Planning for EVP and TSP Deployments in Rochester, New York

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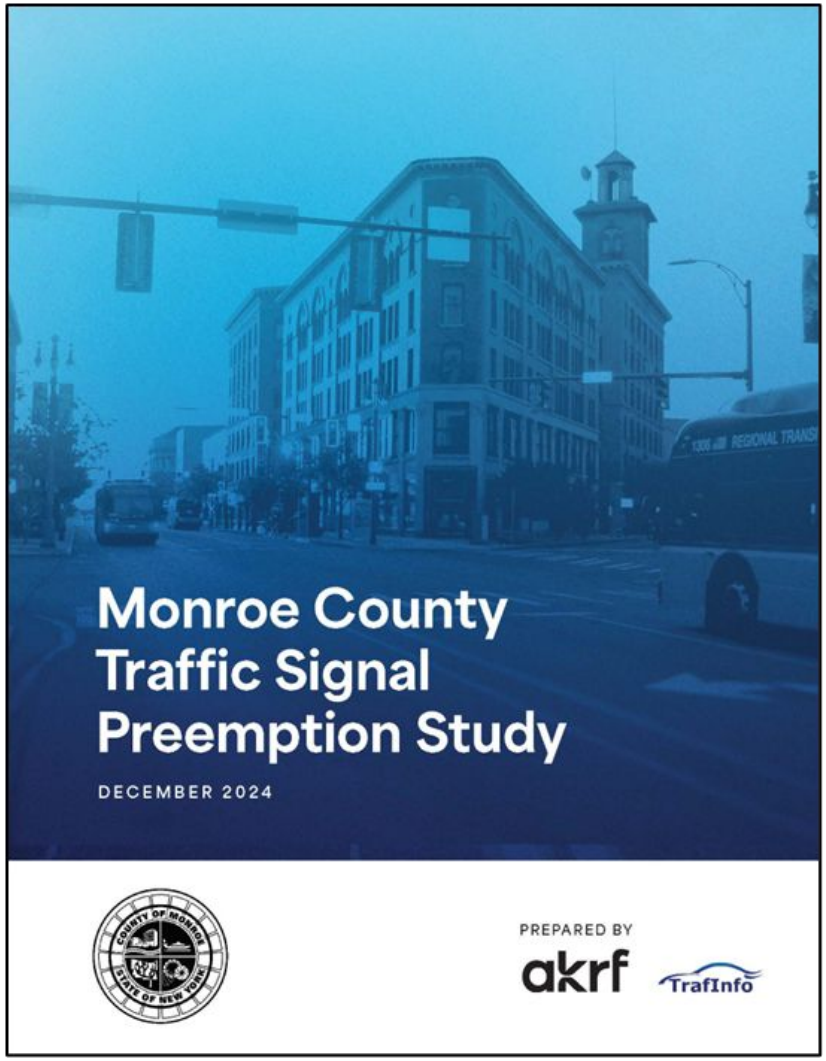
Presentation Outline

- Project Overview
- Planning Process
- Findings
- Next Steps



Project Objective

- To investigate the future implementation of hardware and software that will enable upgrades and deployment of cellular/GPS-based Emergency Vehicle Preemption (EVP) and Transit Signal Priority (TSP) at Monroe County traffic signals.
  - EVP: Supports emergency vehicle operations.
    - Improves emergency response times and first responder safety by giving emergency vehicles a green light while stopping all other traffic.
  - TSP: Supports transit operations.
    - Adjusts traffic signal timing to reduce delay and improve bus travel time reliability (extend green, queue jumping, etc.).

Key Project Stakeholders

- Monroe County Department of Transportation (MCDOT)
- NYS Department of Transportation – Region 4 (NYSDOT-R4)
- City of Rochester Fire Department (RFD)
- Rochester Genesee Regional Transportation Authority (RGRTA)
- Genesee Transportation Council (GTC)

MCDOT Traffic Operations – Overview

- James R. Pond Regional Traffic Operations Center (RTOC)
- 130 traffic cameras
- 830 traffic signals
  - 630 three-color traffic signals
  - 200 flashers/RRFBs

- Provides traffic engineering services for the City of Rochester
- EVP currently available at 403 signals

Key Tasks

- Needs Identification/Problem Statement
- National Best Practices
- Existing Conditions and Priority Locations
- Estimated Implementation Costs (Capital, Operating, Administrative)
- Operations and Maintenance Responsibilities
- Estimate Return on Investment (ROI)

Needs Identification

- **Preemption System Upgrades**
  - Improve efficiency for RFD
  - Add TSP functionality for RTS
  - Enable new agencies (AMR) to be added to the system
- **Implementation Challenges**
  - Funding sources
  - Interagency coordination
  - Legacy system

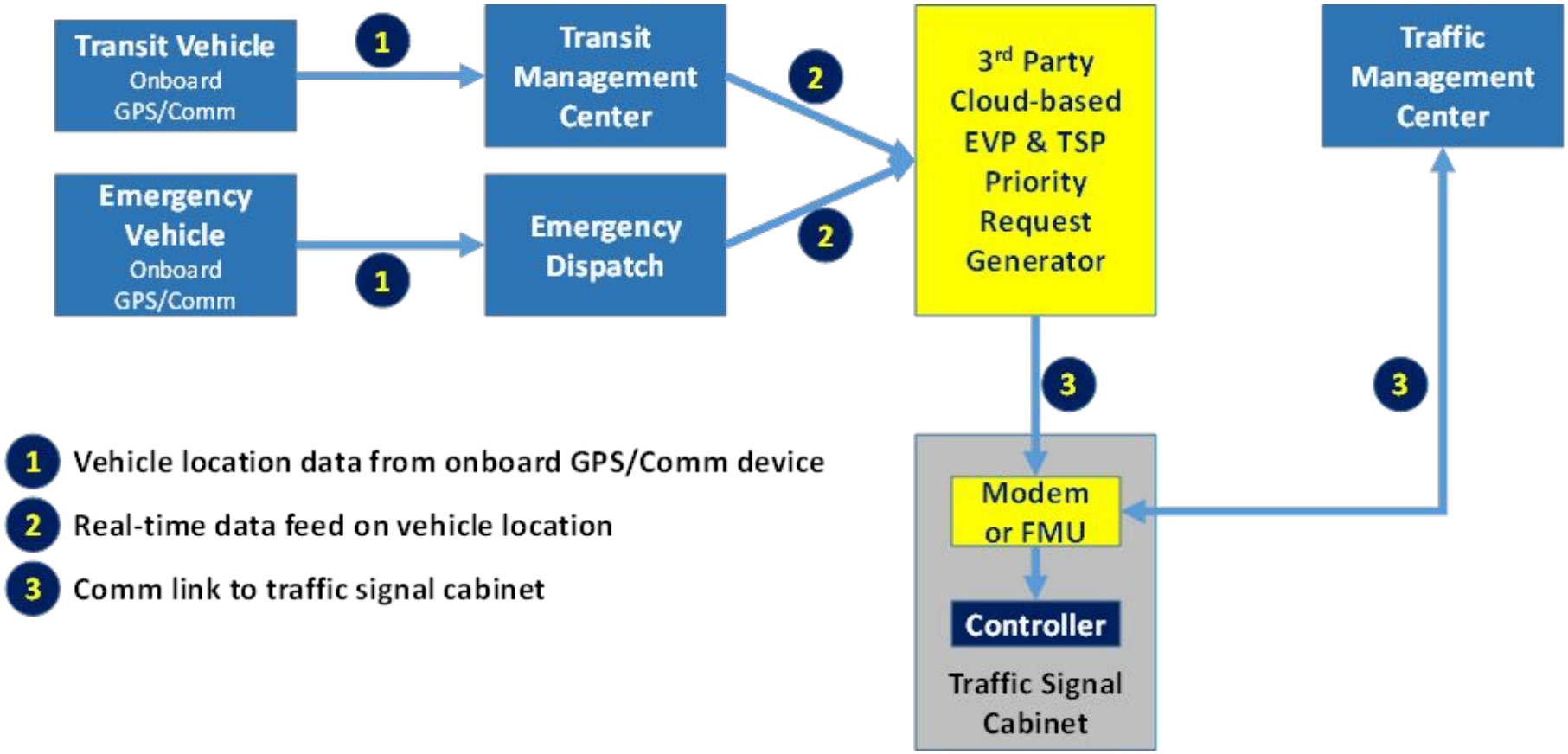
EVP and TSP System – Overview

- Two Primary Systems: Distributed and Centralized
- IR and GPS/Radio most prevalent EVP

Cloud-Based Systems

- Utilize existing CAD/AVL or GTFS feed for real-time location
- Latency a key concern, particularly for EVP

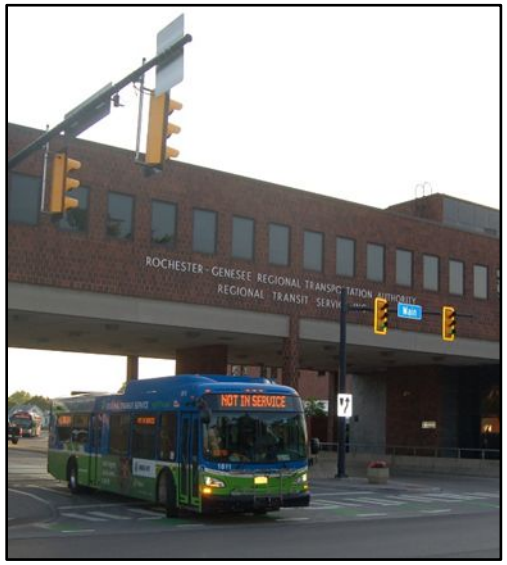
Cloud-based EVP and TSP System Architecture



Existing Conditions

Key Requirements:

- **NYSDOT may require edge device**
- **TSP equipment must be provided for the entire bus fleet**

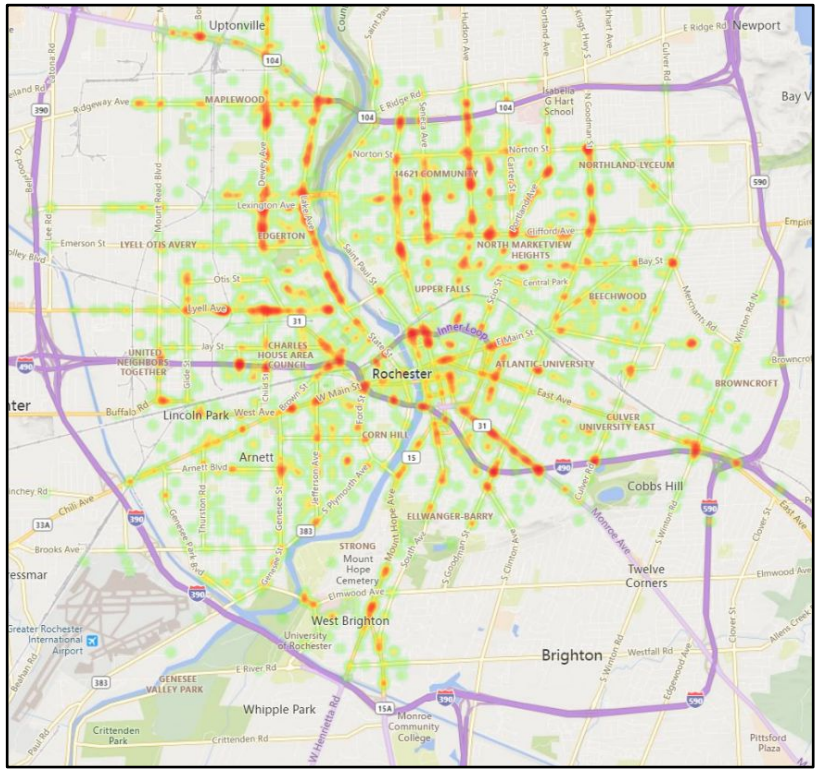


Agency	Optical Preemption	Traffic Signal Technology	Signal Communication Infrastructure
MCDOT	GTT Opticom Optical	Econolite ASC/3 or Cobalt controllers with associated firmware	Cellular or fiber optics
NYSDOT	GTT or Tomar Optical	2070 Controllers with Cubic/ Trafficware Firmware	Cellular or fiber optics

Agency	Optical Emitters	CAD / AVL	Polling Frequency
RFD	GTT Opticom 700 Series Emitters	Hexagon / Cradlepoint modem	10-15 seconds
AMR	N/A	Zoll Rescuenet / Cradlepoint or Sierra Wireless modem	10-15 seconds
RTS	N/A	Conduent IVU-4000 system over cellular wireless modems	10-15 seconds

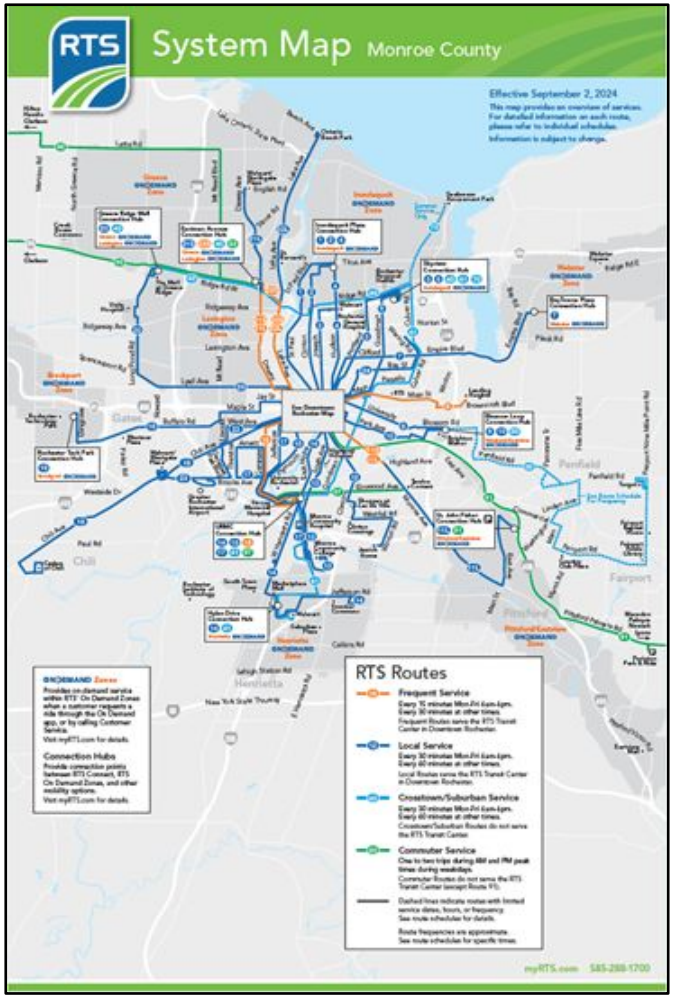
Priority Location Identification

- EVP
  - Frequency of preemption
  - Difficulty/safety of maneuvering at urban intersections
- TSP
  - ~~On-Time Performance~~
    - Ridership Levels
    - Travel Time Reliability
  - Bus Stop Locations
  - Existing congestion/queue jump



Priority Location Identification

- Best demonstrate the feasibility of cloud-based TSP
- Provide substantial benefit to the surrounding community
  - Approximately 27-43% of adjacent housing without a vehicle
  - % of zero car households exceeds the current public transit demand
  - Demonstrated potential for increased ridership



Priority Corridors

Corridor	Bus Routes	AADT (year)	Average Weekday RTS Ridership[3]	RFD Priority Ranking	RTS Priority Ranking	AMR Key Corridor	TTI of 1.3 or Greater[1]	RTS Frequent Network	Highest Community Priority Input[2]	Market Potential Ranking[2]
Lake Avenue (Lyell Ave to Route 104)	22	24,953 (2019)	1,597		2	X	X	X	X	1
West Main Street (Broad St to Genessee St)[4]	23/16/18	19,401 (2019)	2,299		1	X			X	2
Dewey Avenue (Lyell Ave to Route 104)	21	15,681 (2019)	2,143	1		X		X		4

Alternative	Lake Avenue (Lyell Ave to NY 104)	West Main St (Broad St to Genesee St)	Dewey Avenue (Lyell Ave to NY 104)
Transit Signal Priority	231%	2615%	269%

Estimated Implementation Costs – Capital Costs

Component	Price per Unit	Quantity	Total
General			
Traffic Signal Controllers	$3,500	2	$7,000
Communication Equipment	$1,500	31	$46,500
Upgrade 5 Cradlepoint R20-C7A	$1,500	5	$7,500
Conduent Latency Reduction	$25,000	1	$25,000
		TOTAL	$86,000
Vendor 1			
Edge Devices	$7,510	31	$232,810
Central Software (Including installation, configuration and training)	N/A	N/A	$0
Vehicle Equipment/Software and One-Time Deployment Costs			
RTS	$714	180	$128,520
RFD	$714	54	$38,556
AMR	$714	60	$42,840
		TOTAL	$442,726
Vendor 2			
Edge Devices	$4,500	31	$139,500
Central Software (Including installation, configuration and training)	$108,900	1	$108,900
Vehicle Equipment/Software and One-Time Deployment Costs			
RTS	$36,558	1	$36,558
RFD	$17,614	1	$17,614
AMR			
		TOTAL	$302,572

Estimated Implementation Costs – Operational Costs

Component	Price per Unit	Term	Quantity	Total
Vendor 1				
Intersection Fee	$392.00	10 years	31	$121,520
Edge Device Connectivity	$148.80	10 years	31	$45,880
RFD Vehicle Fee	$384.00	10 years	54 Vehicles	$207,360
AMR Vehicle Fee	$384.00	10 years	60 Vehicles	$230,400
RTS Vehicle Fee	$384.00	10 years	180 Vehicles	$691,200
			Annual Fee	$129,636
			Total Fee	$1,296,360
Vendor 2				
Transit License	$241.13	120 Months	31 Signals	$897,000
Emergency Vehicle License	$80.38	120 Months	31 Signals	$299,000
			Annual Fee	$119,600
			Total Fee	$1,196,000

Estimated Implementation Costs – Administrative Costs

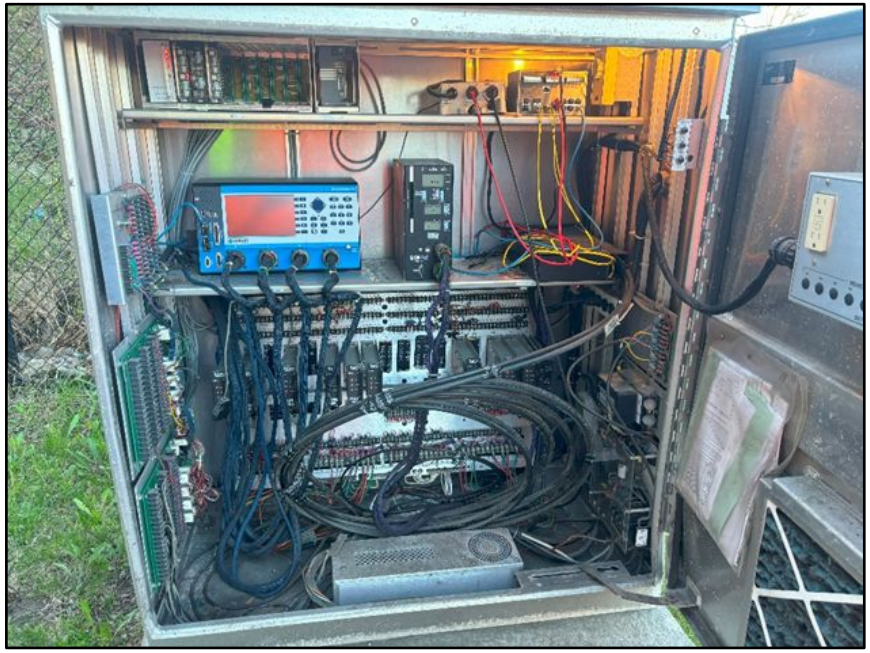
Component	First Year	Each Successive Year	Quantity	Total
Vendor 1				
Project Manager	$40,000	$25,000	2 years	$65,000
Consultant Support (Implementation, Testing and Evaluation)	$200,000	$100,000	2 years	$300,000
Procurement	$25,000	$10,000	10 years	$125,000
Implementation				
MCDOT (Electronics/ IT)	$75,000	$20,000	2 years	$95,000
RFD	$86,000	$5,000	2 years	$91,000
RTS	$290,000	$10,000	2 years	$300,000
AMR	$96,000	$5,000	2 years	101,000
Administration/ Data Analytics	$40,000	$20,000	10 years	$220,000
			Total Fee	$1,297,000

Estimated Implementation Costs – Summary

- **Total capital and operational costs approximately $1.5 million (10-year projected lifecycle)**
- **Administrative costs approximately $1.3 million**
  - **Support stakeholder staffing and consulting needs for:**
    - **Procurement**
    - **Implementation**
    - **Testing**
    - **Evaluation**

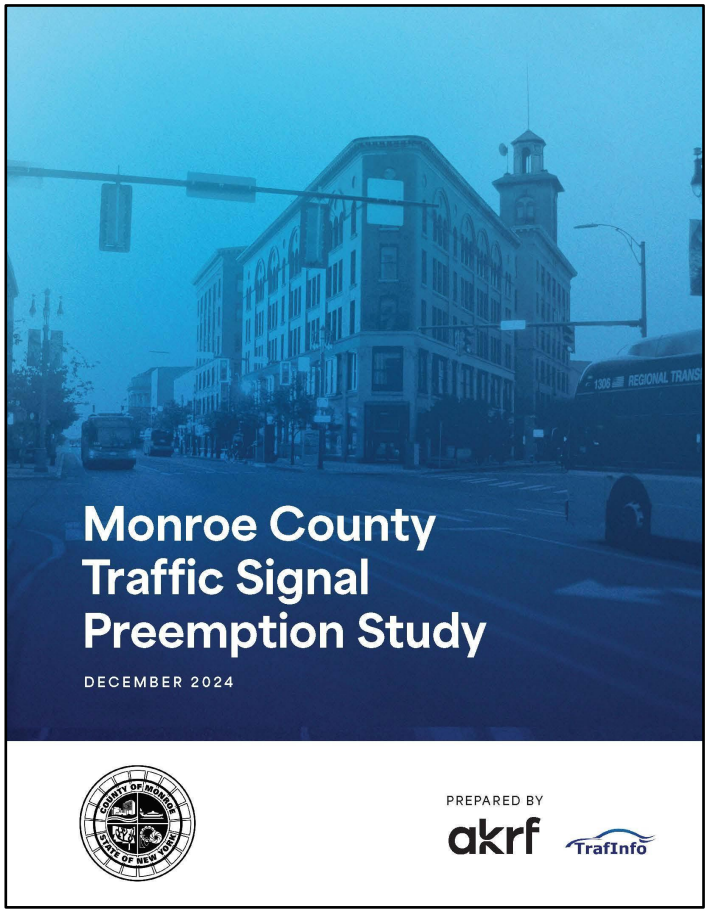
Next Steps

- Form Stakeholder Working Group
- Document/Update Stakeholder Needs
- Identify Funding Opportunities



GTC Plans and Studies

- Available: https://www.gtcmpo.org/plans-and-studies



GENESEE TRANSPORTATION COUNCIL

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Assessment Questions: 1 of 3

1. **Which stakeholder need was not addressed by the Monroe County Traffic Signal Preemption Study?**

   A. **Improve efficiency for the Rochester Fire Department.**

   B. **Add Transit Signal Priority (TSP) functionality for the Regional Transit Service.**

   C. **Add new agencies to the county's signal system.**

   D. **Use Artificial Intelligence (AI) to reduce ITS maintenance expenses.**

Assessment Questions: 2 of 3

2. **Which of the following factors was considered when identifying priority locations for EVP deployments?**

   A. **Integration into a regional Connected Vehicle network.**

   B. **Difficulty/safety of maneuvering at urban intersections.**

   C. **Building a new regional traffic operations center.**

   D. **Transit vehicle replacement costs.**

Assessment Questions: 3 of 3

3. **What were the three implementation cost types analyzed for this project?**

   A. **Operations, Maintenance, and Replacement.**

   B. **Capital, Operations, and Replacement.**

   C. **Capital, Operations, and Administrative.**

   D. **Administrative, Operations, and Maintenance.**