Canadian Conservation Institute
Institut canadien de conservation

CCI Notes 14/2

Emergency Preparedness for Cultural Institutions: Identifying and Reducing Hazards

Introduction

Many disasters that have occurred in museums could have been prevented, or the damage greatly reduced, had the museum been prepared. Irreversible and total damage to collections must be avoided wherever possible.

A combination of seemingly insignificant factors, if left unchecked, may turn into a major disaster. It is therefore important to identify and assess all the potential risks and hazards that may affect your institution, and to take measures to prevent them or to minimize their consequences.

What is the probability of a certain risk occurring? How often is it likely to occur? What type of damage is likely or possible as a result of its occurring? How severe might this damage be? What degree of risk or loss is your museum willing to assume? Certain hazards, particularly those associated with construction and renovations, may change frequently. You may need to assess these hazards on an ongoing basis.

Following are some hazards that may threaten your institution or its collections. This list is meant to serve only as a guideline. Add or delete hazards from the list to fit your situation, and use the answers to these questions to assist in developing an emergency plan for your institution.

Temperature

Is your region subject to extremes or sudden changes of temperature?

How quickly will the temperature in your building reach an unacceptable level if the heating, air conditioning, or ventilation system fails?

Do you know which objects in your collection are sensitive to extremes or fluctuations of temperature?

Relative Humidity (RH)

Is your region subject to extremes or sudden changes of relative humidity?

How quickly will the relative humidity in your building reach an unacceptable level if the heating, air conditioning, or ventilation system fails?

Do you know which objects in your collection are sensitive to extremes or fluctuations of relative humidity?

Precipitation and Storms

Is your region subject to heavy or prolonged rain or snowfall?

Is flooding a possibility?

Could a storm or exceptional precipitation affect access of personnel or of essential and emergency services?

Could a storm or exceptional precipitation affect communications in your region?

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If your region is subject to hurricanes, tornados, severe electrical storms, ice, or high winds, do you know how to prepare your museum to minimize damage?

Seismic Stability

If your region is a high-risk area for earthquakes or earth tremors, do you know how to prepare your museum and collections to minimize damage?

Do you know your region's risk factor for earthquake intensity and frequency?

Could an earthquake cause the soil on which your building is situated to liquify?

Is your region volcanic?

Could the site of your building be affected by a mud or lava flow or by ash fall-out?

Could a "hot spot" at a higher elevation cause a mud slide or an avalanche?

Rivers and Lakes

Is your building situated in a flood plain?

Is the basement above flood level?

Is the basement above the water table?

Is the river tidal? Could a combination of heavy run-off and spring tides cause flooding?

Does the river/lake freeze in winter? Could an ice jam in the spring result in flooding?

Is there a dam upstream?

Have you discussed your situation with the river conservation authorities to ensure that they will warn you of any expected flooding or manipulation of water levels?

Coastal Sites

Is your building sufficiently above high-water levels to escape flooding even if a high tide coincides with a hurricane or with a severe onshore gale?

Is your waterfront secure from erosion?

Is any part of the museum, including docks and moored vessels, within range of wave-borne debris such as logs?

Is your location, particularly if it is on the Pacific Coast, sufficiently above sea level to escape a tsunami (a "tidal wave") resulting from seismic activity—not necessarily local?

Gradient and Drainage

Is your building on or beneath a steep slope? Could it be subject to an avalanche or a landslide caused by heavy precipitation, warming at a higher elevation, or earth tremors?

Could access routes or services be cut off by an avalanche or landslide?

Does rain water and melting snow drain away from the building or does it back up and "pool" against the building's foundation?

Flora and Fauna

Could access routes or services to your building be affected by a grass or forest fire?

Are any trees close enough to fall on the building during high winds or earth movements?

Do birds roost on the roof, on the eaves, or in the chimney of your building?

Is your building secure against the entry of rodents and small animals?

Access

Is your building situated in an isolated location?

Are roads to your building kept clear and well maintained for emergency services at all times?

Will large vehicles have trouble negotiating narrow roads, tight turns, or narrow or steep gradients on the way to your building?

Are there any low height clearances (e.g., old railway bridges, overpasses, or arches) that could impede access during an emergency?

Is the route to your building often impeded by parked vehicles?

Are there fire hydrants nearby? Are they accessible? Is water pressure adequate for fire fighting?

If your building is located in an isolated area, is there an alternative source of water (i.e., a lake or river) for fire fighting?

Commercial and Industrial Hazards

Would a fire, explosion, or structural collapse in an adjacent building affect your building or the access routes and services to it?

Are any hazardous materials manufactured, stored, used, or transported nearby?

Are any hazardous activities conducted nearby?

Is your building subject to vibration from traffic (road, rail, or air) or from nearby construction or blasting?

Is your building located near a nuclear power plant?

Is your building located beneath the flight path of an airport?

Building Structure

Is your museum an historic building? If so, it may be more prone to problems.

Are your building and the buildings around it earthquake resistant?

Has the building structure been inspected recently?

Are all building repairs and maintenance up to date?

Has lightning protection been installed? Has it been inspected recently?

Have chimneys been cleaned and inspected for obstructions recently?

If your building has a flat roof, is it watertight? Are roof drains kept clear? Is heavy snow accumulation removed regularly?

Are skylights or roof-access doors waterproof under high wind, heavy rain, or melting snow?

Are gutters and roof drains kept clear of leaves, nests, dead birds, and other obstructions?

If the roof drains are internal, can you trace them through the building? Are they accessible? Do you know where their access points are?

Are the drains and their access points marked on a diagram of the building?

Are the roof and attic secure against leaks and condensation? Are collections stored there?

Are workshop, laboratory, and kitchen drains equipped with appropriate grease and acid traps? Are they cleaned regularly?

Is the basement secure against flooding? If collections are stored in the basement, are they raised at least 10 cm to 15 cm (4 to 6 inches) off the floor?

Are basement drains adequate, unobstructed, and in good working order?

Does the building have water detectors in the basement or in other areas that may be prone to environmental or accidental flooding?

Does the building have an effective dampcourse (a barrier against rising moisture from the ground)?

Is the building well insulated?

Does the building have an effective vapour barrier?

Are downspouts long enough and located in such a way that water is carried away from the building?

Is the basement inspected during thaws and heavy rainfalls for signs of dampness, cracks, and leaks?

Are sinks and toilets checked at the end of each day to make sure they are not clogged or overflowing?

Are water pipes inspected regularly and any necessary repairs undertaken immediately?

Are there overhead pipes in any collections areas? If so, are the collections protected against leaks or breaks in the pipes?

Are copies of floor plans and blueprints readily available?

Are emergency exits well marked and equipped with emergency lighting?

Are emergency exits unobstructed, both inside and outside?

Is the building equipped with smoke detectors, heat detectors, fire alarms, portable fire extinguishers, and an automatic sprinkler system? Is this equipment inspected, tested, and maintained according to the manufacturer's specifications?

Are portable fire extinguishers replaced or refilled immediately after use? Are staff trained in their proper use?

Is the building's electrical system adequate and in good condition?

Does the building's electrical system comply with building codes?

Are the building's heating, ventilation, and air conditioning systems inspected and maintained regularly?

Essential Services

Are telephone numbers for the "Trouble Centres" of all essential services prominently displayed beside more than one telephone? Are these numbers checked and updated annually?

Have you a way to contact emergency and essential services if the telephones in your area are not functioning?

Do gas, water, and electrical services in your building comply with the appropriate codes?

Are utility services regularly inspected and maintained?

Do staff know the location of all master switches and turn-off valves for water, gas, and electricity, and how to operate them?

Are services to different parts of the building, and their "turn-offs", master switches, and valves, clearly marked on readily available diagrams?

If your museum is part of a larger complex, do you know which parts of the utility services are your institution's responsibility?

If a service fails, is there a back-up or alternate service?

Are any services dependent on another (e.g., electrically fired oil furnace, electrically powered water or drainage pumps)?

Do any services share common transmission routes (e.g., electricity and telephones sharing common conduits or power poles)?

Are all diagrams and drawings (e.g., blueprints and floor plans) up to date, and are additional copies safely stored off-premise?

Have you discussed your institution's special needs with the suppliers of essential services to ensure that service will be restored as soon as possible in the event of an outage or shutdown?

Safety and Security

Are the numbers of all emergency services (i.e., police, fire, ambulance) prominently displayed at all telephones?

Do you have a plan for calling the fire department and evacuating the

building if there is a fire? Have you practised it recently?

Have you discussed your institution's special needs with the police and fire departments and with your insurance company?

Has the Fire Chief toured your museum recently to advise on fire safety? Have you discussed the special needs of your museum in the event of a fire?

Have all shifts of the local fire department toured the museum recently to become familiar with the museum, its collections, and its activities? Are the firefighters aware of the presence and location of any hazardous materials and collections?

Has the Crime Prevention Officer of your local police department visited your museum to advise on ways of making it more secure?

Have you given a copy of your disaster plan to the fire and police departments, and also to your insurance and legal representatives, to ensure that the plan is safe, effective, and legal?

Are staff trained in the use of potentially hazardous equipment and materials?

Are staff trained in the correct use of fire extinguishing equipment?

If another organization uses part of your building, have you practical control over their activities?

If you depend on contract employees or on another organization for essential services such as security or maintenance, are they reliable individually? Collectively? Do you have practical control over their activities?

If your location is vulnerable to natural disasters, do you monitor marine weather forecasts, forest fire hazard alerts, etc.?

Are a battery-powered radio and spare batteries available?

Have you a way to bypass bureaucratic obstruction in an emergency or a threatened emergency?

Are staff, contractors, and visitors adequately supervised?

Are there staff members or others who are known to have malice towards the museum?

Could your institution or its collections be a target for protest groups?

Are political activities or demonstrations held in the vicinity?

Are you aware of local contingency plans for widespread disasters, acts of war, terrorism, or civil disturbances, and how they will affect your museum if implemented?

Hazardous Materials and Activities

Are any gasoline-powered tools (e.g., chain saws, pumps, generators, lawnmowers, snowblowers, outboard motors) or the fuel for them stored in the building?

Is any flammable-gas-powered equipment (e.g., gas stoves, welding equipment) stored or used in the building?

Are cylinders of flammable or explosive gases used or stored in the building?

Are work and workshop areas kept clean and hazard free (e.g., sawdust vacuumed up, trash removed, oily rags disposed of)?

Are all potentially hazardous chemicals and substances stored, used, and disposed of in accordance with appropriate safety standards?

Are "interpretive fires" such as fireplaces, cook stoves, oil lamps, candles, or blacksmith forges used in your museum? If so, are appropriate safety precautions taken? Are fire extinguishers kept nearby?

Is smoking prohibited in the building or restricted to designated areas?

Are extra safety precautions taken during construction and renovations—when the building is exposed to even greater risks?

Collections

If you have an industrial collection, has the entire fuel system of all internal combustion engines, including their lines, pumps, and carburators, been completely drained?

Have explosives (e.g., blasting caps, fuses, charges, flares, live ammunition, fireworks, military pyrotechnics), nitrate film, and other incendiary or flammable materials or objects in your collection been checked by the proper authorities and deactivated or disposed of accordingly? Has this information been recorded?

Do dangerous items in your collection, including medical and veterinary kits, poisoned darts, etc., have warning labels? Have these items been removed from exhibits, placed in locked cases, or otherwise made inaccessible to the public? Have the dangers of these items and any procedures taken (e.g., disposal) been recorded?

Are staff aware of the flammability and health risks associated with biological specimens preserved in alcohol or formaldehyde?

Do you have any cellulose nitrate film in your collections? If so, has it been copied onto another material by an experienced firm, and has the original been disposed of according to instructions from the fire department?

Have you prioritized your collections and essential records? Is this information readily available?

Is a duplicate set of all essential records kept off-premise?

If collections are stored in the basement, have you installed a moisture detector and raised the collections at least 10 cm to 15 cm (4 to 6 inches) off the floor?

Are collections that are stored directly under water pipes loosely covered with polyethylene sheeting to protect them from water leaks?

If your museum is located in a region of known seismic instability:

- Are storage units and display cases secured to each other and/or to structural members of the building? Have unit doors and drawers been secured closed to prevent them from flying open and spilling their contents?

- Have cases that are top heavy been weighted at the bottom to prevent them from toppling? If the cases are standing on a slippery surface, have they been equipped with non-skid pads on the bottom or have they been secured to the floor?

- Have collections in storage or on display been secured to keep them from toppling or rolling? Have collections in storage been secured and protected from each other by such means as compartmentalizing, tying, recessing into Ethafoam, padding, or wrapping in acid-free tissue?

- Have objects that are suspended (e.g., chandeliers, paintings suspended on wires or chains) or that have swinging parts (e.g., the pendulum of a grandfather clock) been secured to prevent them from damaging themselves or other objects?

Have you designated temporary storage and drying spaces that could be used if collections must be relocated quickly?

In the event of an emergency or a disaster, do you know how to assess damage to the collections? Do you know how to stabilize both the environment and the collections to prevent further damage?

Have you familiarized yourself and other staff with the correct procedures for handling and transporting damaged or wet records and objects?

Do you know which objects in your collections are particularly susceptible to water damage or to high relative humidity? Do you know what to do to inhibit mould growth?

If you do not have a conservator on staff, is CCI's telephone number (613-998-3721) displayed prominently in the event that advice is required for dealing with damaged collections?

Use the answers to these questions to assist in preparing an emergency plan for your institution.

Further Reading

Anderson, Hazel and John E. McIntyre. *Planning Manual for Disaster Control in Scottish Libraries and Record Offices*. Edinburgh: National Library of Scotland, 1985.

Barton, John and Johanna Wellheiser, editors. *An Ounce of Prevention: A Handbook on Disaster Contingency Planning for Archives, Libraries and Record Centres*. Toronto: Toronto Area Archivists Group Educational Foundation, 1985.

Forston, Judith. *Disaster Planning and Recovery*. New York: Neal-Schuman Publishers, Inc., 1992.

Upton, M.S. and C. Pearson. *Disaster Planning and Emergency Treatments in Museums, Art Galleries, Libraries, Archives and Allied Institutions*. Canberra: Institute for the Conservation of Cultural Material, 1978.

Copies are also available in French.

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