Building Better, Building Smarter: Opportunities for Design and Development

May 2013
Executive Summary

The Post-Sandy Initiative is structured as the planning and design community’s response to the recent Superstorm. Initiated by the American Institute of Architects New York (AIANY) and the AIANY’s Design for Risk and Reconstruction Committee (DfRR) in the weeks that followed the storm, and in collaboration with a wide range of other professional organizations and concerned individuals, it has been supported by the participation of a variety of local, regional, state, and national public agency participants. At publication time, still only months after Sandy swept through our region, the report is a slice in time of our efforts as of April 2013—a definition of issues, an analysis of options and opportunities, and the establishment of a framework for next steps. This Executive Summary highlights key issues to be considered as we build back better and smarter. The full report and updates are available online at www.postandyinitiative.org.

Unlike many of the areas devastated by comparable American storms, New York City is a major urban region whose vitality and resiliency depends on a complex web of interconnected systems. With more than 8 million residents, 6 million commuters each day, and 50 million annual visitors, New York City is the largest regional economy in the United States and the second largest city economy in the world after Tokyo. New York is a cultural capital and home to hundreds of museums, performing arts venues, and historic sites; and more than 600,000 students are enrolled at the City’s 110 higher education institutions, a larger number than the entire population of Boston.

Through the Post-Sandy Initiative’s working groups, it quickly became clear that “one size does not fit all”—the imposition of national or other standards, often based on rural, suburban, or small-city situations, may not always be applicable to our high-density environment, and falls short in addressing our complex, interconnected social and economic culture. A series of complementary initiatives, many based on experience from outside the United States, will be required to effect meaningful change.

As part of this Initiative, many professionals have given their time to explore important issues about the emergency planning for and response to Sandy, both in terms of short-term recovery efforts and long-term resiliency considerations. Their contributions have made it clear that we can, and need to, do better in the face of future extreme weather events.

Superstorm Sandy revealed that we have created a defenseless built environment:

- Land-use patterns encourage fragile dwelling units and critical facilities in the most vulnerable locations.
- Transportation and utility systems fail in the face of extreme weather events.
- Stormwater management and development policies now in effect actually increase the impact of runoff.
- Existing buildings are barriers to sustainability, squandering power and producing greenhouse gases.
- The overarching long-term objective is resilience, which can best be achieved by modifying buildings, transportation and infrastructure networks, and land-use patterns.
- This will require consensus on standards and where they apply—what constitutes “harm’s way,” based on
updated predictions of flood zones, storm surges, and sea-level rise, and how these assumptions may shift or increase in coming years.

- It will also take careful analysis of many possible strategies—examining relative costs and benefits in the context of likely useful lifespans.

- There is no universal solution. Design approaches should be site-specific and respond to local programmatic needs.

A great deal of work has been published and is underway on responding immediately after disasters. As architects, planners, and designers, our focus has been, instead, in an area where we can make the most meaningful contribution: design approaches to rehabilitation and new construction to help limit the effects of future storms on our built environment. We are also suggesting processes to coordinate efforts to provide critical services, including regional transportation, immediately after a major storm.

Building back better and smarter—moderating past mistakes through careful planning, becoming more energy independent, and requiring sustainable design and construction practices—will help reverse the vulnerability we have inherited from centuries of misguided development.

COLLABORATING ORGANIZATIONS
American Council of Engineering Companies (ACEC New York)
American Society of Landscape Architects New York Chapter (ASLA-NY)
Citizens Housing & Planning Council (CHPC)
New York State Association for Affordable Housing (NYSAFAH)
American Planning Association New York Metro Chapter (APA-NYM)
Regional Plan Association (RPA)
Structural Engineers Association of New York (SEAoNY)

For more information on AIANY’s Design for Risk and Reconstruction Committee (DfRR) please refer to www.designforrisk.com.
These aging systems were not built to withstand today’s rising sea levels and severe storms. Identifying their vulnerabilities and planning for their reinforcement is an urgent priority, demanding interagency collaboration, public education and commitment, and solutions that contribute to the design quality of the city and region.

KEY CONCEPTS AND FINDINGS

Planning for Redundancy: Transportation and infrastructure networks are interdependent. Multiple and alternative power sources can keep them functioning during severe weather events. Robust, multiple-system communication plans can alert the public to evolving conditions.

Planning for Resiliency: Reinforcing vulnerable structures and repositioning critical equipment can protect vital infrastructure systems. Sensitively-designed elements can also serve as urban amenities. Replacement of those systems that were heavily damaged by Superstorm Sandy should maximize long-term sustainability.

Planning Smart: We have identified case studies that reveal three distinct strategic approaches—defensive, adaptive, and passive. Defensive infrastructure can demand burdensome long-term funding and management; for each particular situation, scenario-planning exercises and other research are needed to suggest whether hard infrastructure (with a constructed resiliency) or simpler, softer solutions will best protect the community. Adaptive efforts reduce disruption of natural ecosystems, and focus on green infrastructure approaches. Passive solutions accept that protecting investments is impractical in a particular situation, and focus on moving or providing alternative systems. For all strategies, solutions must contribute to the amelioration of service gaps and improved design quality of the public realm.

OPPORTUNITIES AND NEXT STEPS

- Assess the infrastructure and transportation systems at greatest risk, and identify strategies for their redundancy and resiliency.
- Educate the public about challenges ahead to ensure realistic expectations and support for required expenditures.
- Improve interagency and interstate communications for holistic planning before the fact and regional coordination during extreme events, including emergency wayfinding strategies to inform residents about alternative backup plans for transportation, power, fuel, and locations for assistance.
- Recognize that infrastructure failures in New York City can have catastrophic international impacts. The funding required to strengthen our infrastructure should be leveraged through all parties that benefit from preventing expanding economic disorder.
Superstorm Sandy revealed the need for new strategies to address evacuating residents who will be displaced in future disasters, and their security and comfort if sheltering in place is necessary. The existing housing stock must be retrofitted to become more resilient. Standards for new housing must ensure that it can be safe, accessible, and attractive.

KEY CONCEPTS AND FINDINGS
Housing displaced people in extreme events requires knowledge of available units, a centralized intake process, and a set of tools including appropriate waivers, qualifying processes, model lease agreements, and allocation of subsidies.

Non-profit housing providers need support with post-disaster training to address residents’ needs, especially in flood-prone neighborhoods.

Gaps in current floodproofing guidelines and regulations—at both local and federal levels—must take into account the character of dense urban environments.

Multi-unit housing stock in flood zones, even where damaged, remains largely sound. With strategic modifications, the useful life of most of these buildings can be extended well into the future.

Broader planning implications should be addressed, such as whether exceptions to allow multi-family housing in downzoned coastal areas could increase community resiliency.

OCCUPATIONS AND NEXT STEPS
FEMA and National Flood Insurance Program literature is largely focused on one- and two-family housing. It is our conclusion that a FEMA multi-family design guide is very much needed.

Zoning regulations should be adjusted, in light of predicted higher flood levels, to recognize the amount of space needed by required ramps, elevators, and lifts in multi-family buildings, and to provide for the relaxation of height restrictions in order to accommodate higher-elevation ground floors.

In low-income rental buildings and supportive and senior housing, where residents may not be able to individually evacuate, safe rooms and expanded programs should be provided to allow congregation, roll call, and rescue during emergency conditions.

Multi-family housing should be engineered with building systems that protect against HVAC shutdowns, provide for alternative power during outages, and ensure a quick return to normal.
Critical facilities like hospitals, police stations, and data centers must be able to withstand the effects of a disaster and remain in operation without evacuation. Other buildings in vulnerable locations may be evacuated, but should be designed to survive without structural failure. Building owners have a responsibility to protect occupants, protect structures and contents from damage, and ensure that buildings can operate during and after the event.

KEY CONCEPTS AND FINDINGS
Owners of all commercial and institutional buildings—existing, in construction, or planned—should begin now to:

▶ Conduct vulnerability assessments of their buildings in anticipation of the likely effects of extreme climate events.
▶ Identify technical standards and technologies that will allow their buildings to successfully withstand these events.
▶ Update plans to keep buildings operational during disasters and to quickly recover functionality afterwards.

▶ Create implementation plans to put in place remedial actions indicated by the three preceding steps.

OPPORTUNITIES AND NEXT STEPS
Disaster-resistant building design strategies, technologies, and materials that already exist or are being developed elsewhere should be examined and adapted here.

We should move toward replacing existing critical buildings in harm’s way that cannot be hardened, with exceptions for buildings of historic or cultural significance.

We need regional protective systems that can enhance, or eliminate the need for, individual building responses.

The challenges that hurricane conditions and floods pose for buildings, in particular those in densely populated areas, should be brought to the attention of the many scientific, governmental, and professional organizations currently exploring the potential impacts of climate change. Dialogue will lead to better simulation models of water and wind behavior on built structures, a new national reference code for building construction, and zoning and planning approaches that bring patterns of development into line with present and emerging knowledge about disaster-prone areas.
Superstorm Sandy has given us a new perspective on New York City’s diverse waterfront and watershed—comprising ocean, riverine, and estuarine systems within a broader context of interactive water flow. Floods and storm surges are natural, although their frequency, intensity, and impact on our city are increasing. Within this ecological context, an array of opportunities exists that can integrate diverse land-uses—public access, parks, housing, commercial districts, and working waterfronts—and accommodate the climatic events we must now anticipate.

**KEY CONCEPTS AND FINDINGS**

More scientific research will help us to understand the interactions between urban waterfront and human ecologies. We need a dynamic and innovative approach to waterfront projects, allowing for experimentation and novel resiliency strategies.

Interdisciplinary collaborations, organizational structures, and funding mechanisms could promote robust collaborations among pure and applied disciplines—linking the design community, the scientific research community, and the regulatory community.

There is always more than one solution. New York City has 520 miles of shoreline, with varying geomorphology, hydrology, land-uses, and habitat types. Planning and design of waterfronts should embrace unique, site-specific attributes. For instance, we need to set priorities for current and future funding for the alternatives being identified and discussed by the City’s post-Sandy task force, the Special Initiative for Rebuilding and Resiliency (SIRR), the Department of City Planning’s year-long Urban Waterfront Adaptive Strategies Study, and NYS 2100 Commission. These include nourishing beaches and expanding dunes, reinserting wetlands, raising bulkheads, adding tide gates and revetments, building breakwaters, installing passive and deployable floodwalls, constructing seawalls and surge barriers, and conceiving of dual-use or multi-purpose levees.

Redundancy and modularity should be built into flood protection and stormwater management systems in areas of dense population.

**OPPORTUNITIES AND NEXT STEPS**

We need a ground-up, incremental approach to waterfront resiliency, partnering with local communities to generate sensitively formulated solutions, and arming property owners with a menu of strategies. From government we need agility and flexibility in regulations, and funding that affects the planning and design of waterfront solutions in the context of a collaborative, problem-solving approach.

We propose Waterfront Labs to investigate strategies that could mitigate storm surge, prevent erosion, and soften the impact of rising tides. Experiments would focus on both predictable and unpredictable events, and take into account the different natural typologies found in the New York City region. The Waterfront Lab will make an important contribution by bringing New York City to the forefront of innovative waterfront resiliency planning and design.
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