Design Criteria in Revitalizing Old Warehouse District on the Kalimas Riverbank Area of Surabaya City

Endang Titi Sunarti Darjosanjoto, Setyo Nugroho & R.Winton Danardi

Department of Architecture, Institut Teknologi Sepuluh Nopember,
Kampus ITS Sukolilo, Surabaya 60111, Indonesia
Email: endar@arch.its.ac.id

Abstract. Neglected warehouse buildings along the *Kalimas* River have created a poor urban façade in terms of visual quality. However the city government is planning to encourage tourism activities that take advantage of *Kalimas* River and its surrounding environment. If there is no good plan in accordance with the concept of local identity for old city of Surabaya, it will reduce it as a tourist attraction. In reference to the issue above, design criteria needs to be compiled for revitalizing the old warehouse district, which is expected to revive the identity of this district and be able to support the city's tourism. This study was conducted by recording field observations, and the data was analyzed using the character appraisal method. The character appraisal analysis method is presented in the form of street picture data, which is divided into determined segments. The results show that there are five components including place attachment, sustainable urban design, green open space design, ecological riverfront design, and activity support that should be considered in the revitalization of the warehouse district. Those components are divided into two parts: building and open space at the riverbank. There are 13 design criteria for building at the riverbank, while there are 14 design criteria for open space at the riverbank. These design criteria can enrich the warehouse district's revitalization by improving the visual quality of the urban environment.

Keywords: *design criteria; warehouse district; riverbank; Surabaya; revitalization.*

1 Introduction

Kalimas River has been playing an important role in shaping Surabaya City's character. Since the 18th century it has had the longest harbour, equipped with thousands of warehouses and factories, much more than Batavia (now referred to Jakarta) ever had. Based on the *Trowulan* Inscription I, dated to 1358, Surabaya was a village located on the riverbank and served as a crossing point [1]. The presence of *Kalimas* River as a main gate supported Surabaya as a trading city. Presently, the remains of its triumph are reflected in the 19th century warehouse district and harbourmaster's tower which has been designated as cultural heritage properties by City Government, these are still able to be observed.

Received October 16th, 2014, 1st Revision June 4th, 2015, 2nd Revision July 1st, 2015, Accepted for publication July 3rd, 2015.
ISSN: 1978-3078, DOI: 10.5614/j.vad.2015.7.1.5

Activities in the warehouse district needed support from inexpensive labour. This condition triggered the low-income labourers to create settlements around the old warehouse district. It was an effort to fulfil the need of space with minimal costs. Indirectly, these settlements generated slums and decreased the aesthetic quality. On the other hand, the city government plans to increase tourism activity along the *Kalimas* River. If there is no appropriate planning that refers to local identity, it will reduce the attractiveness for tourism activity. Hence, design criteria needs to be compiled for revitalizing old warehouse district, particularly related to the buildings' facade and the built environment. The aim of this paper is to revive the identity of the warehouse district on the riverbank area, thus supporting the city's tourism, particularly along the *Kalimas* River.

2 Physical and Non-physical Aspects in Revitalizing the Riverbank Area

Literature reviews focuses on two important aspects: physical and non-physical. Physical aspects refer to theories related to *green open space in sustainable urban design, ecological riverfront design*, and *activity support*. While non-physical aspects focus on *place attachment*. As mentioned by Budihardjo [2], waterfront areas can be utilized as open public space. Open space itself has several functions, such as; social community space, a sport and recreational place, flood control, and rainwater absorption. Open space at the riverbank area which is referred to transition space can nurture social relationship and sense of community [3]. Moreover, open space at the riverbank should consider the local environment and characteristic to create public space for people [4].

A synthesis of the literature review can be seen in Table 1 (physical aspect) and Table 2 (non-physical aspect). According to Table 1, the planning and design at riverbank area consist of combination between physical feature and the utilization of riverbank. Physical feature includes vegetation, embankment, hardscape elements, and natural feature. While the utilization of riverbank area is addressed in order to strengthen the public space, recreational purpose, and daily activities of the community in designated area.

Table 2 shows the importance of place since it is created by the human's cognitive, emotional, and behavioural. Based on the literature review [5], the place also provides meaning and identity for people, so that there is a mutual relation between people and the environment. The syntheses of the physical and non-physical aspects that were examined above were combined and produced into universal criteria of riverbank development. Universal criteria (As shown on Table 3) became the foundation for arranging design criteria in revitalizing the old warehouse district on the riverbank area of Surabaya City.

Table 1 Physical aspect in Revitalizing the Riverbank Area.

	Literature Review	Synthesis
Sustainable Urban Design	Sustainable urban design includes seven things: transportation, landscape and green space, building design need to pay attention to energy consumption by its inhabitants, the urban design concept refers to the ability to support itself, through the use of existing natural resources, material, water area, garbage [6]	The riverbank area development refers to sustainable urban design; Community planning processes, the local culture and activity strengthen urban public space; Specific importance is related to: features of natural river and its functions, non-structural elements in the riverbank area, lack of hardscape elements, storm water maintenance, equal balance between recreational purpose and public access. Activity support and unique combination of environmental development strategies apply to improving the riverbank area.
Green Open Space Design	Urban design includes two components: building and open space. While 'open space' itself has a part called green open space [7]	
Ecological Riverfront Design	**(1)** In the beginning, location was chosen by the community as a habitat [8]; **(2)** Protect the following items: keep the features of the natural river and its functions, use non-structural elements, reduce hardscape, maintain storm water, and keep a balance between recreational purpose and public access. **(3)** Strategy of environmental development reflect the characteristic and the intensity of development or re-development, riverbank embankment, purpose of riverbank development, and its managements [9];	
Activity Support	**(1)** Thebuilt-environment is closely linked to the local community and their culture [10]; **(2)** Activity support is a function and activity that strengthen public space. Activity and physical space are always supporting each other in forming activity support [11].	

Source: Synthesis of literature review

In this study, the use of the term 'revitalization' is closely related to conservation. Conservation refers to the concept of that an object or a place is managed so to maintain its cultural significance and meaning. More specifically, it is concerned with maintaining urban morphology, as well as function. If it is associated with a district, the conservation contains a process of preventing inappropriate social change as well as any unsuitable utilizations, this does not merely refer to the physical. Revitalization is a conservation activity. Revitalization is a refurbishment of buildings and heritage environments in order to earn economic, social, and cultural value; this prevents the loss of a city's historically valuable assets, which might be caused by a district's decreasing productivity.

Table 2 Non-physical aspect in Revitalizing the Riverbank Area.

	Literature Review	**Synthesis**
Place Attachment	**(1)** Cognitive, emotional, and behavioral connections between human and environment [12]; **(2)** The dwelling also provides meaning and identity for people who are able to form social relations [5]; **(3)** Urban form is influenced by natural geography, culture, and social relations [5]; **(4)** Human life influences and generates an environment [13]; **(5)** People tend to attach emotion to a place [12].	Attachment to a place: An environment is created by the effects of human's cognitive, emotional, and behavioral association with a place; Dwellings reflect the meaning and identity of social relations; Natural geography, cultural aspects, and social relations create a space; An environment is generated by human life.

Source: Synthesis of literature review

Table 3 Universal Criteria for Riverbank Development.

Component	**Universal Criteria of Riverbank Development**	
	Buildings at the Riverbank	**Open Space at the Riverbank**
Place Attachment	A building should keep its meaning and local identity, in order to form social relations.	Open space should be maintained as a cultural product, which is influenced by natural geography, culture, and social relations.
Sustainable Urban Design	Riverbank development must apply community planning processes, local identity, and its function and activities for strengthening urban public space.	Open space at the riverbank development should consider the principles of sustainable urban development when restructuring the riverbank area.
Green Open Space Design	Built-environments should be filled with buildings and open space.	Green open space should be a component provided in the urban design.
Ecological Riverfront Design	The riverbank should maintain some features of the natural river and its function, and provide a balance between recreational purposes and public access.	It should maintain features of the natural river and its function, use non-structural elements, reduce hardscape elements, and maintain storm water.
Activity support	(1) Building use must support activities 24 hours/day, individually or regionally; (2) Functions for living, working, and playing activities must be provided.	(1) It must provide support for activities in open space 24 hours/day, whether events are organized and managed by the private sector or the community. (2) It must create an environment where activities and physical space always support each other.

Source: Author, 2013

Without neglecting its functions, a river can be utilized as a tourist attraction. It has to be well maintained in order to generate a strong image and visual quality. If the concept of revitalization is applied, it will create uniqueness that differ it from other tourist attractions.

3 Methodology

This research applied an explorative and descriptive framework. It started with field observations in order to gain a general overview general condition of the study area's condition which were based on the 'Rossi's reading of the city' [14]. The study area is shown on Figure 2. Considering the location which has been designated as cultural heritage properties by City Government, analyses will be interpreted by applying *character appraisal* analysis method. A *Character appraisal* is the best method of defining the key elements that contribute to the special historic and architectural character of conservation area [15]. It produces an overview, identification, and evaluation of existing conditions, in regards to the buildings and open space at the riverbank [16]. The purpose of character appraisal in a conservation area is to define the special interest or 'character' of the study area, in order that this may be enhanced, preserved, rehabilitated, reconstructed and/or demolished. Moreover, this analysis method will be a material consideration when considering applications for development within conservation area and applications for significant new developments which should be accompanied by a contextual analysis that demonstrate the essential character of the area [15].

In order to simplify the reading of the character of the area, the data collection is presented in street view or street picture and descriptive narration. There are plenty of researches which focus on street pictures and image digitalization in the field of architecture, urban studies, and even computer engineering. Street view is identified as coloured image that contains the information of building and all of the objects that affect the configuration of the street which are primarily required in the scope of environmental aesthetic consideration [17]. The images of street picture are captured along the riverbank by using digital camera which is portrayed with the same street level in order to achieve the best match of sequence. One image of street picture represents urban facts related to building appearance, activity at the space between building and riverbank, and hardscape-softscape element of riverbank, as shown in Figure 1. The result of the character appraisal analysis is synchronized with literature reviews that generate specific design criteria.

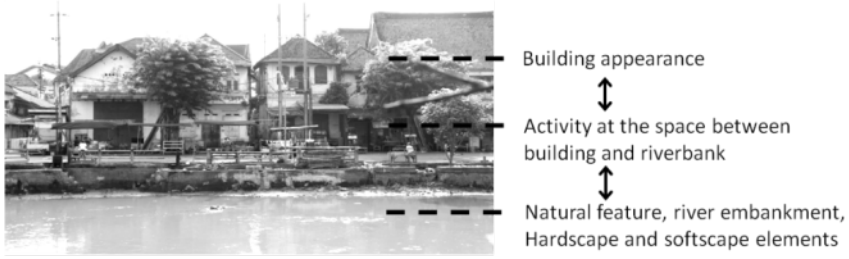

Figure 1 Information of building and all of objects captured at the riverbank area (Author, 2014).

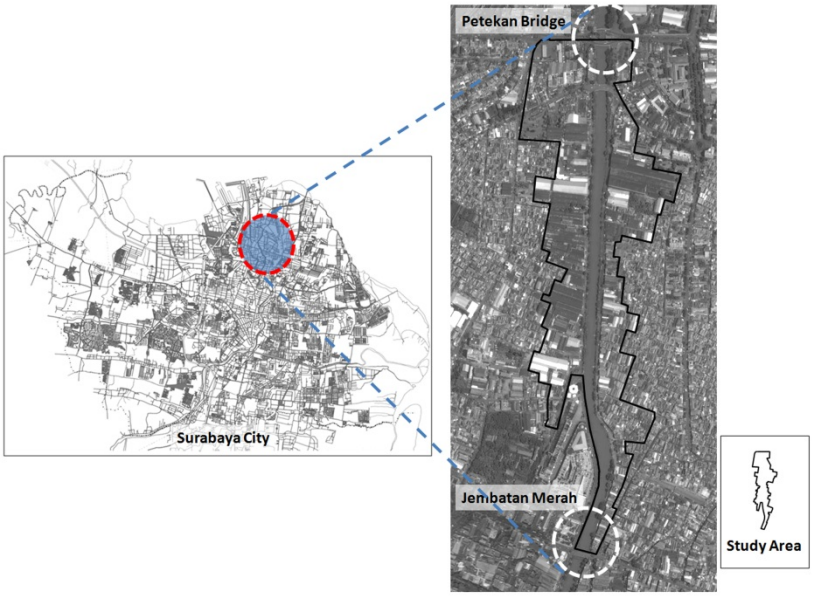

Figure 2 Study location (Source: processed from Google Earth and official city map of Surabaya).

4 Findings and Results

Street pictures of study area are divided into two parts. The first part is the eastern side of the *Kalimas* River (Figure 3) and the second part is the western side of the *Kalimas* River (Figure 4). From the six segments explained in Figure 3, three buildings in two segments have potential urban landmarks (marked by bold circle line). Potential urban landmarks can be contrived from their uniqueness, rarity, prominence, and richness of historic value. The first potential urban landmark shows in segment 1 which displays a unique building that exhibits *Jengki* architectural style (a local style that arose around 1950-1960). It became a potential landmark because of its individual characteristics compared

with its surrounding (marked by 'A' in bold circle line). The second and third potential urban landmark which shows in segment 5 are the historical harbormaster's tower (used to monitor activity along the River) and the old Chinese roof-style building that serves as a witness of the urban development in Surabaya City. They are prominence in building scale and have different characteristic from others which are potential to be a landmark (marked by 'B' and 'C' in bold circle line). Social space can be placed adjacent to potential landmarks. However, the buildings' façade of potential urban landmark are deteriorating and needed to be improved and rehabilitated.

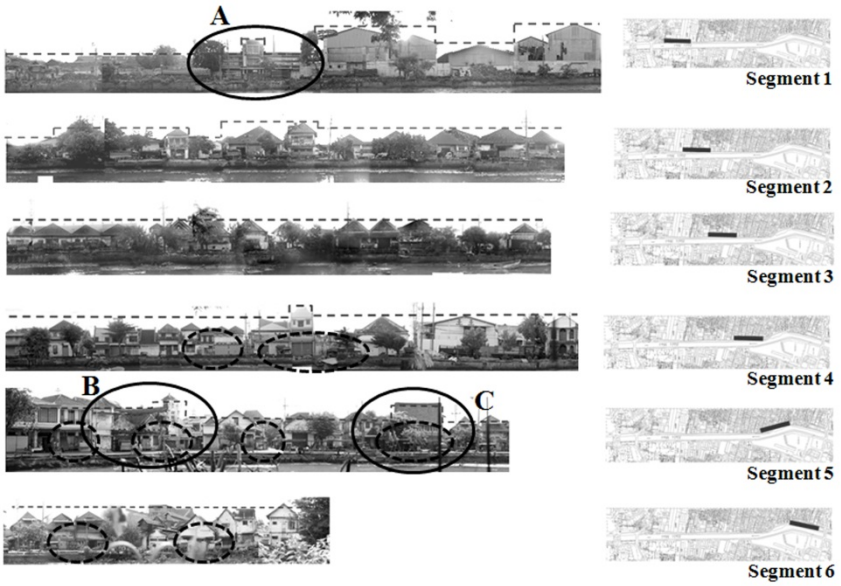

Figure 3 Street Picture of Eastern *Kalimas* River.

The results of street picture of eastern Kalimas River are divided into two aspects: building and open space. In the building context: many buildings keep their façade originality even the physical condition are decaying; no signage of information about warehouse district area; three potential urban landmark that must be improved by rehabilitating the façade; additional semi-permanent building which is shown in the dotted line in Figure 3 must be uninstalled in order to create original environment. While in the open space context: local economy at the riverbank can revive the activity support; people are easy to walk because the street is not for public transportation; no parking management at the riverbank area; few bench as integral part of street furniture cannot create

a place for communities. Some recommended actions relating to improve visual quality are: using materials of varying heights and colors that are compatible with the building's façade, rehabilitating the façade, and dismantling illegal and temporary buildings would strengthen the place (marked by dotted line in Figure 3).

The street picture of Western *Kalimas* River shows five segments. It contains three buildings in two segments that have a potential urban landmark in segment 2 and 5 which is marked by 'D' 'E' and 'F' (Figure 4). Potential urban landmarks of the western part can be contrived from their prominence. The first and second potential urban landmarks have no specific architectural style. However, the gable roof style becomes the characteristic of the street. Visual quality can be improved by dismantling the illegal non-permanent (temporary) buildings, rehabilitating building façades (segment 3 and 4), and reconstructing a building (marked by 'F') that has a high level of damage. The massive and flat wall (segment 2) does not directly interact with the public; therefore it should provide shading or have overhanging that utilizes a similar height and shape. Highly prominent buildings can be renovated to have new functions, such as a restaurant or gallery (segment 4), in order to create a livelier city.

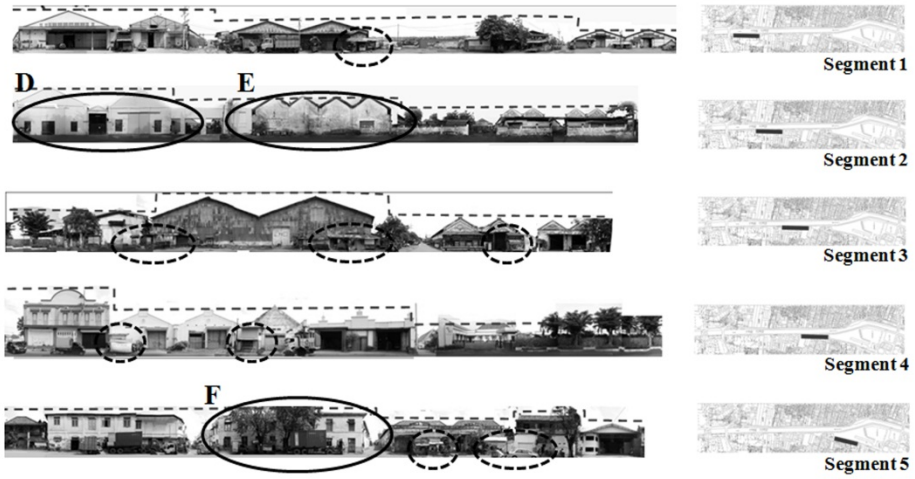

Figure 4 Street Picture of Western *Kalimas* River.

The results of street picture of western *Kalimas* River are briefly described through two aspects as eastern *Kalimas* does. In the building context: gable roof style is the characteristic of the street; additional and illegal non-permanent buildings which are shown in dotted line must be dismantled in order to restore the building; the role of vegetation is less in improving and strengthening the

Table 4 Design Criteria of Buildings at the Riverbank.

Component	Universal Criteria	Design Criteria
Place Attachment	A building should keep its meaning and local identity, in order to form social relations.	• New buildings must consider the characters of old buildings, from its roof shape (pyramid roof, hip roof, and gable roof), openings (door and window type). • New buildings must be compatible with old buildings, in scale, proportion, rhythm, color, texture, and material. • The district boundaries on the northern and southern side have signs installed to inform visitors of the warehousing district and so that they can get a feel of the place.
Sustainable Urban Design	Riverbank development must apply community planning processes, local identity, and its function and activities for strengthening urban public space.	• New building structures must not obstruct old structures or inhibit its local identity. • Existing activities have to be incorporated into the new developments of the old warehouse district. • Potential urban landmarks can be improved by rehabilitating and reviving building façades, in order to provide community space.
Green Open Space Design	Built-environments should be filled with buildings and open space.	• Urban public space is created along the *Kalimas* River to create accessible space in between the buildings and river. • The space between the buildings and riverbank is served as walking tracks.
Ecological Riverfront Design	The riverbank should maintain some features of the natural river and its function, and provide a balance between recreational purposes and public access.	• Vegetation does not obstruct the view of the *Kalimas* River; it must create a view to the River. • The riverbank must be free from permanent buildings in order to support recreational purposes that can be easily accessed by the public.
Activity support	(1) Building use must support activities 24 hours/day, individually or regionally; (2) Functions for living, working, and playing activities must be provided.	• The warehouse district must provide functions that are able to arouse local activity, such as: coffee shops, cafeteria, or a food center. • New functions can be incorporated into potential urban landmarks. • Potential urban landmarks can further revitalize the area by utilizing new functions, which support the local economy, such as: a museum and gallery about the history of the warehouse district. Visitors would have to pay for the entrance ticket to access the whole facilities.

Table 5 Design Criteria of Open Space at Riverbank.

Component		Design Criteria
Place Attachment	Open space should be maintained as a cultural product, which is influenced by natural geography, culture, and social relations.	• Open space can provide a place to enjoy the old buildings and the surrounding environment. • Nodes are created by wider streets, which consequently provide a better place for gatherings or cultural events.
Sustainable Urban Design	Open space at the riverbank development should consider the principles of sustainable urban development when restructuring the riverbank area.	• Pedestrian ways are located at the riverbank in order to maximize its view, and to provide a chance to observe some old buildings along the River. • Parking areas for motorized vehicles (truck and pick-ups) are placed along the riverbank so that they do not obstruct the view of buildings. • Pedestrian ways must be safe and comfortable for community use. • Benches must be provided to create a leisure space.
Green Open Space Design	Green open space should be a component provided in the urban design.	• Open space at the riverbank must provide a place for resting. • Open space quality can be provided by lighting arrangements, either on the floor or wall, in order to create a sense of safety. • Existing vegetation should provide shade for pedestrians.
Ecological Riverfront Design	It should maintain features of the natural river and its function, use non-structural elements, reduce hardscape elements, and maintain storm water.	• There must be canal improvement on a scheduled basis in order to create a good quality of water. • The riverbank must provide a biotope that assists in the maintenance of the ecosystem.
Activity support	(1) It must provide support for activities in open space 24 hours/day, whether events are organized and managed by the private sector or the community. (2) It must create an environment where activities and physical space always support each other.	• Open space at the riverbank should become a place for communities. • Food service should be placed in buildings with high architectural and historical value, so that the visitors can feel the atmosphere of the olden days. • The heritage community can use the open space at riverbank to collaborate events (example: night heritage trail, etc).

visual quality. In the open space context: no pedestrian ways is provided therefore people are difficult to walk at the riverbank; street furniture has not been able to improve the image of warehouse district area; the river is less maintain the natural features and its function.

Behavior mapping (existing activities) must also be considered in determining the design criteria. Existing activities are divided into two types: movement or static activity. Movement activities are those involving the mobility of humans and motorized vehicles, including cars, trucks and pick-ups. Motorized vehicles can be divided into four categories of movement: movements by any types of vehicle, movement by a medium vehicle, and movements by small vehicles and boats. Astatic activity is an activity in a single place, including loading and unloading, parking areas, stalls, and temporary markets. There are differences in the intensity of these activities between the weekend (Saturday-Sunday) and weekdays (Monday to Friday). The highest intensity is on weekdays.

The findings and results described above by applying character appraisal analysis are compiled for design criteria of warehouse district at the *Kalimas* riverbank. Design criteria are divided into two categories based on the universal criteria: buildings and open space. Overall criteria for warehouse district at the riverbank of *Kalimas* River can be seen on Table 4 and 5.

5 Conclusion

5.1 Limitation of the Research

The result of this study clearly showed that the warehouse district area is significant not only for urban aesthetic, but also urban heritage and social community. The research is limited to the warehouse district area of *Kalimas* River which is applying aspect of place attachment, sustainable urban design, green open space design, ecological riverfront design, and activity support as the research's components. Those aspects are divided into two categories: buildings and open spaces analyzed by character appraisal technique analysis. Based on the components and universal criteria, the buildings and open spaces are highly important in order to create public open space, urban landmark, and better living environment.

5.2 Summary

Based on the findings and results from our analysis, design criteria for revitalizing the old warehouse district must consider these following points:

First, the buildings' character on the western and eastern side of *Kalimas* River need to be maintained and rehabilitated in order to sustain the meaning of place.

Second, open space along the *Kalimas* River must still be provided in order to create space for community and social activities.
Third, there must be canal improvement on a scheduled basis in order to create a good quality of water.

5.3 Implication of Future Research

The study is only discussed limited reference with specific area (warehouse district area). However the study related to the riverbank should not be conducted only per section; the investigation from headwaters up to downstream must be analyzed in order to obtain better living environment as a whole. The references about space arrangement between private (housing and warehousing) and public (open space) is also crucial to be analyzed in the further study before the design criteria will be applied in the research location.

Acknowledgment

This research was supported by funding from *Penelitian Hibah Kompetensi* – The Research and Community Service Institute (*Lembaga Penelitian dan Pengabdian Masyarakat*) *Institut Teknologi Sepuluh Nopember* (ITS), year 2014, with contract number: 07555.9/IT2.7/PN.01.00/2014.

References

[1] Handinoto, *Perkembangan Kota dan Arsitektur Kolonial Belanda di Surabaya* (1870-1940), LPPKM UK, Petra Surabaya & Penerbit Andi Yogyakarta, 1996.
[2] Budihardjo, E., *Kota Berkelanjutan*, Penerbit Alumni, Bandung, 1999.
[3] Putra, R.D.W., Nugroho, S., Darjosanjoto, E.T.S., *The Role of Riverbank Area as Community Space in Surabaya City, Case Study: Kampung Jambangan and Kampung Keputran*, Asian Urban Place Great Asian Street Symposium Department of Architecture School of Design and Environment, Natioanl University of Singapore ISBN 978-981-09-3687-7, Reference: A201412030011, pp. 78-82, 2014.
[4] Darjosanjoto, E.T.S. & Nugroho, S., *Design Criteria for Open Space at the Riverbank Area in Kampung Wonorejo Timur*, International Journal of Education and Research, ISSN: 2411-5681, **3**(4), April 2015.
[5] Crowe, N., *Nature and the Idea of Man-Made World*, MIT Press. 1995.
[6] Ritchie, A. & Thomas, R., *Sustainable Urban Design: An Environmental Approach*, Taylor and Francis. 2009.
[7] Trancik, R., *Finding Lost Space: Theories of Urban Design*, Wiley, 1986.
[8] Norberg-Schulz, C., *Nightlands: Nordic Building*, Cambridge, Mass: The MIT Press, 1996.

[9] Otto, B., McCormick, K. & Leccese, M., *Ecological Riverfront Design: Restoring Rivers, Connecting Communities*, American Planning Association, Planning Advisory Service Report Number, pp. 518-519, 2004.
[10] Rapoport, A., *The Meaning of Built Environment–A Nonverbal Communication Approach*, The University of Arizona Press, 1990.
[11] Shirvani, H., *The Urban Design Process*, Van Nostrand Reinhold Company, New York, 1985.
[12] Altman, I. & Low, S.M., *Place Attachment*, Human Behavior and Environment, Springer, 1992.
[13] Oliver, P., *Dwelling: the House across the World*, University of Texas Press, 1987.
[14] Rossi, A., *The Architecture of the City*, The MIT Press, 1982.
[15] Holmes, A.M., *Old Town Conservation Area Character Appraisal*, the City Development Department: Planning & Strategy, ISBN 1851910719, Edinburgh, 2005.
[16] *Urban Design Toolkit*, The New Zealand Ministry for the Environment, http://www.mfe.govt.nz/publications/urban/urban-toolkit-2009/urban-design-toolkit-third-edition.pdf (March 2013).
[17] Mutlu, B., Hacıömeroğlu, M., Guzel, M.S., Dikmen, M. & Sever, H., *Silhouette Extraction from Street View Images*, International Journal of Advanced Robotic Systems, DOI: 10.5772/58740, pp.1-12, 2014.