Resilience Strategy	Description	Cost	Cost-Sharing Opportunities										Cost Share	Long Lead Time	Energy Cost Reduction	Occupant Disruption	Dependencies
			PPA	P3	ITC	PACE	EaaS	Rebates	Grant	EPC	Utility	Insurance					
Onsite Renewable Energy	Solar PV, wind, or micro-hydro systems provide power during grid outages and reduce dependency on external sources.	$$$$	x		x	x	x						4	Yes	Drastically	Moderately	Structural, electrical
Microgrids with Islanding Capability	Allow buildings or campuses to disconnect from the grid and operate independently during emergencies.	$$$$	x	x	x	x	x		x		x		7	Yes	Moderately	Very	DER, electrical, legal
Battery Energy Storage Systems (BESS)	Store energy for critical loads and enable continuity during blackouts or peak demand events.	$$$$			x		x	x					3	Yes	Slightly	Slightly	Load profile, fire code
Onsite Wastewater Treatment	Maintain sanitation and water reuse capabilities during sewer outages or disasters.	$$$$		x					x				2	Yes	Slightly	Very	Health dept, soil test
Redundant HVAC Systems	Dual chillers, boilers, or air handlers ensure climate control continuity during equipment failures.	$$$$		x		x							2	Yes	Slightly	Moderately	Envelope, structural
Building Automation System (BAS) Resilience	Ensure BAS has backup power, secure remote access, and fault-tolerant controls for emergency operation.	$$$				x		x					2	Mixed	Moderately	Moderately	Backup power, IT
High-Performance Envelope for Passive Survivability	Climate-tuned insulation, airtightness, and thermal mass maintain habitable indoor conditions during extended outages.	$$$			x	x	x						3	Mixed	Drastically	Very	None
Hardened Electrical Infrastructure (Fire Proofing)	Use underground cabling, surge protection, and weather-resistant components to reduce vulnerability to storms and outages.	$$$		x							x		2	Yes	Slightly	Very	Utility trenching
Dual Water Supply Lines	Ensure water redundancy by integrating municipal, well, or rainwater sources.	$$$		x					x				2	Mixed	Slightly	Moderately	Plumbing, source testing
Greywater Reuse Systems	Recycle water from sinks and showers for irrigation or toilet flushing to reduce potable water demand.	$$$				x	x						2	Mixed	Slightly	Moderately	Plumbing, filtration
Passive Survivability (Cooling & Ventilation)	Stack effect, cross-ventilation, and operable windows reduce reliance on mechanical cooling and support thermal autonomy.	$$				x	x						2	No	Moderately	Moderately	Envelope, airflow modeling
Smart Load Shedding	Automatically prioritize and shed non-critical loads to preserve essential operations during power shortages.	$$				x		x					2	No	Moderately	Slightly	BAS, load mapping
Climate-Adaptive Controls (Future Weather)	Use weather forecasts and sensors to preemptively adjust HVAC, lighting, and shading systems for resilience.	$$						x					1	No	Moderately	Slightly	Sensor logic
Flood-Proof Equipment Placement	Elevate or waterproof mechanical systems to prevent damage during flooding	$$		x								x	2	No	Slightly	Slightly	Site survey
Leak Detection & Shutoff Automation	Use sensors and automated valves to prevent water damage and conserve	$$						x					1	No	Slightly	Slightly	Sensor layout
Elevated or Protected Piping	Protect plumbing from freeze damage and flood exposure by strategic placement and insulation.	$$		x								x	2	No	Slightly	Slightly	Freeze/flood mapping
Resilience-Focused Commissioning	Validate system performance under stress scenarios like blackouts, floods, or extreme heat during commissioning.	$$		x						x			2	No	Slightly	Slightly	Scenario scripting
Community-Scale Utility Coordination	Collaborate with local utilities for grid hardening, water redundancy, and coordinated emergency response.	$$		x							x		2	Mixed	Slightly	Slightly	Stakeholder engagement
Daylighting with Thermal Zoning	Use clerestories, solar tubes, and light shelves to maintain visual function and reduce lighting loads, while isolating sunlit zones thermally.	$$				x	x						2	Mixed	Moderately	Moderately	Envelope, solar path
Scenario-Based Emergency Protocols	Align MEP operations with emergency plans for fire, flood, extreme heat, and other hazards.	$											0	No	Slightly	Not at all	SOP drafting

Resilience Strategy	Permitting Risk	Swing Space Needed	Modular Deployment Possible	Site Prep Activities				Total	Prep Time (mo)
				Activity 1	Activity 2	Activity 3	Activity 4		
Onsite Renewable Energy	High (utility interconnect)	No	Yes (roof or canopy zones)	Structural review	interconnection study	utility approval	PPA structuring	4	4–9
Microgrids with Islanding Capability	High (utility, legal)	No	Partially (pilot zones)	Feasibility study	DER modeling	protection scheme design	utility negotiation	4	6–12
Battery Energy Storage Systems (BESS)	High	No	Yes	Load profile analysis	fire code compliance	utility coordination		3	4–7
Onsite Wastewater Treatment	High	Yes	No	Soil percolation testing	health department approval	system sizing		3	6–10
Redundant HVAC Systems	Moderate	Yes (mechanical rooms)	Yes (phased zones)	Load calculations	equipment sizing	structural review	crane access planning	4	3–6
Building Automation System (BAS) Resilience	Moderate	No	Yes	Backup power planning	cybersecurity review	remote access setup		3	2–4
High-Performance Envelope for Passive Survivability	High (energy code, historic)	Yes (occupied zones)	Yes (zone-by-zone)	Envelope audit	blower door testing	material selection	phasing plan	4	4–8
Hardened Electrical Infrastructure (Fire Proofing)	High	Yes (outages)	No	Trenching plan	outage coordination	utility permits		3	4–8
Dual Water Supply Lines	Moderate	Yes (wet walls)	No	Plumbing reroute design	source testing	backflow prevention planning		3	3–6
Greywater Reuse Systems	Moderate	Yes (wet zones)	Yes	Fixture mapping	plumbing code review	filtration design		3	3–5
Passive Survivability (Cooling & Ventilation)	Low	No	Yes	CFD modeling	operable window spec	airflow path coordination		3	2–4
Smart Load Shedding	Low	No	Yes	BAS integration plan	critical load mapping	control logic testing		3	2–4
Climate-Adaptive Controls (Future Weather)	Low	No	Yes	Sensor selection	weather API integration	override logic testing		3	1–3
Flood-Proof Equipment Placement	Low	No	Yes	Flood zone mapping	elevation design	anchoring details		3	1–3
Leak Detection & Shutoff Automation	Low	No	Yes	Sensor layout	valve access planning	BAS integration		3	1–3
Elevated or Protected Piping	Low	No	Yes	Freeze risk mapping	insulation spec	routing review		3	1–3
Resilience-Focused Commissioning	Low	No	Yes	Scenario scripting	test protocol development	stakeholder coordination		3	1–3
Community-Scale Utility Coordination	Moderate	No	No	Stakeholder engagement	joint planning sessions	MOUs		3	3–6
Daylighting with Thermal Zoning	Moderate	Yes (roof/wall access)	Yes	Solar path analysis	glazing spec	shading coordination		3	2–5
Scenario-Based Emergency Protocols	Low	No	Yes	Risk mapping	SOP drafting	staff training		3	1–3