Preparing a More Resilient NYC: Flood Emergency Plans

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New York City Department of Buildings
Outline

• Background information
  – FEMA and the NFIP
  – ASCE 24

• New York City Context
  – Regulatory Framework
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• Flood Emergency Plan Components

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Background Information

Image from NYC DCP West Chelsea Resiliency Report
44 CFR 60.3 (c) (3)

• (c) When the Federal Insurance Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:

   – (3) Require that all new construction and substantial improvements of non-residential structures within Zones A1-30, AE and AH zones on the community's firm (i) have the lowest floor (including basement) elevated to or above the base flood level or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
FEMA P-936 Floodproofing Non-Residential Buildings

• Purpose of dry floodproofing non-residential buildings is to “minimize the downtime of such buildings and to ensure post-flood functionality.”

• New buildings and substantial improvements must meet the definition of nonresidential to utilize dry floodproofing.
Flood Emergency Operations Plan

- From Section 2.5.4 of FEMA P-936
- FEOPs are “highly recommended” for floodproofing methods
  - They are the responsibility of the building owner/operator.
  - The design professional certifying the floodproofing project is responsible for how the measures resist flood loads and make the building watertight
  - The plan should be posted in two clearly marked locations
  - Include a periodic (annual) drill and training program to make sure personnel clearly understand the procedures
Inspection and Maintenance Plan

• From Section 2.5.5 of FEMA P-936
  – Inspections should cover the entire floodproofing system, including the walls, floor slab, openings, flood shields, valves, drainage system, and any pump system.
  – Maintenance should be part of routine operations of the building’s facility maintenance staff.

*Images from Urban Waterfront Adaptive Strategies by NYC DCP*
Floodproofing Certificate

- Instructions include requirements for a comprehensive Maintenance Plan to include but not limited to:
  - Exterior envelope of the structure
  - All penetrations to the exterior of the structure
  - All shields, gates, barriers, or components designed to provide floodproofing protection to the structure
  - All seals or gaskets for shields, gates, barriers, or components
  - Location of all shields, gates, barriers, and components as well as all associated hardware, and any materials or specialized necessary to seal the structure.
ASCE 24-05/14

• American Society of Civil Engineers Standard for Flood Resistant Design and Construction
• Section 6.2 Dry Floodproofing Requirements
ASCE 24-05/14 Dry Floodproofing

- As a condition for using of human intervention Section 6.2.3 Item 3 outlines the minimum requirements for the Flood Emergency Plan
  - Required when removable shields are used
  - Storage locations of shields
  - Method of installation
  - Conditions activating installation
  - Maintenance of shields and attachment of devices
  - Periodic practice of installing shields
  - Testing sump pumps and other drainage measures
  - Inspecting necessary material and equipment to activate or implement floodproofing
  - Posted in at least two conspicuous locations
New York City Context
New York City Context

- 1 Community, 70,000+ flood-zone buildings
New York City Context

- Residential, Commercial, Manufacturing
- Low-Rise, High-Rise
Hurricane Sandy

• Commercial districts inundated during the storm (34th St and 1st Ave)
Amendments to ASCE 24-05

• New York City amendments to the ASCE standard are located in Appendix G section G501.1.
• NYC Building Code amends definitions, tables, and the requirements for dry floodproofing
• Section 6.2.3 Limits on human intervention is amended to include NYC-specific requirements for Flood Emergency Plans
Amendments to ASCE 24-05

• The amendments adopted in Local Law 109 of 2013:
  – Require storage location information, maintenance, and practice installations of associated temporary stairs and ramps
  – Methods and conditions of flood shield removal
• Temporary stairs and ramps permitted for existing buildings, evacuated buildings, and evacuated portions of buildings
• Freeboard (1’ – 2’) added to minimum elevation of floodproofing in table 6-1 in 1 RCNY 3606-04
Flood Emergency Plan Components

Image from NYC DCP Resilient Retail Report
Flood Emergency Plan Components

Required when using removable shields or temporary stairs or ramps
Flood Emergency Plan Components

Use of removable shield or temporary stairs or ramps
Flood Emergency Plan Components

Use of removable shield or temporary stairs or ramps
Flood Emergency Plan Components

Storage location of the shields and temporary stairs and ramps
Flood Emergency Plan Components

Storage location of the shields and temporary stairs and ramps
Flood Emergency Plan Components

Method of installation and removal

- Transportation from storage location
- Instructions from the manufacturer
- Description of required tools and fasteners
- Removal and return to storage location
Flood Emergency Plan Components

Method of installation and removal

Images from NYC DDC, Manhattan Districts 1/2/5 Garage
Flood Emergency Plan Components

Conditions activating installation and removal, in addition to periodic practice

• ASCE 24-05 requires minimum of 12 hours notification, or
• A community-provided minimum flood warning time equal to or longer than:
  – time to notify person(s) responsible for installation of floodproofing measures, plus
  – time for responsible persons to travel to structure to be floodproofed, plus
  – time to install, activate, or implement floodproofing measures, plus
  – time to evacuate all occupants from the flood hazard area;
Flood Emergency Plan Components

Conditions activating installation and removal, in addition to periodic practice

- NYC Emergency Management department provides warning information to the public via social media, email blasts, etc.
- For hurricanes and tropical storms warnings are issued within 36 – 48 hours of expected flooding
- Warnings for other coastal and inland flooding are issued between 24 – 48 hours in advance
Flood Emergency Plan Components

Maintenance of shields and attachment devices and temporary stairs and ramps

- Periodic maintenance ensures that shields and temporary stairs, along with their destinations are prepared in the event of a flood
- Maintenance should include cleaning all elements of the system to remove any dust or debris that may impair the performance.
Flood Emergency Plan Components

Periodic practice of installing and removing shields and temporary stairs and ramps
Flood Emergency Plan Components

Testing sump pumps and other drainage measures

• Typically tested during the annual operational inspection
• Occasionally tested monthly
• Tests recorded in a log book indicating date and time the drainage measures were tested

Image from Ohio Basement Authority
Flood Emergency Plan Components

Inspecting necessary material and equipment to activate and implement floodproofing

• Methods of inspection vary, the best plans include:
  – Monthly visual inspections
  – Semi-annual inventory check
  – Annual operation inspection with deployment

• Required inspections should follow manufacturer’s recommendations, including inspecting gaskets for damage, verify all fasteners are accounted for, etc.
Flood Emergency Plan Components

Permanently posted in at least two conspicuous locations within the structure

• Flood Emergency Plans are typically posted:
  – In the flood barrier storage room
  – Near affected egress doors
  – At the building’s security desk
  – In the Building Engineer’s Office
Flood Shield Special Inspection

• Applicable to permit applications where flood shields or other flood control devices are installed
• Inspector must be a Professional Engineer or Registered Architect with 1 year relevant experience
Flood Shield Special Inspection

• Includes:
  – Inspection of the shields/devices in their stored positions/locations
  – Witness their activation or transportation to their installed positions
  – Witness their deactivation and return to their stored locations
  – Confirm installation of flood egress signage
Future Improvements

NYC Buildings @NYC_Buildings

Mayor de Blasio and FEMA today announced an agreement to revise NYC’s flood zone maps.

fema.gov/news-release/2...
Code Revision

- Annual testing, revised from “periodic”
- Interagency coordination for observation during test deployments (DOB, FDNY, Department of Transportation, NYC Emergency Management)
- On-site storage of all flood shield and other elements
- Freeboard of 2’ for all flood design classes (aligning with NY state requirements)
- Recertification of Flood Emergency Plans
Questions