

Rehabilitation of the Lost Urban Spaces below the Elevated Movement Axes within the City

Mohamed Hassan Atwa Eldek *, Ahmed Mohamed Saleh Khedr**, Doaa Mohamed Ali Abdelaziz**

* Professor at Department of architecture, design, and urban planning, Faculty of Engineering, Suez Canal University, Ismailia, Egypt

** professor at Department of Architecture and Urban Planning, Faculty of Engineering, Suez Canal University, Ismailia, Egypt

** Demonstrator at Department of Architecture and Urban Planning, Faculty of Engineering, Suez Canal University, Ismailia, Egypt.

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Abstract- In recent years, many elevated roads have been implemented in the Egyptian city, especially in the capital, because of the demand for transportation and solving traffic problems. This is shown by the informal use of the lost spaces below elevated roads, so these lost spaces are considered a possibility to transform into urban spaces that serve the surrounding urbanization. Those huge structures caused many problems in urbanization, such as cutting the urban fabric, wasting distinctive lands, and created lost urban spaces.

This research aims to focus on the urban lost spaces under elevated roads, and the optimal use of those spaces, then proposing principles and guidelines to be followed whenever designing these spaces.

A literature review on the urban lost spaces and how it can transform into urban spaces, secondly, a study on the elevated roads, their importance and impact on the surrounding urbanization, then an analytical study of several international and local examples is conducted, followed by a comparison study to reach the best use for those spaces and concluding guidelines that are taken into consideration when designing those spaces or rehabilitating them.

Index Terms- Urban lost spaces – urban spaces – public spaces – elevated roads - Elevated Movement Axes

I. INTRODUCTION

The rapid growth in the population has led to congestion of cities, so the Country adopted the concept of establishing new cities and reducing traffic problems. Despite these solutions, there was pressure on the road networks, in the 21st century the country tended to construct overpasses and dig tunnels to solve the traffic problems.

Nowadays, the elevated roads become one of characters of the Egyptian city, as they are huge structures that cut the urban and social fabric and occupy large urban areas, which leads to depriving the surrounding community of those spaces, it can be said that the elevated roads weren't consciously built to integrate with the urbanization surrounding. (Tawfiq, 2018)

on other hand, Cairo suffers from lack of open public spaces and a high building density. This lack can be compensated by using the spaces under the elevated roads as urban public spaces for the surrounding community, but the country has planned to transform these spaces into private and commercial spaces aiming for a financial profit or as car park lots.



Figure 1 The current situation in Egypt below the elevated road Saft El Laban and Tharwat. source: researcher



Figure 2 The current situation in Egypt below the elevated road El-Etahdya in Masr El-Gadida. source: researcher

II. URBAN LOST SPACES

The lost spaces are defined as lands neglected or left among the urban spaces in the communities, also to these spaces can be incomplete or lack in use and seen as undesirable, neglected and leave a void in the urban fabric, Also, Roger Trancik mention in Finding Lost Space book that voids disturb the surrounding urban fabric. (Trancik, 1986)

While these spaces are seen as undesirable urban spaces, they have various potentials and opportunities that serve the communities around them. (Narayanan, 2012)

A. VALUE OF URBAN LOST SPACES

Regardless of the negative effects of lost spaces on the city, it can be as a vital resource that provides great value to the community to improve the quality of life. These values are divided into environmental, social, economic, cultural and visual values. (Tobias, 2018)

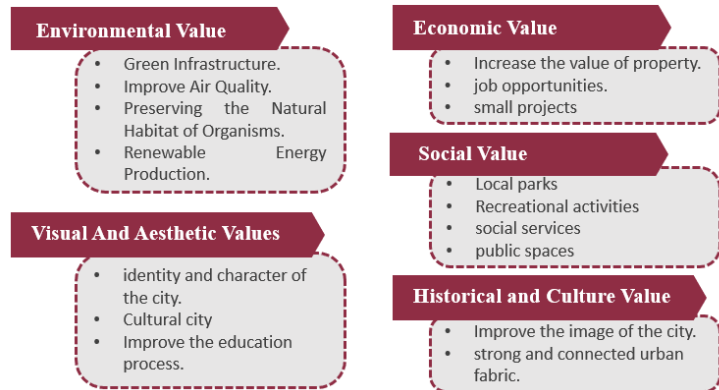


Figure 3 Value of Urban Lost Spaces. Source: Researcher

III. ELEVATED ROADS

Because of the continuous increase in population density, the demand for increasing transportation increased, which led to neglecting other dimensions when constructing elevated roads, as the design and planning of roads became limited to some officials who aim to solve traffic problems only.

“The planning and design of roads, like other modes of transport, tends to become the preserve of blinkered specialists infatuated with the dream of maximizing the transport mode for which they assume responsibility”
(Turner, 1998)

Regardless the importance of the elevated roads in connecting the cities together, they lead to cutting the fabric below them and affect the urbanization around, so many countries went to solve the problem resulting from the construction of the elevated roads.

A. THE IMPACT OF ELEVATED ROADS

In the 1960s, Jane and several urban planners realized the negative impacts of elevated highways in cities. In (The Death and Life of Great American), the book discusses these various impacts on the environment and society,

The impacts of the elevated roads divided to environment, economic, aesthetic, social impacts, and can be illustrated in **fig7**

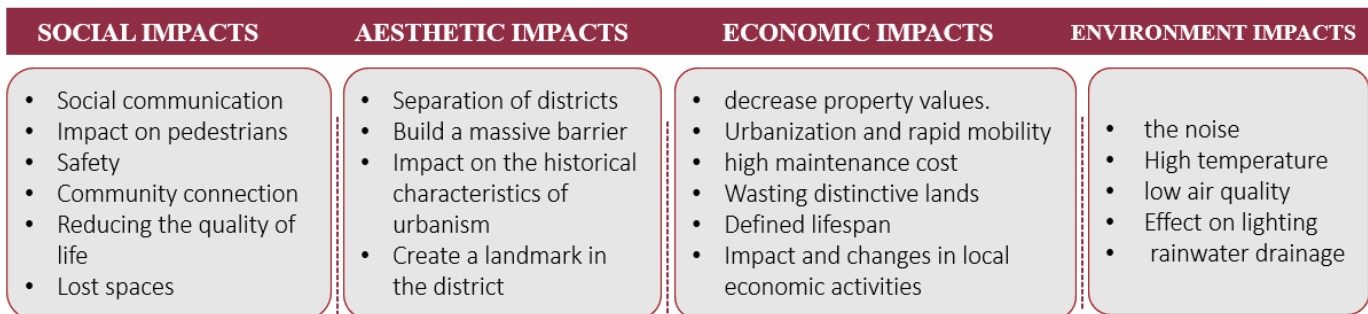


Figure 7 The Impact of Elevated Roads. **Source:** researcher

B. COMPONENTS OF LOST SPACES UNDER THE ELEVATED ROADS

It is necessary to know the components of urban spaces below the elevated roads to understand the relationship between them and the elements of urban open spaces, as it is the main component influencing the activity and pedestrians within the space. (Al-Qanati, 2015)

C. POTENTIALS OF VOIDS UNDER ELEVATED ROADS

Spaces beneath elevated roads are considered a double-edged because they have many negative impacts, whether they are environmental, social or others, but they contain many potentials that can be used, most of these spaces are transformed into lost spaces containing crimes like drugs and garbage, due to lack of management.

The potentials can be summarized as follows:

- Unused spaces that can be used within the city.
This potential is important in congested cities where open and entertainment spaces are rare (Kamvasinou, 2011), for example in Paris, the Viaduct

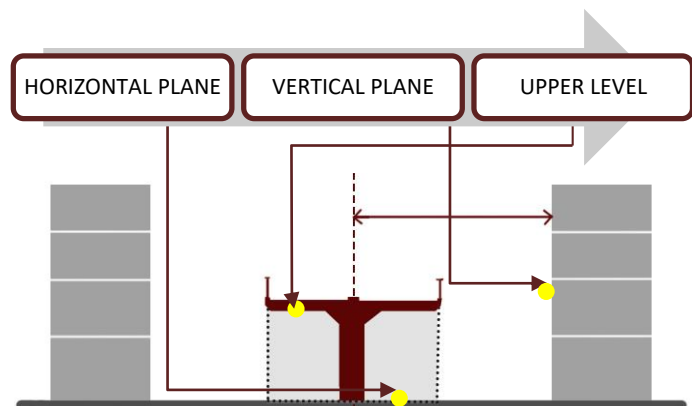


Figure 8 Components of lost Spaces Under Elevated Roads. **source:** researcher



Figure 9 Viaduct des Arts in paris **source:**
<https://en.parisinfo.com/shopping-paris/73812/Le-Viaduc-des-Arts>

des Arts, down the Avenue Daumesnil, and its use as art shops.

- **Huge structure**

these spaces located under huge structure, whether concrete or metal, that protect them from natural factors such as sunlight and rain (Su, 2005). Also (Under Elevated Structure) indicated that "protection from sunlight and rain is a necessary component for users." (Bauer, Drake, Fletcher, Travieso, & Woodward, 2015). The structure of the elevated road provides shade and protection from rain, as shown in **Fig10**



Figure 10 Shadow tracking beneath elevated roads

- **Distinguished location**

Most of elevated roads are generally located in a distinct and vital location, as they are located in the main axes of movement in the centers of cities and vital places and are distinguished gathering points. Therefore, the spaces under elevated roads must take more importance than elevated roads themselves because they affect the urban fabric at the ground level. (Jones, 2002)

Akkerman and Cornfeld mentioned "Because they occupy an important space in the city and in mind of users, but may be invisible to planners and designers the same." (Kamvasinou, 2011)

IV. INTERNATIONAL EXAMPLE

International examples were chosen to conclude guidelines to be used when designing or rehabilitating the spaces under the elevated roads, the projects were chosen using the following criteria: were implemented to know the extent of their success and impact on the urbanization around, in communities similar to Egypt economically, socially and environmentally, being in urbanization due to their large impact on the urbanization around them.

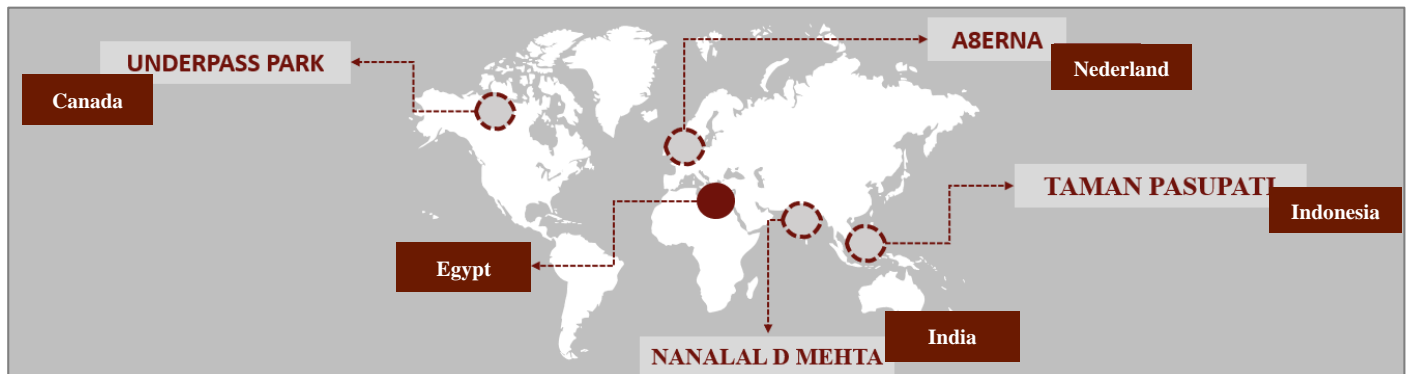


Figure 11 International Examples. **Source:** researcher

A. UNDERPASS PARK

The underpass is one of the largest parks under elevated roads and the first of its kind in Toronto. It was developed and transformed from an unsafe and dark place into a livable garden, the garden transformed the unused and abandoned space into services for the neighborhood and into a pedestrian path, the project area is about 2.5 acres designed by Philips Farevagg Smalberg (PFS Studio), The project is located under the east side of the Richmond/Adelaide Elevated Road which crosses the Don River.

It is surrounded by residential, commercial areas and open greenspaces such as Lawren Harris Park and Corktown Common Garden. It is also surrounded by trees.

In the beginning, the residents and officials were afraid of the existence of a huge structure that divides the neighborhood and creates intermittent and abandoned spaces, also leads to isolating the residents of their services and the rest of the neighborhood. Therefore, the main aim was to revive the space beneath the elevated road as parts of the neighbourhood, Each community organization or group working on this development wanted it to reflect the neighbourhood's identity, its residents and its history instead of feeling artificial, The development includes a traditional community-led plan that aims to have the void under the upper road suggest to users that it is a social and innovative gathering place and also that it gives a sense of welcome and dynamic in environment.

Although the park is a permanent design, it includes a number of flexible spaces that allow the community to gather and festivals (Hamelin, 2016), the activities in the space divided into: skate area – Basketball – kids area - community gathering area – semi shaded sitting area



Figure 12 uses around underpass park. Source: researcher

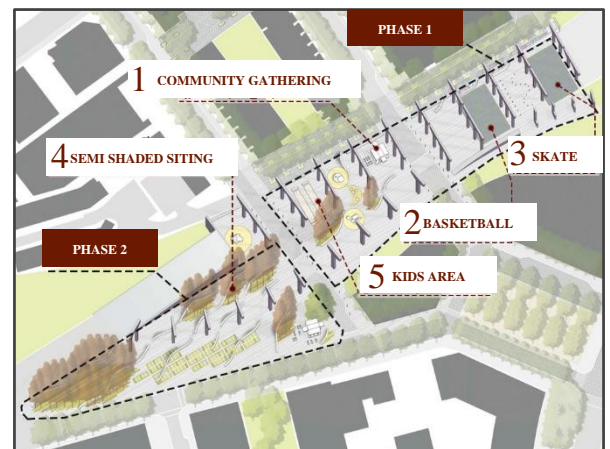


Figure 13 activities in space. Source: researcher
<https://urbantoronto.ca/database/projects/underpass-park>

Underpass Park has received the American Society of Landscape Architect's prestigious Award of Excellence (ASLA), the highest honor given in the public design. (Awards, 2016)

B. A8ERNA

In the early seventies, the new A8 elevated road was built with the aim of crossing a river in Koog aan de Zaan, which is located on the Zaan River, it has led to the separation of the city in two parts. It is considered a blind spot for more than 30 years, The project is surrounded by residential, commercial and open green areas, from the north by the State Hall, from the south by a church, and the Zaan River from the east and the Provincialeweg axis from the west, for many years the space was neglected and used as a car parking, Due to the dense construction on the banks of River, the river was closed as an outlet for the users and this was compensated by the part of the river within the project and the work of a mooring for boats, As for the graffiti exhibition, its purpose



Figure 14 uses around A8erna. Source: researcher

was to create a space for drawing to reduce scribble on the walls (Singhal, 2011), Project A8erna was awarded (The European Prize for Urban Public Space) in 2006.

The project consists of three parts in addition to developing two urban areas around it as shown in **fig15**:

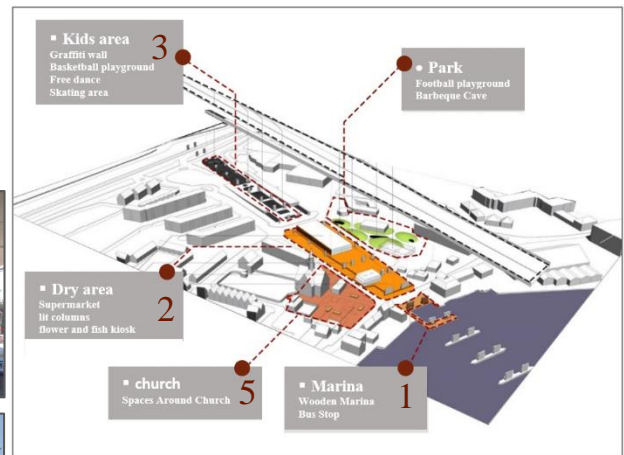






Figure 15 activities in space. **Source:** researcher (Singhal, 2011)

V. EGYPT

To solve the problem of overpopulation and traffic jams, urban planners and decision makers have seen that the overpasses and bridges that extend above the center of Cairo are the easiest way to solve the problem and connect between the regions (Elbih, 2020), In the Arab Republic of Egypt, there are 2,267 bridges and overpasses, including elevated railways, pedestrian bridges and overpasses, according to the report of the Central Agency for Public Mobilization and Statistics (CAPMAS) in 2015, while the recent report in 2019 showed that 1,762 of them are bridges and overhead roads for cars. And Cairo only contains 94 bridges and overpasses, as these statistics reflect the size and development of the road network inside Egypt (CAPMAS, 2015), The highway network was developed as a tool to reach new cities, and decision makers ignored the old cities and neglected surface transportation in order to improve access to them. (Dessouky, 2016)

In the following, the current trends in Egypt will be divided into spaces designed as shops and parking lots, spaces transformed into bus stops and some informal uses, spaces that were used as landscapes that are not used, and finally informal spaces filled with crime, garbage and informal use.

Table 1 trends in Egypt beneath elevated roads. **Source:** researcher

A. The Space Beneath the Elevated Road Intersection Mustafa AlNahas with Abbas ElAkkad	B. The Space Beneath the Elevated Road Juhayna Square	C. The Space Beneath the axis of Saft al-Laban	D. The Space Beneath the Elevated Road Ahmed Elzomor (Elasher stop)
			
<p>The uses in the space were divided into commercial kiosks of various use and design, and parking lots.</p>	<p>The uses in the space were sitting area, green spaces and pedestrian paths.</p>	<p>The uses in the space were informal uses like parking, street vendors and café.</p>	<p>The uses in the space were divided into bus stop, street vendors and parking.</p>

It was concluded from this that the current situation in Egypt has deteriorated and it is important to reconsider the plan used to rehabilitate these spaces and benefit from them as public spaces for the Egyptian society.

VI. GUIDELINES FOR DESIGNING SPACES UNDER ELEVATED ROADS

After completing the theoretical part and analyzing the global examples, the most important points to be taken into consideration were concluded:

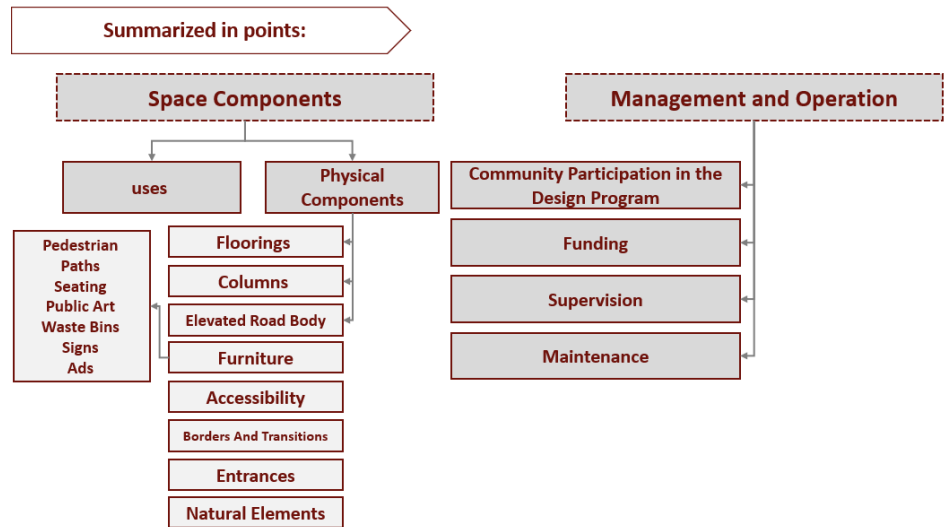


Figure 16 Guidelines for Designing Spaces Under Elevated Roads. Source: researcher

Table 2 a comparative study between international and local example with deduced guidelines. Source: researcher

		International example				Local example				
		Underpass Park	Nanatal D Mehta	Taman Pasupati	A8erna	Mustafa AlNahas	Juhayna Square	Saft al-Laban	Ahmed Elzomor	
Components Of Space Under Elevated Roads	Physical Components	Floorings	√	√	√	√	√			
		Columns	√	√		√				
		Elevated Road Body	√	√						
		Furniture	Pedestrian Paths		√		√	√		
			Seats	√	√	√	√	√		
			Public Art				√			
			Waste Bins			√		√		
			Signs			√				
			Ads			√	√			
		Barrier	√	√	√	√				√
		Lighting	√	√	√	√	√	√	√	√
		Accessibility								
		Borders And Transitions	√	√			√			
	Entrances									
Natural Elements (Softscape)	√	√	√	√	√	√				
Uses	√	√	√	√	√	√				
Identity		√	√	√						
Management and Operation	Community Participation in The Design Program		√		√					
	Funding	√	√	√		√				
	Supervision			√						
	Maintenance			√						
Project evaluation	21 variables	10	13	13	12	5	7	1	2	

VII. CONCLUSION

The continuous population increase leads to more elevated roads and thus an increase in the lost urban spaces that can be converted into urban public spaces which improve the quality of life, as these spaces have huge potentials to improve the city and provide a stronger urban fabric, and the rehabilitation of these spaces can reduce the negative effects of the elevated roads, The guidelines can be summarized as follows:

VARIABLES		GUIDELINES	
Components Of Space Under Elevated Roads	Physical Components	Floorings	<ul style="list-style-type: none"> ▪ floor`s Finishing is chosen according to the activities in the space, and it is preferable to have an interlock with colors to attract the attention of users to the space. ▪ Children's play areas preferably with materials that protect them from shocks, such as rubber or grass.
		Columns	<ul style="list-style-type: none"> ▪ The location of the columns in the space determines the locations of the activities where in the edges the activity is in the middle and vice versa in the case of the columns in the middle, so the activities are exposed to the movement of vehicles differently. ▪ Finishing materials can be concrete, painted or clad.
		Elevated Road Body	<ul style="list-style-type: none"> ▪ According to the structural system of the elevated road, in the steel systems, a noise insulator is made
		Furniture	<ul style="list-style-type: none"> ▪ Establishing a clear path for the movement of pedestrians and calves and separating them from the path of vehicles, as well as pedestrian paths preferably separated in terms of use according to the age group. ▪ Seating close to movement paths and in gathering areas, preferably flexible for use in more than one purpose. ▪ Providing barriers separating the space from the surrounding roads to reduce accidents, transparent to give a sense of welcome and safety from blind spots. ▪ The lighting elements must be distributed in the space equally and sufficiently to illuminate the space to avoid criminal acts, and lighting units on pedestrian paths, the boundaries of the space, the ceiling of the space and the places of activities, considering that they are designed in an attractive form. ▪ It is preferable that the space contain Public Art works to attract users to the public space. ▪ Garbage bins are evenly distributed in the void to avoid the vacuum being unclean. ▪ signs help to understand the space forms faster. ▪ Private sector advertisements can provide funding for space through space management and maintenance.
		Accessibility	<ul style="list-style-type: none"> ▪ accessibility by clearing the space from the outside and preparing the road to the space by making bumps or traffic lights or determining the speed of vehicles around the space. ▪ If the speed of vehicles around the void is high, pedestrian bridges can be made to cross the road or tunnels.
		Borders And Transitions	<ul style="list-style-type: none"> ▪ Transitions in the space are observed by seeing the vehicles around the space. ▪ The boundaries of the space must be defined to prevent encroachment on the space and the boundaries of the roads surrounding it.
		Entrances	<ul style="list-style-type: none"> ▪ Entrances must be clear from surrounding urban space ▪ Allow all categories of society to use the space under the elevated road. ▪ Entrances can be definite by signs, lighting and plants.
		Natural Elements (Softscape)	<ul style="list-style-type: none"> ▪ Natural elements are placed on the edges of the space due to their need for sunlight and at the same time to reduce pollution and noise around the space, so it is preferable to use types that help in this. ▪ Using natural elements that are suitable for use, grass can be used in children's play areas. ▪ The use of natural elements suitable for the site, it is preferable to use trees and plants that can withstand the site conditions from pollution and reduce noise to space. ▪ Pots of plants should not obstruct the view into and out of the site.
		Uses	<ul style="list-style-type: none"> ▪ Activities in the space must be suitable to the surrounding uses and meet their needs. ▪ Flexible activities, so the space can be used in more than one use, which helps to operate the space throughout the year and throughout the day, which reduces the transformation of the space into a lost space again. ▪ It is necessary to provide services for the space such as toilets, shops and security rooms, Providing enough parking spaces for space users. ▪ The activities in the space are determined by the size of the space. ▪ If the space below the upper road is part of a larger space, the program must link the space with the rest of the space.

		<ul style="list-style-type: none"> ▪ Providing recreational areas and public art, taking into account that the recreational activity is suitable for the size of the space. ▪ Separate activities that need a quietness and sports and leisure activities as well as separate them from surrounding traffic. ▪ Providing commercial elements and integrating them with activities in the public space to increase the users of the space and the sustainability of the space through the contribution of the financial consideration to the maintenance process. ▪ Providing flexible spaces that can be used in more than one activity.
	Identity	<ul style="list-style-type: none"> ▪ Create visual Landmark that can be seen from a distance. ▪ Using the elevated road body in the design, which can be used in drawing graffiti, colors or lights. ▪ The use of suitable materials in finishing floors, ceilings and columns, and the difference in materials can help visual observation of the spaces.
Management and Operation	Community Participation in The Design Program	<ul style="list-style-type: none"> ▪ The community must participate in the selection of activities and uses within the space to meet their needs, and this is done through questionnaires, forms or meetings.
	Funding	<ul style="list-style-type: none"> ▪ Funding can be divided into: ▪ The local sector can collect donations for the space. ▪ The private sector can participate in the space in exchange for advertisements in the space, considering the space remain a public space ▪ The public sector finances the space as a public space that serves the community.
	Supervision	<ul style="list-style-type: none"> ▪ Supervising the space from the public sector or local community. ▪ Provide security elements for the space. ▪ There must be a management that manages the process of space, cleaning and safety.
	Maintenance	<ul style="list-style-type: none"> ▪ Maintaining the Space periodically contributes to the maintenance of the Space and not turning it into a lost Space again. ▪ A plan must be drawn up for the maintenance of the space, as it can be from the space due to shops or donations from the surrounding community.

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AUTHORS

First Author – Mohamed Hassan Atwa Eldek, Professor at Department of architecture, design, and urban planning, Suez Canal University, Ismailia, Egypt

Second Author – Ahmed Mohamed Saleh Khedr, Professor at Department of architecture, design, and urban planning, Suez Canal University, Ismailia, Egypt.

Third Author – Doaa Mohamed Ali Abdelaziz, Demonstrator in Architecture Department, Suez Canal University, Ismailia, Egypt.

Correspondence Author – Doaa Mohamed Ali Abdelaziz, baumanee@gmail.com, doaa.mohamed@eng.suez.edu.eg