CHAPTER 7

Shelter & Structural Safety

New here? Ready, Set, Ready is a 10-minute starting point: an honest assessment, one gap closed for real, then a map for using the rest of this site. Once something's actually happened, Surviving picks up where this chapter leaves off, organized by chronology instead of category. Curious how Tier, Stage, and Phase relate? See the Glossary.

Why This Category Comes Fifth

Shelter & Structural Safety is about keeping the structure you're in intact and safe, especially against Northern Utah's dominant hazard, earthquake, plus the recurring regional hazards (wildfire, extreme heat and cold, flooding) that threaten a home the rest of the year. A structural or entry failure is a near-certainty in a major seismic event, so this chapter is written heavy on hazard mitigation and hardening. This chapter's companion, Security & Self-Defense, covers keeping people out who intend harm; the two are meant to be read together, since a household that has hardened its structure but never thought about entry security, or the reverse, has only solved half the problem.

As with the prior chapters, each tier adds capability rather than replacing it: Tier 1's seismic strapping and utility shut-off knowledge stay relevant even after Tier 3 adds a relocation or long-term hardening plan.

Tier 1: Short-to-Medium Term (Hours – 14 Days)

Goal: *Immediate life safety and structural integrity. Focus on preventing injury during the initial event (e.g., earthquake) and knowing how to shut down utilities safely.*

Tier 1 is dominated by earthquake preparedness, not because every emergency is a quake, but because the Wasatch Front sits on an active fault system and the same hazard-mitigation and utility-shutoff skills apply to most other short-term emergencies as well.

Skills to Build

- **Hazard Hunting:** Walk the home identifying and securing unsecured heavy furniture, appliances, water heaters, and glass. The leading cause of earthquake injury is falling and

shifting objects, not building collapse. See the Securing Your Home Against Earthquake Damage skill guide for stud-finding and anchoring technique.

- **Utility Shut-off:** Know exactly where the main gas, water, and electric shut-offs are and how to operate them. Critical nuance: only shut off gas if you smell it, hear hissing, or see obvious damage. Turning it off unnecessarily means a licensed technician has to relight pilot lights before service resumes, and in a widespread disaster that wait can stretch to weeks.
- **Earthquake Drill:** Practice “Drop, Cover, and Hold On” (drop to hands and knees, take cover under sturdy furniture, hold on until shaking stops) until it’s automatic. This is the current, evidence-based standard; the older “triangle of life” technique that circulates online has been debunked and is not recommended by any seismic safety authority. Unlike California, Oregon, and Washington, Utah does not yet have an operational ShakeAlert earthquake early-warning system. There’s no expectation of advance notice before shaking starts here, so this has to be a reflexive response to feeling the ground move, not something triggered by a phone alert.

▸ GO DEEPER

The **Shelter & Structural Safety Addendum** builds these into real, tested competency.

For the hands-on how-to:

Emergency Shelter Basics | Securing Your Home Against Earthquake Damage | Basic Knots

Tech & Equipment

- **Gas Shut-off Wrench:** A dedicated wrench kept near the external gas meter, essential for Utah homes given seismic risk. Don’t rely on finding a random tool when it’s needed.
- **Cordless Drill:** For emergency strapping, boarding, or structural repairs.
- **NOAA Weather Radio:** Battery or hand-crank powered, for official alerts.

Materials & Supplies

Item	Quantity / Spec	Notes
Seismic straps	Heavy-duty steel, water heater + furnace	Mandatory in practice for Utah homes: an unstrapped water heater is one of the most common sources of post-quake gas leaks and fires.
Furniture anchors	L-brackets or nylon straps	Secure bookcases, TVs, and other tip hazards directly to wall studs, not just drywall.
Window protection	Pre-cut plywood or security film	Pre-cut and labeled per window now; cutting boards to size during an actual emergency wastes critical time.

WARNING

An Unstrapped Water Heater Is a Leading Post-Quake Fire Source

An unstrapped water heater is one of the most common sources of post-quake gas leaks and fires: it tips, the rigid gas line connected to it shears or cracks, and gas leaks into a space that may already have an open flame source (a pilot light) nearby. Heavy-duty steel strapping is a cheap, one-time fix for a real, common failure mode, not a precaution worth putting off.

Northern Utah Note

The Wasatch Fault is capable of producing a magnitude 6.5–7.5 earthquake, and seismologists consider the region overdue for one at that scale. This isn't a hypothetical hazard; it's the specific, well-documented risk this tier is built around. The Great Utah ShakeOut is a real, free annual statewide earthquake drill (usually held in October); participating is a low-effort way to actually rehearse Drop, Cover, and Hold On rather than just reading about it. Standard homeowners insurance excludes earthquake damage the same way it excludes flood damage; a separate earthquake policy or endorsement is required to cover the structural damage this tier's own strapping and anchoring work is meant to prevent.

Quick Checklist

- [ ] Water heater and furnace seismically strapped
- [ ] Heavy furniture/TVs anchored to wall studs, not just drywall
- [ ] Gas shut-off wrench staged at the meter; every adult knows the "only if you smell/hear gas" rule

- [ ] Windows measured and plywood/film pre-cut and labeled
- [ ] Practiced: Drop, Cover, and Hold On drilled, ideally during the annual Great Utah ShakeOut

Tier 2: Extended (2 Weeks – 3 Months)

Goal: Hardening the home's physical structure against sustained conditions, and maintaining a stocked retreat space distinct from day-to-day living areas.

Tier 2 assumes normal repair and construction services are degraded or unavailable, so a household needs its own materials and practiced routine for reinforcing the structure itself, not just calling someone to fix it.

Skills to Build

- **Barricading:** Practice reinforcing doors and windows quickly with available materials, rather than figuring it out for the first time under pressure. This is a structural-hardening skill as much as a security one; see the Security & Self-Defense chapter for the deterrence side of the same problem. See the Home Lockdown & Barricading Basics skill guide for real reinforcement technique.

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Tech & Equipment

- **Reinforcement Kits:** Door jamb reinforcement bars and window security bars, sized and test-fitted to your actual doors and windows in advance.

Materials & Supplies

Item	Quantity / Spec	Notes
Boarding materials	Pre-measured plywood + screws	For rapid window/door covering; pairs with the pre-cut Tier 1 stock.
Safe room supplies	Water, radio, first aid, stocked interior room	A retreat point distinct from the Energy & Heat chapter's safe room, or combined with it if space is limited.

Quick Checklist

- [ ] Door/window reinforcement kits test-fitted in advance
- [ ] Safe room stocked with water, radio, and first aid
- [ ] Practiced: barricading routine rehearsed with available materials

Tier 3: Permanent (Indefinite)

Goal: *Long-term structural resilience, including seriously weighing rural relocation for households in dense urban areas.*

Tier 3 assumes sustained instability with no return to normal infrastructure in sight. For households in dense urban areas, this is the point to seriously weigh relocation to a more self-sufficient rural property; that’s a shelter decision as much as a security one, and it’s not one to make under pressure.

Materials & Supplies

Item	Quantity / Spec	Notes
Relocation assets	Rural property deed, cabin materials, bug-out vehicle	For urban/suburban households, seriously evaluate this option well before Tier 3 conditions actually arrive. See the Security & Self-Defense chapter's Tier 3 for the defensibility side of the same decision.

Northern Utah Note

If relocating to a rural property with woodlot access, coordinate any defensive landscaping (see the Security & Self-Defense chapter) with wildfire defensible-space guidance below: spacing, plant selection, and clearance around structures. The same plantings that deter human intrusion often need to be balanced against wildfire risk in this region, and the two aren't always aligned by default.

Quick Checklist

- [ ] Relocation option evaluated in advance, not decided under pressure
- [ ] If relocating, defensive landscaping cross-checked against wildfire defensible-space rules

Tier 4: Sustainable Community

Goal: *Decide, deliberately, what structural safety and shelter coordination actually look like for your own neighborhood, rather than assuming one shared shelter space is the only real option.*

A single household can only triage its own damage and house so many people for so long. Before building anything shared, ask concretely: how many households would actually participate, and what's the real local structural risk, older or mixed-vintage building stock carries more real risk than a neighborhood of newer construction. Not every neighborhood has a viable shared shelter structure, and that's a real, honest answer, not a failure: individual household hardening plus a real evacuation plan (see the Transportation and Security & Self-Defense chapters) may be the right scope instead of a building project nobody can actually host.

Choosing an Approach

Three real models fit different circumstances, not one assumed path:

Approach	What it is	Fits when
Informal mutual-aid check-in	No new infrastructure: neighbors agree in advance to check on each other and share space informally if one household's home becomes unsafe	Low correlated structural risk, a small or already-close group, or no viable shared space nearby
Trained triage roster	Several neighbors complete ATC-20 awareness-level training together and keep a current roster of who's trained	Real seismic risk, older or mixed-vintage building stock, a group willing to invest the training time
Shared, hardened shelter space	A specific structure is identified, assessed, and agreed on in advance as the group's shelter location, with real access rules	A viable structure actually exists nearby and its owner is willing; a group with real organizing capacity

Skills to Build

- **Structural Triage Training:** The real credential here is ATC-20 Evaluator training, built on the Applied Technology Council's post-earthquake safety evaluation system this chapter's own red-flag tagging is based on. Utah's version runs through the Utah Division of Emergency Management and the Utah Seismic Safety Commission; confirm current course dates and fees directly with them, since cost and availability vary by provider (commonly free through a state or local emergency management office, sometimes a paid professional course). The ATC-20-1 and ATC-45 field manuals themselves are a real, standalone purchase from the Applied Technology Council, worth owning even before a course. A full training session with several neighbors at once, not just reading the manual alone, is what actually makes self-triage work under real pressure while professional inspectors are still scarce after a major earthquake.
- **Sheltering Displaced People:** Plan, in advance, how to safely and sustainably take in neighbors or family members (vetting, space allocation, and resource-sharing rules) so an influx of people in genuine need doesn't destabilize the group. Fold this into the same written charter the Security & Self-Defense chapter's Tier 4 builds for guard rotation and governance, rather than maintaining two separate agreements. See the Thriving's Governance chapter for what actually makes a charter like this hold up in practice.

▸ GO DEEPER

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Materials & Supplies

Item	Quantity / Spec	Notes
Guest/shelter capacity	Extra bedding, tents, allocated space	Planned in advance so an emergency influx doesn't mean scrambling for space.
ATC-20-1 and ATC-45 field manuals	Applied Technology Council publications	Worth owning even before a course; the real reference a trained triage roster actually works from.

Quick Checklist

- [ ] Real local structural risk and participation level honestly assessed before building anything shared
- [ ] Multiple neighbors trained in ATC-20 structural triage, roster kept current
- [ ] Plan in place for safely sheltering displaced neighbors/family, if a viable shared space exists
- [ ] Guest/shelter capacity (bedding, tents, allocated space) planned in advance
- [ ] Shelter/triage agreement revisited on a set schedule, at least yearly

Regional Hazard Considerations

The tiers above are written to be disaster-agnostic; the skills and gear apply no matter what caused the disruption. But Northern Utah carries a specific set of recurring natural hazards beyond earthquake, each of which demands its own shelter-specific preparation. This section applies across all four tiers rather than being tied to a single duration: a wildfire threat is relevant whether you're in Tier 1 or Tier 3.

Wildfire

Wildfire season in Utah generally runs June through October, and foothill and canyon communities along the Wasatch Front sit squarely in the wildland-urban interface: the zone where development meets flammable open land.

- **Defensible Space Zoning:** Follow the standard 0-5-30-100 ft zone model: noncombustible material only within 5 ft of the structure (no bark mulch, no shrubs against the house), lean fuel spacing from 5–30 ft, and thinned/maintained vegetation from 30–100 ft. This is the same defensible-space principle referenced in the Security & Self-Defense chapter's defensive-landscaping guidance; the two goals (deterring intrusion, resisting fire) need to be balanced together, not treated separately.

- **Home Hardening:** Ember-resistant vent screens (embers, not flame contact, ignite most homes lost to wildfire), a Class A fire-rated roof, noncombustible siding or skirting near ground level, and gutters kept clear of dry debris.

- **Evacuation Readiness:** Keep the portable go-bag subset described in the Water and Food chapters' Tier 1 notes packed and ready; wildfire evacuations are often faster-moving and shorter-notice than other disaster triggers.

- **Smoke & Air Quality:** Even households far from active fire lines face smoke exposure for days at a time. Keep N95 or P100 respirators on hand, and know how to build a low-cost Corsi-Rosenthal box (a box fan with MERV-13 filters taped to its sides) as an effective, inexpensive DIY air filtration option if a HEPA purifier isn't available. Seal windows and doors during smoke events rather than ventilating.

Extreme & Extended Heat

The Salt Lake Valley's basin geography and urban heat island effect can extend summer heat waves well past what surrounding areas experience, and prolonged heat without reliable cooling is a genuine hazard, especially for elderly household members, infants, and anyone without power for air conditioning.

- **Passive Cooling:** Close blinds/reflective coverings on south- and west-facing windows during the day, ventilate by opening windows at night when outside temperature drops, and retreat to the lowest, most interior room during peak afternoon heat: the inverse of the Energy & Heat chapter's winter safe-room strategy.

- **Low-Power Cooling:** A box fan draws a fraction of the power an air conditioner does. If running on a Tier 2 solar generator, prioritize fans and evaporative (swamp) cooling, which works well in Utah's low-humidity climate, over trying to run AC.

- **Heat Illness Recognition:** Know the difference between heat exhaustion (heavy sweating, weakness, nausea) and heat stroke (hot/dry or wet skin, confusion, loss of consciousness). Heat stroke is a medical emergency; see the Medical Care chapter for treatment. Anyone medically

vulnerable to heat should have a specific cooling plan; see the Access & Functional Needs chapter.

- **Structural Prevention:** Shade trees or awnings on south/west exposures and light-colored, reflective roofing meaningfully reduce indoor heat gain over a full summer, worth planning as part of any Tier 3 construction project.

Extreme & Extended Cold

Cold-weather survival (layering, safe-room heating, hypothermia recognition) is covered in depth in the Energy & Heat chapter; this section covers only the shelter-specific side of winter risk that belongs here instead.

- **Pipe Freeze Protection:** Insulate exposed pipes (crawl spaces, exterior walls, unheated garages) before winter, and know how to shut off and drain them if a hard freeze is coming. Let faucets drip slightly during extreme cold snaps; moving water resists freezing better than still water.
- **Burst Pipe Response:** Know the main water shut-off location (same one referenced in Tier 1's utility shut-off skill). A burst pipe left running can cause more damage in hours than most other winter hazards combined.
- **Roof Snow Load:** Heavy, wet Wasatch Front snowfall can exceed a roof's design load, particularly on flatter or older roof sections. Know your roof's rated snow load and have a plan (professional snow removal, a roof rake for reachable sections) for unusually heavy years.
- **Ice Dams:** Watch for ice buildup at roof edges after heavy snow; it can force meltwater back under shingles into the structure. Proper attic insulation and ventilation prevent most ice dams before they start.

Flooding

Utah's flood risk comes primarily from two sources: rapid spring snowmelt overwhelming rivers and canals after a heavy snowpack winter, and flash flooding from summer monsoon thunderstorms in canyons and normally-dry washes. Salt Lake City has real precedent here: City Creek overflowed down State Street in 1983 after a fast, warm snowmelt, a widely documented event worth knowing about.

- **Know Your Flood Zone:** Check FEMA flood maps for your property before an event, not during one; it determines whether sandbagging, insurance, or evacuation planning should be a priority. Standard homeowners insurance excludes flood damage entirely; separate coverage

through the National Flood Insurance Program (NFIP) or a private flood policy is required, and NFIP residential coverage caps at $250,000 for the building and $100,000 for contents. There's typically a 30-day waiting period before a new NFIP policy takes effect, another reason to check this before, not during, an event.

- **Structural Flood Prep:** Grade soil away from the foundation, maintain functioning gutters and downspouts extending well clear of the house, and consider a sump pump with battery backup if the property has a history of water intrusion.
- **Sandbagging:** Learn correct sandbag placement (stacked in a running-bond pattern, not just piled) before a flood watch is issued; most jurisdictions along the Wasatch Front make sand and bags available at fire stations or public works yards during snowmelt season.
- **Flash Flood Safety:** Never walk or drive through flowing water. "Turn Around, Don't Drown" is the National Weather Service's standard guidance for good reason: it takes surprisingly little moving water to sweep away a person or a vehicle. Avoid canyon narrows and washes entirely during a flash flood warning, regardless of how clear the sky looks overhead.
- **Post-Flood Water Safety:** Treat any water source that may have mixed with floodwater as contaminated; apply the same purification steps from the Water chapter's Tier 2 guidance before using it for anything.

WARNING

"Turn Around, Don't Drown" Isn't a Slogan

It takes surprisingly little moving water, roughly a foot, to sweep away a vehicle, and far less to sweep away a person on foot. Never walk or drive through flowing water, and avoid canyon narrows and washes entirely during a flash flood warning, regardless of how clear the sky looks overhead.

Regional Hazard Quick Checklist

- [ ] Defensible space zones (0-5-30-100 ft) established and maintained around the home
- [ ] Ember-resistant vents, Class A roofing, and clear gutters (wildfire hardening)
- [ ] N95/P100 respirators on hand; Corsi-Rosenthal box materials or HEPA purifier available
- [ ] Passive cooling measures (reflective coverings, night ventilation) in place for summer
- [ ] Heat illness signs known by every adult in the household

- [ ] Exposed pipes insulated; main water shut-off location known
- [ ] Roof snow load and ice dam risk assessed
- [ ] Property's FEMA flood zone checked; sandbagging technique known
- [ ] Practiced: household knows evacuation triggers for wildfire and flash flood specifically, distinct from the general lockdown/evacuation routine

At a Glance: Shelter & Structural Safety Across All Tiers

A single-page reference for planning purposes. This does not replace the detailed guidance above; use it to see how the plan scales, not as a standalone checklist.

Tier	Duration	Structural/Shelter Focus
Tier 1	Hours – 14 days	Seismic safety, structural hazard mitigation
Tier 2	2 weeks – 3 months	Reinforced entry points, stocked safe room
Tier 3	Indefinite	Long-term structural resilience or rural relocation
Tier 4	Sustainable community	Shared shelter capacity for displaced members