APPROACHES TO MONITOR TRUCK LOADING ACTIVITY IN NEW YORK CITY USING VIDEO ANALYTICS

TRB Innovations in Freight Data Workshop – Irvine, California

May 18, 2017

NEW YORK CITY DOT

NYCDOT Office of Freight Mobility

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OFFICE OF FREIGHT MOBILITY (EST. 2007)

Mission

Reduce the impacts of trucks on communities and infrastructure, while also supporting the City's economic competitiveness.

2016 Strategic Freight Goals

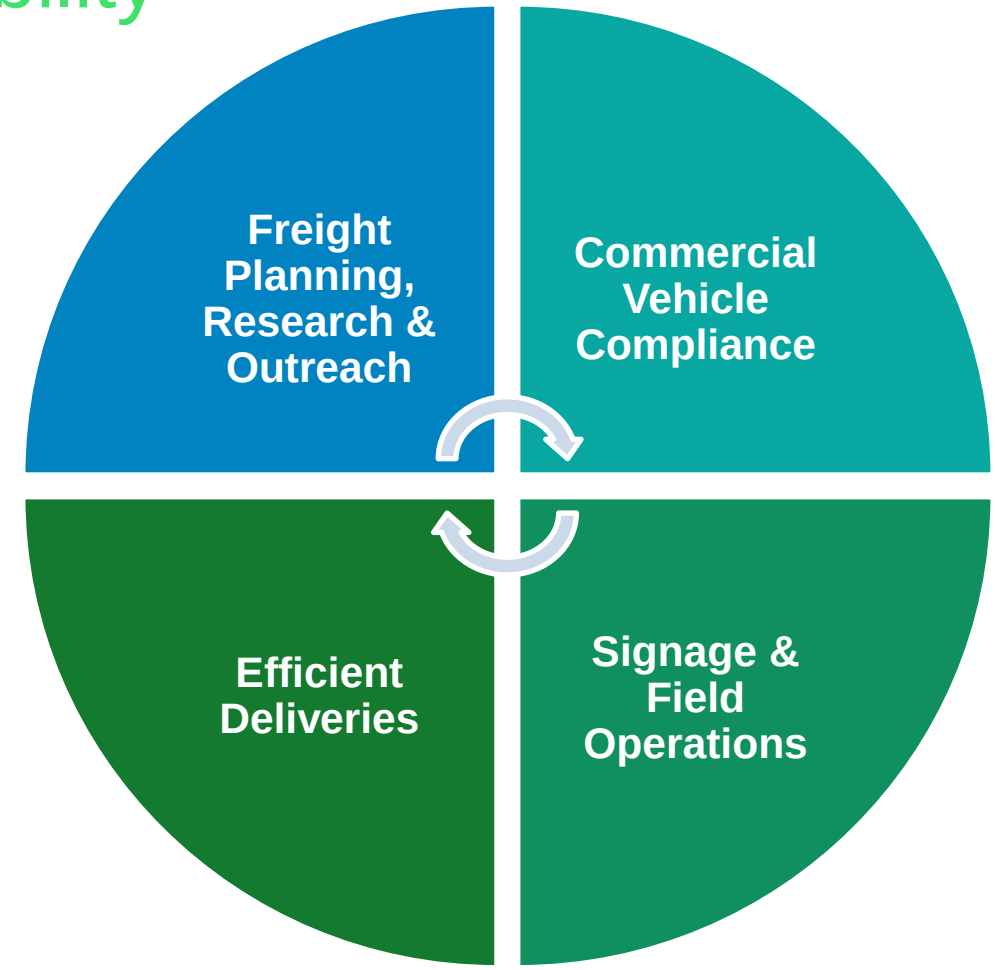
1. **Improve the safety, environmental performance, and economic efficiency of truck deliveries** across the five boroughs, in partnership with the freight industry.
2. **Foster a culture of regulatory compliance** in the trucking industry.
3. **Expand partnerships with the freight and trucking industry** to encourage sharing of data to better manage truck movements throughout the City.

OVERVIEW

Office of Freight Mobility

Key Projects/Deliverables

- Smart Truck Management Plan & Borough Freight Plans
- Truck Route Compliance
- Weigh-in-Motion (WIM) Program
- Off Hour Deliveries (OHD) Program & Low Noise Monitoring Program
- Fleet Recognition Programs
- ITS Pilot Projects



Project Background & Previous Pilots

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PROJECT BACKGROUND

Purpose

To develop a quantitative approach to project freight demand

Project Goals

1. To **pilot video analytics** for **transportation data collection, planning analysis**, and **policy development**
2. To develop a **data-driven methodology** for **projecting freight demand in New York City**
3. To **validate prototype formula** developed by WXY Architecture + Urban Design (funded by NYSERDA) to **project off-street loading and unloading capacity**
4. To **align off-street loading capacity** with **on-street loading availability** for improved street efficiency

PROJECT BACKGROUND

WXY Loading Berth Formula

1 **LOADING BERTH REQUIRED**

calculating loading capacity

2 **LOADING BERTH NEEDED**

(defined per hour)

=

Freight Trips Generated (use+employment)

x (% of trips during peak hours)

[1 / average dwell time in dock]

3 **ON STREET LOADING CAPACITY**

(in available loading spaces per hour)

=

Length of Commercial Loading Zones / average truck length

[average dwell time in dock]

+

OFF STREET LOADING CAPACITY

(in available loading spaces per hour)

=

Sum of total required loading berths as defined by historic and present zoning regulations

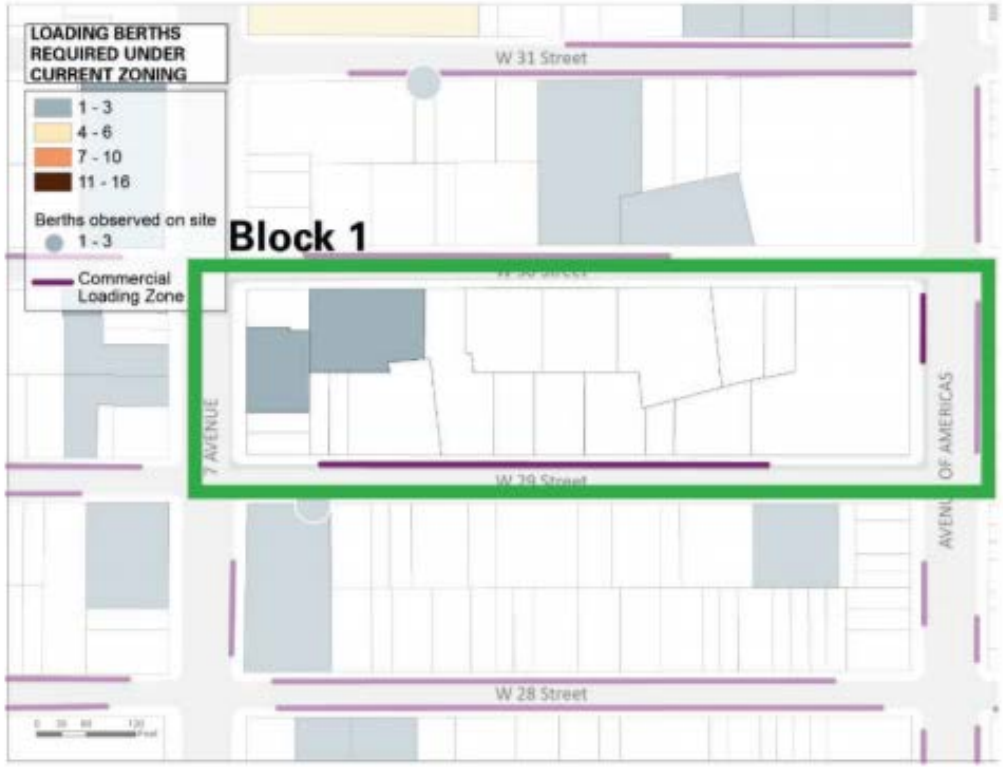
[average dwell time in dock]

Avg dwell time = 40 mins (based on on-site investigation of midtown Manhattan)

Avg truck length = 45 ft.

PROJECT BACKGROUND

WXY Formula Application



Block 1 requires 34 loading berths per hour to service the incoming freight, but there are only 24 on and off-street spots available*

On + Off Street Capacity		Loading Berth Needed		
24	-	34	=	-10

PROJECT BACKGROUND

Project Partners

NEW YORK CITY DOT

BOSCH
Invented for life

WXY

cradlepoint

Spectrum

PROJECT BACKGROUND

Metrics

1. Traffic Volumes by classification of through traffic on street
2. Parking utilization on-street (by classification)
3. Loading dock utilization off-street (by classification)
4. Double parking (by classification)

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5. Freight trips generated by store based on trajectory to/from truck

**This pilot will provide quantitative data that will be used to validate the WXY formula

PREVIOUS PILOTS

Lessons Learned

1. Analytics need to run at the camera = video analytics at the edge
    - **NYCWin** – City owned wireless network cannot transmit video to run analytics
    - **Hard-Wired Networks** – Not suitable due to difficulty and cost to set up infrastructure
    - **Cellular Networks** – Suitable and can support streaming video but are cost prohibitive to use
    - **Managed Wi-Fi** – Not suitable for live video
    - **Cloud Analytics** – On-going subscription and licensing costs
2. Dedicated technical vendor staff to help troubleshoot and calibrate cameras
3. Need for customizability given the uniqueness of each location/neighborhood cluster

Project Status

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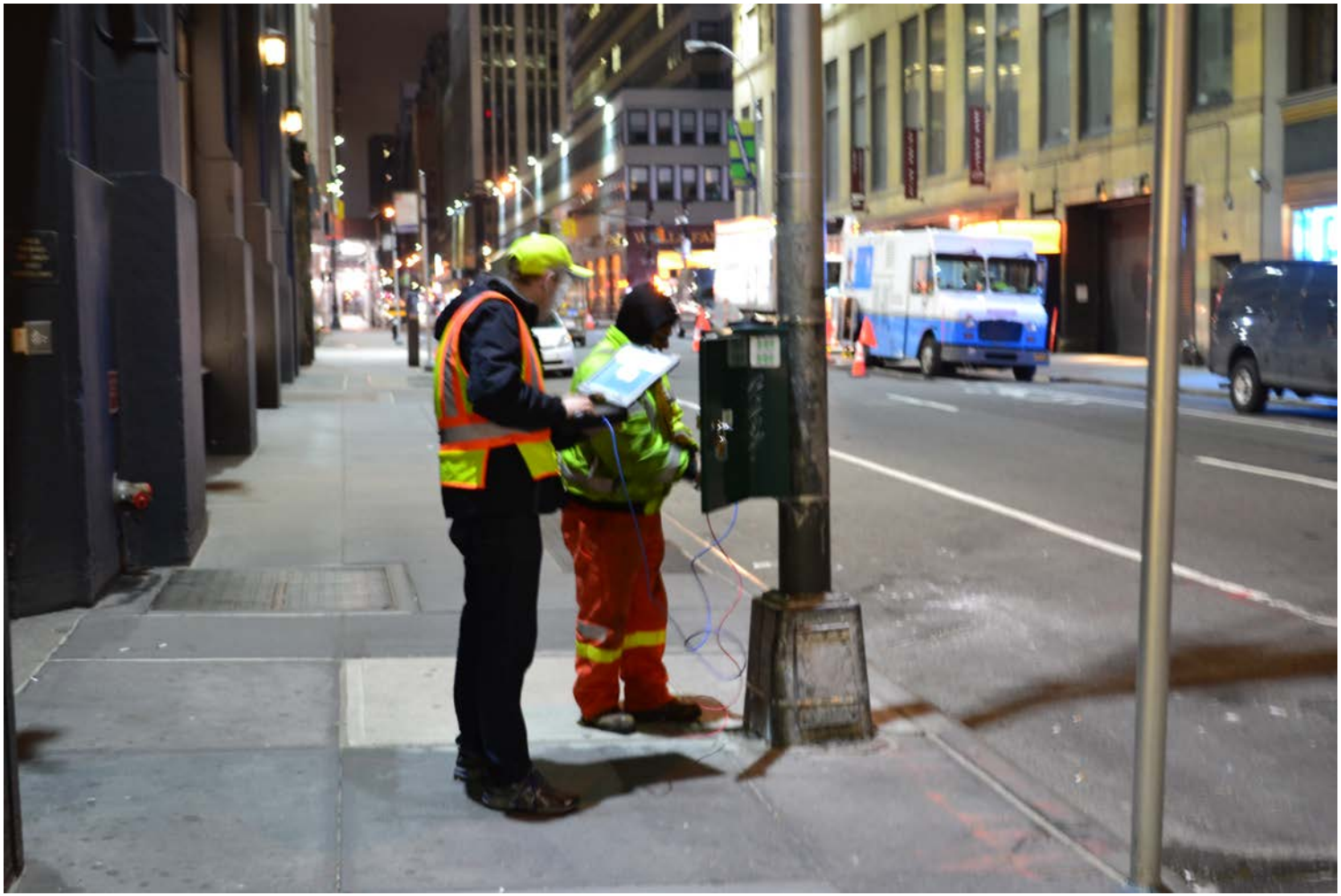
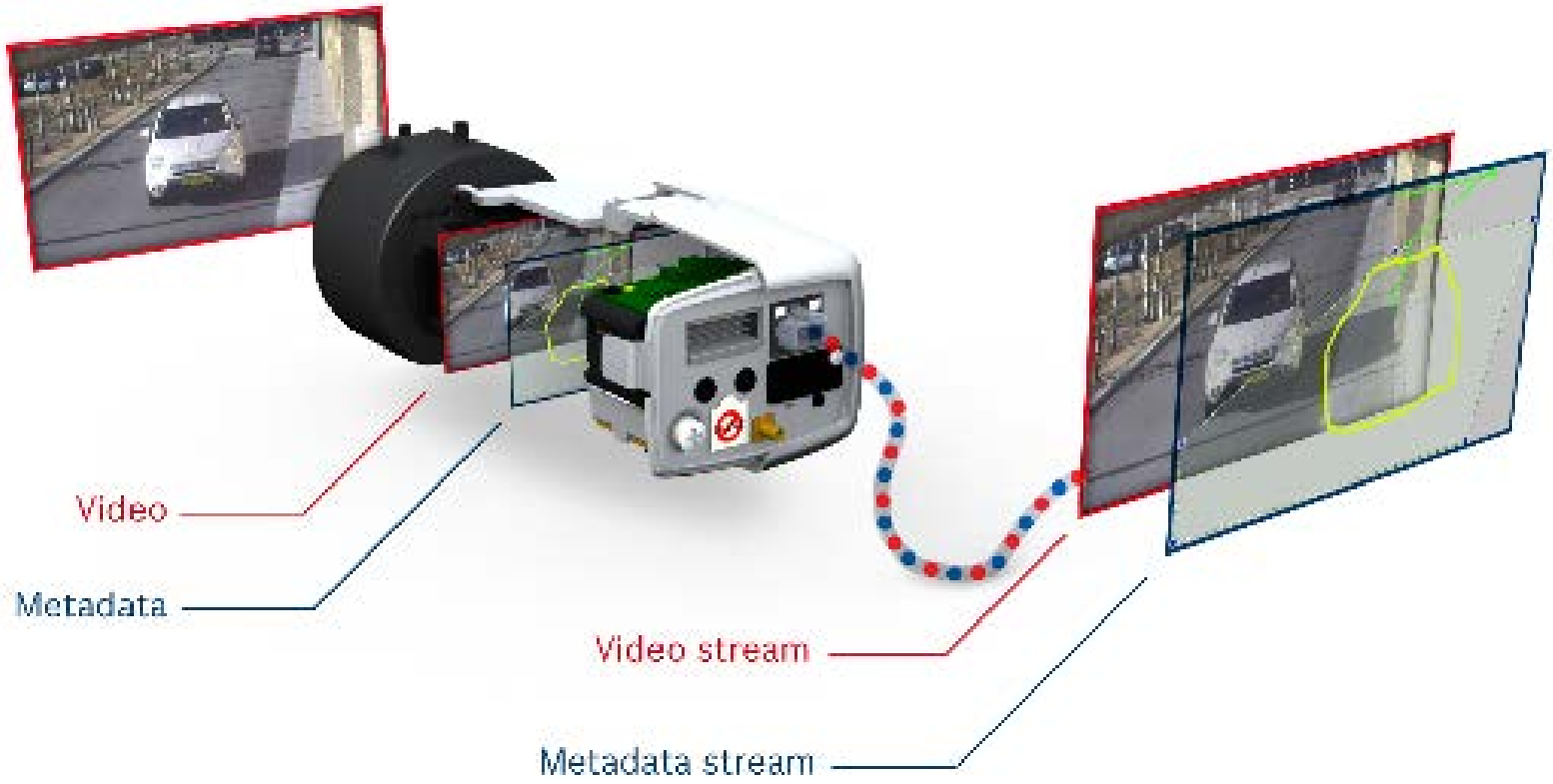
PROJECT LOCATION

CAMERA INSTALLATION

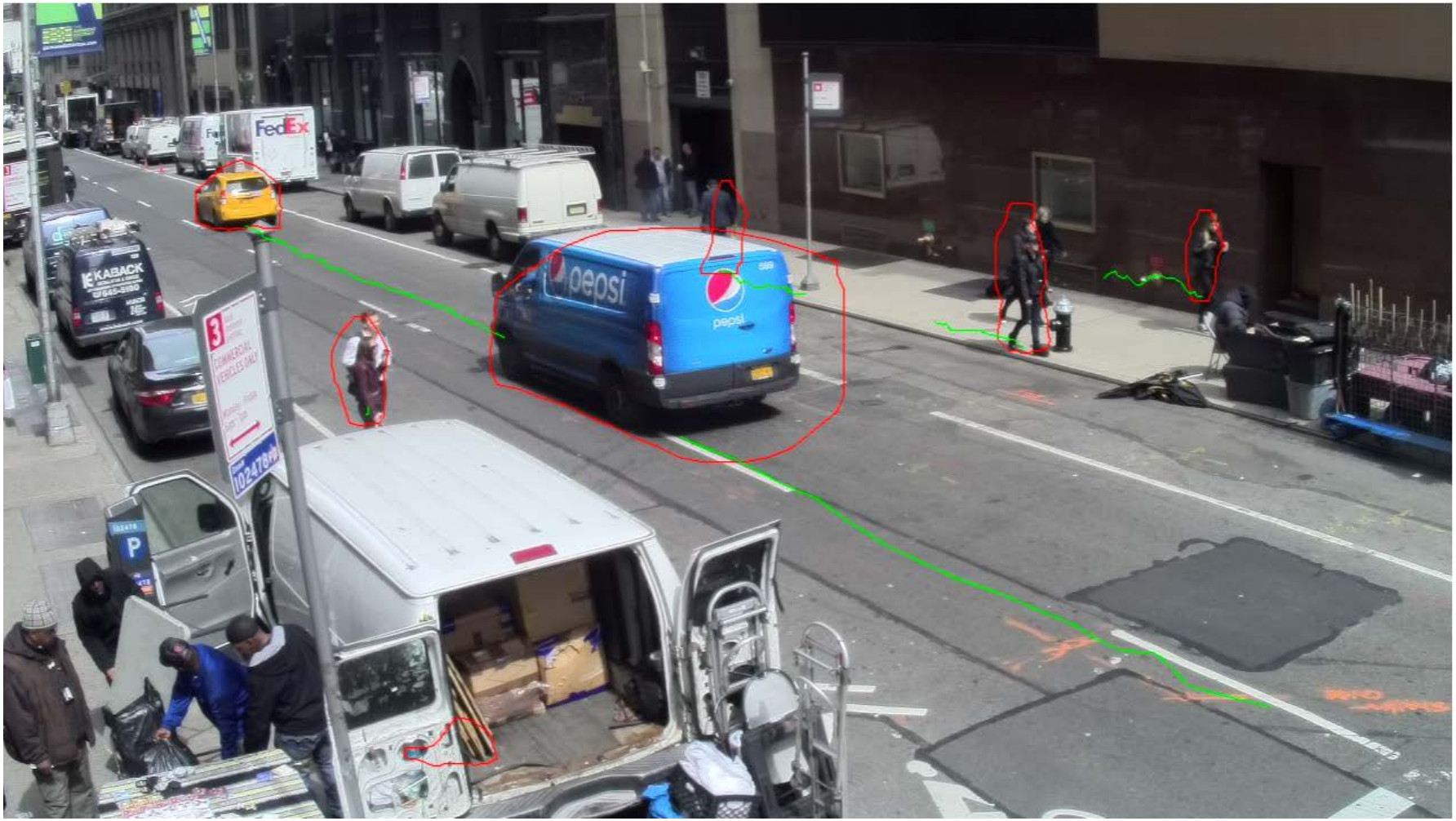
CAMERA CALIBRATION



CAMERA DESIGN



CAMERA ANALYTICS



Next Steps

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NEXT STEPS

1. Transmit data from cameras and verify that analytics are working properly
2. Build a database to retrieve (ingest) data
3. Develop a framework to process (digest) metadata and to display it on a real-time dashboard for analysis and loading formula verification

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4. Incorporate Machine Learning into the NYC-based video analytics architecture to support more robust vehicle classification

THANK YOU!

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