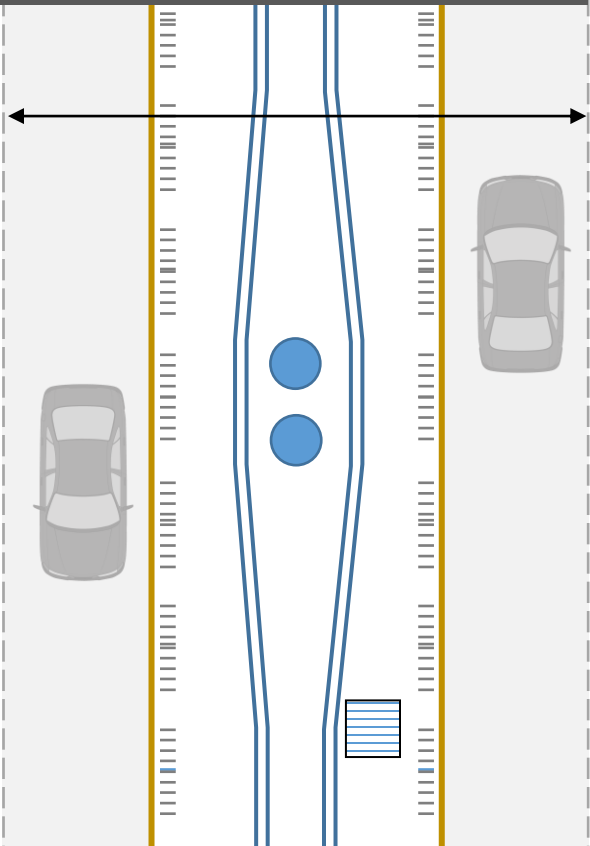
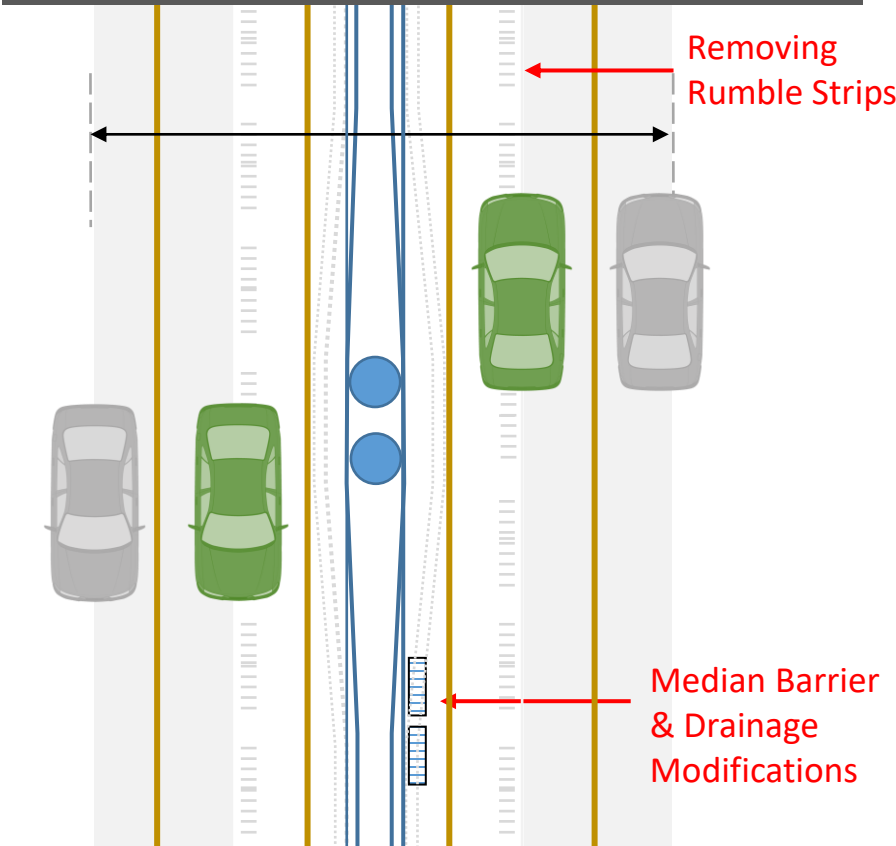


Lane Use and Drainage

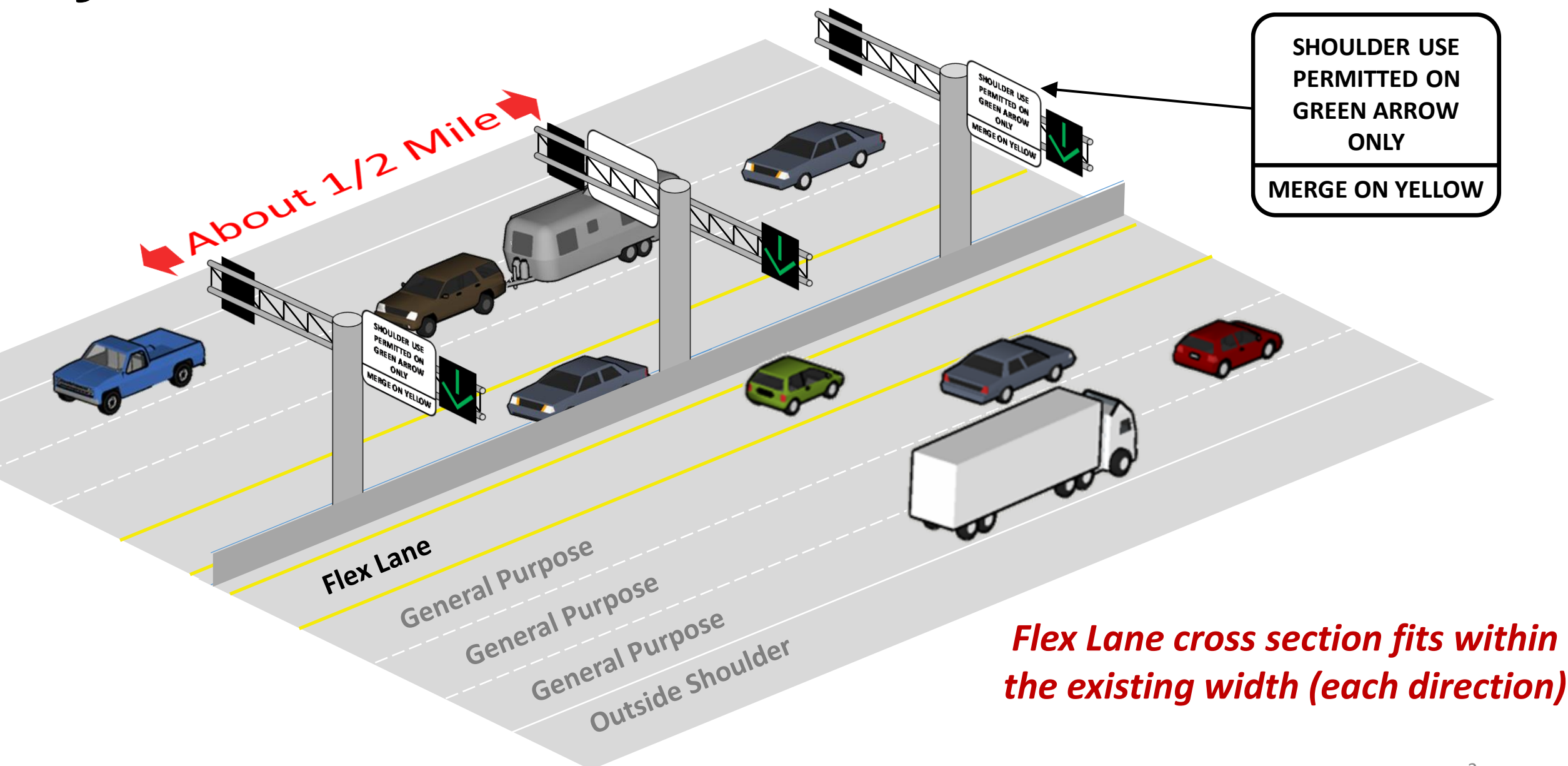
No-Build Alternative



Resurfacing w/ Flex Lane



System Overview



Flex Lane cross section fits within the existing width (each direction)

Dynamic signing

Active management



In operation



Not in operation



Approaching lane drop or for use in closure scenarios



Indicates lane drop at the Flex Lane limits

Sample freeway messaging

**LEFT SHOULDER
OPEN
TO TRAFFIC**

**LEFT SHOULDER
EMERGENCY
STOPPING ONLY**

Operations – peak period

Outside shoulder

General purpose

General purpose

General purpose

Flex Lane (median shoulder)

Median Barrier Wall

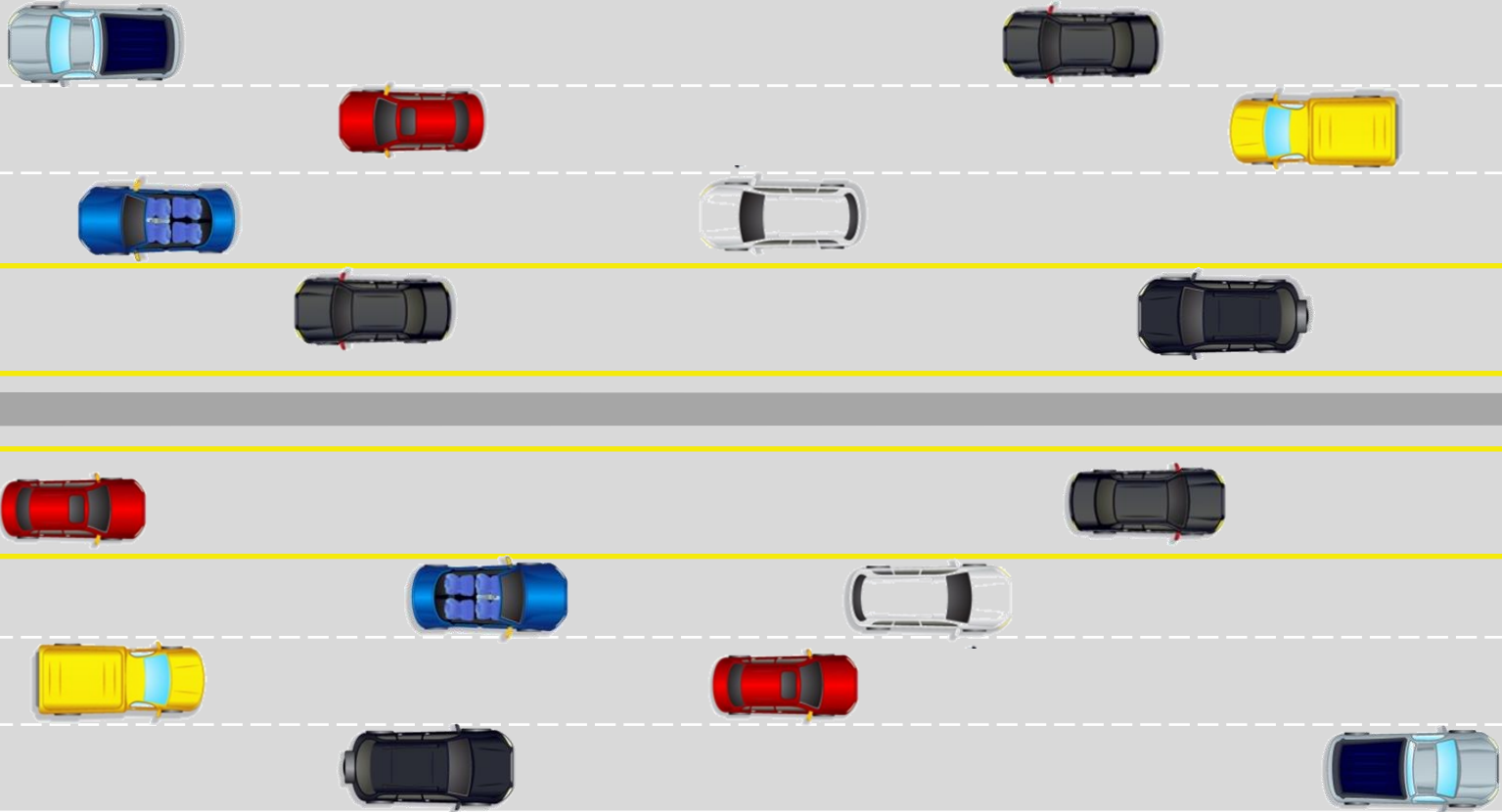
Flex Lane (median shoulder)

General purpose

General purpose

General purpose

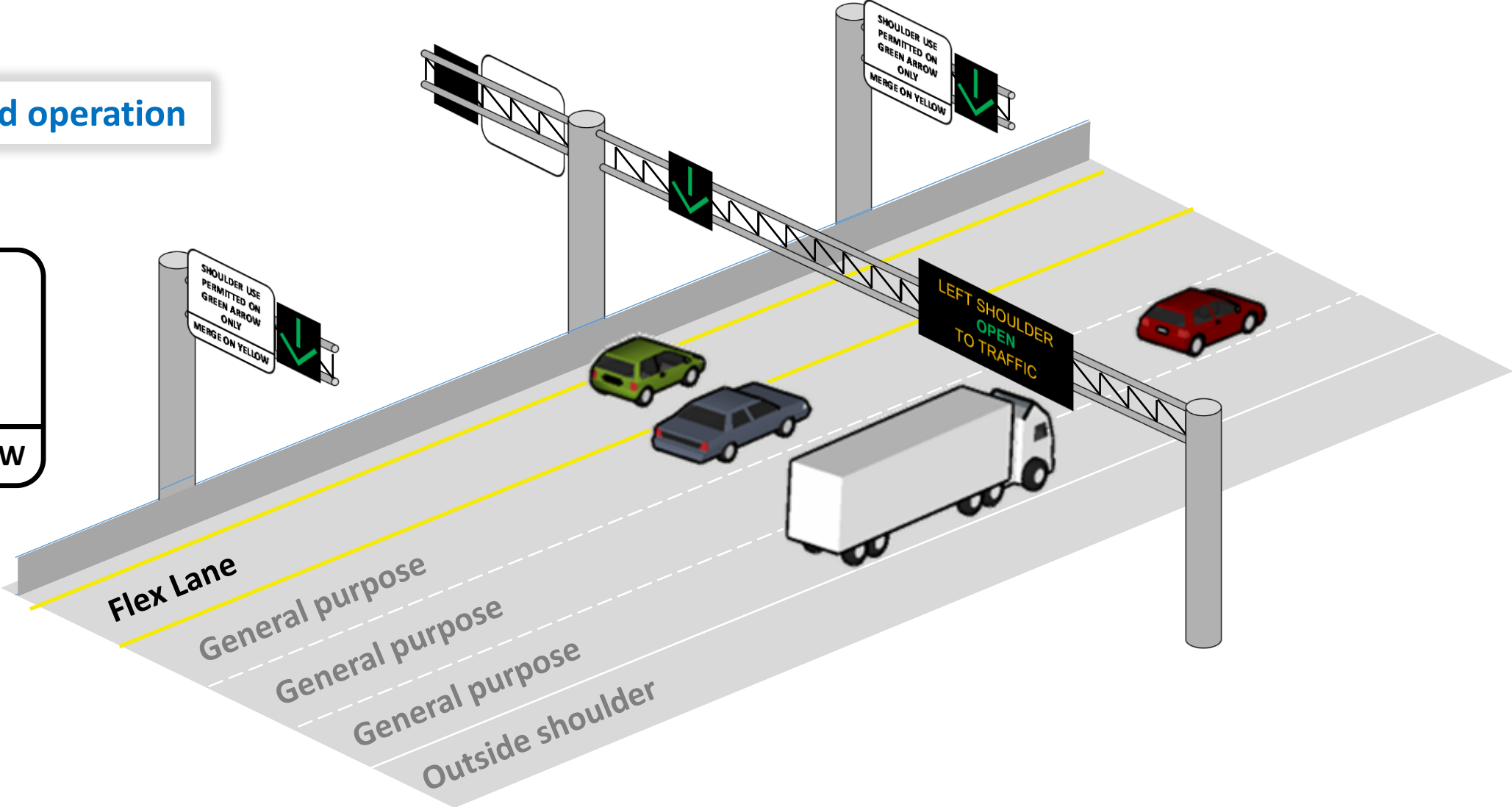
Outside shoulder



Operations – peak period

Peak period operation

SHOULDER USE PERMITTED ON GREEN ARROW ONLY
MERGE ON YELLOW



Overhead sign with instructions

SHOULDER USE PERMITTED ON GREEN ARROW ONLY
MERGE ON YELLOW



Dynamic sign indicating availability of shoulder

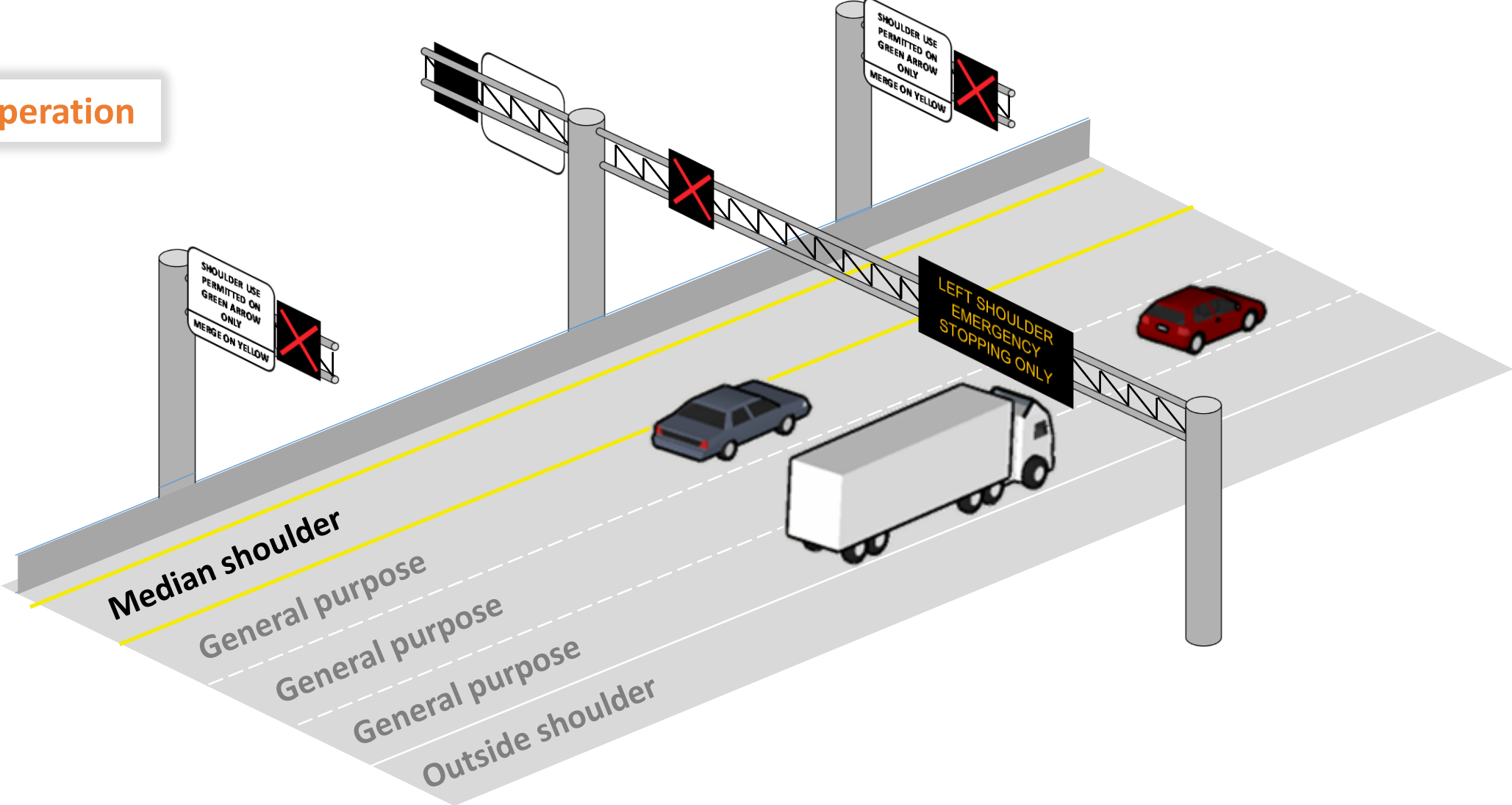
Flex Lane

General purpose lanes open 24 hours



Operations – off-peak

Off-peak operation



SHOULDER USE
PERMITTED ON
GREEN ARROW
ONLY
MERGE ON YELLOW

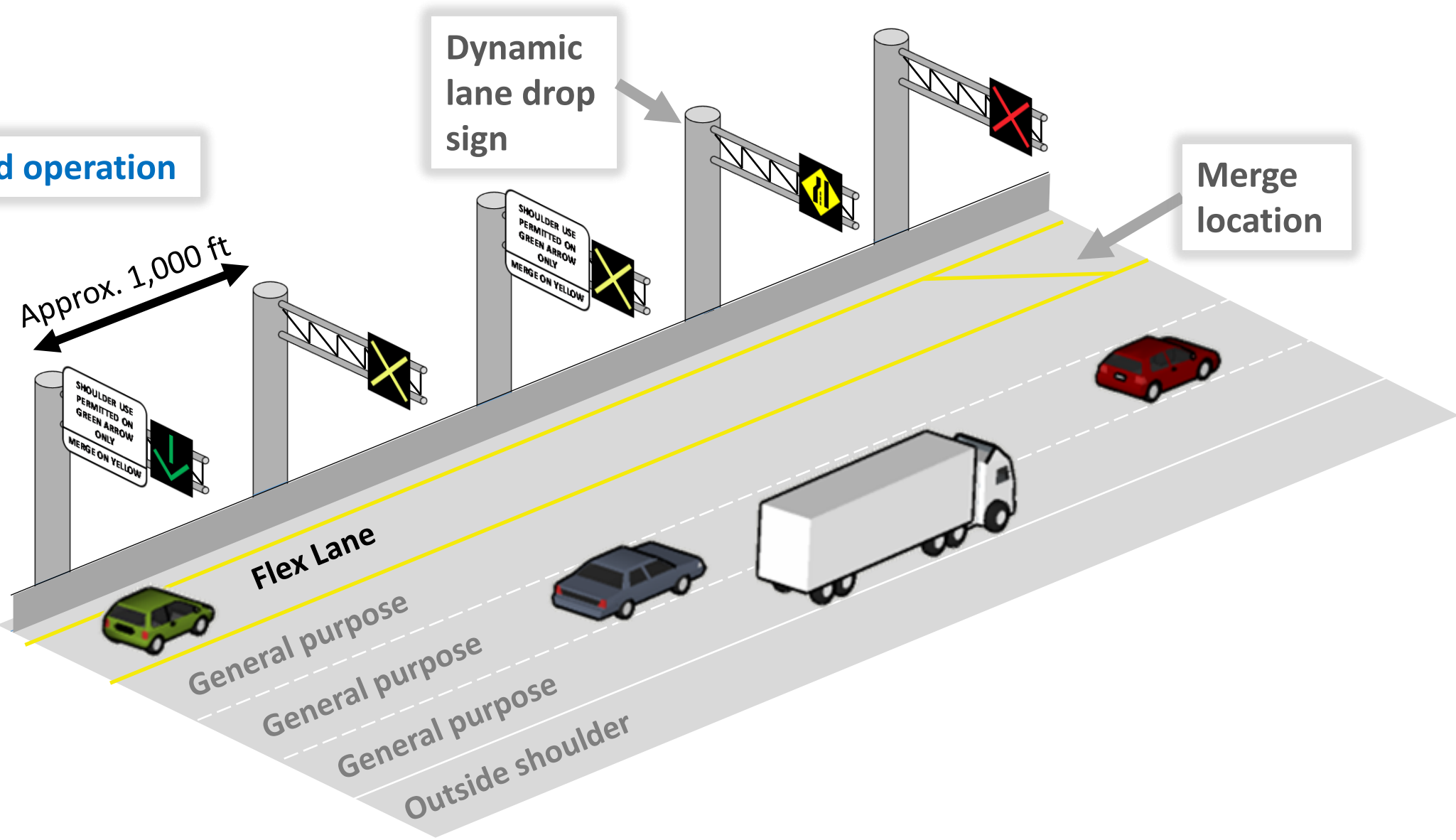


Median shoulder

**General purpose lanes
open 24 hours**

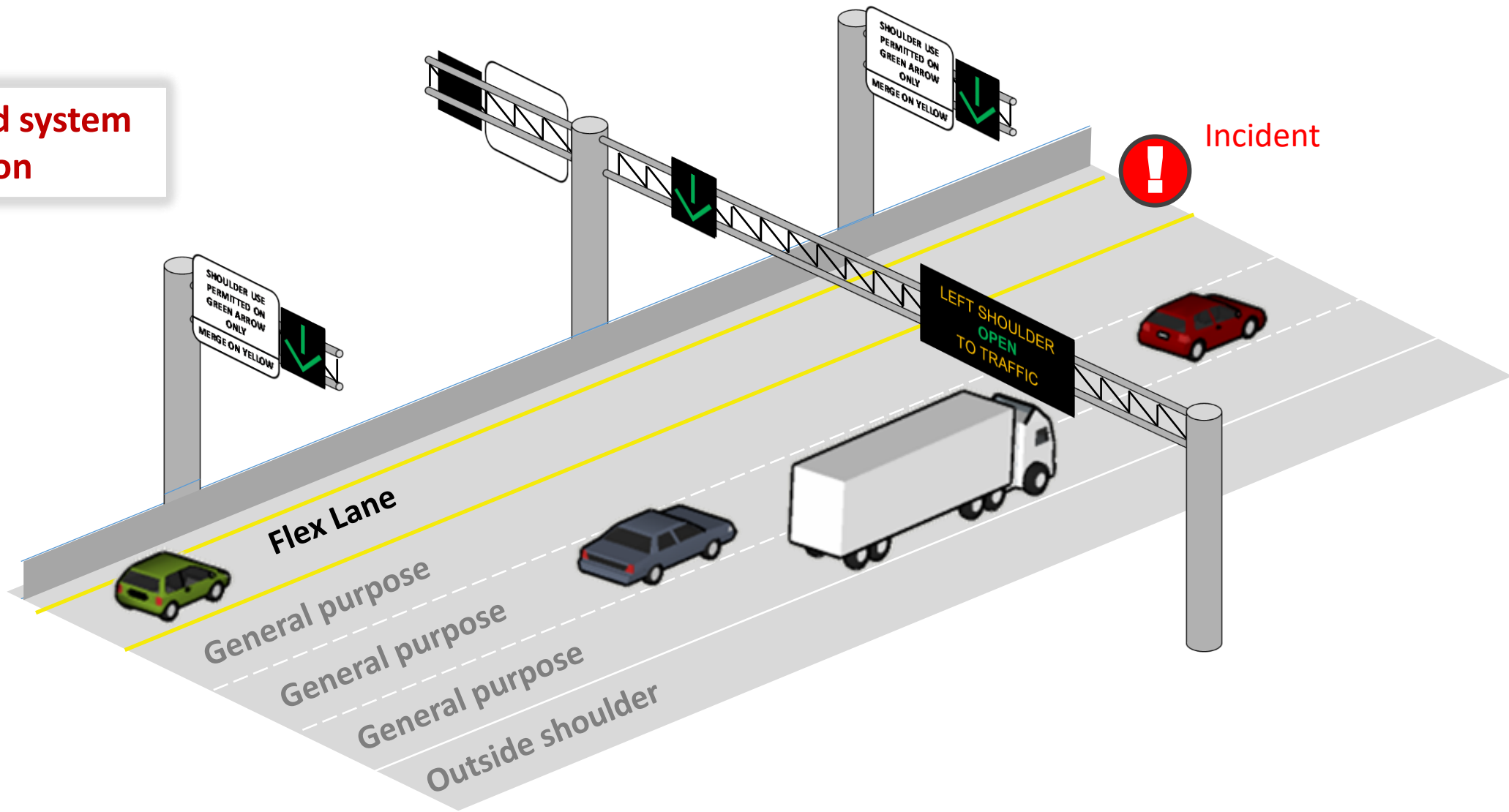
Operations – lane drop

Peak period operation



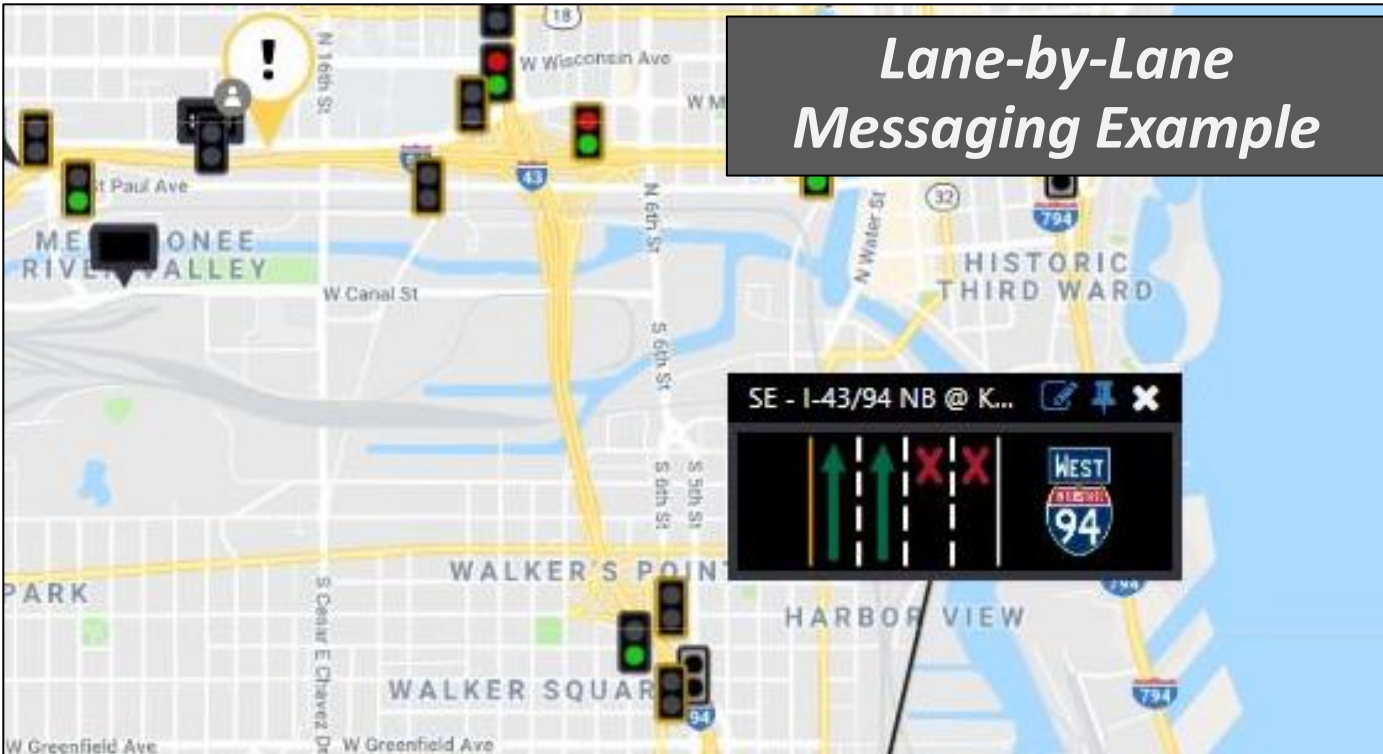
Operations – system deactivated

Unplanned system deactivation



Easy-to-Read Color Messaging Communicates Advanced Lane Modifications

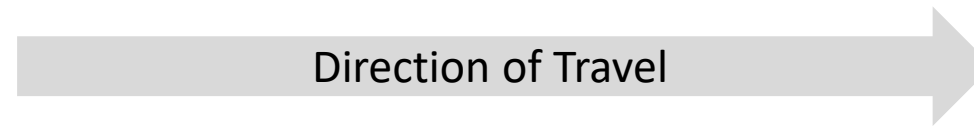
Lane-by-Lane Messaging Example



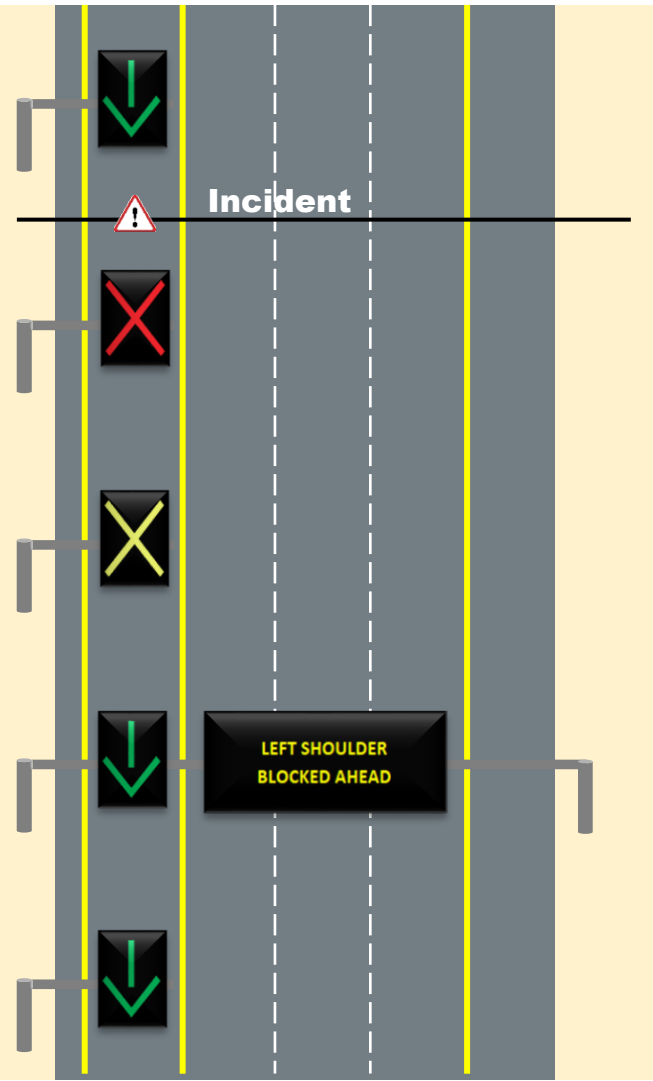
- *Incident in Milwaukee, January 2019.*
- *Advance planning required to program signs*

November 2019 example application

Example DMS Messaging



Left Shoulder Incident Example



- Left Shoulder Blocked*
- Right Lane Blocked*
- Left Lane Blocked*
- 2 Lanes Blocked Incident*
- Total Roadway Closure*

| | 2 nd Upstream DMS (if available) | 1 st Upstream DMS (if available) |
|---------------------------------|--|--|
| <i>Left Shoulder Blocked</i> | LEFT SHOULDER BLOCKED AHEAD | LEFT SHOULDER BLOCKED |
| <i>Right Lane Blocked</i> | RIGHT LANE BLOCKED AHEAD | RIGHT LANE BLOCKED |
| <i>Left Lane Blocked</i> | ONLY RIGHT LANE OPEN AHEAD | ONLY RIGHT LANE OPEN |
| <i>2 Lanes Blocked Incident</i> | ONLY LEFT SHOULDER OPEN AHEAD | ONLY LEFT SHOULDER OPEN |
| <i>Total Roadway Closure</i> | FREEWAY CLOSED XX MILES AHEAD | FREEWAY CLOSED |

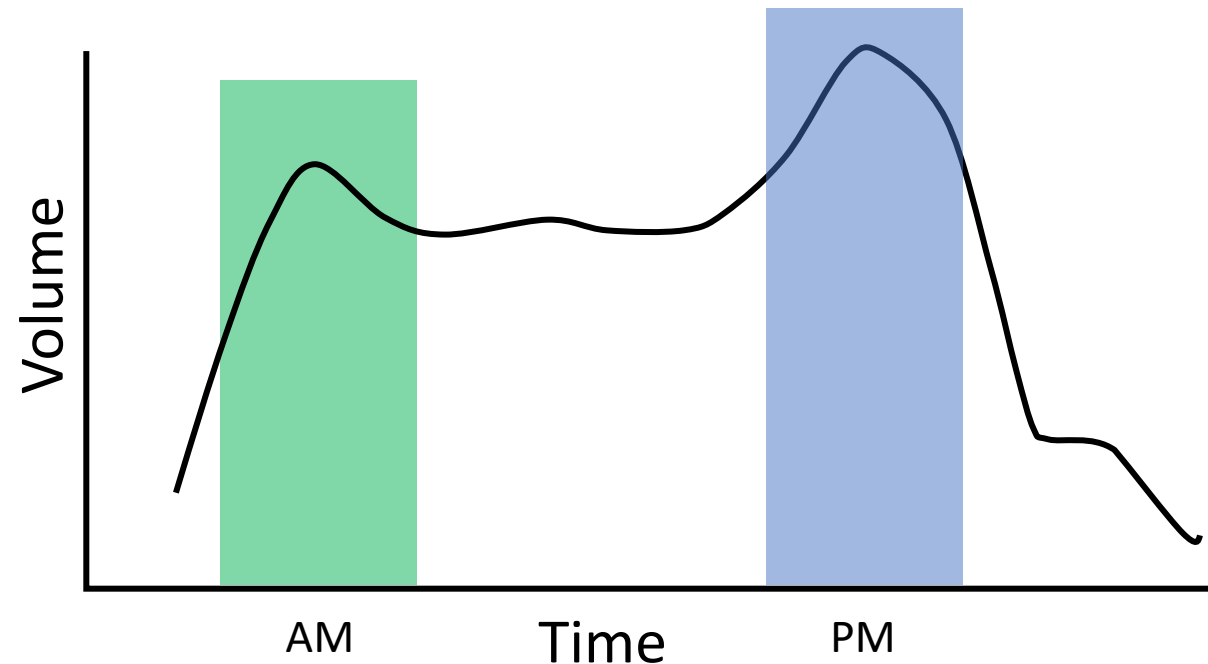


System Reliability and Operational Challenge Aspects

System Reliability: Planned Operations

Typical Operation planned for weekday **AM Peaks** and **PM Peaks**

- Supported by traffic data and operations



System Operations Plan / Goals

Roles and Responsibilities, Staffing Resources

- Maintenance/Operation Needs
- Communication with maintenance
- TMC staffing needs
- Training needs
- Operator One-Pagers



System Operations Plan / Goals

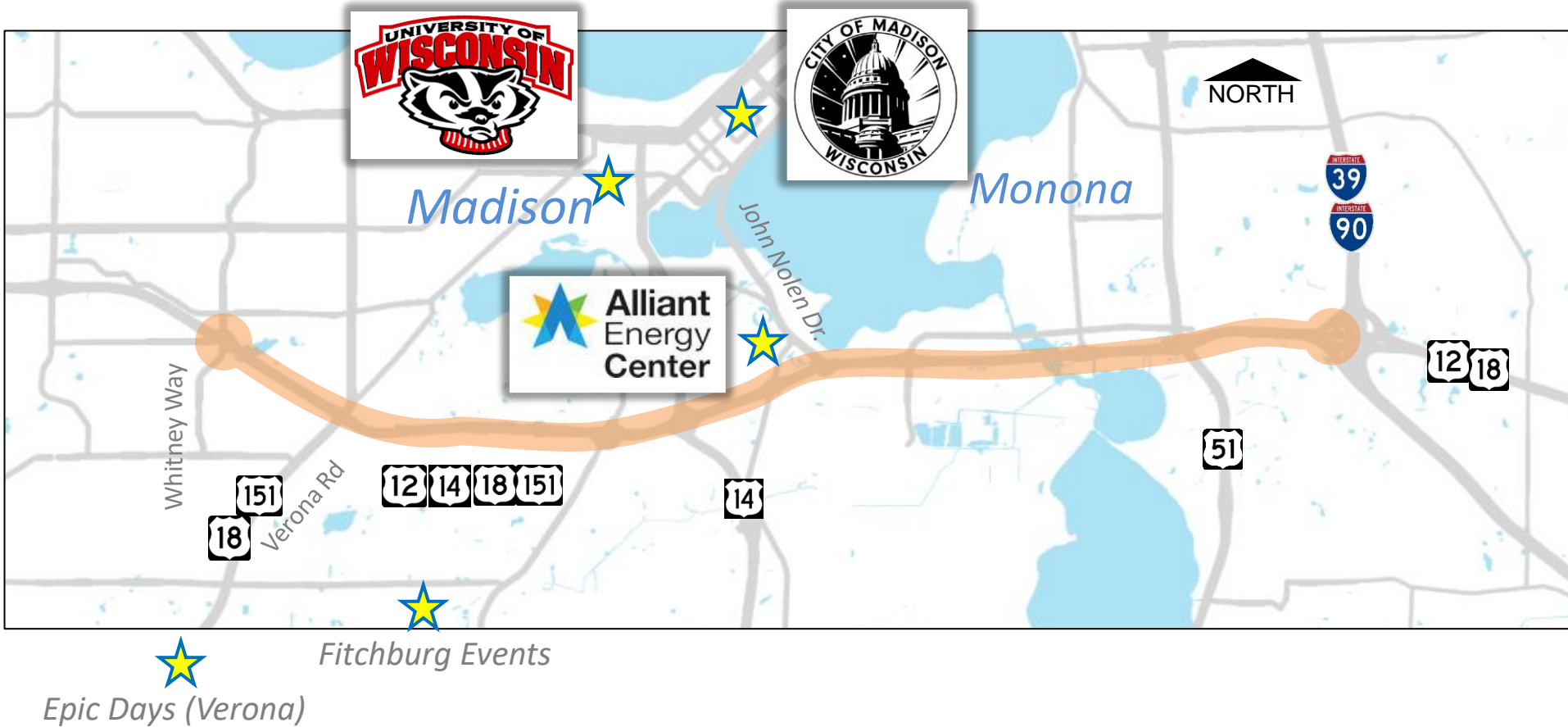
Scenarios

Nonrecurring congestion / Scenario planning

- Incidents
- Special Events
- Weather
- Power Outages/Failure
- others



Special Events are Common



Downtown and UW:

- Sporting Events
- Iron Man Triathlon
- Art Fair on the Square
- Taste of Madison
- July 4th Fireworks

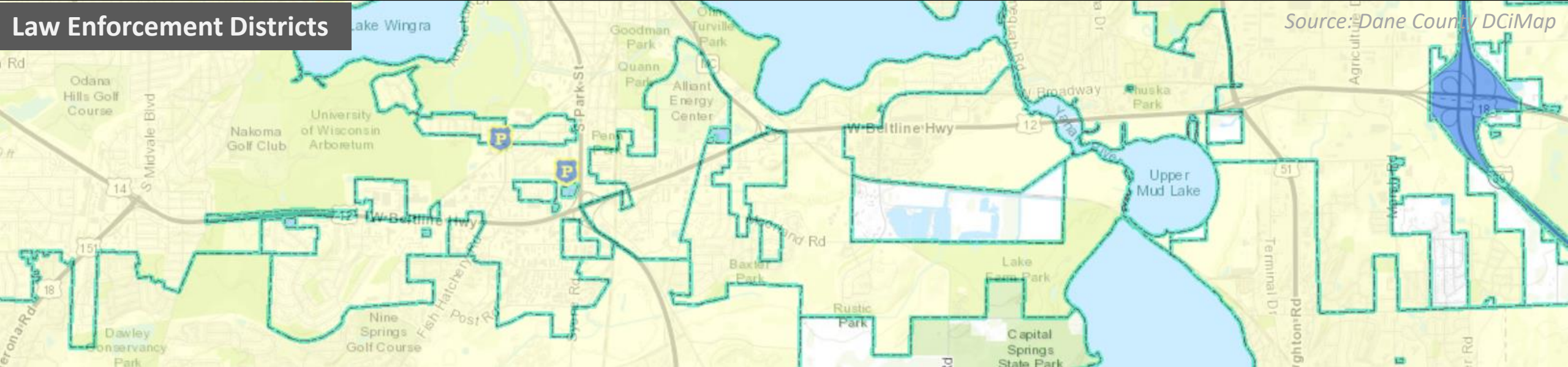
Alliant Energy Center:

- Midwest Horse Fair
- World Dairy Expo
- Dane County Fair
- Brat Fest
- Concerts/Other Events

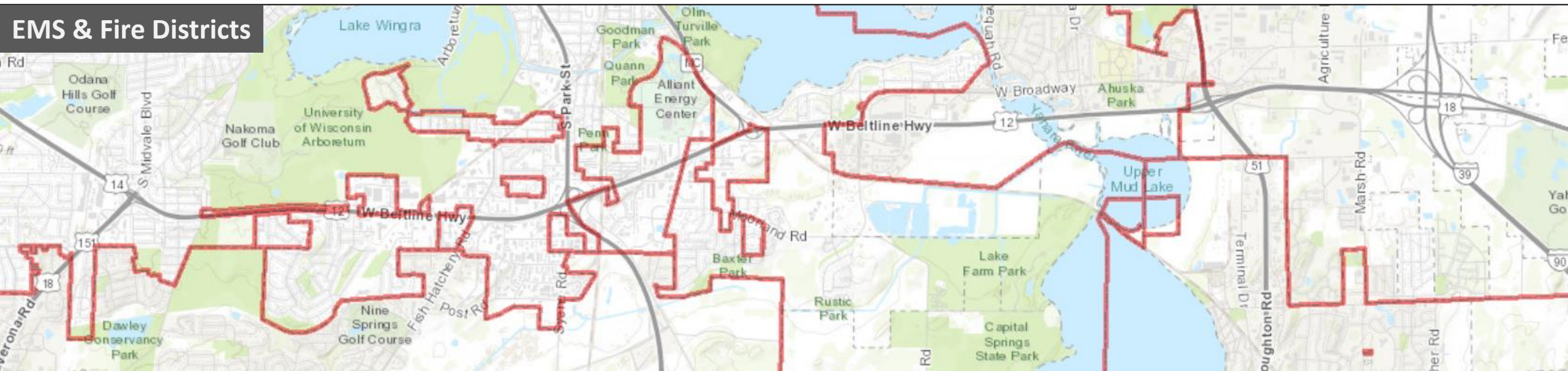
First Responder Involvement

Jurisdictional Challenges

Law Enforcement Districts



EMS & Fire Districts



Flex Lane Stakeholder Outreach



First Responder Coordination

Flex Lane Stakeholder Outreach



Flex Lane Draft Layouts

Flex Lane Stakeholder Outreach



First Responder Incident Table Top Exercise

Hot Wheel Cars in the Hands of Law Enforcement Provides Valuable Feedback



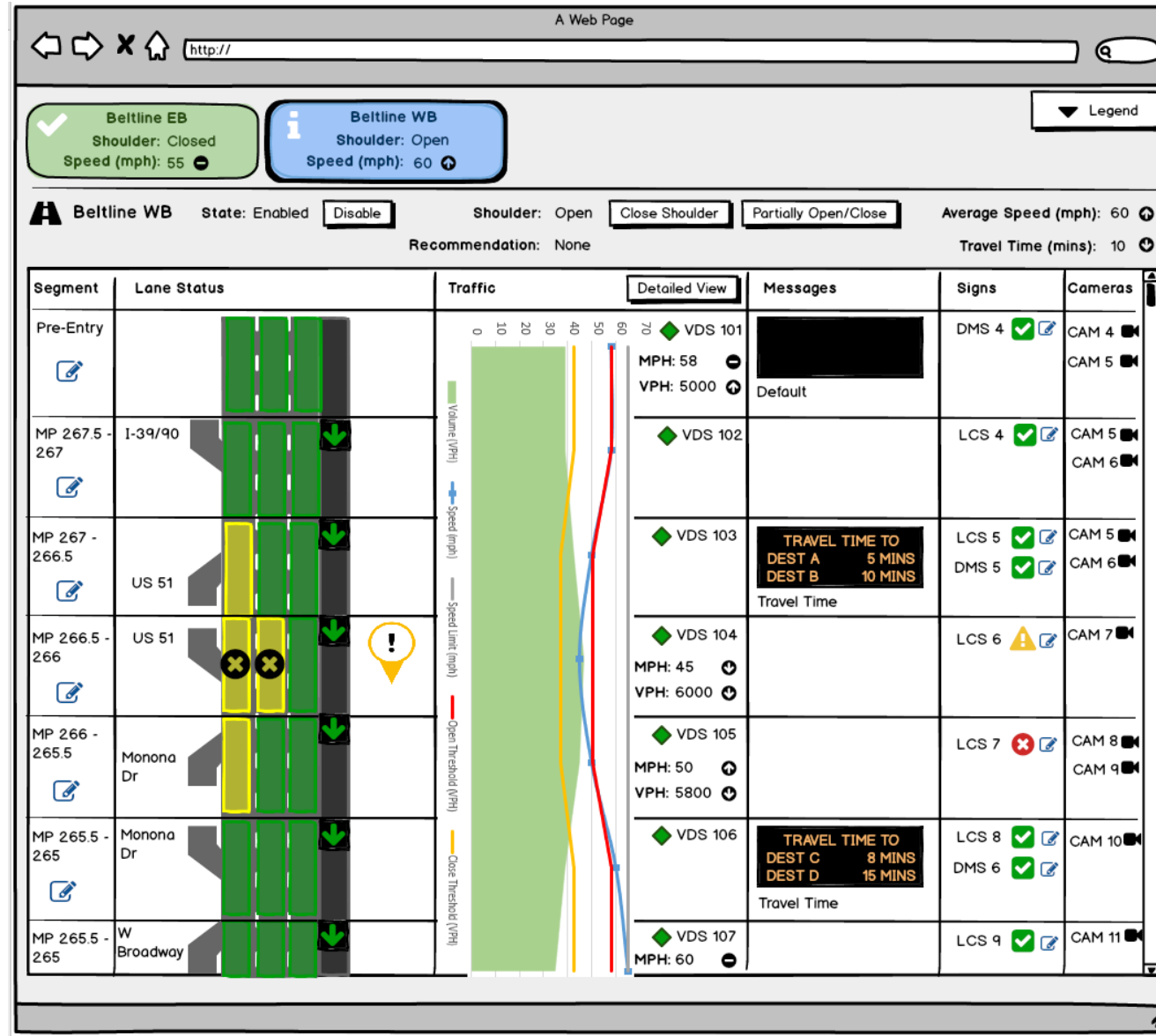
Flex Lane Draft Layouts



First Responder Incident Table-Top Exercise

Ongoing Elements


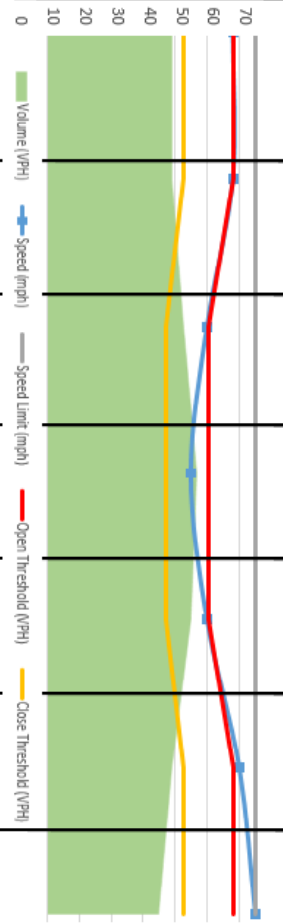




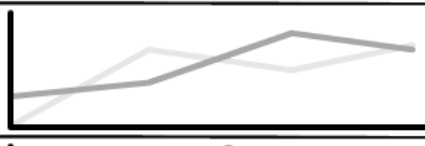





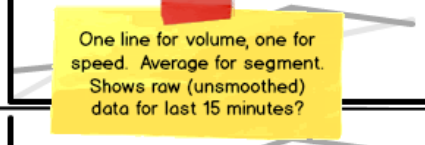
















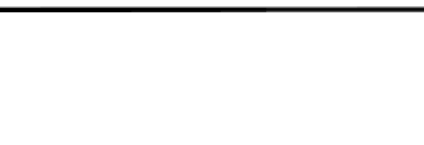


Initial Look at Software User face



Initial Look at Software User face



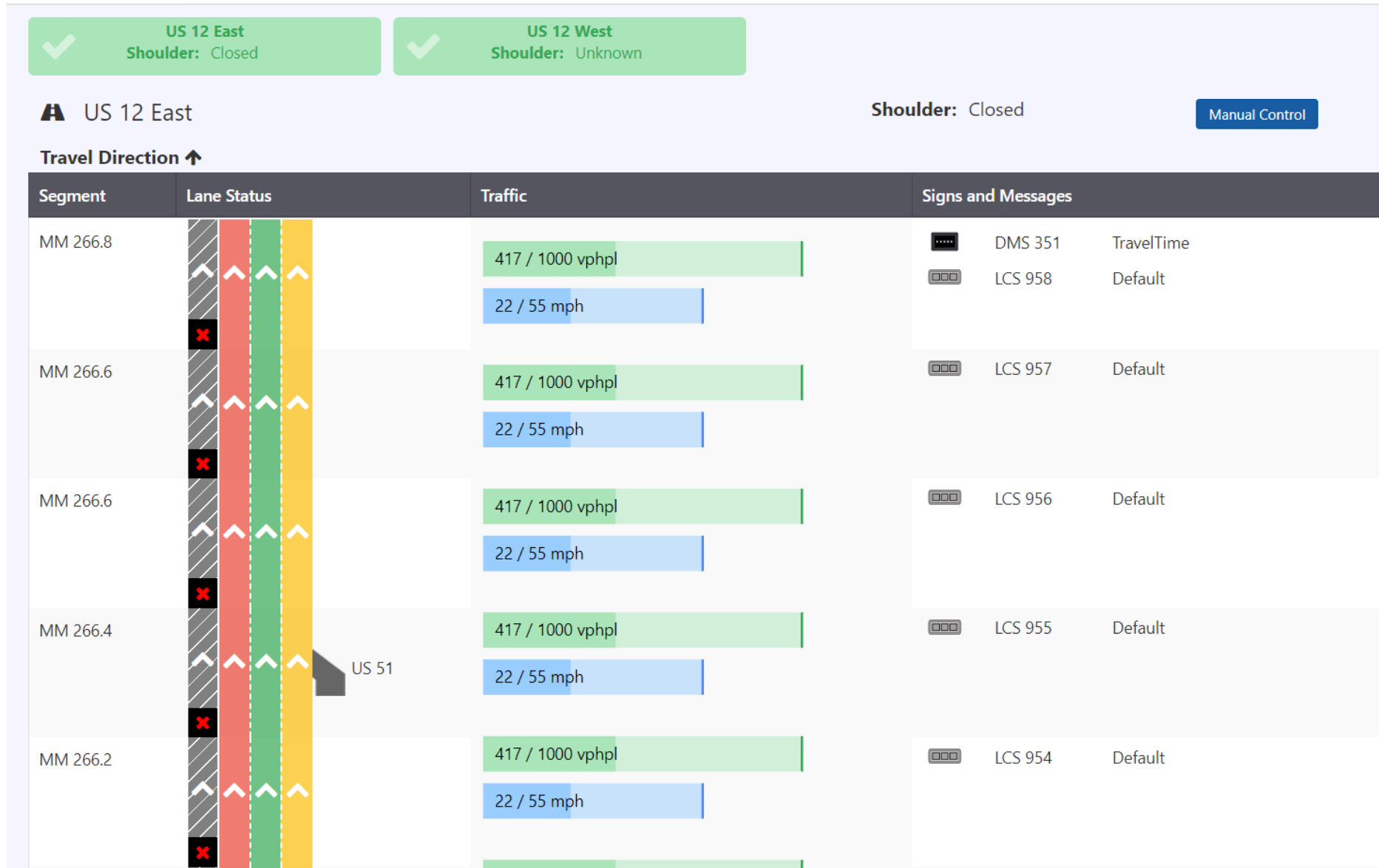
Initial Look at Software User face

| Beltline WB: Traffic Conditions | | | | | |
|---|-----------|--|--|--|--|
| Segment | Data Type | Conditions | Current Data | Trend | Devices |
| Pre-Entry  | Decision |  | Speed (mph): 55 Volume (vph) 3000 (1000) (per lane): Last Updated: 10:30 |  |  RTMS 101  |
| MP 100 - 100.5  | Monitor | | Speed (mph): 55 Volume (vph) 3000 (1000) (per la double-click to edit) Last Updated: 10:30 |  |  RTMS 102   RTMS 103  |
| MP 100.5 - 101  | Decision | | Speed (mph): 55 Volume (vph) 3000 (1000) (per lane): Last Updated: 10:30 |  <p>One line for volume, one for speed. Average for segment. Shows raw (unsmoothed) data for last 15 minutes?</p> |  RTMS 104  |
| MP 101 - 101.5  | Monitor | | Speed (mph): 55 Volume (vph) 3000 (1000) (per lane): Last Updated: 10:30 |  |  RTMS 105   RTMS 106  |
| MP 101.5 - 102  | Monitor | | Speed (mph): 55 Volume (vph) 3000 (1000) (per lane): Last Updated: 10:30 |  |  RTMS 107  |
| MP 102 - 102.5  | Decision | | Speed (mph): 55 Volume (vph) 3000 (1000) (per lane): Last Updated: 10:30 |  |  RTMS 108  |
| MP 102.5 - 103 | Monitor | | Speed (mph): 55 Volume (vph) 3000 (1000) (per lane): |  |  RTMS 109  |

Properties button triggers opening of RTMS data window on ATMS map

One line for volume, one for speed. Average for segment. Shows raw (unsmoothed) data for last 15 minutes?

Initial Look at Software User face



Initial Look at Software User face

✓

US 12 East
 Shoulder: Closed

✓

US 12 West
 Shoulder: Unknown

A





























US 12 East

Shoulder: Closed

Travel Direction ↑

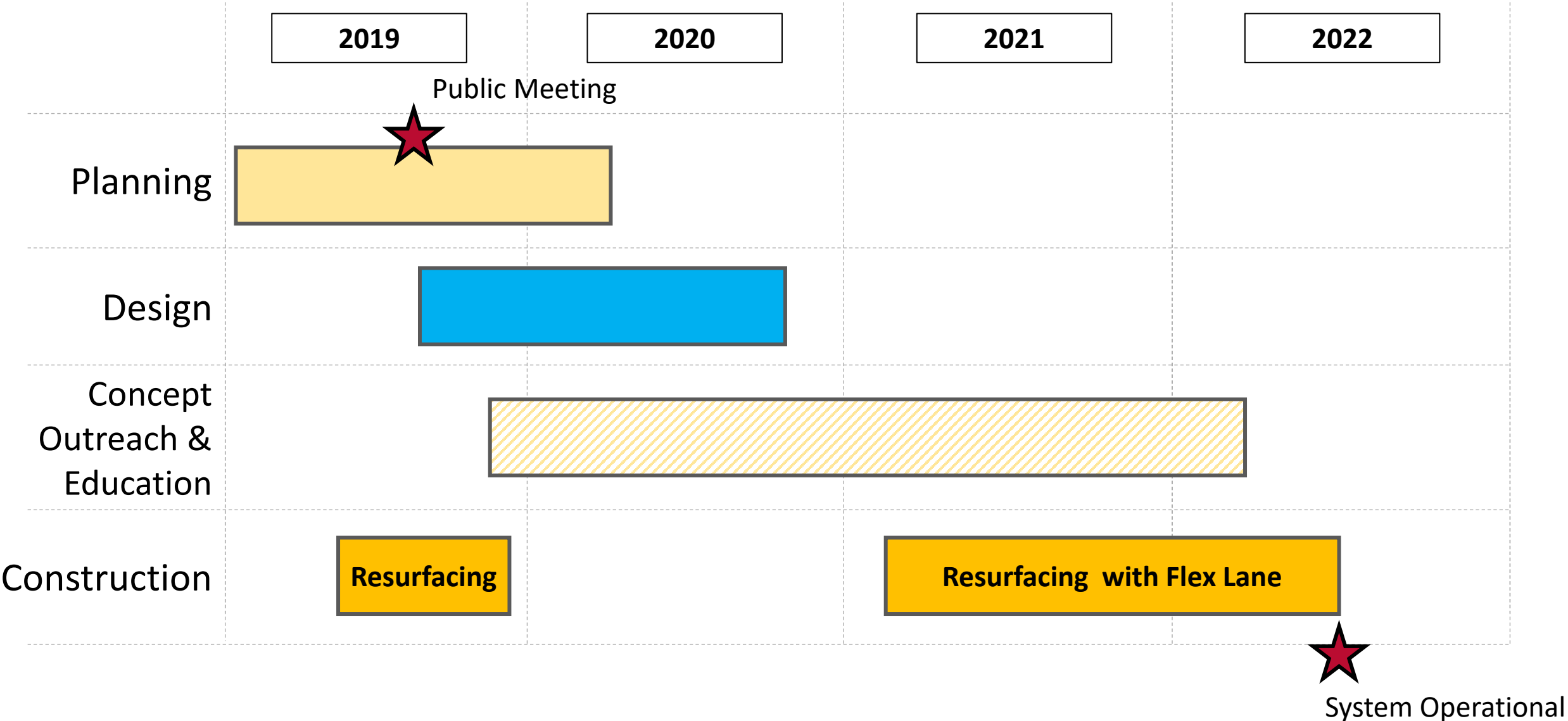
| Segment | Lane Status | Traffic | ATMS New Window | Signs and Messages |
|----------|-------------|--|---|---|
| MM 266.8 | | <div style="background-color: #e0f2f1; padding: 2px; margin-bottom: 2px;">213 / 1000 vphpl</div> <div style="background-color: #bbdefb; padding: 2px;">17 / 55 mph</div> | <div style="background-color: #424242; color: white; padding: 5px; border: 1px solid #ccc;"> MILES MIN US 51 S 19 20 </div> | <div style="margin-bottom: 10px;"> DMS 351 TravelTime LCS 958 Default </div> |
| MM 266.6 | | <div style="background-color: #e0f2f1; padding: 2px; margin-bottom: 2px;">213 / 1000 vphpl</div> <div style="background-color: #bbdefb; padding: 2px;">17 / 55 mph</div> | | <div style="margin-bottom: 10px;"> LCS 957 Default </div> |
| MM 266.6 | | <div style="background-color: #e0f2f1; padding: 2px; margin-bottom: 2px;">213 / 1000 vphpl</div> <div style="background-color: #bbdefb; padding: 2px;">17 / 55 mph</div> | | <div style="margin-bottom: 10px;"> LCS 956 Default </div> |
| MM 266.4 | | <div style="background-color: #e0f2f1; padding: 2px; margin-bottom: 2px;">213 / 1000 vphpl</div> <div style="background-color: #bbdefb; padding: 2px;">17 / 55 mph</div> | | <div style="margin-bottom: 10px;"> LCS 955 Default </div> |
| MM 266.2 | | <div style="background-color: #e0f2f1; padding: 2px; margin-bottom: 2px;">213 / 1000 vphpl</div> <div style="background-color: #bbdefb; padding: 2px;">17 / 55 mph</div> | | <div style="margin-bottom: 10px;"> LCS 954 Default </div> |

Initial Look at Software User face

| Segment | Lane Status | Signs and Messages | | | | |
|----------|---|---|-------|---|-----------|--|
| All |    | Message <input type="text" value="Select Library Message"/>   | | | | |
| MM 266.8 |    |  DMS 351 | TT |  | No Change | |
| | |  LCS 958 | BLANK |  | No Change | |
| MM 266.6 |   |  LCS 957 | BLANK |  | No Change | |
| MM 266.6 |   |  LCS 956 | BLANK |  | No Change | |
| MM 266.4 |   |  LCS 955 | BLANK |  | No Change | |
| MM 266.2 |   |  LCS 954 | BLANK |  | No Change | |

US 51

Project Schedule



Questions?

Brenda Schoenfeld, P.E. – WisDOT, Brenda.Schoenfeld@dot.wi.gov

Luke Holman, P.E. – Strand Associates, Inc., Luke.Holman@Strand.com

Jerry Shadewald, P.E. – HNTB, JShadewald@HNTB.com

Nick Bennett, P.E. – HNTB, nbennett@HNTB.com
