International journal of sustainable building, infrastructure and environment

Utilization and Accessibility for Pedestrian Bridges at Ahmad Yani and Sugiyapranata Street, Semarang

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Abstract. The pedestrian bridge is a facility built to provide comfort and safety for a pedestrian. The pedestrian bridge can also be interpreted as a pedestrian facility to cross busy and full roads, cross highway road, or railroad line so that the flow of circulation people and vehicles can be separated and minimize accidents. The purpose of this study is to analyze whether the pedestrian bridge in Semarang has met the standards, at the Ahmad Yani street, the pedestrian bridge there are still many who do not use these facilities. The method used is qualitative research with direct observation methods. As a result, the two pedestrian bridges do not safety and comfort standards, so the level utilization is lower (about 27-37%).

Keywords: pedestrian, pedestrian bridge, accessibility, disabled people, street

1. Introduction

Pedestrian Bridge is a facility built to provide comfort and safety for people. Pedestrian bridges can also be interpreted as pedestrian facilities for crossing busy and full roads, crossing highways, or railroad lines so that the circulation paths of people and vehicles can be separate and minimize accidents (Reay and Kew, 2007). In several places, this awareness to use facility was ignored by many pedestrians, preferring to cross the road without using a pedestrian bridge, as if the facility was to decorate sections of a city street. There are many factor impact on this problem, like the dimension of the stair, width of pedestrian, handrail, ram, roof, lighting, etc.

Semarang city as a metropolitan city developed of public facilities include pedestrian street, there more pedestrian street will built-in central business district with a meeting to accessibility standard (Wibawa and Saraswati, 2017) and (Wibawa, 2016). To support and to connect between pedestrians, they built several pedestrian bridges to connected. In Semarang city have many pedestrian bridges and faced the problem of the number of utilization. Until now, many citizens don't want to use the pedestrian bridge for various reasons. This research tries to count the number of usage and analysis of accessibility standards.

This research picks two samples located at the central business district in Tugu Muda (Sugiyapranoro street) and Simpang Lima (Ahmad Yani street). The question of the study: 1. What is the utilization of pedestrian bridges by a citizen? And 2. How is the level of accessibility for "all" (include disabled people)?. The goals of the research are analysis of the utilization of the pedestrian bridge and level of accessibility for disabled people.

2. Methods

The research used is qualitative. It interpreted as problem-solving procedures that investigated by describing the state of the subject or object of study (a person, group, institution) at present based on the facts that appear or as they should. The procedure of the research is to explain, describe, and interpret the results of the study with the arrangement of words and or sentences as a response to an exact problem.

This survey was done in three-time (day, evening, and night) with 1 hour and 45 minutes each time. Descriptive research is research that aims to make a systematic, factual, and accurate description of the facts and characteristics of particular populations or regions. The next analysis did compare the existing conditions to standard accessibility in Indonesian. The leak of utilization number will be analyzed by several indicators released by accessibility indicators (ram, stair, railing, etc.). Standard of accessibility in Indonesian use of the rules from Permen. PUPR No. 14 / 2017.

3. Results and Discussion

3.1. Concept of Pedestrian Bridge

According to John J. Fruin (1971), in planning facilities for pedestrians, including crossing facilities must pay attention to seven main targets, namely: safety, security, convenience, continuity, comfort, system integration (system coherence), and attractiveness (attractiveness). The seven factors are inter-related and overlapping. Changing one factor will affect changes in other elements.

According to the regulation of accessibility in Indonesian (Permen PUPR No. 14/PRT/ M / 2017 about the technical requirements of the stairs that can be applied and used as a reference for accessibility standards are as follows (Permen PUPR No. 14, 2017):

1. Height of steps (optride / riser) no more than 18 cm and less than 15 cm.
2. Width of steps (antride / tread) of at least 30cm.
3. Steps or stairs using non-slip material on the edges step (step nosing).
4. The stairs equipped with a continuous handrail for safety
5. The maximum number of stairs to landing (bordes) is 12 steps.
6. Every side of a ladder that is not restricted by a wall must be balustraded
7. Baluster consisting of a grid must be made tight enough to avoid the risk of accidents, especially for children.

3.2. The Existence and location

The study conducted along the corridor Jl. Ahmad Yani, Jl. and Jl. Mgr Sugiyopranoto, Semarang city. The reason the author chose this location is that along the corridor, and the road is a commercial zone with a lot of people (**Figure 1**).

Figure 1. The location of the pedestrian bridge at Sugiyapranoto Street and Ahmad Yani Street

Figure 2. The visual of the pedestrian bridge at Sugiyapranoto Street and Ahmad Yani Street

3.3. Analysis of Utilization by Citizen

The results of the survey conducted at the same time (afternoon, evening, and night) for a total of 5 hours 15 minutes on both objects indicate that the number of users on Jl. Ahmad Yani is 110 people, while on Jl. Soegiyapranata as many as 182 people.

Table 1: Utilization of Pedestrian Bridge at Ahmad Yani Street

Day

Time	Used	Unused	Total
10:00-10:15	0	3	3
10:15-10:30	2	6	8
10:30-10:45	1	5	6
10:45-11:00	0	3	3
11:00-11:15	3	4	7
11:15-11:30	4	8	12
11:30-11:45	5	11	16
Total	15	40	55
Prosentage	27.27%	72.73%	100%

Evening

Time	Used	Unused	Total
15:30-15:45	1	0	1
15:45-16:00	3	5	8
16:00-16:15	0	4	4
16:15-16:30	3	2	5
16:30-16:45	2	5	7
16:45-17:00	4	7	11
17:00-17:15	2	5	7
Total	15	28	43
Prosentage	34.89%	65.11%	100%

Nigth

Time	Used	Unused	Total
19:00-19:15	0	2	2
19:15-19:30	0	0	0
19:30-19:45	1	2	3
19:45-20:00	0	3	3
20:00-20:15	2	0	2
20:15-20:30	0	1	1
20:30-20:45	1	0	1
Total	4	8	12
Prosentage	33.33%	66.67%	100%

Table 2: Utilization of Pedestrian Bridge at Soegiyapranata Street

Day

Time	Used	Unused	Total
10:00-10:15	3	5	8
10:15-10:30	2	7	9
10:30-10:45	4	8	12
10:45-11:00	1	0	1
11:00-11:15	3	6	9
11:15-11:30	4	9	13
11:30-11:45	7	13	20
Total	24	48	72
Prosentage	33.33%	66.67%	100%

Evening

Time	Used	Unused	Total
15:30-15:45	1	3	4
15:45-16:00	0	2	2
16:00-16:15	3	3	6
16:15-16:30	4	1	5
16:30-16:45	1	5	6
16:45-17:00	3	6	9
17:00-17:15	2	4	6
Total	14	24	38
Prosentage	36.84%	63.16%	100%

Nigth

Time	Used	Unused	Total
19:00-19:15	3	2	5
19:15-19:30	5	7	12
19:30-19:45	2	5	7
19:45-20:00	0	11	11
20:00-20:15	3	8	11
20:15-20:30	3	5	8
20:30-20:45	4	14	18
Total	20	52	72
Prosentage	27.78%	72.22%	100%

The results of an analysis of the number of crossing bridge users show that the average percentage of road crossers at Soegiyapranatan street use it is only 31,83%, this means that there are 68,62% of road pedestrians not utilizing the available pedestrian bridges. If it divided into morning, afternoon, and night periods, the morning conditions are the worst were only 27,27% want to use the pedestrian bridge (table 2).

The results of an analysis of the number of crossing bridge users show that the average percentage of road crossers at Ahmad Yani street use it is only 32,65%, this means that there are 67,35% of road pedestrians

not utilizing the available crossing bridges. The night conditions are the worst was only 27,78% want to use the pedestrian bridge (table 3) because of this pedestrian bridge not facilitated by lighting at night.
The number undoubtedly of people not used in two objects is very high (above 67%), with the two streets is very wide with very high traffic, this condition is dangerous for them.

3.4. Existing of Pedestrian Bridge

The comparison of the existing conditions can describe in table 3. The high level, optride and antride of the stairs are the same, but the position of bordes, lighting and material uses different.

Table 3. The existing condition of two pedestrian bridge

No.	Component	Sugiyaprnaoto Street	Ahmad Yani Street
1	Optride of stair (high)	20 cm	20 cm
2	Antride of stair (width)	30 cm	30 cm
3	Roof high	250 cm	no
4	High of baluster	120 cm	110 cm
5	Bordes	11 optrides 11 optrides	19 optrides 6 optrides
6	High of handrail	150 cm	90 cm
7	Width of pedestrian	150 cm	170 cm
8	High of the pedestrian	560 cm	540 cm
9	Lighting	yes	no
10	Material construction	Steel (IWF)	Concrete

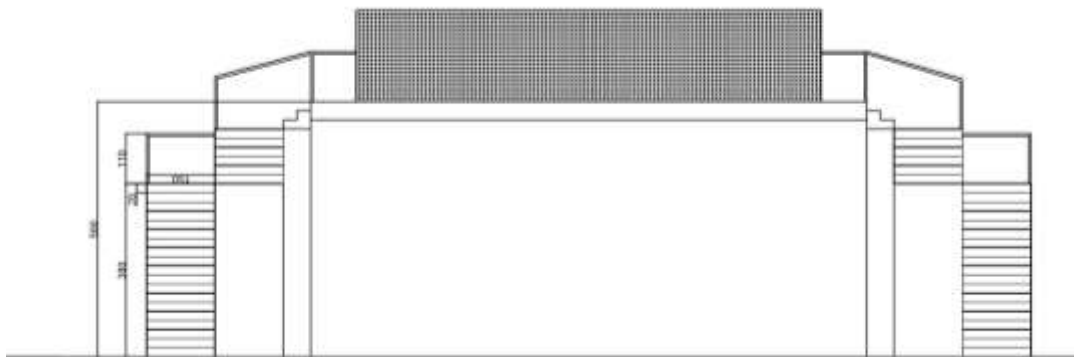The elevation condition can see in Figures 3 and 4.

Figure 3. Elevation of the pedestrian bridge at Ahmad Yani Street

Figure 4. Elevation of the pedestrian bridge at Ahmad Yani Street

3.5. Analysis of Accessibility Standard

The existing condition compared to the standard of accessibility (Permen PUPR No. 14 / 2017), the result can describe bellow (table 4 and 5):

1. The high of the stair (optride) in two pedestrian streets is too high. The existing of two optrides are 20 cm, this is too high compared with the standard in range 15 until 18 cm. It is hard stairs to go through and dangerous when going downstairs.
2. The width of the stair (antride) in two pedestrian streets is meet to standard about 30 cm. This dimension is safe enough for users.
3. The use of fences is needed to maintain and ensure safety for users. By standard, it takes a fence of at least 100 cm, the existing in Ahmad Yani street about 110 cm, and in Soegiyapranata street about 130 cm. Both pedestrian bridges fulfill the specified requirements so that both are functionally safe for the user.

Table 4: Utilization of Pedestrian Bridge at Ahmad Yani Street

Facilities	Existing	Dimention	PERMEN PUPR	Note
Optride of stairs	v	20cm	15-18cm	too high
Antride of stairs	v	30cm	Min 30 cm	meet the standards
Balustrade/fence	v	110cm	100 cm	meet the standards
Bordes 1	v	19	12 optride maks	number optride to much
Bordes 2	v	6 optride	12 optride maks	meet the standards
Handrail of stair	v	90cm	Maks 80cm	To high
Width of Pedestrian	v	170cm	Min 180	Tidak memenuhi standar

Table 5: Utilization of Pedestrian Bridge at Soegiyapranata Street

Facilities	Existing	Dimention	PERMEN PUPR	Note
Optride of stairs	v	20 cm	15-18cm	too high
Antride of stairs	v	30 cm	Min 30 cm	meet the standards
Atap	v	250 cm	-	Exist
Balustrade/fence	v	130 cm	100 cm	meet the standards
Bordes 1	v	11	12 optride maks	meet the standards
Bordes 2	v	11	12 optride maks	meet the standards
Handrail of stairs	v	120 cm	Maks 80cm	To high
Width of Pedestrian	v	150 cm	Min 180	Not meet the standards

4. The height of the landing pad (bordes) determines user comfort and youthfulness. The standard bordes must provide at a maximum of 12 steps. If the number of stairs is more than 12 and a landing does not provide as a place to rest, it will make the user tired. In Ahmad Yani street have 19 steps before the meet to bordes, so this stair is too heavy for access. On the Soegiyapranata road, the number of steps before the landing borders only 11 levels, so this still provides excellent comfort for users.
5. The hight of the handrail of stairs can increase comfort and safety. The height of a standard stair handrail is 80 cm. On Ahmad Yani street, the elevation is slightly higher than the standard which is 90 cm, but the height on the Soegiyapranata road is too much higher than the standard. This condition makes it difficult for users on the Soegiyapranata road to hold on to the available handrail.
6. Pedestrian width will determine the ease and comfort of users to be able to walk with each other and not intersect. The standard pedestrian width for two directions is at least 180 cm (Goldsmith, 2000). Referring to the existing standard, the width on Jalan Ahmad Yani is a little less full because there is only 170 cm, while on Soegiyapranata street, it is very less because there is only 150 cm. This is lacking make the users having to tilt if they have to cross paths with users in the opposite direction.

4. Conclusion and Recommendation

1. Based on the results of the study, the use of pedestrian bridges on the two objects of research can describe as follows:

- Based on research, the level of pedestrian bridge usage is still very small, about 33%, and this means that there are around 67% of users who don't want to use the pedestrian bridge. The number of people who cut directly on the road is hazardous for pedestrians and motorists.
- Percentage of road crossers at Soegiyapranatan street use it is only 31,83%, and this means that there are 68,62% of road pedestrians not utilizing the available pedestrian bridges. Percentage of road crossers at Ahmad Yani street use it is only 32,65%, and this means that there are 67,35% of road pedestrians not utilizing the available crossing bridges.

2. Based on the analysis of the level of accessibility based on PUPR Perem standard No. 14/2017 can be described as follows:
   - The high of the stair (optride) in two pedestrian streets is too high, but the width of the stair (antride) in two pedestrian streets is meet to standard about 30 cm.
   - The use of fences in both pedestrian bridges fulfills the specified requirements so that both are functionally safe for the user.
   - Pedestrian bridge in Ahmad Yani street has 19 steps before the meet to bordes, so this stair is too heavy for access, but in Soegiyapranata street, the number of steps before the landing borders only 11 steps, so this still provides excellent comfort for users.
   - The height of a standard stair handrail on Ahmad Yani Street is slightly higher than the standard, which is 90 cm, but on the Soegiyapranata road is too much higher than the standard. This condition makes it difficult for users on the Soegiyapranata road to hold on to the available handrail.
   - Referring to the existing standard, the width on Jalan Ahmad Yani is a little less because there is only 170 cm, while on Soegiyapranata street, it is very less because there is only 150 cm. This lacking width condition results in pedestrian users having to tilt if they have to cross paths with users in the opposite direction.

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