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Safe Homes:
An Architectural Feasibility Study

Submitted by

William Allison

Aaron Campbell

Caroline Shelley

Kelly Williamson

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WHY IS A SAFETY ROOM NEEDED?

Safety is defined as a state of being safe from the risk of experiencing or causing injury, danger, or loss. For individuals to achieve this, it is imperative for them to feel safe within the comfort of their own home. If their basic place of shelter cannot provide safety, people can never feel truly protected. We may not be able to fool Mother Nature, but there are certain steps we can take to safeguard ourselves, our families, and our personal property before, during, and after disaster strikes.

As people have become more interested in protecting themselves, a need for security in the home has been created. A safe room within one's house is a solution to the uneasiness and discontent that some may feel. This room, whichever model or option chosen, will provide a means of safety to seek refuge when needed. Three options of diverse examples of safety rooms have been explored and provided in the following project. Each model varies on level of safety, cost, size, and complexity.

WHY NOW?

There are many reasons to choose a safety room for protections against inevitable circumstances. Now is as good a time as ever. Precautions that haven't been taken in the past need to be studied, contemplated, and put into action. Anything can happen at any time. Unnatural disasters, such as the September 11 disasters, can occur unexpectedly within minutes. More common disasters such as natural disasters can occur within minutes also. There isn't always enough time to prepare when disaster strikes so access to safety must be convenient and easy. Just less than a month ago, tornadoes struck the mid-southern region of our country. Many were injured, including some fatalities in Alabama and Arkansas. Whether a natural or unnatural disaster, safety measures must be easily available for each when the time comes. Don't wait until it is too late to protect yourself, your loved ones, and your home.

3 OPTIONS FOR SAFETY ROOMS:

“The Life Pod”

The Basics:

The “Life Pod” is an underground shelter that offers the protection against tornadoes and hurricanes for families across the country.[1] The shelter is made from polyethylene and is less likely to corrode or break when compared to steel and fiberglass. The consumer has the option of installing the “life Pod” unit in the ground himself or herself or hiring a contractor. For an economically challenged family, this would be the ideal shelter of choice.

The Scope:

- 7.5 cubic yards of volume
- A floor plan of 5 feet x 9 feet
- 5 feet of head room
- 7 inch Stainless Turbine Vent
- 24 inch Stainless Man way with Vent, Hinge, and latch handle
- Bench seating
- Stairs

[1] Life Pod cannot guarantee to protect against other storms.

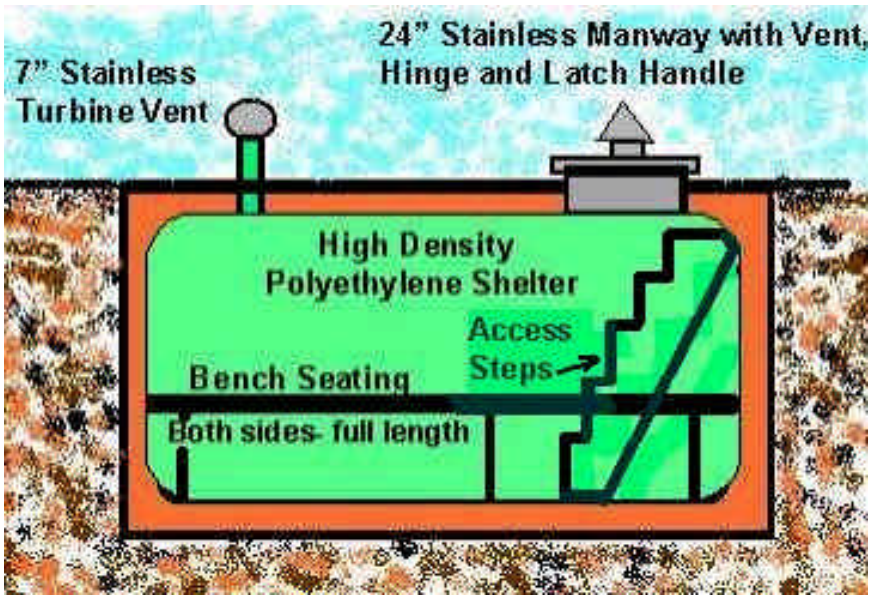

Figure 1: Sectional Diagram of Life Pod.

Requirements:

- 10 feet-9 inches x 5 feet-9 inches site for digging
- 2 yards of sandy clay for bedding
- 1 yard of ready mix concrete
- Life Pod unit

The Cost:

$2195.00 for the unit itself. Contractors fee, if one chooses to use one, is not included with the "Life Pod".

The Time Table:

With the help of a contractor the unit can be installed within 3 to 4 hours.

Mortgage Insurance:

The U.S. Department of Housing and Urban Development will provide mortgage insurance to enable homebuyers to borrow up to $5,000 to create windstorm shelters in their homes. At the present time many

homeowner's insurance policies do not give allowances for shelters but we are confident that they will be provided for in the future.

Figure 2: Exterior picture of Life Pod unit before it is placed in the ground.

Figure 3: Exterior picture of the Life Pod unit placed into the ground.

Figure 4: Exterior picture of the Life Pod unit buried underground and surrounded by landscaping.

Figure 5: Close up picture of the Life Pod's exterior

"The Safety Room"

THE BASICS:

The Safe room as developed by Texas Tech. In theory this is a small, readily accessible room that protects against tornadoes and other bad weather. The concept can be used in built and newly built residences where providing a totally protected home is not possible.

The Scope:

- Can be a small, windowless room such as a closet
- Can be easily accessed from all rooms of the house
- Can be built in varying sizes. The duration of time spent in the room justifies the size. For example a hurricane would last longer than a tornado. The following are basic requirements for how much space is needed per person for the following storms or emergencies.
  -Hurricanes: 10 ft ^{2} per person [2]
  -Tornado: 5 ft ^{2} per person
  -Chemical warfare: Customer's discretion of how much space is needed[3]

- Reinforced Concrete Masonry Construction

[2] The Safe Room cannot protect against all kinds of storms due to the location. The "safe room" is guaranteed to protect your family against the following: Hurricanes Tornadoes, and Chemical Warfare.
[3] The average person gets at least 10 ft^2 per person.

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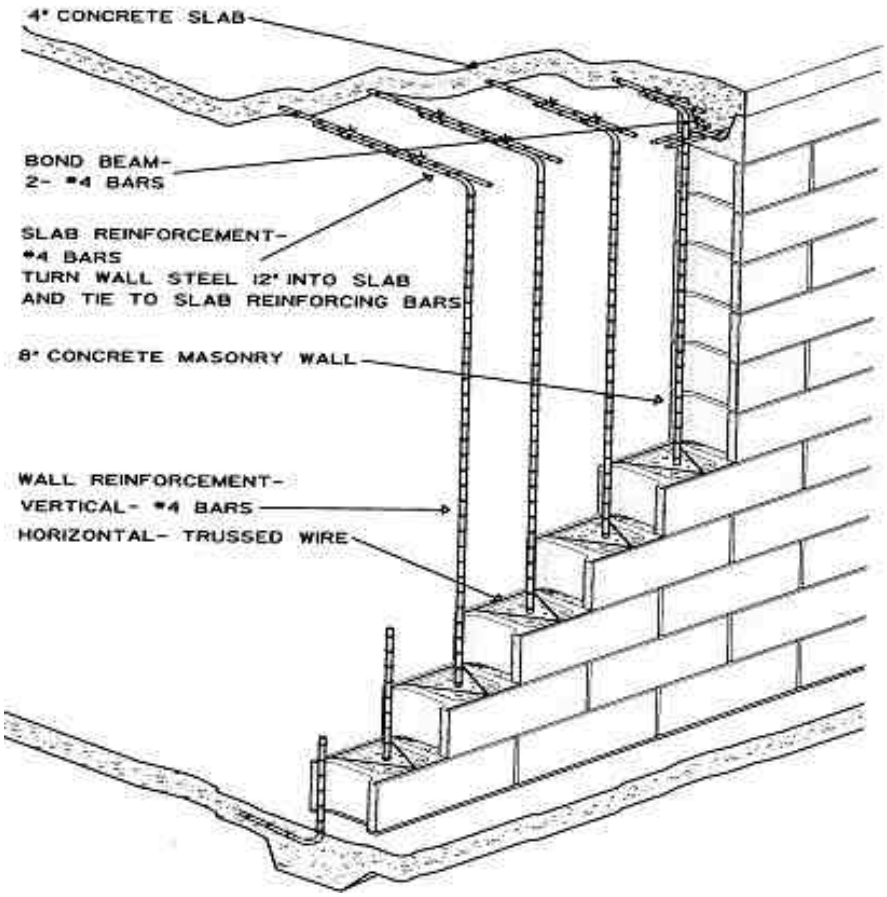

- Plumbing Optional based on occupant's level of safety concerns. [4]
  - -Hurricane*:* Plumbing including toilets or sinks
  - -Tornadoes*:* Plumbing optional (based on customer's needs)
  - -Chemical Warfare: No plumbing (threat of chemicals in sewer system)

[4] Plumbing is used where threat of warfare is not a concern.

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Shaded areas designates possible locations for safe room

- Can be built in basements
- Special Ventilation for Chemical Warfare optional
- safe rooms can provide protection against:
  -winds of up to 250 miles per hour
  -projectiles traveling at 100 miles per hour

Can be built into an already built home or newly built home

SHELTER CONSIDERATIONS (NEW HOUSES)	APPROPRIATE SHELTER TYPE		
	BASEMENT	ABOVE-GROUND	IN-GROUND*
House located in storm surge area		✓	
House located in flood hazard area		✓	
High water table		✓	
Low cost	✓		✓
Long-term shelter occupancy	✓	✓	
Least likely to be hit by missiles			✓

SHELTER CONSIDERATIONS (EXISTING HOUSES)	APPROPRIATE SHELTER TYPE		
	BASEMENT	ABOVE-GROUND	IN-GROUND*
House located in storm surge area		✓	
House located in flood hazard area		✓	
High water table		✓	
Low cost	✓	✓	
Easiest retrofit	✓		
Long-term shelter occupancy	✓	✓	
Least likely to be hit by missiles			✓
Ease of separation from structural framing of house	✓		
Minimal disruption to house	✓		
Ease of accessibility		✓	

Cost:
The average cost for an 8x8 room is between $3000-$3500, but varies depending on where the room is built. (8x8) is taken as an example.

FOUNDATION TYPE	SHELTER TYPE[1]	AVERAGE COST
Basement	Lean-To	$3,000
	AG – Reinforced Masonry	$3,500
	AG – Wood-Frame w/Plywood & Steel Sheathing	$5,000
	AG – Wood-Frame w/Concrete Masonry Unit Infill	$4,500
	In-Ground	NA
Slab-on-Grade	Lean-To	NA
	AG – Reinforced Masonry	$3,500
	AG – Wood-Frame w/Plywood & Steel Sheathing	$4,500[2]
	AG – Wood-Frame w/Concrete Masonry Unit Infill	$4,000[2]
	In-Ground	$2,000
Crawlspace	Lean-To	NA
	AG – Reinforced Masonry	$4,500
	AG – Wood-Frame w/Plywood & Steel Sheathing	$6,000
	AG – Wood-Frame w/Concrete Masonry Unit Infill	$5,500
	In-Ground	NA

Mortgage Insurance: The U.S. Department of Housing and Urban Development will provide mortgage insurance to enable homebuyers to borrow up to $5,000 to create windstorm shelters in their homes. At the present time many homeowner's insurance policies do not give allowances for shelters, but we are confident that they will be provided for in the future.

“The Subterranean Fortress”

The Basics:

Subterranean Fortress is a four story deep camouflaged made to handle any type of disaster. It is made for someone who wants to live just like everyone else, with all the comforts of a normal civilian neighborhood community, while at the same time, is secretly prepared for the worst disaster without having to leave the home.

The Scope:

- 4-story deep shelter designed to handle virtually any disaster
- 1,400 square feet in rooms
- several independent ventilation system
- engineered to handle a nuclear explosion within 2.5 miles
- all cement surfaces are finished off with several layers of epoxy paint that is radiation resistant and maintenance free drainage and pump systems keep the shelter dry and clean
- secret passageways and compartments take you to different levels and allows you to hide valuables
- camouflaged utility entrances
- heavy duty generator with sound buffering room and ventilation system, complete battery system power
- 1 full bath and half bath which includes a fully automatic and sealed sewer pump to get waste product to the city sewer
- cement computer room that is Electro Magnetic Pulse (EMP) wave proof This means your computer will be one of very few that still works after the EMP wave following a nuclear explosion.
- one person elevator to the bottom of the fourth floor to carry down supplies any other necessity[5]

Cost:
$329,000 for the total construction without luxury accommodations which the buyer can remodel to suit individual taste

Mortgage Insurance:

The U.S. Department of Housing and Urban Development will provide mortgage insurance to enable homebuyers to borrow up to $5,000 to create windstorm shelters in their homes. At the present time many homeowners insurance polices do not give allowance for shelters but we are confident they will be provided for in the future.

The Best Home Shelter For You and Your Family

WACK® designs has been working to establish three different shelters to protect you and your family from natural disasters. The models range from:

1. A small “Life Pod” made to handle minor natural disasters
2. A mid-range model called the “Safe Room” which is built while your house is under construction or if it is already existing; it will protect against tornadoes, hurricanes and chemical warfare
3. The ultimate protection, the “Subterranean Fortress”, which can virtually protect against certain disasters, natural or manmade.

Working together we believe we have the solution to protecting families from deadly disasters that are happening around the world. We have reviewed many options and decided on the best ones to fit you and your families needs.

These additions can add value to your property while giving you an ease of mind knowing that you will be safe if anything should happen.

Here are the comparison and specifications for the three different shelters:

Location for shelter

Life Pod:

- select a site and stake out 10 feet-9 x 5'-9" for a digging guide
- the final site location must be accessible by vehicles to excavate, load out excess soil, and deliver sand and concrete
- do not select a location too far from the house, in digging too close to a tree or in a low area subject to flooding, one may encounter large roots
- do not select a location that will be traveled by heavy vehicles
- do not select a location with a high water table

Safe Home:

- Typically, due to foundation size and location limitations, a retrofitted safe room is usually installed as a separate addition to an existing home or as a detached structure. Sometimes, with proper foundation preparation, it is possible to install a safe room in a garage or a basement four stories deep
- A small interior room above grade is the best location for a safe room. Safe rooms are often used for other non-emergency purposes. Bathrooms and large closets are a frequent choice. Because warning times for tornadoes can be very short, quick access to the safe room is important in choosing location. If the owners have any special accessibility needs these should be considered in the location and design of the safer room.

Subterranean Fortress:

- 4 stories underground
- 1,400 square feet
- must be added before construction on the house begins

Costs

Life Pod:
$2,695.00 for a single unit

Safe Room:
Between $2,500 and $6,000 depending on the following factors:
- The type of foundation on which your house is built
- The size and location of the shelter

Subterranean Fortress:
$329,000 for basic plan however customer can add more luxuries to suit their taste

Conclusion:
These safety shelters are needed for any family living in natural disaster prone areas. They have been proven to save lives in the past and will be essential to saving lives in the future.

With three models to choose from, all fitting most income brackets, a home shelter is a necessity that anyone can acquire.