

Best Practices in Mitigating Air and Noise Pollution From Urban Highways

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Agenda

- Context and Objectives
- NYC Corridors of Concern
- Best Mitigation Practices
- Corridor-Specific Recommendations
- Conclusion

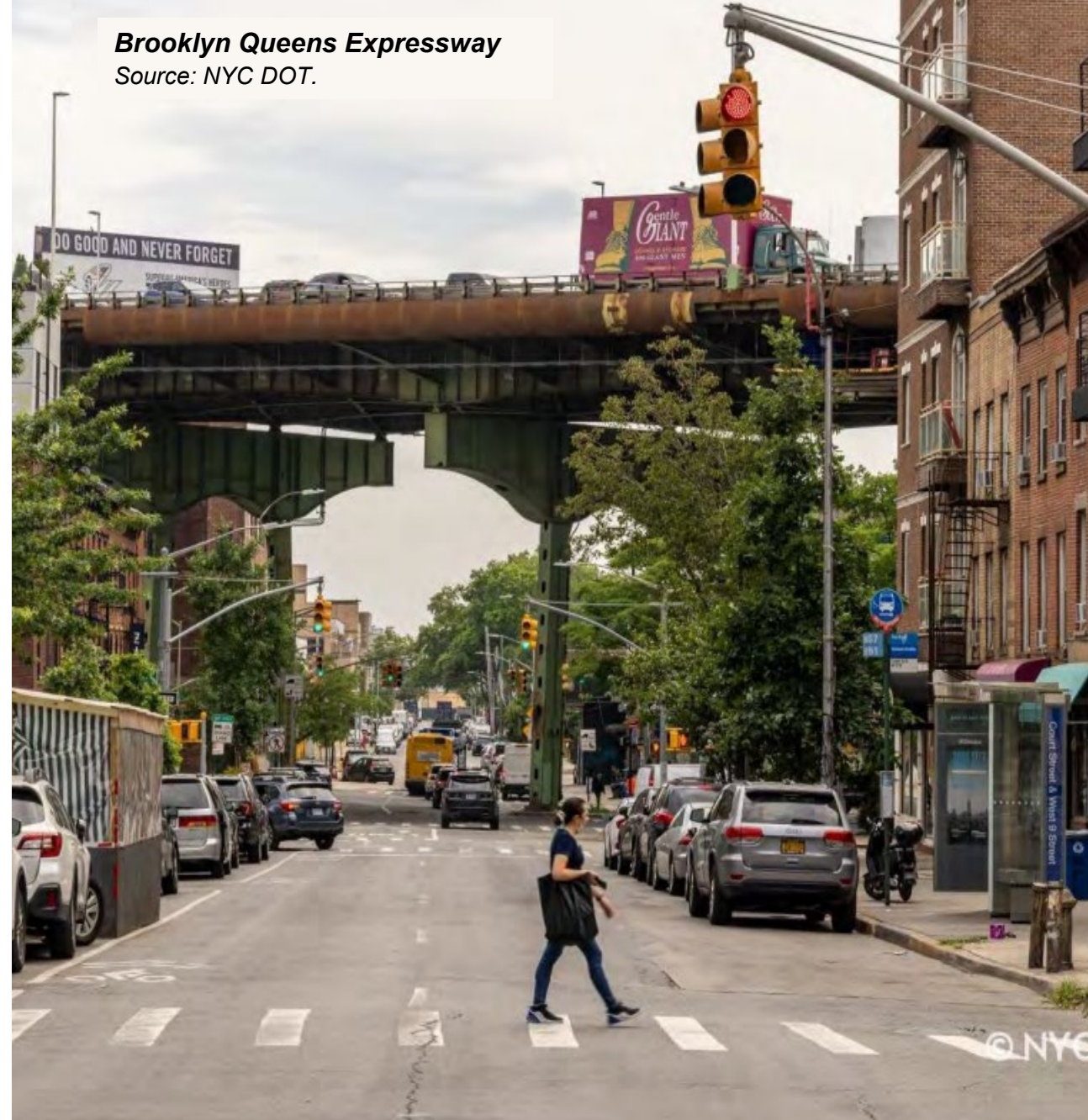
Cross Bronx Expressway

Source: NYC DOT



Disclaimer

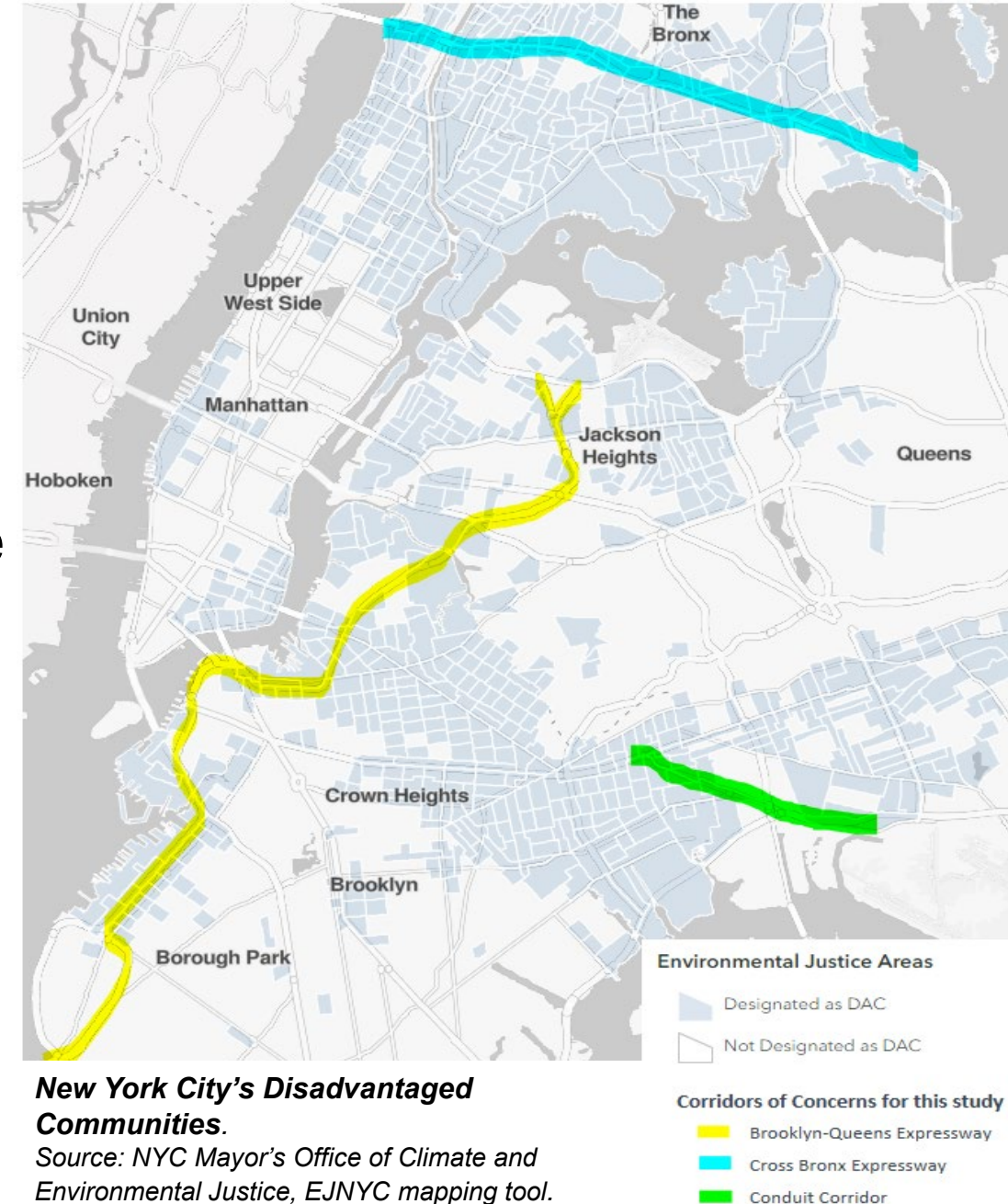
- The recommendations presented in this deck are based on the work conducted as part of the Research Fellowship
- They do not represent official policy positions of NYC DOT



Urban Highways: Mobility vs. Community Impacts

Context

- Regional mobility and economic lifeline
- Major source of air and noise pollution
- Disproportionate impacts on Disadvantaged Communities (DAC)
- Health disparities



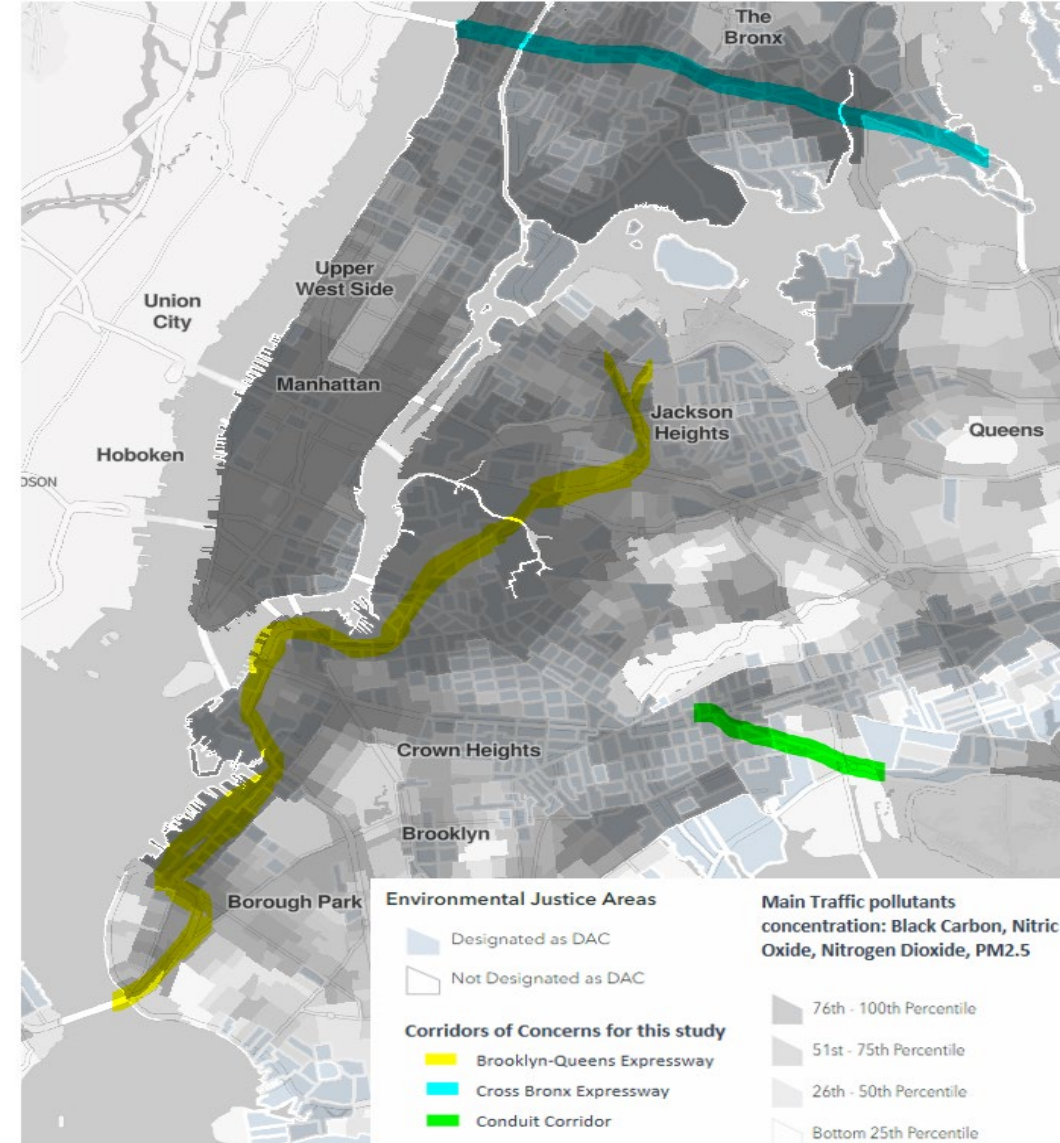
Turning a Challenge into an Opportunity

Motivation

- Legacy highways now require major repairs
- Infrastructure renewal

Objectives

- Survey global and local best practices
- Adapt strategies to NYC corridors
- Recommend actionable options



New York City's Disadvantaged Communities and traffic related air pollution

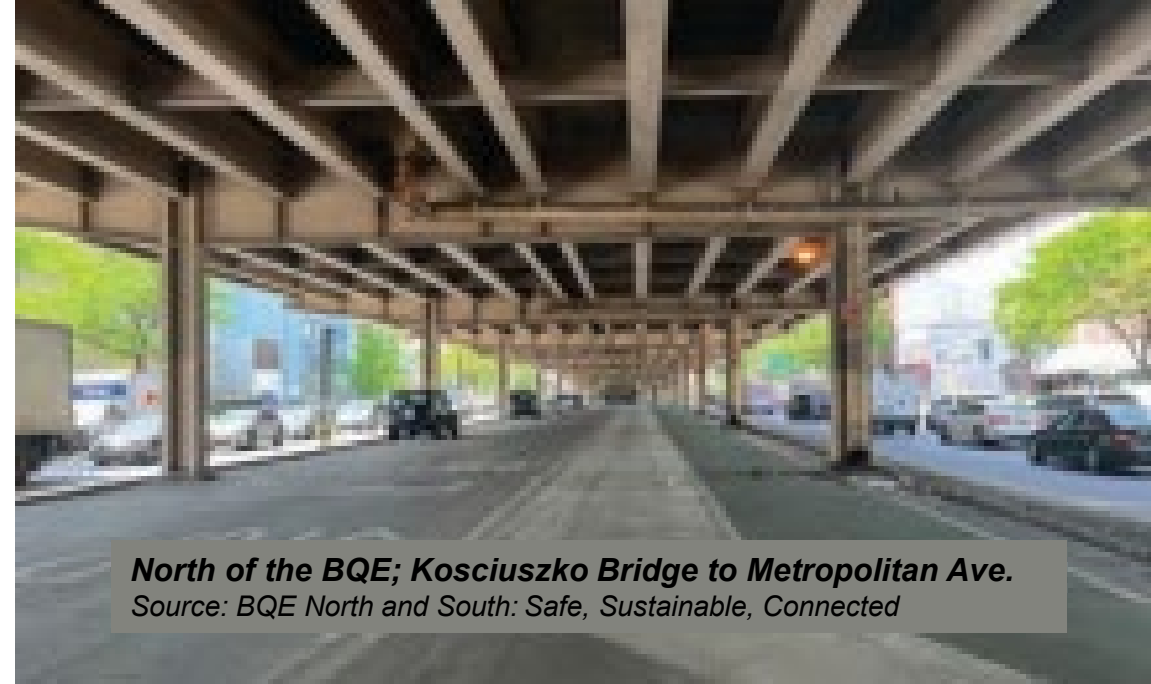
Source: NYC Mayor's Office of Climate and Environmental Justice, EJNYC mapping tool.

NYC Corridors of Concern

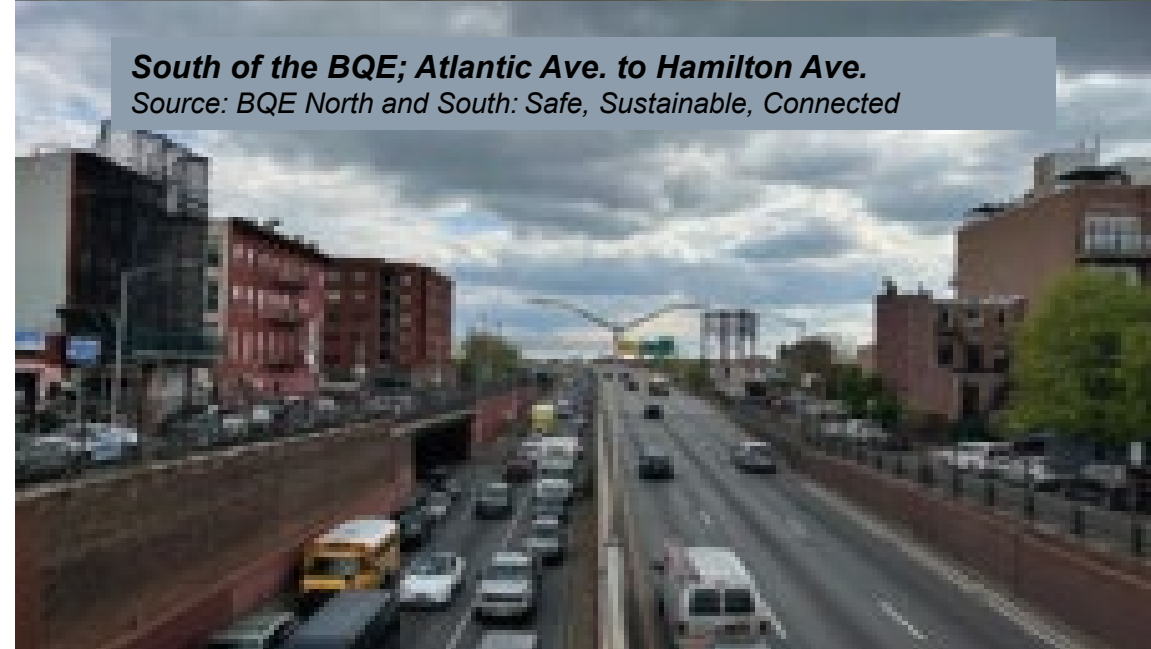


Brooklyn-Queens Expressway

- From the Grand Central Parkway to the Verrazzano-Narrows Bridge
- Essential freight corridor
- Mix of trench and elevated sections
- Dense residential adjacency



North of the BQE; Kosciuszko Bridge to Metropolitan Ave.
Source: BQE North and South: Safe, Sustainable, Connected



South of the BQE; Atlantic Ave. to Hamilton Ave.
Source: BQE North and South: Safe, Sustainable, Connected

Cross Bronx Expressway

- From Harlem River to the Throgs Neck Expressway
- High congestion and pollution burdens
- Long trench sections
- Densely populated DAC

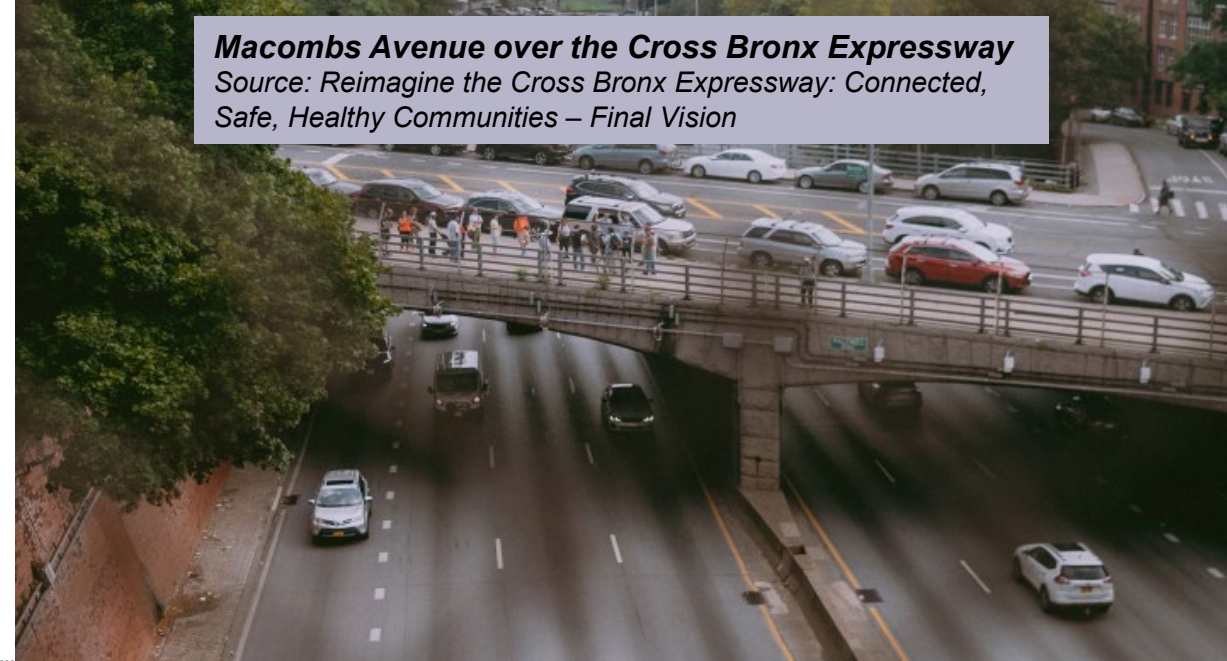
Cross Bronx view south from Washington Bridge

Source: Reimagine the Cross Bronx Expressway: Connected, Safe, Healthy Communities – Final Vision



Macombs Avenue over the Cross Bronx Expressway

Source: Reimagine the Cross Bronx Expressway: Connected, Safe, Healthy Communities – Final Vision



Conduit Corridor

- From Atlantic Avenue to Lefferts Boulevard
- Divisive median corridor reinforcing inequities
- At-grade through residential districts
- Heat island and pollution overlap

South Conduit Avenue and 79th Street.

Source: NYC DOT



North Conduit Boulevard between Pitkin Avenue and Grant Avenue.

Source: NYC DOT



Best Mitigation Practices

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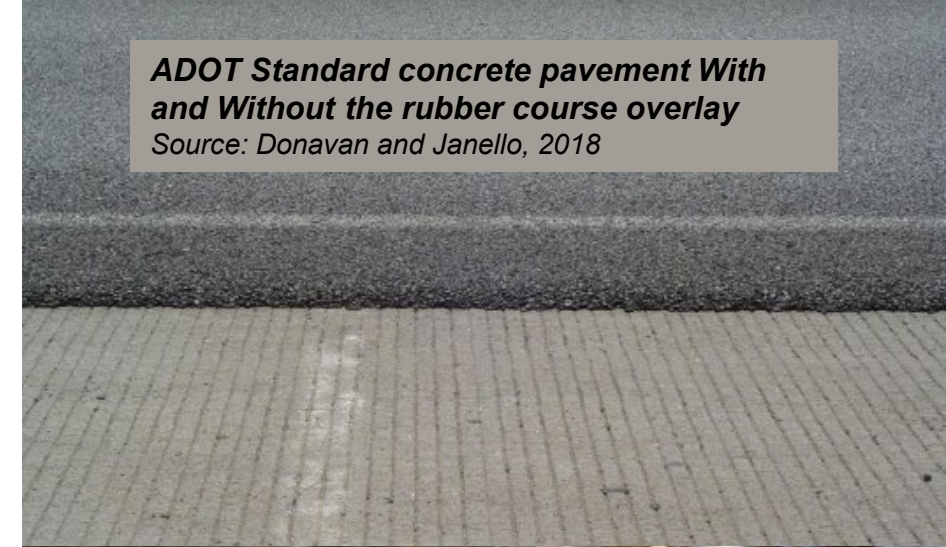
At the Source Level

- Reduce emissions/noise before they disperse
- Target vehicle and road interaction and traffic flow control

Examples

- Low-noise pavements (rubberized, porous asphalt, diamond grinding, etc.)
- Pollutants degrading pavement (TiO_2 coating)
- Active traffic management and driving behavior
- Electric buses and vehicles

ADOT Standard concrete pavement With and Without the rubber course overlay
Source: Donavan and Janello, 2018



TiO_2 Photocatalytic Coating Field Application on the campus of Louisiana State University
Source: Hassan and Okeil, 2011

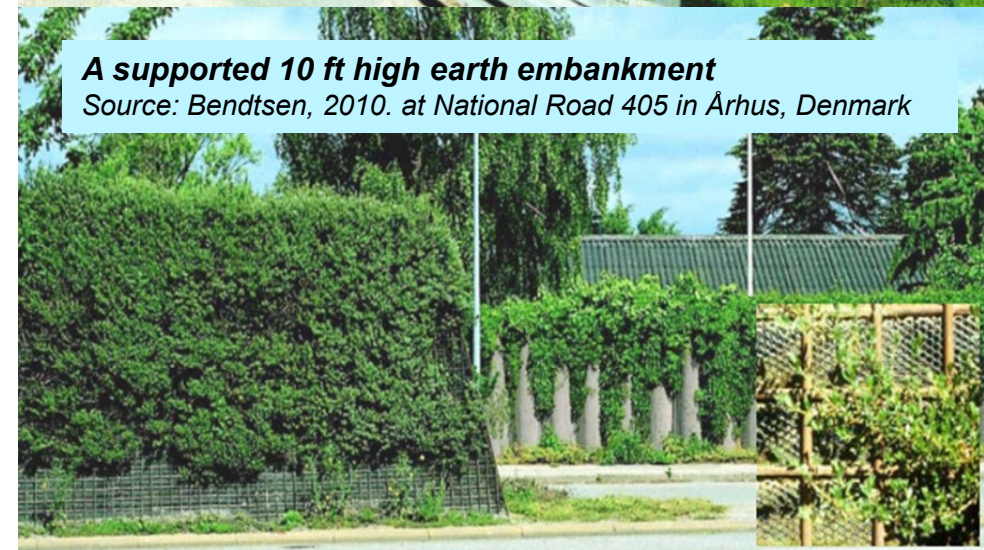
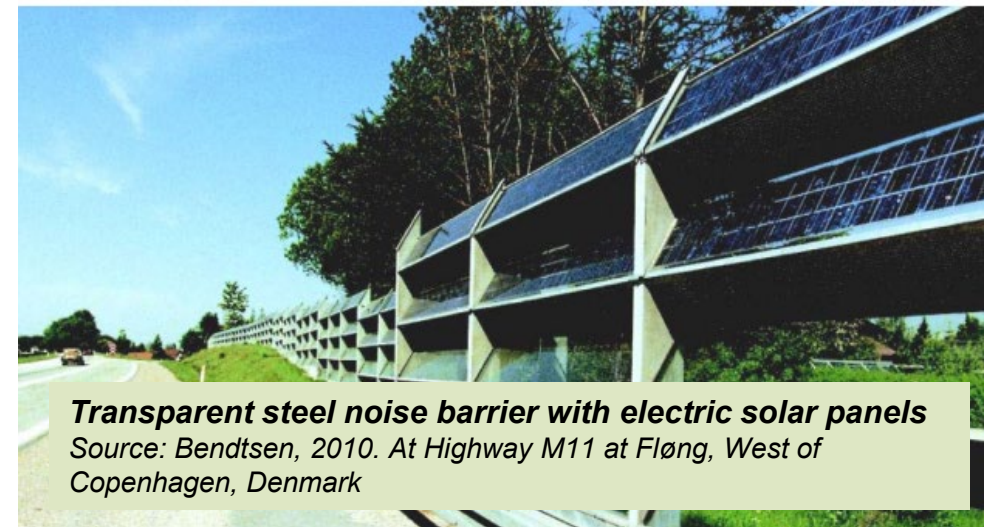


Along the Path (Propagation Control)

- Block or filter emission/noise before it reaches communities

Examples

- Innovative noise barrier designs (transparent, absorptive, vegetated, etc.)
- Vegetated belts and green buffers
- Earth berms
- Roadway caps / decking



At the Receiver (Private Protection)

- Directly protect buildings and residents from noise/air exposure
- Requires private owner cooperation and higher investment

Examples

- Building retrofits (better insulation, double/triple glazing)
- HVAC upgrades with filtration
- Vertical greenery on facades
- Vegetated/green roofs

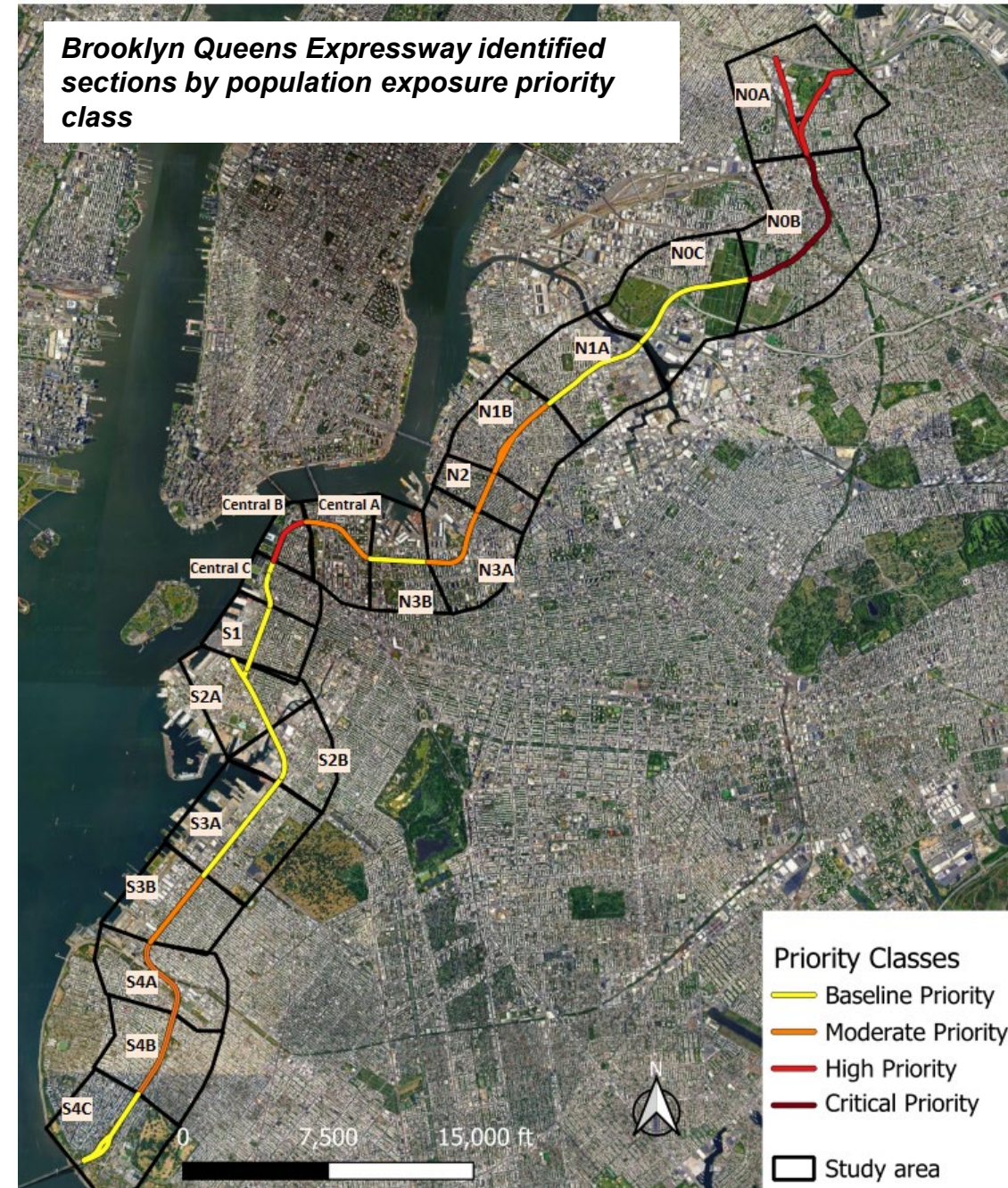


Corridor-Specific Recommendations

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Corridor Sectioning Analysis

- Divided into sections based on typology
- 0.5-mile buffer to capture residents exposed to traffic-related air and noise
- Clustering by concentrating census tracts with the affected populations
- Priority classes by population exposure



Linking Solutions to Corridors

- Representative sections chosen based on exposure priority, typology, and community context
- Close examination of representative sections
- Corridor-wide measures applied consistently
- Section-specific strategies tailored to unique characteristics

Cross Bronx Expressway
Source: Spencer Platt/Getty Images



Conclusion

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Conclusion

- Corridor-wide strategies can be paired with section-specific solutions and policy interventions
- Community needs and preferences are central to effective mitigation and acceptance
- Cost-effective measures can often outperform large infrastructure changes
- Sustainable success requires balancing technical feasibility with social equity

Thank You!



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