Before the Storm: How to prepare for a severe weather event and mitigate its impact

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Learning Objectives

By the end of this session, participants will be able to:

1. Identify severe weather plan elements.
2. Discuss how to establish severe weather mitigation objectives.
3. Review the skill(s) needed for severe weather preparedness planning.
4. Offer resources related to severe storm education, planning and mitigation recommendations.
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Before the Storm:
How to prepare for a severe weather event and mitigate its impact
Objectives

• Review the essentials of a severe weather plan
• Identify mitigation strategies
• Outline preparedness activities
• Develop effective response and recovery
World Natural Catastrophes -1980–2018

- Geophysical events (Earthquake, tsunami, volcanic activity)
- Meteorological events (Tropical storm, extratropical storm, convective storm, local storm)
- Hydrological events (Flood, mass movement)
- Climatological events (Extreme temperature, drought, forest fire)

Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).
Why Plan?

It is not a matter of if...

It’s when?

Source: Jim Wills, Gilbane
Where?

Source: Mainichi Shimbun / Reuters
Where?

Source: Roland Schneider / Reuters
Mitigation strategies
Mitigation strategies

• All starts with your HVA
• Review what went wrong during similar disaster events
• Emergency Response Plan (ERP)
  ✓ No Primary Power
  ✓ No Phone
  ✓ No Internet
  ✓ No Water (may also include No Waste Water Treatment)
Logistics

No fuel...no workers

Potable Water

Source: Jim Wills, Gilbane
Severe weather plan

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Severe weather plan

• Severe thunderstorm and torrential rain events
• Wind and wind-driven rain events
• Weather forecast monitoring and planning of work
• Hurricane preparedness 36 hours and 24 hours out
Severe weather

• Monitor weather conditions using a weather app or the NWS
• Determine when to halt work based on forecast observations
  • Lightning within 20 miles
  • Lightning within 10 miles
  • Lightning within 6 miles
• Protect equipment over idle periods
• Be prepared for torrential rain events
Water infiltration plan
Water infiltration plan

Stormwater Pollution Prevention Plan (SWPP) Development

• Site assessment and planning
• Selecting erosion and sediment control BMP’s
• Selecting good housekeeping BMP’s
• Inspections, maintenance and recordkeeping

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Sediment control practices

Before

Source: Michael Widdekind, The Zurich Services Corporation.

Source: Michael Widdekind, The Zurich Services Corporation
Sediment control practices

After

Source: Michael Widdekind, The Zurich Services Corporation.

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Elevation of materials and equipment off the floor and ground

Skid ductwork off the floor

Source: Michael Widdekind, The Zurich Services Corporation.
Elevation of materials and equipment off the floor and ground

Elevate process piping and sprinkler off the floor

Source: Michael Widdekind, The Zurich Services Corporation.
Elevation of materials and equipment off the floor and ground

Elevate piping in laydown area and inside building

Source: Michael Widdekind, The Zurich Services Corporation.
Emergency power considerations

• Portable generators
• Fuel properly stored for the generators
Before hurricane season begins

- Review the hurricane plan. Make sure it is current.
- Verify there is a designated person on site at all times during hurricane season with the authority to implement the hurricane emergency action plan. This includes ordering process shutdowns and facility evacuations.
- If responsibilities are assigned to specific individuals, update the assignments if positions or personnel have changed.
- Make sure dedicated hurricane supplies and equipment are on hand. Order replacement materials as needed.
- Maintain a roofing company under contract to respond quickly should repairs be needed before or after a storm. Having a contract in place will allow faster access to critically needed repair services.
When a hurricane watch is issued – 36 hours before a hurricane

• Check building roofs. Make repairs to coverings and flashing as needed.
• Remove loose equipment and debris from roofs.
• Verify roof drains are clear of obstructions.
• Fill fuel tanks serving emergency generators and other vital services.
• Verify dewatering pumps are in-service and working.
• Verify outside drains and catch basins are clean.
When a hurricane watch is issued – 36 hours before a hurricane

- Remove debris from outdoor areas.
- Remove loose, outdoor, inactive equipment.
- Back-up computer data.
- Ship out as much stock as possible and stop deliveries.
- Verify all stock is skidded at least 4 inches above the floor.
- Review construction projects. Remove loose equipment and temporarily brace new construction.
When a hurricane warning is issued – 24 hours before a hurricane

- Protect or relocate vital business records.
- Remove all loose outdoor storage or equipment.
- Anchor portable buildings or trailers to the ground.
- Secure outdoor storage or equipment that cannot be moved.
- Begin installation of manual protection systems (e.g., shutters, plywood covers and flood gates).
- Raise critical equipment off floors.
When a hurricane warning is issued – 24 hours before a hurricane

- Move critical equipment from below grade areas.
- Cover critical stock and equipment with waterproof tarpaulins.
- Initiate an orderly shutdown of production equipment and systems that rely upon normal power.
- Turn off fuel gas services.
- Turn off non-essential electrical systems.
- Verify all fire protection systems are in service (e.g. water supplies, fire pumps, sprinklers, fire alarms and special extinguishing systems).
Preparedness measures
Laydown area and material securement

- All ditches backfilled
- All jobsite, signage removed
- Electrical junction boxes and panels protected
- Equipment secured
- Exterior fence intact and weighted
- Exterior scaffold planking removed and secured

Source: Michael Widdekind, The Zurich Services Corporation

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Building interior

• All electrical shrink wrapped
• Debris netting removed and secured
• Elevator and stairwell lobbies free of debris
• Scaffold planks removed and secured
• Scaffolds secured

Source: Jim Wills, Gilbane
Building interior

- Loose formwork secured / weighted
- Perimeter guardrails secured to deck
- Pump in place for drainage
- Reshoring laced
- Roof debris removed
- Roof drains open and operational

Source: Michael Widdekind, The Zurich Services Corporation
Job trailers and office areas

- Computers elevated off floor
- Electronic equipment protected
- Gates secured
- Power disconnected to overall jobsite
- Power disconnected to temp. facilities
- Tie-downs in place
- Water shutoff
- Windows secured

Source: Jim Wills, Gilbane
Crane safety operations

Five basic causes of crane accidents:

- Operations
- Assembly/disassembly
- Rigging
- Maintenance
- Weather

Source: Jim Wills, Gilbane
Crane preparedness

- For crawler crane, lay boom down
- For tower crane, remove all banners, retract trolley and allow to weathervane
- Follow manufacturer’s guidelines
Preparedness strategies review

• Flood protection
• Electronic data backup and access
• EOP
  ✓ Drill often
  ✓ Monitor storm conditions
  ✓ Pre-storm building envelope assessment
  ✓ Pre-storm grounds, including storm water drain and catch basin assessment
  ✓ Monitor temporary sediment controls
Protect high valued equipment

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Source: Michael Widdekind, The Zurich Services Corporation.
Flood protection

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(photo courtesy of Presray Corporation)

(photo courtesy of Presray Corporation)
Hesco Barrier

Source: Jim Wills, Gilbane

Source: Jim Wills, Gilbane
Flood protection

Sand bags should be used as a last resort

Source: Michael Widdekind, The Zurich Services Corporation.
Flood protection

Portable pumps should be automatic not manual

Source: Michael Widdekind, The Zurich Services Corporation.
Wind concerns – rooftop equipment

Source: Michael Widdekind, The Zurich Services Corporation

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Response and recovery
Getting employees back to work quickly

- Verify all job site employees are credentialed
- If some employees will remain on site during the storm:
  - Verify a secure location has been established
  - Anticipate 96 hours of supplies
  - Establish emergency communications
Getting employees back to work quickly

Encourage employees to prepare their families at home

• Give them time to prepare
  • www.ready.gov
  • https://sbpusa.org
Response and recovery strategies

- Vendor agreements and MOU’s
- Employee / vendor credentialing and site security
- Accounting documentation
- Get help to manage the loss during continued operations
- Building envelope evaluation
Response and recovery strategies

Accounting documentation

- Setup separate accounting codes to track loss expenses
- Maintain project term of business income reports (financials)
- Up-to-date asset run of equipment
- Equipment vendor contact list
Response and recovery strategies

• Get help to manage the loss during continued operations
• Consider the following drop-in team to assist your facility during a loss
  ✓ Accountant
  ✓ Facility engineer
  ✓ Risk manager
  ✓ Safety officer
• Your facility staff already have a full time job running the day to day operations
• The drop-in team can assist with managing the loss
After the storm - what happens when water gets into the building

- Critical interior features can be damaged as wind-driven rain enters and spread downward by gravity.
After the storm - what happens when water gets into the building

<table>
<thead>
<tr>
<th>What can wind driven rain damage?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interior finish</strong></td>
</tr>
<tr>
<td>Drywall, woodwork, paint, wallpaper, flooring</td>
</tr>
<tr>
<td><strong>Contents</strong></td>
</tr>
<tr>
<td>Storage, machinery, medical diagnostic equipment, computers, files, furniture, laundry equipment, kitchen equipment</td>
</tr>
<tr>
<td><strong>Wiring systems</strong></td>
</tr>
<tr>
<td>Transformers, switchgear, telephone, fire alarm, network, door lock, cable TV</td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
</tr>
<tr>
<td>Elevators, electrical, generators, elevators, boilers, chillers, fire pumps, domestic water pumps</td>
</tr>
</tbody>
</table>
After the storm

• Electric power interrupted
• Emergency generators stop due to
  ✓ Wind driven rain carried over into air intakes
  ✓ Consuming a limited fuel supply
• No HVAC
• No humidity control
• Mold
• Delayed building access
  ✓ Civil authority, flooding, debris, downed power lines
• If elevators are lost, so is vertical access to the building for repairs
• Repairs cannot begin until
  ✓ Elevators are restored to service
  ✓ The building is dry
Summary

A hurricane and flood plan should be quick, simple and practiced.

- **Quick** means the plan must fit into a reasonable timeframe. A reasonable timeframe will begin no more than 48 hours before estimated hurricane landfall and needs to wrap up with sufficient time to allow for personnel evacuation. For example, if a location requires more than two days to install shutters on windows, it is probably best to leave the shutters in place during hurricane season.

- **Simple** means a series of checklists to facilitate implementation. The checklists should be backed up with more detailed documentation as needed; however, keep in mind that as a hurricane approaches or flooding is expected, no one will have time for the details.

- **Practiced** means you have actually conducted a full-scale implementation test of your plan. You know how many people are needed, you know what tools and supplies are needed, and you know how long each task will take. In short, you know the plan will work because you have tried it.
References

• Plan Ahead for Disasters, https://www.ready.gov/
• SBP, https://sbpusa.org/
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