ITS-NY TWENTY-EIGHTH ANNUAL MEETING AND TECHNOLOGY EXHIBITION

“Transportation Operations and Resiliency during Extreme Events”

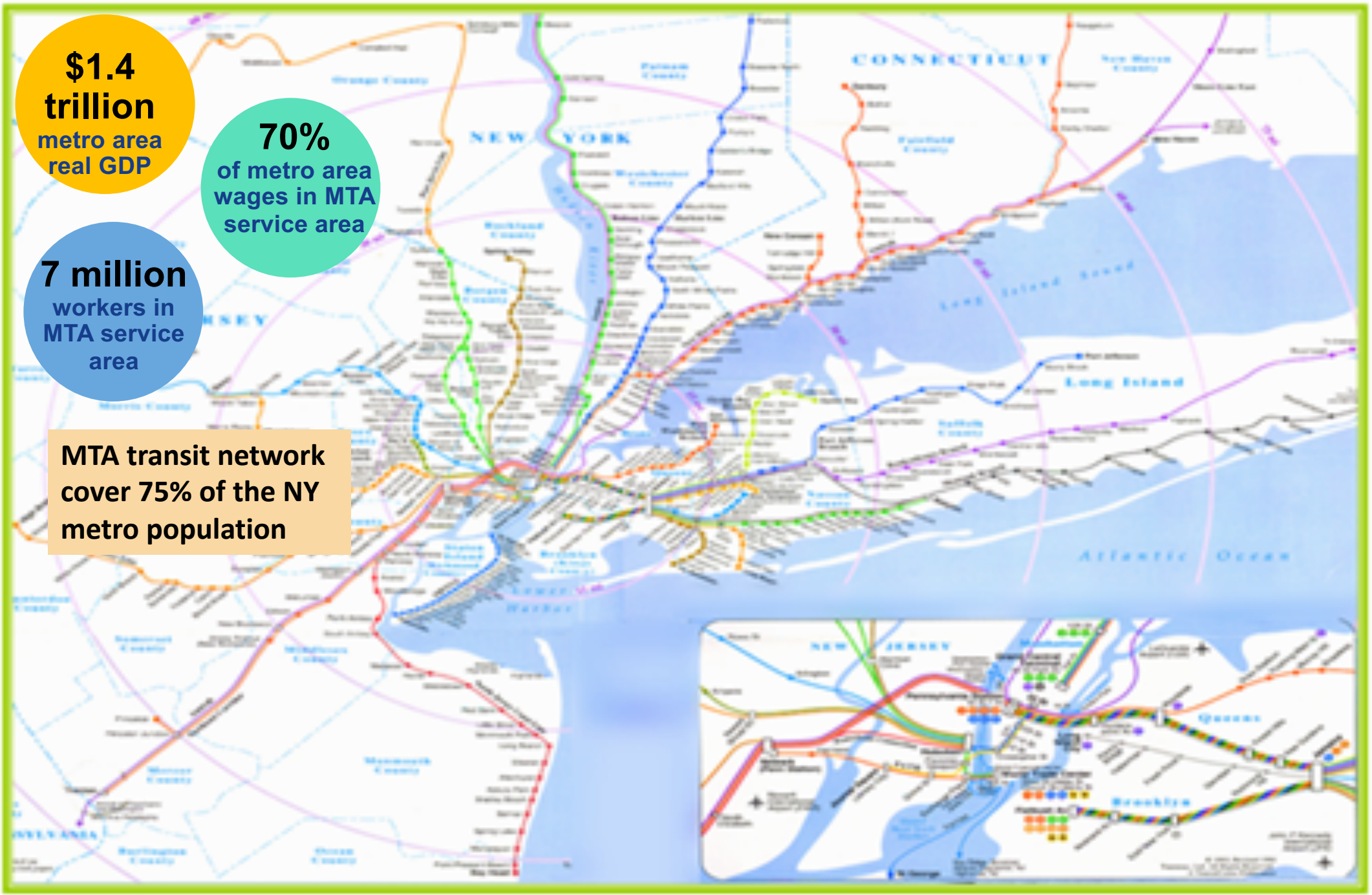
Resilience & Preparedness at the MTA

Porie Saikia-Eapen FAIA FCIOB RIBA

Sept 28, 2021

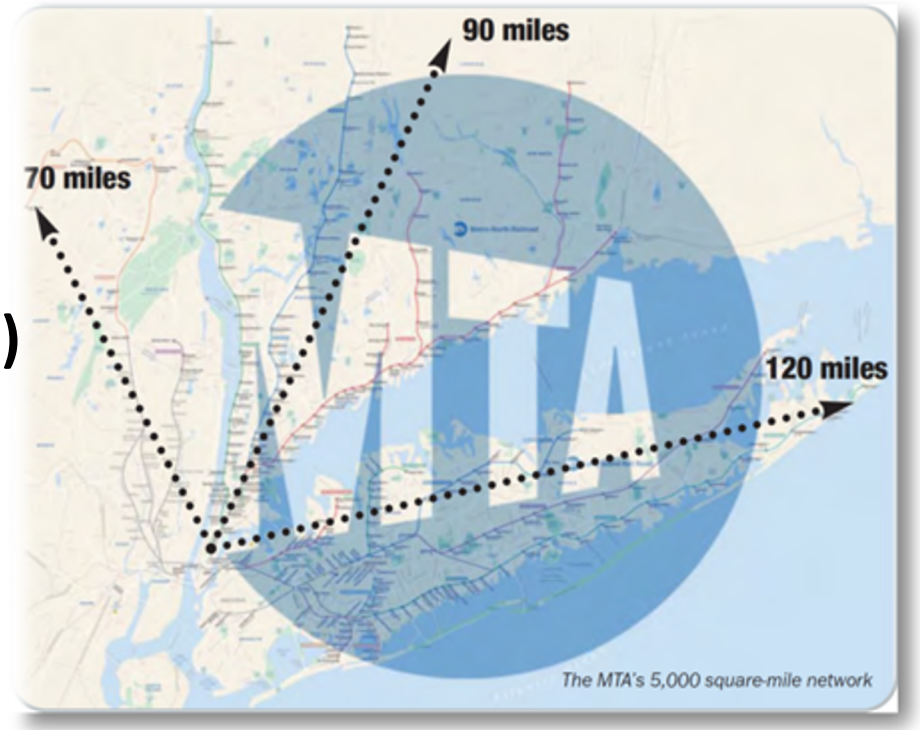
The Metropolitan Transportation Authority NY

THE MTA at a Glance



THE MTA at a Glance

- **8-9M Riders/weekday**
- **5000 Sq. Mile Operating Territory**
- **Assets & Infrastructure(Self Maintained)**
  - ✓ 2000 Miles of Track
  - ✓ 9000 Train Cars
  - ✓ 6000 Buses
  - ✓ 700 Stations
  - ✓ 7 Bridges
  - ✓ 2 Tunnels
- **With Five Operating Agencies**



1	2	3	4	5
Buses	NYCT Subways	Long Island Rail Road	Metro-North Railroad	Bridges & Tunnels

The MTA - Services

MTA NYC Subway

Keep Employees Safe
Keep Customer Safe
Keep the System moving

MTA Metro North Railroad

MTA Long Island Rail Road

MTA NYC Bus Routes

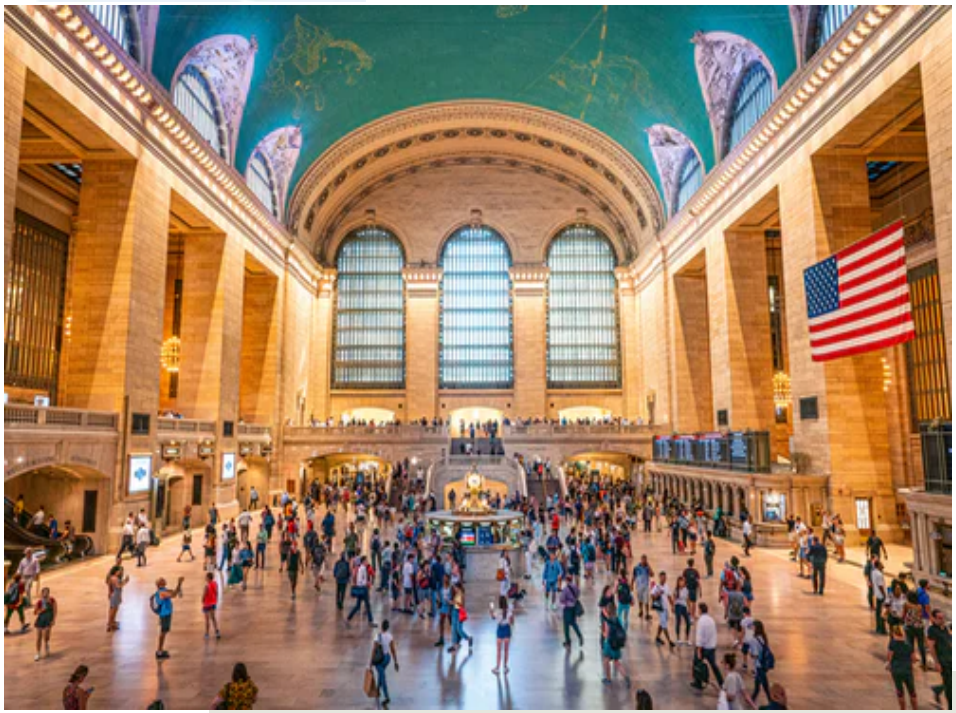
MTA Long Island Bus Routes

The MTA -A Century old System

1904

The MTA - A Century of Progress

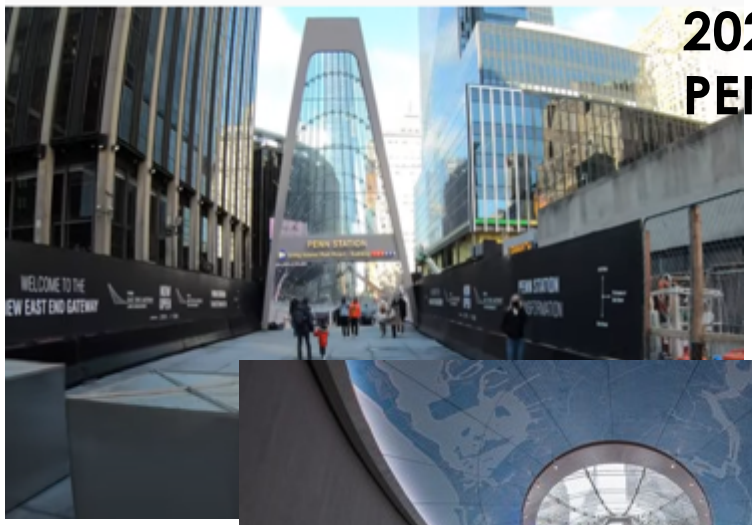
2017
Second Ave Subway



2020
GCT

2003
Stillwell
Ave

The MTA - A Century of Progress



2021 PENN Station

Ongoing MNR

LIRR Expansion project will construct a third track along a critical 9.8-mile section of LIRR's Main Line.

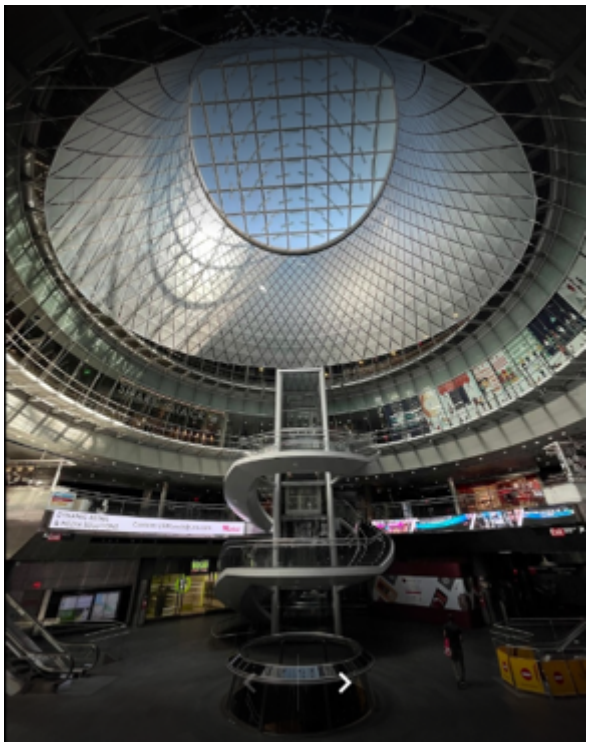
Ongoing Second Ave Ph 2

Ongoing LIRR

Disaster - Recovery & Rebuild

SEPTEMBER 11, 2001

Disaster & Recovery- 9-11 Rebuild +



2016

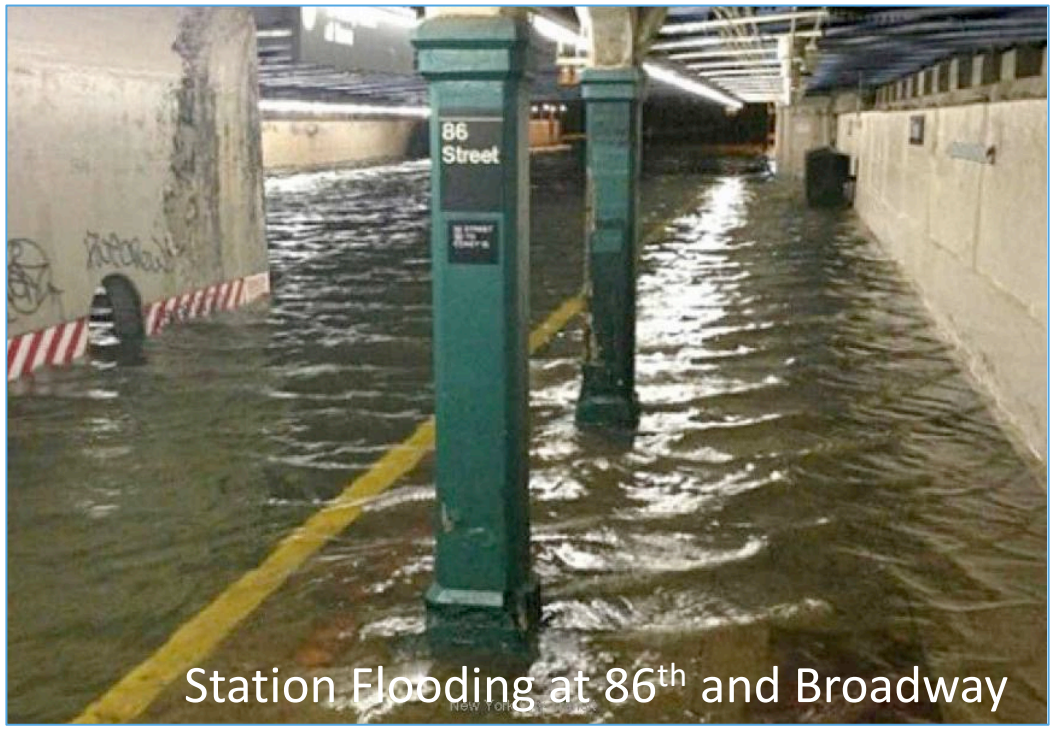
2009

2014

Climate Vulnerability- Superstorm Sandy Oct 29, 2012

Superstorm Sandy Oct 29, 2012


Track Level at South Ferry



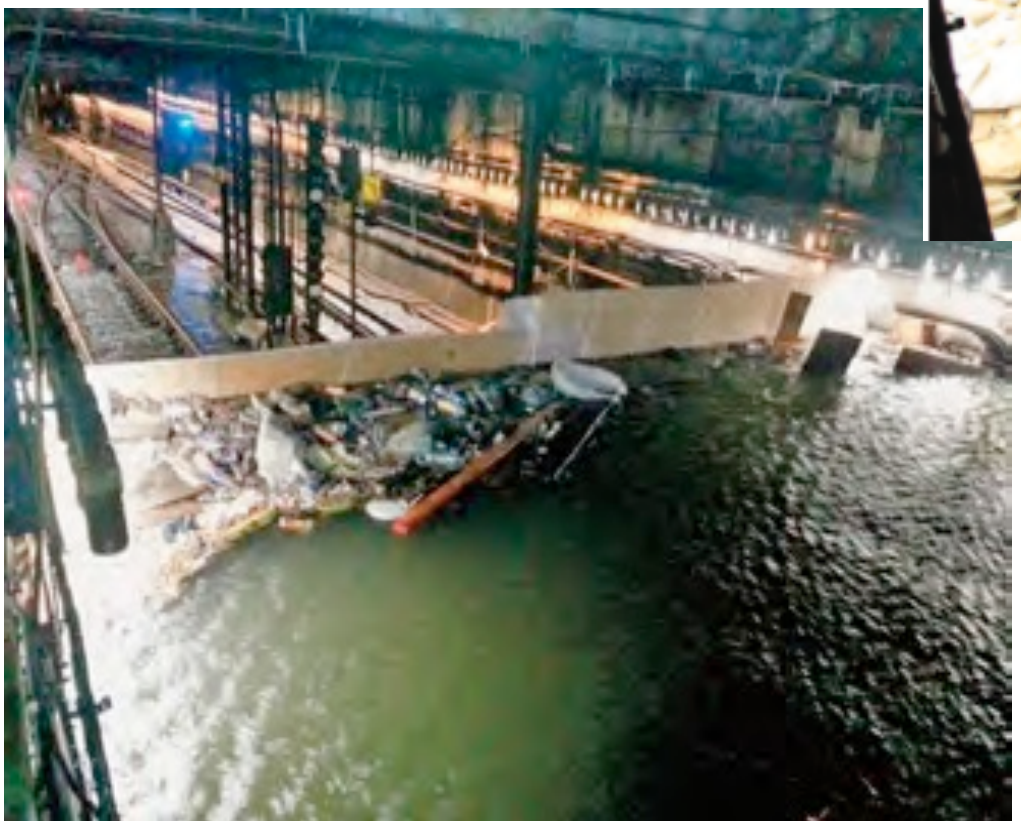
Station Flooding at 86th and Broadway


Mezz Level at South Ferry


Hudson Line MNR

Climate Vulnerability & Preparedness

Immediate Measures – THEN…(2012)



Climate Vulnerability & Preparedness

Rapid Mitigation Measures

-NOW

Manhole Inserts

swing gate or side flex wall at strategic locations

Water filled Cofferdam

Climate Vulnerability & Preparedness

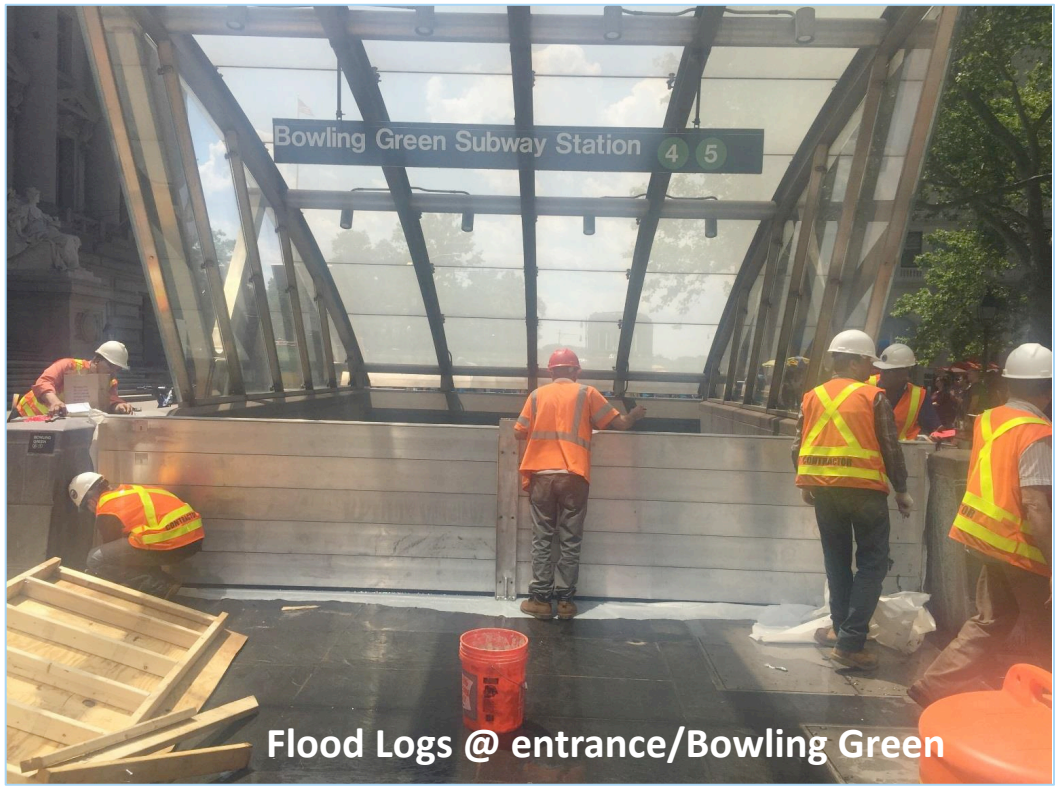
Rapid Mitigation Measures NOW

Sidewalk Vent Cover

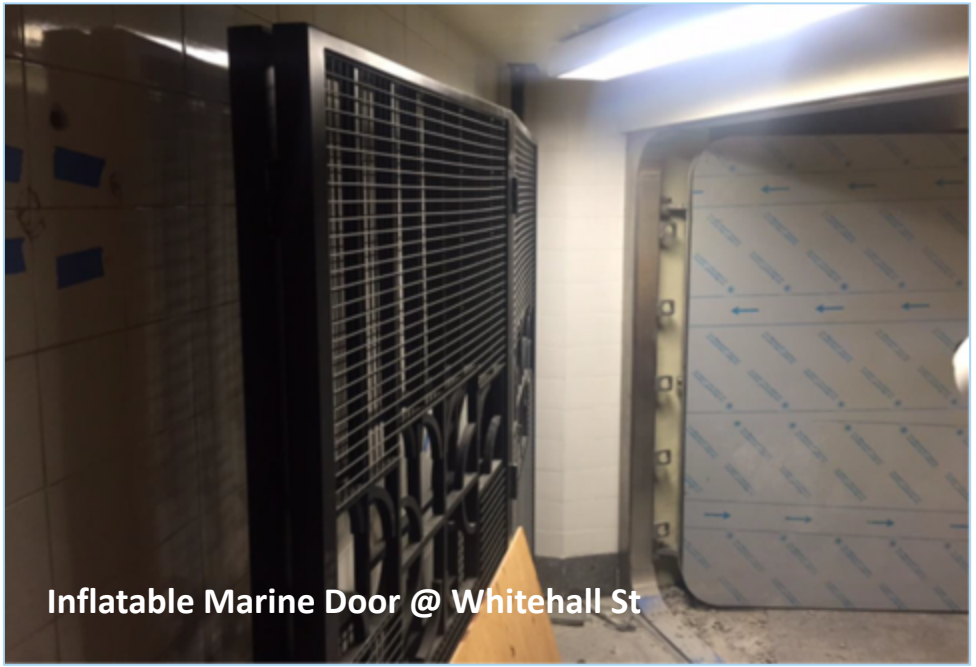
Flex Gate @ subway Ent

Climate Vulnerability & Preparedness

Long Term Measures



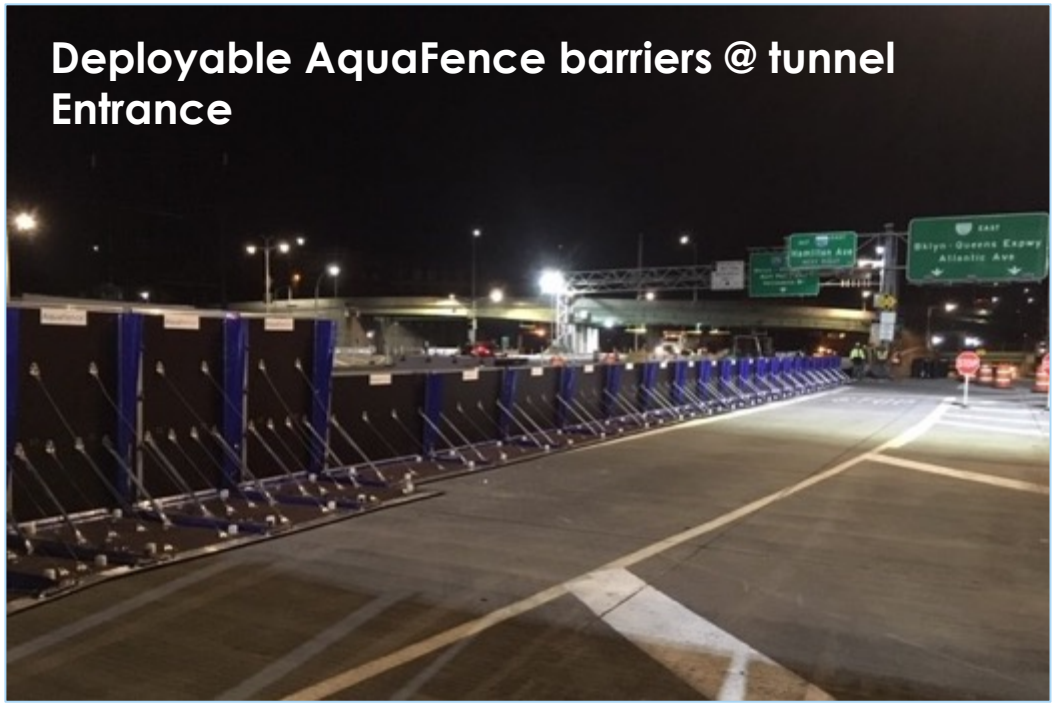
Flood Logs @ entrance/Bowling Green

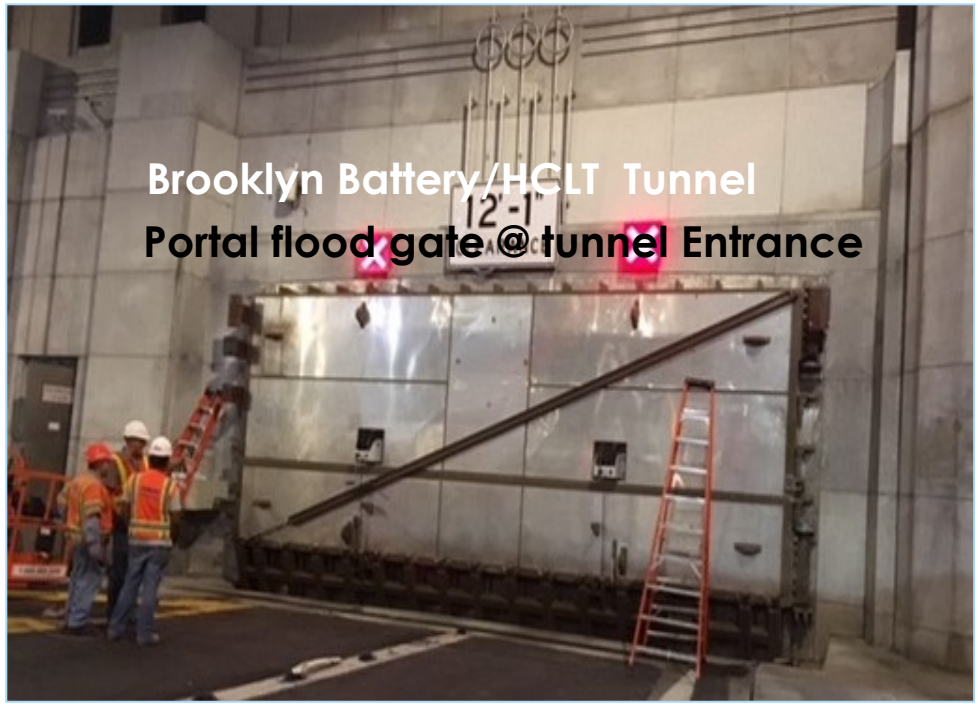

Inflatable Marine Door @ Whitehall St

Entrance Mitigation at South Ferry /Lower Manhattan


Marine Door @ South Ferry

Climate Vulnerability & Preparedness





Long Term Measures

Climate Vulnerability & Preparedness

Long Term Measures

Elevated Substations

Climate Vulnerability & Preparedness

Long Term Measures

Restored abutment
at Cross Bay Bridge

Sea Wall at Gov. Is Ventilation Bldg

Bridges & Tunnels

Climate Vulnerability & Preparedness

Post SANDY Lessons Learned

Steps	Opportunities to Integrate Climate Vulnerability and Risk
Establish Vision, Goals & Performance Measures	• Consider resilience to climate change in each element of policy framework for statewide and regional long range plans, transportation improvement programs, risk-based transportation asset management plans, and mode-specific plans. • Establish regional and statewide performance measures related to climate change, resilience, and sustainability.
Assess Tradeoffs Between Modes and Programs	• Include climate risk as one key element of an agency's broader risk management framework. Include climate related risks in agency risk register. • Test implications of various funding allocation decisions at the level of program areas and modes. How do investments in adaptation strategies vs. safety vs. pavement/bridge maintenance vs. mobility affect a state's or region' s ability to meet short-term and long-term performance targets?
Formulate and Evaluate Policies, Strategies, and Investments	• Propose specific adaptation strategies based on assessment of regional, subarea, and asset-level vulnerability and risk. • Consider cost and feasibility of options. Some adaptations may be relatively expensive (perhaps requiring additional sources of revenue or outside financial support).
Apply Practical Design, Prioritize & Implement	• Make changes to assumptions about climate stressors, particularly for asset classes that have longer useful life and are in high risk areas. • Conduct "bottom up" prioritization of adaptation investments to complement "top down" program-level tradeoff analysis. • Program adaptation strategies at appropriate time frames given understanding of pace of climate change (including timing of risks) and key milestones.
Monitor Performance Results & Outcomes	• Monitor changing climate conditions and keep abreast of latest climate projections and models to inform design and prioritization decisions. • Amass database of weather events that cause damage or disruption to the transportation system. Archive operational data and damage reports, including costs and duration of closure. • Conduct "plan vs. actual" analysis to measure effectiveness of adaptation investments in reducing or mitigating damage and disruption.

Establish
Vision/Goal/Measures
Assess
Risks/Trade offs
Formulate & Evaluate
Policy/Strategy/Investment
Apply
Design/Implementation
Monitor
Performance/Outcome

MTA Climate Policy & Prioritization

- Internal MTA-wide **Climate Adaptation Task Force** & Forums
- Improved **enterprise asset management** which includes location data and vulnerability and criticality metrics
- Coordinated geospatial analyses and the use of **geographic information system (GIS)** and mapping technologies
- Access to **early detection warning systems** including weather sensors and tide gages
- Incorporation of future climate projections into **engineering design standards** (temperature, precipitation, sea-level rise)

Agency	Design Flood Elevation
NYCT	Category 2 + 3'
MNR	ABFE + 4'
LIRR	ABFE +4'
B&T	500 year flood

Climate Vulnerability & Preparedness

the first capital market cat bond focusing directly on storm surge risk

THE WALL STREET JOURNAL. Thursday, August 1, 2013 | A15

MTA Sells Storm Bond

Agency Gets Creative in Disaster Planning as Usual Sources of Insurance Dry Up

By Katy Burne And Ted Mann

The Metropolitan Transportation Authority has sold the first bond designed to protect specifically against storm surges, assembling a $200 million protection plan against the greatest source of damage from superstorm Sandy.

The MTA's traditional avenues for insurance coverage dried up after Sandy, with damage from the storm making it "exceedingly difficult for [it] to obtain insurance," MTA Chairman Thomas Prendergast said in a statement.

The use of the new financing tool—known as a catastrophe bond—is one of the clearest signs yet of how Sandy has driven up the cost of running the MTA and how its leaders are moving to adapt to the risk of future storms.

Storm surges, which occur when coastal waters are pushed to unusually high levels during natural disasters, can devastate sensitive electronic infrastructure, such as the MTA's aging subway signals, switches and power stations. Corrosion from brackish harbor water will lead the agency to shut down a busy tunnel this weekend for repairs lasting up to 14 months.

Analysts said the MTA's move may entice other public agencies to sell bonds to cover themselves from storm surges.

"If one authority came in like that, you may see more," said Gary Martucci, director at Standard & Poor's, which rated the bonds.

Some other transit agencies in the Northeast said they were considering whether to follow the MTA's lead. The use of catastrophe bonds is "still being evaluated," Jonathan Davis, chief financial officer of the Massachusetts Bay Transportation Authority, said through a spokesman. The same is true at the Port Authority of New York and New Jersey, which saw its auto tunnels and PATH subway system damaged by the storm surge from Sandy, which struck on Oct. 29.

$4.8 Billion
Amount budgeted by the MTA for repairs after Sandy.

"Superstorm Sandy caused significant impacts in the region that have seriously impacted the insurance market," Port Authority spokesman Steve Coleman said. "Catastrophe bonds are something that we have considered and will continue to evaluate as a source of risk financing."

But reliance on the new tool will depend in part on where those agencies are located, and their vulnerability to future storm surges, officials at affected agencies said.

Please turn to page A18

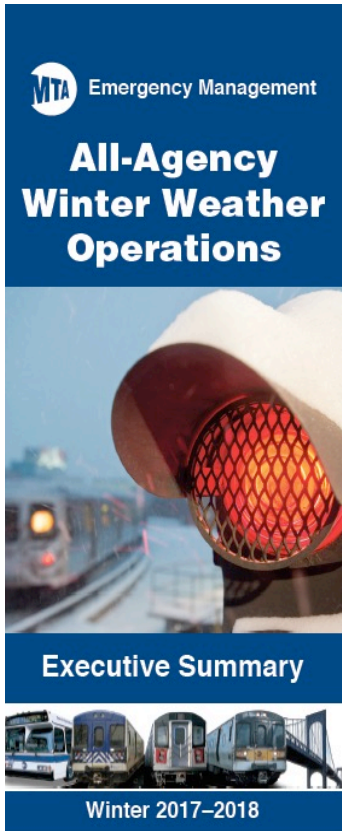
Capital market risk transfer enabled FMTAC to obtain fully secured property reinsurance protection against storm surge without requiring MTA or FMTAC to become a catastrophe bond issuer. FMTAC entered into a reinsurance agreement with MetroCat Re Ltd.

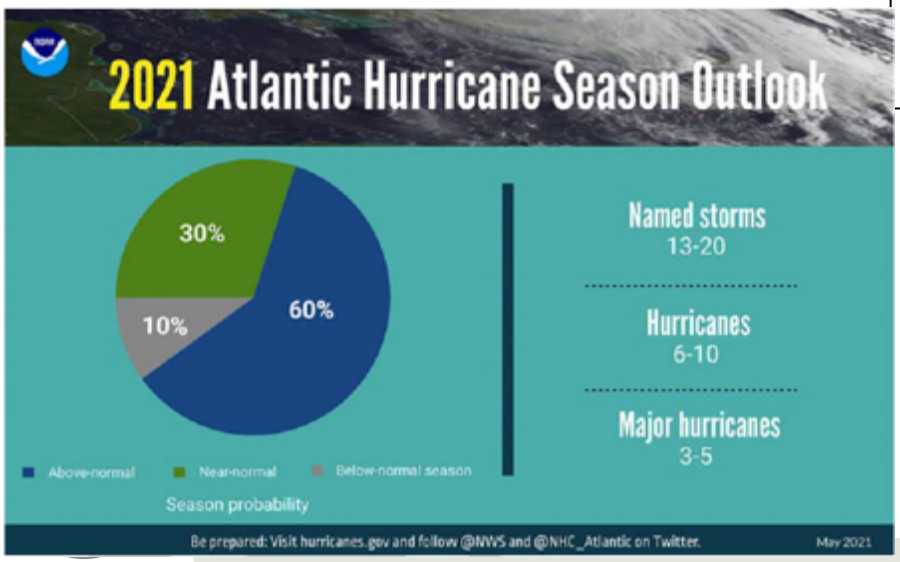
On June 5, 2013 MTA and FMTAC (First Mutual Transportation Assurance Company) staff received authorization from the Board to proceed with structuring and marketing of a capital markets-based reinsurance transaction providing storm surge coverage

Goals:

- Access to additional reinsurance capacity for catastrophic perils
- Developing a stable, long term alternative reinsurance
- Creating competition with traditional reinsurance, thereby providing leverage
- Demonstrating reasonable efforts to obtain property coverage comparable to prior years' coverage levels

The MTA Emergency Management Office





Natural Disasters/Storm Management

- ✓ Extreme Heat / Cold
- ✓ High Wind Storms
- ✓ Severe Thunderstorms
- ✓ Hurricanes (evacuations)
- ✓ Tropical Storms
- ✓ Coastal Floods
- ✓ Flash Floods
- ✓ Winter Storms
- ✓ Blizzards
- ✓ Ice Storms
- ✓ Freezing Rain
- ✓ Earthquakes

2020 Hurricane Season in Review

- 30 named storms, which is a single year record. It was also the fifth consecutive year with above-normal Atlantic season activity. 12 made landfall within U.S. territory, causing $51.1 billion in damage.
- 14 hurricanes during the season (winds of 74 mph or greater). Of those, there were 7 major hurricanes (winds of 111 mph or greater).
- It was the 5th year in a row with a category 5 storm.

OTHER Related Departments

Man-Made Disasters & Counter Terrorism (MTA Police & Security)

Cyber Security (MTA IT)

Press, Liaisons, etc

COVID-19 – Pandemic Response Priorities

March 2020

New York - the EPICENTER of COVID-19

- COVID-19 Complexities
- Lack of information around a novel virus
- Inconsistent messaging

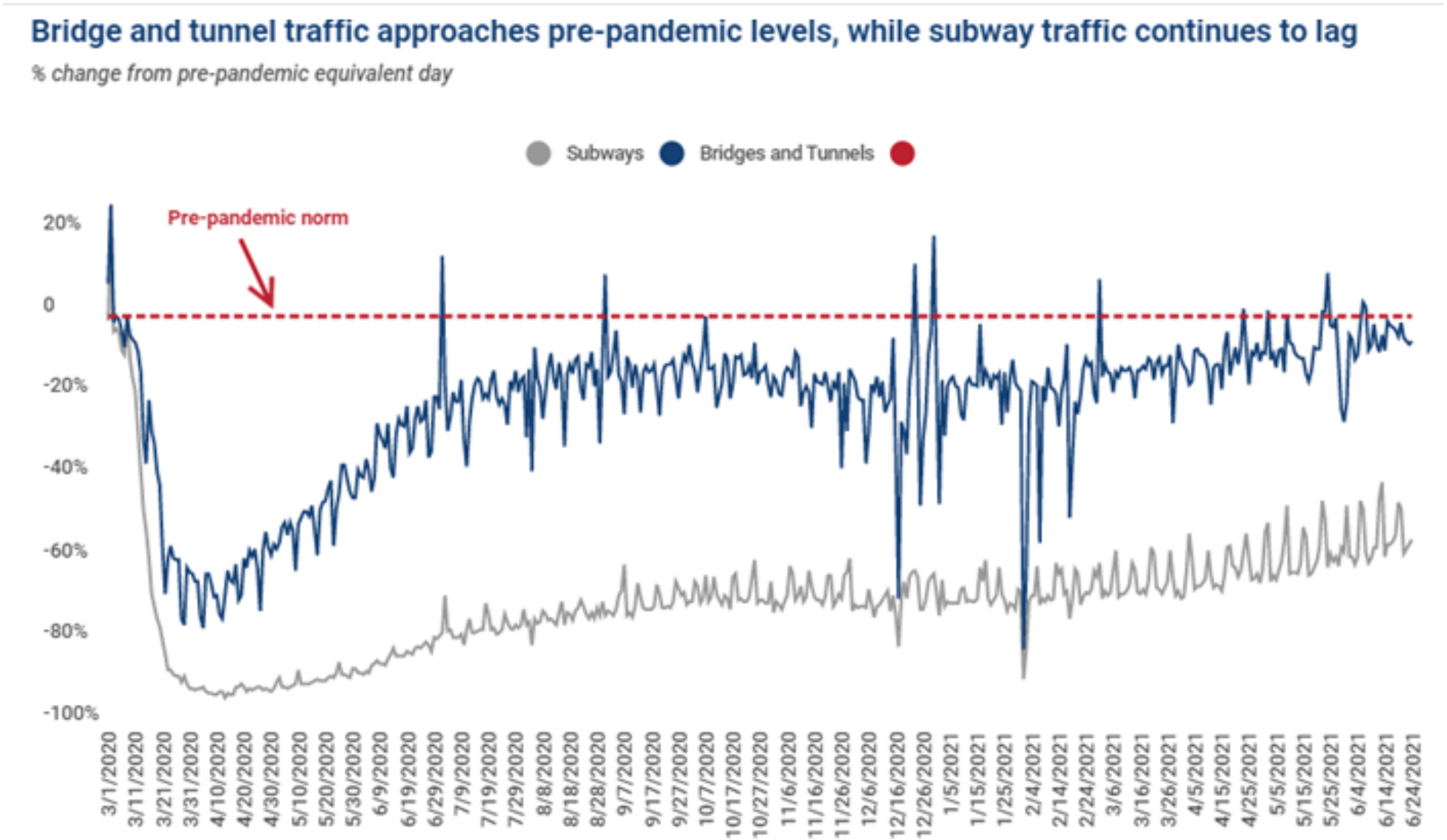
IMPACTS THREATENED

Employee Safety
Customer Safety
Service Maintenance

We Scrambled – Initially
We Learnt – Quickly
We are Managing – Efficiently
We Developed a Pandemic Plan

Impacts of Pandemic at the MTA Region

THE MTA and New York – Ridership in June 2021



COVID-19 – Pandemic Response Priorities

SAFETY

Keeping Customers Safe:

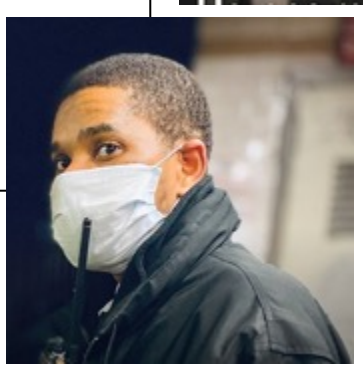
- Enhanced Cleaning - 24 Hours: Rolling Stock
- Suspended Service from 1-5 AM for 1 year (5/2020-5/2021)
- No Fare Bus Service in NYC from March 2020 to March 2021
- Free Car Service in 2020 to all essential workers paid for by MTA

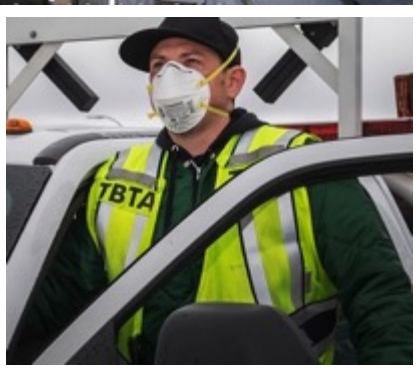
Keeping Employees Safe:

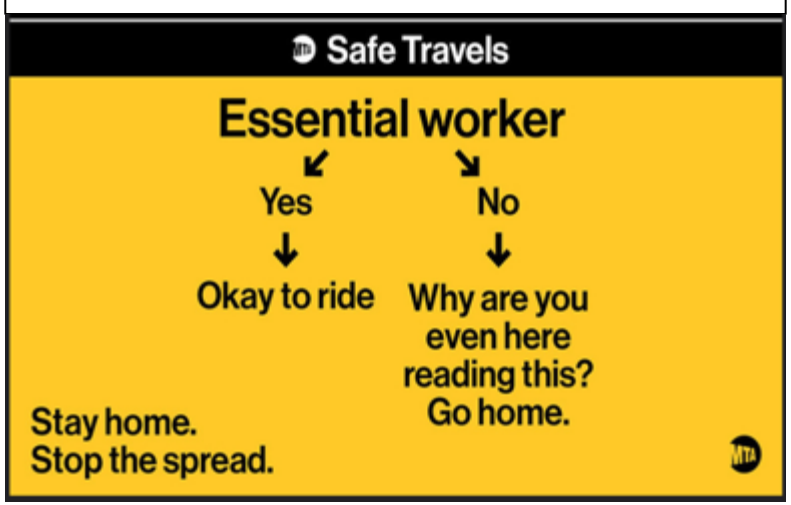
- Leadership Engagement
- Telecommuting
- Communicating regularly via Internal Websites, FAQs Everbridge
- PPE

Keep the System Moving for

- Essential Workers
- Health Care Workers
- Essential Suppliers
- Police Department
- Fire Department
- Other Essential Movements







MTA Environmental Sustainability Goals

- **Climate Adaptation & Resiliency**
- **Greenhouse Gas Reduction**
- **Energy Efficiency**
- **Renewable Energy**
- **Reuse & Recycle**

NY has the lowest per capita Carbon Footprint in the nation

MTA Keeps 700,000 cars off CBD-NYC Every Weekday

"An average MTA trip saves over 10 pounds of greenhouse gas emissions."

"In 2019, the MTA effectively prevented the release of approximately 17 million tons of greenhouse gases."

The Climate Agenda- The MTA Acting Locally…

- **PARTICIPATING in the GOVERNOR'S CLIMATE AGENDA – CLCPA** (Climate leadership & community protection act)

  New York State is committed to the most aggressive clean energy and climate agenda in the country. Among its goals are:

  - 85% Reduction in GHG Emissions by 2050
  - 100% Zero-emission Electricity by 2040
  - 70% Renewable Energy by 2030

  https://www.nyserda.ny.gov/All-Programs/Programs/CLCPA

- **ACCEPTING THE FTA CHALLENGE OF SUSTAINABLE TRANSIT FOR A HEALTHY PLANET**

  In Oct 2021, MTA pledged to develop a Climate Action, Electrification and Sustainability plan that details GHG reduction strategies to achieve a 50% reduction by 2030. http://www.transit.dot.gov/climate-challenge

- **THE CLIMATE REGISTRY VERIFICATION**

  MTA earned Climate Registered™ GOLD Status and joined US Climate Leaders by publicly reporting a verified GHG emissions inventory.

  By reporting our emissions, we work to reduce our greenhouse gas emissions and educate the public in the role that mass transit plays in avoiding carbon emissions.

  http://www.theclimateregistry.org/

Participation in the Global Climate Agenda & COP21

May 2015 Caring for Climate C4C

MTA becomes a Signatory Participant at UN's Caring for Climate Program.
MTA's C4C Commitment Goals:

- 20% Energy Reduction at all MTA Facilities
- Develop MTA wide Climate Adaptation Guidelines
- Continue to Develop and Implement Sustainable Strategies in Capital Projects

November 2015

MTA is Featured by UNFCC at COP21 in Paris for Post Sandy Strategies.

December 2016

MTA Meets C4C Goal #1

November 2019 SCIENCE BASED TARGET INITIATIVE (SBTI)

MTA Commits to Paris Agreement's Science Based Target Initiative, developing a defined set of emissions reduction targets aligned with Paris Climate Accord goals.

April 2021

- MTA submits SBTi targets for Scope 1 , 2 & 3, to educe GHG emissions from non-revenue activities by 38% and revenue activities 51% by 2030 using 2015 as a base year.

THE MTA Capital Plan

MTA is restarting its $51.5 billion capital plan and the borrowing to finance it as federal aid rescues the city's bus and subway operator from the financial toll of the pandemic.

The 2020-24 Capital Plan's biggest priorities are:

- Upgrading stations and improving accessibility
- Investing in new buses and train cars
- Modernizing signals on the busiest subway lines and commuter rail lines
- Building the region's megaprojects
- Keeping bridges & tunnels in good working condition
- Keeping the MTA's other infrastructure in good working condition

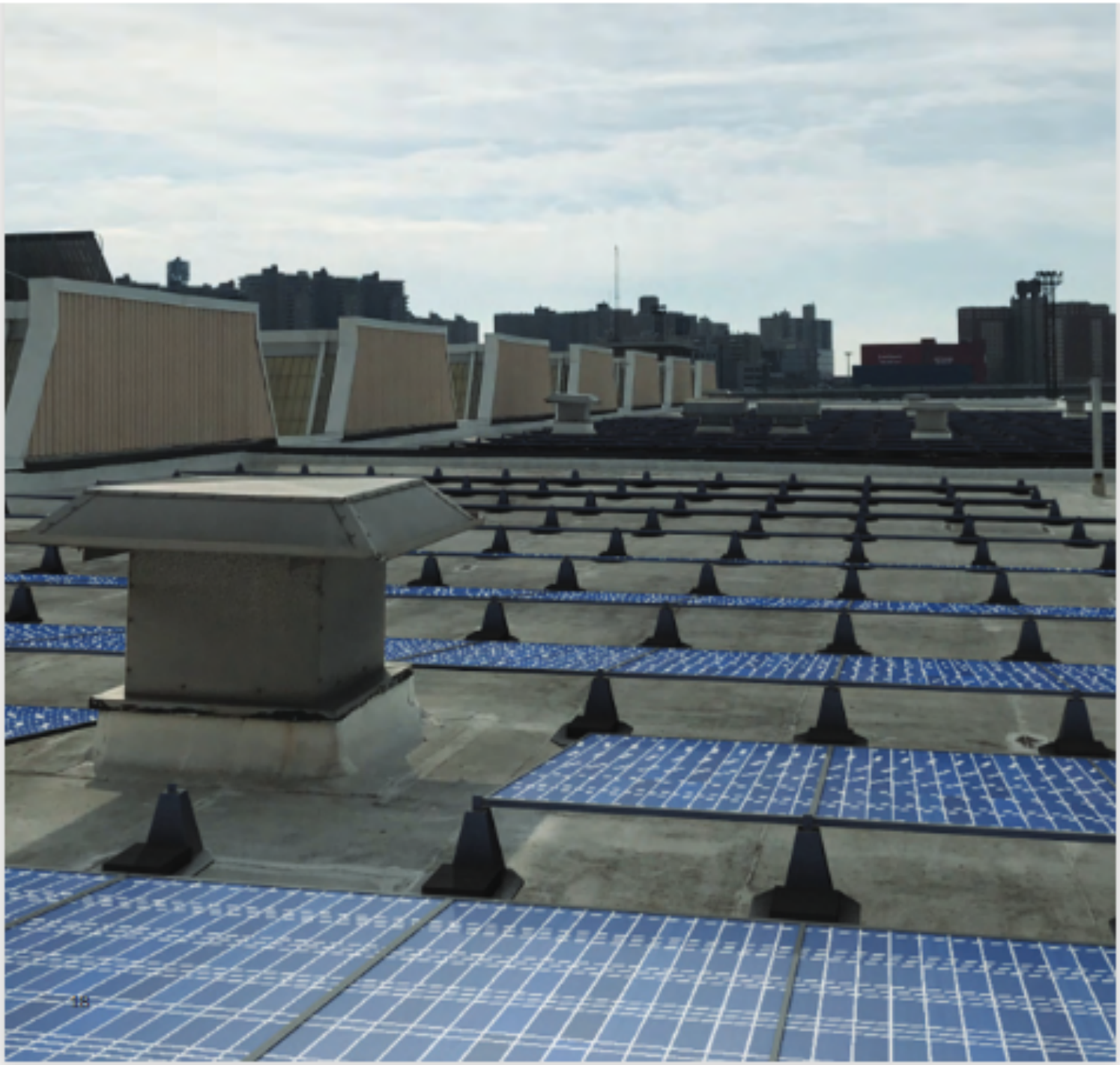
ENERGY EFFICIENCY

Charging Infrastructure – Opportunities & Challenges

- MTA has 25 electric buses in operation (10 standard + 15 articulates)
- 60 on order.

- **Scale up** to **500** buses in the 2020-2024 Capital Program

RENEWABLE ENERGY/ MTA Solar



On Earth Day 2019, MTA Launched MTA Solar Initiative identifying more than 100 million sf roof space suitable for solar development.

Digital representation of Solar Panel installation at Coney Island Yard Facility

MTA Leadership & Benchmarking

MTA actively participates in national and international benchmarking and knowledge-share efforts.

- **ITS- NY** (Intelligent Transportation Society NY)
- **TRB** (Transportation Research Board)
- **UITP** (L'Union Internationale des Transports Publics)
- **APTA** (American Public Transit Association)
- **COMET** (Community of Metros) at Imperial College of London
- **IBBG** (International Bus Benchmarking Group)
- **ISBeRG** (International Suburban Rail Benchmarking Group)

THANK YOU