The BQE Triple- Cantilever Conundrum

A Traffic Engineering Review "Work-in-Progress"

Focus: Construction Phase

Presented to:

BQE EXPERT PANEL

Presented by:

Sam Schwartz

WXY

Today's Discussion

1. Guiding Principles
2. The Givens
3. Traffic Science and Myths
4. Lessons from the Past
5. Redefining the Problem
6. Travel Demand Management (TDM) – Reduce Traffic Volumes
7. Construction Alternatives - A Start

Guiding Principles

"Insanity is doing the same thing over and over again and expecting different results" **– Einstein**

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"Those who fail to learn from history are condemned to repeat it"
– Churchill (Santayana)

"You can't always get what you want"
– The Rolling Stones

The Givens

1. BQE in need of repair
2. Three-level cantilevered structure with a tight right-of-way
3. 153,000 vehicles use the road daily
4. For construction, one roadway may have to be closed during phases
5. Heavy truck corridor
6. Only expressway through Brooklyn
7. Direct links to two bridges in this segment
8. Don’t touch Brooklyn Bridge Park or Promenade, if possible

Traffic Science and Myths | Law of Induced Demand

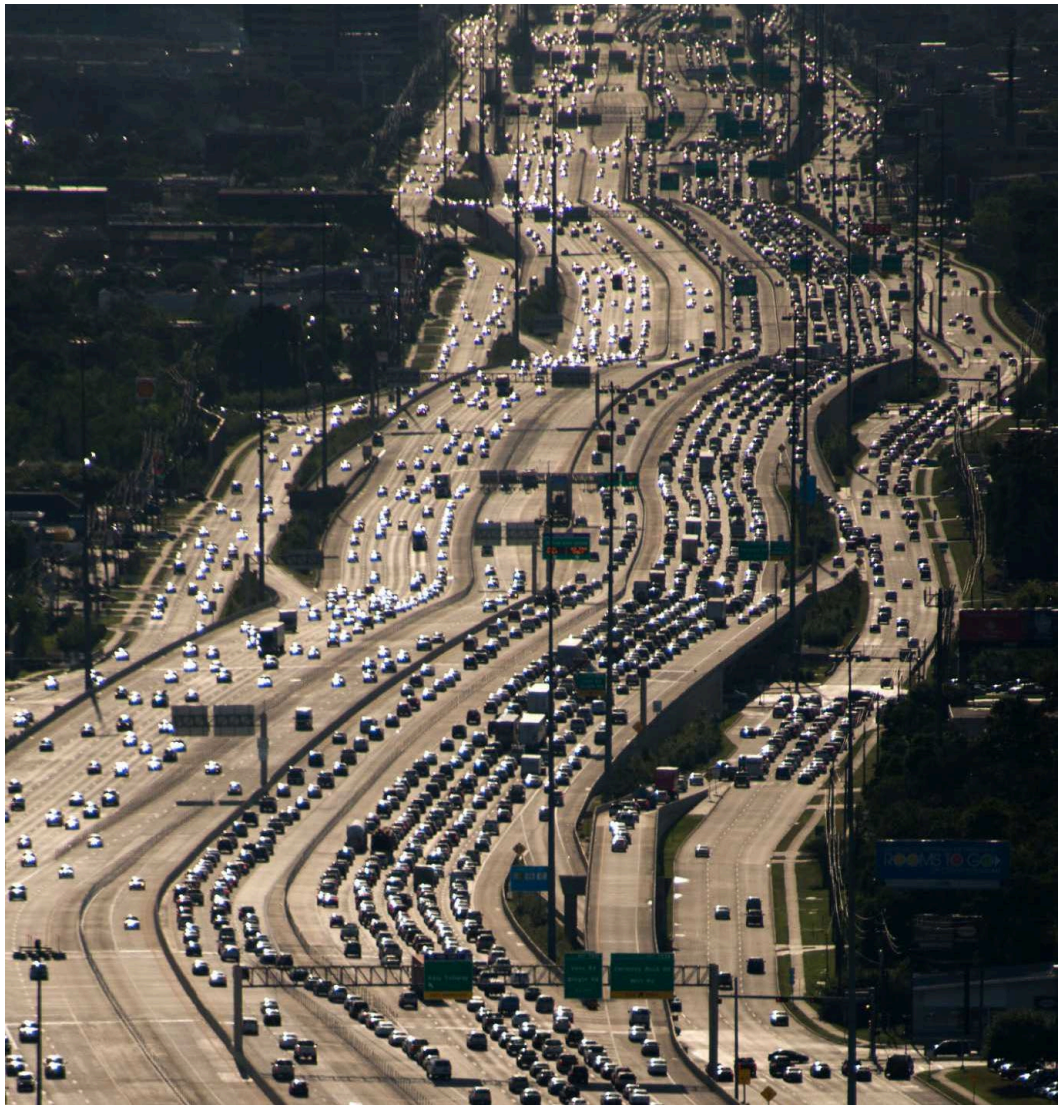
Adding capacity increases demand

"On urban commuter expressways, peak-hour traffic congestion rises to meet maximum capacity." - Anthony Downs

Katy Freeway expansion to 26 lanes

Travel times increased 2011 and 2014

- AM Peak +30%
- PM Peak +55%



Traffic Science and Myths | Law of Induced Demand

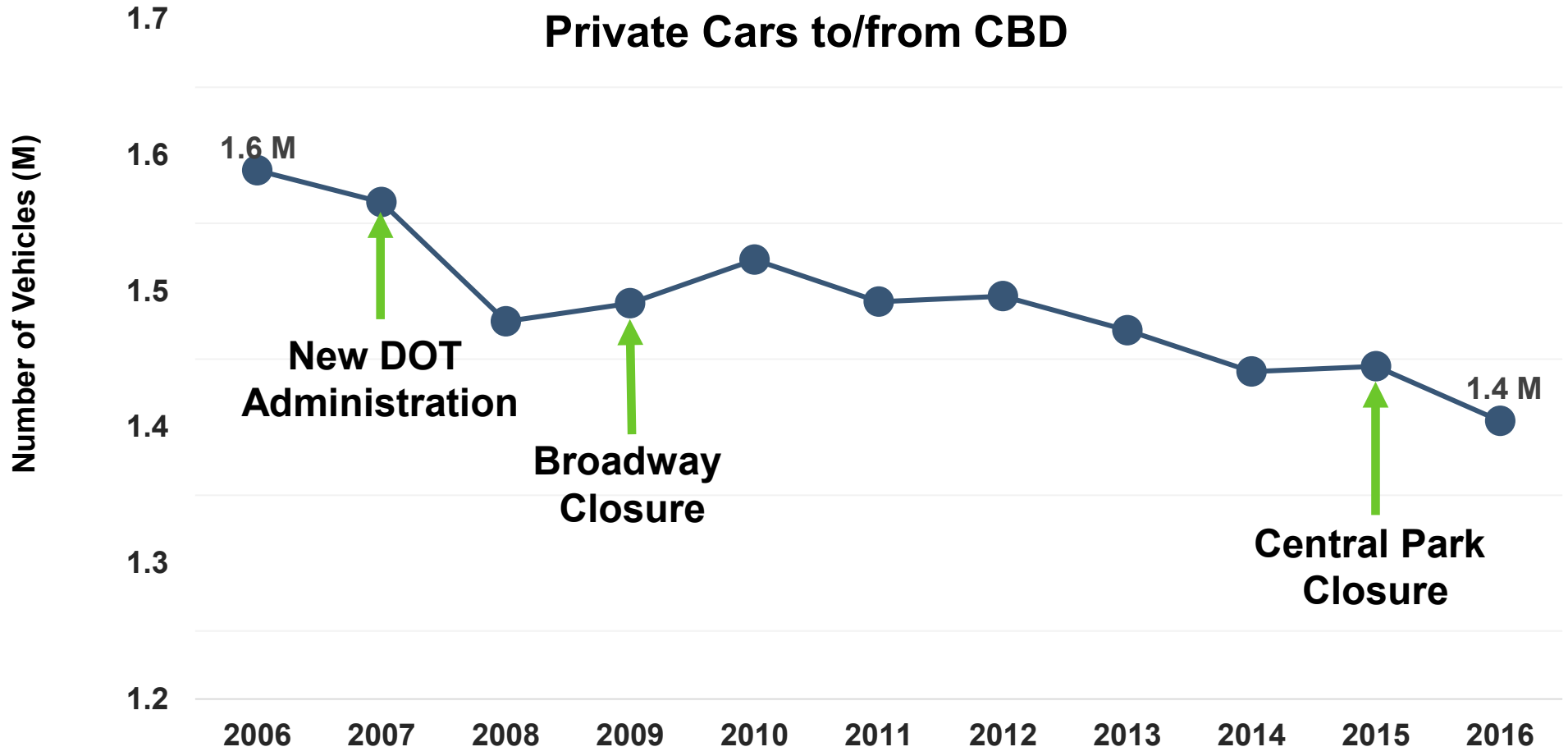
The corollary is true: reducing capacity lessens demand

West Side Highway - 1973

Embarcadero Freeway (I-480) - 1989

Traffic Science and Myths | Reduce Capacity Lessen Demand

Nobody is better at this than NYC DOT (bike lanes, bus lanes, road-diets, etc.)



Source: 2016 Hub Bound Travel Data, NYMTC

Traffic Science and Myths | Lessons Learned

Myths

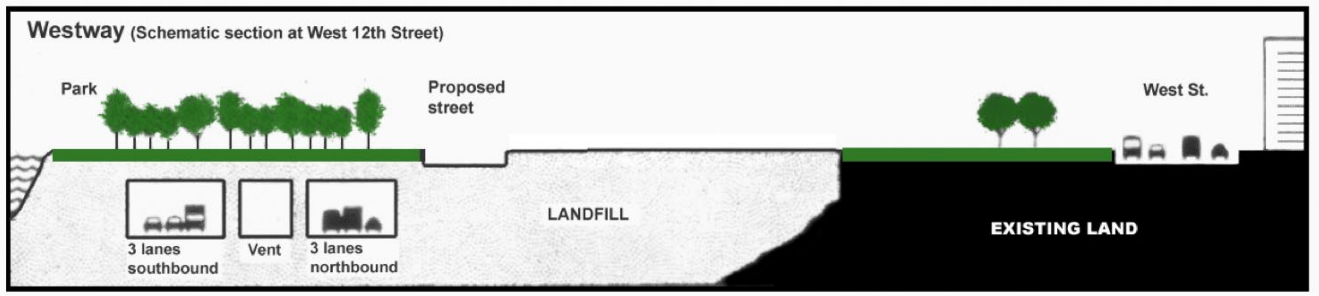
- Wider lanes are safer lanes
- Three lousy lanes are better than two good lanes

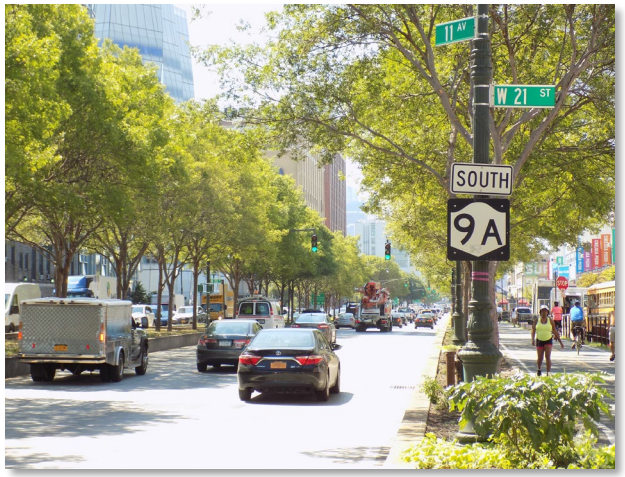
Science

- Reducing capacity, reduces demand
- The traffic disappearance phenomena

Lessons From the Past | West Side Highway 1973

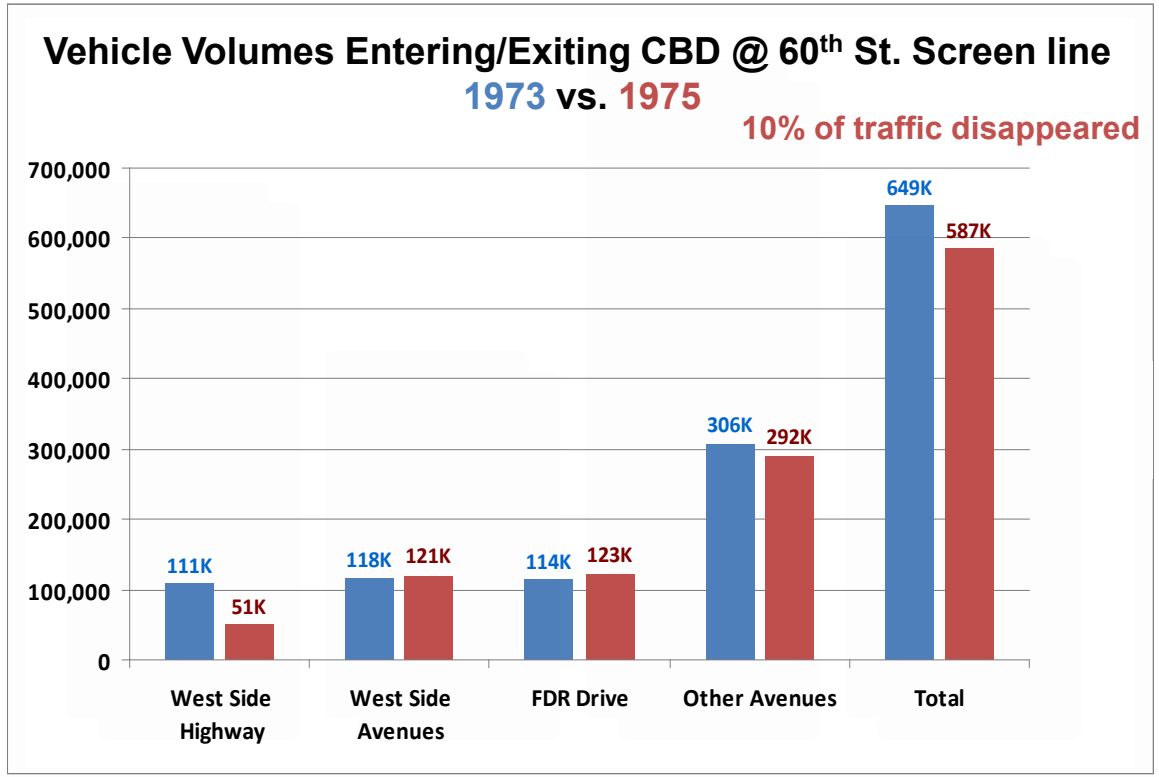
West Side Highway - 1973

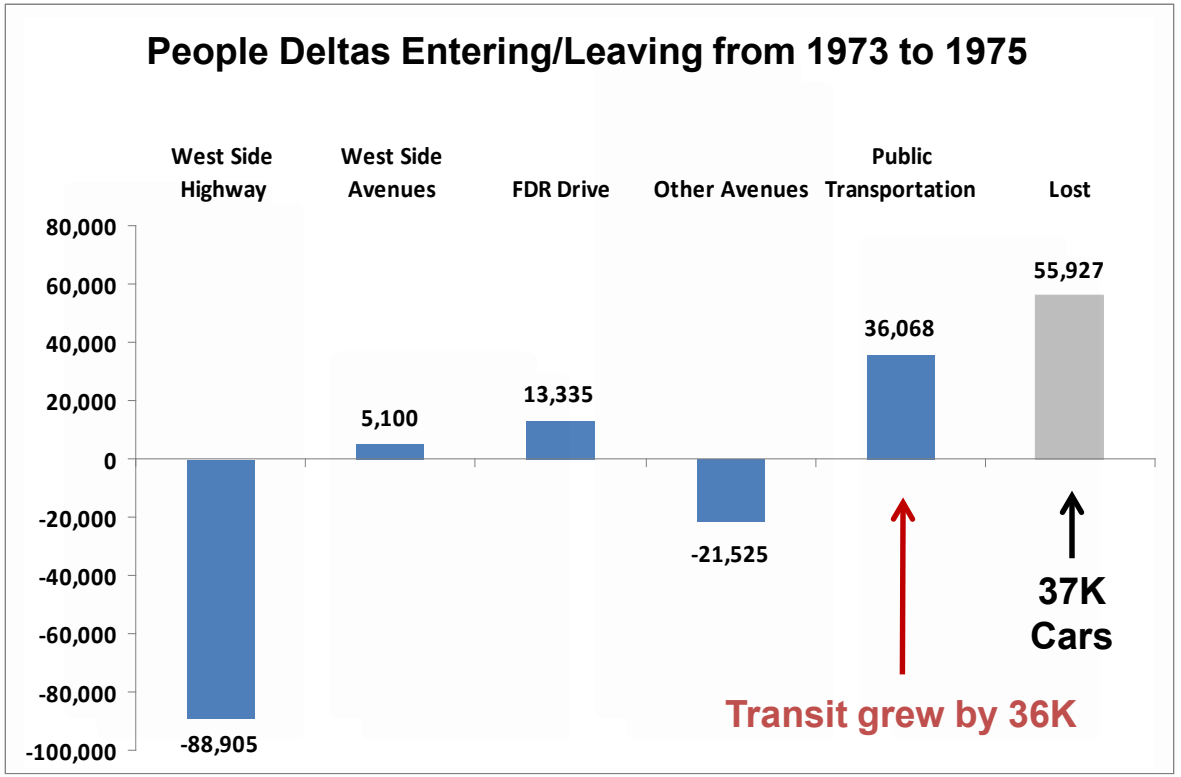




West Side - Today

Lessons From the Past | West Side Highway 1973 vs. 1975





Note: The number of people entering /exiting CBD increased by 25,000 people 1973 vs. 1975

Key Takeaway: Drivers adjust to changes in the roadway network, some stay, some detour, some divert to transit…some disappear

Lessons From the Past | Williamsburg Bridge 1988

NEW YORK POST

SPORTS FINAL

CLOSED!

Crumbling W'burg bridge shuts – maybe forever

By TIMOTHY McDARRAH and MARGIE FEINBERG

The Williamsburg Bridge was closed last night — perhaps forever.

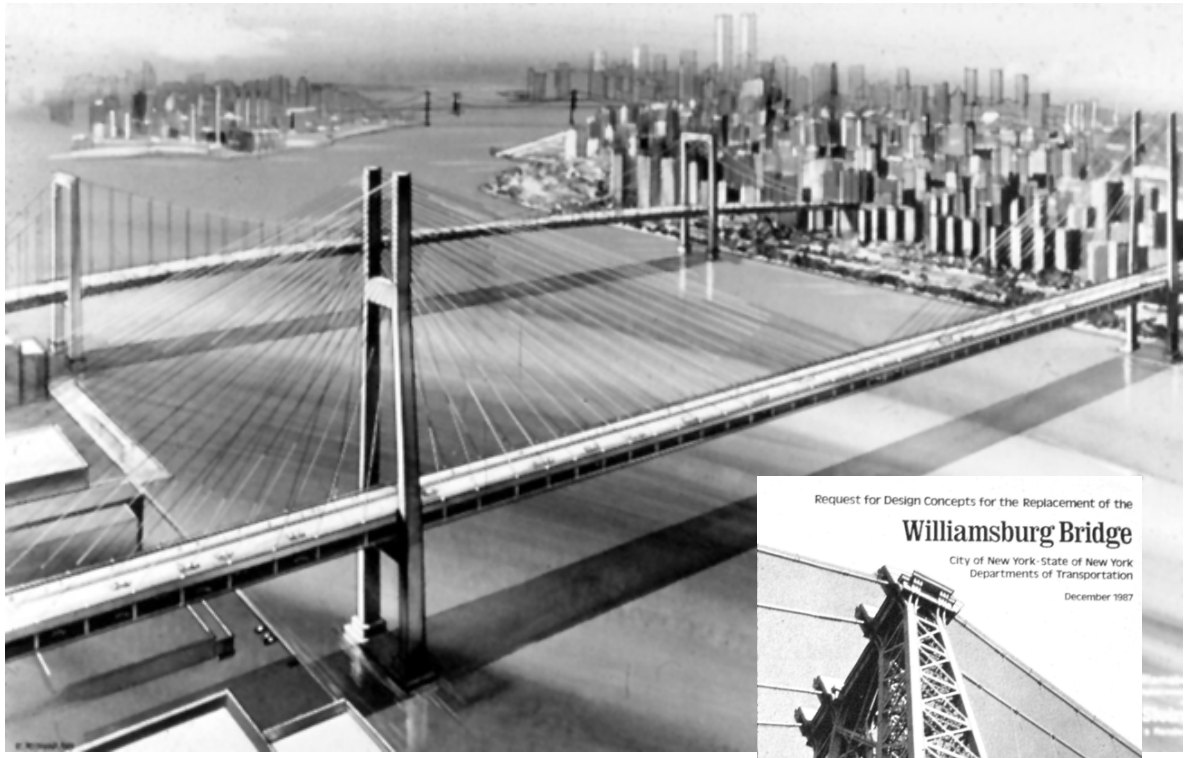
The decision to ban traffic from the crumbling 85-year-old span indefinitely came last night after inspectors found "holes you could crawl through" in support beams, a source told The Post.

Only pedestrian and bicycle traffic will be permitted on the bridge

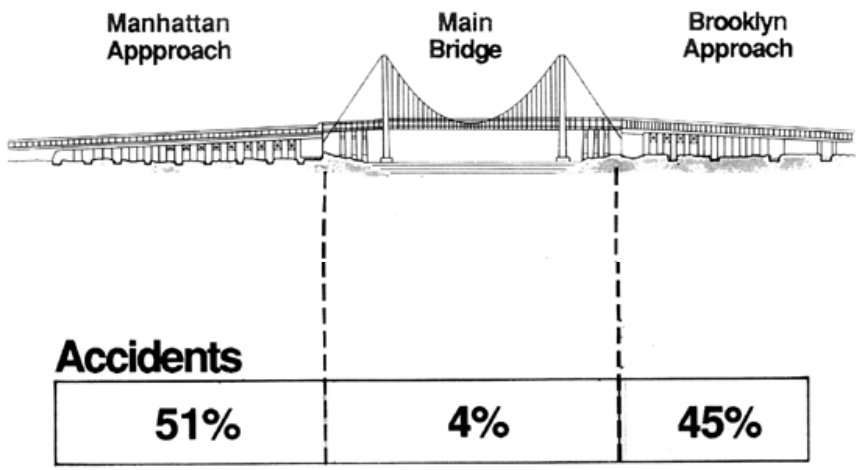
Continued on Page 2

GUIDE TO GETTING IN & OUT, PAGE 5

Lessons From the Past | FHWA: Replace Williamsburg Bridge



Lessons From the Past | Williamsburg Bridge 1988



***Key Takeaway**: Substandard does not mean unsafe, FHWA can be flexible*

Lessons from the Past | FDR Drive Reconstruction 2004

- Reconstruction from East 54th Street to East 63rd Street
- 135,000 vehicles per day
- Temporary roadway constructed over East River
- NB traffic on temp roadway throughout construction
- NB roadway reconstructed; SB remained in place
- SB traffic shifted to NB roadway
- Traffic returned to original roadways; temp roadway removed

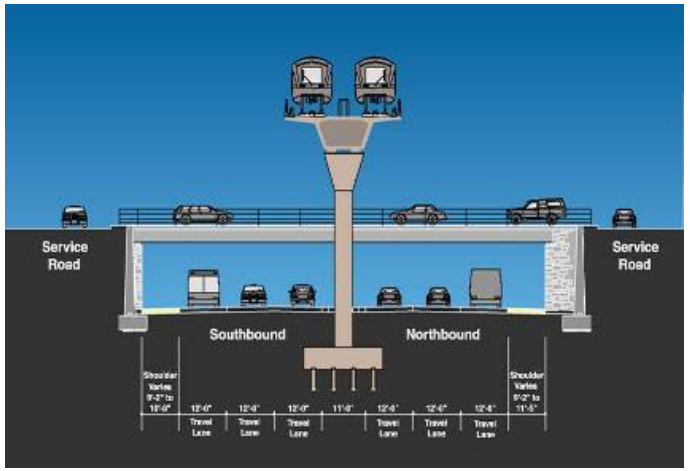
***Key Takeaway**: Flipping roadways during construction is effective at maintaining capacity*

Lessons from the Past | BQE Trench late 1970s, Early 1980s

- Full BQE Closure
- Temporary Ramp Construction to/from Hicks Street

***Key Takeaway**: Armageddon didn't happen!*

More Recent Past | Van Wyck Air Train Construction



Van Wyck Expressway, Belt Parkway, Nassau Expressway closed entirely at times

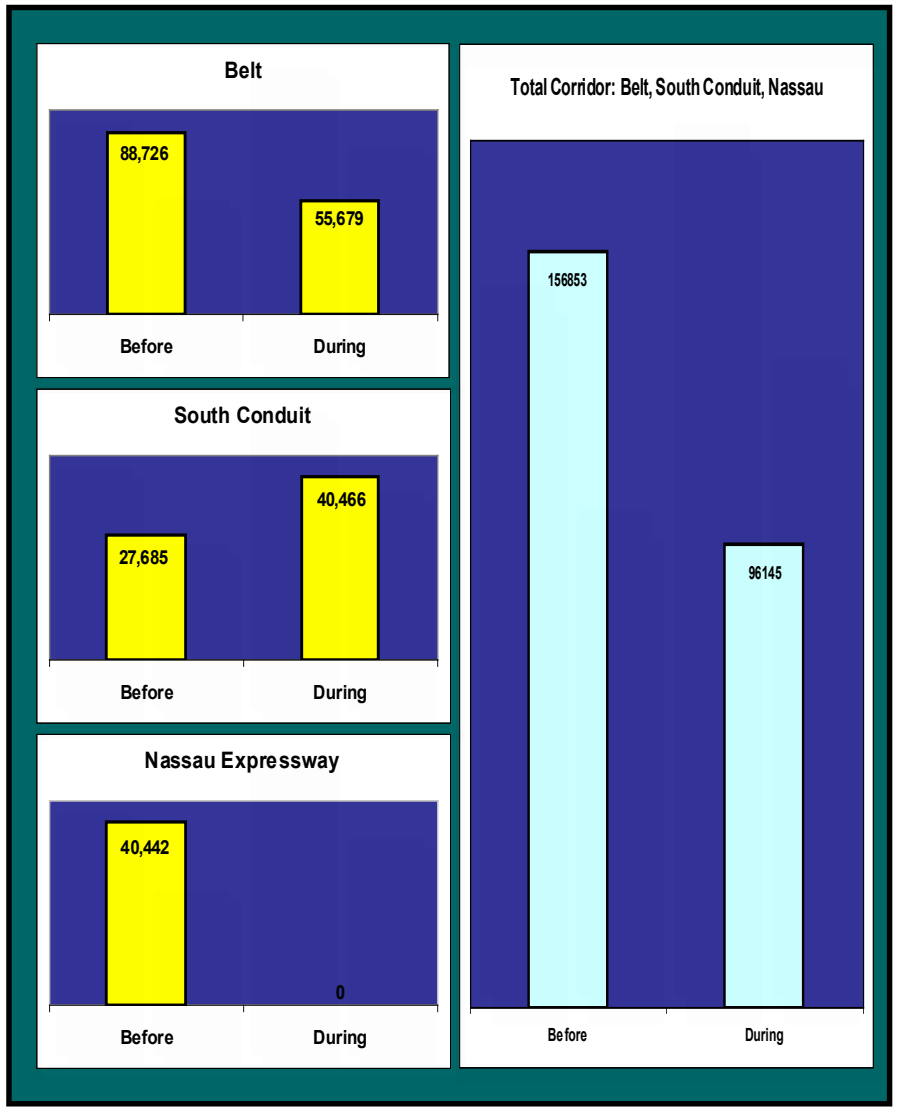
Aggressive TDM Strategies | Van Wyck Air Train Construction

Capacity Management

- Traffic Management Center
- Incident detection & management plan
- Rapid response plan (tow-trucks strategically located)
- Interagency coordination (points of contact & responsibilities)

Communications

- Conventional media (print and radio)
- Traffic media (waze and google maps)
- Social Media (twitter)
- Stakeholder outreach (i.e. truckers, JFK employees)
- VMS



40% Reduction in total corridor

Aggressive TDM Strategies | Van Wyck Air Train Construction

TDM MEASURE	EXPECTED (%)	USED (%)
Normal adjustments to detours	3-5	0-1
Variable message signs	5-8	3-5
Saturate radio, TV, market	15-25	10-15
Other Media	3-5	0-1
Truck programs (passenger car equivalents)	3-5	0-1
Kennedy Airport employee program	1-2	0-1
Treatments of other N-S routes	2-4	1-2
Highway advisory radio	1-2	0-0
TOTAL	**33-56**	**15-28**
Mid-point	**44.5**	**21.5**

Use 20% for maximum demand management

***Key Takeaway**: Aggressive TDM strategies work*

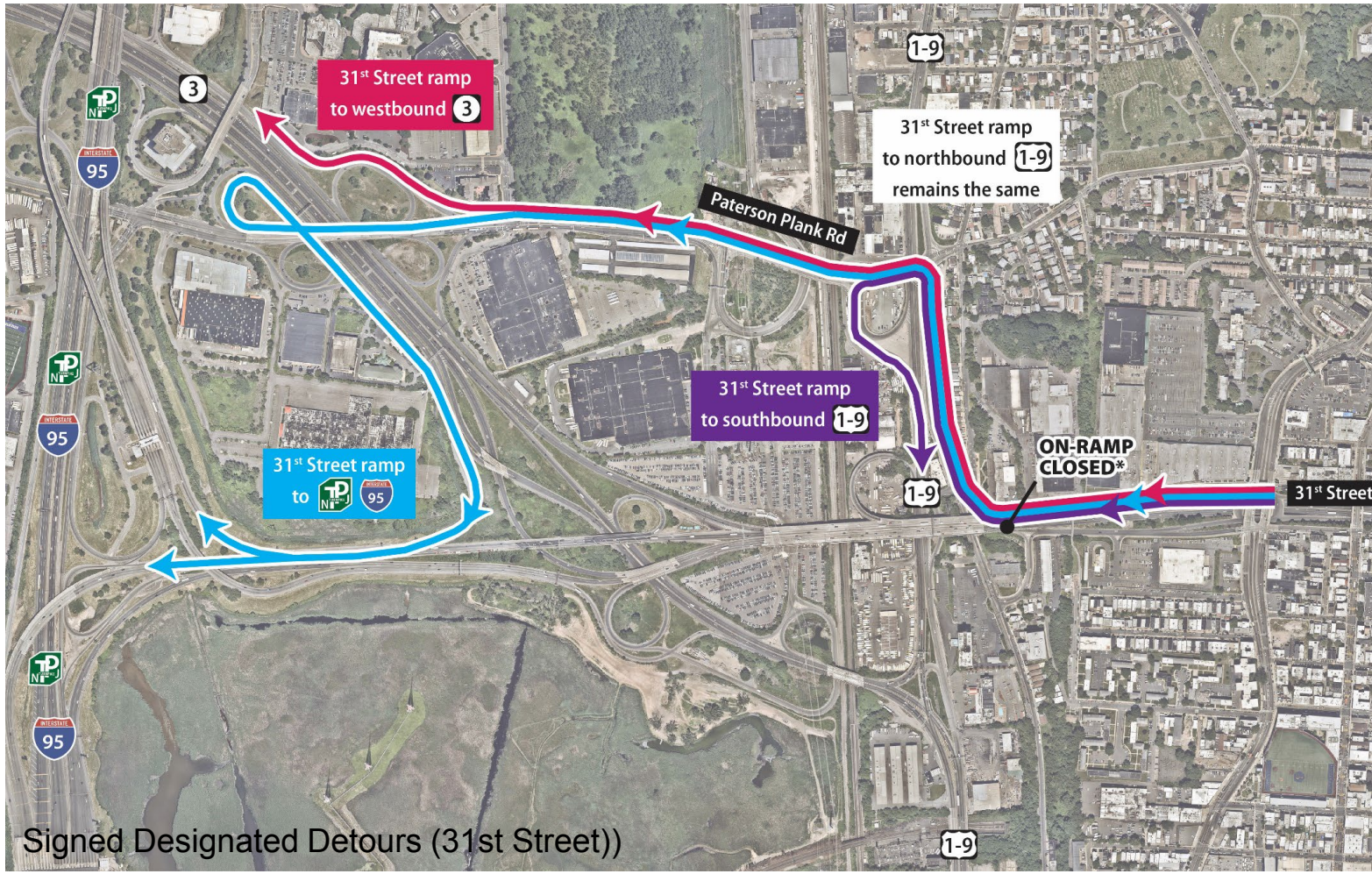
Recent Projects | Pulaski Skyway

- Entire northbound roadway closed for 3 years
- Heavy Truck Corridor heading to Holland and Lincoln Tunnels

***Key Takeaway**: Strong Communication Program+ Aggressive TDM strategies work*

Recent Projects | I-495 Bridge Restoration

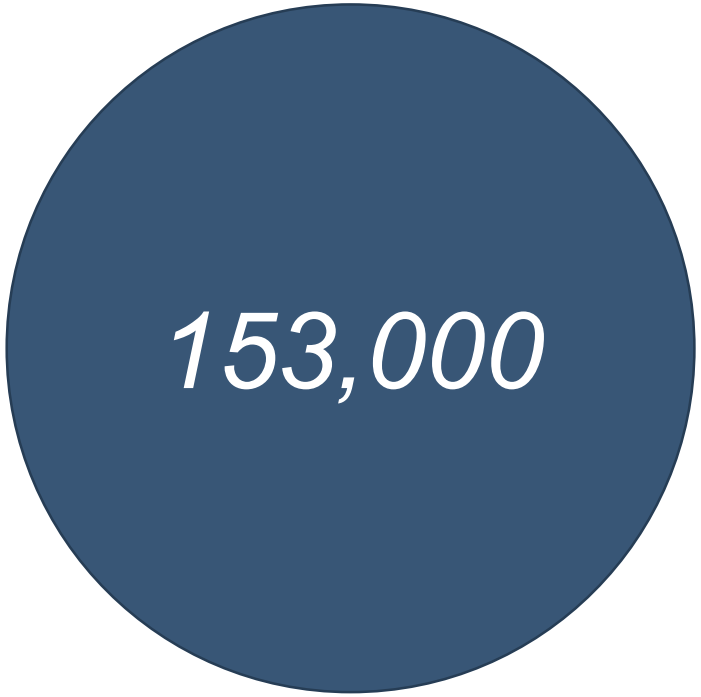
Regional Diversion Options



Signed Designated Detours (31st Street))

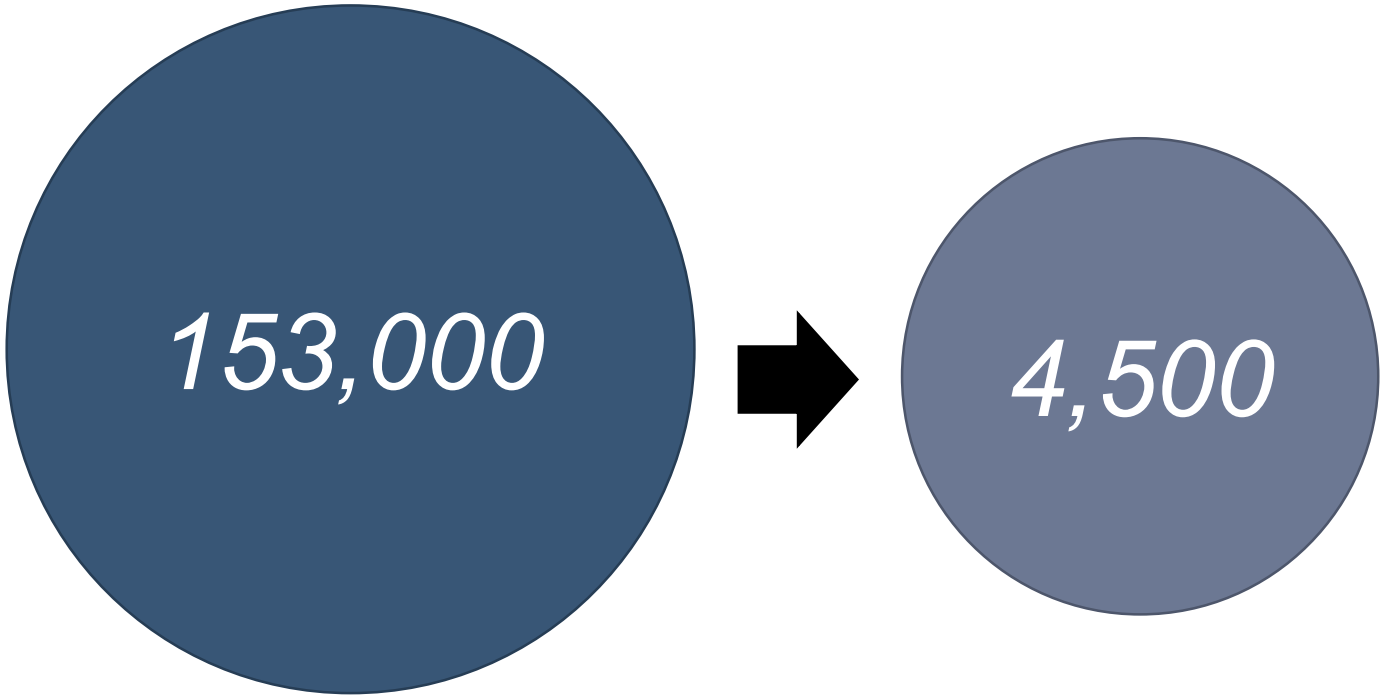
***Kew Takeaway**: Successful local and regional diversion plans*

Back to the BQE



24 Hour Volume

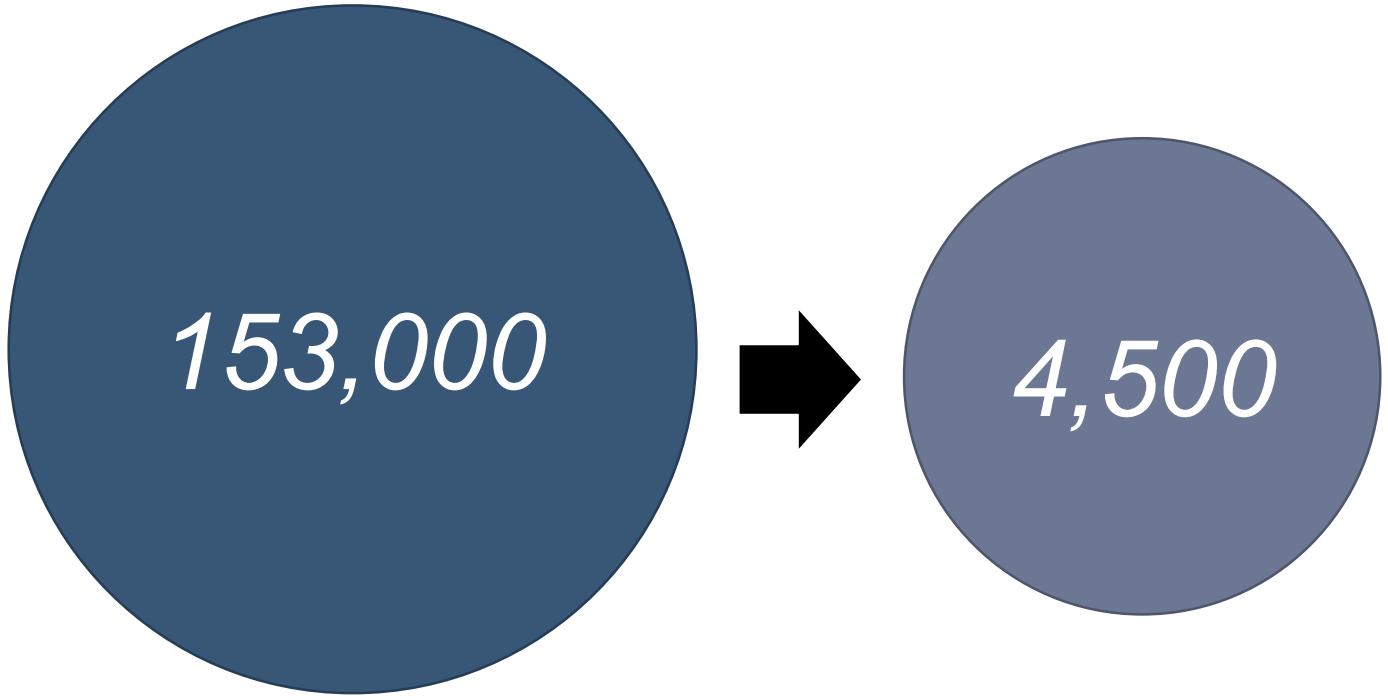
Redefining the Problem | Traffic Volumes



24 Hour Volume

Peak Hour Volume

Redefining the Problem | Traffic Volumes



24 Hour Volume

Peak Hour Volume

Lane Capacities

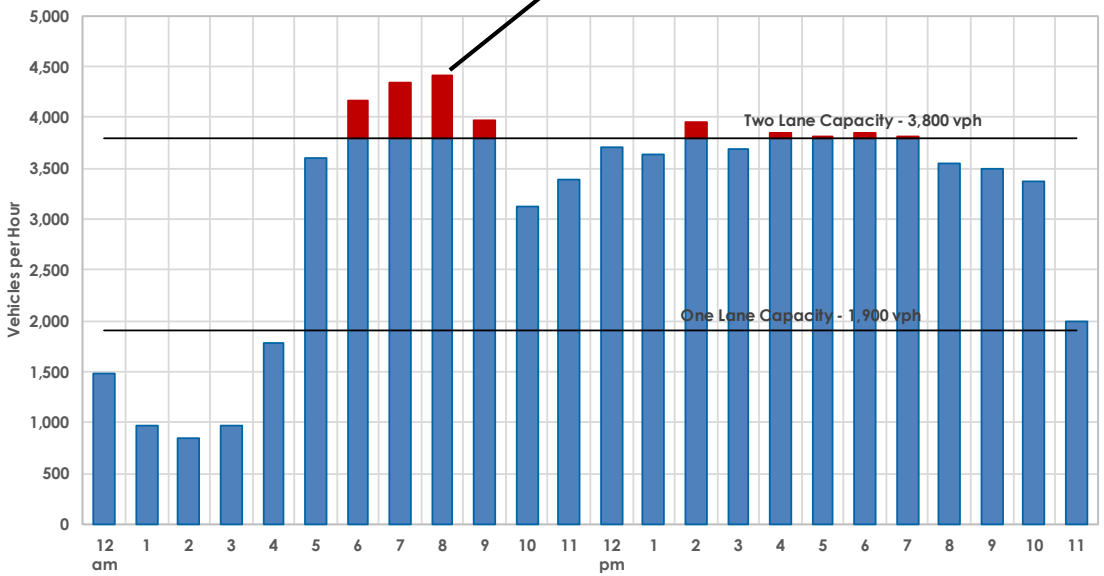
Let's Assume: 1,700 to 1,900 vph

Two-lanes: 3,400 to 3,800 vph

Redefining the Problem | Traffic Volumes

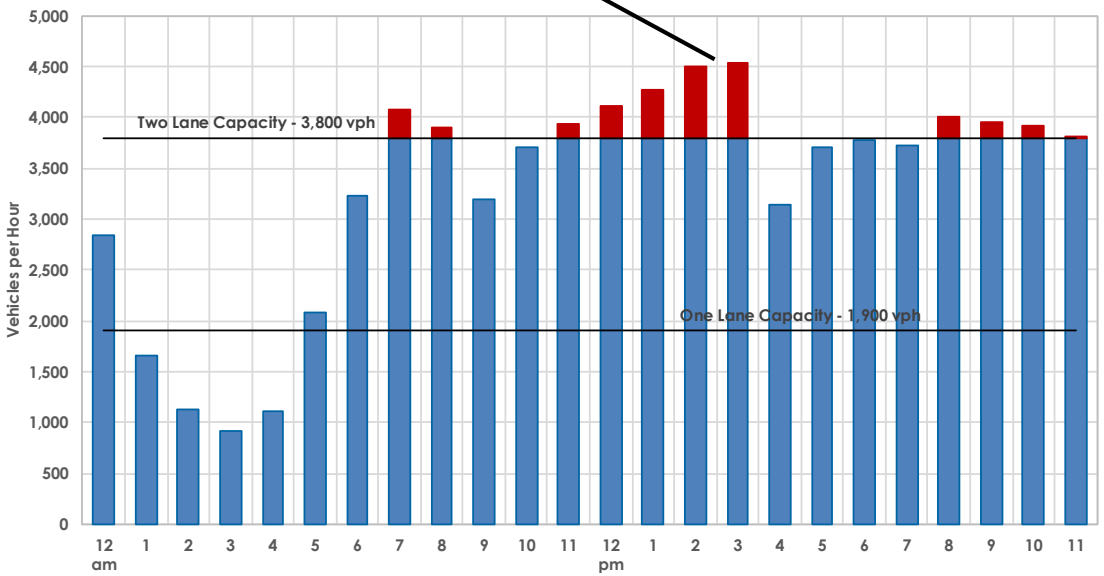
Weekday Hourly Volumes - Northbound
Between Pineapple Street and Columbia Street

Morning Peak: 8:00 to 9:00 AM
~ 4,400 veh / hr
Delta = 4,400 - 3,800 = 600 veh / hr



Weekday Hourly Volumes - Southbound
Between Joralemon Street and Atlantic Avenue

Afternoon Peak: 3:00 to 4:00 PM
~ 4,500 veh / hr
Delta = 4,500 - 3,800 = 700 veh / hr



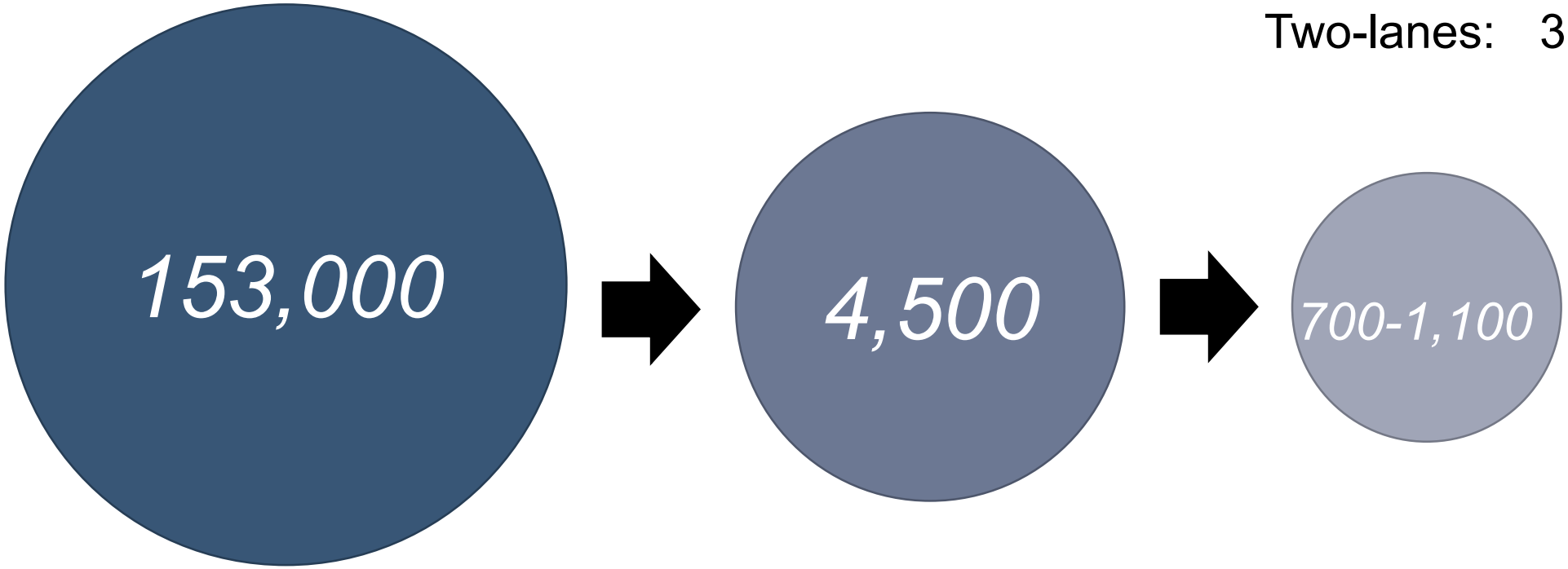
Source: Average of ATR counts, September and October 2016

Redefining the Problem | Traffic Volumes

Lane Capacities

Let's Assume: 1,700 to 1,900 vph

Two-lanes: 3,400 to 3,800 vph



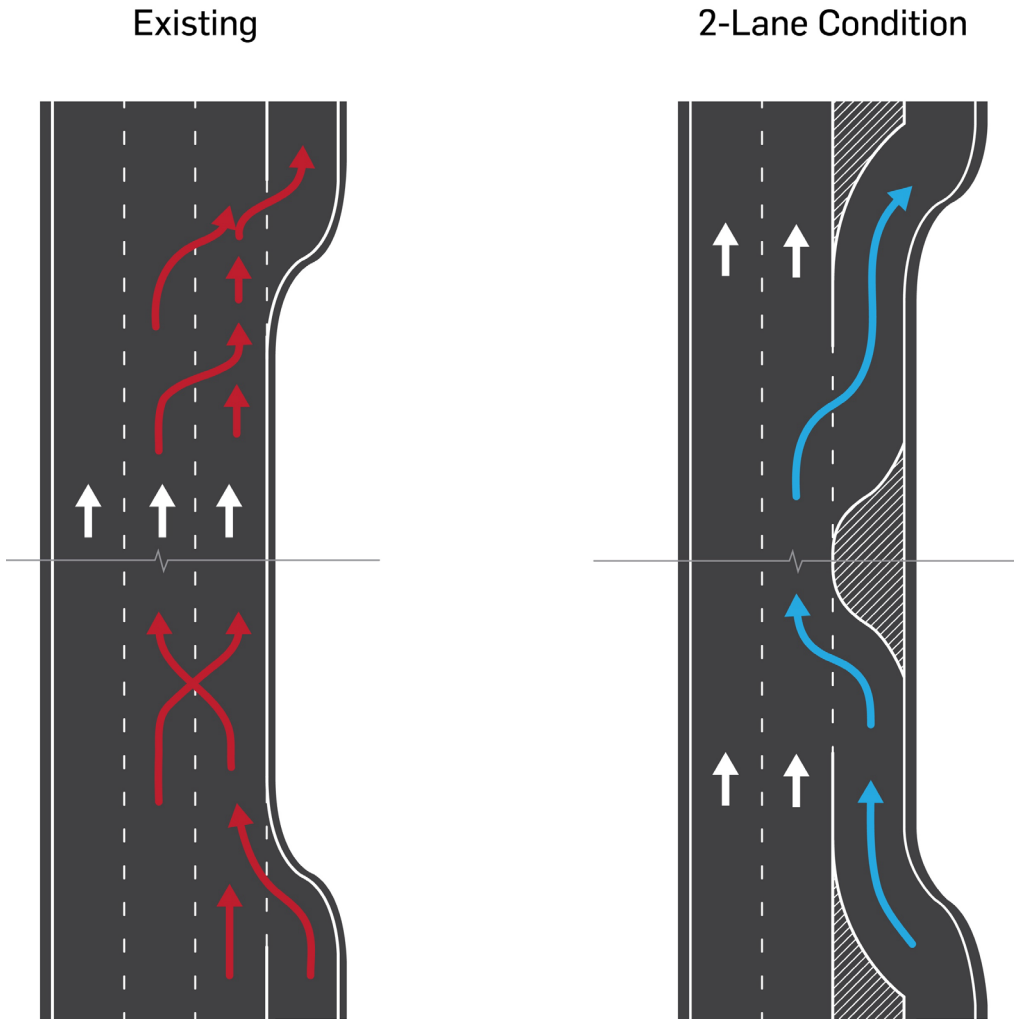
24 Hour Volume

Peak Hour Volume

Magnitude of diversion necessary

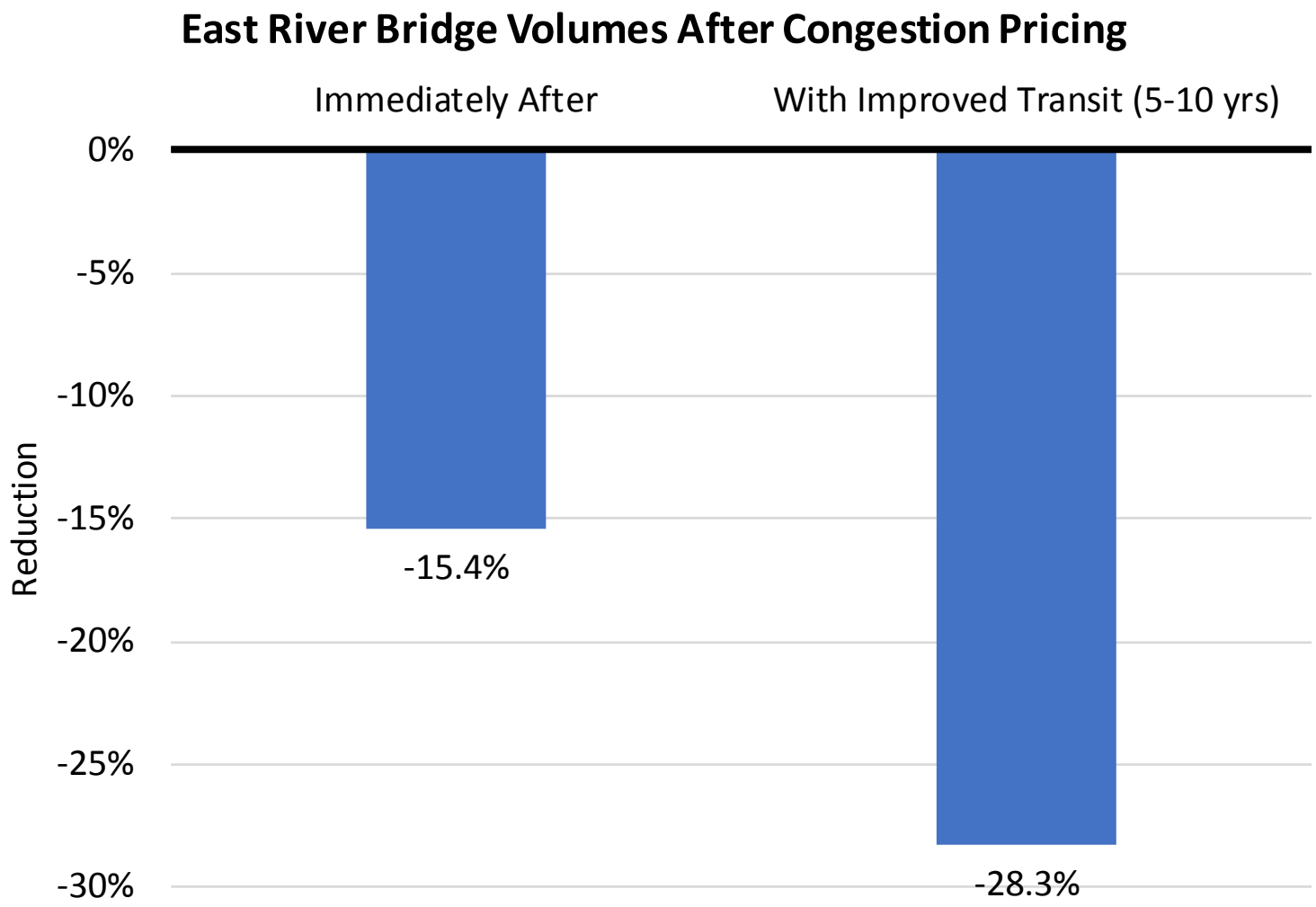
Redefining the Problem | Two-Lane Highway

A well-designed 2-lane highway w/ ramps can perform better than a poorly built 3-lane highway



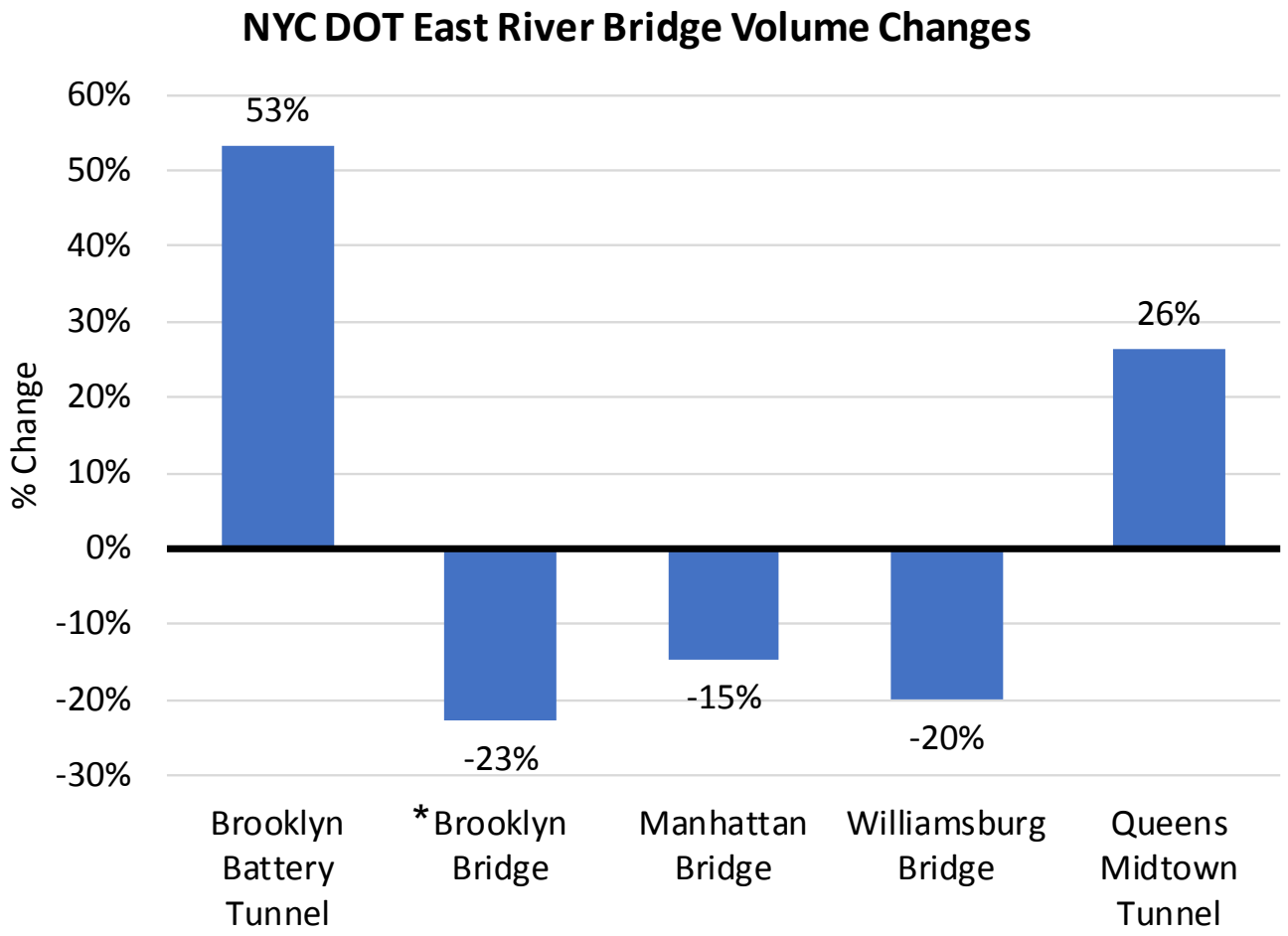
- Dedicated acceleration/deceleration lanes
- Minimizes weaves
- Allows for shoulder at times (fewer crippling incidents)
- Fewer crashes
- Fewer extreme delays
- Fewer spill-overs to local communities

Reducing Corridor Traffic | Congestion Pricing



Source: Balance Transportation Analyzer

Reducing Corridor Traffic | Congestion Pricing



Source: Traffic Impact of Tolls on the East & Harlem River Bridges, NYC DOT

*Brooklyn Bridge thru trips north of 60th street free under current plan

Reducing Corridor Traffic | Congestion Pricing

- Anticipated 15-20% reduction on East River Bridge Crossings
- Rough estimate 10-20% reduction on BQE

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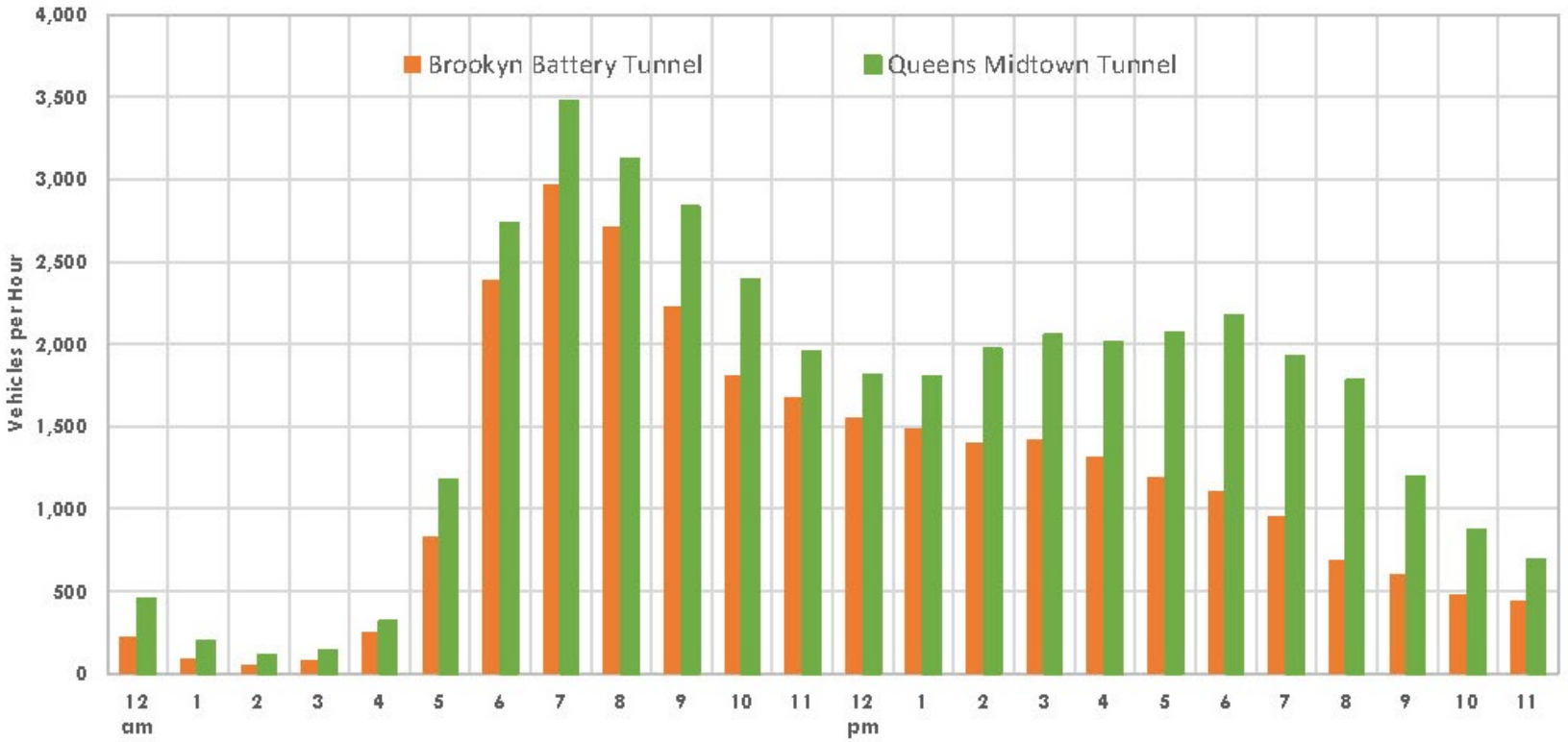
https://bqe-i278.com/en/expert-panel/documents

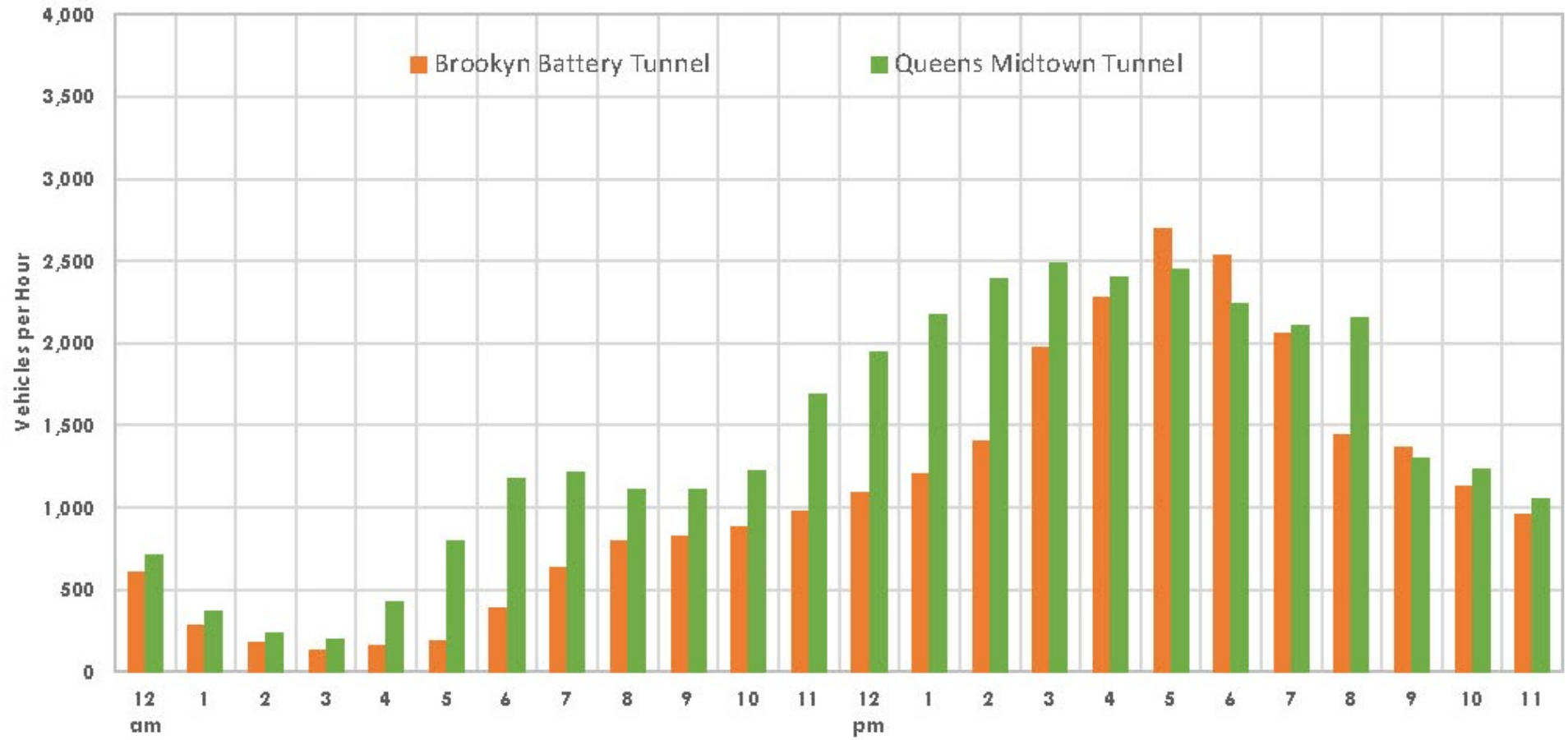
Can the Battery Tunnel Handle More Traffic to Manhattan?

Daily Volume to Manhattan
BBT = 27,898
QMT = 39,261
Difference = 11,363



Can the Battery Tunnel Handle More Traffic From Manhattan?

Daily Volume to Brooklyn
BBT = 26,178
QMT = 34,209
Difference = 8,031

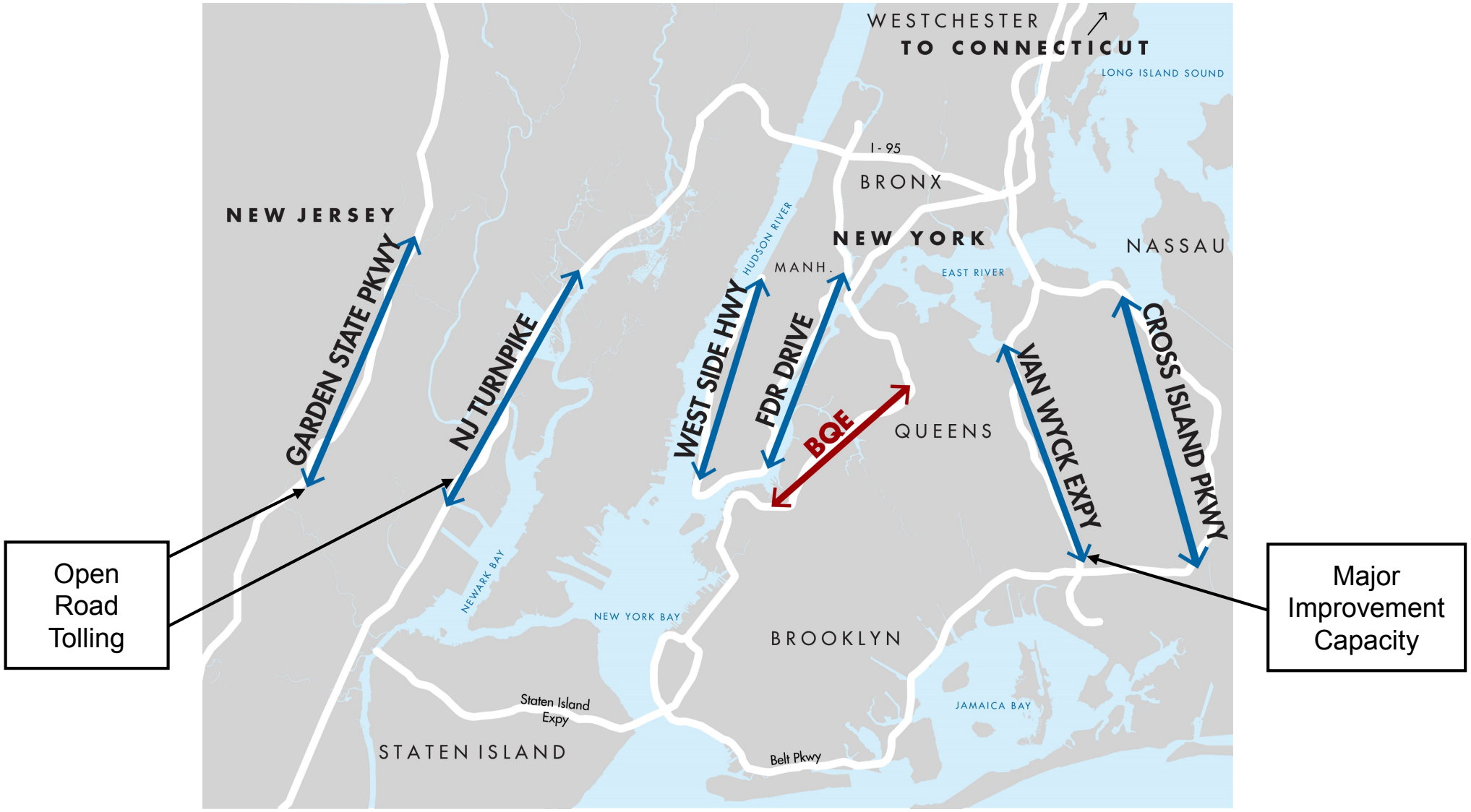


Additional Travel Demand Management | Strategies

How do we reduce demand in the corridor?

Area of Opportunity	TDM Measure	Potential Impact
Pricing	Congestion Pricing	10% to 20%
Area Roadway Network	Loosen Restrictions to HOV Lanes to BBT Other Roadway Network Improvements	3% 2%
Freight	Permit Small Trucks on Belt-Shore Parkway	>1%
Transit	Various (improved bus, BQX, G-train expansion)	>1%
Other considerations		
• Regional Rebalancing	Area equilibrium (and disappearances)	3%
• Historical Trends	NYMTC negative growth to HUB	2%
	Range of Impact =	22% to 32%
	Peak Hour Volume Reduction =	990 to 1,440

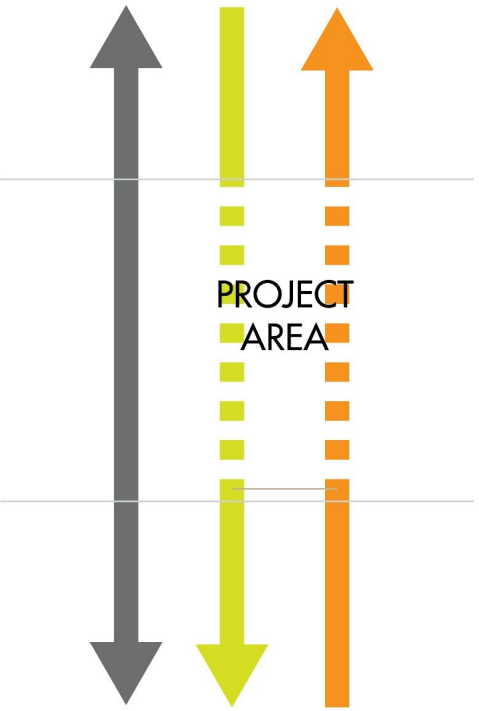
Six Other Major North-South Highways within ~10 Miles



TDM Transit | Area Improvements

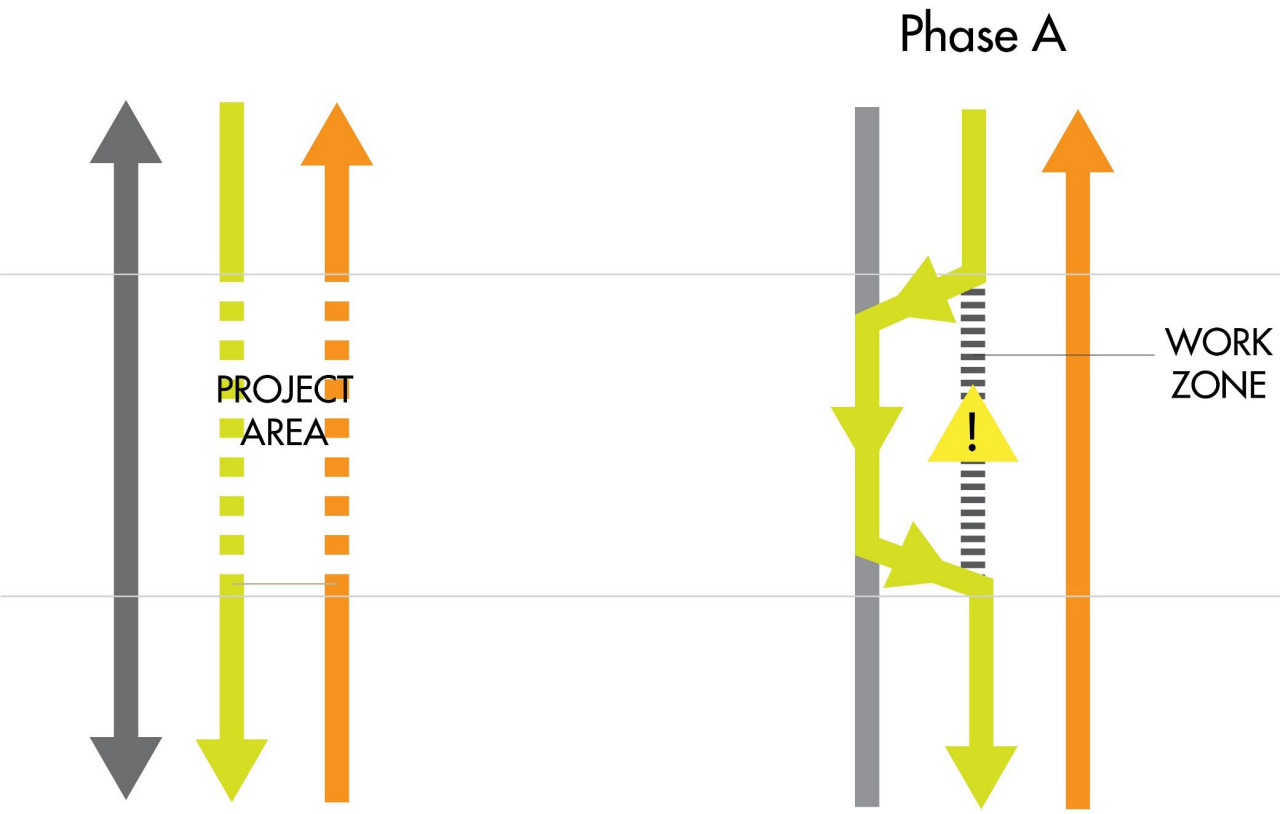
- G Train
- BQX
- Triboro RX

Construction Methodology for Consideration



Under Construction
Detour Route
S/B Broadway
N/B Broadway

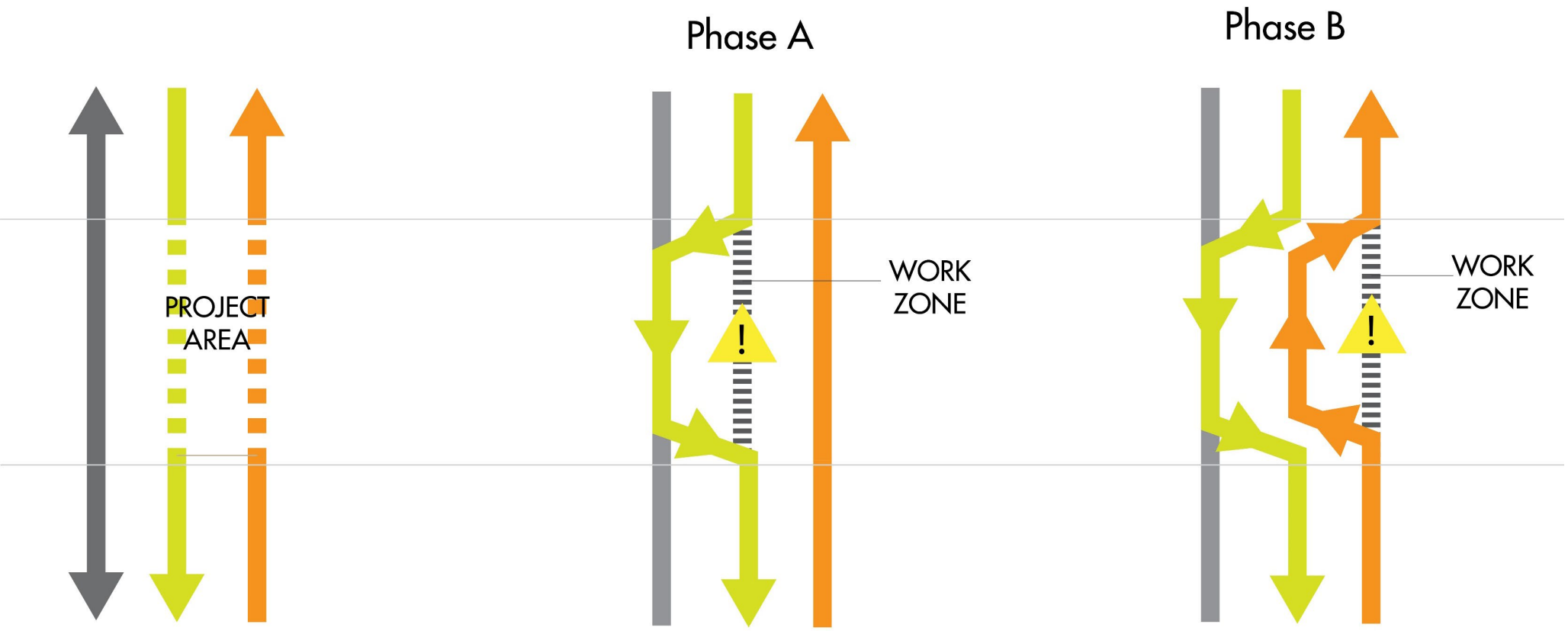
Construction Methodology for Consideration



! Under Construction
Detour Route
S/B Broadway
N/B Broadway

- Close S/B Road
- Divert S/B to Detour
- Rebuild S/B

Construction Methodology for Consideration

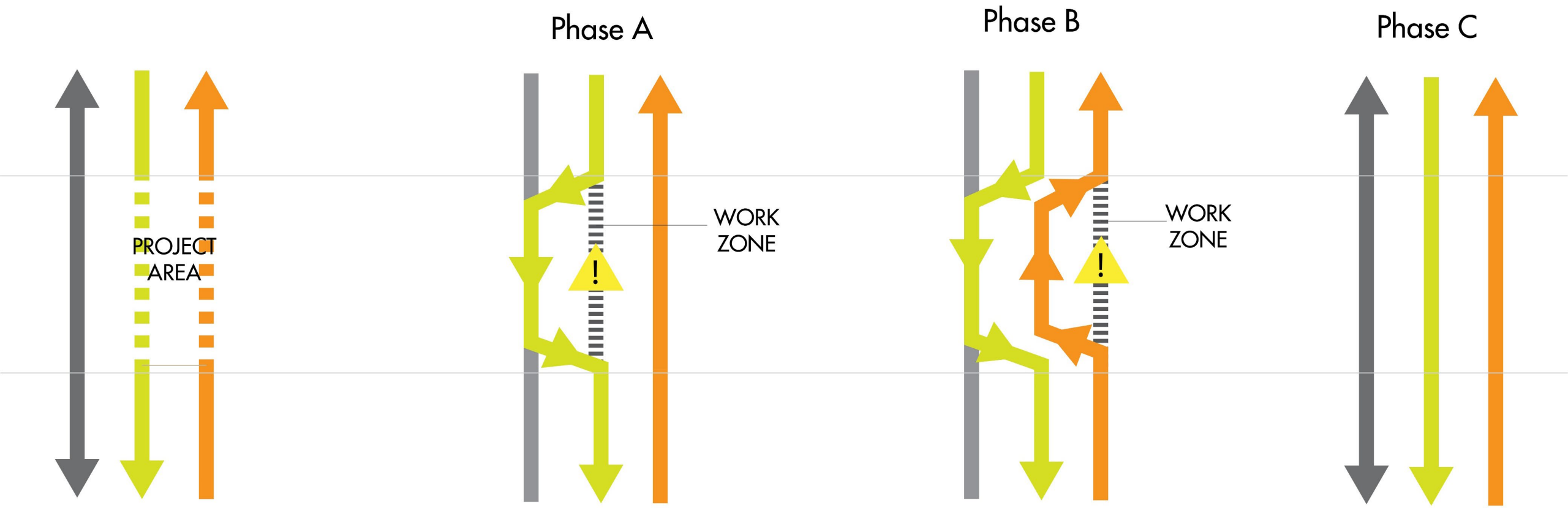


- ! Under Construction
- Detour Route
- S/B Broadway
- N/B Broadway

- Close S/B Road
- Divert S/B to Detour
- Rebuild S/B

- Divert N/B to Rebuilt S/B
- Rebuild N/B

Construction Methodology for Consideration



- Under Construction
- Detour Route
- S/B Broadway
- N/B Broadway

- Close S/B Road
- Divert S/B to Detour
- Rebuild S/B

- Divert N/B to Rebuilt S/B
- Rebuild N/B

- Divert N/B & S/B to Rebuilt Roadway
- Reopen Detour to Local Traffic

Construction Methodology for Consideration Furman St. Detour

- Temporary detour serving southbound traffic.
- No stopping (no traffic signals, no pedestrian crossings.)

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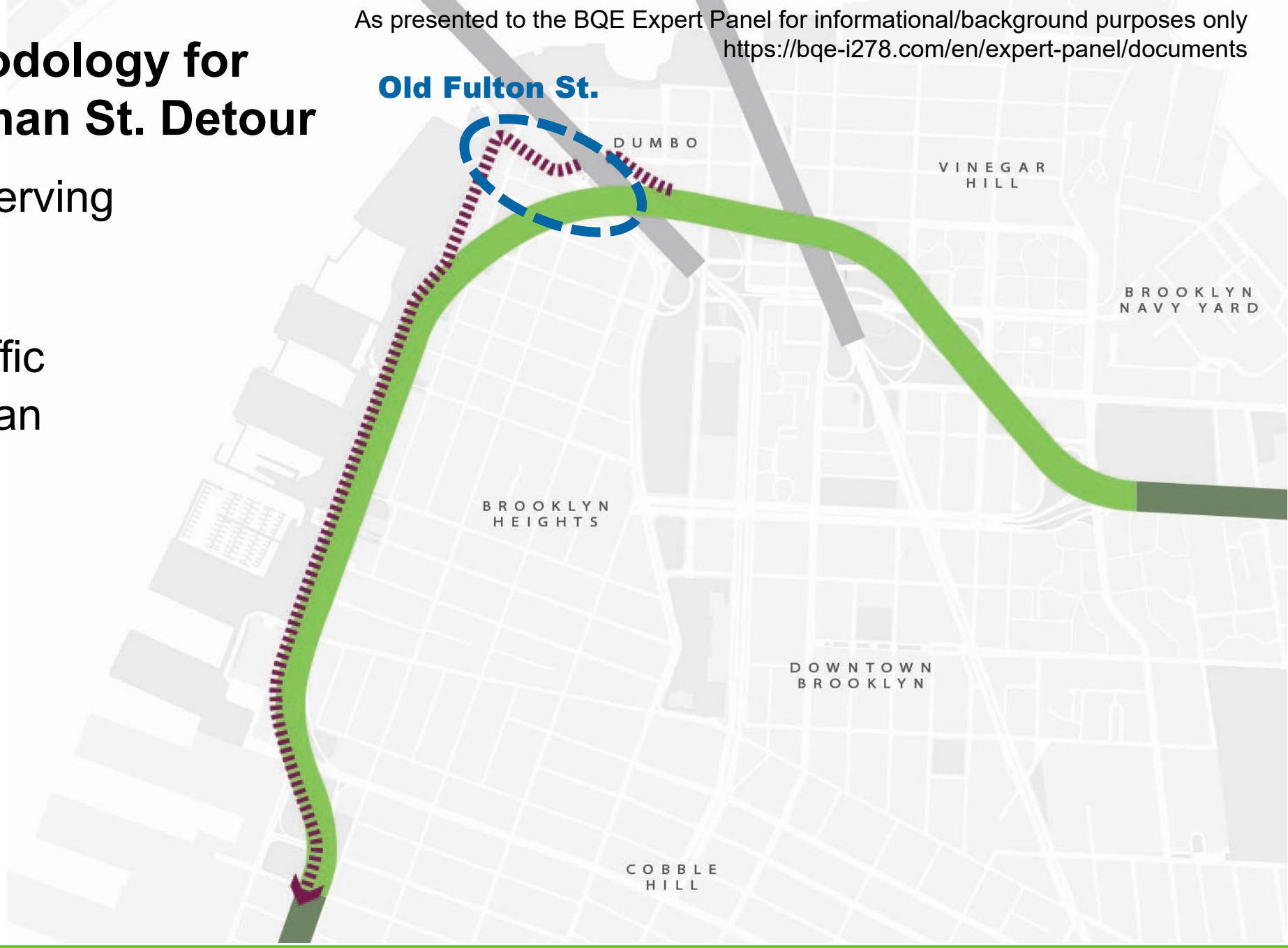

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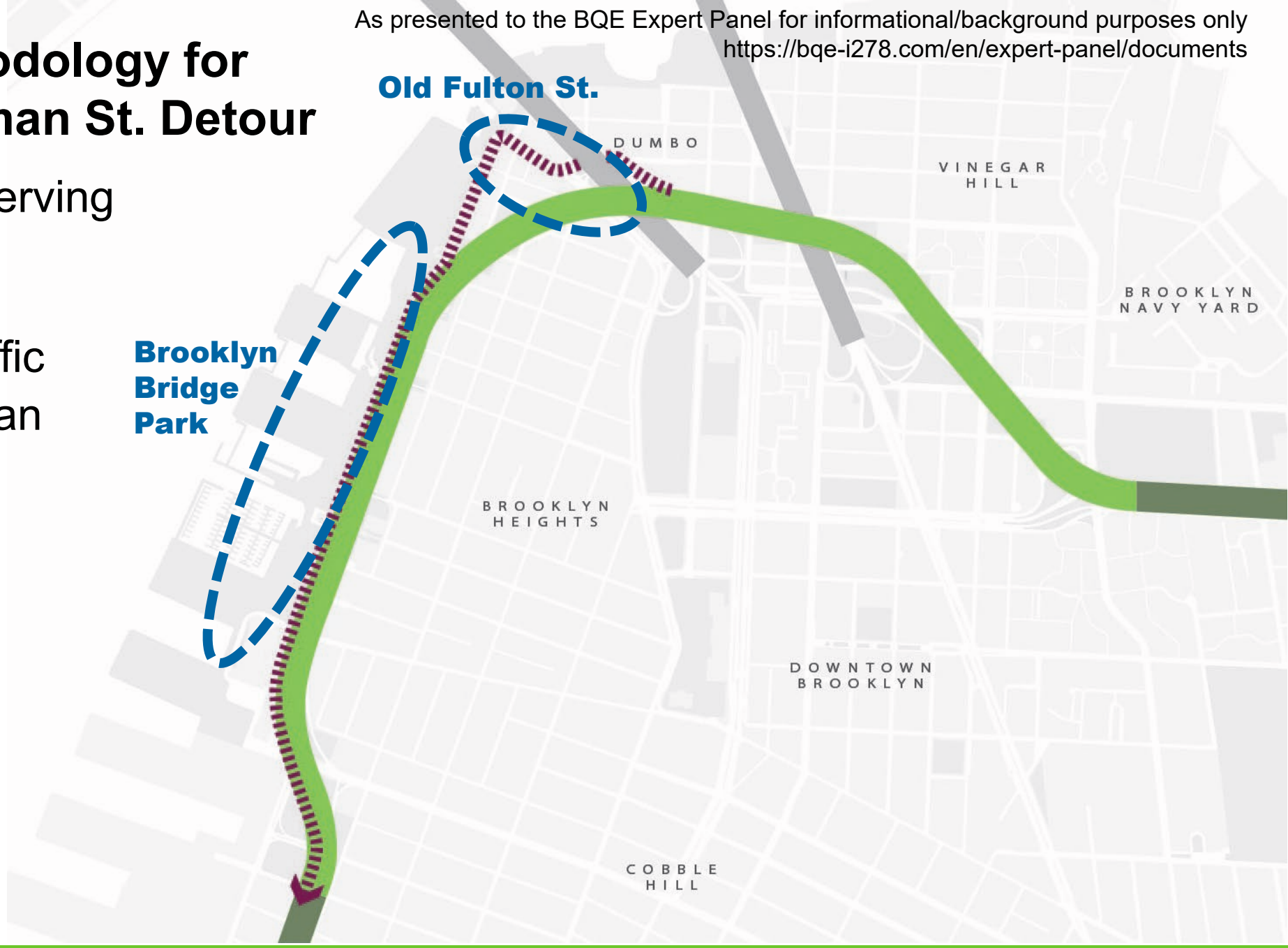

Construction Methodology for Consideration Furman St. Detour

- Temporary detour serving southbound traffic.
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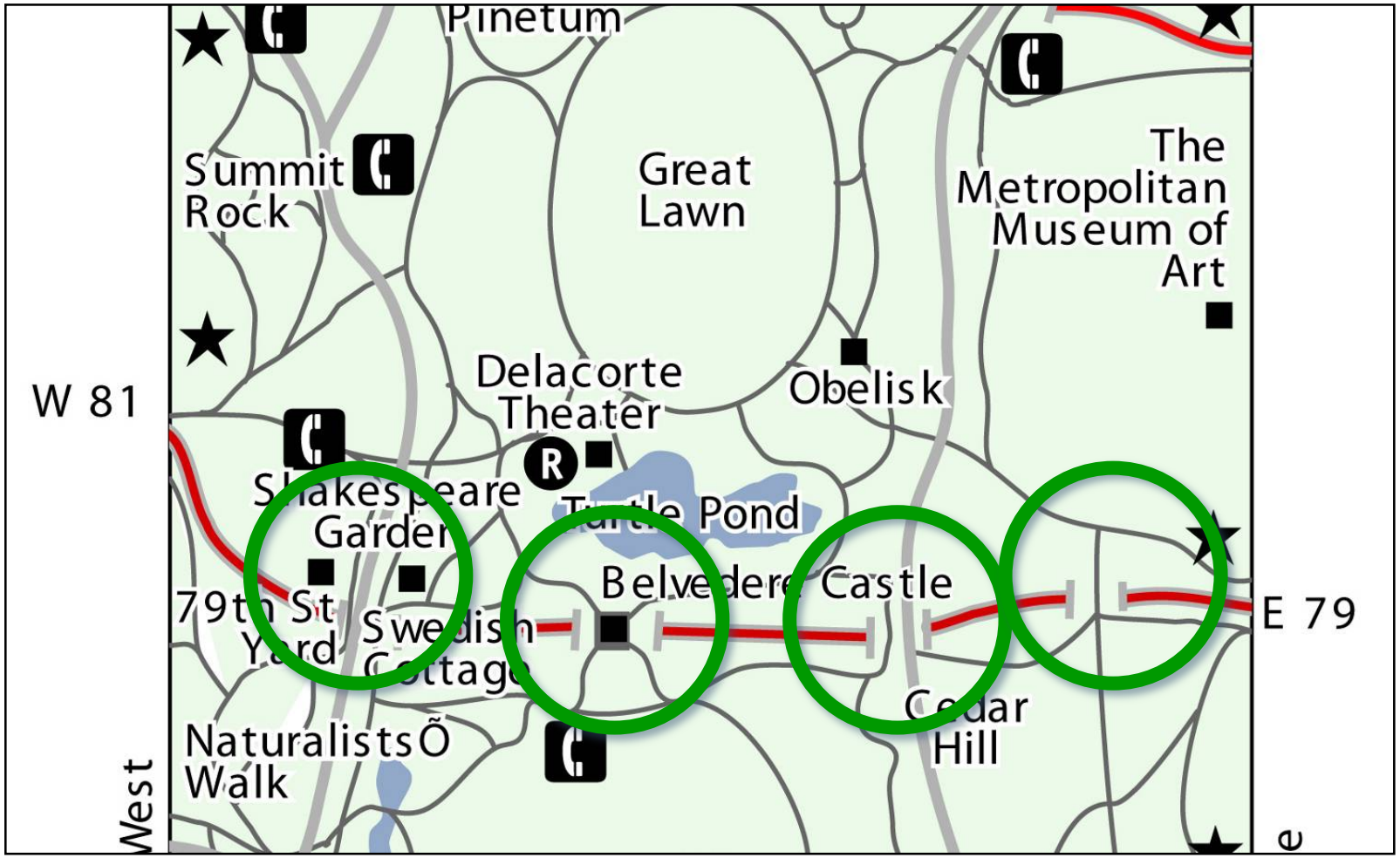
What would Olmsted do?

Manhattan's Biggest Highway: Central Park, 16 Lanes



What would Olmsted do?

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TWO ECOSYSTEMS

People + Traffic

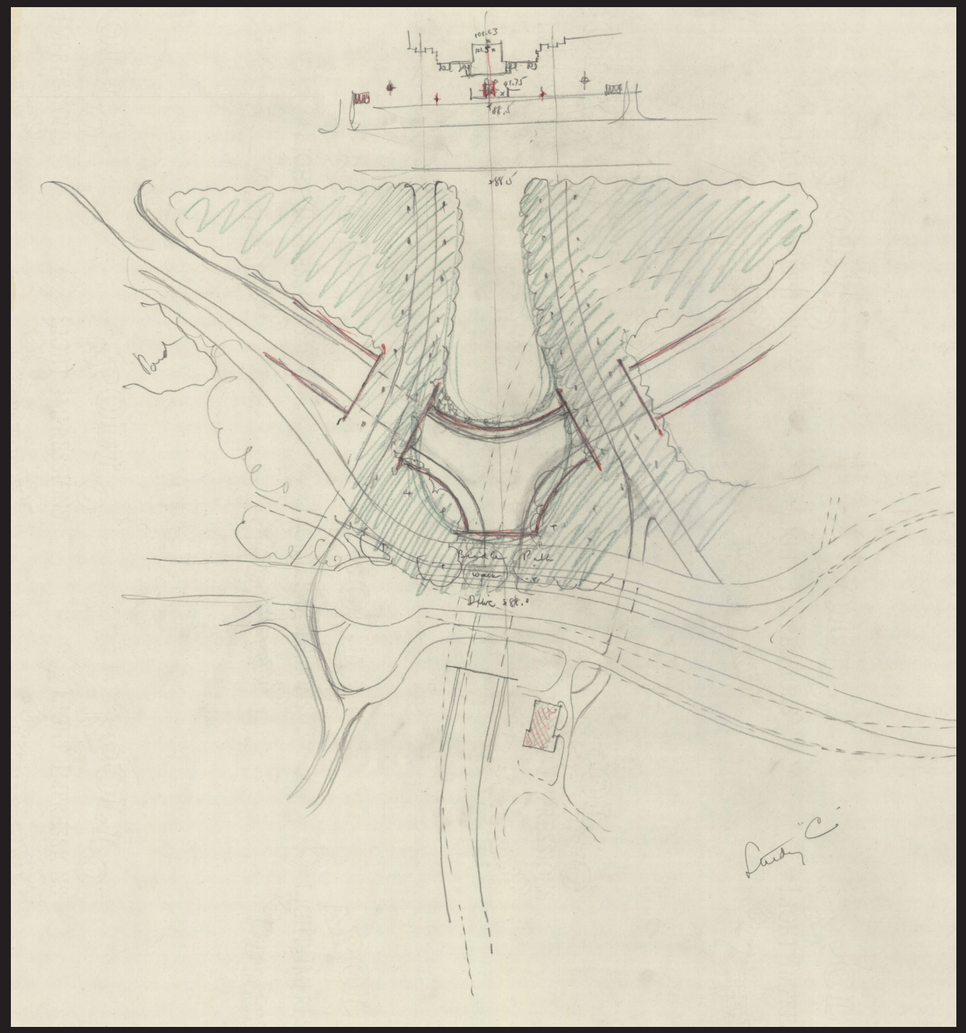
BB ⟷ **BBP** ⟷ **BQE**

Brooklyn Bridge

Brooklyn Bridge Park

Brooklyn-Queens Expressway

Olmsted’s Layered Landscape



Transverse roadways, Central Park, 1868

Traffic

The Furman Reroute

Two lanes for temporary southbound BQE

Space for phased reconstruction

Reduced impacts for people & traffic

People

Fulton Landing Strip

Link between Brooklyn Bridge and Brooklyn Bridge Park

Iconic gateway & public space

Reduce conflicts between people & traffic

0 Now

BQE Triple Cantilever

0 Now

1 Reduce

Reduce from
3 Lanes to 2 Lanes

0 Now

1 Reduce

2 Reroute

Reroute southbound traffic along Furman Street

0 Now

1 Reduce

2 Reroute

3 Restrict

Limit access at key on-ramps and exits

0 Now

1 Reduce

2 Reroute

3 Restrict

4 Reconnect

Connect pedestrians from Brooklyn Bridge to Brookyn Bridge Park

0 Now

1 Reduce

2 Reroute

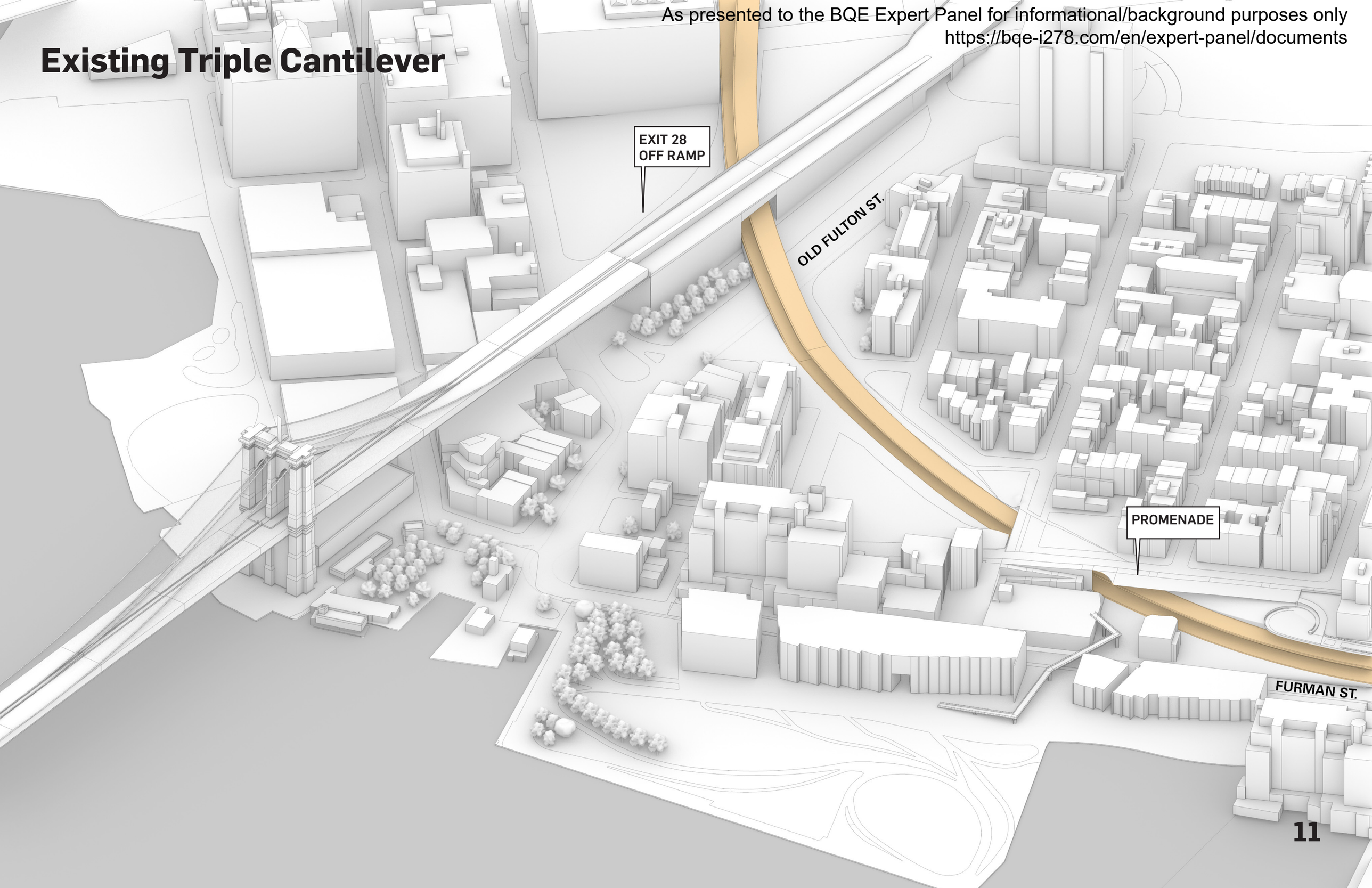
3 Restrict

4 Reconnect

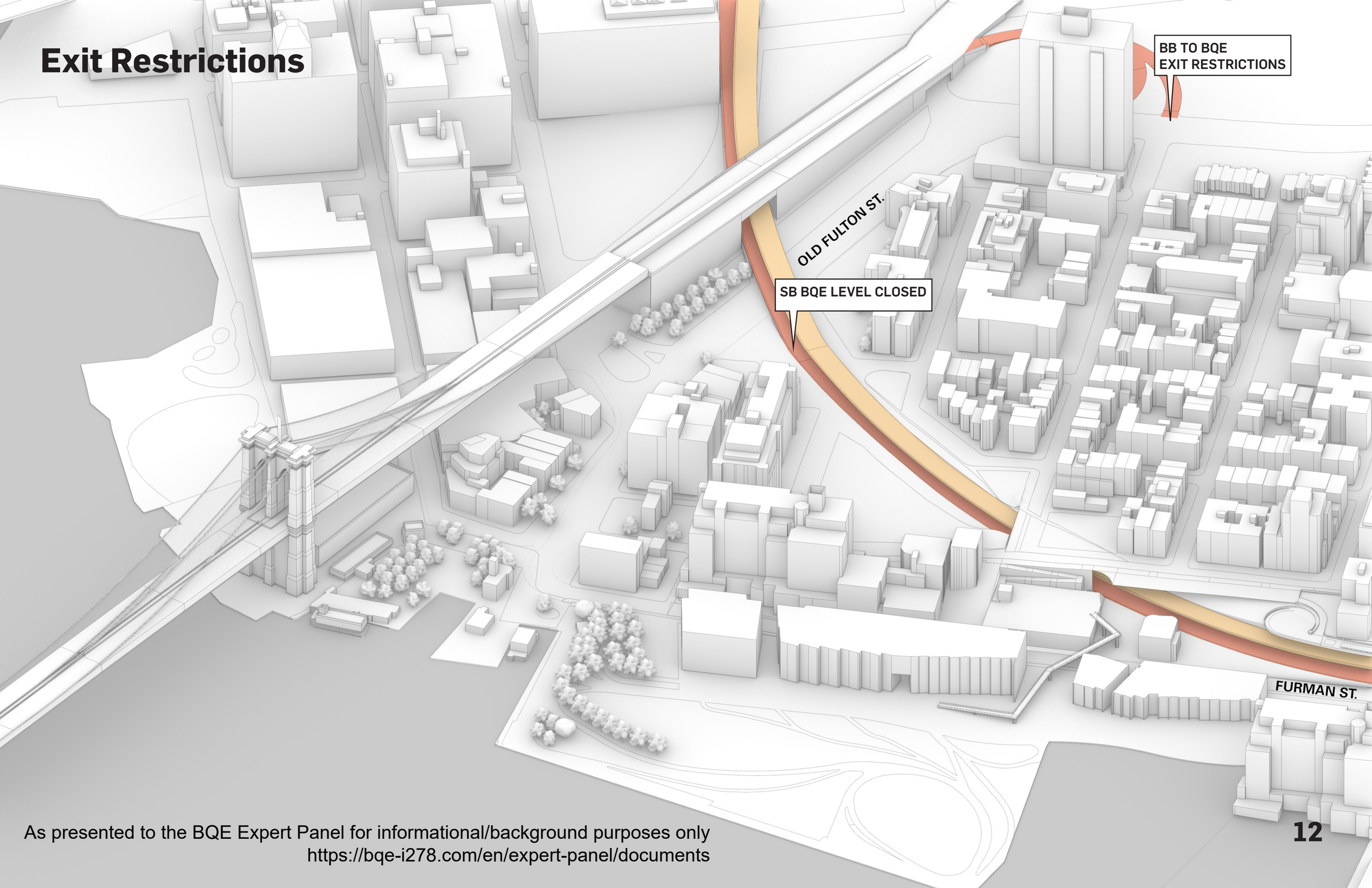
5 Ramp up

Ramp up from Furman to BQE over Atlantic Avenue

Existing Triple Cantilever



Exit Restrictions



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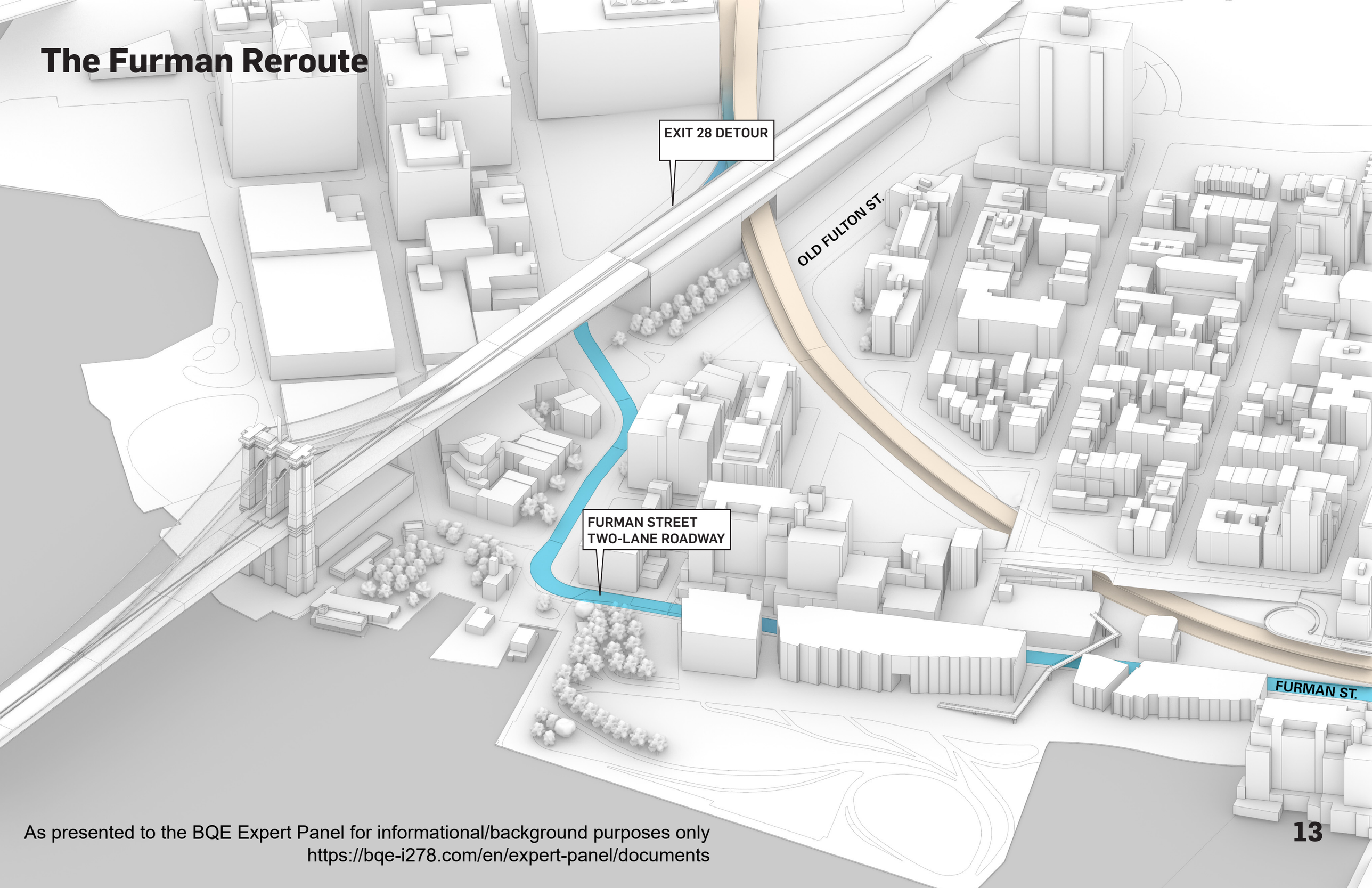
The Furman Reroute



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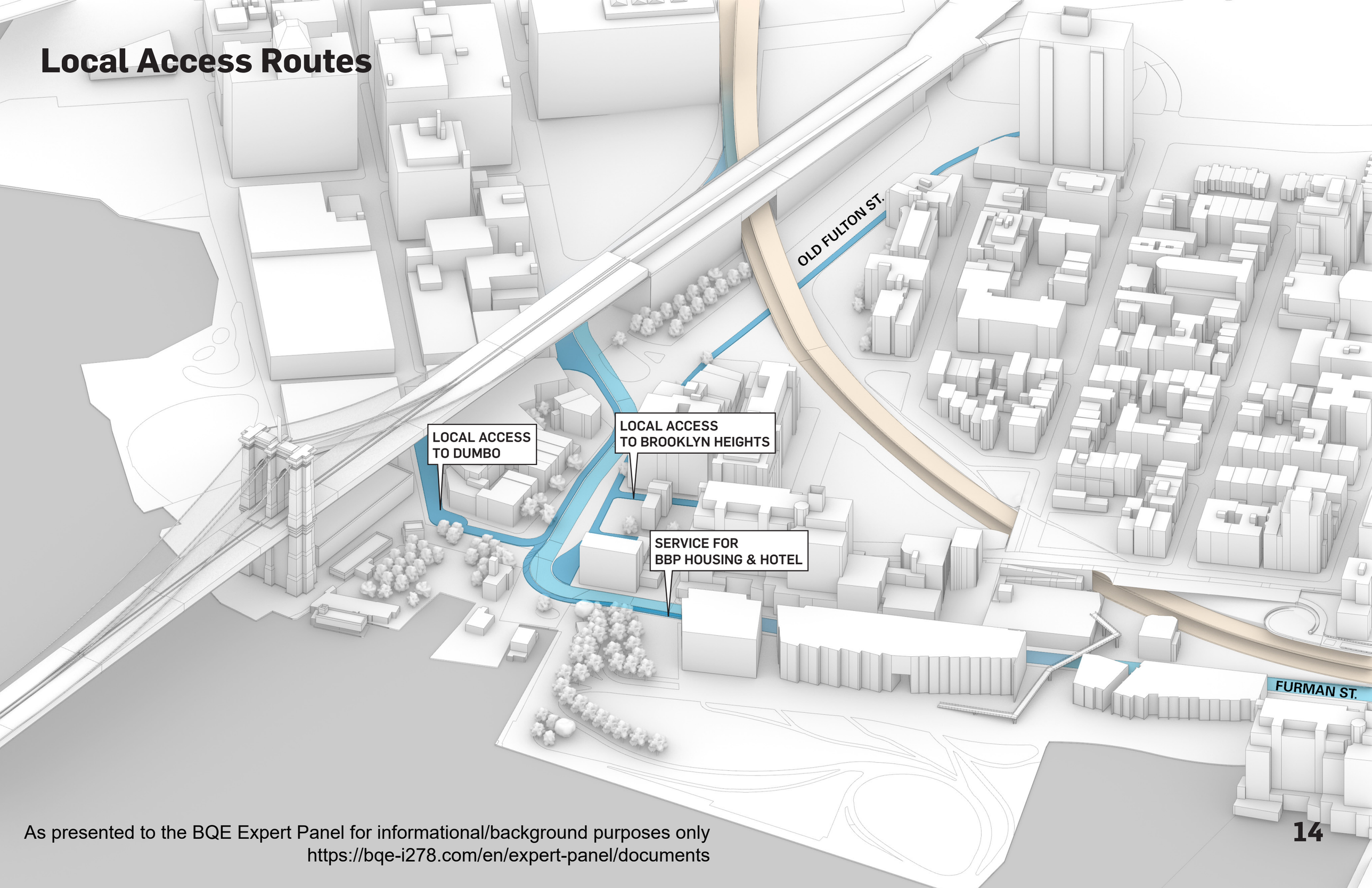
Local Access Routes



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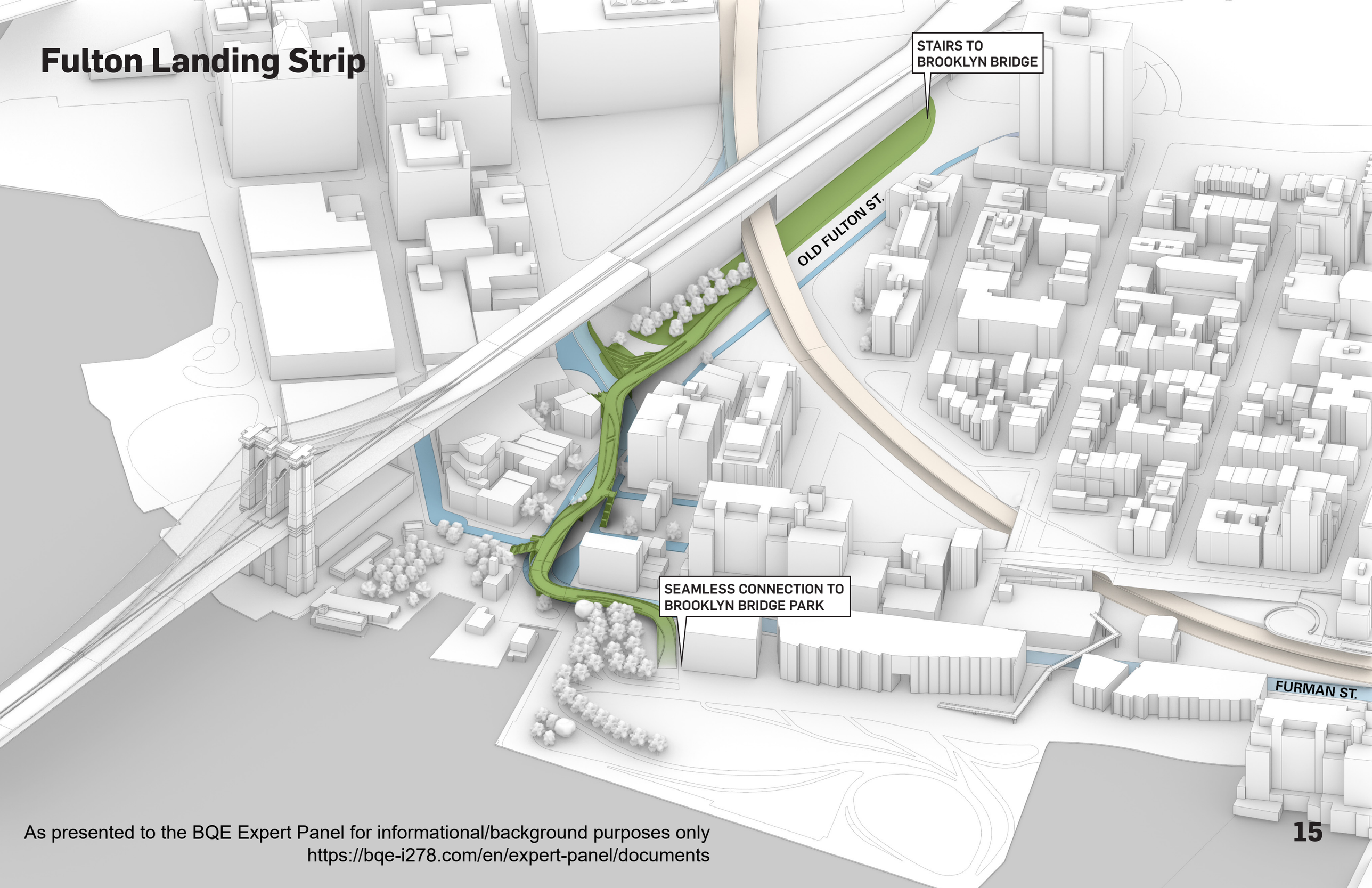
Fulton Landing Strip



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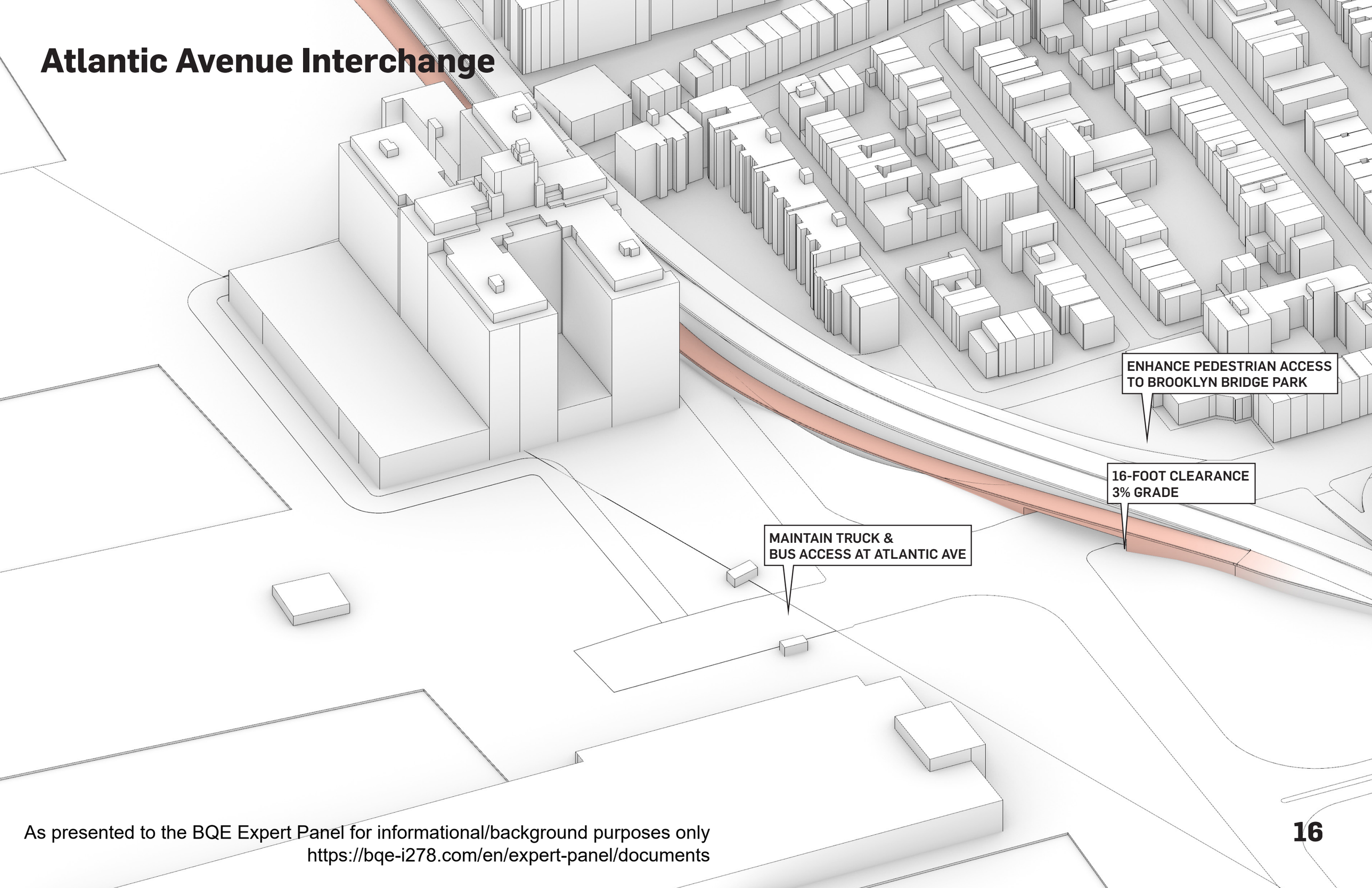
Atlantic Avenue Interchange



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THE EAGLE WAREHOUSE & STORAGE COMPANY

VIDEOS

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Thank You!

Questions & Comments

Appendix

Protecting Adjoining Neighborhoods

- Set up cordon zone for FHVs and apply same rules as CBD. Only 30% time without a passenger
- Trucks must have electronic bills of lading and GPS systems to ensure only in-block deliveries off truck routes.

Lessening Demand on SB Temporary Roadway Redirect

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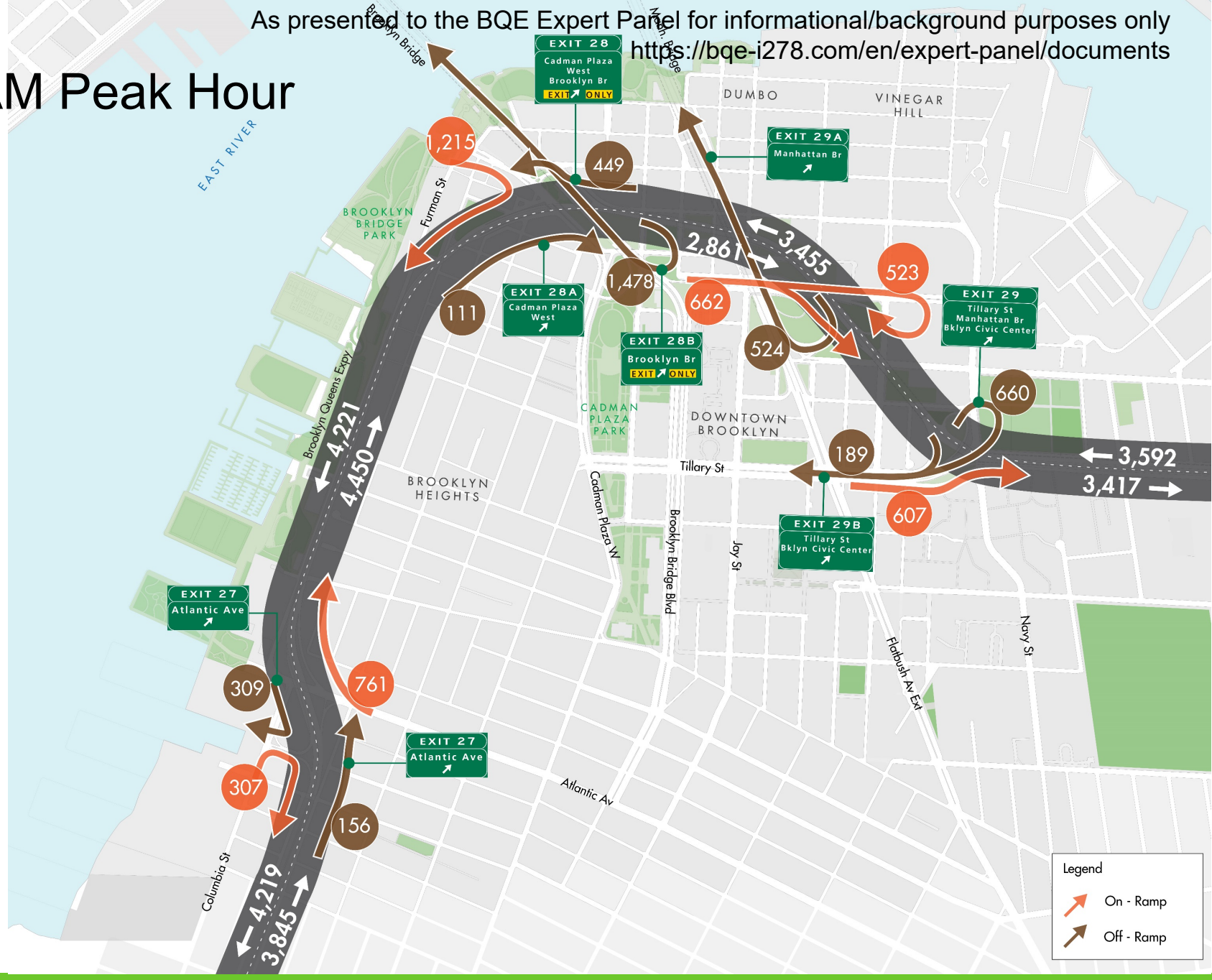
Refining the Problem | AM Peak Hour



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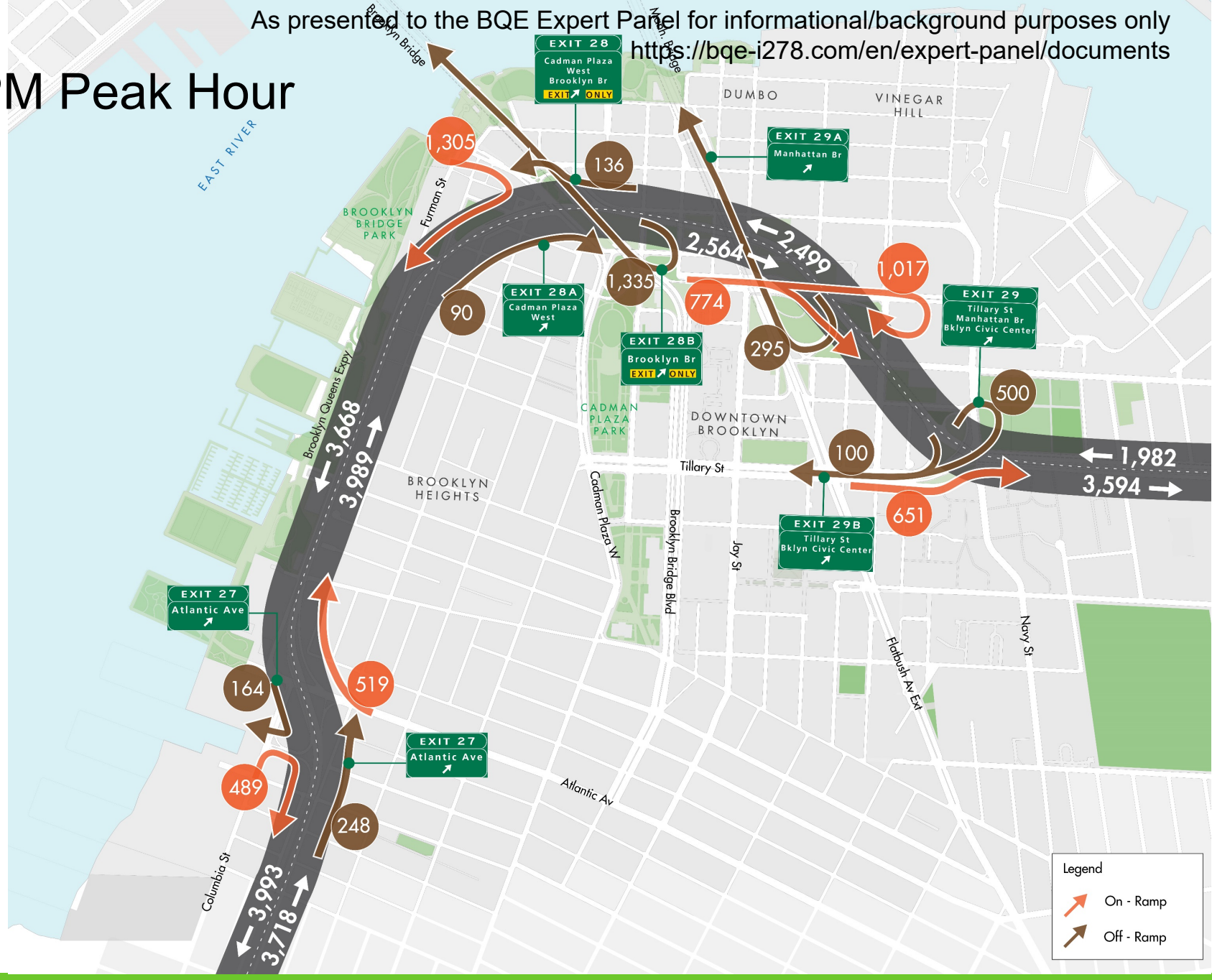
Refining the Problem | PM Peak Hour



Redefining the Problem | Two-Lane Highway

A 2-lane highway creates opportunities in final and temporary design.

- Add standard 11-foot lanes
- Add full acceleration and deceleration lanes, shoulder and center medium.

Eastbound/Northbound

- Dedicated exit lane to Exit 27, Atlantic Avenue
- Dedicated entrance lane from Atlantic Avenue
- Restrict Exit 28A, Camden Plaza West to “Authorized Vehicles Only”
- Advance signage, add over-height detection and extend exit lane to Exit 28B Brooklyn Bridge

Westbound/Southbound

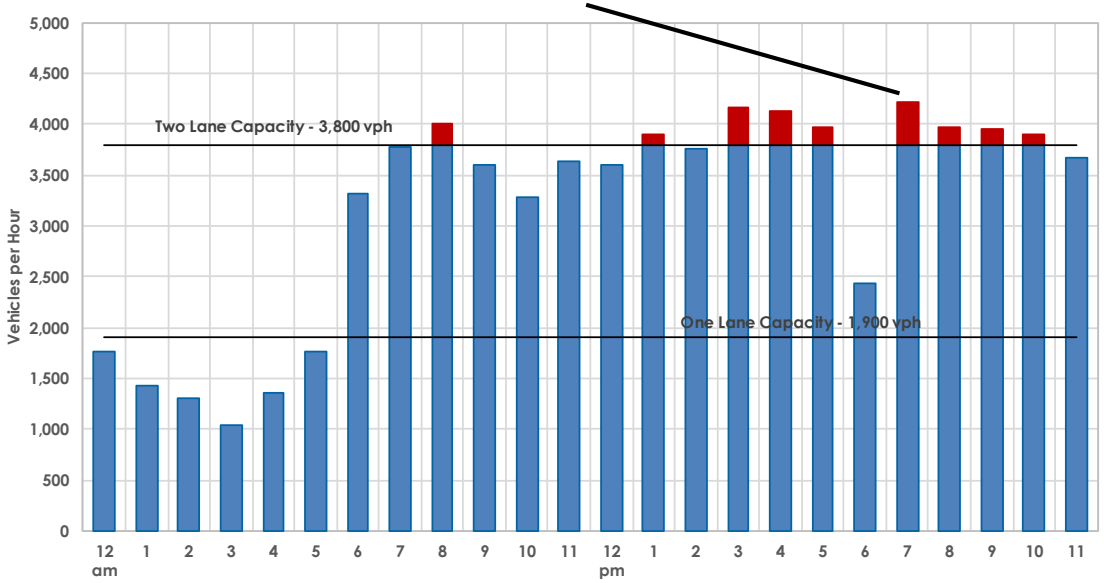
- Dedicated (physically separated) entrance lane from Hicks Street
- Dedicated exit lane to Exit 27, Atlantic Avenue
- Dedicated entrance lane from Columbia Street

Refining the Problem | Saturday Traffic Volumes

Saturday Hourly Northbound Volumes

Between Pineapple Street and Columbia Street

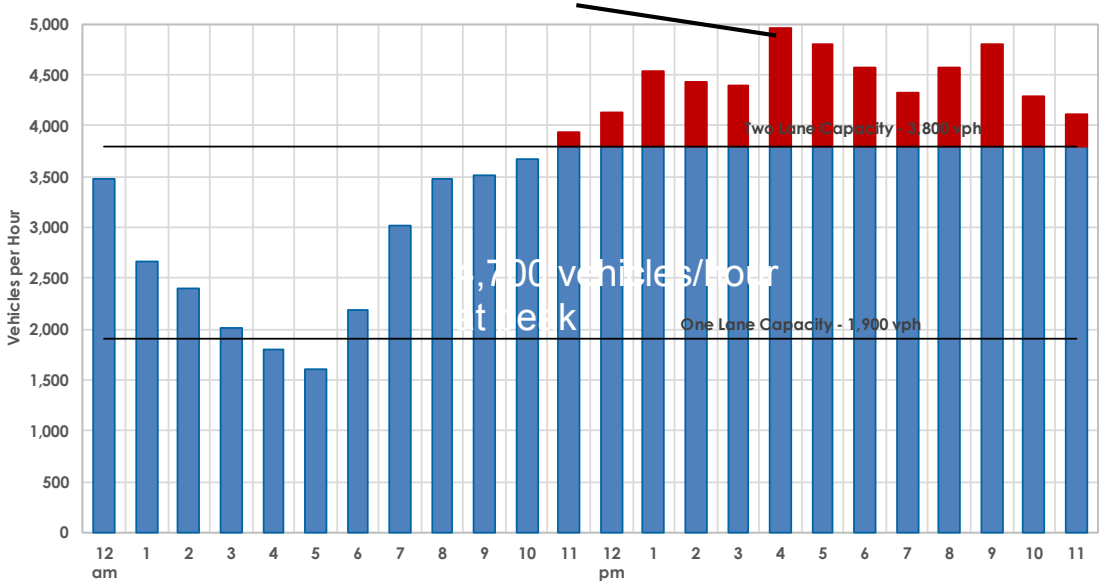
Saturday Peak: 7:00 to 8:00 PM
~ 4,200 veh / hr
Delta = 4,200 - 3,800 = 400 veh / hr



Saturday Hourly Southbound Volumes

Between Joralemon Street and Atlantic Avenue

Saturday Peak: 4:00 to 5:00 PM
~ 5,000 veh / hr
Delta = 5,000 - 3,800 = 1,200 veh / hr



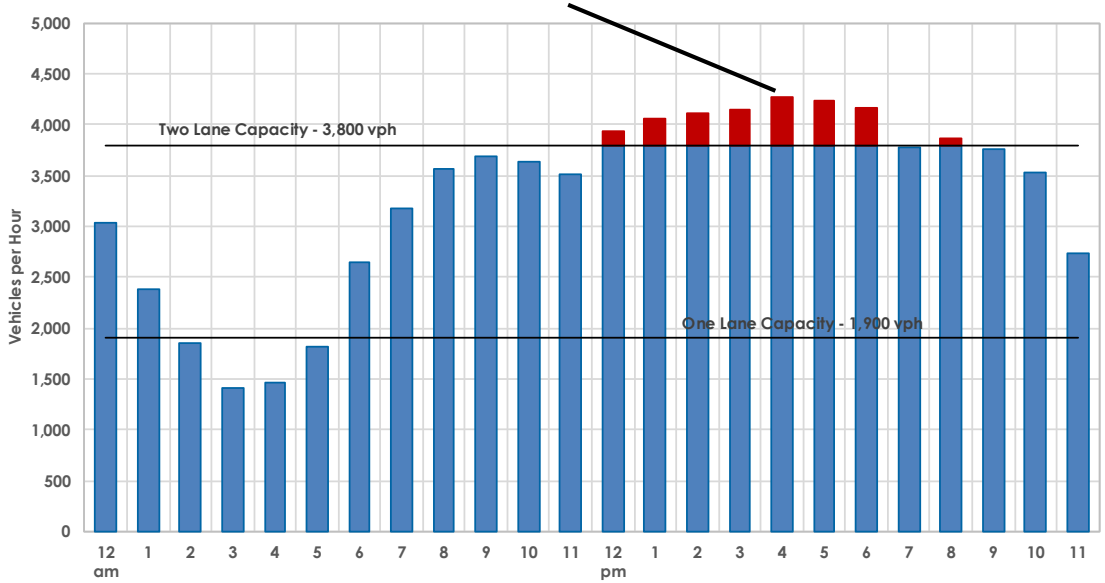
Source: Average of ATR counts, September and October 2016

Refining the Problem | Sunday Traffic Volumes

Sunday Hourly Northbound Volumes

Between Pineapple Street and Columbia Street

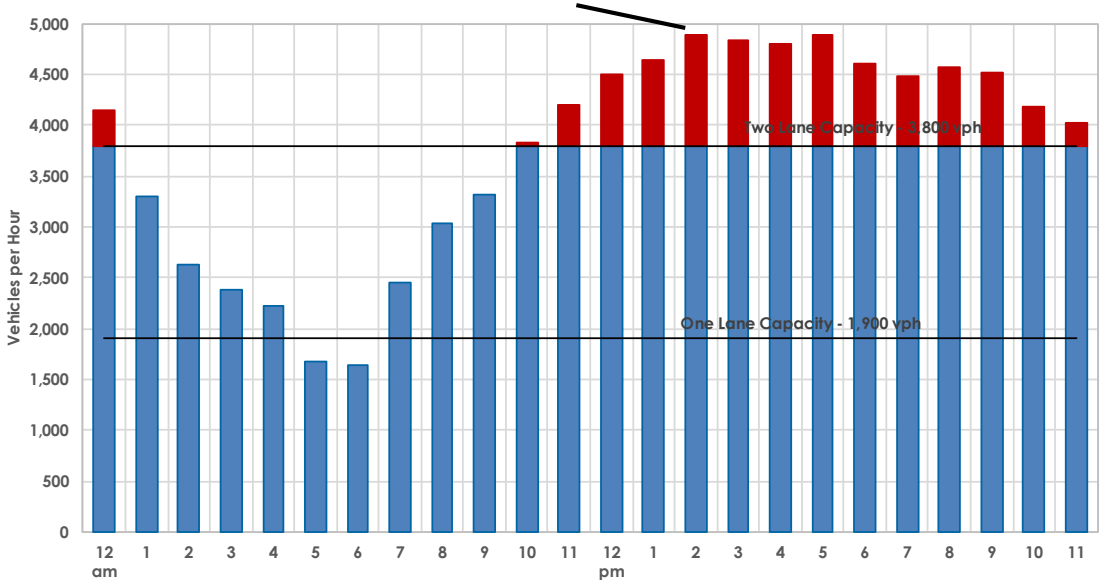
Sunday Peak: 4:00 to 5:00 PM
~ 4,300 veh / hr
Delta = 4,300 - 3,800 = 500 veh / hr



Sunday Hourly Southbound Volumes

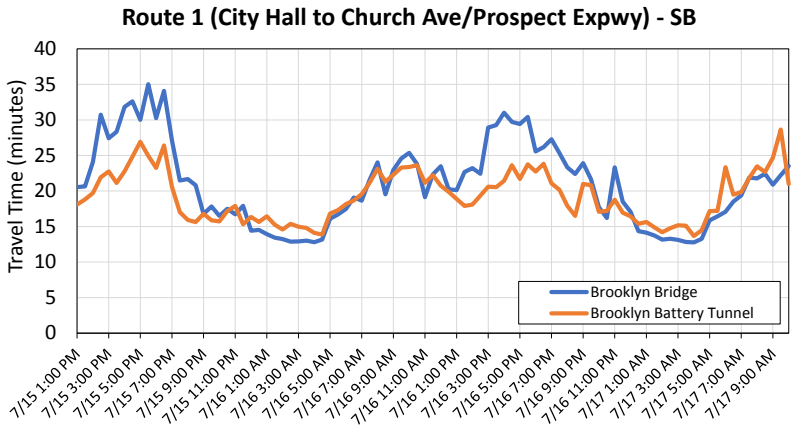
Between Joralemon Street and Atlantic Avenue

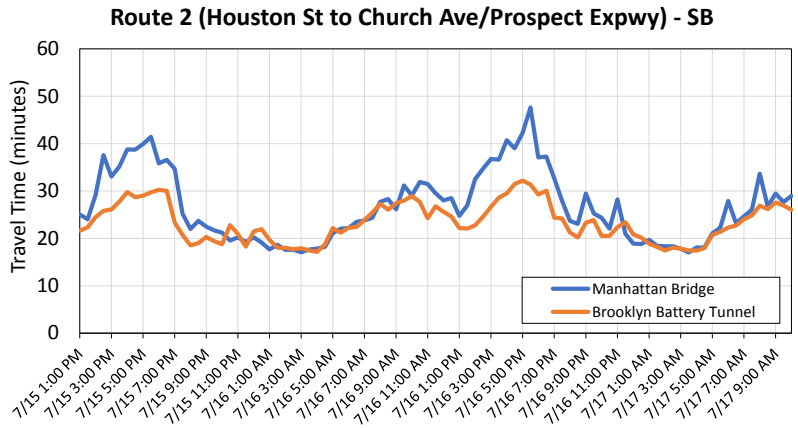
Sunday Peak: 2:00 to 3:00 PM
~ 4,900 veh / hr
Delta = 4,900 - 3,800 = 1,100 veh / hr

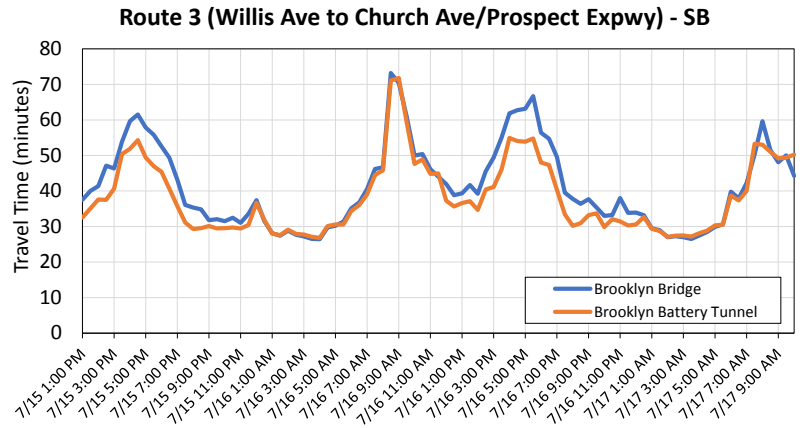


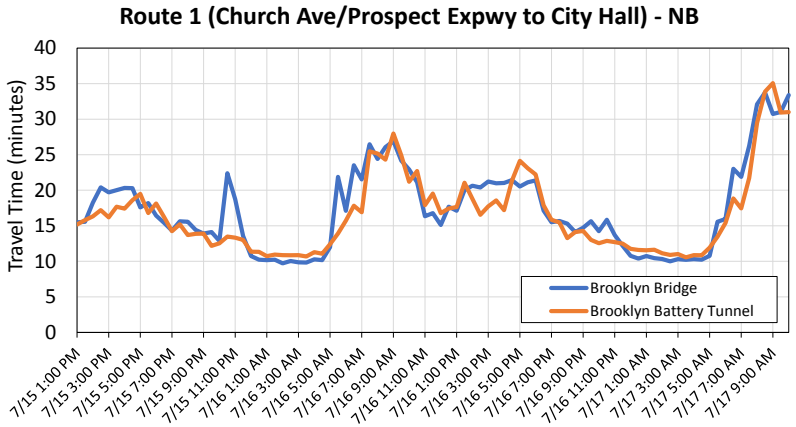
Source: Average of ATR counts, September and October 2016

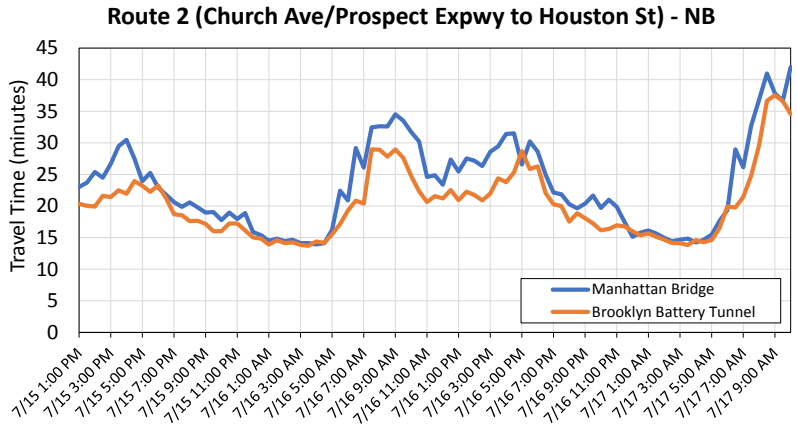
Travel Times | July 15 – July 17

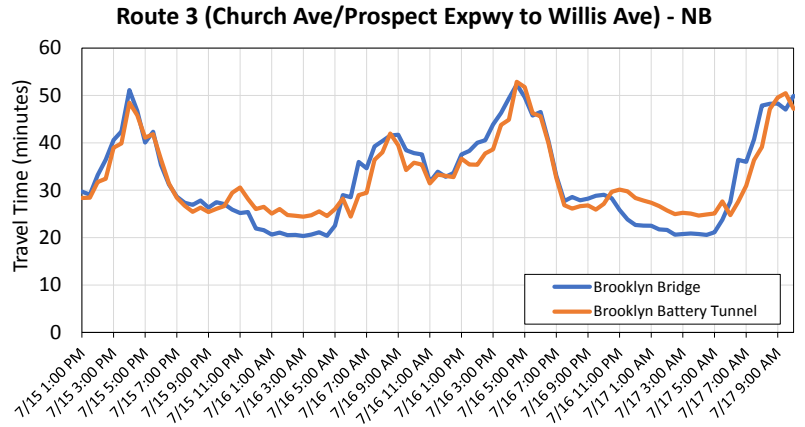






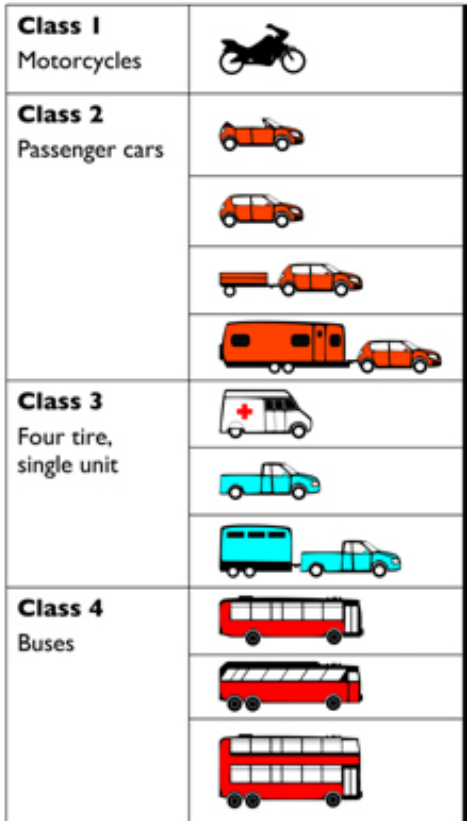


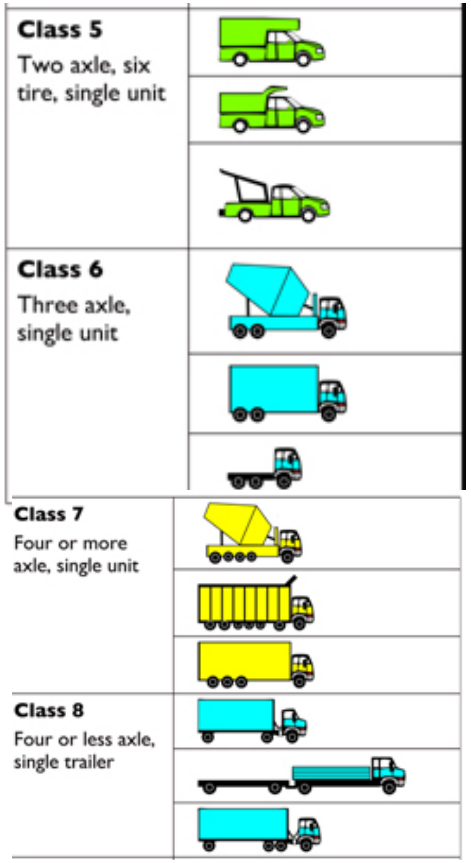


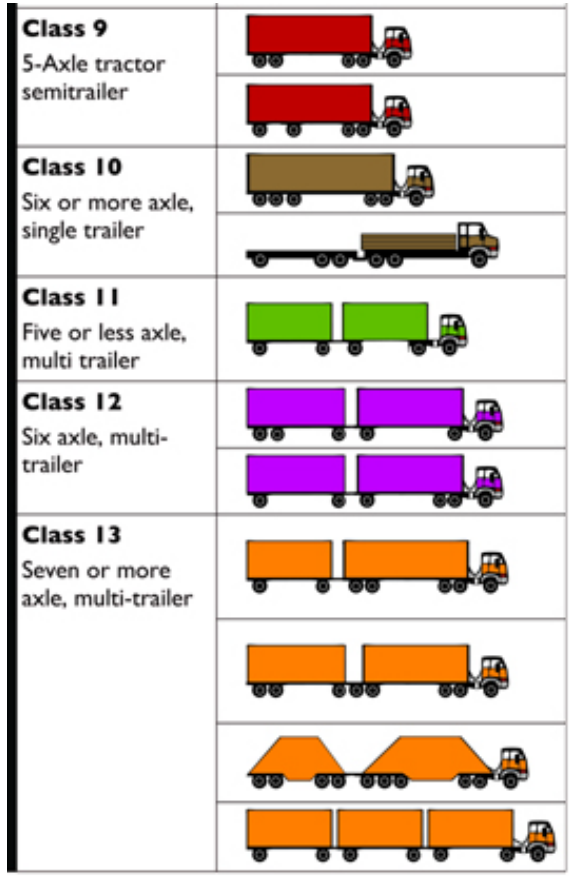


Source: Google Maps API

TDM Freight | Small Trucks on Belt Parkway





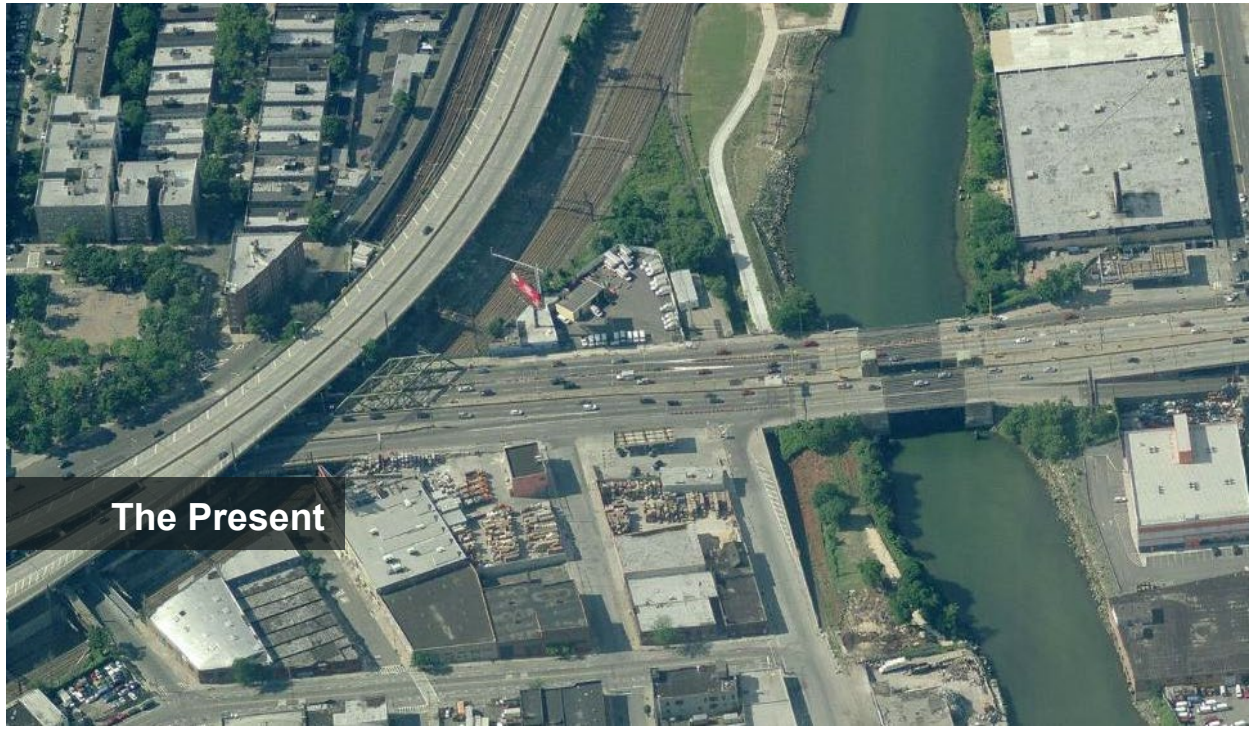


Recent Projects| Kosciuszko Bridge Reconstruction

Brooklyn New Connector and Approach Alignment Next to Existing BQE March, 2017

***Kew Takeaway**: Successful use of accelerated bridge construction methods*

More Recent Past | Sheridan Express Removal: 28 Acres Of New Space



- 1200 units of new housing
- 500,000 square feet of commercial, community and light industrial space
- Low density retail

APPENDIX

Auto Turn Analysis

Auto Turn Analysis

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Brooklyn Strand Concepts

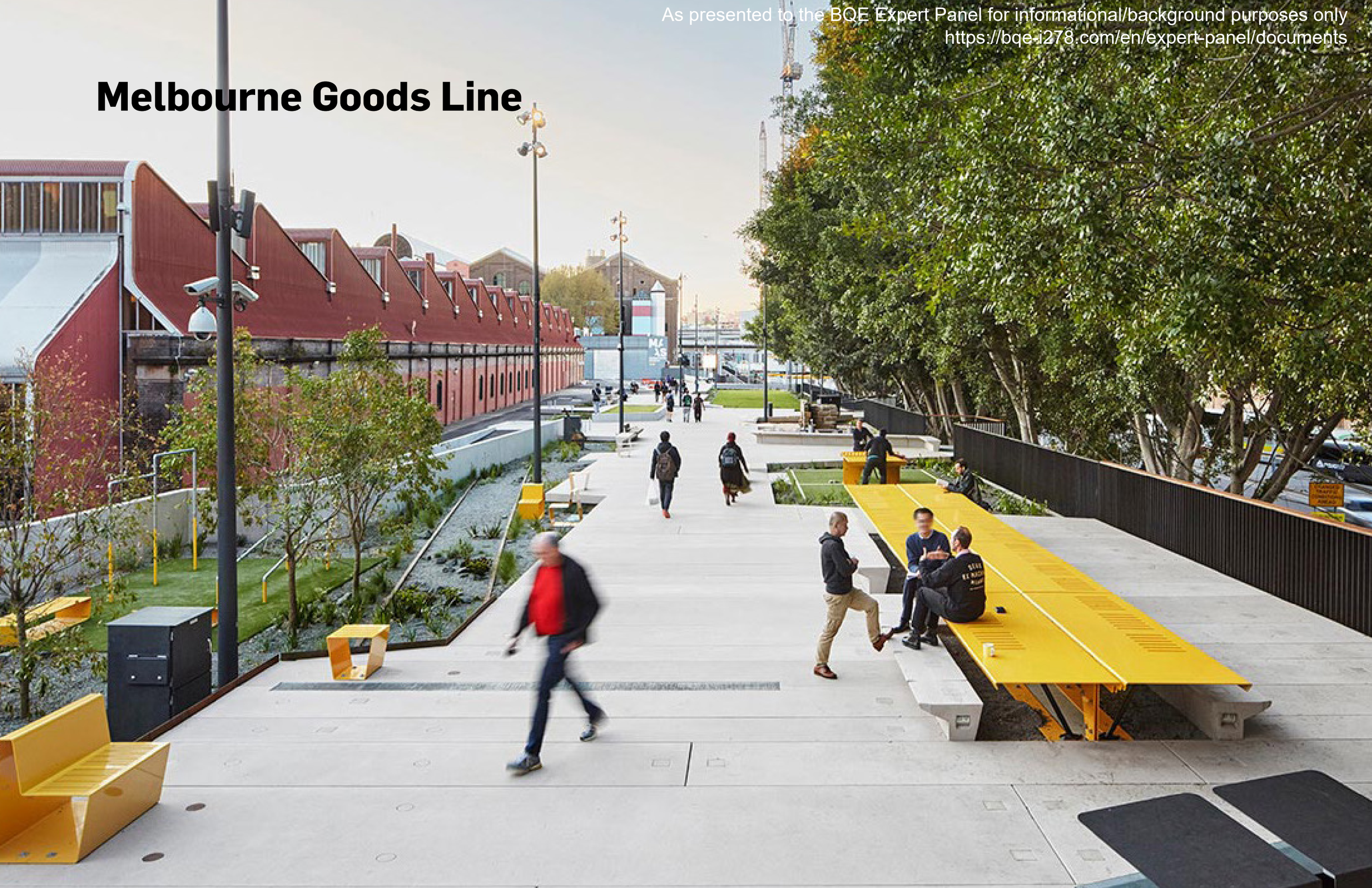

BROOKLYN BRIDGE
SNACKS

Precedents

High Line

Liberty Park

Melbourne Goods Line



Sky Garden, Soeul

Philadelphia Rail Park

Video Stills

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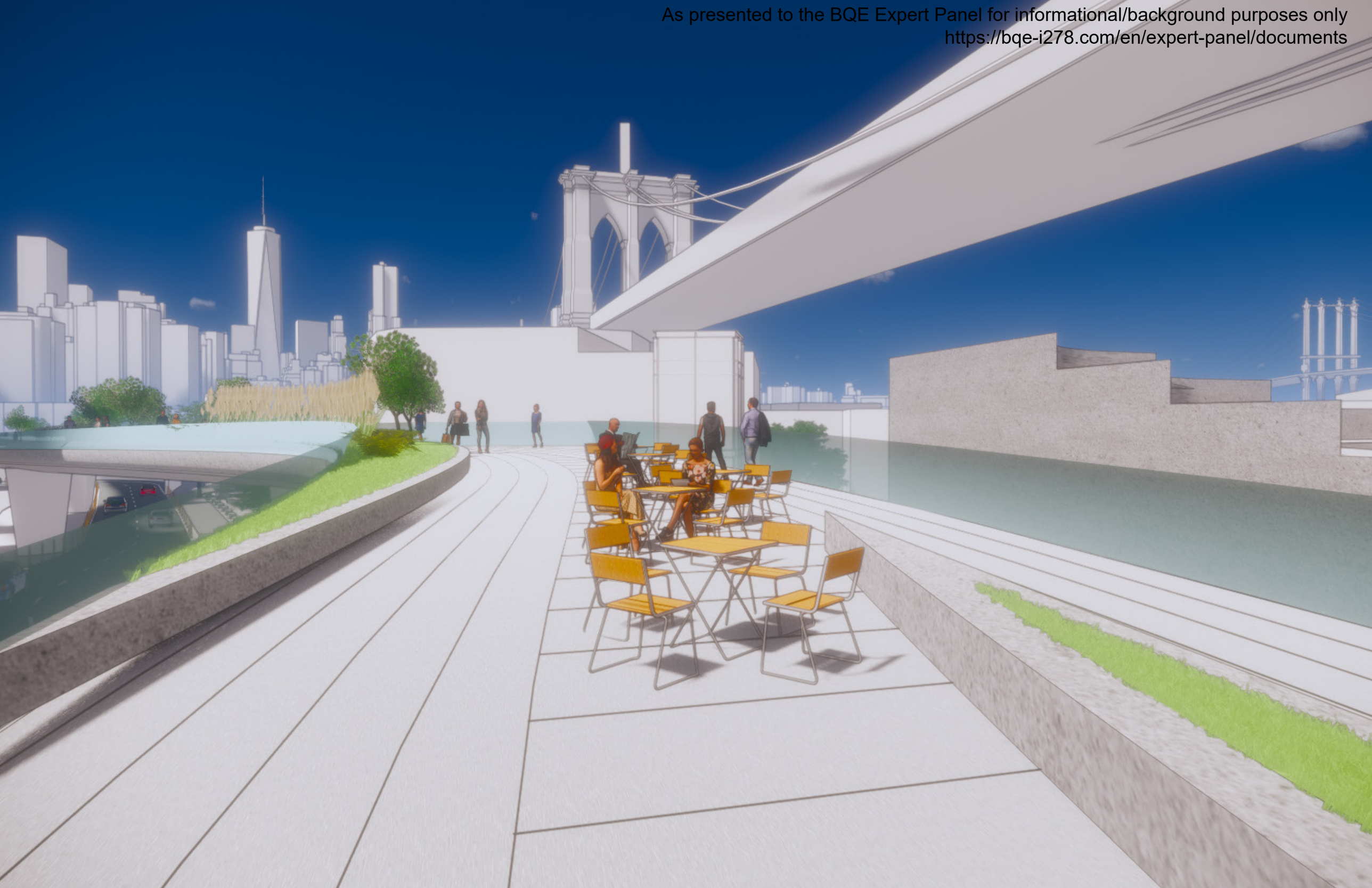

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