

## A Study on the Activation of Unemployed Space under the Viaduct

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### *Abstract*

*As population inflows into the city and the traffic volume increases, a three-dimensional transportation system was developed, and as a result, the lower space of the viaduct was formed. Since the space under viaduct includes factors such as shadow, noise, vibration, and disconnection between regions, efforts have been made to prevent slumming and help form local communities by activating them. This study intends to derive analysis based on locality, functionality, and communication for a variety of access to the lower space of an overpass, and analyze cases based on the result. We have the results through analysis are as follows.*

*First, the space under the viaduct has been turned into a slum due poor accessibility and utilization, and local residents and local government also neglected the space. However, it appears to be a space with high potential utilization. Second, by giving diversity to the lower space of the viaduct and cultivating spatial identity, the space was activated and connected with the surroundings by providing a more pleasant environment. Third, accessibility was improved by providing a complex functional and aesthetic environment, and by providing various programs that could form a community among residents, voluntary and active participation was elicited.*

**Keywords:** *Activation, Viaduct, Urban, Unemployed space, Function, Community*

## 1. INTRODUCTION

### 1.1 Background and Purpose of the Study

As industrialization progressed, an increase in the influx of people into the city and an expansion of traffic occurred. Therefore, the density of urban infrastructure was increased for smooth traffic flow. Accordingly, viaduct is one of the results that was carried out to allow free movement on existing roads and railroads. The lower part of the viaduct is created as a natural space.

The viaduct lower space caused many problems, such as shade, noise, vibration, boundaries between neighboring areas, creation of an offender area, and unfavorable appearance. In the end, the under-space of the viaduct was left as an unused space in the city, and continuous interest and improvement have been made to use this unemployed space under viaduct.

In 2017, the Urban Space Improvement Team conducted a survey and analysis of the sub-space of the overpass in Seoul to establish a comprehensive plan for the “underpass utilization project” [1]. Therefore, in this study, various opinions are presented on the unused area under the viaduct, but a more detailed study is needed. Through the analysis of precedent cases, the study would like to propose a more organic and sustainable plan by considering accessibility, locality, functionality, spatiality, and suitability.

## **1.2 Scope and Method of Research**

The scope of this study is to find the basis for the activation factor through advanced cases from the perspective of urban regeneration under the viaduct, and to seek sustainable space utilization methods and directions.

As a research method, first, understand the theoretical meaning of the unused space and the space under the viaduct. Second, the direction of activation of the subspace is studied through the review of previous studies. Third, the direction of activation of the space under the viaduct is explored through case analysis by using the spatial characteristics of locality, the functionality of contents and facilities, and the communication of culture and aesthetics as analysis elements.

## **2. THEORITICAL CONSIDERRATIONS**

### **2.1 Theoretical Consideration of Unused Space**

Employment means the state of being without any work yet looking for work [2]. unused space refers to a space that is not used properly or is not used, or a space that has not been used for a long time but has room for development or improvement. It is also defined as a space that has temporarily lost its function due to a change of use or transformation as an abandoned and abandoned space [3] rather than an activated space given a function. In other words, it is a space that has been used in the past or is not currently used, and it still has the potential for development, and remains empty for a long time until the land value increases, or the land is redeveloped by the owner, developer, or local government [4].

### **2.2 Understanding the Space under the Spatial Road**

#### **2.2.1 Spatial Segmentation of Overpasses**

After the Industrial Revolution, many roads have been created to move and exchange people and goods, and among them, the construction of overpasses is being used in a modern way to solve the traffic problems in urban spaces. However, the formation of overpass in urban space creates a lot of unused space in urban area, and due to unrestricted urban planning, it is recognized as an alienated area than the planned space in local public spaces. The viaduct is deepening the conflict between the current architecture and the city. Also, it cuts off the space and acts as an element that obstructs the flow of space, leading to confrontation between spaces. Through this, the spaces did not communicate and formed a boundary between each area, resulting in regional segmentation [5].

#### **2.2.2 Environment under viaduct**

As a structure to support the upper structure, the lower space of the viaduct is exposed to the ground, which is the main activity area of residents, and is not utilized, so it exists as an unused space in the city. Characteristics of these unused spaces are that they are located on roads or rivers, which are not accessible by residents, and are used as parking lots, garbage dumps, and neglect of heavy construction equipment, turning into a desolate and crime zone in the city [6]. In addition, viaducts are recognized as disgusting facilities and facilities that change urban environmental factors. noise, vibration, exhaust gas, sunlight, view, and psychological pressure, which are factors that overpasses have on the urban pedestrian environment, provide serious environmental problems in daily life [7].

## **3. UTILIZATION OF SPACE UNDER THE VIADUCT**

### **3.1 Consideration of Utilization Plan Considering Spatial Characteristics**

In the utilization of the lower part of the viaduct, identity should be given and accessibility should be

strengthened by considering the connection with the surrounding environment [8]. In addition, it is necessary to form a mutual architectural relationship in terms of cultural, social and economic aspects [9]. Through this case study, it is intended to derive the activation factors of the lower space of the overpass from the perspective of urban regeneration as follows.

### 3.2 Derivation of Activation Elements of the Underpass

The activation factors of the space under the viaduct for improving the quality of life and promoting convenience were extracted from existing case studies. As a result, in order to improve users' perception of the underdeveloped space, a plan was required to give a symbolic space image and to build a local identity through revitalization of culture, and it is summarized as follows.

#### 3.2.1 Locality

The space under the viaduct should be easily accessible due to its unique environment, and the spatial characteristics should be emphasized by forming a close relationship with the existing or surrounding facilities. In addition, in order to increase the usability of the space, it is necessary to remove the negative factors that deteriorate the quality of the urban landscape. And in order to induce spatial intimacy, it is necessary to expand the space for easy access.

#### 3.2.2 Functionality

The public space that humans want requires content that is diverse, convenient, and fun. In order to achieve this, the first thing that must be preceded is the safety of the space. Unused facilities or sites under the overpass cause environmental problems in the local area and social problems such as crime. Therefore, it is necessary to overcome this problem through the use of facilities for convenient use or space that supports insufficient functions.

#### 3.2.3 Communication

In order to revitalize the space under the viaduct, active participation and connection of users through exchanges with the local area is required. Activation of the space is accompanied by the actions of various people and develops into a culture, triggering other actions. This restores the temporality and historicity of the space and naturally melts into the lives of the residents. In addition, by highlighting the unique image or culture of the region, it induces differentiation and gives uniqueness, thereby triggering and activating active use.

**Table 1. Plans for utilizing the space under the overpass considering the characteristics**

Spatial element	Characteristic	Contents
<b>Locality</b>	Accessibility	Expansion of pedestrian space and creation of intimacy for easy access
	Connectivity	Expansion of exchanges with neighboring facilities Formation of spatial flow through organic relationships with related facilities
<b>Functionality</b>	Environmental	Creating a safe and comfortable environment Forming social functions for the majority
	Diversity	Provide variety of convenience Support for insufficient functions in the surrounding area
<b>Communication</b>	Cultural	Settlement of indigenous culture Accept a variety of content
	Aesthetic	Providing aesthetic functions for cognition Enhance the function and intimacy to represent the region

## 4. CASE SELECTION AND CASE ANALYSIS

### 4.1 Case Selection and Analysis Method

In the case selection criteria, we will analyze cases where various facilities and contents were provided in the lower space of the overpass in an area where communication with the surrounding area was cut off due to the downtown overpass, and the case of revitalizing the underdeveloped space and forming amenity. Therefore, A8ernA Public Space in the Netherlands, Viaduct des Arts in France and Lao-Chung Du Folklore Park in China were selected.

Since the four target sites are in various overseas regions, the website was referred to as a case study method and based on the table of elements of space utilization plan considering the characteristics of the underpass of the overpass, the analysis was focused on locality, functionality, and communication.

### 4.2 Case Analysis

#### 4.2.1 A8ernA Public Space in the Netherlands

**Table 2. Case analysis 1**

Location	Van Hallstraat 294, 1051 HM Amsterdam, Netherlands	
Image		
Spatial element	characteristic	Contents
Locality	<b>Accessibility</b>	<ul style="list-style-type: none"> <li>- Designing the old, underdeveloped ground into a variety of pedestrian spaces.</li> <li>- Easy access by installing Dry Square in connection with the church square and the existing city hall site.</li> </ul>
	<b>Connectivity</b>	<ul style="list-style-type: none"> <li>- Forming organic connection with various spaces that consider users.</li> <li>- Connection with surrounding.</li> </ul>
Functionality	<b>Environmental</b>	<ul style="list-style-type: none"> <li>- Provides space and monitoring function by using various convenient functions for various age groups.</li> </ul>
	<b>Diversity</b>	<ul style="list-style-type: none"> <li>- Expansion of various facilities such as gallery, various sports facilities (soccer, basketball, skating, dance stage), supermarket, flower shop, parking lot, panorama deck, etc.</li> <li>- Provide a space for activities that residents lack.</li> </ul>
Communication	<b>Cultural</b>	<ul style="list-style-type: none"> <li>- Forming an art and cultural space that anyone can use, such as dance stages and exhibitions.</li> </ul>
	<b>Aesthetic</b>	<ul style="list-style-type: none"> <li>- Various activity facilities that induce exchanges between users, as well as sculptural bus stops and mini-marinas are installed to enhance the image. Unique materials and designs give you originality.</li> </ul>

4.2.2 Viaduct des Arts in France

Table 3. Case analysis 2

<b>Location</b>	Avenue Daumesnil, 12th Arrondissement, Paris, France	
<b>Image</b>		
<b>Spatial element</b>	<b>characteristic</b>	<b>Contents</b>
<b>Locality</b>	<b>Accessibility</b>	<ul style="list-style-type: none"> <li>- The inflow of movement into the upper park through restoration of the closed railroad.</li> <li>- Provides openness for entry into the arch space.</li> </ul>
	<b>Connectivity</b>	<ul style="list-style-type: none"> <li>- Pursuing revitalization of streets by providing similarities with surrounding commercial areas.</li> <li>- Connection with surroundings.</li> </ul>
<b>Functionality</b>	<b>Environmental</b>	<ul style="list-style-type: none"> <li>- Inducing intimacy by providing a green view from the surrounding residential facilities.</li> </ul>
	<b>Diversity</b>	<ul style="list-style-type: none"> <li>- Attracting various commercial facilities, ateliers, galleries, and restaurants.</li> <li>- Provide walking trails to residents and induce influx of tourists.</li> </ul>
<b>Communication</b>	<b>Cultural</b>	<ul style="list-style-type: none"> <li>- Enhance the image of Paris by focusing on visual arts related facilities.</li> <li>- Instill historical significance by modernizing facilities during the industrial revolution.</li> </ul>
	<b>Aesthetic</b>	<ul style="list-style-type: none"> <li>- Based on the materials and colors of the existing facilities, the windows of all arch spaces are designed identically to give unity.</li> <li>- A green garden was installed to enhance the image of continuity and disconnection with the surrounding park.</li> </ul>

4.2.3 Lao-Chung Dao Folk Culture Park in China

According to the analyzed cases, the space around the overpass is often outdated or fragmented and turned into a slum, so the identity of the space is maximized by facilitating access and solidifying the relationship with the surroundings. In addition, various programs, facilities, objects, and various works of art were provided to induce users' participation. These facilities transformed the area into a unique space and played a role in restoring the vitality of the city.

Table 4. Case analysis 3

<b>Location</b>	Sichuan, Qingdao, China	
<b>Image</b>		
<b>Spatial element</b>	<b>characteristic</b>	<b>Contents</b>
<b>Locality</b>	<b>Accessibility</b>	<ul style="list-style-type: none"> <li>- Seeking diversification of entry options by creating a bridge that connects well spaces.</li> <li>- Easy access by providing shade space in the park.</li> </ul>
	<b>Connectivity</b>	<ul style="list-style-type: none"> <li>- Remodeling of existing commercial facilities maintains characteristics and links with surrounding parks.</li> </ul>
<b>Functionality</b>	<b>Environmental</b>	<ul style="list-style-type: none"> <li>- Securing comfort by regenerating facility maintenance that replaces the difficulty of maintaining the existing green space.</li> </ul>
	<b>Diversity</b>	<ul style="list-style-type: none"> <li>- Providing unique content for each pier.</li> <li>- Cross the well and experience the diversity of space.</li> </ul>
<b>Communication</b>	<b>Cultural</b>	<ul style="list-style-type: none"> <li>- The history of the region is expressed in three-dimensional techniques.</li> <li>- Take a walk or take a break to learn locality.</li> </ul>
	<b>Aesthetic</b>	<ul style="list-style-type: none"> <li>- Providing design in connection with overpass based on China's unique architectural technique.</li> <li>-The pier is expressed like a monument to offset the grandness.</li> </ul>

## 5. CONCLUSION

We arranged the plan for activating the space of the underdeveloped viaduct and derived the following major research results through case analysis.

First, the space under viaduct is slumped by the neglect of local residents and local governments due to lack of accessibility and utilization, and appears as a space with high potential utilization. Second, it was activated with connection with surroundings by providing a more pleasant environment by giving diversity to the space under viaduct and cultivating the spatial identity. Third, it was possible to increase accessibility by providing complex functions and aesthetic environments, and to induce voluntary and active participation by providing various programs to form communities among residents. Finally, through these activation plans, it is necessary to develop potential to make more efficient use of unemployed space and to carry out various studies to create continuous urban space.

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