Real-time, Asynchronous Data in Incident Detection and Work Zone Management

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ite
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Outline

- Work Zone Management and TSMO
- Asynchronous Data… So much data…
  - Also… AV/CV
- An Architecture for Data Analytics and Scenario Planning

Work Zones and TSMO

TSMO

An integrated set of strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system.

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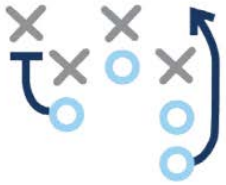


TSMO PURPOSE

A way to address reliability, mobility, and congestion by utilizing strategies rather than just trying to build our way out.

TSMO Vision

A less congested, more reliable network.

TSMO Mission

Move people and goods, from Point A to Point B, as efficiently, safely, and reliably as possible.

https://www.tesc.psu.edu/assets/Session%20PDFS/Room206/3B-Tomlinson.pdf

We Know How to Get Out of This!

Traffic Management Centers – A Data Nerve Center

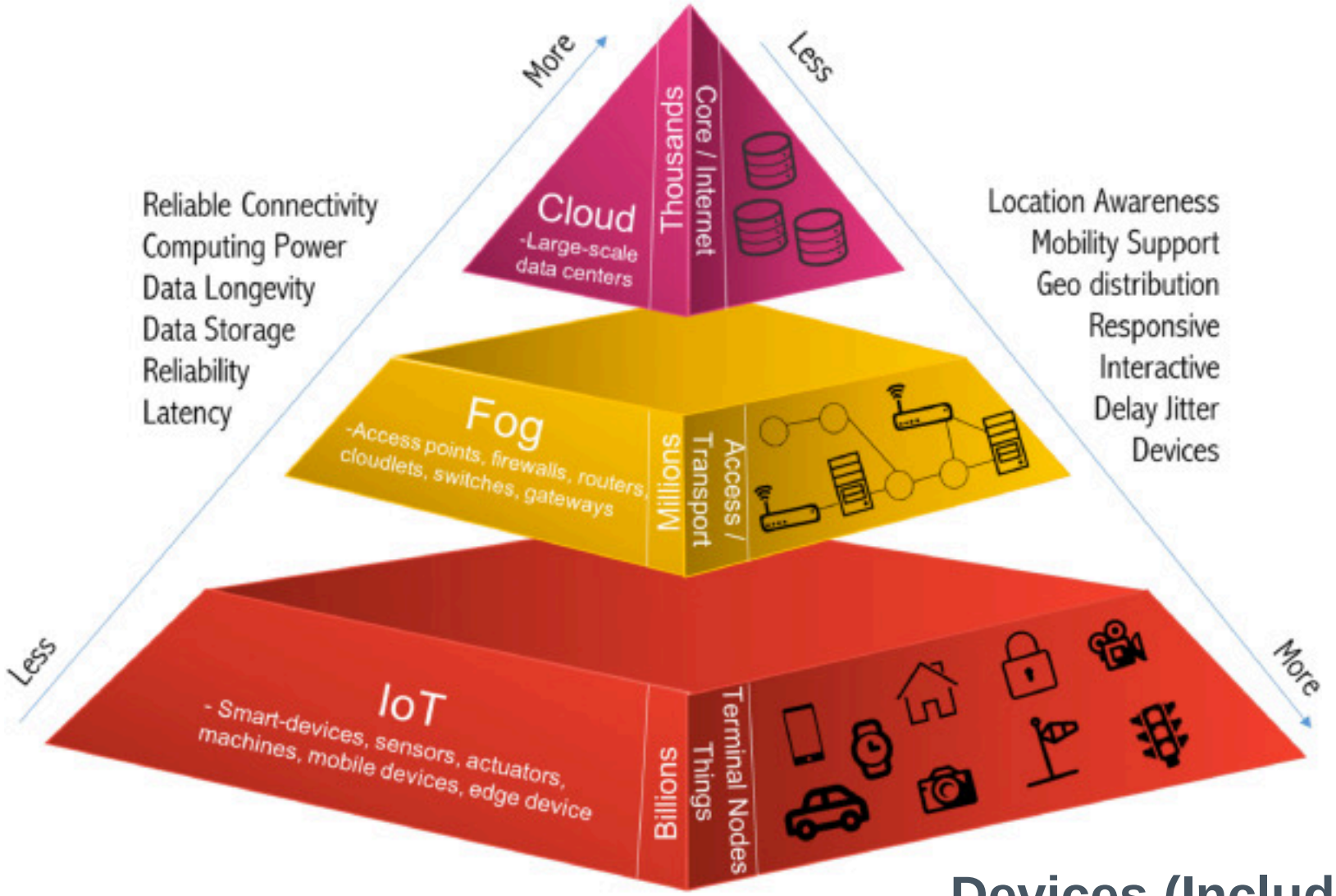
- ✓ Centralized
- ✓ High-density Information
- ✓ Largely Monitored by People

Data, Data, and more Data

What About CV/AV?

- Significant increase in data is possible
- Peer to peer communication
- “Edge” and “Fog” devices include vehicles themselves

Computation at the Foggy Edge

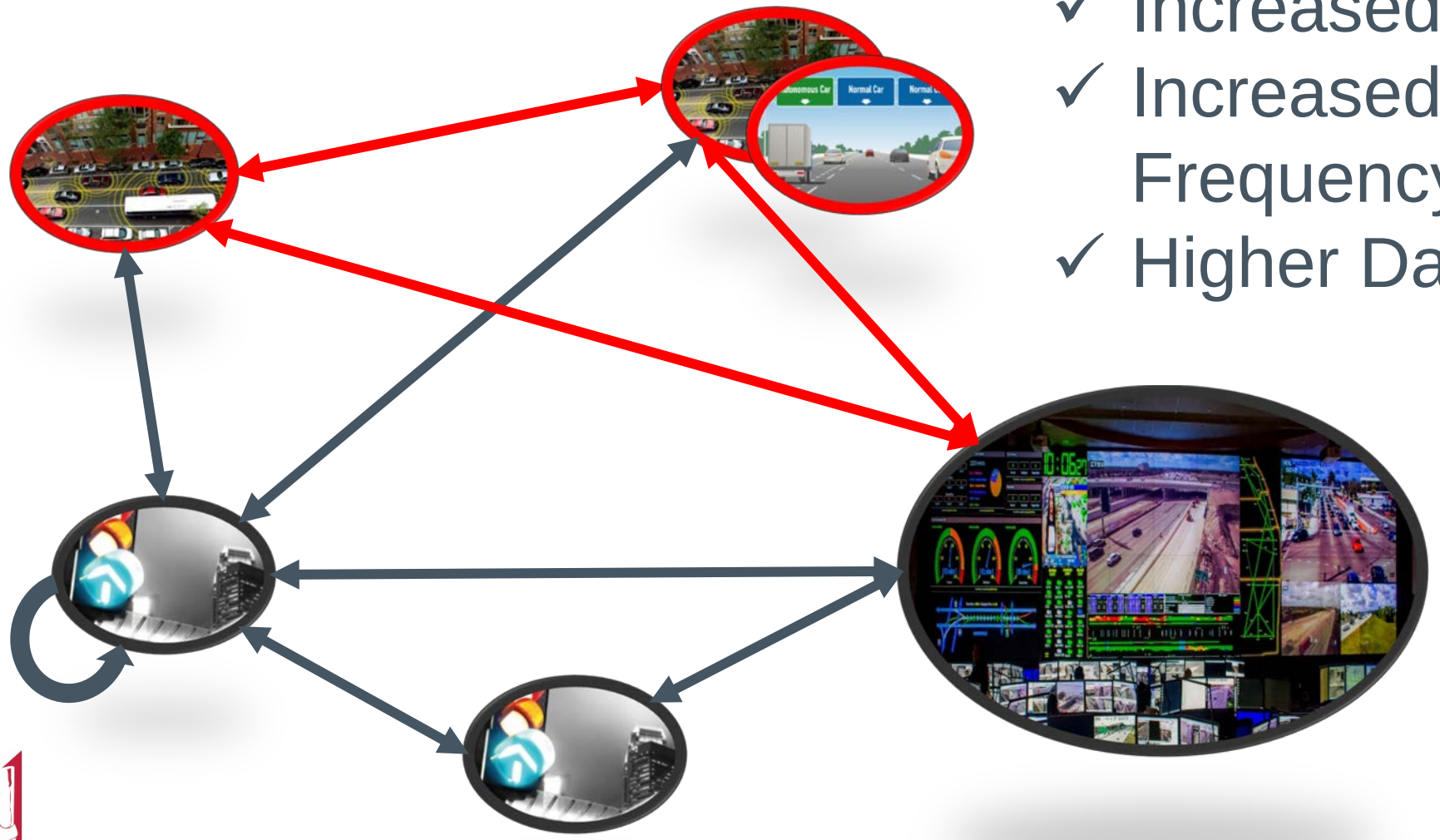


TMC

Intermediary Devices

Devices (Including Vehicles)

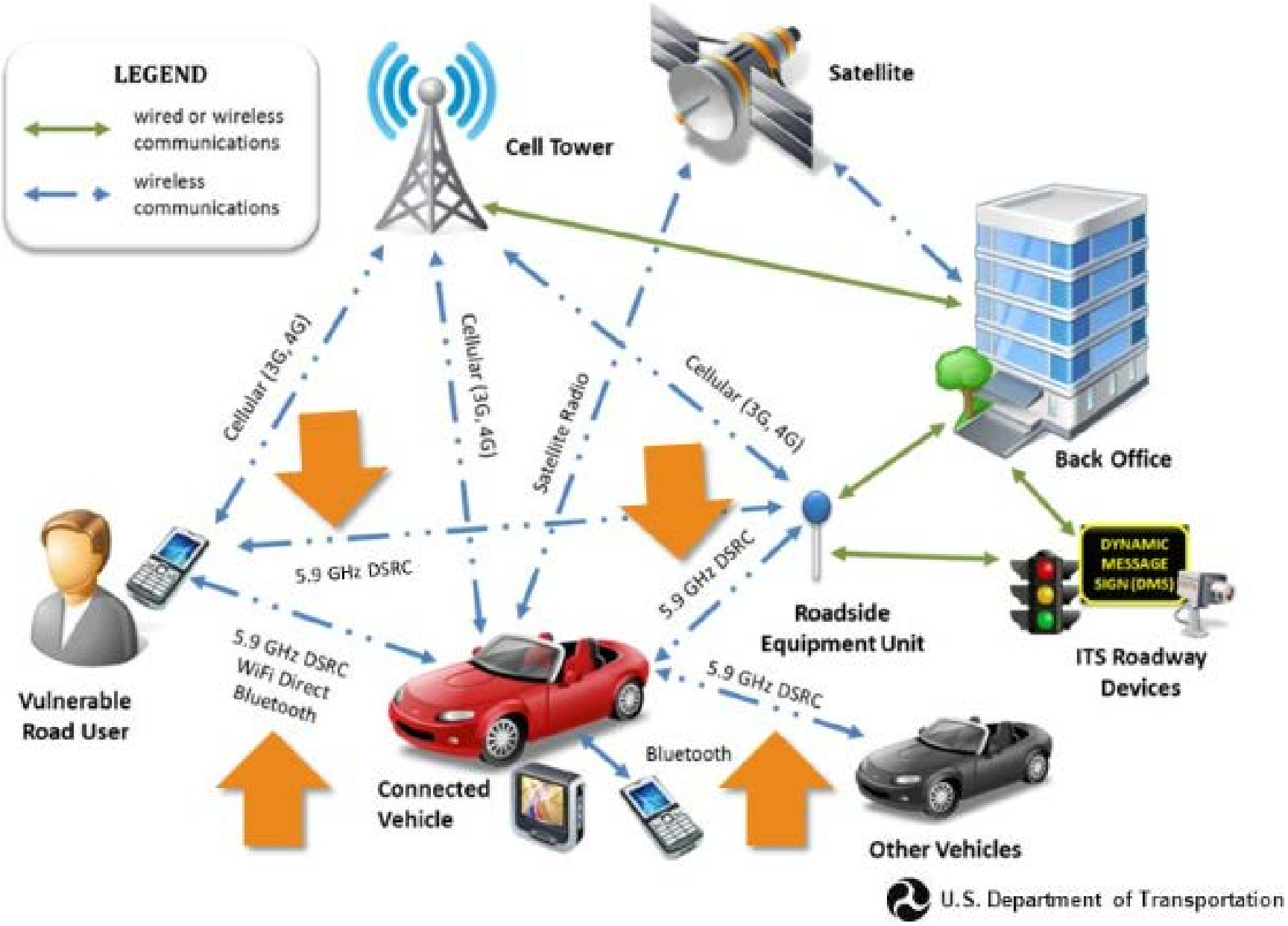
A Changing Ecosystem



- ✓ Increased Connectivity
- ✓ Increased Interaction Frequency
- ✓ Higher Data Density

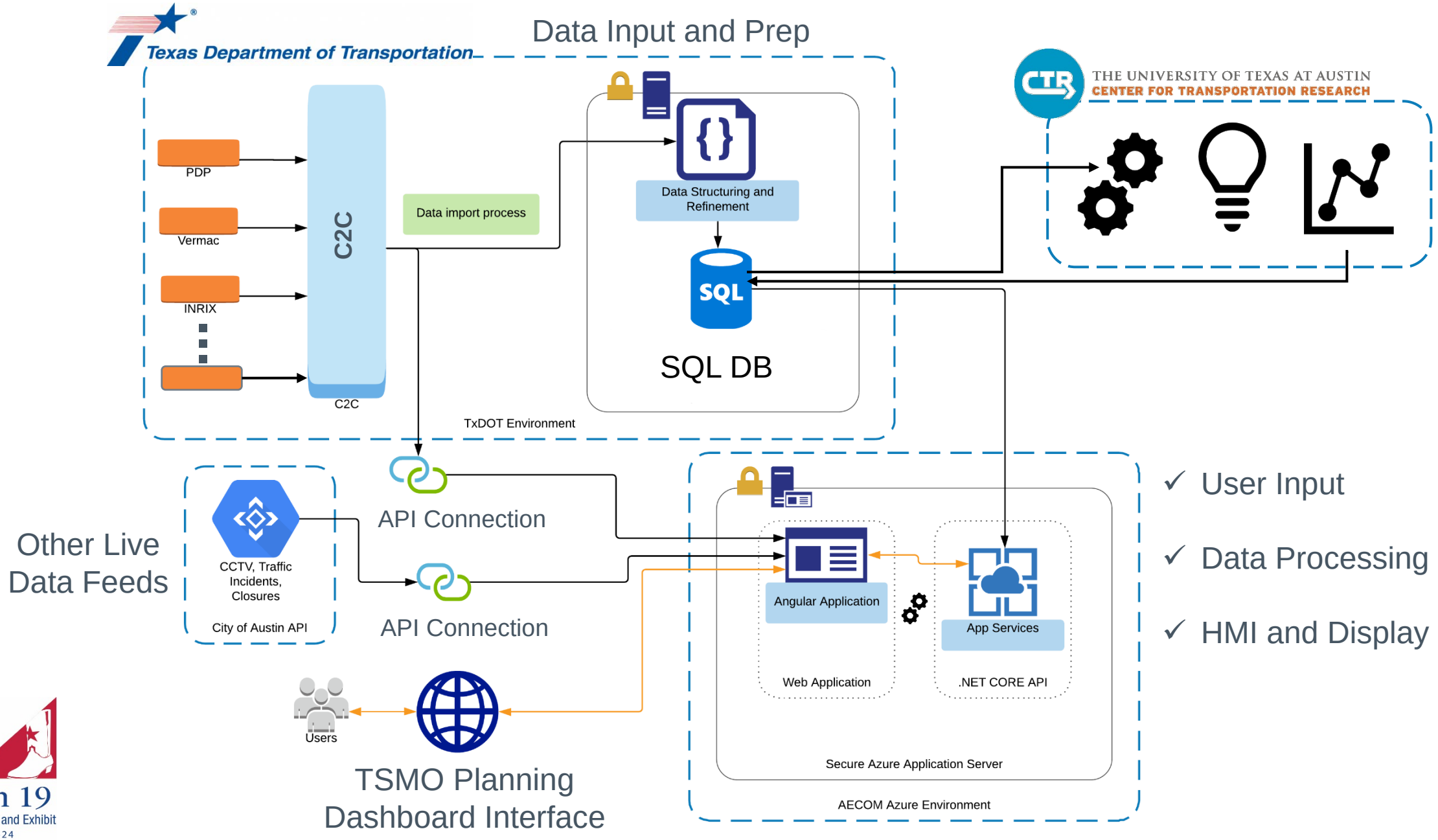
Connected Vehicle Physical View

USDOT's Version

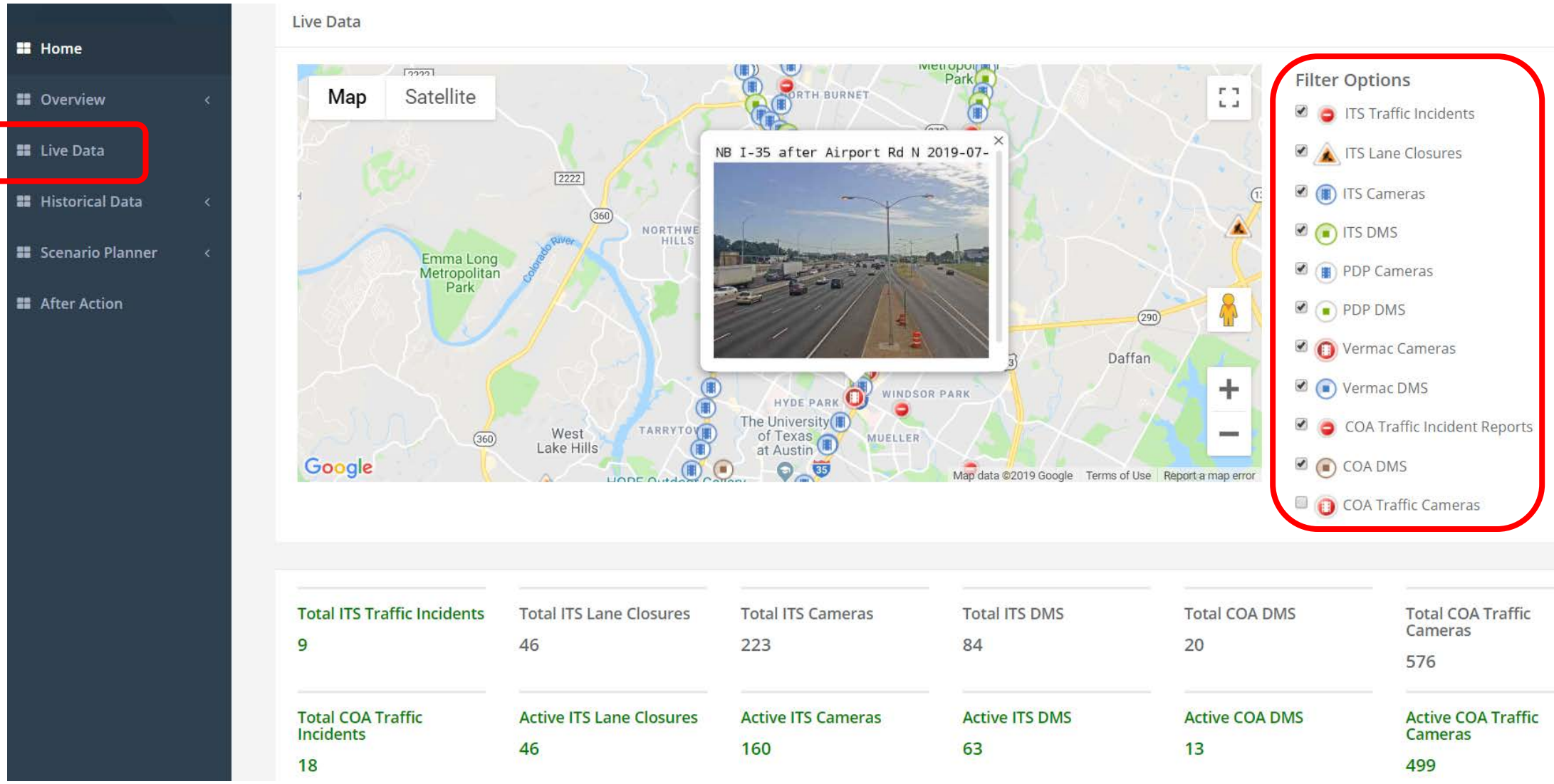


U.S. Department of Transportation

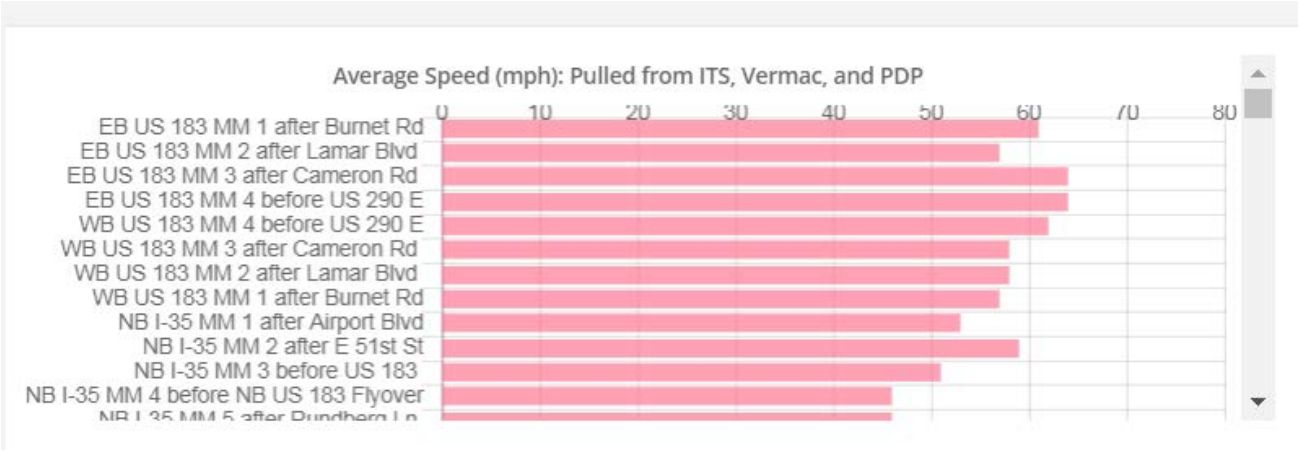
TSMO Planning Dashboard Architecture

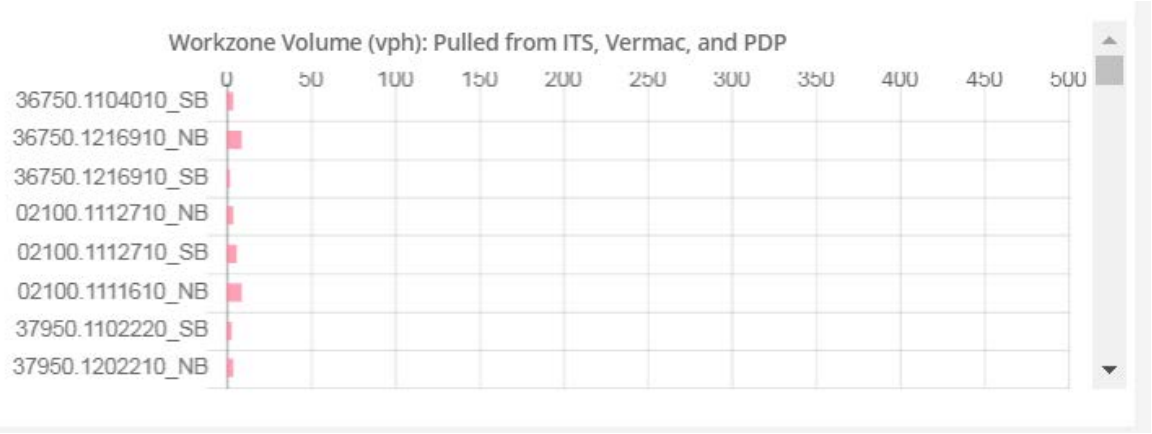


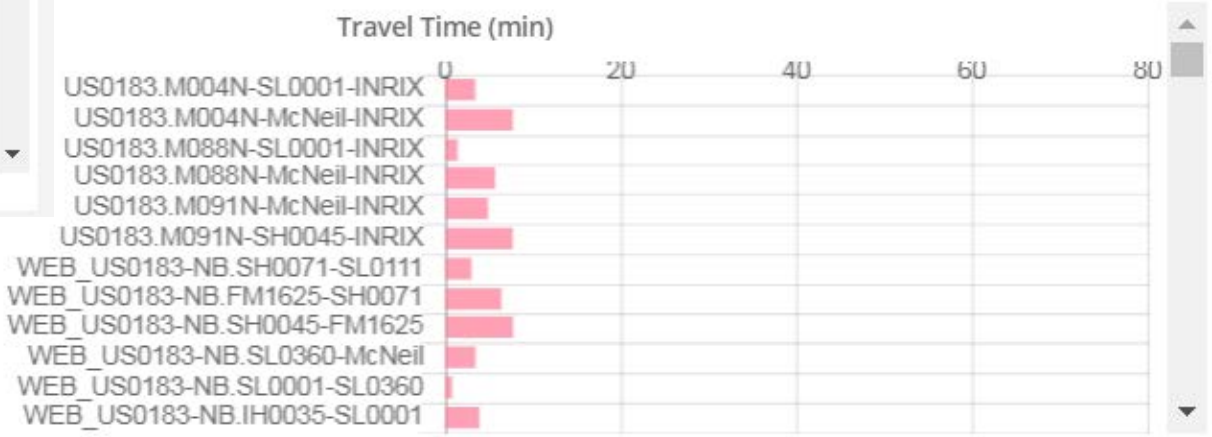
Live Data


Home
Overview
Live Data
Historical Data
Scenario Planner
After Action
Live Data
Map
Satellite
NB I-35 after Airport Rd N 2019-07-
Emma Long Metropolitan Park
Colorado River
NORTHWEST HILLS
NORTH BURNET
Park
West Lake Hills
TARRYTOWN
HYDE PARK
WINDSOR PARK
The University of Texas at Austin
MUELLER
Daffan
2222
360
290
35
Google
Map data ©2019 Google
Terms of Use
Report a map error
Filter Options
ITS Traffic Incidents
ITS Lane Closures
ITS Cameras
ITS DMS
PDP Cameras
PDP DMS
Vermac Cameras
Vermac DMS
COA Traffic Incident Reports
COA DMS
COA Traffic Cameras
Total ITS Traffic Incidents
9
Total ITS Lane Closures
46
Total ITS Cameras
223
Total ITS DMS
84
Total COA DMS
20
Total COA Traffic Cameras
576
Total COA Traffic Incidents
18
Active ITS Lane Closures
46
Active ITS Cameras
160
Active ITS DMS
63
Active COA DMS
13
Active COA Traffic Cameras
499

Live Data


Average Speed (mph): Pulled from ITS, Vermac, and PDP
0
10
20
30
40
50
60
70
80
EB US 183 MM 1 after Burnet Rd
EB US 183 MM 2 after Lamar Blvd
EB US 183 MM 3 after Cameron Rd
EB US 183 MM 4 before US 290 E
WB US 183 MM 4 before US 290 E
WB US 183 MM 3 after Cameron Rd
WB US 183 MM 2 after Lamar Blvd
WB US 183 MM 1 after Burnet Rd
NB I-35 MM 1 after Airport Blvd
NB I-35 MM 2 after E 51st St
NB I-35 MM 3 before US 183
NB I-35 MM 4 before NB US 183 Flyover


Workzone Volume (vph): Pulled from ITS, Vermac, and PDP
0
50
100
150
200
250
300
350
400
450
500
36750.1104010_SB
36750.1216910_NB
36750.1216910_SB
02100.1112710_NB
02100.1112710_SB
02100.1111610_NB
37950.1102220_SB
37950.1202210_NB

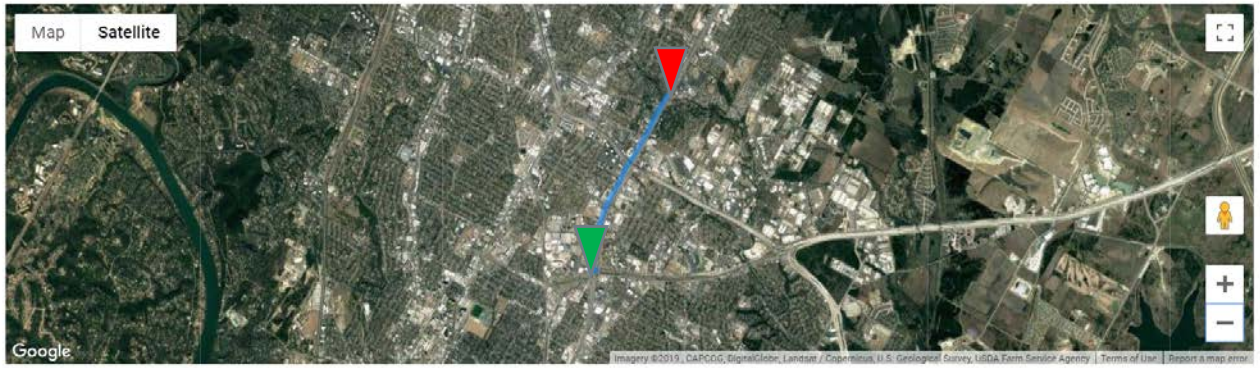

Travel Time (min)
0
20
40
60
80
US0183.M004N-SL0001-INRIX
US0183.M004N-McNeil-INRIX
US0183.M088N-SL0001-INRIX
US0183.M088N-McNeil-INRIX
US0183.M091N-McNeil-INRIX
US0183.M091N-SH0045-INRIX
WEB_US0183-NB.SH0071-SL0111
WEB_US0183-NB.FM1625-SH0071
WEB_US0183-NB.SH0045-FM1625
WEB_US0183-NB.SL0360-McNeil
WEB_US0183-NB.SL0001-SL0360
WEB_US0183-NB.IH0035-SL0001

Historical Data – Lane Closures

Historical Road Closures

Historical Data – Single Closure Analysis

Historical Road Closures



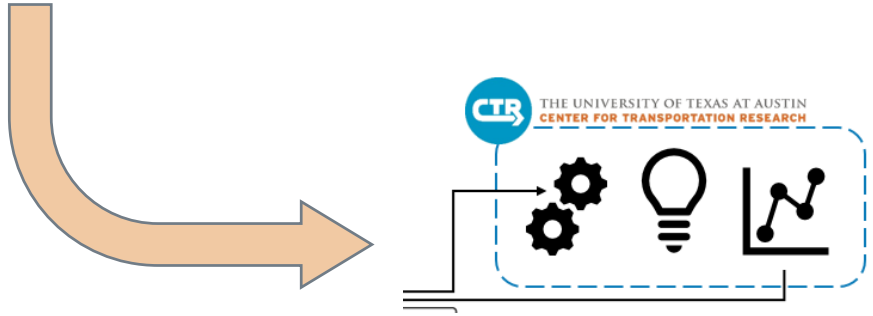
Select Closure

1798 - I-35 from US 290 to Rundberg

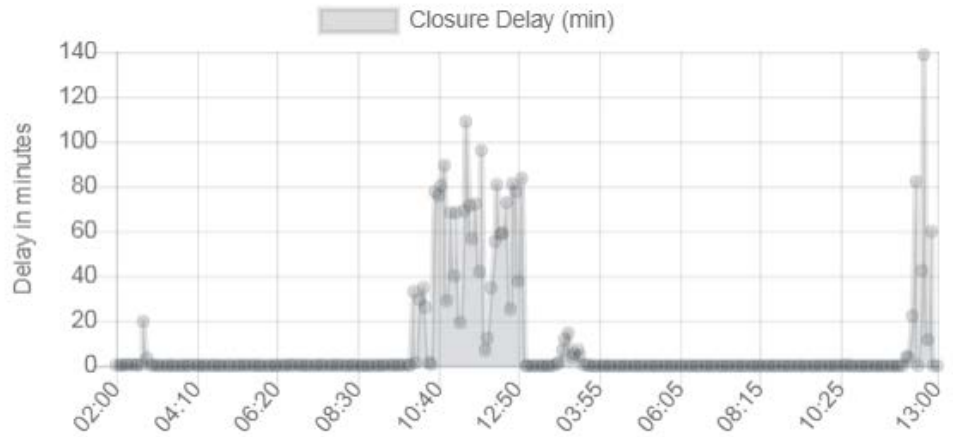
Close Details

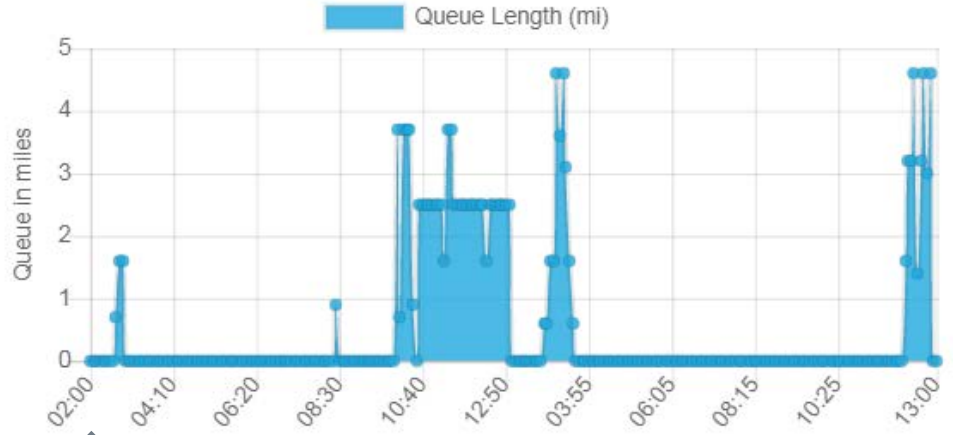
No analysis completed

Click here to perform analysis



Queue Length and Closure Delay





Scenario Planning – Select Smart WZ Trailer

Select Trailer

SB I-35 MM 1 before E Roundberg Ln

Date Selection - leave blank for all available data

Start Date:

Enter Start Date (mm/dd/yyyy)

End Date:

Enter End Date (mm/dd/yyyy)

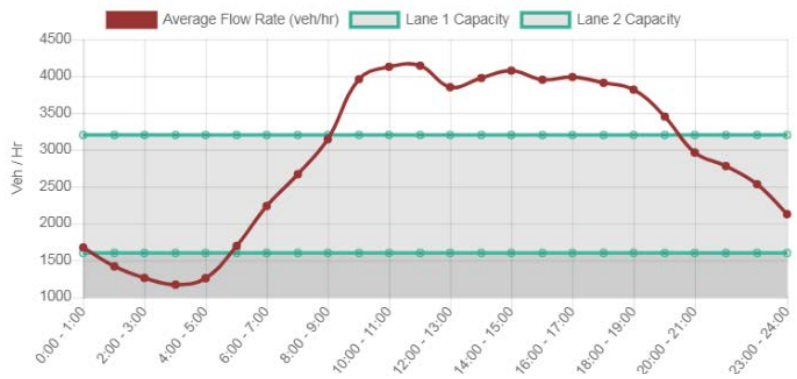
Select Charts to Display

Hourly Flow Rate

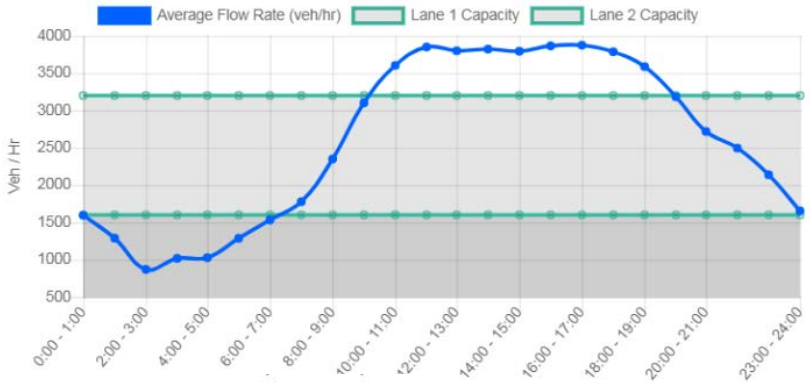
Run Scenario

Scenario Planning – Daily Projected Impact

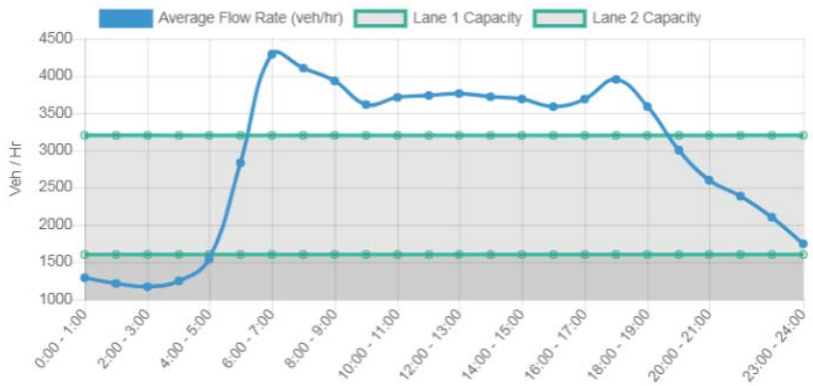
Saturday



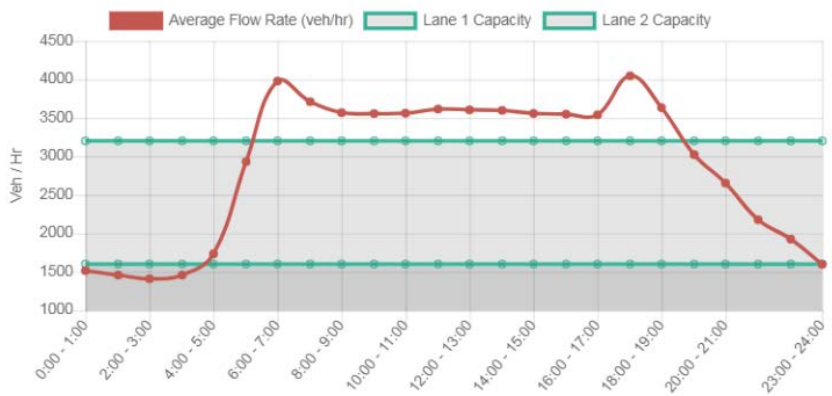
Sunday



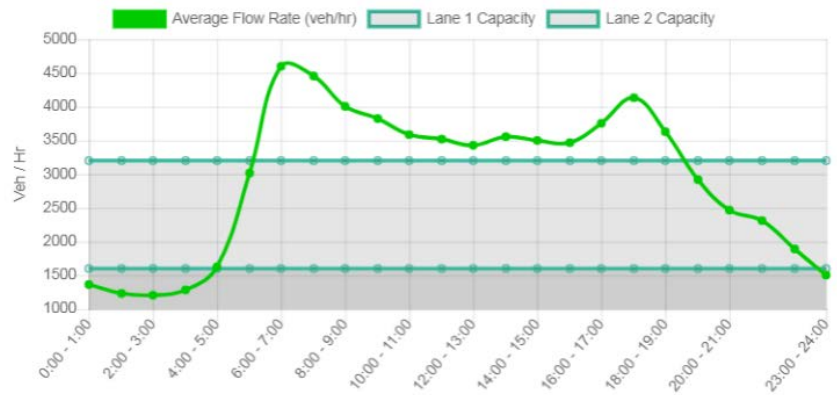
Monday



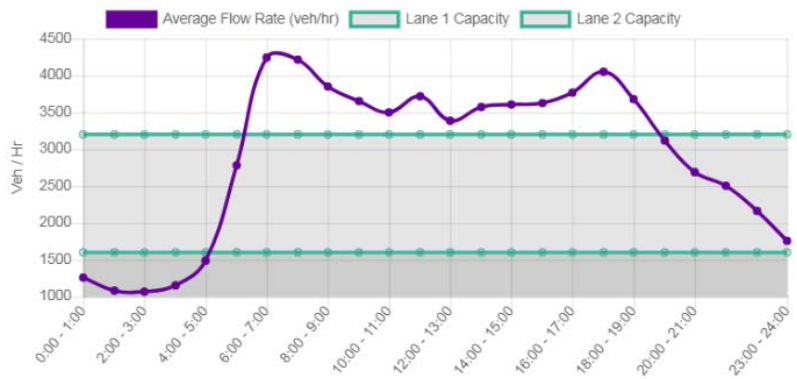
Tuesday



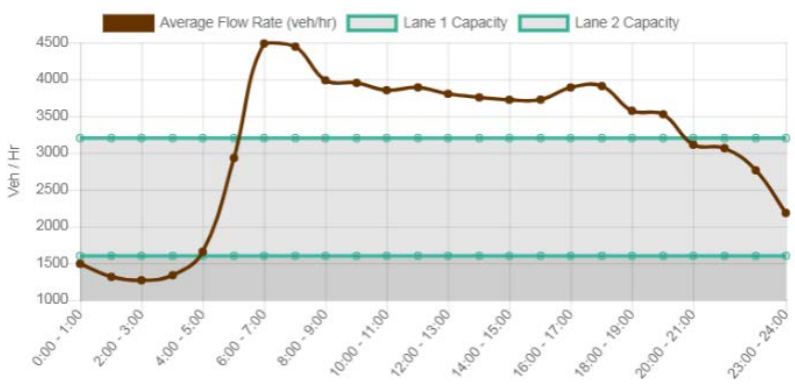
Wednesday



Thursday

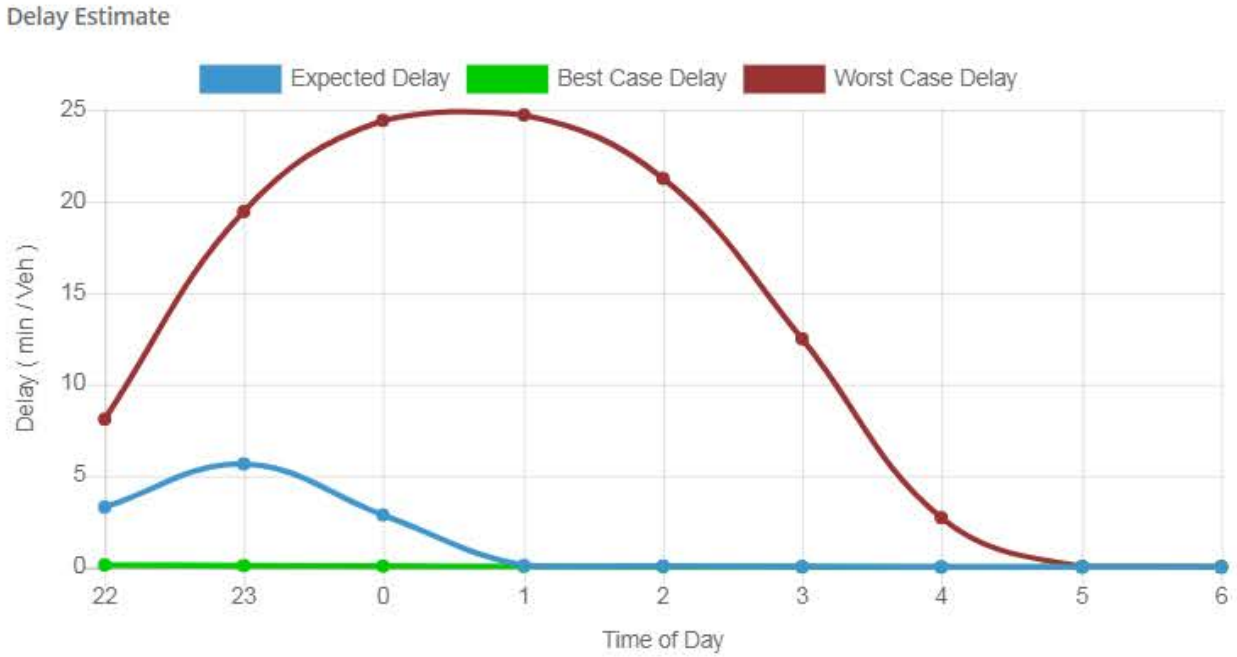


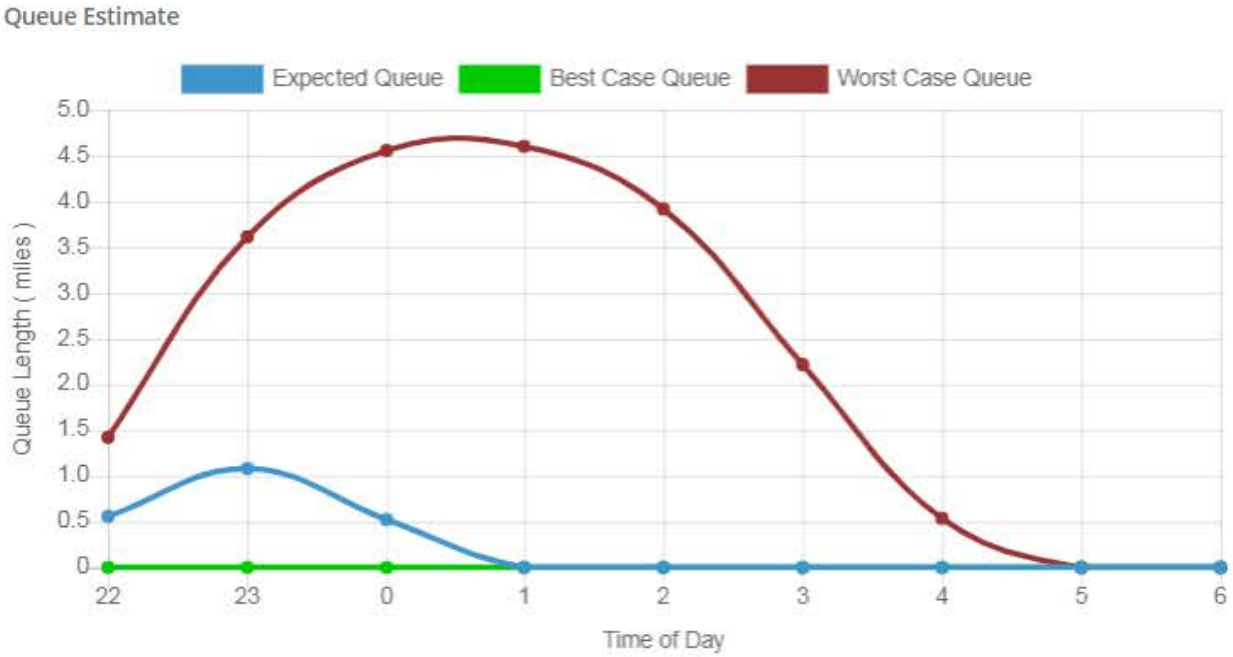
Friday



# of Vehicles during Window

Delay & Queue Estimates - based on user input





Delay & Queue Estimates - based on user input

Summary

- TSMO efforts seek to improve operations of existing transportation systems, including work zones and incident management.
- Increasing numbers of interacting devices is driving complexity, and the need for asynchronous data aggregation.
- TxDOT recognizes this need, and is exploring the use of sophisticated tools for data collection, aggregation, and analytics towards enhancing safety for the traveling public, and driving efficiencies for TxDOT operations.