



Metropolitan Waterfront Alliance

MWA Research and Policy Directions

Maximizing Ferries in New York City's Emergency Management Planning

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Maximizing Ferries in New York City's Emergency Management Planning

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The Metropolitan Waterfront Alliance works to transform the New York and New Jersey Harbor and Waterways to make them cleaner and more accessible, a vibrant place to play, learn and work with great parks, great jobs and great transportation for all. For more information, please visit www.waterfrontalliance.org.

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Executive Summary

From the terrorist attacks of September 11th to extreme weather events, a number of local disasters have demonstrated that New York's transportation network lacks the resiliency and redundancy it needs to respond to emergency events and function efficiently in their aftermath. As climate change continues to fuel increasingly volatile weather patterns, New York City is likely to experience extreme weather events with greater frequency and severity, resulting in recurrent disruptions to safe and efficient transportation in New York City.

In addition to providing fast, efficient, and enjoyable public transportation under normal circumstances, ferries have consistently proven to be the most resilient mode of transit during and after emergencies. Lacking reliance on either a fixed route or the electrical grid, ferries have historically been deployed for speedy evacuations from no-notice emergency situations. Moreover, ferries are typically the first mode of transportation to resume service during prolonged transit outages, relieving New Yorkers—particularly in communities lacking bus and subway access—from an extended transit paralysis.

In spite of ferries' utility in emergency management, they are presently underutilized in New York's waterways. This paper is a call to action to policymakers and city officials to redefine ferries as critical emergency management assets. In doing so, the City will not only be equipped for a robust, interconnected ferry transit network, but it will also be prepared to facilitate effective waterborne evacuation and transit recovery. This paper makes eight key recommendations for maximizing the role of ferries in citywide emergency preparedness:

1. Increase capacity for waterborne evacuation by expanding inter-borough ferry service.
2. Provide ferry crews with emergency personnel identification.
3. Prioritize reimbursements to ferry operators when allocating federal and state emergency relief funds.
4. Fully integrate ferries with mass transit to facilitate seamless regional mobility.
5. Coordinate all regional ferry infrastructure—including all boats and landings—as one unified system of emergency management.
6. Develop coastal design standards to equip New York's shoreline for emergency response.
7. Establish a Department of the Waterfront—a new city agency—and house a Waterfront Emergency Management division within it to coordinate long-term planning and preparedness efforts.
8. Considering ferries as essential emergency management assets, apply for government emergency preparedness and recovery grants for coastal retrofitting and additional tie-up sites.

Introduction

“Restoring the [transit] system was vital to restoring the economic and social pulse of the city.”¹

Victor Mendez, Federal Highway Administrator

The Hudson River rushing into the Brooklyn-Battery Tunnel. Roofs of taxicabs piercing the surface of rising floodwaters. Subway tunnels and primary avenues reminiscent of Venetian canals. These haunting images of Superstorm Sandy's strength are a reminder that, as a waterfront city, New York's surface and rail transportation remains highly vulnerable to disasters. It is critical, however, that transportation systems operate smoothly in the wake of a natural or manmade disaster, since power outages and public health risks often necessitate speedy evacuations. As extreme weather events continue to grow in frequency and severity, it is essential that New York adapt its transit network so it is sufficiently prepared to respond to, and recover from, emergency events.



Record storm surge flooded upland areas during Sandy.
Source: NY Daily News

Recent transit outages have proved that a redundant transportation system is a resilient transportation system. And ferries—a fast, efficient, and appealing mode of transit under normal operation—become indispensable in the wake of emergencies. Since the beginning of the 21st century, a number of urgent events prompting transit shutdowns—including the terrorist attacks of September 11th, the 2003 blackout, the 2005 transit strike, the 2007 summer storm, and, most recently, Superstorm Sandy—have demonstrated that ferries can still operate (when the waters are calm enough) and provide vital redundancy when other transit modes become inoperative. When electricity fails, subway tunnels flood, trees and debris obstruct roads and train tracks, and river crossings suffer paralyzing congestion, ferries continue to crisscross waterways, evacuating residents from the water's edge in hard-hit neighborhoods and maintaining regional mobility during extended recovery periods.

This paper calls upon City officials and policymakers to redefine ferries as essential emergency management assets. It is divided into three parts. First, “Assessing Risks and Impacts” lays out a number of vulnerabilities specific to New York City that place its transportation infrastructure at a high risk of malfunction during emergencies. Second, “How Ferries Help” details ferries' ability to fill transit service gaps during and following emergencies. Finally, “Challenges and Solutions” outlines strategies for maximizing the utility of ferries during disaster response and recovery. By recognizing ferries' critical role in emergency management, and integrating them into long-term emergency preparedness planning, policymakers will ensure that New Yorkers can enjoy ferries under normal circumstances and depend upon them when disaster strikes.

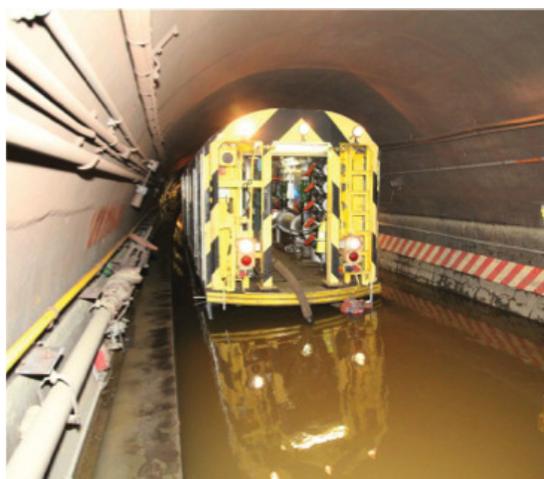
1. Victor Mendez, “Planning for Resiliency: Adapting the Transportation System to Emerging Vulnerabilities.” (presentation, NYMTC Annual Meeting, New York, NY, February 26, 2013).

Part I: Assessing Risks and Impacts

In recent years, emergency events prompting system-wide transit shutdowns, once a relatively rare occurrence, have become anticipated realities of urban life (see Appendix 1). In fact, in the history of New York City, transit officials have only preemptively suspended service in advance of extreme weather twice: in August 2011, prior to Hurricane Irene, and in October 2012, before Superstorm Sandy. In the short term, transit outages can quickly produce public health crises—with residents left stranded in inundated areas without electricity, medical care, or essential supplies—while extended or indefinite shutdowns often result in significant economic losses for businesses, employees, and government agencies, whose staffs must work around the clock to restore transit as quickly as possible. In addition, communities most likely to suffer long-term impacts of disasters tend to be isolated waterfront neighborhoods with few transportation options.

Whether caused by natural or man-made disasters, these situations have repeatedly exposed a number of weaknesses in New York's transportation infrastructure that hamper functional operation both during and following emergency events:

- **Limited egress across waterways:** New York is a city of islands and peninsulas with a limited number of crossing points among the boroughs. When power fails, or bridges and tunnels become unsafe for travel, evacuation across the rivers can become a chaotic, time-consuming, and potentially dangerous process. This issue is further compounded by the fact that New York's 520-mile coastline, with inconsistent waterfront access and a shortage of landing and tie-up sites, is not sufficiently equipped to facilitate large-scale emergency waterborne evacuations.
- **Lack of transit redundancy:** A number of neighborhoods in New York City, particularly the rapidly growing districts along the waterfront, must contend with limited options for public transportation that are already strained beyond their capacity. This lack of transit redundancy can deter evacuation efforts and lead to prolonged disruptions to mobility when the City's transit system—or portions of it—become incapacitated.
- **Fixed-route transportation system:** New Yorkers rely on roads, bridges, tunnels, and trains for travel under normal circumstances, yet these fixed-route modes of transportation are currently limited in their ability to facilitate evacuation during emergency events. This is particularly problematic for isolated waterfront neighborhoods with limited means of egress.



A pumping train removes floodwater out of Cranberry Street tunnel following Sandy.

Source: MTA

- **Low-lying infrastructure:** The low elevation of New York's transportation infrastructure—including trains, roadways, and tunnels—creates a perennial risk of extreme flooding. Repairs of inundated infrastructure can be heavily delayed if an excess of saltwater enters tunnels, as salt deposits can corrode equipment and necessitate expensive, time-consuming replacements.²
- **Climate change:** With temperatures and sea levels rising and severe weather events projected to occur more frequently, coastal cities like New York—with an extremely high population density, a proliferation of low-lying neighborhoods, aging infrastructure, and a “heat island” effect—face particularly significant risks from climate change (see Appendix 2). Accordingly, New York can expect to see more frequent and prolonged transit outages in the future.

2. Sarah Kaufman, et al. *Transportation During and After Hurricane Sandy*. (New York: NYU Robert F. Wagner Graduate School of Public Service, 2012), 14.

Part II: How Ferries Help

“Resilience means creating diversity and redundancy in our systems and rewiring their interconnections, which enables their functioning even when individual parts fail.”³

Judith Rodin and Felix Rohatyn, NYS 2100 Commission Co-Chairs

Ferries have become highly popular in New York City in recent years, owing to their demonstrated effectiveness as a means of transit, an engine of economic development, and a tourist attraction. Whereas ferries had all but disappeared from New York City's waters by the 1970s, today the demand for water mass transit is growing steadily, with enthusiastic support from policymakers, city officials, and the public. The same qualities that make ferries effective as a form of public transportation under normal circumstances—namely their flexibility, adaptability, and the ease with which they can be mobilized—make them indispensable during emergency events. In the last decade, the increasing number of ferry vessels in New York's waters has been critical to waterborne emergency response and recovery.⁴

Immediate Emergency Response

As waterborne vessels, ferries are relatively immune to many of the obstacles that can cripple rail-and-road transit infrastructure such as power outages, obstructed roads, and impassable bridges or tunnels. As a result, even under the most challenging circumstances, ferries can be quickly mobilized from across the region to reach disaster victims who have been completely disconnected from the transit network. For instance, on January 15, 2009, ferries proved vital to the rescue of the 155 passengers aboard US Airways Flight 1529, which made a sudden emergency landing in the Hudson River after striking a flock of geese. Minutes after the plane touched down, NY Waterway deployed three ferries to the aircraft—followed by a convoy of tugboats, police, fire, and Coast Guard vessels—to achieve a successful rescue of all passengers on board.⁵



Ferries successfully rescued the passengers of US Airways Flight 1529.
Source: Sacramento Bee

3. Judith Rodin and Felix Rohatyn, foreword to *NYS 2100: Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure* (2013), 6.

4. New York City Economic Development Corporation. *Maritime Support Services Location Study*. (New York: Economic Development Corporation, 2007), 80.

5. Robert D. McFadden. "Pilot Is Hailed After Jetliner's Icy Plunge." *The New York Times*. January 15, 2009, accessed March 8, 2013, <http://www.nytimes.com/2009/01/16/nyregion/16crash.html>.

Long-Term Recovery

Lacking a strictly fixed route, during extended transit outages ferry operators can quickly plan new service to areas in need by utilizing temporary landings and adding vessels with the help of emergency funding. Moreover, owing to their minimal reliance on either hard infrastructure or the electrical grid, ferries are typically the first mode of transportation to resume operation following emergency events. In the case of Superstorm Sandy, though many subway lines remained closed for a week, ferries resumed service the next day, providing quick and efficient mobility across the East and Hudson Rivers (see Appendix 3). Most important, in comparison to road and rail, new ferry infrastructure can be built relatively quickly and affordably, opening vital transportation arteries to hard-hit neighborhoods in a matter of weeks. For instance, in order to accommodate the sudden twofold increase in ferry ridership following September 11th, the Port Authority constructed a new landing in Battery Park in just six weeks, costing \$4 million. By contrast, rebuilding the destroyed PATH infrastructure between New Jersey and Manhattan required two years of labor and more than \$320 million in capital funding.⁶

6. New York City Economic Development Corporation, *Comprehensive Citywide Ferry Study*, 158.

September 11th, 2001: The largest maritime evacuation in history

What happened:

The collapse of the Twin Towers necessitated the rapid evacuation of Lower Manhattan. However, with subways shut down and river crossings either blockaded or clogged with frenetic crowds, millions of people found themselves trapped on the tip of Manhattan. Panicked and disoriented crowds instinctively fled to the waterfront in hopes of finding a way off the island.⁷ They quickly found boats to be their only mode of transportation. Thereafter, nearly 17% of those fleeing the attacks identified ferries as among the means of transit they used to reach their final destinations—more than buses, subways, or emergency vehicles.⁸

How ferries helped:

Not long after the towers fell, the Coast Guard radioed the message, "All available boats...anyone to help with the evacuation of Lower Manhattan, report to Governors Island."⁹ Moments later, hundreds of boats raced across the harbor toward the enormous cloud of smoke and ash engulfing Lower Manhattan. Ferries, cruise boats, and even tugboats that were not designed to carry passengers shuttled evacuees from the shores of Lower Manhattan to destinations in the outer boroughs and New Jersey.¹⁰ Owing to their ability to seek out those in need and transport them across the rivers, ferries and other marine vessels facilitated the largest water-based evacuation in human history, transporting nearly half a million people from Lower Manhattan in less than nine hours.¹¹



Ferries and other maritime vessels facilitated the largest waterborne evacuation in history on September 11th.

Source: ReelGoddess.com

The return to transit normalcy following September 11th was a long and costly process. The World Trade Center attacks destroyed roughly 1,800 feet of subway tunnel, damaged critical infrastructure, and overwhelmed Lower Manhattan's transit network with debris. Repairs and cleanup exceeded \$850 million, while new security measures and the reconstruction of the World Trade Center PATH station cost an additional \$2 billion.¹² Concurrently, to compensate for lost transit capacity, the City quickly developed a more redundant system with more than a dozen new ferry lines that carried more than twice the average number of waterborne passengers. This ridership spike continued for more than two years until the resumption of PATH service in late 2003.¹³

7. *Boatlift, an Untold Tale of 9/11 resilience*. Directed by Eddie Rosenstein. Eyepop Productions, 2011.

8. Rae Zimmerman, and Martin F. Sherman. "To Leave an Area After Disaster: How Evacuees from the WTC Buildings Left the WTC Area Following the Attacks." (New York: NYU Robert F. Wagner Graduate School of Public Service, 2010), 8.

9. *Boatlift*.

10. Jessica DuLong. "The Untold Story of Tround Zero Evacuations by Boat." *Huffington Post*. September 13, 2011, accessed March 6, 2013, http://www.huffingtonpost.com/jessica-dulong/the-untold-story-of-groun_b_955893.html.

11. *Boatlift*.

12. Carl H. McCall. *The Impact of the World Trade Center Tragedy on the Metropolitan Transportation Authority*. (New York City: Office of the State Comptroller, 2001), 1-2.

13. New York City Economic Development Corporation. *Comprehensive Citywide Ferry Study*. (New York: Economic Development Corporation, 2010), 158.

After Superstorm Sandy – How ferries kept New York moving

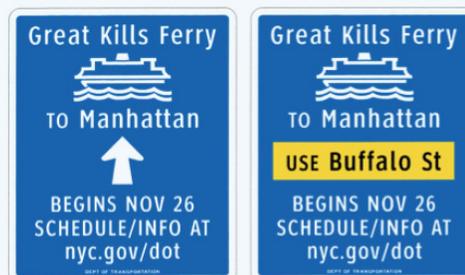
"Hurricane Sandy and its impact on transportation also provided a timely message to all New Yorkers that public transportation is essential to the economic and social well being of the people who live, work and visit here." – NYU Rudin Center for Transportation¹⁴

What happened:

Superstorm Sandy plainly demonstrated the impacts of climate change on the City's already vulnerable transit system. Largely located in low-lying coastal areas, the City's transportation network shut down as rising floodwaters filled underground tunnels and significantly damaged electrical equipment. The complete saturation of the Brooklyn–Battery and Queens–Midtown Tunnels made them impassable for days after the storm, while the unprecedented inundation of subway tunnels substantially delayed cleanup and repair efforts.¹⁵ Moreover, as bridges, tunnels, and subway lines gradually reopened in a piecemeal fashion, the City's transit network witnessed levels of congestion "reminiscent of scenes from Sao Paulo and Jakarta: emerging megacities that struggle to provide adequate capacity...in their urban cores."¹⁶ According to a survey conducted by the Rudin Center for Transportation at New York University, residents of Manhattan and Brooklyn saw their commute times nearly double in the days following Sandy, while Staten Islanders' commutes increased nearly threefold.¹⁷

How ferries helped:

The extensive transit recovery period following Superstorm Sandy clearly demonstrated ferries' unique ability to quickly adapt to emergency circumstances and help New Yorkers resume their daily lives. To help restore mobility to some of the City's hardest-hit neighborhoods, the New York City Economic Development Corporation and the Department of Transportation partnered with private operators Seastreak and New York Water Taxi to implement temporary, rush-hour ferry service from Rockaway Park, Queens, and Great Kills, Staten Island, into Manhattan.¹⁸⁻¹⁹ In both cases, the City constructed temporary ferry landings and allowed commuters to travel to Manhattan for a low one-way fare of \$2. Additionally, in order to facilitate easier access to the waterfront, the City made free parking available near the landing sites, while the MTA ran free shuttle bus service between the Great Kills ferry and the busy Hylan Boulevard bus routes. These improvised ferry routes and upland connections allowed otherwise stranded New Yorkers to resume their commutes following what Chairman Lhota called the most severe transit crisis in the City's history.²⁰



Ferries restored mobility to hard-hit areas such as Great Kills, Staten Island.

Source: nyc.gov

14. Kaufman, et al., *Transportation During and After Hurricane Sandy*, 2.

15. Kaufman, et al., *Transportation During and After Hurricane Sandy*, 16.

16. *Ibid.*, 11.

17. *Ibid.*, 26.

18. New York City Economic Development Corporation. *New Rockaway Ferry Service*. January 18, 2013, accessed March 6, 2013, <http://www.nycedc.com/blog-entry/new-rockaway-ferry-service>.

19. New York City Department of Transportation. *Great Kills Ferry*. November 2012, accessed March 6, 2013, <http://www.nyc.gov/html/dot/html/ferrybus/greatkills.shtml>.

20. Mark Duell and Jill Reilly. "FIFTY DEAD...and It's NOT Over." *Mail Online*. October 29, 2012, accessed March 6, 2013. <http://www.dailymail.co.uk/news/article-2225108/Hurricane-Sandy-2012-pictures-FIFTY-DEAD--NOT-over.html>.

Part III: Challenges and Solutions

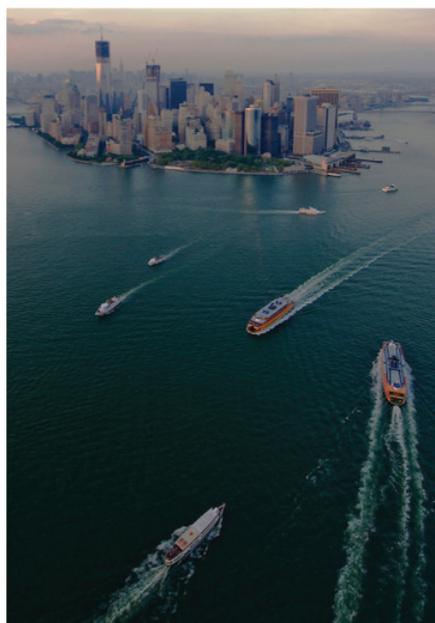
In spite of their proven utility as a mode of transit in both normal and emergency circumstances, the City has not yet maximized ferries' potential for either public transportation or emergency management. This section identifies a number of existing challenges that hinder the optimization of ferries and recommends actionable solutions to integrate them into comprehensive planning for public transit and emergency management.

- 1. Challenge:** Available ferry assets do not provide sufficient capacity to meet demand in emergency situations. During disaster events, New Yorkers instinctively flock to piers and landings, waiting in long lines to board ferries and rescue boats.²¹ Time and again, this phenomenon leads to overcrowding, delays, and inefficiencies as available vessels are overwhelmed by passenger demand.

Solution: Increase capacity for waterborne evacuation by expanding inter-borough ferry service. Following the 2003 blackout, the Mayor's Office convened an Emergency Management Task Force to analyze city agency response to the event. The Task Force strongly recommended that New York City "explore all avenues to supplement ferry service during emergency situations."²² In the wake of Superstorm Sandy, the Rudin Center for Transportation at New York University called for expanded commuter ferry service in New York City, arguing that adding more inter-borough ferry routes would mitigate vehicular and transit congestion.²³ This is crucial because ferries' ability to provide redundancy in contingencies is greatly affected by the availability of vessels and landings in New York's waterways. Given the rapid population growth projected in coming decades—with nearly a million new New Yorkers expected by 2030²⁴—the best way to achieve these investments is to expand citywide ferry service. Growing water mass transit will strengthen the City's capacity for waterborne evacuation and the effectiveness of its emergency response.



Ferry ridership spiked after Sandy.
Source: [ctvnews.ca](#)



Expanding ferry service—increasing the number of boats in the harbor—is key to emergency preparedness.
Source: [Keith Sherwood](#)

21. Boatlift.

22. New York City Emergency Response Task Force. *Enhancing New York City's Emergency Preparedness: A Report to Mayor Michael R. Bloomberg*. (New York, October 2003), 23.

23. Kaufman, et al., *Transportation During and After Hurricane Sandy*, 31.

24. New York City Office of Long Term Planning and Sustainability. *PlaNYC Update April 2011*. (New York: Office of the Mayor, 2011), 5.

- 2. Challenge:** Ferry crews lack the credentials necessary to gain access to disaster areas. Ferry crews are vital to waterborne evacuation efforts. However, during emergencies police officers and emergency response officials may deny them access to blockaded roads and river crossings—delaying their ability to get to their vessels—or prohibit them from entering disaster areas.²⁵

Solution: Provide ferry crews with emergency personnel identification. In addition to the Transit Workers Identification Credential (TWIC) card, ferry crews must be supplied with a form of identification that designates them as essential emergency personnel. Police officers and other officials will then recognize them as integral to emergency response, enabling them to effectively fulfill their evacuation duties.

- 3. Challenge:** Private ferry companies are often forced to operate at a financial loss during no-notice emergency events. When private companies' ferry fleets are called upon in a no-notice emergency evacuation—such as September 11th, the 2003 blackout, or the Miracle on the Hudson—they will likely have to provide rapid and prolonged service at no charge.

Solution: Prioritize reimbursements to ferry operators when allocating federal and state emergency relief funds. In the San Francisco Bay Area, the Water Emergency Transportation Authority (WETA), the regional authority responsible for both regular ferry service and waterborne emergency transportation, collects fares from passengers whenever possible. However, when fare collection is impractical, the agency works with FEMA and the California state government to receive retroactive payments for fare-free emergency operations.²⁶ Given New York City's heavy reliance on private ferry operators for the provision of emergency transportation services, the City should assume a leading role in coordinating reimbursements for fuel, labor, and any damages incurred and ensure that they occur in a timely manner.

Case Study: WETA

The San Francisco Bay Area—a region that, similar to New York, is surrounded by water on all sides—presents an effective paradigm for waterborne emergency management. Prior to 2007, San Francisco's Water Transit Authority (WTA) was the government agency responsible for managing and operating the region's extensive water mass transit network. However, after a number of incidents in which ferries proved critical to emergency response and recovery efforts, in 2007 San Francisco replaced the WTA with the Water Emergency Transportation Authority (WETA). Today, as San Francisco's official provider of both ferry transportation and waterborne emergency response, WETA not only manages ferry operations under normal circumstances but also mobilizes its resources to implement waterborne evacuations across the bays to nine coastal counties in emergency events.²⁷

25. Tom Fox. "Gaps in Maritime Emergency Evacuation Infrastructure and Planning, and Suggested Solutions." (Brooklyn, NY: Harbor Experience Companies, December 14, 2009), 3.

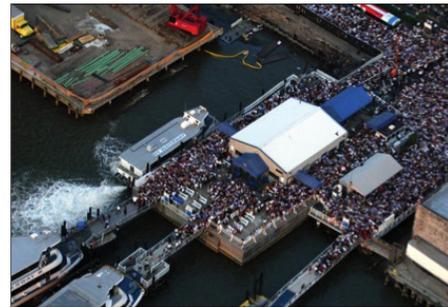
26. San Francisco Bay Area Water Emergency Transportation Authority. *Emergency Water Transportation System Management Plan*. (San Francisco: WETA, 2009), 24.

27. San Francisco Bay Area Water Emergency Transportation Authority, *Emergency Water Transportation System Management Plan*, 13.

- 4. Challenge: Connectivity from the water's edge to points further inland is limited.** Despite the marked population growth of waterfront neighborhoods in New York City, most of the City's residents still live further inland, where upland connectivity is key to water mass transit utility. However, a significant disjuncture exists between ferries and mass transit, discouraging ferry ridership and fostering the perception of ferries as a nonviable mode of public transportation, both in good times and under emergency circumstances.

Solution: Fully integrate ferries with mass transit to facilitate seamless regional mobility. The incorporation of ferries into the City's mass transit system will enhance their effectiveness both during normal service and following emergencies when river crossings are incapacitated. For instance, displaying ferry routes on MTA subway and regional rail maps will reinforce ferries as part of the public transportation network and direct passengers to multi-modal transit hubs such as Long Island City, which offers upland connections from the East River Ferry via subway, bus, and the Long Island Railroad (LIRR). Smartphone applications can synthesize this data to assist travelers on-the-go. Moreover, better synchronization between ferry and train schedules will facilitate faster and more efficient travel throughout the city. This would also improve connectivity at stations like the Long Island City LIRR stop, which only operates at peak hours and precludes midday and weekend connections to ferries. Finally, an integrated payment system—through which passengers could purchase fares for subways, regional rail, and ferries—would be the most significant integrative enhancement to ferry service. With just one versatile card, riders would no longer perceive ferries as distinct from transit; rather they would recognize them as a viable commuting option during both normal operations and extended transit outages.

- 5. Challenge: Inconsistencies in New York's ferry infrastructure complicate and delay emergency procedures.** Even with proper coordination, mass waterborne evacuations may be hampered by a shortage of berthing space and inconsistently configured landings. For example, the East 35th Street ferry landing, the primary point of waterborne egress on the East Side of Manhattan, can accommodate up to four vessels at a time, while the Hunters Point ferry terminal, located directly across the river from East 35th Street, has berthing space for just one boat.²⁸ During



Ferry piers experienced severe overcrowding during the 2003 blackout.

an emergency, this can result in prolonged queuing and overcrowding. Moreover, while high-capacity vessels are highly effective during emergency evacuations, many ferry landings, particularly those on the East River, are too small to accommodate them. For instance, Seastreak's fleet boasts four 505-passenger ferries, among the highest-capacity passenger vessels in the New York Harbor. However, New York's waterways lack sufficient landing sites large enough for these essential boats to dock.

28. Fox, "Emergency Evacuation," 2.

Solution: Coordinate all regional ferry infrastructure—including all boats and landings—as one unified system of emergency management. By creating symmetrical capacity at ferry landings, the City can ensure that all boats departing from one side of the river will be able to quickly and effectively transport evacuees to safety and, if necessary, turn back and pick up additional passengers. Moreover, coordinating landing and ferry capacities will enable more seamless, efficient evacuations in which all involved vessels can safely transport New Yorkers to the greatest number of points along the coast.

- 6. Challenge:** New York's coastline is insufficiently equipped to facilitate waterborne vessel access during emergencies. Legal regulations require that all airplanes, public buildings, and subway cars be equipped with unobstructed emergency exits to allow for quick and safe evacuations. However, though fringed with a 520-mile coastline, New York City lacks analogous requirements for waterborne evacuation points.²⁹ The vast majority of New York City's marine edge either precludes public access entirely or is designed for passive use, while opportunities for active maritime use and water access are extremely limited. For instance, on September 11th, owing to the insufficiency of cleats, ladders, and gangways along the edge of Lower Manhattan, many rescue boats tied up to trees and other makeshift anchors, while evacuees were forced to jump several feet down from the water's edge into rescue boats.³⁰



Emergency response to September 11th demonstrated that the City's edge is ill-equipped for waterborne evacuation.
Source: Metropolitan Waterfront Alliance

Solution: Develop coastal design standards to equip New York's shoreline for emergency response. Design guidelines should call for the retrofitting of the City's coastline with landings, gangways, cleats, and bollards at strategic points to ensure ample tie-up opportunities. Waterfront neighborhoods with a particular dearth in both public transportation and landing facilities should be prioritized for new infrastructure, while existing infrastructure—regardless of present use or future development plans—should be preserved in order to ensure that ferries and other emergency vessels can safely receive and transport passengers during evacuations. To help achieve these goals, the City should seek a commitment from permitting agencies to support new coastal infrastructure that is large enough to accommodate an adequate number of appropriately sized vessels.

- 7. Challenge:** Responsibility for preparing the waterfront for long-term transit outages is fragmented across a variety of government agencies. When an emergency situation disrupts New York's transit system, responsibility for transporting New Yorkers across the rivers diffuses across a diversity of government agencies. For instance, the Office of Emergency Management responds to the immediate impacts of an emergency; the Coast Guard controls on-water communications and protocol; and the New York Police Department handles security at piers that are constructed by the Economic Development Corporation (NYCEDC) and

29. Fox, "Emergency Evacuation," 6.

30. Boatlift.

maintained by the NYC Department of Transportation.³¹ This intricate web of governmental authority has worked to facilitate some impromptu evacuations, but it neglects long-term issues of emergency preparedness planning.

Solution: Establish a Department of the Waterfront—a new city agency—and house a Waterfront Emergency Management division within it to coordinate long-term planning and preparedness efforts. Since the release of the *Comprehensive Waterfront Plan* in 2011, the Metropolitan Waterfront Alliance has pushed for the establishment of a Department of the Waterfront, a new city agency dedicated exclusively to managing the City's 520 miles of coastline. The agency would be tasked with integrating "permitting, maintenance, public and user participation processes, interagency coordination, and waterfront leadership to achieve long-term waterfront goals—in particular the goals and objectives articulated in the newly updated New York City *Comprehensive Waterfront Plan*."³² This interdisciplinary agency would house a Waterfront Emergency Management Division that would coordinate various city agencies to ensure that the City's waterways are equipped for emergency events. Specifically, the Waterfront Emergency Management Division would streamline ferry infrastructure planning to implement coastal design standards and ensure symmetrical capacity at all ferry landings.

- 8. Challenge:** Insufficient funding is available to expand water mass transit. Though ferries possess significant potential to both enhance New York's public transportation network and prepare the City for emergency events, in an era of chronic budget cuts, funding for even the most essential services can be scant.

Solution: Considering ferries as essential emergency management assets, apply for government emergency preparedness and recovery grants for coastal retrofitting and additional tie-up sites. It is presently a financially propitious time to invest in ferry infrastructure, as a host of new federal emergency preparedness and recovery grants may be available to help subsidize the construction of new ferry terminals and the creation of additional tie-up sites. For example, in July 2012, the Obama Administration worked with Congress to pass the Moving Ahead for Progress in the 21st Century Act (MAP-21), which commits \$105 billion in fiscal years 2013 and 2014 to transportation projects.³³ Moreover, to help states and localities recover from Superstorm Sandy, the U.S. government has allocated \$60 billion for disaster relief and preparedness, \$50 billion of which will be disseminated through various Federal agencies by decree of H.R.152, the official Sandy supplemental funding bill. In fact, this funding stream has already benefited New York City's ferries, with \$22 million going to the NYC Department of Transportation, for preparedness work and free shuttle bus service, and the Economic Development Corporation, for extended ferry service along the East River and to the Rockaway Peninsula.³⁴ A selection of emergency preparedness grant opportunities that may be relevant is listed on the following page.

31. Regional Plan Association. *Ferries in the Region: Challenges and Opportunities*. (New York: Regional Plan Association. 2006), 20.

32. Metropolitan Waterfront Alliance. *Retooling Waterfront Governance in the New York–New Jersey Harbor*. (New York: Metropolitan Waterfront Alliance, 2013).

33. U.S. Department of Transportation. *MAP-21*. 2012, accessed March 15, 2013. <http://www.fhwa.dot.gov/map21>.

34. Joseph Straw. "Capitol Hill Will Provide \$22 Million for City Ferry Service Post–Sandy Recovery." *NY Daily News*. March 28, 2013, accessed March 28, 2013, <http://www.nydailynews.com/new-york/feds-include-22m-sandy-relief-city-ferry-services-article-1.1301040>.

Part III: Challenges and Solutions (cont'd)

Funding Source (Responsible Federal Agency)	Program	Amount	Duration	Purpose	Ferry Eligibility
MAP-21 (Department of Transportation)	Section 5324 Public Transportation Emergency Relief Program	\$2 billion	N/A	To fund capital projects to protect, replace, or repair infrastructure that sustained damage due to emergency events. To fund operating expenses related to evacuation, rescue, temporary transit service, or re-routing of service. ³⁵	Section 5324 funds may help to reimburse private ferry operators for revenue lost during fare-free evacuations. Section 5324 can also finance temporary ferry service to hard-hit areas such as the Rockaway Peninsula and Staten Island.
MAP-21 (Department of Transportation)	Ferry Boat Program	\$67 million	Available until expended	To fund the construction of publicly owned (or majority publicly owned) ferry boats and ferry terminal facilities. ³⁶	The publicly subsidized East River Ferry could apply for MAP-21 funding to finance new landings and service expansion.
U.S. Congress, H.R. 152: Hurricane Sandy Supplemental Funding (Department of Transportation)	Federal Transit Administration Public Transportation Emergency Relief Program	\$5.4 billion	Available until expended	To fund transit systems affected by Hurricane Sandy. ³⁷	In areas where Sandy severely impacted transit, FTA funding can finance ferry redundancy.
U.S. Congress, H.R. 152: Hurricane Sandy Supplemental Funding (Department of Housing and Urban Development)	Community Development Block Grants (CDBG)	\$3.85 billion	Funds available until 9/30/2017	To fund "necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, and economic revitalization in the most impacted and distressed areas..." ³⁸	In low-income areas where Sandy severely impacted transit infrastructure, HUD CDBG funds can finance redundant ferries both as public transportation and engines of economic development. Funding decisions are largely determined by the City of New York.
U.S. Congress, H.R. 152: Hurricane Sandy Supplemental Funding (Federal Emergency Management Agency)	FEMA Disaster Relief Fund	\$11.487 billion	Available until expended	To fund operations, mitigation, and emergency measures. ³⁹	FEMA funds may be used to finance ferries as transportation redundancy to hard-hit areas, as well as preparedness measures such as additional boats and tie-up sites.
Consolidated Appropriations Act, 2012 (Department of Homeland Security)	Transit Security Grant Program	\$87.5 million	24 months	To protect critical transit infrastructure from acts of terrorism and to make transit systems more resilient. ⁴⁰	As ferries are critical to mass evacuation procedures, Homeland Security funding can finance emergency preparedness infrastructure such as ferry boats and landside tie-up infrastructure.
Consolidated Appropriations Act, 2012 (Department of Homeland Security)	Port Security Grant Program	\$97.5 million	24 months	To fund the implementation of Area Maritime Transportation Security Plans and facility security plans among port authorities, facility operators, and state and local government agencies. ⁴¹	Homeland Security funding can finance a marine security plan that incorporates ferries as essential to emergency response and recovery efforts.

35. Federal Transit Administration. "Fact Sheet: Public Transportation Emergency Relief Program Section 5324." MAP-21. 2012, accessed March 6, 2013, http://www.fta.dot.gov/documents/MAP-21_Fact_Sheet_-_Public_Transportation_Emergency_Relief_Program.pdf.

36. Federal Highway Administration. "Federal-Aid Highway Funding of Ferry Boats and Ferry Terminal Facilities." December 5, 2012, accessed March 6, 2013, <http://www.fhwa.dot.gov/specialfunding/fbp/primer.pdf>.

37. U.S. Congress. "H.R. 152." Washington, D.C., 2013.

38. Ibid.

39. Ibid.

40. Federal Emergency Management Authority. "Fiscal Year (FY) 2012 Transit Security Grant Program (TSGP) Frequently Asked Questions." Washington, DC: U.S. Department of Homeland Security, 2012.

41. Federal Emergency Management Authority. "Fiscal Year (FY) 2012 Port Security Grant Program (PSGP) Frequently Asked Questions." Washington, DC: U.S. Department of Homeland Security, 2012.

Conclusion

Superstorm Sandy provided yet another reminder that New York City is indeed a waterfront town. Though among its greatest assets, the City's waterways can place New Yorkers at risk of flooding during extreme weather and make for dangerous mobility within the urban archipelago both during and following emergency events. As a changing global climate produces increasingly volatile weather patterns, New York City is likely to experience extreme weather events with more frequency and greater intensity, accounting for recurrent disruptions to the safe and efficient transportation systems upon which New Yorkers habitually rely.

From September 11th through Superstorm Sandy, ferries have consistently proven to be the most resilient and adaptive mode of transportation. Typically the first form of transit to resume service following an emergency event, and the most flexible to allow for the development of new routes to hard-hit, transit-poor neighborhoods, ferries must be defined as essential emergency management assets, and New York City must engage in long-term preparedness planning to ensure its coastline is sufficiently equipped to facilitate waterborne emergency response. To effect these critical changes, MWA recommends expanding citywide ferry service, redefining ferry crews as emergency personnel and compensating them following the fulfillment of emergency response duties, integrating ferries into the City's public transit network, and equipping the City with the ferry assets necessary to facilitate speedy and efficient waterborne emergency response and recovery. MWA also proposes that the City seek funding for capital improvements through federal emergency management grants and coordinate long-term waterfront emergency management issues through a dedicated division within a newly created Department of the Waterfront. In embracing ferries as fundamental to waterborne emergency management, and incorporating them into long-term emergency planning processes, New York City can develop a waterfront that is resilient to the challenging new realities of the 21st-century metropolis.

Appendices

Appendix 1: The Role of Ferries in Emergency Events

Emergency Event	Role of Ferries
September 11, 2001	The fall of the Twin Towers necessitated the largest waterborne evacuation in history. For two years following the attacks, more than a dozen new ferry routes crossed the harbor to accommodate increased demand in the absence of PATH service. ⁴²
2003 Northeast Blackout	With power out for 50 million customers from Michigan to Massachusetts, New York City's subways, streetlights, and traffic signals failed. In the absence of rail and road transit, demand for ferry service increased more than fivefold, with NY Waterway transporting about 170,000 people to New Jersey. ⁴³
2005 Transit Strike	With MTA employees on strike for three days in late December 2005, ferries became among the only mass-transit option for entry to and exit from Manhattan. The City extended service, and ferries saw a ridership uptick of roughly 50%. ⁴⁴
Miracle on the Hudson (2009)	When US Airways Flight 1529 struck a flock of geese, it was forced to make an emergency landing in the middle of the Hudson River. A fleet of NY Waterway ferries raced to the fallen plane and safely rescued all 155 passengers on board. ⁴⁵
Superstorm Sandy (2012)	With many subway lines out of service for a week, and some commuter rails out for longer, ferries helped restore mobility to neighborhoods across the City.

Appendix 2: Climate Change Projections for New York City⁴⁶

	1971–2000 (Baseline)	2020s	2050s	2080s
Air Temperature	55°F	+1.5–3°F	+3–5°F	+4–7.5°F
Precipitation	46.5 inches	+0–5%	+0–10%	+5–10%
Sea Level Rise	NA	+2–5 inches	+7–12 inches	+12–23 inches
Rapid Ice–Melt Sea Level Rise	NA	+5–10 inches	+19–29 inches	+41–55 inches
Number of Days/Year with Temps over 90°F	14	23–29	29–45	37–64
1-in-100 Year Flood to Occur, on Average	Once every 100 years	Once every 65–80 years	Once every 35–55 years	Once every 15–35 years

42. New York City Economic Development Corporation, *Comprehensive Citywide Ferry Study*, 161.

43. Ibid.

44. New York City Department of Transportation. 2005 *Transit Strike: Transportation Impacts and Analysis*. (New York: Department of Transportation, 2006), 6.

45. McFadden, "Jetliner's Icy Plunge."

46. New York City Panel on Climate Change. "Climate Risk Information." New York, 2009, accessed March 6, 2013. http://www.nyc.gov/html/om/pdf/2009/NPCC_CRI.pdf.

Appendix 3: Superstorm Sandy Transit Timeline⁴⁷

Date	Transit status
Sun., Oct. 28	MTA orders preemptive shutdown of subways and buses. Commuter rails suspend service.
Mon.–Tues., Oct. 29–30	Superstorm Sandy makes landfall in New Jersey. Subway service remains suspended indefinitely, and all river crossings (with the exception of the Lincoln Tunnel) close.
Wed., Oct. 31	NY Waterway resumes partial service between New Jersey and Manhattan. Significant overcrowding is reported on buses and bridges.
Thurs., Nov. 1	East River Ferry service resumes. MTA restores partial subway service.
Fri., Nov. 2	Staten Island Ferry restores service. Limited subway service accounts for severe overcrowding on functioning lines. Long waits seen at gas stations.
Sat., Nov. 3	Subway system 80% operational.
Tues., Nov. 6	PATH resumes limited service.
Thurs., Nov. 8	Most commuter rail (including Metro–North and LIRR) resumes service.
Mon., Nov. 12	Emergency ferry service begins operation between Rockaway Park and Manhattan. ⁴⁸
Tues., Nov. 13	Brooklyn–Battery Tunnel partially reopens to traffic.
Fri., Nov. 16	Queens–Midtown Tunnel reopens to traffic.
Mon., Nov. 26	Emergency ferry service begins operation between Great Kills and Manhattan. ⁴⁹

47. Kaufman, et. al., *Transportation During and After Hurricane Sandy*, 7.

48. New York City Economic Development Corporation, *New Rockaway Ferry Service*.

49. New York City Department of Transportation. *Great Kills Ferry*.

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