Central Florida Connected Vehicles Initiative

Presented to:
MetroPlan Orlando

April 24, 2020

METRIC ENGINEERING

Overview

CV OVERVIEW

LOCAL CV INITIATIVES

PROJECT HIGHLIGHTS

Connected Vehicles Definition

The term **connected vehicles** refers to applications, services, and **technologies** that connect a **vehicle** to its surroundings

Connected vehicle technology will enable vehicles, roads & other infrastructure, and our smartphones to all communicate and share vital transportation information through advanced wireless communication technology

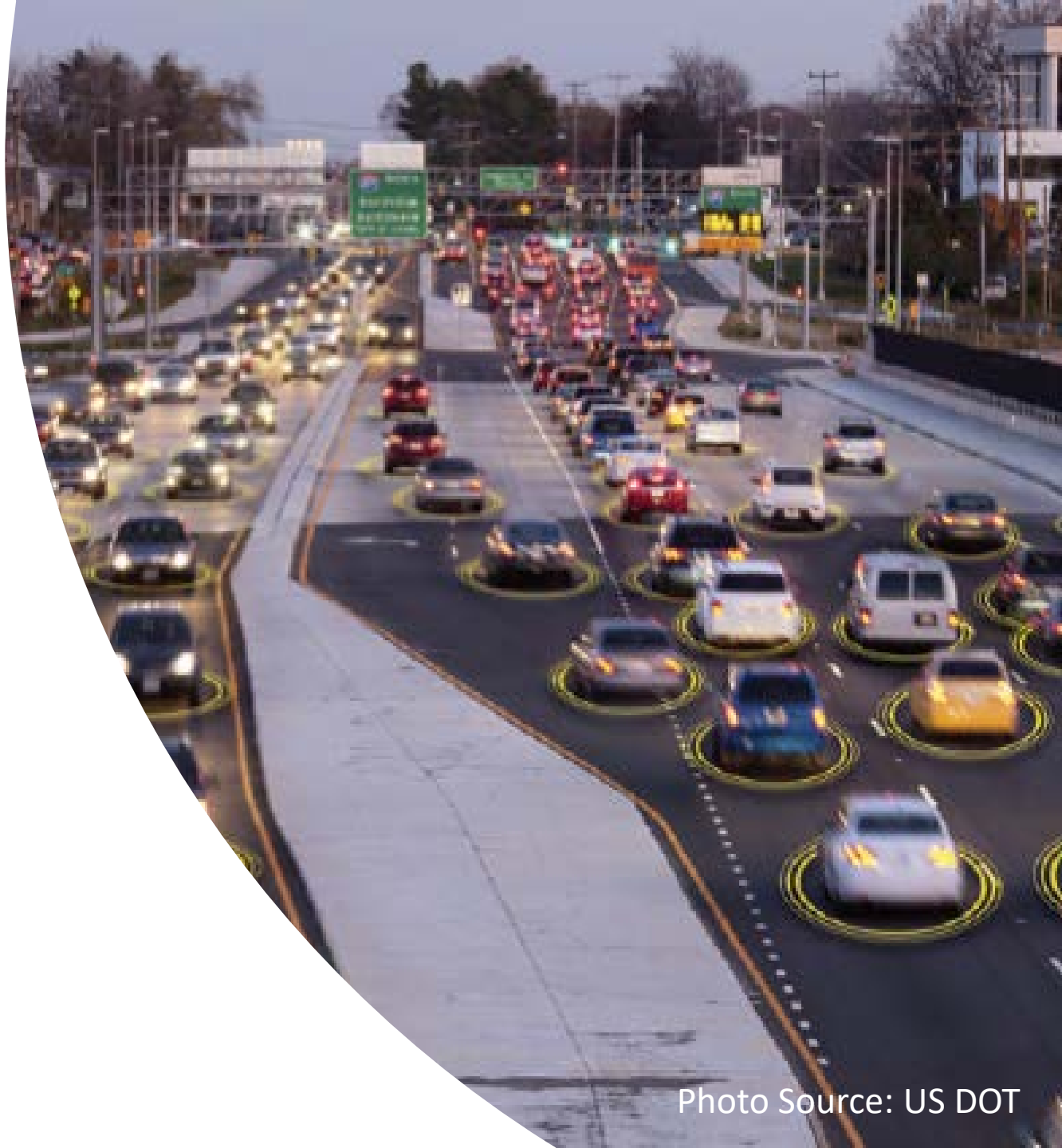


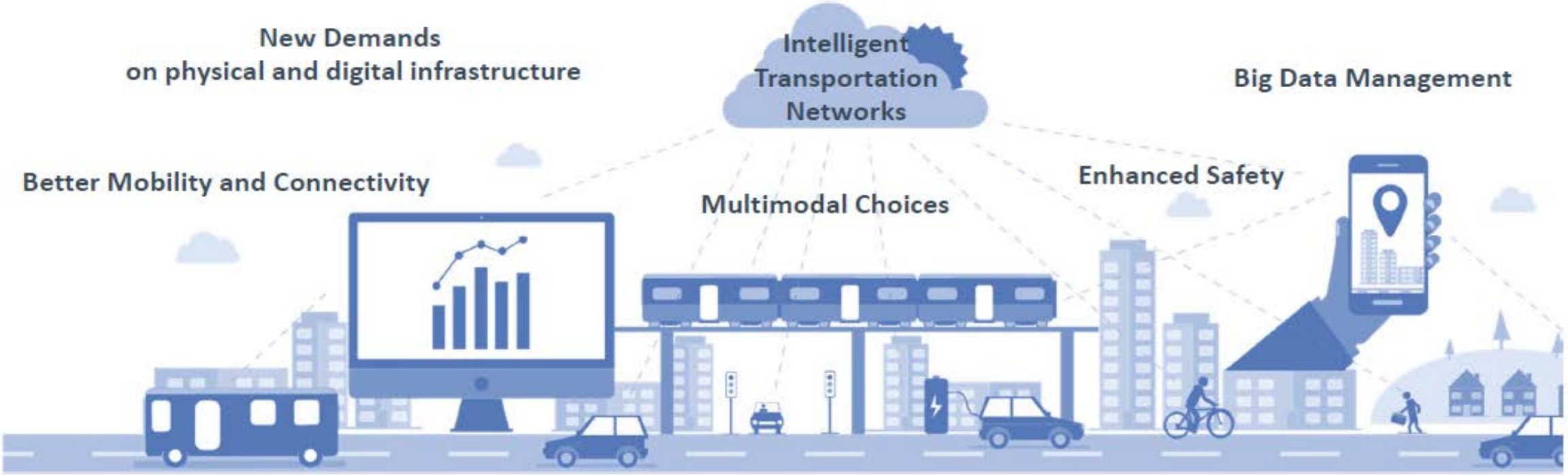
Photo Source: US DOT

Connected Vehicles Overview

CV
Technologies

- Hardware
- Software
- Testing

A connected, digital world with smarter streets.



Hardware

Roadside Units (RSU)

- Wireless communication between the roadway infrastructure and the vehicles that are equipped with OBUs
- Communicates on the 5.9 GHz DSRC band or C-V2X to transmit and receive CV messages

Integrated V2I Prototype (IVP) Hub / (Industrial Computer)

- A small form-factor computer
- Handles the processing of CV applications
- Allows the RSU to perform “radio” functions only

On-board Units (OBU)

- Device installed on the motor vehicle to allow communication (transmitting/receiving) with other OBUs or RSUs having WAVE functionality

Detection Devices

- Detect & notify of pedestrians/bicyclists

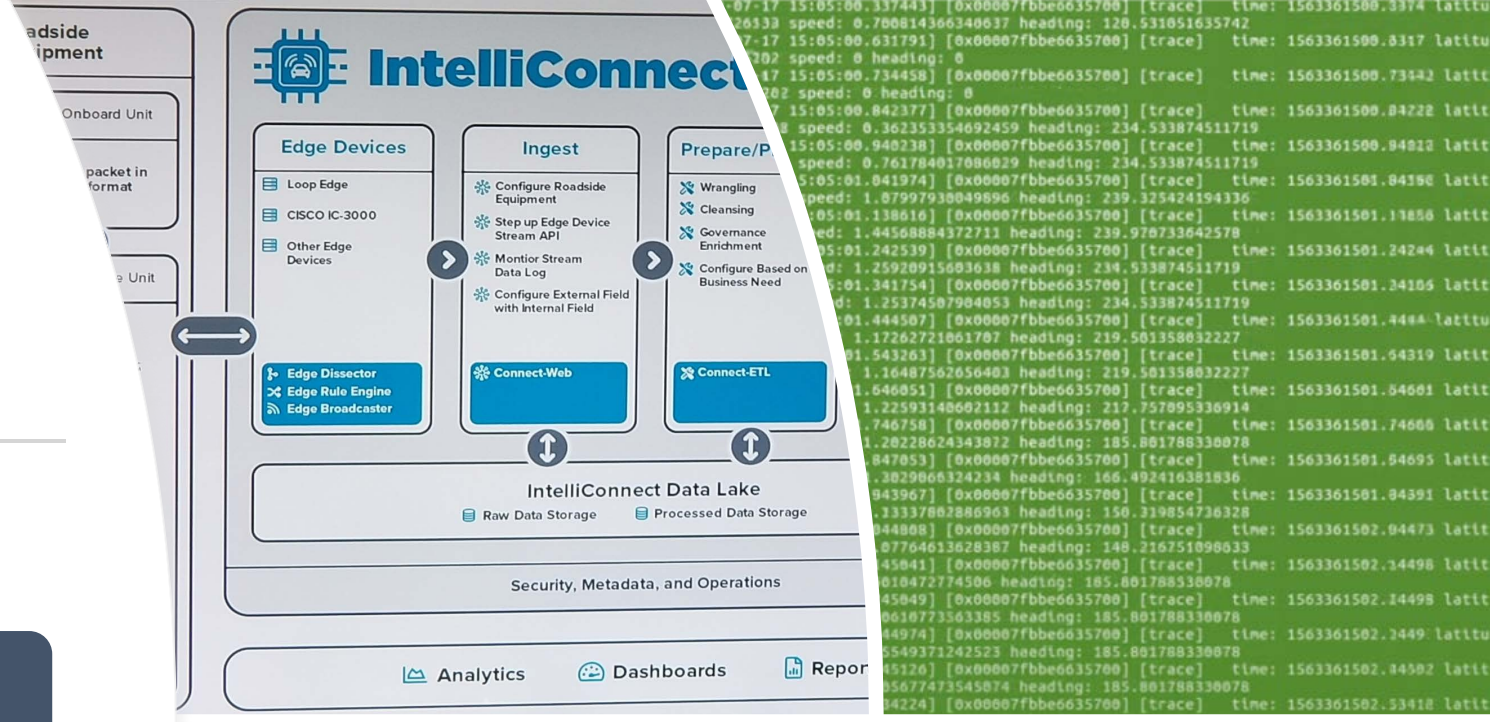
CV Technologies (Software)

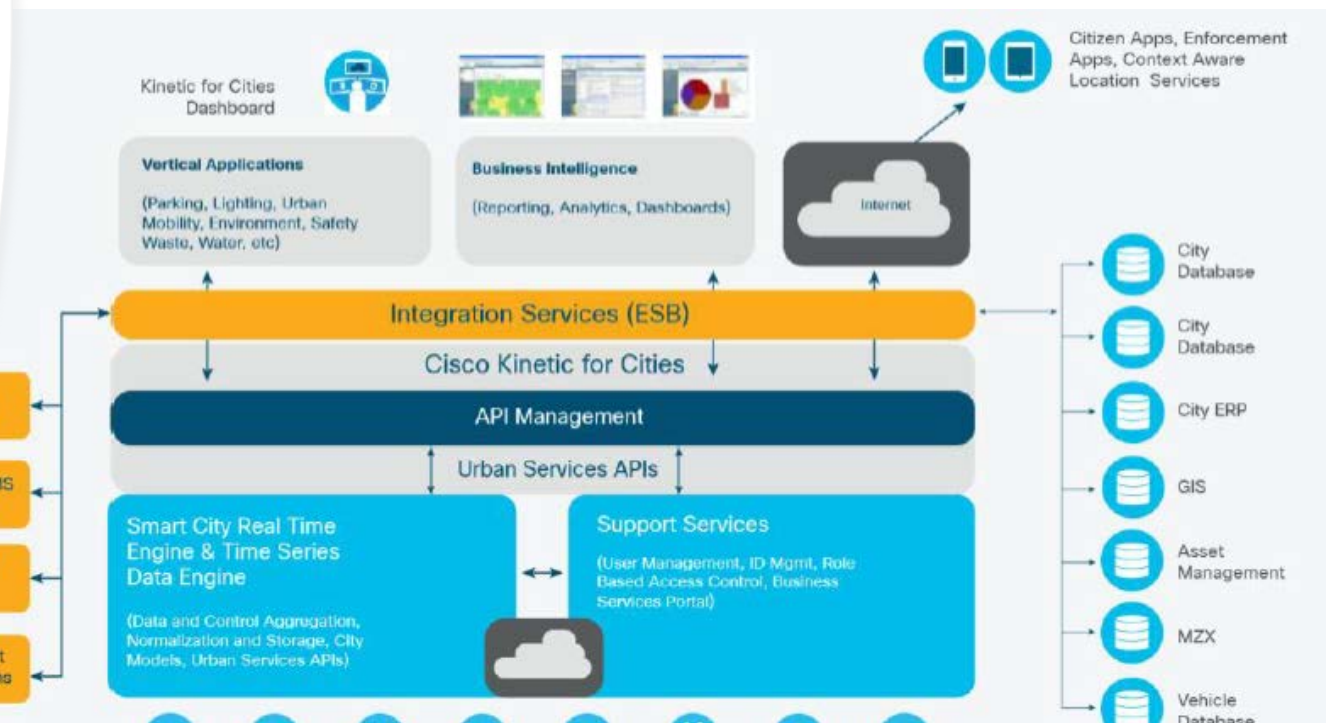
CV Applications

Broadcasting Messages

Platform for CV Central Management

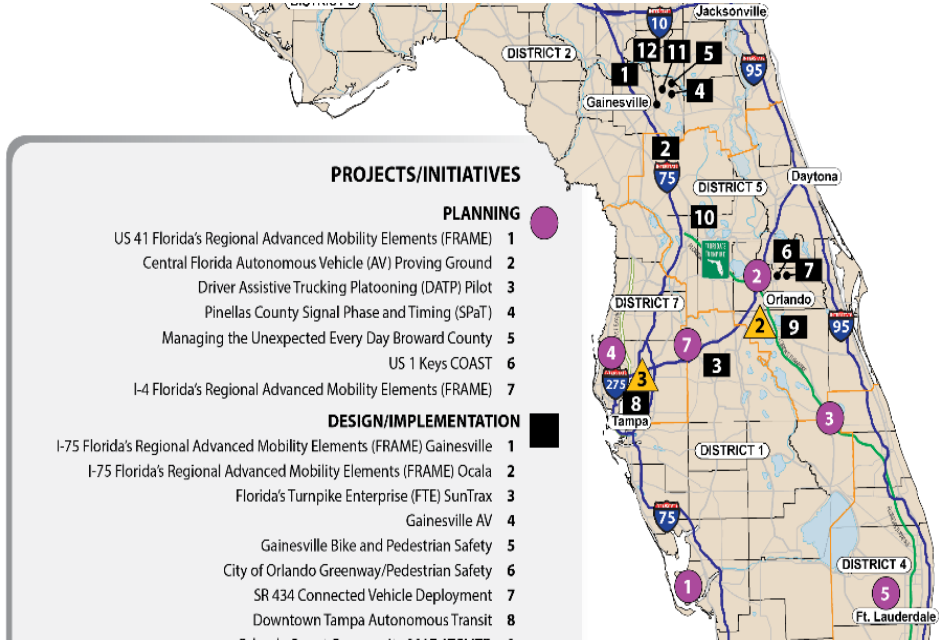
Device Management
Dashboards & Maps
Alerts and Notifications





LOCAL CV INITIATIVES

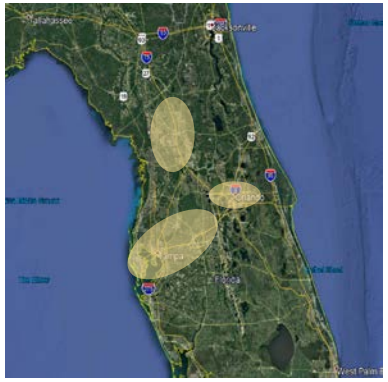
Central Florida

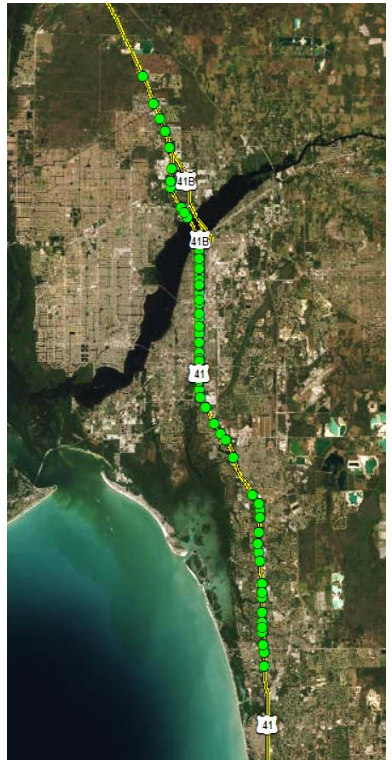


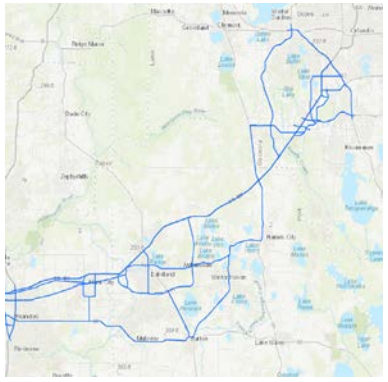
Planning

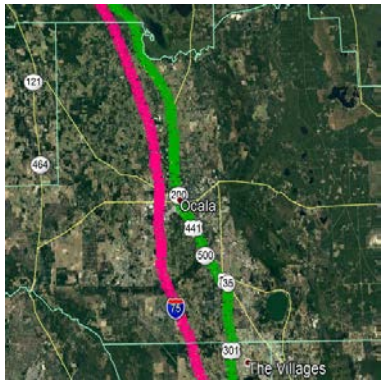
Design/Implementation

Operation









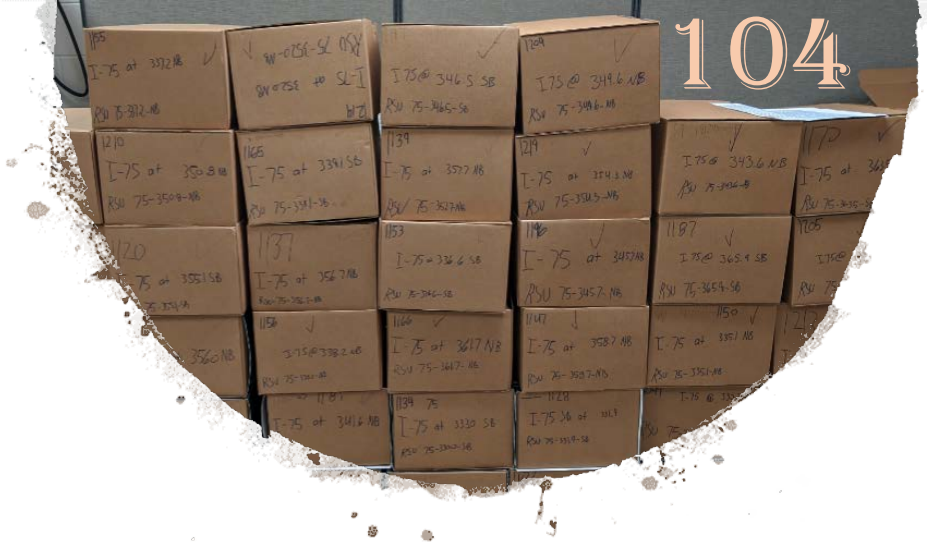
Central Florida CV Initiatives

Project Highlights

- FDOT D5 – I-75 FRAME
- Florida’s Turnpike Enterprise (FTE) – CV Pilot Project
- FDOT D1 – US 41 FRAME
- FDOT CO – I-4 FRAME (includes D5, D1 and D7)

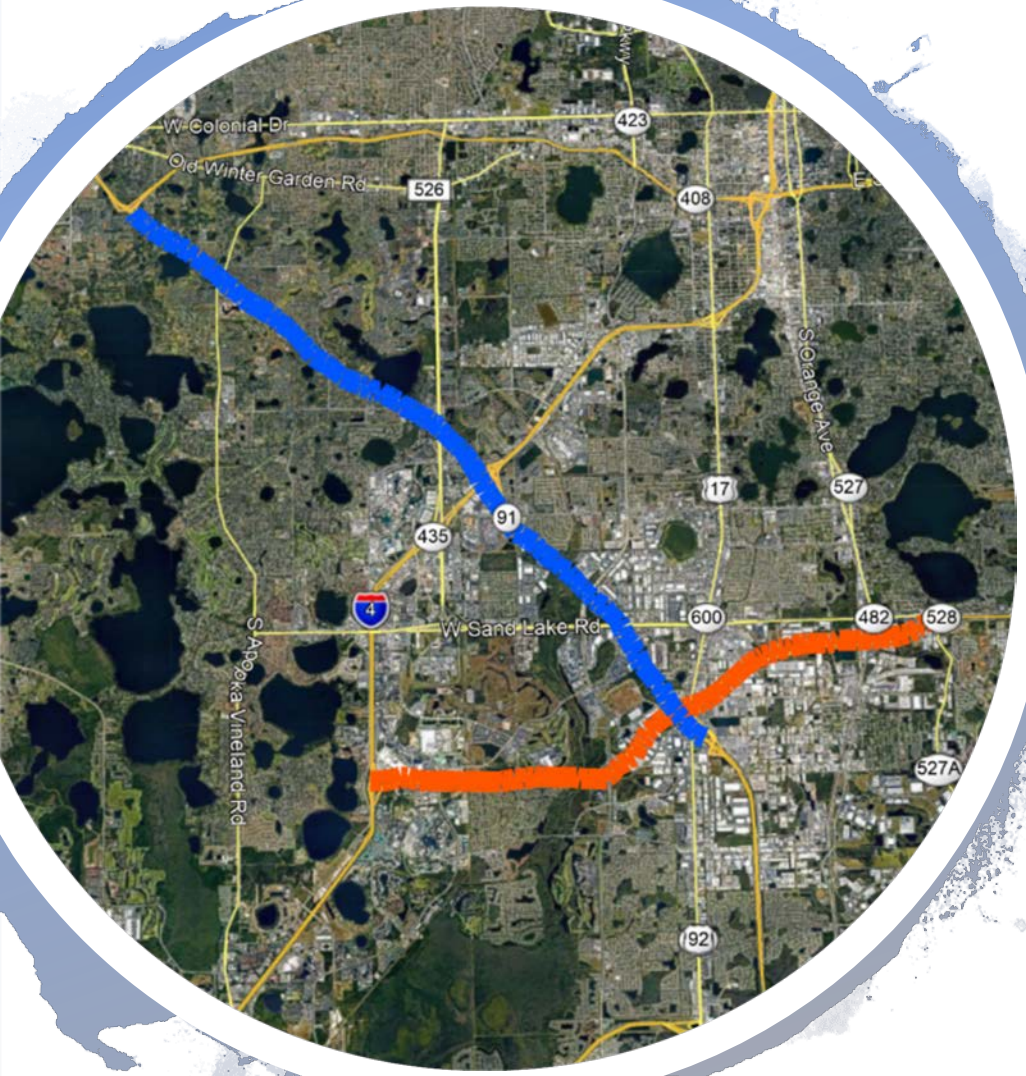
I-75 FRAME

- **Location:** Marion & Sumter Counties along I-75 & US 301/441 from TPK to D5 Boundary
- **Elements:** Traffic Signals, 104 RSU's
- **Goal:** The purpose of this project is to implement CV technology and Signal Performance Metrics (SPM) in Sumter and Marion Counties Improve Safety & Mobility with the Deployment of CV Technology
- **Project:** System Manager Approach (Awarded to Metric Engineering)
  - Includes CV technology along I-75, US441 & US 301
  - Includes Signal Performance Measures
  - CV Applications include:
    - Signal Phase & Timing (SPaT)
    - Map Data Message (MAP)
    - Traveler Information Message (TIM)
    - Transit Signal Priority (TSP)
    - Emergency Vehicle Preemption (EVP)
- **Status – In Construction**
  - Production date: Jan. 2, 2019
  - Construction Awarded to InLine
  - Implementation planned for late 2020



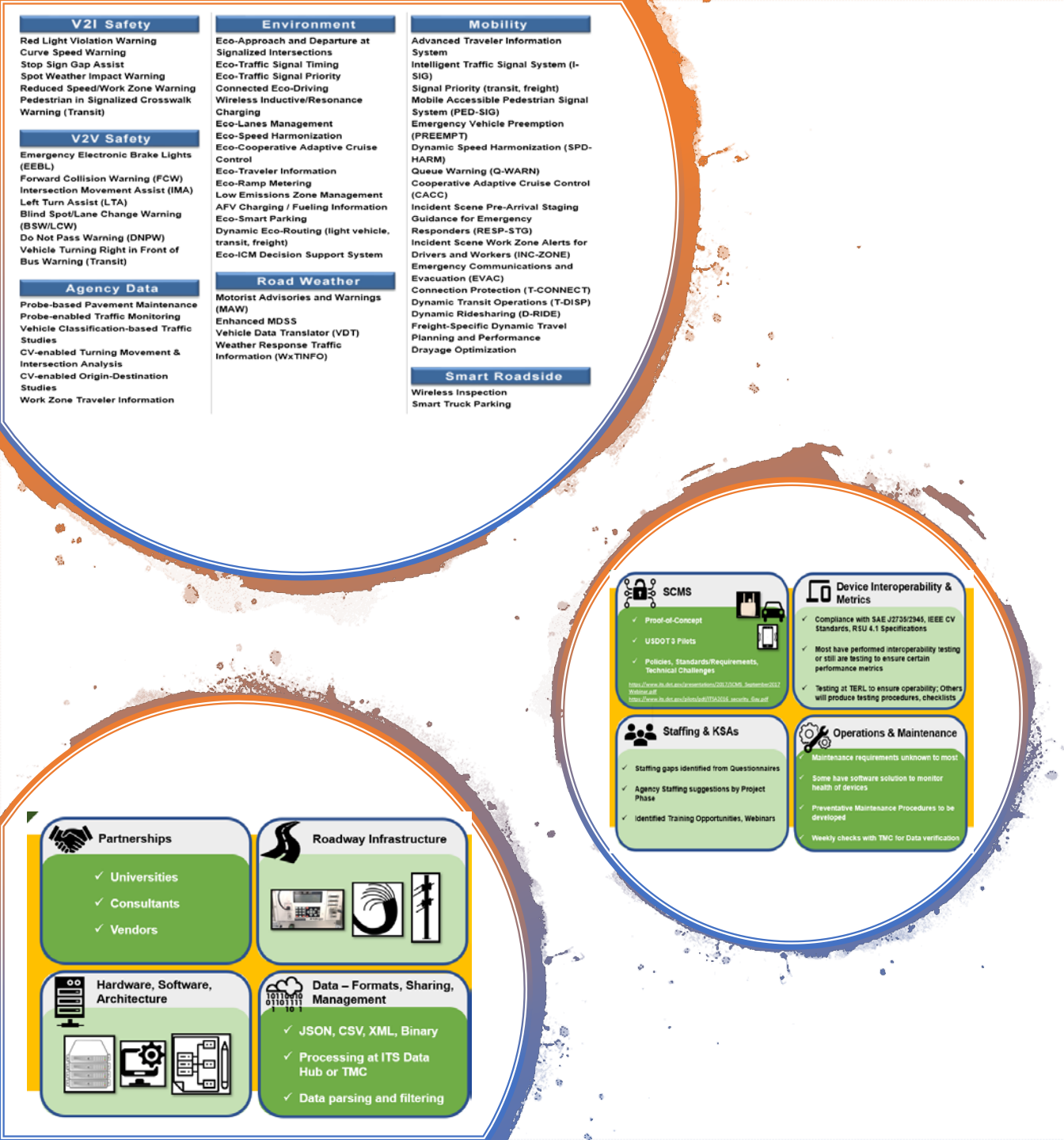
I-75 FRAME CV Testing

- Coordination with CV Vendors
- Seminole County Lab
- Field Testing
- Interoperability Testing
- CV Application Testing
- Testing documents listed on:
  - www.cflsmartroads.com
  - Testing Matrix
  - Videos & Photographs
  - Lab Testing Documentation
- Current Efforts – April 2020 +
  - Security Credential Management System



FTE CV PILOT

- **Location:** 20 Miles in Orange County
- **Elements:** TBD RSU's, TBD OBU's via Fleet vehicles
- **Goal:** To test the effectiveness of deployed CV Technology
- **Project:** Continuing Services Consultant Contract (Metric Engineering)
  - Includes CV Pilot along SR 528 and SR 91
  - CV Applications include:
    - Map Data Message (MAP)
    - Traveler Information Message (TIM)
    - Wrong Way Driving (WWD)
    - Curve Speed Warning (CSW)
- **Status:**
  - Design began April 2020
  - Construction TBD



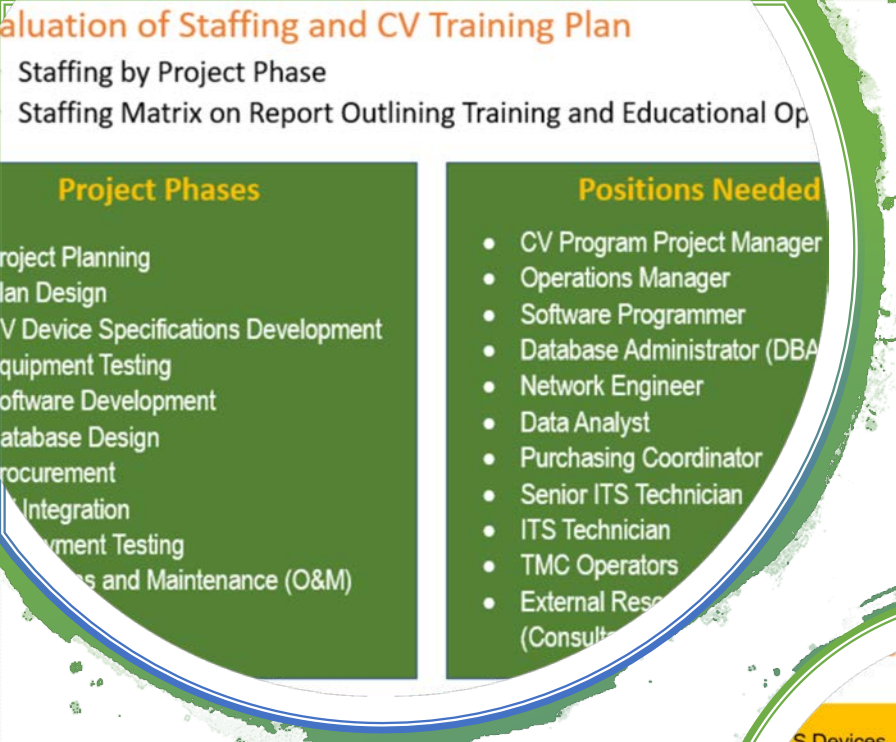
FTE Approach

Task 1

- Task 1 – National & state of Industry Assessment
- Task 2 – Existing Operational Readiness Assessment
- Task 3 – Ready to Deploy CV applications Evaluation & Deployment Plan

Outcomes:

- CV Deployment Motivation
- Agency Deployment Strategies
- Lessons Learned



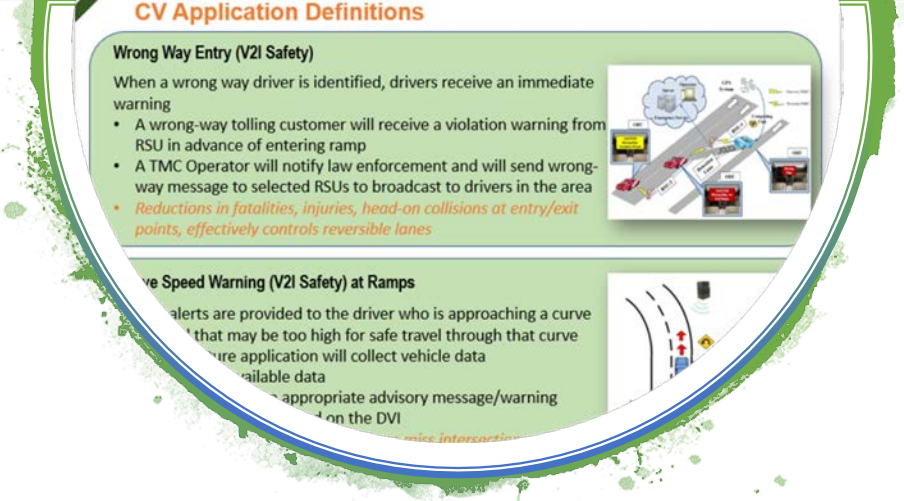
FTE Approach

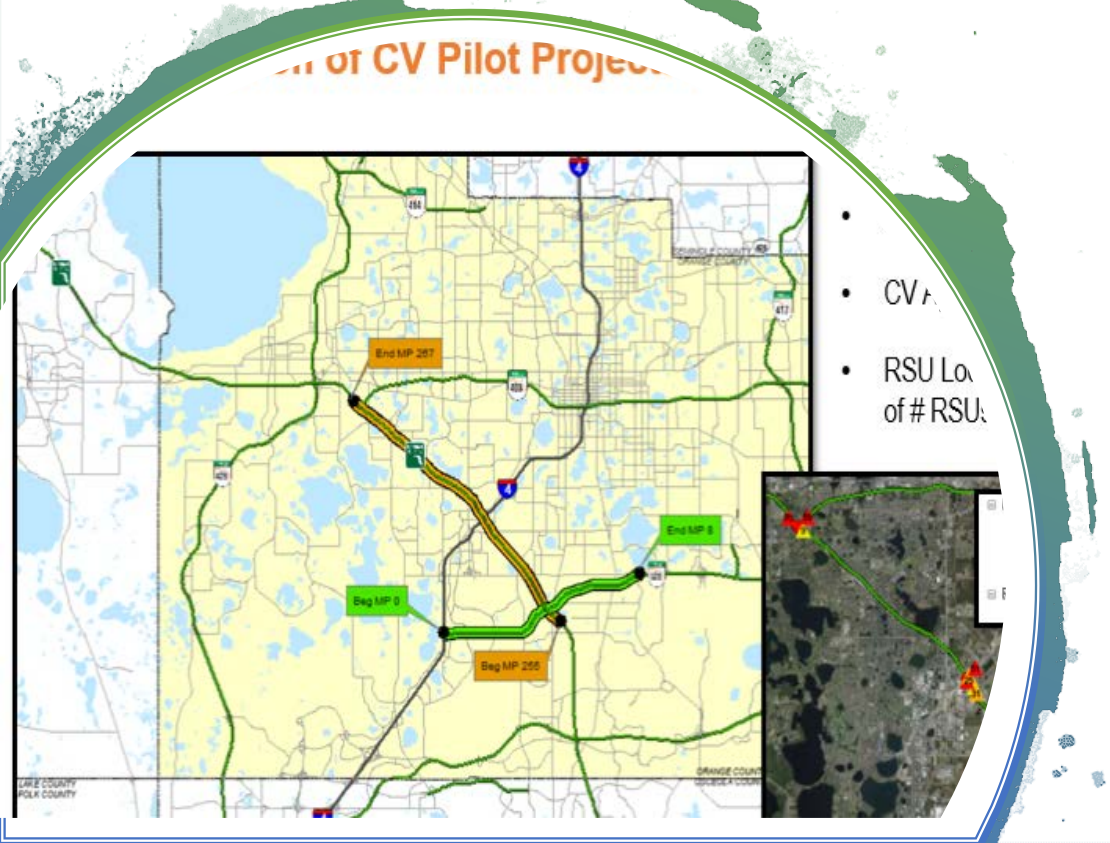
Task 2

- Task 1 – National & state of Industry Assessment
- Task 2 – Existing Operational Readiness Assessment
- Task 3 – Ready to Deploy CV applications Evaluation & Deployment Plan

Outcomes:

- Recommendation for Best Practices
- Recommendation for Future Investments





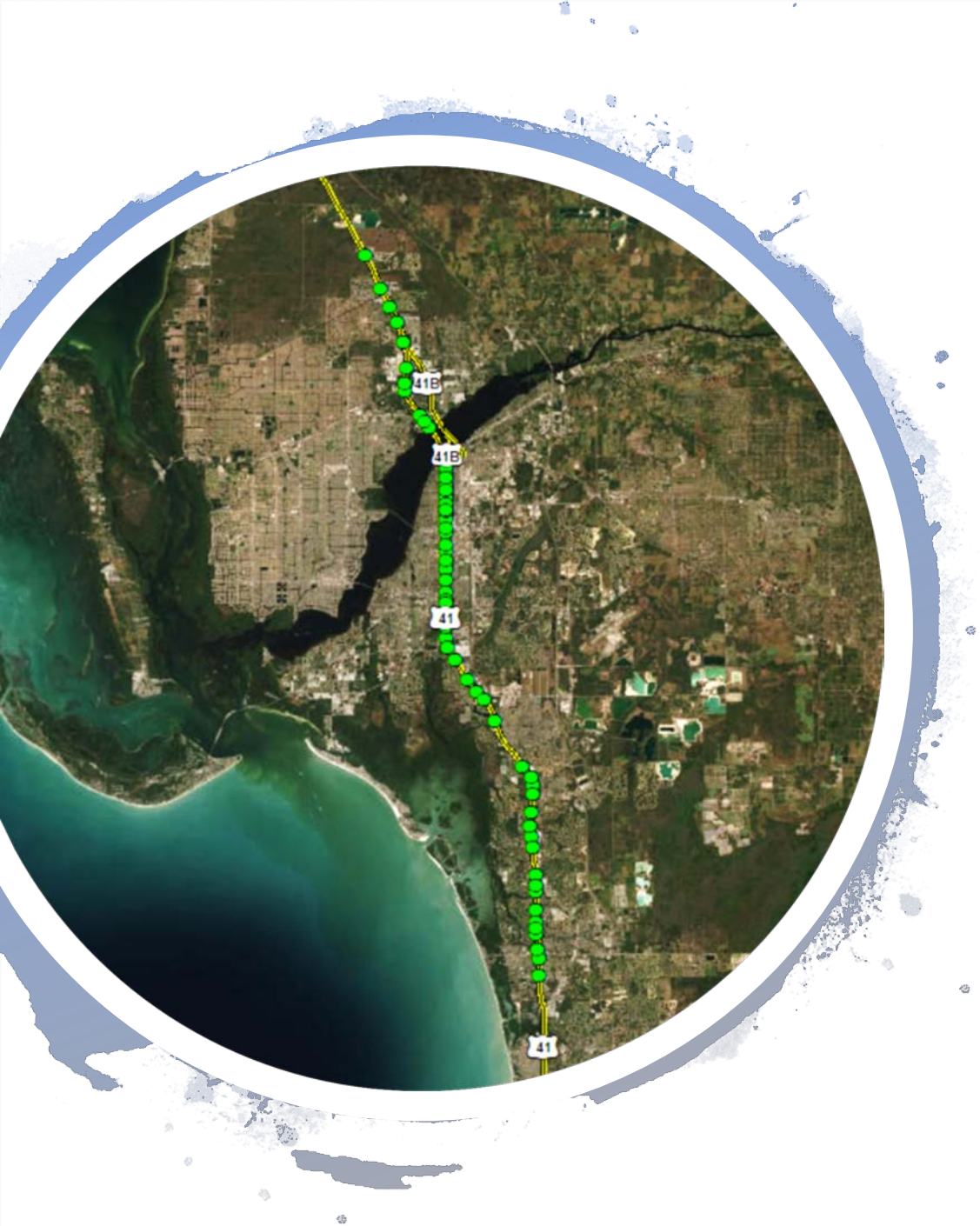
FTE Approach

Task 3

- Task 1 – National & state of Industry Assessment
- Task 2 – Existing Operational Readiness Assessment
- Task 3 – Ready to Deploy CV applications Evaluation & Deployment Plan

Outcomes:

- Ready to Deploy Plan
- Determination of CV Apps, # Devices
- Recommendation on Evaluation of Effectiveness



US 41 FRAME

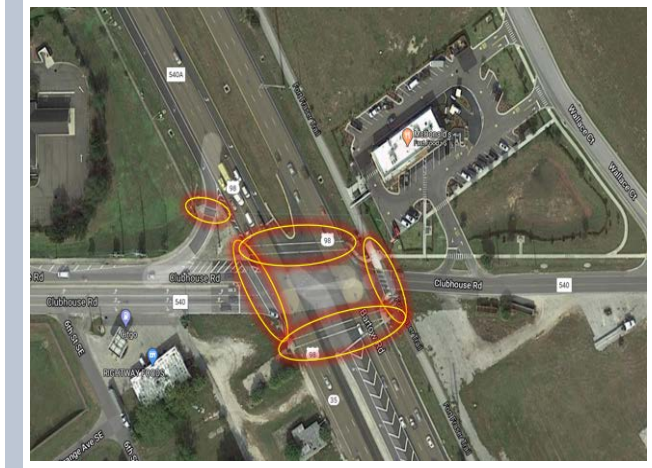
- **Location:** 34 Miles in Lee County
- **Elements:** 71 Traffic Signals, RSU's TBD
- **Goal:** Improve Safety & Mobility with the Deployment of CV Technology
- **Project:** System Manager Approach (Awarded to Metric Engineering)
  - Includes CV Pilot along US 98
  - CV @ 4 Intersections including Passive Pedestrian Detection
  - CV Applications include:
    - Signal Phase & Timing (SPaT)
    - Map Data Message (MAP)
    - Traveler Information Message (TIM)
    - Personal Safety Message (PSM)
- **Status –**
  - May 2020 US 98 CV Pilot

FDOT D1
(US 41 FRAME)

Research & Testing Phases

- Alternatives Analysis for Technologies
- Assessment of CV device capabilities
- Review of CV Applications for safety benefits
- Determining optimal locations for RSUs
- Systems Engineering Documentation

US 98 @ Combee Road



US 98 @ Clubhouse Road

FOUR PROPOSED CV PILOT LOCATIONS

1. US 98 at CR540A
2. US 98 at Clubhouse Rd
3. US 98 at Autumnwood Grove Blvd
4. US 98 at Combee Rd

CV APPLICATIONS

- Signal Phase & Timing (SPaT)
- Map Data Message (MAP)
- Traveler Information Message (TIM)
- Personal Safety Message (PSM)
- Transit Signal Priority (TSP)
- Emergency Vehicle Pre-emption (EVP)

I-4 FRAME

- **Location:** Along I-4 and Arterials in District 1, 5 and 7
- **Elements:** TBD Traffic Signals, RSU's, OBU
- **Goal:** Implement Connected Vehicle (CV) technology and Automated Traffic Signal Performance Metrics (ATSPM) for freeway management systems and arterial management systems in Hillsborough, Polk, Osceola, and Orange Counties
- Improve Safety & Mobility with the Deployment of CV Technology
- **Project:** System Manager Approach (Awarded to Metric Engineering)
  - Includes CV Pilot along I-4
  - Cellular Vehicle-to-Everything (C-V2X) and Dedicated Short Range Communication (DSRC)
  - Security Credential Management System (SCMS)
  - Automated Traffic Signal Performance Measures (ATSPM)
  - & Timing (SPaT)
  - Map Data Software Development
  - CV Applications include:
    - Signal Phase Message (MAP)
    - Traveler Information Message (TIM)
    - Personal Safety Message (PSM)
- **Status** – In Design

CAV Benefits

- Smart Mobility & Pedestrian Safety
- Travelers receive Traveler Information Messages (weather, upcoming collisions, diversions, etc.)
- Reduction in incidents
- Emergency & Transit Vehicle Benefits
- Data Acquisition: motorist awareness from trends analysis
- Benefits for the Disabled
- Drivers can arrive quickly, safely
- Car Sharing & Mitigation of Environmental Impacts
    - Travel behavior changes, self-parking, smart routing, eco-driving, reducing emissions, (NOx, SOx, and CO2), reduction in fuel consumption
- Intangibles – Quality of life

CV Training

- Connected Vehicle Professional Training
- The NEXT Education
  - 4 Days, Online
  - CV technology
    - Software, Hardware, Communication, Standards
- Online Testing
- CVP Certification

Questions