A Case Study on Sustainable Reuse of Abandoned Infrastructure at Seoul Station Overpass as Urban Park for the Design Strategies in Korea

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Abstract. As the 21st century, known for knowledge information era, many industrial infrastructures built as part of the 20th century urban development have been devastated functionally and new alternatives for them have been demanded nowadays. This study aims to discuss the strategies used in the design proposals of the International Competition for ‘Seoullo 7017 Project’, which was recently completed in May 2017, based on the sustainability of the deteriorate infrastructure as urban park. Through the competition brief, each proposal is analysed against the competition brief and the more generic approaches on the adaptive reuse of infrastructure are proposed. By examining the case in Korea, it is expected to explore the possibilities for the sustainability of abandoned infrastructure through adapting reuse as urban park in Korea, to propose design strategies that can be applied to the future adaptive use of deteriorated infrastructure in Korea, and to provide broader academic base to related works.

Keywords: Industrial Heritage; Adapting reuse; Seoul Station Overpass; International Design Competition

1. Introduction

As the age of knowledge information in the 21st century has come, many industrial heritages such as overpasses and railroads, which were once considered to be the symbols of urban development in the 20th century modernism era, are being devastated in their functional aspect and new alternatives are being demanded. Also, the number of underused infrastructures is growing globally, and managing them either by decommissioning or adapting is becoming important issue [1]. In this trend, there was an attempt to transform the abandoned highway into an urban park in Seoul Metropolitan, and the ‘Seoullo 7107 Project’, completed in May 2017, attracted the attention of people in that it was the first elevated walking path in Korea. More than that, this project is considered to be more noticeable in terms of sustainable use of urban park, instead of dismantling abandoned overpass.

At the heart of the project, there was an International Invited Design Competition to decide the future of Seoul Station overpass. This study, therefore, focusing on the external space and landscape, analyzed and discussed the design strategies reflected on the proposals. In this regard, this paper illustrated the variety of design strategies put forward by each competition team to meet the competition brief. Then
these strategies were grouped into more generic approaches on the adaptive reuse of infrastructure. For the analysis, the report presented by Seoul Metropolitan Government and the websites to refer the drawings and the commentary were used.

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2. Overview of international invited design competition of ‘Seoullo 7017 Project’

2.1. History background of Seoullo 7017 project

The ‘Seoullo 7017 project’ in Seoul, which is an example of this study, is a project that has been completed recently in May 2017 and is significant in that it is the first high-level walking path in Korea. ‘7017’ in the project name has several meanings: It means the 1970 and 2017, the years in which the structure was built and subsequently transformed and the height of 17m. Also, it has the meaning of being reborn with 17 different kinds of pedestrian road for the people, not for the car. This project was promoted as part of a city revitalization project to make high value-added areas, nearby Seoul Station including the overpass [2].

The overpass was built in 1970 to cope with rapid population growth and traffic congestion. However, concerns about its stability had been raised since the end of the 1990s, and in 2006, serious safety problems were raised, resulting in prohibition of vehicle traffic and decision on demolition. Although Seoul Metropolitan government has taken a uniform way to dismantle deteriorated structures so far, the city government chose to change its viewpoint and turned overpass into a walking path instead of removing it.

Figure 1. Seoul Station overpass in the past [2].

Figure 2. Current state of Seoul Station Overpass.

2.2. Introduction of the competition

The site overview

The site of the design competition is around Seoul Station including Seoul Station overpass. It has an area of 9,661 m², a width of 10.3m, a length of 938m and a height of 17m. It is adjacent to major historical and cultural heritages in the downtown area of Seoul, and the abundant resources such as Namdaemun, Seoul fortress wall and Namsan Mountain are scattered around the area. (See Figure 2.)

The method of design competition

The design competition was conducted by invitation of designation, and seven architects and landscape architects from Korea and abroad were selected. Considering the structural problems of the overpass, it was promoted to form a consortium around the nominees in various fields of architecture, landscape, and bridge structure. The list of nominated participants is shown in Table 1. Because it is difficult to cover all the 7 entries within limited text, three entries, C, E, and G, that received a prize were selected as the subject of study.
Table 1. A list of entries of the competition.

| Listing | Name                | Company                | Nation     | Title                        | Notes   |
|---------|---------------------|------------------------|------------|------------------------------|---------|
| A       | Chang Yung Ho       | Atelier FCJZ           | China      | Seoul Mirage                 |         |
| B       | Juan Herreros       | Estudio Herreros       | Spain      | Seoul Evergreen Terrace      |         |
| C       | Winy Maas           | MVRDV                  | Netherlands| The Seoul Arboretum          | 1st prize |
| D       | Martin Rein-Cano    | Topotek 1              | German     | Skyway                       |         |
| E       | Joh Sung-yong       | Joh Sung-yong Urban Architecture | Korea | The Seoul-Yeok-Goga: Walkway for All | 2nd prize |
| F       | Jin Yanggyo         | CA Landscape Design    | Korea      | Slow, Soul, Seoul            |         |
| G       | Cho Minsuk          | Mass Studies           | Korea      | Continuous Landmark, Unified Hyper-Collage City | 3rd prize |

2.3. Guideline of the competition

According to the competition brief, the main purpose of the contest was to restore the urban memory and sovereignty of the citizens over place through conservation. In regard this, three main goals were proposed: conservation of memory, creation of new public space, and recovery of the walking network. In addition, it provided eight design requirements such as integrated design in the various fields, structure preservation, accessibility, ecological sustainability, and etc. Also design guidelines for each of three sections were provided to make use of local characteristics. (See Figure 3.)

Meanwhile, these guidelines are interrelated rather than independent, and there are overlapping parts in the guideline. In particular, the design requirement(b) contains elements that are not tied to the superordinate concept with weak specificity. In other words, there is inconsistency shown in hierarchical structure and bias is found in certain contents. It is expected that these contents directly or indirectly affected the entries.

In Figure 3, although not all items are fully associative, the correlation between the parent items and child items is showed with lines. From the correlation in Figure 3, the items can be divided in to three parts according to the hierarchy from the most abstract part of concept and goal, to the spatial structure part and the detailed space design planning part like as shown in design guideline for sectors(c) for the analysis in Chapter 3. Also, in this study, only the physical elements that can be identified in the design will be evaluated. In other words, non-physical factors that are difficult to represent by design, for example maintenance management in design requirement, were excluded from the evaluation.

3. Analysis of relation between design strategy and guidelines

3.1. Analysis of the concept and main goal

In the case of the winning work C, which won the first prize, the main concept of the design is to create space for the pedestrians in the urban space through means of arboretum as revealed in the title. In other
words, the goal is to make the overpass as a public garden and to transform the Seoul Station area into green space step by step. It can be seen that the design strategy is established by focusing on a-2 and a-3 among the three goals of the project.

In the case of work E, which won the second prize, it also values the place for the pedestrians as seen from the title, ‘The road for everyone.’ Its goal is to provide a public space that every citizen is entitled to enjoy by providing barrier-free design, design that touches different sensibilities and design flexible enough to suit changing needs. However, although C emphasis on the nature of the new public space used for the people, E emphasis on the history of the overpass(a1) and puts importance on the relationship between history and the place. It can be seen through diagrams indicated in the panel, that track down the changes in terrain and urban tissues over times.

Finally, in the case of the winning work G, it symbolizes the overpass as a new landmark, while at the same time reveals close connection with the urban tissues. The main premise is that of a new pedestrian-friendly experience and that of urban continuity. The dual characteristics of the existing structure, that of figure as ground and ground as figure has a potential of intervening and uniting the conditions of many neighboring areas. It devises design strategies with emphasis on the connection with the historical and cultural assets of the periphery like the goal in a1-2 and a3-1.

In the following proposals, it can be notified that all proposals take consideration of the main three goal, but they take different strategies in designing with different emphasis.

3.2. Analysis of the basic spatial structure strategies
The formation of new public space as an arboretum in proposal C is structured as follows. It gives small deformation to the entrance and the side of the bridge while preserving the prototype of the bridge as much as possible. These deformations are mainly shaped like the branches of trees, which strengthens the possibilities of reaching around important historic and cultural assets such as Namdaemun Market, Junglim-dong and so on. Especially, various types of structures are used to make connections between up and down the bridge. It is significant not to end the design of the overpass itself, but to consider the connection with the many urban elements in the surrounding area. In addition, this connectivity is a design that can be changed and transformed continuously, so that flexible design can be made through consensus with the public and citizens in the future. Moreover, it takes a strategy of one integrated space with some of each parts used separately or in conjunction, not splitting or diving the whole space.
In the proposal E, the highest importance was given to the history value of the overpass and it appears as a design with little change of the overpass. Although it transforms the bottom part of the bridge, making new walking path, however, it has been criticized as a passive plan that rarely utilized the upper part of the bridge. It creates various public spaces by combining different elements with the part of the overpass. Although, it emphasis the historical value of the overpass itself, it seems that the connection with the surrounding historical and cultural assets is considered weakly compared to other proposals. 

Lastly, the proposal G proposes the most sophisticated use of spatial composition and contains eight different strategic parts to connect with the areas adjacent to each part or segment, which have unique urban characteristics as well as specific requirements in their urban functions. However, it is criticized by over-transforming some parts of the bridge in designing it and it loses its historic value as Seoul Station overpass. It shows the role of successive landmarks in showing the connection to the widest area among the three proposals.

3.3. Analysis of detailed spatial planning and other planning

Connectivity

Along with the connectivity, the proposal C (Figure 5) is taking a design strategy that best shapes the relationship with the surrounding high-rise office buildings. This not only makes effective use of the height of the overpass, but also suggests the possibility that the floor of the connected building can be utilized as a public space. In the proposal E, vertical connection for all levels of movement is suggested in relation with Seoul station. Also, various structure such as sunken plaza is used to deal with the difference in level. In proposal G, various structures considering the level difference play a role of linking the public space with the bridge, but no specific connection to the building is seen.

Ecology

As the name of arboretum suggested, the proposal C proposes variety of ecosystem by ordering all possible plants in the order of the Korean alphabet from east to west, they cause different neighborhoods. These plants also create links to areas where local residents can be proud because of the plants they often see in their area. With the planting planning, C suggests plan for rainwater system. Although G specifies the possible plantations for eight specific sites, there is no mention for specific management that are appropriate for the climate of Korea. There is no planting plan for proposal E.

Management

Both C and E are open to the possibility of being finalized in the future, not limited to the present and focus on processes that are created by citizens. In C, it provides a design that can be flexibly transformed when management is needed. For example, it is possible to add and change the pots, new soil for pavement over time, when needed for maintenance. For proposal E, design strategy is established through participation of local residents, and private sector where public intervention is possible is presented. On the other hand, there was no specific description of management in the proposal G.

Program

Figure 5. Some example of connectivity in proposal C and E [2].

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Although there are no explicit programs in all three proposals, the activities that can occur in each place are presented in abstract words. In the proposal C, the space such as a rose plaza, a café and a flower shop are presented where activities can be occurred. In the proposal E, a space created by a combination of bridge is defined as a space character by attaching the word such as "Invigorate." This open program strategy allows for the flexibility of the needs of rapidly changing citizens.

3.4. Result of the comprehensive analysis of entries

Based on an analysis of the three submitted proposals described in section 3, the comprehensive analysis is shown in Table 2.

| Basic spatial structure | Contents       | C: first prize | E: second prize | G: third prize | Relation between design strategy and the guideline on the brief |
|-------------------------|----------------|---------------|-----------------|----------------|-----------------------------------------------------------------|
| Concept and goal        | The value of the overpass | As a new open space for the pedestrian | The historical value of the overpass | Connection with surrounding area | • Connectivity (a3-1) (b-3) • Priority of people over the car (a2-1) |
| Design concept, and goal | Arboretum | Road for everyone | Continuity, landmark | | |
| Structure conservation  | Well preservation, with little change | Conservation of the most of the overpass | Some bold change with the bridge | Consider the historic meaning of the overpass (a1) (b-2) |
| Accessibility           | Various structures located up and down of overpass | Limited to nearby place | 8 specific strategic parts as public spaces with nearby historic and cultural assets | |
| Connectivity            | Branch-like structure to connect with urban elements | Structure of Combination of public space and the bridge | ➤ Creating open space using existing public space (a2-1) (b-8) | |
| New open space          | Viaduct as a new open space | | | |
| Detailed and other planning | Connectivity (Vertical) | Most active with office buildings with use of height | Seoul Station, nearby plaza, Path under the bridge | Broad range with surrounding area | ➤ Use of existing buildings to be a new public space (a2-2) (a3-2) (c1-5) |
| Ecology                 | Various ecosystem with rainwater system | - | Specific planting planning in each sector | | ➤ Less specification in ecosystem (b-8) |
| Management              | Flexible and changeable design over time with participation of citizens | - | - | |

| Program | Open program strategy | |

•: All applied, ☉: Partly applied, ○: Independently applied

4. Discussion design strategies of the competition and its implication

The three design proposals presented above are designed to integrate the disconnection of Seoul Station through the transition to the walkway of the overpass, and accept the will to contribute to regional revitalization. As looking through the competition brief, there was inconsistency shown in hierarchical structure and bias is found in certain contents. This factor affected the design proposed in the entries to emphasis on limited elements such as accessibility or connection. Also, although not outlined in the
guidelines, the proposals include flexible programs as well as changeable design over the consensus with the citizens.

The design strategies that are common among the proposals are as follows:

- **Horizontal continuity with the urban elements**: It sees the spatial connection with the adjacent urban structures as practical design strategies.
- **Reconstruction of the site context**: It is the practice design strategies to emphasize the context of surrounding spaces, especially focusing on remembering memory by preserving the prototype of the overpass in various way.
- **Interactive and flexible process within design**: The non-deterministic spaces and programs that are capable of accommodating changes and the process design over time with the participation of various subjects are regarded as practical design strategies.

These strategies can be applied to other similar infrastructure, for example, New York Highline Park. Highline. While preserving the old railway in many aspects, it preserves some parts rather than reveals the traces of the past obviously, allowing people to notify that it was once a railroad. In the case of planting, it was not artificially planted, but it left wildflowers naturally grown while the railroad was left untouched. It also runs a variety of programs that allow members of the community to participate and that can be changeable through many suggestions from the members. In connection with the surrounding area, the possibility of being connected with the Highline structure is facilitated through appropriate regulation such as the floor area ratio bonus.

Meanwhile, the strong focus on the active interaction with urban elements and accessibility with surrounding elements, reflected in both design guideline and the proposals, is considered to be due to the feature of linear park itself as in this case study. According to Kullmann (2012), he paid attention to important features of linear parks such as connectivity with urban space, continuity of spatial experience, lateral permeability, linear inner circulation, and boundary design [3]. Because of its narrow and long characteristics, linear parks can be directly connected with large part of the urban areas than urban parks with the same area, and thus have excellent accessibility. In addition, since it has a close relationship with the periphery, it has a large influence on urban space.

In the case of large scale lands such as brownfield or landfill, they are often located far from the city. However, the linear infrastructures, such as railway or highway are often located within the city, so adaptive reuse of them will become a compelling issue in the future. Also, linear park has had increasing potential, as large scale network-type urban infrastructure such as rail ways, highways and overpasses are considered to be a good opportunity to provide parks for improving quality of life in existing urban areas [4]. In Korea, while making large scale parks was a mainstream in the past, nowadays, like the example of this study, many projects regarding reuse of linear infrastructures have been operated by the government. Therefore, it is believed that presenting the design strategy for the linear parks is significant. It is expected that better design will be achieved by using active joints with urban spaces, putting variable programs and operation plans, and providing varied sequent along the long space in dealing with linear infrastructure systems.

5. Conclusion
With the completion of the ‘Seoullo 7017 project’ in Seoul Metropolitan in May, 2017, the abandoned overpass that was used as a road for the cars was transformed into a park, being handed back to the citizens. The Seoullo 7017 project, which has attracted much interest before and after the project, is a case of the first high-elevated walkway in Korea with many significances. This study has been applied specifically to the international invited design contest of Seoullo 7017 project to examine the design strategies of the proposals against the competition brief. With the analysis, this study explored the possibilities of design strategies that can be applied to the future adaptive use of deteriorated infrastructure in Korea. However, there is a limit that this study only researches one specific example. Therefore, more profound examination for further study would be needed to develop the research.
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