RESILIENCE CAPITAL NEEDS ASSESSMENT

334 E. 8th Street, New York, New York

Owner: LESPMHA
Report Date: 12/30/2013
Site Visit Date: 12/03/2013
Inspection Team: Paul Grosser, Ph.D., P.E. and Jenny Lund, I.E., LEED GA
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1.0 OBJECTIVE

The purpose of this assessment is to recommend capital upgrades which will strengthen the resiliency of the facility and its ability to stay operational after or quickly recover from a variety of anticipated extreme storm event impacts. Recommended capital upgrades will increase the short-term and long-term resilience of the facility and reduce the cost of repair and replacement.

This report is intended to be used by executive staff of the Lower East Side People’s Mutual Housing Association (LESPMHA) multi-family housing organization to evaluate their upgrades over the short-term and long-term and to assist them in prioritizing expenditures and funding requests.

2.0 EXECUTIVE SUMMARY

The subject property (334 E. 8th Street, New York, NY) experienced severe flooding and loss of services as a result of Superstorm Sandy. A team inspected the building’s key systems in an effort to determine the need for and the practicality of relocating components to avoid or minimize disruption by future severe storm events.

A cost estimate has been prepared incorporating estimated low and high costs of each of the recommended items and the items have been prioritized for immediate, mid-term, and long-term repair or replacement. The recommendations listed as immediate, require repair, correction or action as soon as reasonably possible and preferably within three months. Immediate recommendations indicate deficiencies that are in violation of codes, which pose a danger to public safety, or which, if not corrected, will lead to further deterioration of the property.

Mid-term recommendations are activities that will allow the properties executive staff to plan and estimate long-term equipment upgrades or relocation costs. Long-term measures are items that will strengthen the buildings ability to be resilient over the life of the building, given specific impacts to the building’s mechanical and electrical equipment that are located below the base flood elevation.

The following table summarizes the immediate, mid-term, and long-term measures identified as part of our evaluation.
## IMMEDIATE MEASURES

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>MEASURE ID</th>
<th>LOW</th>
<th>HIGH</th>
<th>SCOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor Drains (Base Option)</td>
<td>I1</td>
<td>$2,400</td>
<td>$3,200</td>
<td>Permanently seal any floor drains/penetrations that are no longer in use and purchase removable plugs to plug remaining floor drains during a storm.</td>
</tr>
<tr>
<td>Floor Drains (Alternate Option)</td>
<td>I1</td>
<td>$22,000</td>
<td>$29,000</td>
<td>Permanently seal any floor drains or penetrations that are no longer in use and install plug valves and valve boxes on remaining floor drains for use during a storm event.</td>
</tr>
<tr>
<td>Emergency and Exit Lighting</td>
<td>I2</td>
<td>$6,000</td>
<td>$8,000</td>
<td>Install emergency lighting and an exit lighting sign with back-up battery power to ensure a safe evacuation of the building in a power loss event.</td>
</tr>
</tbody>
</table>

**Total Immediate Measures (Base Option)** $8,400 $11,200

**Total Immediate Measures (Alternate Option)** $28,000 $37,000

## MID-TERM MEASURES

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>MEASURE ID</th>
<th>LOW</th>
<th>HIGH</th>
<th>SCOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Address System (PA System)</td>
<td>M1</td>
<td>$19,000</td>
<td>$25,000</td>
<td>Install an intercom system throughout the building that communicates information and updates to occupants in the event of an emergency.</td>
</tr>
<tr>
<td>Back-up Power System Analysis</td>
<td>M2</td>
<td>$5,000</td>
<td>$7,000</td>
<td>Perform an analysis of the electric load for the building in order to correctly size a back-up power system/generator.</td>
</tr>
<tr>
<td>Building Structural Analysis</td>
<td>M3</td>
<td>$5,000</td>
<td>$8,000</td>
<td>Perform an analysis of the building’s roof structural system in order to determine if the back-up power system can be relocated to the roof.</td>
</tr>
</tbody>
</table>

**Total Mid-Term Measures** $29,000 $40,000
## LONG TERM MEASURES

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>MEASURE ID</th>
<th>LOW</th>
<th>HIGH</th>
<th>SCOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. 8th Street Building Modifications</td>
<td>L1</td>
<td>$34,500</td>
<td>$46,000</td>
<td>Retrofit building door and utility penetrations along the front of the building to utilize removable flood barriers.</td>
</tr>
<tr>
<td>Rear Building Modification (Base Option)</td>
<td>L2</td>
<td>$18,000</td>
<td>$24,000</td>
<td>Install demountable flood control barrier across the width of the basement doors to prevent water from entering the basement through the rear of the building.</td>
</tr>
<tr>
<td>Rear Building Modification (Alternate Option)</td>
<td>L2</td>
<td>$32,000</td>
<td>$42,000</td>
<td>Retrofit the basement doors to utilize pedestrian flood doors.</td>
</tr>
<tr>
<td>Encapsulate Utility Rooms</td>
<td>L3</td>
<td>$51,000</td>
<td>$68,800</td>
<td>Perform an analysis of the basement walls and foundation. Install flood doors in place of existing doors in the critical utility rooms (including the boiler room, electrical room, and elevator equipment room).</td>
</tr>
<tr>
<td>Back-Up Power System (Base Option)</td>
<td>L4</td>
<td>$9,000</td>
<td>$12,000</td>
<td>Install a manual transfer switch to allow for the connection of a rented backup power supply system/generator.</td>
</tr>
<tr>
<td>Back-Up Power System (Alternate Option)</td>
<td>L4</td>
<td>$67,500</td>
<td>$90,000</td>
<td>Install a permanent natural gas generator and associated appurtenances to supply back-up power in the event of a power outage.</td>
</tr>
<tr>
<td>Sewage Bypass System</td>
<td>L5</td>
<td>$62,000</td>
<td>$83,000</td>
<td>Install a bypass pump system on the sanitary sewer lines in order to prevent sanitary sewage from backing up into the building during a storm event.</td>
</tr>
<tr>
<td>Total Long-Term Measures (Base Option)</td>
<td></td>
<td>$174,500</td>
<td>$233,800</td>
<td></td>
</tr>
<tr>
<td>Total Long-Term Measures (Alternate Option)</td>
<td></td>
<td>$247,000</td>
<td>$329,800</td>
<td></td>
</tr>
</tbody>
</table>
3.0 GENERAL DESCRIPTION

3.1 General Description

The property is developed with one (1) 6-story residential building with a basement and passenger elevator and a handicap lift elevator. The subject property is a rectangular-shaped site with one (1) rectangular shaped building and no on-site parking. The majority of the subject property is occupied by the building and a backyard area. The property is located on the south side of E. 8th Street between Avenue B and Avenue C in the East Village section of New York, New York.

Figure 1: Site Aerial

The property is designated to provide long term, affordable housing for low and moderate income individuals and families. LESPHMA’s residents are made up of a large cultural and ethnically mixed
group of people and the organization provides in-house services such as housing development, real estate management, organization membership services and social services in some of their facilities. Due to the varying nationality of the occupants, there is the potential for some occupants to not understand English, which may pose additional challenges in case of the event of an emergency.

| STREET ADDRESS | 334 E. 8th Street |
| CITY, STATE | New York, New York |
| ZIP CODE | 10009 |
| OCCUPANCY | Elevator Apartment Semi-Fireproof (w/o Stores) (D1) |
| YEAR BUILT | 1900 (Approximate) |
| YEAR OF MOST SUBSTNTIAL REHAB | 1994 |
| TYPE OF FUEL USED | Natural Gas |
| BASEMENT SQUARE FEET | 4,872 Square Feet (Approximate) |
| COMMERCIAL SQUARE FEET | 0 Square Feet |
| RESIDENTIAL SQUARE FEET | 29,232 Square Feet |
| TOTAL BUILDING SQUARE FEET | 34,104 Square Feet |
| FOOTPRINT OF BUILDING (SQUARE FEET) | 5,655 Square Feet (Approximate) |
| # OF HABITABLE FLOORS | 6 Floors |
| TOTAL UNIT COUNT | 30 |
| -STUDIO | 7 |
| -1 BEDROOM | 6 |
| -2 BEDROOM | 12 |
| -3 BEDROOM | 5 |
| -4 BEDROOM | 0 |
| BLOCK | 00390 |
| LOT | 0024 |
| LOT AREA | 0.15 Acres |
| ZONING DESIGNATION | R8B |
| EXTERIOR WALL CONSTRUCTION | Brick |
| FOUNDATION | Concrete Masonry Units, Brick, and Stone |
| ROOF CONSTRUCTION | Insulation, Roof Membrane, Tar |
| BASEMENT HEIGHT | 8 Feet (Average) |
| FULL BASEMENT | Yes |
| NUMBER OF LIVING UNITS IN BASEMENT | Zero (0) |
| STORAGE IN BASEMENT | Yes |
| FIRST FLOOR HEIGHT | 10 Feet (Approximate) |
| APARTMENTS ON FIRST FLOOR | One (1) |
| FRONT YARD SQUARE FEET | 0 Square Feet |
| SIDE YARD SQUARE FEET | 0 Square Feet |
| BACK YARD SQUARE FEET | 683 Square Feet (Approximate) |
3.2 General Physical Condition

Generally, the property was constructed within industry standards, and has been adequately maintained since construction and appeared to be in a good overall condition. Major capital improvements have been reported since the original construction. It was reported that substantial rehab took place in 1994, however the scope of the work performed was not reported.

3.3 Regulatory Compliance Review

Review of the New York City on-line DOB records indicate that there is one (1) open DOB violation for the subject property at 218 E. 7th Street, New York, NY. The violation type is “Unsafe Local Law 11/98 – Façade.”

Review of the New York City on-line Housing Prevention and Development (HPD) records indicate that there are no open violations for the subject property.

It is recommended that the open DOB violation be addressed and closed immediately.

3.4 Interview Summary

The property management staff was interviewed for specific information relating to physical property aspects, the events during Superstorm Sandy, and the infrastructure repairs after Superstorm Sandy. While conducting the site inspection and follow-up telephone calls, the following property management personnel were interviewed:

<table>
<thead>
<tr>
<th>NAME &amp; TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Manager – Sam Peng</td>
</tr>
<tr>
<td>Building Superintendent – Roberto Figueroa</td>
</tr>
</tbody>
</table>

Information the facilities personnel provided has been deemed to be accurate based on subsequent site observations. The named property management personnel were cooperative and the on-site contacts were knowledgeable about the subject property. It should be noted that the property manager was not employed by LESPMHA during the storm event (the building superintendent was employed during the storm event).
4.0 SUPERSTORM SANDY IMPACTS AND RESPONSES

4.1 General

It was reported by building staff that the subject property saw the effects of Superstorm Sandy on October 28, 2012 and October 29, 2012 as early as 8pm, with flooding resulting from only one of the tidal cycles. The building staff stated that the flood water started receding by morning, however it took approximately 3 to 4 days for the water to completely recede from the basement. The building was not equipped with a back-up power system, nor were there any generators available for rental following the storm.

The general impacts at the subject property due to Superstorm Sandy are as follows:

- Water intrusion from the East River along E. 8th Street and the Franklin D. Roosevelt East River Drive which was observed to be approximately 4 feet deep on E. 8th Street and approximately 5 feet deep in the basement.
  - According to the building staff, the water entered primarily from E. 8th Street through the sidewalk and utility hatches along the front of the building, through the basement floor drains, and through the rear basement doors and windows.
  - The front door is located at sidewalk level causing floodwater to flood through the front door into the entrance lobby. The building supervisor reported that approximately 18 inches of water was noted in the entrance lobby during the storm. The first floor elevation is approximately 5 feet higher than the entrance lobby therefore water did not reach the first floor, however water flooded from the entrance lobby into the handicap lift elevator shaft. According to the building supervisor, if water did not flood into the elevator shaft, the height of the water in the entrance lobby would have been much higher.
  - Water flooded up through the floor drains (approximately six (6)) and area drains in the basement and concrete courtyard areas. Flood water also entered the basement thorough the sidewalk and utility hatches along the front of the building (the sidewalk hatch is used to access the Verizon terminal room in the basement).
  - The rear of the building has a concrete courtyard located at basement level. The courtyard is a low point compared to the adjacent properties which caused floodwater to flow directly onto the subject property during the storm. There are two (2) basement doors used to access the basement from the courtyard area that permitted water to enter the basement from the rear of the building.
According to the building staff, the basement and entrance lobby was the only location where water was present.

The water caused damage to the utilities located in the basement, such as in the boiler room, electrical room, water meter room, and elevator equipment room.

There was minimal damage done to exterior of the building as a result of flooding.

- Water flooded into all parts of the basement and into the two (2) air shafts located on the interior of the building. The air shafts are equipped with area drains which also flooded during the storm.
- The building has an east and west stormwater line and sanitary line connecting to the municipal combined sanitary system.
  - Each stormwater line is equipped with two (2) sump pumps, however during the storm the sump pumps were not operative due to the lack of power.
  - The building is not equipped with ejector pumps and consequently during the storm sanitary sewer connections became pressurized and forced the sanitary caps off the sanitary lines backing up into the basement.
- There is a community room located in the basement of the building which flooded during the storm. Within the community room is a small kitchen area and all the kitchen cabinets were damaged due to the floodwater.
- The supply room in the basement is equipped with a trash compactor, which was damaged during the storm. The compactor has yet to be repaired.
  - All supplies stored in the storage area were damaged during the storm, including but not limited to, snow blowers, tools, cleaning supplies, and furniture.
  - Three (3) Well-X-Trol pressurized water tanks located in the storage room became displaced during the storm and broke from it’s piping.
- The building tenants have access to the basement where a laundry room is located. The laundry room was also flooded during the storm and damaged all of the washers and dryers. The room is currently empty with the exception of a utility sink.
- The elevators were not in service during or after the storm.
  - The elevator equipment for the two (2) elevators is located in the basement of the building (the elevators are hydraulic powered).
All components of the elevators were damaged during the storm.

It was reported by the building supervisor that it took approximately two and a half (2.5) months for the passenger elevator to be repaired and approximately eight and a half (8.5) to nine (9) months for the handicap lift elevator to be replaced.

- The Verizon terminal room located in the basement is used to service the surrounding neighborhood. The room can be accessed via the sidewalk hatch or from within the basement. All of the terminals were damaged or lost during the storm.
- The Consolidated Edison electrical facility is located in the same neighborhood as subject property. The facility was damaged as a result of the storm, affecting the power in the building. The building supervisor reported that the building was without electric for two (2) weeks. The building uses gas for cooking, however it utilizes electric igniters.
- There was no heat or hot water for the whole building for about two and a half (2.5) to three (3) weeks.
- The building had cold water during the entire duration of the storm event.
- The telecommunication services for TV/internet/phone are supplied by Time Warner Cable and by Verizon. The telecommunication services were not functioning after the storm. It was reported that it took approximately eight (8) to nine (9) months for the Verizon telecommunication services to be completely functional, while it took Time Warner Cable two (2) to three (3) weeks to become functional.

### 4.2 Electrical

There is one (1) main electric feed which services the building. All electrical panels, breaker boxes, meters, and switchgear are currently located in the basement.

The main electrical impacts due to Superstorm Sandy are as follows:

- The electrical switchgear, panels, breaker boxes, and elevator panels, which are all located in the basement, were submerged.
- The electrical wiring in the basement was exposed to salt water during the storm event.
- The main electrical feed entering the building had no power to service the building.

### 4.3 Boiler and Hot Water

There is one main boiler room that services the building. There are four (4) gas-fired Caravan Boiler Slant/Fin boilers located in the boiler room, along with boiler control panels and piping. The
boiler room also has two (2) A.O. Smith hot water heaters with 100 Gallon Capacity, two (2) expansion tanks, and two (2) circulator pumps.

The main impacts to the boiler and boiler room due to Superstorm Sandy are as follows:

- The lower portion of the boilers was submerged, including the wiring and switches.
- The piping in the boiler room did not sustain major damage.
- The hot water heater submerged during the storm, however they are still operational.

4.4 Previous Non-Superstorm Sandy Impacts

Prior to Superstorm Sandy impacting the subject property, other storm and weather related events have occurred. They are as follows:

- During Hurricane Irene there was minimal damage, however the sanitary system began to back up into the building.

4.5 Superstorm Sandy Responses to Date

Since Superstorm Sandy various responses, repairs, and improvements have been made to the subject property. As previously mentioned the main portion of the buildings to sustain the most damage was the basement.

The following repairs and improvements have been made to the subject property thus far:

- The basement of the building had to be cleaned of storm residue resulting from Superstorm Sandy. All damaged equipment, cleaning supplies, and furniture has been removed.
- Two (2) of the three (3) gas meters had to be replaced.
- The Well-X-Trol tanks in the storage room had to be remounted and all the piping had to be reconnected.
- The sump pump (four (4) total) and control panels (two (2) total) have been replaced.
- The snow blowers, tools, and cleaning supplies which were stored in the basement have all been replaced.
- All elevator equipment has been replaced, including the motors, control panels, and electrical disconnects.
- All of the electrical meters, panels, and switchboards in the electrical room have been replaced.
- The boilers electrical components were replaced due to saltwater intrusion.
- The hot water heaters have not been replaced, but the building supervisor stated that new ones will be installed.
- Verizon replaced all of the terminals in the Verizon terminal room.

4.6 Total Spending on Superstorm Sandy-Related Infrastructure Repairs

At this time, it was reported by the building management that the repairs related to Superstorm Sandy damage is $107,873. These repairs include the items listed above in Section 4.5 (Superstorm Sandy Responses to Date) which are considered to be major items and also include minor items which may not be included above.
5.0 PROPERTY VULNERABILITIES

5.1 Vulnerabilities Map and Flood Zones

The subject property is in Flood Zone “AE” according to the FEMA New York City Preliminary FIRM (Floor Insurance Rate Map) Data Viewer released on December 05, 2013. The Preliminary FIRMs include preliminary work maps for certain communities which include the full results of the coastal flood study performed by FEMA both before and after Superstorm Sandy hit. Flood Zone “AE” is subject to a 1% annual chance coastal flood occurring in any given year, often referred to as the 100-year storm.

Figure 2 represents the FIRM legend and 3 below represents the current FEMA New York City Preliminary FIRM within the vicinity of the subject property. The subject property has a base flood elevation of 11 feet and it is estimated that the ground floor has a finished floor elevation of approximately 15 feet.
Figure 3: FEMA New York City Preliminary FIRM
5.2 General Vulnerabilities

Although the subject property is susceptible to numerous vulnerabilities, there are primary vulnerabilities which are most likely to occur. The primary vulnerabilities are as follows:

- Flooding
- Power Outage and Power Reduction
- Heavy Rain
- Extreme Heat and Cold

5.3 Vulnerability Checklist

With potential exposures in mind, the building systems that are most vulnerable were ranked given a set of anticipated climate hazards. As mentioned above, the primary exposures include flooding, power outages, heavy rain, and extreme heat and cold. The categories which were chosen were created based on a tool developed by Enterprise Community Partners, Inc. to determine the vulnerability of the site in accordance with the local municipalities FEMA Hazardous Mitigation charting. The checklist is listed below.

<table>
<thead>
<tr>
<th>BUILDING SYSTEM IMPACTED BY IDENTIFIED PRIMARY EXPOSURES</th>
<th>ADEQUATE CONDITIONS</th>
<th>INADEQUATE CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compromised Building Structure</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Indoor Air Quality</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Safety of Egress and ADA Compliance</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Stable Foundation</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Safely Secured Equipment to Walls/Floors/Roof²</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Strengthened Utility Connection to Building</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Flood Resistant Electrical Wiring²</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Flood Resistant Electrical Panels²</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Sufficient Backup Power for All Core Life Safety Equipment³</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>BUILDING SYSTEM IMPACTED BY IDENTIFIED PRIMARY EXPOSURES</td>
<td>ADEQUATE CONDITIONS</td>
<td>INADEQUATE CONDITIONS</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Domestic Hot Water</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Flood Resistant Boiler Systems</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Emergency Lighting</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Flood Resistant Security Panels</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

1 – It was reported by the building staff that equipment located in the basement became displaced by the floodwaters during Superstorm Sandy.

2 – The electrical wiring and panels have not been upgraded since the building renovation and are not currently flood resistant.

3 – In the event of a severe storm and flood, or cause of a power outage, there is currently no backup power on site.

4 – The domestic hot water heaters and boiler are located in the basement below the base flood elevation. If there is a power outage or flood, the boiler may not be operational and domestic hot water may not be available.

5 – At the time of the building assessment, there were no emergency lights noted throughout the building.

6 – At the time of the building assessment, there were no security panels located in the building.

5.4 Evacuation

Due to the nature of the numerous vulnerabilities applicable at the subject property, it may be prudent to evacuate. It is important to evacuate prior to an event occurring (due to the potential for flooding and isolation of the buildings to occur) and heeding local governing officials warning to evacuate. The subject property is located within Zone 1 of New York City’s Office of Emergency Management (OEM) Hurricane Evacuation Map, which would be the first zone to evacuate should an evacuation recommendation or order occur.

Prior to a storm event occurring, it is important to identify potential evacuation modes and routes in case the need to evacuate arises. The primary mode for evacuation would be to use mass/public transportation such as a bus or the subway. This will most likely be the fastest way to reach a safer location or evacuation center and it will also reduce the volume of evacuees on the road.
The closest evacuation center to the subject site is Seward Park High School, located at 350 Grand Street, New York, NY. The primary evacuation route for the subject property is to head south on Avenue C to the M9 Av. C/E 8 St. bus stop. Take the M9 to Essex St/Grand St and walk about 1 minute to the Seward Park High School. In the event that public transportation is not available head northwest on E. 8th Street toward Avenue B, turn left onto Avenue B, then continue onto Clinton Street, and make a right on Grand Street where the evacuation center is located.

In speaking with building manager, it was reported that most of the tenants did not evacuate prior to Superstorm Sandy occurring.

5.5 Implemented Resiliency Legislation

In response to Superstorm Sandy, the New York City Building Resiliency Task Force (BRTF) released thirty three (33) recommendations to safeguard buildings against future risks and natural disasters. Out of the thirty three (33) recommendations, fifteen (15) have been enacted to ensure protection of the water and fuel supply, improvement of sanitation conditions during power outages, prevention of sewage from entering building sites due to flooding, as well as additional emergency plans and measures. Of the fifteen (15) implemented recommendations, ten (10) are applicable to building tasks. They are as follows:

- **BRTF 3 Relocate and Protect Building Systems**
  - Building owners should consider relocating equipment above the flood level and follow best practices when flood proofing. Require fire protection equipment to be raised in new construction and enhance standards for hospitals.

- **BRTF 4 Remove Barriers to Elevating Buildings**
  - Allow building owners to raise telecommunications rooms and to store more fuel about the flood line. Consider allowing zoning relief for buildings elevating to the 500-year flood line.

- **BRTF 5 Remove Barriers to Sidewalk Flood Protection**
  - Allow underground sidewalk attachments for temporary flood barriers. After evacuation, allow nonresidential buildings to maintain a single entrance/exit for emergency personnel so that flood barriers can be installed.

- **BRTF 8 Prevent Sewage Backflow**
  - Require valves on building sewage lines to prevent sewage from entering the building.

- **BRTF 11 Prevent Wind Damage to Existing Buildings**
o Require that equipment and structures added to existing buildings meet the same wind standards in effect for installations on new buildings. Require heavy pavers on rooftops and impact-resistant windows in high wind zones.

- **BRTF 17 Remove Barriers to Backup**
  o Only require buildings over 75 feet to power an elevator with the standby generator, and reduce the minimum requirements for generator size. For emergency generations, increase the allowed startup delay from 10 to 60 seconds, making more options available for generators operated by natural gas.

- **BRTF 20 Add Hookups for Temporary Generators & Boilers**
  o Require some existing health care facilities to install external electrical hookups. Recommend these installations as best practices for other buildings, and recommend external hookups for heating and cooling as well.

- **BRTF 23 Supply Drinking Water Without Power**
  o Require residential buildings to provide drinking water to a common area, supplied directly through pressure in the public water main.

- **BRTF 24 Ensure Toilets & Sinks Work Without Power**
  o Require that toilets and faucets be capable of operating without grid power.

- **BRTF 28 Create Emergency Plans**
  o The city should work with industry experts to develop emergency preparedness information and instructions for apartment residents and homeowners including model emergency operating procedures and a building contact directory.

It is recommended that the building considers upgrading to these passed regulations in order to comply with the NYC Building Resiliency Task Force, as well as increasing building resiliency for the future.
6.0 ASSESSMENT OF KEY BUILDING SYSTEMS

Based upon the property vulnerabilities, the subject property should consider modifying the site accordingly in order to prevent additional damage and failures in the buildings. Although the subject property will still be subject to potential evacuations heeding local governmental warnings, these modifications will protect the property's assets so that after the storm, the building may be reoccupied in a timely fashion with minimal damage.

6.1 Floor and Area Drain Modifications (I1)

The building staff reported that floodwater and stormwater began backing up through floor drains. Floor drains were noted throughout the basement of the building, as well an area drain in the rear concrete courtyard and air shafts.

Base Option: It is recommended that any floor drains or penetrations no longer in use be sealed permanently, as to not allow future back-ups to occur. It is also recommended that removable plugs be purchased in order to plug floor drains still in use during a storm event. This will allow building staff to manually plug the floor drains during a storm event. This may not completely prevent flood water from backing up through the floor drains as the pressure in the storm lines could potentially affect the plugs, but it could potentially minimize the amount of flood water which backs-up.

The anticipated cost range for the base option is between $2,400 and $3,200.

Alternate Option: It is recommended that any floor drains or penetrations no longer in use be sealed permanently, as to not allow future back-ups to occur. It is also recommended that plug valves and valve boxes be installed on the floor drains still in use during the storm. This will allow the building staff to mechanically plug the floor drain piping during a storm event.

The anticipated cost range for the alternate option is between $22,000 and $29,000.
6.2 Emergency and Exit Lighting (I2)

Following Superstorm Sandy it was reported that the building was out of electrical power and during the building assessment it was noted that no emergency lighting or exit lighting signs were available for building occupants. In the event of a power outage, the battery supported emergency lighting would automatically switch on and provide sufficient illumination for building occupant to safely evacuate the building.

The anticipated cost range for the installation of emergency lighting and an emergency exit light would be $6,000 to $8,000.

6.3 Public Address System (PA System) (M1)

During the building inspection, it was noted that there is a buzzer/intercom system that runs to each of the tenant units. However, this system is solely used for tenants to grant access into the building and is not used to relay information throughout the building. It is recommended that a PA system be installed throughout the building that could communicate information to occupants in the event of an emergency. This gives the added safety measure and benefit of updating tenants on events in a quick and timely fashion.

The anticipated cost range for a PA system (including one speaker in each tenant unit and one speaker unit in each hallway) is between $19,000 and $25,000.

6.4 Back-up Power System Analysis (M2)

In the aftermath of Superstorm Sandy it was reported that the building was out of electric power for approximately two (2) weeks. It is recommended that an analysis of the electric load for the building be performed in order to correctly size and locate a back-up power system/generator.

The anticipated cost range for this analysis is between $5,000 and $7,000.

6.5 Building’s Roof Structural Analysis (M3)

In the aftermath of Superstorm Sandy it was reported that the building was out of electric power for approximately two (2) weeks. During the site inspection it was noted that the building has potential for the installation of a back-up power system/generator on the roof. Therefore it is recommended that a structural analysis of the building’s roof be performed in order to determine if the back-up power system (and associated electrical panels and or engine/generator set) can be located on the roof of the building and above flood elevation.
The anticipated cost range for this analysis is between $5,000 and $8,000.

6.6  E. 8th Street Building Modifications (L1)

During Superstorm Sandy there was floodwater infiltration through the building’s front door, Verizon terminal sidewalk hatch, and the utility room access door all along the front of the building on E. 8th Street. In order to prevent future water penetration through these doors and hatches, it is recommended that removable flood barriers be installed on the exterior of the building. The flood barriers will be sealed with gaskets on three (3) sides for door applications and on four (4) sides for utility penetration or hatch applications. The installation of these flood control measures is not to prevent all water from entering the building, but to prevent a majority of the water from entering and creating detrimental effects on the interior of the building.

It is recommended that the following penetrations on E. 8th Street be retrofitted to utilize a removable flood barrier:

- One (1) 80” wide x 30” high utility room access door (a removable flood panel is recommended),
- One (1) 54” wide x 80” high glass door unit system (a removable flood panel approximately 60” high is recommended),
- One (1) 33” wide x 43” high x 70” long Verizon Terminal sidewalk hatch (a sealable sidewalk hatch is recommended).
The anticipated cost range is between $34,500 and $46,000.

6.7 Rear Building Modifications (L2)

During Superstorm Sandy floodwaters entered the subject property's rear courtyard from the adjacent properties and penetrated through the basement doors. The rear courtyard is located at a lower elevation than the surrounding properties making it to be an extremely vulnerable location.
Base Option In order to prevent future water penetration through the doors, it is recommended that removable flood barriers be installed on the exterior of the building.

It is recommended that the doors leading to the basement from the rear courtyard be retrofitted to utilize a removable flood barrier as follows:

- One (1) 80” high x 36” wide door (a removable flood panel is recommended).

The anticipated cost range for the base option is between $18,000 and $44,000.

Alternate Option: It is recommended that the basement doors be replaced with pedestrian flood doors. These doors are normal use doors which also can act as a flood protection door, the doors just have to be closed and latched to protect the building from flooding.

The anticipated cost range for the alternate option is between $32,000 and $42,000.

6.8 Encapsulate Utility Rooms (L3)

Superstorm Sandy caused the entire boiler room, electrical room, and elevator equipment room to flood leaving the subject property without heat, hot water, and electric for approximately two (2) to three (3) weeks and without an elevator for two and a half (2.5) months. In order to prevent the flooding of these critical rooms, it is recommended that component protection measures be installed. Component protection refers to the implementation of design techniques that protect a component or group of components from flood damage when they are located below the base flood elevation. For the utility rooms, this would include the installation of an 8 inch concrete step with a watertight or flood door. This would allow the door to be sealed and prevent the penetration of water into the boiler room, electrical room, and elevator equipment room and assist in protecting their critical components.
Prior to the doors being purchased an analysis should be performed to determine the structural integrity of the basement and foundation walls. The anticipated cost of the analysis is between $3,000 and $5,000.

The anticipated cost range for the flood doors is between $48,000 and $63,800.

6.9 Back-up Power Source (L4)

Although LESPMHA has purchased three (3) generators, 1.5 H.P each, there are more than three (3) property sites that may require back-up power in the event of an emergency. Therefore, it is not guaranteed that the subject property will have an adequate back-up power source. Based on the back-up power source analysis it is recommended that either arrangements for a portable back-up power system and required connections or a back-up power system/generator be purchased and installed on the subject property. This will ensure that the buildings most critical loads will have back-up power in the event of a power outage for life-safety purposes.

Base Option: it is recommended that manual transfer switch and required electrical components be installed in order to support a back-up power system/generator. This will allow the subject property to rent a portable back-up power system/generator in case of an emergency or power outage without having to purchase a back-up power system/generator (with a 50kW output).

The anticipated cost range for the base option is between $9,000 and $12,000. Cost includes the manual transfer switch and does not include the cost to rent a portable back-up power system.

Alternate Option: It is recommended that electrical switchboards and an Automatic Transfer Switch (ATS) be installed in order to support a back-up power system/generator. It is also recommended that the subject property purchase a generator to remain on the property at all times. This will ensure that during a power outage the facility will still have power and not be concerned with renting a back-up power system/generator.
The anticipated cost range for the alternate option is between $67,500 and $90,000. Cost includes a natural gas/diesel generator engine (50 kW), battery, charger, muffler, and transfer switch (price is contingent upon back-up power system analysis).

6.10 Sewage Bypass Pump (L5)

The building staff reported that during Superstorm Sandy and occasionally during heavy rainfall events, the sanitary sewer system begins to back-up. The building’s current sewer system is a gravity fed system with two (2) connections into the municipal combined sewer system. During flood or heavy rainfall events, the municipal combined sewer system becomes surcharged and prevents any additional flow (such as the flow from the subject property) from entering into the system. In instances such as this, the flow from the buildings may begin to back up into the building.

It is recommended that a sewage bypass pump, grinder pump, and check valve be installed on the each of the sewer line inside the building. This will allow the flow to be pumped out of the building and directly into the municipal combined sewer system.

The anticipated cost range for the sewage bypass pump/system is between $62,000 and $83,000.
### 7.0 EQUIPMENT INVENTORY

The following is a general list of building mechanical and electrical equipment. The items that are applicable to the subject property are denoted.

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<tr>
<th>EQUIPMENT</th>
<th>LOCATION</th>
<th>MFR.</th>
<th>MODEL</th>
<th>QUAN.</th>
<th>VOLT./PHASES</th>
<th>BACKUP UNITS</th>
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</table>

The above equipment inventory is a list compiling the various pieces of equipment in the building required for complete building operation, including critical and non-critical items (it should be noted that individual apartments were not observed during the assessment). In the event of an emergency, not all of the buildings equipment will need to be operational in order for the building to still function adequately. Therefore it is recommended that the building management and superintendent have spare parts and equipment at the facility which could aid in restoring the building’s critical equipment.
in a timely manner. It is recommended that these spare parts and equipment be stored in an area above the potential flood areas (such as on the second floor or higher). Below is a list of the critical building equipment:

- Furnace Equipment, such as the burners (the boilers do not have blowers),
- Electrical Service Breakers (if located below base flood elevation),
- Water pump motors and switches,
- Sump pump motors,
- Compactor motor.
8.0 CONCLUSION

The subject property has many vulnerable areas due to the potential for flood waters to inundate the site as seen by the Superstorm Sandy. Although a flood event may not occur very often, the potential effects that could be created by this event could be catastrophic to the subject property. Therefore it is recommended that the subject property take preventative measures in order to reduce such risks and to ensure the safety of the buildings staff and residents.

Although not all of these preventative measures need to be put into effect, the major actions recommended to increase the resiliency of the subject property is as follows:

- Installation of plugs or check-valves on the floor drains to prevent floodwater from backing up into the building,
- Installation of emergency lighting and a public address (PA) system to increase occupant safety in the event of an emergency,
- E. 8th Street and rear building modifications to prevent floodwater from entering the building and impacting the critical utilities,
- Back-up power analysis and options to power critical loads in the event of a power outage,
- Installation of flood doors for the boiler room, electrical room, and elevator equipment room,
- Install a sewage bypass system to prevent sanitary sewage from backing up into the building during a storm event.
APPENDIX A – REFERENCES

A.1 Scope and Purpose

A walk-through assessment of the property was completed and the property management and maintenance personnel were interviewed in an attempt to evaluate the physical condition of the various components, and to examine and know damage, opine on hidden or latent defects, and determine the need for immediate and future capital expenditures relating to storm mitigation. This report was prepared referencing the requirements of ASTM E2018-08 "Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process" as modified herein to include an assessment of extreme storm event vulnerability.

If available plans and specifications were reviewed for appropriate design criteria stated on the plans. A detailed analysis of the building components was not performed. Tenant finish requirements and common area maintenance (CAM) charges have not been addressed.

Please be advised that the scope of the field observations work included only a visual examination of readily visible physical components of the property. It is not possible for this office to identify discrepancies that are likely to occur within concealed spaces. No materials testing (e.g., roof cuts, pavement corings, etc.) or field testing (e.g., water testing, etc.) were performed by this office unless specifically authorized and detailed herein.

A.2 Cost Estimating

The opinions of cost presented herein were based on readily available information on the potential cost to install storm mitigation measures. These costs were based on individual vendor quotes, technical conversations with vendors, and costs based on similar projects. These opinions were based on approximate quantities and values, and do not constitute a warranty or guarantee that all item(s) were included. Items not incorporated into the estimated costs were operations costs, such as potential cost to remedy any further damage or unpredictable (aesthetic) upgrades.

It is important to understand that actual costs will vary depending on such factors as contractor expertise, previous contractor commitment, seasonal workload, insurance and bonding, and local labor conditions. These factors may cause wide variations in the actual costs as estimated by different bidders. In view of these limitations, the costs presented herein should be considered “order of magnitude” estimates and used for preliminary budgeting purposes only.
APPENDIX B – PHOTO LOG

View From Roof of Building (Facing North)

View from Roof of Building (Facing West)

View of Rear Concrete Courtyard

View of Rear Concrete Courtyard and Stairs to Adjacent Property

View of Tenant Entrance Lobby

View of Well-X-Trol Tanks in Basement
View of Trash Compactor in Basement

View of Utility Room Hatch (From Inside the Basement)

View of Sump Pumps in Basement

View of Cold Water System in Basement

View of Laundry Room

View of Sanitary Connection
View of Hot Water Heaters In Basement

View of Boiler Room Controls

View of Boilers

View of Electrical Room

View of Verizon Terminal Room

View of Stairs to Verizon Terminal Sidewalk Hatch
APPENDIX C – VICINITY MAP AND VULNERABILITY ASSESSMENT MAPS

In addition to the site aerial located in Section 3.1 and the FEMA New York City Preliminary FIRM Map in Section 5.1 is a subject site vicinity map and a vulnerability assessment map. The vicinity map is an overall map depicting the vicinity of the subject property in relation to the surrounding areas, including political and environmental boundaries.

The vulnerability assessment map is a Geographic Information System (GIS) composite map depicting the most recent FEMA flood zones, the field verified Superstorm Sandy surge boundaries, and the surrounding infrastructure derived from the New York City (NYC) Department of Planning PLUTO (Preliminary Land Use Tax Lot Output) data. The PLUTO data files contains more than seventy (70) fields of data derived and maintained by the city agencies, including information such tax assessments, historic districts, year built, number of units, lot size, etc. The vulnerability assessment map is a compilation of data to depict not only the storm vulnerabilities, but vulnerabilities relating to supporting infrastructure, including but not limited to hospitals, fire departments, electric utilities, communication facilities, and utility companies.
VULNERABILITY ASSESSMENT

334 E. 8th Street
New York, NY

0 0.1 0.2 0.3 0.4 Miles

Subject Site

Surface Elevation Contour (5')
Field Verified Sandy Surge Boundary
Supporting Infrastructure
Hospitals, Sanitariums, Mental Institutions
Infirmary
Health Center, Child Center, Clinic
Assist Care Facility
Utility Company Land and Buildings
Bridges, Tunnels, Highways
Electric Utilities, Gas
Telephone Utilities
Communication Facilities (Other Than Telephone)
Fire Department
Police Department
Effective Flood Data
Shaded X
A
AE
AH
AO
D
 OPEN WATER
V
VE
X

Project: ECP1303
Date: 12/23/2013
Designed by: BB
Drawn by: BB
Approved by: PG

Figure No: 2