

Study Of Psychological Impact of Underground Habitable Structure on its users

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Analyzing underground space development as a measure to combat urban predicaments

The rapid growth of world leads to increased pressure on the land and significant impact on human beings. Placing facilities underground is a promising method for helping ease land use caused by the growth and urbanization of world's population. As there are some practical benefits for utilizing the underground space for a variety of purpose so it is necessary to find out what is the psychological

impact on the underground space users. With this objective, the study was planned in Pune city. The underground space users are interviewed by using interview schedule. After conducting the interviews analysis of the psychological impact on underground space users was done. From the analysis, certain aspects were found such as some people found underground space with poor light and ventilation, no connec-

tion with society and have negative image in mind. Also some people found that a sense of security and protection, a quiet environment without distraction, and sometime a setting that is stimulating due to its novelty and even sense of mystery and adventure. These aspects may help in formulating the design guidelines for the designers of underground architecture while designing underground space.

INTRODUCTION

A life of control and safety is the perpetual desire of humanity. To achieve this desire, suitable space is required for dwellings and workplaces as well as for various necessary functions such as energy production, storage, mobility and many others. However, fulfilling this need for suitable space is becoming more and more difficult in many areas of the world due to growing shortage of urban land. Also concern has been rising over the social costs of above-grade construction. Spurred by these factors interests in underground space utilization is increasing throughout the world. (Yorihiko Ohsaki 1993)

The rapid growth of world civilization will have a significant impact on the way humans live in the future. As the global population increases and more countries demand a higher standard of living, the world must provide more food and greater energy and mineral resources to sustain this growth. This difficulty of doing is compounded by three broad trends, the conversion of agricultural land to development uses, the increasing urbanization of the world's population and growing concern for the maintenance and improvement of the environment especially, regarding global warming and impact of population growth. Underground space utiliza-

tion offers opportunities for helping address these trends.

By moving certain facilities and functions under surface land in urban areas can be used more effectively thus freeing space for agriculture and recreational purposes. On an urban or local level the use of underground facilities is rising to accommodate the complex.

PSYCHOLOGICAL EFFECTS IN UNDERGROUND SPACE

There is numerous numbers of practical benefits to utilizing the underground for a variety of purposes. For uses such as storage, utility infrastructure, transportation tunnels, involvement of people in the space is relatively low. However, when underground space is to be utilized for function that involves human occupancy, then the questions are raised. What are the Psychological effects on people utilizing underground space? Information about Psychological effects on underground space users can be drawn from two sources —

- The image of the underground that seem to be rooted in history, culture, language.
- the actual experience of people in underground (John Carmody, 1993)

In spite of the usually well ventilated and well lighted examples of modern subsurface environments, the idea of the underground seems to provoke some powerful images and associations from the past.

Natural caves that served as shelter to primitive humans are dark, somewhat cold places with humid, stale air. Paradoxically, the underground in its role as shelter also evokes the more positive associations with safety, security and protection. The image of mother earth is usually envisioned powerful, and yet the space within the earth is usually envisioned as a lifeless and static environment.

These basic associations are both reflected in and enhanced by the use of underground imagery in literature, "religion, language and psychology. In *The Life below the Ground*", Wendy Lesser (1987) explores the underground as a metaphor in literature. She points out that the underground has always been only partially visible and partially accessible to people, in spite of the access provided by continuing technological advances. She continues: "What this indeterminacy means is that the underground has always situated oddly between the visible and the invisible between that which one can see and touch in one's normal life and that which one must accept on faith.

This may explain, in part why the real underground...has given to so many fictional or imaginary undergrounds. There was, to begin with, Hades- that is, the imaginary underground is first of all the locus of death and rebirth, the place where dead souls go to be washed of their memories and returned to life on earth." (Wendy Lesser (1987).

ACTUAL EXPERIENCE IN UNDERGROUND BUILDINGS

While underground space is utilized all over the world and for almost every human activity, relatively little research exists on the responses of people to these environments. Research has attempted to summarize the limited existing literature. Research has drawn from many related information to hypothesize psychological issues in underground buildings.

DATA ANALYSIS AND FINDINGS

Users were more than one with respect to an open ended question hence "multiple response analysis" was done due to which the percentage of re-



sponses did not add up to 100% but it was more than 100%.

1. IMAGE OF UNDERGROUND STRUCTURES -

From the chart, it is found that most of users have a bad image about structures. Some reasons found - It is largely not visible, an underground building is likely to lack a distinct image. The movement at the entrance is usually downward, which potentially elicits negative associations and fears

Good	20%
Bad	80%

2. LIGHT AND AIR QUALITY-

The absence of windows or less no.

of ventilators causes lack of sunlight. Most artificial lighting lacks the characteristics of sunlight, which raises physiological concerns in environments without any natural light.

Good	12%
Bad	88%

3. IS IT DIFFERENT THAN REGULAR STRUCTURES? -

Yes	80%
No	20%

4. COMFORTABLE FEELING-

The lack of windows seems to contribute to the majority of negative attitudes and associations. That is lack of view, natural light, stimulation

and no connection to nature gives discomfort feeling.

Yes	04%
No	96%

5. SAFETY-

In underground structure, there is association with darkness so most of the users find underground space is not safety. But some users also found that there is a sense of security and protection.

Yes	20%
No	80%

6. IS THE UNDERGROUND SPACE NOISY?

Most of interviewed recognized the positive benefits of a quiet environ-

ment for work.

Yes	62%
No	38%

7. ARE THEY HAPPY TO WORK WITH THIS AMBIENCE?

Poor light and air quality, high levels of humidity reduces interest in working underground. There were other users who were less negative about using underground and appeared to have accepted their surroundings.

Yes	20%
No	80%

8. REDUCTION IN EFFICIENCY OF WORK-

People were neutral about the reduction in efficiency of work.

Yes	59%
No	49%

9. SPACIOUS -

Most of the users want underground space to be more spacious. As there are no windows to the exterior, there can be a sense of confinement.

Yes	62%
No	38%

10. ISOLATED FEELING-

Yes	20%
No	80%

11. HAVE THE FELT THAT THERE IS NO CONNECTION TO THE OUTSIDE WORLD?

As there are no windows, there is a loss of stimulation from and connection to the natural and manmade environments on the surface.

Yes	59%
No	49%

CONCLUSION

With the survey, it is found that most of the users have negative image about underground buildings. These poten-

tially negative effects are all related. One of three basic physical characteristics of underground buildings are—

Lack of visibility from exterior

Lack of windows

Being underground

Lack of visibility from exterior causes the lack of a distinct image and the inability to find the entrance, while it contributes to lack of spatial orientation inside the building since the overall configuration cannot be easily understood. The absence of windows causes a sense of confinement, lack of stimulation and connection to the outdoors and lack of sunlight. The windowless nature of underground buildings also contributes to lack of spatial orientation since reference points to the exterior are missing, which is related to a fear of not being able to escape in an emergency. Finally, simply being underground elicits associations with darkness, coldness, dampness, poor air quality.

Although the research generally perceived characteristics of the underground result in a predominantly negative, there are, nevertheless, some positive associations and characteristics as well. These is a sense of security and protection, a quite environment without distraction, and sometimes a setting that is stimulating due to its novelty and even sense of mystery and adventure.

Underground space development may be one of the most significant ways to contend with urban predicaments such as congestion, lack of open space, and aging infrastructures. However, designers must consider whether or not people will be willing to live and work in what could be perceived as inhospitable environments.

DESIGN GUIDELINES

When appropriate to the building

function, it creates a distinct overall building image. Articulate building boundaries and exposed architectural elements to clarify the building's location and extent.

- Avoid permitting the building services (ventilation shafts, loading docks, fire escape doors) to create the dominant building image. Separate the pedestrian entrance, vehicular drop-off, and service entrances as much as possible.
- Provide a clear, legible entrance (or entrances) that can be recognized from a distance along major paths of approach.
- Give the entrance a sense of place by creating variety and complexity in the entry approach that stimulates curiosity and heightens experience.
- When the underground facility is entered through adjacent above- or below-grade buildings, create a distinct entrance or demarcation where people cross into the facility.

Provide a graceful transition to lower levels.

Make the entrance area and vertical circulation spacious and well lighted.

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