



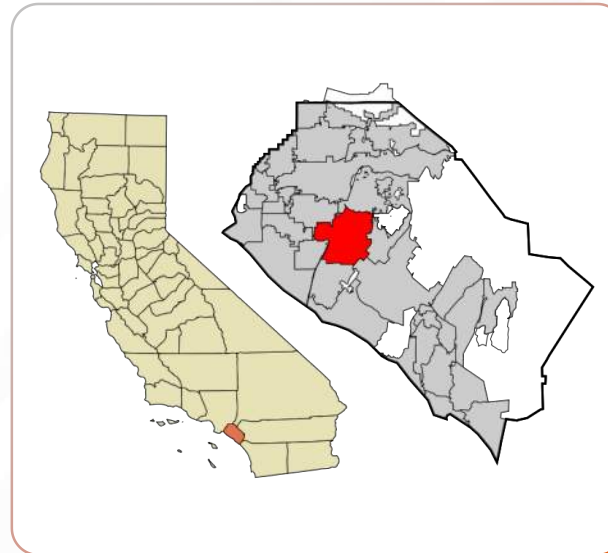
McFadden Avenue Multimodal Improvements

Safety, Connectivity, and Transit Innovation

July 2026

City of Santa Ana, CA

- Southern California, Orange County
- Population 310,000, 14th in California
- County Seat
- Incorporated 1862
- Arts and Culture
- Ethnically Diverse



City of Santa Ana, CA



Revitalization



Active Transportation

- 25 Miles New Bikeways (Under Construction)
- 16 Bikeway Miles (Last 5 Years)
- 100+ High Visibility X-Walks (Last 5 years)



Public Transportation

- OC Streetcar (1st in County)
- Transit Signal Priority (1st In County)



Traffic Signal Modernization

- Fiber Optic Network = 20 Miles new Fiber
- New Traffic Signals = 20 (last 5 years)
- Video Bike Detection = 100 (last 5 years)

Project Overview

McFadden Avenue Multimodal Improvements

Goals

- Improve Safety for all Roadway Users
- Enhance Connectivity between Neighborhoods and Destinations
- Enhance Transit Reliability and Attractiveness
- Support Active Transportation
- Leverage Technology to Improve Mobility
- Advance Sustainability and Climate Goals
- Measure and Fine Tune Corridor Operation and Performance

Partnerships



Funding

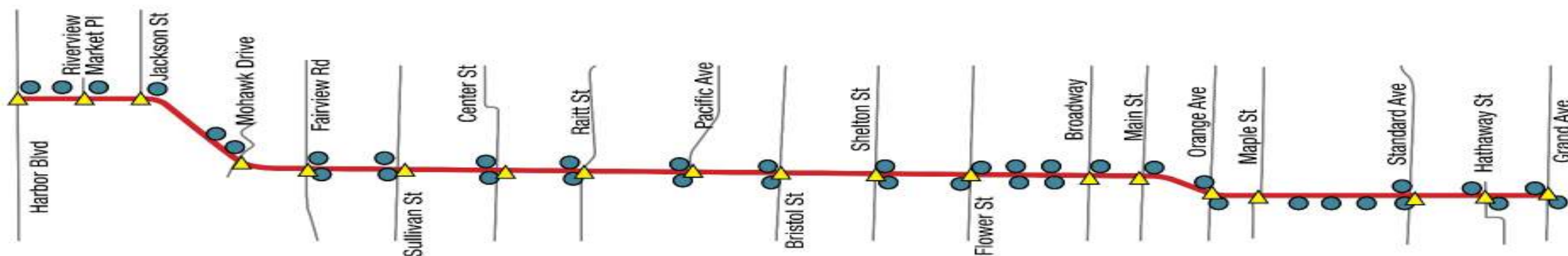


Engineering





Existing Environment on McFadden Ave

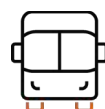


Legend

- Signalized Intersections
- Local Bus Stops
- Express Bus Stops
- Route 64Xpress
- Route 64
- Route 66



- Divided Collector
- 4 miles, 4 Lanes
- 15,000 – 20,000 ADT
- 44 mph 85%tile speed
- 19 Traffic Signals
- Signals not Coordinated



- Routes 66
- 19 Stops (each direction)
- 10 min Headway
- 3rd Highest Boarding in County (1.4 Million)
- No Transit Signal Priority



- 9-10' Sidewalks
- Controlled Crossings Only at Signals
- 60' to Cross McFadden



- No Existing Bicycle Facilities

Multimodal Corridor

Approach - 3 *Projects*

Roadway Redesign

- Protected Bikeways
- Road Diet
- Pedestrian Safety Improvements

Traffic Signal Operations

- Smart Signal Technology
- Optimized Traffic Signal Timing
- Emergency Vehicle Preemption

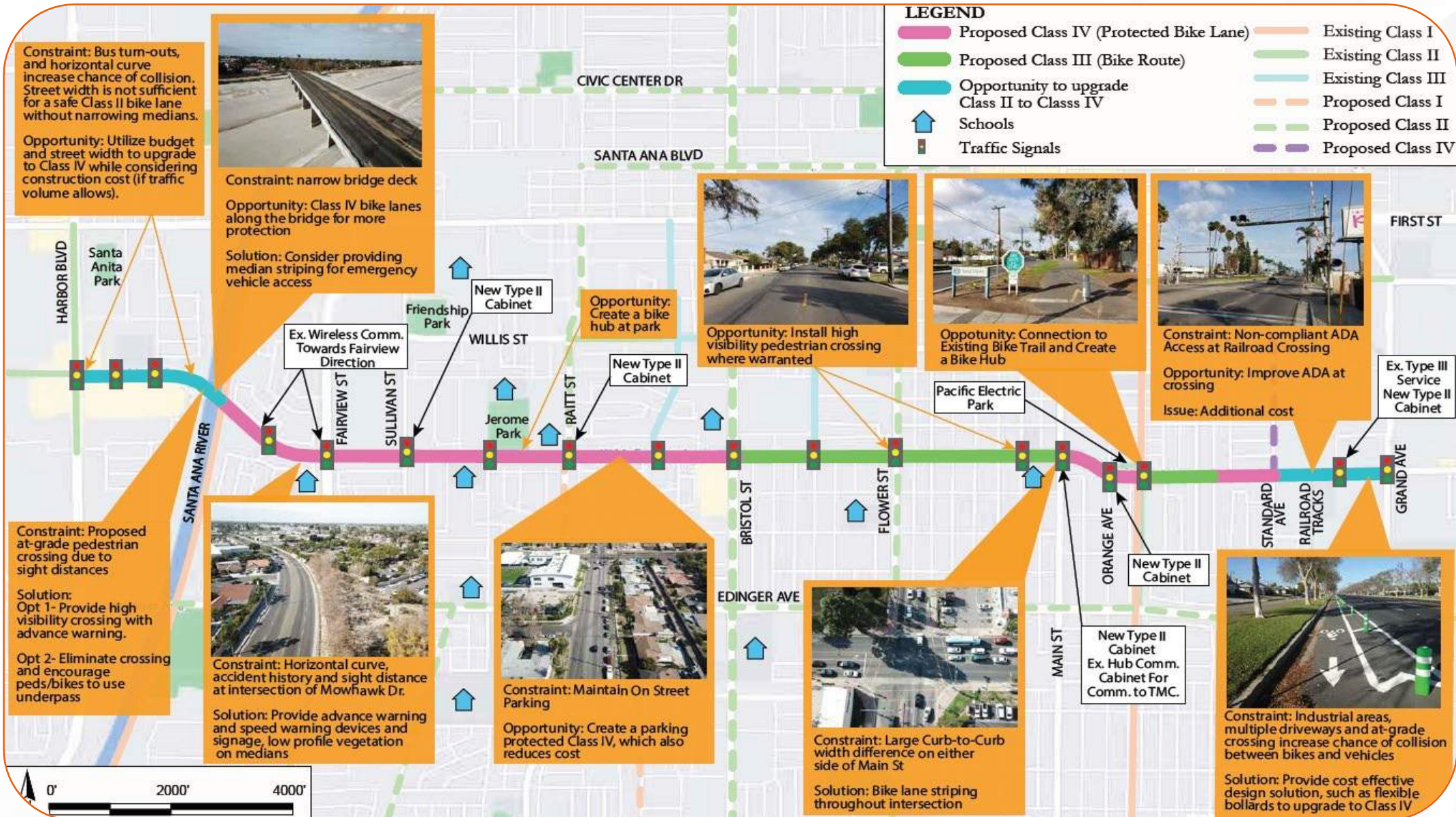
Transit Enhancements

- Cloud Transit Signal Priority (TSP)
- Modern Passenger Amenities
- Accessibility Upgrades



A multimodal corridor is a transportation route that integrates multiple modes of travel movements such as roads, transit, cycling, and walking facilities to enable efficient and connected mobility.

Roadway Redesign



Roadway Redesign



Harbor to Santa Ana River- .35 mi



Class 2 Bikeway

- Higher ADT- Maintain Vehicle Capacity
- Geometry Constraints
- Median Island Reconstruction

Santa Ana River to Fairview- 0.5 mi



Class 4 – Bollard Buffer Bikeway

- Narrow Bridge
- Connectivity to River Path
- Type K Delineators

Fairview to Bristol- 1.25 mi



Class 4 Protected Bikeway

- Residential and Small Business
- Raised median with Landscaping
- Parking Protected – Maintain Parking Spaces

Roadway Redesign



Bristol to Main- 1 mi



Class 3 Bike Route

- Narrow Street Segment
- Preserve Parking
- Shared Use, Lower Speed and Volume

Main to Standard- .65 mi



Bulb Outs

- Shorter Crossing Distance
- Slower Turning Movements
- High Visibility Crosswalks

Standard to Grand- 35 mi



Protected Intersection

- Still Under Construction
- Improved Ped and Bike Sight Distance
- Reduce Turning Speed

Before



After



Class 4 Buffer Bikeway, Flexible Bollards, Striped Conflict Zone



Before



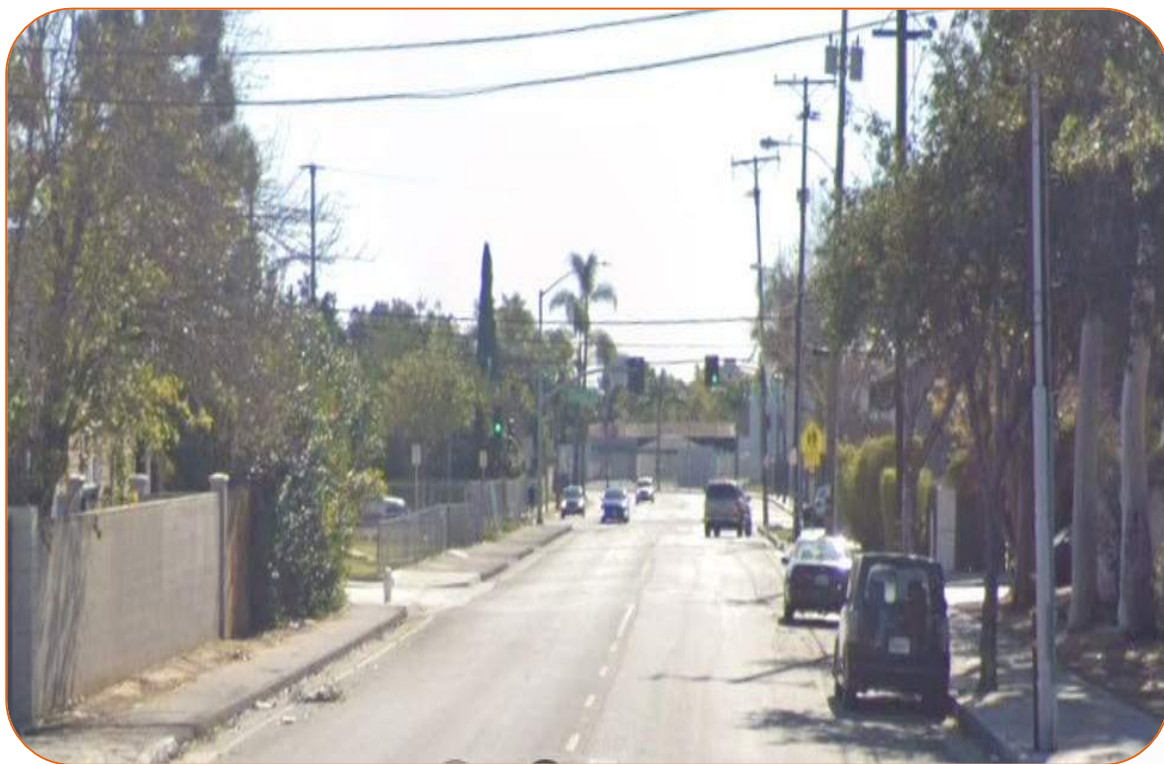
After



Class 4 Protected Bikeway, Raised Median, Parking Protected, Increased Safety and Comfort



Before



After



Class 3 Bikeway, Pavement Marking & Signage, Lower volume, Lower speed, Preserve Parking

Before



After



Shorter Crossing Distance, Slower Turning Movements, High Visibility Crosswalks, Traffic Signal

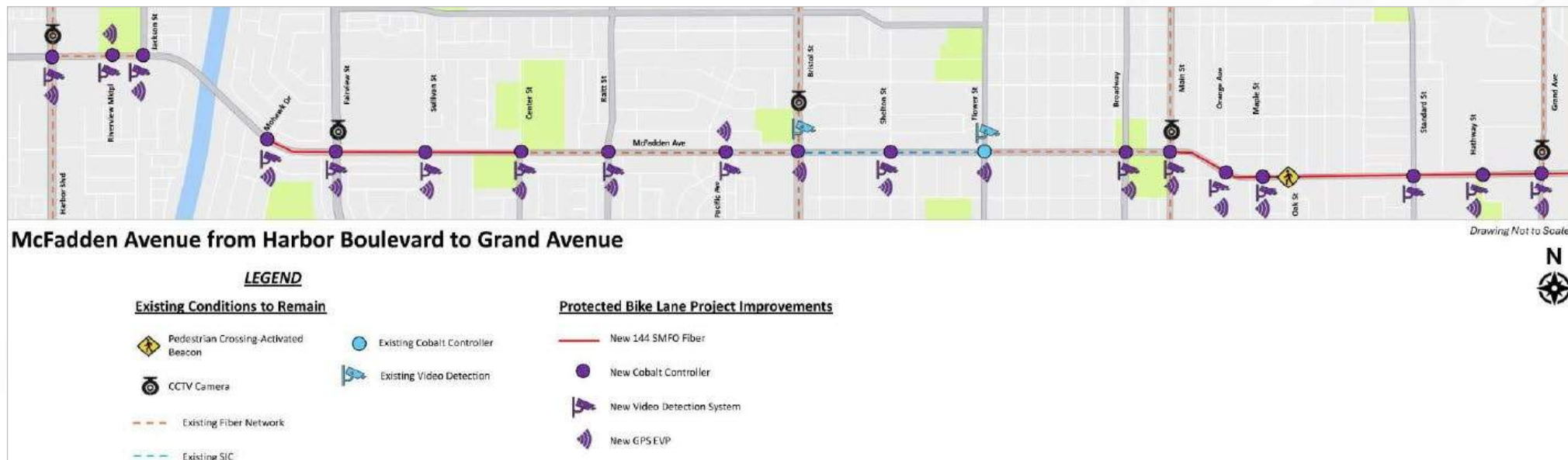
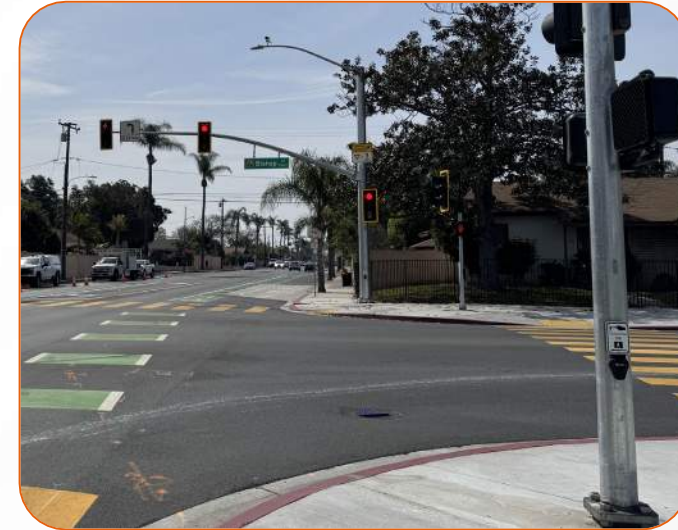
Smart Traffic Signal Improvements

Technology

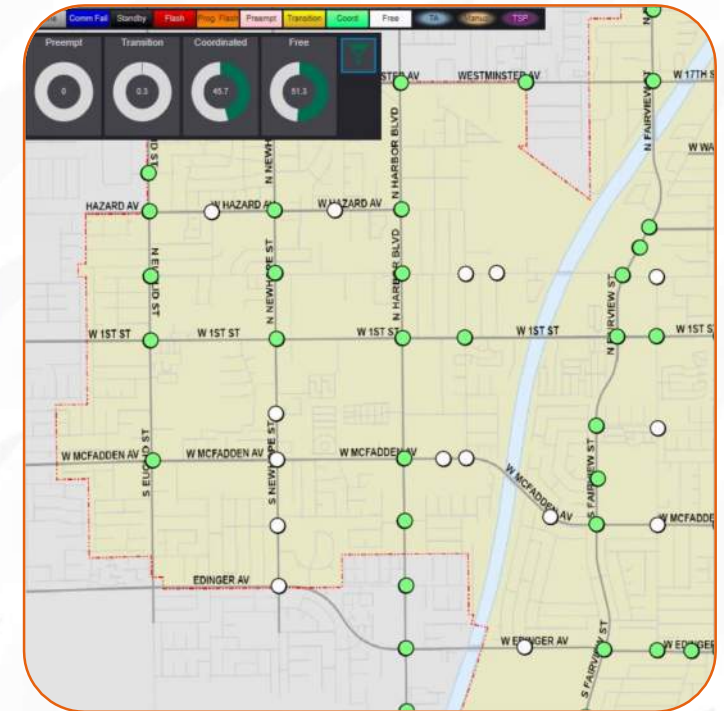
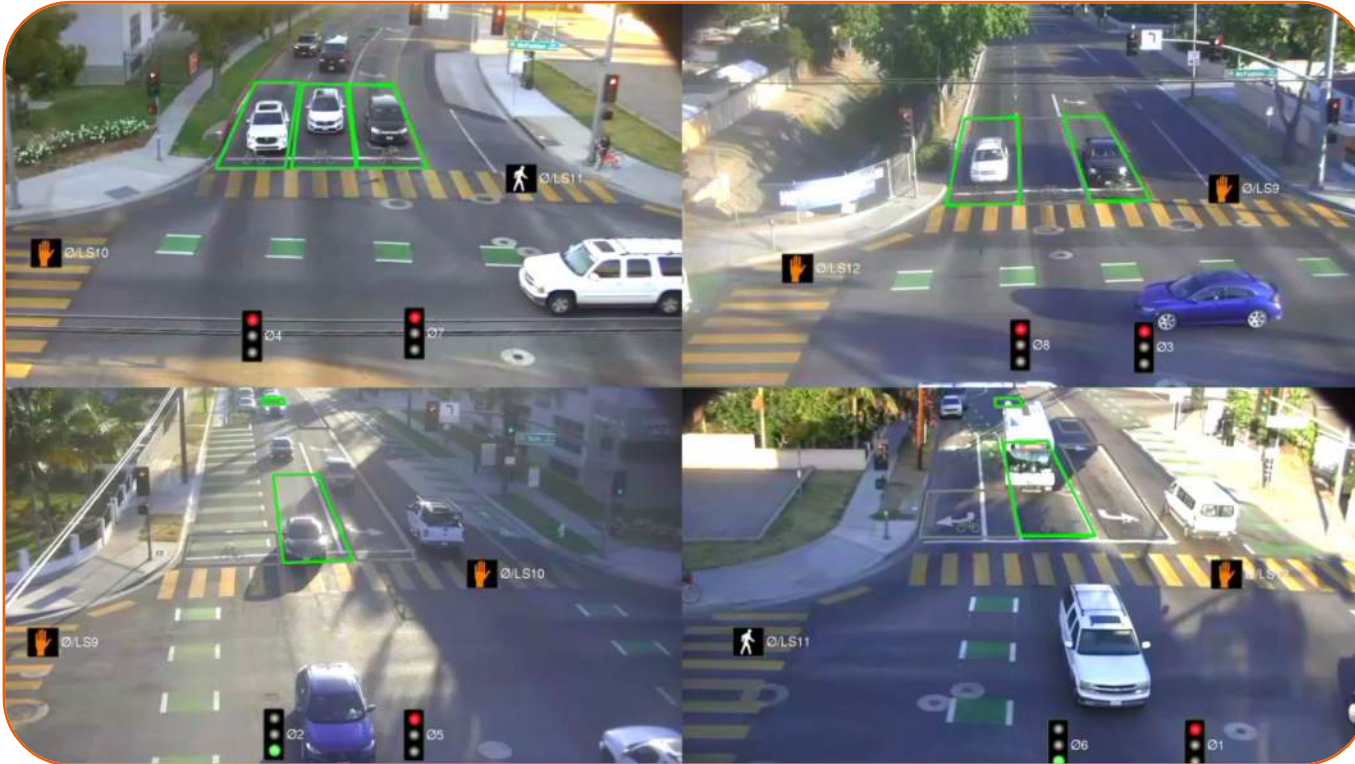
- Advance Traffic Controllers
- Video Detection Systems
- Emergency Vehicle Preemption
- Fiber Optic Communication Network

Safety

- Audible Pedestrian Signals
- Retro Reflective Back Plates
- High Visibility X-Walks
- Artwork



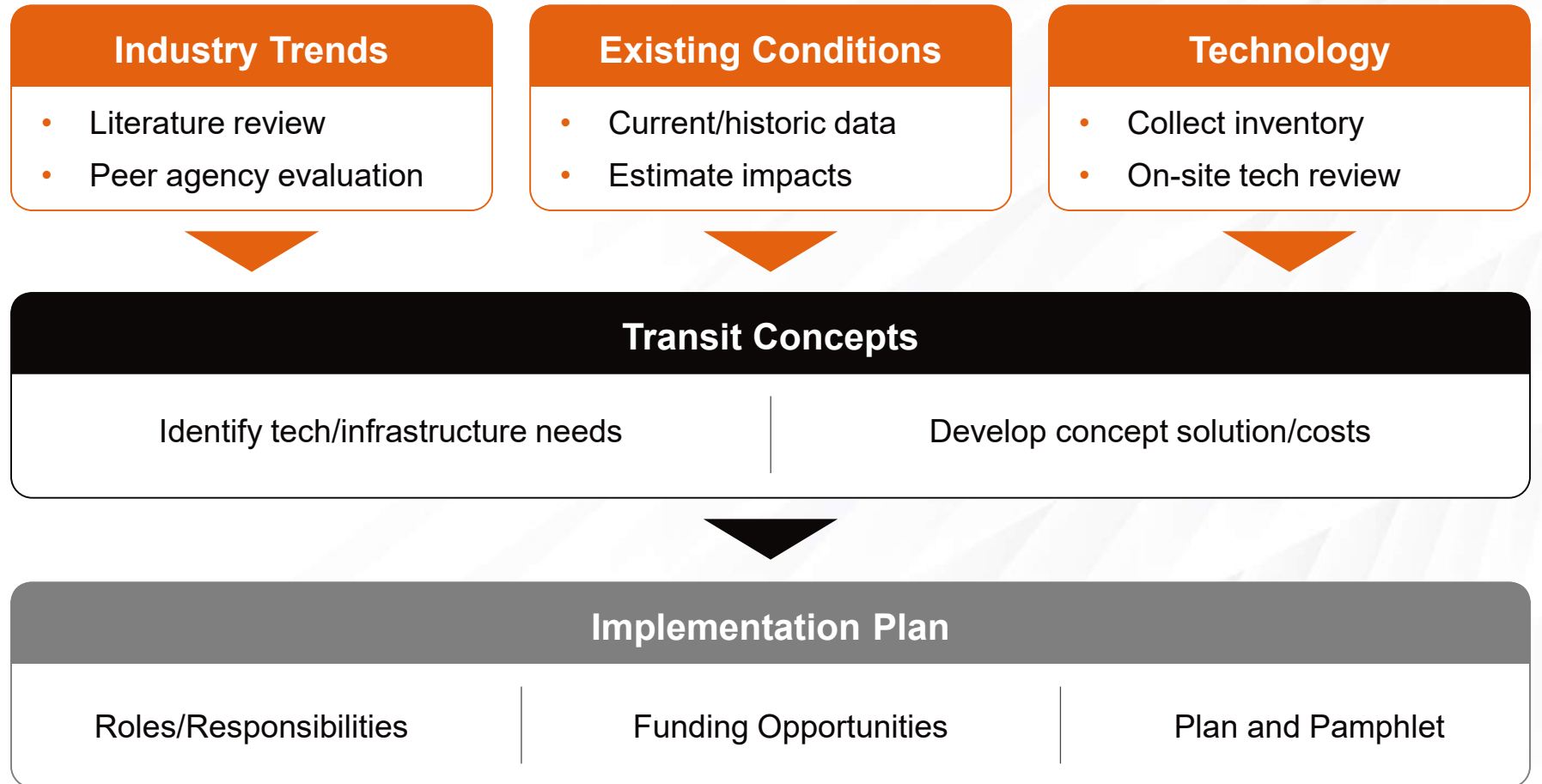
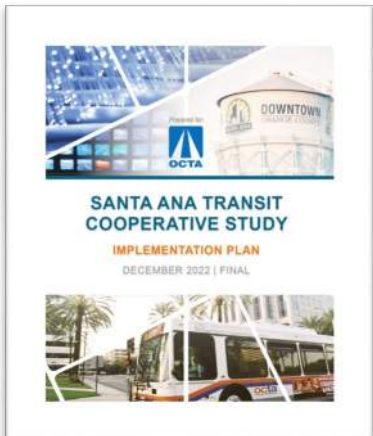
Smart Traffic Signal Improvements



- Traffic Signal Timing Optimization
- Bicycle Detection
- Signal Operation Enhancements
- High Speed Communication
- High Resolution Data
- Real Time Signal Status

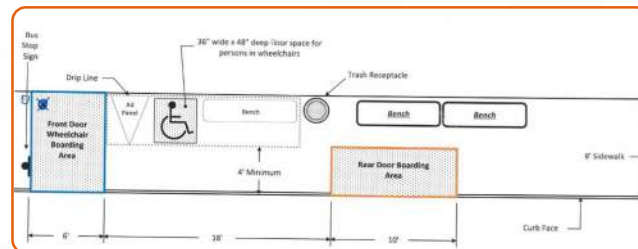
Transit Study

- Evaluate Impact of Roadway Modification on Bus Service
- Identified Transit Improvement to Reduce, Eliminate or Even Reverse Impacts
- **Projected 4% Increase in Travel Time (2+ Minutes)**



Bus Stop Improvements

- 1 Bus Shelters
- 2 Bus Stop Relocation – Near Side to Far Side
- 3 Upgraded Bus Pads
- 4 Real Time Arrival Signs
- 5 Solar Powered Lighting
- 6 Sidewalk Accessibility Improvements



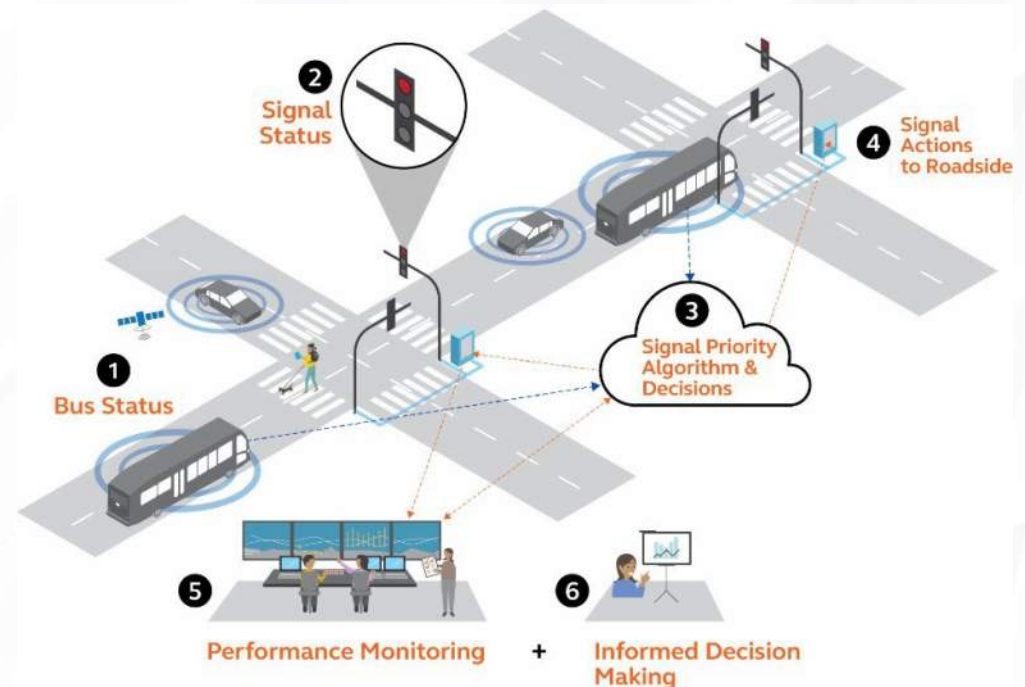
What is TSP / McFadden Concept

What is Transit Signal Priority?

- Strategy to improve **bus travel time and reliability**
- **Adjusts signal timing to prioritize transit vehicles**
 - Early Green / Green Extension

Project Concept

- Deploy Cloud-Based TSP for Route 66 (19 Signals)
- Improve Transit Performance without Degrading Traffic Operations
- Leverage Existing Infrastructure -> **No additional field equipment**



McFadden Avenue Cloud-TSP Schematic

The schematic illustrates the data flow and infrastructure for the McFadden Avenue project. At the top left, the **OCTA Traffic Operations Center CAD/AVL** is shown with a building icon. A bus labeled **66 McFADDEN AVE** is depicted with **Radio / GPS / Voice** and **Bus Location / Status Data** connections to the **Swiftly** cloud platform. The **Swiftly** cloud is connected to **ClearGuide** and **LYT**. The **LYT** cloud is connected to the **ARCADIS Operations Dashboard** and the **City of Santa Ana TMC**. The **City of Santa Ana TMC** includes a **FIREWALL**, **LYT**, and **Centrac** components. The bottom section shows a map of **McFadden Avenue from Harbor Boulevard to Grand Avenue** with various infrastructure elements marked, including **Harbor Blvd**, **McFadden Ave**, **Grand Ave**, and several cross streets. A **LEGEND** defines the symbols for **Existing Conditions to Remain** and **Protected Bike Lane Project Improvements**.

LEGEND

Existing Conditions to Remain

- Pedestrian Crossing-Activated Beacon
- CCTV Camera
- Existing Fiber Network
- Existing SIC
- Existing Cobalt Controller
- Existing Video Detection

Protected Bike Lane Project Improvements

- New 144 SMFO Fiber
- New Cobalt Controller
- New Video Detection System
- New GPS EVP

McFadden Avenue from Harbor Boulevard to Grand Avenue

Drawing Not to Scale

N

- Bus Location Data (CAD/AVL, GTFS) – OCTA Swiftly Feed

- Process Real Time Bus Requests

Communications

- Utilize City's Fiber Network
- Bus On-Board Cellular Communications

- Cobalt / EOS (NTCIP 1211)

Key Point: Centralized system -> scalable, no additional hardware, real-time control

TSP Implementation Approach

Planning & Evaluation

- Concept Development
- Requirements Definition
- Vendor Demos / Scoring

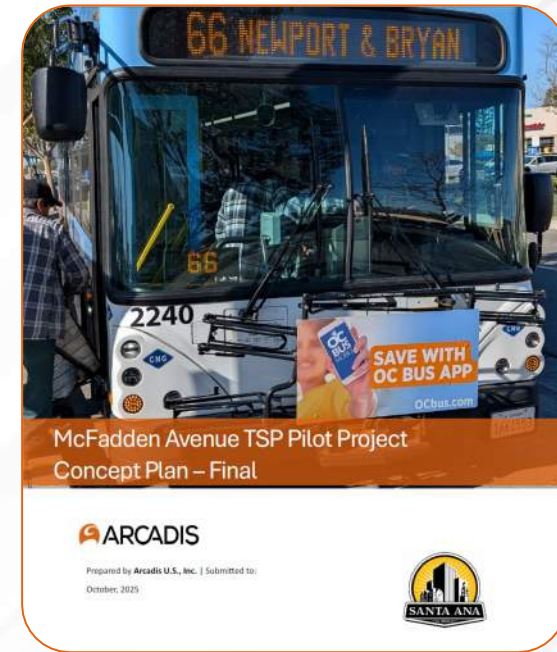
Deployment

- System Configuration
- Signal Timing Updates –TSP Parameters and Optimized Traffic signal Timing
- Swiftly Integration – Already integrated from the OCTA Harbor Blvd Pilot

Operations

- Real-time Priority Operation
- Monitoring and Fine Tuning
- Continuing Performance Monitoring

Key Point: Full Lifecycle Pilot
(evaluation -> implementation -> operations)



B.1 TSP Setting Recommendations

TSP Setting	Initial Recommendation	Follow up Adjustments	
		Too Aggressive	Too Conservative
Class Type (advanced request)	10	10	7
Class Type (updated request)	7	10	7
Class Level	1	1	1
Phase Reduction (through phases)	10 sec	5 sec	15 sec
Phase Reduction (left turn phases)	5 sec	0 sec	5 sec
Phase Extension (non-priority phase)	10 sec	5 sec	15 sec
Phase Extension (priority phase)	20 sec	10 sec	20 sec
Conditional Priority	Priority only if bus is on time or late	Priority only if bus is late	Unused
Time of Day Plan	Unused	Implement	Implement
Max Queue Compensation	10 sec	0 sec	20 sec
Recover Cycle	0	2	0

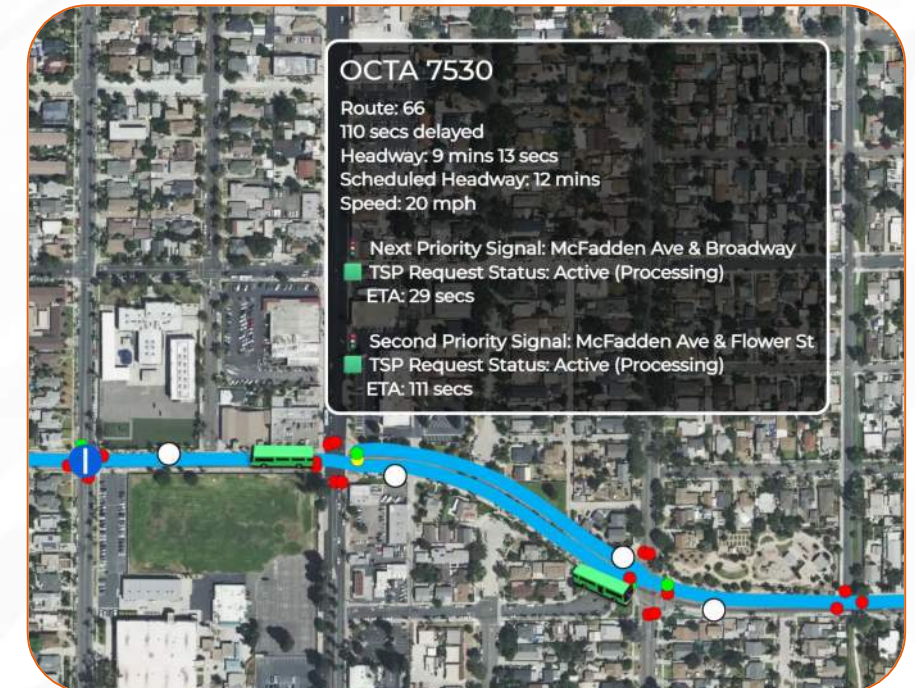
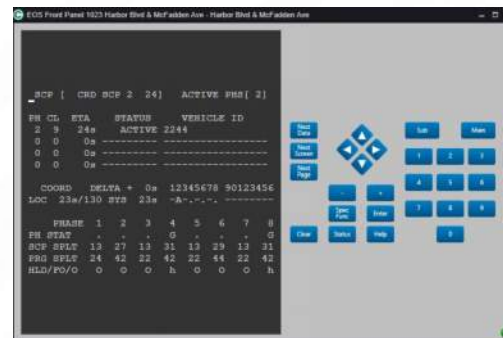
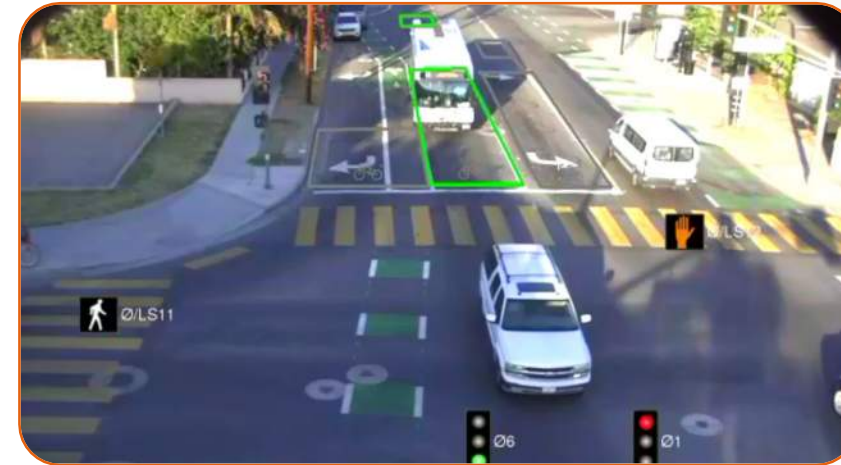
TSP Fine Tuning

TSP Logic Refinement

- Go Live March 2026
- Cloud Based Dashboard
- GTFS – Bus Stop Relocation
- Latency – Reduced from 10 to 5 Second
- ETA – 60 sec to 120 sec
- Conditional Priority Rules to be Implemented (July)

Signal System Updates

- Advance Traffic Management System
- Controller Firmware – Updated to Latest Version of EOS
- Recovery Cycle – 3 down to 1
- Green Reduction or Extension
- Class Type



Performance So Far



Transit Performance	Before	After	Difference
TSP Requests (per day)	N/A	5k	
Average Red-Light Delay (s)	7.97	7.54	-0.43 (5.4%)
Average Green Light Success			
Trip Duration (Min)	25.07	24.40	-2.17 (8.52%)
% Signals Encountered	3.54	3.43	-0.09 (3.52%)

Transit Data Started January 2026

Key Point: System is Deployed, but Operating Conditions are still stabilizing

Corridor Performance	Before	After	Difference
Travel Time (Min)	11.72	10.86	-0.66 (5.6%)
Delay (Min)	3.61	3.15	-0.46 (12.7%)
Speed (MPH)	22.0	23.5	+1.5 (7%)
Travel Time Index (TTI) <i>Mainline</i>	1.40	1.40	0 (0%)
Travel Time Index (TTI) <i>Cross-Street</i>	1.66	1.69	+0.03 (1.8%)

Compared between January 2025 (before construction) and May 2026

Full Evaluation Timeline



Post-construction
conditions

Full TSP logic
in place

August / September

Updated transit
data (GTFS)

Normal Traffic
Patterns

Bus Travel
Time Reliability

Intersection
Delay Impacts

Evaluation Focus

Corridor-level
Performance

Lessons Learned



1 Public Outreach

2 Project Branding

3 Strong agency partnerships

4 Multi Project Coordination

5 Phased Construction

6 Traffic Signal Detection

7 TSP Adjustments and Monitoring

8 Combining infrastructure and technology

9 Leveraging grant funding opportunities

10 Corridor-wide planning approach

Thank You!

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