

The complexity of hazards underscores the importance of an integrated approach to risk management.

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CHAPTER 4

SELECTED HAZARDS AND RISK MANAGEMENT STRATEGIES

HAZARD PROFILES

This chapter profiles selected hazards that pose a risk to our city. Each hazard profile describes the nature of the hazard, identifies key risks it poses, and presents a sampling of strategies for managing the risks. The focus is generally on long-term risk management, but the subject of short-term emergency response informs the profiles, as well.

For each hazard, a tremendous body of knowledge exists, along with fields of research that continue to evolve. We hope our profiles will motivate readers to learn more. Good places to start are “Resources,” at the end of this Guide, and the *2014 Hazard Mitigation Plan*.

Hazards profiled below are:

Coastal Storms

Coastal Erosion

Flooding

Strong Windstorms

Extreme Heat

Winter Weather

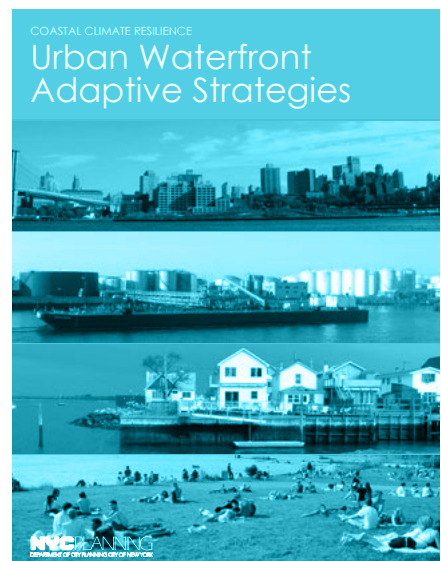
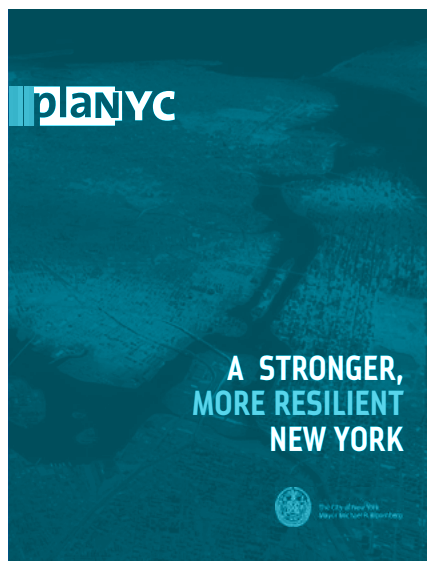
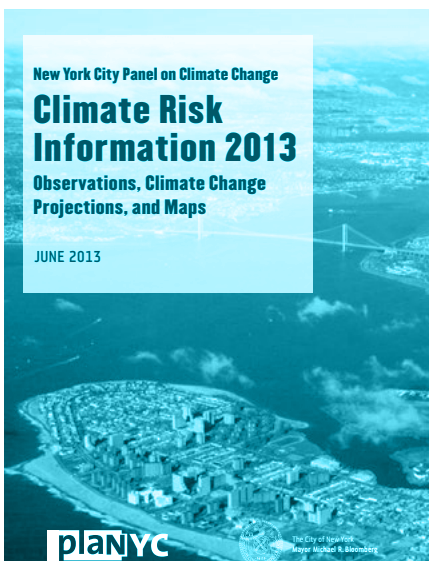
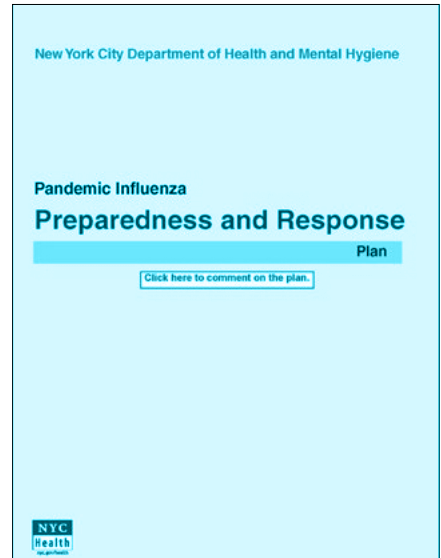
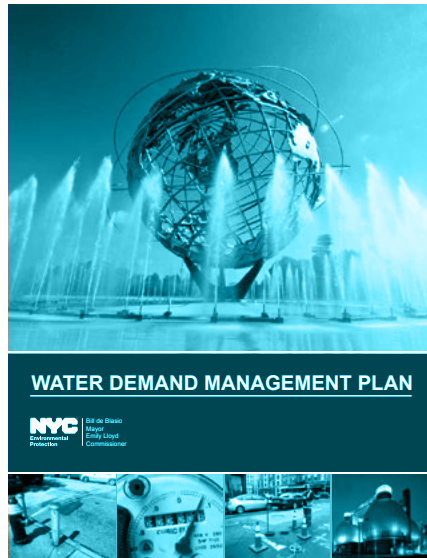
Water Shortage

Earthquakes

Pandemic Influenza

Note that we have sequenced hazards somewhat thematically, with Coastal Storms, Coastal Erosion, Flooding, and Strong Windstorms being most closely related. The length of the text devoted to any one hazard is not a proxy for importance.

This Guide builds on a comprehensive set of resources developed by the City and its partners to manage the risks we face.



CROSS-REFERENCING, AND CROSSCUTTING INFORMATION

Redundancies are inherent in our subject. Many features of our risk landscape are vulnerable to more than one type of hazard, and some hazards are dramatically diverse, while others are closely interrelated. For example, coastal storms flooding, strong windstorms, and coastal erosion have similar risks and hazard management strategies. Similarly, our built environment constitutes an immense risk exposure, and our Building Code helps protect against a variety of weather-related hazards.

Most hazards occur independently of each other, but some occur as a result of others. For example, coastal storms can result in flooding. Some hazards that are unrelated, such as coastal storms and earthquakes, could produce similar impacts, such as fatalities, power outages, and transportation disruptions.

This complexity underscores how important an integrated approach to risk management is, and why the City continues to expand and strengthen collaborations among the public and private sector parties responsible for long-term hazard mitigation.

To reduce redundancy, we present crosscutting background information about building protections and City response capabilities.

PROTECTING BUILDINGS: EVOLVING LAWS, REGULATIONS, AND GUIDELINES

The City uses its Zoning Resolution and Construction Codes to control the built environment and create a safer, healthier, more resilient city. Zoning, developed and written by the Department of City Planning and enforced by Department of Buildings, regulates building size, use, location, and density, thereby shaping the character of neighborhoods and quality of life. Individual buildings are governed by New York City's Construction Codes which is administered by the Department of Buildings. The Codes specify standards for design, construction, and maintenance of individual buildings, with the aims of protecting public safety, health, and welfare, and advancing sustainability and resiliency goals.

As displayed in the timeline, New York City's building codes are continuously evolving. About 80 percent of our building stock was built before the 1961 Zoning Resolution established modern rules for building design, reducing residential densities and requiring more open space. Because Building Code requirements became stricter over time, older buildings can affect vulnerability. Light-frame buildings built to less stringent codes tend to sustain more structural damage from a hazard than newer, heavier buildings made with non-combustible materials like steel, concrete, and masonry that meet modern standards.

When enacted in 1968, the New York City Building Code was one of the Country's most stringent. But decades of piecemeal modifications produced a long, cumbersome code that was hard to interpret. In 2008, the City adopted New York City Construction Codes, an updated, comprehensive set of rules adapted from International Code Council (ICC) model codes. The new Codes were designed to meet present and future challenges of our dense urban environment, and to embody the latest professional scientific and engineering knowledge. They govern building, plumbing, mechanical, fuel gas, and energy conservation, and they introduced new standards for construction that help protect buildings from earthquakes, extreme temperatures, flooding, wind, and winter weather.

Hurricane Sandy exposed constraints in codes and zoning law that limited the ability to perform construction needed after the storm. Shortly after the storm, the Mayor enacted an Executive Order to lift zoning requirements to enable people to rebuild higher. This became law with the 2013 Flood Resilient Zoning Text Amendment and new Construction Code regulations. In addition, the 2014 Codes incorporate recommendations from the City's Building Resiliency Task Force and Green Codes Task Force, effective December 31, 2014.

Like the ICC Codes, our Codes must be updated every three years to capture new safety and technological advances. Future hazard events may test the codes. They will be updated as needed.

2014 Construction Codes: Effective Oct 1, 2014, they include new seismic standards for risk-based requirements and enhanced design requirements for soil liquefaction.

Amendment encourages flood-resilient building construction throughout designated flood zones.

Update requires that building be protected from flooding to a level 1 or 2 feet higher than the FEMA-designated flood elevation.

The Building Code is comprehensively revised and updated and retitled 'Construction Codes.' Modeled after International Code Council codes, City Codes address natural hazards and include additional safety and emergency provisions. Must be updated every 3 years.

Dept. of Transportation Seismic Criteria Guidelines for bridges are adopted by all local bridge owners. Guidelines are revisited every 3 to 4 years.

Local Law 17/19 of the Building Code update contains the first seismic provisions that consider soil and foundation conditions for new construction (effective Feb. 1996).

Revisions incorporate FEMA floodplain maps and mandate flood-resistant construction standards (for new or substantially improved buildings) that residents must meet to be eligible for National Flood Insurance Program.

Revisions Incorporate new technology and building practices, including performance criteria for building construction and design requirements for wind pressure (including buildings lower than 100 feet).

2nd Zoning Resolution focuses on reducing densities and requires open space. Introduces Floor Area Ratio, limiting building height based on size of lot.

Revisions address wind loads for skyscrapers and standards for multi-family buildings.

Multiple Dwelling Law replaces Tenement House Act. Establishes additional fire and health safety requirements for multi-family buildings.

Revisions requires one stairwell for each 2,500 sq. ft. of floor area in office buildings.

1st Zoning Resolution (the first in the nation) establishes rules for "land use and bulk" to separate residential, commercial, and manufacturing districts, and control building heights.

Strict fire safety and labor laws established for factories.

Tenement House Act ("New Law") adds height restrictions on residential buildings, replaces airshafts with courtyards, requires individual bathrooms in apartments.

City enacts first citywide building code. Previous building laws were enacted by the State.

The Second Tenement House Act ("Old Law") requires that all rooms open onto a street, rear yard, or air shaft.

The First Tenement House Act requires fire escapes and one outhouse for every twenty occupants.

First comprehensive building regulations enacted for the city.

2012

2001

1988

2014
2013

2008

1998

1995

1983

1968

1961

1938

1929

1916

1913

1901

1899

1879

1867

1860



Hurricane Sandy prompts changes to the Zoning Resolution and Building Codes

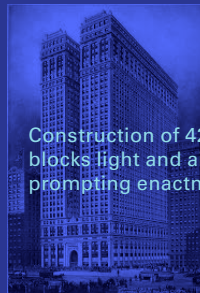


Collapse of World Trade Center reveals safety issues related to outdated 1968 Building Code



Widely felt Quebec earthquake and 1989 Loma Prieta earthquake in California prompt adoption of federal seismic guidelines for bridges and NYC seismic Building Code provisions and seismic Bridge Design guidelines

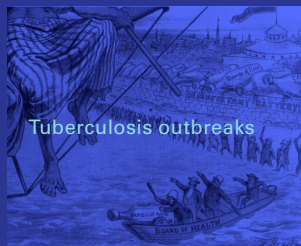
New York City is shaped by its hazard history and its ability to continuously adapt to risk.



Construction of 42-story Equitable Building blocks light and air for surrounding environment, prompting enactment of Zoning Resolution



Triangle Shirtwaist Factory fire kills 146 people, spurring adoption of many building safety codes



Tuberculosis outbreaks



Tenement fire takes 20 lives

OPERATIONAL PLANS FOR PREPAREDNESS, RESPONSE, AND RECOVERY

In some hazard events, the ability to respond quickly is an essential strategy for managing the risks. The type of responders varies according to the nature and extent of the impacts, but the foundation for a coordinated response is the following:

- Our Citywide Incident Management System is the City's framework for managing and coordinating response and recovery operations at emergency incidents. All parties participating in emergency responses – public agencies and private and nonprofit organizations – must operate within this structure.
- New York City's frontline emergency responders are the Police Department, Fire Department, and New York City Emergency Management. Other City agencies—such as the Department of Health and Mental Hygiene, the Department of Environmental Protection, the Department of Housing and Preservation Development, and the Department of Buildings—perform emergency-response functions, too.
- Continuity of Operations plans establish operational procedures which ensure that an organization can continue to provide essential services to the public during an emergency or other incident that may disrupt normal agency operations. All Mayoral agencies have developed continuity plans for providing essential services, reducing disruptions to operations, protecting personnel and assets, and ensuring a timely and orderly recovery from an emergency.
- Comprehensive Emergency Plans: Emergency plans help prepare NYC to respond effectively during an incident in order to reduce the disruption to people and services. NYC Emergency Management creates and updates the City's emergency plans for a range of natural and man-made hazards. These plans are either operation specific, such as debris management, or hazard specific, such as the Coastal Storm Plan.