**Building Evaluation Guidelines**

**Structural instability**

The aftermath of an earthquake, explosion or high wind event may cause a variety of structural instability hazards for staff. These may include weakened walls, floors, columns, or beams that are incapable of supporting the remains of the structure. Secondary collapse of structural elements will be a major concern to staff working in areas supported by these weakened building parts.

Freestanding walls and damaged or loose chimneys can easily fall because of earthquake aftershocks and vibrations. In earthquake-prone areas, damage resulting from quakes will be highly vulnerable to further damage/collapse because of aftershocks.

Very often, structural stability is difficult to evaluate and requires the services of a structural engineer. Responders are encouraged to *stay out of buildings with questionable structural damage and contact structural engineers in their response areas to determine their availability if needed.*

**Overhead Hazards**

Evaluate the scene for overhead hazards that have the potential to fall and strike people. Overhead hazards may include loose debris and building components suspended overhead, ceiling tiles, walkway covers or dislodged bricks precariously perched on a broken wall assembly.

Damaged electrical wires hanging low or heavily tensioned and ready to fail may pose an electrocution danger, choking, and entanglement hazard.

**Interior Hazards**

Unsecured building contents such as file cabinets, refrigerators, and other furnishings can also create hazards should they fall over or on someone.

**Surface Hazards**

The environment may be full of sharp debris that can cause injury. This debris will differ depending on the building's construction and contents. Generally, staff may be faced with broken glass, nails, wood splinters, jagged metal, and rough masonry. Difficult footing will be common due to spilled fluids and pools of water and sewage. Ground fissures, depressions and uneven or unsecured walking surfaces around the collapse site will add to difficult footing which can potentially result in injuries to responding personnel.

Water and other liquids on the ground will obscure the view of the walking surface and reduce friction, potential electrocution if contacting an energized power source and drowning if the water is deep. Liquids may also cause hypothermia problems for rescuers and victims, add additional weight to structural elements and debris and softens the ground supporting structural elements and debris. DO NOT ENTER BUILDINGS WITH STANDING WATER INSIDE.

Rescuers must be aware of the potential for downed or exposed live electrical wires. **All wires and conduits must be considered live until confirmed otherwise.**

Additional potential surface hazards include open manholes resulting from flooding, or ground-level openings created by the force of the collapse. Fallen trees and utility poles blocking roadways may cause access problems for responding apparatus and personnel.

**Below-Grade Hazards**

These hazards will occur in areas such as basements, underground parking garages, or low lying void spaces. The potential exists in these areas for the accumulation of atmospheric hazards due to ruptured natural gas lines or spilled chemicals. Contaminated atmospheres can be flammable, toxic, or oxygen deficient. Flooding from broken water or sewer lines may also cause difficulties for staff.

**Utility Hazards**

The most common utility types include natural gas, propane, electrical, steam, water, and sewage. When these utilities are disrupted, they will cause serious safety hazards. These will include electrocution and fire hazards from broken electrical wiring, and explosion hazards from broken natural gas and/or heating fuel lines. Disrupted steam lines can cause burns to rescuers exposed to them. Sewage from broken sewer lines can release toxic gases such as hydrogen sulfide or methane, and can expose rescuers to bacteria.

**Hazardous Materials**

Hazmat poses a significant present or potential hazard to human health or safety, or to the environment if released.  Common examples are flammables such as gasoline, corrosives such as hydrochloric acid and toxics such as pesticides.

The type of building affected and its normal contents will help to identify potential hazardous materials thatmay be released during a collapse. Staff must be aware of this potential at residential dwellings as well commercial establishments.

**Other Hazards**

Staff may face additional incident hazards that do not fall into any previously listed categories. Some of these hazards are related to the cause of the damage, and others are actually created by our own actions.

It is important for staff to realize that a damaged structure will be much more susceptible to fire after an earthquake and much harder to extinguish.

Particulate matter such as smoke, concrete dust and asbestos must be recognized and appropriate personal protective equipment (PPE) must be worn to prevent this material from entering the respiratory system. Exposure to particulate matter can cause immediate and long-term problems if not appropriately mitigated.  The type of N95 masks, used in CERT training, are not designed for long term exposure to particulate matter.

Staff may be faced with several hazards created by their own actions such as operating internal combustion engines and power tools within confined areas and contaminating the atmosphere.

Vibrations from various sources are a safety concern, because these can cause a collapse of unstable building parts. Vibration sources can include:

* Rail traffic, such as trains and subways
* Vehicular traffic on nearby roadways
* Air traffic or helicopters over the site
* Heavy construction equipment, generators and power tools
* Responding fire and rescue apparatus

Equipment noise can drown out communication, victims’ calls for help and other sounds that could warn rescuers of changing conditions inside a structure.

Operators with an obstructed view while backing or turning could run into damaged structures and over rescuers.  *A secondary collapse can be caused by lifting, pulling or removing structural components with heavy equipment, such as a vehicle,*

**Hazard Guidelines**

GAS LEAKS – If you smell gas or hear a blowing or hissing noise, open a window and quickly leave the building. Turn off the gas, using the outside main valve if you can, and call the gas company. If you turn off the gas for any reason, it must be turned back on by a professional.

ELECTRICAL – If you see sparks or broken or frayed wires, or if you smell buring insulation, turn off the electricity at the main fuse box or circuit breaker. If you have to step in water to get to the fuse box – STOP. Call an electrician for advice first.

SEWAGE/WATER – If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap.

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| ***Always do a 360 degree check of the building before entering.*** | |
| **If Structural Damage Is…** | **Building Status is...** |
| **Light:**  **Superficial damage, broken windows, fallen or small cracks in plaster, minor damage to contents** | OK to enter |
| **Moderate:**  **Visible signs of damage to decorative architecture**  **Many visible cracks in plaster**  **Major damage to contents**  **Controllable gas leaks**  **Foundation intact**  **Ground rupture – slight (buckled sidewalk)** | Carefully enter to QUICKLY remove any items needed for the EOC, then exit and go to an alternate EOC. |
| **Heavy:**  **Partial or total collapse**  **Tilting**  **Obvious structural instability**  **Heavy smoke or fire**  **Uncontrollable gas leaks**  **Rising or moving water**  **Moved off foundation**  **Change to horizontal and vertical lines**  **Paint lines**  **Large cracks from corners of windows at 45 degree angle**  **Large cracks around doors or large windows.**  **Large cracks about 1’ above the sidewalk at foundation level**  **Ground rupture - severe** | Secure the building perimeter and warn others about the danger of entering the building.  DO NOT ENTER UNDER ANY CIRCUMSTANCES. |