RECENT BORDER ADVISORY SYSTEM DEPLOYMENTS

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AGENDA

1. Canada
2. Michigan
3. San Diego

CANADA

BORDER ADVISORY MESSAGE SIGNS

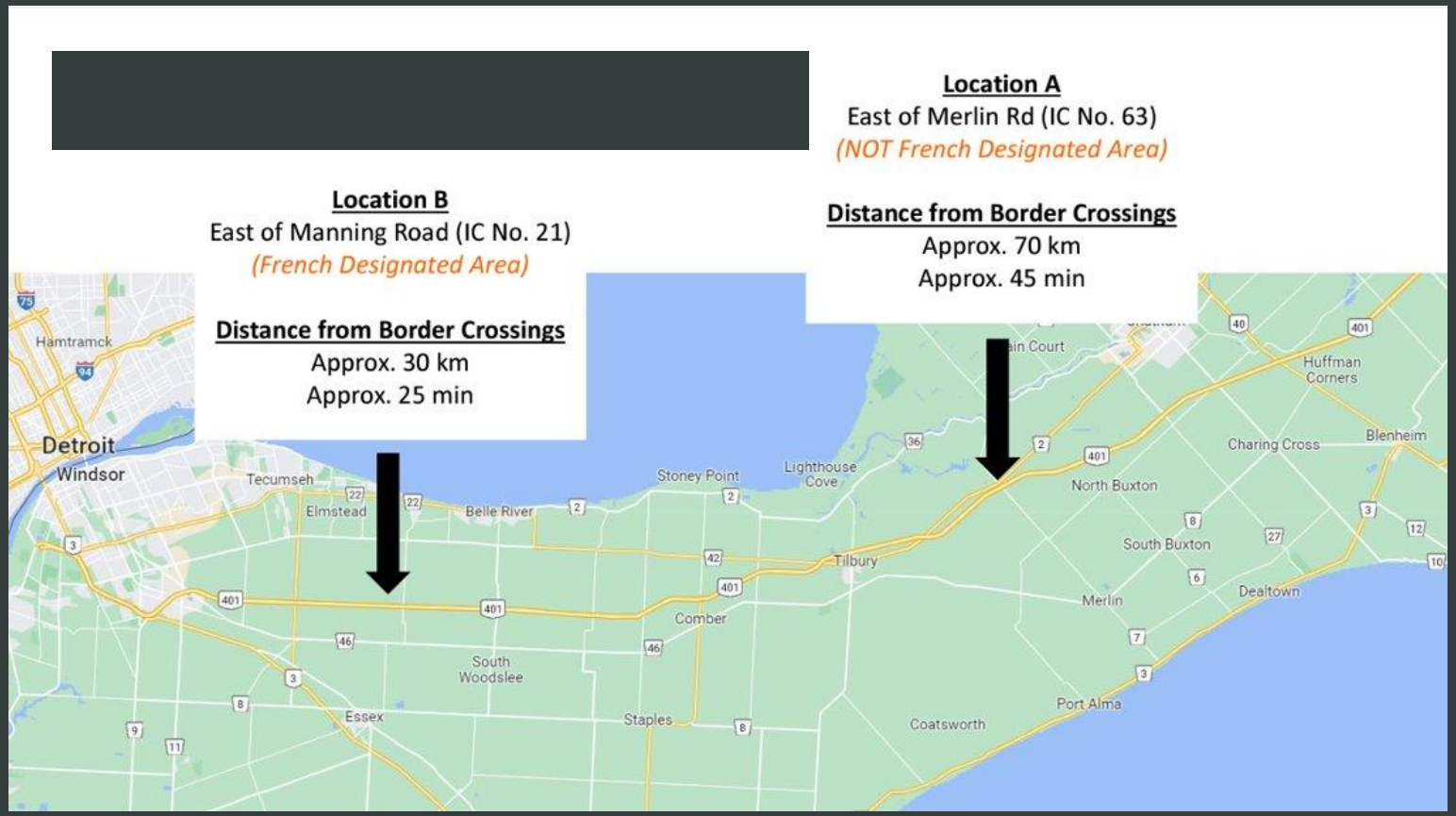
CLICK TO ADD SUBTITLE

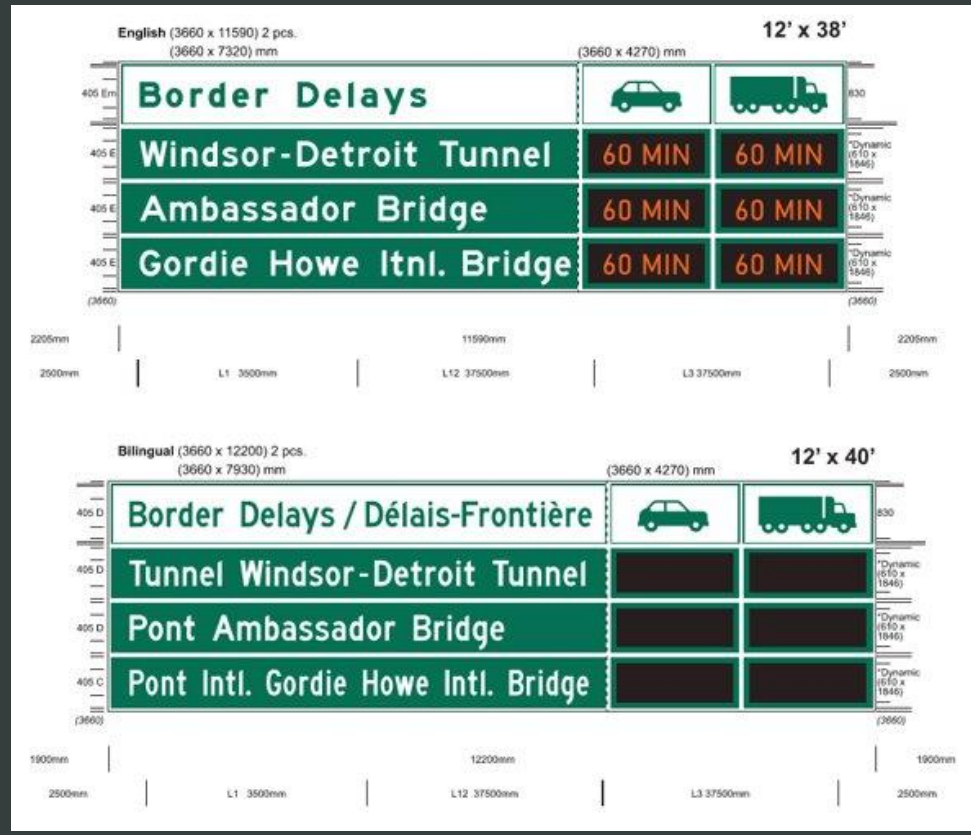
BORDER Advisory signing

Distinct border wait times for cars and trucks

Signing to guide vehicles to the appropriate lanes

BORDER Advisory signing





BLUETOOTH-BASED BORDER WAIT TIME MEASUREMENT

CLICK TO ADD SUBTITLE

BLUETOOTH travel Time Measurement

Technological Principles

- Bluetooth devices within moving vehicles regularly emit a unique identifier
- Readers installed at the roadside detect these identifiers as vehicles pass by
- Cloud-based analytics collect identifiers from the readers and use this data to compute real-time travel times along routes
- Computed travel times are provided to the subscribing agencies

Technical Standards

- Bluetooth Classic – increasingly rare
- Bluetooth Low Energy – now the prevalent standard

Current Industry Standard

- Reader can detect both Bluetooth Classic and Bluetooth Low Energy
- Reader supports 4G communication

Bluetooth Reader in Solar Powered Configuration (per TPA North America)

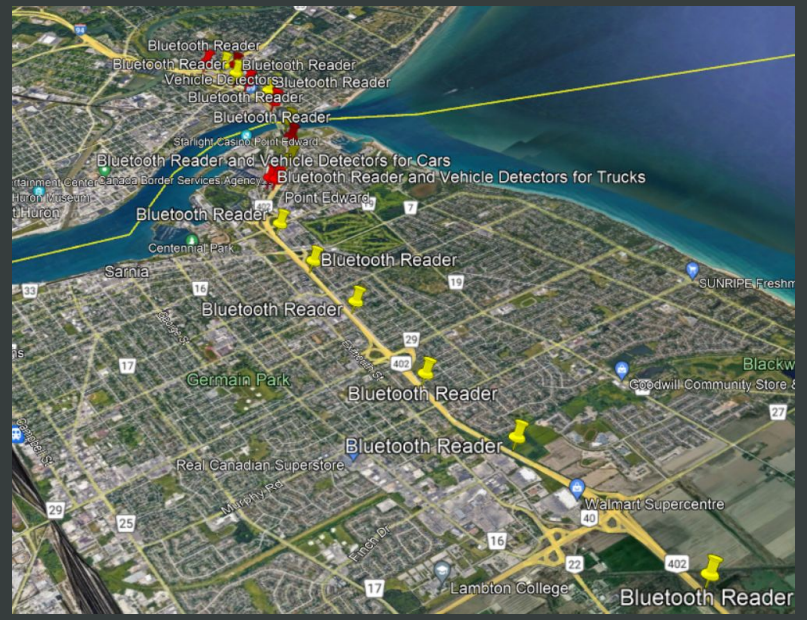
Border wait Time Measurement

Readers are placed along the route to the border and at exit from primary inspection

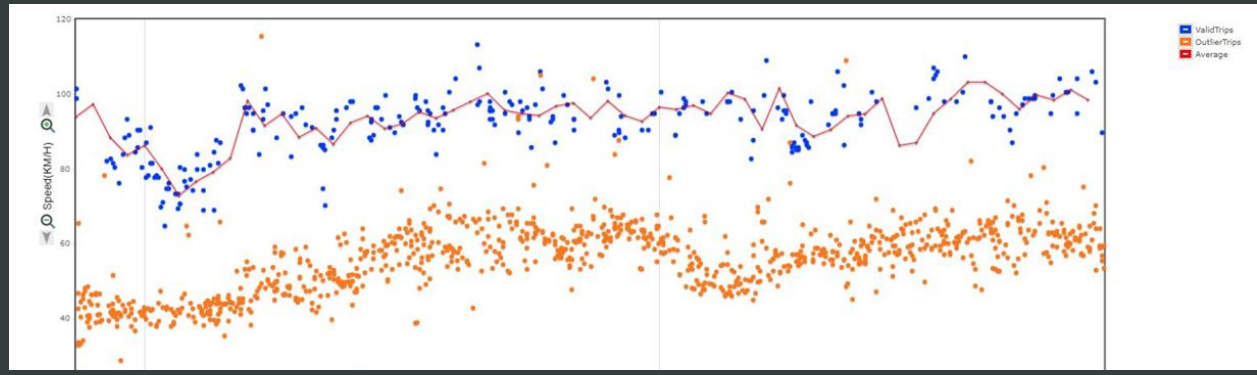
- Along the approaching highway; and, if applicable, along the primary route through the urban signalized network
- Capturing vehicles exiting from primary inspection on the US side of the bridge or tunnel

Specialized analytics differentiate passenger vehicles from commercial vehicles

- Trucks are speed-limited and have a different freeway travel time distribution than cars
- Trucks may follow a different route through inspection facilities
- These effects can be leveraged to provide independent travel time for cars and trucks



Reader locations at the Blue Water Bridge crossing



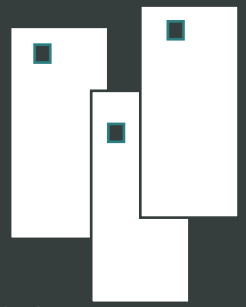
Distinct travel time distributions by vehicle class (per TPA North America)

BORDER WAIT TIME PROCESSING, MONITORING, AND DISSEMINATION

CLICK TO ADD SUBTITLE

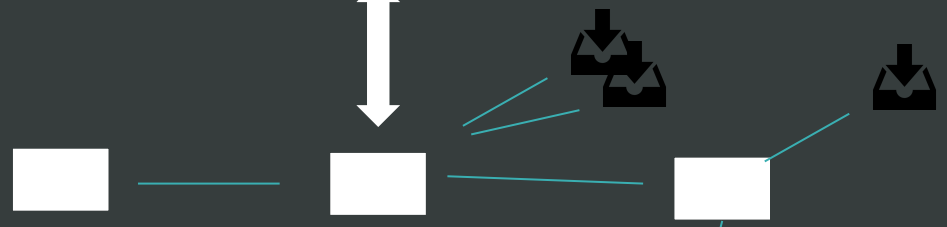
Border wait Time Measurement

COMPASS ATMS



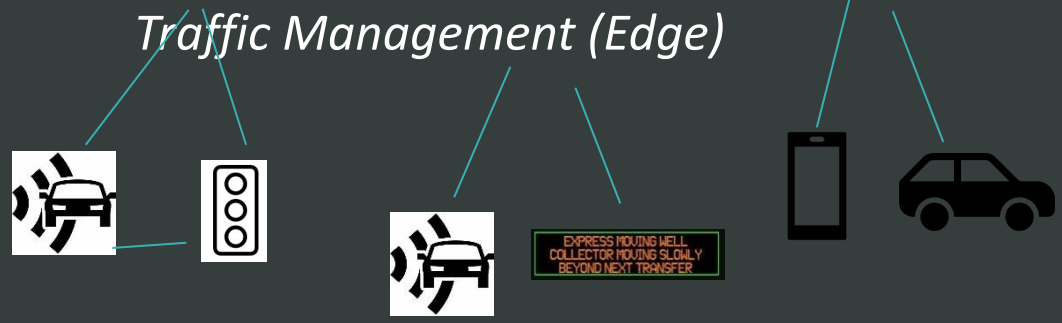
Monitoring and Decision Support (Data Center/Cloud)

Field Traffic Master



Traffic Management (Edge)

Roadside Equipment/External Feeds

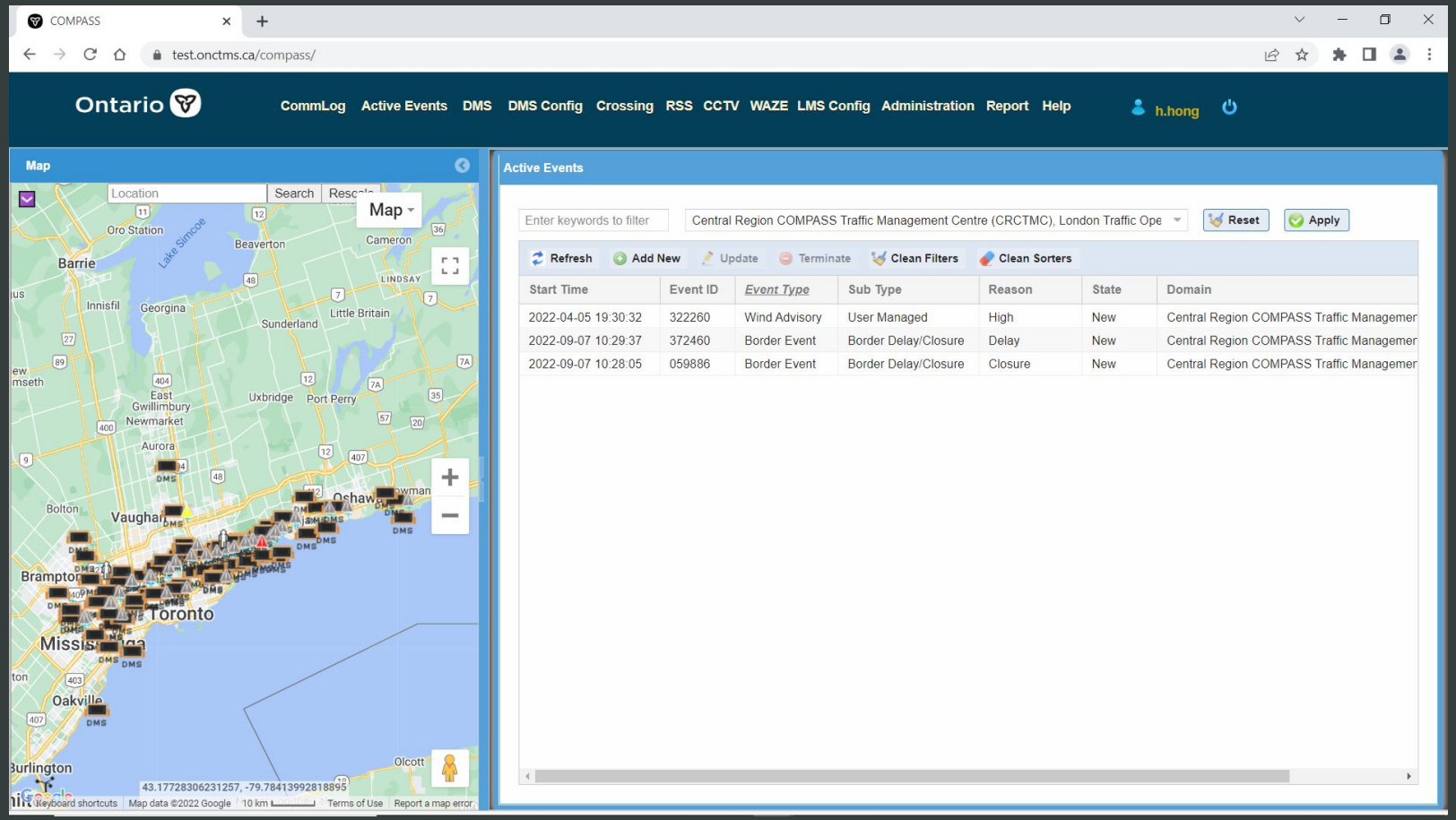


Sensing and Advising Traffic (Endpoints)

Border Crossing Event processing enables MTO ATMS operators to manually override border delays or to close individual border crossings.

Border Wait Time processing collects real-time car and truck border route travel times from Bluetooth data sources, converts these values to border delays, and posts these messages to advisory signs.

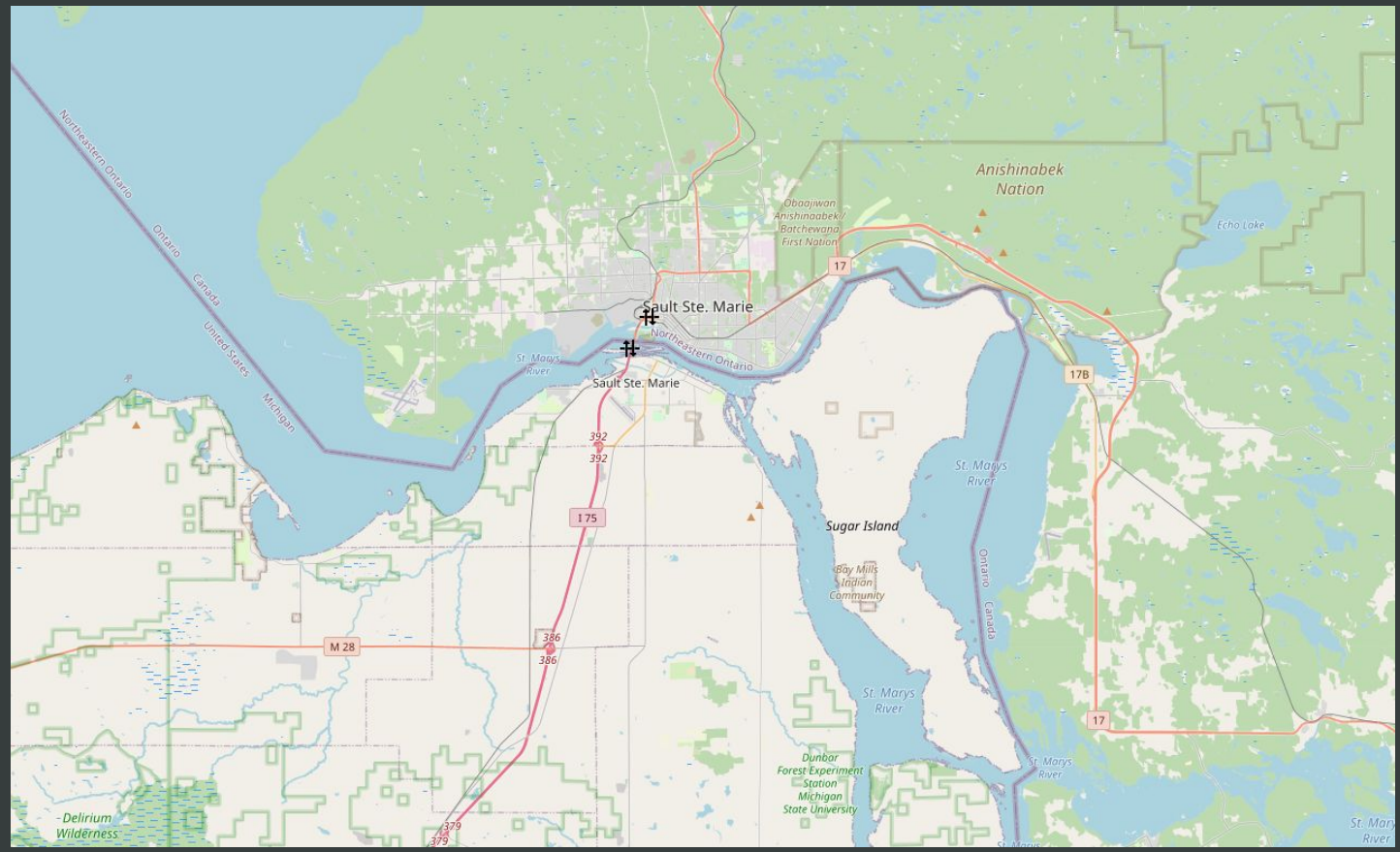
Border wait Time MANAGEMENT



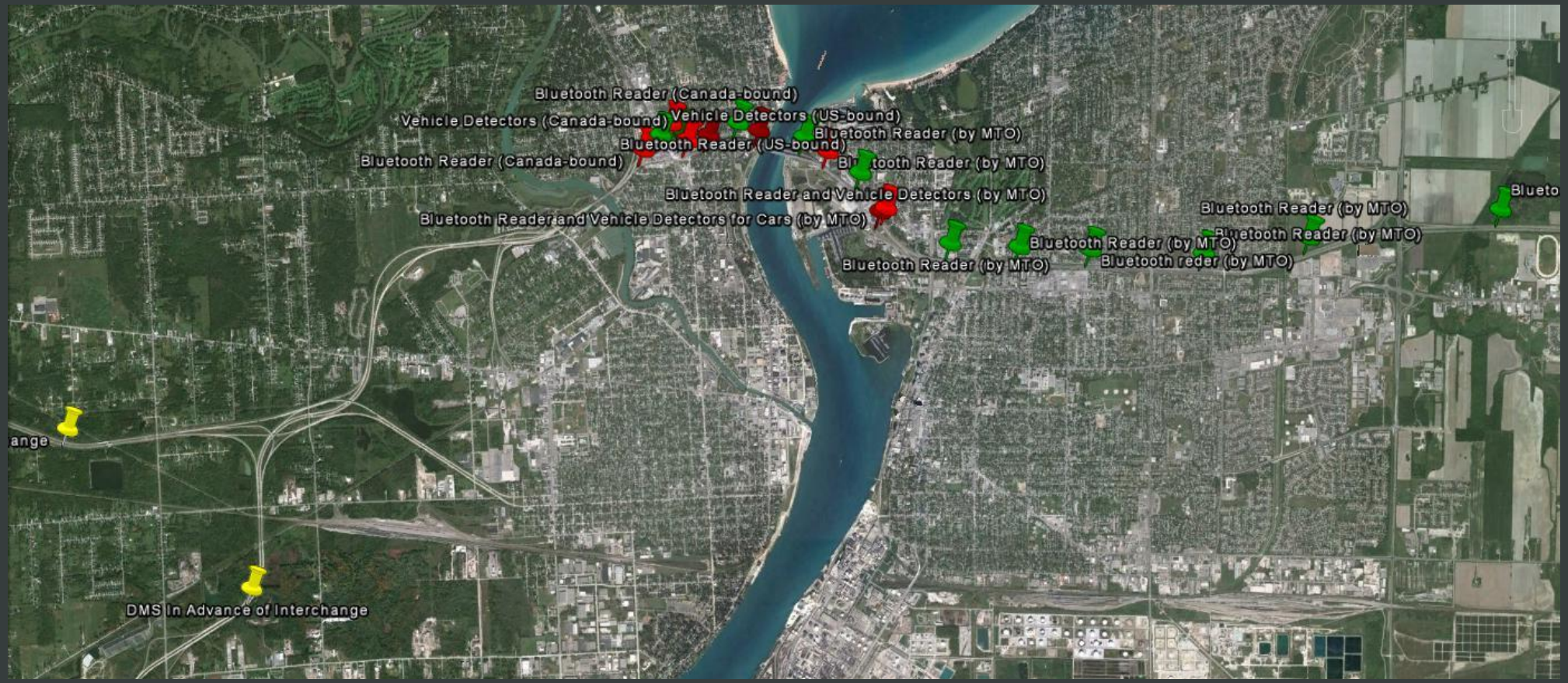
Ministry TMC operators can manually override messaging in the event of incidents or border closures

MICHIGAN

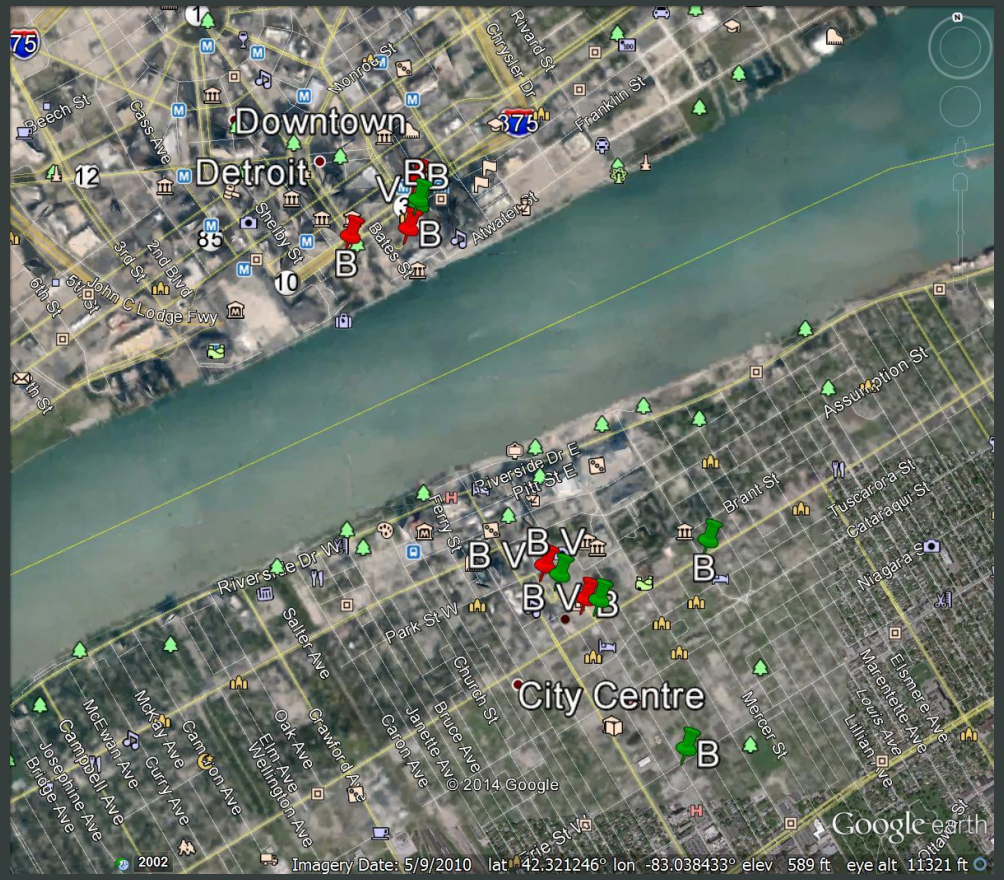
Northern Crossing – International Bridge

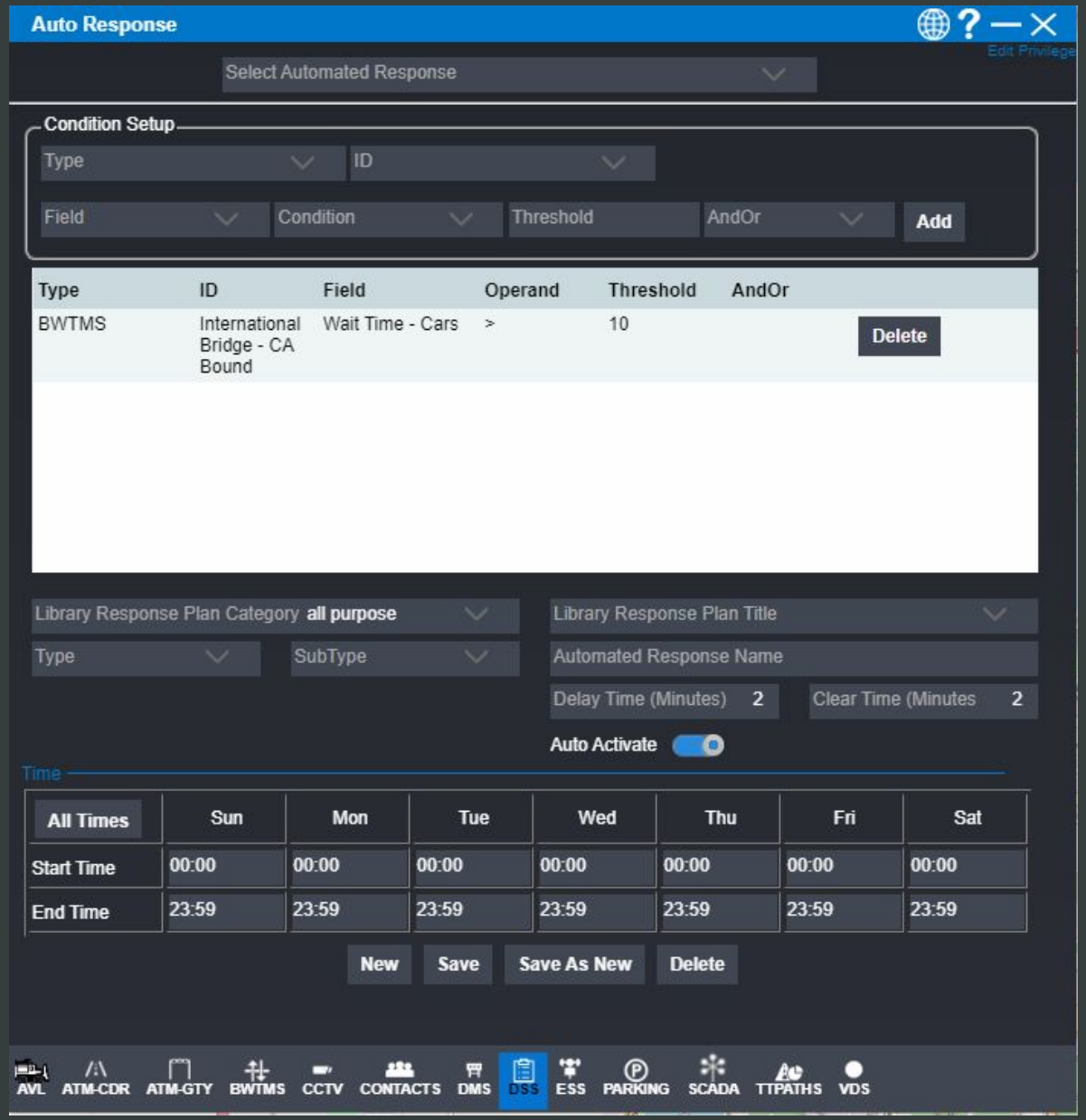


Eastern Crossing – Blue Water Bridge



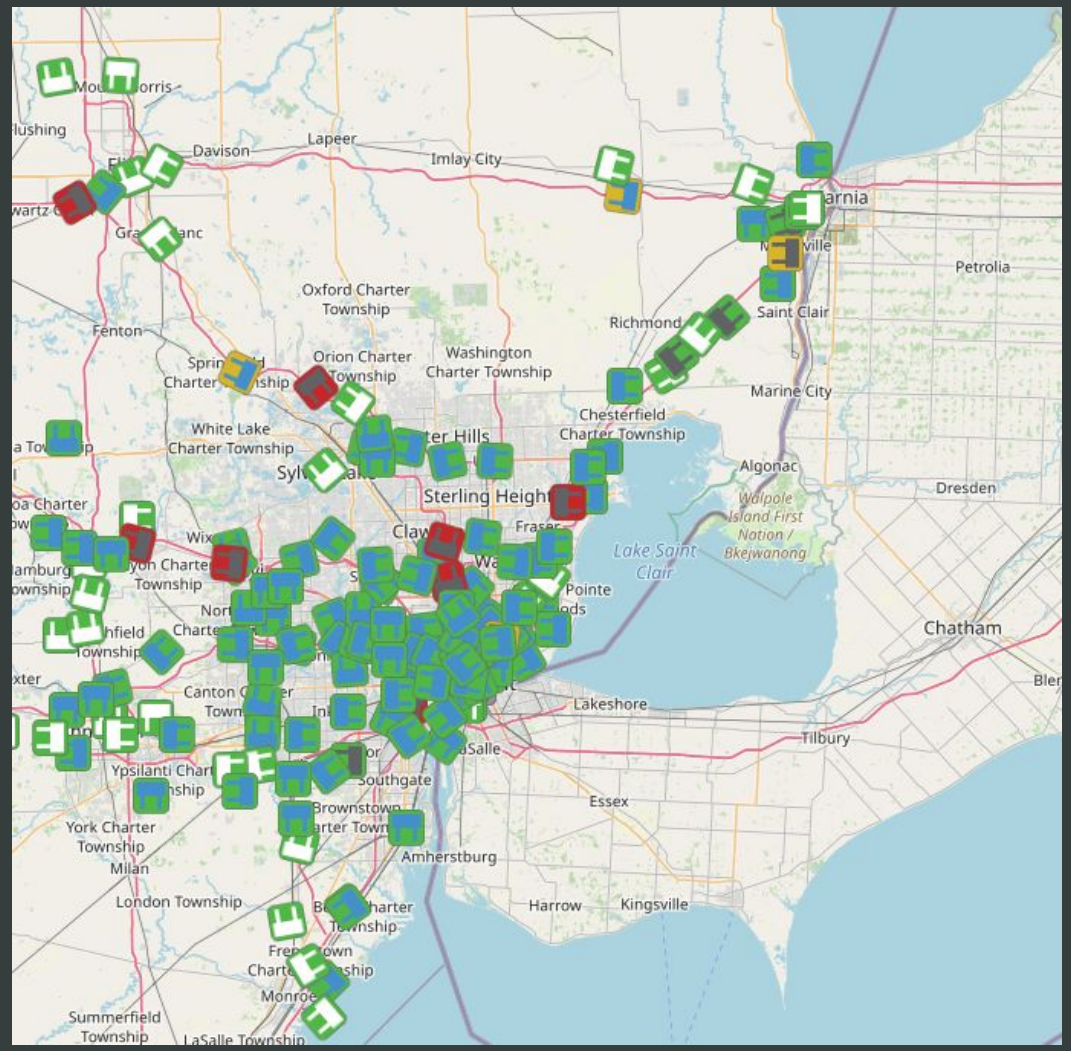
Detroit Crossing

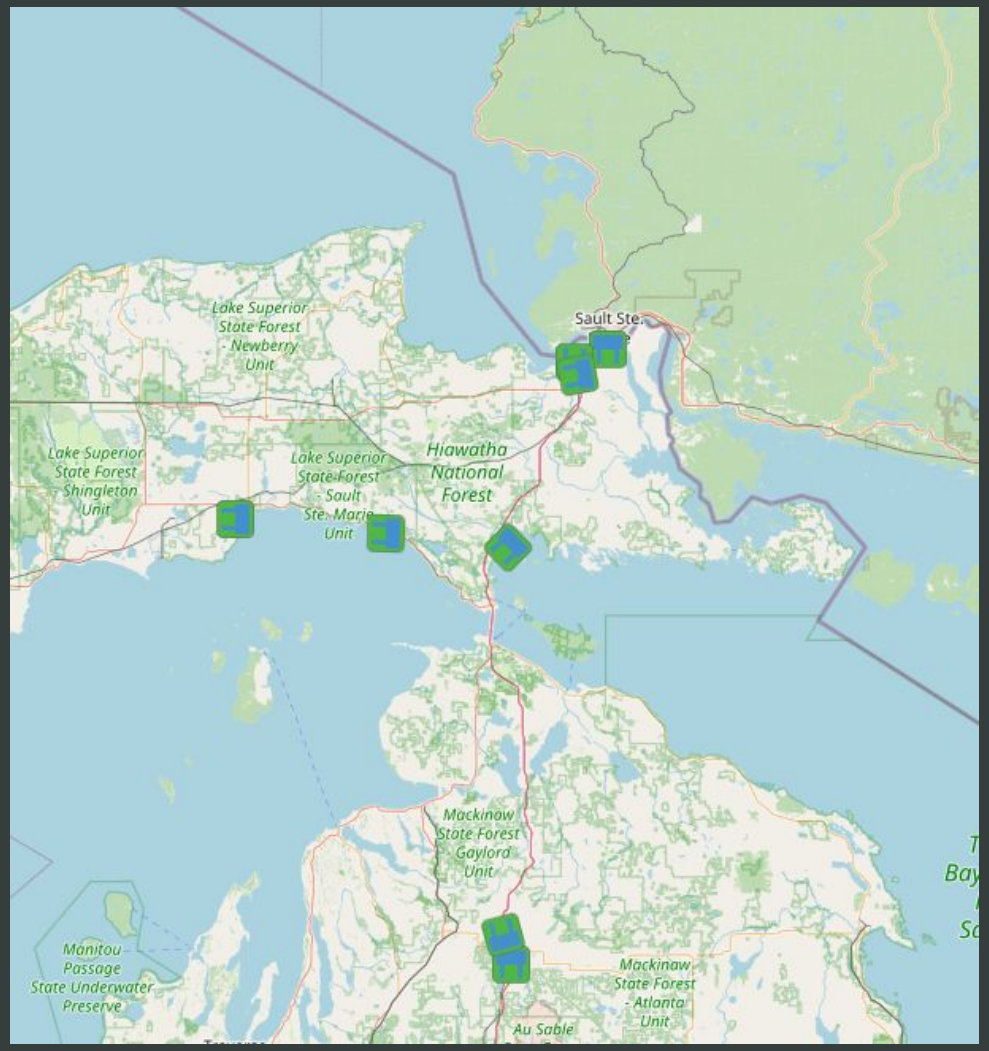




Auto Response

Signs used for advance alerting

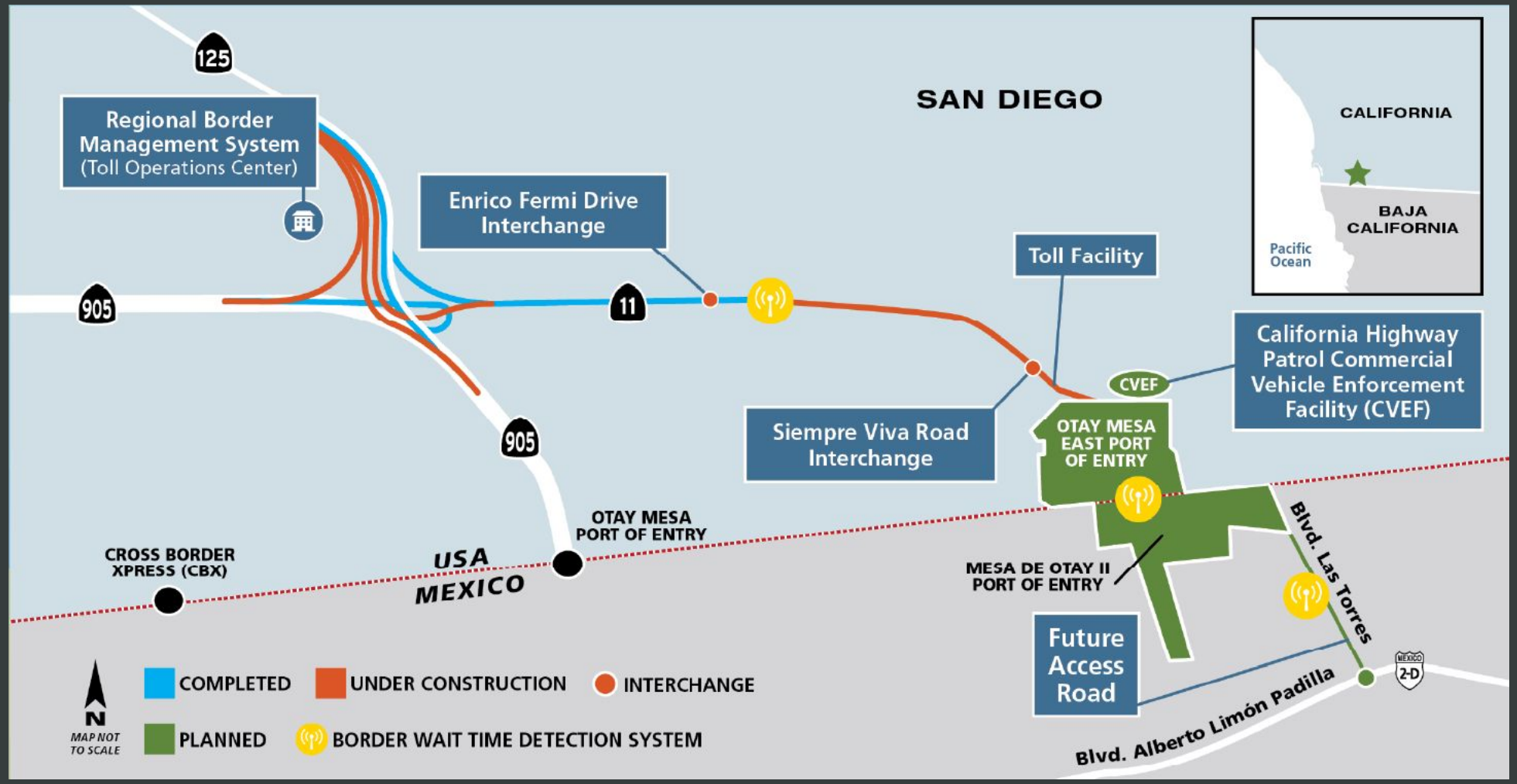




SAN DIEGO

ABC Project
Advancing Border Crossing

ABC Project Location and Overview

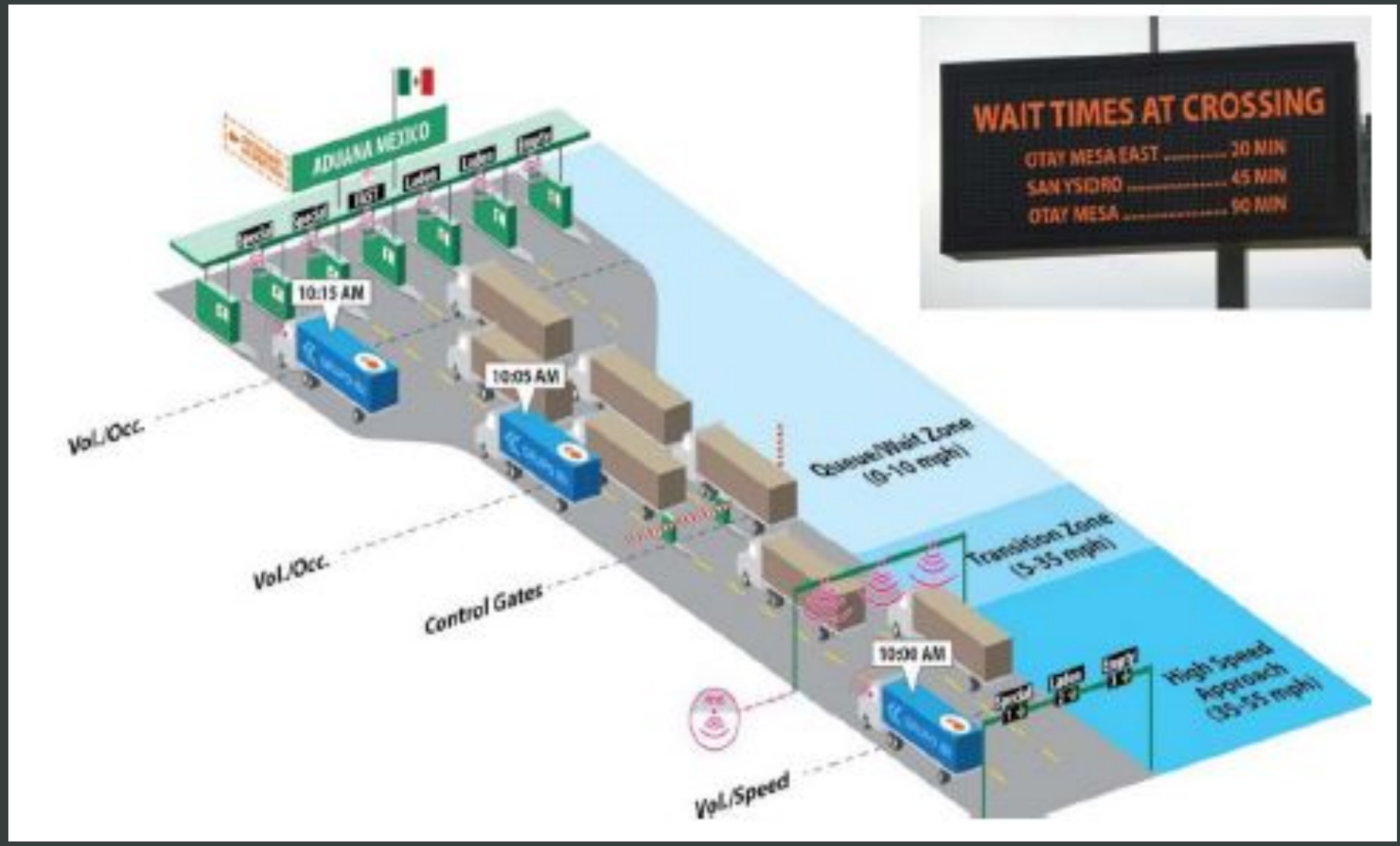


Two main elements for iNET™ Development

- Expansion and version upgrade of existing I-15 ICM for use on SR 905 and SR 11
- Replace iNET™ ICMS simulation with real-time information

- Border wait times and lane management
- Border dynamic-pricing
- Border lane management

SANDAG RBMS Concept



Leverage I-15 ICMS with Enhanced Capabilities

- En-route traveler information
- Pre-trip traveler information
- Automatically detects congestion events
- Dynamic Rerouting
- Regional arterial management
- Freeway coordinated adaptive ramp metering
- Signal coordination on arterials with freeway ramp metering
- Real-time multimodal decision support