

Clarksville Urbanized Area  
MPO

# Regional ITS Architecture Update

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Stakeholder Workshop

October 6, 2020



# Workshop Overview

Welcome and Introductions

Overview of the Regional ITS Architecture

Review of Regional ITS Needs

Review of High Priority ITS Service Packages

Review of ITS Projects in the Region

Wrap Up

# **What is the Regional ITS Architecture?**

# What is ITS?

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## ITS

An acronym that stands for Intelligent Transportation Systems.

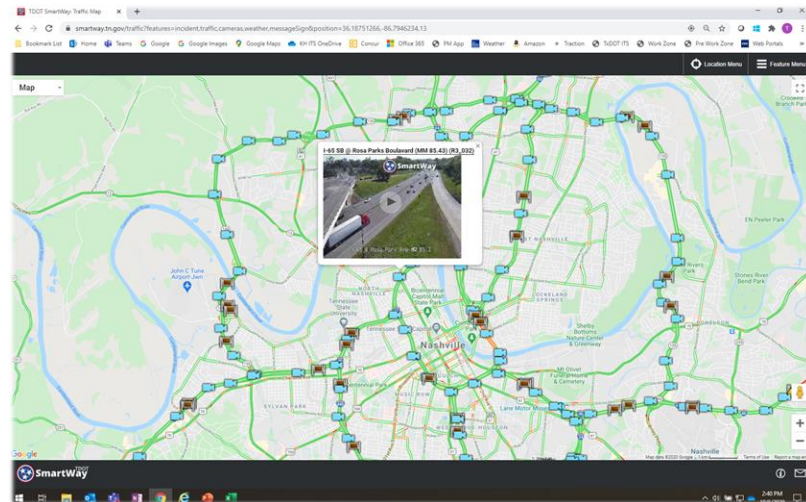
## One Definition of ITS

The application of data processing and data communications to surface transportation to increase safety and efficiency.





# What is ITS?



# Emerging ITS Technologies

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Automated Vehicles

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Connected Vehicles

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Active Traffic Management

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Integrated Corridor Management

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Decision Support Systems

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Privatized Traffic Data



# Why Deploy ITS?

## REDUCE CONGESTION

Congestion caused urban Americans to travel **8.8 billion hours** longer and use an extra **3.3 billion gallons** of fuel for an estimated congestion cost of **\$166 billion**.\*

## INCREASE SAFETY

In 2019, Tennessee had 1,069 traffic fatalities and Kentucky had 732.

## IMPROVE RELIABILITY and DECREASE TRAVELER FRUSTRATION

Travelers report variability in travel times to be one of their greatest sources of frustration.

*\*from the 2019 Urban Mobility Scorecard*

# What is a Regional ITS Architecture?

A long-range plan for the deployment, integration, and operation of ITS.

The architecture acts as a framework for ensuring institutional agreement and technical integration among **stakeholders** for the implementation of ITS projects in a particular region.



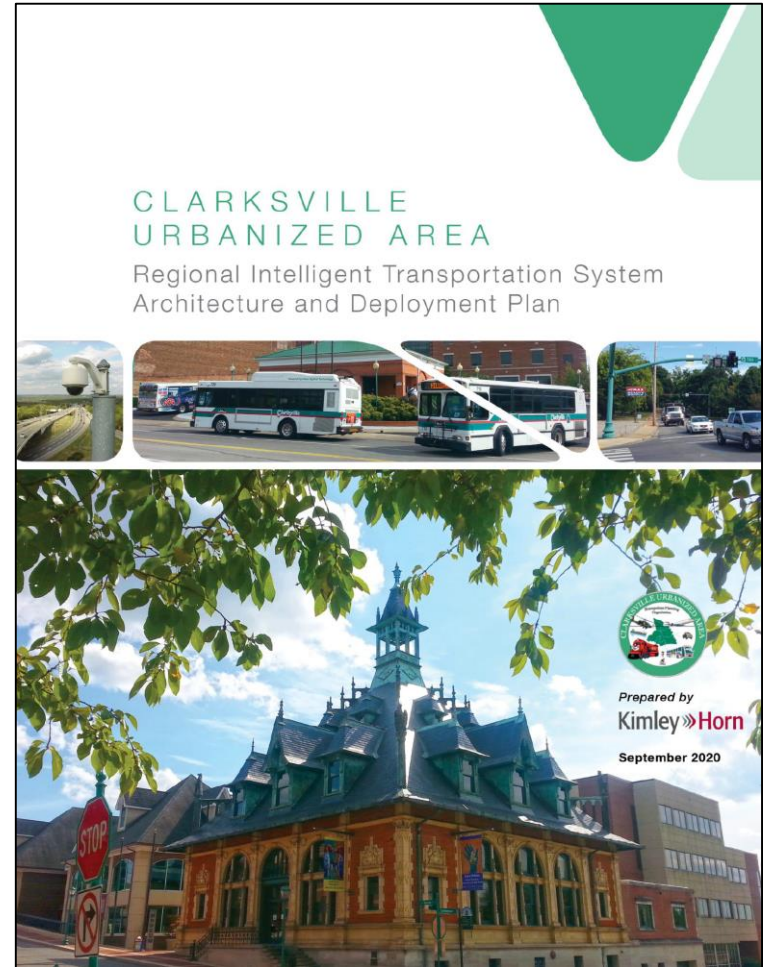
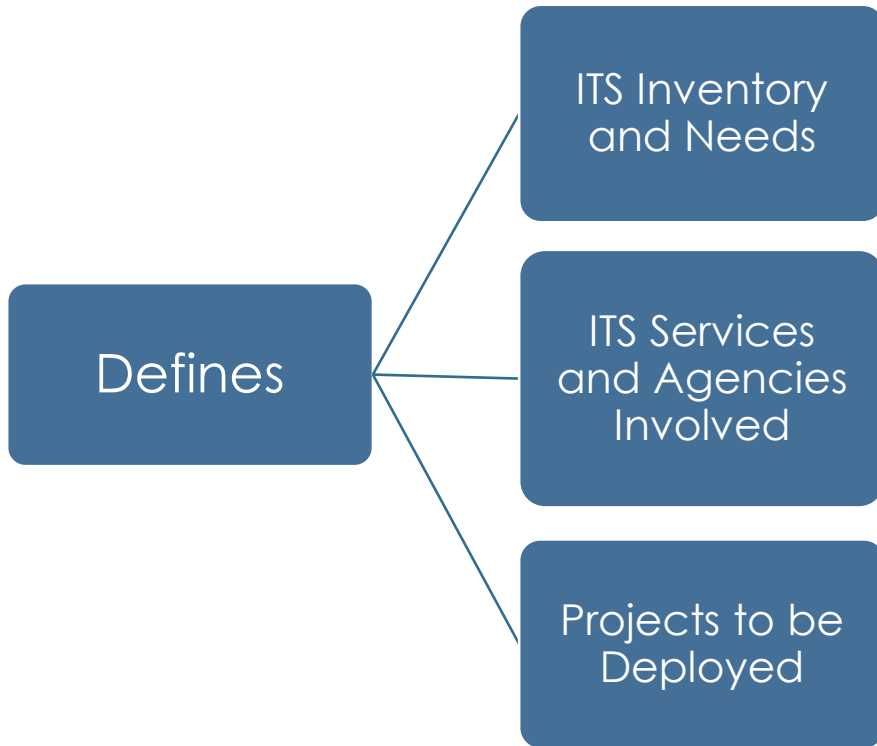
# Regional ITS Architecture Components



## Requirements of a Regional ITS Architecture

- Regional Description
- Stakeholder Identification
- Inventory of ITS Elements
- Identification of ITS Services
- Operations Concepts (Roles and Responsibilities)
- Functions
- Interfaces/Information Flows
- Standards Identification
- Project Sequencing
- Agreements
- Maintenance Plan

# Clarksville Regional ITS Architecture



# History of Clarksville Regional ITS Architecture

First developed in 2006



Updated in 2015

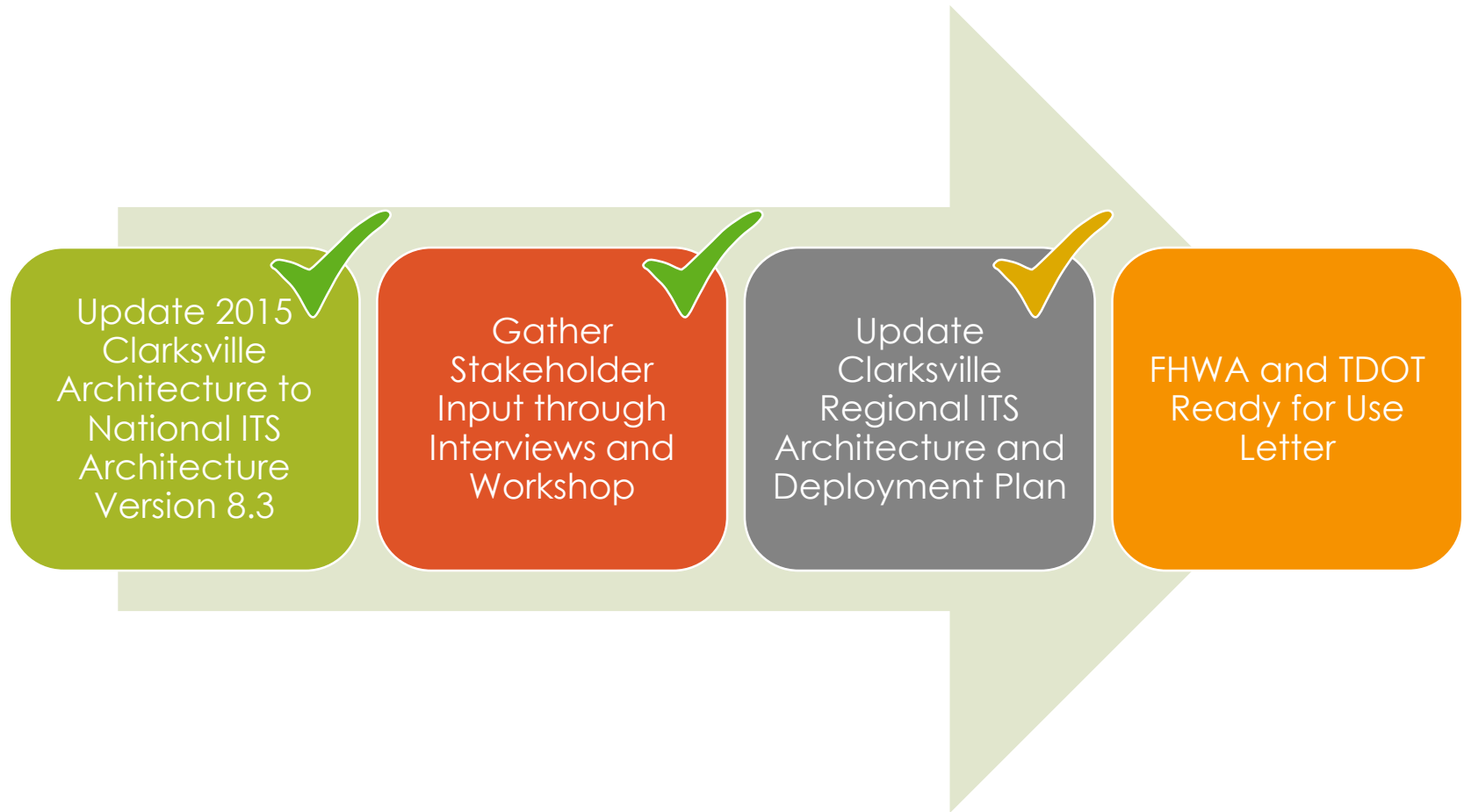


Last updated in 2020



A “living document” updated in coordination with the Metropolitan Transportation Plan update (typically on a 5-year basis)

# Architecture Update Process





# National ITS Architecture Structure

## Twelve Service Areas for ITS

- ❑ Traffic Management
- ❑ Traveler Information
- ❑ Public Safety
- ❑ Maintenance and Construction
- ❑ Commercial Vehicle Operations
- ❑ Sustainable Travel
- ❑ Public Transportation
- ❑ Weather
- ❑ Data Management
- ❑ Support
- ❑ Parking Management
- ❑ Vehicle Safety

# National ITS Architecture Structure

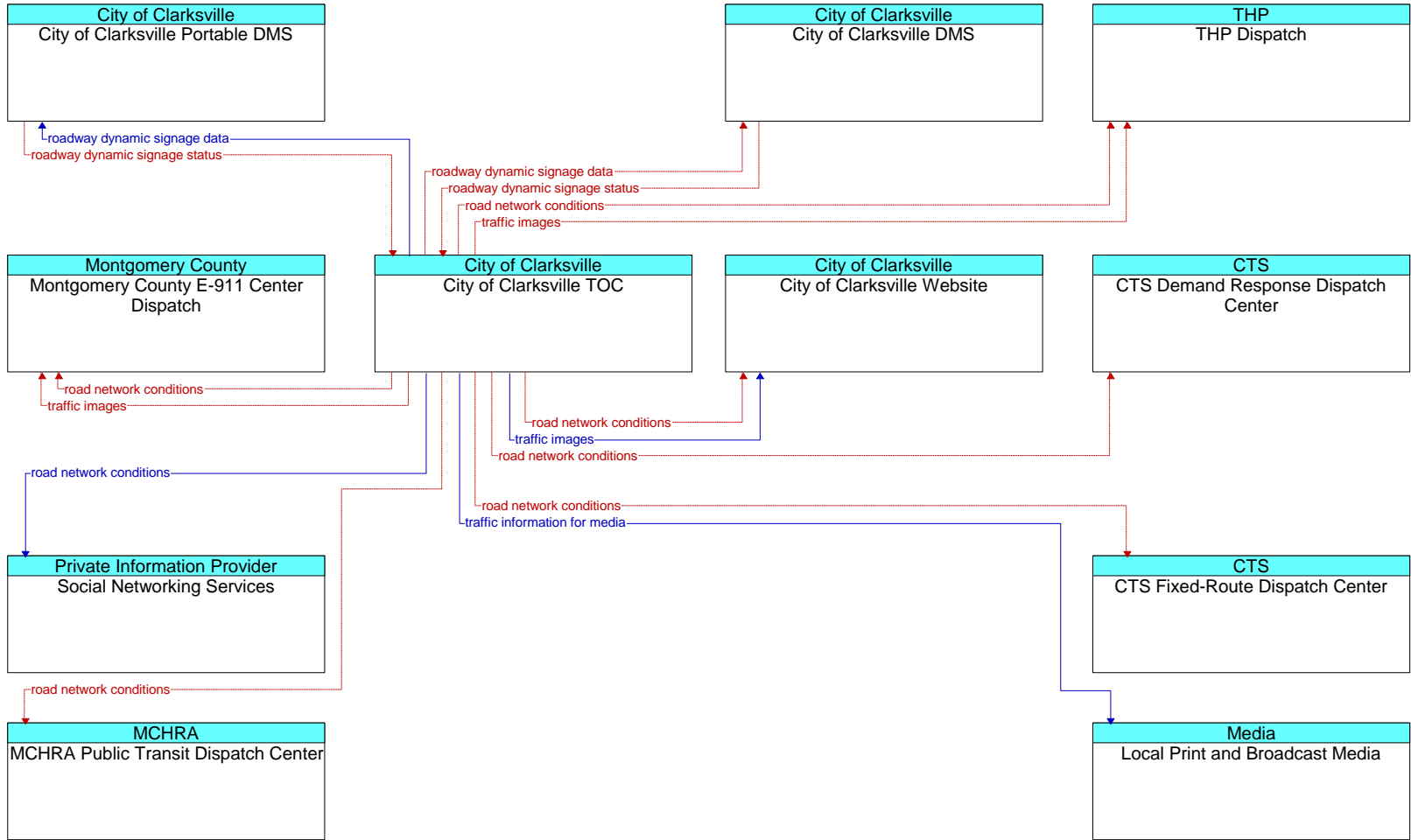
Each service area includes multiple ITS service package.

Total of **141** ITS service packages in the National ITS Architecture.

The ITS service packages provide a visual representation of how ITS services are deployed and how information is shared.

In Clarksville we have identified **65** ITS service packages for the region.

# ITS Service Packages



— Existing  
- - - Planned

TM06 Traffic Information Dissemination  
(City of Clarksville)

# Approach to Regional ITS Architecture Plan

## □ Regional ITS Architecture and Deployment Plan

- Focus on identifying ITS needs and ITS service packages for the Region
- Customization of the ITS service packages
- List ITS projects and programs for the region and identify supporting ITS service packages

## □ Documentation

- Regional ITS Architecture and Deployment Plan Report
- Document and Interactive Version on project website:

<https://extsites.kimley-horn.com/projects/TennesseeITSArchitecture/clarksville.html>



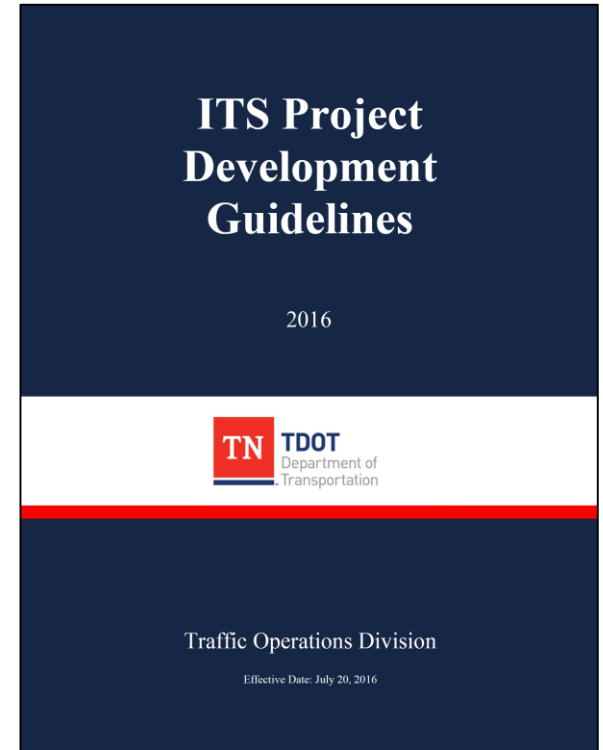
# Systems Engineering

## Definition

Systems engineering is an interdisciplinary approach to enable the realization of successful systems. It **focuses on defining customer needs and required functionality early** in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem.

## Requirements

Using a systems engineering approach is required by the USDOT for ITS projects. The process includes **demonstrating conformance to the Regional ITS Architecture.**



Guidance can be found in the *TDOT ITS Project Development Guidelines*

# What Have We Heard so Far?

Needs included in **Table 3**  
(Page 16) of the  
Clarksville Urbanized Area  
Regional ITS Architecture  
and Deployment Plan  
Report

# Regional ITS Needs

## □ State Level

- Need for expand TDOT's SmartWay system on I-24 in the CUAMPO Region (Includes DMS and CCTV cameras)
- Need to expand TDOT's HERO freeway service patrol
- Need to fund KYTC's SAFE Patrol freeway service patrol
- Need to improve coordination between TDOT and KYTC TMCs for TIM
- Need to provide alternate route information when incidents occur on the I-24
- Need to monitor truck parking facilities on I-24 and provide information on parking availability

# Regional ITS Needs

## □ Regional and Local Level

- Need to improve dissemination of gate information from Fort Campbell to daily commuters
- Need to implement and expand adaptive signal control technology along major corridors to improve traffic flow
- Need to monitor rail crossings and convey blockages to drivers
- Need to remotely control warning beacons for school zones
- Need to consider implementation of connected and automated vehicle technology to improve safety

## □ Transit

- Need to provide real-time information to transit riders
- Need to implement a transit trip planning system
- Need to implement bus priority along specific corridors
- Need to monitor bus passenger boarding and alighting



# What ITS Service Packages do we Need?

Discussion on Level of Deployment of Each ITS Service Area and Additional Needs

Service Packages included in **Table 7** (Page 37) of the Clarksville Urbanized Area Regional ITS Architecture and Deployment Plan Report

# Service Area 1 Traffic Management

## High Priority Service Packages

- Infrastructure-Based Traffic Surveillance
- Traffic Signal Control
- Traffic Information Dissemination
- Regional Traffic Management
- Traffic Incident Management System
- Roadway Closure Management
- Variable Speed Limits





## Service Area 2 Public Safety

### High Priority Service Packages

- Emergency Call-Taking and Dispatch
- Emergency Vehicle Preemption
- Incident Scene Safety Monitoring
- Roadway Service Patrols



# Service Area 3 Maintenance and Construction

## High Priority Service Packages

- Work Zone Management
- Maintenance and Construction Activity Coordination







# Service Area 4 Public Transportation

## High Priority Service Packages

- Transit Vehicle Tracking
- Transit Fixed Route Operations
- Dynamic Transit Operations
- Transit Fare Collection Management
- Transit Security
- Transit Fleet Management
- Transit Passenger Counting
- Transit Traveler Information



# Service Area 5 Traveler Information

## High Priority Service Packages

- Broadcast Traveler Information
- Personalized Traveler Information



# Service Area 6 Commercial Vehicle Operations

No High Priority Service  
Packages...Medium  
Priority Service Packages  
Include

- HAZMAT Management





# Service Area 7 Data Management

No High Priority Service  
Packages...Medium  
Priority Service Packages  
Include

- ITS Data Warehouse
- Performance Monitoring



# Service Area 8 Parking Management

No High Priority Service  
Packages...Medium Priority  
Service Packages Include

- Parking Space Management
- Parking Electronic Payment





## Service Area 9 Vehicle Safety

### High Priority Service Packages Include

- Autonomous Vehicles Safety Systems
- V2V Basic Safety
- V2V Special Vehicle Alert
- Queue Warning
- Reduced Speed Zone Warning/Lane Closures
- Restricted Lane Warnings
- Intersection Safety Warning and Collision Avoidance





# Service Area 10 Sustainable Travel

**No High Priority Service Packages...Medium Priority Service Packages Include**

- Emissions Monitoring
- Eco-Traffic Signal Timing
- Electric Charging Stations Management

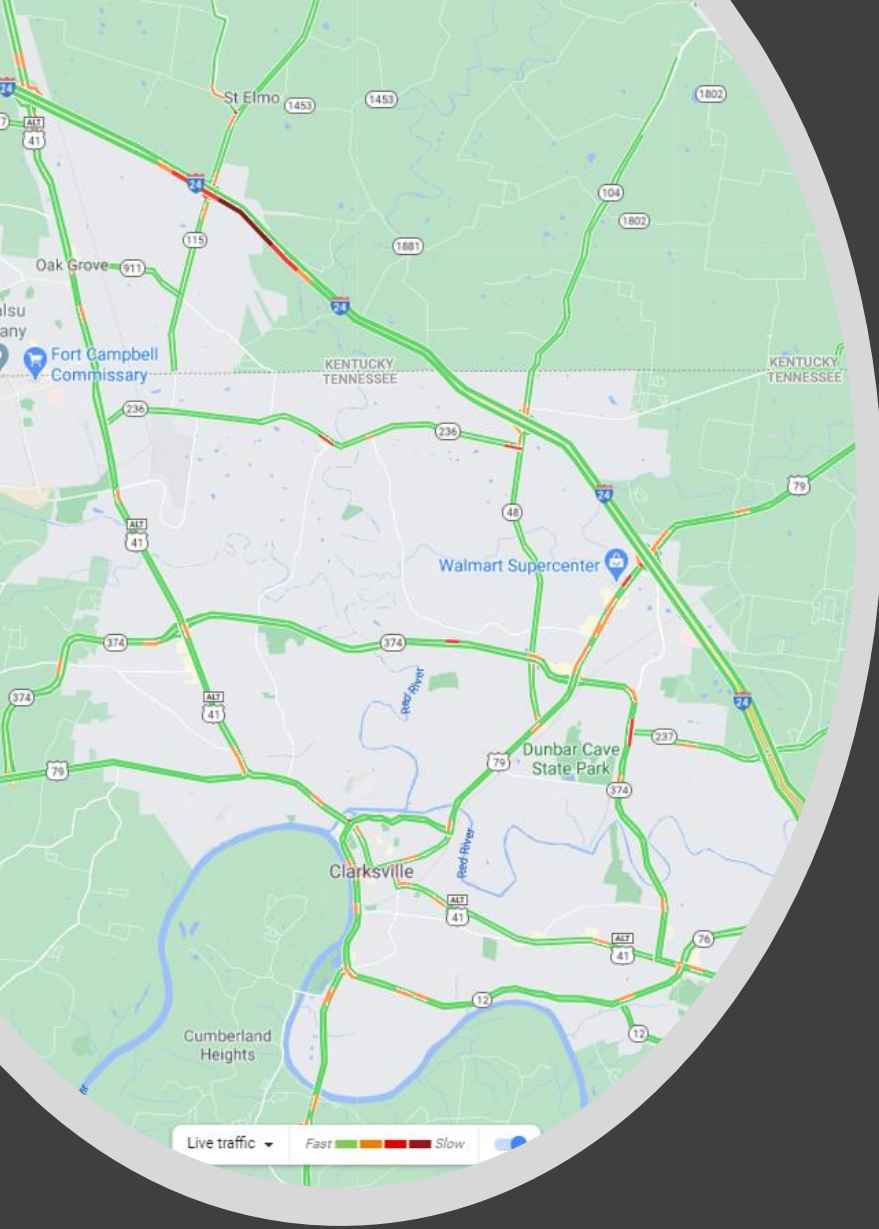


# Service Area 11 Weather

No High Priority Service Packages...Medium Priority Service Packages Include

- Weather Data Collection
- Weather Information Processing and Distribution





# Service Area 12 Support

Catch-all category for systems supporting transportation operations.

## High Priority Service Packages Include

- Map Management
- Data Distribution
- Security and Credentials Management

# Potential Regional ITS Projects and Operations Initiatives

Discussion on Projects

Projects included in **Tables 14- 17** (Page 78) of the Clarksville Urbanized Area Regional ITS Architecture and Deployment Plan Report



# ITS Deployment Plan Projects

## State DOT Projects

| Project   | Project Description  | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status             | Applicable ITS Service Packages  |
|---|--|--|----------------------------|--|
| TDOT/KYTC Coordination  | Improve coordination between TDOT and KYTC, including the exchange of future CCTV camera feeds and improved coordination during incidents.   | Short-Term:<br>TDOT & KYTC                               | Funding Identified:<br>No  | TM07 Regional Traffic Management<br>TM08 Traffic Incident Management System<br>TI02 Personalized Traveler Information        |
| TDOT SmartWay Region 3 TMC and City of Clarksville Coordination | Implement coordination between the TDOT SmartWay Region 3 TMC and the City of Clarksville to allow for video and data sharing between agencies as needed. TDOT plans to complete and begin distributing software to share CCTV video feeds to municipalities in 2015. Estimated project cost for the SmartView video distribution software and a five-year support contract is \$3,300,000. The project is funded through State funds. | Short to Mid-Term:<br>TDOT and Municipalities            | Funding Identified:<br>Yes | TM06 Traffic Information Dissemination<br>TM07 Regional Traffic Management   |
| TDOT SmartWay Installation on I-24                              | Deploy SmartWay infrastructure on I-24. As part of 2017 TDOT Traffic Operations Program Plan, the Three-Year Strategic Deployment for TDOT Region 3 identified 2 DMS, 4 CCTV cameras, 4 RDS, and 4 temperature sensors. Estimated cost is \$1,500,000.   | Mid-Term:<br>TDOT  | Funding Identified:<br>No  | TM01 Infrastructure-Based Traffic Surveillance<br>TM07 Regional Traffic Management<br>TM06 Traffic Information Dissemination |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

# ITS Deployment Plan Projects

## State DOT Projects (Continued)

| Project   | Project Description   | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status             | Applicable ITS Service Packages |
|---|---|--|----------------------------|---------------------------------|
| TDOT HERO Service Area Expansion on I-24                          | Expand the coverage area of the TDOT freeway safety service patrol to include I-24 in Tennessee within the CUAMPO Region.   | Mid-Term:<br>TDOT  | Funding Identified:<br>No  | PS08 Roadway Service Patrols    |
| KYTC Traffic Signal System Controller and Communications Upgrades | Complete upgrade of traffic signals to 2070 controllers and communication upgrades on State owned signals.  | Short-Term:<br>KYTC                                      | Funding Identified:<br>Yes | TM03 Traffic Signal Control     |
| KYTC SAFE Patrol Deployment                                       | Deploy KYTC SAFE Patrol freeway safety service patrol to include I-24 in Kentucky within the CUAMPO Region. Funding to the SAFE Patrol program was cut in 2020 however the need for this type of service continues to be recognized by stakeholders as a regional need. | Mid-Term:<br>KYTC  | Funding Identified:<br>No  | PS08 Roadway Service Patrols    |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

# ITS Deployment Plan Projects

## Local Projects

| Project  | Project Description  | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status            | Applicable ITS Service Packages   |
|--|--|--|---------------------------|---|
| City of Clarksville Adaptive Signal Control System     | Install an Adaptive Signal Control System on I-24, US 79, SR 374, and SR 76.   | Short-Term:<br>City of Clarksville                       | Funding Identified:<br>No | TM03 Traffic Signal Control   |
| City of Clarksville CCTV Cameras                       | Continue to deploy additional pan/tilt/zoom CCTV cameras along major arterials in Clarksville for incident management and traveler information.      | Short-Term:<br>City of Clarksville                       | Funding Identified:<br>No | TM01 Infrastructure-Based Traffic Surveillance<br>TM06 Traffic Information Dissemination  |
| City of Clarksville Fiber Optic Expansion              | Install additional fiber optic cable for traffic signal communications. Approximately 1/3 of the City's traffic signals are not currently connected. | Long-Term:<br>City of Clarksville                        | Funding Identified:<br>No | TM03 Traffic Signal Control   |
| City of Clarksville Flood Detection and Warning System | Implement a system to provide automated flood detection, road closure, and advanced warning on roads with low water crossings that frequently flood. | Mid to Long-Term:<br>City of Clarksville                 | Funding Identified:<br>No | TM06 Traffic Information Dissemination<br>WX01 Road Weather Data Collection<br>WX02 Weather Information Processing and Distribution |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

# ITS Deployment Plan Projects

## Local Projects (Continued)

| Project   | Project Description  | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status            | Applicable ITS Service Packages   |
|---|--|--|---------------------------|---|
| City of Clarksville RWIS                                | Install road weather information system that includes field sensors to monitor road weather conditions including ice, snow, and rain.  | Long-Term:<br>City of Clarksville                        | Funding Identified:<br>No | WX01 Road Weather Data Collection<br>WX02 Weather Information Processing and Distribution             |
| City of Clarksville Street Lighting Control             | Install new streetlights or retrofit existing streetlights to include remote variable lighting control to adjust brightness.   | Long-Term:<br>City of Clarksville                        | Funding Identified:<br>No | ST04 Roadside Lighting  |
| Fort Campbell Traffic Signal Communications             | Connect all traffic signals within Fort Campbell to a centralized TOC for operations.  | Short to Mid-Term:<br>Fort Campbell                      | Funding Identified:<br>No | TM03 Traffic Signal Control   |
| Fort Campbell Entrance Gate Traveler Information System | Improve operations and reduce congestion at entry points to Fort Campbell including geometric reconfiguration, gate closure information dissemination, traffic signal coordination, CCTV cameras deployment, and other ITS measure to improve monitoring capabilities of traffic and traveler information dissemination. | Short to Mid-Term:<br>Fort Campbell                      | Funding Identified:<br>No | TM03 Traffic Signal Control<br>TM06 Traffic Information Dissemination<br>TM19 Road Closure Management |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

# ITS Deployment Plan Projects

## Transit Projects

| Project  | Project Description  | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status             | Applicable ITS Service Packages   |
|--|--|--|----------------------------|---|
| CTS Trip Route Planner (Google) Implementation     | Continue to work with Google to provide information for trip route planning. CTS is coordinating with City of Clarksville GIS personnel to provide Google with transit data. No additional funds have been established for this on-going effort. | Short-Term:<br>CTS                                       | Funding Identified:<br>Yes | PT08 Transit Traveler Information<br>TI02 Personalized Traveler Information |
| CTS Mobile Phone Application                       | Develop a mobile phone application that allows users to view transit service information, real-time bus location, and create a transit trip plan.  | Short-Term:<br>CTS                                       | Funding Identified:<br>No  | PT08 Transit Traveler Information   |
| CTS Real-time Bus Location and Arrival Information | Install next-bus arrival DMS at CTS bus stops, provide next-stop announcements on buses, allow transit rides to see bus location on the CTS website or mobile phone app.   | Mid to Long-Term:<br>CTS                                 | Funding Identified:<br>No  | PT01 Transit Vehicle Tracking<br>PT08 Transit Traveler Information          |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

# ITS Deployment Plan Projects

## Transit Projects (Continued)

| Project                                | Project Description  | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status             | Applicable ITS Service Packages                                    |
|--|--|--|----------------------------|--|
| CTS Transit Signal Priority Deployment | Implement a transit signal priority system on select routes for CTS fixed-vehicle bus routes including Wilma Rudolph Boulevard, Fort Campbell Boulevard Madison Street, and Riverside Drive. | Mid to Long-Term:<br>CTS and City of Clarksville         | Funding Identified:<br>No  | TM03 Traffic Signal Control<br>PT09 Transit Signal Priority        |
| Regional Transit Coordination          | Improve coordination within and among transit agencies to optimize transit travel times.   | Short to Mid-Term:<br>CTS, MDHRA, and PACS               | Funding Identified:<br>No  | PT07 Multimodal Coordination<br>PT11 Transit Connection Protection |
| MCHRA Transit Fleet Management         | Implement an automated process for drivers to perform pre- and post-trip safety inspections of transit vehicles.   | Short-Term:<br>MCHRA                                     | Funding Identified:<br>Yes | PT06 Transit Fleet Management                                      |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

# ITS Deployment Plan Projects

## Other Projects

| Project  | Project Description  | Deployment Timeframe and Responsible Agency <sup>1</sup> | Funding Status            | Applicable ITS Service Packages |
|--|--|--|---------------------------|---------------------------------|
| Clarksville Urbanized Area MPO Data Warehouse Implementation | Develop a transportation data warehouse that includes region-wide transportation data gathered from the ITS network. | Long-Term:<br>CUAMPO                                     | Funding Identified:<br>No | DM1 ITS Data Warehouse          |

<sup>1</sup>Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).



# Wrap Up

# Next Steps

- Stakeholders to provide comments by **October 23**
- Update Draft Clarksville Urbanized Area Regional ITS Architecture and Deployment Plan
- Work with FHWA and TDOT to Obtain “Ready for Use” Letter

# Thank You

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