

# The Importance of Passive Defense in National Construction with the Focus on its Significance for Engineers

S.H. MOUSAVI

MA student of Construction Engineering and Management,  
Amirkabir University of technology & Official judiciary Expert on civil construction, Iran.

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## ABSTRACT

Today, the need for appropriate mechanisms for minimizing the impact of any hostile violation by enemies is of great importance. In order to achieve this aim, we have to utilize all available properties in such a way that efficiency shall be maximized. Construction is one of the major areas in this regard. Having been included in different phases of construction such as planning, design, execution, and utilization, passive defense can substantially reduce the loss of lives and properties and any probable damage to buildings. However, training is the first step in this process. Along with the introduction of passive defense application in this field, the paper tries to underline the necessity of training for the engineers.

**Key words:** Passive defense, Construction, training.

## INTRODUCTION

Construction is majorly supervised by construction engineering organization in Iran and the organization members, based on issued licenses, can perform their specified tasks. The availability of various tasks and experts in this area has made it possible to minimize the defects of buildings and their linking spaces by creating comprehensive procedures in passive defense. Given that the main factor in raising the construction quality and subsequently the social welfare is enhancing the quality of work and material, this factor is now receiving special attention in different countries. Urban centers and hotspots in developed countries always receive great deal of attention for being reinforced and resistant against military attacks. Shelters in most city centers are often highly apparent (like in Switzerland). It is inevitable to equip open spaces and build a set of linking networks based on availability and flexibility as necessary and useful measures for preserving and sustaining the urban neighborhoods. (Jafari *et al.*, 2013)

## Passive defense requirements in urban construction

Urban constructions can be categorized into three major classes:

- a) Urban blocks: the smallest set of integrated construction or land segmentation in a way that each segment is restricted by several passages.
- b) Segments: a piece of land with specified borders having document of title and approached to at least one passage.
- c) Buildings: set of structures built on the land for residential or non-residential purposes (administrative, commercial or cultural, for instance).

The important point to be noted here is that passive defense may primarily be used as a kind policy to reduce the consequences of a human disaster, like war for example, even before its breakout. Secondly, although the use of passive defense is popular in urban and macro levels, this solution can be applied in urban blocks and their

features. Also knowing the defense instructions with regard to the size of blocks, segments and buildings, buildings form and density, the location of building and segment and so on, is of great importance. (Moafi *et al.*, 2011)

#### Principles of passive defense

1. Selecting the safe geographic areas of a country
2. Determine the optimal scale of population and space activities
3. Distribution of the functions with threats and geography
4. Small and inexpensive construction and initiative in passive defense
5. Economic feasibility of the project
6. Parallelism associated support systems
7. Retrofitting structures
8. Positioning of operations
9. Crisis defensive management in scenes
10. Camouflage and concealment
11. Destruction of enemy intelligence system
12. Concealment using natural and geomorphologic features
13. Initiativeness and diversity in all actions
14. Protection of critical information systems
15. Production of dual purpose structures.

The approach of different countries toward passive defense

#### China

The indication of china's passive defense performance is important because of the fact that even a country like China with such military capabilities feels the necessity for passive defense. There have been built various shelters across urban regions of China, particularly in Beijing, which are divided into two types: 1. Shelters in large residential complexes, 2. Public shelters; most recently built residential or commercial complexes in Beijing have several underground stories currently used as parking lots which are connected to subway network.

#### USA

passive defense became more important and popular in the US in early 1960's and after the emergence of tension between the two powers of east and west. During the presidency of Carter and Reagan, passive defense became important again

with the emphasis on these three reasons: a. passive defense is a significant part of deterrence theory; b. passive defense is an important instrument in crisis management; c. passive defense in the focal point for country's sustain and survival.

#### North Korea

it has concealed the critical facilities in 80 to 100 meter depth underground tunnels under the volcanic mountains.

#### Switzerland

passive defense in managed by "the Federal Department of Civil Defense". The objective of passive defense programs in Switzerland is to supply shelter against explosions for each individual of its 6.5 million population with the financial contribution of the owners as 50% of total expenses.

#### Israel

since its foundation in 1948 it has always been endangered by Arab neighbors particularly across the borders. Thus, passive defense has always been an indispensable part of country's preservation strategy. (Mohammadi *et al.*, 2009).

The following table describes different measures of passive defense adopted by some countries.

#### Passive Defense in Iran

the teachings of Islam has prohibited Muslims of any bellicosity, however, it puts more emphasis on defending their lives, property and prestige. After announcing Iran as "the axis of Evil" by the US, the importance of being alert and prepared to defend has duplicated in Iran. (Mohammadi *et al.*, 2009)

In fact, different stages of passive defense plan are prepared and implemented before any invasion and at the peacetime. Given the great time and opportunity available for such plans before any malicious violations, various measures should be considered within the context of planning. Today the basic measures of passive defense like camouflage, concealment and so on do not encompass all aspects of a comprehensive passive defense plan and thus, the Expediency Counsel of IR, has provided new definition for passive defense:"

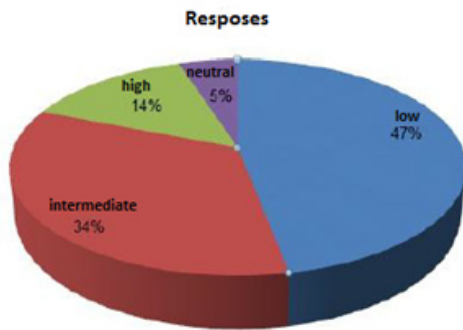
**Table1: Passive defense measures in different countries (Yeganegi *et al.*,2011)**

Country	Measures
Germany	<ul style="list-style-type: none"> <li>• Compilation of laws and required support for passive defense</li> <li>• Construction of shelters in residential and public environments</li> <li>• Establishment of various manufacturers of prefabricated shelters</li> <li>• Double use of facilities, shelters</li> <li>• Compilation of preparatory measures for foundation of cities in the area of land aiming at equal distribution of small and medium cities after World War II</li> </ul>
Switzerland	<ul style="list-style-type: none"> <li>• Establishment of a safe and well-equipped shelters for 90% of the population</li> <li>• Establishing safe places like hospitals and ...</li> <li>• Strong and integral organization of people in cities.</li> <li>• Establishment of a safe subway in proper depth functioning as urban life and shelter</li> <li>• Observing equal right for using shelters</li> <li>• Necessity for multipurpose public shelters in required numbers at desirable areas of the country</li> <li>• Compulsory development of shelters by private units through public contribution and financial encouragement from the government</li> <li>• Prohibiting the evacuation of people at the time of invasion</li> </ul>
Former Soviet Union	<ul style="list-style-type: none"> <li>• Use of shelters and evacuation plans for people from major and target areas to safe places prior to attack of the enemy</li> <li>• Construction of simple and light shelters for people</li> <li>• Construction of strong shelters for maintaining industrial facilities and workers</li> <li>• deep subway for required policies to be used by people as shelters</li> <li>• construction of underground shelters in apartments and public buildings resistant to atomic blast wave and chemical or microbial factors.</li> <li>• Creating mobile command and control headquarters</li> </ul>
America	<ul style="list-style-type: none"> <li>• Construction and dispersion of similar military stations</li> <li>• Strengthening the Intercontinental ballistic missile platforms and their telecommunication and control headquarters</li> <li>• Constructing several shelters for each missile and constant displacement of the missiles from one shelter to another</li> <li>• Construction of light and atomic resistant shelters for protection of population and public evacuation of highly populated areas</li> </ul>
Sweden	<ul style="list-style-type: none"> <li>• Construction of shelters at residential buildings to be used as parking lot or stores at the peacetime</li> <li>• Establishment of underground power centers, fuel reserves and urgent supplies</li> <li>• Executing drill plans for probationary population evacuation of threatened areas to safer areas</li> </ul>
Denmark	<ul style="list-style-type: none"> <li>• Construction of shelters at personal buildings and factories</li> <li>• Constructing public shelters by the government</li> </ul>
Finland	<ul style="list-style-type: none"> <li>• Establishment of group shelters made of reinforced concrete and drilling shelters into the rocks.</li> </ul>
Pakistan	<ul style="list-style-type: none"> <li>• Public trainings, particularly with regard to atomic explosions</li> <li>• Conducting Precautionary measures such as controlling roads lighting, camouflage, concealment, dispersion and so on.</li> </ul>

North Korea	<ul style="list-style-type: none"> <li>• Adoption of decentralization policies aiming at decrease of vulnerability of vital and significant resources</li> <li>• Transfer ring a major part of vital and critical facilities and civil installations to the depth of earth and inner parts of rocks</li> <li>• Constructing Piongyang subway system at the depth of 100 meter underground to counter US threats</li> </ul>
India	<ul style="list-style-type: none"> <li>• Use of voluntary public organizations in urban defense operations</li> </ul>
Italy	<ul style="list-style-type: none"> <li>• Use of specialized services for civil defense: mountaineering federation and ...</li> </ul>
Former Yugoslavia	<ul style="list-style-type: none"> <li>• Having enough food reserves within the country and control of market as well as rationing of strategic items such as gas</li> <li>• Closing down schools and universities at the wartime and use of the said places by army</li> <li>• Use of simulation and making lots of Maquettes to deceive NATO forces</li> <li>• Establishing a complete underground city with all infrastructural and service facilities discovered intact by NATO forces after Kosovo battle. It had numerous entries from mountain houses.</li> </ul>
China	<ul style="list-style-type: none"> <li>• Establishing underground solid shelters resisting atomic bombardments</li> <li>• Establishing military and nucleus centers in forestry and mountain regions</li> <li>• Construction of the great wall as the clearest and the most effective measures taken earlier by human regarding passive defense</li> </ul>
Iraq	<ul style="list-style-type: none"> <li>• Construction of shelters, hospitals and communication centers at the depth of the earth</li> <li>• Use of deceiving Maquettes of planes, tanks, missiles and ...</li> <li>• Fixing anchored air balloons surrounding economic, military and vital centers</li> </ul>
France defense	<ul style="list-style-type: none"> <li>• Establishing shelters resisting atomic bombardments</li> <li>• Training people against dangers and regarding Self-preservation and passive measures</li> <li>• Construction of Maginot line as a significant passive defense measure</li> </ul>

**Table 2: The comparison between city-fortress in ancient Iran (Khodaparast *et al.*,2012)**

City/fortress	Passive defense features
Hegmataneh	Proper positioning for implementing multilayer passive defense, using circular plan for facilitating the defense, proper use of geographical features of the region, constructing barriers and ramparts
Dara	Proper positioning,proper use of geographical features of the regionconstructing barriers and ramparts
Hatra	
Nesa	
Marv	
Castles of Sam, Yazdgerd, and Azhy Dahak	Proper positioning, constructing long and thick defense walls, proper use of geographical features of the regionconstructing barriers and ramparts, digging ditches, applying underground routes
Ctesiphon	
Nisibis	
Narin, falakol-aflak, Dokhtare in Save, Dokhtar in FirouzAbad, Sorkhgaleh, Qom Chaqay	



**Fig. 1: Responses**

it includes decreasing the vulnerability, raising national endurance, continuing the activities, and facilitating the servicing and crisis management. “ . Raising the national endurance does not necessarily means military preparation, but it also encompasses political, economic, social, and cultural measures. (Kazemian *et al.*, 2012)

Considering the weight of international threats facing the IRI, we are still at the beginning of a long journey in the process of passive defense, and increasing the knowledge level of managers and experts about passive defense can elevate the safety level against any possible foreign threat. As stated by the head of standing committee of Iran passive defense, due to the lack of an identical recognition of threats and kind of uncertainty in this area after the Islamic revolution, a great deal of construction was performed in vulnerable areas and different economic or civil projects were conducted regardless of the aspects of passive defense. With respect to the high level of threats and dangers targeting our national security, independence and sovereignty, the issue of passive defense has received so much attention from military and non-military authorities in recent years. The potentials of subsurface spaces and fundamental principles of passive defense are bound together in such a way that make it necessary to be executed for realization of the developmental needs. (Salek Ahmadi *et al.*, 2011)

#### **Passive defense in ancient Iran**

During the Median era passive defense was primarily relying on retrofitting the constructions and military castles, while Parthian put more attention on battlements and using different approaches

to decelerate the enemy access such as digging ditches as a sort of passive defense solution around the castles. In Sasanian era, in addition to the mentioned measures, more stress was on the construction of long and thick walls like Gorgan wall besides castles. Also, changing the internal systems of castles such as complex underground traffic system can be considered as another feature of passive defense during this historical era. Regarding the excavated features from ancient structures, it can be inferred that the passive defense considerations had kind of incremental trend in each era.

The following table provides a comparison between the passive defense features of three mentioned eras. (Khodaparast *et al.*, 2012)

#### **Studying sample population of Construction Engineering Organization members**

With respect to the importance of recognizing the passive defense and its application in national construction, the author has conducted a survey on the level of knowledge about the application of passive defense measures in the industry among the members of Iran Construction Engineering Organization. The results of the survey which is collected from 380 engineers, is illustrated in the following graph.

It can be seen from the graph that there is an emergent need to put more stress on training the engineer community. Considering the working conditions, such trainings can be in the form of Leaflets and Catalogs offered at special meetings, publishing specialized books and magazines in this field, and also refreshment training s and notes via periodic SMSes in a way that can be properly utilized by the experts in construction sector.

#### **CONCLUSION**

As mention in the context, considering various measures of passive defense has always existed from a historical point of view, and different countries including developed and developing ones, are now putting more emphasis on it. Fortunately, in Iran, both prior and after the impose war by Iraq, passive defense has often been considered in buildings and facilities but there is still a long way toward achieving the desirable goal. The necessity

of instruction and training for the society is one of the most significant factors and with respect to the critical role of engineers in the construction industry they must pay more attention to learning and observing

the regulations in this field. The officials and authorities should also provide the requirements in such a way that necessary information in this regard can be well transferred to the engineer society.

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