APPENDIX A

NONSTRUCTURAL INVENTORY FORM

Facility: _____ **Assumed Intensity:** _____

Priority	Nonstructural Item	Location	Quantity	Risk			ER	Estimated Upgrade Cost		Notes
				LS	PL	LF		Per Item	Subtotal	
								Total		

LS (Life Safety) PL (Property Loss) LF (Loss of Function) ER (Engineering Required) L (Low) M (Moderate) H (High)

Inventory Form

Facility: XYZ Office **Assumed Intensity:** Severe

Priority	Nonstructural Item	Location	Quantity	Risk			ER	Estimated Upgrade Cost		Notes
				LS	PL	LF		Per Item	Subtotal	
2	Air conditioner	roof	1	H	H	M	X	$500.00 (estimated)	$500.00	Sits on springs; no seismic restraints
1	Suspended ceiling	throughout	5,000 sq. ft.	H	H	H	X	$50.00 (per strut)	$4,000.00	No diagonal wires
5	Water heater	utility room	1	M	M	M	X	$200.00 (each)	$200.00	Gas fired; no flexible pipe no anchorage
4	Tall shelving	storage room	40 lin. ft.	H	M	M	X	$20.00 (per lin. ft.)	$800.00	*Low priority, contents not essential; unanchored; 8 ft. high
6	Half-height partition	work stations	20 (6' each)	M	M	M		$10.00 (per lin. ft.)	$1,200.00	Stable layout (has returns)
3	Suspended lights	offices	50	H	M	M		$50.00 (each)	$2,500.00	Fixtures just rest loosely on ceiling grid
								Total	$9,200.00	

LS (Life Safety) PL (Property Loss) FL (Loss of Function) ER (Engineering Required) L (Low) M (Moderate) H (High)

Sample Inventory Form

APPENDIX B

CHECKLIST OF NONSTRUCTURAL EARTHQUAKE HAZARDS

How to Use This Checklist

This checklist is intended to be used in surveying buildings to assess whether the nonstructural elements (electrical, mechanical, architectural, and furniture or contents) pose a danger to the building occupants or are likely to cause financial loss or interruption following an earthquake. The questions in this form have been stated in such a way that a "NO" answer indicates there may be a potential problem with the item. Write "**Y**" for Yes and "**N**" for No in the box provided. The list may be used in conjunction with the nonstructural inventory form provided in Appendix A. As an example, a line item in the inventory form should be created for each instance where a question in this form is answered "NO".

BUILDING UTILITY SYSTEMS

EMERGENCY POWER-GENERATING EQUIPMENT

Emergency power-generating equipment generally consists of the following components:

U1. Generator

☐ Is the emergency generator adequately secured, especially if mounted on motor vibration isolation springs?

U2. Batteries, battery rack *[See Example U2]*

☐ Are the batteries securely attached to the battery rack?
☐ Is the battery rack cross-braced in both directions?
☐ Does the battery rack have anchor bolts secured to a concrete foundation pad?
☐ Is the foundation large enough to keep the rack from sliding or tipping?

U3. Diesel fuel tank *[See Example U3]*

☐ Is the tank securely attached to the supports?
☐ Are the tank supports braced in both directions?
☐ Is the bracing attached with anchor bolts to concrete walls or foundation pad?
☐ Is the foundation large enough to keep the tank from tipping over or sliding?
☐ Is the wall strong enough to support the tank?

U4. Fuel line, cooling water lines, exhaust flues

☐ Are these lines attached with flexible connections that are able to accommodate relative movement at junctions to spring-mounted equipment, at building entry and exit points, and at expansion joints within the building?

ELECTRICAL EQUIPMENT

The emergency power system includes both power-generating equipment and the electrical distribution system:

U5. Transformers

- ☐ Are transformers properly anchored to the floor or wall?

U6. Motor Control Center (MCC)

- ☐ Are the motor control centers properly anchored to the floor or wall?

U7. Electrical switchgear

- ☐ Is the switchgear properly anchored to the floor or wall?

U8. Electrical bus ducts and primary cable system *[See Example U8]*

- ☐ Are electrical cables or conduit able to distort at the connections with the equipment or where they cross seismic joints between buildings?
- ☐ Are the bus ducts or cable conduits laterally braced?

*(**Caution**: Only qualified personnel should open access panels on electrical equipment).*

FIRE DETECTION AND SUPPRESSION SYSTEM

The fire detection and suppression system may include any or all of the following components:

U9. Smoke detectors, fire alarm system, control system for automatic fire doors

- ☐ Are fire and smoke detectors properly mounted?
- ☐ Is the control equipment for the fire alarm system and automatic fire doors securely anchored?

U10. Fire extinguisher or fire hose cabinets *[See Example U10]*

- ☐ Are the fire extinguisher cabinets and/or hose cabinets securely mounted?
- ☐ Are the fire extinguishers secured with quick-release straps?

U11. Fire sprinklers and distribution lines

- ☐ Are the fire sprinkler piping components laterally braced?
- ☐ Is the ceiling braced so the ceilings won't break the sprinkler heads?
- ☐ Are the distribution lines able to accommodate movement where they cross seismic joints between buildings?

U12. Fire water pump

- ☐ Is the fire water pump anchored, or is it mounted on vibration isolation springs with additional seismic restraints?

U13. Emergency water tank or reservoir

- ☐ Is the water tank or reservoir securely attached to its supports?
- ☐ Are the tank supports braced in both directions?
- ☐ Are the supports or braces properly anchored to the foundation?

U14. Smoke control systems

- ☐ Are the fans properly braced and/or anchored?
- ☐ Are fan control centers securely anchored?

PROPANE TANKS

Propane tanks may be used for backup power, heating, or cooking. These systems include:

U15. Propane tank *[See Example U15]*

- ☐ Is the tank securely anchored to the supports?
- ☐ Are the tank supports braced in both directions?
- ☐ Are the supports or braces anchored to a concrete foundation pad?
- ☐ Is the foundation large enough to keep the tank from sliding or tipping over?

U16. Shut-off valve

- ☐ Does the system have an automatic, earthquake-triggered shut-off valve?
- ☐ If the shut-off is manual, is a wrench stored within easy reach?

U17. Gas or fuel supply pipe

- ☐ Are the supply pipes laterally braced?
- ☐ Do the pipes have flexible connections at the tank that are able to accommodate relative movement?

PLUMBING SYSTEM

The plumbing system may include:

U18. Gas-fired water heater or boiler

- ☐ Are the water heaters or boilers securely anchored to the floor or wall?
- ☐ Does the gas line have a flexible connection to the water heater that is able to accommodate movement?

U19. Residential water heater *[See Examples U19a and U19b]*

- ☐ Are the water heaters securely anchored to the floor or wall?
- ☐ Does the gas line or electrical conduit have a flexible connection to the water heater that is able to accommodate movement?

U20. Distribution pumps

- ☐ Are the distribution pumps anchored, or are they mounted on vibration isolation springs with additional seismic lateral restraints?

U21. Hot and cold water pipes, hot water return, wastewater pipes *[See Example U21]*

- ☐ Are the pipes laterally braced at reasonable intervals?
- ☐ Do the pipes have flexible connections to boilers or tanks that are able to accommodate movement?
- ☐ Are the distribution lines able to accommodate movement where they cross seismic joints between buildings?
- ☐ Are pipe penetrations through structural walls or framing members large enough to allow for some seismic movement?
- ☐ Are the pipes free of asbestos insulation that could be damaged by movement in an earthquake?

ELEVATORS, ESCALATORS

The transport equipment generally includes:

U22. Elevator cab

☐ Is the elevator cab properly attached to the guide rails?

U23. Cables, counterweights, and guide rails (for cable-traction systems)

☐ Are the cables installed in such a way that they are protected against misalignment during an earthquake?

☐ Are the counterweights properly attached to the guide rails?

☐ Are the guide rails securely attached to the building?

U24. Elevator motor and motor control cabinets

☐ Are the motor and motor control cabinets properly anchored?

U25. Elevator cab and hydraulic elevator equipment (hydraulic systems)

☐ Are the components of the hydraulic system properly anchored?

U26. Escalator

☐ Is the escalator control equipment securely anchored?

U27. People mover (moving walkway)

☐ Is the control equipment for the people mover properly anchored?

*(**Caution**: The moving parts or components of these systems need to be evaluated by qualified personnel. Inappropriate seismic restraints may compromise the safe operation of these systems.)*

HEATING, VENTILATING, AIR CONDITIONING (HVAC) SYSTEM

The HVAC system may include any or all of the following components, depending on the size of the facility:

U28. Boilers and furnaces

☐ Are boilers and furnaces securely anchored with adequately sized bolts?

☐ Are furnaces, and furnace or boiler bases, constructed without using unreinforced masonry?

U29. Chillers *[See Examples U29a and U29b]*

☐ Are chillers securely anchored, or are they mounted on vibration isolation springs with added seismic restraints?

U30. Heat pumps or heat exchangers

☐ Are pumps or heat exchangers anchored, or are they mounted on vibration isolation springs with added seismic restraints?

U31. Fans, blowers, filters

☐ Are fans, blowers, and filters securely anchored, or are they mounted on vibration isolation springs with added seismic restraints?

U32. Air compressors *[See Example U32]*

☐ Are air compressors anchored, or are they mounted on vibration isolation springs with added seismic restraints?

U33. Roof-mounted HVAC units

☐ Are the HVAC units securely anchored, or are they mounted on vibration-limiting springs with added seismic restraints?

U34. Wall-mounted room air conditioning units

☐ Are the air conditioning units securely mounted to the wall or shelf?

U35. Suspended room heaters or fans *[See Example U35]*

☐ Are the suspended room heaters, especially gas-fired ones, laterally braced, and are gas-fired heaters fitted with flexible gas connections?

U36. Distribution ducts *[See Example U36]*

☐ Are the distribution ducts laterally braced?

☐ Are the distribution ducts able to accommodate movement at locations where they cross seismic joints?

U37. Diffusers *[See Example U37]*

☐ Are the air distribution grills or diffusers anchored to adequately supported sheet-metal ducts or to the ceiling grid or wall?

☐ Do the diffusers have positive independent support, such as at least two hanger wires per diffuser?

MECHANICAL APPENDAGES

This category may include the following:

U38. Small stacks or residential chimneys *[See Example U38]*

☐ Is the brick chimney braced to the roof?

☐ Are stacks bolted to the supports or foundation by means of anchor bolts of adequate length and double nuts?

U39. Roof-mounted equipment, vents, or flues

☐ Is roof-mounted equipment properly anchored?

U40. Solar panels

☐ Are the solar panels securely anchored to the roof?

☐ Is the piping laterally braced?

ARCHITECTURAL ELEMENTS

BUILT-IN PARTITIONS

These may include elements of many different materials and construction types:

A1. Permanent block wall partitions (concrete masonry unit, brick, hollow clay tile)

- ☐ Are block wall partitions reinforced? (Most brick or hollow clay tile walls in pre-1933 California buildings are unreinforced. In other regions, unreinforced masonry elements may be found even in current construction.)
- ☐ Are concrete masonry unit (CMU) partitions detailed to allow sliding at the top?

A2. Partial- and full-height stud wall partitions *[See Examples A2a and A2b]*

- ☐ Are partial-height partitions braced to the structure above the ceiling line?
- ☐ If partitions function as lateral support for tall shelving or cabinets, are these partitions rigidly attached or braced to the structure above the ceiling line?

CEILINGS AND SOFFITS

A3. Ceilings (acoustic tile, gypsumboard, plaster) *[See Example A3]*

- ☐ Does the suspended ceiling have adequate diagonal bracing wires?
- ☐ Are decorative ceiling panels and/or latticework securely attached?
- ☐ For plaster ceilings, is the wire mesh or wood lath securely attached to the structural framing above?

A4. Soffits (stucco, gypsumboard, plaster)

- ☐ Are decorative finishes and/or latticework on beam soffits or beneath exterior eves securely attached, particularly over exits?
- ☐ For stucco soffits, is the wire mesh or wood lath securely attached to the structural framing above?

LIGHTING

A5. Suspended overhead lighting, fixed or track lighting *[See Examples A5a and A5b]*

- ☐ Do the lay-in fluorescent light fixtures have positive support, independent of the ceiling grid, such as at least two diagonally opposite hanger wires per light fixture?
- ☐ Do chandeliers or other hanging fixtures have safety cables to prevent them from impacting each other or a window?
- ☐ Do pendant or stem light fixtures have safety cables so they will not fall if the fixture sways and breaks the stem connection, or are they braced to prevent swaying?
- ☐ Are spot lights or track lights securely attached to resist seismic shaking?

A6. Emergency lighting and exit lights

- ☐ Are emergency lights and exit lights mounted to protect them from falling off shelf supports?

DOORS AND EGRESS ROUTES

A7. Primary exit doors

☐ If exit doors are heavy metal fire doors that might jam if the building racks during an earthquake, is there a crowbar or sledgehammer located near the exit to facilitate emergency exiting?

A8. Automatic doors with optical or floor sensors, mechanized roll-up doors

☐ Do these doors have a manual override in case of a power outage after an earthquake?

A9. Stairways *[See Example A9]*

☐ Do steel stairs in multistory buildings have sliding supports at one end that can accommodate interstory displacements?

☐ Have any unreinforced masonry partitions in stairwells been removed, strengthened, or encapsulated?

A10. Building utilities and architectural finishes along egress routes (piping, ducts, ceilings, lights, partitions, etc.)

☐ Are piping, ducts, ceilings, lights, partitions, and other elements braced adequately to prevent falling obstructions along egress routes?

A11. Furniture and/or contents along egress routes (cabinets, shelving, etc.)

☐ Are furniture and/or contents along the egress routes sufficiently anchored to prevent objects from obstructing the egress route?

☐ Are unanchored furniture and/or contents kept far enough from the exits so they will not slide and obstruct the doors?

WINDOWS

Note: The term *safety glass* means tempered, laminated, or wired glass; glass covered with shatter-resistant film; or plastic panels.

A12. Glazing *[See Example A12]*

☐ Is it known whether the glazing was designed by an architect/engineer to accommodate lateral movement?

☐ Do large windows, especially storefront windows, have safety glass?

A13. Overhead glazing or skylights

☐ Are transoms (glass panes over doors) made of safety glass?

☐ Are skylights made of safety glass or covered with shatter-resistant film?

☐ Are large panes made of safety glass, or is it known whether the glazing assembly was designed by an architect/engineer to accommodate the expected seismic distortion of the surrounding structure?

A14. Interior glass or glass block partitions

☐ Are the glazed partitions laterally braced to the structure?

PERMANENT ORNAMENTATION AND APPENDAGES : EXTERIOR OR INTERIOR

A15. Parapets, cornices, veneer or other decoration *[See Examples A15a and A15b]*

- ☐ Are parapets or cornices reinforced and adequately braced?
- ☐ Do other decorative elements have positive anchorage to the building?
- ☐ Does the veneer have positive anchorage to the building?

A16. Freestanding walls or fences (concrete, CMU, brick, or stone) *[See Example A16]*

- ☐ Is it known whether freestanding walls or fences were designed by an architect/engineer to resist lateral forces?
- ☐ Are CMU walls adequately reinforced with vertical bars set in grout-filled cells and horizontal bars embedded in the mortar joints?
- ☐ Is it known whether CMU walls or fences were built with adequate foundations to prevent them from tipping over in an earthquake?

A17. Hanging appendages

- ☐ Are hanging appendages braced or secured with a safety cable?

A18. Exterior lighting

- ☐ Are exterior light fixtures properly supported or securely attached to the structure?

A19. Flagpoles

- ☐ Are flagpoles securely attached to the structure?

A20. Tall sculptures (over about 5 feet)

- ☐ Are heavy or sharply pointed sculptures anchored to prevent overturning during an earthquake?
- ☐ Do hanging sculptures have a safety cable to prevent them from swinging excessively or falling?

A21. Heavy signs or exterior billboards *[See Example A21]*

- ☐ Are exterior signs or billboards adequately braced and anchored?
  Are interior signs securely attached with positive connections?

A22. Clay roof tiles

- ☐ Are clay roof tiles secured to the roof with one nail-and-wire connection per tile?

FURNITURE AND CONTENTS

COMMUNICATIONS EQUIPMENT

Communications and emergency communications systems may include:

C1. Radio and short-wave radio equipment

- ☐ Is radio equipment restrained to keep it from sliding off shelving or tabletops?

C2. Telephone, cellular phone, and fax equipment

- ☐ Is important equipment restrained to keep it from sliding off shelving or tabletops?
- ☐ Are telephones placed on desktops or counters far enough from the edge that they will not slide and fall off?

C3. Public address system

- ☐ Is the public address system restrained to prevent the equipment from sliding and falling off the shelving?

C4. Suspended speakers in conference room or auditorium

- ☐ Are sound system speakers in elevated locations anchored to the structure or hung with safety cables?

C5. Microwave equipment (antennae, receiver, transmitter, etc.)

- ☐ Is the microwave communications equipment securely braced and/or anchored?

C6. Computer networks, data storage

- ☐ Is computer information vital to operations backed up and stored off-site?
- ☐ Is critical computer equipment securely anchored to supports?
- ☐ Is sensitive computer or communications equipment located out of range of fire sprinkler heads or joints in the sprinkler pipes where they are less prone to water damage if the sprinkler lines break?

C7. Wall-mounted televisions or surveillance cameras

- ☐ Are wall-mounted televisions or surveillance cameras in elevated locations securely anchored to support shelves or brackets that are in turn adequately connected to the wall?

OFFICE AND COMPUTER EQUIPMENT

This category may include a broad range of equipment, such as:

C8. Large computer equipment, tape drives ***[See Example C8]***

- ☐ Are computers, tape racks, and associated equipment that is about twice as tall as wide, anchored, tethered, and/or braced?
- ☐ Is heavy computer equipment anchored to the structural floor slab and braced independently of the computer access floors?

C9. Computer cabling

- ☐ Is computer cabling long enough to accommodate lateral movement within the building?

C10. Desktop computer equipment or printers ***[See Example C10]***

- ☐ Are computer monitors anchored to desktops or computers?
- ☐ Are desktop computers and printers mounted with positive restraint, resting on high-friction rubber pads, or located far enough from the edges of desks and tables to prevent them from sliding and falling in an earthquake?

C11. Computer access floors ***[See Notes with Example C8]***

- ☐ Are computer access floors braced with diagonal steel members, or is it verified that the vertical pedestals are a seismically qualified model, installed in accordance with the manufacturer's recommendations?
- ☐ Do cable openings in the access floor have edge guards to prevent equipment legs from sliding into the openings?

STORAGE OF RECORDS AND SUPPLIES

Storage for files, accounting records, and emergency supplies may include:

C12. Bookshelves and library stacks 5 feet or taller ***[See Examples C12a, C12b, C12c]***

- ☐ Are bookshelves properly anchored with brackets to a solid wall or stud, or anchored to the floor?
- ☐ Are bookshelves fitted with edge restraints or elastic cords to keep books from falling?
- ☐ Are large and heavy books located on the lowest shelves?
- ☐ Are rare books given extra protection to prevent falling and water damage?

C13. Tall vertical or lateral file cabinets ***[See Example C13]***

- ☐ Do the file cabinet drawers or doors latch securely?
- ☐ Are tall file cabinets anchored with wall brackets to a solid wall or stud, anchored to the floor, or bolted to one or more adjacent cabinets to form a more stable configuration, i.e., a larger "footprint"?
- ☐ Are unanchored cabinets located so that they will not fall or slide and block an exit?

C14. Tall storage racks or shelving

- ☐ Are tall storage racks or shelves securely anchored to the floor or walls?
- ☐ Are heavily loaded racks or shelves braced in both directions?
- ☐ For racks significantly taller than wide, are large anchor bolts used to anchor each leg to a concrete slab?
- ☐ Are breakable items secured to the shelves or racks, or are they stored in stable units (e.g., are they shelved in the original packing boxes, or are small items shrinkwrapped together)?

C15. Emergency supply cabinet (water, medicine, food, etc.)

- ☐ Is the cabinet in an accessible location that is not likely to be heavily damaged?
- ☐ Is the cabinet properly braced and anchored, and are the cabinet doors securely latched?

C16. Especially valuable and fragile merchandise

- ☐ Are valuable or fragile items protected against tipping over or falling off shelving or pedestals?

KITCHEN AND LAUNDRY EQUIPMENT

These facilities may include any or all of the following items: gas and/or electric stoves and ovens, built-in or countertop microwave ovens, garbage compactors, dishwashers, refrigerators and freezers, clothes washers and dryers, ironing and pressing equipment.

C17. Large kitchen or laundry equipment

- ☐ Are all of the these items securely anchored to the floor, wall, or countertop?

C18. Gas and/or electric hook-up *[See Example C18]*

- ☐ Are the gas or electric hook-up lines able to accommodate movements at the equipment interface and where they cross seismic joints between buildings?

C19. Drawer and cabinet latches (kitchen, laboratory, office, etc.) *[See Example C19]*

- ☐ Are the drawers and cabinet doors latched securely, e.g., with special latches or baby-proof hardware that will not fly open in an earthquake?

C20. Freestanding wood stove (wood, pellet, or gas-fired) *[See Example C20]*

- ☐ Is the stove securely anchored to the hearth or floor framing in a manner that will not conduct heat to any combustible materials?
- ☐ Is the exhaust flue anchored to the stove, are the flue sections secured together, and is the flue anchored to the wall with some type of thermal radiation shielding?

HAZARDOUS MATERIALS

Hazardous materials may include:

C21. Compressed-gas bottles or cylinders (oxygen, carbon dioxide (CO_2), ammonia) ***[See Example C21]***

- ☐ Are gas cylinders tightly secured with one chain near the top and one near the bottom, or are they otherwise restrained?
- ☐ Are the chains or restraints securely anchored to a wall or counter with screws or bolts rather than clamps?

C22. Chemical, laboratory, or medical supplies ***[See Example C22]***

- ☐ Are chemical supplies secured with shelf lips several inches high, or are they stored in "egg crate" containers in drawers, so that the containers will not overturn or fall and spill?
- ☐ Are chemicals stored in accordance with manufacturers' recommendations?
- ☐ Are incompatible chemicals stored at an appropriate distance from one another so that they will not mix if the containers are broken?
- ☐ Are the chemicals in each cabinet catalogued properly and marked clearly?
- ☐ Are Material Safety Data Sheets (MSDSs) stored in a location separate from the chemicals?

C23. Cabinets for hazardous materials

- ☐ Are cabinets for hazardous materials securely attached to the floor or to a sturdy wall?

C24. Asbestos

- ☐ Has asbestos insulation been removed, or has it been encapsulated to reduce the possibility of damage in an earthquake?

FURNITURE, INTERIOR DECORATION

C25. Potted plants or indoor landscaping resting on shelves above the floor ***[See Example C28]***

- ☐ Are heavy potted plants on file cabinets or tall shelves restrained to prevent falling?

C26. Valuable and fragile artwork or decorative vases ***[See Example C26]***

- ☐ Are valuable or fragile items protected against tipping over and/or falling off shelves or pedestals?

C27. Freestanding half-height movable partitions ***[See Example C27]***

- ☐ Are freestanding partitions braced or arranged in stable layouts?

C28. Miscellaneous furnishings ***[See Example C28]***

- ☐ Are unanchored furnishings located where they cannot slide or overturn to block corridors or doors?

C29. Lockers, vending machines

- ☐ Are personal or storage lockers and vending machines anchored and braced, or are they clear of exits?

APPENDIX C

NONSTRUCTURAL RISK RATINGS

Explanation of Risk Ratings

The risk ratings that appear in this Appendix are based on the following assumptions:

Life Safety (LS) Risk: Risk of being injured by the item. This does not include the overall impact on life safety systems in a building, such as loss of emergency power in a hospital or loss of fire detection capability. These disruptions of service are covered under Function below.

Property Loss (PL) Risk: Risk of incurring a repair or replacement cost because of damage to the item. This property loss, as used here, includes the cost of fixing a broken pipe but not the indirect cost of water leakage damage, and includes the cost of repairing a computer but not the loss of business revenue computer downtime might cause. These indirect effects cannot be estimated here on a generic basis.

Loss of Function (LF) Risk: Risk that the item will not function because it has been damaged. This includes some consideration of the impact of this loss of function of the component on the operation of an ordinary occupancy building. Not included are off-site functional impacts, such as the loss of function of a piece of equipment because of a city-wide power outage. Outages of power, water, and other utility company or agency services are real problems to consider but are outside the scope of the item-by-item ratings here.

Unanchored, unbraced items are assumed. The risk ratings are based on the assumption that the item has been installed without seismic bracing, anchorage, restraint, or allowance for differential movements. In areas of the U.S. where seismic building code provisions have only recently been enforced, this assumption will be generally true. In areas of the western U.S. where seismic codes have been enforced for some time, this assumption may not always be true. Particularly in buildings constructed in the western states since the mid-1970s, some nonstructural items may be anchored or braced, but the assumption of unanchored and unbraced items will still be true for many items on these lists.

The item is assumed to be located at or near the ground level, or in a low-rise building. The most common case of a relatively stiff low-rise building with structural walls is presumed in the ratings here. Items such as full-height partitions and glazing are more likely to be damaged in flexible buildings that experience large lateral deformations. Damage to items sensitive to imposed deformation will be greater in buildings or portions of buildings that are more flexible, such as mid-rise and high-rise buildings; flexible frame buildings without significant structural walls; "soft stories" of buildings with structural walls in most stories but with a story, typically the ground story, that is much less laterally stiff because of the absence of walls; the "soft wall" sides of bearing wall buildings where there is little or no solid wall area, such as the face of a typical commercial storefront building.

A building of ordinary occupancy is assumed. Some nonstructural items in special facilities would be rated differently. For example. shelving in an ordinary occupancy building is assumed here, but the same shelving would be rated quite differently with regard to Life Safety risk in a lab, Property Loss risk in a museum, or risk of Loss of Function in a communications center.

NONSTRUCTURAL RISK RATINGS

		SH	LS	PL	LF	ER	PG
	UTILITY SYSTEMS						
	EMERGENCY POWER-GENERATING EQUIPMENT						
U1	Generator	Light	L	L	M	yes	
		Mod	L	M	H		
		Severe	L	H	H		
U2	Batteries and battery rack	Light	L	L	L	yes	30
		Mod	L	H	M		
		Severe	L	H	H		
U3	Diesel fuel tank	Light	L	L	L	yes	31
		Mod	H	H	L		
		Severe	H	H	M		
U4	Fuel line	Light	L	L	L		
		Mod	H	H	L		
		Severe	H	H	M		
	ELECTRICAL EQUIPMENT						
U5	Transformers	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	M		
U6	Motor control center (MCC)	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	M		

SH= Shaking intensity
ER= Engineering required
PG= Upgrade detail page number

Type of Risk

LS= Life safety
PL= Property loss
LF= Loss of function

Risk Rating

L= Low
M= Moderate
H= High

		SH	LS	PL	LF	ER	PG
U7	Electrical switchgear	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	M		
U8	Electrical bus ducts and primary cable system	Light	L	L	L	yes	32
		Mod	L	M	M		
		Severe	M	M	M		
	FIRE DETECTION AND SUPPRESSION SYSTEM						
U9	Smoke detectors, fire alarm system, control for automatic fire doors	Light	L	L	L		
		Mod	L	L	L		
		Severe	L	L	L		
U10	Fire extinguisher or fire hose cabinets	Light	L	L	L		33
		Mod	M	H	L		
		Severe	M	H	L		
U11	Fire sprinklers and distribution lines	Light	L	M	M	yes	
		Mod	L	H	H		
		Severe	M	H	H		
U12	Fire water pump	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	L		
U13	Emergency water tank or reservoir	Light	L	L	L	yes	
		Mod	M	H	L		
		Severe	H	H	L		

SH= Shaking intensity
ER= Engineering required
PG= Upgrade detail page number

Type of Risk

LS= Life safety
PL= Property loss
LF= Loss of function

Risk Rating

L= Low
M= Moderate
H= High

		SH	LS	PL	LF	ER	PG
U14	Smoke control systems	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	L	M	L		
	PROPANE TANKS						
U15	Propane tank	Light	L	L	L	yes	34
		Mod	H	H	M		
		Severe	H	H	M		
U16	Shut-off valve	Light	L	L	L		
		Mod	H	H	M		
		Severe	H	H	M		
U17	Gas or fuel supply pipe	Light	L	L	L		
		Mod	H	H	M		
		Severe	H	H	M		
	PLUMBING SYSTEM						
U18	Gas-fired water heater or boiler	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	M		
U19	Residential water heater	Light	L	L	L		35, 36
		Mod	M	H	L		
		Severe	M	H	L		
U20	Distribution pumps	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	L	M	M		

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U21	Hot and cold water pipes, hot water return, wastewater pipes	Light	L	L	L	yes	37
		Mod	M	M	M		
		Severe	M	M	M		
	ELEVATORS, ESCALATORS						
U22	Elevator cab	Light	L	L	L	yes	
		Mod	L	M	M		
		Severe	M	M	M		
U23	Cables, counterweights and guide rails (for cable-traction system)	Light	L	L	L	yes	
		Mod	H	M	M		
		Severe	H	M	M		
U24	Elevator motor and motor control cabinets	Light	L	L	L	yes	
		Mod	L	M	M		
		Severe	L	H	M		
U25	Elevator cab and hydraulic elevator equipment (hydraulic systems)	Light	L	L	L	yes	
		Mod	L	M	M		
		Severe	M	M	M		
U26	Escalator	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	L	M	L		
U27	People mover (moving walkway)	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	L	M	L		

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	HEATING, VENTILATING, AIR CONDITIONING (HVAC) SYSTEM						
U28	Boilers and furnaces	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	M		
U29	Chillers	Light	L	L	L	yes	38, 39
		Mod	L	L	L		
		Severe	L	M	M		
U30	Heat pumps or heat exchangers	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	L	M	M		
U31	Fans, blowers, filters	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	L	M	M		
U32	Air compressors	Light	L	L	L	yes	40
		Mod	L	M	L		
		Severe	L	M	M		
U33	Roof-mounted HVAC units	Light	L	M	L	yes	
		Mod	L	M	L		
		Severe	M	H	M		
U34	Wall-mounted room air conditioning units	Light	L	L	L		
		Mod	H	M	L		
		Severe	H	M	L		
U35	Suspended room heaters or fans	Light	L	L	L	yes	41
		Mod	H	H	L		
		Severe	H	H	L		

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U36	Distribution ducts	Light	L	L	L	yes	42
		Mod	L	L	L		
		Severe	M	M	L		
U37	Diffusers	Light	L	L	L		43
		Mod	H	H	L		
		Severe	H	H	L		
	MECHANICAL APPENDAGES						
U38	Small stacks or residential chimneys	Light	L	L	L	yes	44
		Mod	M	M	L		
		Severe	H	M	M		
U39	Roof-mounted equipment, vents or flues	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	M	M	M		
U40	Solar panels	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	L		

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	ARCHITECTURAL ELEMENTS						
	PARTITIONS AND CEILINGS						
A1	Permanent block wall partitions (CMU, brick, hollow clay tile)	Light	L	L	L	yes	
		Mod	H	H	H		
		Severe	H	H	H		
A2	Partial- and full-height stud wall partitions	Light	L	L	L	yes	45, 46
		Mod	M	M	H		
		Severe	M	H	H		
A3	Ceilings (acoustic tile, gypsumboard, plaster)	Light	L	L	L	yes	47
		Mod	M	M	M		
		Severe	H	H	H		
A4	Soffits (stucco, gypsumboard, plaster)	Light	L	L	L		
		Mod	M	M	M		
		Severe	H	H	H		
	LIGHTING						
A5	Suspended overhead lighting, fixed or track lighting	Light	L	L	L		48, 49
		Mod	H	L	L		
		Severe	H	M	M		
A6	Emergency lighting and exit lights	Light	L	L	L		
		Mod	M	L	L		
		Severe	H	M	L		

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	DOORS AND EGRESS ROUTES						
A7	Primary exit doors	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	M		
A8	Automatic doors with optical or floor sensors, mechanized roll-up doors	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	M	M	M		
A9	Stairways	Light	L	L	L	yes	50
		Mod	H	M	L		
		Severe	H	M	H		
A10	Building utilities and architectural finishes along egress routes (ceilings, lights, partitions, etc.)	Light	L	L	L	yes	
		Mod	H	M	L		
		Severe	H	M	L		
A11	Furniture and/or contents along egress routes (cabinets, shelving, etc.)	Light	L	L	L		
		Mod	H	M	L		
		Severe	H	M	L		
	WINDOWS						
A12	Glazing	Light	L	L	L	yes	51
		Mod	M	M	L		
		Severe	H	M	M		
A13	Overhead glazing or skylights	Light	L	L	L	yes	
		Mod	H	M	L		
		Severe	H	M	M		

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A14	Interior glass or glass block partitions	Light	L	L	L	yes	
		Mod	M	M	L		
		Severe	H	H	M		
	PERMANENT ORNAMENTATION AND APPENDAGES : INTERIOR OR EXTERIOR						
A15	Parapets, cornices, veneer or other decoration	Light	M	M	L	yes	52, 53
		Mod	H	H	L		
		Severe	H	H	L		
A16	Freestanding walls or fences (concrete, CMU, brick, or stone	Light	L	L	L	yes	54
		Mod	L	L	L		
		Severe	H	H	M		
A17	Hanging appendages	Light	L	L	L	yes	
		Mod	H	H	L		
		Severe	H	H	M		
A18	Exterior lighting	Light	L	L	L		
		Mod	M	L	L		
		Severe	M	M	M		
A19	Flagpoles	Light	L	L	L	yes	
		Mod	L	L	L		
		Severe	M	M	L		
A20	Tall sculptures (over 5 feet)	Light	L	L	L	yes	
		Mod	M	M	L		
		Severe	H	H	L		

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A21	Heavy signs or exterior billboards	Light	L	L	L	yes	55
		Mod	H	H	L		
		Severe	H	H	L		
A22	Clay roof tiles	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	M	H	M		
	FURNITURE AND CONTENTS						
	COMMUNICATIONS EQUIPMENT						
C1	Radio and short-wave radio equipment	Light	L	L	L		
		Mod	L	H	H		
		Severe	L	H	H		
C2	Telephone, cellular phone and fax equipment	Light	L	L	L		
		Mod	L	H	M		
		Severe	L	H	M		
C3	Public address system	Light	L	L	L		
		Mod	L	H	L		
		Severe	L	H	L		
C4	Suspended speakers in conference room or auditorium	Light	L	L	L	yes	
		Mod	M	M	L		
		Severe	H	H	L		
C5	Microwave equipment (antennae, receiver, transmitter, etc.)	Light	L	L	L	yes	
		Mod	L	M	L		
		Severe	M	H	M		

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C6	Computer networks, data storage	Light	L	L	L		
		Mod	L	M	H		
		Severe	L	H	H		
C7	Wall-mounted televisions or surveillance cameras	Light	L	L	L	yes	
		Mod	H	H	L		
		Severe	H	H	L		
	OFFICE AND COMPUTER EQUIPMENT						
C8	Large computer equipment, tape drives	Light	L	L	L	yes	56
		Mod	L	M	M		
		Severe	M	H	M		
C9	Computer cabling	Light	L	L	L		
		Mod	L	L	L		
		Severe	L	L	L		
C10	Desktop computers or office equipment	Light	L	L	L		57
		Mod	L	H	M		
		Severe	L	H	M		
C11	Computer access floors	Light	L	L	L	yes	56
		Mod	L	L	M		
		Severe	L	M	M		
	STORAGE OF RECORDS AND SUPPLIES						
C12	Book shelves, library stacks (over 5 feet)	Light	L	L	L	yes	58, 59, 60
		Mod	H	M	M		
		Severe	H	M	M		

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C13	Tall vertical or lateral file cabinets	Light	L	L	L	yes	61
		Mod	M	M	M		
		Severe	H	M	M		
C14	Tall storage racks or shelving	Light	L	L	L		
		Mod	H	M	M		
		Severe	M	M	L		
C15	Emergency supply cabinet (water, medicine, food, etc.)	Light	L	L	L		
		Mod	L	L	L		
		Severe	M	M	M		
C16	Especially valuable and fragile merchandise	Light	L	M	L		
		Mod	L	H	L		
		Severe	L	H	L		
	KITCHEN AND LAUNDRY EQUIPMENT						
C17	Large kitchen or laundry equipment	Light	L	L	L		
		Mod	M	M	L		
		Severe	H	M	M		
C18	Gas and/or electric hook-up	Light	L	L	L		62
		Mod	M	H	H		
		Severe	H	H	H		
C19	Drawer and cabinet latches (kitchen, laboratory, office, etc)	Light	L	L	L		63
		Mod	L	L	L		
		Severe	L	M	M		

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C20	Freestanding wood stove (wood, pellet, or gas-fired)	Light	L	L	L		64
		Mod	L	L	L		
		Severe	M	M	M		
	HAZARDOUS MATERIALS						
C21	Compressed-gas bottles or cylinders (oxygen, CO_2, ammonia, etc.)	Light	L	L	L		65
		Mod	M	M	L		
		Severe	H	M	M		
C22	Chemical, laboratory, or medical supplies	Light	L	L	L	yes	66
		Mod	H	M	L		
		Severe	H	M	M		
C23	Cabinets for hazardous materials	Light	L	L	L	yes	
		Mod	H	M	H		
		Severe	H	M	H		
C24	Asbestos	Light	L	M	M		
		Mod	L	H	H		
		Severe	L	H	H		
	FURNITURE, INTERIOR DECORATION						
C25	Potted plants or indoor landscaping resting on shelves above the floor	Light	L	L	L		69
		Mod	L	L	L		
		Severe	M	L	L		
C26	Valuable and fragile artwork or decorative vases	Light	L	L	L		67
		Mod	L	H	L		
		Severe	L	H	L		

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C27	Freestanding half-height movable partitions	Light	L	L	L		68
		Mod	L	L	L		
		Severe	M	M	M		
C28	Miscellaneous furnishings	Light	L	L	L		69
		Mod	L	M	L		
		Severe	L	M	L		
C29	Lockers, vending machines	Light	L	L	L		
		Mod	H	M	L		
		Severe	H	M	L		

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