

## ZERO HOUR READY — MODULE 0, LESSON 7

# Action Steps & Resources

### *Bunker (Protected Habitat)*

## IMMEDIATE ACTION STEPS

### ACTION 1 - Identify Your Current Protected Habitat Status

What do you already have? Be honest about exposure level.

HABITAT TYPE	DO YOU HAVE ACCESS?	CONDITION / NOTES	VIABLE?
Cave or mine (natural or existing)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Notes: _____	<input type="checkbox"/> Y <input type="checkbox"/> N
Root cellar (existing)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Notes: _____	<input type="checkbox"/> Y <input type="checkbox"/> N
Basement - minimal exposure (few/no windows)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Notes: _____	<input type="checkbox"/> Y <input type="checkbox"/> N
Basement - exposed (walkout, large windows)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Notes: _____	<input type="checkbox"/> Y <input type="checkbox"/> N
Existing bunker (any type)	<input type="checkbox"/> Yes <input type="checkbox"/> No	Notes: _____	<input type="checkbox"/> Y <input type="checkbox"/> N
Will need to build from scratch	<input type="checkbox"/> Yes <input type="checkbox"/> No	Notes: _____	<input type="checkbox"/> Y <input type="checkbox"/> N

### ACTION 2 - Complete the Six Pre-Construction Planning Questions

Answer every question before any construction decisions are made. These answers drive the build.

PLANNING QUESTION	WHY IT MATTERS / WHAT TO DECIDE
<b>How many people?</b>	Include every member of the survival group. Not just your family - the full community if building a shared bunker. Each person needs space to sleep, sit, move, and store personal supplies for 3-10 days.
<b>One shared bunker or individual family units?</b>	Key community decision. One large bunker: more efficient space, better resource pooling, harder to build and seal. Individual family bunkers: smaller scale, more achievable independently, requires coordination of placement.
<b>Animals?</b>	Which animals are coming in? Chickens, dogs, small livestock? They add warmth but also CO2, noise, and waste. Account for their space and ventilation needs.
<b>Supplies separate or co-located?</b>	Storing supplies in a separate secured structure vs. with the people. Each has tradeoffs in accessibility vs. space vs. security. Decide before you build - it changes the layout.
<b>What equipment must come in?</b>	Medical equipment, communication gear, food prep tools, personal weapons. Anything that must be accessible during the 3–10 day period goes on this list before sizing the space.
<b>Space required?</b>	Calculate: people + animals + supplies + equipment + movement. Then add 20% for what you forgot. 3-10 days is the expected maximum underground duration. Plan for the top of that range.

### ACTION 3 — Run the Materials Assessment

What materials are available to you? What do you need to source? Check accessibility of the recommended materials before committing to a design.

MATERIAL	AVAILABLE LOCALLY?	APPROX. COST / NOTES	USE PLAN
<b>Aircrete (preferred)</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	_____	<input type="checkbox"/> Primary <input type="checkbox"/> Backup <input type="checkbox"/> Skip
<b>Hempcrete (preferred)</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	_____	<input type="checkbox"/> Primary <input type="checkbox"/> Backup <input type="checkbox"/> Skip

Standard concrete (acceptable)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	_____	<input type="checkbox"/> Primary <input type="checkbox"/> Backup <input type="checkbox"/> Skip
Fiberglass rebar (required)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	_____	<input type="checkbox"/> Primary <input type="checkbox"/> Backup <input type="checkbox"/> Skip
Wood (for roof)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	_____	<input type="checkbox"/> Primary <input type="checkbox"/> Backup <input type="checkbox"/> Skip
Non-metallic piping (ventilation)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	_____	<input type="checkbox"/> Primary <input type="checkbox"/> Backup <input type="checkbox"/> Skip

**ACTION 4 - Complete the Features Checklist for Your Planned Habitat**

Whether upgrading an existing space or building new, assess every critical feature. Nothing on this list is optional except where noted.

FEATURE	STATUS	NOTES / PLAN
Air ventilation system installed	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Non-metallic piping (all ventilation)	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Primary entry/exit (fortifiable, sealable)	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Emergency exit (second point of egress)	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Walls angled outward (or built into hillside)	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Entrance non-obvious from distance	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Interior waste drainage line	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Perimeter drainage managed	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Elevated solid ground confirmed	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Floor load capacity known	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Fiberglass rebar used (no metal rebar)	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
Seismic load reversal considered (if applicable)	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____
All specs documented / manuals written	<input type="checkbox"/> Done <input type="checkbox"/> In Progress <input type="checkbox"/> Not Yet	_____

**MATERIALS REFERENCE - QUICK COMPARISON**

MATERIAL	PROS	CONS / CAUTIONS	RATING
<b>Aircrete</b>	Stronger than concrete, lighter, floats (dual-purpose flotation structure), not conductive, not flammable. Works well with fiberglass rebar.	Requires mixing and curing process. Less widely available than standard concrete. Check local supply.	<b>BEST</b>
<b>Hempcrete</b>	Similar to Aircrete: strong, light, not conductive, not flammable. Excellent insulative properties. Works with fiberglass rebar.	Not load-bearing on its own - requires a frame structure. Curing time is longer than concrete.	<b>BEST</b>
<b>Standard Concrete</b>	Widely available, well-understood by contractors. Good load-bearing strength.	Conductive (arc discharge risk during solar event). Heavier. Does not float. Use fiberglass rebar, not metal.	<b>ACCEPTABLE</b>

<b>Wood</b>	Excellent insulation. Readily available in most locations. Easy to work with. Fantastic for roofing - add soil on top, snow insulates for free.	Flammable. Not for primary structural walls if other options exist. Best use: roof construction with soil cover.	<b>ROOF / SUPPLEMENTAL</b>
<b>Earth / Soil</b>	Free. Works via mass - enough depth provides good thermal mass. Already covering your bunker in most designs. Hit rock beneath and insulation is near-total.	Lowest insulation per unit thickness. Requires waterproofing. Must be stable ground, not loose fill.	<b>COVER LAYER</b>
<b>Metal Rebar</b>	Standard rebar - strong, widely available.	DO NOT USE. Conductive during solar blast. Arc discharge risk inside bunker. Use fiberglass rebar instead.	<b>AVOID</b>

## FEATURES REFERENCE — COMPLETE GUIDE

CATEGORY	FEATURE	WHAT IT MEANS / WHY IT MATTERS
<b>VENTILATION</b>	<b>Air ventilation system</b>	Non-negotiable. CO2 builds up in an enclosed space with people and animals. Without active ventilation, everybody in the bunker dies in their sleep. This is not an exaggeration.
	<b>Non-metallic piping</b>	Plastic, ceramic, or clay for all ventilation pipes and chimneys. Metal conducts and can arc-discharge during the solar blast. This applies to anything that would normally be metal and runs into or out of the bunker.
<b>EXITS</b>	<b>Primary entry/exit</b>	Main access point. Fortified. Can be sealed from inside. Design so it is not obvious from a distance - a visible door screams 'humans built this, someone is in here.'
	<b>Emergency exit</b>	Second point of egress - opposite side or above. If the primary is blocked, compromised, or attacked, you need a way out. Not optional.
<b>WALL ANGLE</b>	<b>Walls angled outward (recommended)</b>	The greatest structural risk in a shallow bunker is not from above - it's from the sides. Wet, waterlogged soil generates enormous lateral pressure. Angling walls outward means that pressure pushes the structure upward rather than causing inward collapse. Also preserves vertical wall space for shelving and bunks.
	<b>Alternative: built into a hillside</b>	Building into a hillside with the natural slope creates the angular structure and uses the existing geology as your wall. The hill absorbs lateral pressure. Less construction required. Excellent option where terrain permits.
<b>DRAINAGE</b>	<b>Interior drainage</b>	Your waste goes somewhere during 3-10 days. Receptacle-and-remove requires someone to exit during potentially dangerous conditions. A drain line that runs waste outside is far better. Plan this before construction - retrofitting drainage is extremely difficult.
	<b>Perimeter drainage</b>	Building a bunker changes how water moves through that ground. What was stable soil now has a subterranean structure redirecting water flow. Perimeter drainage prevents water from pooling against your walls and creating the lateral pressure problem. Requires engineering input in most cases.
<b>STRUCTURAL</b>	<b>Elevated solid ground</b>	Your Tsunami Safety Score from Lesson 6 confirms the macro location. This is the micro-location within that area. Don't build on the side of a hill that could give way. Don't build where rainstorms will pool. Elevated, solid, stable ground. Then build.
	<b>Floor load management</b>	Weight distributed unevenly on a floor cracks it - sometimes immediately, sometimes over weeks. Know the load capacity of your floor before stacking supplies. Spread heavy loads evenly. Get this from your engineer.
	<b>Fiberglass rebar</b>	Replace all metal rebar with fiberglass rebar. Achieves the same structural reinforcement without conductivity. Pairs with aircrete, hempcrete, or standard concrete equally well.
	<b>Seismic load reversals</b>	For earthquake-risk areas: design for uplift (net upward load = dead load + half live load) and rebound using seismic hooks. Bring this up with your engineer or architect if seismic activity is a meaningful risk in your location.
<b>DOCUMENTATION</b>	<b>Records and manuals</b>	Document everything about your bunker: the design, the materials used, the drainage routing, the ventilation specs, the load calculations. You may need to repair it. You may need to rebuild it. Others in your group may need to understand it if you're not available. Simplicity of design makes documentation easier - one more reason simplicity is king.

## INSULATION REFERENCE - HIERARCHY

*From highest insulation to lowest. Soil/sand is adequate for 3-10 day duration — don't overthink it.*

INSULATION MATERIAL	RATING	PRACTICAL NOTES
Rock	HIGHEST	Once you're down into bedrock, insulation is near-total. If your bunker is a cave or mine, you already have this.
Packed Snow	EXCELLENT	Don't sleep on this. Igloos work because packed snow traps air pockets. An inch of packed snow over your roof adds significant insulation - and if it's cold enough for snow, it arrives free.
Straw / Dry Grass	VERY GOOD	Old technology. Works because of trapped air. A thick layer of packed straw over a wood roof is a low-tech, low-cost insulation solution that has kept people alive in harsh winters for thousands of years.
Wood	GOOD	Excellent for roofing. A wood-planked roof with a layer of soil on top, and snow accumulating in winter - that is all you need. The insulation is already there for free in cold climates.
Soil / Sand (shallow)	LOWEST	Lowest insulation per unit thickness - but plenty for the expected duration. You don't need much depth before reaching rock, which ends the insulation problem entirely. Soil is fine. Don't overthink it.

## RESOURCES - LESSON 7

### On Bunker and Underground Construction

#### Build Your Own Earth Shelter - Rob Roy

Practical, builder-oriented guide to underground and earth-sheltered home construction. Covers structural principles, material choices, drainage, ventilation, and waterproofing - all the engineering topics from this lesson at the practical construction level. The most accessible and directly useful single resource for someone designing a bunker or earth-sheltered structure without professional construction experience.

#### The Art of Natural Building - Joseph Kennedy, Michael G. Smith, Catherine Wanek

Comprehensive guide to natural building materials including cob, straw bale, adobe, and earthen construction. Most relevant here for the alternative materials discussion - cob and adobe share properties with hempcrete in terms of thermal mass, non-conductivity, and low flammability. Useful for understanding the full range of natural material options beyond Aircrete and Hempcrete.

### On Concrete and Structural Design

#### Concrete and Masonry - Tom Philbin

Practical handbook for working with concrete, block, and masonry at the DIY and small contractor level. Covers mixing, forming, reinforcing, and curing - including the rebar substitution discussion. Useful for anyone planning to use concrete as their primary material and working with contractors to ensure fiberglass rebar is correctly specified.

### On Aircrete and Hempcrete Specifically

#### The Hempcrete Book - William Stanwix and Alex Sparrow

The most thorough available resource on hempcrete as a building material. Covers structural properties, mixing, forming, curing, insulation properties, and use in combination with other materials. Essential reading before specifying hempcrete as your primary bunker material - it clarifies where hempcrete excels (walls and insulation) and where it needs a frame (load-bearing applications).

## On Underground Survival

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Life After Doomsday - Bruce D. Clayton, Ph.D.

The original scientific analysis of survival planning for civilization-level disasters. Covers fallout shelter design, underground duration planning, and the specific physiological and psychological challenges of extended underground habitation. More extreme-scenario oriented than this lesson requires, but provides valuable context for understanding the engineering requirements and the 3-10 day estimate in perspective.

**Simplicity is king. Use the Earth.**

God created a heck of a protection here. You don't need much of it.

*See you for the final lesson.*