Aftermath of Sandy:

Will you be prepared for the next super storm?

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Introduction

Out of Business! Three words that no one wants to hear – not business owners, managers, employees, customers or our communities. The impact of a company going out of business is often devastating – on families, communities, and society. Forces that drive a company out of business are varied, including competition, obsolescence, and loss of resources. This paper will examine another of these forces – going out of business due to inadequate planning to respond to natural hazard events.

Destruction from recent super storm Sandy was unprecedented, resulting in loss of life as well as loss of billions of dollars from damage to properties and community infrastructure. Even more recently, the Northeast was hit by a significant snow event, Storm Nemo, that caused similar disruptions. Although recovery and restoration efforts are now underway, it will take years for many affected businesses to recover from the massive destruction caused by Sandy. Some will never recover!

"Destruction from recent super storm Sandy was unprecedented, resulting in loss of life as well as loss of billions of dollars from damage to properties and community infrastructure"

Many impacted businesses were small to medium sized concerns operating in the tri-state NY/NJ/CT area. Lessons from Sandy showed that many of these businesses were ill-prepared to respond to the disaster and implement recovery tasks in a timely basis. Many businesses lacked effective disaster response and business continuity plans. Gaps and vulnerabilities were evident in planning for disruptions in communication, power outages, employee transportation, information technology systems, availability of alternate temporary locations and site remediation.

Most disturbing is that many losses from natural hazards are either preventable or can be greatly reduced. Everyone knows the famous quote from Benjamin Franklin about "an ounce of prevention is worth a pound of cure", yet many businesses fail to adequately prepare for a disaster.

Two primary messages

The information provided in this paper can be summarized in two points:

- **Prepare a Plan using the many resources available**
- **Execute your Plan in a timely and safe manner**

Obstacles to Action

Many businesses do not adequately prepare for natural disasters, even though company executives recognize the seriousness of the exposure. Why do we fail to take the threat seriously? Why do we underestimate the risk, and /or overestimate the protection? We can offer several explanations:

- **Denial** – it won't happen to me, or it won't happen here. A failure to acknowledge the risk.
- **Invincible** – we've withstood severe storms in the past with little or any damage.

- **Improper Logic** – the 100 year flood happened last year, so it won't happen again for 99 years.
- **Improper Reliance** – insurance and/or the government will protect our assets and make us whole.
- **Improper Rewards** – short term vs. long term. We invest in things that provide a real short term return rather than a possible long term benefit.
- **Improper Focus** – reliance on disaster recovery rather than proactive loss prevention and mitigation.

Other factors add to inaction:

- **Unfamiliarity** – our natural tendency is to focus on what we know. Managers focus on business needs, shying away from unfamiliar loss control concepts and programs.
- **Complexity** – the ability to mitigate natural hazards can involve complex decisions, tasks, and equipment. For example, we can be overwhelmed with the options involved in providing emergency power (permanent vs. temporary, size of the generator, type of fuel supply, etc.). No decision becomes easier than any decision.
- **Fear** – we become afraid to do the wrong thing, so we do nothing.

Still, those companies whose leaders recognize the potential impact of natural hazard events on their operations, and who proactively adopt meaningful mitigation measures, have a competitive advantage. These companies will not hang an "Out of Business" sign on their door due to inadequate planning to deal with natural disasters.

Moving Forward – Taking Steps to Prepare for the Next Storm

This guide is offered to encourage businesses to take action. It offers short term, easy to implement suggestions, as well as long term recommendations requiring more detailed planning and expense. Since each business and facility is unique, you should use this guide for ideas in developing plans specific to your own situation.

Protecting business from the impact of natural hazard events is a dynamic subject. Detailed protective measures are beyond the scope of this document, and in fact are changing daily. Still, we've included a list of additional references for those who wish to go beyond adopting the most basic loss mitigation measures. A good source of information is **"Zurich easy-tough guide to starting a hurricane emergency action plan"** which is available at www.zurichna.com

Disaster Recovery and Business Interruption Plans

Experience has shown that damages and losses from severe windstorms, floods, and other natural events can be prevented or reduced when organizations develop plans that address actions to take before, during and after the storm. Organizations that have no plans suffer the worst losses.

Create an Emergency Response Plan that takes into account the worst case scenario for your facility and recheck your assumptions. The wrong time to find out that your plan to protect against a two-foot flood event is after there is three feet of water in your parking lot. Appendix I provides ten actions to take when faced with an imminent storm. Appendix II offers an outline of key elements of an Emergency Response Plan.

Several resources are available to create and customize a plan to your own situation. The key to success is to keep the plan simple and modular to implement in an emergency. Don't forget to review, test and update the plan at least once a year. One good source of templates for creating a disaster recovery plan is found at the Disaster Safety website (http://disastersafety.org/open-for-business/).

"Experience has shown that damages and losses from severe windstorms and floods can be prevented or reduced when organizations develop plans that address actions to take before, during and after the storm."

The plan should identify emergency response team members and maintain contact information for all key internal and external contacts including utilities, vendors, suppliers and contractors. Make prior contractual arrangements for specialist contractors, including suppliers of emergency equipment such as generators and dewatering pumps and IT hot sites for backup operations.

The plan should also identify critical equipment, vulnerable stock inventory, critical business records and strategies to relocate or protect them in case of a flood or other emergencies. No plan is complete without an emergency communication plan and alternate means of communication during emergency.

Businesses affected by natural hazard events often suffer business interruption losses equal to, and many times greater, than physical damage losses. Your facility may not be able to operate as a result of an off-premises loss of power, or you may not be able to get critical supplies from vendors affected by the disaster. Have you considered how resilient your supply chain is? Hurricane Sandy taught us just how critical it is to include Business Interruption possibilities such as loss of power and employees not being able to commute to work as part of a comprehensive disaster recovery plan.

Some elements of disaster recovery plans should be emphasized:

- Senior management must actively and visibly support development of a meaningful plan. It takes money, resources, and cooperation throughout the organization to develop an effective plan. Create a team, rather than assigning responsibility for plan development to one individual. The team should build the plan on a month-by-month basis until a working document is complete, and then review the plan at least annually.

- Identify who has authority to activate the plan. These individuals must have the authority to make difficult decisions, which may involve shutting utility systems, relocating stock and equipment, and evacuating the premises.
- Develop alternate means of communication – phone and email. Break-downs in communication are consistently shown to be problematic from one disaster to another. Consider assigning alternate email addresses to employees and maintain directories of cell phone numbers. Discuss the need for a temporary off-site communications center. Some services that offer alternate communication capabilities include One Call Now (http://www.onecallnow.com/) or Send Word Now (http://www.onecallnow.com/).

Employee safety during clean-up and recovery

Post-disaster cleanup and recovery operations can be very hazardous to worker safety. Dangerous conditions include exposure to hazardous chemicals, fuel spills, electrical hazards, heat stress, working at heights, structural safety issues, mold exposure and confined space exposures. After Hurricane Sandy, many businesses could not resume operations due to chemical pollution from fuel oil tanks that were dislodged by floodwaters, or from cars parked in underground garages. Some buildings experienced pollution when flood waters entered through fuel fill lines. Filling fuel tanks before the storm may help keep these in place.

Although salvage and recovery operations may be undertaken by company employees, some of these tasks require use of contractors with specialized skills and knowledge. Salvage of telecom equipment, machinery, electronic data media and documents are highly specialized tasks that are better left to professionals.

Recovery and salvage activities should have a pre-plan and should prepare for the types of hazards and conditions likely to be encountered. This may require issuing personal protective equipment, such as hard hats, face masks, heavy work gloves and safety-toe boots. The plan should include provisions to shut off power and utility systems until competent professionals (e.g. electricians and/or utility companies) inspect and deem it safe to restore these. Many businesses faced extended delays because they did not have an electrician (on payroll or under contract) who could certify to the utility company that it was safe to restore electrical power.

Long term protection strategies

Some mitigation measures require additional investigation, planning and budgetary considerations and can be part of planned physical improvements to improve the resiliency of your building facilities and protection. With the increasing frequency of so called "one hundred year" weather events, stronger building codes, construction materials and methods are coming and should improve protection against flood, water infiltration and wind for new construction.

Existing buildings and structures will have to review their situation for retrofitting flood and wind protection. Many businesses have installed or are considering flood barriers around building perimeters and shutters for the windows and door openings. A list of long term control measures, along with sources of additional information, is provided in Appendix II of this document. Further, many excellent resources for additional information are available to assist you. The links to these resources are provided at the end of this paper.

Conclusion

With growing threat of destructive extreme weather events, all companies, be it a small, mid-size or a large company, will have to implement adaptive risk management strategies and improve their business resiliency. Although government has a role to play, businesses will have to educate themselves regarding the importance of disaster management and planning and take necessary steps to address their vulnerabilities. Faced with the prospects of an imminent storm event, it may be too late to develop a comprehensive response plan but you can still take some basic steps to protect your property and mitigate the potential damage. The survival of your business may depend on it.

"With growing threat of destructive extreme weather events, all companies, be it a small, mid-size or a large company, will have to implement adaptive risk management strategies and improve their business resiliency."

Resources

- Flood Gates, Barriers, and Doors
  http://floodbreak.com/
  http://www.floodcontrolam.com/
  http://www.totalfloodsolutions.com/
  http://www.presray.com/
  http://www.psdoors.com/flood-protection/
- NYS Energy and Gas "Emergency Generator Safety" guide: https://www.nyseg.com/MediaLibrary/2/5/Content%20Management/Shared/UsageAndSafety/PDFs%20and%20Docs/Combo%20Generator%20Safety%20Brochure.pdf
- Generator Manufacturers
  http://www.cummins.com/cmi/navigationAction.?nodeId=3&siteId=1&nodeName=Power+Generation+Business&menuId=1001

  http://www.generac.com/
- Salvage and Restoration Contractors
  http://www.servpro.com/
  http://www.ampmrestoration.com/
  http://www.alladinrestoration.com/
  http://www.maxons.com
- Alternate Communication Services
  www.onecallnow.com
  www.sendwordnow.com

Additional Information – Links

(Please note that design and mitigation efforts in accordance with these standards does not in any way indicate insurability)

1. Zurich Best Practices we offer our clients and brokers through www.zurichna.com.
2. Design Guide for Improving Critical Facility Safety from Flooding and High Winds (FEMA 543 Jan. 2007): http://www.fema.gov/library/viewRecord.do?id=2441
3. Flood Resistance of the Building Envelope (WBDG): http://www.wbdg.org/resources/env_flood.php?r=envelope
4. Flood Damage-Resistant Materials Requirements (FEMA TB 2 August 2008): http://www.fema.gov/library/viewRecord.do?id=1580
5. Protecting Building Utilities from Flood Damage (FEMA P-348 November 1999): http://www.fema.gov/library/file?type=publishedFile&file=p_348.pdf&fileid=d211eb30-cbd0-11df-8ed4-001cc4568fb6
6. Attachment of Rooftop Equipment in High-Wind Regions http://www.fema.gov/library/file?type=publishedFile&file=fema549_apndx_e_ra6.pdf&fileid=901b7f70-0315-11dc-a1f1-000bdba87d5b
7. Hurricane Preparedness Planning for Business (Texas Department of Public Safety May 2003): http://www.txdps.state.tx.us/dem/documents/plans/hurr_planning_businesses.pdf
8. Open for Business – Disaster Planning Toolkit for Small to Mid-Size Businesses (IIFB&HS): http://disastersafety.org/open-for-business/
9. Disaster Safety Resources for Small to Mid-Size Business (IIFB&HS): http://disastersafety.org/
10. Inspectapedia - Inspection Guidelines for after the disaster: http://inspectapedia.com/Disaster_Aid/Disaster_Services.htm
11. Applied Technology Council: Field Manual: Safety Evaluation of Buildings After Wind Storms and Floods https://www.atcouncil.org/downloads/atc-45-placards.html

APPENDIX I – Top Ten Actions:

Steps to take, when faced with the prospects of an imminent storm event and it is too late to develop a comprehensive response plan.

1. Review your plan (if you have one) and implement steps to be taken from when the storm is imminent.
2. Inspect and fortify building envelop against potential wind damage and water infiltration, including clearing roof drains, securing roof mounted equipment, removing potential wind/water missiles, installing window shutters and sandbagging.
3. Be prepared for an extended power outage by ensuring adequate fuel supply and testing the backup emergency generator. Protect the generator if located in flood-prone lower level or basement.
4. Raise or relocate vulnerable stock and critical equipment to higher level when possible.
5. Fuel up and relocate vehicles to higher grounds if located in flood-prone areas.
6. Fully charge all cell phones and radios and remind employees about emergency communication including alternate communication plan.
7. Contact and make pre-arrangements with salvage and recovery specialists.
8. Check emergency equipment and supplies.
9. Make plans for an orderly shutdown of hazardous processes, utilities and sewer backflow preventer
10. Back up all critical computer data and make arrangements for an alternate back up site if necessary.

APPENDIX II – The Emergency Response Plan

Emergency Response Plans - Important Considerations

Damages and losses from severe storms can be prevented or reduced with plans that address actions to take before, during and after the storm. Organizations with no Emergency Response Plans suffer the worst losses.

Loss Mitigation Measures – Well Before the Storm

- General upkeep and maintenance of building exterior, including trimming of tree branches and cleaning of roof drains, should be part of routine maintenance measures. The integrity of windows and doors should also be reviewed.
- Have your roofing contractor check the condition of roof coverings and flashing. Verify rooftop equipment is secure and connections and fasteners holding equipment in place are not corroded. Add strapping or bracing to reinforce rooftop equipment (see Appendix II).
- Update lists of key participants, especially vendors you will call upon to assist with salvage and recovery efforts.
- Evaluate the need and availability of emergency power supplies. See additional information in the Resources section below.

Examples of steps to take when the storm is imminent – 12 to 24 hours

- Plan for business shutdown and evacuation if the situation demands. Remind employees about the emergency communication protocol, including instructions to monitor email, web-sites, and phone number for information status updates
- Review your emergency actions checklist. Considerations should include:
  - Check roofs to ensure drains are clear and roof-mounted equipment is securely attached.
  - Raise stock, supplies and contents off floors to a location above flood levels.
  - Relocate critical equipment to area above flood level or off-site (computers, high valued stock)
  - Verify emergency equipment is available – sandbags, tarps, floodgates, pre-fitted windstorm shutters
  - Install flood-protection barriers.
  - Remove items from basement areas, especially chemicals and vehicles (to minimize pollution damage)
  - Check outside grounds for equipment, supplies and furnishings that can become airborne missiles. Move these indoors if possible.
  - Check nearby trees and trim to remove weak limbs.
  - If flooding is expected, shut off utilities (electric/gas) – done by competent personnel or vendors
  - Plan to provide facility security in case of a shutdown.

Examples of steps to take after the storm passes:

- Only qualified personnel should engage in post-event structural surveys to examine building features that could cause a shift or building collapse. The Applied Technology Council has a good guide called "Field Manual: Safety Evaluation of Buildings after Windstorms and Floods" - ATC-45 (see link below).
- Evaluate the site for hazards such as live electrical wires, leaking fuel gases, flammable liquids, hazardous chemicals, and broken glass or sharp metal objects. The Inspectepedia (Disaster Aid tab) website has guidance on a wide range of applicable topics. http://inspectapedia.com/Disaster_Aid/Disaster_Services.htm
- Once stability has been ensured, remove standing water and make repairs to fire suppression and detection systems if warranted. Then proceed with additional repair and salvage operations.
- Establish lines of communication.

APPENDIX III – Long Term Loss Control Measures

Some mitigation measures require more extensive investigation, planning and budgetary consideration. Several physical improvements to improve the resiliency of your facilities are outlined below, along with sources of additional information.

Flood

- Install Flood Barriers around buildings. The "Design Guide for Improving Critical Facility Safety" - FEMA, provides good guidance in this area.
- Use flood-resistant materials. These are floor, wall, and finish materials that are capable of withstanding direct and prolonged (72 hour) contact with floodwaters, without sustaining significant damage (requiring more than cosmetic repairs) below DFE. The "Flood Damage Resistant Materials" – FEMA, provides good guidance in this area.
- Relocate vulnerable utilities and equipment above flood zones. The "Protecting Building Utilities from Flood Damage" - FEMA, provides good guidance in this area.
- Permanently install automatic flood shields, window shutters and doors. Several links to suppliers of flood shields and doors is found below.
- Install waterproof sealants and coatings on walls, floors and equipment.
- Install backflow prevention valves and sump pumps. Backflow prevention valves are needed on sewer lines.
- Install separate electric circuits and ground fault interrupter circuit breakers in areas that will flood. Emergency measures should be provided so that electrical service can be shut down to avoid electrocution hazards.

Wind

Rooftop equipment and features such as skylights often form an integral part of the building envelope are vulnerable to wind damage. Air intakes and exhaust fans cover large openings in the building envelope. If forced from their curbs, the unprotected opening that remains can allow significant quantities of water to enter. Equipment dislodged by wind also becomes wind-borne debris that can damage the roof cover, skylights, or other building envelope features.

Roof Mounted Equipment

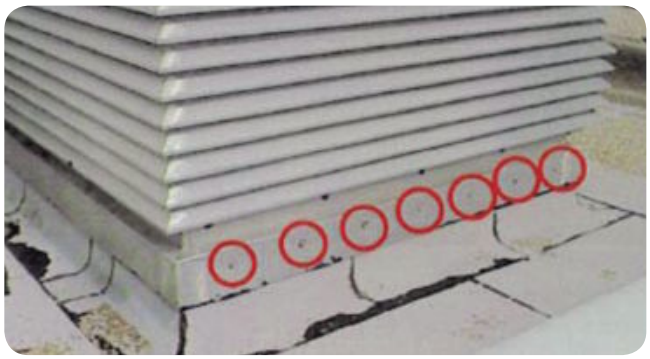
- Secure small roof top equipment such as stacks, exhaust fans and air intakes to resist expected wind loads. Exhaust fan cowlings and air conditioning condensers should be secured with wire rope or straps fastened to the stand, curb, or roof deck. Several screws should be used to attach straps.
  http://usasearch.fema.gov/search?query=securing+roof+equipment&op=Search&affiliate=fema

Use of securement straps – several fasteners should be used.
Source: Thomas Smith – TLSmith Consulting, Inc.

Source: Thomas Smith – TLSmith Consulting, Inc.

Where applicable, provide corrosion resistant fasteners not exceeding 6" on centers between the equipment, transition pieces, and the roof curb.

Source: Zurich Services Corporation



Source: Zurich Services Corporation

Roof Flashing

Roof-covering failures are common during severe windstorms. Many begin with a failure of the perimeter roof flashing that forms the weather seal between the roof cover and the building wall. A good practice is to inspect perimeter flashing and reinforce it with additional fasteners if necessary. This should be done by a qualified contactor to ensure appropriate materials are used.

Source: Thomas Smith – TLSmith Consulting, Inc.

Source: Thomas Smith – TLSmith Consulting, Inc.

A guide to improving roof flashing in high wind regions is found at this link. http://www.zurichna.com/NR/rdonlyres/43A9CE1F-8885-4611-AB73-33F0025B2EFA/0/guide_to_perimeter_roof_flashing_in_hurricaneprone_regions_rt_27013_20110930.pdf

Satellite dishes, lightning protection systems, electrical conduit, and piping can also become significant sources of damage to the roof cover and other building envelope features. Satellite dishes typically have a maximum design wind speed rating of 125 mph. In hurricane prone regions, hurricane emergency action plans should be expanded to include relocating satellite dishes inside before the hurricane. If the satellite dish frame is not secured to the building, it should be relocated inside with the dish.

Before High Winds.
Source: Thomas Smith – TLSmith Consulting, Inc.

After High Winds.
Source: Thomas Smith – TLSmith Consulting, Inc.

Protection of Openings

Windows and doors must be strong enough to not only withstand wind pressures acting on them during severe storms, but also be able to resist impact from windborne missiles. If building openings are breached, significant wind and water damage can occur, to the point of resulting in structural failure of the building. If the building is in a high wind region, at a minimum you should use protective barriers that can be quickly installed over doors and windows.

Where impact resistant glazing does not provide enough protection against high winds, additional protection may be needed. These might take the form of pre-installed mechanical storm shutters. The following guide provides some good guidance in this:

Protection of Openings – Shutters and Glazing from www.fema.gov

Source: FEMA

Metal panel shutter. The shutter is installed in a track permanently mounted above and below the window frame. The shutter is placed in the track and secured with wing nuts to studs mounted on the track. This type of shutter is effective and quickly installed, and the wing nut and stud system provides a secure anchoring method. Track designs that have permanently mounted studs for the nuts have been shown to be more reliable than track designs using studs that slide into the track.

Roof Inspections

Property owners can conduct basic self-inspections of their roofs to identify if any major deficiencies exist but must follow safe practices when performing checks of flashing securement. Check the flashing to see if it feels secure. If it feels loose it probably needs additional securement. Are there any skylights? If so, are they made of impact resistant glass or do they need shutters?

Can you see the underside of your roof? If the underside is a steel deck, look for fasteners, especially in the corners. If these are spaced more than 12" apart it is likely that additional fasteners are needed. Applying additional fasteners at the corners and perimeter of the roof can prevent it from peeling back. Fortunately, this is a relatively inexpensive fix that can add a great deal of protection to your building.

A comprehensive guide on Wind Safety of the Building Envelope, written by Tom Smith of TL Smith Consulting, can be found on the Whole Building Design Guide website: http://www.wbdg.org/resources/env_wind.php?r=envelope

Authors

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