Post-Sandy Resiliency in Community District 1

Columbia University GSAPP
Advanced Urban Planning Studio
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1. Executive Summary

During the Fall 2013 semester at Columbia University’s Graduate School of Architecture Planning and Preservation, the advanced urban planning studio was tasked with studying post-Sandy recovery and developing a set of recommendations for Manhattan Community District 1. This report compiles and synthesizes a semester’s work on ways to improve resilience to future disasters in Lower Manhattan. It details nine recommendations for Community Board 1 to better address the needs of the District’s vulnerable populations. It is also a summary of three months of data compilation, interviews, observations and analysis.

The recommendations are as follows:
→ Designate one or more facilities in the District to house resilience planning activities, called Disaster Orientation Logistics Locations (DOLLs)
→ Educate residents with the knowledge and tools to assess their own risks
→ Encourage residents to self-identify and communicate their own needs and vulnerabilities
→ Utilize a sign-out sheet as a practical exercise that reinforces communication and disaster response
→ Rethink communications by encouraging bottom-up processes and low-tech solutions
→ Incorporate larger, institutional and organizational networks
→ Coordinate information sharing within existing community and business groups
→ Create opportunities for collaboration through community roundtables
→ Incorporate resiliency into the existing school-building agenda
2. Introduction

In October 2012, Hurricane Sandy brought all of Lower Manhattan to a standstill but caused disproportionate damage in northwest Tribeca and South Street Seaport. These areas suffered from damaged utilities, incapacitated communications networks, and prolonged disaster recovery. Street-level businesses in these areas were unable to reopen for weeks, months, and even a year later, resulting in the loss of income and the subjection of merchandise and equipment to water damage. Since climate projections indicate that New York City will experience hurricanes with increasing frequency and intensity in the coming decades, it is critical to identify and mitigate vulnerabilities to hurricane impacts—both social and physical—in the District.

Those who struggled most through Hurricane Sandy were the aging populations, particularly in Independence Plaza and Southbridge Towers, as well as the merchants of South Street Seaport and the small businesses of Northwest Tribeca. These areas suffered from damaged utility services and incapacitated communications, which resulted in prolonged recovery. They are also the same groups who do not have the resources to “bounce back” quickly because of their unique needs.

Some residents in Lower Manhattan chose not to evacuate in anticipation of Hurricane Sandy because they felt they had unnecessarily done so for Tropical Storm Irene in 2011. Under the assumption that past experiences affect future decisions, planning for future storms needs to take the psychological aspects of disaster planning as much as the physical hardening/preparation strategies into account. The Irene/Sandy example illustrates how the personal frame of reference (past experience) outweighed the City’s broadcasts and predictions. One Front Street resident describes how she left the neighborhood during Irene but sheltered in place during Sandy in order not to be away from her art studio. She attributes the building’s flooding to an entry door that warped due to flooding during Irene; even though her landlord made extensive preparations for Sandy, the building flooded again throughout the first floor. Although the tenant herself remained dry on the third floor, the decision not to evacuate points to a human tendency that works against the larger agenda of disaster risk reduction. If this tendency is assumed to apply to other populations, particularly vulnerable populations, then it warrants urgent action to mitigate disaster risks.

Because it is possible that residents in Community District 1 will be required to evacuate again, it is critical that the community engage in a conversation about when, why, and how to evacuate, and what rationales and emotions are tied to these evacuation orders. Particular sensitivity and thought needs to be given to income disparities and how they affect evacuation options, as well as how physical needs and dependencies play a role in the decision to stay or go, and the risks associated with each.

This report compiles and analyzes the findings of the urban planning studio. It provides a set of recommendations for Community Board 1 that can improve disaster resilience in the district and explains the studio's process and research methods. Finally, it summarizes the findings and analysis.
3. Background

3.1. Manhattan Community Board 1
Manhattan Community Board 1 (CB1) consists of 50 board members who serve in staggered two-year terms. Community boards have four major responsibilities: to make decisions on zoning and land use, to assess the needs of the neighborhoods, to advise on the City’s capital and expense budgets, and to provide and monitor services in regards to community concerns. Community boards have advisory and advocacy roles in their neighborhoods.

Community Board 1 serves five major, mixed-use sub-districts in Lower Manhattan: Financial district, Seaport / Civic center, Tribeca, Battery Park, and World Trade Center. The nearby Governors, Ellis, and Liberty Islands also fall under the jurisdiction of CB1. The neighborhoods are supported by committees made up of board members. Other committees in CB1 include Planning, Quality of Life, Youth and Education, and the Executive Committee. CB1 also has five board officers and five staff members. CB1 vigilantly monitors service delivery and quality of life ensuring the vibrancy and livability of the district. CB1 also advocates for adequate infrastructure, services, and resources for new and longtime residents and workers.

For this project, Community Board 1 directed the studio with three objectives:

- to identify who the vulnerable populations are and where they are located, which would allow Community Board 1 to better understand the impact on these populations and prepare a better plan in future, similar events
- to investigate how the transient student population—a growing dynamic in the district particularly within the last decade—weathered Sandy as the experience of this population groups is relatively unknown
- to assess impacts and suggest ways to improve recovery and future resilience for small businesses
3.2. Vulnerability

Vulnerability can be defined as a set of prevailing or consequential conditions that adversely affect a community’s ability to prevent, mitigate, prepare for, or respond to hazardous events. Vulnerability needs to be understood in a context that encompasses risk and manageability (Shukla, 2004). Risk refers to the expected or anticipated losses from the impact of a given hazard. In other words, it is a probability of suffering harm or loss, or of meeting danger. Manageability is the degree to which a community can intervene and manage a hazard in order to reduce its potential impact.

\[ RISK = \frac{(Hazard \times Vulnerability)}{Manageability} \]

Vulnerability is typically identified in terms of three temporal elements (Bicknell et al. 2009): system exposure to crises, stresses, or shocks (before the event), inadequate system capacity to cope (during the event), and consequences and attendant risk of slow (or poor) system recovery (after the event).

The physical and systemic characteristics of a locality can affect the extent of vulnerability. Vulnerability typically increases for those living in particularly dangerous locations, like in a hazardous flood zone. Much of Lower Manhattan is located in a floodplain, which makes the area particularly susceptible to floods. Vulnerability also highly affects those living in settlements lacking protective infrastructure. Lower Manhattan has many aging buildings that are not equipped to withstand floods and storm surges. This adds yet another layer of physical vulnerability. This is further exacerbated for those living in poor quality housing around the District.

Vulnerability is not only physical and systemic but also social. Age, health, and gender are characteristics that influence a population’s vulnerability. Young children and older residents are more likely to depend on others to meet their daily needs, and their dependency is increased during times of disaster. The lack of resources for a household or community also increases vulnerability. Access to resources allows expedient recovery after a disaster event. If these resources are scarcely available, it decreases manageability increasing a population’s risk. Finally, access to information is a major component of social vulnerability. Information is crucial in times of disaster; people need to know what is happening, what resources and help are available, when it is safe to return, who they can go to for help, and many other things. When access to information is limited or reduced, it greatly increases a population’s vulnerability.

These aspects of vulnerability were applied for the purposes of the studio. In the context of Community District 1, groups are vulnerable due to their age, health status, and access to information. For example, in regards to access to information, transient students may be unfamiliar with risks in their new living environments hence limiting their knowledge on where they can go to access information. Similarly, older residents may not be as familiar with newer ways to communicate using the most recent technological developments. If certain information is accessible only through these media, then it poses a challenge to communicate essential information to this population group. Another assumption is that health status is correlated with age. Younger children and older residents are likely to have higher dependencies on caretakers and medications. Due to their need for additional assistance, these groups are considered relatively more vulnerable than other populations in Community District 1.
4. Methods & Approach

4.1. Data collection methodology
Preliminary information on Community District 1 was gathered through reports published by the City and by the Community Board in addition to current events and academic literature. These provided the background from which to conduct further analysis. Background and contextual research provided information regarding Sandy’s impact on residents and businesses, and existing recovery and resiliency efforts. A major document that provides substantial information on the Community District and its needs is "Emergency Preparedness: Lessons Learned from Superstorm Sandy" published on January 22, 2013. Other documents that were consulted were PlaNYC’s “A Stronger More Resilient New York” and Community District 1’s annual report. A more detailed list of documents is presented in the report’s bibliography section. It was necessary to see what was already in place in terms of resiliency and recovery so as to avoid duplicating existing measures.

In the subsequent research stages, direct observations and interviews were conducted to gather further information. The studio went on site visits of Tribeca and South Street Seaport where existing businesses were documented including those that had not yet recovered from storm damage. During the site visits, the studio had the opportunity to speak with residents and business owners regarding their personal experience during Sandy. The map below outlines the route taken during the visit to South Street Seaport.

Interviews were conducted with the building management at Southbridge Towers, residents at Gateway Plaza in Battery Park City, staff at the Office of Emergency Management, and administrators at Pace University.

4.2. Studio’s approach
In order to address Community Board 1’s objectives the studio’s initial approach was to use US census data between 2000 and 2010 to identify vulnerable populations. For the aging population, it was determined that district residents over the age of 55 were those to be considered as vulnerable. It would then be appropriate to perform spatial analysis using census data to identify concentrations of residents in this age group with the district. A similar technique could be used for families with children. The studio determined that children were to be those under the age of 14. Finally, small businesses, as a vulnerable group, were to be identified as those with 1 through 9 employees. Nine zip codes make up Lower Manhattan. Given that 75% of the businesses in Lower Manhattan were captured using this 1 through 9-employee benchmark, it would provide a majority of the businesses for study.

Spatial areas of study were determined using FEMA and maps provided by New York City. By layering the Department of Building’s post-Sandy building tag map over FEMA’s flood zone map, the studio was able to observe the extent of building damage in flood-prone areas. The yellow indicators on the map show buildings that suffered from moderate water damage while the red indicators show buildings there suffered more severe damage. There is a cluster of damaged buildings in Tribeca and South Street Seaport. It was from this observation that the studio considered these areas as a primary concern that warranted further analysis.

Using these areas as a starting point, the studio further identified residential complexes in or near these locations. Southbridge Towers was seen to be a major residential complex that was not only located in the area but housed a significant number of aging residents. Independence Plaza was also
identified by Community Board 1 to be a residential complex that could be investigated further.

Finally, given the complexity and limited time frame of the semester, the studio decided not to include detailed recommendations on small businesses. Although some analysis was conducted, it was not substantial to include specific recommendations for small businesses in Lower Manhattan. Work on small businesses is included in the appendix section of this report.

Figure 5 Yellow- and red-tagged buildings in Lower Manhattan (Source: SIRR report, PLUTO)
5. Quantitative Findings

Figure 6 Distribution of residents relative to the flood zone (Source: FEMA ABFEs, PLUTO, 2010 Census)
5.1. The residential population
There are over 61,000 residents living in over 325 residential buildings in Community District 1. According to the Downtown Alliance, a local business improvement district (BID), families constitute the majority of the district’s residents. Additionally, the 2012 Annual Report published by CB1 claims that 39,380 visit the area each day, or 10 million tourists annually. More than 309,500 workers are employed in Lower Manhattan.

Although the district is already contains a large population of residents and visitors, the Community Board expects population to grow. Residential growth has been significant in all of CB1’s neighborhoods. The most dramatic growth has been seen in the Financial District where the number of residents will have increased by 240% in 2013 over the number recorded in the 2000 Census (Manhattan Community District 1, 2013). According to the 2010 U.S. Census, the population of Lower Manhattan grew by over 77% from 34,420 to 61,000 in ten years from 2000. Not surprisingly, CB1 is the fastest growing community district in New York City and growth is expected to continue. Given the significance of the district’s population, it is even more essential to mitigate the vulnerabilities of the population.

5.2. The aging population
Data was gathered from the U.S. Census using census tracts associated with four neighborhoods in Community District 1. Utilizing census tracts as the spatial scale allowed for specificity in locating and identifying the population dynamics of the aging population. The list below shows the census tracts that were used:

<table>
<thead>
<tr>
<th>Financial District</th>
<th>Seaport / Civic Center</th>
<th>Tribeca</th>
<th>Battery Park City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Census Tract 7</td>
<td>Census Tract 15.01</td>
<td>Census Tract 21</td>
<td>Census Tract 317.01 (2000)</td>
</tr>
<tr>
<td>Census Tract 9</td>
<td>Census Tract 29</td>
<td>Census Tract 33</td>
<td>Census Tract 317.02 (2000)</td>
</tr>
<tr>
<td>Census Tract 13</td>
<td>Census Tract 31</td>
<td>Census Tract 39</td>
<td>Census Tract 317.03 (2010)</td>
</tr>
<tr>
<td>Census Tract 15.02</td>
<td></td>
<td></td>
<td>Census Tract 317.04 (2010)</td>
</tr>
</tbody>
</table>

Figure 7 Southbridge Towers, a Mitchell-Lama complex with a high proportion of older residents
The number of aging residents has grown since the 2000 U.S. Census, based on four sub-districts in Community Board 1: the Financial District, Seaport/Civic Center, Tribeca, and Battery Park City. The aging population in 2000 was 6,519 and it grew by over 55% in ten years to 10,122 in 2010. The total population of the four districts grew from 39,539 in 2000 to 65,703 in 2010. This is a growth rate of over 66%. Although the growth rate of the aging population is smaller than the total population, it still demonstrates a significant increase.

Figure 8 shows the total population growth in the four distinct districts while figure 8 illustrates just the aging population.
According to the Figure 9, the majority of the aging population reside in Seaport / Civic Center neighborhood (4380), followed by Tribeca (2860), Battery Park City (1983), and Financial District (899). The growth rate is highest in Battery Park City; the aging population has increased by 145%.

A trend line can be identified using relative percentage changes, as shown in Figure 10. The red trend line in Figure 10 shows the percentage of aging residents relative to the total population, which indicates how the percentage of older residents that make up the total population changed from 2000 to 2010. Comparing the aging population to the total population, though the absolute number of older residents increased as a whole, it actually decreased modestly as a fraction of the total population from 16.5% to 15.5%. The largest relative increase was in Battery Park City (46%) while relative percentage in the Financial District decreased.

The rate of growth of the aging population also varies by age cohort (Figure 11), with the greatest percentage change in the 60-64 years old cohort (+123%).

Finally, there are more elderly women than men living in Community District 1. Figure 12 shows the aging population in the census tracts in the four neighborhoods in 2010 grouped by gender. Only two out of eight age cohorts have more men than women.
Figure 11 Age cohorts of the aging populations by sub-district (Source: US Census, 2000 & 2010)

Figure 12 Aging population by gender and age cohorts, 2010 (Source: US Census)
5.3. Families with children

A major component of the total population growth has been the tremendous growth in Community District 1’s residential population. In 1990, the total population was 25,366 and it grew to 34,420 in 2000 based on New York City Planning and U.S. Census Data. This reflects a 36% change. The greater change, however, occurred within the next 10 years; according to Census data, the population grew to 60,978 in 2010, a 77% increase from 2000. Such a rapid increase creates an enormous strain on the number of school seats in the District as overcrowding becomes a major issue.

The studio concentrated its efforts in focusing on children under the age of 14 since these children are more dependent on their parents/guardians than those that are older making them more vulnerable. In general, these children are associated as students in middle school and below.

The population of children under the age of 14 increased by 52% from 2000 to 2010 in Community District 1 as a whole (Figure 13). The population according to the U.S. Census in 2000 was 3,504 and increased to 5,314 in 2010. The greatest change occurred in the Financial District (+209%), which is consistent with the overall population growth in this sub-district. Battery Park City had the second greatest change (+121%), which shows that not only is the aging population growing in this sub-district but children under 14 as well.

Similar to Figure 10 above, the red line in Figure 13 shows the relative change comparing the number of children under the age of 14 to the total population. Whereas the relative change with the aging population fluctuated among sub-districts, the relative change for children under the age of 14 was more consistent, in all cases an increase of 10% to 30%. The sub-districts Battery Park City and Seaport/Civic Center show the highest rates of relative change, which demonstrates that children represent a higher proportion of residents in these sub-districts than others.

Figure 13 Relative change of the under-14 years population compared to total population, 2000-2010 (Source: US Census, 2000 & 2010)
Figure 14 Distribution of children (under age 14) (Source: 2010 US Census, PLUTO, FEMA ABFEs)
5.4. Transient population (college-aged students)
Despite Community District 1’s relatively small geographic size, there are numerous types of community facilities. These institutions serve residents of all ages, from childhood to senior services, and are located throughout the district.

Community facilities are important to consider as they serve as places where residents can learn, interact, and engage in community issues. Specifically, there are nine colleges and other secondary institutions in CB1. These were used as a starting point to locate the transient population.

<table>
<thead>
<tr>
<th>Colleges and educational institutions &amp; locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Borough of Manhattan Community College (CUNY)</td>
</tr>
<tr>
<td>2. College of Insurance (St. John’s University)</td>
</tr>
<tr>
<td>3. College of New Rochelle – DC 37 Campus</td>
</tr>
<tr>
<td>4. New York Academy of Art</td>
</tr>
<tr>
<td>5. New York Law School</td>
</tr>
<tr>
<td>6. Pace University</td>
</tr>
<tr>
<td>7. St. John’s University – Manhattan Campus</td>
</tr>
<tr>
<td>8. Globe Institute of Technology</td>
</tr>
<tr>
<td>9. New York Career Institute</td>
</tr>
</tbody>
</table>

Finding data for this population group was challenging since the U.S. Census does not have a category for this population group. Instead, the studio relied on enrollment numbers and dorm capacity to infer both the population number and the location of these vulnerable populations.

There are more than 41,000 college students enrolled in nine institutions in Community District. An estimated 2,800 live in student housing, of which 2,411 alone live in Pace housing. The total number of beds was used to infer the number of students living in the dorms. Since the number of beds is relatively low compared to the total number of enrolled students, it was speculated that the majority of students in college and secondary institutions in Community District 1 are commuting students. However, seeing that Pace University has the largest number of beds in the district, the studio concluded that Pace University would be an appropriate institution to contact for details regarding the students’ experience during Sandy.
Figure 15 College and graduate enrollment and dorm capacity (Source: schools’ respective websites)

![Bar Chart: College and Graduate Enrollment and Dorm Capacity]

- Total Number of Students = 41,348
- Total Number of Beds = 2,411

Sources: Respective School Websites

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Figure 16 Pace University (Source: Flickr)

![Image of Pace University]

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6. Qualitative Findings

This section presents summaries for the various interviews that were conducted to obtain experiential data from residents’ experiences during Sandy. Three substantial interviews were undertaken in these locations: Southbridge Towers, Gateway at Battery Park City, and Pace University. Other informal interviews were held during short conversations with residents and business owners in Tribeca and South Street Seaport during site visits. However, due to the limited scope of those conversations, the information obtained through those means provides anecdotal evidence.

Additionally, an interview was completed with New York City’s Office of Emergency Management (OEM). The interview with OEM was primarily about OEM’s programs and evaluation of those programs rather than about OEM’s experience during Sandy. The questions were aimed to determine the effectiveness in communication of OEM’s numerous emergency services.

6.1. Southbridge Towers

At Southbridge Towers, where an estimated 1,500 of the 4,000 residents are older than 55 and a geographic location where evacuation was not mandated, residents largely remained in place during Sandy. Once the power went out, and elevators and water ceased to function, the residents relied on building management and the security team to assist them. Building staff provided updates, helped with medical related needs, and provided extra care to those living alone. There was even a resident, employed by the Visiting Nurse Services of NY, who was able to assist residents until power was restored and the usual VNSNY staff serving Southbridge Towers was able to return to the site.

After the experience of being short-staffed on security during Irene, the management decided to set up an emergency (hurricane) protocol, which proved useful for Sandy. The security team detailed their storm plan days before Sandy made landfall. All security staff was required to stay on premises. In the absence of police, medical personnel, and other administrative help, the security team took responsibility for the safety, health, knowledge, and needs of their residents, including going door to door to check on vulnerable and self-sufficient residents’ alike, dispensing medicine, and disseminating news updates.

In terms of power and utilities, Southbridge management was acutely aware of how locational vulnerabilities and system-wide demands that could cause Con Edison to shut down systems and stop providing power, gas, and steam. Indeed, Con Edison powered down the grid around one hour before the storm made landfall. Southbridge was and is powered by two substations. One of the two substations came back on quickly due to its proximity to the adjacent hospital. These buildings (1-5) powered by that particular substation were back online within 48 hours. Thus buildings 1-5 were without power for 48 hours, while buildings 6-9 lost power from Sunday until the following Saturday. The complex lost steam and hot water as well. Steam and hot water was out till the following Thursday (10-11 days). The towers lost water, as they require a pump for water pressure. Conversely, the townhouses had water the entire time since they were four stories or less. Gas lines worked throughout the entire time.

Based on their experiences with utilities, the management felt that stairwell lighting is a crucial element in planning ahead. For instance, many people were carrying water up and down the stairwell to their apartments that the stairs became slippery. The wet staircases in the dark stairwells were a particularly dangerous situation. Fortunately, Southbridge residents had help from student population, namely from Pace University. These good Samaritans assisted in transporting provisions to residents since the elevators were not functioning.

Although OEM is a great resource for City residents to obtain information and updates during emergency situations, Southbridge Towers did not rely on OEM for information. Rather, Southbridge Towers relied on personal and informal communication networks for information. Various local politicians were instrumental in getting power back and responding to requests. For example, a resident living in Southbridge works in Rep. Silver’s office and became an important information source. The management also had close ties to Con Edison through a resident contact at local political leader office and through that connection they knew when the power was going down.

According to the management and security team, there are a few items that may be worth the investment including: a solar power battery charger for phones, more flashlights on hand, and more water. The complex is looking into improvements including lighting in the stairwells, a generator to run one elevator and the possibility to make its own
steam. The management is more interested in implementing these improvements individually, but the city requires the building to price the engineering for ALL of these items together. Management would like to do the lighting strips as soon as possible to avoid the scenario of dark stairwells and wet staircases.

A year later, residents are still hesitant to share information despite the fact that they were asked to provide it post Sandy. The staff has updated information for about $\frac{1}{2}$ of their residents and continues to push for more complete information.
6.2. Gateway Plaza, Battery Park City

Compared to the experience at Southbridge Towers, Gateway Plaza residents appeared to have a much more fragmented and disorganized emergency response. For example, whereas building management at Southbridge actively communicated with residents, the same did not occur at Gateway. Evacuation notice to Gateway residents was a “no working elevator as of Sunday” notice posted on the Saturday before the storm. Prior to the “note on the elevator”, interviewees relied on TV and Internet for storm updates. In response to the evacuation notice, interviewees never even considered going to Seward Park. They also were under the impression that few residents went to Seward Park. Furthermore, there was no transportation assistance provided to get to Seward Park and because pets are not welcome in the evacuation site, many residents did not wish to abandon their pets. For those that did relocate, building staff did not request information about whereabouts when they left.

Evacuation was primarily determined by the child’s age, options for housing, and pets. Many families with younger children left the District days prior to the storm, when options were available. On the other hand, families with older children and family with pets stayed in place. Family pets were a strong determinant in the decision to evacuate.

The management/staff of Gateway did not set up any communication with the residents. The residents set up their own telephone (cell) chain relying on informal networks. They suggested that a sign-out sheet should be provided so that there would be better communication between the building staff and the residents. Such a sign-out sheet could include the following information: name, apartment number, evacuation location, cell phone number, evacuation location phone number. Additionally, the building management should provide an emergency phone number that could be utilized in a state of emergency.

The interviewees understood that there could not be an official evacuation site in District 1, but stressed the need for an intermediary facility which would help provide steps during and in a mandatory evacuation.

Figure 18 Gateway Plaza (Source: wikimapia)
6.3. College-age students
The studio had the opportunity to speak with Jeff Blaisdell, associate director of the office of housing and residential life at Pace University. From the conversation with Mr. Blaisdell, it was determined that the transient student population at Pace was not as vulnerable as initially expected. In fact, Pace students living in the dorms were very well taken care of.

The residential hall staff started preparing for the storm on Friday, October 26, 2013 when they first learned of Hurricane Sandy’s trajectory towards New York City. The students were informed that in an event of a power loss, they will have to relocate to the dormitory at 1 Pace Plaza. The students were also informed to pack a “to-go” bag and to bring along their Proper Prior Planning Promotes Preparedness handbook, both of which are distributed by the university in an annual basis. On Monday at 6pm, Pace University facilities lost power, however, 1 Pace Plaza was used as a university emergency center. Described as being constructed as a “fortress” by Mr. Blaisdell, 1 Pace Plaza utilized natural gas for backup power, had enough electricity to power at least one elevator at all times, and provided electrical outlets and internet access for communication.

Like Southbridge Towers, there was a designated team that was responsible for the safety of the students. Security personnel were deployed in the residential halls throughout Sandy and many of the staff members spent the nights in their offices to protect the students. The security personnel instituted a resident sign-in and sign-out system and a log book to keep track of students entering and leaving the building. Escorts were available to relocate students to one building to another based on the intensity of the storm and flooding potential. A shuttle bus was used as well to transfer students to Brooklyn, if required.

Pace University also had an ample supply of resources for students to use. The cafeteria at 1 Pace Plaza always maintains a food supply of 7 days, which allowed students to gain access to food and water free of charge. There were generators available for students to charge their phones. Mr. Blaisdell mentioned that as long as students had food, water, and phone services, that was enough to satisfy their current situation.

Communication was also a major help to students. Walkie-talkies were available for staff members to maintain communication and the P.A. system was used, as a low-tech device, to communicate with students. Residential assistants (R.A.’s) were implemented as liaisons between students and staff to transfer information. The university also implemented their greatest efforts to communicate with the parents. It was mentioned that proper communication with parents was very important since there were some cases where parents had misunderstandings of what Pace staff was doing to care for the students. Miscommunication created a more stressful environment that was not conducive to emergency response efforts.

In summary, the transient student population at Pace were not as vulnerable as originally thought but rather their experiences provided great insight for recommendations to be used for other population groups.
6.4. South Street Seaport

Although the seaport appears to consist of many small buildings, it is actually controlled by a few major real estate interests: Howard Hughes Corp. and Durst Organization among other smaller owners. Many buildings owners learned about the storm two to three days prior and prepared their buildings using sandbags, wooden boards, and cardboard boxes. However, water still caused damage in all buildings that it touched, though only abandoned or unprepared buildings experienced structural damage. Marco Pasanella of Pasanella & Son Vintners prepared his building, but because the neighboring building was not prepared, water seeped through from the side of the building where stone meets mortar. Damage may have been compounded by residual damage from Irene (2011), for example, the building at the Fish Market that flooded because the front door was warped - this is the cause attributed by a tenant. As a result of the interconnectivity of neighboring buildings, businesses should be prepared and organized to deal with disasters as a community at the block level, rather than individually.

A significant number of the buildings were yellow tagged, meaning that the building was damaged from Hurricane Sandy. According to the New York City Department of Buildings, yellow-tagged buildings have non structural damages that includes “a compromised electrical system, the loss of basic sanitary facilities due to broken water or sewer pipes, or life safety systems, including but not limited to, fire alarms, sprinklers, standpipes and carbon monoxide and smoke detectors.” Structural damages include “localized structural damage that can make a portion of a building unsafe while other areas remain usable.”

Five buildings in the Seaport were tagged with red placards, signifying that the buildings were deemed unsafe, meaning that “the property is seriously damaged and is unsafe to enter or occupy. A red placard is not an order to demolish.” The studio learned from a Seaport resident that these buildings were abandoned since 2005 when the fish market moved. Therefore, the buildings had not been prepared prior to the storm. It is evident that buildings that were prepared for the storm experienced less damages than those that were not prepared.

Businesses that reopened quickly represent significant owner investment and decision making over a long period of time; owners who relied on disaster relief funding took the better part of a year to reopen or are still trying to resume operations.

Attitudes of business owners varied from taking total responsibility to none at all, including the following: 1) do whatever it takes to have business continuity, 2) to repair and resume operations as is possible, and 3) to make no preparations and expect the City will take action.
6.5. The Office of Emergency Management (OEM)
The New York City Office of Emergency Management (OEM) is responsible for planning, preparing, and distributing information pertaining to various disaster situations to NYC’s large and diverse population. During Sandy, it provided critical information and instructions, but the information was inconsistently received and followed within the community district, especially its evacuation order. Many interviewees stated that they did not follow the evacuation order in order to protect their property, did not have a safe place to go to, or thought they would be safer by sheltering in place, despite it being the City’s policy that evacuations are mandatory to ensure the safety of residents and emergency personnel. As a matter of policy, OEM’s disaster planning assumes compliance with its evacuation orders.

Additionally, OEM’s email broadcasts are not always received. OEM reported during an interview that sometimes subscribers to NotifyNYC, a free OEM program that disseminates emergency-related information to residents who choose to subscribe, may remove themselves if they 1) find the announcements annoying, 2) they are surprised to receive cell phone carrier charges for the notifications, and 3) consider the events unrelated to their geographic location or daily routine. This especially affects the transient population because they are usually not engaged in OEM programs.

OEM does not collect information about individuals who have extensive health care needs, instead, these individuals were often best served by the on-site staff, who knew their individual needs. It is unclear whether there is a conscious effort to communicate to building managers who in turn should be required to communicate that material to residents. For example, the building management at Gateway did not always know which residents evacuated or remained on-site. Building staff at Southbridge Towers went door-to-door to determine who did not evacuate what types of supplies or medical assistance they required. Because OEM emergency preparedness and recovery plans are designed to be used at the City-wide scale and do not account for individual building or community-specific concerns and vulnerabilities, residents and businesses were not provided specific information regarding the availability of water, location of utilities, and area infrastructure.

Finally, OEM’s Community Emergency Response Team (CERT) did not function as had been hoped. As mentioned previously, in Southbridge Towers, the CERT team was not physically capable of delivering water and resources to residents on the top floors, which was instead carried out by Pace students. Although it is important to acknowledge that CERT team members cannot be at every place all the time, the important point here is that informal networks of trust and assistance cannot be ignored. Formally, CERT has the designated function of serving people during times of an emergency, but there are also informal networks that OEM can collaborate with to provide greater assistance and mitigate the vulnerabilities of population groups. This is elaborated further in the recommendations section.
6.6 Businesses that support the residential population

Until ten years ago, Lower Manhattan was synonymous with business. The studio sought to understand the composition of businesses and locate those that either operate in ground floor storefronts or could be defined as providing necessities for the residential population (figure 11). As shown in Figure 11, there are over 27,000 businesses CD1 based on Reference USA Data for 2012. It would be impossible for the Community Board to focus on all business needs. And many businesses within the District have disaster planning priorities in place. The priority of the Community Board could be directed on businesses that provide products and services the residential populations rely on pre- and post-storm. Therefore, we narrow the businesses with the District that the Community Board could focus on based on type. Classifications established by the National Industry Classifications Standards (NAICS) for businesses provide a starting point to narrow the focus and include basic, daily, goods and services i.e., food, drugstore and basic retail that are needed for a return to normalcy. This exercise led the studio to identify over 2,500 businesses that provide priorities and almost 1,700 that provide necessities.

There are eight (8) NAICS codes which include what can be defined as necessities or businesses which could facilitate in providing food and basic needs: Food Retail (Meat, Bakery, Supermarket), Pharmacy and Drugstore, Convenience Stores, Hardware Stores, Gas Stations. These are business categories whose facilities and products can assist residents before the disaster and they are the same businesses that can speed up the recovery process post-disaster. They are vital in returning a community to normalcy.

The studio presents this information in two different formats: by zip code in tabular form below and spatially on the following page. Segregating the three retail categories by zip code in the chart below highlights the preponderance of restaurants in the Tribeca area and the very small presence of food related, pharmacy and restaurants in Battery Park City.

The residential environment is intricately woven into the business of the global economy in the Community District and this relationship and inter-dependency requires significant understanding to develop targeted resiliency and recovery measures, which is beyond the time-constraints of this Studio. However, the Studio supports a program that marries the businesses that cater to both residents and the working population. The quicker such businesses return to normalcy, both interests will benefit.

Figure 23 Number of businesses and selected focus (Source: referenceusa.com)

Figure 24 Distribution of restaurants (Source: NAICS)
Figure 25 Distribution of retail by type (Source: Reference USA and NAICS)
7. Recommendations

This report frames its recommendations around an integrated approach to resilience. Effective resilience planning is about a continuous cycle of activity. Its stages—Preparedness, Response, Recovery, and Mitigation—are interconnected and interdependent, and thus create an integrated process. For example, community roundtable discussions are a recovery strategy that overlaps with preparedness. In this way, both long-range and short-range planning frameworks are incorporated.
7.1. Pilot a Disaster Orientation Logistics Location program

Our first recommendation is that the Community Board designates one or more facilities in the district to house resilience planning activities, called Disaster Orientation Logistics Locations. DOLLs should be located in each of the sub-districts, in publicly accessible buildings. As physical locations, they can anchor the Community Board’s resilience agenda and support the board’s effort to foster communication, coordination, and collaboration. The DOLLs should be capable of storing emergency supplies on an ongoing basis and have meeting spaces for community education and meetings. In the case of a disaster, the facilities can function as intermediate evacuation locations, volunteer meeting points, and temporary command and information centers. Each sub-district would need to further refine and develop the DOLL concept to implement it in a way that best suits their needs.

The necessity for a non-evacuation center for intermediate use becomes particularly clear when looking at the evacuation map for Lower Manhattan. The DOLLs should be centrally located, physically-identifiable facilities and located in zone 5, away from the shore, and better positioned to provide a range of services. In the event that Lower Manhattan is evacuated entirely, the DOLLs could fill the coordination, communication, and spatial gaps in the emergency management system.

Figure 27 Washington Market School (Source: Sandy studio)
7.2. Educate residents about risks
The assumption that past experiences influence future response demonstrates the need to educate residents about risks. Community Board 1 can lead an education effort through newsletters and community meetings. A DOLL in a school would be an ideal place to meet for an evening seminar and encourage the exchange of experiences.

Communication is an integral component of proper and effective education. Communication is an avenue through which the parties involved can understand the risks associated with their decisions. For the aging population and families with young children alike, better information about risks, like remaining in place during a storm, will enable residents to make more informed, proactive decisions and protect themselves and their property. Staying in place during an emergency creates risk for both the residents, building staffs, and emergency personnel because vital services such as electricity, water, steam, and gas service that is relied on daily can be interrupted. If buildings can implement backup systems for these essential services, residents may be able to shelter in place without creating additional safety risks.

The Southbridge Towers experiences provides a tangible example. Southbridge Towers’ management was acutely aware of the potential for building utilities to become damaged by Sandy. Indeed, ConEd powered down the grid around one hour before the storm made landfall. Knowing that this would happen, the management took the initiative of communicating these anticipated actions to inform residents. Their communication effectively educated the residents about the circumstances that could occur during a storm. This allowed residents to become more aware and to prepare accordingly. Educating residents about future disaster scenarios is a preparation strategy for future events.

Figure 28 The Fish Market, where abandoned buildings fared worse than those whose owners prepared for Sandy (Source: Sandy studio)
7.3. **Self-identify vulnerabilities**

In terms of personal risk, residents should be encouraged to self-identify and communicate their own needs and vulnerabilities. A survey that gets attached to annual lease forms could be one way for building managers to prompt residents to consider their own vulnerabilities, personal and medical needs, and emergency plan.

Self-identification prior to a disaster improves not only residents’ ability to plan but also logistics and response from building staff. For example, when the power grid went down, elderly residents at Southbridge Towers who depended on refrigeration for their medication suddenly became even more vulnerable. Without electricity, they were dependent on security staff to store their medications in the management office refrigerator and then travel up and down the stairs twice daily to deliver and sometimes administer doses.

Pets were another predictor of behavior throughout the district. Many residents decided to shelter in place because of their responsibilities to their pets. The formal evacuation procedures do not take this into consideration. Many factors that contribute to vulnerability cannot be known unless residents verbalize their needs and constraints.
7.4. Utilize a sign-out sheet
One of the best practices mentioned throughout the qualitative findings at both Pace University and Southbridge Towers, and desired at Gateway Plaza, was the concept of the sign-out sheet. This is a practical exercise that reinforces communication and disaster response because it allows the building management to keep in touch with the residents informing them of their location and contact information. Residential building managers at Southbridge Towers and Pace University said that it was important to understand who was on-site to properly allocate resources and ensure the safety of residents who remained. A sign-out system serves this purpose. At the same time, those who decide to relocate can be contacted when it is the right time to return. DOLLS can provide sign-out sheet templates and keep a database of information during a disaster event, allowing community members to keep each other accountable.

Figure 30 Sample sign-out sheet

The Greystone
xxx Broadway
NY, NY 10004

OEM is mandating an evacuation of Flood Zone 1, 2, and 3. In an effort to keep you informed about the building over the upcoming days, we ask you to complete the following sign-out sheet when you depart the building.

In preparations for the storm, we anticipate shutting down the elevators.

Post storm, it may take a few days for power and services to return to normal. With the information supplied below, we hope to provide you with daily updates. The information below will help us provide you with the most up-to-date information.

We will also be recording a daily message on the voice mail of our Building. Please listen daily for updated information.

BUILDING SIGN OUT SHEET

Name ______________________

Unit ______________________

Cell Phone Number ____________

Additional Phone Number where we may contact you over the next few days if necessary: ______________________

Family Contact Outside the Tri-state Region ______________________
7.5. Promote low-tech solutions

It is important to rethink communications by encouraging bottom-up processes. Low-tech communications and informal networks are examples that worked during Sandy.

In the case of Southbridge, the building management reached out early to the residents, communicating with them daily and providing necessary resources.

At Pace University, the administration also worked proactively to communicate and provide necessary resources. The Pace University staff used walkie-talkies to communicate with each other since their cell phones didn’t work. Additionally, the school’s P.A. system was used to communicate with students.

These pictures below show notices that were used by Southbridge Towers Management.

Figure 31 Southbridge Towers staff used photocopied notices to share information.
Connect with larger organizational networks

Improved communication is not limited to residents and buildings staff. It is also important to incorporate larger, institutional networks. For example, the Office of Emergency Management distributes valuable information that is not always received nor followed. NotifyNYC is one emergency information service that OEM provides to subscribers and was active leading up to and throughout Sandy. In addition, there are the CERT teams, CorpNET, ReadyNY programs, and PALMS network.

All these programs demonstrate the thoughtful and wide range of programs aimed at communicating with New York City residents. However, it is like a double-edge sword because too much information can also translate into unused information, leading to an inefficient manner of communication. There is the concern that the information doesn’t get to the right people at the right time, in addition to the fact that many residents do not act upon or respond appropriately to the information provided. For example, residents at Gateway described how few residents did not act upon OEM’s evacuation order until the day before Sandy. This response time is considerably late, and it is fortunate that a more severe impact did not occur to the Gateway residential complex. Therefore, Community Board 1 can act as the collaborator to build opportunities to discuss procedures and identify more effective ways to communicate between larger networks like OEM and specific residential buildings with both staff and residents.
7.7. Leverage existing community assets
While OEM can act as a collaborating partner with political entities, community groups and businesses are essential institutions within the district that should not be disregarded. CB1 can work with OEM to establish a localized version of the citywide Private Asset and Logistics Management System (PALMS). PALMS is a public-private partnership where businesses list goods, facilities, and services that the City could use in an emergency. A localized PALMS system for Community District 1 could include large kitchen facilities, generators, medical personnel, and other emergency needs. The Disaster Orientation Logistics Location (DOLL) can serve to store and utilize these assets. Community groups, residents, and businesses in Lower Manhattan would be able to work together though the PALMS framework to prepare for disasters.

Figure 33 Asset checklist (Source: OEM)

Figure 34 Flooded roadways at the Battery (Source: NY Daily News)
7.8. Initiate community roundtables
It was mentioned many times that people received their most valuable information through personal networks. Community roundtables can be a practical means of institutionalizing these informal and personal networks through communication and collaboration with various stakeholders. By creating opportunities for collaboration through community roundtables in DOLL facilities, Community Board 1 can allow this valuable information to spread among groups like OEM, businesses, building managers, and residents.

The assumption is that the informal and personal communications networks that took place during Sandy (i.e. at Southbridge Towers and Gateway) are a more effective means of relaying information to people in need. While, theoretically, formal communication networks like those established by OEM and other City institutions have the resources and manpower to reach and extended audience. Thus, by combining the assumption and theoretical understanding, a new means of communication is created composed of effective informal networks combined by the power and scope of formal networks. This then creates the potential for strengthening communication networks, which can be operationalized through community roundtables in DOLLs.
7.9. Incorporate resiliency into the school-building agenda

If current and future new schools are built using storm-resilient design, these buildings can serve as a DOLL. In recent years, there has been a challenge to gain enough school seats to meet the increasing demand in Lower Manhattan even though schools are the lifeblood of a community. While it has been announced that only one new school will be constructed, as the construction and renovation process advances on existing and future buildings, CB1 can coordinate with the Department of Education, OEM, and community groups to design and locate schools as accessible spaces before and after a disaster. Incorporating resiliency into the school building agenda can serve the dual purpose of providing more educational seats for the growing population and constructing storm-resilient infrastructure in preparation for future storm events.

A precedent for sustainable and resilient school construction can be seen elsewhere in the City. P.S. 62 on Staten Island broke ground on the first net-zero energy school in New York City, which will also help meet the goals of PlaNYC. Federal Sandy relief funds could also support resilient construction design, as seen in Queens, where Federal dollars are currently being spent on protective measures.
7.10. Engage and coordinate with community organizations

Finally, the Disaster Orientation Logistics Location (DOLL) can be used to engage with community organizations and volunteer groups during disaster recovery. They can be central meeting areas for volunteers, a distribution center, and information center. CB1 can coordinate with OEM, the NYPD and volunteer organizations to distribute food and resources to people in need just like during Sandy. Although city organizations did much for disaster-recovery efforts, there were many volunteer organizations and community groups that assisted in recovery as well.

Figure 37 Neighborhood organizations and associations had ready-made networks for social action (Source: Northstar Fund)
8. Conclusion

Planning for disasters is both a systematic and integrative process. Actions can be taken at different times of a disaster but it is important to keep in mind the big picture, as each action is a critical link that connects to another. By incorporating the recommendations mentioned in this report, it allows disaster resilience to occur through an integrated effort that addresses all elements of the disaster preparedness cycle.

The residents of Community District 1 have experienced major disaster events within a relatively short time and have learned through those experiences. By fortifying the planning principles of communication, collaboration, and coordination, we believe Community Board 1 can be a powerful entity in uniting the resilient efforts of Lower Manhattan. Not only can these recommendations improve the lives of the vulnerable populations, but they can also affect the lives of all residents living in the community.