RECENT DEVELOPMENTS IN FREIGHT ITS/CAV IN THE WESTERN UNITED STATES

NW Transportation Conference

March 5, 2024

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WHAT TRANSPORTATION CAN BE.

OUTLINE

- Advanced Border Information System (ABIS)
- I-10 Truck Parking Availability System (TPAS)
- DrayFLEX Freight Optimization

Acknowledgements

ABIS
- WCOG (Melissa Fanucci)
- SAI (Venu Sarakki)
- TTI (Rafael Aldrette)

I-10 TPAS
- TxDOT (Sherry Pifer)
- Caltrans (Matt Hanson)
- NMDOT (Charles Remkes)
- AZDOT (Victor Yang)
- HNTB (Brian Comer)

DrayFLEX
- LA Metro (Ed Alegre)
- InfoMagnus (Sal Manzo)
- OZ Engr (Gopol Raju)
- FHWA (Jesse Glazer)

WCOG / IMTC / USDOT-SMART

Advanced Border Information System (ABIS)

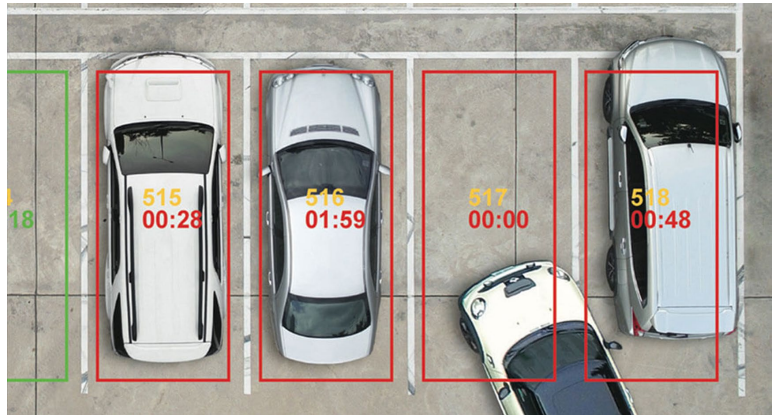
POTENTIAL BWT SENSOR TECHNOLOGIES

WIFI and Bluetooth

LIDAR & RADAR

In-Pavement Sensors

Video Analytics



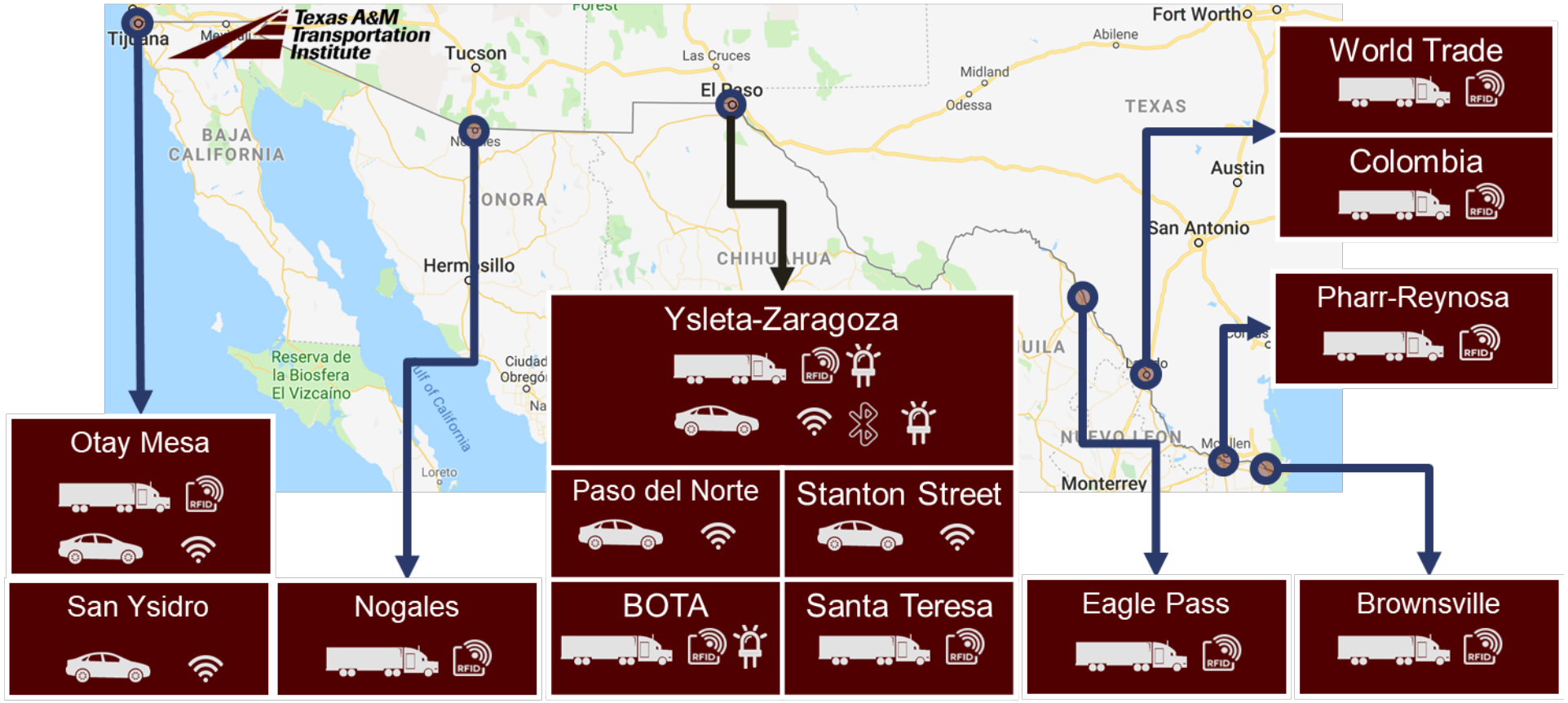
RFID

SOUTHERN BORDER BWT TECHNOLOGIES

CASE STUDY EXAMPLE:
Southern Border Crossing Information

Key:

- RFID Reader
- WiFi Reader
- Bluetooth Reader
- Precision LiDAR Volume Counter



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BWT TECHNOLOGY TRENDS FOR CONSIDERATION

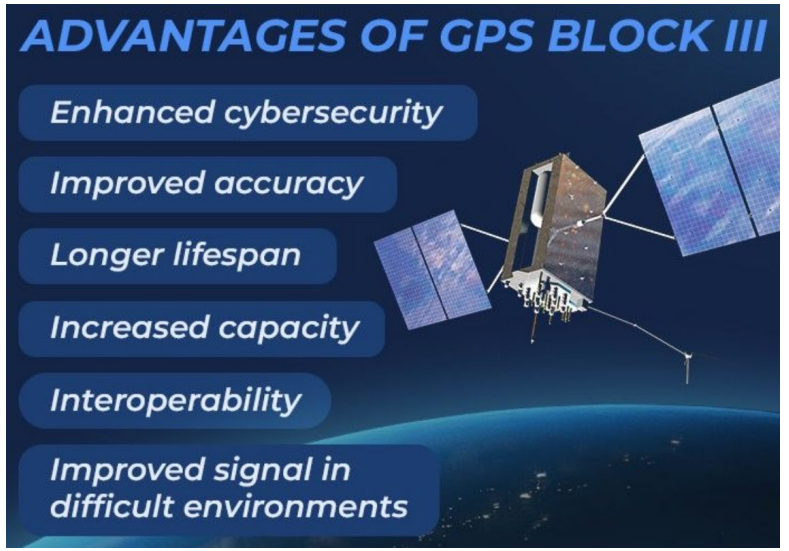
TODAY'S SOA

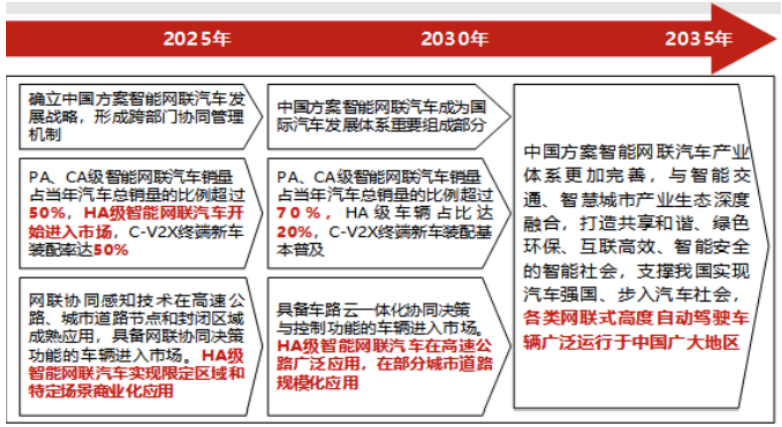
Approaches with multiple technologies integrated together, and supported by software infused with AI represent the emerging trend in BWT system design

TRENDS

- Cloud migration vs on-premise hosting of data and processes
- Location based (GPS) and App based BWT measurements
- Use of AI, ML and PoE/Agency specific automated analytics, dashboards and reports

5 -10 YEARS OUT





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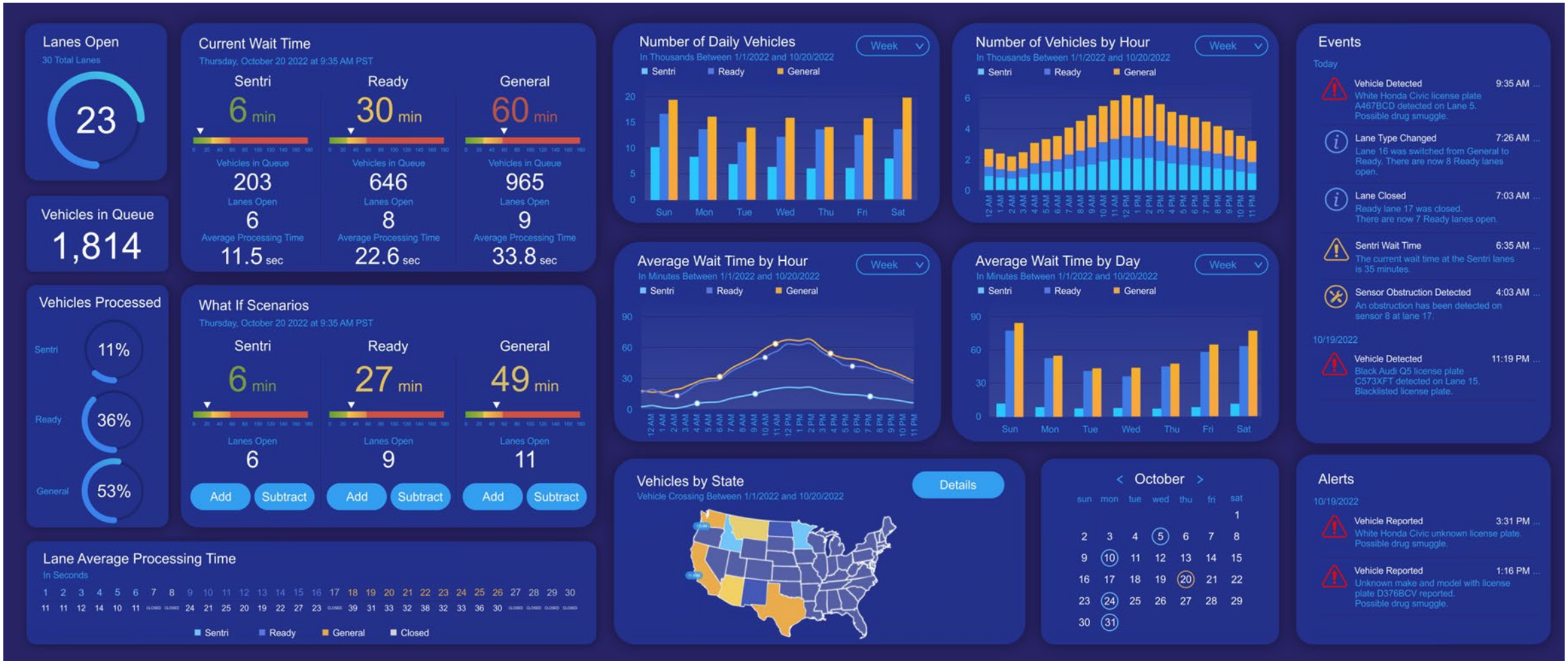
CONCEPTUAL BWT FUTURE DASHBOARD

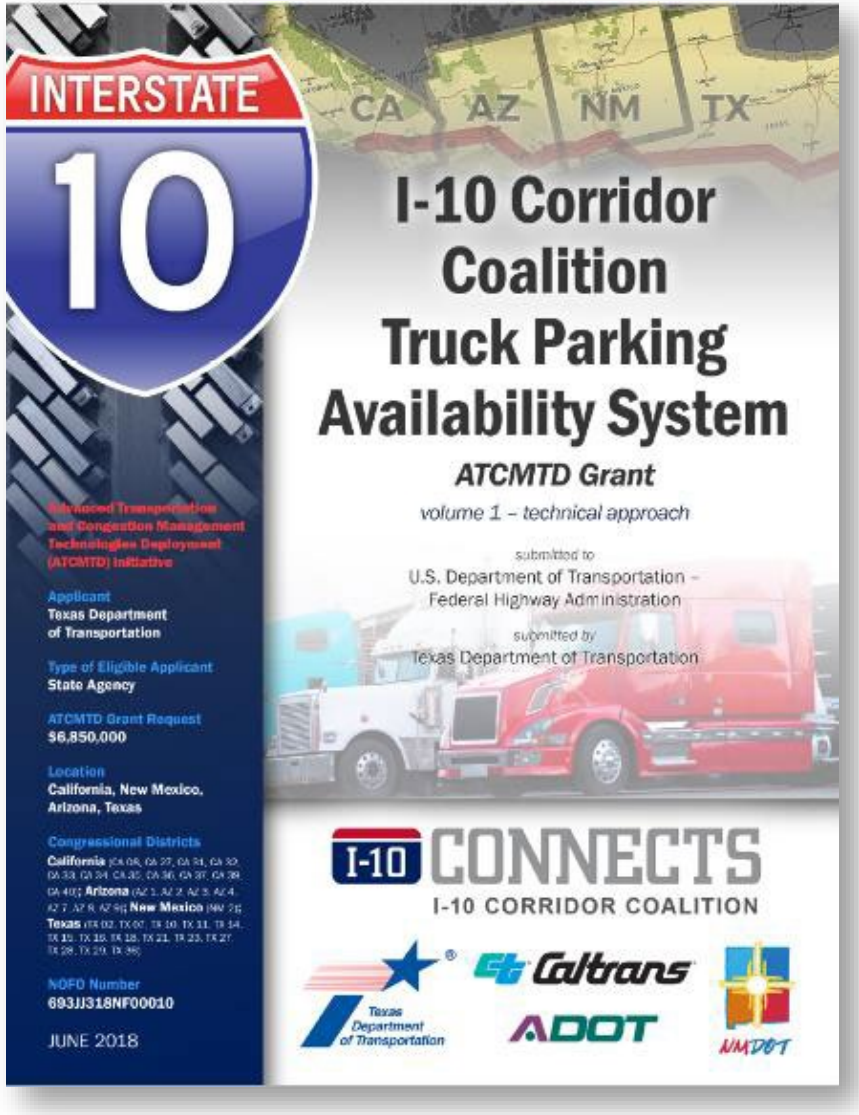


I-10 Corridor Coalition

Truck Parking Availability System (TPAS)

Goals and Objectives

Goals	Objectives
Reduce fatigue-related truck-involved crashes in the I-10 Corridor.	The I-10 Corridor Coalition TPAS will enable commercial vehicle drivers to readily identify parking spaces and reduce the chances of operating while fatigued.
Reduce emissions associated with excess driving while searching for parking.	The I-10 Corridor Coalition TPAS will enable commercial vehicle drivers to readily identify parking spaces and reduce travel searching for parking.
Reduce public infrastructure degradation from vehicles parking in unauthorized locations.	The I-10 Corridor Coalition TPAS will enable commercial vehicle drivers to readily identify parking spaces and reduce parking along highway shoulders, ramps or other unauthorized locations.
Increase driver efficiency by reducing time spent looking for parking	The I-10 Corridor Coalition TPAS will reduce the amount of time spent looking for parking, which will increase the time traveled towards a destination.
Create a standardized information technology system that can be expanded in future deployments to serve other corridors within the four states, other states along I-10, and/or other ITS needs in the I-10 Corridor.	The I-10 Corridor Coalition TPAS will create a system that can be expanded elsewhere in the member states, possibly expanded to adjacent states, and could be leveraged to deliver other truck-related information such as forecasted truck availability or weather advisories.



I-10 CONNECTS
I-10 CORRIDOR COALITION

I-10 Corridor TPAS Deployment Summary

LEGEND

- I-10 Corridor Coalition States
- Interstate Highway 10
- U.S. Interstates
- I-10 Corridor Coalition TPAS Truck Parking Site

California	243 Miles	6 Sites
Arizona	392 Miles	8 Sites
New Mexico	164 Miles	5 Sites
Texas	881 Miles	18 Sites
Total	1,680 Miles	37 Sites

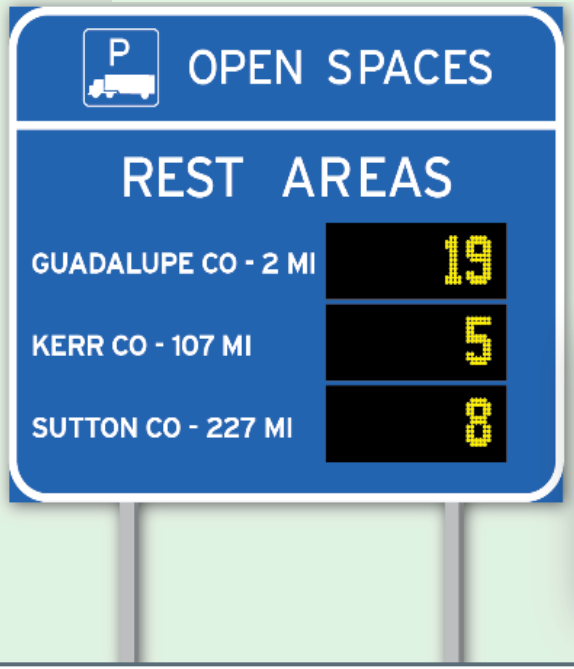
I-10 TPAS Concept

I-10 CONNECTS
I-10 CORRIDOR COALITION

1. Vehicle detection provides truck parking availability

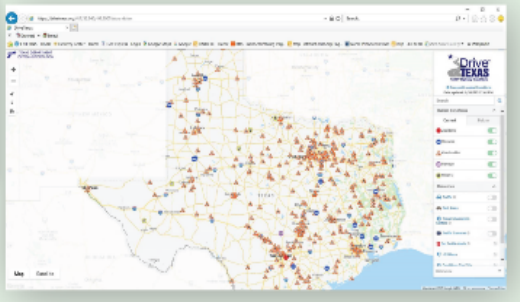
2. Parking data goes to states and 3rd parties

3.* Data delivered to drivers and fleets



Navigation Applications and Systems

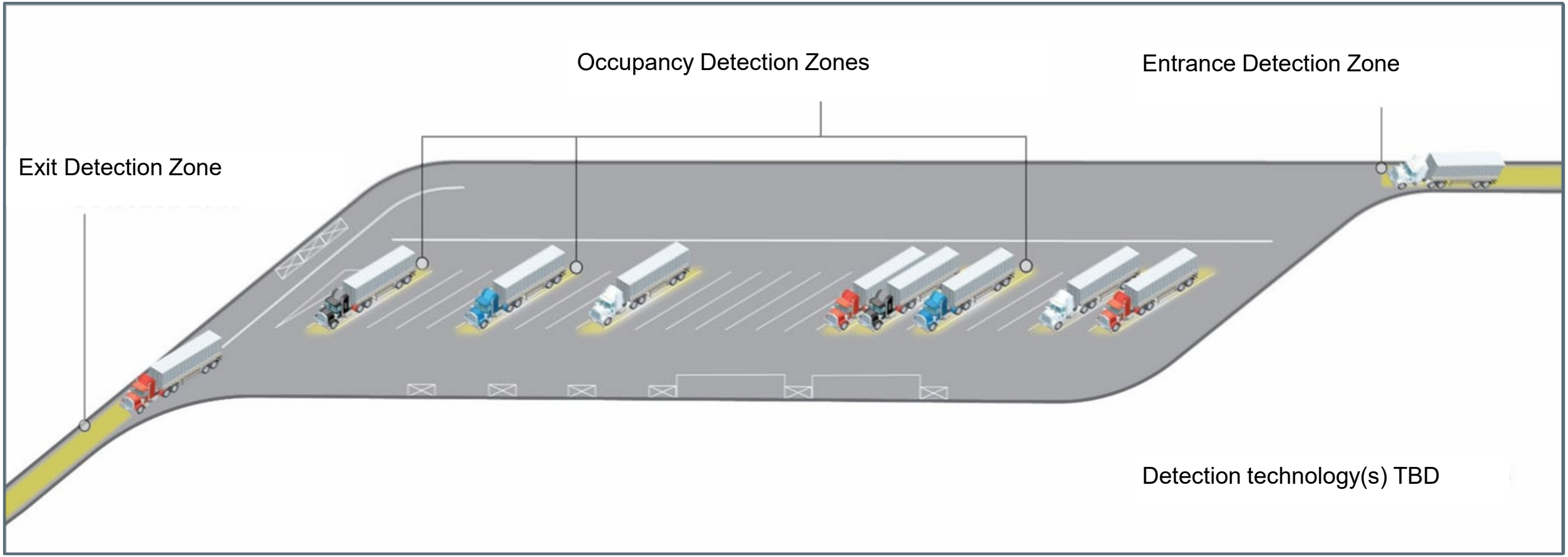
DriveTexas Website



* Examples are for illustrative purposes only

I-10 CONNECTS
I-10 CORRIDOR COALITION

I-10 TPAS – Truck Rest Stop Detection



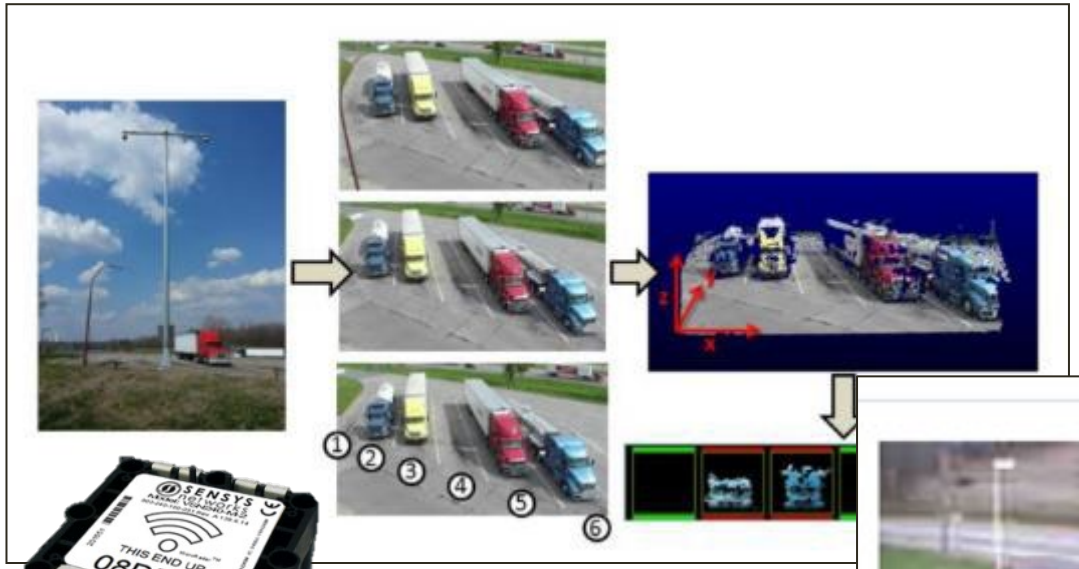
Detection technology (in-pavement sensors, video analytics, etc.) selected during concept of operations and preliminary engineering phase

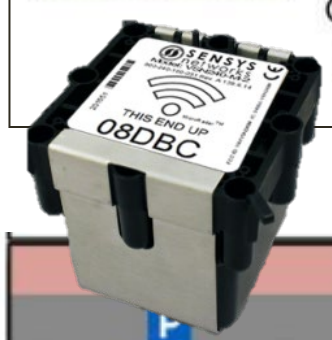
I-10 CONNECTS
I-10 CORRIDOR COALITION

Data Collection

Entrance and Exit Detection

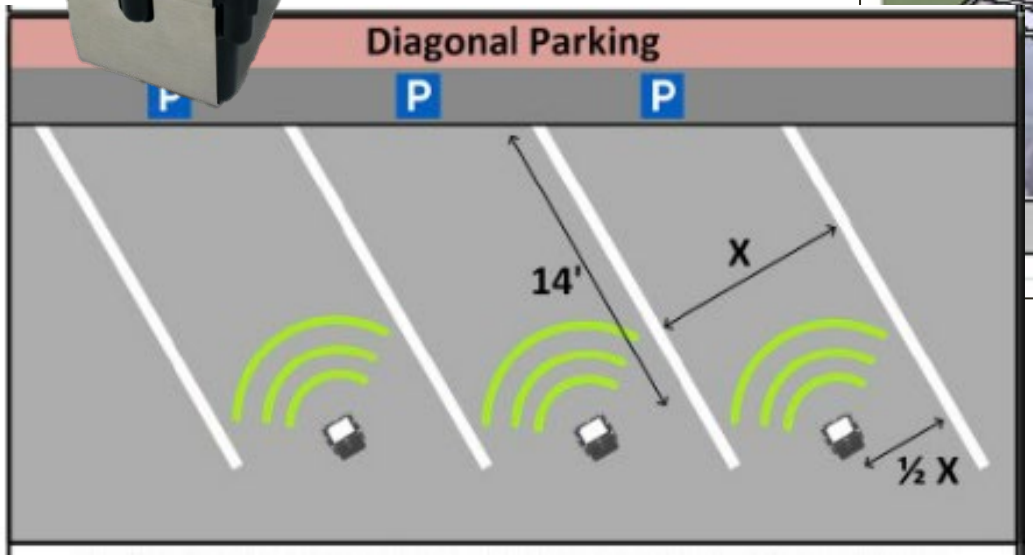
- In-pavement magnetometer
- In-pavement microwave/magnetometer
- In-pavement infrared/magnetometer
- Video analytics
- Laser
- Microwave radar
- RFID





Space Occupancy Detection

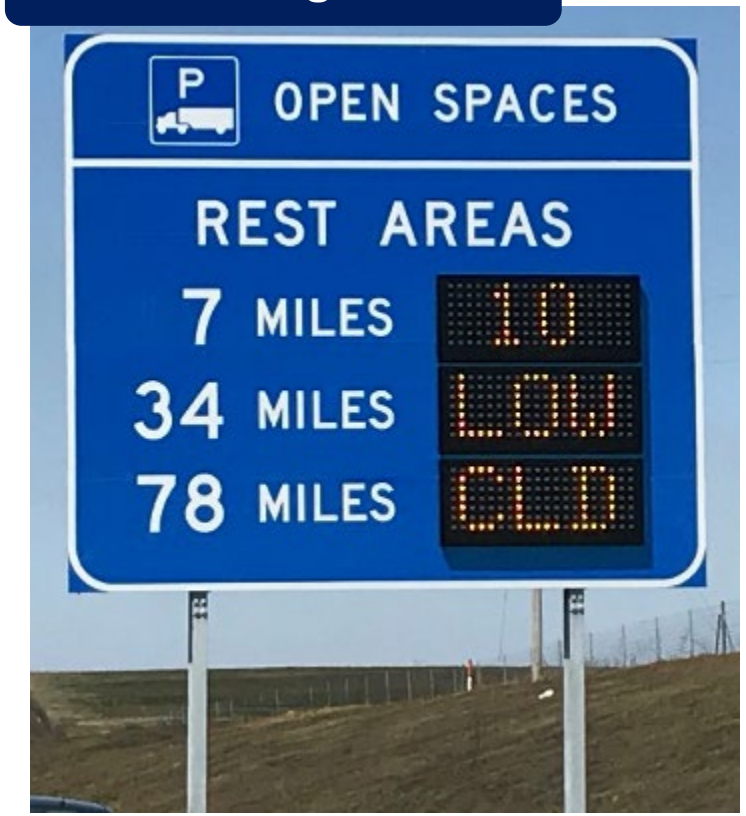
- In-pavement magnetometer
- In-pavement microwave/magnetometer
- In-pavement infrared/magnetometer
- Video analytics
- Microwave radar



I-10 CONNECTS
I-10 CORRIDOR COALITION

Data Dissemination

Roadside Signs



Data Feed (API)

Element	Type	Description
siteId	string	Unique fixed-length … number, route type, reference post, side of road and unique location number or name abbreviation. See more detailed description in appendix.
timeStamp		
timeStampStatic		
reportedAvailable		

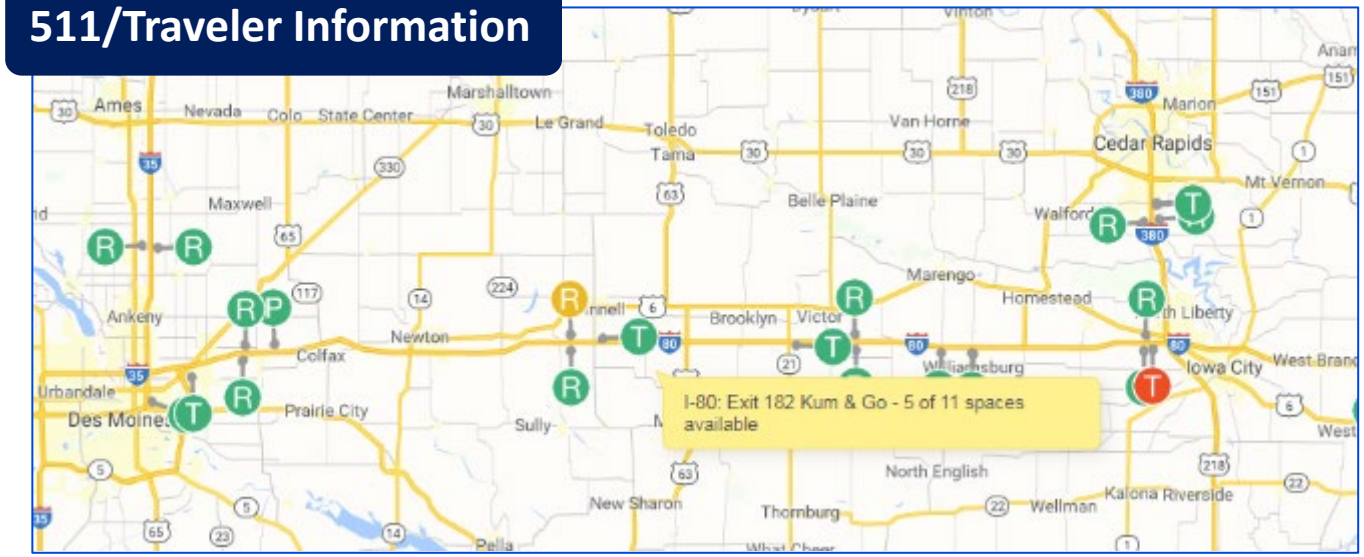
JSON format


```
[{"siteId":"WI00094IS0012400ERSTARE53","timeStamp":"2016-08-
15T20:35:15Z","timeStampStatic":"2015-05-
03T12:24:19Z","reportedAvailable":"25","trend":"FILLING","open":true,
"trustData":"true"}]
```


Dynamic Public Feed - live URL

https://transportal.cee.wisc.edu/TPIMS/dynamic

511/Traveler Information



I-10 CONNECTS
I-10 CORRIDOR COALITION

Project Schedule

TPAS PROJECT SCHEDULE

SPRING 2019	2020	2021	2022	2023	ONGOING
Notice of Award	Systems Engineering Documentation	System Design	Software Development and Integration Construction	System Testing and Validation System Launch	Operations and Maintenance Performance Monitoring

STAKEHOLDER ENGAGEMENT

Current Status

TPAS COMING SOON TO OREGON (I-5 CORRIDOR)

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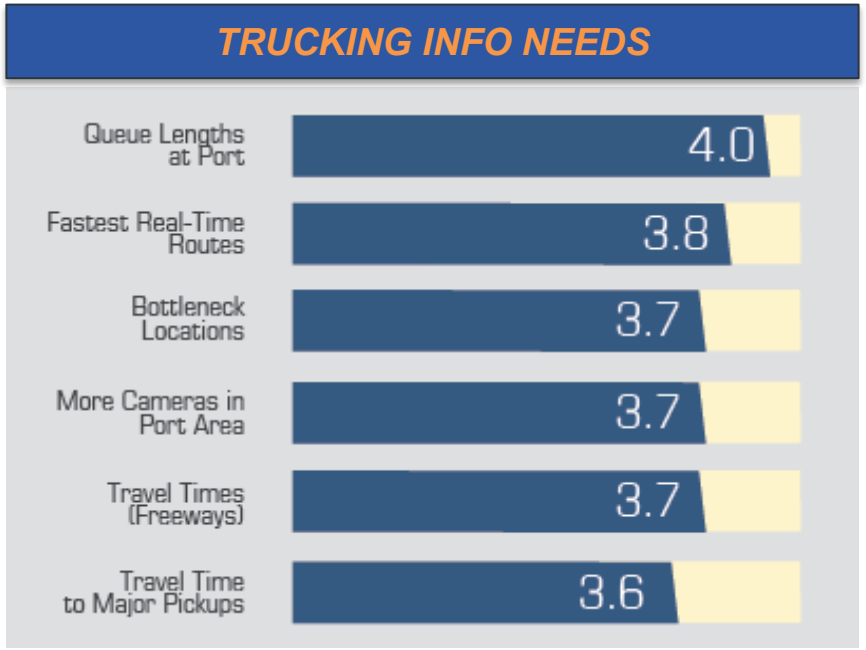
LA Metro DrayFLEX
Freight Optimization

Background: Gateway Cities Logistics Corridor

- **Anchored by Ports of Long Beach & Los Angeles**
  - Busiest port complex in North America
  - Over 1000 Trucking Companies
  - Includes 14 Active Marine Terminals
  - 694 Million sqft. of regional warehousing space
- **Robust transportation network**
  - I-710, I-5, I-405. I-605, I-105, SR-91; vast arterial network of over 2300 signalized intersections
- **Major Issues in Goods Movement Efficiency**
  - Lack of information sharing between trucking and terminals impedes freight system efficiency
  - Lack of freight-specific traveler information such as terminal wait times and dynamic routing options



OPERATIONS CONERN:

During COVID, 50+ ships were sometimes waiting to get a cargo berth at the ports

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ATCMTD GRANT

FReight Advanced Traveler Information System (FRATIS)

ATCMTD Benefit	Anticipated Benefits
Mobility	FRATIS would drive overall goods movement efficiencies for the private sector through shorter turn times, improved travel times to distribution centers achieving benefits of 15 percent savings in vehicle miles of travel (VMT), travel times, and 21 percent savings in fuel.
Safety (non-quantifiable)	By reducing congestion and increasing reliability, FRATIS will enhance safety by lowering the number of primary and secondary incidents.
Environment	FRATIS will reduce CO_2, NO_X and SO_X, V_OC and CO by and between 21 and 23 percent each, and PM_{10} by 27 percent.

DRAYFLEX CORE APPLICATION VISION

- Real-time data integration (TM TOS, appointments)
- Route optimization based on real-time data
- Leverage regional traveler information data
- Ability to integrate CV/AERIS
- API-based open architecture

DRAYFLEX CORE APP (OPTIMIZATION)

DRIVERS AVAILABLE

DISPATCH PLAN OPTIONS

QA DRIVER2501 9876543210
Vehicle ID: 9E33247

PLAN 1 4 hr 25 min
3 Moves/42 Miles

$210 ($-30 ↓) Approximate Time

1	131 W 223RD ST, CARSON -- SHIPPERS MIDDLE RD	12 min
2	SHIPPERS MIDDLE RD -- DAMCO SFS	39 min
3	DAMCO SFS -- TTI	44 min

PLAN 2 6 hr 35 min
4 Moves/73 Miles

$213.5 ($-26.5 ↓) Approximate Time

1	131 W 223RD ST, CARSON -- Home Lomita Yard Hub	13 min
2	Home Lomita Yard Hub -- Trapac	14 min
3	Trapac -- TTI	21 min

PLAN 2

1 — 131 W 223RD ST, CARSON → Home Lomita Yard Hub

ETA: 12:00

2 — Home Lomita Yard Hub → Trapac

Pickup+Dropoff

17:00 - 21:00 — 17:00 - 02:00

ETA: 17:43

3 — Trapac → TTI

ETA: 19:50

4 — TTI → ELECTROLUX HOME PRODUCTS

Pickup+Dropoff

20:00 - 22:00 — 00:00 - 23:59

ETA: 23:01

Cancel Submit Plan

DRAYFLEX CORE APP AGILE DEVELOPMENT

Release (~ 8 weeks)	Release 0 - Planning	Release 1 - Basic Dispatch Optimization	Release 2 - TMS Integration	Release 3 - Improved Dispatch	Release 4 - Minimal Viable Product	Release 5 - Multiple TMS	Release 6 - Automation & Reporting	Release 7 - DrayFLEX-Trip Integration/Pilot Release
Goals of Product Increment	•Design and development tool preparation •Proof of concept assessment •Release planning	•Standalone system with manual entry of data (import from Excel-file, no integration) •Create dispatch optimization engine	•Reading driver, order and appointment data from TMS simulator •Complete standalone •Fleet dispatch and optimization •Optimization engine enhancements	•Optimization engine enhancements •User management •Tenant management •Improved dispatch workflow and exception handling part 1 •Chassis matching	•Optimization engine enhancements •Improved dispatch workflow and exception handling part 2 •Move alerts	•Optimization engine enhancements •Integration with TMS 1 •Ready to Pilot Planning portion of DrayFLEX Core •Initial truck location integration •Dashboard design	•Optimization engine enhancements •Initial Integration with DrayFLEX Trip •Complete Truck location integration •Integration with TMS 2	•Complete Tracking portion of DrayFLEX Core •Dashboards •Company Chassis availability •Complete DrayFLEX-Trip Integration •Updates based on user feedback

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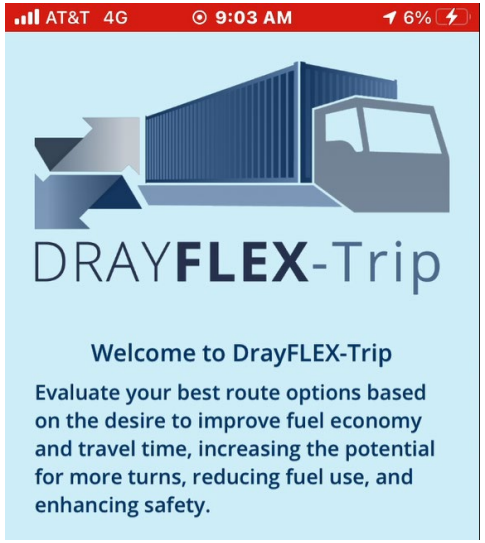
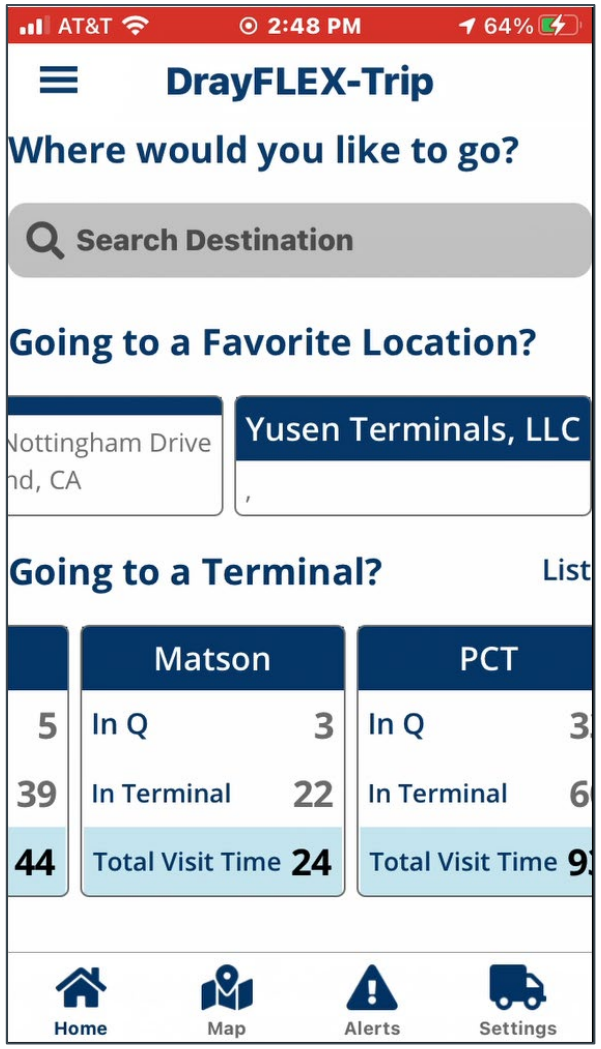
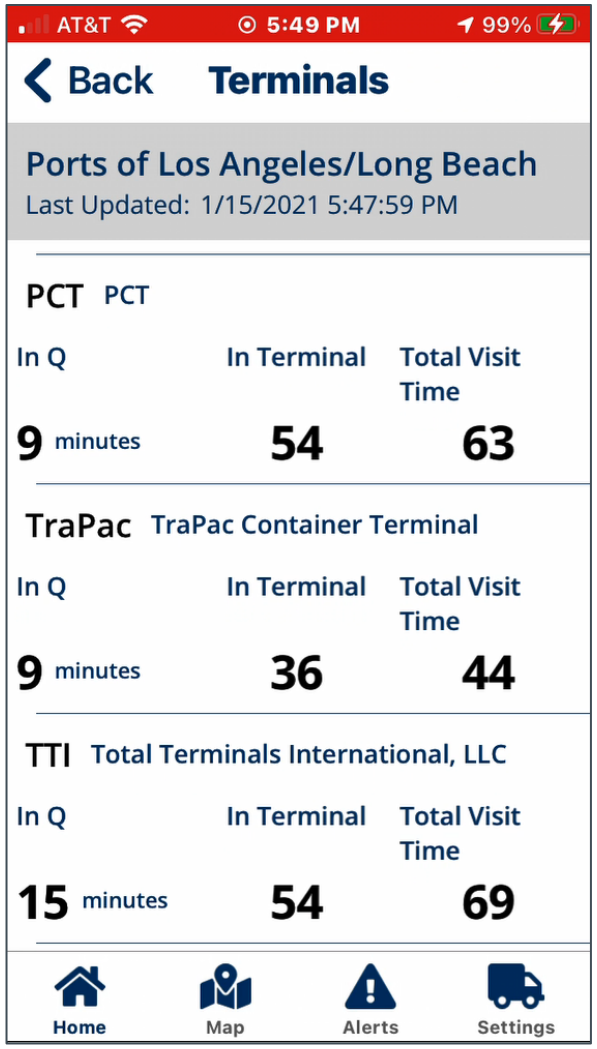
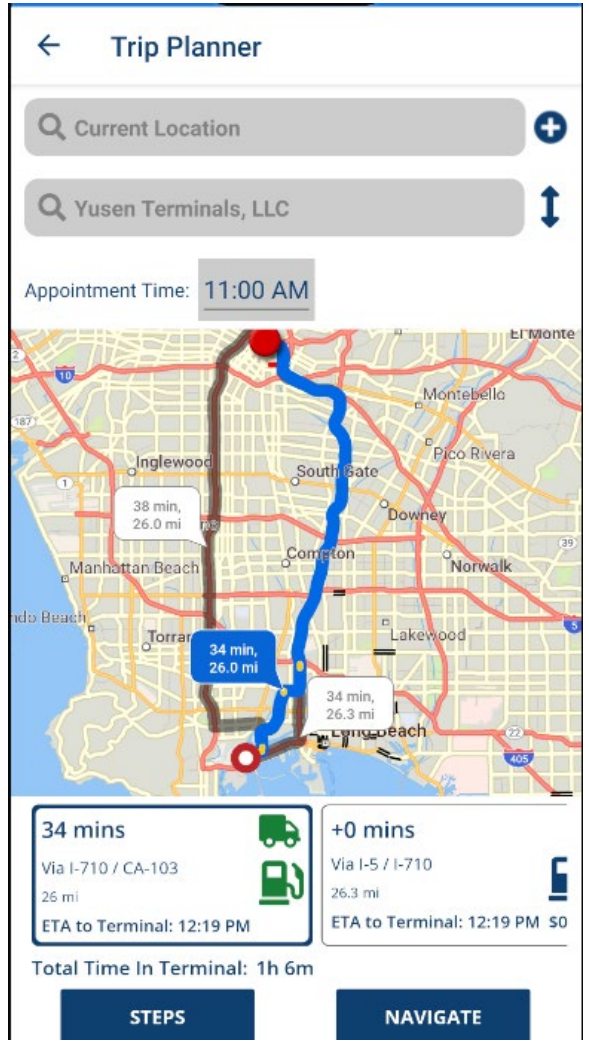
DRAYFLEX TRIP APP (TRUCK-SAFE ROUTING)









DRAYFLEX PERFORMANCE METRICS

Overarching Goal	Description/Hypothesis	Primary/Key Performance Indicators	
		Core	Trip
Mobility	DrayFLEX will improve mobility and reduce congestion for the trucking community through optimization of truck planning and dispatching (Core) and improved truck routing capabilities (Trip).	•Turns per truck per day •VMT per move (or turn) •Perceived congestion improvement	•Travel time •Perceived trip time improvement •Perceived congestion improvement
Safety	The DrayFLEX project will improve safety by providing information to the driver on traffic conditions (Trip).	•N/A	•Number of dangerous slow-down notifications •Perceived safety
Environment	Reduced congestion, bobtails, queues, and idling from the DrayFLEX project will result in environmental benefits, including reduced emissions and fuel use (Core and Trip).	•Emissions/GHG •Fuel use	•Emissions/GHG •Fuel use
Operational Efficiency	DrayFLEX will improve system performance and operations for trucking companies through improved technology and systems	•Perceived system effectiveness	•Perceived system effectiveness
Economic Benefit/Cost Savings	DrayFLEX will reduce costs and improve return on investments for the project stakeholders (MTOs and truck operators) through improved fleet planning and dispatching, and shorter turn times (Core); and improved travel times and fuel savings (Trip).	•Number of dual transactions •Number of transactions •Moves per driver per shift	•Fuel savings
Traveler Information	Traveler information from DrayFLEX will provide truckers with easier access to improved information for trip planning (Core) and en-route alerts and notifications (Trip).	•Perceived customer satisfaction	•Perceived customer satisfaction

QUESTIONS?

MARK.JENSEN@TRANSPOGROUP.COM