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A Study on Underground Bunker as Emergency Shelters

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ABSTRACT: In some urban residence and buildings, equipped shelter has all the time played a task in security preparation from the secret safe region in medieval castles to "panic room". By designing many kinds of underground shelter, during the 20th century when present combat placed civilian population at hazard the civil defense planners modified on the military protection initiated in the U.S. civil War and World War I. During the Cold War these facilities became memorable, and even though the much-feared nuclear divergence never become visible. Many Civil Defense bunkers have proven useful as shelters for people afflicted by natural disasters of different kinds .Underground bunkers can be as elementary as a hand-dug foxhole, or as detailed and sophisticated as the subterranean complex such as the one recognized beneath the ill-fated Maginot Line. Amid assembly cost-effective and social crises, the scene of terrorist attacks, and the continuing plague of natural catastrophes, people seeking to provide security for themselves and their families would be wise to consider the various options for building an underground security shelter.

KEYWORDS: bunker, shelter, hazards, facilities.

I.INTRODUCTION

A safety place designed to be used during the wars to protect people as well as other rich valued resources is named as bunker. Bunkers are safe from any explosions and attacks. These bunkers are protective shelter inserted deep underground hidden from the visible infrastructure [1]. These are similar to living accommodation located underground. These were used during the World War I, World War II, and cold war as well as used as command centres and storage purpose. These helps protect assets from disaster. Those shelters which provides protection from rays, bombs, attacks, tornadoes and many other safety measures. They do provide many others protection for above ground shelters the underground is the best place to accommodate living and storage units to avoid threats.

II.HISTORY OF BUNKERS AND ITS ORIGIN

The "bench, seat" is a source word from where the word bunker originated as a scot word (recorded 1758, alongside shortened bunk "sleeping berth"). Bunker similar to bench, bank or boards used to protect the cargo of a ship. A sense of "earthen seat" is recorded 1805, from whence the technical use in golf (by 1824). The word entered Dutch and German as a loanword from English in the 19th century, in the nautical sense of "room for coal storage in a ship". In German, the word came to be applied for dug-out military shelters in the World War I period [2] and came to be used by the Germans to describe bombproof shelters both above ground as in Hoch bunker and below ground as in the Fuhrer bunker [3].

III.IMPORTANCE OF SHELTER USING UNDERGROUND BUNKERS

A careful measure to be taken based on the location and design of the bunker before purchasing the underground bunker. Risk assessment can be change suddenly. Array of hazards should be considered during designing of bunker. These hazards should withstand earth quakes and other related vibrations from earth such as high velocity winds from tornados and hurricanes, invasion from mobs, heavy overpressures from nuclear blast, all types of radiation, wild fires, known as 'All Hazard Shelter'. For nuclear survival the underground shelter must assure the entire scope of

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requirements for 'All Hazard Shelters, and the cost should be taken care during the purchasing this kind of shelters and it should be limited in its capabilities [4].

- **Underground Steel Shelters**

The effects of nuclear weapons, as well as biological and chemical weapons (NBC) in built-up underground steel shelters because they provide very cost effective protection. It can be so effective protection for ordinary citizens from nuclear explosion with in ½ mile such that the cost of a new pickup truck is significant. The concept is simple. To assure proper earth arching and protecting, a steel cylinder of a valid size is outfitted with bulkheads, a floor, and electrical system and the properly designed entrances and buried to an appropriate depth. If the wall thickness of the cylinder is thick enough, and the backfill is performed to industry specifications, such a structure will endure a nuclear shock that would destroy all above ground buildings within a 5-mile radius of the blast [5].

Fig.1 steel shelter [5]

- **Steel Shelter Design Feature**

The protection from blast, earth movement, fire, waves and chemical and biological war glasses is offered by the overall design of our underground steel shelter. Through careful engineering and design of the shelter body, doors, air filtration systems and the geometry of the entrance and the installation process was been accomplished. This is accomplished through careful engineering and design of the shelter body, doors, air filtration systems and the geometry of the entrances and the installation process.

- **Shelter Body**

At the Nevada test site to blast pressure of 200 psi the corrugated steel pipe (CSP) shelters were tested and has been proved. In order to achieve protection to some level, the diameter of the shelter must be less than or equal to the dirt cover over the shelter chamber and the shelter must have an arched ceiling. At this depth, earth arching is achieved. It should be concerned that the shelter diameter must be match with the gauge of the steel. Eight-foot shelters are

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constructed of the proper gauge to be deployed into a 16-foot hole and to safely survive the burden of 8 feet of dirt envelop plus the additional overpressure of 200 pounds per square inch of air blast. Ten-foot shelters are considered to be deployed into a 20-foot hole with 10 feet of envelope. “Earth arching” cannot be achieved because flat roofed steel shelters will not survive these heavy over burdens. They will fail disastrously under these over pressure loads.

Entrances

- The radiation accumulation is the greatest hazard for entrances. To attenuate gamma radiation to acceptable levels steels doors to be thick enough. Other shelters system has designed by offering a 90- degree turn and long vertical and horizontal runs to attenuate gamma for entrance. Larger diameter entrances need longer horizontal runs.
- One can modify entrances to preferred diameter. If the shelter is closer to a nuclear blast target and there is a threat of initial radiation, six feet of shielding should be deployed into the horizontal run to protect the inner part of the shelter. We also have a special 'T' shaped entrance, if preferred, to offer storage space for the shielding material. A shelter this near to targets must have entrances no more than 4' in diameter [6].

Fig.2 Entrance to a bunker[6]

Two entrances have been provided to all of our shelters to ensure egress in the incidence is blocked by debris. Steel hatch type blast doors, or concrete filled vertical doors are protected to all the entrances.

In the attenuation of radiation, distance and geometry play a vital role. Both a vertical and horizontal component, connected with a 90- degree turn is compulsory for the nuclear shelter entrances. The total entrance length must be at least 4 times the diameter, with the vertical and horizontal legs as nearer to the same size as possible, for the proper attenuate gamma radiation. After a nuclear event, gamma radiation is a factor throughout the first two weeks. Gamma radiation is directional and will not turn well. The vertical and horizontal run will attenuate 90% of the gamma radiation with 90-degree turn and the remaining radiation to a small fraction can be reduced by horizontal run. Greater diameter entrances need long runs and are not practical in the attenuation of initial radiation.

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- **Concrete shelter**

A large numbers of people can accommodate in a concrete shelter, and it is easy to design**.** In Switzerland, the deep underground basements of homes, hospitals, schools, hospitals, public buildings, hotels, and most all other buildings are entirely constructed with concrete shelter and deployed inside the deep underground basements. These kinds of shelters are constructed past hundred years ago. And it is constructed in such a way that the entire population of Switzerland can reach a shelter in a matter of minutes.

Governments that mandate a national shelter program can afford the luxury of building large population concrete shelters. They build in mass and tax their citizens accordingly. They build and install these shelters to last for long periods of time. When people move and purchase another home, they can be assured that the shelter in the new home will be built to the same standard and code as the shelter they have left. Concrete shelters are very well-organized for the resistant structure. The cost of concrete shelter will be four to five times more than that of size of the steel shelters. steel shelter contain popular quality such as small diameter, angled entrances and the deep burial depth, achieve a much higher level of protection than is found in the Switzerland public shelter systems[7].

IV.PLANNING

Approximate centre of urban area can be calculated from the urban map. 5 km diameter entrance from the center should have additional specification. Urban centre living and floating population to be accommodated in bunkers. Technical and constructional standards have to establish before deployment of shelters.

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V.CONCLUSION

Building underground shelters once required huge financial investments – often to the tune of hundreds of thousands of dollar. They were designed for the direst of circumstances, and complicated to build and maintain confidentially. The modern urban channel is a much more versatile and cost-effective way to provide the defence in depth afforded by underground shelters. It can provide greater protection in a more convenient and accessible manner right under your home, and for considerably less money than deep bunkers.

REFERENCES

[1] For the difference between bunkers and blockhouses see Schneider & Kitchen 2002, p. 87, BACM Research 2009, p. 263, Davis 2007, p. 290.
[2] "The German term Bunker was used to denote a type of shelter which was of permanent construction. It can be distinguished from the improvised type built in cellars or 1``by reinforcing ordinary buildings. Bunkers were of two types: underground and tower" (Morale Division (1945).
[3]The effect of bombing on health and medical care in Germany. Reports: European war, United States Strategic Bombing Survey 65 (2 ed.). United States War Department. p.189 (footnote "*").)
[4] http://www.utahsheltersystems.com/underground-bunkers-overview.html
[5] http://www.utahsheltersystems.com/steel-shelters.html
[6] http://www.utahsheltersystems.com/shelter-protective-features.html
[7] http://www.utahsheltersystems.com/concrete-bunkers.html

BIOGRAPHY

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