

HURRICANE SANDY

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■ AGENDA

1. Overview
2. Precautions
3. Disaster Management
4. What was Right / Wrong?
5. Lessons Learned
6. References

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OVERVIEW: ORIGIN

originated from a tropical wave in the Caribbean Sea on **October 22, 2012**

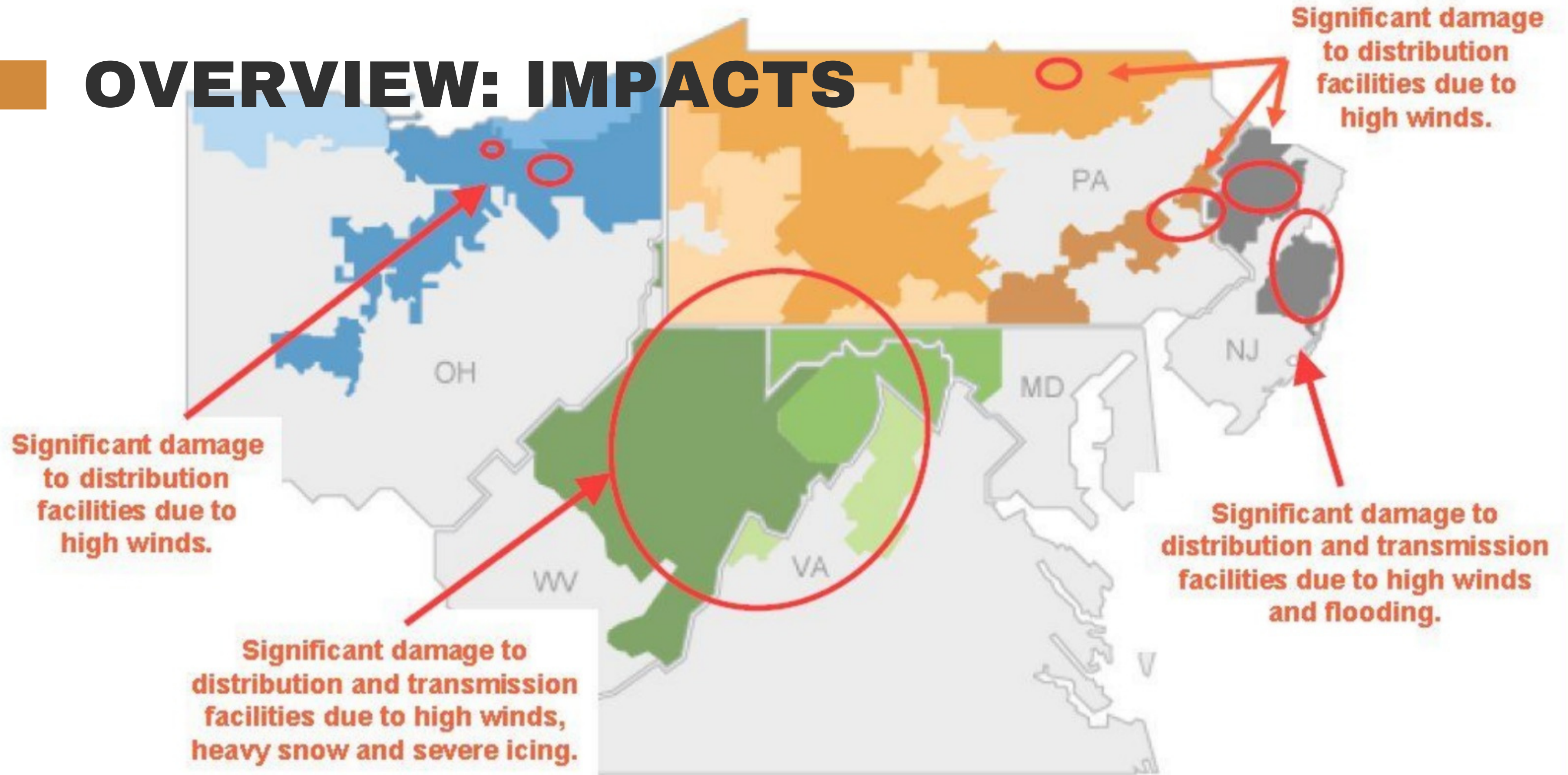
developed into a **tropical storm** and intensified into a **hurricane** as it moved northward

storm surge: combination of high winds and a full moon along the coasts of New Jersey and New York

power outages: over 8 million people were left without power as Sandy knocked down power lines and flooded substations



OVERVIEW: IMPACTS



- | | | | |
|----------------------------|---------------------|--------------------------------|------------------------------------|
| Ohio | Pennsylvania | New Jersey | West Virginia/
Maryland |
| ■ Ohio Edison | ■ Met-Ed | ■ Jersey Central Power & Light | ■ Mon Power |
| ■ The Illuminating Company | ■ Penelec | | ■ Potomac Edison |
| | ■ Penn Power | | |

OVERVIEW: EFFECTED REGIONS

October 22: a tropical depression formed

October 24: it strengthened and officially became a Category 1 hurricane as it moved northeast

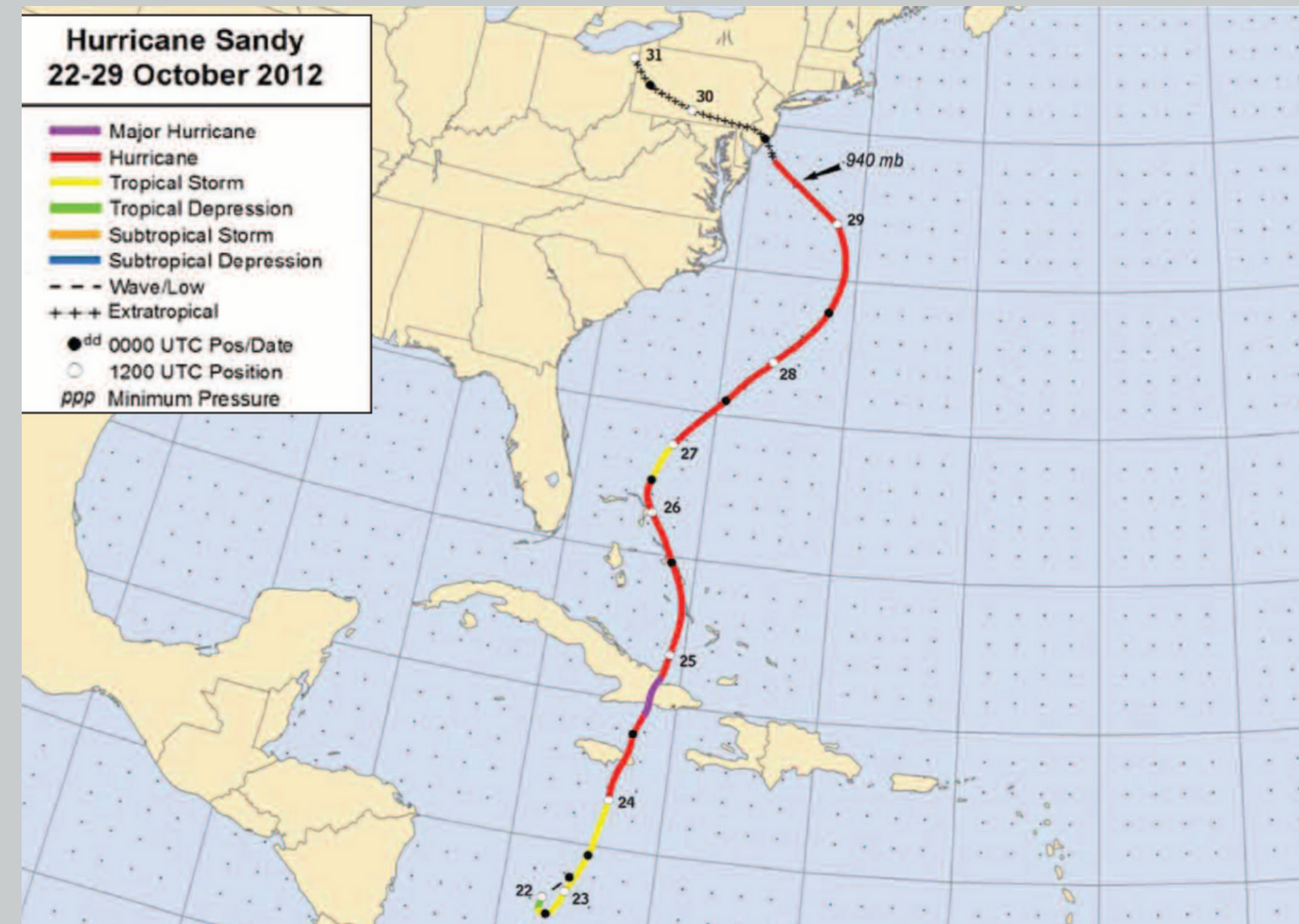
October 25: it had crossed over Jamaica, the Dominican Republic, and Haiti

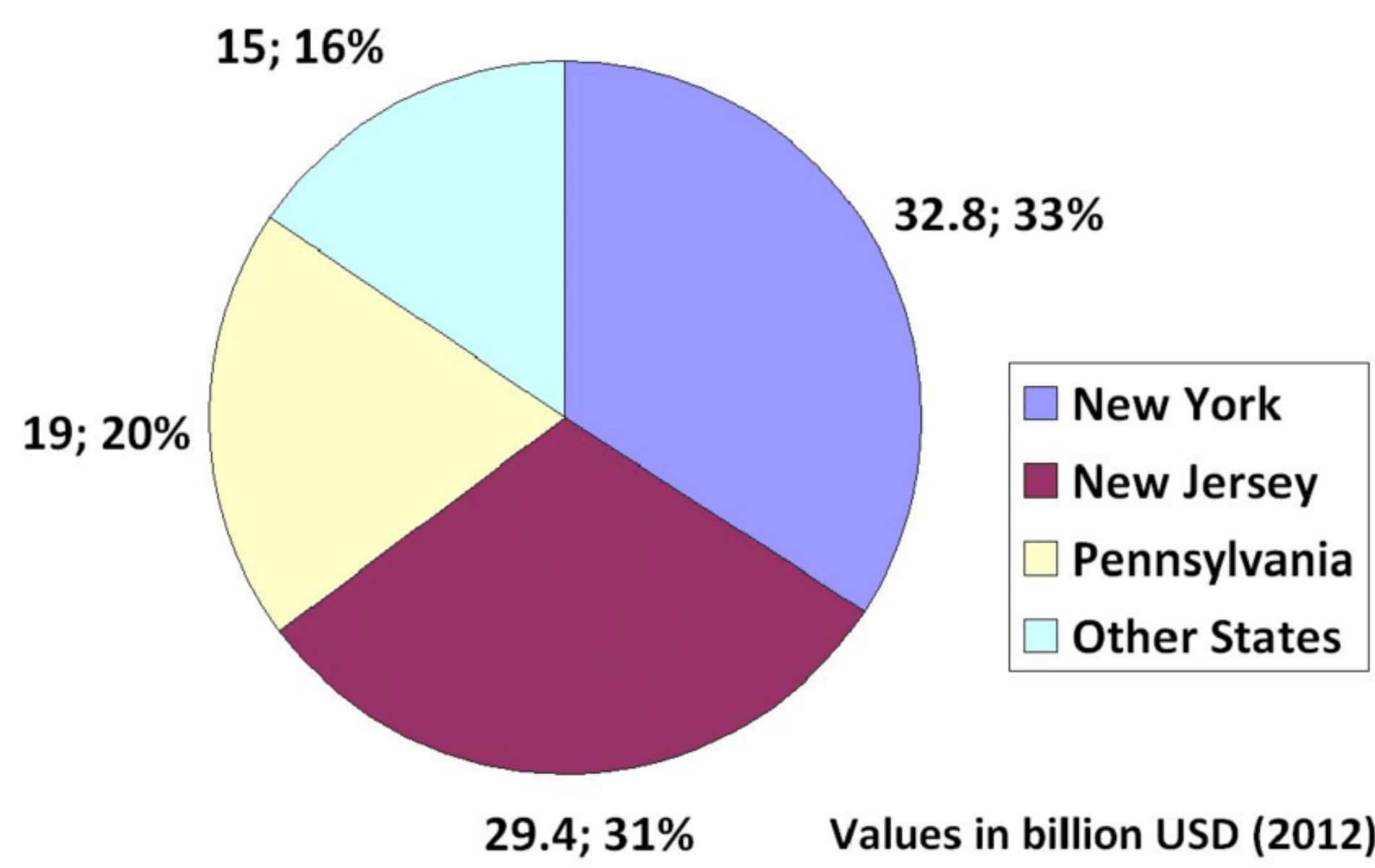
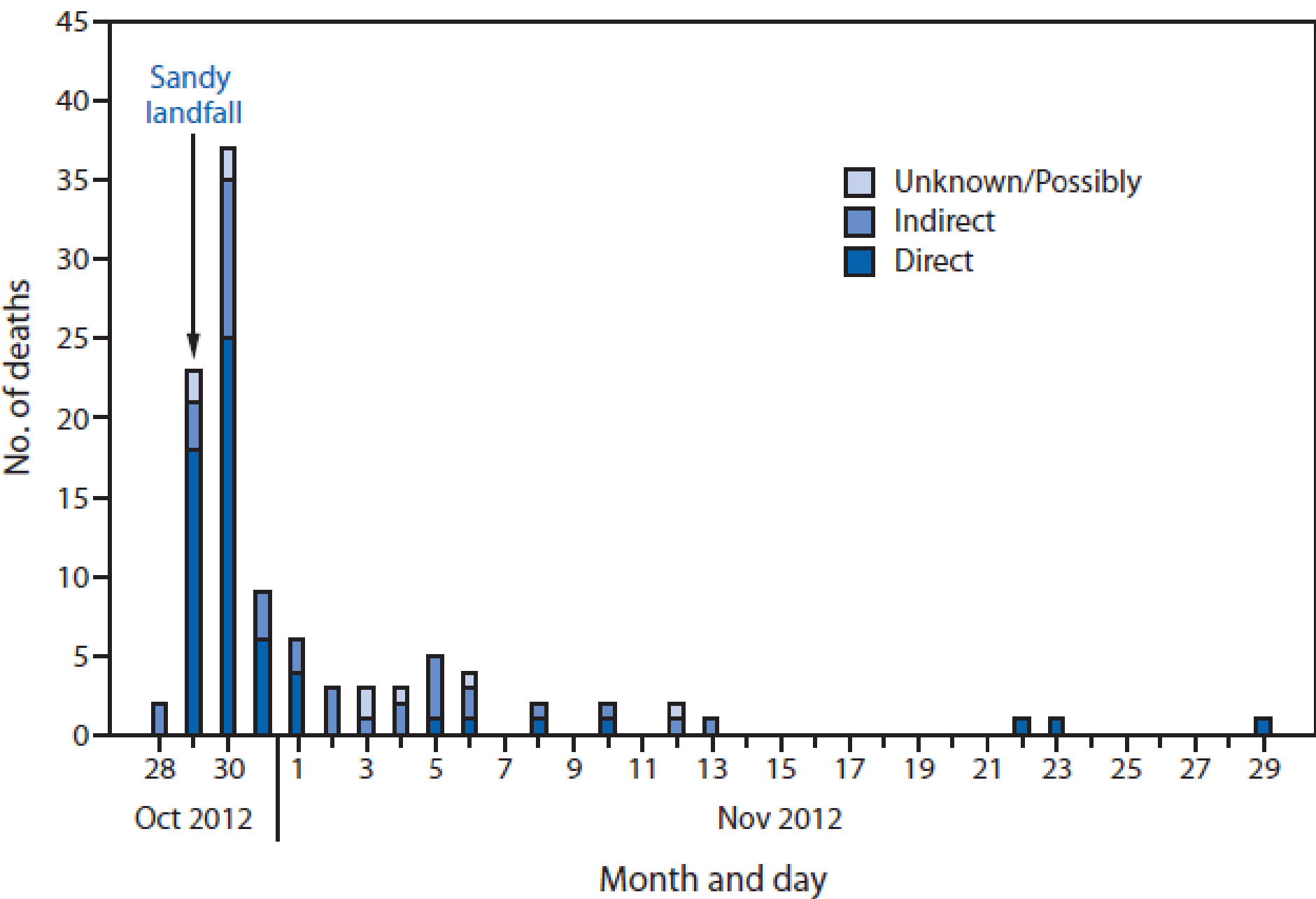
October 26: it had passed over Puerto Rico and Cuba

October 27: it weakened to a tropical depression once reaching the Bahamas, but then it quickly restrengthened into a Category 1 hurricane

October 30: the storm began to weaken as it moved inland before finally the next day over Pennsylvania

October 31: it finally lost its defined center while passing over northeastern Ohio





OVERVIEW: STATISTICS



- Sandy's winds extended 1,000 miles along the coast.
- It caused at least \$70 billion in damages, making it among the costliest storms in US history.
- It killed 70 people in the Caribbean and almost 150 people in the US.

OVERVIEW: STATISTICS



- There were more than 6,500 patients evacuated from hospitals and nursing homes.
- Nearly 90,000 buildings were left in the inundation zone (more than 300,000 homes).
- At its greatest extent, the storm measured more than 900 miles (about 1,450 km) in diameter.

■ **PRECAUTIONS: TRANSPORTATION**

- The storm was monitored prior to its arrival by MTA (Metropolitan Transportation Authority), they secured loose materials, inspected pump rooms and pump trains
- The MTA suspended all services before the storm hit and took precautions to block off most subway stations at risk of flooding

A man wearing a clear, full-body protective suit is talking on a mobile phone. He is standing at night near a structure with scaffolding. The background is dark with some lights visible.

■ PRECAUTIONS: TRANSPORTATION

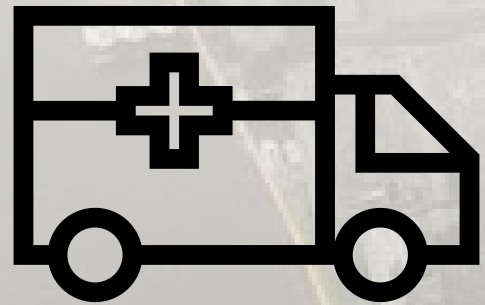
- Staten Island Ferry service and East River Ferry service were both shut down
- Airlines operating in New York canceled numerous flights in anticipation of Hurricane Sandy (American Airlines, JetBlue and Delta canceled all flights in and out of the area airports)



■ **PRECAUTIONS: OTHER**

- Public schools were closed in New York City
- NYSE officials closed physical trading floor and stock exchange building, the courthouses in the Southern District of New York were also closed

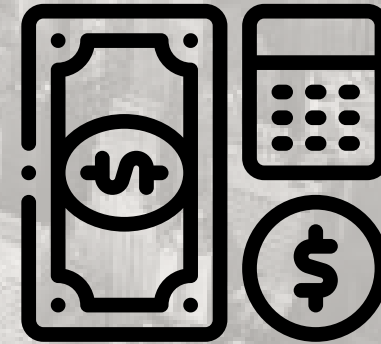
■ DISASTER MANAGEMENT



A. HURRICANE SANDY RESCUE MISSIONS



B. CLEANUP OF THE AFTERMATH OF HURRICANE SANDY



C. GLOBAL DONATIONS FOR THE RECOVERY



D. DEVELOPING A REBUILDING STRATEGY

■ DISASTER MANAGEMENT

A. HURRICANE SANDY RESCUE MISSIONS



■ **DISASTER MANAGEMENT**

A. HURRICANE SANDY RESCUE MISSIONS

- Evacuation with boats
- Search and rescue operations with helicopters
- Rescuing people from floodwaters using large trucks
- Bringing survivors up into helicopters using hoists
- Responding to storm-related fires and emergencies



■ **DISASTER MANAGEMENT**

B. CLEANUP OF THE AFTERMATH OF HURRICANE SANDY

- NIEHS (National Institute of Environmental Health Sciences)
- NIEHS Superfund Worker Training Program (WETP)
- Training resources to support response and cleanup activities from Hurricane Sandy
- Ensure high levels of worker protection during the cleanup process



Timeline Associated with the Activities

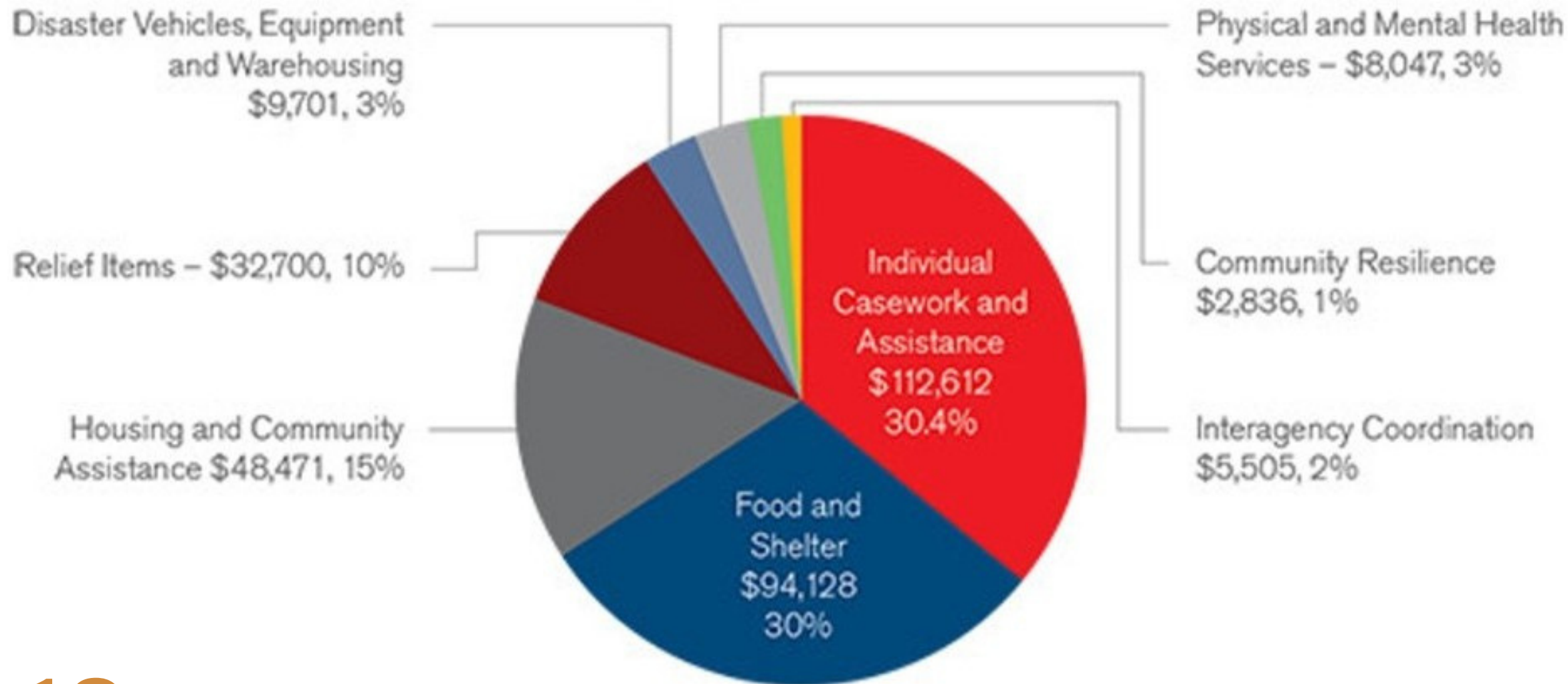
AS EARLY AS NOVEMBER 1	Requests came into the Clearinghouse for hurricane booklets. The booklet was quickly updated to include the hazards of working in cold weather.
NOVEMBER 11, 2012	Congressional demands for strong OSHA enforcement.
NOVEMBER 13, 2012	New York City asbestos abatement cleanup procedures issued for buildings affected by the hurricane.
NOVEMBER 14, 2012	NIEHS grantees began requesting permission to reprogram funds for Hurricane Sandy activity.
NOVEMBER 19, 2012	OSHA lets FEMA know of need to protect clean-up workers and volunteers and requests FEMA bring in NIEHS to train.
LATE NOVEMBER 2012	Grantees began deploying trainers (using reprogrammed funds) to the area to assess training needs in New York and New Jersey. Deployments began around November 21, 2012.
NOVEMBER 20, 2012	NIEHS-OSHA conference call on Hurricane Sandy efforts.

- Cleaning activities
- Clean-up workers and volunteers (self response)

■ DISASTER MANAGEMENT

C. DONATIONS FOR THE RECOVERY

Total Expenses*†
Through September 30, 2017– \$314M (in thousands)



- Both domestic and international donations (Self and global response)
- Hurricane Sandy relief funds

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*These costs include the logistics, staff and technology expenses that make our services possible. An average of 91 cents of every dollar the Red Cross spends is invested in humanitarian services and programs.

■ **DISASTER MANAGEMENT**

D. DEVELOPING A REBUILDING STRATEGY

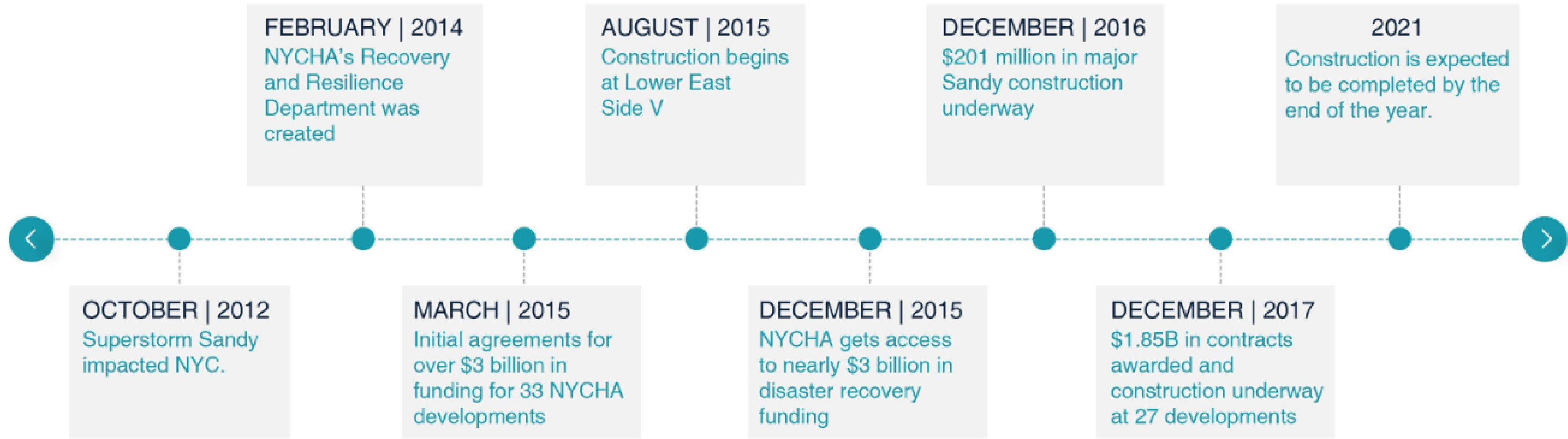
- More than 69,000 residential units were damaged
- Approximately \$3 billion was allocated in CDBG-DR (Community Development Block Grant Disaster Recovery) funding to address the needs



DISASTER MANAGEMENT

D. DEVELOPING A REBUILDING STRATEGY

New York City Housing Authority (NYCHA) recovery program



DISASTER MANAGEMENT

D. DEVELOPING A REBUILDING STRATEGY

Build It Back Single-Family

12.759

Households Repaired, Reimbursed,
or Acquired



Build It Back Multi-family

19.699

Households Repaired or
Reimbursed



BIB - Temporary Disaster
Assistance Program

298

Households provided Rental
Assistance



NYCHA - Public Housing

234

NYCHA Buildings Repaired or
Improved



■ WHAT WAS RIGHT/ WRONG?

- Early Warning and Communication
- Coordination and Collaboration
- Search and Rescue Operations
- Infrastructure Vulnerability



WHAT WAS RIGHT/WRONG?



EARLY WARNING AND COMMUNICATION

Forecasters are warning of high winds that could topple trees and damage homes.



COORDINATION AND COLLABORATION

Many of the volunteers are working people from the working class neighborhoods hardest hit by the storm. They have stepped forward to assist their communities.

■ WHAT WAS RIGHT/ WRONG?

SEARCH AND RESCUE OPERATIONS

Helicopters, boats and large trucks were used for searching, rescuing and evacuating. Firefighters and volunteers took role in rescuing. Boats were not durable enough to carry many people. Therefore, searching and rescuing operations were considerably slow.

It was found that while some infrastructure like flood walls was out-of-date, the city also did not have sufficient plans in place to deal with the disaster.

INFRASTRUCTURE VULNERABILITY

■ LESSONS LEARNED

- Even if you aren't told to leave, "stay indoors and avoid the calmed 'eye of the storm' that can pass quickly, leaving you outside at risk".
- The importance of robust, rebuilding their outdated infrastructure

■ **LESSONS LEARNED**

- The need for effective emergency preparedness
- The role of community resilience
- The importance of communication and coordination

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An aerial photograph of New York City, showing the dense urban landscape and the Hudson River. A large, dark, semi-transparent arrow shape points from the left towards the right, partially obscuring the city. The sky is dark and stormy, with several bright lightning bolts striking down. The water in the river is turbulent, with white foam from waves or a storm surge. The overall mood is dramatic and powerful.

**THANK YOU FOR
LISTENING**