

ELEMENT 2 CHECKLIST

LAND USE, BUILDING DESIGN AND REGULATORY CONTEXT

Yes = Action completed Somewhat = Action in progress or incomplete No = No action planned or taken Unknown = Status or action unknown N/A = Does not apply

GENERAL		Value	Rank
2.0.1 Understand the physical parameters of each site or campus; facilities or campuses located in areas noted below are subjected to higher levels of hazard			
• Is the site located on low-lying barrier island and/or coastal regions?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Is the site located on or near 100-year or 500-year floodplains or wetlands?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Is the site located in close proximity to major levees or dams?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Is the site located in close proximity to steep slopes subject to erosion?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Is it located in close proximity to an area subject to fire risk?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• If you answered 'yes' or 'somewhat' to the questions above, have you developed comprehensive hazard mitigation plans (HMPs) for affected sites?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Are you participating in local community and/or regional initiatives around mitigation and adaptation for these hazards?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
<i>In recent years, U.S. health facilities have been impacted by extreme weather events and will continue to be impacted by climate-related hazards. Health care facilities can learn from each other by sharing lessons learned and best practices.</i>			
2.0.2 Does your health care facility collect best practices and lessons learned regarding building envelop and healthcare campus resilience from other health care facilities that have experienced extreme weather disasters?			<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.0.3 Are the individuals responsible for maintenance of your health care campuses and building envelopes adequately trained to manage an extreme weather related emergency or disaster (<i>for examples of climate-related hazards, please refer to the hazards listed in Element 1</i>)			
• Are front-line workers engaged in the development of plans and responses?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Do site and building maintenance procedures include specifications on how weather may affect the safety and continued functioning of your facility?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	

STEP 1: Understand Land Use, Siting and Landscape		Value	Rank
<i>Perform Step 1 for each campus or site</i>			
2.1.1 Inventory stormwater management infrastructure			
• Is the capacity of existing stormwater management system adequate for anticipated 50- or 100-year storm events today?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Will the system be adequate in 2030/2050/2080??		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
2.1.2 Inventory heat-island contributors			
• Have you installed reflective white roofs on buildings to reduce heat island impacts?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Do you have high-albedo, light colored paving on parking areas and walkways?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Have you installed green roofs to mitigate heat-island impacts?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
2.1.3 Inventory plant material and landscape vulnerabilities			
• Are existing trees and plants resilient to climate change effects, both in general climate terms and pest/disease risks?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Are they drought tolerant?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• In coastal areas, are they salt-tolerant to storm surge?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
2.1.4 Based on answers to the above, rank the resilience of land use, siting and landscape		<input type="radio"/> 3 (Exemplary) <input type="radio"/> 2 (Functional) <input type="radio"/> 1 (Marginal) <input type="radio"/> 0 (None) <input type="radio"/> N/A	

STEP 2: Transportation and Site Access		Value	Rank
<i>Perform Step 2 for each campus or site</i>			
2.2.1 Assess transportation and site access resilience.			
• Do you have two unique access routes to critical healthcare facilities?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	
• Do you have contingency plans in place for loss of an access route or routes?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A	

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<ul style="list-style-type: none">Have you surveyed existing landscape elements to ensure that if damaged they will not block on-site access routes to the facility?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.2.2 Inventory pavement design and materials		
<ul style="list-style-type: none">Are pavements designed to withstand extreme temperatures, freezing and thawing, or solar radiation?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.2.3 Inventory transportation options for each site		
<ul style="list-style-type: none">Is the building or campus served by public transportation systems, such as light rail or subway?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">If so, have local public transportation systems undertaken climate resilience efforts?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Is public transportation likely to remain operational during or immediately following an extreme weather event?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Do you have a contingency plan for personnel transportation?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">If the building or campus is automobile and/or bus dependent, have you surveyed transportation vulnerabilities associated with weather extremes?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Is there a helipad?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Have you evaluated the location of the helipad against extreme weather risks? <i>(For example, at grade flooding or rooftop vulnerability to damage from high winds.)</i>		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.2.4 Inventory evacuation routes and their vulnerabilities		
<ul style="list-style-type: none">Have you developed contingency plans for evacuation during or following an extreme event?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Are evacuation routes vulnerable to falling trees, utilities <i>(fallen wires or poles)</i>?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Are evacuation routes above flood elevation?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.2.5 Based on answers to the above, rank the resilience of transportation and site access.		<input type="radio"/> 3 <i>(Exemplary)</i> <input type="radio"/> 2 <i>(Functional)</i> <input type="radio"/> 1 <i>(Marginal)</i> <input type="radio"/> 0 <i>(None)</i> <input type="radio"/> N/A

STEP 3: Critical Building Inventory	Value	Rank
<i>Perform Step 3 for each critical building on the campus or site</i>		
2.3.1 Develop inventory of buildings vulnerable to each risk.		
<ul style="list-style-type: none">Have you mapped building locations relative to hazard maps?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Have you compiled building envelope and performance vulnerabilities for each critical building?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Have you reviewed building code design baselines against extreme weather intensities <i>(wind speeds, rainfall volumes, etc.)</i> for each critical building?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Have you incorporated expected climate change data over time into building vulnerability assessments?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.3.2 Assess potential injuries and property loss associated with hazards		
<ul style="list-style-type: none">Have you prepared a building asset inventory?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Where vulnerabilities are identified, have you used HAZUS or FEMA 386 to calculate potential losses?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.3.3 Develop a checklist for each building that summarizes major principles that should be considered when developing policies or capital projects		
<ul style="list-style-type: none">Have you reviewed local or regional resources on improving building resilience?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Review USGBC's "Green Building and Climate Resilience" for regional strategies. See Resources.		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">For Hospitals, review FEMA-577 for flood and high wind. See Resources.		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">For Residential Healthcare Facilities, review FEMA-577 and P-361 for Safe Rooms. See Resources.		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">For ambulatory facilities, review FORTIFIED®. See Resources and Step 4.		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
2.3.4 In flood regions, understand if the buildings on your campus comply with the following specific regulations:		
<ul style="list-style-type: none">NFIP or FEMA Coastal Construction Manual and FEMA-577. See Resources.		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">Additional flood requirements per local jurisdiction		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
<ul style="list-style-type: none">ASCE 24-05, Flood Resistant Design and Construction. See Resources.		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A

2.3.5 Based on answers to the above, rank the state of critical building inventories 3 (Exemplary) 2 (Functional) 1 (Marginal) 0 (None) N/A

STEP 4: Building Construction and Vertical Transportation **Value** **Rank**

Perform Step 4 for each critical building on the campus or site

2.4.1 Inventory Building Envelope design parameters for each critical building

• What is the date of construction/occupancy?		<input type="radio"/> Unknown <input type="radio"/> N/A
• What are the design wind loads for envelope?		<input type="radio"/> Unknown <input type="radio"/> N/A
• What are the design wind loads for windows?		<input type="radio"/> Unknown <input type="radio"/> N/A
• What are the design wind loads for roofs?		<input type="radio"/> Unknown <input type="radio"/> N/A
• What are the design snow loads for roofs?		<input type="radio"/> Unknown <input type="radio"/> N/A
• What are the design peak rainfall parameters for roof drainage systems?		<input type="radio"/> Unknown <input type="radio"/> N/A
• In high wind areas, are there places of refuge designed as part of the structure?		<input type="radio"/> Unknown <input type="radio"/> N/A
• Have building insulation and windows been updated to comply with contemporary energy codes?		<input type="radio"/> Unknown <input type="radio"/> N/A

2.4.2 Create places of refuge by hardening envelope and building shell

• Have buildings taller than 60 feet or having long span roofs (<i>more than 150'</i>) been peer reviewed for structural design for increased extremes?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Have rooftop structures and equipment (<i>and their attachments</i>) been reviewed for anticipated wind speeds?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Have rooftop structures and equipment (<i>and their attachments</i>) been reviewed for extreme precipitation and/or hail vulnerabilities?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Are skylights uplift resistant and impact resistant?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Do exterior wall systems meet the requirements for wind and water resistance?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• In high wind areas, have you installed impact resistant glazing or opening protectives?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A

2.4.3 Review vertical transportation system vulnerabilities

• Are machine rooms resistant to flooding or high wind/rooftop damage?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Are vertical transportation systems dispersed to allow for partial use if some infrastructure is damaged or disabled?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• In flood zones, is a portion of the elevators constructed to remain operational during and following flood events?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A

2.4.4 Review interior construction for hazard vulnerabilities

• Is interior construction water-resistant below 500-year flood elevations?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Is stairwell construction fortified against high-wind events?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Is there a designated high wind "safe area"?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A

2.4.5 Based on answers to the above, rank the overall status of critical building construction and vertical transportation systems for each campus? 3 (Exemplary) 2 (Functional) 1 (Marginal) 0 (None) N/A

STEP 5: Passive Survivability Inventory **Value** **Rank**

Perform Step 5 for each critical building on the campus or site

Understand how buildings will perform if mechanical/electrical systems are disabled for an extended period of time. Assess overall passive survivability for the applicable conditions below:

2.5.1 In extreme heat:

• Are windows operable to provide for ventilation air and to maintain habitable conditions?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Are there exterior shading devices, trees or other architectural features that mitigate solar gain?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Have you assessed the length of time people can remain in place before overheating requires evacuation?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A

2.5.2 In extreme cold:

• Do building orientation, glazing and/or shading devices provide for supplemental daytime solar gain?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Is the building well-insulated, with high efficiency glazing systems?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Does the building have significant thermal mass to reduce heat loss?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A
• Are there any sources of supplemental building heat?		<input type="radio"/> Yes <input type="radio"/> Somewhat <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> N/A

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• Have you assessed the length of time people can remain in place before extreme cold requires evacuation?

Yes
 Somewhat
 No
 Unknown
 N/A

SUMMARY

Value

Rank

Based on your responses above, develop a list of action items to address Land Use, Building Design and Regulatory Issues identified.

2.6.1 Have you determined key resilience improvement strategies for each building and campus?

Yes
 Somewhat
 No
 Unknown
 N/A

2.6.2 Have you mapped priority strategies for this Element across a timetable for implementation? *Refer to the Getting Started section of the Climate Resilience Toolkit at toolkit.climate.gov.*

Yes
 Somewhat
 No
 Unknown
 N/A

*This checklist is one component of a five element framework and toolkit for improving healthcare facility climate resilience.
 The full set of checklists, companion resources and case studies are available at toolkit.climate.gov.
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