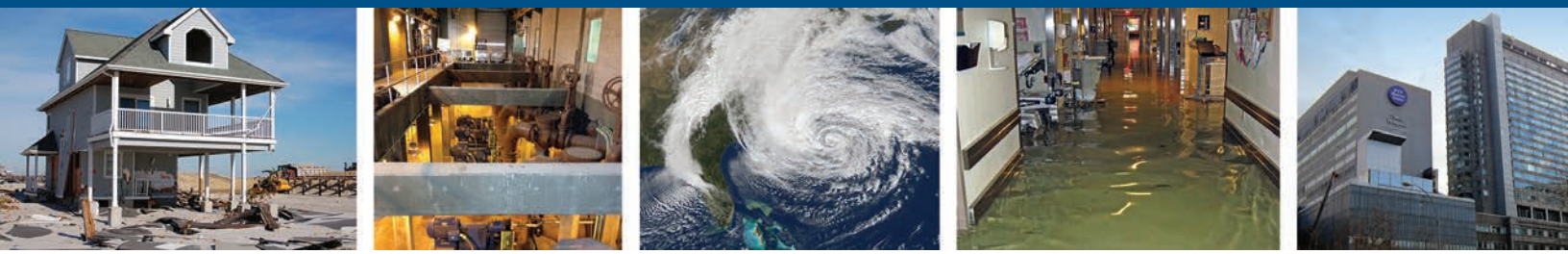

HURRICANE SANDY IN NEW JERSEY AND NEW YORK

6 Historic Properties

Historic buildings are a tangible link to a community's past and often form the core of a community's identity.

Historic districts and downtowns are often a vital part of a community's economy that attract businesses and tourists and increase surrounding property values. Unfortunately, once a historic building is lost, it cannot be replaced; therefore, mitigation and recovery strategies for historic buildings and structures should be designed to preserve the historic features and character of those properties.

Hurricane Sandy affected many historic properties, and even though wind damage was observed throughout the declared disaster areas, most of the damage to the properties appeared to be flood-related. Most of the damaged historic properties were in exposed locations (e.g., open spaces), were near the water and therefore vulnerable to storm surge and wave impact, and had floor elevations that were much lower than the Hurricane Sandy flood elevations. The historic buildings and historic districts that escaped the heavier flood damage were inland. The MAT chose eight facilities that represented the typical damage observed after Hurricane Sandy. The locations of the properties are presented in Figure 6-1.

Figure 6-1: Locations of the historic facilities visited by the MAT

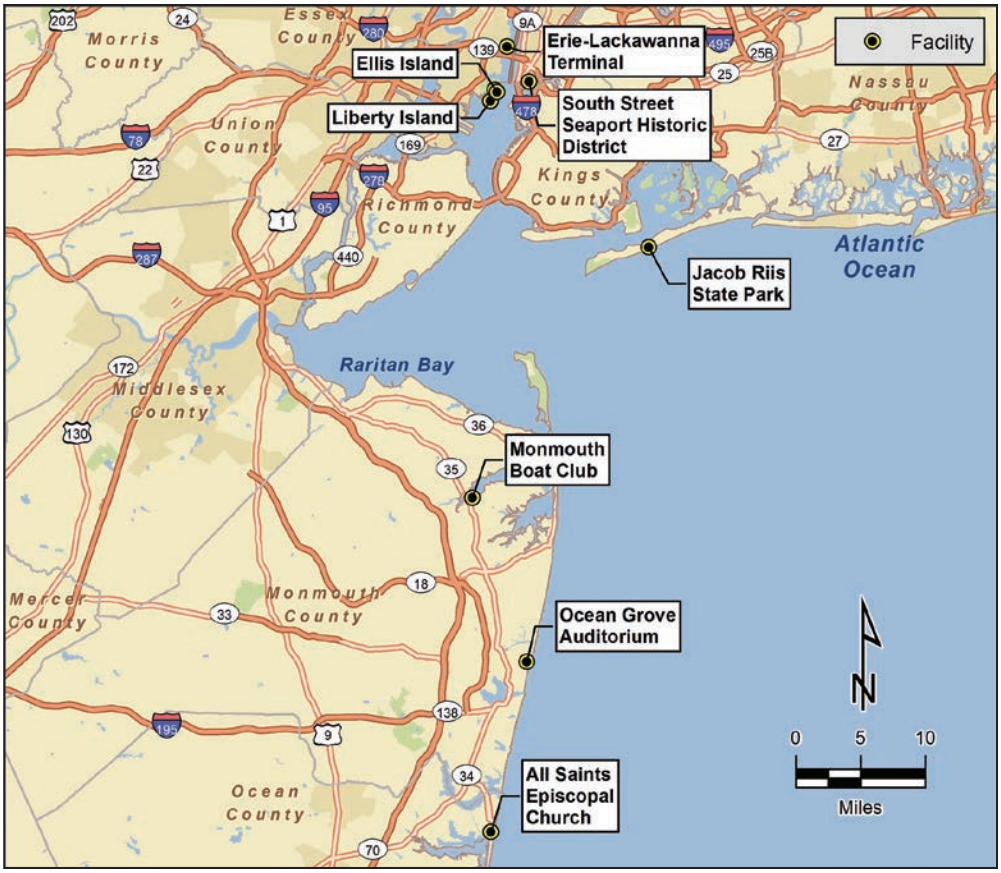

Table 6-1 lists each of the historic facilities visited, along with the applicable flood zones, 1-percent- and 0.2-percent-annual-chance flood elevations for sites in Zone V and Zone A, and the level of storm surge during Hurricane Sandy. The flood zones in Table 6-1 include those shown on all FEMA flood maps relevant to the site location: the Effective FIRM and the ABFE map (where applicable). Refer to Section 1.4 for more information about BFE and ABFE maps.

Two of the eight historic facilities visited were located entirely in Zone X, outside the SFHA; the remaining six facilities were in the SFHA. All of the historic sites visited by the MAT suffered storm surge and inundation damage from Hurricane Sandy.

Europeans came to the New Jersey and New York area in the 1600s. New Jersey's historic and cultural resources include more than 74,000 historic properties and more than 6,000 archaeological sites (NJDEP 2013). Appendix G describes the regulations for repair and rehabilitation of historic structures in the State of New Jersey. New York State's historic and cultural resources include more than 5,000 national and State register listings, with more than 90,000 properties (NYS OPRHP 2009). Appendix G describes the regulations for repair and rehabilitation of historic structures in the State of New York as they relate to Substantial Improvement and Substantial Damage.

Table 6-1: BFEs, ABFEs, and Sandy Floodwater Elevations for Historic Structures

Facility Name	Location	Relevant FEMA Flood Maps	Flood Zone on Map[a]	1-Percent-Annual-Chance Elevation (feet)[b]	0.2-Percent-Annual-Chance Elevation (feet)[c]	Approximate Maximum Water Surface Elevation During Hurricane Sandy (feet)[b,c]
All Saints Episcopal Church	Bay Head, NJ	Effective FIRM	AE	5	n/a	7
		ABFE	V	10	14	
Erie-Lackawanna Terminal	Hoboken, NJ	Effective FIRM	AE	9	n/a	11
		ABFE	V	15	20	
Monmouth Boat Club	Red Bank, NJ	Effective FIRM	AE	8	n/a	11
		ABFE	V	12	15	
Ocean Grove Auditorium	Ocean Grove, NJ	Effective FIRM	Unshaded X	n/a	n/a	11
		ABFE	Unshaded X	n/a	n/a	
Ellis Island Ferry Building	New York Harbor	Effective FIRM	AE	9	n/a	11
		ABFE	V	16	22	
Ellis Island Immigration Museum	New York Harbor	Effective FIRM	AE	9	n/a	11
		ABFE	AE	12	n/a	
Statue of Liberty Concessions Building	New York Harbor	Effective FIRM	Shaded X	n/a	n/a	11
		ABFE	V	16	21	
Statue of Liberty Visitors Building	New York Harbor	Effective FIRM	Shaded X	n/a	n/a	11
		ABFE	V	16	21	
Jacob Riis State Park	Queens, NY	Effective FIRM	AE	10	n/a	11
		ABFE	A	12	17	
South Street Seaport Historic District	Manhattan, NY	Effective FIRM	AE	10	n/a	11
		ABFE	V	15	18	

a. Information related to the Effective FIRM and ABFE maps are based on current data available during the development of this report. Information is expected to change.

b. Elevations are reported as North American Vertical Datum of 1988 (NAVD88).

c. Data from Table 5 of the *Tropical Cyclone Report, Hurricane Sandy* (AL182012) (NHC 2013b).

n/a = Not applicable (base flood elevations [BFEs] do not exist for Zone X or 0.2-percent-chance elevation and are not included on the Flood Insurance Rate Map [FIRM]). Advisory Base Flood Elevation (ABFE) maps were not produced for Nassau and Suffolk Counties in New York because their FIRMs are up to date and based on current models and technical studies.

6.1 All Saints Episcopal Church (Bay Head, NJ)

Facility Description. The All Saints Episcopal Church located on Lake Avenue in Bay Head, NJ, is a contributing resource to the Bay Head Historic District (Figure 6-2). The church complex includes the sanctuary, Bristol Hall, parish office, and the rectory (located on the east side of Lake Avenue). The church falls under the governance of the New Jersey State Uniform Construction Code Act.

Figure 6-2: All Saints Episcopal Church (Bay Head, NJ)

All Saints Episcopal Church was constructed in 1889 and is the oldest church in Bay Head. Constructed in the Shingle style, the church complex and its multiple additions are clad in cedar shingles. Bristol Hall, a social hall just south of the church, was built in 1980 in a compatible style to that of the church (NPS 2005a).

Severity of Flooding and Damage to Facility. Hurricane Sandy caused severe damage to All Saints Episcopal Church and its surrounding landscape; stormwater reached approximately 7 feet (Table 5 of NHC 2013b). The rectory, the sanctuary, Bristol Hall, and the parish office sustained extensive damage. More than 4 feet of water inundated the church, destroying the main floor support in the sanctuary. The swiftly rising waters of the bay destroyed the bulkhead at the rear of the property (Figure 6-3). At the time of the MAT site visit, this bulkhead had been replaced. The rectory, located on the east side of Lake Avenue at a lower elevation, was destroyed by the combined storm surge from the ocean and the bay.

Recovery Actions. Part of the recovery efforts for this property involved cleaning and drying the buildings. Recovery efforts were well underway at the time of the MAT visit in the immediate aftermath of the storm. The hardwood floors and subfloors in Bristol Hall, the kitchen, and the entire first floor of the parish office building were removed. All of the drywall and insulation from floor level to 4 feet were removed from Bristol Hall, the kitchen, and the entire first floor of the parish office building. To preserve the interior woodwork in the sanctuary, the exterior cedar shake siding, sheathing, and insulation were removed from the foundation to 4 feet around the perimeter of the sanctuary to allow the building to dry slowly, using natural ventilation (Figure 6-4).

Figure 6-3:
Replacement bulkhead behind the narthex of All Saints Episcopal Church (Bay Head, NJ)

Figure 6-4:
Exterior cedar shake siding, sheathing, and insulation removed around the exterior of All Saints Episcopal Church for the purpose of drying the historic interior wood paneling (Bay Head, NJ)

6.2 Erie-Lackawanna Terminal (Hoboken, NJ)

Facility Description. The terminal complex in Hoboken, NJ, includes joined ferry and railroad buildings, the train shed, the baggage building/Young Men's Christian Association (YMCA) Building, and the former Pullman Building and Immigrant Station. The terminal complex falls under the governance of the New Jersey State Uniform Construction Code Act.

Completed in 1907, the Erie-Lackawanna Terminal links rail, ferry, subway, and pedestrian traffic. New Jersey Transit began rehabilitation activities at the terminal in 1978. The style of the buildings is an eclectic mix of English High Victorian in massing and French Beaux-Arts in ornamentation (Figure 6-5).

Except for the baggage building / YMCA Building and train shed, the complex is constructed on a concrete platform supported by 80-foot to 90-foot yellow pine piling set into the bed of the Hudson

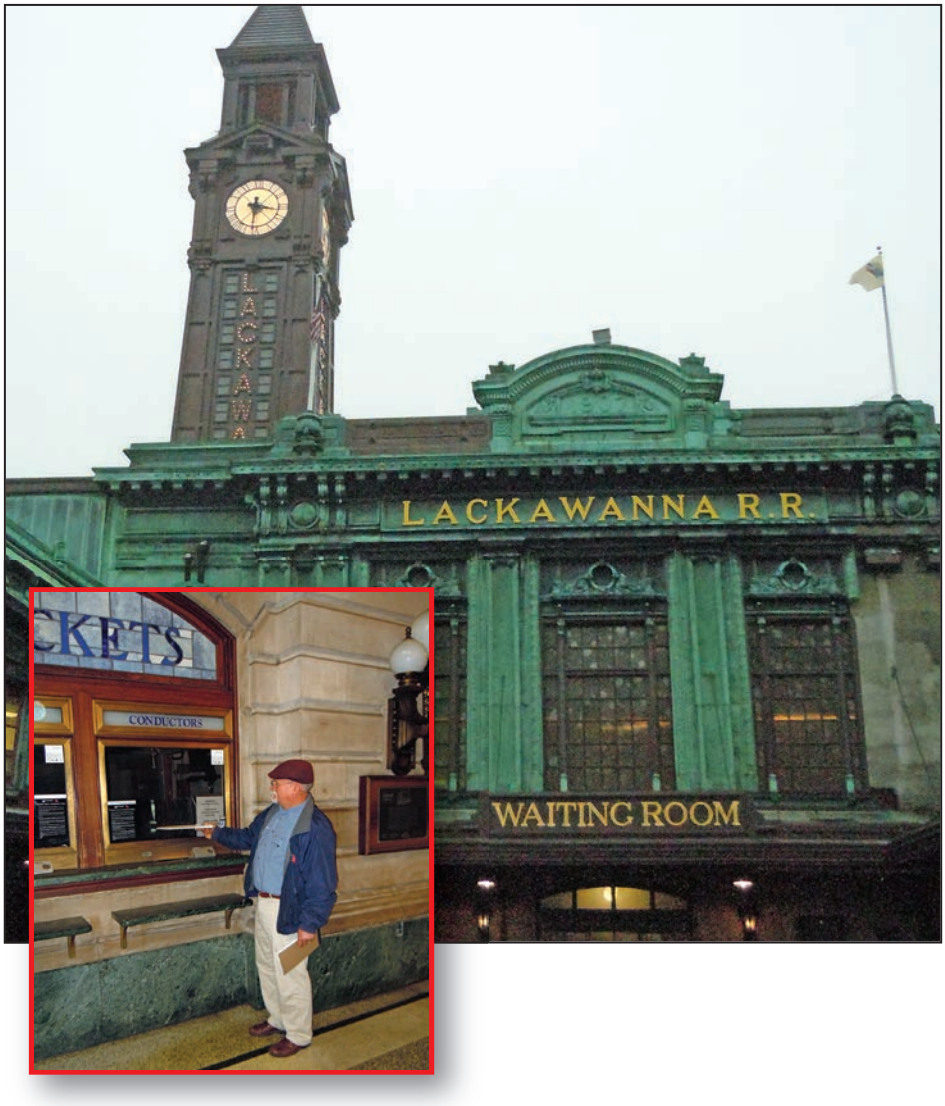

Figure 6-5:
Entrance to the waiting room of the Erie-Lackawanna Terminal; storm surge inundated the waiting room to a depth of 4 feet. Stations and Terminal Manager, Everett Lopes, indicates the HWM level in the waiting room (inset) (Hoboken, NJ).

River with a base of alternating 12-inch by 8-inch and 12-inch by 12-inch timbers laid atop the piling. Concrete footings reinforced with steel were poured on top of the timber base (NPS 2005b). The almost exclusive use of concrete in the construction of the terminal and its buildings was a fireproofing measure.

Severity of Flooding and Damage to Facility. The ferry operations section of the terminal complex suffered extensive flooding and damage, including damage to the ticketing area, locker rooms, electrical distribution equipment, transformers, and fire suppression equipment. Stormwater rose to approximately 11 feet NAVD88, which came to approximately 4 feet in the waiting area, exposing the wooden benches and the marble wainscot to saltwater intrusion (Figure 6-5 inset). Water remained in the building for over 24 hours. In the lower level of the building, some areas were inundated by 7 feet of water.

Damage to the train station section affected ticketing operations, vendor spaces, trainmaster offices, and fire suppression equipment. The engine house and wheel truing facility, electrical substations, boiler house, rail operations, and equipment were also damaged, as were some metal sheathing panels on the clock tower.

Recovery Actions. Because the wood pilings supporting the terminal complex may have been affected by hydrodynamic pressure and buoyancy, a structural assessment will be contracted by facilities management to ascertain the condition of the pilings.

6.3 Monmouth Boat Club (Red Bank, NJ)

Facility Description. The Monmouth Boat Club in Red Bank, NJ, is in Monmouth County and encompasses two conjoined buildings. The boat club falls under the governance of the New Jersey State Uniform Construction Code Act.

Constructed in 1895, the Monmouth Boat Club is the last surviving 19th-century building on the waterfront in Red Bank (NPS 1993). The original structure is a wood-frame building sheathed in hand-split cedar shingles in the Shingle style (Figure 6-6). A 1930 third-story addition exhibits more of a Colonial Revival style influence. The building is supported on five rows of pilings driven into the ground.

Of the two conjoined buildings, one is original to the site and one was moved to the site. The exterior is clad in unpainted cedar shingles with wood-frame double-hung windows and exterior doors. The heart pine strip flooring is nailed directly to the wood floor joists.

Severity of Flooding and Damage to Facility. The Monmouth Boat Club building (Figure 6-7) was inundated by storm surge and high tides, and the MAT observed HWMs at approximately 74 inches above the first floor. The building's heating and electrical systems, located below the BFE, were destroyed. In addition to flood damage to the building, the slate roof on the original building sustained minor wind damage. Some windows were damaged by either wind or wind-borne debris.

Recovery Actions. Repairs that the MAT observed to have been completed at the time of the site visit included replacement of the damaged finishes and elevation of electrical and heating equipment.

Figure 6-6:
Monmouth Boat Club's three tiers of porches overlooking the Navesink River; note exposed location on the water (Red Bank, NJ)

Figure 6-7:
Toilet room floor and subfloor had been removed prior to the MAT visit (indicated by red arrows); the river water (blue arrow) and foundation (yellow arrow) are visible below (Red Bank, NJ)

6.4 Ocean Grove Auditorium (Ocean Grove, NJ)

Facility Description. The Ocean Grove Auditorium is located in Ocean Grove, NJ, in Monmouth County three blocks west of the Atlantic Ocean and one block south of Wesley Lake. The auditorium falls under the governance of the New Jersey State Uniform Construction Code Act.

The Ocean Grove Auditorium was constructed in 1894 and is a contributing resource to the Ocean Grove Camp Meeting Association Historic District. The auditorium is a variant of the Ruskinian Gothic style (NPS 1975b). The design of the auditorium is notable for its application of 19th-century acoustical science and an innovative ventilation system that channels sea breezes through the floor and out the roof via circular ducts.

Severity of Flooding and Damage to Facility. Although the MAT observed no flood damage to the auditorium, they did observe notable wind damage. A reported 89 mph wind gust uplifted a 4,000-square-foot section of the auditorium's roof, which consisted of plywood sheathing underlayment, wood furring, and a stainless steel metal roof finish. The roof had recently been replaced in 2007. The removed roofing section composed approximately 20 percent of the entire roof. Emergency measures were taken to temporarily cover the roof to protect the interior of the auditorium. Photographs provided by the Ocean Grove Camp Meeting Association show that roof framing members, a few windows, and plywood decking were also damaged (Figure 6-8).

Recovery Actions. Repairs were underway at the time of the MAT visit, including re-roofing of damaged sections and hardening of the roof's structural members.

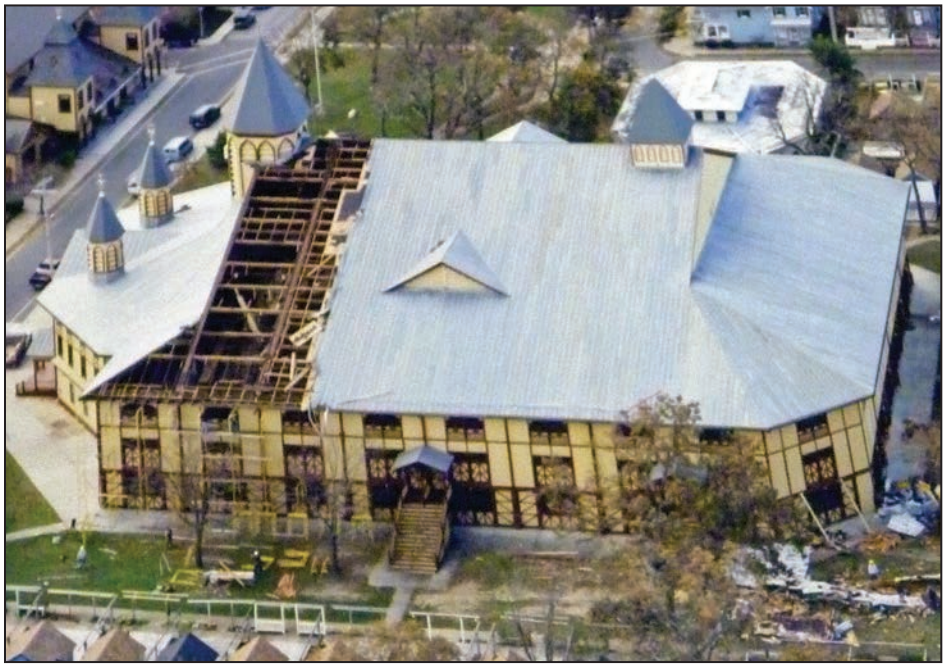

Figure 6-8: Aerial view of the wind-damaged and exposed roof of the Ocean Grove Auditorium (Ocean Grove, NJ)

SOURCE: OCEAN GROVE CAMP MEETING ASSOCIATION

6.5 Statue of Liberty National Monument (New York Harbor)

The Statue of Liberty National Monument includes Liberty Island, with the Statue of Liberty and Ellis Island, which are located in New York Harbor.

6.5.1 Ellis Island

Facility Description. Ellis Island is in New York Harbor close to Liberty State Park, NJ. Ellis Island consists of three islands, but is effectively one island because the areas between the islands have been filled in. Ellis Island is within the territorial jurisdiction of both New York State and New Jersey; the main building, which houses the Ellis Island Immigration Museum, is in New York State (NPS 2013a). There are 32 buildings on Ellis Island.

The 32 buildings were constructed of brick and stucco circa 1890 to 1930 and are distributed across Ellis Island. The buildings that date to the earlier phase of construction (late 19th to early 20th centuries) are masonry in the Beaux Arts style, and buildings dating to the last phase of construction (mid-1930s) are masonry structures in the Art Moderne style (New York City Landmarks Preservation Commission 1993). These facilities pre-date the NFIP, and many have their first floors below the BFE. Restoration and stabilization work has been ongoing since the National Park Service acquired the island in 1965.

Severity of Flooding and Damage to Facility. The storm brought water levels to approximately 11 feet at Ellis Island, destroying boilers and electrical systems below the flood level (Table 5 from NHC 2013b). The National Park Service closed Ellis Island in the aftermath of Hurricane Sandy. The main building of the Ellis Island Immigration Museum suffered significant damage to its infrastructure, mechanical systems, and fire suppression systems. There was also standing water in the basement of the building, where the concessioner's supplies are stored. Doors and windows in the Ferry Building were severely damaged, as were exhibits in the building (Figure 6-9).

Although the museum collection sustained little damage, maintaining a climate-controlled environment in the aftermath of the storm became extremely difficult because of the power loss. As a result, more than 1 million historical artifacts and documents from the Ellis Island Immigration Museum had to be relocated to storage facilities. Ellis Island was partially reopened to the public on October 28, 2013, but some buildings will remain closed until at least 2014.

6.5.2 Liberty Island

Facility Description. Liberty Island is in the New York Harbor opposite Liberty State Park, New Jersey (Figure 6-10). Once known as Bedloe's Island, Liberty Island was officially renamed in 1956. The island, along with the rest of the monument, is owned by the Federal Government and under the administration of the National Park Service.

Construction of the statue was completed in France in 1884, and the statue was shipped to the United States for reassembly and installation (NPS 1980). The statue was designated as a National Monument in 1924. Fort Wood on Liberty Island was chosen as the site for the statue because of its prominent harbor location and robust construction. Built in 1811, Fort Wood is an 11-point-star shaped fort with 24-foot-high, 30-foot-thick stone walls. The statue underwent restoration work from

Figure 6-9: Ferry Building on Ellis Island with boarded-up front doors because of damage from the hurricane (New York Harbor)

Figure 6-10: Aerial photograph showing key facilities on Liberty Island (New York Harbor)
SOURCE: GOOGLE EARTH

1984 to 1986. During the renovation, iron structural elements were replaced with steel, and a new torch was constructed (NPS 2013b).

Severity of Flooding and Damage to Facility. The Statue of Liberty itself did not receive any damage from the storm. The statue's 126-year-old, sturdy iron framework allowed it to withstand the storm's winds. However, when Hurricane Sandy hit, Liberty Island was overwhelmed with stormwater that reached approximately 11 feet. Several ancillary buildings on the north end of Liberty Island were destroyed, including storage garages, staff offices, the park police barracks, and the superintendent's house. All of the island's utilities, backup generator, and power systems were destroyed by water that was more than 5 feet deep in some parts of the 12-acre area. Additionally, the island's passenger and auxiliary docks were severely damaged.

Moderate damage was observed in all areas of a brick promenade that was built for foot traffic around Liberty Island and extends east, south, and west of the statue; large areas of paving were washed out. Stone copings and ornamental steel guardrails associated with a low stone wall that follows the edge of the island suffered moderate damage because of their exposure to the elements. Below-grade electrical floodlighting for the statue, installed in 1986, was inundated and damaged beyond repair (Figure 6-11). Liberty Island was reopened to the public on July 4, 2013.

Figure 6-11: Temporary lighting at the Statue of Liberty, installed because of damage to below-grade fixtures (New York Harbor)

6.6 Jacob Riis Park (Queens, NY)

Facility Description. Jacob Riis Park Historic District is on the Rockaway Peninsula in Queens, NY, on Jamaica Bay (Figure 6-12). The historic district comprises three main buildings: a bathing pavilion, two central mall buildings, and several miscellaneous buildings (e.g., the First Aid building). The park is part of the Gateway National Recreation Area and is under the care of the National Park Service. Although it is located in a borough of New York City, the park is a federally owned property and subject to Federal codes and regulations.

Figure 6-12: Jacob Riis Park (Queens, NY)
SOURCE: GOOGLE EARTH

Jacob Riis Park was constructed between 1932 and 1937 (NPS 1975a), which pre-dates the NFIP. These buildings were constructed of unreinforced masonry block with a brick façade. The bathing pavilion (i.e., bathhouse) is an Art Deco masonry structure that includes bathing facilities, concessions, and refreshment bars on the first floor and a sun deck and chair rental on the second floor (Figure 6-13). The eastern-central mall building houses a cafeteria, and the western building houses offices, restrooms, and a small bathhouse. Renovation on the buildings began in the 1990s, but was never completed because of lack of funding (Foderaro 2012).

Severity of Flooding and Damage to Facility. Water rose to approximately 11 feet in the historic district of Jacob Riis Park during the storm (Table 5 of NHC 2013b). The hydrostatic and hydrologic forces generated by combined effects of the inundation, repeat wave action, and sand deposition affected shoreline park buildings, building systems, roads, boardwalks, parking lots, fences, walls, and benches, causing significant structural damage because the buildings were sited so close to the coastline. Utilities were located on the first floor of the bathhouse and were destroyed, and flood forces were strong enough to demolish sections of unreinforced masonry and brick walls (Figures 6-14 and 6-15). Additionally, wide swaths of the park's beach were severely eroded from the storm surge.

Figure 6-13:
Jacob Riis bathhouse (Queens, NY)

Figure 6-14:
Flood forces destroyed masonry and brick walls; utilities located below the BFE were inundated (Queens, NY)

The combination of inundation and wave action resulted in extensive damage to lower-level openings, both windows and doors, and also caused extensive damage to the interior of the building and its contents (Figure 6-16). The Police and First Aid buildings, also located in the historic district, sustained similar damage (Figure 6-17). Sand blanketed acres of Riis Park, and waves toppled part of a brick garden wall behind the historic Art Deco bathhouse.

Figure 6-15:
Cross-section of a damaged exterior wall (Queens, NY)

Figure 6-16: Windows, walls, and doors on the Jacob Riis bathhouse destroyed by storm surge and wave action; the original windows were replaced in the 1990s during a restoration project (Queens, NY)

Figure 6-17:
Solid brick walls at the Jacob Riis First Aid building destroyed by storm surge and wave action (Queens, NY)

6.7 South Street Seaport Historic District (Manhattan, NY)

Facility Description. The South Street Seaport Historic District is located along the eastern waterfront of the East River in Manhattan, NY, and includes portions of Beekman Street, Dover Street, Front Street, Fulton Street, John Street, Pearl Street, Peck Slip, South Street, and Water Street (Figure 6-18). The historic district is under the jurisdiction of New York City and subject to the City's building codes and regulations.

Although the buildings in the district span a construction period of almost 200 years, the majority of structures date to the first half of the 19th century and pre-date the NFIP. The buildings comprise a mix of commercial and residential structures and encompass a variety of architectural styles indicative of the early commercial development of New York City (New York City Landmarks Preservation Commission 1977). The buildings are primarily constructed with brick or brownstone and have basements and first floors below the BFE; therefore, many of the MEP systems for these buildings were below the BFE. Many of the historic properties in this section of Lower Manhattan have been converted to retail shops, restaurants, and offices.

Severity of Flooding and Damage to Facility. Located in Zone AE along the East River at the southern tip of Manhattan Island, some areas of the South Street Seaport Historic District received 5 to 8 feet of flooding as stormwater reached approximately 11 feet (Table 5 of NHC 2013b). At the historic waterfront along the banks of the East River, seven historic ships at the South Street Seaport Museum rode out the storm without damage. Farther inland, commercial tenants who remained during the storm observed a "river of water" rising and flowing through the streets. First floor and

Figure 6-18: Map of the sites visited in the South Street Seaport Historic District in Manhattan, NY

basement flooding was widespread. At the South Street Seaport Museum, water surged to 6 feet at the lobby entrance, destroying the building's electrical systems, cafe, and gift shop. A HWM above 6 feet was observed at a building addressed as 24 Peck Slip, which is approximately one block inland from the waterfront. As is evident throughout affected areas of Lower Manhattan, first floor and basement flooding was the most typical cause of damage. For example, a HWM was visible on a brick wall inside Meade's Restaurant at 22 Peck Slip (Figure 6-19). Repairs at the South Street Seaport Museum were underway at the time of the MAT visit.

Figure 6-19:
HWM (red dashed line) identified in Meade's Restaurant in the South Street Seaport Historic District (Manhattan, NY)