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The Reliability Level of Women's Dormitory Building Ibn Khaldun University Bogor

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ABSTRACT

The Ibn Khaldun University Women's Dormitory Building, Bogor (ASPIKA) is a building that functions as a temporary residence for female students. The ASPIKA Building was established 13 years ago, this has resulted in several building components and structures experiencing some damage which resulted in the function of the ASPIKA Building decreasing, so an assessment of the reliability level of the building is needed. Aspects used in the assessment of the reliability of the ASPIKA Building based on the proper function of the building include aspects of architecture, structure, utility and fire protection, accessibility, and building layout taking into account the applicable SNI standards. The method used is descriptive quantitative as well as survey data of the existing building by the Minister of Public Works No. 2/PRT/M/2006 concerning Guidelines for Building Technical Requirements. The results showed that the percentage value of the building on the architectural component aspect was 95.50%, indicating the building is in reliable condition. The percentage value on the structural component aspect of the building is 96.56%, indicating that the building is still reliable. The percentage of utility and fire protection components has a value of 65% indicating that the component aspects of the building are not reliable. Unreliable factors in utility and fire protection components are influenced by an inadequate fire prevention system so more attention must be paid to these aspects. Components in the accessibility aspect get a percentage of 65%, meaning that they are less reliable, where this value is influenced by the limited access of people with disabilities to reach areas on each floor of the building. The building layout and the environment get a 100% percentage which identifies the building layout as reliable based on the documents on the ASPIKA Building. The total value of the reliability level of ASPIKA Buildings obtained is 79.41% categorized as "Less Reliable" (reliable category is > 95%), this is influenced by the fire protection component by 65% and the accessibility component by 65%. The solution that can be done by the university is to repair and procure facilities on the fire protection system and provide accessibility facilities that can make it easier for people with disabilities.

Keywords: dormitory building; level of reliability; proper function of the building.

INTRODUCTION

Campuses and universities are small miniatures of a country. The campus is a center for gaining knowledge, manners, and ethics, so it is not surprising that the campus is called a place of transitional generations (Anang Anas Azhar). Bogor Ibn Khaldun University (UIKA) located on Jalan Sholeh Iskandar, RT 01/10, Kedung Badak, Tanah Sereal District, Bogor City is an Islamic campus consisting of sons and daughters between regions throughout Indonesia, supporting learning mobility for students so within The UIKA Bogor campus has dormitory buildings for both boys and girls. The UIKA Girls Dormitory Building (ASPIKA) functions as a safe place to live as well as a resting place as well as a means of supporting creativity for female students to study at the University of Ibn Khaldun (UIKA) Bogor. The ASPIKA building was inaugurated on October 12, 2009 (UIKA website). As time went on, there was damage to the physical condition of some of the rooms which were no longer fit for occupancy. It is appropriate for the building to be assessed for the feasibility or physical reliability of the building to ensure that the ASPIKA building is still suitable for use. Decent buildings must meet the technical requirements stipulated and specified in PUPR Ministerial Regulation No. 29 of 2006 Article 3 guidelines for technical requirements for buildings. Physical

observations in the field are carried out in terms of architecture, structure, utilities and fire protection, accessibility, and analysis of a building's reliability with consideration of several reliability requirements which include aspects of safety, health, comfort, and convenience, using visual inspection and examination of concrete compressive strength based on requirements the applicable concrete technique, so that the value of the feasibility or physical reliability of the building is obtained as well as recommendations that can be made as an effort to overcome the prevention of worse damage. The Indonesian National Standard (SNI) and applicable regulations are requirements that must be met to determine the reliability of a building. Regulations that address the specific proper function of buildings are as follows:

a. The field of architecture is based on PUPR Ministerial Regulation NO.29 of 2006 Article 3 guidelines for technical requirements for buildings SNI 03-1977-1990 specifications for modular coordination of houses and buildings.
b. Structural sector based on SNI 2847:2019 Article 4 Structural concrete requirements for buildings.
c. The field of utilities and fire protection is based on SNI 03-1746-2000 procedures for planning and installing means of exit for rescue against fire hazards in buildings, and Permen PU No.26 of 2008 concerning technical requirements for fire protection systems in buildings and environment.
d. The accessibility sector is based on PUPR Ministerial Regulation No: 30/PRT/M/2006 which discusses building reliability in the form of technical guidelines for facilities and accessibility in buildings and the environment.
e. The field of building planning is based on Bogor Mayor Regulation Number 40 of 2017 concerning Technical Guidelines for Controlling Space Utilization in the Context of Building Construction in Bogor City and the provisions of Bogor Mayor Regulation Number 23 of 2016 concerning GSB in Bogor City.

Figure 1. ASPIKA Building

RESEARCH METHODS

Research on the reliability of the dormitory building was carried out at the Ibn Khaldun University Bogor Girls Dormitory (ASPIKA) with coordinates Latitude:-6.558487; Longitude: 106.792273, located on Jalan Sholeh Iskandar RT 01 RW 10, Kedungbadak, Tanah Sereal District, Bogor City, West Java in February 2021. The research location is shown in Figure 2.

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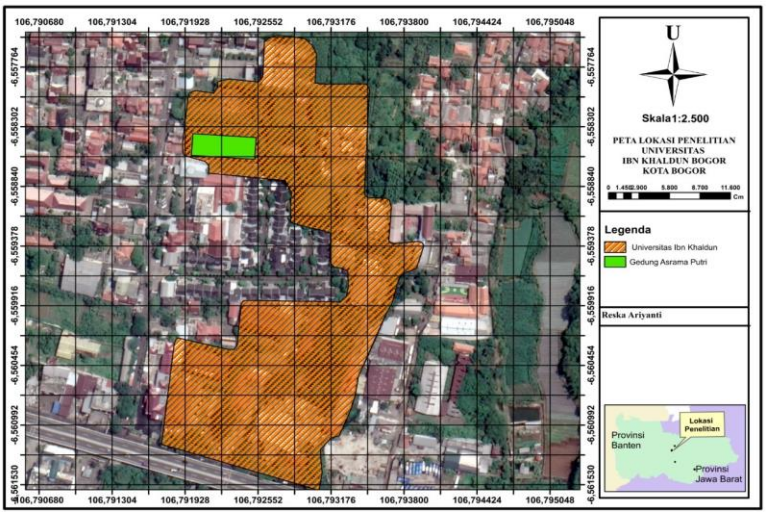

Figure 2. Map of the Research Location of the ASPIKA UIKA Bogor Building Source: Google Maps 2021

Research on the reliability of the dormitory building was carried out at the Ibn Khaldun University Bogor Girls Dormitory (ASPIKA) with coordinates Latitude:-6.558487; Longitude: 106.792273, located on Jalan Sholeh Iskandar RT 01 RW 10, Kedungbadak, Tanah Sereal District, Bogor City, West Java in February 2021. The research location is shown in Figure 2.

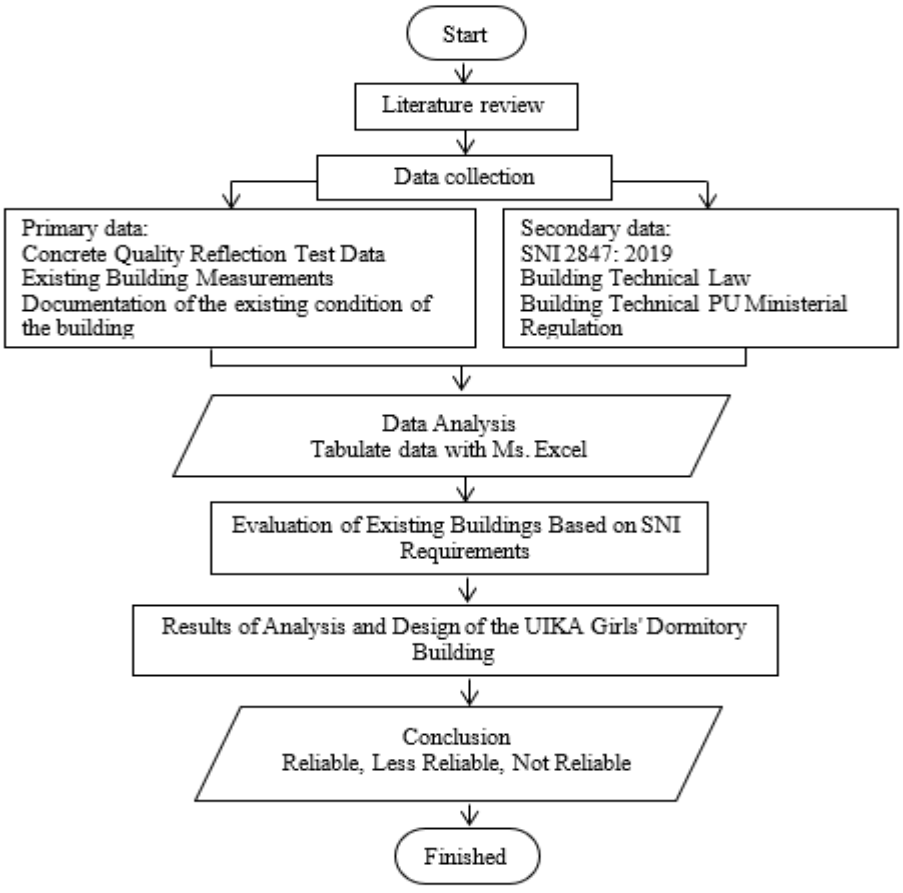

Figure 3. Research Flowchart

RESULTS AND DISCUSSION

The ASPIKA Building is a building that stands on a land area of 2300 m² with a total building area of 6318 m². The ASPIKA Building was built in 2009 and contains around 104 rooms and several administrative rooms and other supporting facilities, some of the facilities are presented in Table 1.

Table 1. Supporting Facilities for the UIKA Girls Dormitory Building (ASPIKA)

No.	Activity Function	Floor	Unit	No.	Activity Function	Floor	Unit
1	Administration Office	1	1	14	Dorm Room	3	26
2	Cooperative / Warung	1	1	15	Bathroom	3	4
3	Security Room	1	1	16	Place for Drying Clothes	3	4
4	Bathroom	1	2	17	Sink / Dishwasher	3	4
5	Meeting room	1	1	18	Dorm Room	4	26
6	Empty space	1	2	19	Bathroom	4	4
7	Warehouse	1	1	20	Place for Drying Clothes	4	4
8	Sitting room	1	1	21	Sink / Dishwasher	4	4
9	prayer room	1	1	22	Dorm Room	5	26
10	Dorm Room	2	26	23	Bathroom	5	4
11	Bathroom	2	4	24	Place for Drying Clothes	5	4
12	Place for Drying Clothes	2	4	25	Sink / Dishwasher	5	4
13	Sink / Dishwasher	2	4				

Building Ownership and Technical Administration Data

According to Minister of Public Works No. 2/PRT/M/2006 concerning Guidelines for Technical Requirements for Buildings, records and track records of buildings are carried out with the aim of orderly development which includes data collection on aspects of function, class, building, and ownership. The ownership owned by the ASPIKA Building is in the form of physical ownership of the building along with land and important papers which are presented in Table 2.

Table 2. ASPIKA Building Ownership Data

No.	Component function condition	Information
1	IMB	There is
2	United Nations	There is
3	Building picture	There is
4	Ownership Letter	There is
5	Development Year	2009

Assessment of building reliability is carried out by weighting and dividing scores on each aspect of the assessment in each technical aspect of the building. Aspects of physical observation of buildings are based on aspects of architecture, structure, utilities, accessibility, and layout of buildings and the environment. In this aspect, the reliability level of the building is obtained in the form of conclusions and problem-solving that can be used by the manager (Muhamad Lutfi, Bagus Nur Zein Syaifullah, 2020)

Architecture

Assessment of the architectural field of ASPIKA Buildings is based on reference to Minister of PUPR Regulation number 29 of 2006 concerning guidelines for technical requirements for buildings

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and the Tarukim Service of Medan City, 2011 implementing a building reliability system in architectural aspects into 2 components with an assessment weight in the form of a space component in getting a percentage of 80 % and the outdoor component gets a percentage value of 20% as shown in Table 3. The ASPIKA Building has a rectangular appearance, using glass that has a frame type with PVC (Poly Vinyl Chloride) material. The dormitory building is dominated by white and orange colors. The roof at ASPIKA Bogor is divided into two parts, namely the atrium uses transparent material (Polycarbonate) so that the sun can enter, while the dorm room area has an area of 18.24 m2 with a width of 3.8 meters and a length of 4.8 meters and is inhabited by 2 -4 female students in each dorm room according to the free space suggested by Soerwanto (2015). The results of calculating the architectural value of the ASPIKA building in Table 3 get a percentage of 95.50% which indicates the building is still in a "Reliable" condition.

Table 3. Value of Reliability in the Field of Architecture of ASPIKA Buildings

No.	Component structure	Component Functional Conditions	Function Value Maximum (%)	Weight Value (%)
1	Interior Space 80%	Appropriate use of functions	15	15
2		Floor coating	10	10
3		Floor plastering	10	10
4		Wall covering	10	10
5		Wall plaster	10	10
6		Door and window frames	15	14,74
7		Ceiling facing	10	9,00
1	Outdoor Space 20%	Roof Cover	10	7,82
2		Exterior wall cladding	2	
3		Exterior wall plastering	0,5	0,5
4		Outer floor coating	3	3
5		Exterior floor plastering	2,5	2.5
6		Ceiling facing	2	2
Total value			100%	95,50 %

Building structure

Inspection of the structure of the ASPIKA Building uses reference to the provisions of SNI 2847: 2019 concerning procedures for calculating concrete structures in buildings and is guided by Permen PU No. 2/PRT/M/2006 concerning Guidelines for Building Technical Requirements. The concrete reflection test with the Hammer Test was carried out to determine the distribution of concrete quality in the ASPIKA Building structure. The results of the Hammer Test on ASPIKA Buildings obtained an average concrete quality in columns of fc'=25.83 MPa and an average concrete quality in beams of fc'=27.45 MPa. The average concrete quality in beams and columns meets the requirements based on SNI 2847-2019 Article 19.2 concerning concrete design properties, stating that the value is safe (fc'=> 21 MPa). Assessment of the building structure field of ASPIKA is based on the Tarukim Service of the city of Medan, 2011 applying a building reliability system in the Structural aspect into 2 components with an assessment weight in the form of the main structural component getting a percentage of 85% and complementary structural components getting a percentage value of 15% as shown in the table .4, the ASPIKA building gets a percentage of 96.56%, it can be concluded that the building is "Reliable" in terms of building structure, as shown in Table 4.

Table 4. Value of Reliability in the Field of ASPIKA Building Structures

No	Component structure	Component Functional Conditions	Function Value Maximum	Weight Value

			(%)	(%)
1	Main Structure 85%	Foundation	25	25
2		Structure Column	20	19.56
3		Structure Beam	15	15
4		Column-Beam Joints	15	15
5		Platform	5	4,5
6		Roof Plate	0,5	0,5
7		Ceiling Hanging	5	5
1		Ladder Plate Or Beam	6	6
2		Joist	5	5
3		Etc	4	1
Total value			100%	95,56%

Utility and fire protection

The value of utility and fire protection is based on the regulations of SNI 03-1746-2000 Procedures for planning and installing means of egress for rescue against fire hazards in buildings and the Tarukim Service of Medan City, 2011 implementing a building reliability system in terms of utilities and fire protection to be 7 components with an assessment weight in the form of a fire prevention system component with a percentage of 40%, a vertical transportation component by 10%, a plumbing component by 10%, an electrical installation component by 10%, an air conditioning installation component by 10%, a lightning rod component by 10%, and Communication installation components get a percentage value of 10% as shown in table 5.

Table 5. Reliability Value for Utilities and Fire Protection for ASPIKA Buildings

No.	**Functional Conditions of Utility Components**	**Function Value** (%)	**Function Value Maximum** (%)	**Existing Condition Value** (%)
1	Fire Prevention System 40%	Fire Alarm System	8	1
2		Sprinklers	8	0
3		Extinguishing Gas	8	0
4		Hydrant	8	2
5		fire extinguisher tube	8	2
1		Ladder	10	10
1	Vertical Transport 10%	Clean water	5	5
2		Dirty water	5	5
1	Plumbing 10%	PLN Resources	5	5
2		Generator Power Source (Genset)	5	5
1	Electrical installation 10%	Direct Cooling System	5	5
2		Indirect Cooling System	5	5
1		Lightning Protection Main System	5	5
2		Lightning Protection Installation	5	5
1	Air System Installation	Telephone Installation	5	5
2		Sound Installation	5	5
Total value			100 %	65%

Several fire prevention systems are not available such as sprinklers and gas extinguishers thereby reducing the percentage, thus the ASPIKA Building has a value of 65% of 100%, which indicates "Less Reliable", due to the score of the fire prevention system is not maintained and is prone to damage to the utility percentage value and fire protection are shown in Table 5.

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Accessibility

According to Minister of Public Works No. 30/PRT/M/2006 concerning technical guidelines for facilities and accessibility in buildings and the environment and based on the Tarukim Service of the city of Medan, 2011 implementing a building reliability system in the aspect of accessibility into 6 components with an assessment weight in the form of a basic size component with a percentage of 20%, Pedestrian path and ram components are 20%, parking area components are 20%, equipment and equipment components are 5%, toilet components are 20%, and door components are 15% as presented in table 6. ASPIKA buildings in terms of accessibility get a percentage of 65% of 100% this is due to access to the mobilization of visitors and occupants whose accessibility is constrained due to the absence of RAM facilities.

Table 6. Reliability Value of ASPIKA Building Accessibility

No.	Types of Building Accessibility Components	Function Value (%)	Existing Condition Value (%)
1	Basic Room Size	20	20
2	Pedestrian and Ram lanes	20	0
3	Parking area	20	10
4	Fixtures & Equipment	5	5
5	Toilet	20	15
6	Door	15	10
	Sub Total	100%	65%

Building layout and environment

Building layout has the function of conformity of the building with environmental planning and control. Building and environmental planning is based on Bogor Mayor Regulation Number 40 of 2017 concerning technical guidelines for controlling space utilization in the context of building construction in Bogor City, provisions of Bogor Mayor Regulation Number 23 of 2016 concerning GSB in Bogor City and the Medan City Tarukim Service, 2011 implementing a system the reliability of the building in the aspect of building layout into 3 components with an assessment weight in the form of a conformity component with a basic building coefficient (KDB) of 40%, a conformity component with a building floor coefficient (KLB) of 40% and conformity with a building equivalent line (GSB) of 20 % shown in table.8. Reliability assessment on environmental and building planning aspects is shown in Table 8 with a percentage of 100% included in the "Reliable" category because it complies with environmental building regulations that meet the terms and conditions.

Table 7. Reliability Value of ASPIKA Building Layout Sector

No	Assessed Items	Function Value (%)	Existing Condition Value (%)
1	Compatibility with Basic Building Coefficient (KDB)	40	40
2	Compatibility with Building Floor Coefficient (KLB)	40	40
3	Compatibility with Building Equivalent Line (GSB)	20	20
	Total value	100%	100%

Building Reliability Value

Building reliability is a combination of several aspects that have been calculated and then summed up taking into account the weighting of each factor that has been determined as the dividing figure for the building reliability indicator. The results of the total value of building reliability are shown in Table 8.

Table 8. Total Building Reliability Value

No.	Aspect Assessed	Assessment Criteria (%)						Weight (%) assessment	Score Total Reliability (%)
		Reliable	K value	Less reliable	K value	Unreliable K	value K		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	Architecture	95 -100	**95,5**	75 - < 95		< 75 %		10	9,684
2	Structure	95 -100	**96,56**	85 - < 95		< 85 %		30	3,23
3	Utilities and Fire Protection	99 -100		95 - < 99		< 95 %	**65,00**	50	1,3
4	Accessibility	95 -100		75 - < 95		< 75 %	**65,00**	5	15
5	Building Management and Environment	95 -100	**100**	75 - < 95		< 75 %		5	20
			Total value					100	**79,41%**

Building reliability is a combination of several aspects that have been calculated and then summed up by considering the weighting of each factor that has been determined as the dividing figure for the building reliability indicator. The reliability category of the building is divided into 3 parts, namely if the value of the reliability level is > 95% then the reliability value is categorized as "Reliable". If the reliability level value is > 75%, the building reliability is included in the "Less Reliable" category, and if the reliability level value is <75%, the building reliability is included in the "Unreliable" category. Based on the building reliability assessment shown in Table 8, the reliability value of the ASPIKA building is 79.41%, so it is included in the "Less Reliable" reliability value category, where the biggest contribution comes from the Utilities and Fire Protection aspects and the accessibility aspects.

The plan to increase the reliability of utilities and fire protection according to SNI 03-1746-2000 and Permen PU No.26 of 2008 is the addition of fire prevention systems such as; fire alarms, sprinklers, gas extinguishers, and evacuation routes. Evacuation routes that have been equipped with signs make it easier for building occupants to be directed and not panic when a fire occurs, as shown in Figure 5. The sprinkler installed on the ASPIKA building is in accordance with Figure 6. This is the safest sprinkler installation plan, namely placing it at every point trigger fire or flammable materials, avoid the fire that is getting bigger.

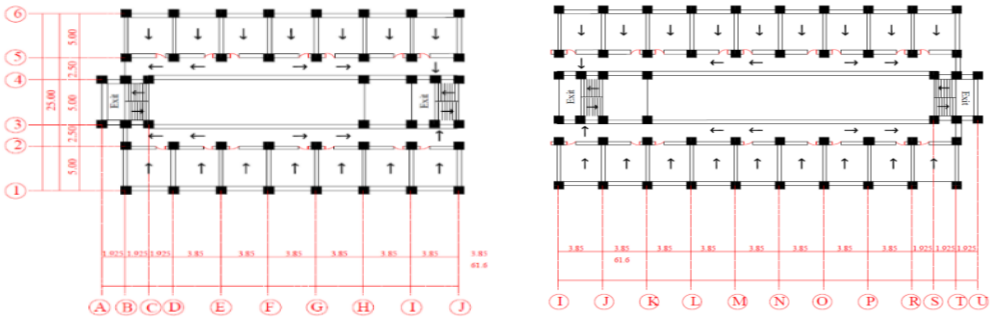

Figure 4. Evacuation Route Plan

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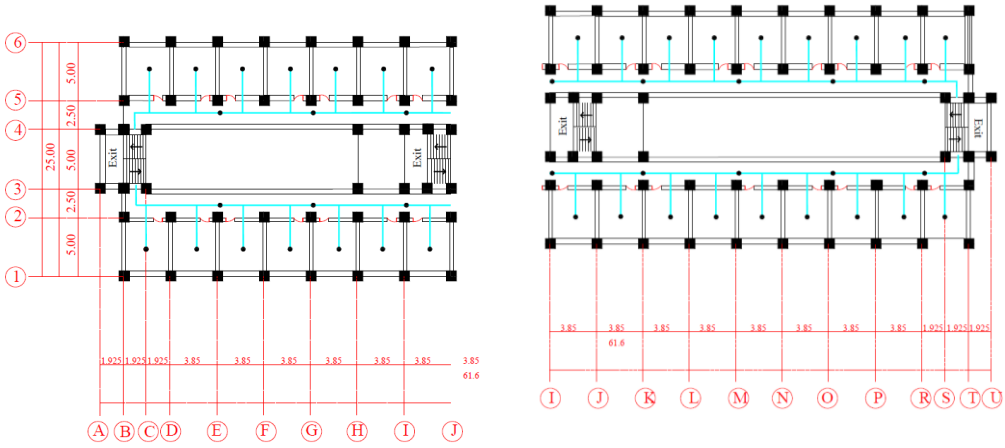

Figure 5. Splinkler Placement Planning Plan

According to PUPR Ministerial Regulation No: 30/PRT/M/2006, the plan to increase the reliability of the Accessibility Sector for ASPIKA Buildings is the addition of a vertical access system facility in the form of a ramp.

Calculation of the slope of the ramp It is known that the height of each floor is 3.5 m divided into 2 parts, the slope used is 6%. Then the length of the ramp used is 25 m with twice the distance on each floor as shown in Figure 7.

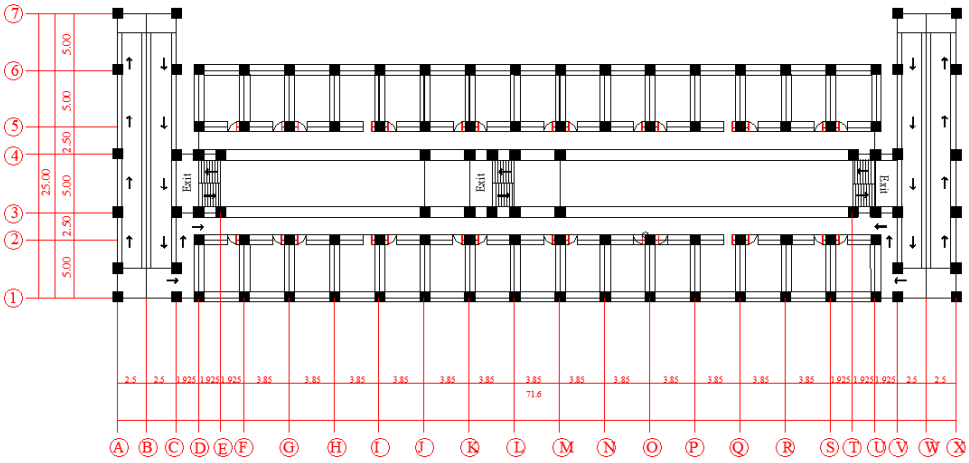

Figure 6. Ramp Placement Plan

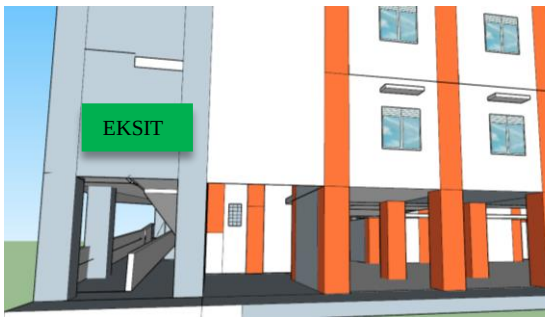

Figure 7. Front view of the Ramp

Figure 8. Side view of the Ramp

CONCLUSION

The ASPIKA building shows a reliability level value of 79.41% which is categorized as "Less Reliable". Aspects that need to be improved are the utility aspect and fire protection with a percentage value of 65% and the accessibility aspect with a percentage value of 65%. This value is far from the requirements for building reliability, namely safety, health, comfort, convenience according to the Building Law No. 28 of the year 2002. The plan to increase the utility and fire protection aspects is to add to the fire prevention system in the form of providing sprinklers, adding fire extinguishers and evacuation access equipped with signs on exit access. The improvement plan on the accessibility aspect is the addition of a vertical access system facility in the form of a ramp.

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