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Design and Implementation of Reservoirs with Passive Defense Approach

Kaveh Ostad-Ali-Askari[1*], Saeid Eslamian[2], Shahide Dehghan[3], Nicolas R Dalezios[4], Vijay P Singh[5] and Mohsen Ghane[6]

[1]Department of Civil Engineering, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran*

[2]Department of Water Engineering, Isfahan University of Technology, Isfahan, Iran

[3]Department of Geography, Najafabad Branch, Islamic Azad University, Najafabad, Iran

[4]Laboratory of Hydrology, Department of Civil Engineering, University of Thessaly, Volos, Greece & Department of Natural Resources Development and Agricultural Engineering, Agricultural University of Athens, Athens, Greece

[5]Department of Biological and Agricultural Engineering & Zachry Department of Civil Engineering, Texas A and M University, 321 Scoates Hall, 2117 TAMU, College Station, Texas 77843-2117, U.S.A

[6]Civil Engineering Department, South Tehran Branch, Islamic Azad University, Tehran, Iran

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***Corresponding author:** *Kaveh Ostad-Ali-Askari, Department of Civil Engineering, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran. Email: kaveh.oaa2000@gmail.com*

Abstract

In this article, the figure of passive systems in modern plans has been considered. Actuality, some of these Reservoirs are offered to be made inside a crowd area without having an exclusion area. However, it may be arduous or inconceivable to incorporate passive systems largely in large size reservoirs, but could be well fit into tiny and mediocre sized reservoirs. The security of progressive reservoirs is pursuant to the latest thinking, regulatory alters, security aims, and peril evaluation propositions. These are considered in this article. The available article contains all sorts, meanings, and opinions of reservoirs offered to date, so as to simplify analogy and resolution the many of plans. This deep-rooted narrow understanding of this defense system has resulted in excessive attention on the reservoirs. Organization with passive defense method prepares the feasibility to keep down the diminution and deletion of many obstacles by considering the concepts of passive defense to exclude the harms when happening menances while amending situations. This article was managed applying overview procedure to detect a solution for retrofitting of reservoir structures against earthquake and explosive burdens. In the following, we study the methods of passive defense of reservoirs in terms of Site Selection, camouflage, deception and dispersion.

Keywords: Passive Defense; Reservoirs; Security; Site Selection; peril evaluation;

Introduction

With big criterion spread of reservoirs in later, the security needs in terms of hazard for these future reservoirs would be diverse and more accurate than the available Reservoirs. To attain the better security ordinaries in periods of decrement of peril, the passive process could play a significant pattern by removing the commitments of operators or outer inputs for their performance. Moreover, it is significant, Also both empirical and numeral modeling, concentrate on the comprehensive method for make certain long-term security. This essential required to be understood. Passive systems have multiple issues containing their credibility, which must be resolved before interpolation of them into progressive plans [9,10].

Passive defenses as one of the most effective and most sustainable defense against threats have always been the focus of most countries in the world, and even countries such as the United States and the former Soviet Union, with a high military capability, have paid special attention to this issue and a country like Switzerland, with the impartiality of the two world wars, and the lack of confrontation with the threat of this matter, has a great deal of interest to this issue.

Considering the changing nature of the war, the large-scale air-missile strike at beginning and during the conflict to vital, critical and military installations, civilian and even residential, administrative, commercial, educational, and national centers for preservation of national documents and cultural heritage is commonplace and considering the size of the country and the extent of the points, the protection of all these areas against air-missile attacks with the allocation of weapons, in other words, the provision of active defense of the agent across the country at all altitudes simultaneously, is not easily possible [31]. One of the obstacles in conserving reservoirs and the expansion of nations is the incidence of natural or unnatural catastrophes that the absence of suitable management to control and negate them will enhance the region and extent of harms caused by

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tension[35]. Structures and concrete reservoirs are examined as municipal tactical installations that should have suitable reason in order to get passive defense [3]. For instance, concrete reservoirs acting a significant pattern in the storage of drinking water and other biotic liquids in the state are discussed among the very momentous structures with regard to the sort of their usage. Presenting a diversity of concrete reservoirs ways, it targets to inspect its retrofitting ways [18]. Applying a diversity of procedures of retrofitting ways, we can certain the stability of reservoirs during martial and indigenous acme [8].

Unforeseeable incidents yearly have a major contribution to the fiscal and life harms in the universe [28]. One of the enemy's targets is fuel and water reservoirs, as was seen in Lebanon's 33-day war, In the early days, the enemy attempted to destroy fuel and water reservoirs in southern Lebanon Which was the main attack on the fuel tank of the power plant, which caused the entry of oil into the sea, which is still the environmental problem [16]. Considering that reservoirs are a source for saving the basic needs of people, the lack of defense and critical management attitude in the construction and operation of reservoirs is very important (Figure 1) [2,7].

Figure 1: The tank is exposed to enemy threats and unstable against loads [12,24]

Site Selection: Site Selection is the choice of the best and most desirable point and place of deployment, so that it is possible to conceal the devices and equipment in the best possible way. Therefore, if Site Selection is done well, the use of artificial instruments and tools does not find necessary to camouflage and concealment or this necessity will be minimized [1].

Mission: Mission has the most important and best role in comparison with other factors of Site Selection. There may be a good location for the deployment of a repository for camouflage, closure and coverage in the best possible condition, but it is not possible to perform the intended activity there [2].

Dispersion: This factor requires the size, breadth and area needed for a position or location. Therefore, if the breadth of the chosen location is not sufficient to allow for the dispersion, it will not be a good place to set up and carry out operations and perform activities, because the chosen site will become a vulnerable target due to the congestion of reservoirs [2].

Terrain Pattern: Every terrain pattern has a special shape and structure that distinguishes it from other environments, and any changes in the environment indicate a kind of activity and the presence of human resources there, and any construction and a new construction that is not coordinated with the environment will quickly detect and expose the activity and increase the sensitivity of the enemy to that location [23]. The points of the address lead to the attention of the enemy. In the positioning, in order to exclude the enemy's fire and ground, it should be avoided even from the establishment in the vicinity of the points mentioned. In the positioning in order to discard accuracy of ground and airborne fire of the enemy, as far as possible, it should be avoided from deployment in the vicinity of the points mentioned (Figure 2).

Figure 2: An example of a proper location in a vegetation shelter and incorrectly exposed [19]

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Camouflage and Hiding: The overall concept of camouflage is coherent and the formation of facilities, equipment and forces with the surrounding area. Hiding protects its forces against the enemy's eyes and camouflage reduces the possibility of detecting forces, installations and movements.

Camouflage Types: There are two types of camouflage materials: natural materials and artificial materials

Types of natural materials of camouflage: Live Plants: like trees, growing plants, and so on

Plants that have been cut: like leaves and branches cut out trees Soil: The soil is used as a mud coating or soil hill in the protection and camouflage of reservoirs.

Types of synthetic materials of camouflage: Colours: Colours are used for irregular painting of tanks [13,22]. Painting of buildings is usually done by camouflage specialists. When using colours for camouflage of special targets, Precision in the choice of color and type of purpose is very necessary [25].

Oily colours, oily colors soluble in water or plastic, painted colours, silicate colours, Cement paints.

Camouflage Pattern (with attitude to the colour of the environment):

The camouflage pattern (Camouflage method) varies according to the geographical location and the type of season. With the proper use of the standard camouflage table, you can create an ideal color combination for each area [32]. With more precision in the design of the color of the premises, the ideal system can be achieved [20]. If colors are not fitted in the Vehicles, their diagnosis will be easily possible.

Camouflage Nets: Nets are the most appropriate camouflage equipment, although they do not protect the reservoirs effectively, but small-nets are useful in this case and are used when needed. Wire nets also are valuable assets as camouflage equipment and because of its high volume and lack of transportation, it provides an appropriate cover for the reservoirs.

Covered Nets: Hanging nets on top of a tank or covering the tank [14,19]. Covered nets are effective against aerial and terrestrial vision

Flat Roof Nets: The use of this type of nets is only for the purpose of camouflaging the air view. The problem to be addressed here is the higher level of the net through the surface of the reservoir [3].

Principles and Methods of Camouflage Execution

A-Hiding: Full covering of reservoirs carried out by a variety of natural or artificial coverings. Human beings used the principles of hiding and deceiving in hunting and warfare from the past [17]. Here are some common ways of hiding things in relation to camouflage art that can be used in buildings [11]:

Homogenization with the Environment: It should be borne in mind that the enemy pilot is so fast in the region that he cannot identify every section of regions and only see them as a general plan. Everything that is not compatible with this map draws attention. Therefore, we do not need to have a detailed map of the surrounding area, but we have to take a photo to see if our desired location is so coherent with the environment that it does not attract the attention of the enemy.

Mixing and compositing of building with surrounding area is called the homogenization. This act is possible by natural and artificial colors, or other specific materials.

Changing Shape: The apparent variation of the reservoirs can lead to distracting the attention of the enemy alongside deceptive methods.

Color, Light, and Reflection: Identifying each reservoir is based on changes in the object in contrast to colors, lights, textures and shadows. These factors should be considered in concealment.

Shadow and Brightness: Another way to distinguish the reservoirs is to shadow or illuminate it. For this purpose, the apparent shape of the desired reservoirs should be changed, or we should reduce shadow and bright intensity to make its location less clear.

Having the same color with the environment

Preventing observation and identification

Light and Heat: The principles of heat and light are important at all times But their significance at night is much higher. As long as the monitoring is considered as a primary diagnostic procedure, concealment of the optical symptoms is one of the steps that need to be taken

B) Mixing: That is the use of camouflage materials above and around of the reservoir so that it appears to be a part of the surrounding area.

C) Delusion: That is changing the appearance of a reservoir or a particular activity and displaying it in another shape. Make up is one of deception methods. It involves changing the shape of a target or activity that distracts the enemy's intelligence from identification. In this action the use of materials or false facilities is required [1].

Deception

Actions that misleads the enemy and deviates his attention from quantitative and qualitative capabilities and plans of the country.

The Causes and Deceptive Effects

Deception and misleading the enemy are due to the following reasons

Distraction of the precision and attention of the enemy from the main reservoir

To push enemy attacks to false repositories

performing deceptive local methods, such as trying to divert the enemy's attention from a real target or forcing him to consume power and ammunition on a false repository [4].

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Considerations for Installing Deceptive Models

A fake reservoir should be constructed so that its appearance looks like a reservoir that has not completely been camouflaged. In this regard, it is important to pay attention to the following:

Location: Deceptive targets (Replicas) should be positioned within a reasonable distance of real targets and have enough space to real reservoirs so that the enemy's fire does not cause damage or destruction to real reservoirs. This distance depends on the dimensions, real targets, type of enemy's observation, and the power of the enemy's fire [33].

Explaining that deceptive targets should have logical proportions with the points of the index and their surroundings, taking into account the distance and direction of these points to the actual position.

Footprints: The best way to create footprint of a car is to use real cars in one place. Moving cars and displacing them creates an enemy's mindset that the targets are not deceptive; it is also possible to use chains or digging trees to create footprints of a car. It's hard to create footprint of a pulling car without the use of real cars, and you have to use real cars for this purpose.

Camouflage: Facilities and deception positions must be camouflaged in such a way that their detection is due to their weak and incomplete camouflage. To this end, the following actions should be done:

- Some parts of the deceptive target should be exposed.

- Pathways of motion are exposed.

- Use of colour and surface texture to be inappropriate.

-Similar to the real example

- Decoy reservoir should be similar to real and original reservoir.

Being Equal: A deceptive replica should be the same as its true size in terms of length, width and height.

It's Three-dimensional: A deceptive replica should be three-dimensional; the placement of stylishly crafted models in positions is an inappropriate action to achieve deceptive targets.

Deployment Speed: The speed of deploying deceptive replica is proportional to the time and speed of deployment of real repositories. Of course, due to the extensive use of prefabricated reservoirs in the country by the Ministry of Power and Oil and the high speed of their installation and placing in the circuit, the speed of installation can be reduced.

Checking and Maintenance: After deploying deceptive replicas in their respective positions, checking and maintenance are necessary, otherwise due to the weather conditions there is a possibility of their displacement and overturning [34].

Having Thermal Infrared Emission: deceptive replica should have the same heat dissipation as the actual sample, in the case of radar, telecommunication equipment and rest the ability to generate electromagnetic, radio, and radio waves in the relevant deceptive models is significant.

Conventional Activities: Following the establishment of deceptive replicas in the positions and locations, the following conventional activities what carries out for real positions are required to be carried out:

-The acquaintance of real organizational cars, alternately scheduled throughout the day.

-Installation of some lighting equipment during the night and turning it off on the day like the real positions.

Create their traces and their true signs (creating smoke, creating moisture on the soil, etc.) [4]

Disadvantages in Deceptive Acts

These disadvantages are the factors that often cause deceiving the enemy to fail. It should be noted that such cases are of general use and each one may be ineffective under certain conditions. Otherwise, they are the best and most complete methods to deceive the enemy. The following is a list of factors that may lead to unsuccessful acts of deception:

- Footprint Uniformity

- The flatness of deceptive reservoirs and the lack of prominence and three dimensional spaces

- Defect in the simulation of a unique reservoir

- Lack of traffic and usual displacements in real positions.

- Defective tactical deployment

- High and unusual speed in the deployment and rebuilding of reservoirs

- Lack of real air defense positions

- Failure and mistake in the simulation of all components of a collection related to each other

- The difference in the dimensions of the deceptive reservoirs with real reservoirs.

- Destruction and decomposition of deceptive models due to atmospheric factors due to their lack of continuous review and maintenance (Figure 3).

Separation & Dispersion

Dispersion, expansion and opening up of facilities and equipment and separation of a part or parts of our equipment, and dispersing human resources and transferring them to safer places is in order to reduce their vulnerability to any air attack. Dispersion creates a smaller set of targets for enemy sensors.

Therefore, during the attack, it creates fewer casualties and less damage and makes it difficult for the enemy to identify our forces.

The dispersion depends on the size and extent of a site. One site will be useful when it provides the ground for sufficient dispersion to enhance the resilience and effective operation. The most important effective factors in determining the type and scope of dispersion acts that can apply to vulnerability are [26]:

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Figure 3: Prefabricated storage reservoir with fast installation as a virtual target for enemy [13]

Figure 4: Misplaced layout of reservoirs and the possibility of the vulnerability of all reservoirs to the initial damage in one of them or due to the proximity of the explosion to the location of reservoirs [5]

- Technical and structural characteristics of reservoirs [21].

- Texture and area of forest, mountain, urban, rural or coastal environment

- The number of human forces per shift in exploiting affiliated facilities or around it, Minimum and Maximum Requirements

-To be economical in comparison to the importance of the vulnerable area

- Effects of actions on the management of services, as some defense acts may be problematic in the operation and use of reservoirs and intermediary facilities (Figure 4).

Effective Indicators Caused by Dynamic Load Effects in the Case of Hunting Reservoirs

The estimation of hydrodynamic forces in fuel tanks, dams, submerged structures and liquid storage has been considered by engineers and designers for a long time [15,22]. The first steps were taken by Westergaard, Carmen and Jacobson. Housner was one of the first to get the forces loaded into the reservoirs with the assumption that the wall was rigid, when the dynamic load arrived [29]. Subsequently, other researchers such as Abramson, Aaron, Voltssus, and etc. completed further work on this subject. Therefore, it is necessary to provide analytical methods and rules for the analysis of dynamic load on reservoirs in case of hunting or explosion occurrence around reservoirs (Figure 5,6,7)[2].

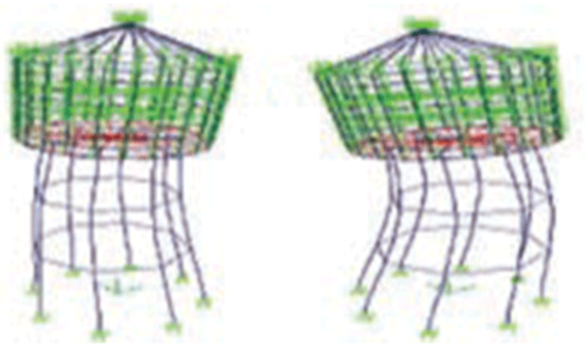

Figure 5: Dynamic load effect on air reservoirs and changes due to this load [6]

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Figure 6: Basement Stabilization of Reservoirs by Using Basic Separators against Dynamic Load [6]

Figure 7: Proper layout of the reservoirs, considering the radius of the work with the radial structure of the basic separators [8]

In order to take into account, the effects of air reservoirs on behavior under their dynamic load, methods and suggestions have been presented which includes possible types of modeling, the number of degrees of freedom to modeling and considering nonlinear behavior relation to the base of the reservoirs, in each case the accuracy and efficiency of the model should be considered according to the dynamic properties of the systems [30].

The dispersion depends on the size and extent of a site. One site will be useful when it provides the ground for sufficient dispersion to enhance the resilience and effective operation. The most important effective factors in determining the type and scope of dispersion acts that can apply to vulnerability are:

- Technical and structural characteristics of reservoirs

- Texture and area of forest, mountain, urban, rural or coastal environment

- The number of human forces per shift in exploiting affiliated facilities or around it, Minimum and Maximum Requirements

-To be economical in comparison to the importance of the vulnerable area

- Effects of actions on the management of services, as some defense acts may be problematic in the operation and use of reservoirs and intermediary facilities.

Application of Remote Sensing and Satellite Images in the Positioning

Remote sensing is science, art, and technology of Information acquisition about different phenomena in the Earth's surface through sensors that have no direct relation to phenomenon itself. Satellite sensors are involved in the recording and collecting of information in the form of satellite imagery and Further, using software and image processing systems, it is possible to extract information and produce different maps, of course due to the lack of tools for management and processing tools for analyzing and analyzing this geographic information, these systems are not comparable to GIS. In addition, GPS satellites can determine the coordinates of the locations of people and objects [1,6]. By deploying this technology, a proper strategy can be found for proper site selecting and implementation of the ideal reservoirs, and maximizes the implementation of the dispersal and the use of all environmental constraints. In addition, global geospatial systems can monitor our structures from the angle of view of the enemy and risk assessment can be done [27].

Conclusion

Experience has shown that control and accuracy in the following cases will be of great help in reservoir immunization:

Irregularities and dispersal in the construction of reservoirs, camouflage and the use of clandestine and deceptive techniques, accurate and scientific site selection and Inhibitor of attacks, anti-bomb protection in very sensitive centers.

In all of the above, economic conditions and access to materials should be considered. If the reservoirs are built in a straight line, this will cause direct destruction of aircraft and moving targets, although precise site selecting due to keeping away. The facility from enemy's eyes is more important, camouflage and hiding the facility from the enemy's eye in the retrieval of reservoirs and forcing him to spend more time and money. Another important factor, which is very little attention, is camouflage during construction. Management tasks in the application of the components of the workshop and equipment used to determine the precise amounts of the project and appropriate camouflage at the time of excavation and implementation of the project [7].

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