NEW YORK STATE | Department of Transportation

Enhancing Pedestrian Safety Through Video Analytics & Connected ITS Technologies

Panel 1A- Next-Gen ITS: Unlocking Real-Time Mobility with Edge Technology and Analytics

ITS-NY
Intelligent Transportation Society of New York

33rd Annual Meeting

June 17, 2026

Outline

- Context & Safety Challenge
- Pilot Design & Deployment
- Data & Insights
- Replicability
- PDH Questions

Project Context & Location

High-Risk Vulnerable Road User (VRU) Crossing near Citi Field.

- **Ramp from WB Grand Central Parkway → Northern Blvd (Exit 9E)**
- **Subway 7 train; Q90 bus**
- **Heavy event-driven surges (Mets, NYCFC, concerts)**
- **VRUs include pedestrians, bicyclists, e-bikes, and mobility-aid users**

The Safety Challenge (Geometry)

Horizontal Curvature Limits Sight Distance

- Ramp from GCP diverges before merging with ramp from Shea Road upstream of crosswalk
- Shea Road (yield) limited sight distance and grade

The Safety Challenge (Visibility)

Limited visibility for both Vehicles and Vulnerable Road Users (VRUs)

Camera View of Crosswalk

Driver's View of Crosswalk

The Safety Challenge (Near-Miss)

Concerns from NYPD and Citi Field

What we Needed to Measure

- Traditional Crash Data was not sufficient to highlight underlying safety issues
- Leverage existing Intelligent Transportation System (ITS) infrastructure to collect data

Quantifiable metrics

to measure safety performance

Vehicle and VRU counts

Vehicle speeds

Near misses

Evaluate effectiveness

of proposed countermeasures

Yielding Behavior

Speed Compliance

Concept Overview

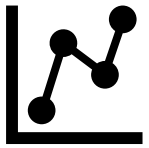
Detect VRU

Use Video Analytics to detect pedestrian in cross walk

Alert Motorist

Trigger Rectangular Rapid Flashing Beacons (RRFB) to provide alerts to approaching motorists

Activate PVMS to provide additional alert to motorists

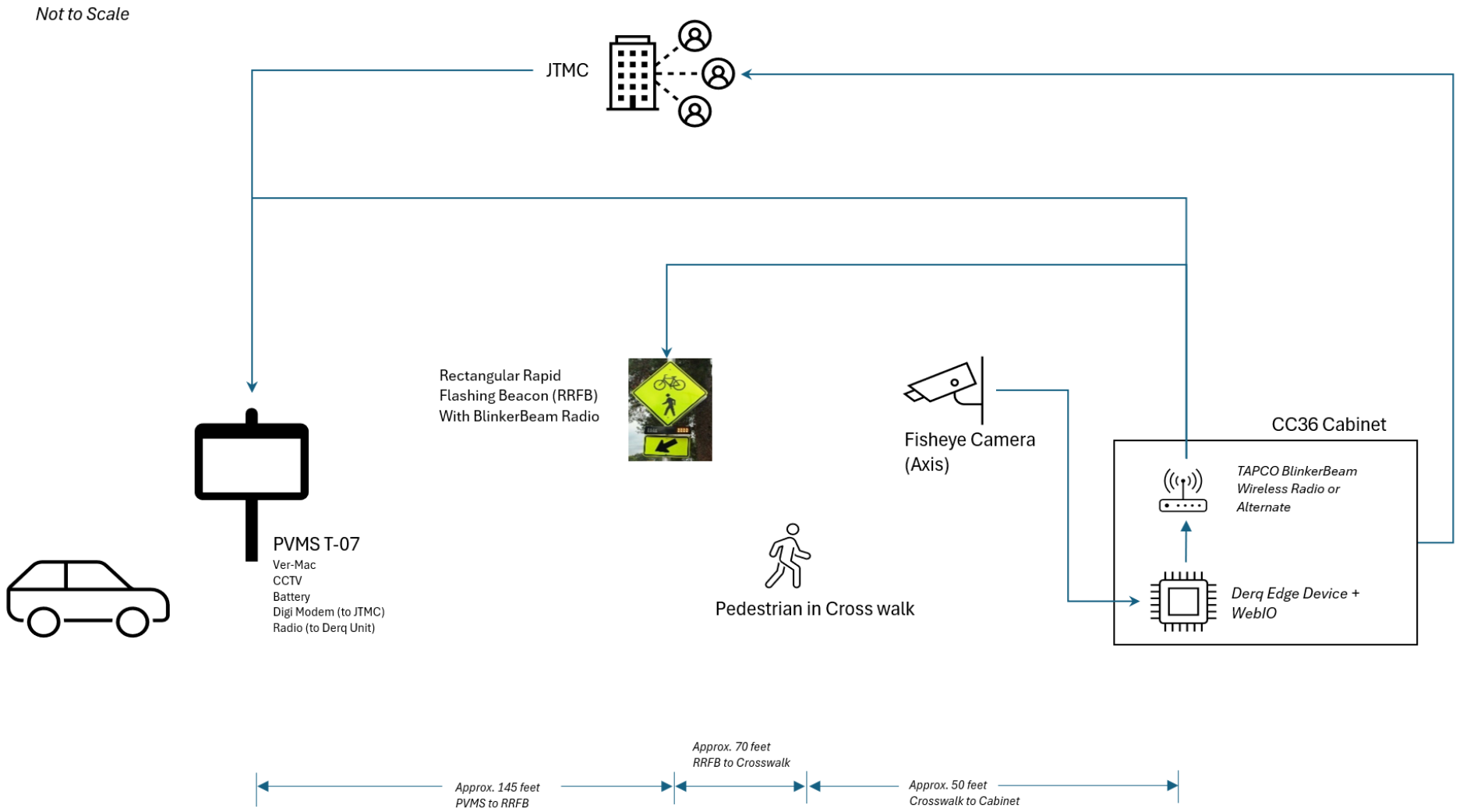


Collect Metrics

Use ML/AI Edge device to extract metrics at the crosswalk

- Mobility – motorists (count, type) and VRU (count, type)
- Safety – near miss, points of conflict

Schematic Diagram



Field Deployment Layout

Phase 1 (complete)

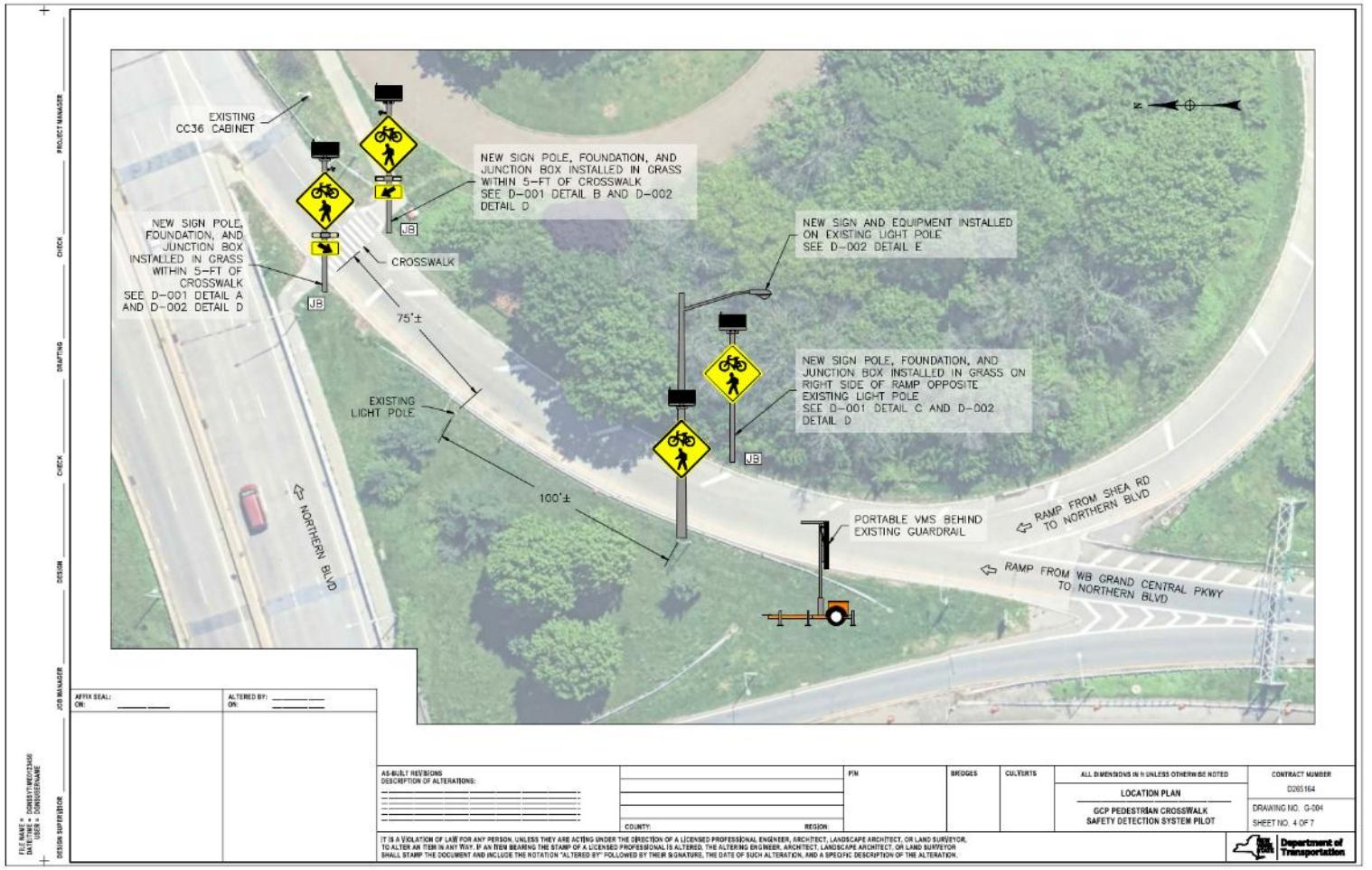
- Collect baseline metrics
- Installed Edge unit & camera

Phase 2 (complete)

- Implement Countermeasures
- Installed RRFBs and PVMS

Beyond MUTCD minimum

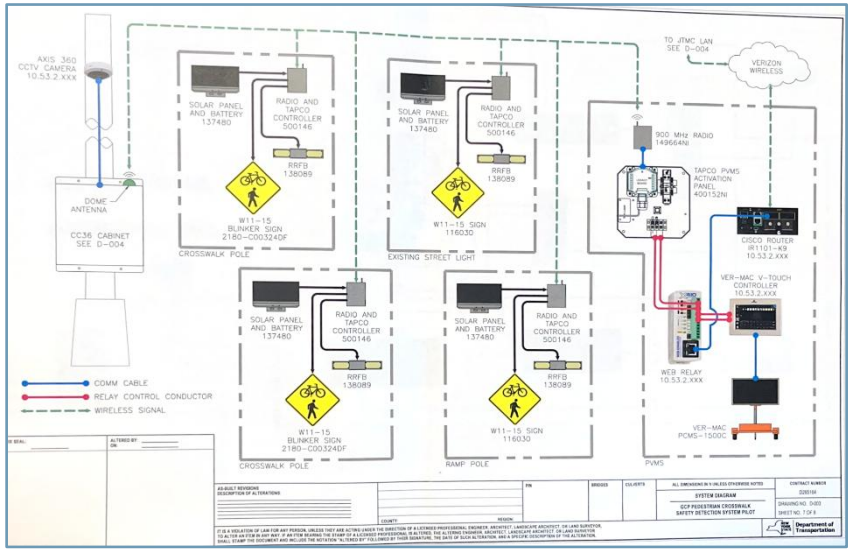
- AI Driven/ Event-Triggered
- Real-time Warning System

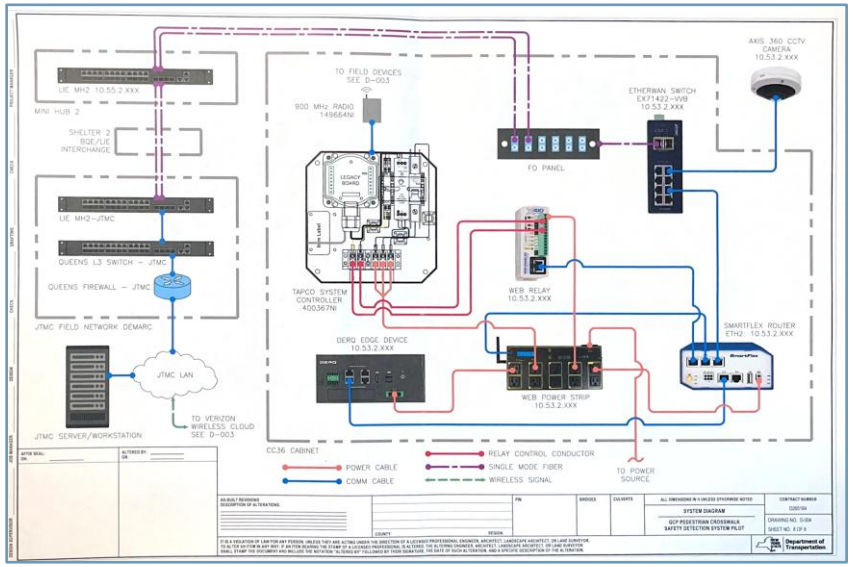


Field Deployment

Roadside Components

- IP Camera
- AI/ML Edge unit
- Pedestrian Warning Signs (W11-15)
- RRFB assemblies
- Flashing beacon controller
- Solar Panels and Battery
- Portable Variable Message Sign (PVMS)
- Wireless Radio
- Control Cabinet (CC36)
- Ethernet Switch





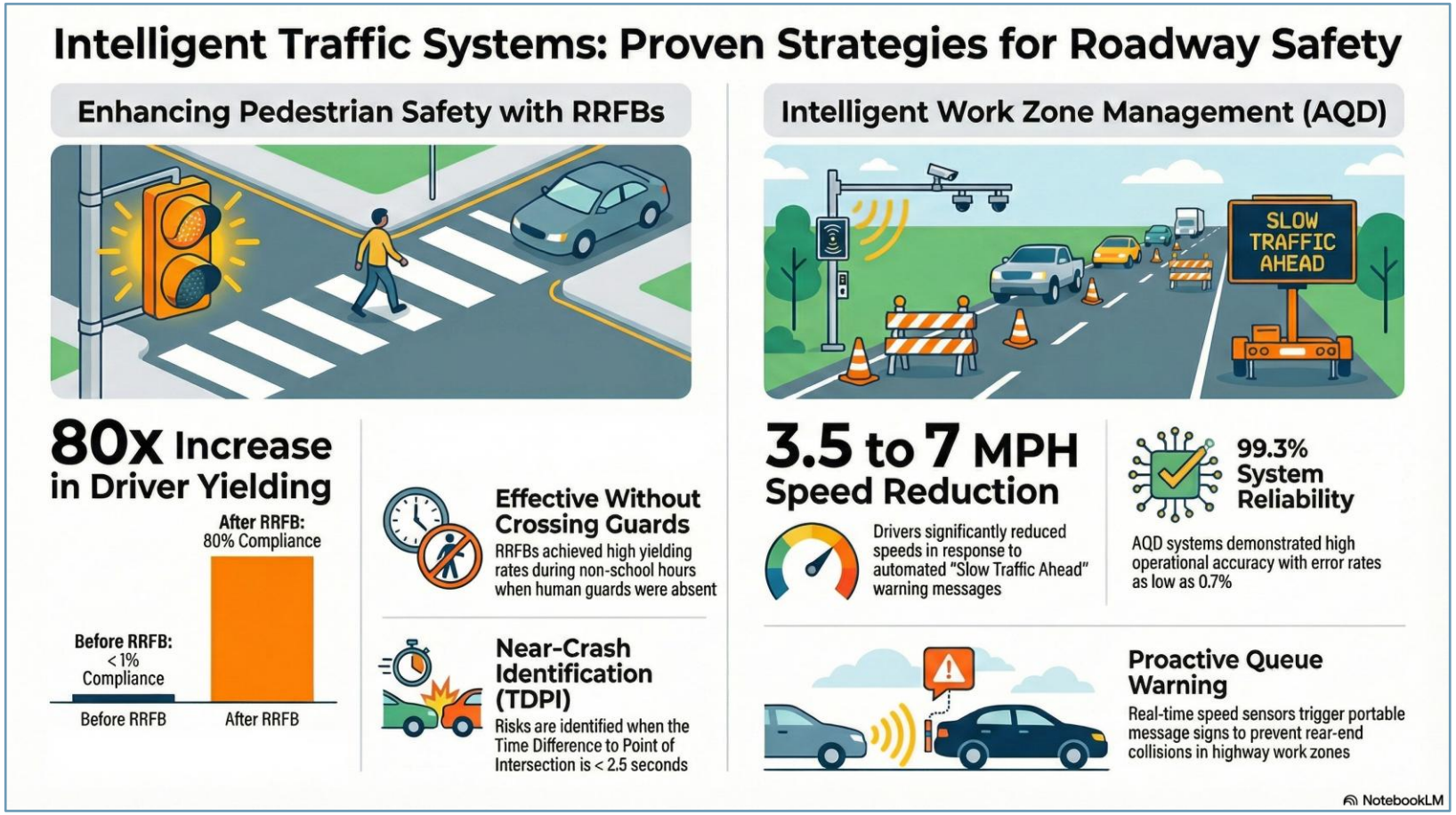
Field Deployment

Data & Insights

Literature Review

Reviewed research papers and publications (before/after studies) related to RRFBs and PVMS and Safety assessments (15 publications)

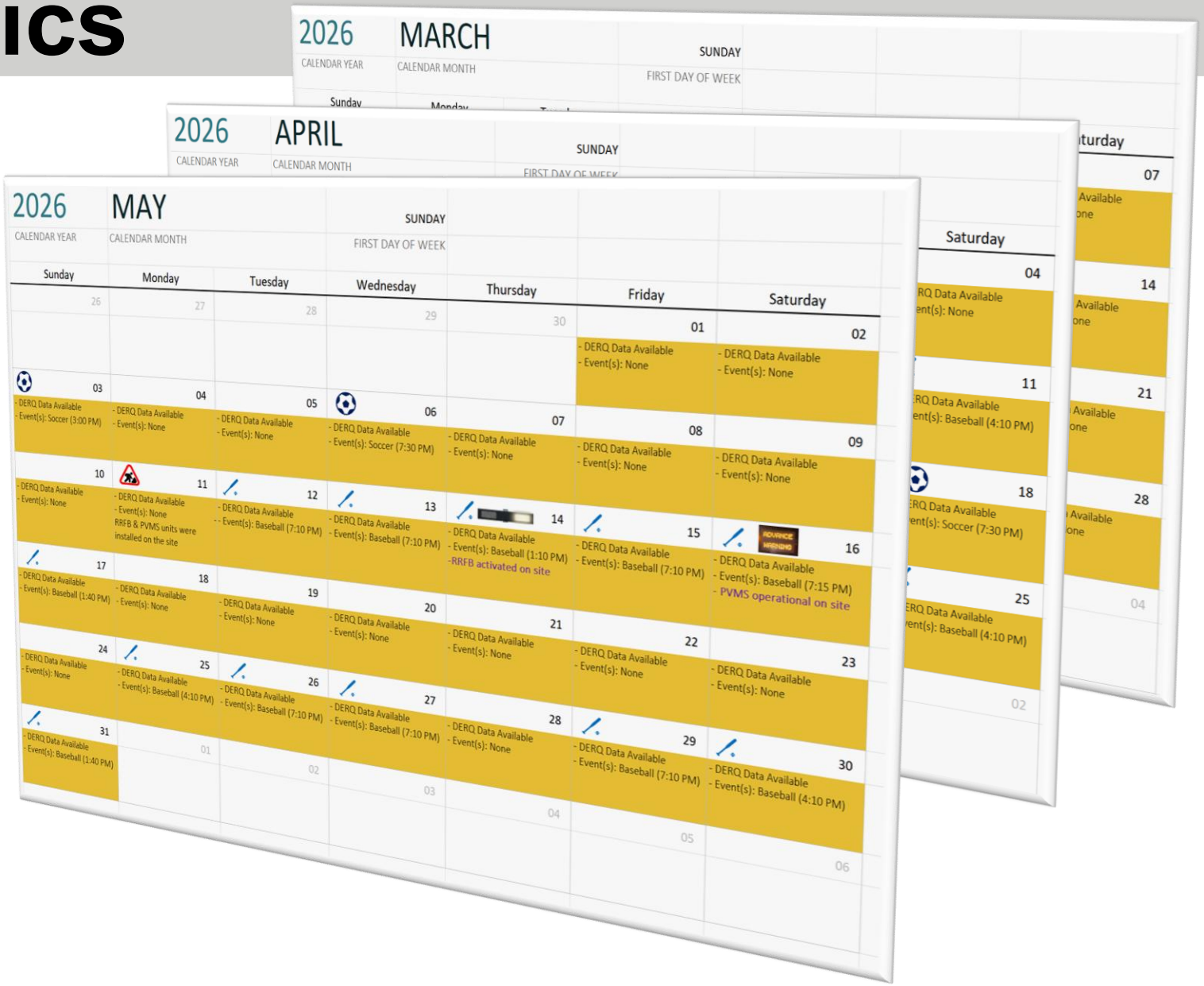
Summary graphic generated Google Notebook LM



Baseline Metrics

Events at Citi Field

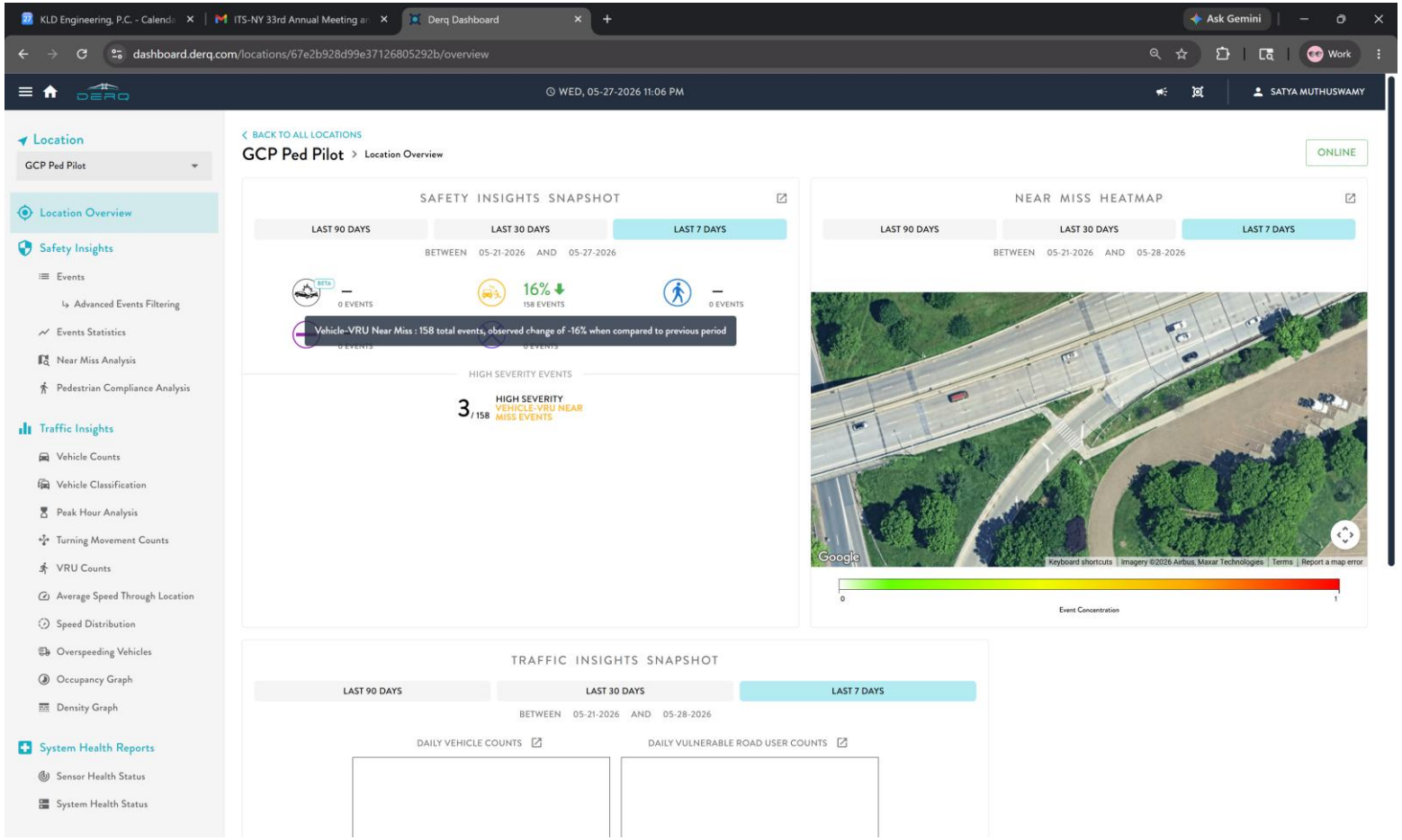
- Log special events
- Concerts
- NYCFC Soccer matches
- Mets baseball games



Baseline Metrics

Dashboard

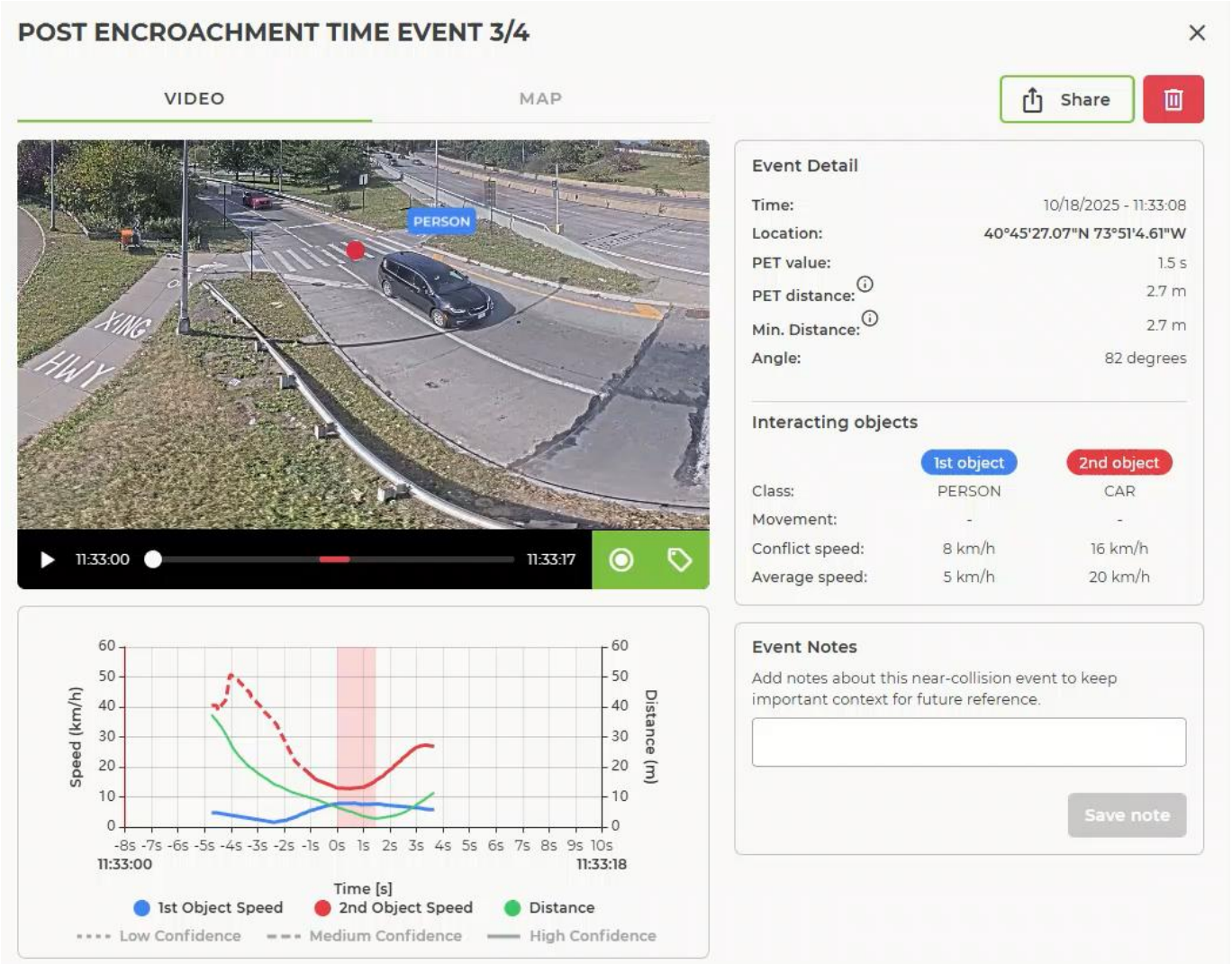
- Traffic Insights
  - Vehicle flow/classification
  - Ped/Bike flow at the cross walk
  - Speed distribution
- Safety Insights:
  - Events (Near Miss)
  - Average speed
  - Surrogate Safety measures



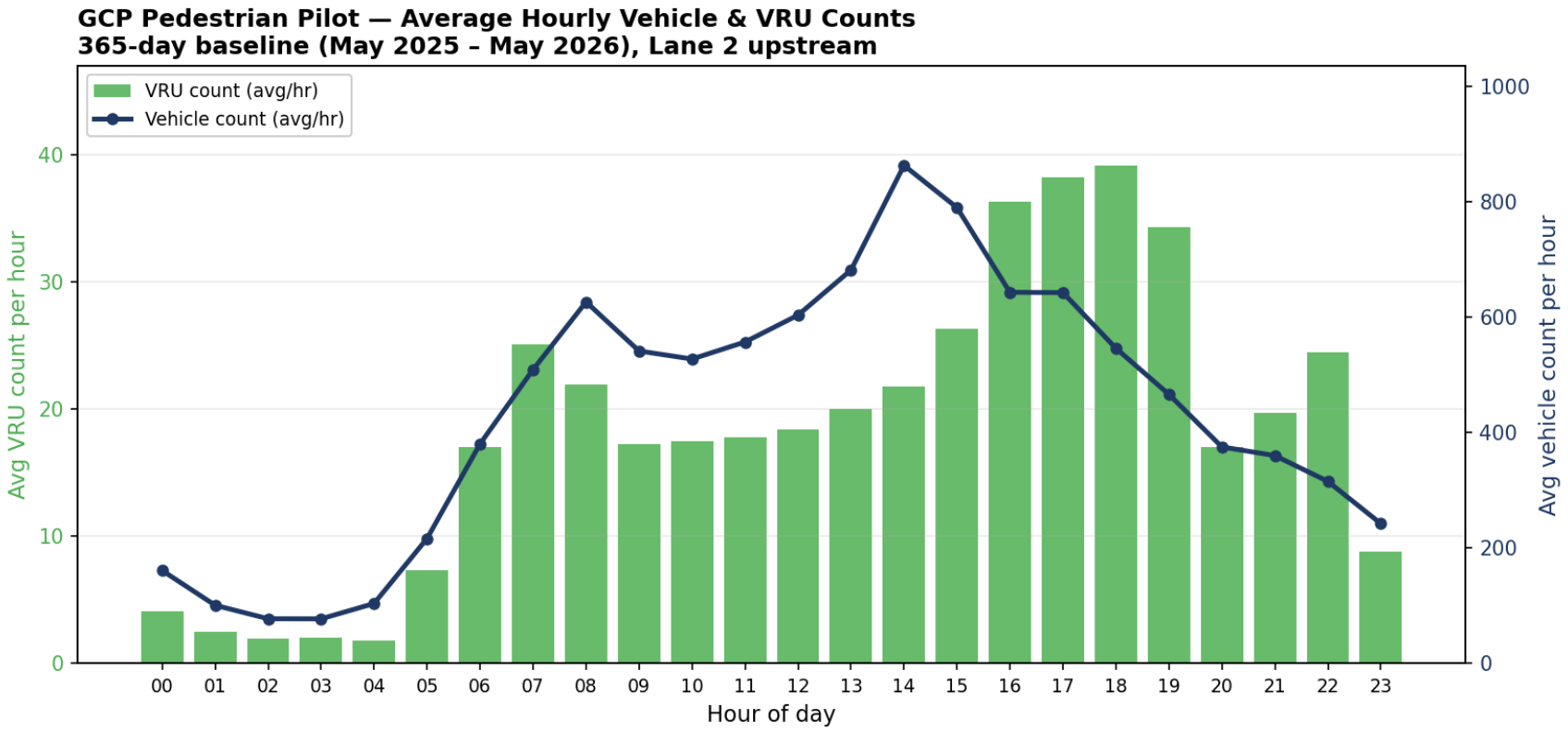
Baseline Metrics

Surrogate Safety measures

- Near Miss Event
- PET (Post Encroachment Time)
- TTC (Time to Collision)



Insights: Baseline Data



VRU/ Vehicle Distribution per Hour of day

Note:
1. VRU counts: pedestrians, bicyclists, e-bikes, and mobility-aid users

No of Vehicles on Ramp

- ~10,200 vehicles/day

No of VRUs Crossing

- ~420 VRUs/day

Speed

- 72% of vehicles > 25 mph

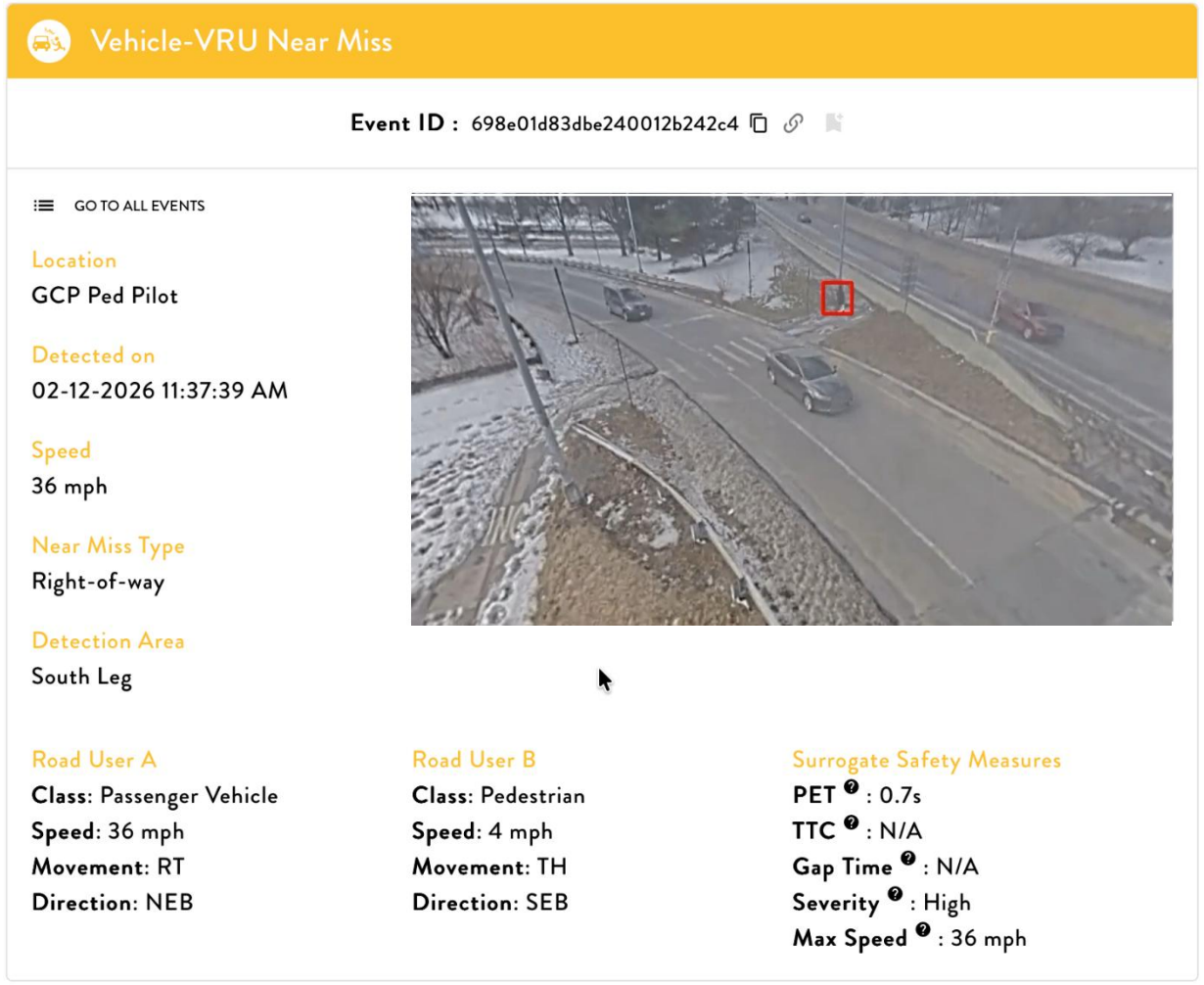
Event Day Vs Non-Event Peak hour

- 1,785 vs 900 vehicles
- 398 vs 39 VRUs

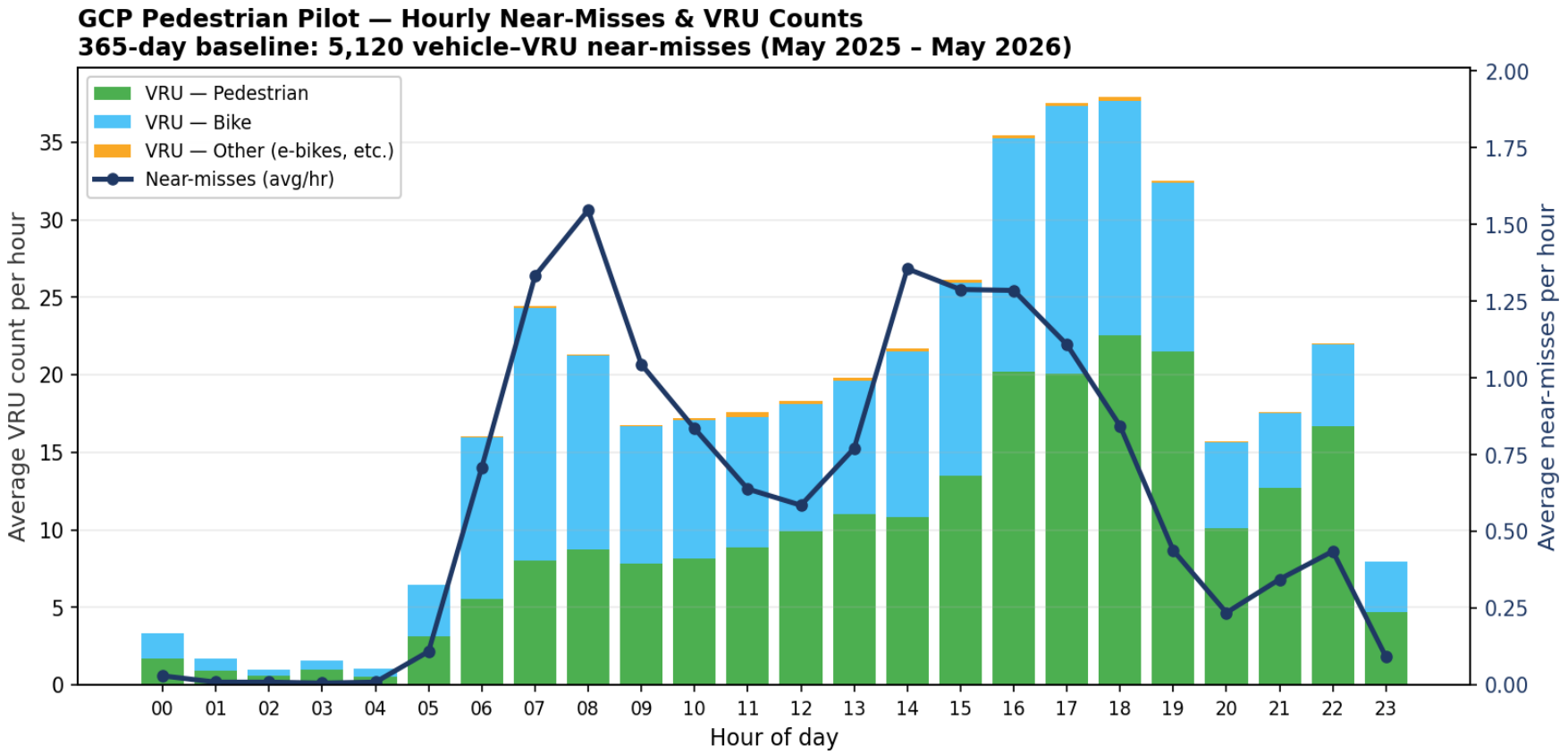
Insights: Near Miss

Edge Unit Dashboard

- Vehicle and VRU- speed and movement
- Calculates surrogate safety measures like PET and Gap Time.



Insights: Near Miss



At least one near-miss almost every hour

365-day Near-miss Data

- 5,120 total near-misses
- ~14 per day average
- 67% bicyclists;
- 32% pedestrians
- Event day effect ~2x non-event baseline rate

✓ **The data confirmed a quantifiable safety risk that crash data alone did not reveal.**

Note:
Near-miss events captured by the Derq edge unit (Vehicle–VRU conflicts)

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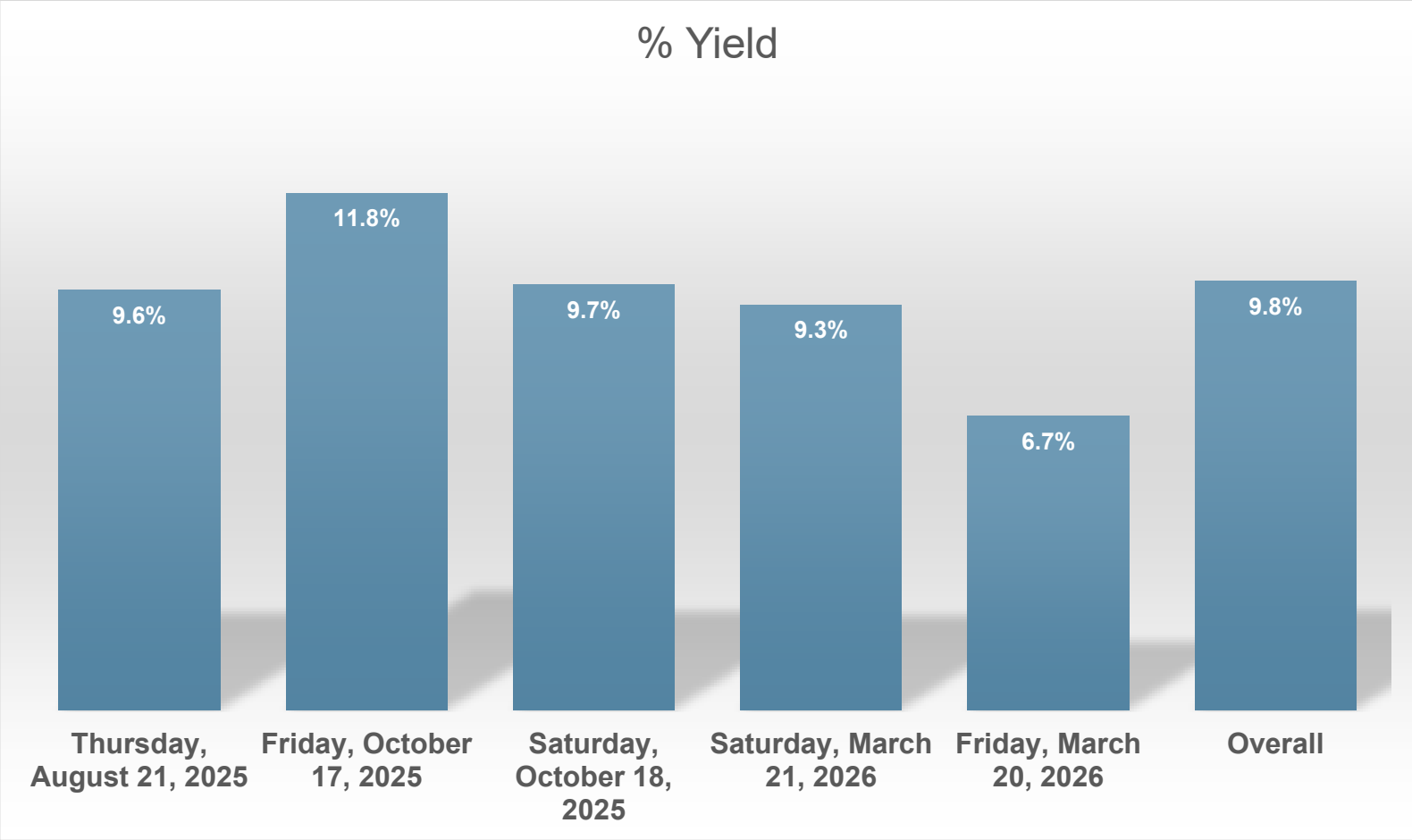
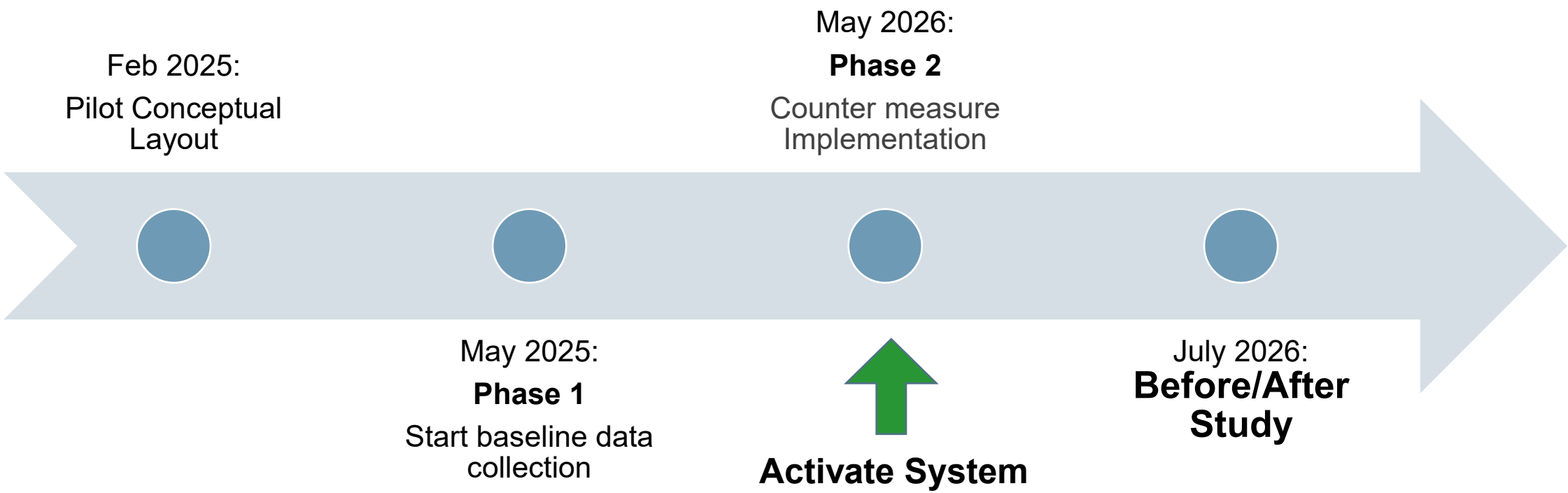
Insights: Yielding Behavior

- Manually sample video to estimate yielding behavior



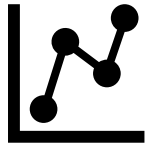
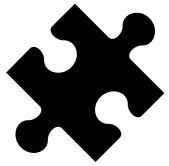
What's Next

The risk is measured; the system is live — next is the before/after evaluation



Significance & Replicability

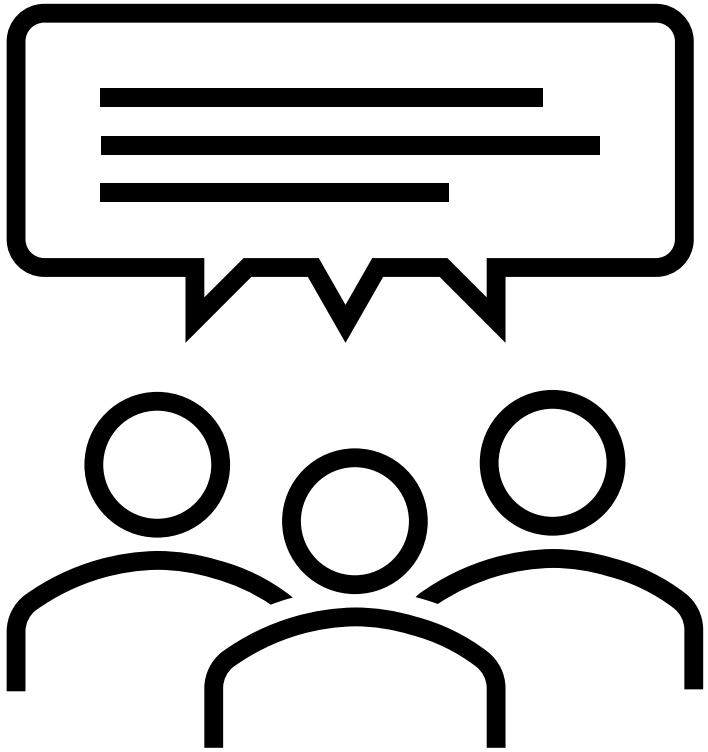
A replicable, low-cost model for VRU safety:

 **Innovation**	Real-time, AI-driven, event-triggered warnings that exceeds MUTCD minimums.
 **Quantifiable Safety Case**	Pre-treatment data; Before/after evaluation to quantify reductions in conflict frequency, severity, and speeds.
 **Replicability**	Built from commercially available components; Scalable to ramps, mid-block crossings, school zones, and event venues.

Project Team

- New York State Department of Transportation, Region 11
- ATANE Engineers, Architects, and Land Surveyors
- PBS Engineering
- Fortis Consulting Services Corp.
- KLD Engineering
- Derq

Q&A



PDH Questions

1. Name some of the safety challenges at this location?
   - *Horizontal Curvature Limits Sight Distance*
   - *Shea Road (yield) limited sight distance and grade*
   - *Limited visibility for both Vehicles and Vulnerable Road Users (VRUs)*

PDH Questions

2. Which surrogate safety metrics were used to quantify conflict severity?
    - *Near miss events*
    - *Time to Collision (TTC)*
    - *Post Encroachment Time (PET)*

PDH Questions

3. What counter measures were deployed as part of the pilot?
    - *Rectangular Rapid Flashing Beacon (RRFB)*
    - *Portable Variable Message Signs (PVMS)*
    - *Signage*

PDH Questions

4. What are some of the benefits or outcomes demonstrated by this Pilot?
    - *Quantifiable safety*
    - *Replicability*
    - *Innovation*

PDH Questions

5. Name some special events that affect the project location?

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