Modal Technology Applications

Melissa Smith
Chief of Modal Development
September 6, 2024

FLORIDA AUTOMATED VEHICLES


SAFETY
RESILIENCY
SUPPLY CHAIN
TECHNOLOGY
WORKFORCE DEVELOPMENT
COMMUNITIES


18205

Meet the Panelists

Rudy Powell

FDOT Chief Engineer of Operations for Infrastructure and Innovation

David Cooke

FDOT District 5 Rail Administration Manager

Brett Fay

Vice President of General Aviation HCAA

Patrick Blair

VP of Engineering at Port Tampa Bay

Rudy Powell, P.E.

Florida Department of Transportation

MODAL TECHNOLOGY APPLICATIONS

RUDY POWELL, P.E., CHIEF ENGINEER

FRIDAY, SEPTEMBER 6TH, 2024

The Truck Parking Challenge

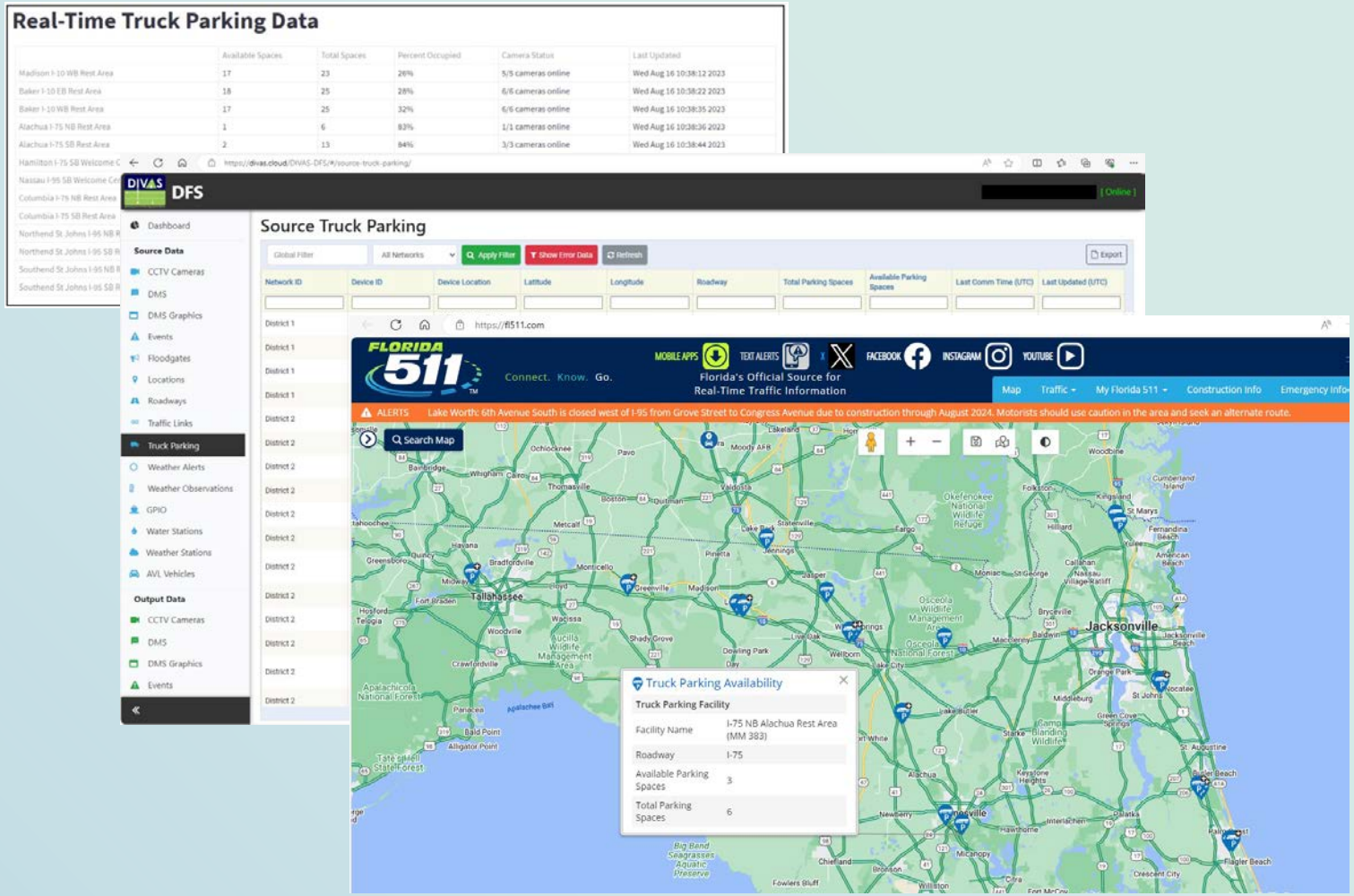
TRUCK DRIVERS RANK PARKING A TOP 5 INDUSTRY ISSUE IN 2015
(AMERICAN TRANSPORTATION RESEARCH INSTITUTE)

98% of truck drivers report problems finding safe parking, costing drivers more than **56 minutes** of drive time. That wasted time is estimated to cost drivers **$5,500** per year – roughly a **12%** pay cut.
(American Transportation Association and Owner Operator Independent Drivers Association)

58% of drivers say they have parked in unauthorized places at least **three** times a week. (American Transportation Research Institute)

$5.1 Billion Lost
Finding safe truck parking is a looming issue that can cost the ***trucking industry*** an estimated ***$5.1*** billion annually.
(Trucker Path)

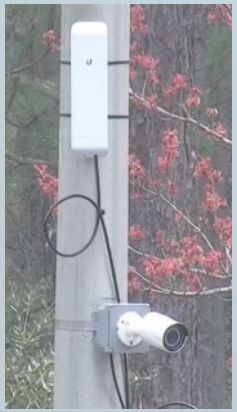
TPAS Importance: FDOT Goals and Systems

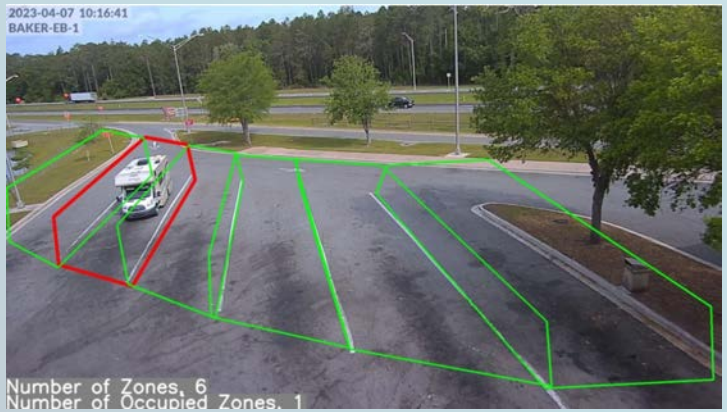


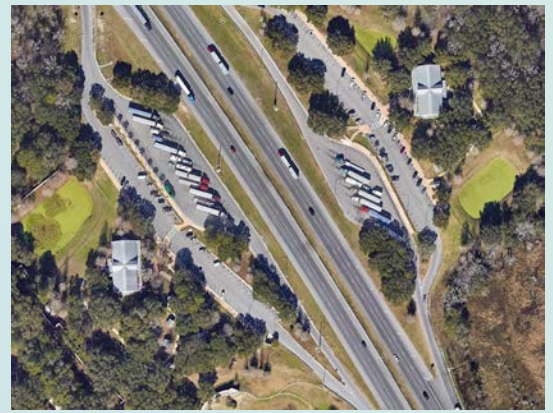
Lessons Learned: Architectures and Technologies

- Count In / Count Out
  - Works best with tightly controlled truck entry and exit points
  - Unable to provide additional data (e.g., individual space utilization, etc.)

- Per Space
  - Can provide additional operational information besides overall counts (e.g., space utilization metrics, overstay, etc.)







What's Next: TPAS 2.0 and Future Direction

TPAS Architecture Capability Matrix

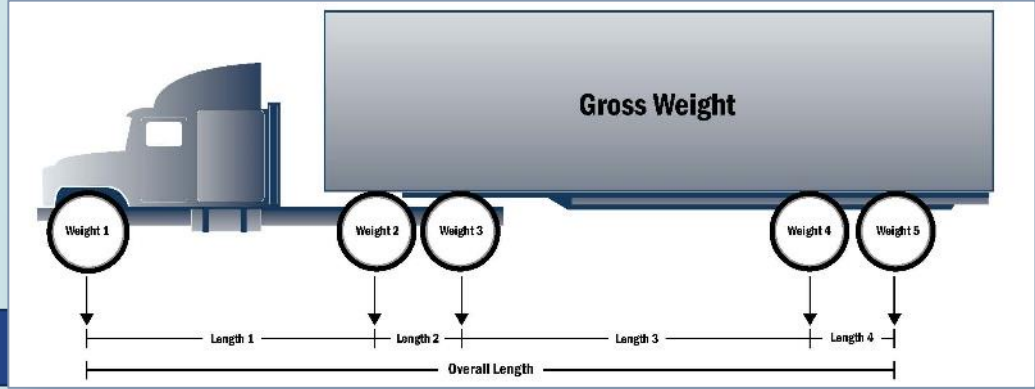
Function	Support	
	Count in/out	Per Space
Total count of vehicles in lot	Yes	Yes
Duration of stay (e.g., overstay alerts that warrant occupant health/safety checks)	Yes*	Yes
Duration of stay per space	No	Yes
Handicapped space utilization	No	Yes
Parking behavior (e.g., identifying preferred spaces, space selection/use trends)	No	Yes
Space utilization by vehicle class (e.g., tractor-trailer, bus, RV)	No	Yes**
Detection of vehicles parking outside of designated spaces	No	Yes**

*Only supported if counting system is also capable of unique vehicle ID (e.g., license plate recognition at ingress/egress)
**Generally requires use of systems that rely upon video analytics

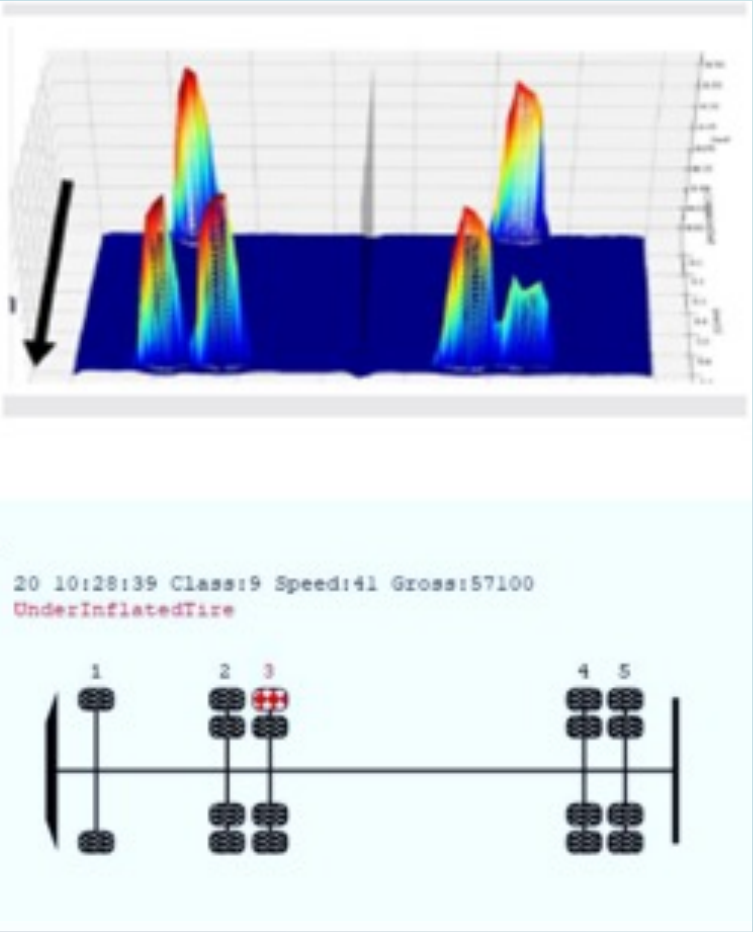
Freight Operations eXchange (FOX)

- **Originally developed for weigh station data collection**
  - **Truck Data:**
    - Individual axle weights
    - Gross vehicle weight
    - Axle spacing
    - Number of axles
    - Overall length (first to last axle)
    - Classification
    - Vehicle identification (license plate number)
    - State of registration
    - Violations
  - **Carrier Data (via USDOT number):**
    - Safety scores
    - Name
    - General commodity data (via SAFER)

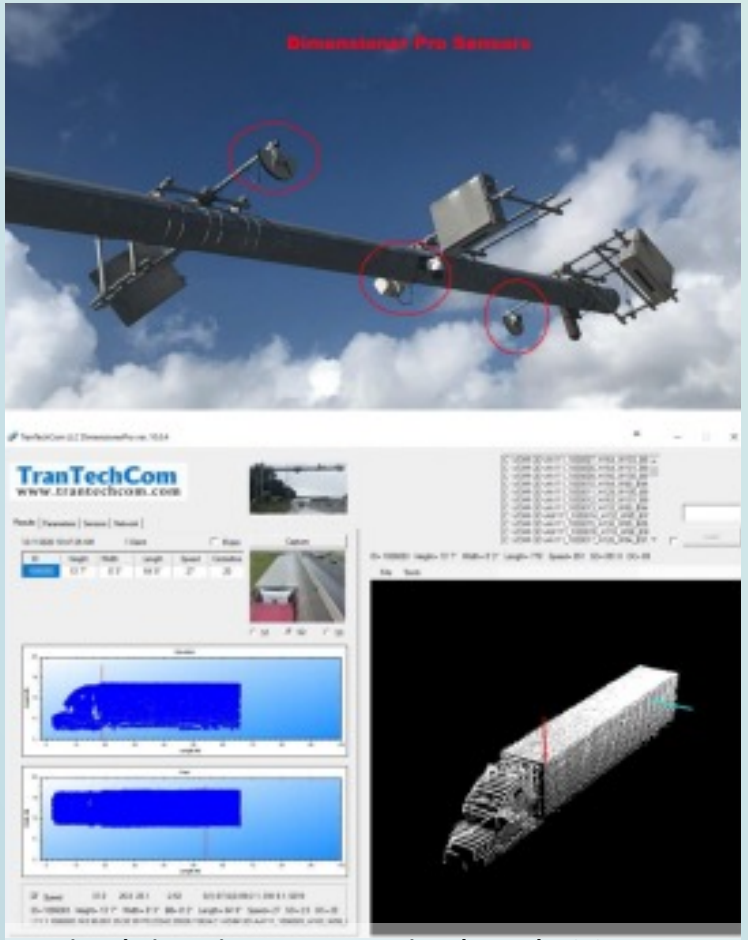
Weigh Station Ramp Equip – WIM Sensors, LPR, USDOT Reader, and Virtual Dimensioner



Freight Operations eXchange (FOX)



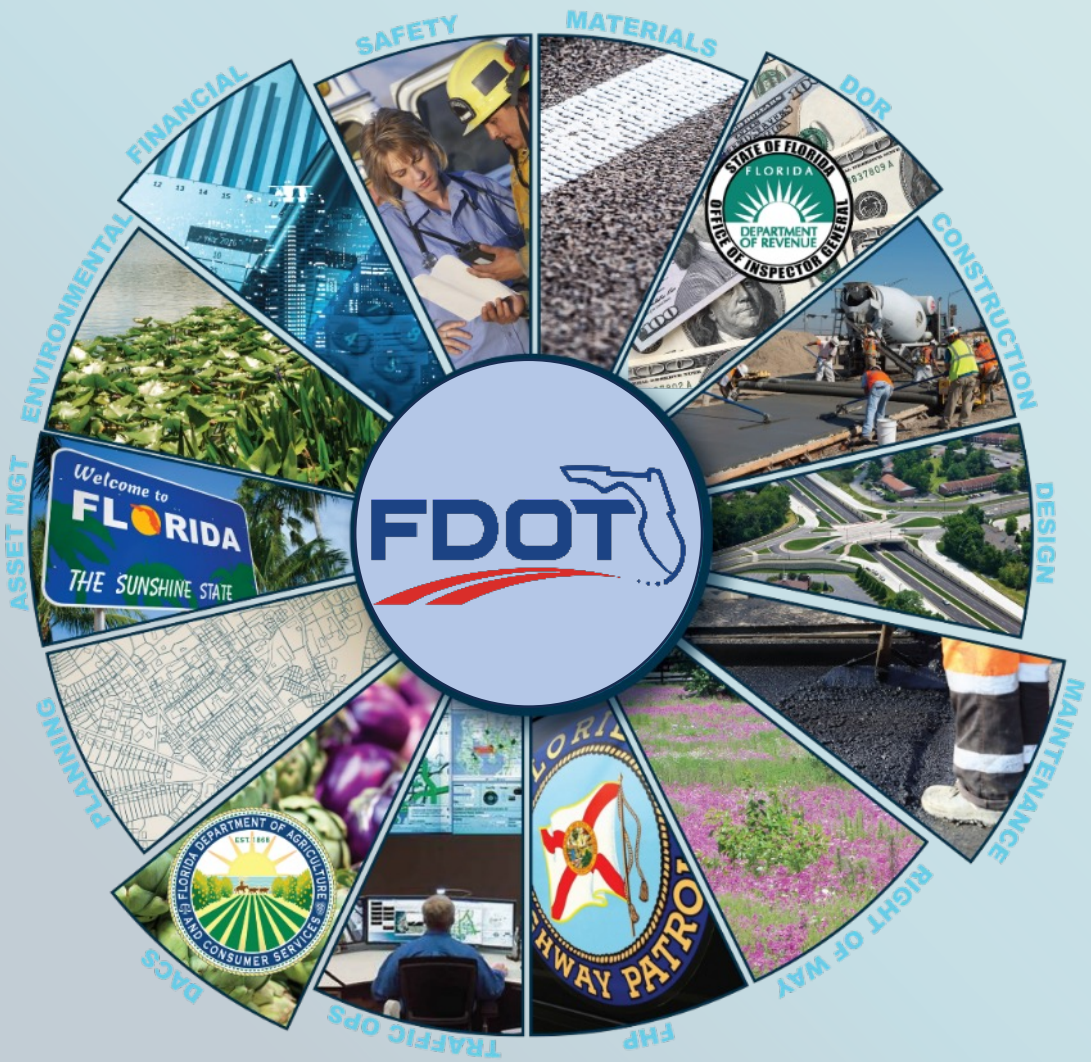
Tire Pressure Anomaly System; Upper section shows raw data, and lower section shows post processing, identifying a suspect underinflated tire.



Virtual Dimensioner; Upper section shows the SICK Lasers mounted on mast arm on the weigh station entrance ramp and lower section shows processed data images.

24-HR Snapshot of FOX Data: upper section provides overview gross weight by classification and the lower portion shows gross weight by number of axles.

Freight Operations eXchange (FOX)



FOX: FDOT USES

- **DESIGN** Geometry Layout (OS/OW load considerations); Pavement Design; and Managed Lanes
- **FREIGHT** Truck Parking, Corridor Designation
- **PLANNING** Modeling and Policy
- **PORTS** FRATIS; Efficiency for Global Trade
- **TRAFFIC OPS** Active Freight Management; Ramp Metering; Freight Signal; Curb Management; Traffic Incident Management; and Commodity Flow/Inspection

The Approach

FDOT MODAL TECHNOLOGY APPLICATIONS includes the following implementation approach to strategically meet the critical demand for additional truck parking spaces


THANK
YOU

David Cooke

Florida Department of Transportation

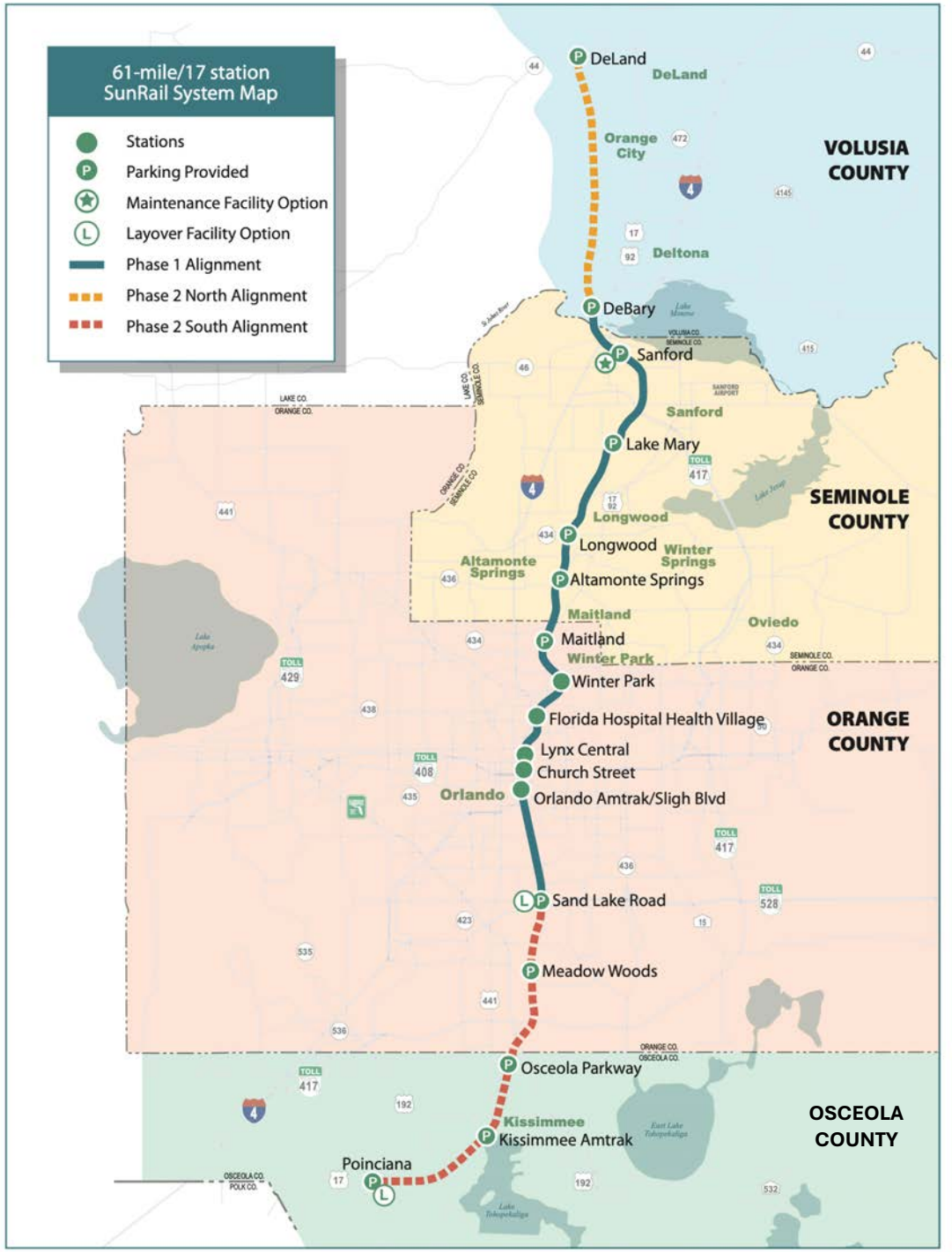
2024 FAV SUMMIT

SunRail

SUNRAIL CORRIDOR

CFRC: 61-mile corridor that hosts SunRail commuter service

- 31.8-mile Initial Operating Segment, 12 stations
  DeBary to Sand Lake Rd – 2014
- 17.2-mile Southern Extension, 4 stations
  Sand Lake Rd to Poinciana – 2018
- 12.2-mile Northern Extension, 1 station
  DeBary to DeLand – 2024



RAIL TRAFFIC ON THE CFRC

- **40 SunRail trains/day** operate through the limits of the CFRC
- **CSX, Amtrak, and FCEN** operate daily as tenant railroads on the CFRC

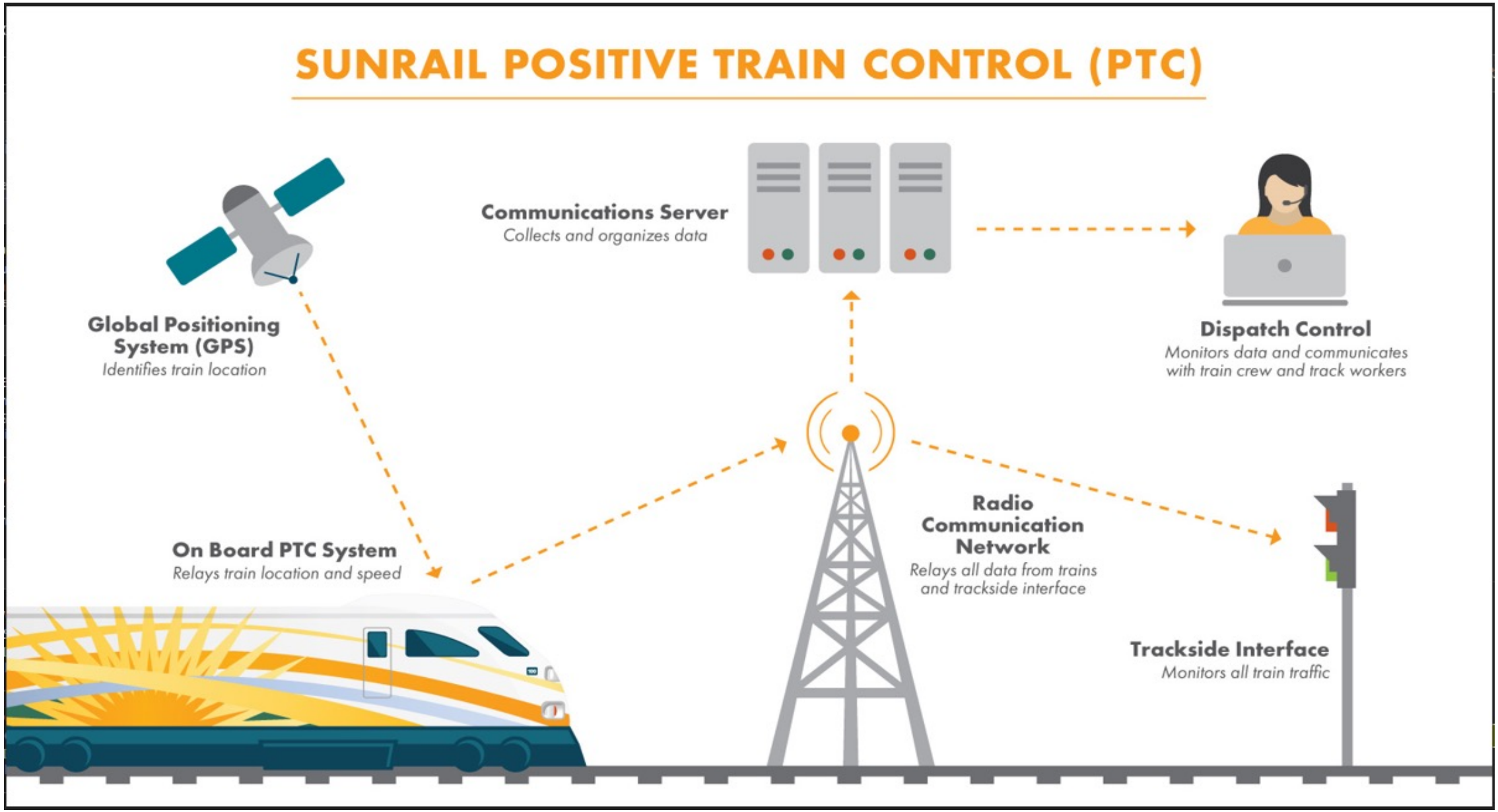
Intelligent Transportation System – Fiber Optic Cable

- 61-mile corridor
- 96-strand Fiber backbone
- Two datacenter master hubs
- 17 stations passenger information systems (PA/VMS, CCTV, FCS, PAT)
- Laterals for central train control signals, PTC, radio base station
- Geographic redundancy afforded by FDOT-D5 ITS
- At-grade crossings share approaching train detection to adjacent crossings using fiber

Positive Train Control - PTC

- Safety System Overlay
- Stops an overspeed train; prevents running through a misaligned switch
- Uses precision GPS for vehicle (train) location
- 220 Mhz radio communication between train and wayside signal system
- Applications live in three realms with the communications between them
  - Back Office Server
  - Onboard
  - Wayside

Positive Train Control - PTC



Wi-Tronix

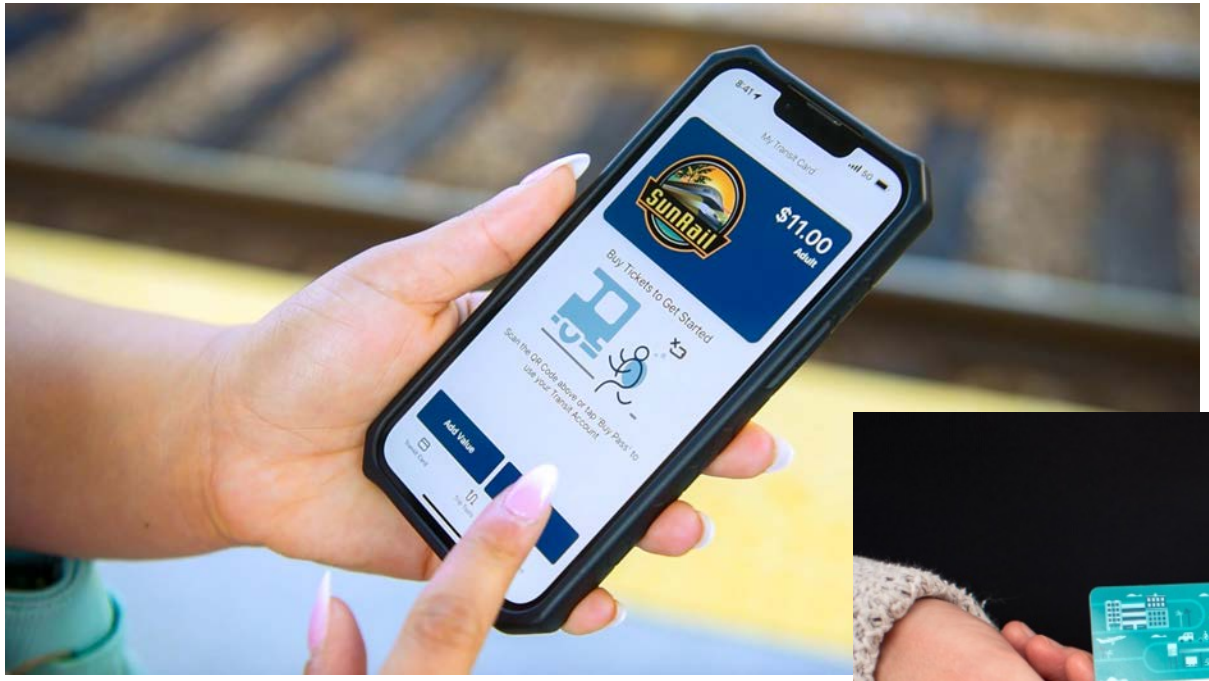
- Rolling stock fleet management and monitoring on-board appliance
  - Vehicle location (GPS)
  - Vehicle telemetry & engine diagnostics
  - Fuel level monitoring

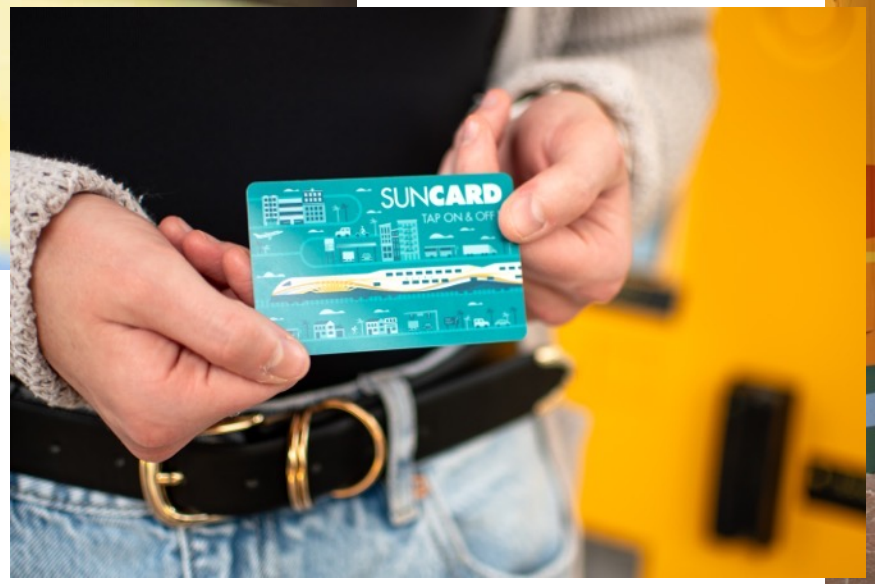
  - Federal regulatory compliance
    - Mobile phone use detection
    - Event recorder (black box)
    - Camera recorder

  - Passenger information integration & station arrival times

SUNRAIL'S ADVANCED TICKETING SYSTEM

Fast, Flexible, and Budget-Friendly



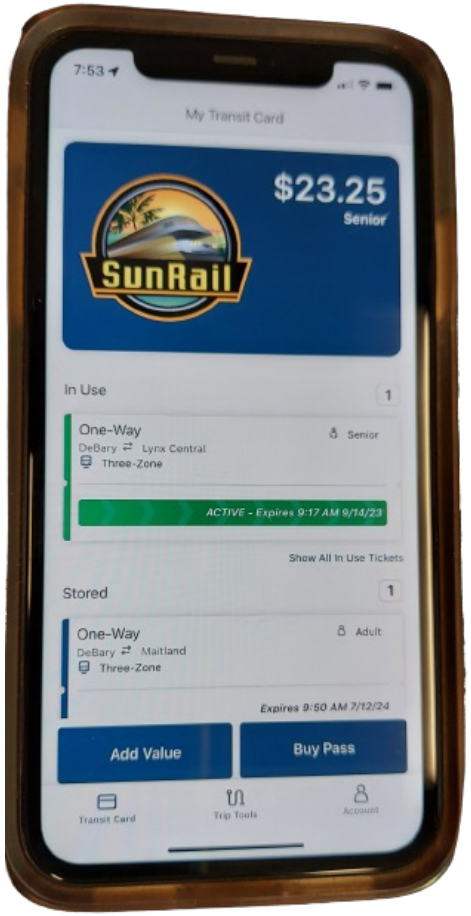


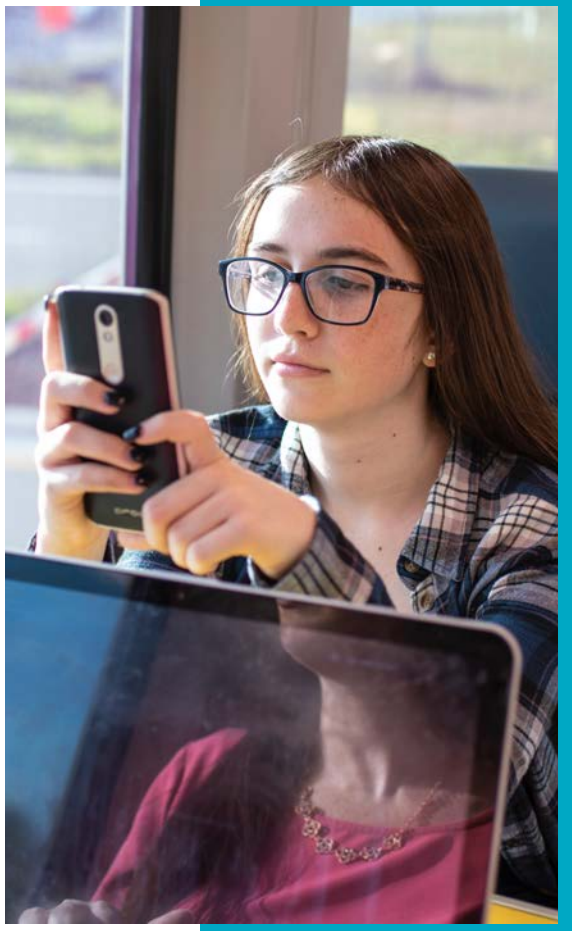
SUNRAIL'S ADVANCED TICKETING SYSTEM

Fast, Flexible, and Budget-Friendly

Mobile Ticketing

- Compatible with Apple and Android Smart Phones
- Saves time by allowing users to purchase train tickets in advance
- Easy to manage rider SunCard Accounts
- Greatly reduces the need and expense of printing single-day tickets and SunCards





SUNRAIL'S ADVANCED TICKETING SYSTEM

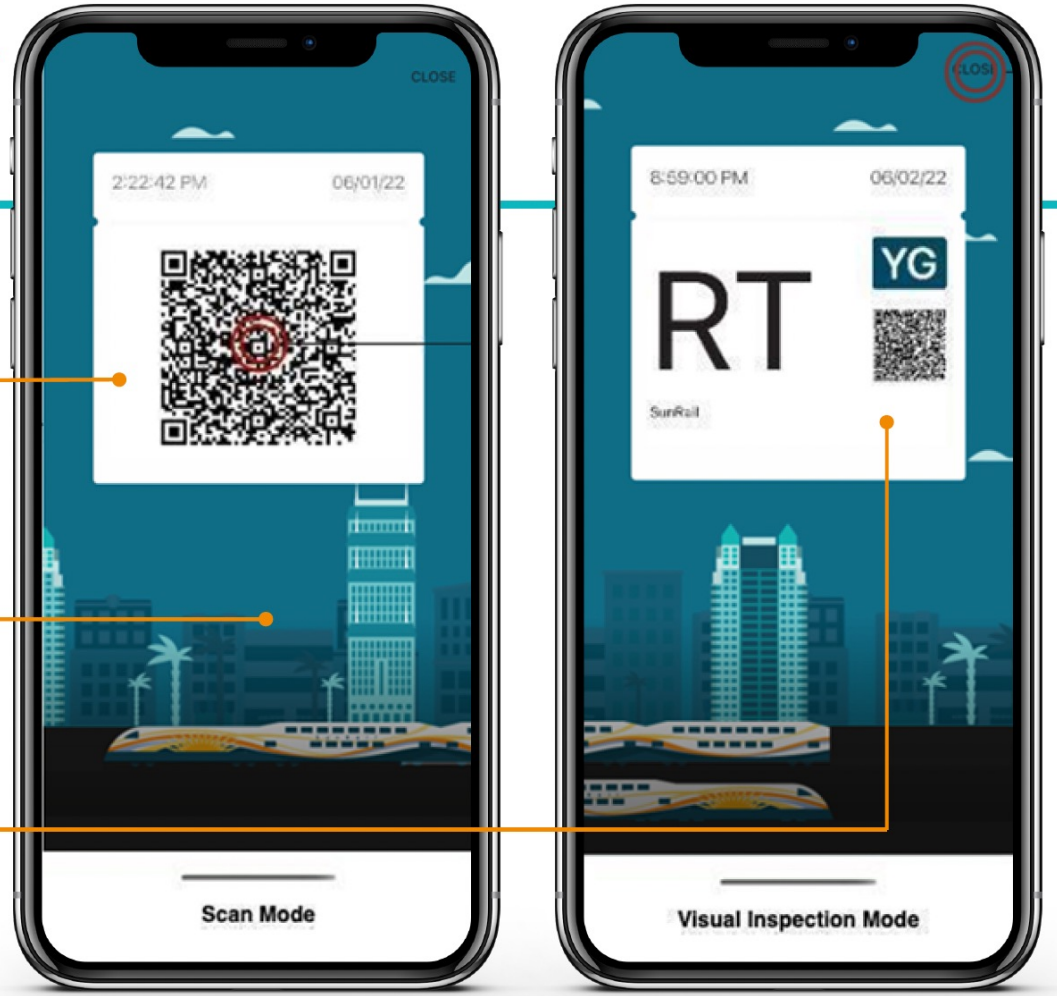
Fast, Flexible, and Budget-Friendly

MOBILE TICKETING CUSTOM SCREEN DEVELOPMENT

QR Code generation for Ticket Purchase and Validation

Animated Central Florida Custom Cityscape Background

Ticket Validation for Conductor Inspection



DELAND GRAND OPENING CELEBRATION!

The DeLand Station had its grand opening celebration on Friday, August 9. Over 400 people came out to support SunRail and the DeLand community.

- There was an inaugural train ride from DeBary Station to and from event
- Completing the vision

Brett Fay

Tampa International Airport

Florida Automated Vehicle Summit

Advanced Air Mobility Airport Planning Perspective

Tampa International Airport

TAMPA INTERNATIONAL AIRPORT

4 Airsides / 58 Gates

Annual Passengers

25,207,407

(Projected for FY24)

Daily Average **69,061**

Highest Traffic Month

March

2,329,120

Lowest Traffic Month

September

1,695,306

66

Shops and Restaurants

23,000

Approx. Parking Spaces

328,351,866

Pounds of Cargo and Mail

Calendar Year 2023

3 General Aviation Airports

Peter O. Knight, Plant City, Tampa Executive

Safe and Efficient Integration

- Protect the utility of the airports
  - Ensure the safe and efficient operation of the airport (FAA mandate)

Master Planning

- Updated every 5-10 years
- To identify future needs and development opportunities over a 20-year horizon
- AAM Master Plan Considerations
  - Site selection
  - Airspace and operations
  - Infrastructure and utilities
  - Community/stakeholder engagement

Advanced Aviation Technology Committee

General Aviation

Real Estate

Government Relations

Planning and Development

Operations

Legal

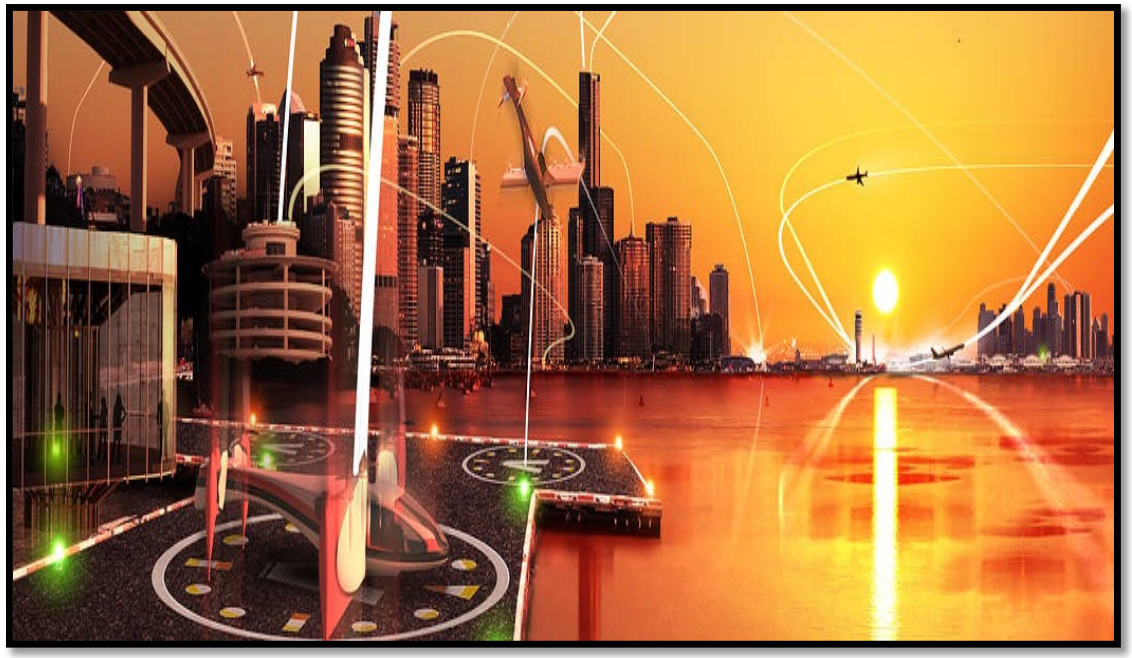
Maintenance

ARFF

Airport Considerations

Key Takeaways

- Infrastructure Requirements
  - Preference for agnostic facilities
- Vertiport Site Location
  - Challenges locating between parallel runways
- Integration with Airport
  - Vertiport access and terminal connectivity



TPA Primary Use Cases

Passenger Transport

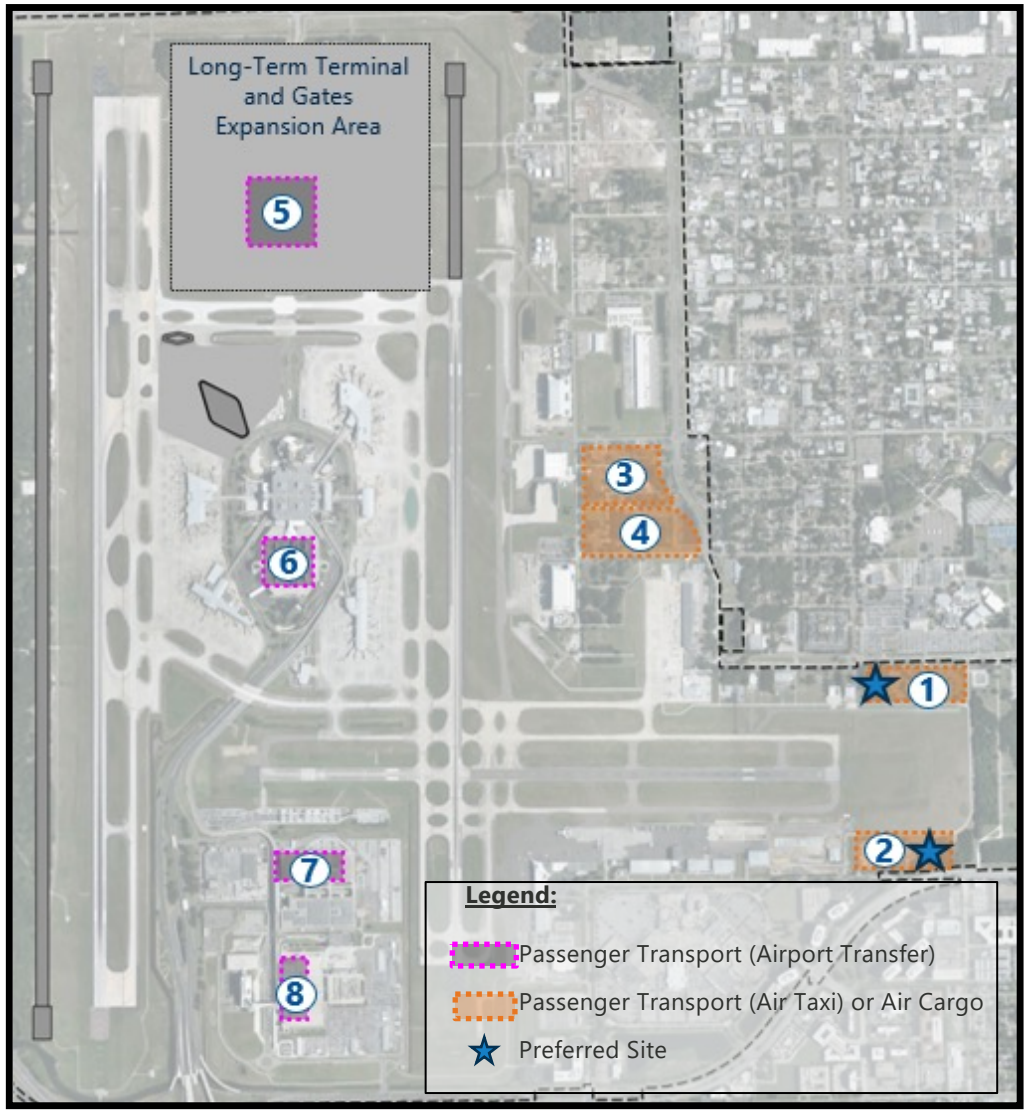
- Airport Transfer: Scheduled passenger service between the airport and several vertiports distributed within the West Central Florida region
- Air Taxi: On-demand service between an on-airport vertiport and other vertiports within the Tampa urban area and/or Florida

Cargo Transfer

- Mid-Range Transfer: Delivery of packages between on-airport cargo facilities and distribution warehouses
- Last Mile Delivery: Delivery of packages from on-airport cargo facilities to designated drop-off vertiports

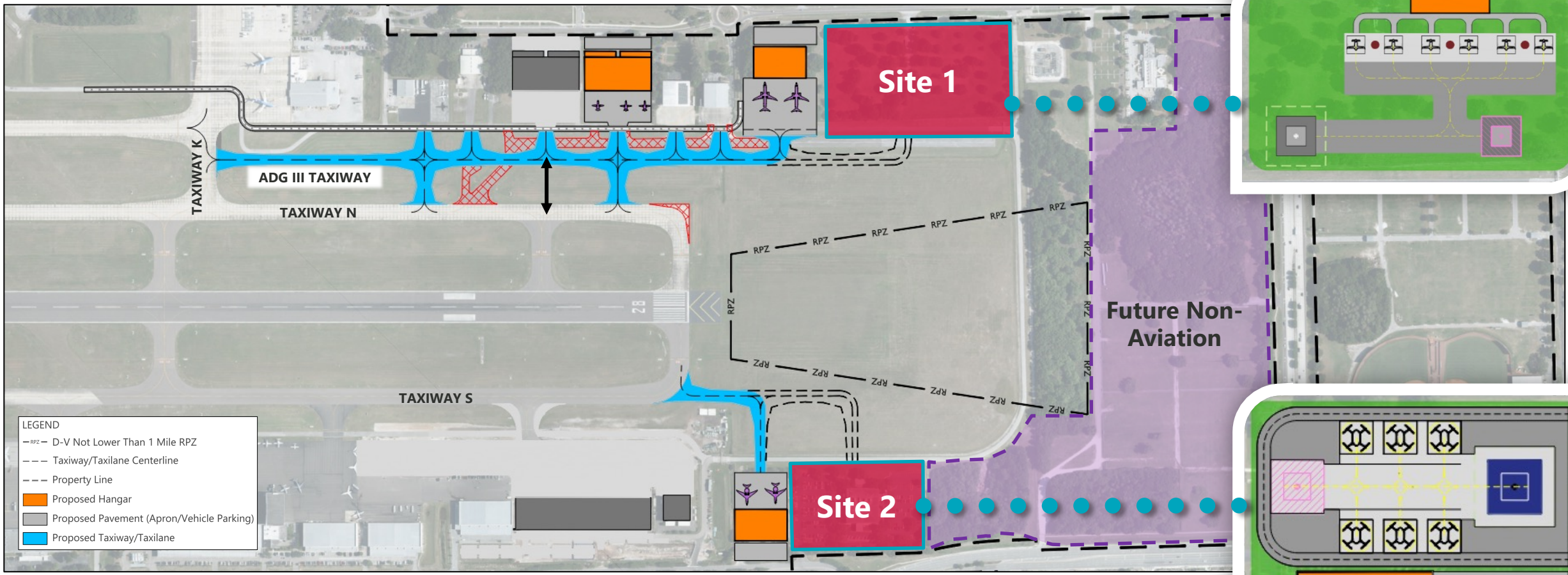
Potential AAM Sites

1. Intersection of W. Tampa Bay Blvd. and Airport Service Road ✓
2. Intersection of Jim Walter Blvd. and W. Columbus Dr. ✓
3. South of W. Dr. Martin Luther King Jr. Blvd. ✗
4. North of Ohio Avenue ✗
5. North Terminal Parking Garage ✗
6. Long-Term Parking Garage ✗
7. Economy Parking Garage ✗
8. Rental Car Center ✗



2022 Tampa International Airport Master Plan Update (MPU)

Preferred Advanced Air Mobility Sites



Florida's First Flight

- First manned eVTOL flight in the state
- Local, national, and international news coverage
- Manufacturing and workforce development
  - Tampa Bay EDC

Florida’s First Flight

Patrick Blair

Port Tampa Bay

PORT TAMPA BAY™

REROUTE YOUR THINKING®

Advancements in Technology









THE SILK ROAD

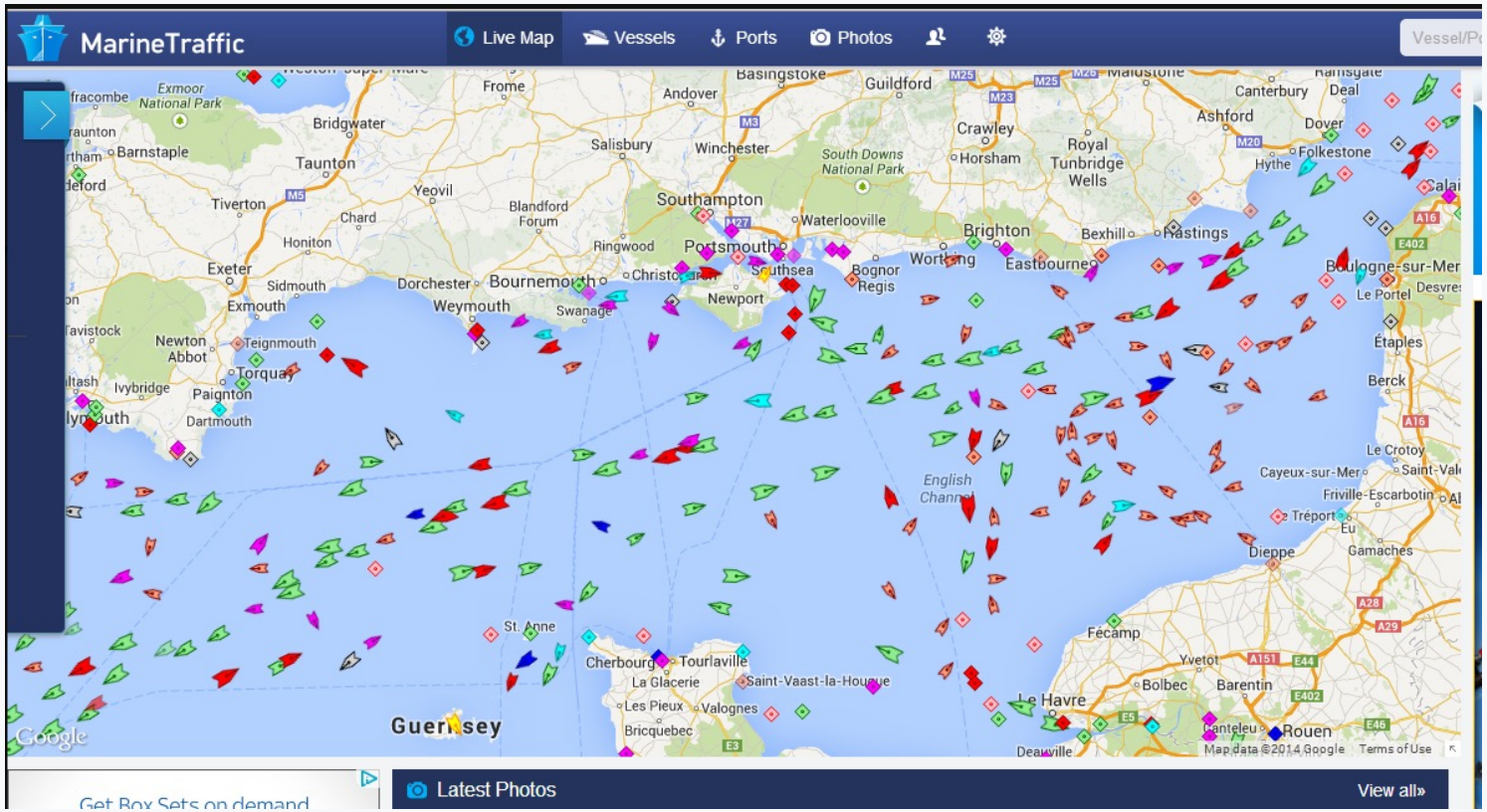
The history of silk route goes back to 15th century when the Chinese first constructed the Silk Road. It is 4500 miles long road, running across China all the way to India and Sri Lanka.

THE MARITIME SILK ROAD

However, the maritime trade routes are believed to have come into existence 3,000 BC. It is essentially a marine trade route between China and South Asia, West Asia, Europe and North Africa, which dealt with transportation of silk.

Advancements in Navigation

- Nautical charts and sailing directions were used since at least the 6th century BC.
- LORAN, radio navigation system developed in the United States during World War II. It had a range up to 1,500 miles (2,400 km) with an accuracy of tens of miles.
- Automatic identification system (AIS) was not invented until the 1990's. Satellite based system, with exact location, speed, depth and more



Maritime Autonomous Surface Ships - MASS

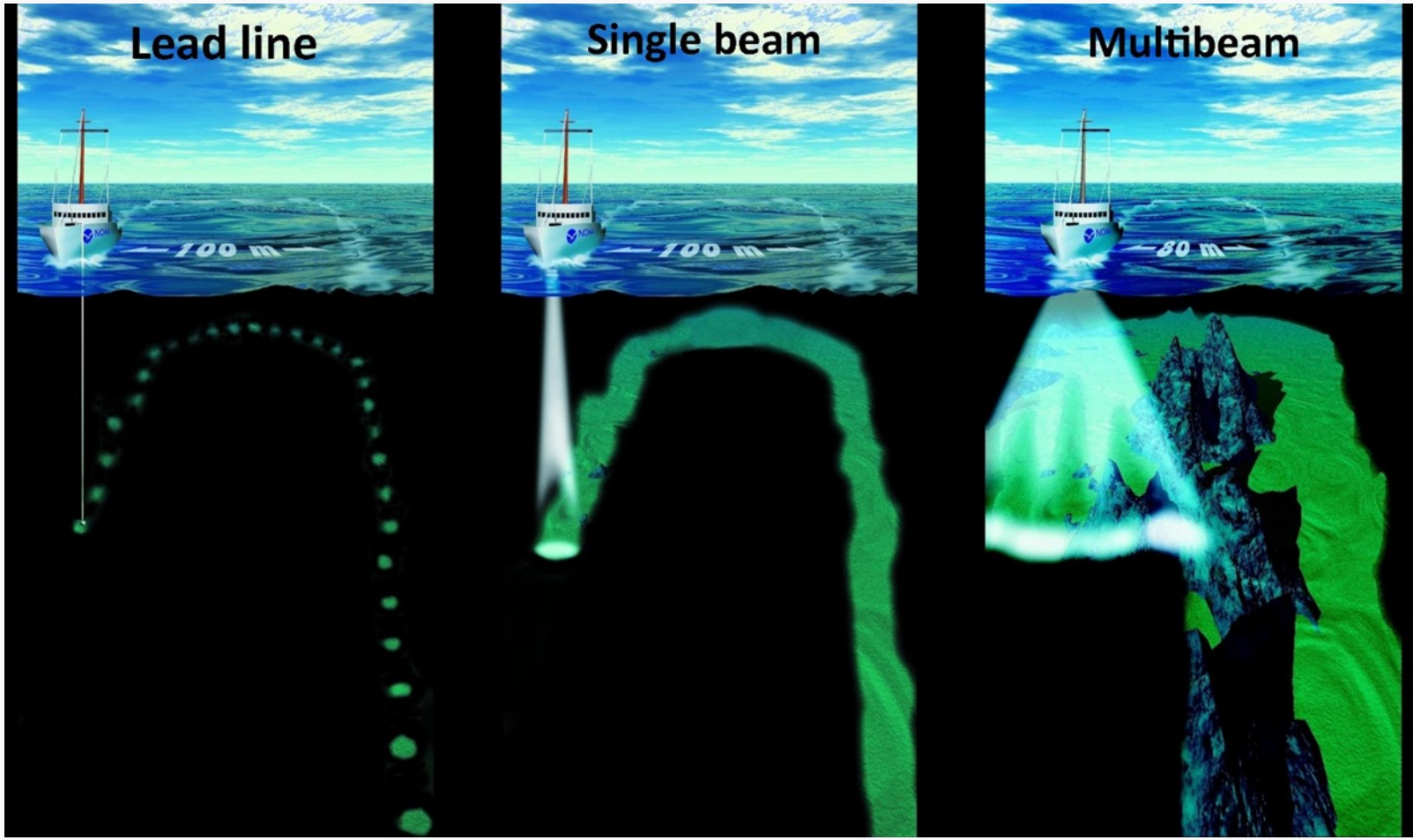
- The Maritime Safety Committee (MSC) 101st session in June 2019 approved Interim guidelines for Maritime Autonomous Surface Ships (MASS) trials. (MSC.1-Circ.1604).

- Degree one: Ship with automated processes and decision support. Seafarers are on board to operate and control shipboard systems and functions.
- Degree two: Remotely controlled ship with seafarers on board.
- Degree three: Remotely controlled ship without seafarers on board: The ship is controlled and operated from another location. There are no seafarers on board.
- Degree four: Fully autonomous ship: The operating system of the ship is able to make decisions and determine actions by itself.

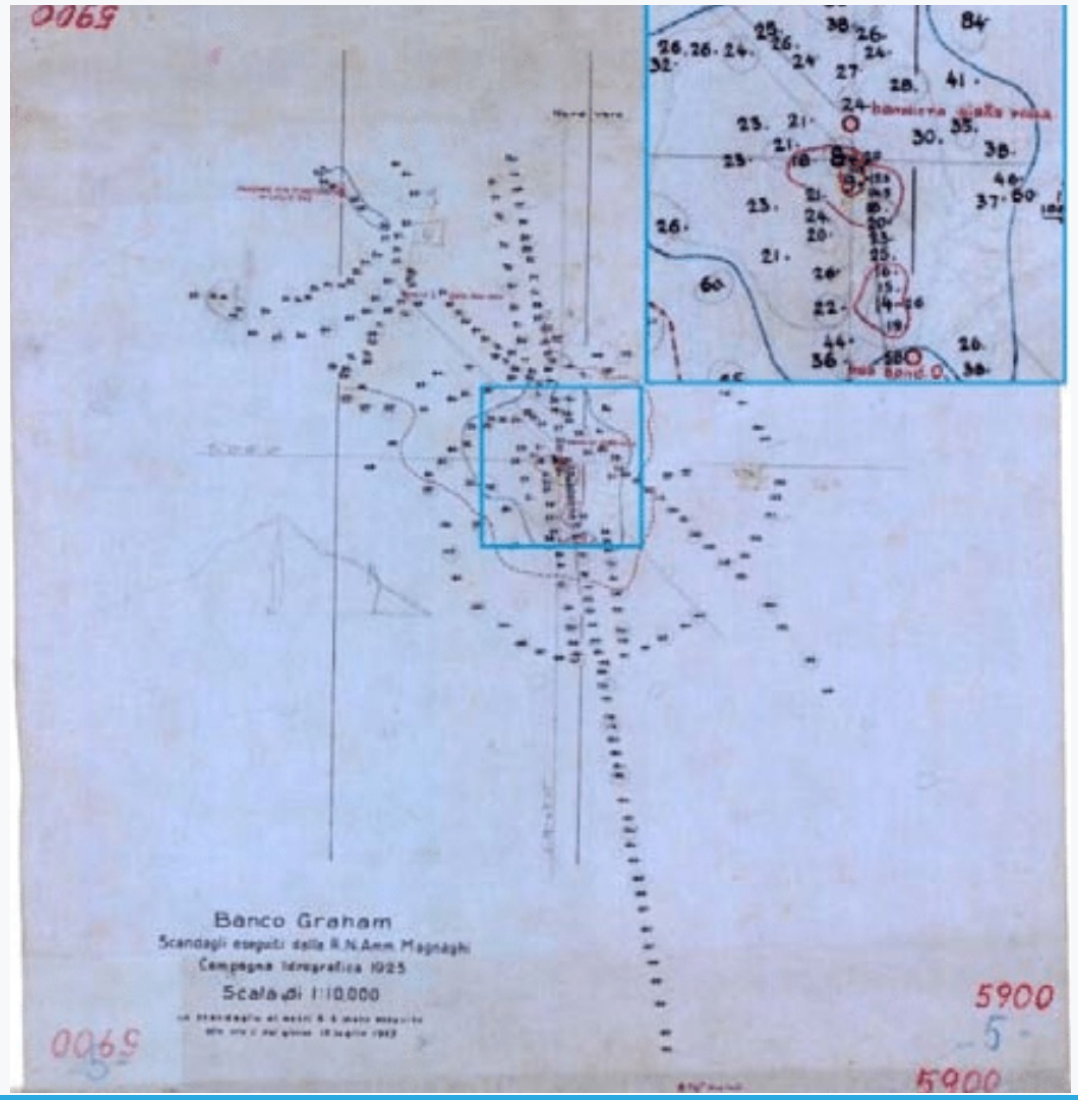
- MV Yara Birkeland is an autonomous 120 TEU container ship carrying fertilizer between ports in Norway.
- The Yara Birkeland was designed to serve as a proof of concept for a fully autonomous ship

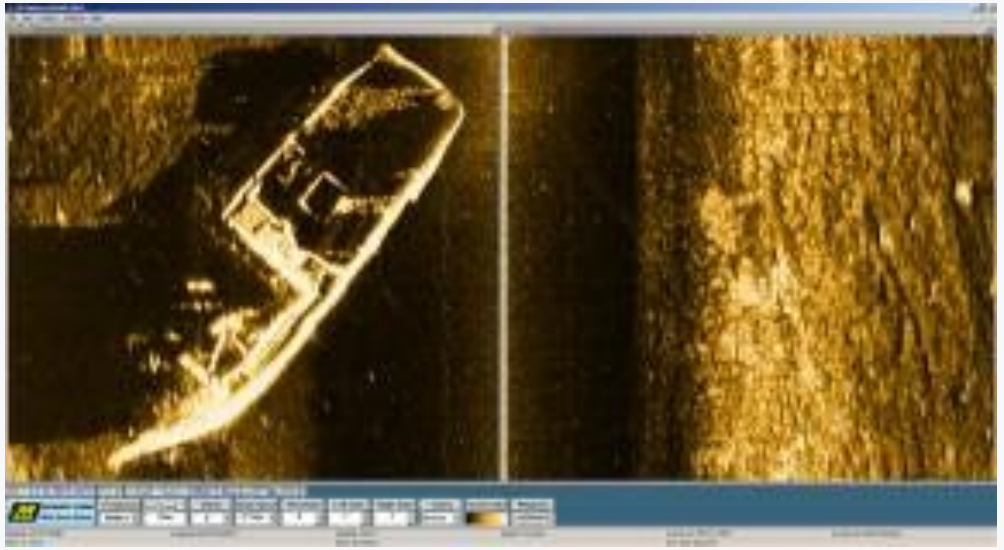
Surveying - Bathymetry

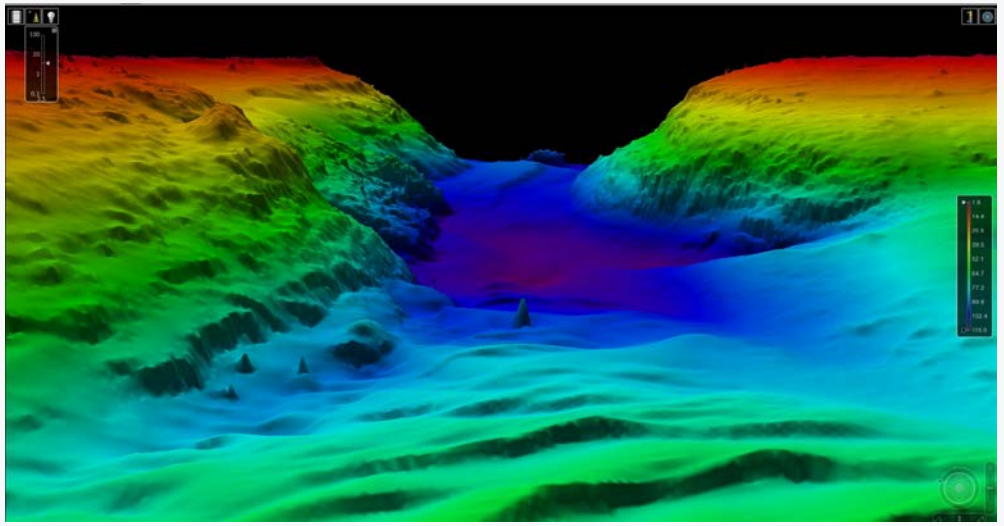
- 2000 B.C. to 1930s: lead line
- 1918 to 1990s: single beam echo sounder
- 1964 to current day: multibeam echo sounder



Advancement in Survey Equipment





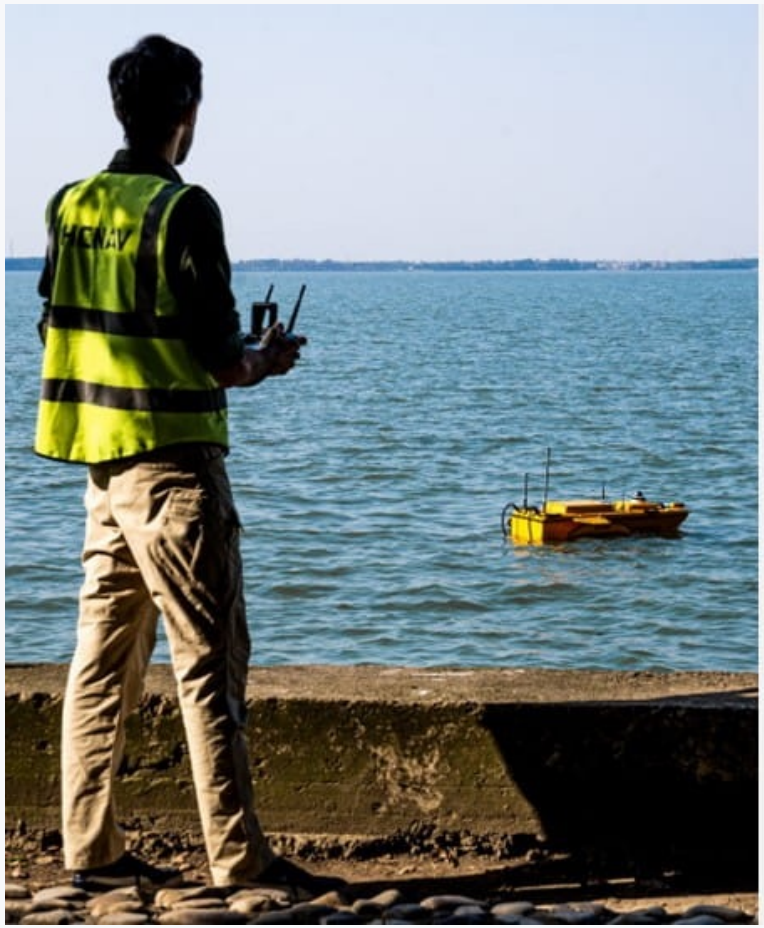


PTB – Survey Equipment

- Muti Beam Hydro Boat
- (2) Side Scan Sonars “Toe Fish”
- Single Beam Low Draft Boat

Tampa Port Authority surveyors prepare to lower their multibeam echo sounder into the water.

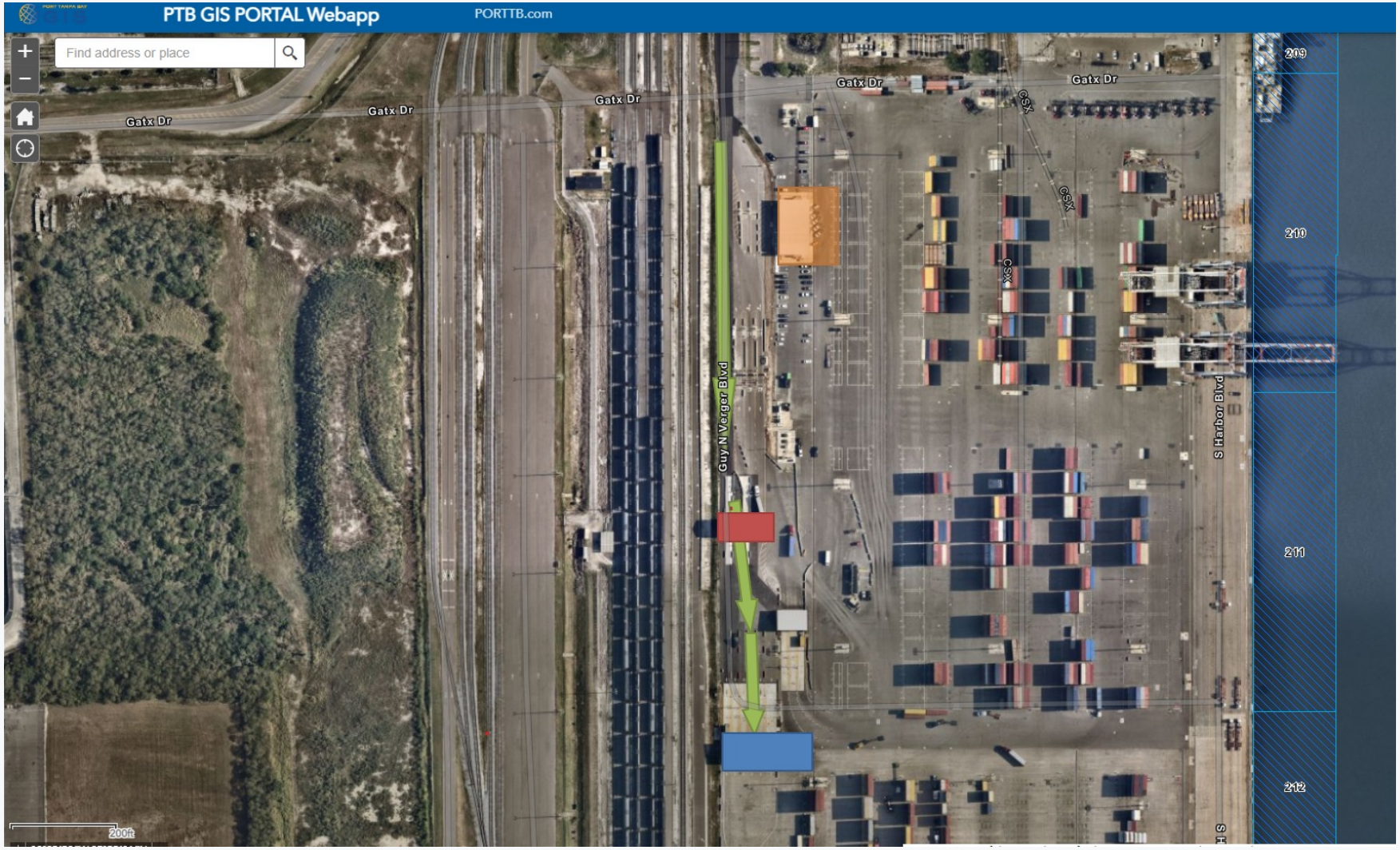
Remote and Autonomous Bathometric Survey Equipment



Operational Advancements with Technology

Container Gate Complex Project with OCR technology - $9 Million

(OCR) Optical Character Recognition



PTB- Container Yard Buildout

90 Acres – Upland
(3) 1,300 Deepwater Berths

Top Pick Vs RTG

Decarbonization in Maritime Industry

- IMO – UN agency responsible for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships.
- Creates regulatory framework for the shipping industry
    - Fair, effective, universally adopted and implemented.
    - Came into existence in 1948 as nations recognized the need for a consistent regulatory framework. Particularly as the oil industry grew.
- International shipping transports more than 80 percent of global trade to peoples and communities all over the world. Efficient and cost-effective method of international transportation for most goods; it provides a dependable, low-cost means of transporting goods globally, facilitating commerce and helping to create prosperity among nations and peoples.

Decarbonization in Maritime Industry

IMO goal: achieve net-zero GHG emissions by or around 2050.

- 2030: Reduce GHG emissions MIN: 20% compared to 2008 levels, with a goal of 30%. Target of using at least 5% zero or near-zero GHG emission technologies, fuels, and/or energy sources .
- 2040: Reduce GHG emissions MIN: 70% with a goal of 80%.
- IMO plans to implement regulatory measures that will be adopted in 2025, effective in mid-2027.
    - How do we get there?

Decarbonization and Electrification

There has been push to convert maritime vessels such as container and cruise ships to Ship to Shore Power to reduce emissions from burning fossil fuels when at dock for over 20 years.

The term “Cold Ironing” dates to when ships burnt coal for power, and would shut down at dock, and the iron furnaces would get cold.

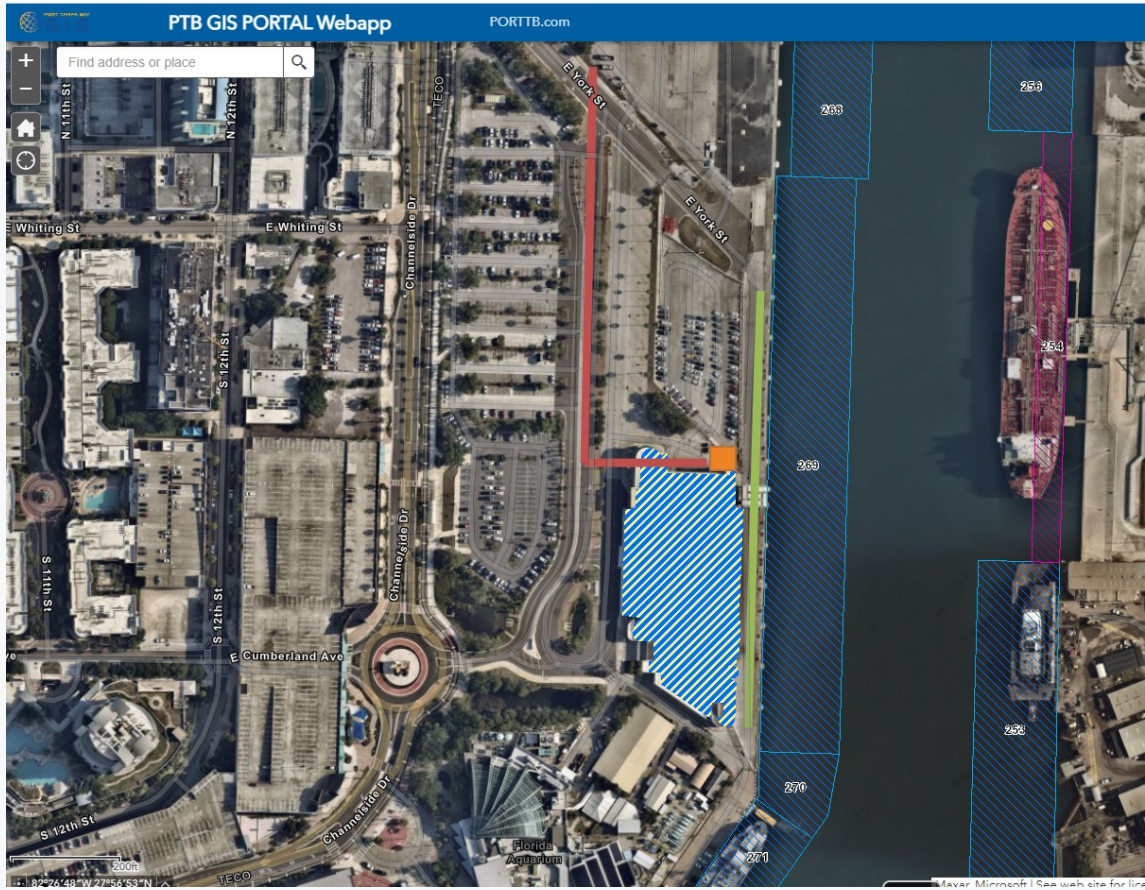
Port Tampa Bay – Cruise Terminal 3 Ship to Shore Project - $12 Million

Each terminal requires a dedicated 13.2 KV circuit due to the high electrical demand.

Significant Electrical Gear System

Underground Trenching and vault system

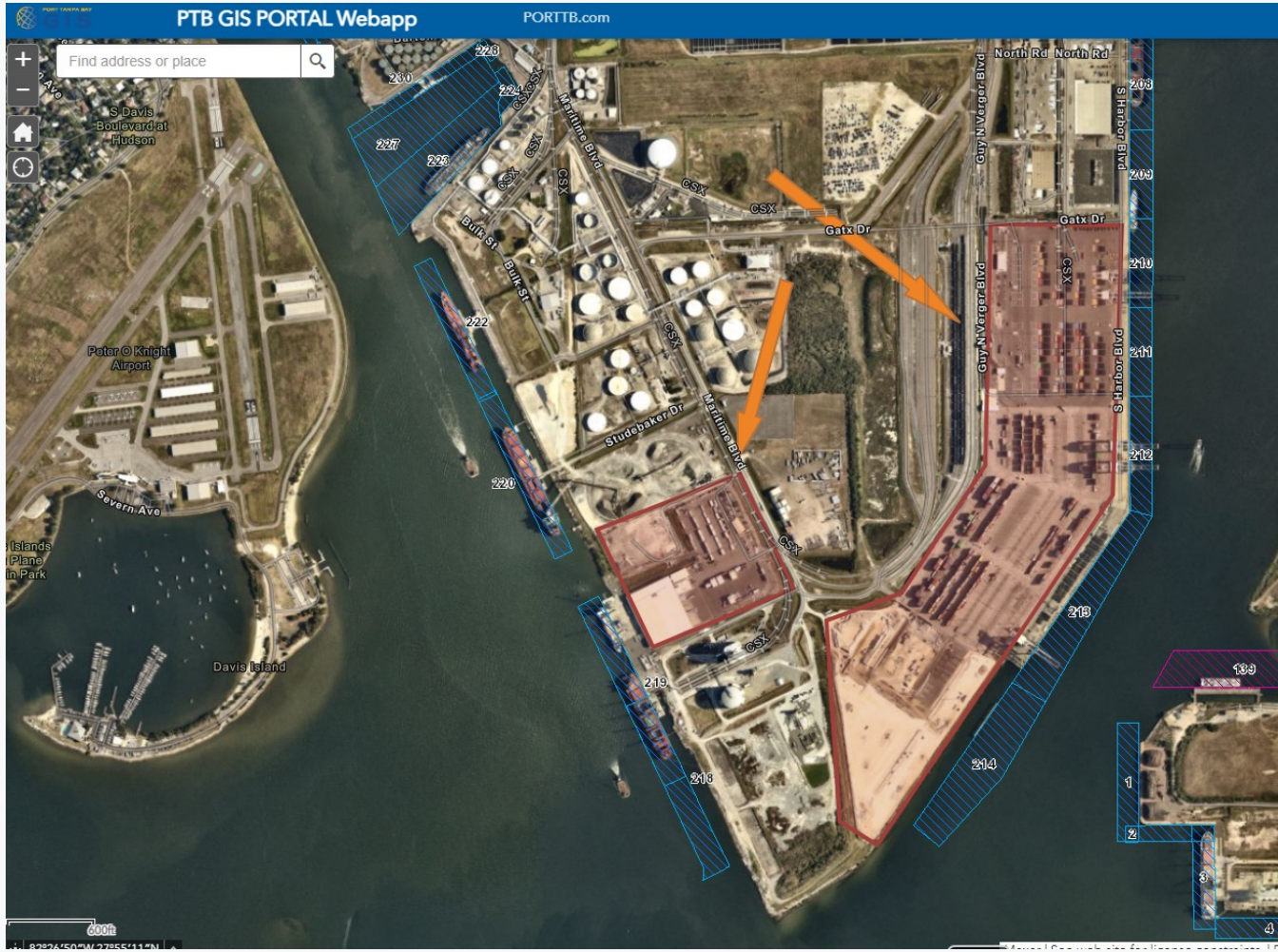
Mobile Cable Management System



Convert Deisel Equipment to Electrical- $32 Million

PTB working with two tenants, Ports America and PLRS to convert Diesel Equipment to Electrical.

Project includes 23 pieces of container handling equipment, 10 electrical trucks and two mobile harbor cranes



PORT TAMPA BAY™

REROUTE YOUR THINKING®

THANK YOU!

Melissa Smith
Chief of Modal Development
Florida Department of Transportation