



RESEARCH ON THE ROAD 2025
Wednesday November 19, 2025

IMPLEMENTATION OF WIM SYSTEMS
FOR DIRECT ENFORCEMENT OF WEIGHT LIMITS
ON THE BQE CONCRETE CANTILEVER STRUCTURES



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



AGENDA



- Challenge
- BQE Example
- Implementation of Direct Enforcement
- Closing Remarks

BQE WIM TEAM



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Kaan Ozbay, Professor and Director of C2SMART



Chaekuk Na, Senior Research Associate
Patrick Lou, Research Associate, and Senior Str. Engineer



Infrastructure, Kistler Instrument Corp.

TRIPLE CANTILEVER DESIGN JV



Design Support

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.

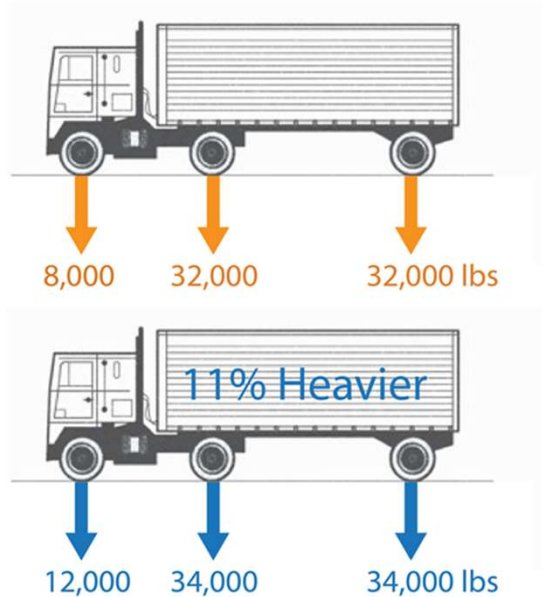
BQE EXAMPLE

BQE

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.



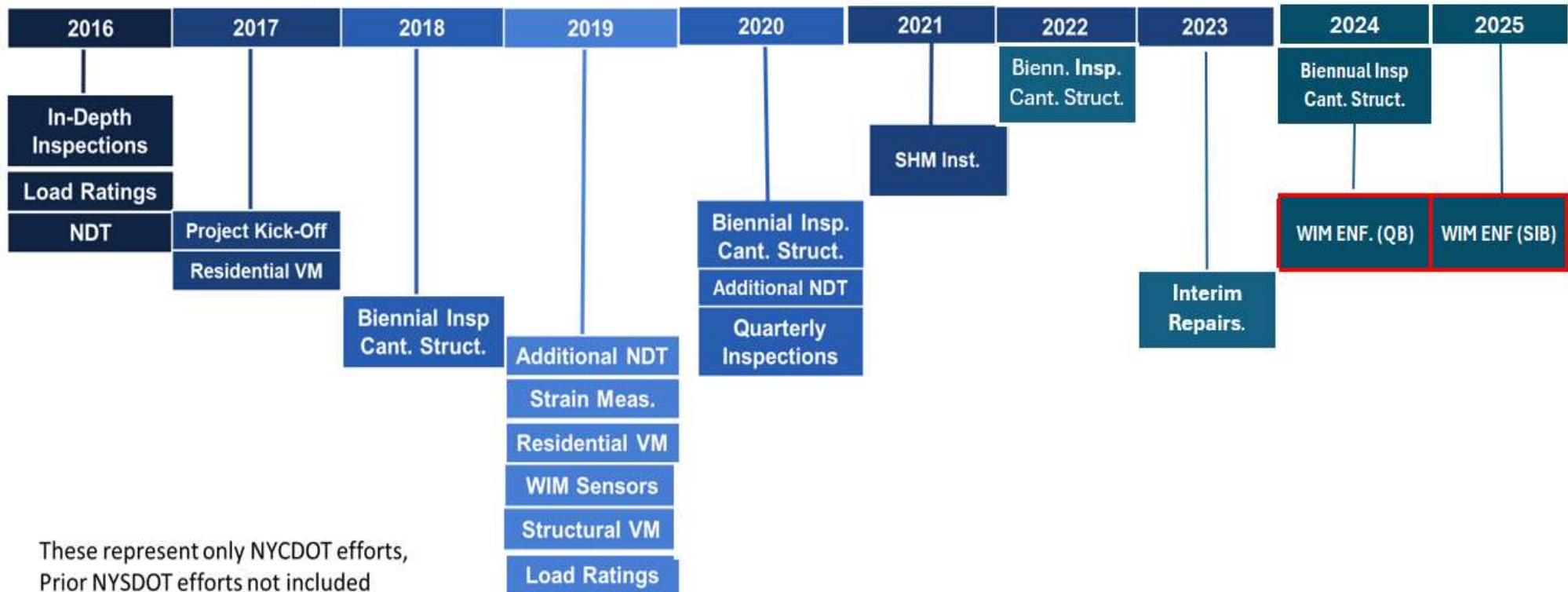
Truck Loading: Then & Now

- Based on A.A.S.H.O. 1941 Specifications
- Designed and constructed – 1948 – 1954
- NYS legal load is significantly higher than structure's designed load, and proliferation of overweight trucks continues



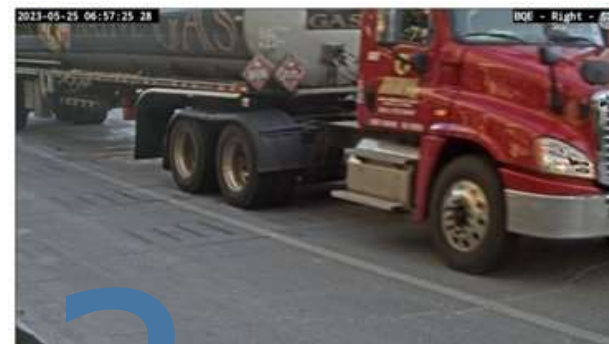
BQE STRUCTURAL ASSESSMENT

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



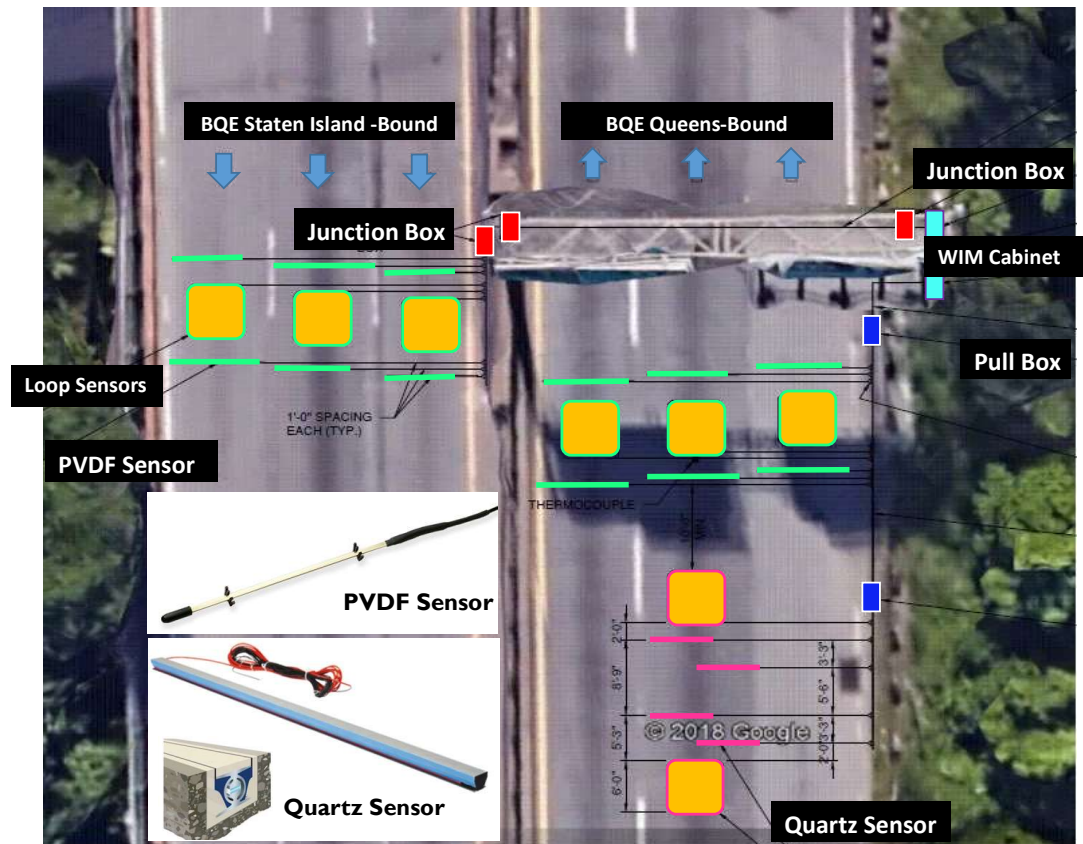
BQE Truck Weight Design & Legal Load

- As BQE Central approaches end of useful life, data collection & enforcement efforts provide for continued lifespan of structure
- 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?



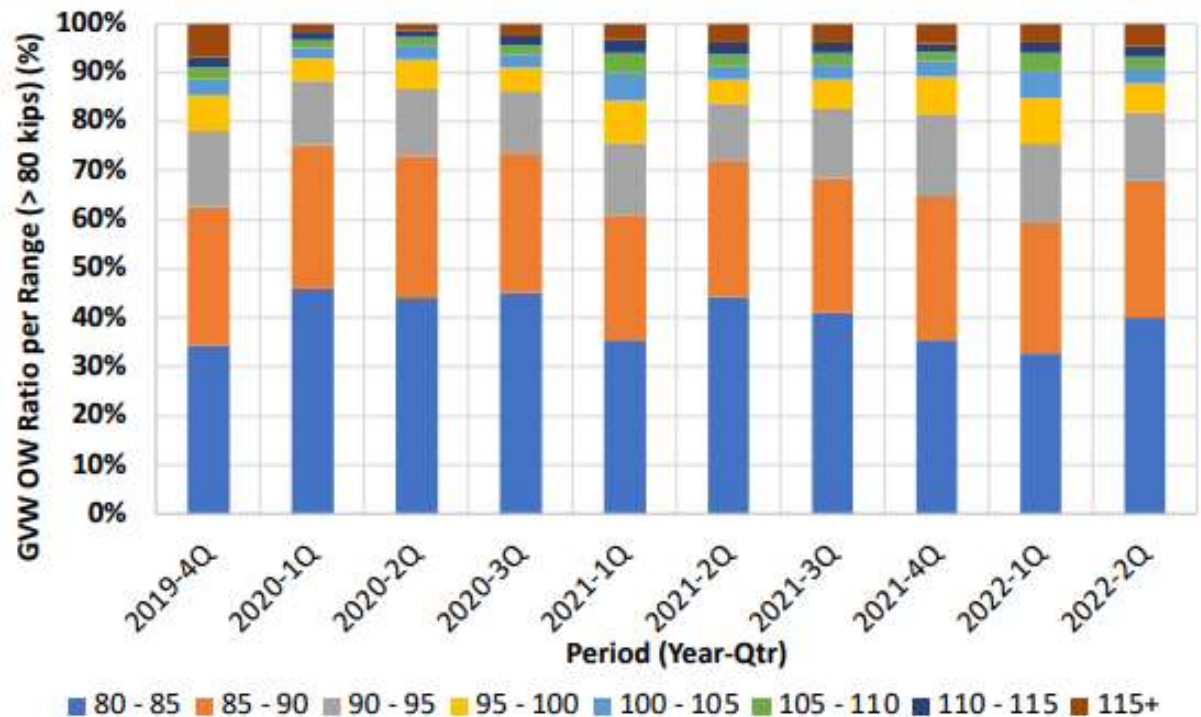
Pilot Study: WIM installed near Pearl St on the BQE

- 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 provided by Rutgers/C2SMART Team assisted in site-specific live load factors for LRFR
- Site selected met following conditions:
 1. Section of roadway on grade & tangent
 2. Gantry provided support for conduits
- SIB connected to equipment on QB side of road



Breakdown of Gross Vehicle Weight Violations

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



DATA COLLECTION: WIM SENSORS

2022 Comparison of Load Factors Staten Island-Bound

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

Queens-Bound

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

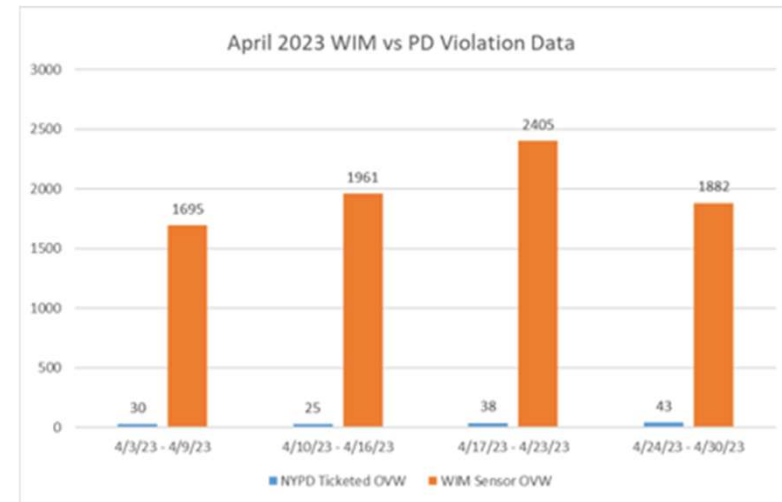
Why does this matter?

- **Higher level of wear and tear on roadway = increased need for repair/shorter service life**
- **Frequent roadway repairs = Congestion/Greater need for resources**
- **Heavier trucks = Increased stopping distance**

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

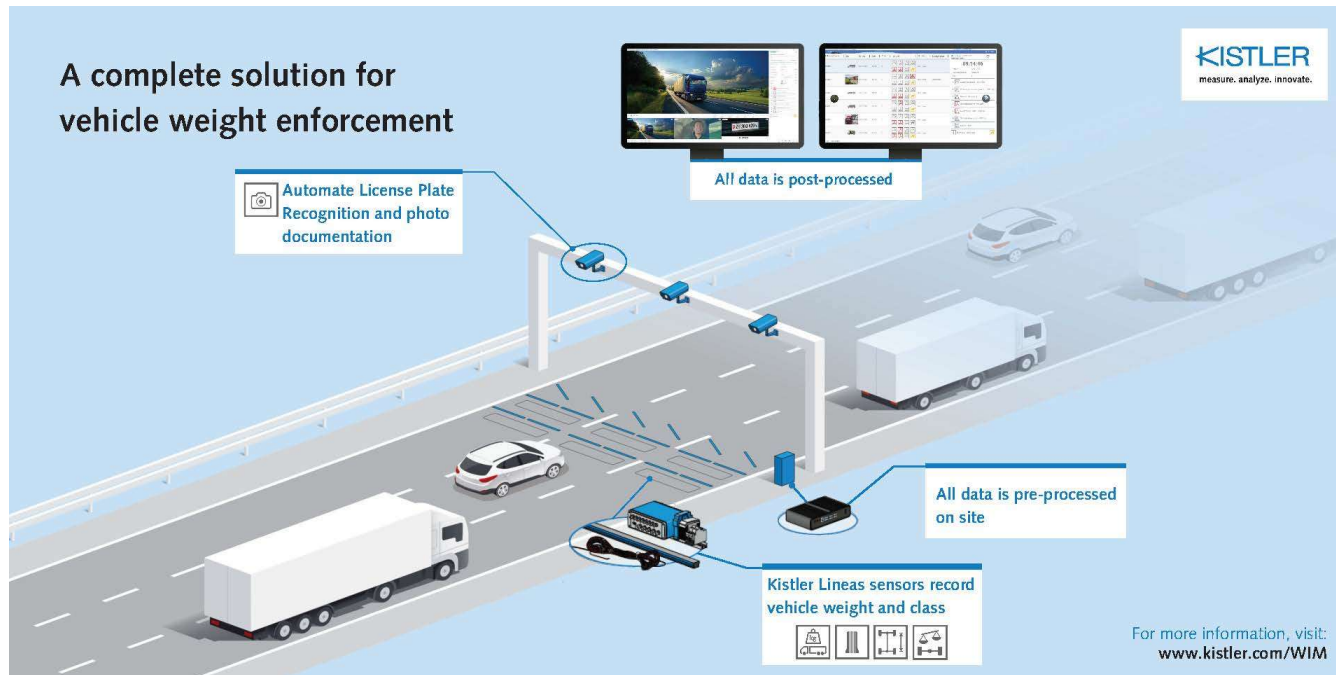
Amended in 2023: S6246/A6225

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

DIRECT ENFORCEMENT - IMPLEMENTATION

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

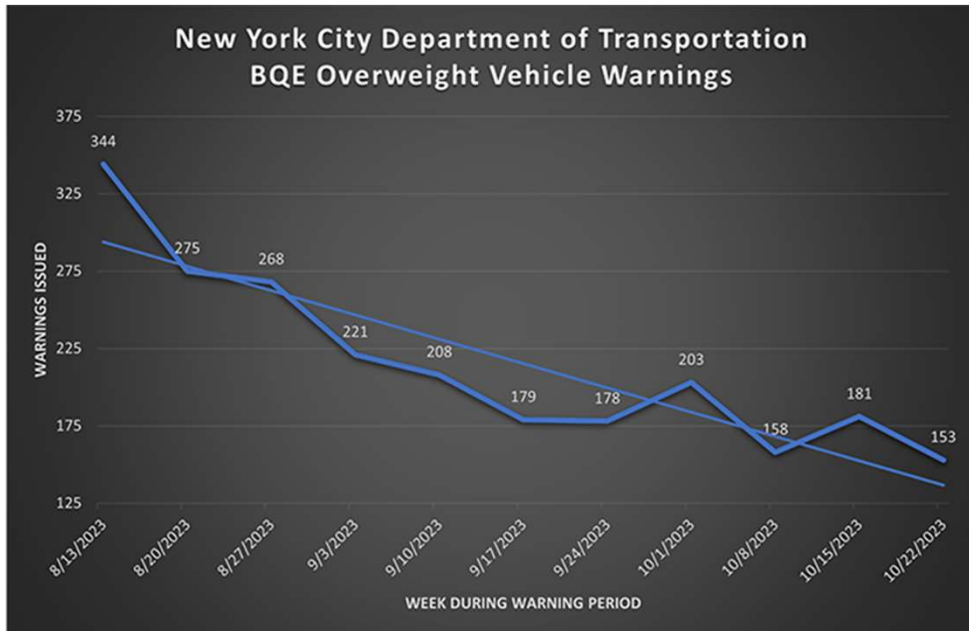
Calibration & Certification – Technical Considerations

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 3 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

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

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.

DIRECT ENFORCEMENT - IMPLEMENTATION



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

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 #: 4500000215
PIN: 8839

#BWCFGHJ
#45000002158#



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.) Sensor Set 1: Tandem - 47,960 lbs Sensor Set 2: Tandem - 49,460 lbs		Maximum Axle Weight (lbs.) Single Axle: 22,400 lbs; Tandem-Axle: 36,000lbs;

There are no points associated with this Notice.



USDOT #



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		AMOUNT DUE	
[Redacted]		\$650.00	
NOTICE NUMBER	VERSION	ISSUED	DUE DATE
4500000215	1	11/14/2023	12/14/2023
PLATE NUMBER	STATE	TYPE	WIM SYSTEM ID
[Redacted]	US-NY	COMMERCIAL	870501

WIM & Automated Enforcement: Violation Notice Requirements

Gross Vehicle Weight Violations

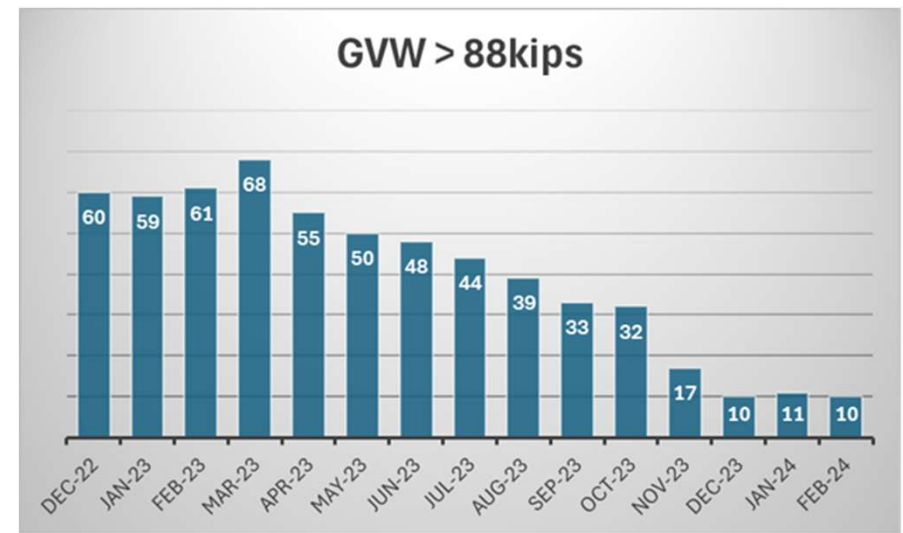
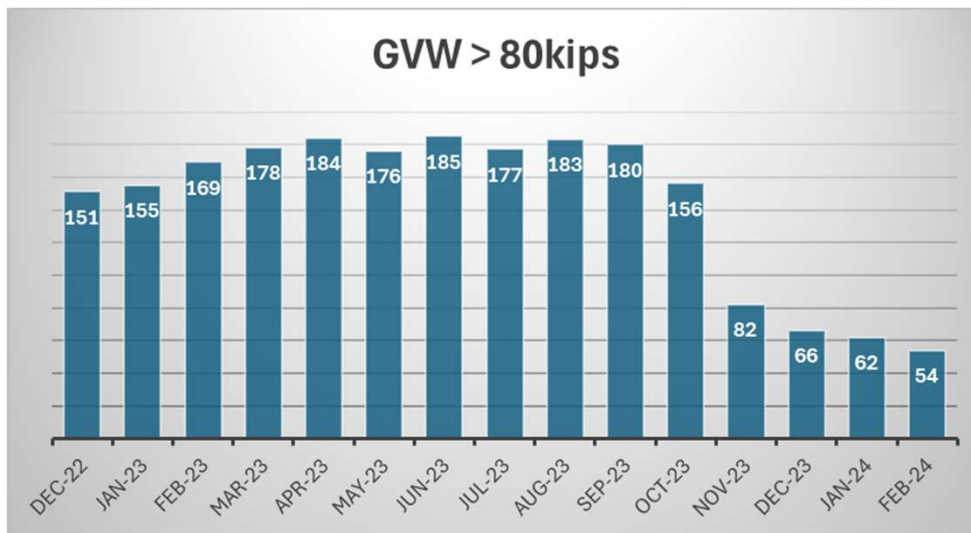
- Date and time of violation
- License plate photograph
- GW Measured per sensor set
- Allowable maximum Weight per bridge formula
- Link to website for view record online
- NOL issued to Owner / Responsible Party (Rental)

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)

DIRECT ENFORCEMENT - IMPACT

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



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 needed to validate preliminary results.

CLOSING REMARKS

Since NYCDOT's implementation WIM for direct enforcement:

Statewide Ripple Effects

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?

Engineers need not stay out of Policy Discussions
Questions?