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## EASY ACCESS TO PUBLIC TRANSPORTATION FOR SUSTAINABLE SITE DEVELOPMENT, ACASE STUDY OF UNISULLA KALIGAWE SEMARANG

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**Abstract:** *Global warming issue generates some sustainable-oriented actions aiming at protecting and improving environment quality. Air pollution caused by vehicles is one of the causes of global warming. Sustainability can be started in academic phase, such as campus environment, landscape, and buildings. This paper aims at explaining the sustainable development in Sultan Agung Islamic University (UNISSULA) and especially in its sustainable site development. Method used for this paper is qualitative case study that is suitable to answers questions about how and why. Case study requires a collection of site's data as much as possible before being analyzed based on relevant theories. The result of this paper suggested the applications of sustainable site development in a campus ground especially with an easy access public transportation for Islamic campus and with Islamic values within.*

**Keyword:** *Campus Ground, Site Development, Sustainable Architecture*

**Abstrak:** Isu pemanasan global menyebabkan beberapa aksi keberlanjutan yang pada dasarnya bertujuan untuk melindungi dan meningkatkan kualitas lingkungan. Polusi udara yang disebabkan oleh kendaraan bermotor adalah merupakan salah satu penyebab pemanasan global. Keberlanjutan dapat dimulai dari tingkat akademisi, seperti lingkungan kampus, lansekap, dan bangunan-bangunannya. Paper ini bertujuan untuk menjelaskan pembangunan keberlanjutan di Universitas Islam Sultan Agung (UNISSULA) dan khususnya pada bagian pembangunan site yang berkelanjutan. Metode yang digunakan untuk paper ini adalah kualitatif studi kasus yang dinilai cocok untuk menjawab pertanyaan mengenai bagaimana dan mengapa. Studi kasus membutuhkan pengumpulan data dari site sebanyak mungkin sebelum dianalisa berdasarkan teori yang berhubungan. Hasil dari paper ini dapat menjelaskan pembangunan site yang berkelanjutan terutama pada kemudahan mengakses transportasi umum pada kampus Islam dan dilengkapi dengan nilai-nilai Islam yang terkandung di dalamnya.

**Kata Kunci:** Kampus, Site Berkelanjutan, Arsitektur Berkelanjutan

### INTRODUCTION

Sustainable ia such an important keyword in many sciences field nowadays. It is happening due to the increasing global warming issues. In the architectural world, architecture, as a science in engineering, also participates in sustainable act and called sustainable architecture. It even generates some isms such as ecological architecture, eco-friendly architecture, green architecture, etc (Sardjono & Nugroho, 2014). Regarding to global warming issue, sustainable architecture concept is absolutely applied, and one of its application is on campus ground (Filho, et al., 2015). Campus ground can contribute a huge impact in sustainability (Amr, et al., 2016). By applying sustainability concept in campus environment, it is expected to build a sustainability awareness character to the students (Coulson, et al., 2011). Islamic-based campus has more emphasis on

sustainability concept, because sustainability is part of Islamic value (Indrawati, 2015). Indrawati (Indrawati, 2015) explained that Islamic architecture has three indicators: functional (*hasan*), good (*thoyib*), and aesthetic (*jamil*), then sustainable contained in good (thoyib). Which means Islamic fully support to sustainability and applicable to whole life aspects, including the academic world. There are many research papers studied about sustainable architecture in housing, buildings, and campus grounds all over Indonesia. Examples of sustainability in housing are the case of PERUMNAS (citizen settlement) and *Badui* tribe traditional buildings (Sudarwanto, et al., 2014) (Sardjono & Nugroho, 2014). But none of them explored sustainability linked to Islamic values. While sustainability study in building was the case of Bank Indonesia Surakarta, and it was not linked to Islamic

values (Sucipto, et al., 2014). Whereas about sustainability study has been conducted in several universities such as Diponegoro University, Bandung Islamic University, Andalas university (Hapsari, et al., 2014) (Salampessy & Pranggono, 2015) (Amrina & Imansuri, 2014) (Phramesti & Yuliasuti, 2013) and none of them linked to Islamic values. While research about Islamic values in a buildings have been conducted for several times but none of them explaining about campus and sustainability. Thus, the aim of this paper is to complete them by providing explanation about sustainability with case study of Islamic campus and considering Islamic values. This paper is an advance explanation and more specific in an easy access to public transportation from previous paper (Hasan, et al., 2016) (Hasan, et al., 2015). Sultan Agung Islamic University (UNISSULA) is the location of this research.

### LITERATURE REVIEW

Sustainable architecture is being part of natural architecture, sustainable architecture uses natural materials, without cause ecological damage (Kultur, 2012). ASHRAE, an organization works as sustainable design promotion, explains that a design that green / sustainable is a design which minimalizes the negative impact of human to the surrounding environment, materials, resources, and nature process (ASHRAE, 2006). Sustainable design is considered as part of sustainable architecture (Sardjono & Nugroho, 2014). Sustainable design has 5 points to be considered, they are: sustainable site development, water conservation and efficiency, energy efficiency and renewable energy, material conservation and resources, indoor environment quality (ASHRAE, 2006) (Yudelson, 2007).

Furthermore, the main point of this paper, which is easy access to public transportation is to include in sustainable site development. Its aim is to create an eco-friendly site by using less private motor vehicle (Yudelson, 2007). Site must be placed within walking distance to any bus stop, which is no more than 300 meters according to Green Building Council Indonesia (GBCI) (GBCI, 2011). It requires adequate pedestrian ways that accomodates all users with various conditions.

After presenting the existing data in site and analyzing based on related theories, Islamic values related also needs to be considered. Islamic values such as verses in Holy Koran and hadith are used to support the reason why UNISSULA as Islamic based campus was chosen. Furthermore, the analysis equipped with Islamic values is the novelty of this present paper.

### RESEARCH METHOD

Qualitative methodology was used in this study since it is considered more appropriate to understanding the significance from social problems and involving participants to generates specific data (Creswell,

2013). Definition above strenghtening the use of qualitative which considers that sustainable architecture is a people involving issue. Further, qualitative method uses case study strategy which allows the researcher to investigates a program, event, activity, process, or a groups (Creswell, 2013). Case study is being recommended to answers questions about how and why (Yin, 2014). Case study is being chosen for its advantage to presents explanation more detail (Alwasilah, 2014) then generates a longitudinal illustration (Prastowo, 2011). First step in case study is collecting datas from site as much as possible. But the datas taken must be related to the theme, easy access to public transportation in UNISSULA. Before collecting datas, requires to understanding about sustainable architecture as the very first variable.

### RESULT AND DISCUSSION

Sultan Agung Islamic University (UNISSULA) takes place on Kaligawe street which is a national high way connecting provinces. Its strategic location makes the academicians easy to access the campus by public transportation. Moreover 2 bus stops (bus and Trans semarang) are located around the area. But there are no integration between campus area to these bus stops. Pedestrian ways connecting to these bus stops less convenient. No wonder, the amount of academicians using private vehicles are numerous. Almost all parking spaces are full of cars and and motor cycles. Actually the university encourages the academicians to use public transportation instead private vehicle. One of the academicians' reasons was the distance between bus stops to the building. Some buildings are located not in a walking distance. Figure 1 explained some buildings from various distances.



Figure 1. Buildings and distance  
Table 1. Meaning of Color Sign in Figure 1

No	Sign	Meaning
1	Pink ellipse	Trans Semarang Bus stop
2	Blue Ellipse	Bus Stop

3	Pink Line	Direction from/to Trans Semarang Bus Stop
4	Purple Line	Direction from/to Bus Stop
5	Red Ellipse	HM. Sulchan Building
6	Yellow Ellipse	Colective Lecture Building
7	Green Ellipse	Masjid Abu Bakar Assegaf
8	Turquoise Ellipse	Al Biruni Building

Those are some buildings represents all buildings in campus of UNISSULA explained in table 1. HM Sulchan (red ellipse) building represents officialdom building, collective lecture building (yellow ellipse) and Al Biruni building (turquoise ellipse) represent lecture buildings, and Masjid Abu Bakar Assegaf (green ellipse) represents public facilities. Those buildings have different distances to bus stops and trans semarang stop, it explained in following table 2.

**Table 2.** Distances

No	Building	From/to Bus Stop (meters)	From/to Trans Semarang Stop
	HM Sulchan Building	100	230
2	Collective lecture building	150	280
3	Masjid Abu Bakar Assegaf	250	365
4	Al Biruni Building	375	330

From explanation in table 2, it can be conclude that buildings in UNISSULA has different distances according from bus stops. Some buildings are not in a walk distances. GBCI (GBCI, 2011) explains that maximum distance for walk-distance is 300 meters. Based on that theory, it has UNISSULA to own low-emission vehicles to accomodate the academicians reach the buildings from/to bus stops without any hassle. The low-emissions vehicle can be in the form of shuttle or bicycle. Beside that, the academicians also should have be stimulated to using public transportation and walk from/to bus stops due to some buildings are in walk distances. Due to UNISSULA has not fully integrated public transportation in the campus ground, the academicians usually going to campus by private vehicles such as motor cycle and car. The problem caused is sprawled parking area inside campus.

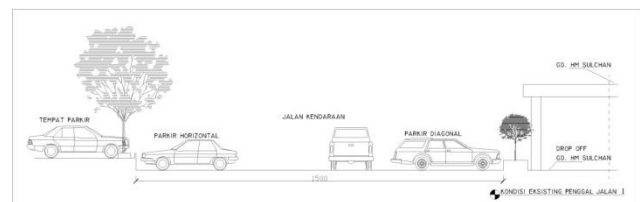
Based on cases above, it requires UNISSULA to own low-emission vehicles and well maintained pedestrian access to stimulated the academicians reducing their private vehicle usage. Due to the absence of low-emission vehicle in UNISSULA, adjustment with the existing roads in UNISSULA is

necessary. The adjustment allows a bicycle way on existing road. It takes some adjustment on roads and explained in some points in UNISSULA sitemap below.

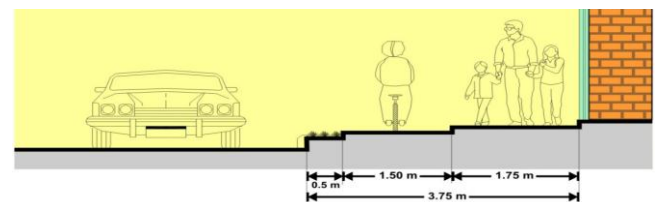


**Figure 2.** Points of existing spot

Point number 1 on figure 2 is a first of UNISSULA ringroad system. Path number 1 has approxiamtely 15 meters width. Then on its existing condition has 2 parking car lines on left and right side with no pedestrian way. The section of its existing condition is explained in figure 3. According to the government regulation (PUPR, 2014) minimum width for pedestrian way is 1,75 meters and 1,50 meters for bicycle way with 0,5 meter separator from vehicle way, it explained in figure 4. Then in figure 5 below is redesign of path number 1 according to the regulation.



**Figure 3** Existing path section number 1



**Figure 4** Path section from guideline design (PUPR, 2014)



**Figure 5** Redesign path section number 1

In redesign path number 1, it requires a roof protected pedestrian way, bicycle path with separator, and remove all parking line. The roof protected pedestrian way is located on right side due to the building is located on right side. Removing parking line requires a parking building, on southwest area of UNISSULA. The parking lot allows the inside area of UNISSULA free from vehicle. The location suggestion for parking lot can be seen on figure 6.

Then on point number 2 in figure 2 is a next phase of ringroad in UNISSULA. Path number 2 has approximately 5,8 meters width. This path is rarely passed by pedestrians since they are prefer passing by the center area of UNISSULA which closer in distance and shaded. The condition at its existing road has no parallel parking. The section of its path can be explained in figure 6. Then in figure 7 below is the redesign of path number 2 adapted from goverment regulation (PUPR, 2014). The bicycle way is made with low separator with 1,5 meters wide.

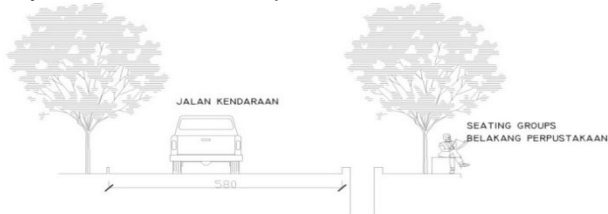


Figure 6 Existing path section number 2

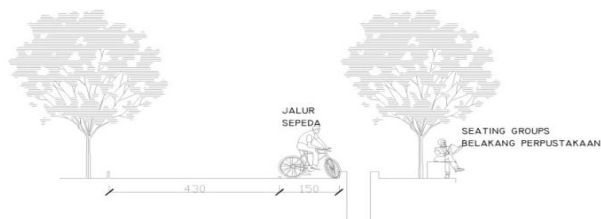


Figure 7 Redesign path section number 2

Point number 3 in figure 2 is a next phase of ringroad in UNISSULA beside of Masjid Abu Bakar Assegaf. Path number 3 has approximately 5,8 meters width. This path is rarely passed by pedestrians since they are prefer passing by the center area of UNISSULA with closer distances and more shaded area. The condition at its existing road has a parallel parking on right side. The section of its path can be explained in figure 8. Then in figure 9 below is the redesign of path number 3 adapted from goverment regulation (PUPR, 2014). The bicycle way is made with low separator with 1,5 meters wide.

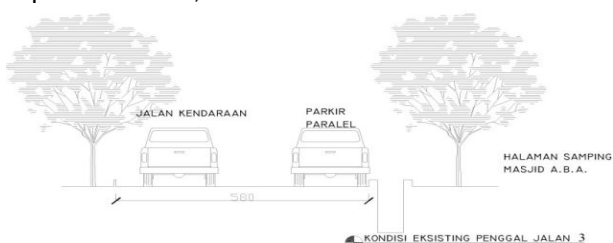


Figure 8 Existing path section number 3

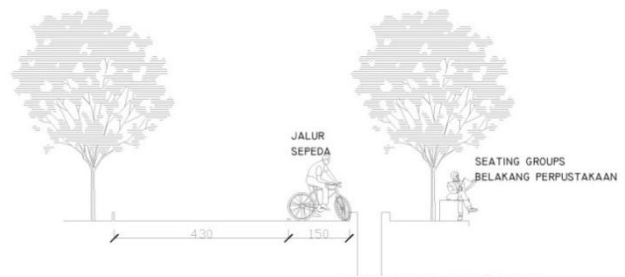


Figure 9 Redesign path section number 3

Point number 4 in figure 2 is a street in front of Masjid Abu Bakar Assegaf. Path number 4 has approximately 5,2 meters width. This path is regularly passed by pedestrians since provides pedestrian way and a way towards masjid. The condition at its existing has a parallel motorcycle parking on right side. The section of its path can be explained in figure 10. Then in figure 11 below is the redesign of path number 4 adapted from goverment regulation (PUPR, 2014). The bicycle way is made with low separator with 1,5 meters wide.

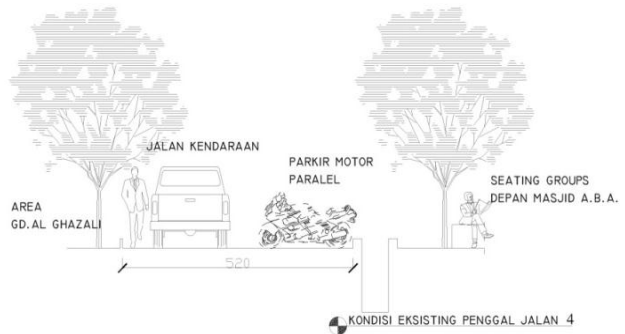


Figure 10 Existing path section number 4

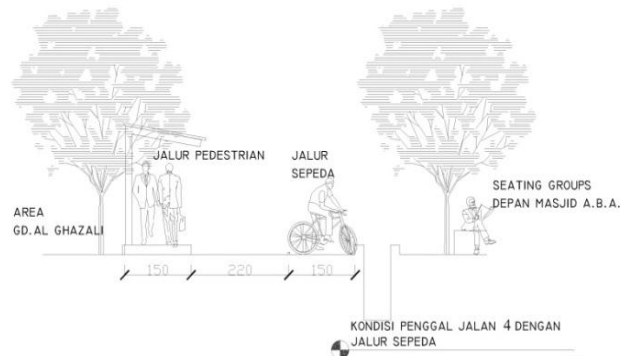


Figure 11 Redesign path section number 4

Point number 5 in figure 2 is a next phase of ringroad in UNISSULA between Technology Industry Faculty building and PUMANISA (canteen building). Path number 5 has approximately 5,3 meters width. This path is regularly passed by pedestrians since provides pedestrian way and access to the BRT (bus) stop. The condition at its existing road has a parallel parking on right side. The section of its path can be explained in figure 12. Then in figure 13 below is the redesign of path number 5 adapted from goverment regulation [24]. The bicycle way is made with low separator with 1,5 meters wide.

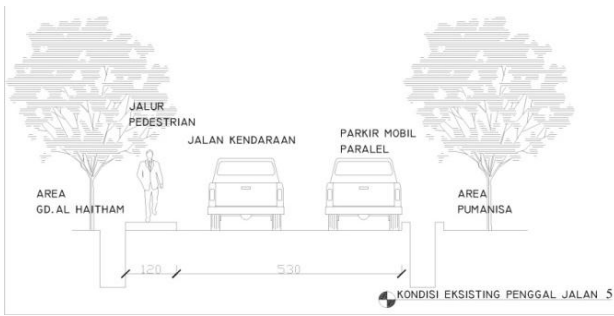


Figure 12 Existing path section number 5

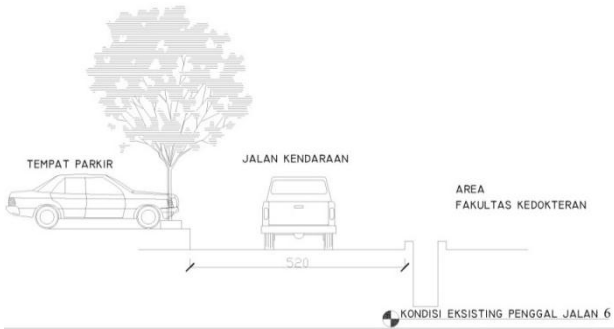


Figure 13 Redesign path section number 5

The last point number 6 in figure 2 is a last phase of ringroad in UNISSULA in front of medical faculty. Path number 6 has approximately 5,2 meters width and parking area on left. This path is regularly passed by pedestrians from and leaving for BRT stop. The condition at its existing road has no parallel parking and without pedestrian way. The section of its path can be explained in figure 14. Then in figure 15 below is the redesign of path number 6 adapted from the government regulation (PUPR, 2014). The bicycle way was made of low separator with 1,5 meters wide and a pedestrian way with roofs.

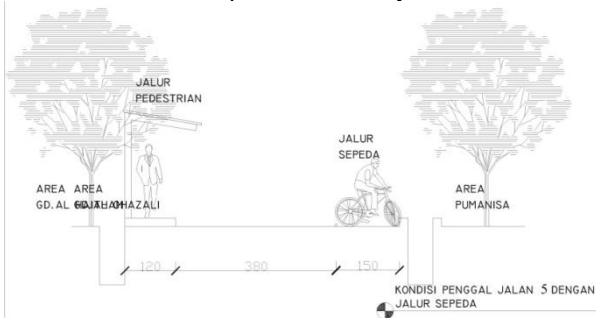


Figure 14 Existing path section number 6

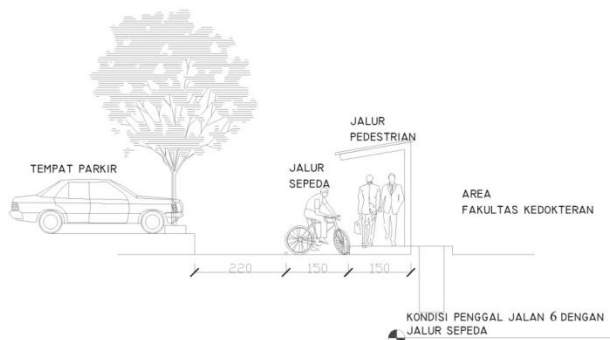


Figure 15 Redesign path section number 6

## Islamic Values

Providing a convenient street for pedestrians and bicycle users by any means facilitating others for doing something. At once it helps to maintain the air from pollution in the campus ground since the parking area is being integrated in front of the campus area. Awareness of giving ease to other Muslims contained in Hadith history by Al-Bukhari and Muslim, "A Muslim is the brother of another Muslim, he is not ill-treat him, and does not lower him. Whoever fulfills the needs of his brother, Allah will fulfil his wish. Whoever removes the narrowness from one world narrowness of a Muslim, Allah will remove from him one of narrowness in the Day of Judgment. When a Muslim covers the ugliness of a Muslim, Allah will cover his ugliness on the Day of Judgment". And it also contained in another Hadith, that is "Whoever helps his brother demand, so Allah will help his demand too." (Hadith history by Al-Bukhari and Muslim)

Then concerning Allah order to not make any damages in the earth has been written in Koran (Al-A'raf : 56), "Do no mischief on the earth, after it hath been set in order, but call on Him with fear and longing (in your hearts): for the Mercy of Allah is (always) near to those who do good." From those hadiths and verse, it can be concluded that Islamic values the sustainability in the form of providing comfort and good quality of life for human being, and that can be in terms of improving air quality, providing access and comfort to pedestrian and care for the needs for other in longer term.

## CONCLUSION

In term of campus location, UNISSULA has already supported by public transportations such as intercity and inner city bus. Pedestrian ways between campus buildings and bus stops should be integrated and renovated to accommodate the pedestrians need. Beside that UNISSULA needs to renovate its ringroad system and parking area to encourage the academicians using public transportation and low-emission vehicle (bike/shuttle) rather than drive their own cars or motorcycles. Renovating such systems will give the benefits to UNISSULA both in short and long term, that maintain the air quality, raise the awareness to live sustainably, and the most important is to implement Islamic values in accordance Koran and Hadith.

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