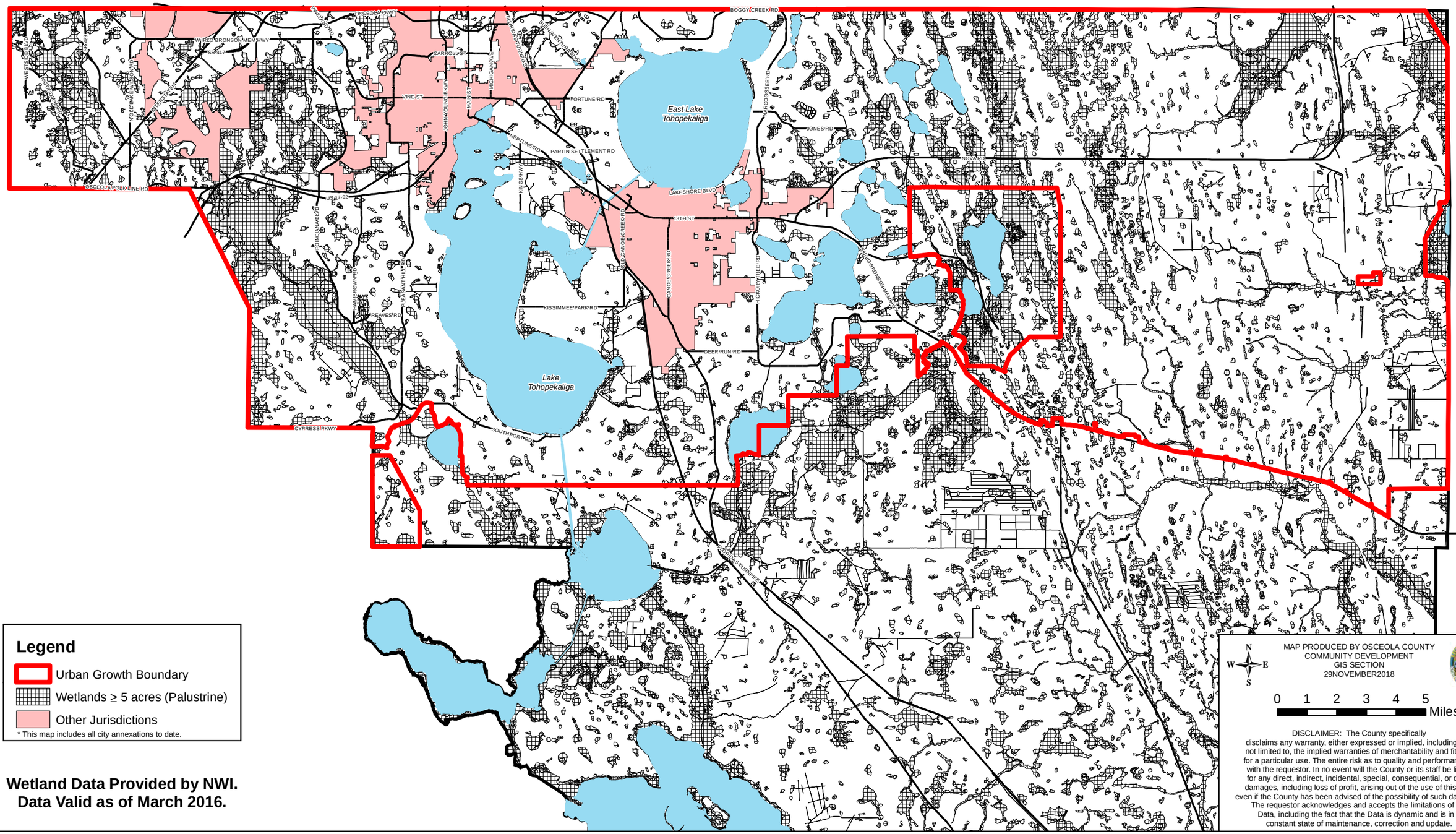
MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
29NOVEMBER2018

N W E S

0 5 10 Miles

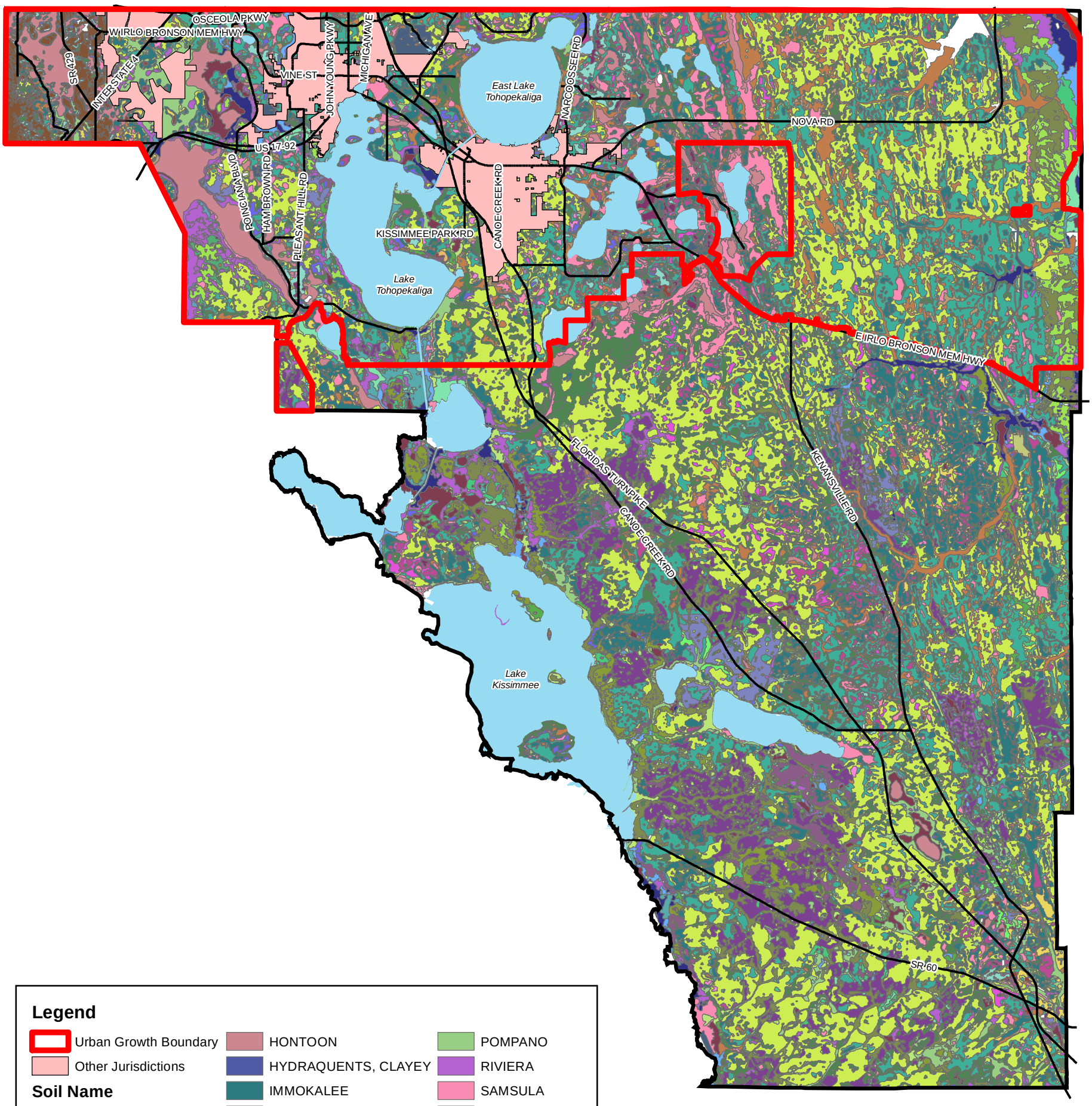
FLU 5B: Wetlands UGB - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_5B.mxd



FLU 6A: Soils and Minerals - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_6A.mxd



Legend

- Urban Growth Boundary
- Other Jurisdictions

Soil Name

- ADAMSVILLE
- ADAMSVILLE VARIANT
- ANCLOTE
- ANKONA
- ARCHBOLD
- ARENTS
- BASINGER
- CANDLER
- CASSIA
- CHOBEE
- DELRAY
- EAUGALLIE
- FELDA
- FLORIDANA
- GENTRY
- HOLOPAW
- HONTOON
- HYDRAQUENTS, CLAYEY
- IMMOKALEE
- KALIGA
- LOKOSEE
- MALABAR
- MYAKKA
- NARCOOSSEE
- NITTAW
- OLDSMAR
- ONA
- PAOLA
- PARKWOOD
- PINEDA
- PITS
- PLACID
- PLACID VARIANT
- POMELLO
- POMONA
- POMPANO
- RIVIERA
- SAMSULA
- SANIBEL
- SATELLITE
- SMYRNA
- ST. AUGUSTINE
- ST. JOHNS
- ST. LUCIE
- TAVARES
- TERRA CEIA
- TOMOKA
- VALKARIA
- WABASSO
- WATER
- WAUCHULA
- WINDER
- ZOLFO

* This map includes all city annexations to date.

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
29NOVEMBER2018

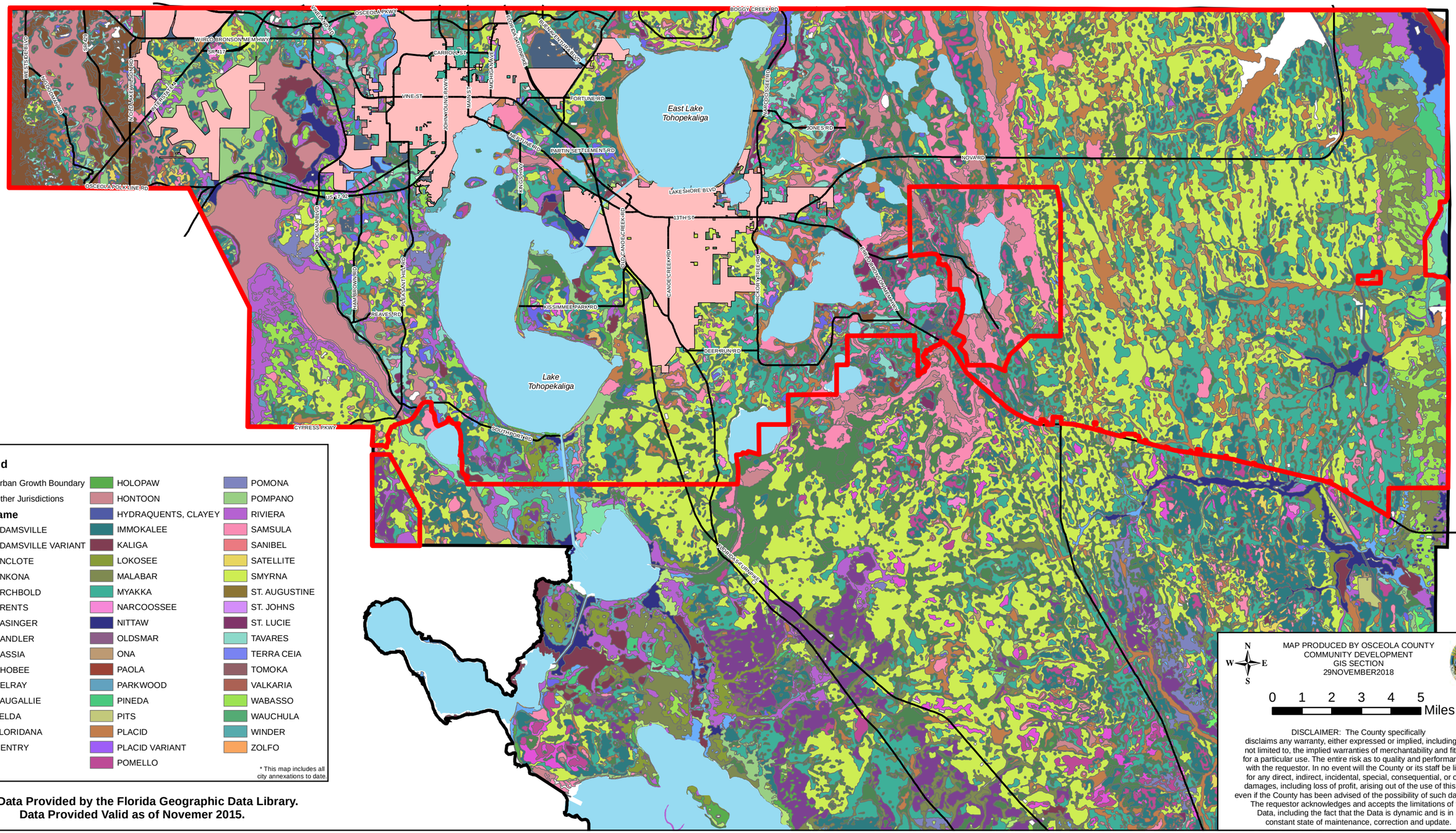
N W E S

0 5 10 Miles

Soils Data Provided by the Florida Geographic Data Library.
Data Provided Valid as of November 2015.

FLU 6B: Soils and Minerals UGB - 2040

G:\ComprehensivePlan\ComprehensivePlan\Supplement_20\FLU_6B.mxd



Legend

- Urban Growth Boundary
- Other Jurisdictions

Soil Name

- ADAMSVILLE
- ADAMSVILLE VARIANT
- ANCLOTE
- ANKONA
- ARCHBOLD
- ARENTS
- BASINGER
- CANDLER
- CASSIA
- CHOBEE
- DELRAY
- EAUGALLIE
- FELDA
- FLORIDANA
- GENTRY
- HOLOPAW
- HONTOON
- HYDRAQUENTS, CLAYEY
- IMMOKALEE
- KALIGA
- LOKOSEE
- MALABAR
- MYAKKA
- NARCOOSSEE
- NITTAW
- OLDSMAR
- ONA
- PAOLA
- PARKWOOD
- PINEDA
- PITS
- PLACID
- PLACID VARIANT
- POMELLO
- POMONA
- POMPANO
- RIVIERA
- SAMSULA
- SANIBEL
- SATELLITE
- SMYRNA
- ST. AUGUSTINE
- ST. JOHNS
- ST. LUCIE
- TAVARES
- TERRA CEIA
- TOMOKA
- VALKARIA
- WABASSO
- WAUCHULA
- WINDER
- ZOLFO

* This map includes all city annexations to date.

Soils Data Provided by the Florida Geographic Data Library.
Data Provided Valid as of Novemer 2015.

N W E S

MAP PRODUCED BY OSCEOLA COUNTY
COMMUNITY DEVELOPMENT
GIS SECTION
29NOVEMBER2018

0 1 2 3 4 5 Miles

Appendix F – Opportunity Cost Formulas

AAM Opportunity Cost Analysis - Osceola County Regionally Significant Facilities

	Road Name	FROM	TO	Total Mileage	# Signals	# Crash in 2018	2018 AADT	Detector Maintenance Opportunity Cost	Average Annual Congestion Cost Per Hour	Annual Congestion Cost Per Mile	Annual Congestion Cost Per Segment	Travel Time Delay Reduction % (Signal Retiming)	Annual Congestion Opportunity Cost (Signal Retiming)	Congestion Cost Per Segment Per Hour	Opportunity Cost (Arterial Management)	Travel Time Delay Reduction % (Adaptive)	Annual Congestion Opportunity Cost (Adaptive)	Annual Congestion Opportunity Cost (Crash Reduction)
NW Osceola County	US 192 (Bronson Memorial Hwy)	Westside Blvd	Seaview Castle Dr	9.910	21	505	62,125	$2,818,148.64	$350.00	$8.43	$5,190,003.26	8%	$415,200.26	$592.47	$99,931.26	3%	$155,700.10	$5,343,594.38
	Old Lake Wilson Rd	US 192 (Bronson Memorial Hwy)	Osceola Polk Line Rd	5.150	4	71	13,900	$120,102.76	$350.00	$8.43	$603,461.55	8%	$48,276.92	$68.89	$1,633.62	3%	$18,103.85	$751,277.63
	Griffin Rd	US 192 (Bronson Memorial Hwy)	World Dr	0.980	0	2	3,500	$0.00	$350.00	$8.43	$28,914.90	8%	$2,313.19	$3.30	$2.20	3%	$867.45	$21,162.75
	World Dr	US 192 (Bronson Memorial Hwy)	Celebration Blvd	2.310	1	27	19,767	$42,698.40	$351.00	$8.46	$386,292.06	8%	$30,903.36	$44.10	$397.67	3%	$11,588.76	$285,697.13
	Celebration Blvd	World Dr	Celebration Pl	2.160	2	10	14,400	$62,211.50	$350.00	$8.43	$262,206.72	8%	$20,976.54	$29.93	$99.97	3%	$7,866.20	$105,813.75
	Osceola Polk Line Rd	Masters Blvd	US 17-92 (Orange Blossom Trail)	4.910	7	129	17,700	$267,639.07	$350.00	$8.43	$732,626.01	8%	$58,610.08	$83.63	$3,603.42	3%	$21,978.78	$1,364,997.38
	US 17-92 (Orange Blossom Trail)	Osceola Polk Line Rd	Poinciana Blvd	3.650	1	71	28,750	$62,103.50	$350.00	$8.43	$884,623.13	8%	$70,769.85	$100.98	$2,394.74	3%	$26,538.69	$751,277.63
	Osceola Pkwy	S Victory Way	East of Polynesian Isle Blvd	3.420	5	98	24,633	$266,054.98	$350.00	$8.43	$710,193.78	8%	$56,815.50	$81.07	$2,653.66	3%	$21,305.81	$1,036,974.75
	Celebration Pl	Celebration Blvd	Celebration Ave	1.270	1	12	17,900	$38,666.18	$350.00	$8.43	$191,639.19	8%	$15,331.14	$21.88	$87.68	3%	$5,749.18	$126,976.50
	Celebration Ave	Celebration Blvd	US 192 (Bronson Memorial Hwy)	0.680	4	25	18,100	$156,392.80	$350.00	$8.43	$103,756.44	8%	$8,300.52	$11.84	$98.90	3%	$3,112.69	$264,534.38
	Sinclair Rd	Old Lake Wilson Rd	Connector Rd	0.680	1	7	4,700	$10,152.57	$350.00	$8.43	$26,942.28	8%	$2,155.38	$3.08	$7.19	3%	$808.27	$74,069.63
	Seralago Blvd	US 192 (Bronson Memorial Hwy)	Osceola Pkwy	0.590	0	5	0	$0.00	$350.00	$8.43	$0.00	8%	$0.00	$0.00	$0.00	3%	$0.00	$52,906.88
City of Kissimme	Poinciana Blvd	US 192 (Bronson Memorial Hwy)	South of Robert McLane Blvd	6.340	4	253	29,467	$254,606.33	$350.00	$8.43	$1,574,881.36	8%	$125,990.51	$179.78	$15,191.85	3%	$47,246.44	$2,677,087.88
	US 192 (Bronson Memorial Hwy)	Seaview Castle Dr	Old Canoe Creek Rd	13.490	26	1128	47,459	$2,665,454.51	$350.00	$8.43	$5,397,084.92	8%	$431,766.79	$616.11	$232,119.01	3%	$161,912.55	$11,935,791.00
	FL 535 (Vineland Rd)	Polynesian Isle Blvd	US 192 (Bronson Memorial Hwy)	1.100	4	99	38,750	$334,818.85	$350.00	$8.43	$359,328.75	8%	$28,746.30	$41.02	$1,356.34	3%	$10,779.86	$1,047,556.13
	Osceola Pkwy	East of Polynesian Isle	CR 530 (Simpson Rd)	10.870	20	321	30,180	$1,303,849.40	$350.00	$8.43	$2,765,517.14	8%	$221,241.37	$315.70	$33,847.28	3%	$82,965.51	$3,396,621.38
	John Young Pkwy	Thacker Ave	Plesant Hill Rd	6.490	14	477	45,125	$1,364,656.82	$350.00	$8.43	$2,468,820.34	8%	$197,505.63	$281.83	$44,900.40	3%	$74,064.61	$5,047,315.88
	US 17-92 (Orange Blossom Trail)	Plesant Hill Rd	Poinciana Blvd	3.100	2	103	31,000	$133,927.54	$350.00	$8.43	$810,123.00	8%	$64,809.84	$92.48	$3,181.49	3%	$24,303.69	$1,089,881.63
	US 441 (Orange Blossom Trail)	North of Centerview Blvd	US 192 (Bronson Memorial Hwy)	2.570	4	223	36,000	$311,057.51	$350.00	$8.43	$779,943.60	8%	$62,395.49	$89.03	$6,631.48	3%	$23,398.31	$2,359,646.63
	Main St	US 192 (Bronson Memorial Hwy)	Neptune Rd	0.620	2	27	26,500	$114,486.44	$350.00	$8.43	$138,504.90	8%	$11,080.39	$15.81	$142.58	3%	$4,155.15	$285,697.13
	Broadway Ave	Neptune Rd	Stewart Ave	0.340	2	27	24,000	$103,685.84	$350.00	$8.43	$68,788.80	8%	$5,503.10	$7.85	$70.81	3%	$2,063.66	$285,697.13
	Emmett St	Stewart Ave	John Young Pkwy	0.510	0	49	24,000	$0.00	$350.00	$8.43	$103,183.20	8%	$8,254.66	$11.78	$192.77	3%	$3,095.50	$518,487.38
	Neptune Rd	Main St	Old Canoe Creek Rd	6.260	6	175	17,600	$228,108.84	$350.00	$8.43	$928,783.68	8%	$74,302.69	$106.03	$6,197.19	3%	$27,863.51	$1,851,740.63
	Oak St	US-192 (Vine St.)	John Young Pkwy	0.750	3	34	5,400	$34,993.97	$350.00	$8.43	$34,141.50	8%	$2,731.32	$3.90	$44.26	3%	$1,024.25	$359,766.75
	Thacker Ave	US 192 (Bronson Memorial Hwy)	Patrick St	1.000	4	34	9,900	$85,540.82	$350.00	$8.43	$83,457.00	8%	$6,676.56	$9.53	$108.19	3%	$2,503.71	$359,766.75
	Hoagland Blvd	US 192 (Bronson Memorial Hwy)	John Young Pkwy	3.800	3	44	9,900	$64,155.61	$350.00	$8.43	$317,136.60	8%	$25,370.93	$36.20	$532.04	3%	$9,514.10	$465,580.50
	Armstrong Blvd	US 192 (Bronson Memorial Hwy)	Columbia Ave	0.310	1	12	9,900	$21,385.20	$350.00	$8.43	$25,871.67	8%	$2,069.73	$2.95	$11.84	3%	$776.15	$126,976.50
	Columbia Ave	Hoagland Blvd	John Young Pkwy	1.780	3	56	9,900	$64,155.61	$350.00	$8.43	$148,553.46	8%	$11,884.28	$16.96	$317.19	3%	$4,456.60	$592,557.00
	Carroll St	John Young Pkwy	Dyer Blvd	1.280	2	18	9,900	$42,770.41	$350.00	$8.43	$106,824.96	8%	$8,546.00	$12.19	$73.31	3%	$3,204.75	$190,464.75
	Dyer Blvd	Osceola Pkwy	US 192 (Bronson Memorial Hwy)	2.680	1	50	9,900	$21,385.20	$350.00	$8.43	$223,664.76	8%	$17,893.18	$25.53	$426.39	3%	$6,709.94	$529,068.75
	Fortune Rd	US 192 (Bronson Memorial Hwy)	CR 530 (Simpson Rd)	1.560	4	59	9,900	$85,540.82	$350.00	$8.43	$130,192.92	8%	$10,415.43	$14.86	$292.87	3%	$3,905.79	$624,301.13
	CR 530 (Simpson Rd)	Fortune Rd	Boggy Creek Rd	4.260	6	214	9,900	$128,311.22	$350.00	$8.43	$355,526.82	8%	$28,442.15	$40.59	$2,900.87	3%	$10,665.80	$2,264,414.25
	Buenaventura Blvd	Osceola Pkwy	CR 530 (Simpson Rd)	2.360	3	77	9,900	$64,155.61	$350.00	$8.43	$196,958.52	8%	$15,756.68	$22.48	$578.24	3%	$5,908.76	$814,765.88
	Lakeside Dr	Fortune Rd	Westlake Dr	0.620	1	8	9,900	$21,385.20	$350.00	$8.43	$51,743.34	8%	$4,139.47	$5.91	$15.78	3%	$1,552.30	$84,651.00
	Boggy Creek Rd	CR 530 (Simpson Rd)	Narcoossee Rd	5.890	3	71	9,900	$64,155.61	$350.00	$8.43	$491,561.73	8%	$39,324.94	$56.11	$1,330.70	3%	$14,746.85	$751,277.63
	Narcoossee Rd	Boggy Creek Rd	South of Disston Dr	5.560	5	73	9,900	$106,926.02	$350.00	$8.43	$464,020.92	8%	$37,121.67	$52.97	$1,291.52	3%	$13,920.63	$772,440.38
	Orange Ave	Orange/Osceola County Line	Osceola Pkwy	0.545	3	7	9,900	$64,155.61	$350.00	$8.43	$45,484.07	8%	$3,638.73	$5.19	$12.14	3%	$1,364.52	$74,069.63
	Partin Settlement Rd.	Neptune Rd	Remington Blvd	1.860	2	19	9,900	$42,770.41	$350.00	$8.43	$155,230.02	8%	$12,418.40	$17.72	$112.45	3%	$4,656.90	$201,046.13
	Mill Slough Rd	Michigan Ave	Dean John Ln	0.747	1	6	9,900	$21,385.20	$350.00	$8.43	$62,342.38	8%	$4,987.39	$7.12	$14.26	3%	$1,870.27	$63,488.25
	Dean John Ln	US 192 (Bronson Memorial Hwy)	Mill Slough Rd	0.755	0	11	9,900	$0.00	$350.00	$8.43	$63,010.04	8%	$5,040.80	$7.19	$26.43	3%	$1,890.30	$116,395.13
	Michigan Ave	Osceola Pkwy	Vine St	2.540	4	170	29,125	$251,654.17	$350.00	$8.43	$623,630.33	8%	$49,890.43	$71.19	$4,042.21	3%	$18,708.91	$1,796,833.75
City of St. Cloud	US 192 (Bronson Memorial Hwy)	Old Canoe Creek Rd	Holopaw Rd	17.600	13	309	30,614	$859,697.94	$350.00	$8.43	$4,542,182.46	8%	$363,374.60	$518.51	$53,513.75	3%	$136,265.47	$3,269,644.88
	Old Canoe Creek Rd	Neptune Rd	Canoe Creek Rd	4.380	5	98	11,350	$122,586.90	$350.00	$8.43	$419,080.59	8%	$33,526.45	$47.84	$1,565.91	3%	$12,572.42	$1,036,974.75
	Narcoossee Rd	Ralph Miller Rd	US 192 (Bronson Memorial Hwy)	1.610	2	26	24,500	$105,845.96	$350.00	$8.43	$332,521.35	8%	$26,601.71	$37.96	$329.64	3%	$9,975.64	$275,115.75
	Canoe Creek Rd	US 192 (Bronson Memorial Hwy)	Deer Run Rd	4.660	2	69	1,850	$7,992.45	$350.00	$8.43	$72,675.03	8%	$5,814.00	$8.30	$191.20	3%	$2,180.25	$730,114.88
	Kissimmee Park Rd	Florida Turnpike	Canoe Creek Rd	0.166	1	6	1,850	$3,996.22	$350.00	$8.43	$2,588.85	8%	$207.11	$0.30	$0.59	3%	$77.67	$63,488.25
	Deer Run Rd	Canoe Creek Rd	Hickory Tree Rd	2.410	2	2	1,850	$7,992.45	$350.00	$8.43	$37,585.16	8%	$3,006.81	$4.29	$2.87	3%	$1,127.55	$21,162.75
	New Notle Rd	Canoe Creek Rd	Hickory Tree Rd	4.690	2	10	14,500	$62,643.53	$350.00	$8.43	$573,282.15	8%	$45,862.57	$65.44	$218.58	3%	$17,198.46	$105,813.75
Poinciana	Poinciana Blvd	South of Robert McLane Blvd	Plesant Hill Rd	7.650	3	99	19,900	$128,959.26	$350.00	$8.43	$1,283,341.05	8%	$102,667.28	$146.50	$4,844.17	3%	$38,500.23	$1,047,556.13
	Plesant Hill Rd	Chad Ln	Poinciana Blvd	7.450	6	251	38,000	$492,507.72	$350.00	$8.43	$2,386,533.00	8%	$190,922.64	$272.44	$22,839.34	3%	$71,595.99	$2,655,925.13
	Cypress Pkwy	Poinciana Blvd	Poinciana Pkwy	4.000	5	112	35,100	$379,101.34	$350.00	$8.43	$1,183,572.00	8%	$94,685.76	$135.11	$5,054.23	3%	$35,507.16	$1,185,114.00
	Marigold Ave	Cypress Pkwy	KOA St	0.990	1	12	5,500	$11,880.67	$350.00	$8.43	$45,901.35	8%	$3,672.11	$5.24	$21.00	3%	$1,377.04	$126,976.50
	Total			181.303	222		Subtotal	$14,026,853.62			$38,974,233.01		$3,117,938.64		$555,453.51		$1,169,226.99	$61,382,556.38
						Average AADT	54891								% Adaptive Intersections =		5.00%	
							TOTALS	$14,026,854					$3,117,938.64		$555,453.51		$58,461.35	$61,382,556.38

TOTAL	$79,141,263.49
10 YEAR COST **	$866,574,754.79

Appendix G – Deployment Cost Estimates

OSCEOLA COUNTY TSM&O IMPROVEMENTS DEPLOYMENT 1 ENGINEER'S ESTIMATE
47 Signals

PAY ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
460-98-2	PIPE HANGERS, STAINLESS STEEL	EA	0	$ 199.43	$ -
630-2-11	CONDUIT, F&I, OPEN TRENCH	LF	103,782	$ 7.33	$ 760,724.99
630-2-12	CONDUIT, F&I, DIRECTIONAL BORE	LF	25,246	$ 17.52	$ 442,302.91
630-2-14	CONDUIT, F&I, ABOVE GROUND	LF	1,700	$ 24.83	$ 42,211.00
630-2-15	CONDUIT, F&I, BRIDGE MOUNT	LF	0	$ 39.50	$ -
633-1-121	FIBER OPTIC CABLE, F&I, UNDERGROUND,2-12 FIBERS	LF	4,548	$ 1.95	$ 8,868.60
633-1-122	FO CABLE,F&I,UNDERGROUND,13-48 FIBERS	LF	7,800	$ 2.10	$ 16,380.00
633-1-123	FO CABLE,F&I,UNDERGROUND,49-96 FIBERS	LF	131,680	$ 2.26	$ 297,596.80
633-2-31	FO CONN.,INSTALL,SPLICE	EA	1,387	$ 38.80	$ 53,815.60
633-2-32	FIBER OPTIC CONNECTION, INSTALL, TERMINATION	EA	120	$ 66.63	$ 7,995.60
633-3-11	FO CONN. HARDWARE,F&I,SPLICE ENCLOSURE	EA	27	$ 869.12	$ 23,466.24
633-3-12	FO CONN. HARDWARE,F&I,SPLICE TRAY	EA	114	$ 52.73	$ 6,011.22
633-3-13	FO CONN. HARDWARE,F&I,PRETERMINATED CONNECTOR ASSEMBLY	EA	1,104	$ 42.13	$ 46,511.52
633-3-16	FO CONN. HARDWARE,F&I,FIELD TERMINATED PATCH PANEL	EA	33	$ 1,746.33	$ 57,628.89
633-3-17	FO CONN. HARDWARE,F&I,CONNECTOR PANEL	EA	80	$ 566.00	$ 45,280.00
633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, F&I	LF	5,250	$ 5.23	$ 27,457.50
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24" COVER SIZE	EA	76	$ 723.78	$ 55,007.28
635-2-12	PULL & SPLICE BOX, F&I, 24" X 36" COVER SIZE	EA	90	$ 1,459.95	$ 131,395.50
635-2-13	PULL & SPLICE BOX, F&I, 36" ROUND COVER	EA	27	$ 2,927.41	$ 79,040.07
635-3-11	JUNCTION BOX, F&I, AERIAL	EA	0	$ 445.00	$ -
639-1-122	ELECTRICAL POWER SERVICE, F&I, UNDERGROUND, METER FURNISHED BY POWER COMPANY	AS	23	$ 2,348.24	$ 54,009.52
639-2-1	ELECTRICAL SERVICE WIRE, F&I	LF	23,990	$ 6.92	$ 166,010.80
639-3-11	ELECTRICAL SERVICE DISCONNECT, F&I, POLE MOUNT	EA	23	$ 1,004.73	$ 23,108.79
641-2-12	PRESTRESSED CONCRETE POLE, F&I, TYPE P-11 SERVICE POLE	EA	18	$ 1,391.87	$ 25,053.66
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT	EA	17	$ 4,751.62	$ 80,777.54
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT	EA	17	$ 833.70	$ 14,172.90
676-2-143	ITS CABINET, FURNISH & INSTALL, BASE MOUNT, 334, 24" W X 66" H X 30" D	EA	5	$ 7,811.93	$ 39,059.65
676-2-144	ITS CABINET, F&I, GRND W/ SUNSHIELD, OTHER	EA	1	$ 10,961.28	$ 10,961.28
676-3-10	SMALL EQUIPMENT CABINET, F&I,	EA	68	$ 1,202.50	$ 81,770.00
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD	EA	51	$ 4,668.02	$ 238,069.02
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	EA	32	$ 5,424.91	$ 173,597.12
684-6-11	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET ACCESS POINT	EA	0	$ 4,500.00	$ -
684-6-12	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET SUBSCRIBER UNIT	EA	0	$ 4,535.00	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF	EA	5	$ 99,013.20	$ 495,066.00
700-10-124	DMS SUPPORT STRUCTURE, CANTILEVER, 40-50 FT	EA	5	$ 61,765.00	$ 308,825.00
	AC FOR MHUB	EA	1	$ 2,500.00	$ 2,500.00
	RPM	EA	27	$ 300.00	$ 8,100.00
				UNIT COST SUBTOTAL	**$ 3,822,775.00**
				MOBILIZATION 10%	$ 382,277.50
				MANITENANCE OF TRAFFIC 10%	$ 382,277.50
				COMPLETION OF DESIGN 10%	$ 382,277.50
				DESIGN BUILD RISK ADDITIVES 0%	$ -
				CONTINGENCY 20%	$ 764,555.00
				CONSTRUCTION TOTAL	**$ 5,734,162.51**

MAINTENANCE

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	TSM&O DEVICES MAINTENANCE	PER YEAR	EA	1	$ 151,255	$ 151,255
	TMC EQUIPMENT	PER YEAR	EA	0	$ 83,245	$ -
	SIGNAL MAINTENANCE	PER YEAR	EA	47	$ 4,391	$ 206,377
	SIGNAL RETIMING (EVERY 3 YEARS)	PER YEAR	EA	15.66666667	$ 3,000	$ 47,000
					TOTAL COST	$ 404,631.60

OPERATIONS

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	DATA MANAGEMENT	PER CENTER MILE * YEARS	EA	47.54739253	$ 200	$ 9,509
	SUNGUIDE MAINTENANCE	1 PER TMC	EA	0	$ 50,000	$ -
UTILITY	STAFF	1 PER TMC	EA	0	$ -	$ -
	CCTV	PER YEAR	EA	61	$ 200	$ 12,200
	BLUETOOTH	PER YEAR	EA	17	$ 120	$ 2,040
	WIRELESS EQUIPMENT	PER YEAR	EA	0	$ 225	$ -
	ADMS	PER YEAR	EA	7	$ 500	$ 3,500
					TOTAL COST	$ 27,249

TOTAL O&M COST	$ 431,881.08

LIFE CYCLE REPLACEMENT (TO BE DONE AT END OF YEAR 10)

PAY ITEM	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT		EA	17	$ 4,752	$ 80,778
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT		EA	17	$ 834	$ 14,173
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD		EA	63	$ 4,668	$ 294,085
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I		EA	47	$ 5,353	$ 251,604
684-6-11	WIRELESS COMMUNICATION DEVICE, F&I, ETHERNET ACCESS POINT		EA	0	$ 4,056	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF		EA	7	$ 99,013	$ 693,091
					TOTAL COST	$ 1,333,731
					MOBILIZATION 10%	$ 133,373
					MANITENANCE OF TRAFFIC 10%	$ 133,373
					COMPLETION OF DESIGN 10%	$ 133,373
					DESIGN BUILD RISK ADDITIVES 0%	$ -
					CONTINGENCY 20%	$ 266,746
					GRAND TOTAL	$ 2,000,596

OSCEOLA COUNTY TSM&O IMPROVEMENTS DEPLOYMENT 2 ENGINEER'S ESTIMATE
133 Signals

PAY ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
460-98-2	PIPE HANGERS, STAINLESS STEEL	EA	0	$ 199.43	$ -
630-2-11	CONDUIT, F&I, OPEN TRENCH	LF	124,818	$ 7.33	$ 914,915.94
630-2-12	CONDUIT, F&I, DIRECTIONAL BORE	LF	30,092	$ 17.52	$ 527,211.84
630-2-14	CONDUIT, F&I, ABOVE GROUND	LF	2,875	$ 24.83	$ 71,386.25
630-2-15	CONDUIT, F&I, BRIDGE MOUNT	LF	0	$ 39.50	$ -
633-1-121	FIBER OPTIC CABLE, F&I, UNDERGROUND,2-12 FIBERS	LF	4,374	$ 1.95	$ 8,529.30
633-1-122	FO CABLE,F&I,UNDERGROUND,13-48 FIBERS	LF	8,100	$ 2.10	$ 17,010.00
633-1-123	FO CABLE,F&I,UNDERGROUND,49-96 FIBERS	LF	157,686	$ 2.26	$ 356,370.36
633-2-31	FO CONN.,INSTALL,SPLICE	EA	1,427	$ 38.80	$ 55,367.60
633-2-32	FIBER OPTIC CONNECTION, INSTALL, TERMINATION	EA	144	$ 66.63	$ 9,594.72
633-3-11	FO CONN. HARDWARE,F&I,SPLICE ENCLOSURE	EA	27	$ 869.12	$ 23,466.24
633-3-12	FO CONN. HARDWARE,F&I,SPLICE TRAY	EA	117	$ 52.73	$ 6,169.41
633-3-13	FO CONN. HARDWARE,F&I,PRETERMINATED CONNECTOR ASSEMBLY	EA	1,176	$ 42.13	$ 49,544.88
633-3-16	FO CONN. HARDWARE,F&I,FIELD TERMINATED PATCH PANEL	EA	35	$ 1,746.33	$ 61,121.55
633-3-17	FO CONN. HARDWARE,F&I,CONNECTOR PANEL	EA	98	$ 566.00	$ 55,468.00
633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, F&I	LF	8,805	$ 5.23	$ 46,050.15
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24" COVER SIZE	EA	124	$ 723.78	$ 89,748.72
635-2-12	PULL & SPLICE BOX, F&I, 24" X 36" COVER SIZE	EA	102	$ 1,459.95	$ 148,914.90
635-2-13	PULL & SPLICE BOX, F&I, 36" ROUND COVER	EA	27	$ 2,927.41	$ 79,040.07
635-3-11	JUNCTION BOX, F&I, AERIAL	EA	0	$ 445.00	$ -
639-1-122	ELECTRICAL POWER SERVICE, F&I, UNDERGROUND, METER FURNISHED BY POWER COMPANY	AS	38	$ 2,348.24	$ 89,233.12
639-2-1	ELECTRICAL SERVICE WIRE, F&I	LF	14,069	$ 6.92	$ 97,357.48
639-3-11	ELECTRICAL SERVICE DISCONNECT, F&I, POLE MOUNT	EA	38	$ 1,004.73	$ 38,179.74
641-2-12	PRESTRESSED CONCRETE POLE, F&I, TYPE P-11 SERVICE POLE	EA	33	$ 1,391.87	$ 45,931.71
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT	EA	31	$ 4,751.62	$ 147,300.22
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT	EA	31	$ 833.70	$ 25,844.70
676-2-143	ITS CABINET, FURNISH & INSTALL, BASE MOUNT, 334, 24" W X 66" H X 30" D	EA	6	$ 7,811.93	$ 46,871.58
676-2-144	ITS CABINET, F&I, GRND W/ SUNSHIELD, OTHER	EA	1	$ 10,961.28	$ 10,961.28
676-3-10	SMALL EQUIPMENT CABINET, F&I,	EA	115	$ 1,202.50	$ 138,287.50
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD	EA	84	$ 4,668.02	$ 392,113.68
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	EA	34	$ 5,424.91	$ 184,446.94
684-6-11	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET ACCESS POINT	EA	0	$ 4,500.00	$ -
684-6-12	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET SUBSCRIBER UNIT	EA	0	$ 4,535.00	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF	EA	6	$ 99,013.20	$ 594,079.20
700-10-124	DMS SUPPORT STRUCTURE, CANTILEVER, 40-50 FT	EA	6	$ 61,765.00	$ 370,590.00
	AC FOR MHUB	EA	1	$ 2,500.00	$ 2,500.00
	RPM	EA	28	$ 300.00	$ 8,400.00
				UNIT COST SUBTOTAL	**$ 4,712,007.08**
			MOBILIZATION	10%	$ 471,200.71
			MANITENANCE OF TRAFFIC	10%	$ 471,200.71
			COMPLETION OF DESIGN	10%	$ 471,200.71
			DESIGN BUILD RISK ADDITIVES	0%	$ -
			CONTINGENCY	20%	$ 942,401.42
				CONSTRUCTION TOTAL	**$ 7,068,010.62**

MAINTENANCE

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	TSM&O DEVICES MAINTENANCE	PER YEAR	EA	1	$ 201,641	$ 201,641
	TMC EQUIPMENT	PER YEAR	EA	0	$ 83,245	$ -
	SIGNAL MAINTENANCE	PER YEAR	EA	133	$ 4,391	$ 584,003
	SIGNAL RETIMING (EVERY 3 YEARS)	PER YEAR	EA	44.33333333	$ 3,000	$ 133,000
					TOTAL COST	$ 918,643.75

OPERATIONS

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	DATA MANAGEMENT	PER CENTER MILE * YEARS	EA	90.59526515	$ 200	$ 18,119
	SUNGUIDE MAINTENANCE	1 PER TMC	EA	0	$ 50,000	$ -
UTILITY	STAFF	1 PER TMC	EA	0	$ -	$ -
	CCTV	PER YEAR	EA	150	$ 200	$ 30,000
	BLUETOOTH	PER YEAR	EA	46	$ 120	$ 5,520
	WIRELESS EQUIPMENT	PER YEAR	EA	0	$ 225	$ -
	ADMS	PER YEAR	EA	11	$ 500	$ 5,500
					TOTAL COST	$ 59,139

TOTAL O&M COST PER YEAR	$ 977,782.80

LIFE CYCLE REPLACEMENT (TO BE DONE AT END OF YEAR 10)

PAY ITEM	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT		EA	46	$ 4,752	$ 218,575
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT		EA	46	$ 834	$ 38,350
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD		EA	150	$ 4,668	$ 700,203
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I		EA	133	$ 5,353	$ 711,986
684-6-11	WIRELESS COMMUNICATION DEVICE, F&I, ETHERNET ACCESS POINT		EA	0	$ 4,056	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF		EA	11	$ 99,013	$ 1,089,143
					TOTAL COST	$ 2,758,257
				MOBILIZATION	10%	$ 275,826
				MANITENANCE OF TRAFFIC	10%	$ 275,826
				COMPLETION OF DESIGN	10%	$ 275,826
				DESIGN BUILD RISK ADDITIVES	0%	$ -
				CONTINGENCY	20%	$ 551,651
					GRAND TOTAL	$ 4,137,385

OSCEOLA COUNTY TSM&O IMPROVEMENTS DEPLOYMENT 3 ENGINEER'S ESTIMATE
27 Signals

PAY ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
460-98-2	PIPE HANGERS, STAINLESS STEEL	EA	0	$ 199.43	$ -
630-2-11	CONDUIT, F&I, OPEN TRENCH	LF	147,373	$ 7.33	$ 1,080,245.56
630-2-12	CONDUIT, F&I, DIRECTIONAL BORE	LF	36,456	$ 17.52	$ 638,705.62
630-2-14	CONDUIT, F&I, ABOVE GROUND	LF	950	$ 24.83	$ 23,588.50
630-2-15	CONDUIT, F&I, BRIDGE MOUNT	LF	0	$ 39.50	$ -
633-1-121	FIBER OPTIC CABLE, F&I, UNDERGROUND,2-12 FIBERS	LF	2,525	$ 1.95	$ 4,923.75
633-1-122	FO CABLE,F&I,UNDERGROUND,13-48 FIBERS	LF	4,200	$ 2.10	$ 8,820.00
633-1-123	FO CABLE,F&I,UNDERGROUND,49-96 FIBERS	LF	188,904	$ 2.26	$ 426,923.04
633-2-31	FO CONN.,INSTALL,SPLICE	EA	935	$ 38.80	$ 36,278.00
633-2-32	FIBER OPTIC CONNECTION, INSTALL, TERMINATION	EA	72	$ 66.63	$ 4,797.36
633-3-11	FO CONN. HARDWARE,F&I,SPLICE ENCLOSURE	EA	15	$ 869.12	$ 13,036.80
633-3-12	FO CONN. HARDWARE,F&I,SPLICE TRAY	EA	78	$ 52.73	$ 4,112.94
633-3-13	FO CONN. HARDWARE,F&I,PRETERMINATED CONNECTOR ASSEMBLY	EA	480	$ 42.13	$ 20,222.40
633-3-16	FO CONN. HARDWARE,F&I,FIELD TERMINATED PATCH PANEL	EA	16	$ 1,746.33	$ 27,941.28
633-3-17	FO CONN. HARDWARE,F&I,CONNECTOR PANEL	EA	54	$ 566.00	$ 30,564.00
633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, F&I	LF	2,850	$ 5.23	$ 14,905.50
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24" COVER SIZE	EA	41	$ 723.78	$ 29,674.98
635-2-12	PULL & SPLICE BOX, F&I, 24" X 36" COVER SIZE	EA	115	$ 1,459.95	$ 167,894.25
635-2-13	PULL & SPLICE BOX, F&I, 36" ROUND COVER	EA	14	$ 2,927.41	$ 40,983.74
635-3-11	JUNCTION BOX, F&I, AERIAL	EA	5	$ 445.00	$ 2,225.00
639-1-122	ELECTRICAL POWER SERVICE, F&I, UNDERGROUND, METER FURNISHED BY POWER COMPANY	AS	13	$ 2,348.24	$ 30,527.12
639-2-1	ELECTRICAL SERVICE WIRE, F&I	LF	12,523	$ 6.92	$ 86,659.16
639-3-11	ELECTRICAL SERVICE DISCONNECT, F&I, POLE MOUNT	EA	13	$ 1,004.73	$ 13,061.49
641-2-12	PRESTRESSED CONCRETE POLE, F&I, TYPE P-11 SERVICE POLE	EA	12	$ 1,391.87	$ 16,702.44
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT	EA	12	$ 4,751.62	$ 57,019.44
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT	EA	12	$ 833.70	$ 10,004.40
676-2-143	ITS CABINET, FURNISH & INSTALL, BASE MOUNT, 334, 24" W X 66" H X 30" D	EA	3	$ 7,811.93	$ 23,435.79
676-2-144	ITS CABINET, F&I, GRND W/ SUNSHIELD, OTHER	EA	1	$ 10,961.28	$ 10,961.28
676-3-10	SMALL EQUIPMENT CABINET, F&I,	EA	38	$ 1,202.50	$ 45,695.00
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD	EA	26	$ 4,668.02	$ 121,368.52
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	EA	15	$ 5,424.91	$ 81,373.65
684-6-11	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET ACCESS POINT	EA	0	$ 4,500.00	$ -
684-6-12	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET SUBSCRIBER UNIT	EA	0	$ 4,535.00	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF	EA	3	$ 99,013.20	$ 297,039.60
700-10-124	DMS SUPPORT STRUCTURE, CANTILEVER, 40-50 FT	EA	3	$ 61,765.00	$ 185,295.00
	AC FOR MHUB	EA	1	$ 2,500.00	$ 2,500.00
	RPM	EA	121	$ 300.00	$ 36,300.00
				UNIT COST SUBTOTAL	**$ 3,593,785.60**
				MOBILIZATION 10%	$ 359,378.56
				MANITENANCE OF TRAFFIC 10%	$ 359,378.56
				COMPLETION OF DESIGN 10%	$ 359,378.56
				DESIGN BUILD RISK ADDITIVES 0%	$ -
				CONTINGENCY 20%	$ 718,757.12
				CONSTRUCTION TOTAL	**$ 5,390,678.40**

MAINTENANCE

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	TSM&O DEVICES MAINTENANCE	PER YEAR	EA	1	$ 155,212	$ 155,212
	TMC EQUIPMENT	PER YEAR	EA	0	$ 83,245	$ -
	SIGNAL MAINTENANCE	PER YEAR	EA	27	$ 4,391	$ 118,557
	SIGNAL RETIMING (EVERY 3 YEARS)	PER YEAR	EA	9	$ 3,000	$ 27,000
					TOTAL COST	$ 300,769.05

OPERATIONS

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	DATA MANAGEMENT	PER CENTER MILE * YEARS	EA	34.04431818	$ 200	$ 6,809
	SUNGUIDE MAINTENANCE	1 PER TMC	EA	0	$ 50,000	$ -
UTILITY	STAFF	1 PER TMC	EA	0	$ -	$ -
	CCTV	PER YEAR	EA	33	$ 200	$ 6,600
	BLUETOOTH	PER YEAR	EA	14	$ 120	$ 1,680
	WIRELESS EQUIPMENT	PER YEAR	EA	0	$ 225	$ -
	ADMS	PER YEAR	EA	3	$ 500	$ 1,500
					TOTAL COST	$ 16,589

TOTAL O&M COST	$ 317,357.91

LIFE CYCLE REPLACEMENT (TO BE DONE AT END OF YEAR 10)

PAY ITEM	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT		EA	14	$ 4,752	$ 66,523
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT		EA	14	$ 834	$ 11,672
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD		EA	33	$ 4,668	$ 154,045
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I		EA	27	$ 5,353	$ 144,539
684-6-11	WIRELESS COMMUNICATION DEVICE, F&I, ETHERNET ACCESS POINT		EA	0	$ 4,056	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF		EA	3	$ 99,013	$ 297,039
					TOTAL COST	$ 673,817
					MOBILIZATION 10%	$ 67,382
					MANITENANCE OF TRAFFIC 10%	$ 67,382
					COMPLETION OF DESIGN 10%	$ 67,382
					DESIGN BUILD RISK ADDITIVES 0%	$ -
					CONTINGENCY 20%	$ 134,763
					GRAND TOTAL	$ 1,010,725

OSCEOLA COUNTY TSM&O IMPROVEMENTS DEPLOYMENT 4 ENGINEER'S ESTIMATE
15 Signals

PAY ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
460-98-2	PIPE HANGERS, STAINLESS STEEL	EA	0	$ 199.43	$ -
630-2-11	CONDUIT, F&I, OPEN TRENCH	LF	850	$ 7.33	$ 6,230.50
630-2-12	CONDUIT, F&I, DIRECTIONAL BORE	LF	0	$ 17.52	$ -
630-2-14	CONDUIT, F&I, ABOVE GROUND	LF	200	$ 24.83	$ 4,966.00
630-2-15	CONDUIT, F&I, BRIDGE MOUNT	LF	0	$ 39.50	$ -
633-1-122	FO CABLE,F&I,UNDERGROUND,13-48 FIBERS	LF	0	$ 2.10	$ -
633-1-123	FO CABLE,F&I,UNDERGROUND,49-96 FIBERS	LF	0	$ 2.26	$ -
633-2-31	FO CONN.,INSTALL,SPLICE	EA	430	$ 38.80	$ 16,684.00
633-2-32	FIBER OPTIC CONNECTION, INSTALL, TERMINATION	EA	0	$ 66.63	$ -
633-3-11	FO CONN. HARDWARE,F&I,SPLICE ENCLOSURE	EA	0	$ 869.12	$ -
633-3-12	FO CONN. HARDWARE,F&I,SPLICE TRAY	EA	52	$ 52.73	$ 2,741.96
633-3-13	FO CONN. HARDWARE,F&I,PRETERMINATED CONNECTOR ASSEMBLY	EA	288	$ 42.13	$ 12,133.44
633-3-16	FO CONN. HARDWARE,F&I,FIELD TERMINATED PATCH PANEL	EA	4	$ 1,746.33	$ 6,985.32
633-3-17	FO CONN. HARDWARE,F&I,CONNECTOR PANEL	EA	40	$ 566.00	$ 22,640.00
633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, F&I	LF	1,125	$ 5.23	$ 5,883.75
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24" COVER SIZE	EA	21	$ 723.78	$ 15,199.38
635-2-12	PULL & SPLICE BOX, F&I, 24" X 36" COVER SIZE	EA	0	$ 1,459.95	$ -
635-2-13	PULL & SPLICE BOX, F&I, 36" ROUND COVER	EA	7	$ 2,927.41	$ 20,491.87
635-3-11	JUNCTION BOX, F&I, AERIAL	EA	11	$ 445.00	$ 4,895.00
639-1-122	ELECTRICAL POWER SERVICE, F&I, UNDERGROUND, METER FURNISHED BY POWER COMPANY	AS	10	$ 2,348.24	$ 23,482.40
639-2-1	ELECTRICAL SERVICE WIRE, F&I	LF	5,907	$ 6.92	$ 40,876.44
639-3-11	ELECTRICAL SERVICE DISCONNECT, F&I, POLE MOUNT	EA	10	$ 1,004.73	$ 10,047.30
641-2-12	PRESTRESSED CONCRETE POLE, F&I, TYPE P-11 SERVICE POLE	EA	10	$ 1,391.87	$ 13,918.70
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT	EA	8	$ 4,751.62	$ 38,012.96
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT	EA	8	$ 833.70	$ 6,669.60
676-2-143	ITS CABINET, FURNISH & INSTALL, BASE MOUNT, 334, 24" W X 66" H X 30" D	EA	0	$ 7,811.93	$ -
676-2-144	ITS CABINET, F&I, GRND W/ SUNSHIELD, OTHER	EA	2	$ 10,961.28	$ 21,922.56
676-3-10	SMALL EQUIPMENT CABINET, F&I,	EA	15	$ 1,202.50	$ 18,037.50
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD	EA	7	$ 4,668.02	$ 32,676.14
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	EA	2	$ 5,424.91	$ 10,849.82
684-6-11	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET ACCESS POINT	EA	0	$ 4,500.00	$ -
684-6-12	WIRELESS COMMUNICATION DEVICE, FURNISH & INSTALL ETHERNET SUBSCRIBER UNIT	EA	0	$ 4,535.00	$ -
700-8-136	FRONT ACCESS DYNAMIC MESSAGE SIGN, FURNISH & INSTALL- W/UPS, FULL COLOR, 101-200 SF	EA	0	$ 99,013.20	$ -
700-10-124	DMS SUPPORT STRUCTURE, CANTILEVER, 40-50 FT	EA	0	$ 61,765.00	$ -
	AC FOR MHUB	EA	2	$ 2,500.00	$ 5,000.00
	RPM	EA	2	$ 300.00	$ 600.00
				UNIT COST SUBTOTAL	**$ 340,944.64**
			MOBILIZATION	10%	$ 34,094.46
			MANITENANCE OF TRAFFIC	10%	$ 34,094.46
			COMPLETION OF DESIGN	10%	$ 34,094.46
			DESIGN BUILD RISK ADDITIVES	0%	$ -
			CONTINGENCY	20%	$ 68,188.93
				CONSTRUCTION TOTAL	**$ 511,416.96**

MAINTENANCE

	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	TSM&O DEVICES MAINTENANCE	PER YEAR	EA	1	$ 8,974	$ 8,974
	TMC EQUIPMENT	PER YEAR	EA	0	$ 83,245	$ -
	SIGNAL MAINTENANCE	PER YEAR	EA	15	$ 4,391	$ 65,865
	SIGNAL RETIMING (EVERY 3 YEARS)	PER YEAR	EA	5	$ 3,000	$ 15,000
					TOTAL COST	$ 89,838.50

OPERATIONS

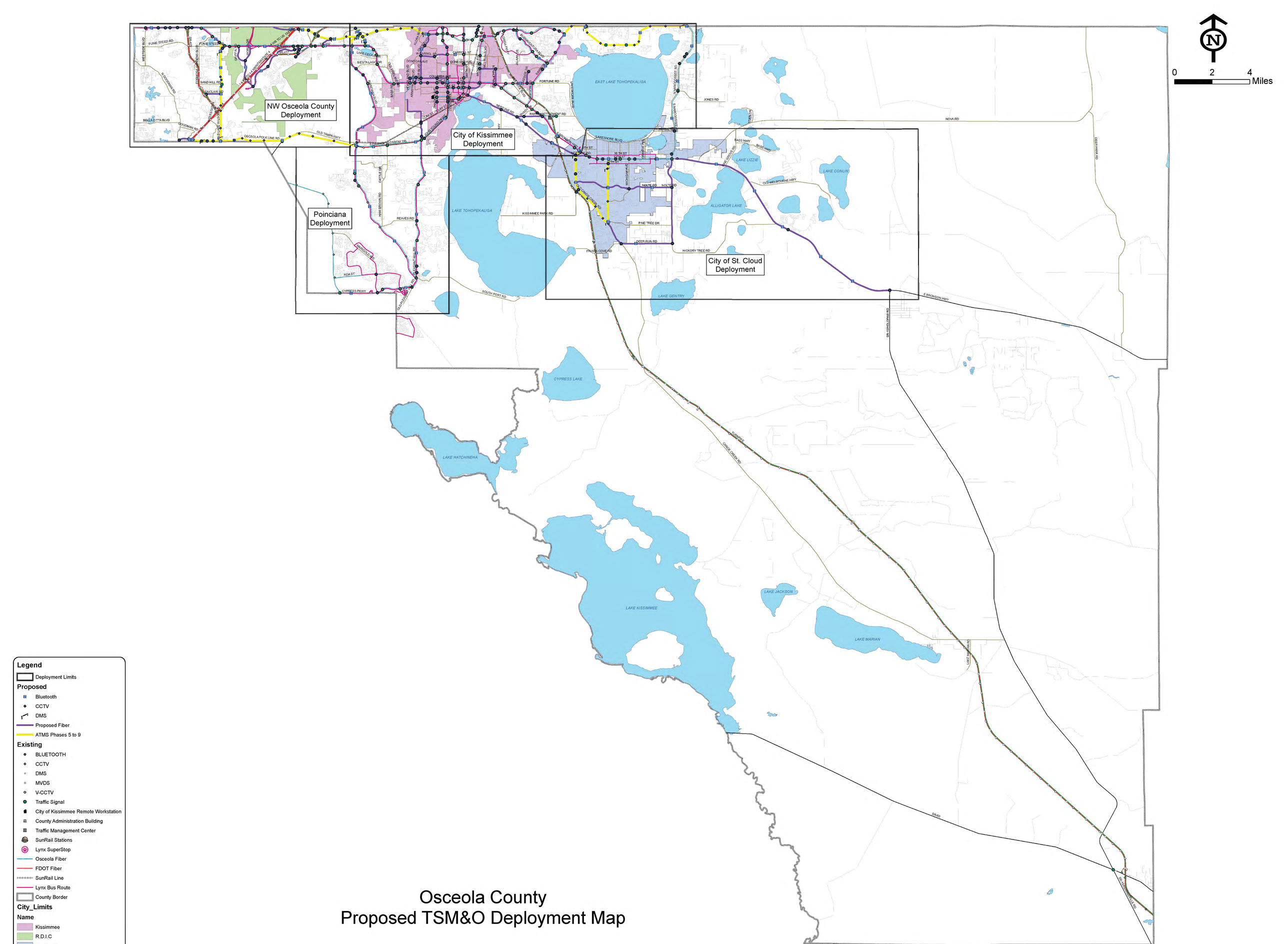
	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
	DATA MANAGEMENT	PER CENTER MILE * YEARS	EA	16.46401515	$ 200	$ 3,293
	SUNGUIDE MAINTENANCE	1 PER TMC	EA	0	$ 50,000	$ -
UTILITY	STAFF	1 PER TMC	EA	0	$ -	$ -
	CCTV	PER YEAR	EA	20	$ 200	$ 4,000
	BLUETOOTH	PER YEAR	EA	8	$ 120	$ 960
	WIRELESS EQUIPMENT	PER YEAR	EA	0	$ 225	$ -
					TOTAL COST	$ 8,253

TOTAL O&M COST PER YEAR	$ 98,091.30

LIFE CYCLE REPLACEMENT (TO BE DONE AT END OF YEAR 10)

PAY ITEM	DESCRIPTION	NOTES	UNIT	QUANTITY	UNIT COST	COST
660-6-121	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, CABINET EQUIPMENT		EA	8	$ 4,752	$ 38,013
660-6-122	VEHICLE DETECTION SYSTEM-AVI, BLUETOOTH, F&I, ABOVE GROUND EQUIPMENT		EA	8	$ 834	$ 6,670
682-1-113	CCTV CAMERA, F&I, DOME PTZ PRESSURIZED, IP HD		EA	20	$ 4,668	$ 93,360
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I		EA	15	$ 5,353	$ 80,299
684-6-11	WIRELESS COMMUNICATION DEVICE, F&I, ETHERNET ACCESS POINT		EA	0	$ 4,056	$ -
					TOTAL COST	$ 218,342
				MOBILIZATION	10%	$ 21,834
				MANITENANCE OF TRAFFIC	10%	$ 21,834
				COMPLETION OF DESIGN	10%	$ 21,834
				DESIGN BUILD RISK ADDITIVES	0%	$ -
				CONTINGENCY	20%	$ 43,668
					GRAND TOTAL	$ 327,513

Appendix H – Deployment Maps



Osceola County
Proposed TSM&O Deployment Map

NW Osceola County
Proposed TSM&O Deployment Map

City of Kissimmee
Proposed TSM&O Deployment Map

Poinciana
Proposed TSM&O Deployment Map

0 0.25 0.5 Miles

MERCANTILE LN
ENTERPRISE DR
CATTLE DR
HAM BROWN RD
HAM BROWN RD
HAM BROWN RD
POINCIANA PKWY
REAVES RD
REAVES RD
POINCIANA BLVD
MARIGOLD AVE
KOA ST
DOVERPLUM AVE
CYPRESS PKWY
PLEASANT HILL RD
OLD PLEASANT HILL RD
SOUTH PORT RD
WALNUT AVE
LAKE RUSSELL

Legend

- Poinciana Deployment Limits

Proposed

- Bluetooth
- CCTV
- Proposed Fiber

Existing

- BLUETOOTH
- CCTV
- DMS
- MVDS
- V-CCTV
- Traffic Signal
- Osceola Fiber
- FDOT Fiber
- County Border
- Lynx SuperStop
- Lynx Bus Route

City of St Cloud
Proposed TSM&O Deployment Map

0 0.5 1 Miles

EAST LAKE TOHOPEKALIGA
LAKE RUNNYMEDE
LAKE LIZZIE
COON LAKE
TROUT LAKE
LIVE OAK LAKE
BAY LAKE
LAKE CONLIN
ALLIGATOR LAKE
BUCK LAKE
CAT LAKE
BRICK LAKE
LAKE GENTRY
LAKE TOHOPEKALIGA

RUMMELL RD
S NARCOOSSEE RD
LAKESHORE BLVD
E BRONSON HWY
NEPTUNE RD
BROWN CHAPEL RD
5TH ST
COLUMBIA AVE
VERMONT AVE
NEW YORK AVE
MICHIGAN AVE
ORANGE AVE
10 TH ST
13TH ST
17TH ST
BUDINGER AVE
OLD HICKORY TREE RD
OAK CANOE CREEK RD
NOLTE RD
KISSIMMEE PARK RD
CANOE CREEK RD
OLD CANOE CREEK RD
PINE TREE DR
DEER RUN RD
HICKORY TREE RD
PRUNES COVE RD
TURNPIKE
NOVA RD
BASS HWY
WOODS ST
PINE GROVE RD
OLD MELBOURNE HWY
SR 15/KISSIMMEE

Legend

- St. Cloud Deployment Limits

Proposed

- Bluetooth
- CCTV
- DMS
- Proposed Fiber
- ATMS Phases 5 to 9

Existing

- BLUETOOTH
- CCTV
- DMS
- MVDS
- V-CCTV
- Traffic Signal
- Osceola Fiber
- FDOT Fiber
- Lynx Bus Route
- Lynx SuperStop

Name

- St. Cloud

Appendix I – Standard Operating Procedure (SOP)

Osceola County, Florida

Intelligent Transportation System Operations

Standard Operating Procedures

March 2020

Version 1.0

Standard Operating Procedures
Osceola County, Florida

DOCUMENT CONTROL PANEL		
File Name:	Osceola County_SOP_Draft.docx	
File Location:	Metric Technology Group - Documents\Projects\4.2352_Osceola Continuing Services\TWO 4_IT Support Tasks (TA #74)\3. Project Documents\Standard Operating Procedures	
Deliverable:	N/A	
Version Number:	1.0	
	Name	Date
Created by:	Scott Agans, Metric Engineering Inc.	January 22, 2020
Reviewed by:	Demetrius Lewis, Metric Engineering Inc.	February 28, 2020
	Kevin Boston, Metric Engineering Inc.	March 2, 2020
Modified by:	Scott Agans, Metric Engineering Inc.	February 26, 2020
	Scott Agans, Metric Engineering Inc.	March 2, 2020
Completed by:		

Table of Contents

Table of Figures

Acronyms List

CCTV ..... Closed Circuit Television Camera
DMS ..... Dynamic Message Sign
EOC ..... Emergency Operations Center
FDLE ..... Florida Department of Law Enforcement
FDOT ..... Florida Department of Transportation
FHP ..... Florida Highway Patrol
FTE ..... Florida's Turnpike Enterprise
GPS ..... Global Positioning Sensor
GUI ..... Graphical User Interface
ICS ..... Incident Command System
IT ..... Information Technology
ITS ..... Intelligent Transportation System
LEO ..... Law Enforcement Officer
MIMS ..... Maintenance and Inventory Management System
MFES ..... Managed Field Ethernet Switch
MMU ..... Malfunctioning Management Unit
MUTCD ..... Manual of Uniformed Traffic Control Devices
NIMS ..... National Incident Management System
NWS ..... National Weather Service
PIO ..... Public Information Office
PSA ..... Public Safety Announcement
RTMC ..... Regional Traffic Management Center
SOP ..... Standard Operating Procedures
TMC ..... Transportation Management Center
TTR ..... Travel Time Reader

1. Introduction

This document will serve as the Standard Operating Procedures (SOP) for the Osceola County Intelligent Transportation System (ITS) Traffic Management Center (TMC) Operation. This SOP provides an overview of the procedures and interactions required to ensure a successful management center operation for Osceola County. This document is to be considered a "living document" and shall be updated whenever new systems, policies, procedures, or operational requirements are implemented.

These guidelines are intended to be supplemented by more detailed instructions provided in Centracs, Iteris, Jupiter, Impath training and supporting documents and other reference materials such as the Manual on Uniform Traffic Control Devices (MUTCD), Florida Department of Transportation (FDOT) Traffic Engineering Manual, FDOT Design Standards and any other applicable reference material. These guidelines should be referenced regularly by operations staff.

NOTE: This document will often refer to concepts by established acronyms or short names. For a complete list of acronyms and short names, please reference the Acronyms List. The terms "Osceola County" and "County" are used interchangeably throughout this document.

1.1. Osceola County Traffic Management Center Requirements

The TMC is the hub or nerve center of most freeway management systems and is utilized to collect traveler data about the Osceola County roadways, which is then collected and processed, fused with other operational and control data, synthesized to produce "information." This specific traveler data is then distributed to stakeholders such as the media, other agencies, and the traveling public.[1] The Osceola TMC was constructed to utilize intelligent transportation technologies and other operational strategies to identify, reduce, and ultimately eliminate extensive roadway congestion issues and traffic problems in the shortest amount of time. This valuable TMC facility is currently housed within the Osceola County Emergency Operation Center (EOC), which is located at 2586 Partin Settlement Road, Kissimmee, Florida 34744.

The remainder of this document will identify and demonstrate TMC operational policies and procedures previously implemented by the Osceola County of Transportation and Transit Department. These specific operational policies were developed for the safety of the operations, staff, other building stakeholders, and the traveling public of Osceola County.

2. TMC General Review

2.1. TMC Mission Statement

The mission of the Osceola County TMC is to provide Osceola County with accurate traveler information through different avenues using Intelligent Transportation System devices.

[1] https://ops.fhwa.dot.gov/freewaymgmt/trans_mgmnt.htm

2.2. TMC Responsibilities and Roadways

The Osceola County TMC provides monitoring and reporting for selected roadways within Osceola County, including, but not limited to, county roads, toll roads, state roads, and U.S. highways. This operations facility operates in conjunction with numerous state and city law enforcement communications centers. At the development of this document, this facility is not managed on a 24 hour/7 day basis, but the TMC Operations Staff operates during specific hours of the day and on days of the year when mandated by the TMC Manager which is normally during unexpected weather events (i.e., tropical storms, hurricanes, or other natural disasters).

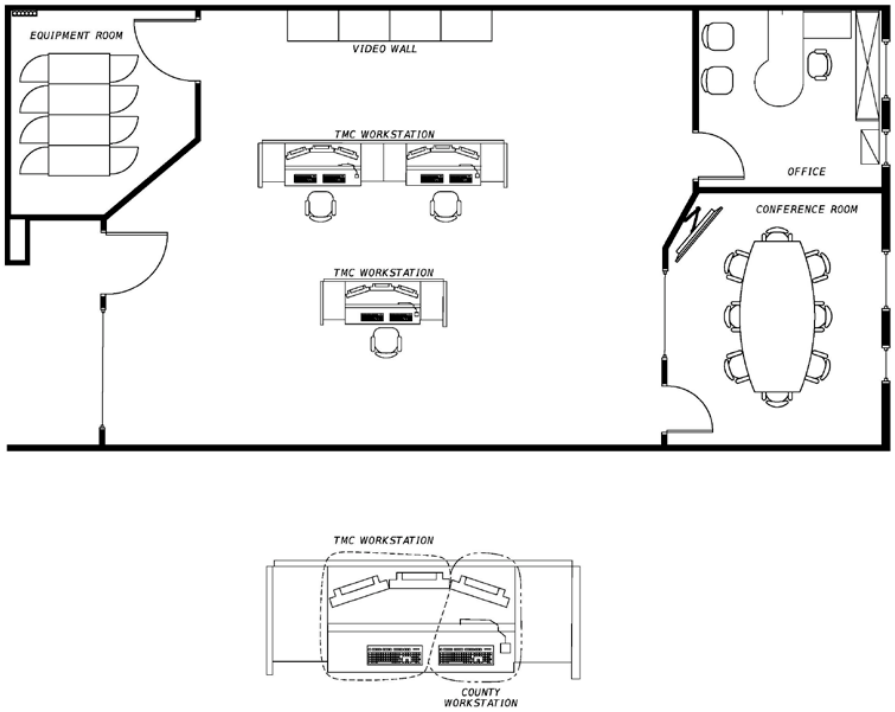
The primary function of the TMC and staff is to monitor Osceola County roadways utilizing their existing ITS devices, systems, and software. The ITS devices are deployed to detect and respond to both planned and unplanned events that arise on Osceola County roadways, but most importantly, to mitigate their identified effects. Because roadways in the County are the primary source of conveyance for goods and services, it is imperative to the economic vitality and general wellbeing of the region to ensure that traffic flows safely and efficiently. Currently, the Osceola County TMC provides real-time monitoring and reporting of traffic information for:

- Boggy Creek Road
- Cypress Parkway
- Florida's Turnpike, through FDOT FTE TMC
- Interstate 4 (SR-400), through FDOT District Five Regional Traffic Management Center (RTMC)
- John Young Parkway
- Michigan Ave
- Narcoossee Road
- Osceola Parkway (Partial Toll)
- Pleasant Hill Road
- Poinciana Blvd
- SR-417 (Toll), through FDOT District Five RTMC
- SR-429 (Toll), through FDOT District Five RTMC
- US 192
- US 441

2.3. TMC Layout

The TMC is collocated with the Osceola County Sherriff's Department Emergency Operations Center. The Osceola County TMC currently has two (2) rows of operator workstations, which are located within the front of the room that faces a video wall. The first row contains two (2) Operator workstations, which are used for daily operations. The second row is an additional workstation that can be utilized as a back-up workstation for the TMC Operations or traffic signal maintenance activities when needed.

Figure 1: TMC Layout



2.4. TMC Staff

2.4.1. TMC Manager/Supervisor

The TMC Manager is responsible for overseeing the daily operations and staff of the Osceola County TMC. The TMC Manager(s) responsibilities consist of all work necessary to provide for the general management, oversight, quality assurance/quality control, and administration of all traffic signal and ITS systems. The TMC Manager is also supported by traffic signal vendor's and engineering support personnel. The TMC Manager is also responsible for the development of TMC operational protocols, standard operating procedures, and ensuring compliance with the FDOT and Osceola County guidelines and practices. In addition, the TMC Manager oversees operations, directing TMC Operator(s) and ensuring all incidents are handled according to County and FDOT District Five policies. Additionally, the TMC Manager assists Operator(s) during busy times, validates all paperwork checks all data entry, and verifies ITS devices and systems are working properly. At present, the TMC manager also functions as the TMC Supervisor. As the TMC is expanded, the role of the TMC Supervisor will be added as a separate position.

2.4.2. TMC Operator

The TMC Operator is responsible for operating the various TMC system workstations and monitoring traffic conditions. The TMC Operator is also responsible for the principal monitoring of the roadways, including detecting, confirming, updating and responding to scheduled and

unscheduled traffic events, congestion and travel time imbalances in the geographical coverage area with monitoring and/or surveillance capabilities. The Operator(s) also provides quality assurance on the day-to-day handling of all events in the TMC, all of which are reported to the TMC Manager.

2.4.2.1 *Operator Abilities and Responsibilities*

Operators shall be experienced in the field of a freeway and arterial traffic operations; the expectations are as follows:

- Have an understanding of local intersection controller operations, traffic signal phasing, video detection, arterial signal timing pattern development, implementation, and fine-tuning.
- Have an understanding of roadway technological operations.
- Prepare detailed technical reports with comprehensive non-technical summaries.
- Present oral presentations on the subject matter of this system in comprehensive detail.
- Communicate clearly with co-workers on technical issues related to the program and ITS device operation.
- Monitor the status of traffic signal and system operations, corridor congestion, and traffic flow, etc. using technology tools, including advanced traffic management systems, travel time monitoring, and Closed-Circuit Television (CCTV) cameras.
- Support the TMC Manager in identifying traffic congestion along the freeway and arterial network, based on pre-defined performance measures, then develop and implement traffic mitigation measures in a timely manner.
- Transmit event information to appropriate personnel and suggest appropriate signal timing adjustment as directed by the TMC Manager.
- Log all activities and ensure that the information is complete and concise.
- Detect, confirm, and track equipment faults affecting arterial operations.
- Coordinate with the TMC Manager and other operations staff with regards to external agency communications and general control room coordination and other staff from signal maintaining agencies to obtain a full understanding of all arterial activity status.

3. System Operations

3.1. Econolite Centracs Advanced Transportation Management System

The Econolite Centracs is the primary operating software used for monitoring of the traffic signals throughout Osceola County. Econolite uses client/server architecture and distributed processing to achieve a flexible and scalable system. System data processing is distributed across multiple servers and applications such that system functions are accomplished

most effectively considering cost, communications implications, security, redundancy (back-up), and network interface capabilities. National and international protocol standards are used to make sure that the system can adapt to changes in technology and increase functionality over time with minimal impact on individual system components. Centracs uses intelligent interface protocols for the distribution of real-time data between workstations, which increases system performance and multi-user responsiveness[2].

3.2. General Use

Econolite Centracs allows the user (Operator) to customize their desktop with a variety of windows. At a minimum, the TMC Operator shall have the entity tree and an overall map of the system open in their Centracs viewing area.

3.2.1. Entity Tree

The entity tree is a window that lists all of the signals that are connected to the network and Centracs in a tree-type format. This tree will give the user a snapshot of the status of the signal in a quick reference format. The Operator can open up each individual intersection by double clicking on the location (this can be accomplished by double-clicking on the location on the map as well); a screen will then appear that will give more options. The Operator shall notify the Osceola Signal Timing Engineer, TMC Manager, and the Senior Signal Technician before any modifications are made to the intersection.

3.2.2. Map

The Centracs Map is a window that illustrates all of the traffic signals that are connected to the network and Centracs in their physical location. Similar to the Entity Tree, the map will allow the user to view a snapshot of the status of the signal in a quick reference format. The Operator can open up each individual intersection by double-clicking on the location; a screen will then appear that will give more options. The Operator shall notify the Osceola Signal Timing Engineer, TMC Manager, and the Senior Signal Technician before any modifications are made to the intersection.

3.2.3. System Generated Alerts

The Econolite Centracs software is able to configure alerts and specific recipients who will receive the alerts. Alerts can range from loss of communication to the intersection going to flash or if the door of the signal cabinet is opened or closed. These alerts are set up, so the TMC Operator, TMC Manager, Senior Signal Technician, and on-call Osceola County Technician can receive them. When an alert is triggered by the signal controller , if it is informational only, the Operator can acknowledge and then close the alert. If it is an alarm, the alert must be acknowledged and then closed.

[2] https://www.econolite.com/products/software/centracs/

3.3. Externally Generated Alerts

Currently, the Osceola County TMC has no means of receiving externally generated alerts by outside agencies. It is the responsibility of the TMC Operator to visit the websites below, and others deemed necessary to post applicable information to Dynamic Message Sign (DMS) signs as the situation warrants.

- Florida Highway Patrol (FHP) Alerts – These alerts can be accessed from the FHP Live Crash Conditions website. Only refer to alerts on roadways within Osceola County, the location descriptor, this means they can also be pulled if that roadway is only referenced as a cross street. FHP alerts have valuable information associated with them, such as trooper dispatch and arrival times, dispatcher comments, and incident location. Because FHP alerts operate off of Global Positioning System (GPS) coordinates, creating events directly from these alerts can result in incorrect direction or reference point (usually by one or two miles). In this respect, it is always recommended that the operator checks for accuracy with events created directly from FHP alerts.

  The FHP Alert website can be found at:
  https://www.flhsmv.gov/fhp/traffic/live_traffic_feed.html

- National Weather Service (NWS) Alerts – Alerts generated by the NWS and are created for the following types of weather:
  - Tornado Watch or Warning
  - Fog
  - Hurricane
  - Tropical Storm
  - When a weather alert is received, it is the responsibility of the Operator to verify conditions via camera. In areas where camera coverage is limited or non-existent, no response shall be taken, and this is because there is no way to verify when the weather conditions have subsided.
  - When responding to weather events concerning fog or smoke, and conditions are verifiable via camera, the Operator should take the following actions:
    - Document pertinent event details, such as specific locations.
    - Post message to applicable DMS
    - Monitor the weather for any changes
    - When alert clears, remove the message from DMS
  - Hurricane and Tropical Storm will typically involve direction from the TMC Manager.
  - Tornadoes and severe thunderstorms present another unique challenge when responding to weather events. In very rare circumstances, it may be necessary to alert motorists to dangerous conditions, which may pose a threat to motorist safety.

In these rare instances, an Operator may post an approved severe weather message with approval from the TMC Manager.

NWS Alert website can be found at https://www.weather.gov/

3.4. Roadside Cameras

3.4.1. Camera Operations

The Osceola County TMC operates over eighty-seven (87) CCTV cameras. CCTV operations are particularly useful in determining the details of traffic incidents, and to monitor scenes to identify and help mitigate the effects of incidents on roadway traffic.

Cameras that are directly available to the TMC have pan, tilt, and zoom features, as well as aperture and focus controls.

3.4.2. General Camera Policies

Osceola County TMC has implemented specific policies and procedures to ensure proper operation of the video camera system is maintained, including traveler privacy. These policies include:

- Do not direct the camera towards a light source, such as the sun or highway luminaries. This will damage the camera lens after prolonged or repeated occurrences.
- When using CCTV cameras and working with other Operators, do not override a camera without asking permission from the Operator who is currently using that camera.
- FDOT's District Five Regional Traffic Management Center (RTMC) and Florida's Turnpike Enterprise (FTE) TMCs are able to view all of the Osceola County cameras. Whenever a viewable incident of moderate to severe impact occurs, it is necessary to switch these feeds to the applicable agency for viewing.
- Do not zoom into an incident in such a manner that all details of the incident can be seen on the camera feed. News agencies are able to use camera feeds at all times. The camera feed needs to remain professional, if there is any question, zoom out.

3.4.3. CCTV Protection of Privacy Policy

The Protection of Privacy Policy predominantly addresses the usage of CCTV camera images but is not meant solely for this purpose. Usage of the CCTV cameras is the most visible and remains the most serious concern regarding the collection and dissemination of the general public's personal identifying information. The Protection of Privacy Policy creates a set of specific rules, that when implemented, provide a high standard of professionalism in managing personal information profiles. These rules are important to TMC Operations because they apply to the collection, use, and disclosure of any personal information that may be present in normal TMC operations with or without CCTV cameras.

The Privacy Policy is based on two principles:

- That an individual has a right to control the dissemination of his/her own personal information.
- The standards and controls in the collection, retention, use, and disclosure of personal information are mandatory.

The following is the Osceola County TMC Protection of Privacy Policy as it relates to CCTV camera usage:

- The CCTV system shall be operated by authorized Operators only. Operation of this equipment, when in service by any other person, is strictly prohibited.
- CCTV cameras and related equipment (surveillance equipment) in the TMC shall be used for traffic and incident management and information purposes only. This includes, but is not limited to, verification of incidents and traffic congestion, maintenance of traffic, disabled vehicles, environmental conditions, and emergency assistance. No one, including TMC Operators and their Supervisors, shall use the system for any other purpose.
- The authorized Operators shall obey all federal and state privacy laws. For example, surveillance of private property and the use of the system with the intent of invading the privacy of those individuals that could be observed through surveillance cameras is strictly prohibited, even as a demonstration of the system's technical capabilities.
- All requests from the media or general public for incident information shall be forwarded to the TMC Manager. The TMC Operator shall not reply to the public without approval from Osceola County.
- The recording of CCTV video is not permissible. No recording devices shall be allowed to be connected to computer equipment or raw video feeds. In the event that Osceola County or any agency, including FDOT, request a camera be recorded, please inform the TMC Manager and then use the Stream Player utility to record. The following are general guidelines to assist staff in the implementation of this policy:

Zooming in of CCTV Cameras

- CCTV cameras must not be zoomed in during routine traffic monitoring to the extent that license plates and persons are identifiable.
- When personal injuries or a hazardous materials spill are suspected in a traffic accident, zoom in to collect the information required by local and/or state law enforcement and Emergency Medical Services (EMS) Operators.
- Immediately after an incident is cleared, return the camera to a wide-angle view to observe traffic conditions. Return to Pre-Set image.

3.5. TMC Video Wall

The TMC video wall is a valuable piece of technology that helps operators detect, respond to, and monitor incidents. The video wall is comprised of eight (8) flat-screen television monitors. Camera feeds can be changed on the video wall by using Video Wall Control. To do this, an operator selects a camera they wish to view on the wall and drops it into the square they choose.

3.6. TMC Video Switching Control

The Video Switching Control allows the TMC to share live feeds with other locations remotely. This tool is most commonly used to share video feeds with the EOC. Feeds can be shared and verified with FDOT's District Five RTMC and FTE's TMC once the future network connections between stakeholders have been established.

3.7. Electronic Signage

3.7.1. Dynamic Message Signs (DMS)

Dynamic Message Signs are the most visible aspect of TMC capabilities. DMS's are highly visible and relay valuable information to motorists. The advantage of dynamic signs is they have a wide array of information dissemination specifically to the change the message as required with the ability to upload images and pictures if needed. Dynamic Message signs have a wide array of use. The purpose of the DMS is to enhance motorist safety; therefore, incident related messages have precedence of any other uses.

The current policy is not to post any non-standard MUTCD messages or disrespectful language which could cause a distraction to the traveling public. Only pre-approved FDOT messages will be allowed to be posted.

The Detailed DMS status window integrates many features of DMS control. The detailed status allows the Operator to send messages to and blank the sign. From this window, the Operator may also set the sign active or out of service. It also allows the operator to view the sign's queue, where it is possible to merge messages together.

3.7.2. Travel Time Readers (TTR)

The Osceola County TMC utilizes Bluetooth readers to calculate travel times. This information is dynamically transferred to the DMS signs via a plugin provided by the vendor. Travel time for corridors can be monitored on the software provided by the manufacturer.

4. Incident Management System

4.1. Standard Incidents

The vast majority of incidents encountered on a daily basis are quite standard. Those types of incidents have predefined procedures to ensure quick, efficient, and uniform response. These incidents can be divided into two categories, planned and unplanned.

Planned incidents are defined as events that are known in advance and may cause congestion or abnormal traffic patterns on area roadways. Examples of planned incidents include road work or maintenance activities or events such as concerts and sporting events. If DMS messages are displayed for a planned incident, the TMC Manager will develop a DMS Plan that will outline the TMC response.

Unplanned incidents are defined as non-recurring events on or near the roadway that cause a reduction in roadway capacity or an abnormal increase in demand. Unplanned incidents include disabled vehicles, crashes, spilled cargo, or emergencies.

4.2. Vehicle Accidents

Unplanned incidents would include vehicle accidents. A motor vehicle accident is defined as a traffic collision, also called a motor vehicle collision, among other terms, occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree, pole or building. Traffic collisions often result in injury, death, and property damage.[3] The Osceola County TMC Operators constantly monitors all of their responsible roadways for auto accidents and road hazards equipped with their roadside cameras.

The primary identification of the vehicular accidents within the County is to monitor all of the roadways with the ITS System. If an accident is identified via the CCTV system, the Operator will then document the date, time, and location of the incident and report the accident to the respective law enforcement agency. If a vehicle incident is not identified via the roadside cameras, the Operator will research if any other law enforcement agency has identified an incident within the County. To identify these roadway concerns within the Osceola County jurisdiction, the TMC Operators will first access the FHP's Live Traffic Crash and Road Conditions Website (https://www.flhsmv.gov/fhp/traffic/live_traffic_feed.html). After selecting the appropriate County from the website drop-down menu, the Operator will be able to identify all of the incident types, dispatch and arrival times, the location of the incident, and finally, any remark or additional comments associated with the incident. Another method to identify a vehicular incident is to obtain notification from Osceola County Sherriff's Office Communication Center. This center is a 24/7 dispatch center that receives emergency management calls for all incidents within Osceola County. The Operator will then contact the local law enforcement agencies (the City of Kissimmee and Saint Cloud) dispatch centers to obtain any other traffic accident information.

Upon notification of a crash or roadway vehicle accident, the TMC Operator will:

1) Attempt to locate the incident via closest roadside camera, if possible, to confirm an incident has occurred and verify the specific accident location.
2) Make the necessary notification to the local response agencies regarding the vehicle incident. These agencies include local law enforcement, Osceola County signal crew,

[3] http://www.academia.edu/download/49535092/91_Paper_31071650_IJCSIS_Camera_Ready_B_pp._711-722.pdf

and the ITS Maintenance contractor. For the serious, long term, or newsworthy incidents, TMC Operators, will send an e-mail to the Osceola County Transportation and Transit Staff to provide specific accident information, which is then forwarded to County Public Information Office (PIO) if necessary.

3) After all agencies are contacted, the Operator will then document incident details (Date, time, location, weather details, etc.) on the Osceola County TMC Incident spreadsheet. Note: Once FDOT SunGuide® software is deployed within Osceola County, the documentation of the incident will be entered into the SunGuide® Graphical User Interface (GUI).
4) During the incident, the TMC Operators will continue to monitor the incident until final conclusion. It is the responsibility of the Operator to send updates as necessary contingent by the changes to the incident. Upon conclusion of the vehicular accident, the Operators will close out the incident on the spreadsheet (or SunGuide®) and send out notifications to all local agencies as necessary.

4.3. Vehicle Congestion

Due to the abundance of vehicles and roadways within Osceola County, many of these roads and highways can experience traffic congestion at certain times of the day. Within transportation and traffic engineering, congestion relates to an excess of vehicles on a portion of a roadway at a particular time resulting in speeds that are slower than normal, which is also is identified as stopped or stop-and-go traffic.[4] The Osceola County Operations Staff is also monitoring the roadways for vehicular congestion. If a roadway is identified with a longer than average congestion time, the TMC Operator will locate and define the area of congestion. The Operator will confirm via visual verification from the roadside camera system and determine possible cause of the congestion. To be proactive, the TMC is in communication with other local dispatch centers to provide a constant status report of the roadway congestion. If the congestion is identified on a state or tolled roadway, the respective agency (FDOT District Five/FTE) will contact the Osceola County TMC to identify potential impacts or possible detour routes onto arterial roadways. The traveling public will also contact the Osceola County TMC via phone or email to report congestion. An alternative measure the Operators utilize is the use of Google Maps and Waze software. This free software utilizes traveler GPS within their smart device to report real-time travel and congestion times to the traveler. The Operator can use this for validation of incidents and approximate clearance times.

If a congestion incident is identified, the TMC Operator will:

1) Attempt to locate the incident via CCTV and confirm the nature of the incident (vehicle accident, fire, a disabled vehicle, signal malfunction, road hazard, etc.).
2) The Operator will make the proper notification upon determination of the incident.

[4] https://ops.fhwa.dot.gov/congestion_report/chapter2.htm

3) Notify the Osceola County Signal Timing Engineer in the event of a timing issue.
4) In the event of a short-term issue, the Signal Timing Engineer will obtain manual control of an intersection(s) via the manual override function within the problematic signal controllers to clear out traffic.
5) Continue to monitor the congestion incident until final conclusion. It is the responsibility of the Operator to send updates as necessary contingent by the changes to the incident.
6) Close out the incident on the spreadsheet (or SunGuide®) and send out notifications to all local agencies as necessary upon conclusion of the vehicular accident.

Operators do not have the authority to make dynamic signal/timing adjustments; these changes can only be made by a pre-approved Signal Timing Engineer or certified Signal Technician.

4.4. Amber and Silver Alerts

The Florida Department of Law Enforcement (FDLE) and other law enforcement agencies have the ability to alert the traveling public regarding missing persons, which are identified as either an Amber or Silver Alerts. Amber Alerts are emergency messages issued when a law enforcement agency determines that a child has been abducted and is in imminent danger,[5] whereas the Silver Alert is used to locate missing persons suffering from an irreversible deterioration of intellectual faculties[6]. Osceola County TMC Operations Staff does not have direct communication with state and local law enforcement agencies, so the TMC receives reports of Amber and Silver alerts via the FDOT District Five. Osceola County Information Technology (IT) Department has allocated an email address which the TMC uses to obtain these Amber and Silver Alerts.

Once an Amber or Silver Alert email is received, the Operations Staff will:

1) Review the received information to ensure the alert is still valid
2) Post both Amber and Silver alerts to the DMS exactly as issued by FDOT District Five.
3) The two existing DMSs on U.S. 192 will be activated for all alerts; local incidents may require activation of additional or all DMS.
4) The procedure for posting a DMS message via the Vanguard system in the Osceola County Operator Training Guide will be followed.
5) Document each alert on the Osceola County Incident Spreadsheet.
6) Monitor all alerts for updates.

[5] https://amberalert.ojp.gov/
[6] http://www.fdle.state.fl.us/AMBER-Plan/Silver-Alert

7) Once Alert is deactivated, replace messages on U.S. 192 DMSs with either travel time or static message. If no messages are available, blank both signs utilizing the Daktronics Vanguard Software.

4.5. Public Service Announcements (PSA)

Basic PSAs allow Osceola County in conjunction with FDOT District Five to disseminate announcements to the traveling public. These informational messages such as "Click it or Ticket" or "Slow Down in Work Zone" are popular messages when the sign is not reporting travel times or alerts. All PSA messages within Osceola County run on a set schedule based on the specific date and time. It is the responsibility of the TMC Operators to ensure these "Quick Messages" are being posted correctly, at the correct time, but also are replaced or removed at the scheduled time.

After the conclusion of a "Quick Message" timeframe for the specific PSA message, the TMC Operators will have to manually select the schedule back within the Daktronics Vanguard software. To achieve this, perform the following actions within the Vanguard software:

1) Start by clicking the play schedule link on the bottom of the Vanguard software then click the arrow on the pop-up box.
2) If the PSA message fails to display/run, the TMC Operator shall report the outage via the Management and Inventory Management System (MIMS) system.
3) Once the outage is reporting in MIMs, the software immediately notifies the TMC Manager via email.

4.6. Traffic Signal Operational Issues

The traffic signal system is essential to move individuals, goods, and services safely throughout the County. The definition of traffic signal operation is the active prioritization of objectives and collection of information to efficiently manage traffic signal infrastructure and control devices to maximize safety and throughput while minimizing delays. [7] In some instances, these complex traffic control systems tend to malfunction over time. Examples of these malfunctions include but are not limited to, a signal in flash, power outage to signal head and cabinets, or actuation of the Malfunction Management Unit (MMU).

The TMC Operators are accountable for the constant monitoring of all of the network-connected traffic signals within the County. All signal controllers are controlled via the Econolite Centracs Advanced Traffic Management Software (ATMS) suite. Econolite Centracs has the ability to alert the Operator of controller issues, an intersection in flash, an equipment failure, or the signal cabinet door status. The citizens of Osceola at times will contact the County TMC or

[7] https://ops.fhwa.dot.gov/publications/fhwahop09006/fhwahop09006.pdf

Transportation and Transit Department via phone call or email to notify them of an issue related to signal timing and phasing due to delays in travel times.

When the TMC Operator obtains a notification regarding a traffic signal operational issue, the Operator should:

1) Attempt to determine the issue of the signal malfunction and try to minimally troubleshoot the signal via the Econolite Centracs Software.
2) Determine if a signal is out or in flash, then contact the Osceola County Signal Maintenance immediately to remediate the issue as quickly as possible as not to harm the traveling public.
3) Determine if additional traffic control is needed to restore safety to the intersection; notify the appropriate police department to place an officer at the scene of the signal issue and to direct traffic appropriately.
4) Determine if the traffic signal system is functioning correctly or an ATMS network issue, if either issue is isolated, then a MIMS ticket will be generated.
5) An email will be sent to the TMC Manager. If necessary, a phone call will be placed to the ITS Maintenance Project Manager.
6) Monitor network outages, assist signal crew/vendors as necessary, and ensure all comments are entered into the MIMS ticket.
7) Identify and report routine traffic signal maintenance issues to the Osceola County Signal crew via email.
8) Report timing issues immediately to the Signal Timing Engineer via email.

4.7. ITS Device Failures/Network Outage

Device Failures are handled very similarly as the *Traffic Signal Operational Issues* section mentioned above. For ITS Device Failures and/or Network Outages, the Osceola County TMC Operator shall reference below.

When the TMC Operator obtains a notification regarding an ITS Device Failure and/or Network Outage, the Operator should:

1) Attempt to determine the issue of the ITS device malfunction or network outage.
2) Inform the TMC Manager immediately of the device failure and/or the identified network outage.
3) Monitor network outages, assist ITS Maintenance crew/vendors as necessary, and ensure all updates are entered in the MIMS ticket(s).
    i. Minor device issues and/or question(s) regarding the operation of the ITS/ATMS system may be reported by phone or email but must be followed up with a MIMS ticket.
4) Identify routine or preventative maintenance issues and report them to the Osceola County ITS Device and Network Maintenance Contractor via email.

4.8. Government Escorts and VIP Details

TMC staff will, from time to time, be tasked with assisting the County EOC with dignitary protection/movements occurring within Osceola County. During these specific governmental escorts and VIP details, TMC Operational Staff will function as EOC partners. Also, Osceola County will also provide logistical support to the EOC and local police agencies as requested. In many circumstances, Osceola County TMC will be asked to either disable or share CCTV feed to the EOC for specific signal manipulation and monitoring. These are high priority/high visibility details, and the TMC will actively assist and provide all support are required by either federal or state law enforcement.

4.9. Natural Disasters and Activation of Emergency Operations Center (EOC)

During a natural or manmade disaster (i.e., hurricane), the Osceola County EOC will activate during predetermined levels. There are three specific levels that are specified by the State of Florida Division of Emergency Management.

4.9.1. EOC Activation Levels

State Emergency Operation Center Activation Levels

The State Emergency Operations Center, located in Tallahassee, serves at the central clearinghouse for disaster-related information, and requests for deployment of assistance.

Level One – Full Scale Activation of State Emergency Response Team – In a full-scale activation, all primary and support agencies under the state plan are notified. The State Emergency Operations Center will be staffed by Division of Emergency Management Personnel and all Emergency Support Functions.

Level Two – Activation of State Emergency Response Team – This is an agency activation that may not require activation of every section, branch, or Emergency Support Functions. All primary, or lead, Emergency Support Functions are notified. The State Emergency Operations Center will be staffed by Division of Emergency Management personnel and necessary Emergency Support Functions.

Level Three – Monitoring Activation – Level 3 is typically a "monitoring" phase. Notification will be made to those state agencies and Emergency Support Functions who would need to take action as part of their everyday responsibilities. The State Emergency Operations Center will be staffed with State Waring Point Communicators and Division of Emergency Management Staff.[8]

Under circumstances where the EOC goes into one of the three activation levels, TMC Staff may be tasked as EOC partners. The Osceola County TMC Staff is normally only mandated

[8] https://www.floridadisaster.org/sert/eoc-activation-levels/

to remain in the EOC for a full-scale activation emergency, also known as a Level 1 or full-scale activation. All Osceola County TMC Staff are certified in various levels of the Incident Command System (ICS) and will follow the guidelines of the National Incident Management System (NIMS).

When TMC staff are tasked to staff the EOC, they normally are assigned to the Logistics Section and designated Emergency Support Function 1 (Transportation). In this role, TMC staff will coordinate various transportation-related functions, including but not limited to:

1) Normal TMC operations will be established before the natural disaster occurs. The TMC Staff will provide all required CCTV feeds and signal function operation to the EOC partners.
2) DMS emergency highway notifications related to coastal evacuation routes/road closures/shelter locations etc. All messages must be validated on an hourly basis when power to the signs and signal system is available.
3) The Operators will remain in constant communication with local Osceola Stakeholders (LYNX, FDOT SunRail, Mears, Osceola County School District Transportation) to provide school buses and drivers in the event of evacuations shelter relocation. Also, the TMC Operators will assist with the deployment of resources post-incident, including for signal operation if necessary, but only after the "All-Clear" is given by EOC staff as not to risk the safety to the first responders. The TMC staff will also provide other logistical support as needed by the EOC logistics section chief and may assume other roles as necessary within the EOC. It is mandated the TMC staff will provide 24-hour coverage for the duration of the Level 3 activation and coverage as needed during Level 1 and 2 activations/de-mobilization as directed by the Osceola County TMC Manager.

4.10. Maintenance Contractors

Many incidents will require the notification of maintenance contractors, whether they are required to provide maintenance of traffic, assist in closing roadways, or to repair the roadway it is the responsibility of the TMC to notify them. When notifying these contractors, be sure to notify the correct contractor for each specific repair. When damage has occurred to the roadway or an incident involves a lengthy closure, the TMC contacts area contractors to assist. The TMC also has access to local traffic engineering companies, which can assist in many tasks, including traffic signal timing. If such an incident occurs, contact the TMC Manager, and the proper channels will be utilized to respond to the incident properly.

5. Management and Inventory Management System (MIMS)

The Maintenance Contractor and Osceola County have been tasked with providing the majority of the day-to-day administrative duties for the contract. Osceola County has designated a Project Manager to act as the MIMS Project Administrator as the single point of contact for

Osceola County under this contract. Osceola County TMC personnel and Metric Engineering personnel work together daily to perform many tasks.

5.1. Maintenance Trouble Ticket Notification, Dispatch, and Resolution

MIMS tickets are generated by Operators at the TMC, or other Osceola County personnel when ITS devices or portions of the communications network are inoperable. These tickets are generated, tracked, and reported within MIMS. Tickets are also created for routine maintenance. This includes troubleshooting and repair, as well as Emergency Repair Services, which require expedited response and resolution. Key project personnel for Metric Engineering is provided MIMS access at various levels to create, edit, assign, update, and resolve MIMS tickets. The Dispatcher and Project Manager keeps the MIMS ticketing system open throughout the workday and monitors it periodically for newly submitted tickets. The following describes the different instances in which we address and resolve MIMS tickets.

5.2. Troubleshooting an Unconfirmed Ticket:

Once a MIMS ticket is created, it starts in an "unconfirmed" status. Metric Engineering must then attempt to resolve the ticket remotely. If the issue can be resolved remotely, the responding technician will verify operation with the TMC and provide comments as to the resolution of the ITS device. Osceola County will then void the ticket.

If unable to resolve remotely, Metric Engineering will comment on the ticket that a field visit is necessary. Osceola County will then verify the ticket and change the status from "unconfirmed" to "unresolved."

5.3. Troubleshooting an Unresolved Ticket

Once the MIMS ticket status is set to "unresolved," Metric Engineering's Dispatcher takes ownership and places the ticket on hold. The ticket will be prioritized based on the ticket level, the status of any previous tickets, and the location of field personnel. Metric Engineering's Dispatcher then assigns the ticket to a Technician within the MIMS system. The Technician will then take ownership of the ticket, respond to the noted trouble site, and attempt to resolve the issue. If the defective device is repaired, the technician will contact the Osceola County TMC to verify the proper functionality of the ITS device. When Osceola County fully deploys the SunGuide Software Suite, The TMC Operator will then set the asset status as operational in MIMS. Once the ticket is placed in an operational status, the technician will enter comments pertaining to the resolution, specific troubleshooting notes, and then set the ticket status to resolved.

If the device is unable to be repaired due to the need for additional parts or further troubleshooting, the dispatched technician will place the ticket on hold and provide troubleshooting comments. The comments will contain information on what they believe will be required to address the ticket further and to accomplish a prompt resolution.

Metric Engineering's Technician will also provide the Dispatcher with the total number of hours used to troubleshoot the device. Osceola County typically pre-approves up to six (6) hours of time to investigate, troubleshoot, and attempt to resolve the ITS device deficiency. If additional hours are required to troubleshoot the device further, the Dispatcher will submit a request within the MIMS ticket for additional hours.

Metric Engineering will continuously update Osceola County on the progress of the "on-hold" ticket and provide comments on what ancillaries are required (e.g., parts ordered, bucket truck required, MOT, etc.). Finally, Metric Engineering will coordinate internally to determine, schedule, and/or provide the proper ancillaries to resolve the ticket.

5.4. Special Projects

Throughout the life cycle of an ITS system, it is necessary to provide minor upgrades or additions due to changing technologies or system requirements. Osceola County and the Osceola County TMC Manager, may at their discretion, issue work orders to the Contractor to perform minor upgrades or additions to the system as a special project. Special projects may include work such as adding a CCTV location to the system due to a new roadway or building feature which created a blind spot for video coverage or running a small length of fiber optic cable to connect to a regional stakeholder to share data and video images.

Upon notification of the need for a special project, Metric Engineering's Project Manager will gather relevant information from the Osceola County TMC Manager and prepare a preliminary schedule, which will include an estimate for the labor, tools, and materials needed. The estimate will be in accordance with the payment structure and pricing in the contract. Metric Engineering will not procure any items for the special project nor proceed with any work until the Osceola County TMC Manager has provided approval and issued a MIMS ticket. Once Metric Engineering is issued a MIMS ticket, they shall proceed with the work, as shown in their preliminary schedule, using the items as indicated in their estimate. If there are unforeseen issues that will affect the final cost of the work order, Metric Engineering's Project Manager will notify the Osceola County TMC Manager and provide an updated estimate within one (1) business day.

5.5. Preventive Maintenance

In order to minimize the amount of MIMS tickets generated as a result of device failures, a portion of the contract responsibilities include performing preventive maintenance on ITS devices, cabinets, and structures. Preventive Maintenance checklists and preventive maintenance schedules have been developed to ensure that all Osceola County ITS devices are maintained in a proactive manner. The Dispatcher tracks the progress of field Technicians on a daily basis as they perform preventive maintenance throughout the project area. The schedule is updated weekly to include the sites which have been addressed and any that may not have received the attention that week. The Technicians upload their completed Preventive Maintenance checklists for each device

to the project SharePoint site as they complete their work at each location. This is another means of tracking the work and also providing documentation on the work performed to date.

5.6. Control of Materials

Osceola County uses MIMS to track all of their ITS Maintenance inventory assets, which are both field-deployed and in contractor storage. Metric Engineering has a fenced security area that is locked with a padlock as well as a security system within their warehouse in which all of the inventory assigned to this contract is stored. They also have an Inventory Custodian who keeps track of all items being taken out of storage, put into storage, and sent back to the manufacturer for repairs. Technicians needing spare parts must arrange for pickup of the part with the Inventory Custodian at which time the item is signed out to the Technician, and the inventory location is updated in MIMS to that Technician's vehicle. Once installed, the new location of the item is updated in MIMS, and the part which was replaced is subsequently noted as being at the contractor's facility for repairs. Anytime a device changes location, MIMS must be updated to reflect the new location.

5.7. Resolution of Citizen Complaints

The objective of the TMC Operations Staff is to ensure that critical County arterial corridors are being operated at a high level of efficiency and effectiveness by establishing baseline conditions for each corridor, identifying any deficiencies, monitoring the corridor on a regular basis to identify any degradation of the corridor requiring corrective action, and then initiating such corrective action. One opportunity to address operational needs within Osceola County is to manage citizen and stakeholder complaints. The TMC Manager has access to Signal Timing specialists that are experienced in the field of arterial traffic operations and are extremely familiar with the traffic operations along the program corridors.

References

1. ATTAIN Central Florida. Available: http://www.cflsmartroads.com/projects/ATCMTD.html. Accessed: October 2019
2. District 5 ITS Master Plan. Available: http://www.cflsmartroads.com/docs/District%205%20ITS%20Master%20Plan_FINAL.pdf. Accessed: September 2019
3. District 5 TSM&O Methodology. Available: http://www.cflsmartroads.com/projects/smartsignals/TSMO%20Methodology.pdf. Accessed: November 2019
4. How Does Connected Vehicle Technology Work?. Available: https://www.its.dot.gov/cv_basics/cv_basics_how.htm. Accessed: November 2019
5. Integrated Corridor Management. Available: http://www.cflsmartroads.com/projects/ICM.html. Accessed: October 2019
6. Managed Lanes: A Primer. Available: https://ops.fhwa.dot.gov/publications/managelanes_primer/. Accessed: October 2019
7. MetroPlan Orlando ITS Master Plan. Available: https://metroplanorlando.org/wp-content/uploads/MetroPlan_ITS-Master-Plan_Final.pdf. Accessed: October 2019
8. NeoCity Master Plan. Available: https://www.osceola.org/core/fileparse.php/2731/urlt/101817_NeoCity_MasterPlan_Final.pdf. Accessed: December 2019
9. One Cent for Transportation. Available: https://www.osceola.org/one-cent-surtax-for-transportation/. Accessed: October 2019
10. Osceola is named the 7th fastest growing County in the U.S from years 2017-2018. Available: http://www.aroundosceola.com/news/osceola-named-th-fastest-growing-county-in-u-s-from/article_8f970038-6c21-11e9-bfe7-c7dc2b6608d7.html. Accessed: November 2019
11. Texas Department of Transportation TSMO Statewide Strategic Plan. Available: http://ftp.dot.state.tx.us/pub/txdot-info/trf/tsmo/tsmo-statewide-strategic-plan.pdf#page=28&zoom=100,0,302. Accessed: November 2019
12. The 2019 Florida Statutes. Available: http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0100-0199/0163/Sections/0163.3161.html. Accessed: October 2019
13. Traffic Crash Facts: Annual Report 2017. Available: https://flhsmv.gov/pdf/crashreports/crash_facts_2017.pdf. Accessed: October 2019

14. Traffic Management Centers. Available: https://mobility.tamu.edu/mip/strategies-pdfs/traffic-management/technical-summary/traffic-management-centers-4-pg.pdf. Accessed: November 2019
15. Traffic Signal Systems: Addressing Technologies and Complex User Needs. Available: http://onlinepubs.trb.org/onlinepubs/millennium/00116.pdf. Accessed: November 2019
16. Traffic Signal Timing Manual. Available: https://ops.fhwa.dot.gov/publications/fhwahop08024/index.htm. Accessed: September 2019. Accessed: November 2019
17. Wrong-Way Drivers on the Rise in Clearwater. Available: https://chelsielamie.com/wrong-way-drivers-on-the-rise-in-tampa-bay/. Accessed: October 2019

Appendix J – ConOps

Osceola County TSM&O Strategic Plan

Concept of Operations (ConOps)

OSCEOLA COUNTY ENGINEERING DEPARTMENT
1 Courthouse Square, Suite 1100
Kissimmee, FL 34741
407-343-2600

DOCUMENT CONTROL PANEL		
File Name:	Task 3 - ConOps	
File Location:	R:\PROJECT\OSCEOLA CO. CONT SERVICES\ITS Strategic Plan\Task 3\ConOps	
Version Number:	1.0	
	Name	**Date**
Created By:	Mohammad Akber, P.E. (Metric)	11/26/19
Reviewed By:	Craig Carnes (Metric)	12/3/19
	Dale Cody, P.E. (Metric)	12/5/19
	Dale Cody, P.E (Metric)	12/12/19
Modified By:	Mohammad Akber, P.E. (Metric)	12/5/19
	Mohammad Akber, P.E. (Metric)	12/12/19
	Mohammad Akber, P.E. (Metric)	3/31/20
Approved By:		

Table of Contents

List of Tables

List of Acronyms and Abbreviations

ADMS ..... Arterial Dynamic Message Sign
APL ..... Approved Products List
ATMS ..... Advanced Traffic Management Systems
CCTV ..... Closed Circuit Television
ConOps ..... Concept of Operations
DMS ..... Dynamic Message Sign
EOC ..... Emergency Operations Center
FDOT ..... Florida Department of Transportation
FHP ..... Florida Highway Patrol
FMS ..... Freeway Management System
FOC ..... Fiber Optic Cable
ITS ..... Intelligent Transportation Systems
JPA ..... Joint Participation Agreement
LRTP ..... Long Range Transportation Plan
MOT ..... Maintenance of Traffic
MOU ..... Memorandum of Understanding
MPO ..... Metropolitan Planning Organization
MVDS ..... Microwave Vehicle Detection System
O&M ..... Operations and Maintenance
PSEMP ..... Project Systems Engineering Management Plan
PTZ ..... Pan Tilt Zoom
RTMC ..... Regional Transportation Management Center
RTVM ..... Requirements Traceability Verification Matrix
SOG ..... Standard Operating Guidelines
SOP ..... Standard Operating Procedures
TMC ..... Transportation Management Center
TSM&O ..... Transportation Systems Management and Operations

1. Overview

This document will serve as the Concept of Operations (ConOps) document for the Osceola County Transportation Systems Management and Operations (TSM&O) Strategic Plan Project. This document is divided into ten (10) Sections and each Section is divided into multiple sub-sections. This document was written after receiving Stakeholder input from both Osceola County and personnel from other stakeholders. The document discusses the current system situation, justification for changes to the existing system, concepts for the proposed system, operational scenarios, a summary of impacts and an analysis of the proposed system.

1.1 Identification

Project Name: Osceola County TSM&O Strategic Plan
Financial Project Identification: N/A
Federal Aid Project Number: N/A

1.2 Purpose and Intended Audience

The purpose of this ConOps document is:

- To communicate user needs and the proposed system expectations.
- To communicate the system developer's understanding of the user needs and how the system will meet those needs.
- To build consensus among user groups or developers.
- To create the basis for requirements development and verification.
- To create the framework for system validation.
- To provide an overview for, or to be part of, a press release or information brochure.

The intended audience for this ConOps document is:

- Non-technical program management and sponsors.
- Technical management of participating agencies.
- System developers.
- Operations managers and operators.
- Others who fulfill special roles or oversight of the project.

1.3 Document Overview

This ConOps document describes the existing system or operation, the shortcomings or unmet needs, changes that would address the needs, and the final system after the changes are made to the system or operation.

1.4 High-Level System Overview

The Osceola County TSM&O transportation network is a system created by collaboration between several agencies, including Florida Department of Transportation (FDOT) District 5, the Metropolitan Planning Organization (MPO), Osceola County Public Works Department, the Osceola County Board of County Commissioners, Osceola County Traffic Operations, and other stakeholders (including municipalities, public safety organizations, schools, etc.). The system aims to improve Operations and Maintenance (O&M) of the arterial network of the County through the design and installation of TSM&O infrastructure and necessary subsystems (i.e. power systems, security protocols, etc.). Currently, Osceola County employs several TSM&O components throughout the County such as fiber optic cable (FOC) and Closed Circuit Television (CCTV) cameras sporadically throughout the arterials, but these components are yet to be utilized as a cohesive unit. The TSM&O Strategic Plan details the installation and/or upgrades of the following components: FOC, CCTV cameras, BlueTooth travel time detectors, and all operating subsystems (i.e. central control software, local software/hardware items such as servers, computers, and switches)

1.5 Stakeholders

Table 1: Stakeholders

Stakeholder	Project Role
FDOT District 5	Project sponsor, operator/maintainer
Osceola County Traffic Operations	Project owner, operator and maintainer
The City of Kissimmee	Operator/maintainer
The City of St. Cloud	Operator/maintainer
Florida Highway Patrol (FHP)	First responders, system users
County Emergency Operations Centers (EOCs)	Emergency coordination
Transit Agencies	System users
Multimodal facilities	System users
Motorists	System users

1.6 Referenced Documentation

Table 2: Referenced Documentation

Document Name	ID, Revision, Date, etc.	Link, or Contact Info to Obtain
Form FM-SE-01 Concept of Operations (ConOps) TEMPLATE	Revision Dated September 4, 2019	https://www.fdot.gov/traffic/ITS/Projects-Deploy/SEMP.shtm

Document Name	ID, Revision, Date, etc.	Link, or Contact Info to Obtain
Systems Engineering and ITS Architecture Procedure 750-040-003	2019	FDOT Forms Management/Procedures https://fms.fdot.gov/
District 5 ITS Master Plan	10/31/16	http://www.cflsmartroads.com/docs/District%205%20ITS%20Master%20Plan_FINAL.pdf
2040 Metroplan Orlando Long Range Transportation Plan (LRTP)	January 2016	https://metroplanorlando.org/wp-content/uploads/2040-lrtp-plan-overview-1.pdf
Metroplan Orlando ITS Master Plan	May 2017	https://metroplanorlando.org/wp-content/uploads/MetroPlan_ITS-Master-Plan_Final.pdf

2. Current System Situation

2.1 Background, Objectives, and Scope

Currently, Osceola County utilizes some existing TSM&O infrastructure throughout the County. This infrastructure includes elements such as FOC, CCTV cameras, Arterial Dynamic Message Signs (ADMSs), Microwave Vehicle Detection Systems (MVDSs), and Bluetooth travel time detectors. Currently, Osceola County Operations operates the signalized intersections in the County using Centracs as their central software. The scope of the system that is considered in the TSM&O Strategic Plan is located in more populous parts of the County where recurring congestion has been identified as a major contributor to decreased efficiency of the transportation network, including Kissimmee, Northwest Osceola, St. Cloud, and Poinciana.

2.2 Operational Constraints

Currently, some TSM&O infrastructure is built out in some urban areas in the region. However, some larger urban areas with significant numbers of traffic signals do not have extensive TSM&O deployed. Gaps in the communications network have been identified that make it difficult for those agencies with communications to operate their entire respective transportation systems and for operations agencies to connect to one another for data sharing purposes. In addition, a lack of funding for O&M purposes has been identified during stakeholder coordination as an obstacle to operating the transportation network in the most efficient way possible. A goal of this phase of the Strategic Plan is to fill in the communication gaps and emphasize the importance of fully funded O&M with the aim of securing additional O&M funding for all operating agencies.

2.3 Description of the Current System or Situation

As explained in **Section 1.4**, there are various operator/maintainer agencies currently actively managing arterial elements in the region. The communications infrastructure throughout the region is made up of a mix of FOC and wireless/cellular communications. The TSM&O devices in use in the region consist of CCTVs (freeway and arterials), Dynamic Message Signs (DMS), ADMS, MVDS, and Bluetooth travel time detectors (arterials). Various levels of Transportation Management Centers (TMCs) are also in use, ranging from smaller rooms consisting of workstations to a fully operational Regional Transportation Management Center (RTMC). The widespread use of all of these TSM&O elements puts the County in a position to build up the infrastructure within the County and allow operations to become more cooperative across jurisdictional lines. This will be useful as there are several non-interstate roadways in the region that span vast distances of the County (i.e. US 192, US 17-92, US 441) that serve as major thoroughfares that would benefit from increased active management in both times of normal congestion and during times of emergency.

2.4 User Class Profiles

The Osceola County TSM&O network features the following seven user profiles (note that all operating agencies previously identified will utilize these profiles):

- TSM&O Operators/Supervisors
    - Has access to and controls ITS devices on Freeway/arterials
        - Utilize Pan Tilt Zoom (PTZ) capabilities of CCTVs to monitor coverage areas
        - Monitor traffic signal control system
        - Gather and report data generated by the travel time system
    - Inform emergency personnel of incidents and coordinate with emergency response personnel throughout the process of clearing any incidents that may occur
    - Monitor performance of the system and inform traffic operations personnel of any faulty equipment so that they may dispatch maintenance personnel to any devices not functioning properly
- ITS/Traffic Operations Device Maintenance Personnel
    - Maintain all ITS/signal equipment in the field
    - Ensure minimal equipment downtime
    - Perform routine maintenance
    - Can be in-house or available via maintenance contract
- ITS/Traffic Operations Network Support Personnel
    - Monitor health and performance of network
    - Perform routine maintenance
    - Implement any required updates
    - Monitor FOC for any physical damage
- Traffic Operations Engineers and Personnel
    - Analyze data generated by ITS devices
    - Make changes and improvements to signal timings and respond in real time to improve performance of the system
    - Make recommendations for future equipment upgrades
- Emergency Response Personnel
    - Work with TSM&O Operator and respond to incidents detected by ITS equipment
    - View video feeds of traffic conditions
    - Use travel time information to determine best route to incidents
- Motorists
    - Receive travel time and incident information reported by ITS Operators
        - Options for traveler information dissemination currently under consideration are Florida 511and 3rd parties such as Google/Waze
    - Make informed decisions on travel routes to ensure best travel times

2.5 Support Environment

The Osceola County TSM&O equipment will be primarily maintained by the County. As all municipalities currently have Osceola County Traffic Operations monitor and maintain all traffic signals, the County will be responsible for any new ITS devices that will be used to improve the transportation system.

Currently, at the Osceola County TMC, normal working schedule and on-call responsibilities are detailed below:

- Working Schedule

    - ITS/Signal maintenance
        - Performed "as-necessary", work can be performed at any given time.
    - IT/Network
        - Performed "as-necessary", work can be performed at any given time.
- On-call Responsibilities
    - ITS/Signal maintenance
        - At an on-call basis.
    - IT/Network
        - At an on-call basis. However, response times are 4 hours for non-emergencies and 2 hours for emergencies.

It should be noted, Osceola County TMC hours of operations are 6:00AM – 8:00PM. On-call hours run from 4:30PM – 6:00AM. Normal business hours for signal maintenance are 6:00AM – 4:30PM.

3. Change Justification

3.1 Justification for Changes

As previously described, there are several urban areas with TSM&O systems needing small gaps filled and outdated infrastructure needing to be replaced/upgraded. Additionally, there are urban areas in need of TSM&O expansion, and more rural areas that would benefit from the introduction of more basic TSM&O elements. These changes are necessary due to several factors including steadily increasing populations, seasonal population changes, tourism, and urban sprawl from the greater Orlando area. The roads become heavily congested, as most of these trips are made in personal vehicles. These vehicles can lead to recurring congestion and traffic incidents that decrease the capacity and efficiency of the transportation network. TSM&O improvements can alleviate this strain by providing the County with better tools to monitor the network and make changes to day-to-day operations to increase the efficiency of the system. The region is in a good position to manage the congestion brought about by these factors with widespread TSM&O infrastructure already in place and being operated by the main operator/maintainer agencies. For the system to work to its fullest potential, filling in of key gaps in communications, dedicated O&M funding, and increased coordination between the agencies is recommended.

3.2 User Needs

Stakeholder needs to be addressed by this project are identified below.

Table 3: User Needs

User Need ID	User	Need
UN001	Motorists, First Responders, Transit, and Multimodal facilities	Reduced congestion resulting in improved travel times and travel time reliability.
UN002	Motorists, First Responders, Transit, and Multimodal facilities	Improved safety resulting in a decrease in the number of vehicular accidents.
UN003	Motorists, pedestrians and bicyclists	Improved safety for pedestrians and bicyclists resulting in a decrease in the number of accidents related to vehicles.
UN004	First Responders	Reduced response time to arrive at incident scenes.
UN005	Transit	Improved reliability of service resulting in riders having more predictable wait times and fewer missed connections.

4. Concepts for the Proposed System

4.1 Background, Objectives, and Scope

The intent of the Osceola County TSM&O Strategic Plan is to provide traffic operations personnel with better tools to proactively manage the County transportation network. The ITS tools that will be installed include new FOC, CCTVs, and a Bluetooth travel time system. All devices installed as part of each of the deployments recommended by the Strategic Plan will be accessible to and operated by the appropriate users defined earlier in this document. These devices will be controlled and maintained by the user agency that has jurisdiction over the region in which they are installed. It is recommended that increased coordination occur between the TMCs in the form of active communications and data sharing. This can be accomplished through official means of communication (through Joint Participation Agreement (JPA), Memorandum of Understanding (MOU), etc.) or on an ad hoc basis.

4.2 Operational Policies and Constraints

This section describes the operational policies and constraints that apply to the recommendations stated within the Osceola County TSM&O Strategic Plan. All field devices that are recommended to be installed as a part of the Strategic Plan will be controlled and maintained by Osceola County. It is recommended that two ITS operators be put in place at the TMC and operate in the following fashion:

- 1 operator during peak morning traffic hours and 1 operator during peak evening traffic hours
    - 7:00 AM – 11:00 AM
    - 3:00 PM – 7:00 PM
    - Part-term hourly employees

Osceola County Traffic Operations will monitor and control all signalized intersections through use of the use of the FOC network that will be controlled using Centracs.

4.3 Description of the Proposed System

The existing TSM&O network deployed in the region will be supplemented with the following elements:

- Additional FOC
    - Gaps in fiber communication and redundant fiber routes identified as a part of Task 2 of the Strategic Plan will be filled in and added respectively
    - All additional backbone fiber will be 96 count single mode
    - All additional drop cables to signals will be 24 count single mode
- CCTV cameras
    - Provide visual surveillance at major intersections
    - Can be controlled by operators using PTZ capabilities
    - Used to verify incident occurrence, location, and determine severity
    - Used to verify proper traffic signal timing performance

  - Can be viewed by all authorized agencies such as first responders, but controlled only by the respective operator/maintainer agency
- ADMSs
  - Provide motorists with event information that may impact motorists' driving decisions
  - Used for travel times, vehicle alerts, safety messages, construction, and other messages approved by the County
- Travel time system
  - Bluetooth detectors
  - Vehicles with Bluetooth enabled devices (discoverable MAC addresses) passing by a detector will be assigned an ID based on a portion of the MAC address and their progress through the roadways will be tracked. Please note that this information is encrypted and not stored.
  - Travel time data will be accessible to ITS operators and traffic operations personnel
  - Operators will use the travel time data to monitor the performance of the system and disseminate the travel time data to motorists
  - Can relay information regarding travel times, incidents, and evacuations

Table 4: Desired Changes

Change Type	Change	Priority
Capability	*Installation of TSM&O infrastructure to provide the capabilities as described above*	High
System Processing	*The addition of this infrastructure will require upgraded database and storage capabilities for operator/maintainer agencies due to the amount of data which will be generated and require storage, and the potential technological advances that will be possible to implement with this infrastructure in place. This large amount of data will then be available for planning purposes and tracking of Performance Measures*	High
Interface	*All new infrastructure will be operable via the existing Advanced Traffic Management Systems (ATMS) software used by operator/maintainers*	High
Personnel	*Personnel will require training for any new software, hardware, device configurations, etc.*	Medium
Operations	*It is desirable to not increase the workload on Operations personnel, however, with additional devices and expanded capabilities, this will not be possible. Therefore, the desire would be to use existing hardware and software to the greatest extent possible to avoid personnel having to learn and work with multiple platforms.*	High
Support	*It is desirable to reduce the amount of additional workload on both maintenance and network personnel to the greatest extent possible. Therefore, it would be desired that equipment be installed which is similar in nature (Interface, configuration, etc.) to existing equipment.*	High
Funding	*Dedicated funding for Operations and Maintenance must be secured in order to effectively utilize any TSM&O expansions.*	High

4.4 Modes of Operation

It is recommended that all operator/maintainer agencies use the following modes of operation while actively operating their respective TSM&O infrastructure.

4.4.1 *Standard Operations*

Standard Operations will occur during normal business hours in use by each agency, unless these hours are altered as a result of the implementation of the new TSM&O infrastructure. TMC Operations staff will utilize the newly installed equipment per their Standard Operating Guidelines (SOG) and Standard Operating Procedures (SOP) documents (if any are in place) to operate the traffic signals, monitor the roadways using CCTVs, and collect travel time information through Bluetooth devices. The new devices will interface directly with the ATMS software in use by each agency unless a device requires Manufacturer/Vendor software to be running on the Operators' workstations. Operations personnel will utilize the information received from the infrastructure to provide information to first responders and other local agency partners.

4.4.2 *After-hours Operations*

After-hours Operations will occur following normal business hours in use by each agency, unless these hours are altered as a result of the implementation of the new TSM&O infrastructure. It is recommended that each agency determine if after hours operations will be beneficial/cost effective.

4.4.3 *Maintenance Operations*

Maintenance Operations will include both Standard Operations during normal business hours and After-hours Operations, through on-call services. It is recommended that each operator/maintainer agency have maintenance staff in place according to the staffing recommendations made as part of Task 2 of the Strategic Plan.

Maintenance crews will provide both preventive maintenance and routine maintenance for the existing and newly installed infrastructure. Preventive maintenance will be performed according to the Manufacturer's recommendations. Routine maintenance will be performed for any components that the TMC Operators report as being failed or that they cannot communicate with. In instances where the component is reported as failed, the maintenance crew will respond to the site and troubleshoot the issue locally. For instances where the TMC Operators cannot communicate with the component, the operator/maintainer agency will need to determine if the communications issue will be initially troubleshot by the network staff or maintenance crews.

4.4.4 *Diagnostics*

Diagnostics will be performed on the system and equipment for both Standard Operations during normal business hours and After-hours Operations, through on-call services. It is recommended that each operator/maintainer agency have maintenance staff in place according to the staffing recommendations made as part of Task 2 of the Strategic Plan and modify their current operating

hours to ensure that they are sufficient for the additional responsibilities and workload of the infrastructure to be deployed.

4.4.5 Emergency Operations

Emergency Operations of the system devices and components will be performed when needed to assist local responder agencies and motorists with detour routing, evacuation, or re-entry following a large-scale event or natural disaster. Emergency Operations for crucial corridors will be coordinated with FDOT District 5 and County EOCs, including the sharing of traffic information and live videos.

4.5 User Involvement and Interaction

The subsections below provide information related to who will be interacting with the components installed as part of the Osceola County TSM&O Strategic Plan and what involvement they will have with these additional system capabilities.

4.5.1 Operator/Maintainer Agency Staff

This category includes TMC management and operations staff as well as network and maintenance staff. Staff will continue to operate, troubleshoot, and maintain the existing system as well as the infrastructure that is recommended to be added as part of the Osceola County TSM&O Strategic Plan. Existing SOP and SOG documents should be updated to provide guidance on day-to-day and special use cases for all newly installed infrastructure, and new SOPs and SOGs should be created if an agency does not currently have any formal documents. Personnel will have the same involvement and interaction following completion of the project as they did previously but will have additional capabilities for actively operating and maintaining the TSM&O network.

4.5.2 First Responders

Administrative officials for first responders are co-located in the EOC and can receive incident information from TMC personnel. An operator at the TMC will use the CCTVs to assess the severity of the incident and notify appropriate emergency response personnel to the scene of the incident.

4.5.3 Motorists

Motorists will travel on corridors with greater efficiency and safety due to increased interconnection of signals, improved traffic monitoring capabilities, information dissemination, and the collection of travel time information.

4.5.4 Pedestrians/Bicyclists

Pedestrians and bicyclists will travel on corridors with greater efficiency due to increased interconnection of signals, improved traffic monitoring capabilities, information dissemination,

and the collection of travel time information. Improved traffic signal performance will lead to improved pedestrian movement as pedestrian signal timings are improved and less congestion will lead to fewer incidents with vehicles in cross walks.

4.6 Assumptions and Constraints

The following assumptions and constraints will be considered:

- All infrastructure installed will be compatible with infrastructure that is currently deployed
- All equipment will be from the FDOT Statewide Approved Products List (APL), as applicable
- Increased TSM&O capabilities will lead to higher levels of staffing needed
- Funding for ongoing operations and maintenance will be secured **before** significantly expanding TSM&O infrastructure
- All operator/maintainer agencies will adhere to security protocols listed in Task 3 of the Strategic Plan to maintain the security of each agency's network and ensure seamless information sharing abilities.

4.7 Risks

Table 5: Risk Register

Risk #	Risk Owner	Description of Risk and Impact	Likelihood (1-4)	Impact (1-4)	Rating (L + I) (2-8)	Mitigation Strategy	Status
1	Operator/ Maintainers	Insufficient Funding for continued operations and maintenance	3	4	7	Project buy-in from stakeholders and prioritization of O&M funding at planning levels	N/A
2	Operator/ Maintainers	Cybersecurity	2	3	5	Training of personnel, adherence to established security protocols, and regular monitoring and security patches	N/A
3	Operator/ Maintainers	Insufficient/outdated infrastructure	2	3	5	Implement infrastructure that is scalable, plan for life cycle replacement	N/A

4.8 Support Environment

All TSM&O infrastructure that has been recommended as a part of the Strategic Plan will be operated and maintained by the operating agency with jurisdiction over it (see **Section 2.1**). Should any additional TSM&O deployments beyond the scope of the Strategic Plan be developed, all infrastructure as part of those deployments will be operated and maintained in the same fashion.

5. Operational Scenarios

The list below details certain operational scenarios that may be encountered during daily operations of the regional transportation system and how they should be dealt with using the proposed TSM&O infrastructure:

- **Normal Operations:** The roadway network is operating efficiently, and congestion is either minimal or non-existent. Operators constantly observe the roadway network using CCTVs and verify that the roadway network is performing up to minimum standards (compared to baseline target numbers put in place by operating agencies) through information provided by the travel time system. Arterial traffic operations personnel will monitor the system as well and verify that current signal timings are adequate. Should any incidents be detected during this timeframe, emergency response personnel will be dispatched to clear the incident in as efficient manner as possible. These incidents include anything that would obstruct the normal flow of traffic such as minor traffic incidents and disabled vehicles.
- **Peak Traffic Times:** Morning and evening rush hours bring increased traffic volumes and congestion is increased as a result. Operators will be alerted to increasing travel times from the travel time system and operators will verify the increased congestion using the CCTVs. Arterial traffic operations personnel will implement alternative signal timings if deemed appropriate. Similar to normal operations, should any incidents be detected during this timeframe, emergency response personnel will be dispatched to clear the incident in as efficient manner as possible. These incidents include anything that would obstruct the normal flow of traffic such as minor traffic incidents and disabled vehicles.
- **Incident Operations:** Major delays can be created by increased congestion that results from incidents that impede normal traffic flow. This increased congestion can occur for a multitude of reasons including decreased roadway capacity and other motorists slowing down to observe the accident scene ("rubbernecking"). As in peak traffic times, operators will be alerted to increasing travel times from the travel time system and operators will verify the increased congestion using the CCTVs. For arterial operations, should the operating agencies deem it appropriate, alternative signal timings will be implemented on roadway sections seeing the most congestion. These changes in signal timing can increase throughput of the impacted roadway, thereby decreasing congestion, travel time delay, and the likelihood of secondary incidents. Operators will also use the CCTVs to assess the severity of the incident and notify appropriate emergency response personnel (police, EMS, flatbed trucks, HAZMAT, coroner) that will clear the incident scene as quickly as possible to ensure that the roadway can return to normal operations. Once congestion has returned to normal, the signals will be changed back to their normal signal timing plans. Finally, operators will send out alerts to motorists that will detail the nature of the incident and expected changes in travel time.
- **Evacuation Operations:** Due to the geographical location of the County, it is susceptible to hurricanes and, as such, is likely to be put under mandatory evacuation orders. Should an evacuation order be issued, all operating agencies should be fully operational to monitor the roadways to monitor the progress of the evacuation in real time. Operators will monitor the roadways using the CCTVs and route evacuating vehicles to less congested roadways to clear the roadways as soon as possible. Should any incidents that could impede the flow

of traffic be detected, emergency responding personnel will be notified to clear the incident as quickly as possible. Should arterials be used as major evacuation routes, signal timings that optimize the flow of traffic out of the region will be implemented.

- **Maintenance Operations:**
  - Equipment malfunction: Operators should poll all devices at the start of their respective shifts using their agencies FMS/ATMS software of choice to ensure that all devices are operating in a way that ensures optimal connectivity and performance. Should the poll return a result that indicates certain devices are not working properly, maintenance personnel (either in-house or maintenance contract personnel) should be dispatched to each non-functioning device and repair the device(s). The maintenance personnel will then contact the operators when repairs are finished, and the operators will verify that the repairs have returned the devices to full functionality. In addition, network support personnel will verify that all FOC is fully functioning and that no damage to the FOC is present. This will ensure that the full communications capacity of the region is fully functional.
  - Preventative maintenance: Maintenance personnel will follow any SOPs put in place by the operating agencies. If SOPs for preventative maintenance are not already in place, it is recommended that they be created. At minimum, all devices/equipment should be checked at regular intervals to ensure that the transportation system will be able to operate at full capacity and to determine when devices are nearing the end of their life cycle and will need to be replaced.

6. Summary of Impacts

During construction of this TSM&O system, there will be some impacts to traffic flow that can be contributed to potential lane closures in areas where the new communications system and devices are being installed. Proper Maintenance of Traffic (MOT) standards and practices should be adhered to thereby ensuring that these closures will only occur as necessary and cause minimal congestion when in place. An additional reason for impact on traffic flow would be the need for time for all previously mentioned user profiles to familiarize themselves with all new equipment and O&M protocols. Once all personnel have been properly acclimated to and trained in the use of the network and equipment, decreases in efficiency will go away. Any congestion created by these potential increases in congestion, however, will provide long term benefit for the citizens and visitors of the County, as they will occur for the purpose of improving the transportation system as a whole. These improvements will be visible in the form of reduced congestion, reductions in travel time delays, fewer secondary incidents, reductions in emissions, and improved traveler satisfaction.

The installation of surveillance and travel time system equipment should have minimal impact on the performance of the system because, as mentioned in section 4.5, all equipment will be from the FDOT APL and will therefore be compatible with the proposed communications system and with all existing field devices.

7. Analysis of the Proposed System

7.1 Alternatives

No alternatives were considered as a part of this ConOps.

7.2 Cost, Schedule, and Procurement Options

High level cost estimates for all TSM&O capital improvements and O&M needs were created as part of the Strategic Plan. Refer to Task 2 for a full breakdown of all anticipated costs associated with the Strategic Plan. Project scheduling and procurement options should be discussed during the design phase of any TSM&O improvements.

7.3 Systems Engineering Plan

The systems engineering process should be followed and all project level systems engineering documents should be created during the design phase of any TSM&O improvements. This includes a project level ConOps (this document can serve as a guide), Project Systems Engineering Management Plan (PSEMP), Requirements Traceability Verification Matrix (RTVM), etc.

7.4 Performance Measurement for System Validation

System Validation ensures that user needs have been met by using Performance Measurement to show that desired outcomes were achieved due to project implementation. A Before and After Study should be performed on the project corridor to demonstrate the benefits related to meeting the User Needs as identified within **Table 3** in **Section 3.2** of this document. The suggested Performance Measures to demonstrate System Validation are:

- Average Travel Times – A reduction in travel times along the corridor will demonstrate a reduction in congestion.
- Travel Time Reliability – Increased travel time reliability along the corridor will demonstrate that the corridor is more effectively and efficiently handling the volume of traffic.
- Number of vehicle crashes – A reduction in vehicle crashes will demonstrate that the corridor is safer for motorists.
- Number of vehicle crashes involving pedestrians and bicyclists – A reduction in vehicle crashes involving pedestrians and bicyclists will demonstrate that the corridor is safer for pedestrians and bicyclists.
- Incident Response Time – A reduction in Incident Response Time will demonstrate that First Responders are able to reach incident scenes faster, resulting in better care for patients and faster removal of incident vehicles resulting in a shorter Open Roads Duration.

8. Notes

Not applicable at this time. The remainder of the page has been left blank should there be future notes required.

9. Appendices

Not applicable at this time. Any appendices required throughout the project will be added within this section.

10. Glossary

Concept of Operations: A document that details the characteristics of a proposed transportation system from a stakeholder's perspective. It includes the following sections: Overview, Current System Situation, Change Justification, Concepts for the Proposed System, Operational Scenarios, Summary of Impacts, Analysis of the Proposed System, Notes, Appendices, and a Glossary.

Intelligent Transportation System: Electronics, communications, and/or information processing used individually or in combination to improve the efficiency or safety of a transportation system.

Stakeholders: Any entities/agencies that have a vested interest in the optimal performance of the system that is the subject of the ConOps. These can include government agencies, private organizations, and the public.

Transportation Systems Management and Operations: The effective implementation and management of ITS devices that contribute to the safer and more efficient operation of the roadway network.

Transportation Management Center: The office that controls all ITS devices, coordinates with all responding agencies to manage incidents, and disseminates travel information to the public.

DOCUMENT REVISION HISTORY			
Version Number	**Approved Date**	**Description of Change(s)**	**Created/ Modified By**

Appendix K – PSEMP

Osceola County TSM&O Strategic Plan

Project Systems Engineering Management Plan (PSEMP)

OSCEOLA COUNTY ENGINEERING DEPARTMENT
1 Courthouse Square, Suite 1100
Kissimmee, FL 34741
407-343-2600

DOCUMENT CONTROL PANEL		
File Name:	Task 3 - PSEMP	
File Location:	R:\PROJECT\OSCEOLA CO. CONT SERVICES\ITS Strategic Plan\Task 3\PSEMP	
Version Number:	1.0	
	Name	**Date**
Created By:	Mohammad Akber, P.E. (Metric)	11/26/19
Reviewed By:	Craig Carnes (Metric)	12/2/19
	Dale Cody, P.E. (Metric)	12/5/19
	Dale Cody, P.E. (Metric)	12/12/19
Modified By:	Mohammad Akber, P.E. (Metric)	12/5/19
	Mohammad Akber, P.E. (Metric)	12/12/19
	Mohammad Akber, P.E. (Metric)	3/31/20
Approved By:		

Table of Contents

List of Tables

List of Figures

List of Acronyms and Abbreviations

APL ..... Approved Products List
ARC-IT ..... Architecture Reference for Cooperative and Intelligent Transportation
ATMS ..... Advanced Traffic Management System
CCTV ..... Closed Circuit Television
CEI ..... Construction Engineering and Inspection
ConOps ..... Concept of Operations
CPAM ..... Construction Project Administration Manual
CPM ..... Critical Path Method
CV ..... Connected Vehicle
ECO ..... Engineering Change Order
EOR ..... Engineer of Record
FDOT ..... Florida Department of Transportation
FOC ..... Fiber Optic Cable
ITS ..... Intelligent Transportation System
MOT ..... Maintenance of Traffic
MTR ..... Minimum Technical Requirement
NTP ..... Notice to Proceed
O&M ..... Operations and Maintenance
PERT ..... Project Evaluation and Review Technique
PITSA ..... Project Intelligent Transportation System (ITS) Architecture
PM ..... Project Manager
PSEMP ..... Project Systems Engineering Management Plan
QC ..... Quality Control
QM ..... Quality Management
RFP ..... Request for Proposal
RITSA ..... Regional Intelligent Transportation System Architecture
RTVM ..... Requirements Traceability Verification Matrix
SEMP ..... (Florida's Statewide) Systems Engineering Management Plan
SEP ..... Systems Engineering Process
TERL ..... Traffic Engineering Research Lab
TMC ..... Traffic Management Center
TSM&O ..... Transportation Systems Management and Operations

WBS ..... Work Breakdown Structure

1. Overview

The first section of the Project Systems Engineering Management Plan (PSEMP) document provides seven elements: an overview of the document, need for a PSEMP, project identification, purpose and scope, technical project summary schedule, relationship to other plans, and applicable documents. These elements are described in the following sections.

1.1 Document Overview

This document is the PSEMP for the Osceola County Transportation Systems Management and Operations (TSM&O) Strategic Plan. This PSEMP is a plan that helps manage and control the project utilizing systems engineering processes (SEP). The PSEMP identifies what items are to be developed, delivered, integrated, installed, verified, and supported as a part of the project deployments outlined in the Strategic Plan. It documents certain processes and procedures for the technical management, procurement, installation, and acceptance of the project deployments. The document satisfies the requirement for a PSEMP for High Risk Intelligent Transportation System (ITS) projects. The PSEMP details are scaled in proportion with the scope, risk, and complexity of the project deployments.

This document is organized as follows:

- Section 1 – Overview of the PSEMP document
- Section 2 – Systems Engineering Processes
- Section 3 – Project Management and Control

1.2 Need for a Project Systems Engineering Management Plan

The Florida Department of Transportation (FDOT) requires high-risk ITS projects using federal funds to use a SEP.[1] The PSEMP documents how systems engineering will be used for ITS project management.

Florida's Statewide Systems Engineering Management Plan (SEMP) was used as a reference guide in the creation of this PSEMP.

1.3 Project Identification

Project Name: Osceola County TSM&O Strategic Plan
Financial Project Identification: N/A.

[1] FDOT Procedure titled Systems Engineering and ITS Architecture (Topic No 750-040-003). Available online at http://cflsmartroads.com/projects/local/docs/750-040-003-c%20SE%20and%20ITS%20Architecture%20Procedure.pdf

Federal Aid Project Number: N/A.

1.4 Project Purpose and Scope

This document serves as the PSEMP for the Osceola County TSM&O Strategic Plan. The intent of the Strategic Plan is to provide traffic operations personnel with better tools to proactively manage the County transportation network.

The project deployments detailed within the Strategic Plan will include multiple TSM&O initiatives to be implemented as a performance driven approach for solving congestion and traffic problems in which ITS, signal systems control, and operational strategies are used to locate and correct the causes of congestion in real-time. The ITS tools that will be installed include new Fiber Optic Cable (FOC), Closed Circuit Television (CCTV) Cameras, and a Bluetooth travel time system. All devices installed as part of each of the deployments recommended by the Strategic Plan will be accessible to and operated by the appropriate users.

A list of project stakeholders and their respective project roles can be found in Table 1.

Further details can be obtained by reviewing other documents, such as the project Concept of Operations (ConOps) and the Florida Statewide and Regional ITS Architecture (RITSA)

Table 1: Stakeholders and Project Roles

Stakeholder	Project Role
FDOT District 5	Project sponsor, operator/maintainer
Osceola County Traffic Operations	Project owner, operator and maintainer
The City of Kissimmee	Operator/maintainer
The City of St. Cloud	Operator/maintainer
Florida Highway Patrol (FHP)	First responders, system users
County Emergency Operations Centers (EOCs)	Emergency coordination
Transit Agencies	System users
Multimodal facilities	System users
Motorists	System users

1.5 Technical Project Summary Schedule

A high-level schedule will be included in this section as the project moves into and through the design phase.

1.6 Relationship to Other Plans

The following documentation was used as a reference in the development of the Osceola County TSM&O Strategic Plan's PSEMP:

- FDOT Project Systems Engineering Management Plan Template, September 2019
- FDOT Statewide Systems Engineering Management Plan (SEMP), March 2015
- FDOT Regional ITS architecture (RITSA), January 2016
    - Currently undergoing an update

1.6.1 Relationship to the Regional ITS Architecture (RITSA)

The development of the Osceola County TSM&O Strategic Plan is currently not included in the District 5 RITSA. Statewide, the RITSAs of every District will be undergoing a transition. Current ITS architectures are laid out in two separate software programs: National ITS Architecture Turbo 7.1 and CVRIA 2.2. In the future, all architecture will migrate from utilizing these 2 separate software programs to one program: Architecture Reference for Cooperative and Intelligent Transportation (Arc-IT) 8.3. This program will encompass all capabilities of each program. FDOT Central Office recently executed the Florida ITS Architecture Support and Maintenance Project with Iteris to perform the migration of the Statewide ITS Architecture. Christine Shafik, PE, PMP®, CPM, FCCM, FCCN, CGB, the State ITS Software Engineer, is the Department Project Manager (PM) leading this effort. Preliminary schedules indicate the initial review activities and stakeholder workshop activities for the migration of District 5's architecture will occur in early 2020. This project will be added to the RITSA during the design process when this migration is complete.

1.6.2 Relationship to Other "On-project" Plans

With the development of this Strategic Plan, it will be Osceola County's responsibility for developing, maintaining, and updating this PSEMP in addition to the ConOps.

1.7 Applicable Documents

The following documents form a part of this document to the extent specified herein. In the event of a conflict between the contents of the documents referenced herein and the contents of this PSEMP, the final Request for Proposal (RFP), Scope of Services, and Minimum Technical Requirements (MTRs), if required, shall be considered the superseding documents.

Table 2: Referenced Documentation

Document Name	ID, Revision, Date, etc.	Link, or Contact Info to Obtain
Scope of Services	N/A	Osceola County Contact: Lindsey M Giovinazzo (407) 742 - 9166
Florida's Statewide Systems Engineering Mangaement Plan: Deliverable 1-10: Technical Memorandum	Revised September 4th, 2019	https://www.fdot.gov/traffic/its/projects-deploy/semp.shtm
National ITS Architecture	Version 7.1	U.S. Department of Transportation (US DOT) 1200 New Jersey Avenue, SE Washington, DC 20590 www.standards.its.dot.gov/LearnAboutStandards/NationalITSArchitecture
Regional ITS Architecture (RITSA)	Revised December 17th, 2015	http://www.consystec.com/florida/d1/web/index.htm

2. Systems Engineering Processes

2.1 Developing the Project ITS Architecture (PITSA)

The Strategic Plan will include the following ITS service packages (both currently in the RITSA and to be added as part of the Strategic Plan) within the project architecture:

- ATMS01 – Network Surveillance
- ATMS03 – Traffic Signal Control
- ATMS06 – Traffic Information Dissemination

2.2 Identifying High-Level Functional Requirements

The ConOps document for the Strategic Plan describes preliminary high-level requirements from the customer and stakeholder perspectives. An identification of these requirements are as follows:

1. Additional FOC is proposed to fill gaps in fiber communication and redundant fiber routes identified as part of Task 2 of the Strategic Plan.
2. Additional CCTV cameras are proposed to provide visual surveillance at major intersections.
3. Bluetooth detectors are proposed to disseminate information regarding travel times, incidents, and evacuations.

2.3 Developing Detailed Requirements

The detailed requirements for the Strategic Plan can be found in the Scope of Services. Only products listed on FDOT's Approved Products List (APL), if applicable, will be installed, unless otherwise approved by the Department's PM and/or permitted through the FDOT Traffic Engineering Research Lab (TERL). APL products have been tested by the TERL and found to be compliant with the requirements of the FDOT Standard Specifications for Road and Bridge Construction.

2.4 Performing Trade-off Studies, Gap Analyses, or Technology Assessments

No trade-off studies or gap analyses shall be required as part of this Strategic Plan.

2.5 Performing Technical Reviews

Reviews for the following deliverables will be performed by the County:

- Service package analysis
- Recommended updates to the RITSA
- ConOps
- PSEMP
- Osceola County TSM&O Strategic Plan

2.6 Identifying, Assessing and Mitigating Risk

Project risks have been identified by examination of risk sources and listed in a Risk Matrix (Table 3). Risks are assessed on a scale of 1-4 based on the risk's probability of occurrence and the impact to the Strategic Plan, with 1 representing lowest risk and 4 representing the highest. Beginning with high-risk items, measures should be documented that can be taken to mitigate the risks in the table and assign each as a task. Completion of these tasks will help to resolve the risks. Risks are evaluated throughout the life cycle of the project until they are resolved.

The following areas have been specifically considered for risk identification:

- Cybersecurity
- Insufficient Funding
- Outdated Infrastructure

Table 3: Risk Register

Risk #	Risk Owner	Description of Risk and Impact	Likelihood (1-4)	Impact (1-4)	Rating (L + I) (2-8)	Mitigation Strategy	Status
1	Operator/ Maintainers	Insufficient Funding for continued operations and maintenance	3	4	7	Project buy-in from stakeholders and prioritization of Operations and Maintenance (O&M) funding at planning levels	N/A
2	Operator/ Maintainers	Cybersecurity	2	3	5	Training of personnel, adherence to established security protocols, and regular monitoring and security patches	N/A
3	Operator/ Maintainers	Insufficient/outdated infrastructure	2	3	5	Implement infrastructure that is scalable, plan for life cycle replacement	N/A

2.6.1 Risk Planning

Risk planning is the process of identifying possible sources of risks, defining the scales used to rate the impact and likelihood, and how they will be combined to identify and mitigate risks that need to be addressed. The following sections will identify sources of risks, how they will be measured and prioritized, and strategies for mitigation.

2.6.2 Risk Sources and Parameters

Many sources of risk are accepted without adequate planning. Early identification of both internal and external risks can lead to early identification and mitigation of actual risks. The following are internal and external sources that have been examined to identify risks.

- Continually changing requirements
- Politically sensitive FDOT priorities
- Difficult design
- Undefined or unaddressed cybersecurity and data privacy needs

- Inadequate staffing and skills
- Cost or funding issues
- Disruptions to continuity of operations

The likelihood category of the risk has been assigned a risk likelihood category below based on the change of occurrence as defined in the Risk Likelihood Category List below:

- 4: Highly Likely: The risk has a 76% to 100% chance of occurring.
- 3: Likely: The risk has a 51% to 75% chance of occurring.
- 2: Somewhat likely: The risk has a 26% to 50% chance of occurring.
- 1: Unlikely/Improbable: The risk has a 0% to 25% chance of occurring.

The risk impact category of the risk has been determined based on the impact or program as defined in the Risk Impact Category list below:

- 4: Critical: Threatens the viability of the project
- 3: Severe: Threatens project/severely reduces benefit
- 2: Moderate: May delay project/reduce project benefits
- 1: Minimal/ Minor: Minimal or no impact on project

The Risk Score is calculated as the sum of Risk Likelihood and Risk Impact. The Risk Score is tracked to help prioritize risks.

Risk Priority is determined by engineering judgement of Risk Probability and Risk Impact. The priority values are assigned as follows:

- Risks with a risk score of 6-8 have a high priority. Mitigation plans will be explicitly discussed with the FDOT in the event the risk becomes a problem. During mitigation planning, resources are first allocated to high criticality risks to mitigate their threats.
- Risks with a risk score of 4-5 have a moderate priority. Mitigation plans will be discussed with FDOT.
- Risks with a risk score of 2-3 have a low priority. No action planning or risk tracking is necessary. However, the risk shall be periodically reviewed to ensure risk probability and risk impact conditions have not changed.

2.6.3 Identify and Analyze Risks

The following methods will be used to identify any additional risks that arise through the design, construction, and integration processes (project staff will enter identified risks into the Risk Matrix (Table 3) upon identification:

- Team reviews
- Peer reviews
- Feasibility studies
- Prototypes

- Examining each element of the project work breakdown structure
- Interviewing subject matter experts
- Reviewing risk management efforts of similar projects
- Examining lessons-learned documents or databases
- Examining design specifications and agreement requirements
- Brainstorming

2.6.4 Avoid, Mitigate, and Transfer Risks

Osceola County staff, responsible for risks, will work with the Contractor PM and other stakeholders to develop plans to handle identified risks. The Contractor will include the plans for avoidance, mitigation, and transference of risks in the Risk Matrix (Table 3) with a high and moderate priority.

2.7 Creating the Requirements Traceability Verification Matrix (RTVM)

RTVM to be created during project development.

2.7.1 System Verification

Systems Verification Plan to be created during project development.

2.8 Conducting System Testing, Integration, Verification, and Acceptance Planning

During the project development process, the Consultant for Osceola County will be responsible for developing a Project Integration and Test Plan that describes the performance and control of all aspects and levels of integration and testing. This plan will include milestones defining the completion of each test procedure and beginning of the next corresponding test procedure. The plan will cover all processes to the extent possible and needed to demonstrate a properly tested, configured, and fully functional system.

Osceola County will define the optimum integration sequence for the various hardware and software functions and develop schedules and procedures for testing those products as they are integrated. This activity (In-progress Testing) will evolve as more of the system is delivered to integration and testing, into the initial procedures for the System Acceptance Test.

The following documents are inputs to the test planning process:

- Contract Requirements (Scope of Services, MTRs, Plans, Technical Special Provisions, and FDOT Standard Specifications for Road and Bridge Construction, etc.)

- Project Schedule
- RTVM

All testing procedures will be witnessed and verified by FDOT or Construction Engineering and Inspection (CEI) personnel. Approved Test Plan will be used to determine if a test should be accepted or rejected based on its results.

2.8.1 System Integration and Testing

During the project development process, Osceola County's Consultant will be responsible for all system integration and testing with the CEI overseeing their efforts. Arrangements must be made with Osceola County personnel prior to performing any testing or integration that uses an existing communications system component. As a part of the Project Integration and Test Plan, Osceola County will provide Stand Alone, Subsystem, and System Acceptance Testing Procedures as described in detail in the following sections. All testing procedures will be reviewed by Osceola County personnel to ensure that the procedures will demonstrate full compliance with the Contract Documents.

As a part of their integration effort, Osceola County will be responsible for integrating all applicable ITS components outlined in the Strategic Plan into the Centracs Advanced Traffic Management Software (ATMS) software.

2.8.2 System Integration and Testing

During the project development process, Osceola County's Consultant will be responsible for developing Stand-Alone Test Procedures for each ITS device installed on the project. The Stand-Alone Test Procedures are to be submitted as a part of the overall Project Integration and Testing Plan. The testing procedures will be reviewed by County personnel to ensure that the Contractor clearly demonstrates their adherence to the Contract Documents.

All ITS field equipment installed at each individual site must be tested to demonstrate functionality of all non-network features and ensure compliance with the Contract Documents. Stand-Alone Testing of a site will be accomplished only after all equipment at that site can be shown to work as a stand-alone unit. Stand-Alone Testing must be completed prior to any System Integration efforts.

2.8.3 Subsystem Testing

The Subsystem Test Procedures are to be submitted as a part of the overall Project Integration and Test Plan. The Subsystem Test shall be developed to demonstrate connectivity of ITS devices to the system and to ensure adherence to the Contract Documents for each of the systems being deployed. The testing procedures will be reviewed by County personnel to ensure that the Contractor clearly demonstrates their adherence to the Contract Documents.

2.8.4 System Acceptance Testing

A Consultant/Contractor who is selected by the County during project development will perform System Acceptance Testing at the Osceola County Traffic Management Center (TMC). The Consultant will be responsible for demonstrating that all new ITS equipment installed as part of the Strategic Plan is fully operational from the Osceola County TMC.

2.9 System Validation

A separate Systems Validation Plan document will be created as a part of this effort. This document will build upon the performance requirements detailed in the ConOps and will detail specific system validation responsibilities, locations, schedules, and specific performance measures. These performance measures will include (but not be limited to) the following:

- Average travel times
- Travel time reliability
- Number of vehicle crashes
- Incident response times
- Transit On-Time Performance

3. Project Management and Control

Figure 1 shows a graphical representation of the project stages of a typical ITS project. The following areas will be covered in this section on Project Management and Control:

- Organization structure
- Managing the schedule
- Work break down schedule (WBS) and work plan
- Procurement management
- Communications management
- Cost management
- Risk management
- Subcontractor management
- Engineering specialty integration
- Integrated logistics support and maintenance engineering
- Monthly project status reviews
- Change management
- Quality management (QM)
- Systems acceptance
- O&M/upgrade/retirement
- Lessons learned

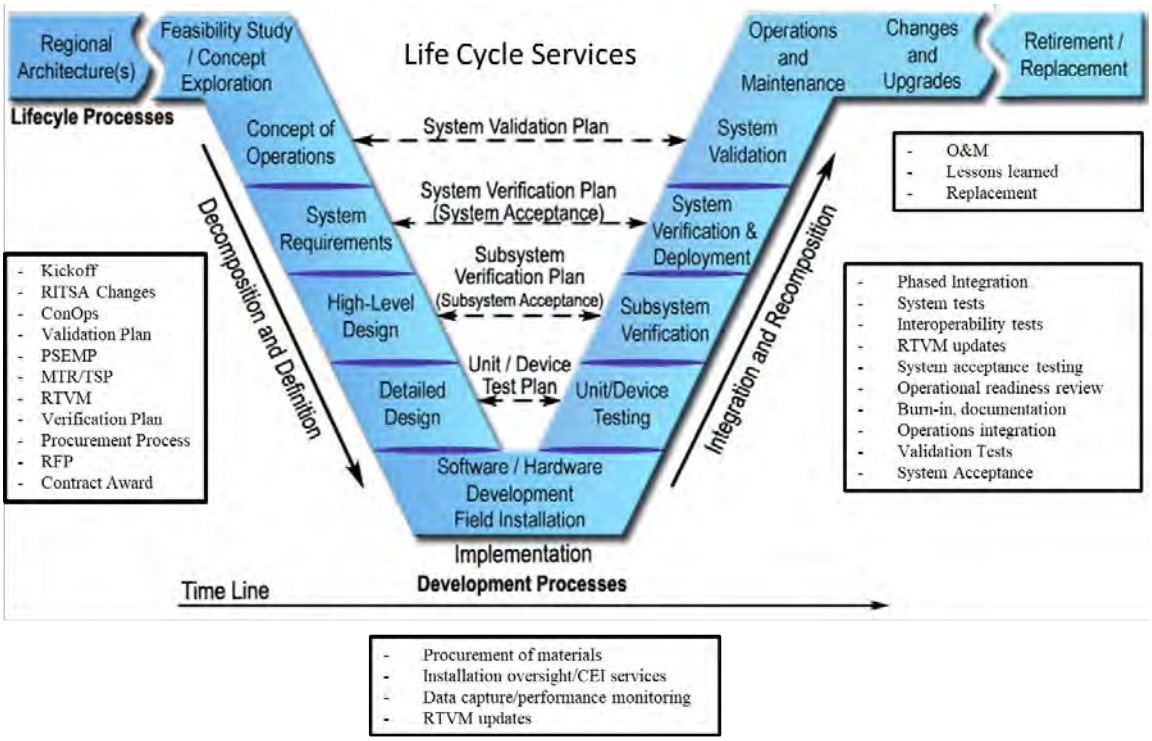


Figure 1: Project Stages for ITS Project

3.1 Organization Structure

During the project development process, Osceola County's Consultant and Contractor will work with the County PM and/or their representative and the CEI Project Administrator to facilitate the successful and efficient completion of the project. The Consultant and Contractor's responsibilities will be further defined in the RFP/Scope/Contract documents for the project.

The CEI will have the primary responsibility for construction inspection, project coordination, and oversight; however, the County PM and/or their representative may share some of the inspection responsibilities for the project. The County Construction PM will be primarily responsible for the oversight of the inspection of construction activities.

The Engineer of Record (EOR) will be responsible for all design aspects, including coordination with power companies, developing utility schedules, obtaining permits, all site surveys and geotechnical investigations, etc.

This section will be updated with a project organization chart when all members of the Consultant, County, and Contractor teams have been identified. Ideally, this will be prior to beginning the procurement process, but no later than award of the construction contract.

3.1.1 The Project Team

During project development, the Project Team will be made up of Consultant/Contractor and County personnel.

The Consultant/Contractor has the following responsibilities:

- Ensuring that all the requirements stated in the RFP, Scope of Services and MTRs (if required) have been met
- Surveying, geotechnical investigation, and design plans
- Creating final design plans including requirements regarding construction and Maintenance of Traffic (MOT) during construction
- Project management, scheduling, and coordination with other agencies and entities, such as state and local governments, utilities and environmental permitting agencies, and the public
- Integration, Subsystem and System Acceptance Testing

The County will have the following responsibilities:

- Providing contract administration, management services, and technical reviews, as necessary, of all work associated with the development and preparation of contract plans and shop drawings, and project construction
- Procurement of Devices (As required)
- CEI Services

3.1.2 CONTRACTOR Team

The Contractor Team will have the following responsibilities:

- Acquisition of all permits not acquired by the County and any required modification(s) to the permits acquired by the County
- MOT
- Demolition
- Construction on or before the applicable deadlines indicated in the contract
- Coordination of all utility relocations

3.2 Work Breakdown Structure (WBS) and Work Plan

During the project development process, the Work Plan and WBS will consist of the following items, including required inputs, activities, and outputs:

- Kick-off Meeting.
    - Inputs: Notice to Proceed (NTP), Proposal, Contract.

  - Activities: Coordinate meeting content, publish agenda, conduct meeting, publish minutes.
  - Outputs: Meeting Agenda, Minutes, Presentation Slides
- Project Management
  - Inputs: RFP/Scope, Contract.
  - Activities: Coordinate all activities related to design, construction, and integration
  - Outputs: Finished system fully integrated into and functional within the Osceola County ATMS
- PSEMP
  - Inputs: Previous PSEMPs, ConOps, Contract
  - Activities: Create and update the PSEMP through the life of the project
  - Outputs: Finished PSEMP document
- Project Schedule
  - Inputs: RFP/Scope, Contract
  - Activities: Create and adhere to the project schedule through the life of the project
  - Outputs: Schedule
- Design
  - Inputs: RFP/Scope, Contract, Systems Engineering documents, Field Review Information, County Comments
  - Activities: Design project based on RFP/Scope requirements (Number of submittals TBD)
  - Outputs: Final Design Plans
- System Test Plan and System Test Procedure
  - Inputs: RFP/Scope, Contract, Systems Engineering documents, Vendor Information
  - Activities: Create test plans and procedures according to RFP/Scope requirements, vendor specifications, and industry best practices
  - Outputs: Final Design Plans
- Training Workshops (Onsite)
  - Inputs: Vendor Information, ATMS Software Information
  - Activities: Train Osceola County TMC staff to effectively utilize new infrastructure installed
  - Outputs: TMC with Fully Trained Staff
- Operations, Maintenance and Support
  - For a term TBD
  - Inputs: Vendor Information, ATMS Software Information
  - Activities: Provide Osceola County with continued operations, maintenance, and support activities as needed
  - Outputs: Continued Operations, Maintenance, and Support Activities
- System Acceptance
  - Inputs: Certified Completed Testing, Completed TMC Staff Training
  - Activities: Osceola County certify that all construction and integration activities are complete, operations are turned over to Osceola County
  - Outputs: Final System Acceptance

- Weekly O&M Status Meeting
  - For a term TBD
  - Inputs: Previous Meeting Minutes, Action Items
  - Activities: Coordinate meeting content, publish agenda, conduct meeting, publish minutes.
  - Outputs: Meeting Agenda, Minutes, Presentation Slides
- Contract End

3.3 Managing the Schedule with the Project Evaluation and Review Technique (PERT) / Critical Path Method (CPM)

As the project moves into the design phase, the Osceola County's Consultant will work with County staff to generate a PERT/CPM chart. The chart will show all project tasks, milestones, and task dependencies. An example PERT chart is shown in Figure 2.

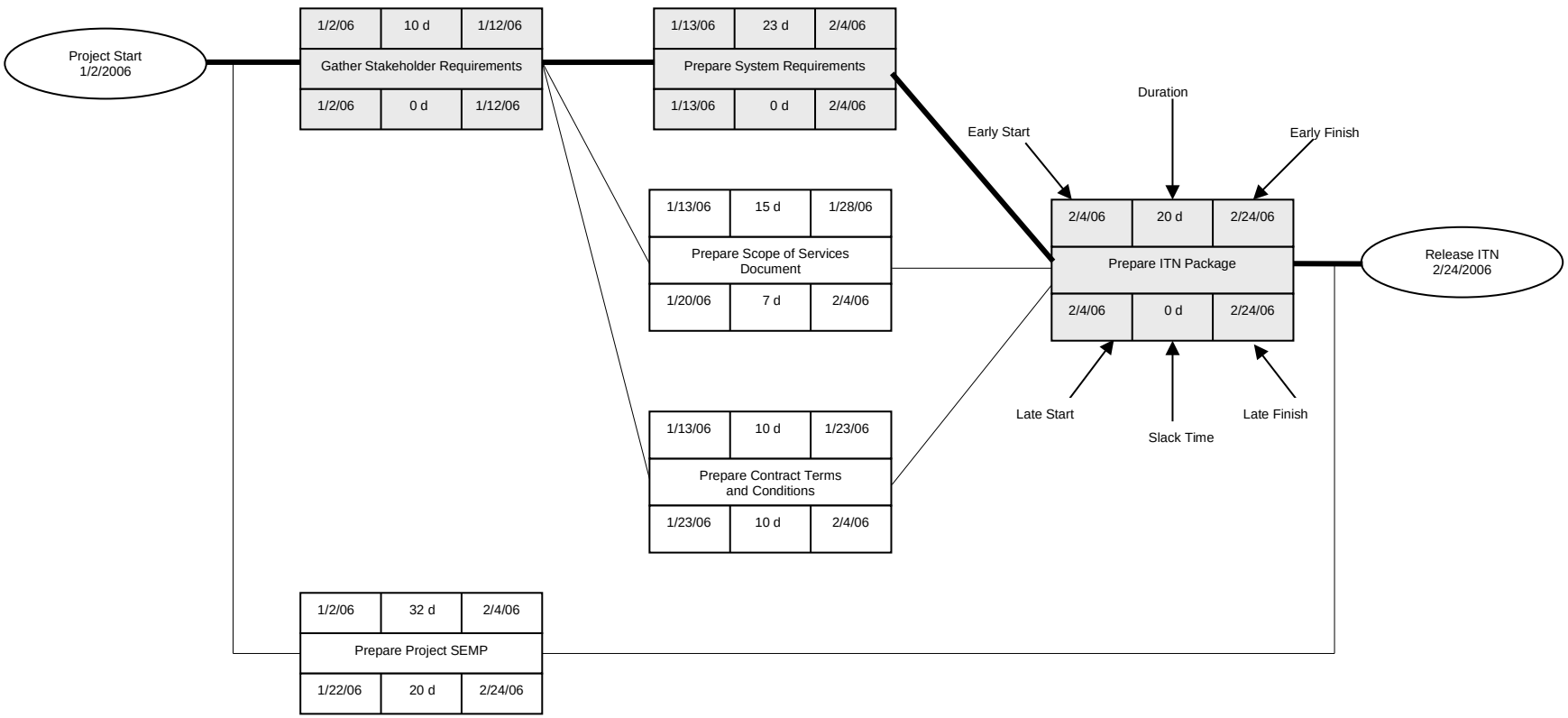


Figure 2: Example of Project Evaluation and Review Technique Chart (PERT Chart)

3.4 Procurement Management

A separate procurement plan document will be generated during the project development process. It will provide guidelines and recommendations to ensure an efficient and cost-effective solution for equipment procurement. The Contractor will be responsible for procurement of all materials, devices, structures, etc. required to complete the construction, integration, and testing. Any items to be used must be submitted to the design consultant EOR for their review and approval. The design consultant EOR is responsible for reviewing the submittal to ensure that it is on the FDOT APL, as applicable, and meets the requirements of the Contract Documents. When the County concurs with the design consultant EOR's review and disposition of the submittal, the County will stamp and distribute the submittal. The Consultant will only be compensated for items which have received approval of the design consultant EOR and the County concurrence and are performing in accordance with the project requirements.

3.5 Communications Management

3.5.1 Communication Channel

Osceola County's PM and Consultant will be the primary communication channel for the project. They may invite additional team members to communicate, but will approve the communications and be provided documentation of the communications in the form of being copied on emails or provided meeting notes. This invitation can be informal, implicit or assumed, but ultimately is under the authority of the respective PMs who will provide direction to clarifiy or fine-tune communication patterns and protocols when needed.

3.5.2 Meetings

The project will have a kick-off meeting, a closeout meeting, monthly project status meetings, and additional specific purpose and ad hoc meetings. These meetings will have an agenda provided by the County's Consultant five business days prior to the meeting, and meeting notes provided within two business days after the meeting, unless agreed upon otherwise by the PMs. Each PM, or their delegate will invite participants to the meeting from their respective organizations. The kickoff meeting establishes the initial scope, cost, schedule, risks, and issues, while the project status meetings will cover variances of these items, and the close-out meeting discusses completion and resolution of these items.

3.5.3 Central Project Documentation Repository

The Consultant will provide a SharePoint project website for use by the project. This site contains collaboration features including a document library that will be used to host all related project documentation.

3.5.4 Communications Tracking

Osceola County's Consultant will create a Project Log to track all project communications and keep it organized using different tabs for different types of communications at their discretion. The following tabs should be considered as part of the Project Log:

- Risk Log
  - Used to record risks as they are exposed and defined by the project team. **Section 2.6** describes the use of the Risk Log, which may be built into the Project Log as a tab within it.
- Action Item Log
  - Used to record Action Items that need to be addressed outside the context in which they arise. The Action Item Log would have such fields as ID, Action Item, Owner, Importance (Low, Medium, High), Status (New, Open, Pending, Closed, Escalated), Date (Assigned, Planned for Completion, Actual Completion) and Linkage to Other Logs.
- Issues Log
  - Used to record Issues. Issues are topics that need discussion or consideration. The Issues Log would have such fields as ID, Issue Description, Identified By, Priority (Low, Medium, High), Status (New, Open, Pending, Completed), Project Impact, Action Plan Resolution, Owner, Date (Assigned, Planned for Resolution, Actual Resolution) and Linkage to Other Logs.
- Decision Log
  - Used to record decisions made by the Department PM that affect execution of the contract. The Decision Log would have such fields as ID, Question/Issue/Action Description, Date Entered, Entered By, Date When Decision Needed, Project Impact, Decision Made, Decision Maker, Date Decision Made, Status (New, Open, Pending, Closed, Escalated) and Linkage to Other Logs.
- Communication Log
  - Used to record official communications regarding deliverables, meeting schedules, or otherwise. The Communications Log would have such fields as ID, Document Title, Description, Date Sent, Format/Method (email, etc.), Template Used, Owner, Recipient/Attendees, Feedback Expected, Date Feedback Due, Date Feedback Received, and Linkage to Other Logs.
- Change Control Log
  - Used to record all proposed Engineering Change Orders (ECO) for the contract. The Change Control Log would have such fields as ID, Change Description, Priority (Low, Medium, High), Originator, Date Entered, Change Owner, Date Assigned, Due Date, Impact (Scope Change?, Cost Change?, Schedule Change?), Date Presented, Approval Authority, Date of Decision, Requires Contract Amendment?, Date of Contract Amendment, and Linkage to Other Logs.

3.5.5 Deliverable Management and Approval Process

Osceola County's Consultant and Contractor will follow the two phase process below for developing and submitting required document deliverables.

3.5.5.1 Phase 1 — Document Template Outline Approval

Where document templates are available on the FDOT Systems Engineering website, the template shall be used and may be tailored by the County or Contractor in developing the document unless an alternative is agreed to. Where a specific document template is not available, the County or Contractor shall use the Department's non-specific technical memorandum document template and include the sections and information specified in the scope item at a minimum.

The County's Consultant/Contractor and Osceola County will agree on deadlines for the document deliverable submittal activities (described below) that fit within the project schedule.

The County's Consultant/Contractor will submit a document shell or outline for the County's review, content, and approval following the submittal procedure below. The document shell will contain the outline of the document and may contain notes to guide the development of the document content.

Osceola County will email the County's Consultant/Contractor that the outline has been accepted.

3.5.5.2 Phase 2 —Document Submittal and Review Procedure

Where document templates are available on the Department's website, the template shall be used.

1. Once a document template has been accepted, the County's Consultant/Contractor will develop a draft of the deliverable.
2. Draft documents will use draft watermarks.
3. The County's Consultant/Contractor delivers the draft deliverable to the County by the draft deliverable due date.
4. The County reviews the deliverable and provides comments to the County's Consultant/Contractor by the deliverable review due date. Comments will be provided as comment balloons and tracked changes if using Microsoft Word; otherwise, a comments table will be provided that will track each comment's text, reference location within the deliverable, and a place for the County's Consultant/Contractor's response, and a status of the comment.
5. The County's Consultant/Contractor addresses comments by modifying the submittal and answering questions by the revision due date. Changes to the deliverable shall be tracked using the tracked changes feature of Microsoft Word if the deliverable is in that format, otherwise, a list of changes made to the deliverable shall be provided with the comments responses.
6. Osceola County reviews the County's Consultant/Contractor's comment responses and deliverable changes by the revision review due date. All comments shall be marked as

completed using the "Mark as Completed" function of the comment balloon if using Microsoft Word, otherwise by indicating in a comments table's status field.

7. Steps 3 and 4 will repeat until Osceola County marks all comments as completed.

3.6 Cost Management

During project devleopment, the method of compensation will be agreed upon.

3.7 Risk Management

Osceola County's Consultant will apply oversight and ongoing reevaluation of risks after they have been originally identified and evaluated per **Section 2.6**.

3.8 Subcontractor Management

The Contractor is considered the "Prime" of the project. The prime Contractor may hire or team up with subcontractors and/or design firms as needed. In such cases, the Prime is directly responsible for managing their subcontractors. Sublet documentation is required to be submitted to the County or their consultants by the Contractor for any subcontractors who will be working on the project. The subcontractors sublet paperwork must be approved by the County or their consultants prior to them performing any work on the project.

3.9 Engineering Specialty Integration

Engineering specialties are highly specialized engineering disciplines included in a project to support Osceola County's Consultant, Osceola County, and the ITS CEI. These specialists increase the expertise available to the project team and support the specialty requirements of the project deployments outlined in the Strategic Plan. It is not anticipated that anyone outside of Consultant, Osceola County, and ITS CEI will be required to assist with design, construction oversight, integration or testing activities. For the project deployments outlined in the Strategic Plan, all ITS related construction and implementation will be provided by the Consultant and Contractor. The Consultant and Contractor will be supported by other Osceola County and Consultant representatives, as required.

3.10 Integrated Logistics Support and Maintenance Engineering

At this time, it is not anticipated that Integrated Logistics Support and Maintenance Engineering will be required. This section will be updated should it become apparent that this discipline will be required.

3.11 Project Status Reviews

Osceola County's Consultant and the Contractor will attend periodic meetings with the County personnel and/or their representatives and other agencies as required for the resolution of design, integration, and/or construction issues. These meetings may include:

- Action Item reviews and resolution
- County technical issue resolution
- Permit agency coordination
- Local government agency coordination
- Scoping meetings
- Pre-construction meeting
- Major risk item reviews
- Critical path item status review

The Consultant and Contractor will, on a monthly basis, or as required by the County Project Manager, provide an updated Project Schedule and provide written progress reports that describe the items of concern and the work performed on each task.

3.12 Change Management

Osceola County's Consultant and Contractor will address changes in schedule and the subsequent impacts by adjusting the schedule and determining any associated cost or time impacts. Sometimes changes in task durations give rise to a new critical path for the project, which must be closely monitored as the project proceeds.

Changes in basic project requirements need careful review. The CEI, acting for the County Construction PM will inform stakeholders of changes to any basic project requirements and the subsequent outcomes. The CEI is responsible for coordinating with the County ITS PM and the County Construction PM to determine impacts and acceptability of any changes to basic project requirements. All changes after the preliminary design must be well documented and distributed to all relevant stakeholders. A single document, developed in accordance with the Construction Project Administration Manual (CPAM), will be compiled throughout the duration of the project to document all changes that have been made to the construction plans and/or Contract Documents. Changes to the plans during construction due to authorized field changes, unforeseen site conditions, or design errors/omissions must also be documented in this document as well as be included in the final "as-built" plans.

3.13 Quality Management

Osceola County's Consultant shall provide a QM plan that describes the procedures to be followed in order to verify, independently check, and review all design drawings, specifications, and other documentation prepared as a part of this project deployments outlined in the Strategic Plan. The

QM plan shall describe how these verification and review processes are to be documented to ensure that the procedures set forth are being followed. The EOR shall utilize the County's quality control checklist. The responsible Professional Engineer that performed the Quality Control review shall sign a statement certifying that the review was conducted.

The Contractor will submit a Quality Control (QC) plan conforming to the requirements of the Contract Documents and Section 105 of the Standard Specifications for Road and Bridge Construction. The Contractor's QC plan must detail, if applicable, the qualified personnel, laboratories and production facilities they intend to use on this project. The CEI will have the primary function of monitoring the Contractor's level of compliance with the approved QC plan throughout the construction duration of the project.

3.14 Systems Acceptance

The systems acceptance process is critical because this is where Osceola County becomes responsible for the continued maintenance and management of the systems, products, and processes delivered. The system must successfully pass all test procedures detailed in the Integration and Testing Plan (Stand-Alone, Subsystem, and System) and a project walk-through (all installed infrastructure) shall be performed by Osceola County ITS Maintenance personnel (in-house or consultant) during System Acceptance Testing to document any outstanding construction deficiencies prior to acceptance of the project. All outstanding construction deficiencies noted during the project walk-through must be addressed and verified by Osceola County or their designated representatives prior to acceptance of the project.

The County Construction PM will assign a County Consultant or CEI staff member to be the Test Manager that will oversee the project testing. The person designated to oversee the testing must be familiar with the Osceola County ITS network architecture and system. The designated individual will use the plans, specifications, and RTVM to supervise the entire testing process. They will provide the status of all tests in report form to the County PM, who will carefully review the reports and decide upon the final acceptance of the system.

3.15 Operations and Maintenance, Upgrade, and Retirement

Throughout the duration of the project, the Contractor will be responsible for the maintenance of ITS infrastructure within the project limits or as otherwise defined by the Contract. As a part of this ongoing maintenance effort, the Contractor will prepare an ITS Repair Plan for submittal and approval by the County. Once completed, the ITS Repair Plan will become an Appendix to this PSEMP. This plan will be supplemented with a written assessment of all existing ITS devices and acceptance of the current condition of all ITS devices and infrastructure which will be determined by an initial project walk-through at the beginning of the project. Any failures of devices or existing deficiencies identified during the initial project walk-through will not be the Contractor's responsibility to maintain. Once the initial assessment is complete, the Contractor will be responsible for maintenance of all existing and proposed devices under construction or impacted by the construction until the project is final accepted.

Upon final acceptance, Osceola County will take over O&M responsibilities with the exception of any construction elements that are still covered under warranty.

The upgrade and retirement of the system should be addressed at a time determined by Osceola County to be necessary.

3.16 Lessons Learned

Upon final acceptance, Osceola County's Consultant, the Contractor, the County, and CEI personnel will meet to discuss lessons learned. The lessons learned discussed at this meeting will be incorporated into this section of the PSEMP for future reference.

Appendix L – RITSA

DOCUMENT CONTROL PANEL		
File Name:	*Task 3 – RITSA*	
File Location:	*R:\PROJECT\OSCEOLA CO. CONT SERVICES\ITS Strategic Plan\Task 3*	
Deliverable Number:	1	
Version Number:	1.0	
	Name	**Date**
Created By:	Mohammad Akber, P.E. (Metric)	11/26/19
Reviewed By:	Katie King, P.E. (Metric)	12/2/19
	Katie King, P.E. (Metric)	12/9/19
	Dale Cody, P.E. (Metric)	12/12/19
Modified By:	Mohammad Akber, P.E. (Metric)	12/6/19
	Mohammad Akber, P.E. (Metric)	3/31/20
Approved By:		

Table of Contents

List of Tables

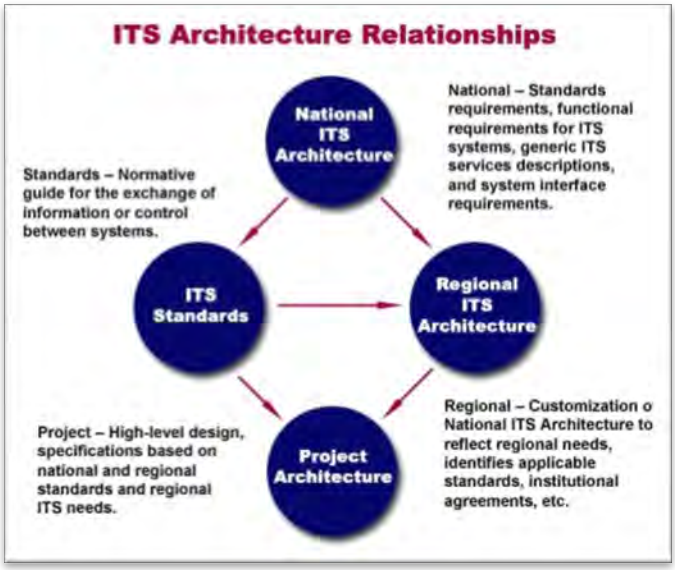
List of Acronyms

ADMS ..... Arterial Dynamic Message Sign
ARC-IT..... Architecture Reference for Cooperative and Intelligent Transportation
ATMS..... Advanced Traffic Management Systems
CCTV ..... Closed Circuit Television
CFR ..... Code of Federal Regulations
CFX ..... Central Florida Expressway Authority
CVRIA..... Connected Vehicle Reference Implementation Architecture
EOC..... Emergency Operations Center
FDOT..... Florida Department of Transportation
FOC..... Fiber Optic Cable
ITS..... Intelligent Transportation Systems
JPO ..... Joint Program Office
NITSA..... National ITS Architecture
RITSA ..... Regional ITS Architecture
RTMC..... Regional Transportation Management Center
SITSA..... Statewide ITS Architecture
TMC..... Traffic Management Center
TSM&O..... Transportations Systems Management and Operation
USDOT ..... United States Department of Transportation

1. Regional ITS Architecture (RITSA)

1.1. Background

The National ITS Architecture (NITSA), also known as the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT), is a nationwide tool that is used as framework for planning, defining, and integrating ITS for all agencies that utilize Transportation Systems Management and Operations (TSM&O). It defines the following functions: subsystem functions, where the functions reside (in vehicle, Traffic Management Center (TMC), or field), how the subsystems interface and communications requirements of the subsystems. It is a mature product that has been developed through extensive cooperation and participation of many different types of agencies that contribute to the TSM&O network. The NITSA reflects the contributions of a broad cross-section of the Intelligent Transportation Systems (ITS) community, including systems engineers, system developers, transportation professionals, and technology specialists.[1] A key benefit of utilizing the NITSA is the definition of key interfaces for standardization. ITS standards are crucial as they detail how ITS systems, products, and components can interconnect, exchange information and interact to deliver services within a transportation network. The use of standards encourages industry growth by minimizing development costs, increasing compatibility and interoperability, and increasing buyer and seller confidence in products. This is accomplished by allowing both like and different ITS devices and equipment to exchange and interpret data directly through a common communications interface. This exchange and recognition of data can take place between devices located within a single system or between devices operating in different systems. By using standards-based agencies can join forces to extend the reach and capabilities of their ITS infrastructure investments.[2]



[1] https://www.standards.its.dot.gov/LearnAboutStandards/NationalITSArchitecture

[2] https://www.standards.its.dot.gov/LearnAboutStandards/ITSStandardsBackground

The Florida Department of Transportation (FDOT) Regional ITS Architecture (RITSA) represents a portion of the NITSA, that has been designed to show how transportation systems are integrated within the State of Florida. The Code of Federal Regulations Part 940 (CFR 940) requires a RITSA conforming to the NITSA for all ITS projects receiving federal funding. The FDOT architecture was developed in 2005 and updated in 2016 with input from the transportation network stakeholders within each District. The FDOT District 5 architecture represents a shared vision of how each agency's systems will work together in the future to enable sharing of information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the Central Florida region.

Task 3 of the Osceola County TSM&O Strategic Plan is to ensure that all TSM&O infrastructure (both existing and proposed) conforms to the FDOT District 5 RITSA and that all planned deployments will be eligible for federal funding.

In order to assist states with the conformance to the NITSA, the United States Department of Transportation (USDOT) ITS Joint Program Office (JPO), created a software application called Turbo Architecture in 2012.[3] The Turbo Architecture software is an application that supports development of regional and project ITS architectures using the National ITS Architecture as a reference. However, from the national perspective the need to consider new service packages and standards to support the rapidly developing connected and automated vehicle technologies brought the rise of a second architecture, the Connected Vehicle Reference Implementation Architecture (CVRIA). The CVRIA project was completed in 2014, and developed a website that hosts the architecture viewpoints for 88 connected vehicle safety, mobility, environmental, and support applications.[4] One thing that became apparent between the NITSA 7.1 and the CVRIA architecture sets was that there was a great deal of overlap of planning information between them but they contained service package and flow names of different naming conventions and definitions. This has led to the integration of the National ITS architecture, version 7.1 with the CVRIA architecture, version 2.2 into one overarching architecture, the ARC-IT version 8.0. ARC-IT version 8.0 is a major upgrade that fully incorporates connected vehicle capabilities to the NITSA in detail that was released in July 2017.

The FDOT Statewide ITS Architecture (SITSA) for the state was created in Turbo Architecture and is currently in version 7.1. However, Statewide, the RITSAs of every District will be undergoing a transition. Current ITS architectures are laid out in two separate software programs: National ITS Architecture Turbo 7.1 and CVRIA 2.2. In the future, all architecture will migrate from utilizing these 2 separate software programs to the latest Arc-IT 8.3 software. This program will encompass all capabilities of each program. FDOT Central Office recently executed the Florida

[3] https://www.its.dot.gov/press/2012/turbo_architecture7.htm

[4] https://www.standards.its.dot.gov/DevelopmentActivities/CVReference

ITS Architecture Support and Maintenance Project with Iteris to perform the migration of the Statewide ITS Architecture. Christine Shafik, PE, PMP®, CPM, FCCM, FCCN, CGB the State ITS Software Engineer is the Department Project Manager leading this effort. Preliminary schedules indicate the initial review activities and stakeholder workshop activities for the migration of District 5's architecture in 2020.

It is recommended that all deployments proposed as a part of the Osceola County TSM&O Strategic Plan be added to the RITSA during the software migration process. This document will detail the projects that are recommended to be added to the RITSA and the service packages that should be included in each project.

1.2. FDOT District 5 Existing Service Packages in the RITSA

A review of the service packages included in the existing FDOT District 5 RITSA pertaining to operator/maintainer agencies was performed to determine what portions of the Strategic Plan recommendations are already included as a part of the RITSA. The existing service packages and their accompanying flow diagrams can all be found online at https://teo.fdot.gov/architecture/d5/web/html/inv/el134.htm. **Table 1** shows a list of the existing applicable service packages in Osceola County. It should be noted, service packages for the Osceola County Expressway Authority are not included. The County has transferred ownership of those functions to the Central Florida Expressway Authority (CFX).

Table 1 - Existing Osceola County Engineering Service Packages in the RITSA

Service Package Name - Description
AD1 - ITS Data Mart - MetroPlan Transportation Data Collection System (1 of 2)
AD2 - ITS Data Warehouse - Central Florida Data Warehouse (1 of 2)
AD2 - ITS Data Warehouse - Local Archives (1 of 2)
APTS02 - Transit Fixed-Route Operations - LYNX Operations Center
APTS02 - Transit Fixed-Route Operations - School District Transportation Dispatch
APTS09 - Transit Signal Priority - LYNX (1 of 5)
ATIS01 - Broadcast Traveler Information - Florida 511 / Private ISPs (3 of 3)
ATIS02 - Interactive Traveler Information - Virtual Travel Planning Center (1 of 2)
ATIS06 - Transportation Operations Data Sharing - Private Sector ISPs (2 of 2)
ATMS01 - Network Surveillance - Osceola County
ATMS02 - Traffic Probe Surveillance - Osceola County/ City of Ocala / Marion County
ATMS03 - Traffic Signal Control - Osceola County
ATMS06 - Traffic Information Dissemination - Osceola County
ATMS07 - Regional Traffic Management - FDOT Districts (2 of 3)
ATMS07 - Regional Traffic Management - Orange County / City of Orlando
ATMS08 - Traffic Incident Management System - Osceola County (TM to EM)
ATMS08 - Traffic Incident Management System - County Emergency Operations Center (TM to EM)
ATMS08 - Traffic Incident Management System - County Traffic Management Centers (TM to MCM)
ATMS13 - Standard Railroad Grade Crossing - City of Daytona Beach / City of Orlando / Osceola County
ATMS15 - Railroad Operations Coordination - Rail Operations Centers
EM02 - Emergency Routing - Osceola County
EM06 - Wide-Area Alert - County EOCs (1 of 3)
EM07 - Early Warning System - County EOCs (2 of 3)
EM08 - Disaster Response and Recovery - County EOCs (2 of 4)
EM09 - Evacuation and Reentry Management - County EOCs (2 of 3)
EM09 - Evacuation and Reentry Management - Central Florida Traffic Management Agencies
MC03 - Road Weather Data Collection - City of Daytona Beach / Osceola County
MC07 - Roadway Maintenance and Construction - Counties and Cities (2 of 2)
MC08 - Work Zone Management - Counties and Cities (2 of 3)
MC08 - Work Zone Management - Counties and Cities (3 of 3)
MC09 - Work Zone Safety Monitoring - Counties and Cities
MC10 - Maintenance and Construction Activity Coordination - Counties and Cities (2 of 4)

1.3. Required Changes

A review of the existing service packages in FDOT District 5 showed that most of the service packages that are applicable to the deployments recommended as a part of the Osceola County TSM&O Strategic Plan are already included in the current FDOT District 5 RITSA.

There is one project currently listed in the FDOT District 5 RITSA that could potentially include upgrades that are recommended as a part of the Strategic Plan. The project is titled Osceola

County ATMS Expansion, the services packages covered for the project are ATMS01, ATMS02, ATMS03, and ATMS06.

While upgrades recommended as a part of the Strategic Plan could potentially already be included in the Osceola County ATMS Expansion Project, this document will identify new projects for each deployment listed in the Strategic Plan.

A description for each of the projects is shown below:

Deployment 1 – Northwest Osceola County

This project includes the installation of the following TSM&O Equipment - 96 count Fiber Optic Cable (FOC), 24 count FOC for drop cables, CCTVs at most signalized intersections that are without them currently, Arterial Dynamic Message Signs (ADMS), and BlueTooth detectors (approximately every 2 miles)

Project limits in Deployment 1 include:

- US 192 from Westside Blvd to Seaview Castle Dr.
- Old Lake Wilson Rd. from US 192 to Osceola Polk Line Rd.
- Griffin Rd. from US 192 to World Dr.
- World Dr. from US 192 to Celebration Blvd.
- Celebration Blvd from World Dr. to Celebration Pl.
- Osceola Polk Line Rd. from Masters Blvd to US 17-92
- US 17-92 from Osceola Pole Line Rd. to Poinciana Blvd.
- Osceola Pkwy from S Victory Rd. to East of Polynesian Isle Blvd.
- Celebration Pl from Celebration Blvd to Celebration Ave
- Celebration Ave from Celebration Blvd to US 192
- Sunclair Rd. from Old Lake Wilson to Connector Rd.
- Seralago Blvd from US 192 to Osceola Pkwy

This project will require new instances of the following service packages:

- ATMS01 – Network Surveillance
- ATMS03 – Traffic Signal Control
- ATMS06 – Traffic Information Dissemination

Deployment 2 – City of Kissimmee

This project includes the installation of the following TSM&O Equipment - 96 count Fiber Optic Cable (FOC), 24 count FOC for drop cables, CCTVs at most signalized intersections that are without them currently, ADMSs, and BlueTooth detectors (approximately every 2 miles)

Project limits include:

- Poinciana Blvd from US 192 to South of Robert McLane Blvd
- FL 535 from Polynesian Isle Blvd to US 192
- Osceola Pkwy from East of Polynesian Isle Blvd to CR 530
- John Young Pkwy from Thacker Ave to Pleasant Hill Rd.
- US 17-92 from Pleasant Hill Rd. to Poinciana Blvd
- US 441 from North of Centerview Blvd to US 192
- Main St. from US 192 to Neptune Rd.
- Broadway Ave from Neptune Rd. to Stewart Ave
- Emmett St. from Stewart Ave to John Young Pkwy
- Neptune Rd. from Main St. to Old Canoe Creek Rd.
- Oak St. from Main St. to John Young Pkwy
- Thacker Ave from US 192 to Patrick St.
- Hoagland Blvd from US 192 to Columbia Ave
- Armstrong Blvd from US 192 to Columbia Ave
- Columbia Ave from Hoagland Blvd to John Young Pkwy
- Carroll St. from John Young Pkwy to Dyer Blvd
- Dyer Blvd from Osceola Pkwy to US 192
- Fortune Rd from US 192 to CR 530
- CR 530 from Fortune Rd. to Boggy Creek Rd.
- Buenaventura Blvd from Osceola Pkwy to CR 530
- Lakeside Dr. from Fortune Rd. to Westlake Dr.
- Boggy Creek Rd. from CR 530to Narcoossee Rd.
- Narcoossee Rd. from Boggy Creek Rd. to South of Disston Dr.
- Orange Ave from Orange/Osceola County Line to Osceola Pkwy
- Partin Settlement Rd. from Neptune Rd. to Remington Blvd
- Mill Slough Rd. from Michigan Ave to Denn John Ln
- Denn John Ln from US-192 to Mill Slough Rd.
- Michigan Ave from Osceola Pkwy to Vine St.

This project will require new instances of the following service packages:

- ATMS01 – Network Surveillance
- ATMS03 – Traffic Signal Control
- ATMS06 – Traffic Information Dissemination

Deployment 3 – City of St. Cloud

This project includes the installation of the following TSM&O Equipment - 96 count Fiber Optic Cable (FOC), 24 count FOC for drop cables, CCTVs at most signalized intersections that are without them currently, ADMSs, and BlueTooth detectors (approximately every 2 miles)

Project limits include:

- US 192 from Old Canoe Creek Rd. to Holopaw Rd.
- Old Canoe Creek Rd. from Neptune Rd. to Canoe Creek Rd.
- Narcoossee Rd. from Ralph Miller Rd. to US 192
- Canoe Creek Rd. from US 192 to Deer Run Rd.
- Kissimmee Park Rd. from Florida's Turnpike to Canoe Creek Rd.
- Deer Run Rd. from Canoe Creek Rd. to Hickory Tree Rd.
- New Notle Rd. from Canoe Creek Rd. to Hickory Tree Rd.

This project will require new instances of the following service packages:

- ATMS01 – Network Surveillance
- ATMS03 – Traffic Signal Control
- ATMS06 – Traffic Information Dissemination

Deployment 4 – Poinciana

This project includes the installation of the following TSM&O Equipment - 96 count Fiber Optic Cable (FOC), 24 count FOC for drop cables, CCTVs at most signalized intersections that are without them currently, and BlueTooth detectors (approximately every 2 miles)

Project limits include:

- Poinciana Blvd from South of Robert McLane Blvd to Pleasant Hill Rd.
- Pleasant Hill Rd. from Chad Ln. to Poinciana Blvd
- Cypress Pkwy from Poinciana Blvd to Poinciana Pkwy
- Marigold Ave from Cypress Pkwy to KOA St.

This project will require new instances of the following service packages:

- ATMS01 – Network Surveillance
- ATMS03 – Traffic Signal Control
- ATMS06 – Traffic Information Dissemination