Active Traffic and Demand Management (ATDM)

Case study at MTA B&T Facilities

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MTA Bridges and Tunnels

Agenda

- MTA Bridges & Tunnels
- Active Traffic Demand Management
- Need at TBTA Facilities
- Proof of Concept Development
- Project Design & Construction
- Project Integration & Commissioning

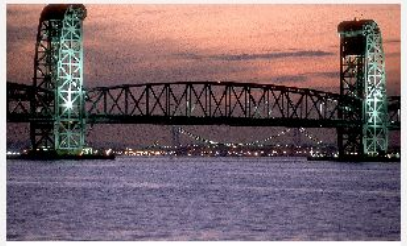
MTA Bridges & Tunnels

- Seven Bridges:
  - Bronx-Whitestone
  - Cross Bay
  - Henry Hudson
  - Marine Parkway
  - Robert F. Kennedy
  - Throgs Neck
  - Verrazano-Narrows
- Two Tunnels:

Bronx-Whitestone Bridge

Cross Bay Veterans Memorial Bridge

Henry Hudson Bridge



Marine Parkway-Gil Hodges Memorial Bridge

Robert F. Kennedy Bridge

Throgs Neck Bridge

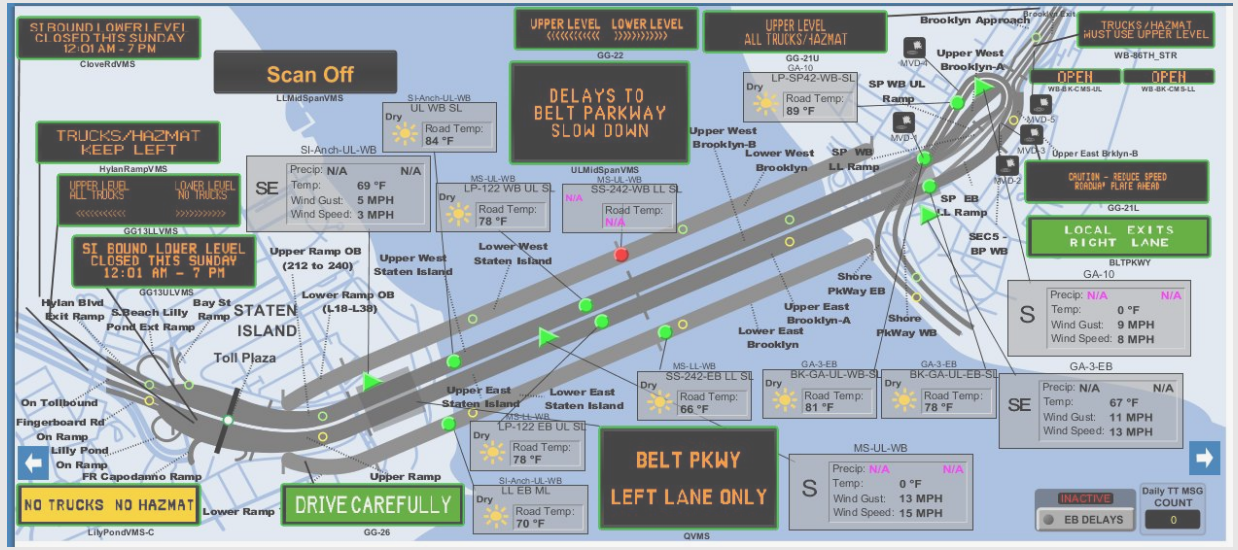
Verrazzano-Narrows Bridge

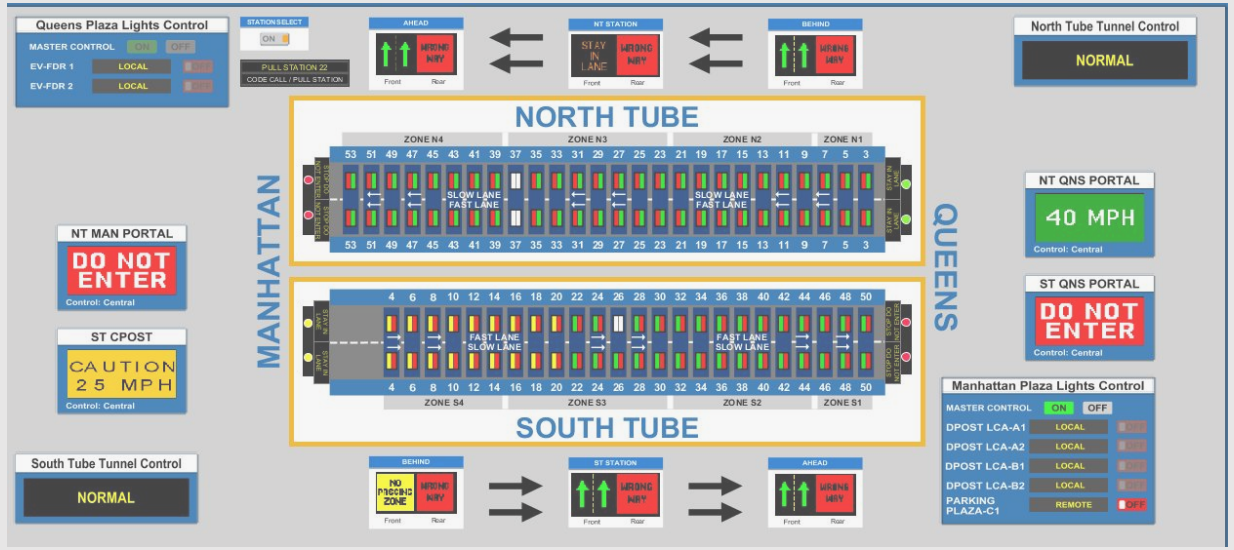
Hugh L. Carey Tunnel

Queens Midtown Tunnel

MTA B&T ITS Program

- Advanced Traffic Management System (DYNAC)
- Facility Control Rooms
- TRANSMIT integration-TRANSCOM's System for Managing Incidents and Traffic
- VMS/VSLS, Cameras, Weather, LUS, Fiber plants
- Tunnels Safety & Traffic SCADA Systems
  - In-tunnel LUS, VMS, Lighting Control, Code Call, Way Finding Light, Portal VMS, etc.
  - Over Height Vehicle Detection & Warning
  - Traffic/Operations SCADA Network
- **Active Traffic Management at BWB, TNB and VNB**

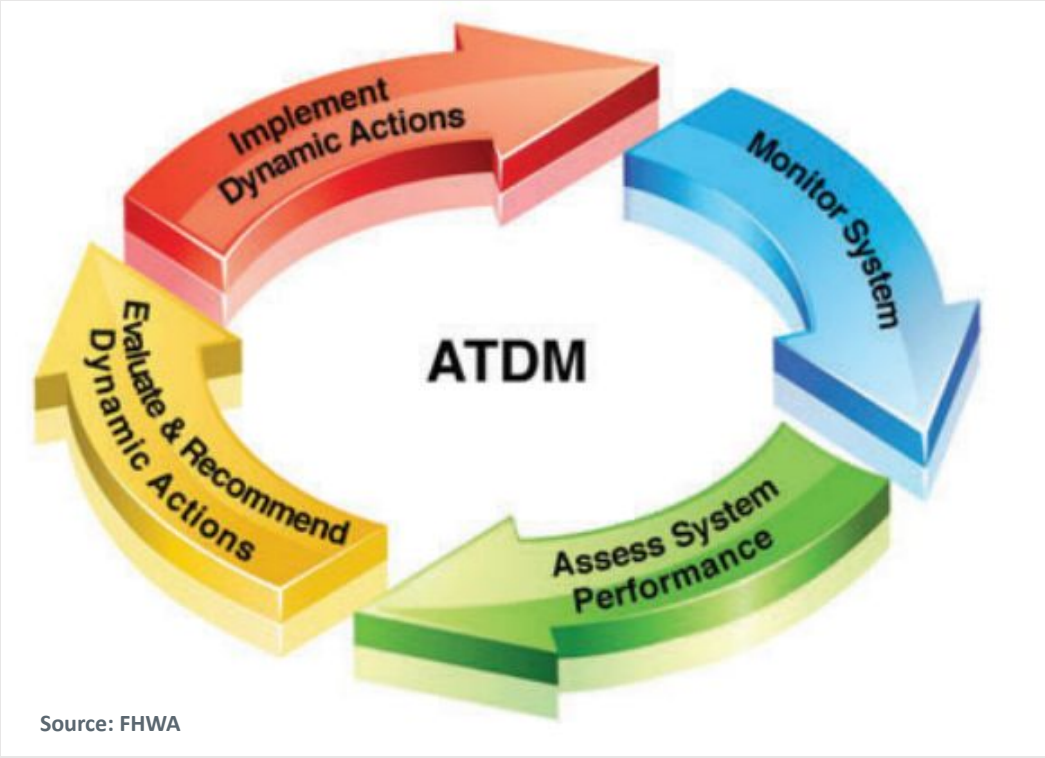




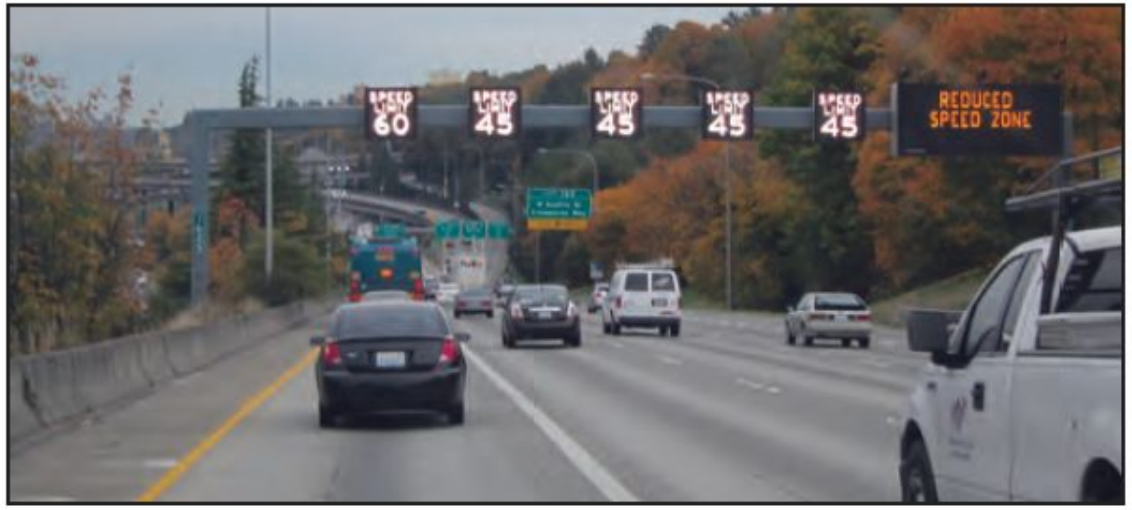
ATDM - Need at TBTA Facilities

Active Traffic & Demand Management

- ATDM is the dynamic management, control, and influence of **traffic demand**, and **traffic flow** at transportation facilities (FHWA).
- The **traffic flow** is managed, and traveler behavior is influenced in real-time to achieve set objectives.
- Maximizing system efficiency, Improving safety, preventing traffic congestion
- ATM examples-Dynamic Lane use Control, Adaptive Ramp Metering , **Variable Speed Limits, Queue Warnings**
- ATM applied in Work Zone



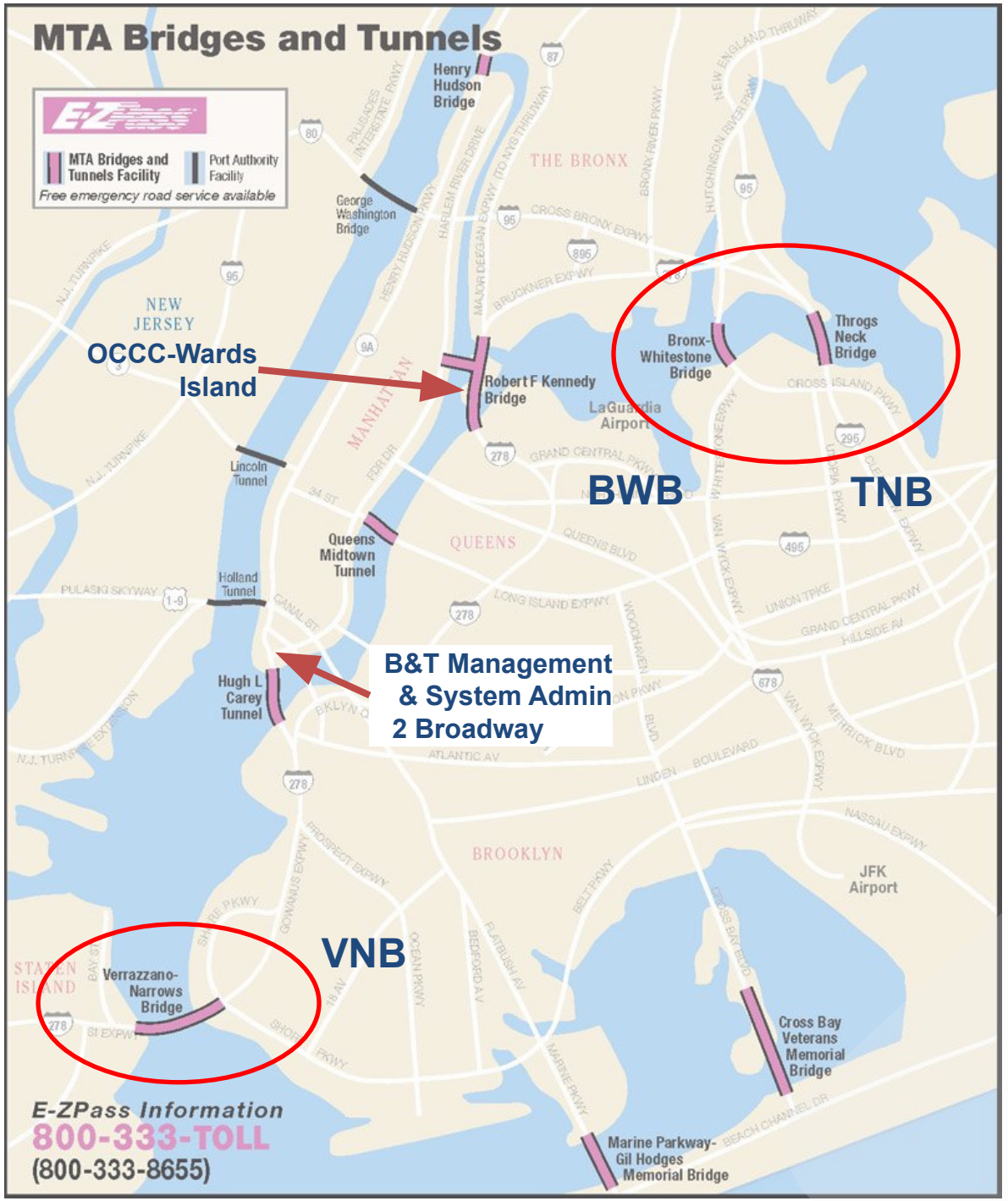
Source: FHWA



Seattle I-5 Northbound Active Traffic Management –
Source: Texas Transportation Institute

Need at TBTA Facilities

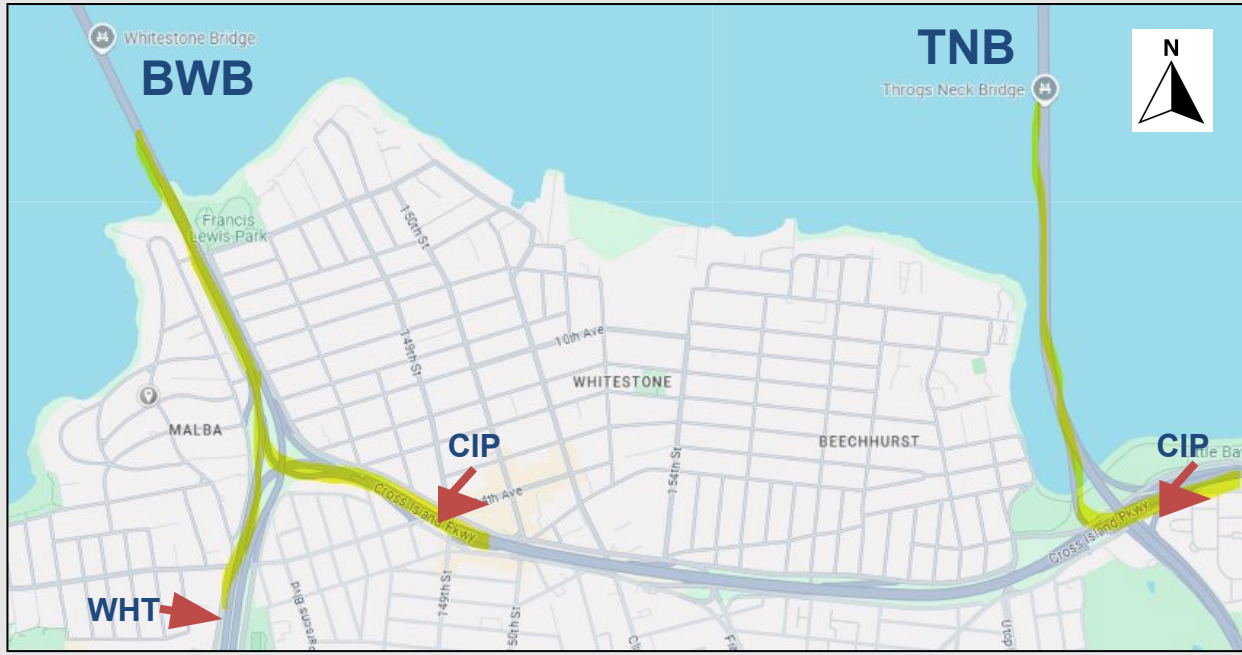
- Free-flow speeds post Open Road Tolling (ORT)
- Severe queuing on exit ramps, rear-end collisions
  - Off-property congestion
  - Ramp exit lane configurations
  - Restricted line of sight geometries
  - Last minute traffic weaving
- Static signing, lane marking changes have been made which reduced weaving conditions, but queuing is still prevalent.
- On-property congestion- disabled vehicle, random collision, weather, routine maintenance activity, planned lane closures.



Need at TBTA Facilities

- TNB: SB Right Exit to Cross Island Pkwy
- BWB: SB Right Exit to Whitestone Expressway and **Left Exit** to Cross Island Pkwy
- VNB: Left Exit to Belt Pkwy
- **Active Traffic Management**

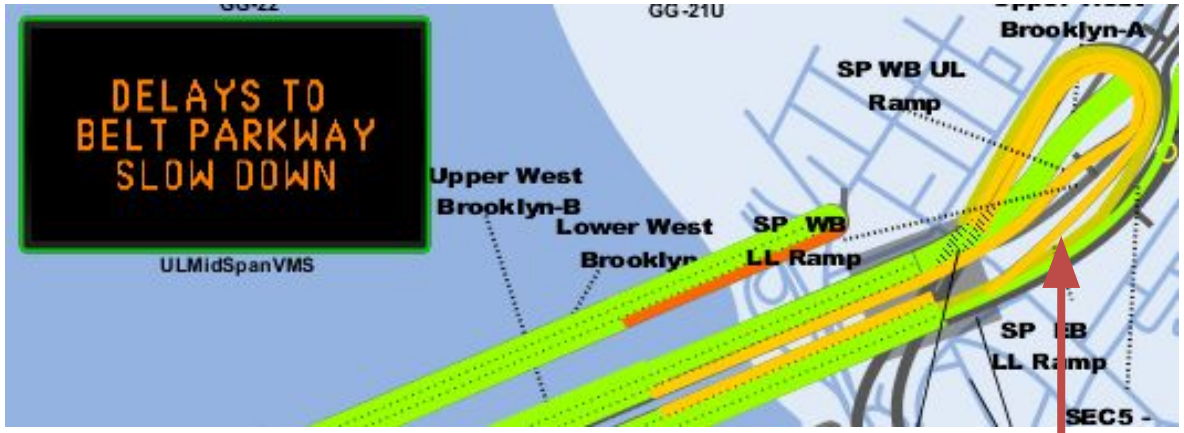
  - Queue Warning & Variable Speed Limits



Proof of Concept Testing

Proof of Concept – Queue Warning

- **VNB**
  - Installed new VMS at midspan.
  - Used existing TRANSMIT link travel time (TT).
  - Incorporated scripts in ATMS to activate alert message based on link average speeds.
  - Posted message on VMS using ATMS.
  - TT updates of 5 minutes were not sufficient.



VNB E Bklyn Gantry U/L – Belt Pky Gantry (35 MPH)

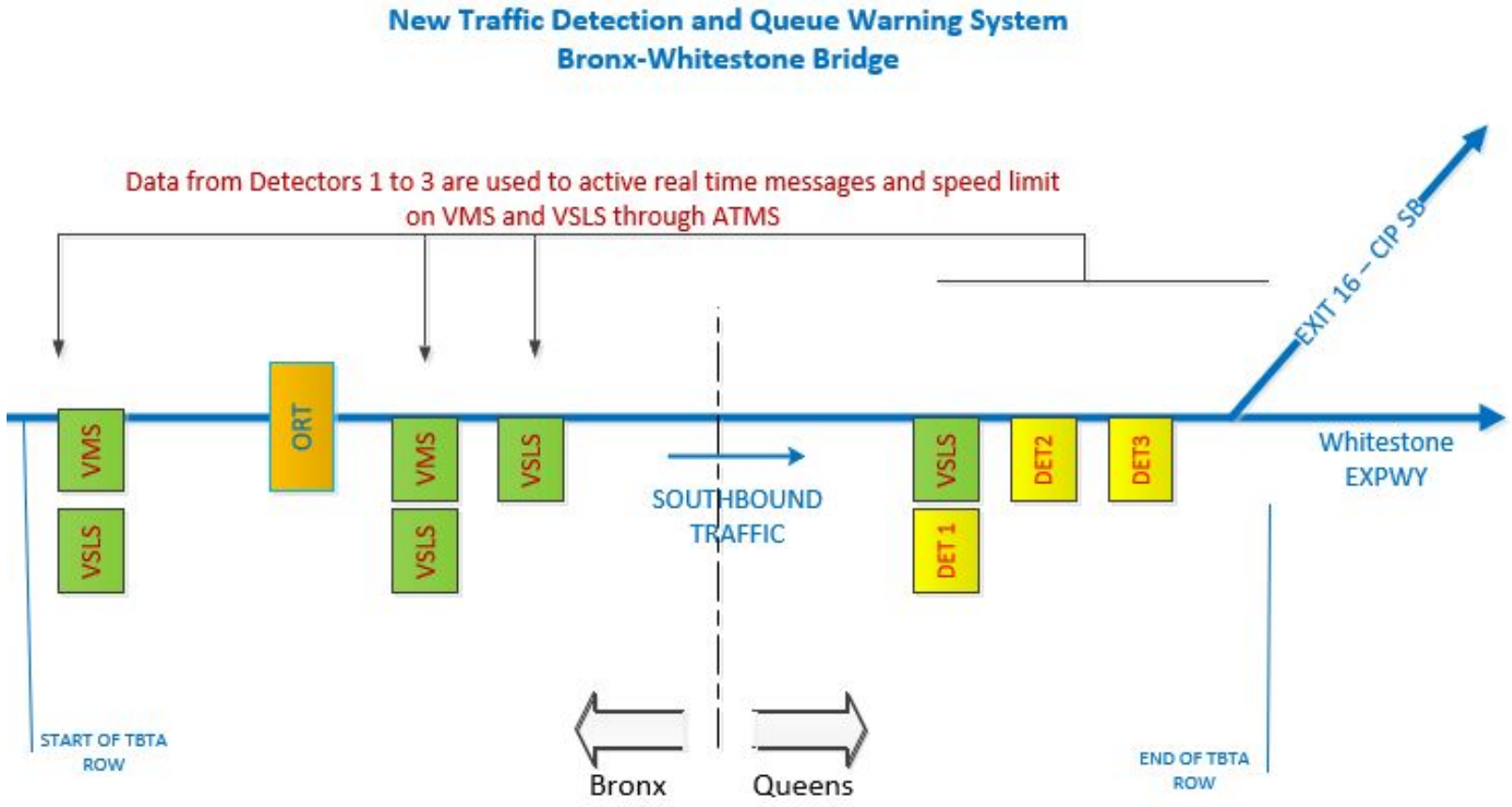
- **BWB**: Used iCones for speed data, Portable VMS and iCone server (cloud based) for sign activation

- Need targeted zone and lane specific data
- Need targeted video surveillance
- Need real time data (<30 sec) to reduce response time

Project Design and Construction

Queue Detection & Warning

- Implemented at BWB, TNB and VNB
- Series of roadway detectors and CCTV cameras at queuing and weaving areas
- Processing of data by central ATMS
- Advance notification using overhead VMS (roadway conditions) and VSLS (recommended speed limits)
- Remote monitoring, alerts and reporting
- Remote device configuration and troubleshooting

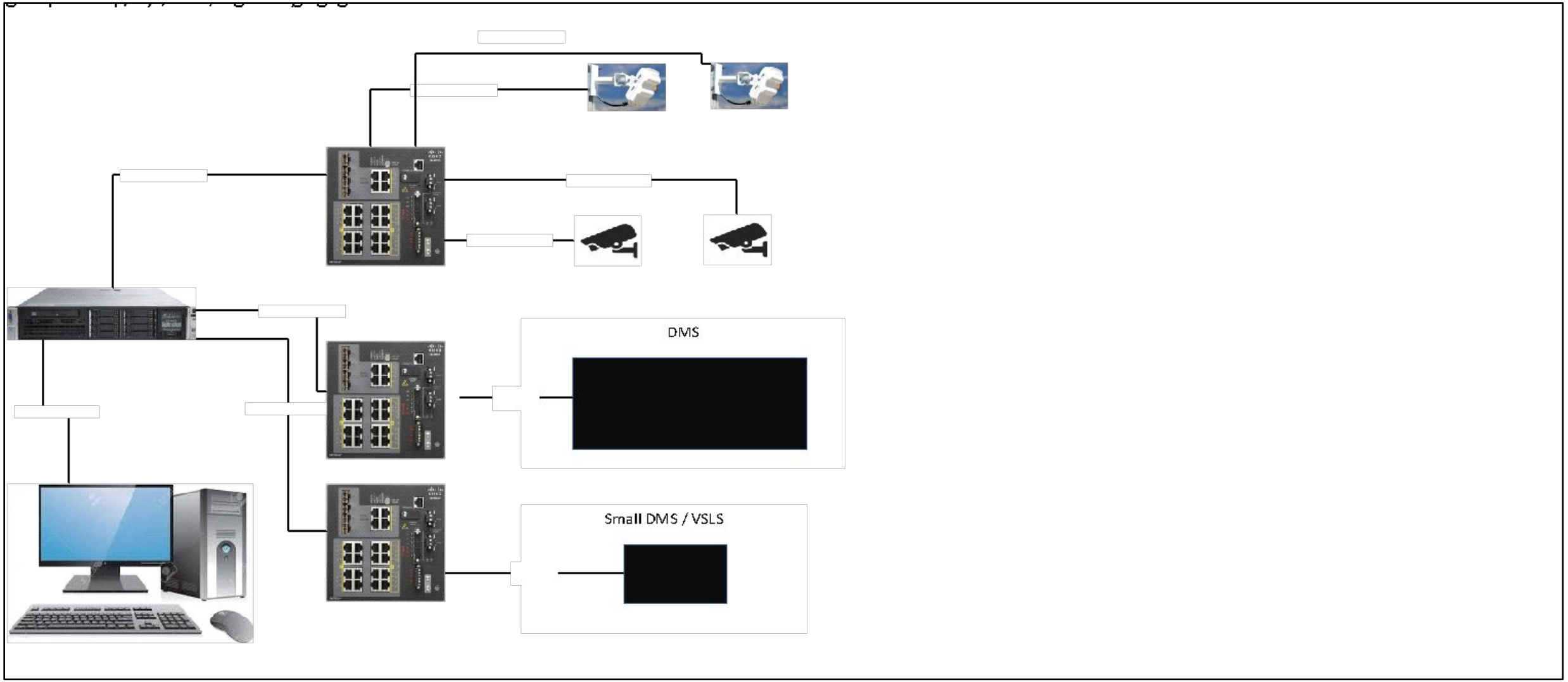


Variable Speed Limit Signs

- VSLS implemented at TNB and BWB
- VSLS can mitigate **rear-end,** sideswipe, and other crashes on high-speed roadways.
- Effective on urban freeways with posted speed limits > 40 mph (TNB: 45 mph, BWB: 40 mph).
- Integrated to facility ATMS
- Implemented as an **advisory** system-Sign is not regulatory
- Applied to an entire roadway segment.
- Messages using full color signs may improve driver reaction time.

Source: FHWA

Queue Detection & Warning System



System Components

- Mature technology, commercially available
- All IP based devices and ability to integrate with ATMS
- Remote device configuration and troubleshooting
- Support remote firmware upgrades

Microwave Vehicle Detector

Small footprint, minimal power required
Real-time point speeds, occupancies and volumes
Performance with small offsets
Calibrated one time on-site

Fixed CCTV

Small footprint, minimal power required
Ability to also integrate with TBTA video management systems
Serve three purposes:
1. Video analytics software at the edge
2. Visually confirm radar calibration
3. Video monitoring to confirm alerts

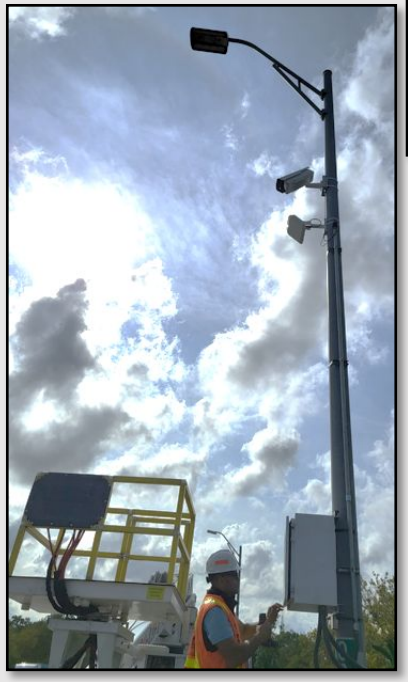
VMS & VSLS

Meets Authority-wide VMS specification:
Full-color, full-matrix, LED, 20mm pitch, NEMA TS-4, NTCIP.
Supports TBTA Maintenance Procedures:
One controller per VMS
Three Sizes:
Full Size VMS (24’x7’)
Mid Size VMS (20’X7’)
Small (5’x5’) VMS used as VSLS

Project Construction

- Standard TBTA construction contract procurement- Not suited to small ITS deployments.
- Savings by breaking the project into components:
  - Design - TBTA ITS On-Call consultant.
  - VMS & VSLS – Procured through NYS OGS
  - CCTV - Procured through a bid
  - Radar Detectors, Network Switches, Control cabinets:

    RFP, bid to furnish, configure, test, and warranty.
  - On-site installations - TBTA Central Maintenance
  - Integration - TBTA ITS staff, On-call ATMS vendor.
- There is no GC or CI: Functions provided by TBTA ITS staff

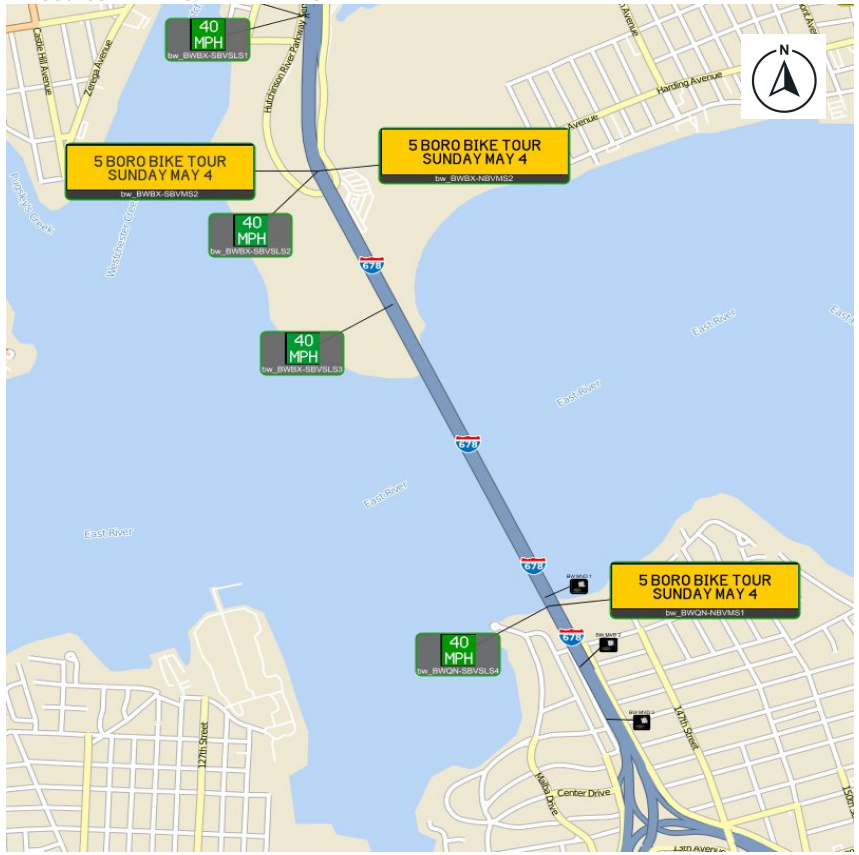


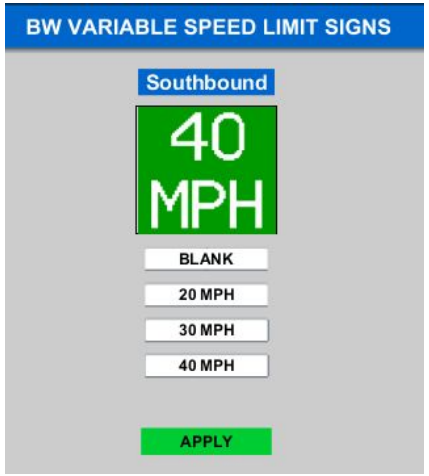
Project Integration & Commissioning

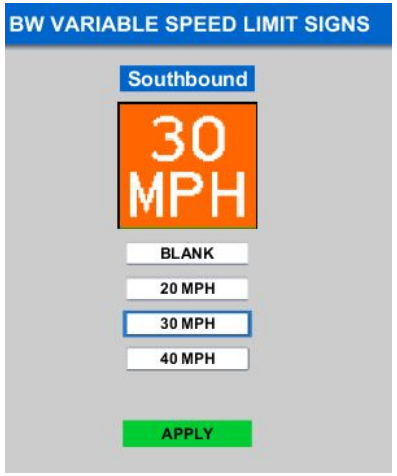
BWB ATMS

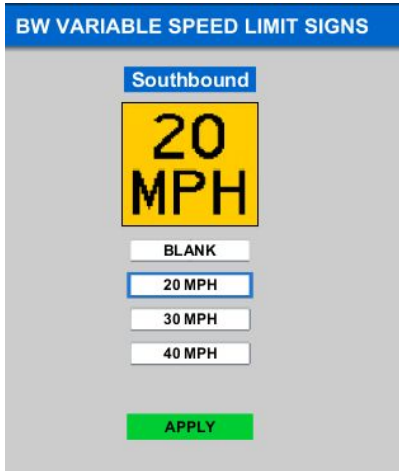
- Queue detection, warning and VSLS integrated to facility ATMS
- (4) Small Full Color VSLS in SB direction
- (3) MVD Stations in SB direction
- Live data view & system status
- Pre-set VMS messages for roadway conditions
- Operator (TMC) can create new messages
- Pre-set variable speed limits for the facility in SB direction
- Operators confirm vehicle speed through MVD & CCTV
- Manually select suggested reduced speeds.
- Activation of VSLS signs can also be automated.

Source: MTA B&T BWB ATMS

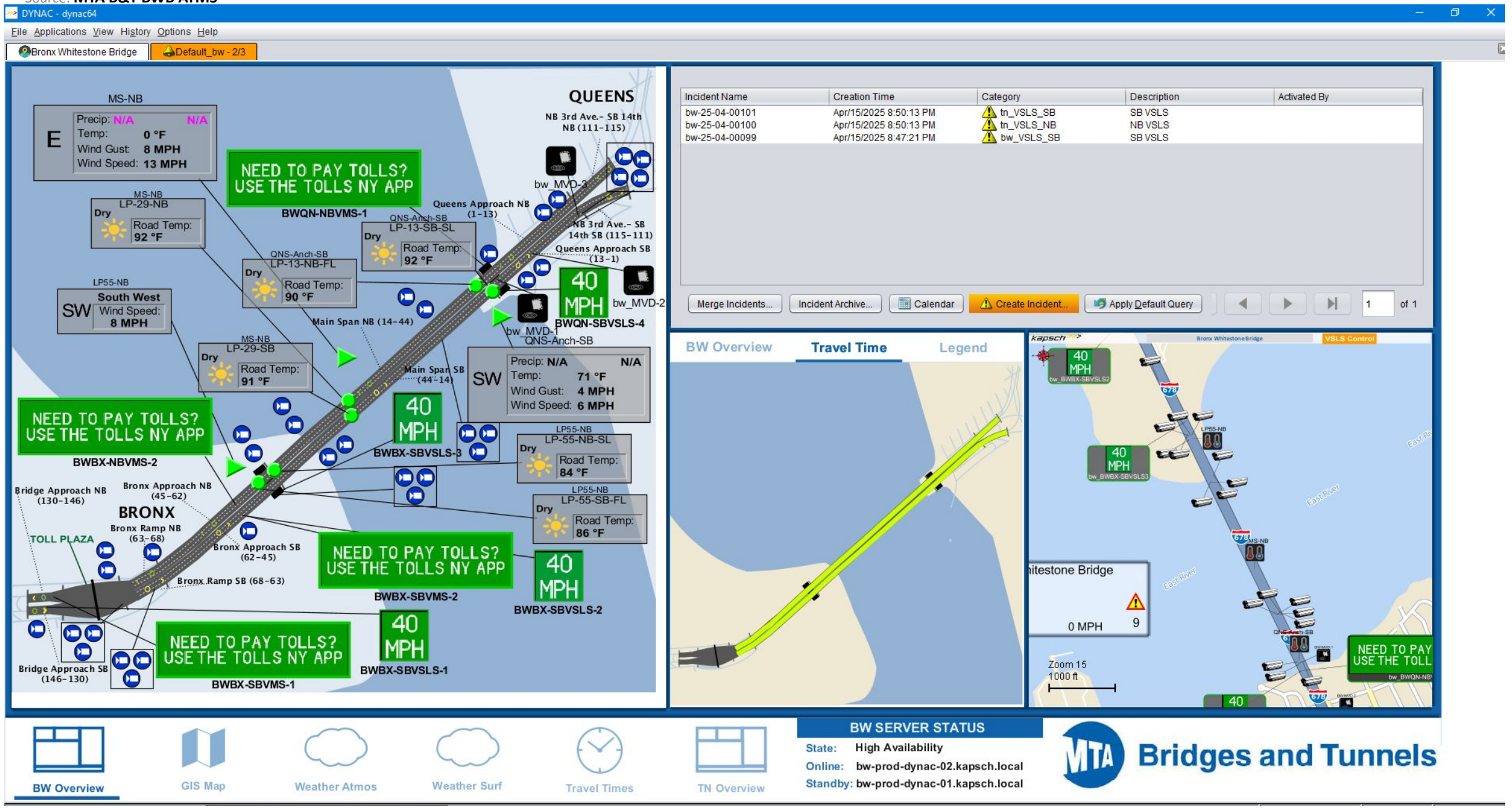








Source: **MTA B&T BWB ATMS**



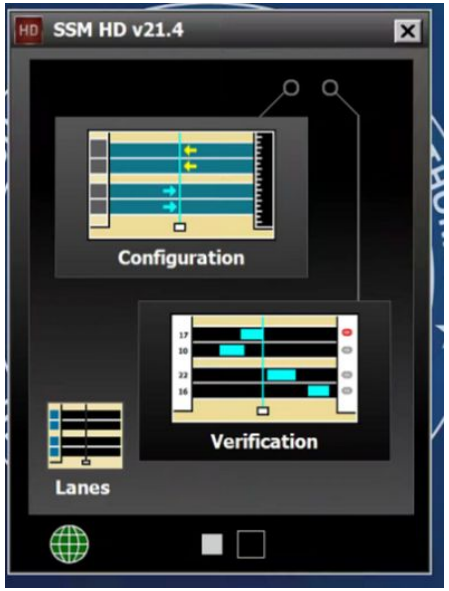
VMS & VSLS Warning Messages

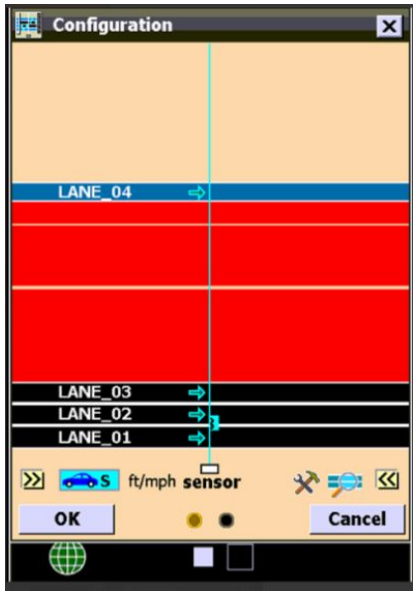
BWB

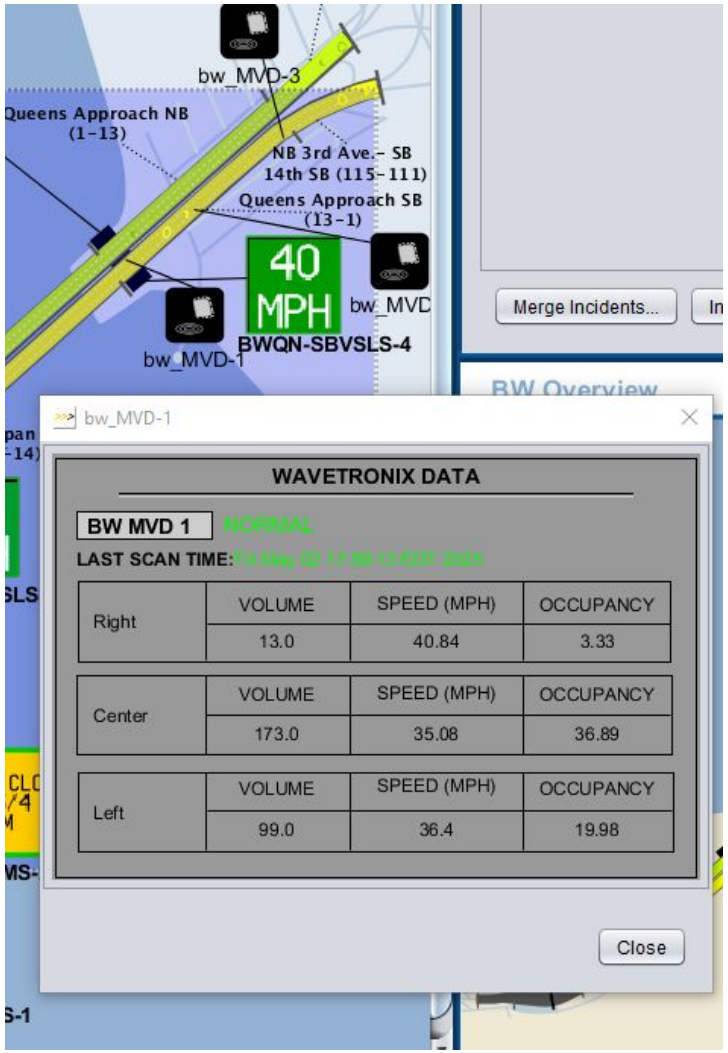
TNB

Radar Detector

- Onsite Calibration
- Remote verification
- Point Speed, Volume and Sensor Occupancy
- Radar interface and ATMS interface
- Point speed is used to determine congestion

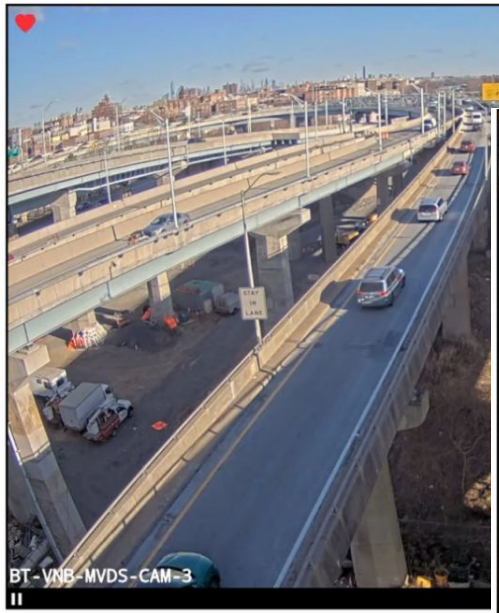


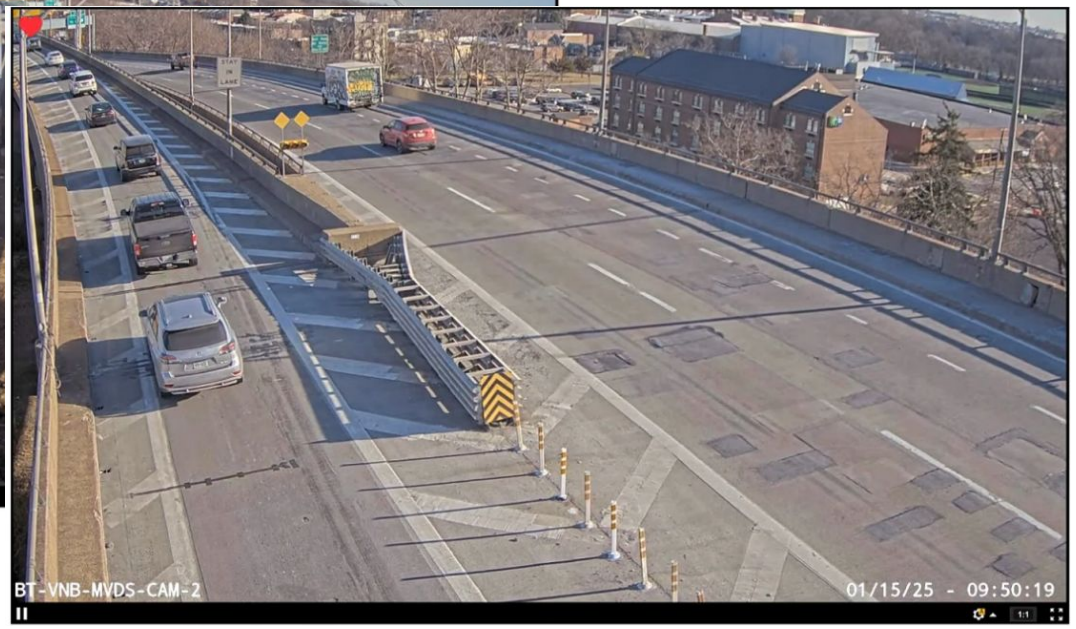




Radar Camera

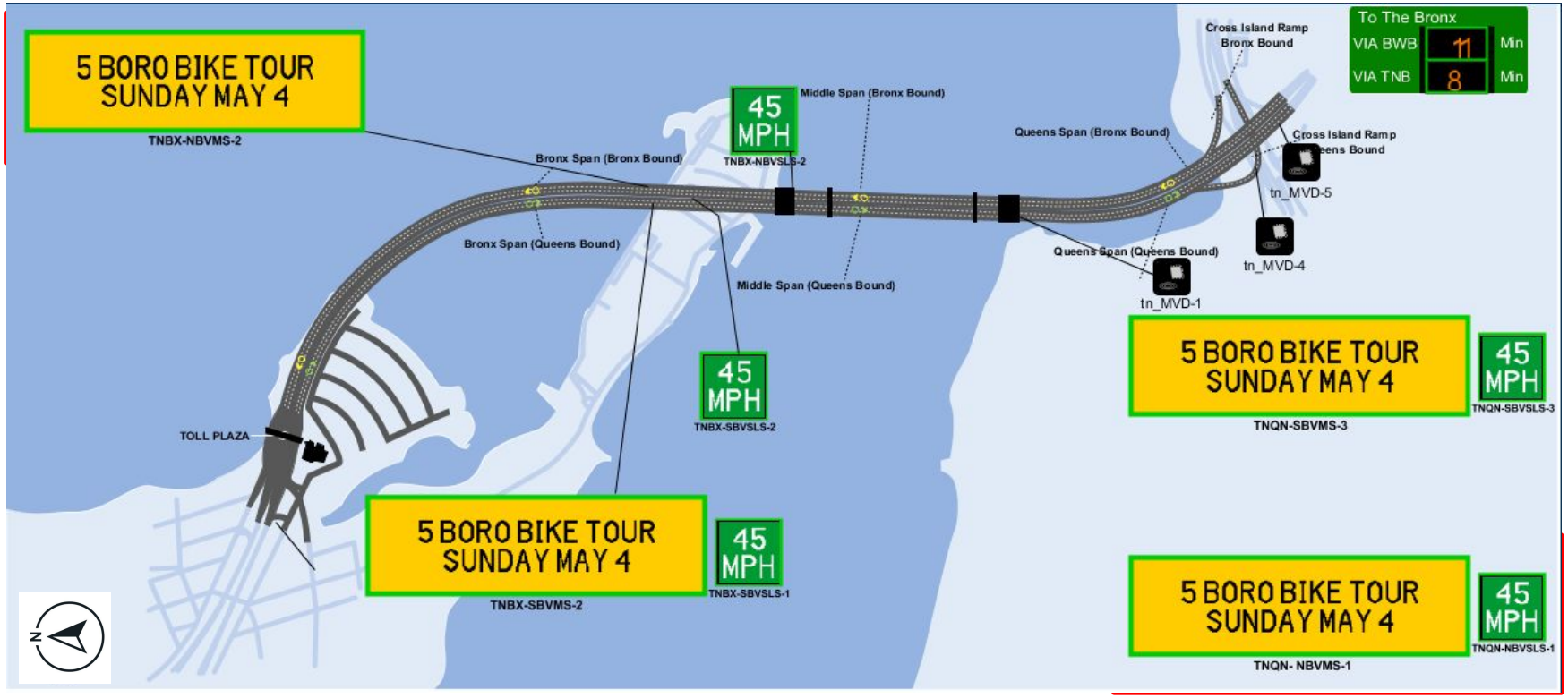
- Visually confirm congestion
- Confirm radar orientation & check calibration
- Access via Camera Manager Utility Tool
- Traffic Data Collection- Speed data
- Compare performance of Radar detector and act as back up





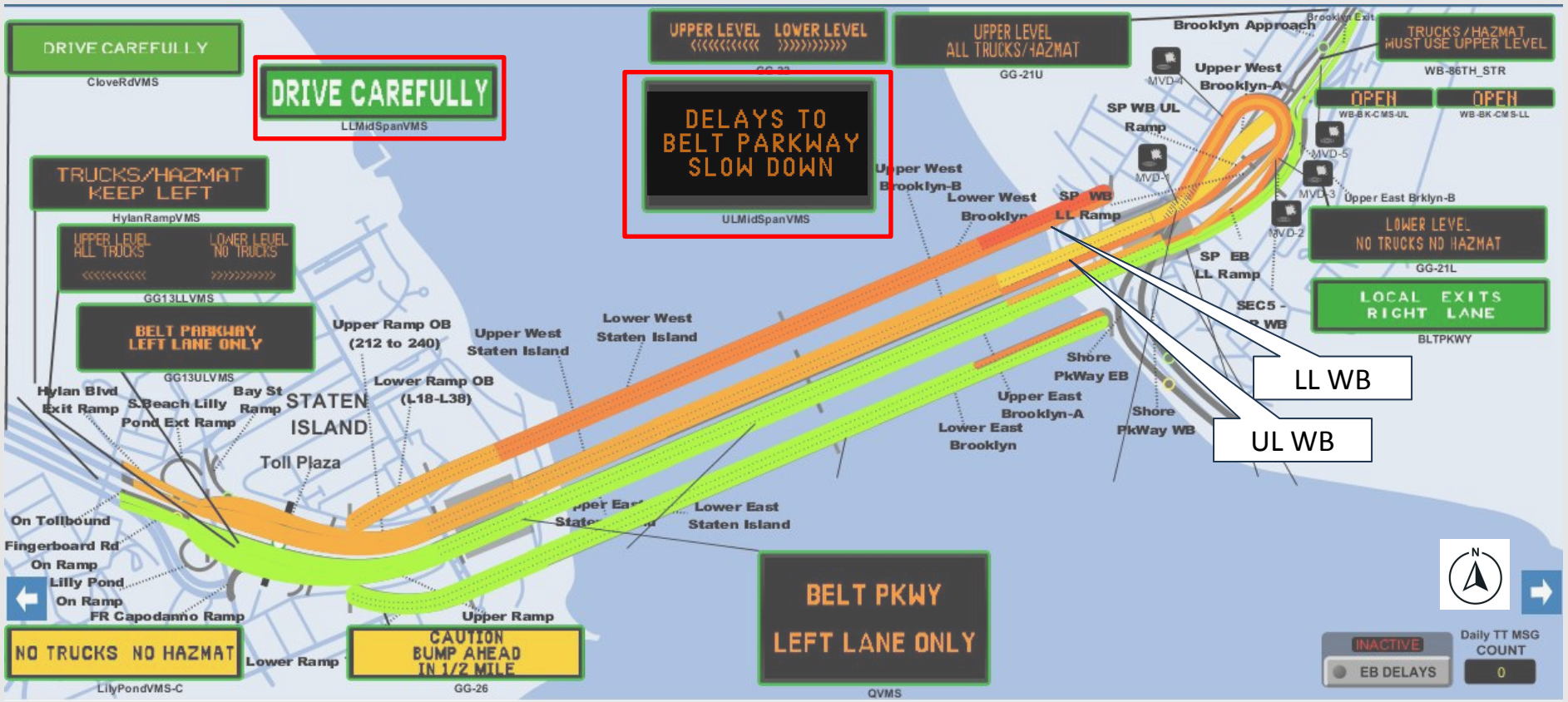
TNB ATMS

- Queue detection, warning and VSLS integrated to facility ATMS
- (3) VSLS in SB direction
- (3) Detectors in SB direction
- (2) VSLS added in NB direction as well to help with lane closures & construction activity.



VNB ATMS

- Queue Detection & Warning integrated to facility ATMS
- (5) Detector Stations on Belt Pkwy Exit ramp
- Existing VMS units on UL and LL used for warning for Belt Pkwy Exit delays



Questions

- What are the four components of ATDM?
- What are the two ATM systems deployed at MTA Bridges & Tunnels?
- What is biggest benefit of using VSLS?
- What kind of data is provided by the Radar Detector?

Thank You

Questions?
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