EMERGING TECHNOLOGY IN AVIATION

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HNTB

FDOT

MIA
MIAMI INTERNATIONAL AIRPORT

Tampa International Airport

EMERGING

TECHNOLOGIES

TOPICS

HYPERSONIC COMMERCIAL TRAVEL

Alternative Aviation Fuels

OPERATION OF AUTONOMOUS FLIGHTS

EXPANSE OF AAM MARKET

HYPERSONIC COMMERCIAL TRAVEL

- Travel 5X the speed of sound
- New York to London in 90 minutes
- Unmanned travel within 3 years
- 1st commercial flight in 10 years

FDOT

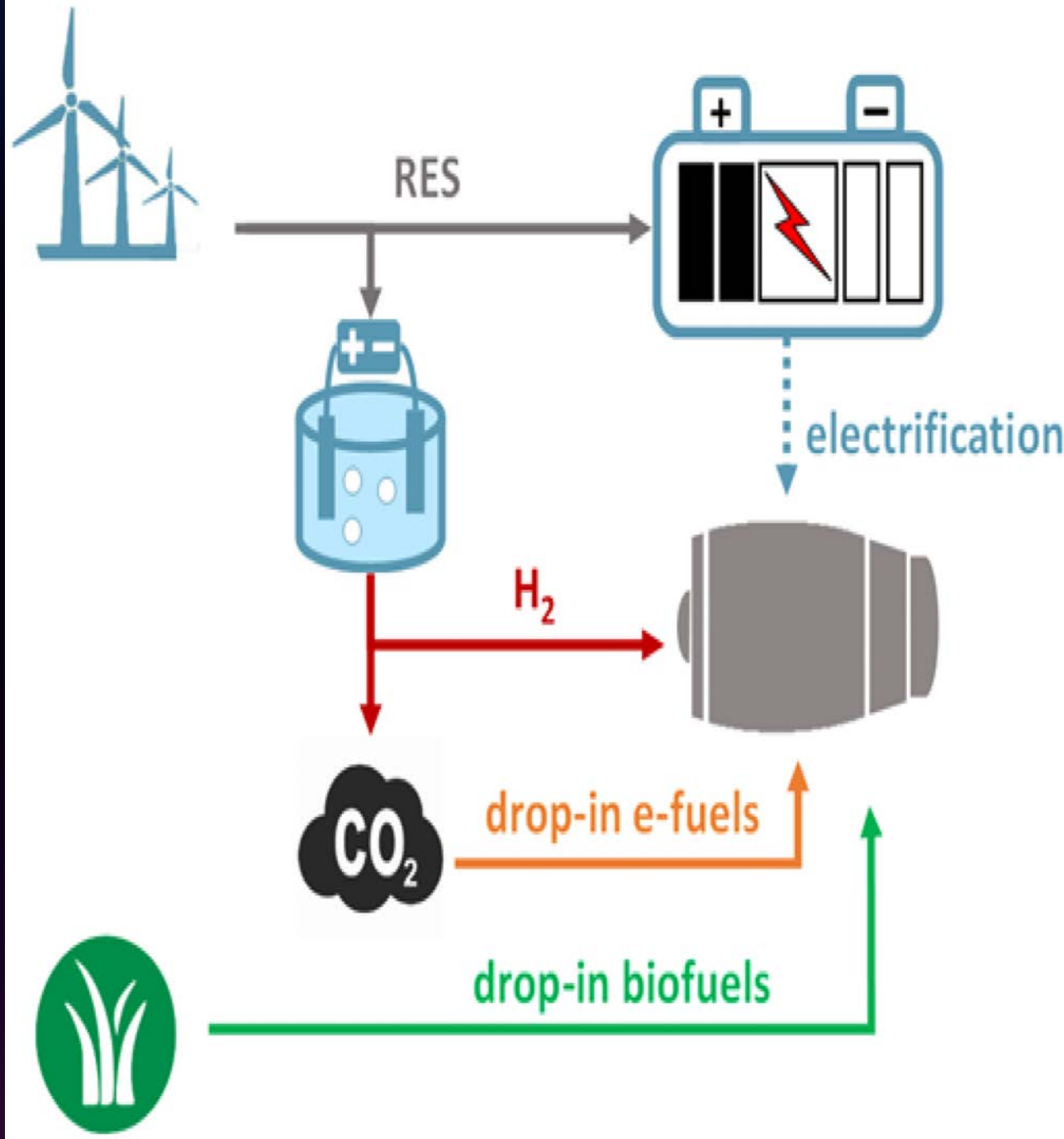
- How will we help develop transportation?
- Fuel production and delivery (hydrogen).
- What are the expected modification of airport layout.
- New terminal and MRO facilities.

ALTERNATIVE AVIATION FUELS

- Sustainable Aviation Fuels (SAFs)
- Biofuels
- Alcohol-to-Jet (AtJ)
- Electrofuels (e-Fuels)
- Hydrogen
- Electrification (Hybrid or Full-Electric Aircraft)

FDOT

- Identify demand
- Support fueling infrastructure
- Support development and modification of airport terminal and airport layout.



OPERATION OF AUTONOMOUS FLIGHTS

- Long haul – reduced crew operations
- High Altitude extended operation
- Autonomous cargo aircraft
- UAM and thin haul operations for passengers and cargo

FDOT

- Infrastructure – charging, vertiports, etc.
- Manufacturing and supply chain network for high-scale operations
- Modified/expanded approach pads and airports.

EXPANSE OF AAM MARKET

- Airport shuttles
- Air taxis (on demand)
- Emergency services
- Regional Air Mobility
- Point-to-point travel

AAM DEMAND INCREASES

- Distance must be long enough to provide sufficient travel time savings over surface modes.
- Cost efficiency must meet demand and willingness to pay per mile.
- Safety and noise concerns will both have to be mitigated.

THANK YOU

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MDAD AAM Planning Update
Florida Automated Vehicles Summit
September 6, 2024

PHASE 2 STUDY EFFORTS

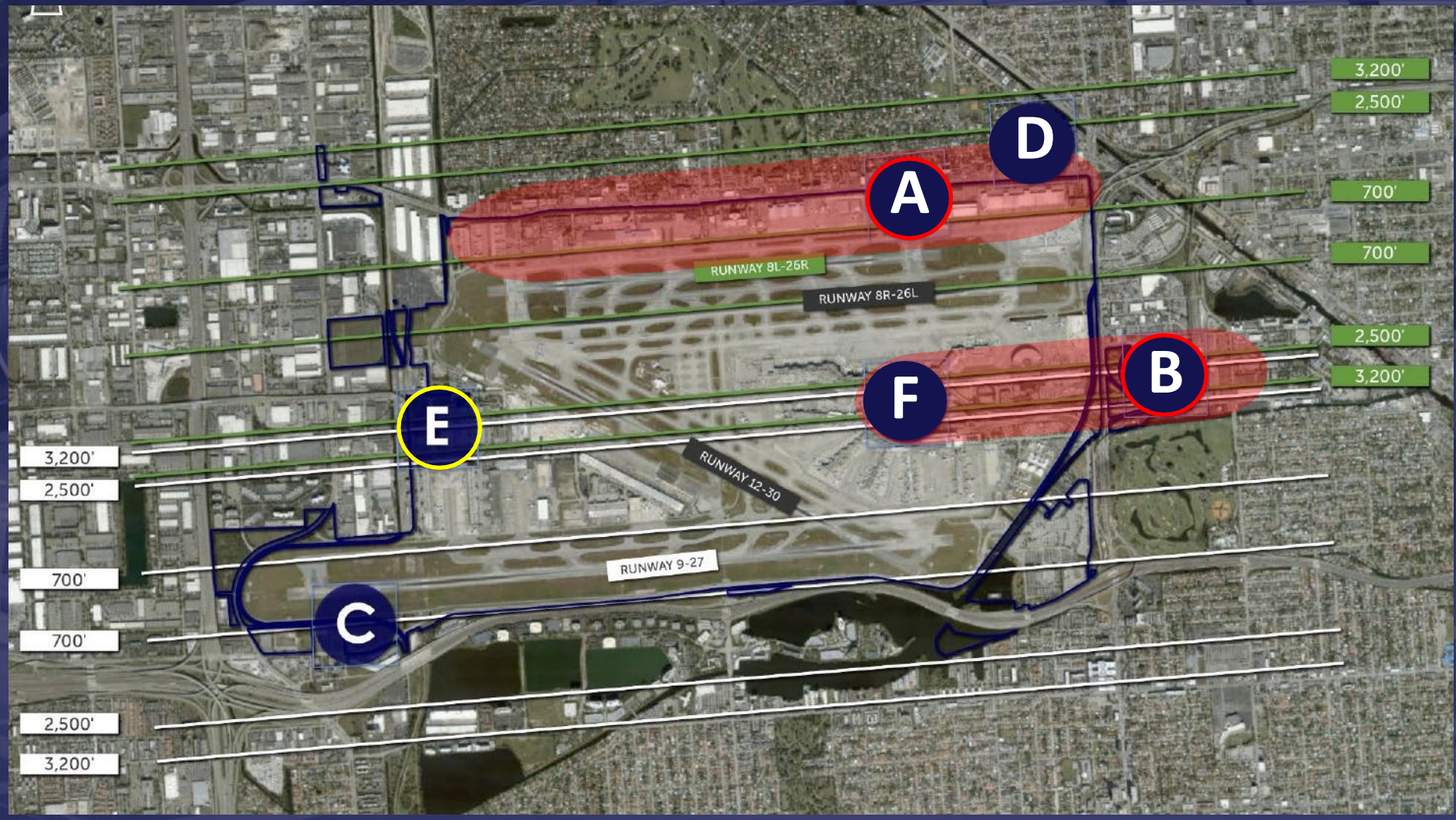
- **MDAD has moved into Phase 2 of its AAM Planning efforts.**
  - MIA Vertiport Site Development Plan
    - Developing site layouts for the two preferred vertiport locations identified in Phase 1.
  - MDAD General Aviation Airports Site Selection
    - Exploring opportunities, business cases, and potential locations for vertiports at OPF, TMB, X51, and TNT.

Vertiport Separation Distances

A vertiport at MIA would ideally be separated from the runways by 3,200 feet to allow for dual simultaneous instrument straight-in approaches.

Because of the light weight of the eVTOL and the heavy weight of the larger legacy aircraft, a separation distance of 2,500 feet should allow simultaneous VFR without extra time separation to accommodate wake turbulences.

The minimum distance a vertiport can be separated from a runway with heavy aircraft operations is 700 feet in distance but this may result in the need for time separations between aircraft landings on the vertiport and runway (as required by FAA JO 7110.126B) depending on the circumstances.



MIA Vertiport Site Development Plan

- **Preferred Site A – MIA Northside**
  - North of runways adjacent to NW 36th St.

- **Preferred Site B - MIC**
  - Above parking lots adjacent to the Miami Intermodal Center (MIC)

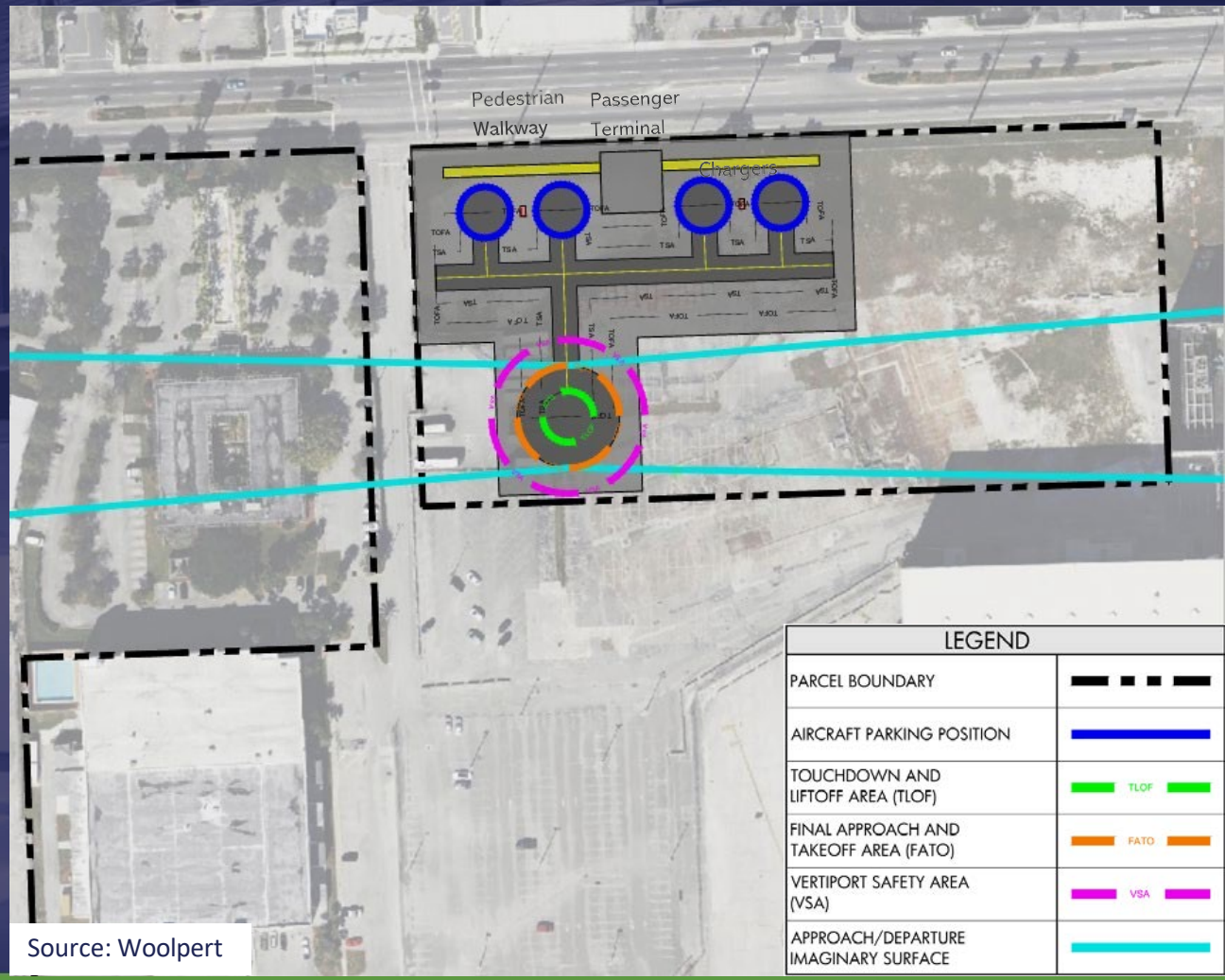
Both sites are feasible but will face operational constraints that limit the timing and number of flights.

MIA Vertiport Site Development Plan

Site A: Layout Plan - MIA Northside

- One landing pad
- Four aircraft parking stands
- Aircraft charger at each stand
- Passenger terminal
- Pedestrian walkway

There is room to add more aircraft stands, but operations will be limited by operational constraints, not the number of available stands.



Source: Woolpert

MIA Vertiport Site Development Plan

Site A: Operational Considerations

- Elevated 40’ to ensure line-of-sight to airport traffic control tower.
- Additional considerations for fire safety.
- By elevating the vertiport, clear approach and departure paths can be achieved.
- Cannot operate independently from Runways 8R/26L or 8L/26R, so operations will be limited.
- Operations under visual flight rules only.

Sample rendering of a vertiport at Site A

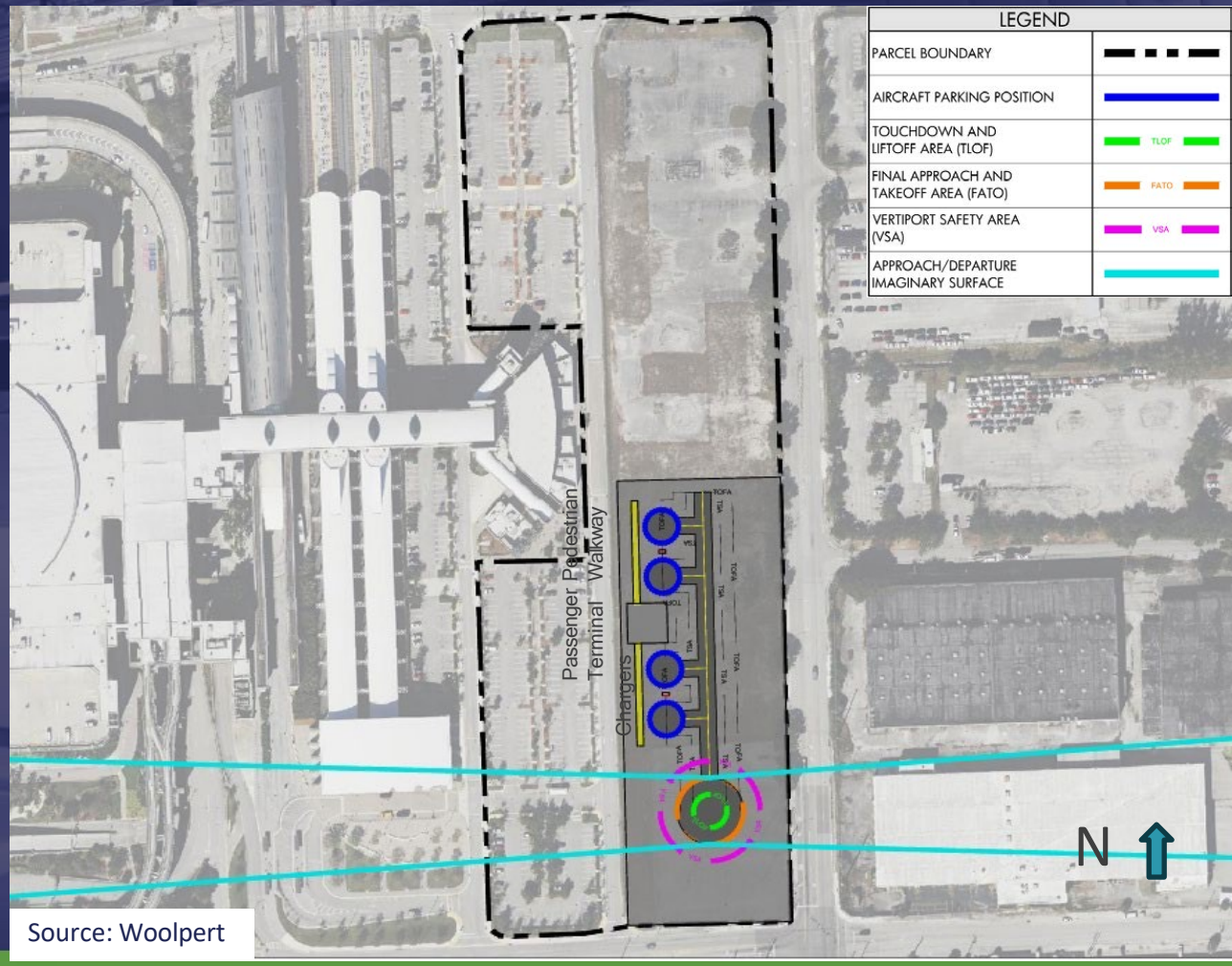
Source: Woolpert

MIA Vertiport Site Development Plan

Site B: Layout Plan - MIC

- One landing pad
- Four aircraft parking stands
- Aircraft charger at each stand
- Passenger terminal
- Pedestrian walkway

There is room to add more aircraft stands, but operations will be limited by operational constraints, not the number of available stands.



Source: Woolpert

MIA Vertiport Site Development Plan

Site B: Operational Considerations

- Elevated 40’ to ensure line-of-sight to airport traffic control tower.
- Additional considerations for fire safety.
- Clear approach and departure paths are only achieved if powerline obstructions are buried or the vertiport is elevated higher.
- Operations could occur only to the east and may encounter traffic collision avoidance system alerts with approaching aircraft.
- Vertiport operations are significantly limited.
- Operations under visual flight rules only.

Sample rendering of a vertiport at Site B (Miami Intermodal Center)

Source: Woolpert

MDAD General Aviation Airports Site Selection

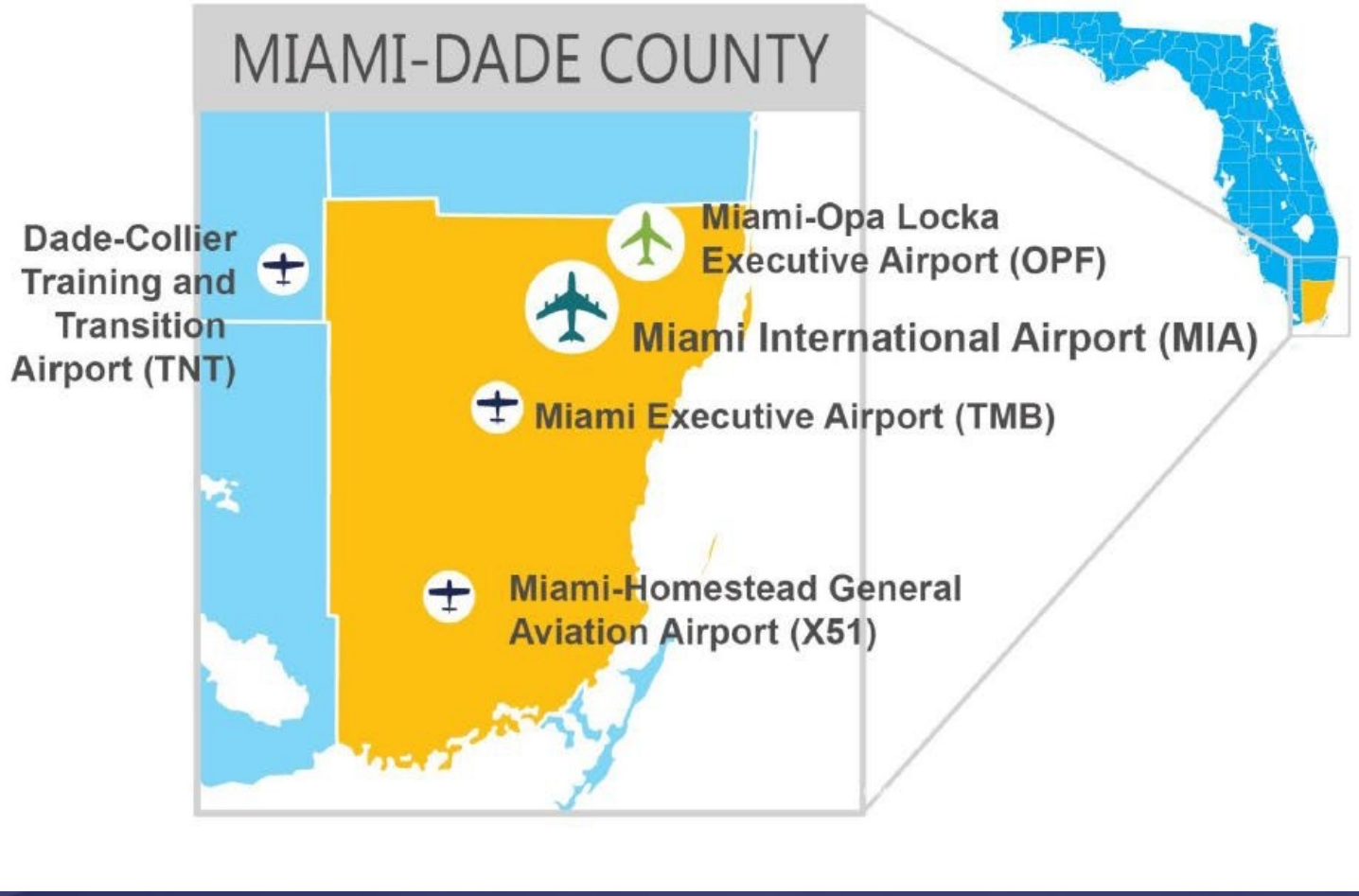
Miami International Airport
Commercial Service
MIA

Miami-Opa Locka Executive Airport
Corporate Aviation
OPF

Miami Executive Airport
Corporate and Training Aviation
TMB

Miami-Homestead General Aviation Airport
Recreational Aviation
X51

Dade-Collier Training and Transition Airport
Training Aviation
TNT



MDAD General Aviation Airports Site Selection

- **Miami Executive Airport (TMB)**
  - Numerous use cases exist for eVTOLs, including travel to downtown Miami (Urban) and the Florida Keys (Regional).
  - The airport can handle eVTOL operations similarly to helicopter traffic and offers good options for vertiport locations.

- **Miami-Opa Locka Executive Airport**
  - Numerous use cases exist for eVTOLs, including travel north of Miami and to Central Florida.
  - The airport can handle eVTOL operations, but most of the airport is leased out.
  - Good siting options exist but will require more coordination with tenants for site plans.

MDAD General Aviation Airports Site Selection

- **Miami Homestead General Aviation Airport (X51)**
  - Distance from major population centers and lack of significant electric infrastructure yield limited use cases at this airport.
  - Excess capacity at the airport means eVTOLs can land on existing runways/taxiways instead of requiring a dedicated vertiport.
  - Significant land available for development.
- **Dade-Collier Training and Transition Airport (TNT)**
  - Distance from major population centers, environmental constraints, and lack of electric infrastructure yield limited use cases at this airport.
  - Excess capacity means that eVTOLs can land on existing infrastructure instead of requiring a dedicated vertiport.
  - Significant land available for development.

Next Steps

- Phase 2 Study efforts will be completed this summer.

- MDAD will review options and make decisions for MIA and the general aviation airports based on study recommendations.

MDAD'S DIGITAL STRATEGY AND INNOVATION OFFICE

FLORIDA AUTOMATED VEHICLES

MIA MIAMI INTERNATIONAL AIRPORT

MIAMI-DADE COUNTY

FUTURE READY

Automated Mowing Demonstration
Miami Executive Airport (TMB)
In Cooperation with American Honda Motor Co., Inc

Plan

【Objective】

Get feedback from team MIA by making a presentation of Honda's autonomous vehicle actually

【Schedule】

	17-Jun	18-Jun	19-Jun	20-Jun
	Monday	Tuesday	Wednesday	Thursday
6:00		Arrive onsite	Arrive onsite	Arrive onsite
6:30		Run AWM & AWV	Run AWM and Video shoot	Run AWM
7:00				
7:30	Traveling			
8:00				
8:30				Packing and Leaving
9:00				
9:30			Demo & Interview 9:30 – 10:30	
10:00	Arriving at site and preparation (12800 SW 145th Ave, Miami, Florida 33186)			
10:30				
11:00				
11:30				
12:00	Lunch	Lunch	Lunch	Lunch
12:30				
13:00				
13:30	Preparation and Test run AWM	Run AWM & AWV	Site Observation	Traveling (Flyback)
14:00				
14:30				
15:00	Activity in the afternoon depends on weather			
15:30				
16:00				
16:30				
17:00				

Autonomous Work Mower (AWM)

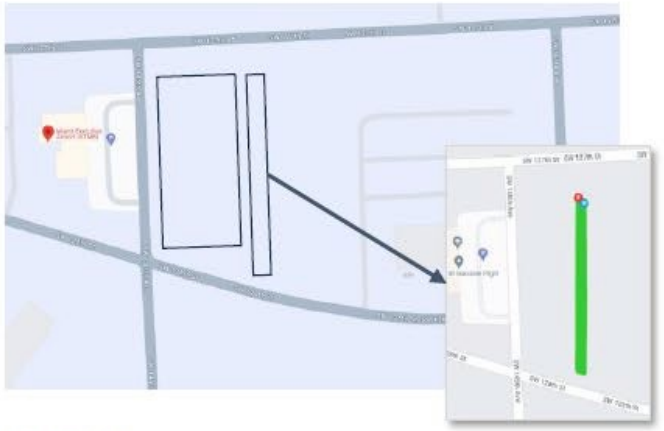
Autonomous Work Vehicle (AWV)

AWM & AWV are demonstrated successfully and develop a plan for collaborating activity continuously

American Honda Motor Co.,Inc

Achievement

AWM



Mowed several areas

- Route: 0.18-mile length
- Mowing time: 2.15 min

AWV

Mowed 1/3 of the yellow area

- Route: 0.7-mile length
- Mowing time: 16.8 min

AWM & AWV are demonstrated successfully and develop a plan for collaborating activity continuously

American Honda Motor Co.,Inc

Proposed Future Action Plan

1. **Observe the mowing job and the tractor's path**
   - Understand the job of mowing to clarify AWV's job (Figure out the mower's path and job process)
   - Example of job flow

2. **Technical improvement**
   - Do actual work like mowing and spraying with production models (AWV Gen3.0)
   - Align the job image and complete the job

3. **Operation and interaction**
   - Confirm AWV actually gets along with operators in the work field

4. **Cost-effectiveness**
   - Confirm AWV brings benefits to MIA actually

Focus on mowing until prospects for realization are obtained first. Then try other use cases

American Honda Motor Co.,Inc

Technical Improvement

Difficulty Level 1 – Establish basic function

Basic AWV Gen3.0 functionality
- Start and tow mower
- Appropriate speed
- Map the entire site
- Battery level

Basic AD system
- AWV does not detect grass

Difficulty Level 2

Advanced AWV's functionality
- Sprayer

Stabilize AD system
- Narrow space (Between trees, by the wall, by the road)

Difficulty Level 3

Manage work equipment
- Temporary stop towed mower

Crossing road management
- Moving equipment to the site next site

Difficulty Level 4

Turn on work equipment remotely
- Turn on the towed mower at the site

Intersection management
- Moving equipment from the storage area

Difficulty levels depends on where AWV is performed, and technology needs to be upgraded

American Honda Motor Co.,Inc

Potential Uses

Spraying

Sweeping

Collecting debris

Collecting magnet

Moving luggage cart

Monitoring

American Honda Motor Co.,Inc

THANK YOU

LiDAR

Emerging Technology in Aviation

Doug Wycoff – Director of Digital Technologies & Innovation, TPA

Tampa International Airport

Intro

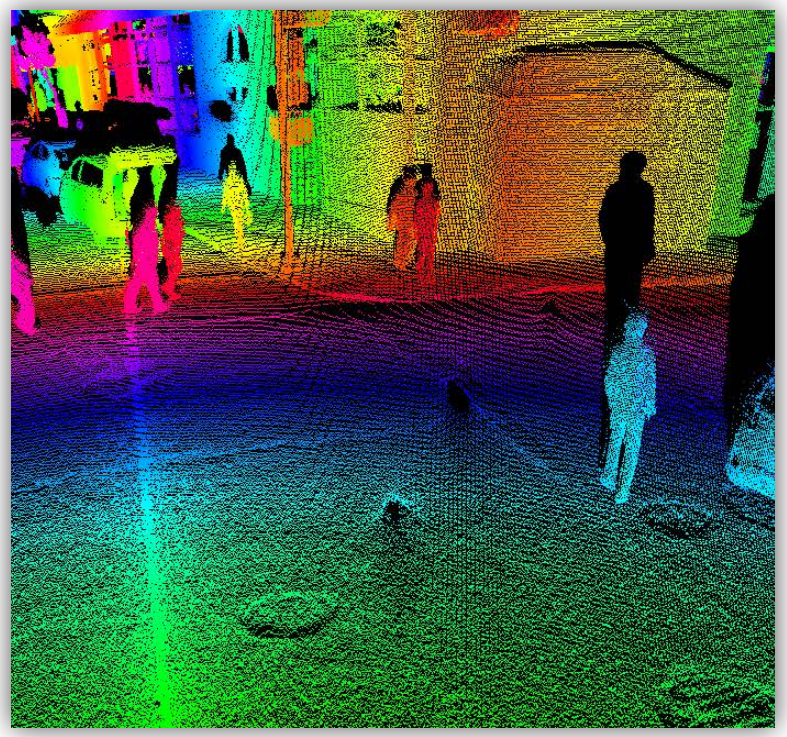
Tampa International Airport

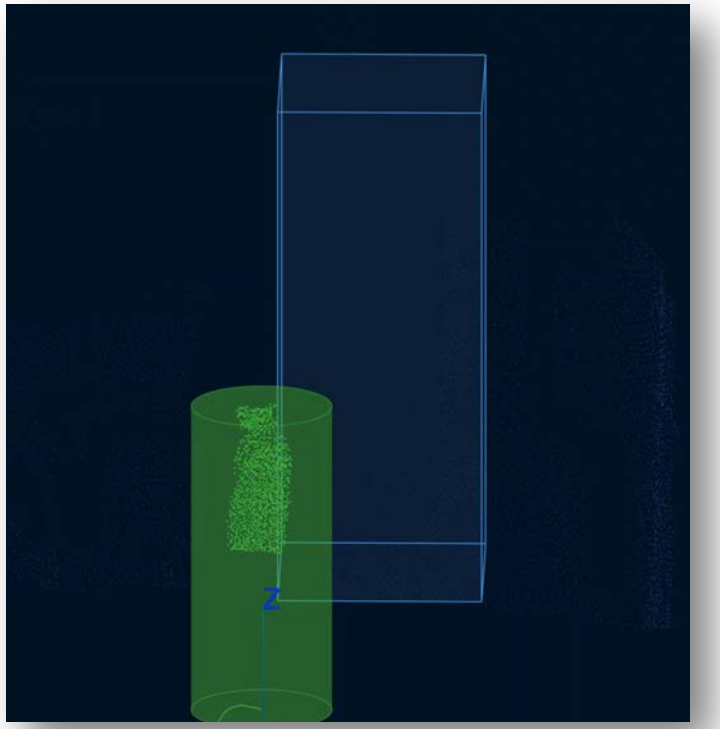
THE INDOOR LAB

LiDAR – Light Detection And Ranging

Object detection with no discernable information displayed makes LiDAR future proof across all markets and environments.

- 3cm accuracy
- Instant detection
- Object classifications
- Non-tech dependent
- Installation in any environment
  - Day & Night
  - Direct sunlight
  - Height and low ceilings
- Creates a 3D top view of area
- Privacy compliant

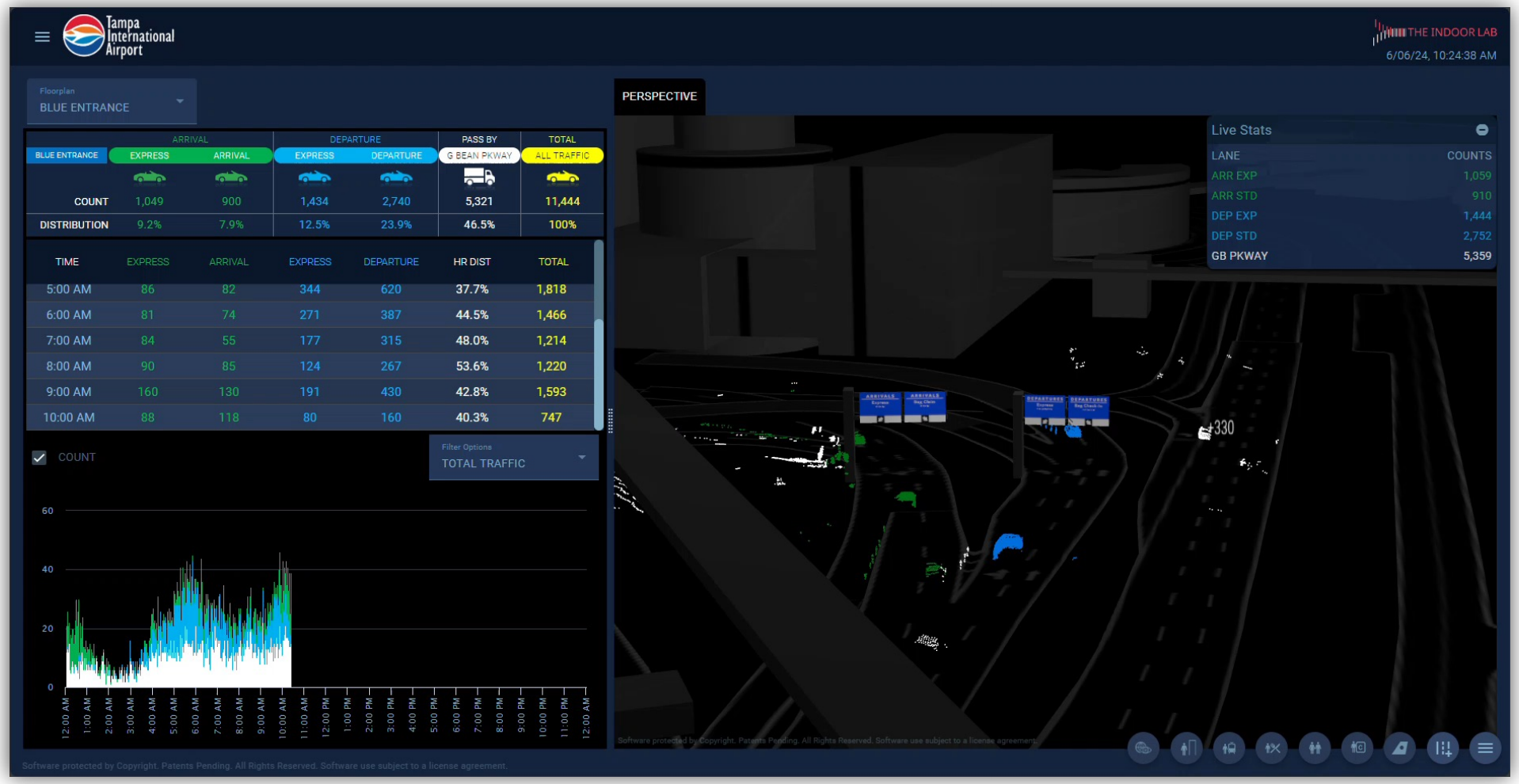




Implementation – Blue Curb

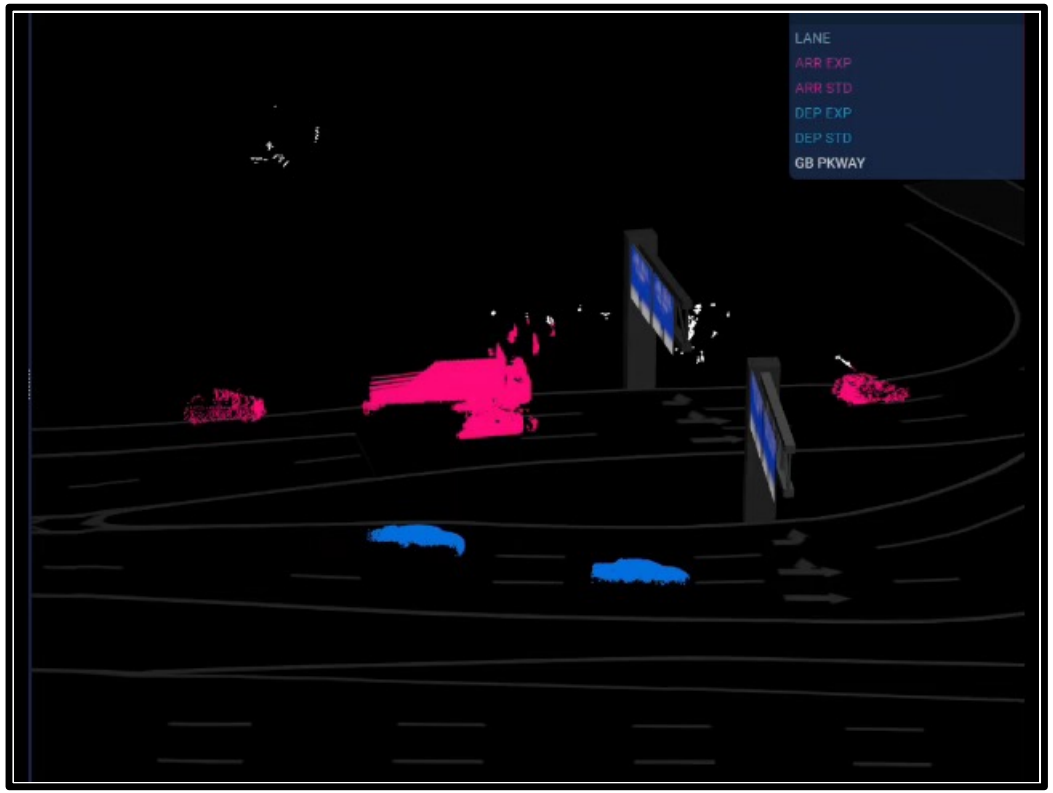
- 5 sensors
- 360 degree viewing radius
- 9 lanes covered
- Vehicle counts
- Stopped vehicle detection
- Wrong-way vehicle detection
- Over-height vehicle detection

Implementation – Blue Curb



Implementation – Blue Curb

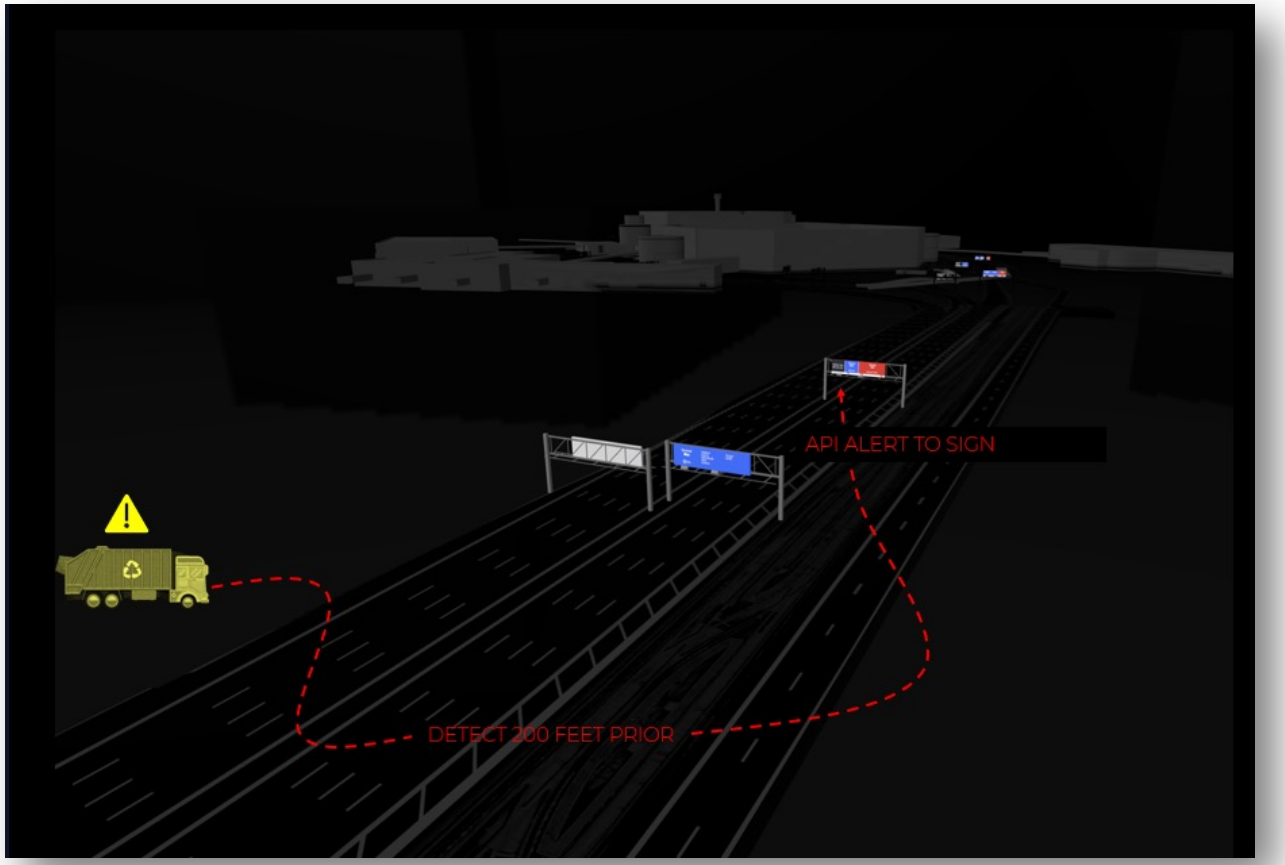
Reverse Vehicle Detection



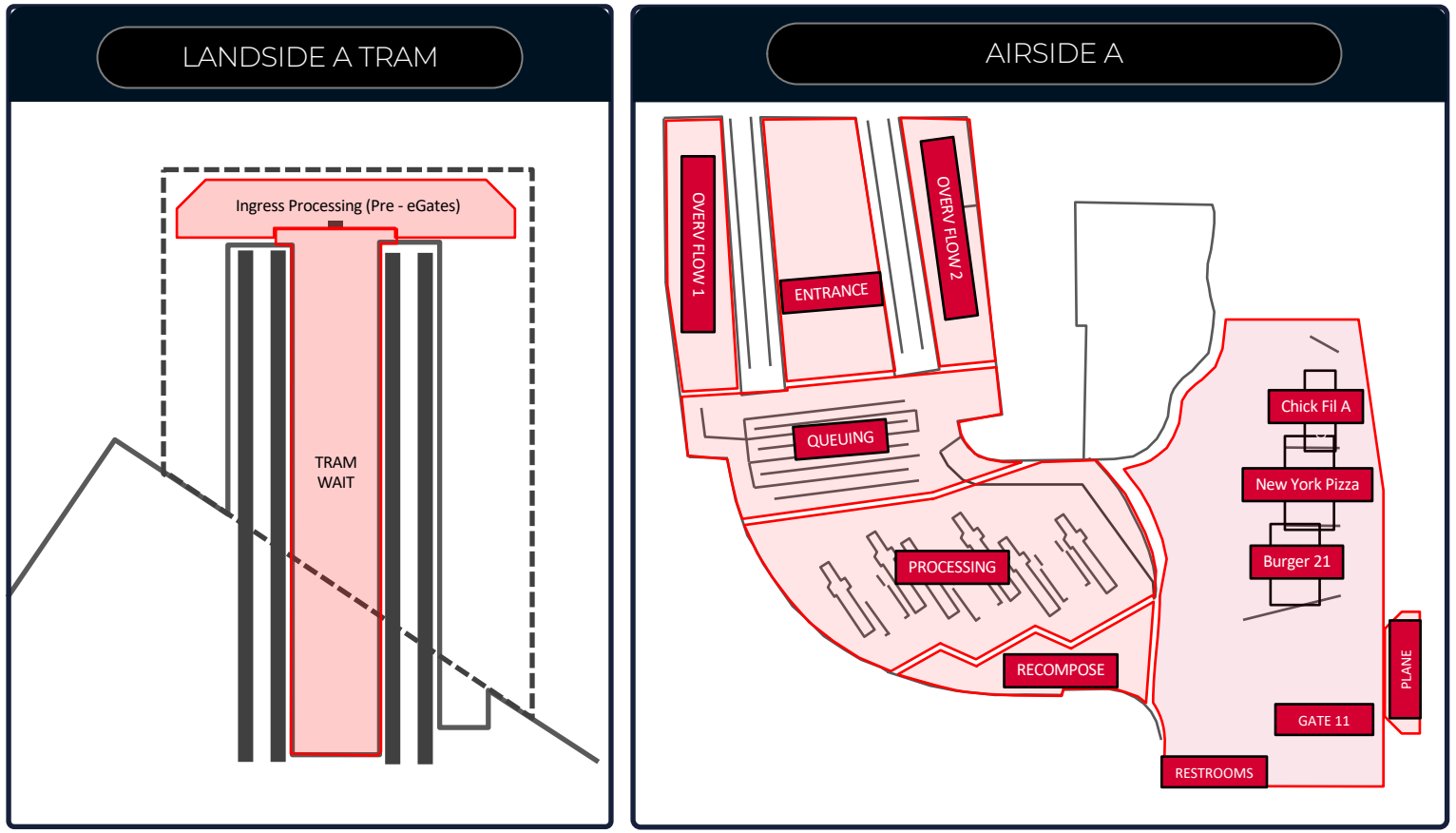
Unauthorized Person Detection

Implementation – Blue Curb

Over-Height Vehicle Detection & Alerting



Implementation – Airside A P.O.C.



LANDSIDE

Airside A Shuttle

- Ingress Processing
- Tram Wait

AIRSIDE A

Queue

- Queue Overflow 1 and 2
- Entrance
- Queuing
- Processing
- Re Compose

Concessions

- Burger 21
- New York Pizza
- Chick Fil A

Restrooms (Gate 11)

- Men's
- Woman's
- Shared

Gate 11 (Interior)

- Gate Hold Area

Gate 11 (Exterior)

- Plane Parking

Implementation – Airside A Shuttle Lobby

- Capacity monitoring
- SMS notifications to OPS and GSRs
- Prevent over-crowding before surge injuries

Implementation – Airside A TSA

Segment Toggle
- General / TSA Pre / Clear

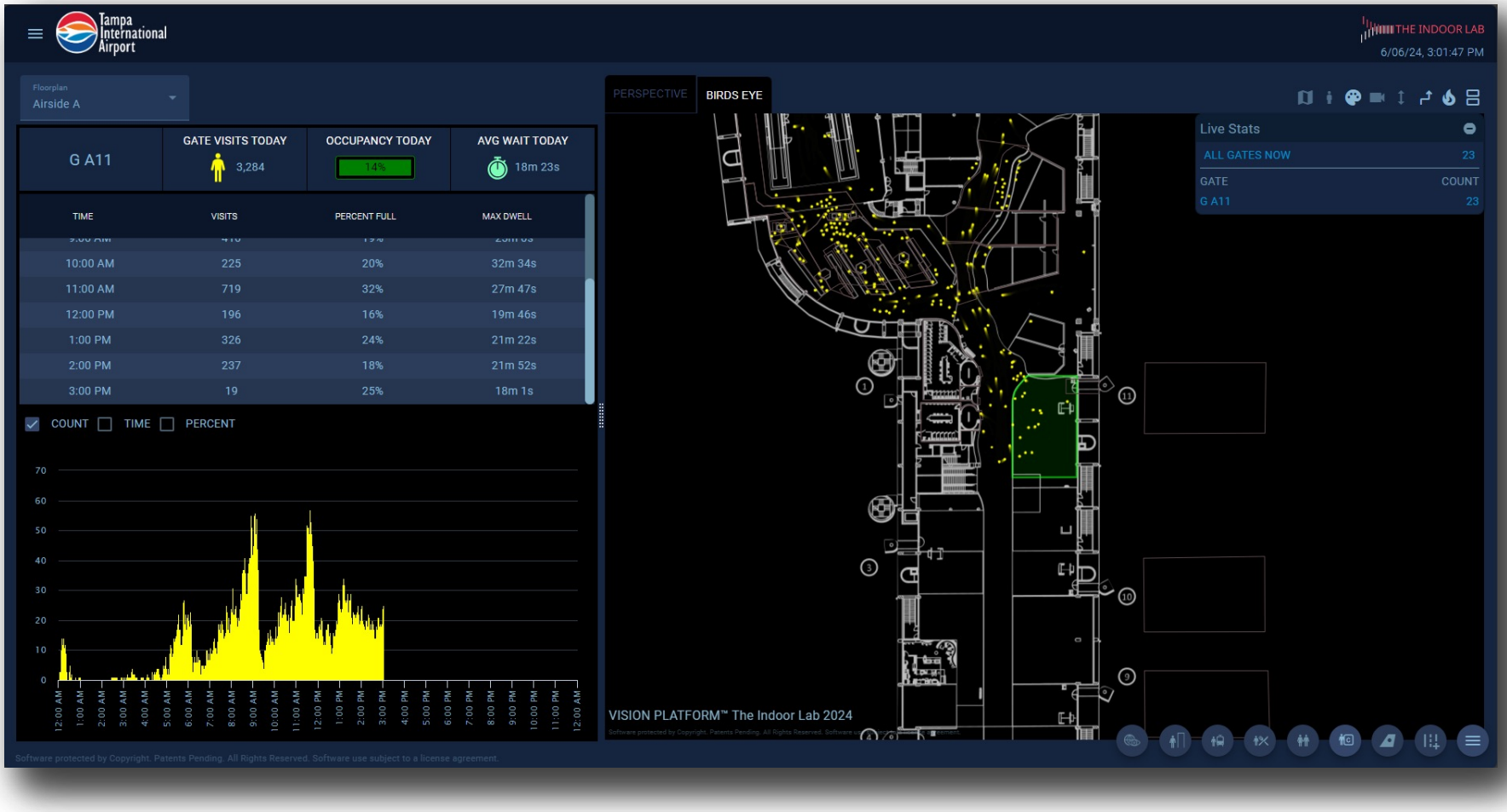
Summary View
- Day summary
- Hour by hour summary

Left Panel
- Counts
- Percent full
- Lanes open
- Wait last 60 minutes

Live Stats
- Segment counts
- Segment waits

Implementation – Airside A TSA

Implementation – Airside A



In Development – Live Gate

Access to live and historical data

- Plane arrives
- Wheels Blocked
- Jet bridge total time connected
- Air connection attached and detached
- Fuel attached and then detached
- Baggage door opens & then closed
- Baggage belt arrives and in place to offload
- Baggage offloading starts & completed
- Lavatory connection & disconnection
- Food services arrives & then departs
- Jet bridge disconnects
- Plane departs

In Development – Live Gate

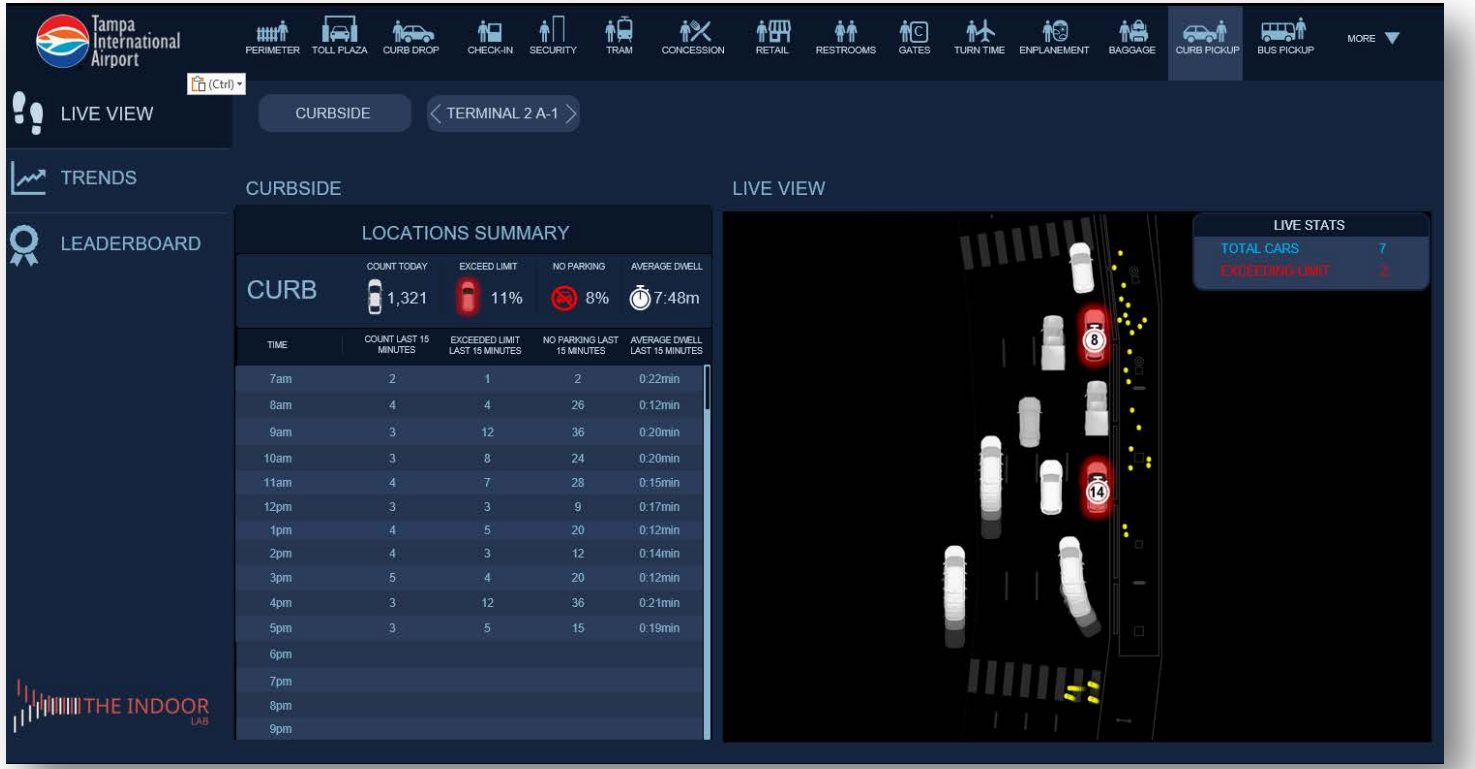
Summary

- Flights today
- Disembark (PAX) today
- Time empty today
- Time occupied today

Live Plane Parking / Occupied

- Craft by hour
- Disembark by hour
- Arrival time
- Departure time
- Occupied time

In Development – Live Curb



Summary View

- Car count today
- Exceed stop time limit today
- Parked in no parking today
- Average stop time today

Left Panel Summary

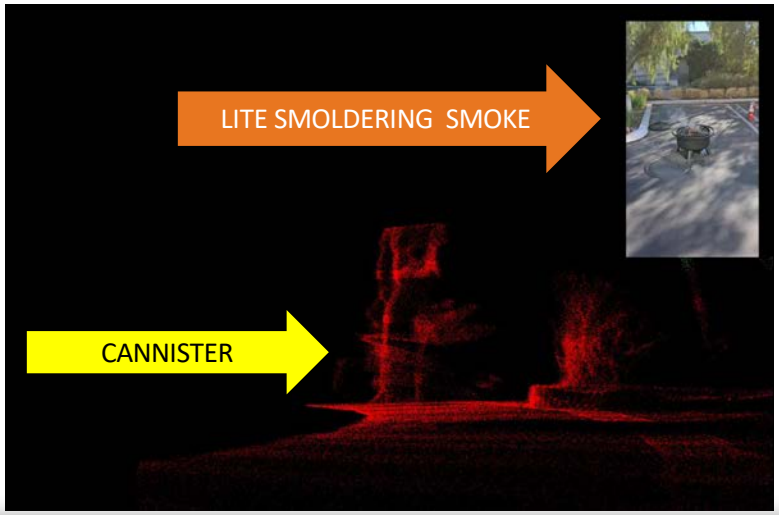
- Count last 60 minutes
- Exceeded limits last 60 minutes
- No parking last 60 minutes
- Average dwell last 60 minutes

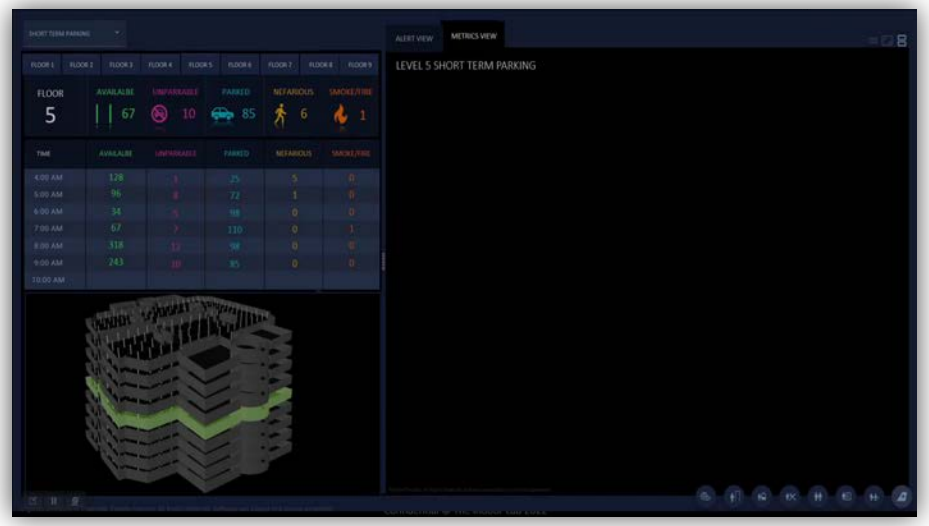
Live Stats

- Cars now
- Exceeding limits now

In Development – Parking Infrastructure

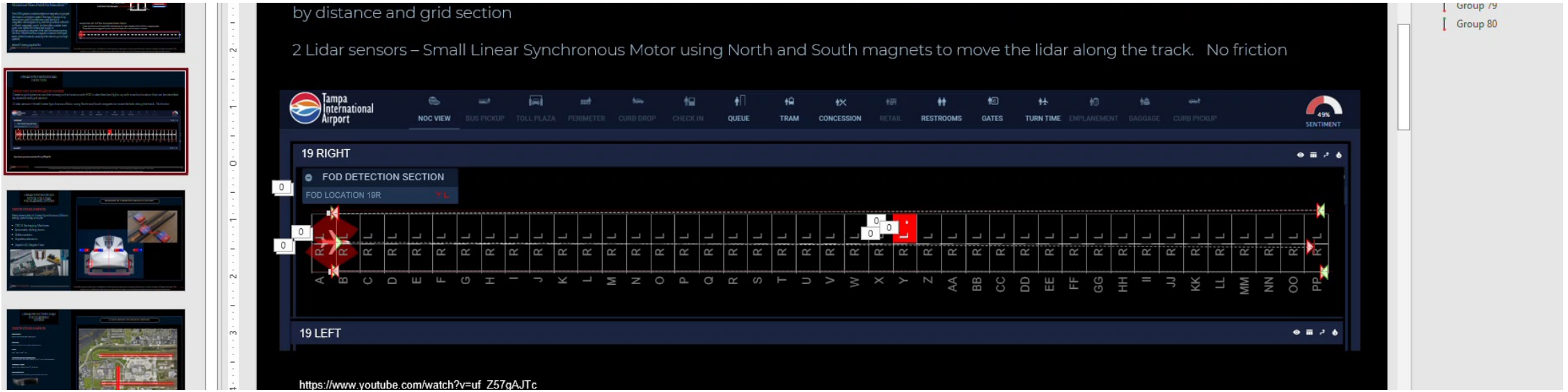
- Smoke/Fire detection
- Nefarious activity
- Vehicle collision detection
- Accurate spot counts
- Available versus unusable spot counts
- Development of a ticketless garage system



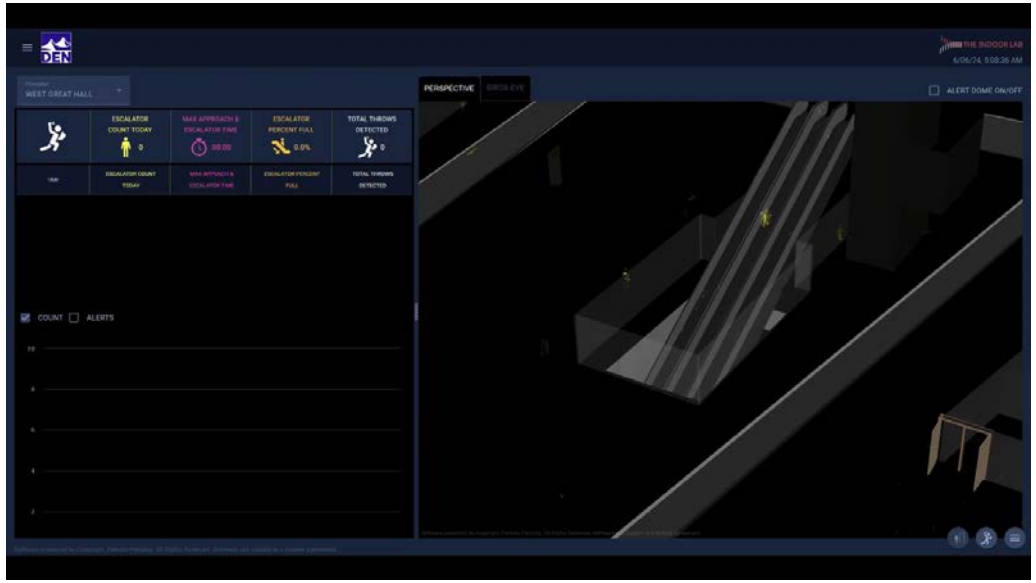


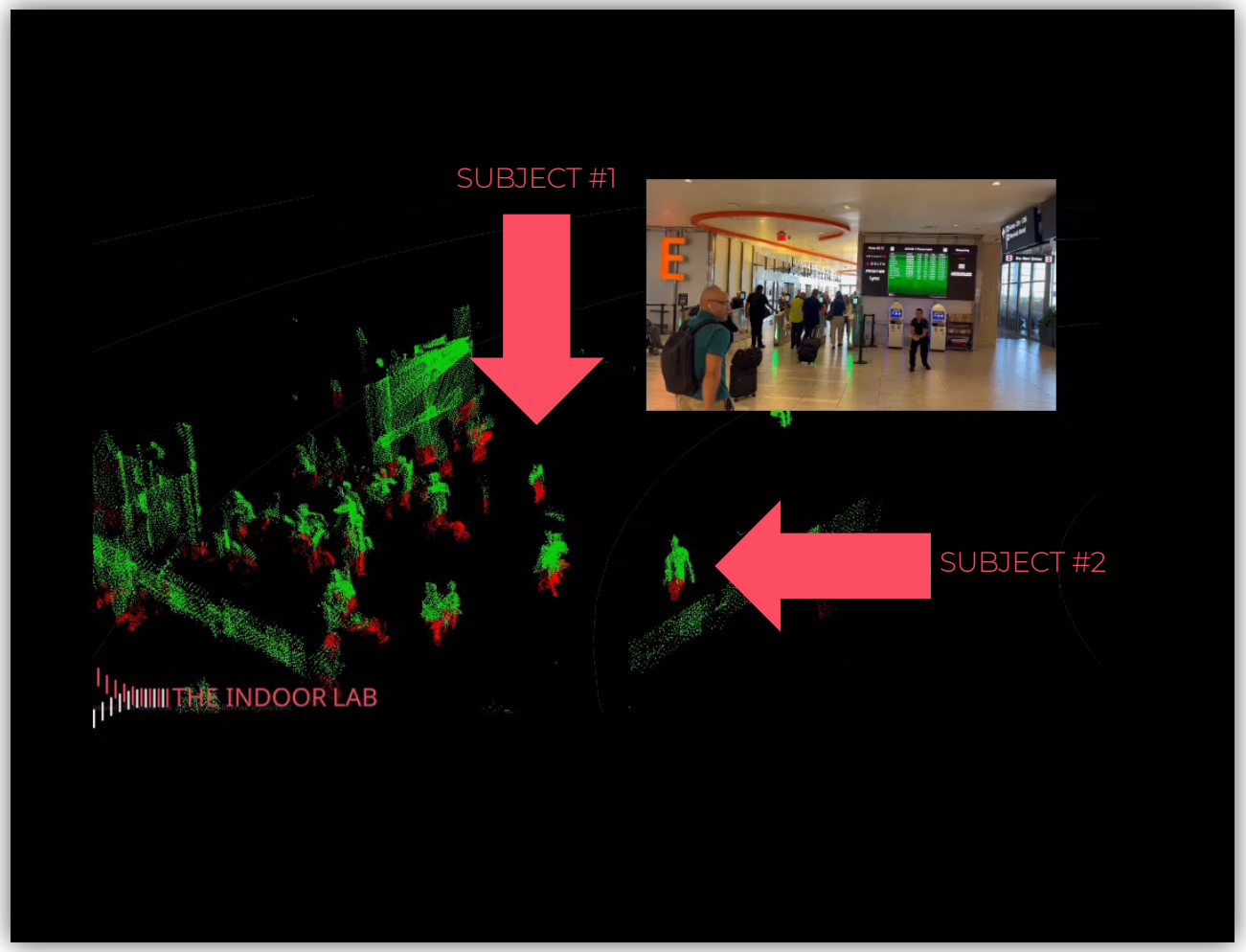
Development – Runway F.O.D. Detection

- Detect objects, cracks, & hazards
- Automate a historically manual process
- Decrease probability of human error/oversight
- Break-away design to meet FAA standard



Development – Throw Detection





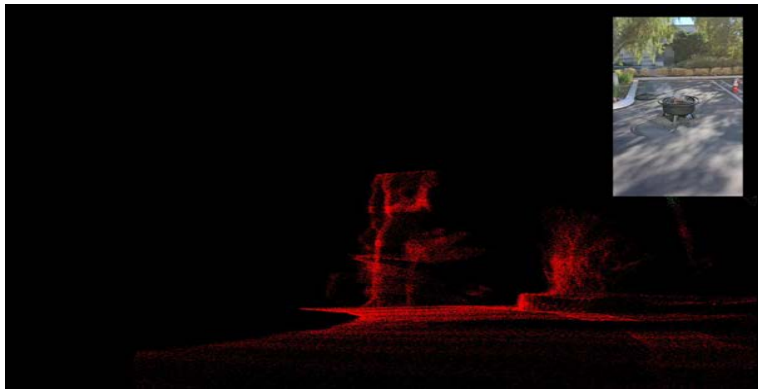
Recap

Roadway Safety

TSA Optimization for National Security

Gate Monitoring & Ramp Safety

Throw Detection & Alerts



Smoke & Fire Detection

Runway & Airfield Safety

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