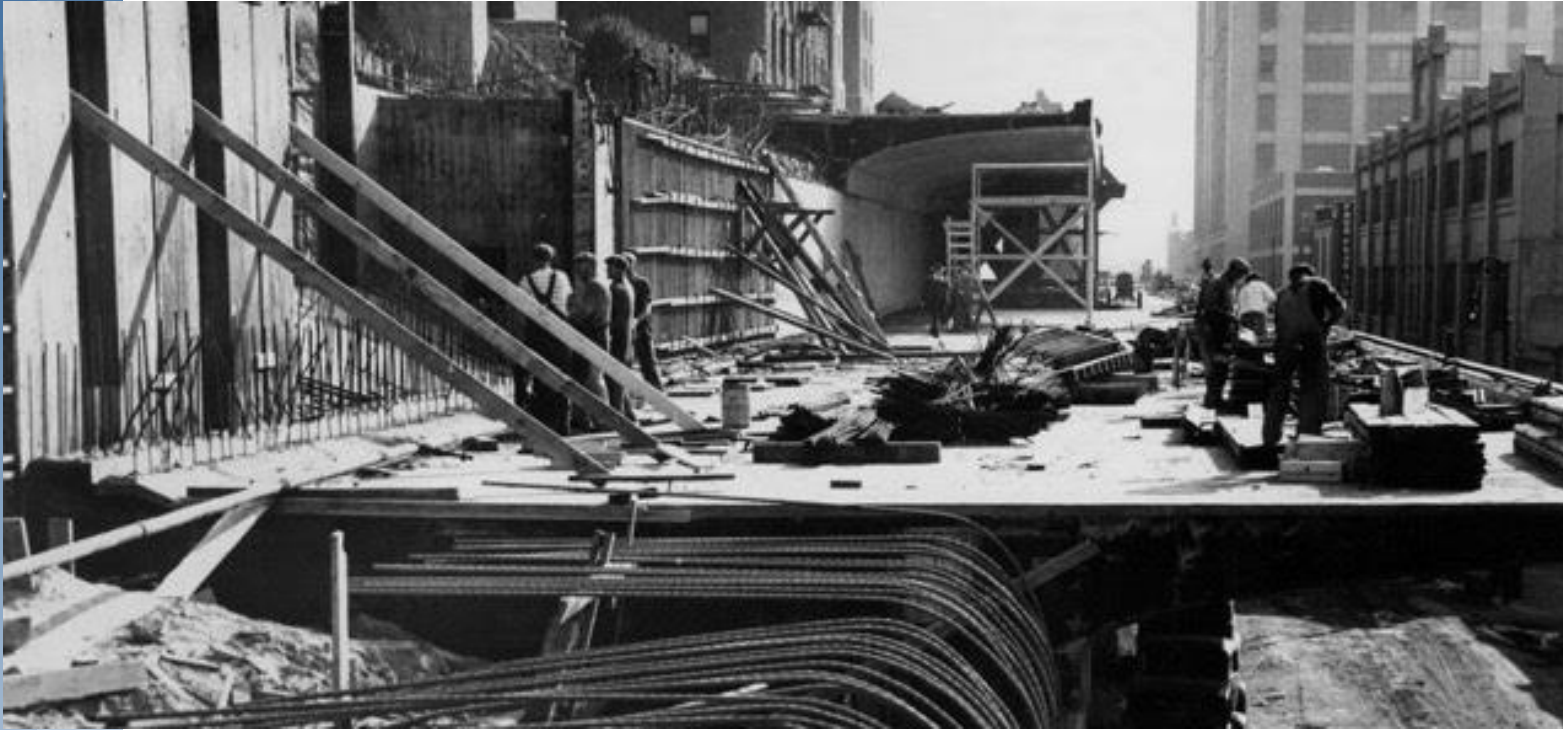




NYMTC Brown Bag Series - Wednesday, December 10, 2025

IMPLEMENTATION OF WIM SYSTEMS FOR DIRECT ENFORCEMENT OF WEIGHT LIMITS



Tanvi Pandya, P.E., DBIA Executive Director, DB & Emergency Contracts/Bridge Division



- Challenge
- BQE Example
- Implementation of Direct Enforcement
- Conclusions & Next Steps



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TRIPLE CANTILEVER DESIGN **JV**



THE PROBLEM

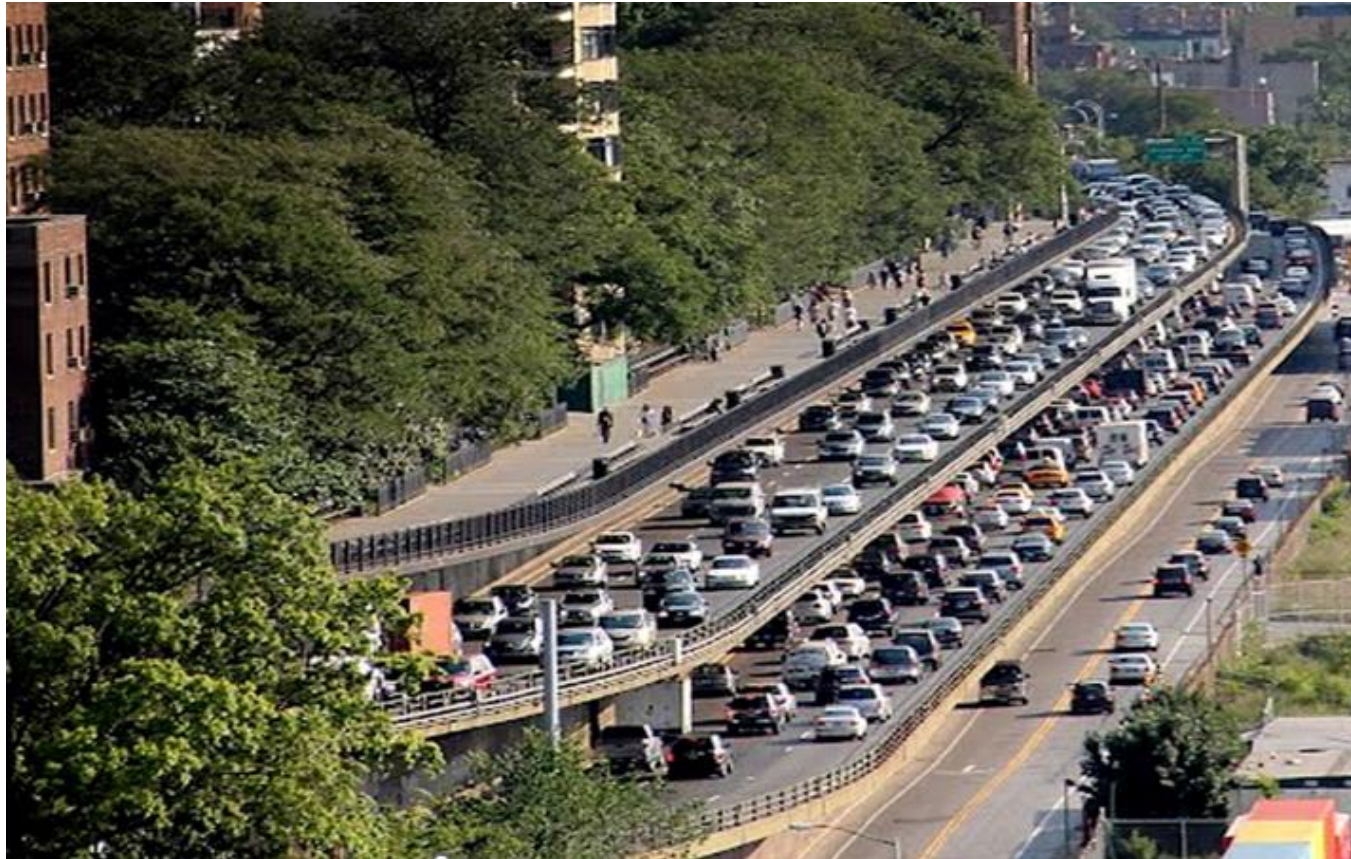
Public agencies face an increasingly complex challenge:

Managing aging infrastructure under demands that far exceed original design expectations with **extensive (and often, uncertain) timelines** required to fund, design, and implement major rehabilitation or replacement projects.

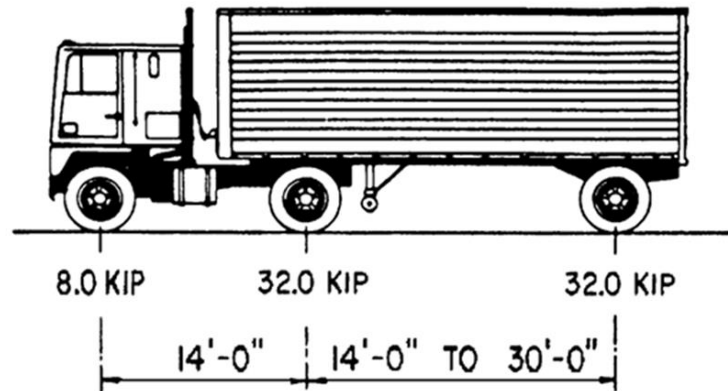
In addition to the operational demands, agencies are also looking to meet sustainability and safety goals.

BQE EXAMPLE

The BQE is one of the most heavily traveled roadways in New York City, and beyond, with an average daily volume of **130,000 vehicles**, including up to 13,000 trucks:



Key freight route: peak volume of up to 1,100 trucks per hour (500-600 per direction) during weekday mornings.



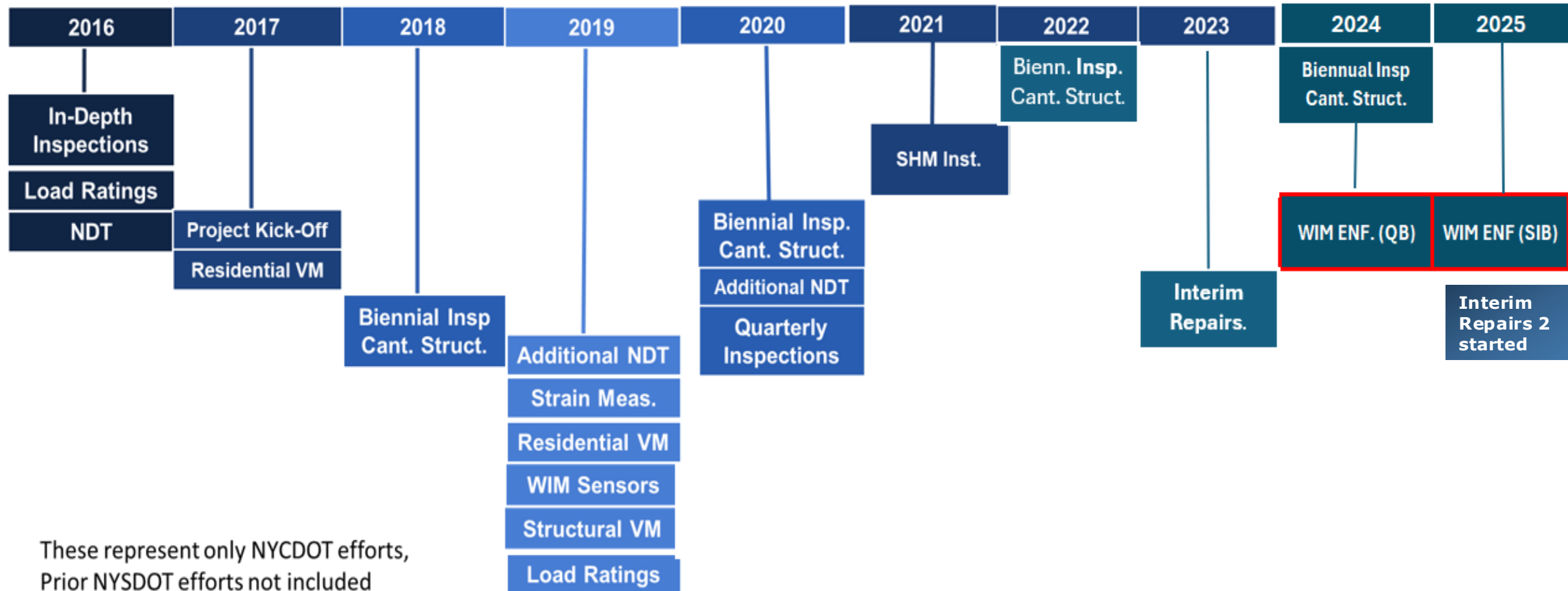
Original Engineering Parameters

- Based on A.A.S.H.O. 1941 Specifications
- Designed and constructed – 1948 - 1954

Vehicular Loading	H20-16
Pedestrian Loading	100 {SF
Soil Loading	30 PCF
All. Concrete Strength	3000 PSI
All. Steel Yield Strength	18 KSI
Pile Capacity	30 Ton Comp.

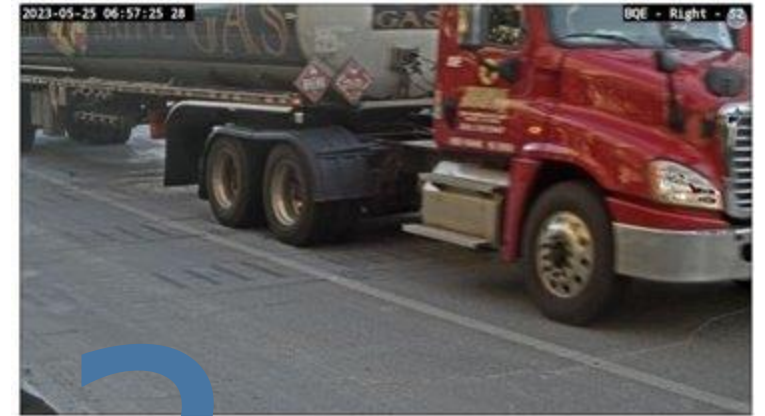
BQE STRUCTURAL ASSESSMENT

BQE Health Monitoring efforts have been on-going since the Project Kick-Off in the Fall of 2017



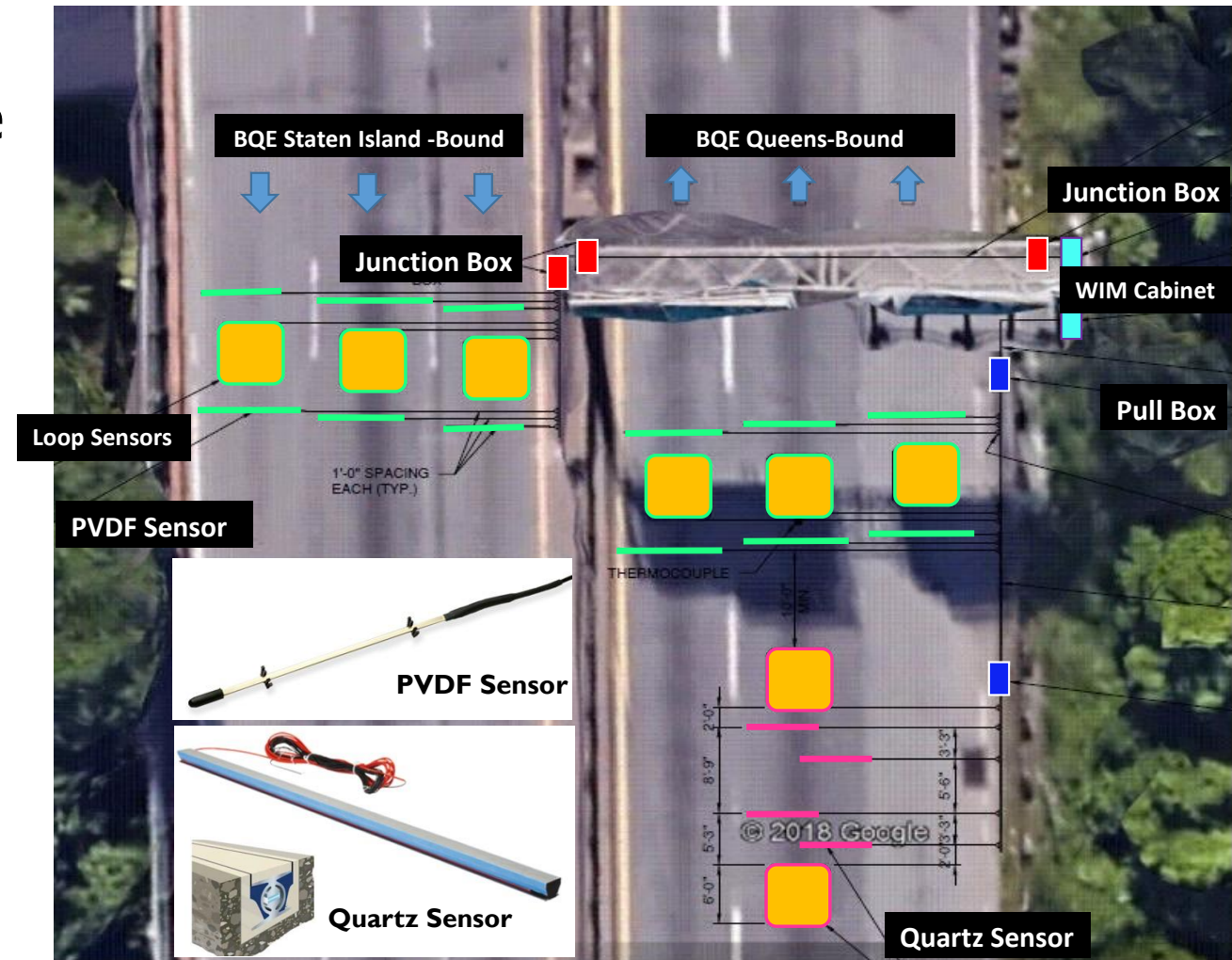
BQE Truck Weight Design & Legal Load

- As BQE Central approaches end of useful life, data collection related to material capacity led to enforcement efforts and the loads on the structure to develop true picture
- NYS legal load is significantly higher than structure's designed load, and proliferation of overweight trucks continues
- So the question arose, what is the actual live load?



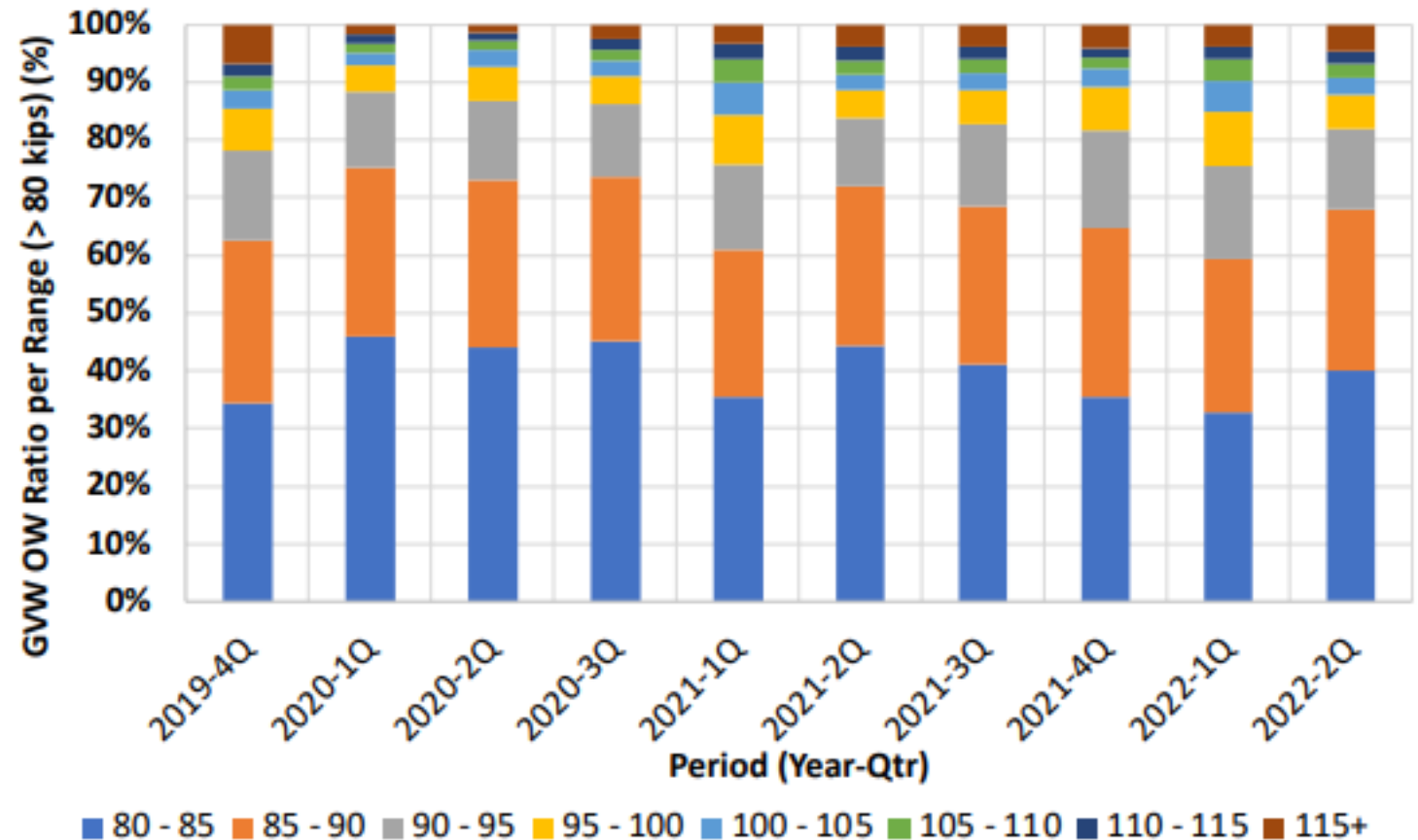
Pilot Study: WIM installed on the BQE

- One QB lane: **Quartz Sensor**
- Remaining Lanes: **PVDF Sensors**
- Installation completed in 2019 with C2SMART/Rutgers Team involved in related research with FHWA on sensors
- Analysis including site-specific live load factors for LRFR provided by Rutgers/C2SMART Team



Breakdown of Gross Vehicle Weight Violations

- Roughly 40% of OW, GVW between 80,000 – 85,000 lbs
- Roughly 30% of OW GVW between 85,000 – 90,000 lbs
- Remainder of OW GVW over 90,000 lbs, with GVW as high as 120,000 lbs
- OW percentages stay relatively constant, with only minor fluctuations



Comparison of Load Factors

Staten Island-Bound

LRFD Rating	HL-93	Site-Specific	% Increase
Inventory	1.75	2.13	22%
Operating	1.35	1.68	24%

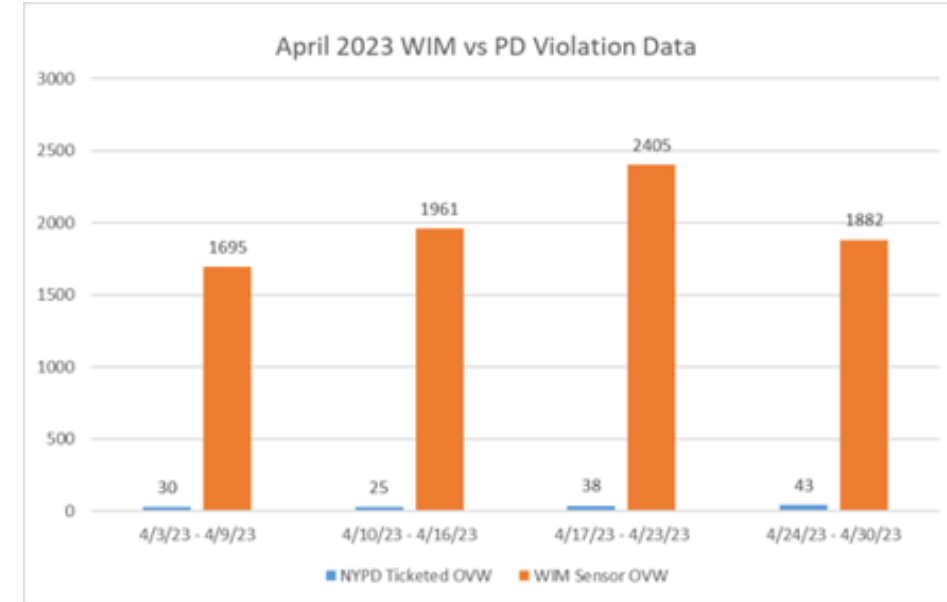
Queens-Bound

LRFD Rating	HL-93	Site-Specific	% Increase
Inventory	1.75	2.31	32%
Operating	1.35	1.83	36%

BQE Truck Weight Limits Enforcement-Traditional

- **Enforcement:** Executive Order 51 issued in January 2020 to provide for strict enforcement of existing weight restrictions on BQE
- **Following the Executive Order, the following notification was sent to all permit holders**

"To all who currently have a valid NYC DOT Annual Overweight Load and or Annual Special Hauling / Crane permit, Vehicles with NYC DOT Annual Overweight Load and or Annual Special Hauling / Crane permits **are NOT permitted** to travel on the BQE / I-278 from Sands St. to Atlantic Avenue in both directions until further notice."
- New York City's highway network presents operational challenges to law enforcement personnel with limited available space to safely conduct truck stops.



Less than **2% of overweight trucks** identified along the BQE corridor by NYPD using portable scales

IMPLEMENTATION OF DIRECT ENFORCEMENT

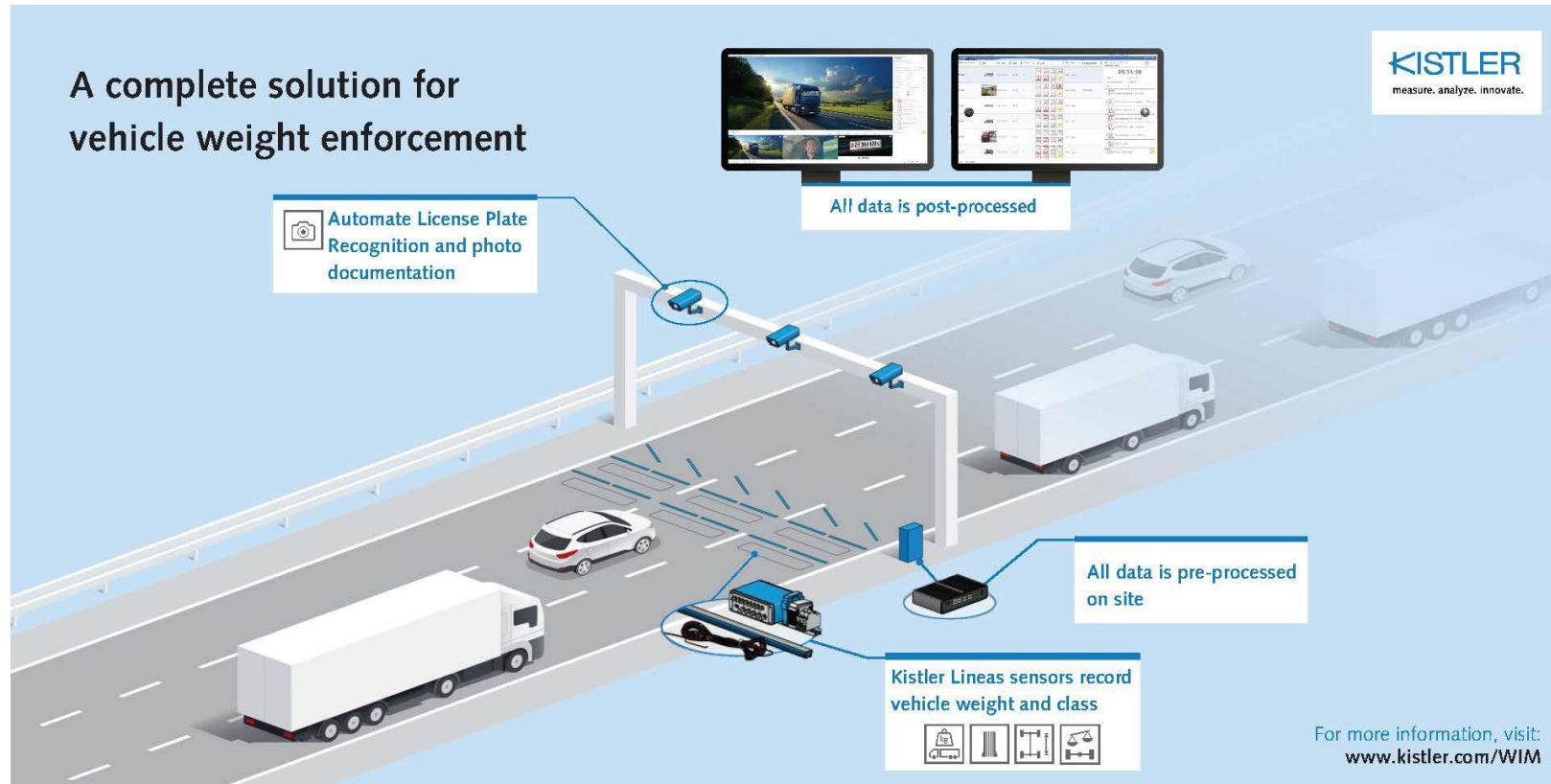
NYS Legislation Overview

Amended in 2023: S6246/A6225

Dec 23, 2021	APPROVAL MEMO.151	Approved.
Dec 22, 2021	SIGNED CHAP.773	
Dec 10, 2021	DELIVERED TO GOVERNOR	
Jun 08, 2021	Returned To Senate Passed Assembly Home Rule Request Ordered To Third Reading Rules Cal.536 Substituted For A2316a	
Jun 03, 2021	Referred To Codes DELIVERED TO ASSEMBLY PASSED SENATE HOME RULE REQUEST	
May 24, 2021	AMENDED ON THIRD READING 2740B	
Apr 26, 2021	ADVANCED TO THIRD READING	
Apr 21, 2021	2ND REPORT CAL.	
Apr 20, 2021	1ST REPORT CAL.707	
Apr 08, 2021	PRINT NUMBER 2740A	
Apr 08, 2021	AMEND AND RECOMMIT TO TRANSPORTATION	
Jan 25, 2021	REFERRED TO TRANSPORTATION	Introduced.

- Establishes a weigh-in-motion (WIM) demonstration program on I-278 in Kings County (Brooklyn, NY), imposing monetary liability for failure of an operator to comply with gross vehicle weight and/or axle weight restrictions; and
- The installation and operation of up to (16) sixteen weigh-in-motion violation monitoring systems within the vicinity of the Atlantic Ave. interchange to Sands St.
- Calibration & Certification of Calibration Required every 6 months
- Violations**
 - GVW at least **10%** above gross vehicle weight restrictions
 - FHWA GVW Limit = 80 kips or Federal Bridge Formula
 - Axle/Tandem weights at least **20%** overweight restrictions
 - At least two independent weight measurements obtained by the WIM monitoring system

Sample System Configuration: Followed the legislative requirements for evidentiary package & code requirements – QB system installation in October 2022



The related system programming completion along with administration platform development completed in summer of 2023

Big Step Forward:

- **What elevates this WIM system beyond traditional monitoring tools?**

its integration with automated enforcement workflows.

- As vehicles pass over the sensors, the WIM system captures axle loads, GVW, speed, and axle configuration & identified violation in real time.
- Simultaneously, high-resolution cameras capture license plate images and vehicle characteristics,
- The combined information is transmitted to trained NYCDOT personnel, who verify that a violation has occurred.

System Configuration

- Well-suited for low & varying speeds of urban traffic. Provides two independent weight readings along with time stamps per vehicle.
- Accounts for accuracy need in varying conditions
- Enables the measurement of axle loads, gross vehicle weight (GVW), axle spacing, and vehicle speed as vehicles travel at or near highway speeds
- **The first in the United States designed and certified specifically for direct enforcement of overweight violations on a public roadway.**
- WIM systems must be calibrated and recertified every 6 months by the NYS Department of Agriculture and Markets.

Calibration & Certification – Technical Considerations

State Department of Agriculture typically certifies all commercial as well as enforcement equipment using NIST Handbook 44 Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

- Existing NIST Handbook 44 currently has a tentative code for screening of vehicles
- ASTM 1318:
 - Type IV system potentially for automated enforcement for speeds of 2 – 10 mph.
 - The Type III system is defined as a system to be used for screening for weight violations only
- OIML R134-1: A comprehensive existing standard available for reference
- August 2022 Formal effort for update of NIST Handbook 44 to address code for direct enforcement

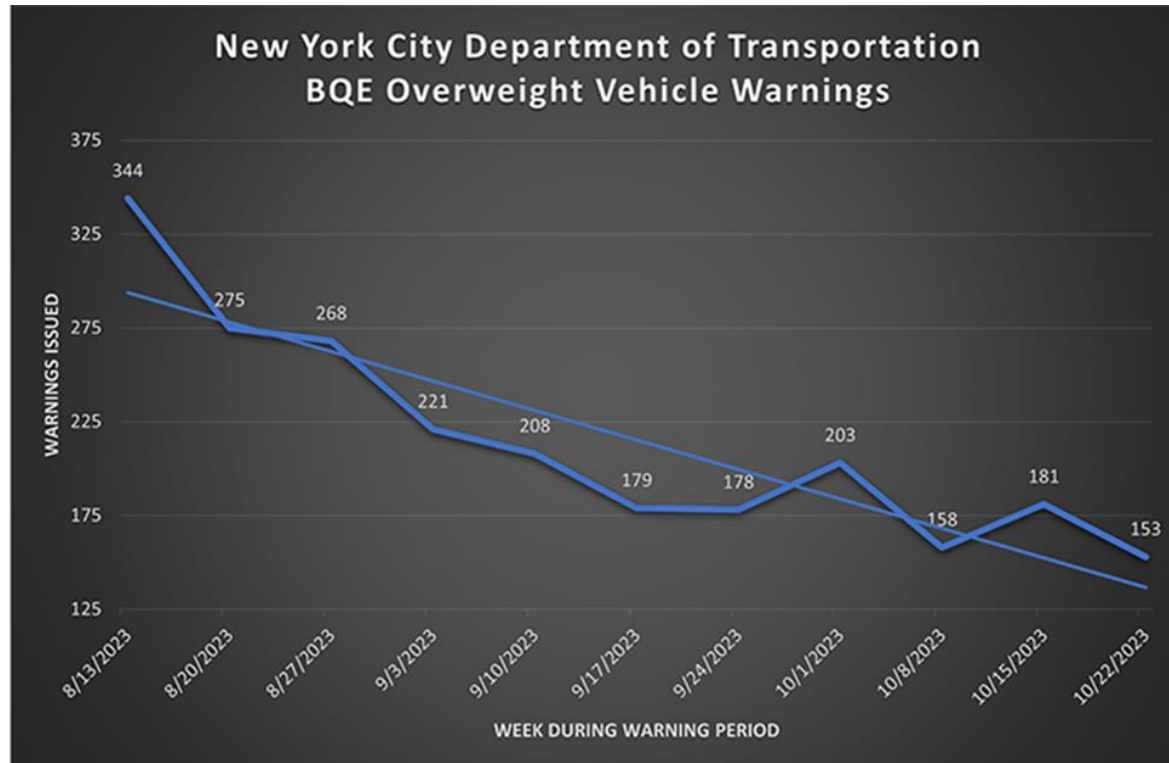
NYCDOT entered a MOA with NYS Dept of Agriculture to certify the system as a pilot. They have the authority to test/certify equipment outside of the handbook guidelines.

Until the handbook is updated, they will use the most recent version of the proposed standard under consideration with national weights and measure for handbook update

- Calibration certification performed in accordance with the proposed amendment to NIST Hand-book 44, which outlines procedures for certification of equipment used legal weight measurements.
 - Diverse fleet of six calibration trucks selected, with known wheel and gross weights verified using certified scales for reference.
 - Each vehicle passed over the sensors multiple times at varying speeds to meet statistical requirements
- **Following successful testing, the New York State Department of Agriculture and Markets certified the site, authorizing NYCDOT to issue violations based on WIM overweight.**

Warning Period

- QB direction
 - 90-day warning period began on **August 10, 2023** ended on **November 8 2023**.
- Warning notices did not carry a fine and will not accrue points or any other liability on vehicle registration.





New York City Department of Finance
Weigh-In-Motion Enforcement Program
PO Box 3641 Church Street Station New York,
NY 10008-3674

W
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M

WARNING NOTICE

Owner's Name
Owner's Address
City, State, Zip

PLEASE TAKE NOTE: In accordance with New York State Vehicle and Traffic Law section 385-a, the photographed vehicle has been detected by the NYCDOT Weigh-in-Motion violation monitoring system located on that portion of Interstate Route 278 (also known as the Brooklyn-Queens Expressway) specifically from the vicinity of Atlantic Avenue to the vicinity of Sands Street in Kings County (Brooklyn), NY traveling:

- at least 10% above the gross vehicle weight limit (80,000 lbs.) at the above stated date and time.

	Gross Vehicle Weight Measured
Sensor Set 1	
Sensor Set 2	

This is a Warning Notice.

There are no penalties associated with this Notice.

There are no points associated with this Notice.

No response or action is necessary.

Please be advised that Weigh-in-Motion violations may subject you to a fine.



Violations

- Violations began to be issued on November 14, 2023(QB), June 2025 (SIB); overweight trucks captured on the BQE WIM system will be subject to a \$650 fine per violation.
- Separate violations can be issued for exceeding both axle/tandem and gross weight

Each violation reviewed by NYCDOT personnel to ensure integrity of package

New York City Department of Finance
Weigh-In-Motion Enforcement Program
PO Box 3641 Church Street Station
New York, NY 10008-3641

**NOTICE OF LIABILITY / CERTIFICATE
CHARGING THE LIABILITY**



View your records online at
www.wimviolations.nyc.gov

NOTICE #: 4500 [REDACTED]

PIN: 8839

#BWCFGHJ
#4500 [REDACTED]

PLEASE TAKE NOTE:

In accordance with New York State Vehicle and Traffic Law section 385-a, the photographed vehicle has been detected by the NYCDOT Weigh-in-Motion (WIM) violation monitoring system located on that portion of interstate route 278 (also known as Brooklyn-Queens Expressway) specifically from the vicinity of Atlantic Avenue to the vicinity of Sands Street in Kings County (Brooklyn), NY traveling: at least 20% above the axle weight limit (22,400 lbs. for a Single Axle and 36,000 lbs. for a Tandem-Axle) at the stated date and time.

You are liable to pay a monetary penalty for the amount shown. This amount is due within 30 days of the date of this Notice. Photographs evidencing the plate and violation are shown. Please see the additional pages of this Notice for further instructions.

ISSUE DATE: 11/14/2023 DUE DATE: 12/14/2023

VIOLATION DATE	VIOLATION TIME	FINE AMOUNT
11/13/2023	01:36:06 AM	\$650.00
LOCATION EB BQE (I-278) MP 2.9 Lane 2; Interstate route 278 specifically from the vicinity of Atlantic Avenue to the vicinity of Sands Street in Kings County, NY		
Axle Weights Measured (lbs.)		Maximum Axle Weight (lbs.)
Sensor Set 1: Tandem - 47,960 bs		Single Axle: 22,400bs; Tandem-Axle: 36,000lbs;
Sensor Set 2: Tandem - 49,460 bs		

There are no points associated with this Notice.



USDOT #
[REDACTED]

Make your check or money order payable to the
NYC Department of Finance

Detach and mail this coupon with your payment.

DO NOT MAIL CASH

Write on the front of your payment:
1) the 10-digit Notice Number
2) Your Plate Number
3) Your State of Registration
4) Your Rate Type

Insert this tear off coupon in the enclosed envelope.

NYC DEPARTMENT OF FINANCE
Weigh-In-Motion
Enforcement Program
PO BOX 3641
CHURCH STREET STATION
NEW YORK, NEW YORK 10008-3641



NAME [REDACTED]		AMOUNT DUE \$650.00	
NOTICE NUMBER 4500 [REDACTED]	VERSION 1	ISSUED 11/14/2023	DUE DATE 12/14/2023
PLATE NUMBER [REDACTED]	STATE US-NY	TYPE COMMERCIAL	WIM SYSTEM ID 870501

Enforcement: Violation Notice Requirements

Gross Vehicle Weight Violations

- Date and time of violation
- License plate photograph
- GW Measured per sensor set
- Allowable maximum Weight per bridge formula
- Link to website for view record online
- NOL issued to Owner / Responsible Party (Rental)

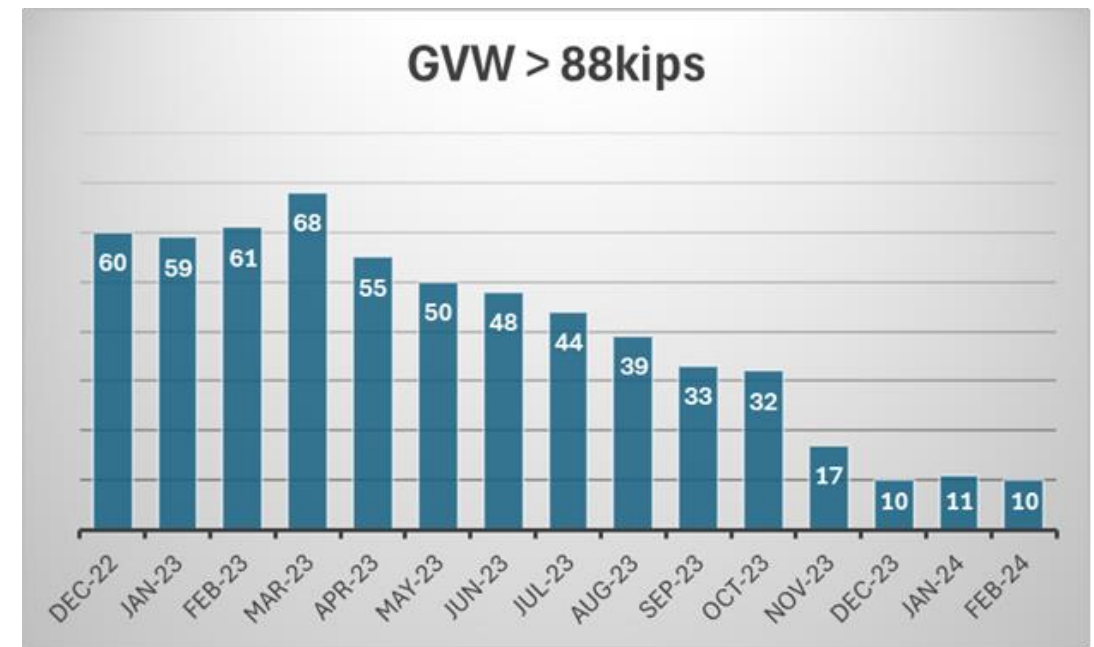
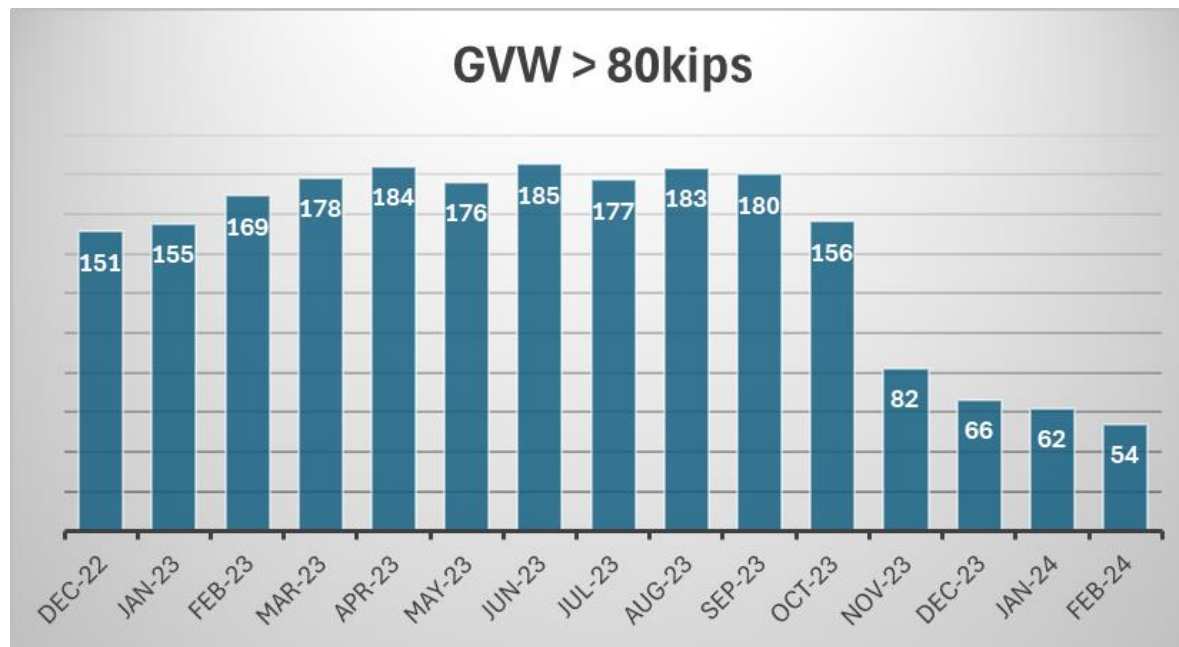
QB BQE enforcement: November 2023

SIB BQE enforcement: June 2025

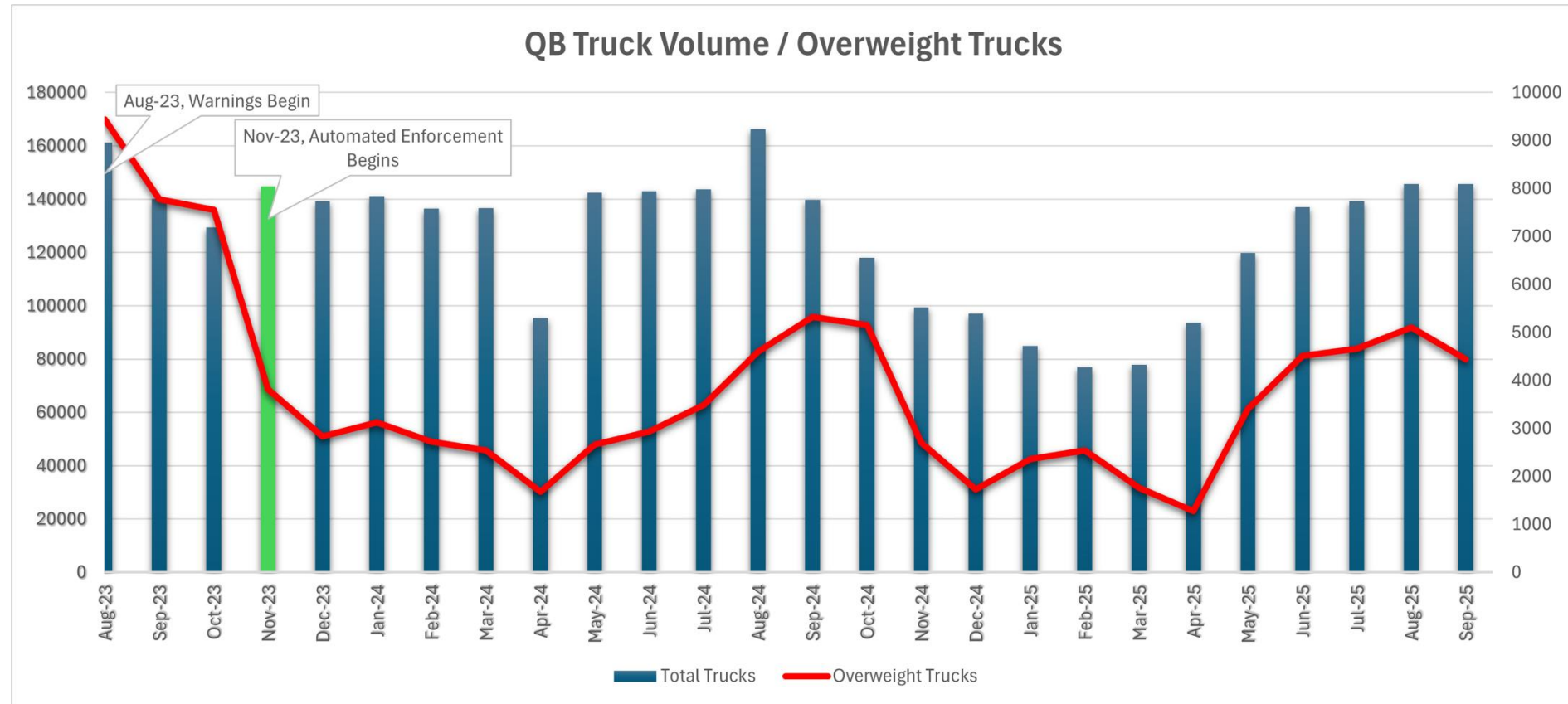
Axle Weight Violations

- Date and time of violation
- License plate photograph
- Each Axle Weight Measured per sensor set
- Allowable maximum for the axle in violation per bridge formula
- Additional tabulation of axle spacing and weights for identification of axle in question, e.g., tandem
- Link to website for view record online
- NOL issued to Owner / Responsible Party (Rental)

After the violations began to be issued, a dramatic decrease has been seen in the number of OW vehicles in QB direction



Traffic Trends after enforcement



- Prior to October 2023, OW truck ratios for Queens-bound traffic reached approximately 9–10% of total truck volume
- Following the launch of automated enforcement in November 2023, these figures dropped by about 60%.
- **More importantly, the significantly overweight (>88,000 for GVW) have been reduced to much smaller proportion of the overweight subset.**

Load Rating Evaluation

- Two distinct WIM datasets were analyzed to evaluate the preliminary effect of the enforcement on the QB roadway:
 - Pre-Enforcement Period: December 20, 2022 – September 20, 2023**
 - Post-Enforcement Period: January 1, 2024 – July 29, 2024**
- Site-specific live load factors calculated for each period:**

Rating Type	Pre-Enforcement LL Factor	Post-Enforcement LL Factor	HL-93 (standard)
Inventory	2.20	1.75	1.75
Operating	1.60	1.27	1.75

This indicates that the enforcement has reduced loads to match the standard design requirements!

Note: Post-enforcement time period documented is roughly 7 months. Longer time periods are under review to validate preliminary results.

CONCLUSIONS & NEXT STEPS

From Legislation to Implementation

- NYCDOT's journey has extended far beyond the physical deployment of sensors.
- It has included:
 - **Spearheading legislation**
 - **Proposing regulatory updates**
 - **Building interagency and stakeholder alignment**
 - Commercial Vehicle Safety Alliance (CVSA)
 - National Institute of Standards and Technology (NIST)
 - ASTM International
 - Freight and trucking industries
 - Elected officials
 - Other transportation agencies

Statewide Ripple Effects since NYCDOT's implementation WIM for direct enforcement

In 2025, New York enacted Senate Bill S6383, expanding the authority to use WIM-based enforcement to other major infrastructure owners, including:

- Triborough Bridge and Tunnel Authority
- New York State Thruway Authority
- New York State Bridge Authority
- Port Authority of New York and New Jersey

Signaling a broader policy shift toward integrating behavioral enforcement with infrastructure preservation.

- Outreach with Freight partners to foster a culture of regulatory compliance and even the playing field
- NYCDOT planning roll out of additional locations authorized by 2025 legislation
- NYCDOT is actively working with authorizing entities, including, FHWA, to educate and inform the industry on the WIM installation, calibration, and enforcement process.

- Protecting our infrastructure and safer highways requires efficient means to enforce truck weight limits along with other related enforcement
- There is a gap in communications in achieving this goal:

For instance –

- DOT needs to protect bridges from overweight vehicles, may or may not be involved in weight enforcement
- Highway Safety Personnel need to ensure vehicles are following safety standards
- Department of Agriculture reviews Handbook 44 which would set the standards for technology
- Who talks to all three to ensure all goals are being achieved?

To build on the success of this initiative, the following areas of work are recommended:

- **Formalize National Standards for Automated WIM Enforcement**
 - Support the updates to NIST Handbook 44 and ASTM standards for WIM used in enforcement.
- Engage with national regulatory bodies to ensure that these updates reflect the practical lessons learned on the BQE.
- **Advance Reliability-Based Load Rating Models**
 - Current AASHTO-based thresholds assume a uniform risk profile that may not align with the actual complexity or criticality of a structure.

Closing Remarks

- In corridors as vital as the BQE—where infrastructure performance is directly tied to regional mobility and economic function—continued reliance solely on theoretical design loads amounts to risk blindness
- Risk-based assessments could refine operational decision-making—particularly in urban corridors where failure consequences are high.
- Weight limit enforcement is not optional—it is structural preservation.

QUESTIONS?