



to this, there are various obstacles in the field. These various problems are expected to be correctly identified and analyzed therefore, they can be handled priority improvements. The problem in this study is "how are the obstacles of the building accessibility on UPGRIS campus 1 to complete the rights of diffabled people?"

## 2 Methods

The methods of the research are mixing either of qualitative nor quantitative analyze. The research methodology uses a qualitative-rationalistic approach with descriptive analysis. Excavation of data through direct observation of objects that become research cases and cross interviews with related informants. Research variables include door, corridor, stairs, ramps, lift, toilet, handwashing, urinal and parking lot. The selection of buildings are(see Figure 1):

- Central Building–**GP** (*Gedung Pusat*)
- **Balairung** Building (*Balairung*)
- Main Building–**GU** (*Gedung Utama*)
- Teacher Building–**GB** (*Gedung Guru*)
- Magister and Library Building–**GPs** (*Magister & Library Building*)

## 3 Result & Discussion

The diffable is an acronym of different abilities namely, humans with different abilities. The Indonesian State of Indonesia guarantees the life of every citizen, including persons with disabilities who have the same legal and human rights positions (Indonesia, 2016). Every diffable person has the same rights and opportunities in all aspects of life and livelihood and also deserves accessibility in the context of his independence (Tarsidi, 2008). Fulfillment of convenience requirements applied universal design principles that can be used for special care. These design provisions must address various needs and insights for persons (universal design) with disabilities, children, struggles, and pregnant women (Damayanti, 2015)

### 3.1 Horizontal Space Relations

#### 3.1.1 Door

The door is part of the building or space to get in and out. The door has been analysed is the main entrance to the classroom. Based on the standard, all buildings have main doors width that meets the requirements  $>90$  cm (Indonesian, 2017) and (Sukamto & Hetyorini, 2013), see figure 2.

According to the standard, the direction of the opening of the main door of a building, it is required that the main door must be able to be opened in the direction of the exit for the sake of security, an emergency can occur (see table 1), such is:

1. In GP, the main door on the 2nd floor has fulfilled the requirements of the openings that can be opened in and out, but the west door is still inward-only. Likewise, the doors in each class and large spaces (hall on the 7<sup>th</sup> floor) are still made openings only inward.
2. In the Balairung Building, the three main doors are all made openings only inward. Visibility requirements for swing doors are not fulfilled in this building.

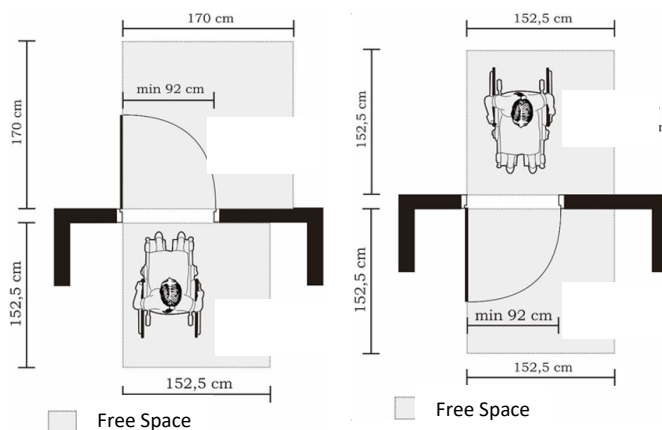


Figure 2. Door Standard  
(Minister Regulation PUPR No.14, 2017)

- In GB the direction of the door opening has not been in the direction of the exit. In the mosque room, the use of the main manual sliding door is also quite difficult during an emergency and have not a visual hole. For the doors of the classes, everything is still opening only inward.

Table 1. Evaluation of The Main Door for Diffable (Analysis, 2018)

No	Buildings	Type	Width		Free area of Outside		Direction		Visibility		
			Standard (cm)	Existing (cm)	Standard (cm)	Existing (cm)	Standard	Existing	Min (cm)	Exist (cm)	
1	Gedung Pusat (GP)										
	a. South door	Glass	>90	209	170x170	682x244	outside	In-outside	<75	0	
	b. West door	Iron	>90	155	170x170	free	outside	inside	<75	75	
	c. Door Class	Allum	>90	140	170x170	free	outside	inside	<75	10	
2	Gedung Balairung										
	a. South door	Wood	>90	169	170x170	172x104	outside	inside	<75	None	
	b. Center door	Wood	>90	217	170x170	643x231	outside	inside	<75	None	
	c. North door	Wood	>90	169	170x170	172x104	outside	inside	<75	None	
3	Gedung Guru (GB)										
	a. South door	Iron	>90	320	170x170	free	outside	sliding door	<75	4	
	b. Mosque door	Wood	>90	330	170x170	150x600	outside	inside	<75	None	
	c. North door	Iron	>90	320	170x170	600x150	outside	sliding door	<75	4	
	d. Door class	Wood	>90	150	170x170	bebasx230	outside	inside	<75	None	
4	Gedung Utama (GU)										
	Door Class	Wood	>90	162	170x170	free x287	outside	inside	<75	100	
5	Pasca Sarjana & Perpustakaan										
	a. 1 <sup>st</sup> south door	Glass	>90	160	170x170	245x213	outside	In-out	<75	0	
	b. 2 <sup>nd</sup> south door	Glass	>90	200	170x170	208x215	outside	In-out	<75	0	
	c. East door	Glass	>90	208	170x170	208x190	outside	In-out	<75	0	
	d. Door class	Glass	>90	160	170x170	freex235	outside	inside	<75	10	

- In GU, all the class door width requirements, but all openings are still inward, the glass hole on the door is also available, but the height is higher than 75 cm (see figure 3).
- At the main door in the GPs has the appropriate width and direction of openings that can be opened both inward and outward, but for the classrooms, they still have the inward-only doors. All doors are made with the glass material, so visually-wise, it's pretty decent.

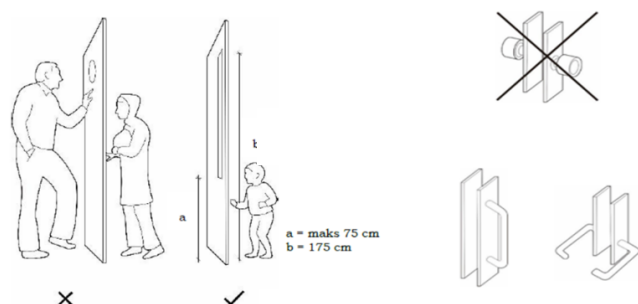


Figure 3 The Standard visibility & handle of Door (Minister Regulation PUPR No.14, 2017)

In accordance with the use of doors for persons with disabilities, the minimum width of the door is 80 cm, therefore wheelchair users can use it. For wheelchair users, there must be free maneuvering in front and back of the door in a 152x152 cm wide room. Furthermore, the shape of the handle is friendly for people

with disabilities and the height of the visual hole should not be more than 75 cm. The results of the study show the various conditions of each building as follows (see table 2):

1. In all buildings, none of lavatory have wide door openings > 80 cm, this has resulted in wheelchair users currently unable to use.
2. From the requirements for the provision of free space in front of the lavatory door, then in all buildings do not have free space to rotate their seats.
3. Requirements for providing visual holes for lavatory doors, only those in the GP and GPs already complied to these conditions.

Table 2. Evaluation of the Lavatory Door for Diffable (Analysis, 2018)

No	Building Name	Width of Door		Free Space		Shape of Handle		Glass in Swing Door	
		Standard (cm)	Exiting (cm)	Standard (cm)	Exiting (cm)	Standard	Existing	Standard (cm)	Exiting (cm)
1	GP	90	68	152x152	123xfree	Easy	difficult	75	73
2	Balairung	90	79	152x152	100x111	Easy	difficult	75	None
3	GB	90	70	152x152	119x177	Easy	difficult	75	164
4	GU	90	75	152x152	83x150	Easy	difficult	75	169
5	GPs	90	68	152x152	115x60	Easy	difficult	75	10

### 3.1.2 Verandah

Verandah is a circulation path outside the building which is not limited by walls or limited to at most 1 (one) side of the wall. For the requirements of the verandah associated with the user of disability, it is required to have enough width dimensions for the circulation of wheelchair users and types of surfaces that are not slippery because of the possibility that this corridor can get exposed to rainwater, therefore it can get wet and slippery, (Indonesian, 2017).

There are several buildings that accommodate the verandah, they are in Balairung, GU and GPs. The minimum width of the hallway has been fulfilled for all of these companies, but the type of floor in GU and GPs is still using a slippery floor (see figure 4 and table 3).



Figure 4. Standard of Verandah  
(Minister Regulation PUPR No.14. 2017)

Table 3. Evaluation of the Breezeway for Diffable  
(Analysis, 2018)

No	Building Name	Breezeway 2 way (main)		Floor Materials	
		Standard (cm)	Exiting (cm)	Standard	Existing
1	GP	140	-	not slippery	None
2	Balairung	140	283	not slippery	None
3	GB	140	-	not slippery	None
4	GU	140	287	not slippery	slippery
5	GPs	140	167	not slippery	slippery

### 3.1.3 Corridor

Corridor is a circulation path inside or outside of a building which is limited by 2 (two) sides of the wall. The requirements for the corridor are mainly focused in its dimension. Another requirement is the presence

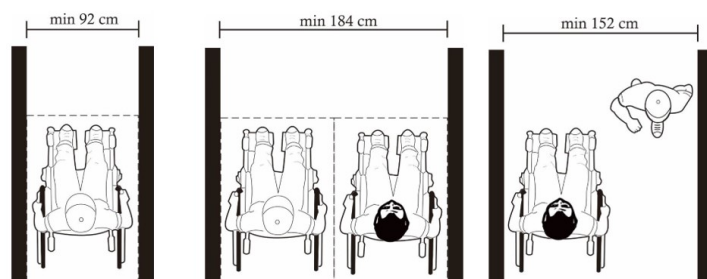


Figure 5. Standard of Corridor  
(Minister Regulation PUPR No.14, 2017)

of interference that can reduce and interfere with circulation in the dusty corridor, therefore the chair user cannot use it (see figure 5). Of the five buildings that have been researched, GU is one of the buildings that have no corridors. It only has a hallway. The GP, Balairung, GB and GPs are having a 2-way corridor that has dimensions of more than 184 cm, therefore wheelchair users can easily and independently use (see table 5). Especially for GPs, there are many chairs in the corridor, thus reducing the width of the corridor width, it is not enough to circulate wheelchair users in two directions.

Table 5. Evaluation the width of Corridor for Diffable (Analysis, 2018)

No	Building Name	Corridor 2 way (main)		Corridor 1 way (secondary)		Interrupted by Circulation	
		Standard (cm)	Existing (cm)	Standard (cm)	Existing (cm)	Standard	Standard (cm)
1	GP	184	786	94	None	None	None
2	Balairung	184	235	94	None	None	None
3	GB	184	210	94	None	None	None
4	GU	184	None	94	None	None	None
5	GPs	184	235	94	None	None	Chairs

### 3.2 Vertical relationship between floors

#### 3.2.1 Stairs

Stairs is a manual vertical transportation for pedestrians that is designed by considering the slope, footing size, and height of the stairs that are suitable, therefore it is comfortable and safe to use by all users, (Indonesian, 2017). Stair requirements are in the dimensions of height and width of stairs, handrail height and safe stair-shape for blind people and other users. Stair dimensions are required to be a maximum of 18 cm, this requirement has been met for all stairs in GP. Likewise, the width of the stairs, is also been more than 30 cm. From the aspect of providing handrail, everything is available, except in the main staircase in front.

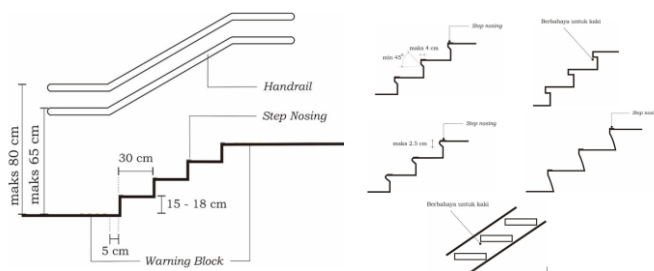


Figure 6. Standard of Stairs  
 (Minister Regulation PUPR No.14, 2017)

Likewise, the width of the stairs, is also been more than 30 cm. From the aspect of providing handrail, everything is available, except in the main staircase in front.

In Balairung, all the stairs have dimensions of more than 18 cm, even on the main staircase in the middle has a dimension of 20-21 cm, this is certainly very difficult for people with visual impairments, and becomes very heavy for normal users. This extreme dimension is very dangerous when going downstairs because it has a very steep slope angle, especially if someone has to use it during an emergency. Stair width dimensions have been fulfilled, except for the main stairs where the dimensions are only 28-29 cm, this is certainly very dangerous for even normal users, because it makes the angle even steeper. As seen for the shape of the stairs, it is safe enough, although there is a slight slope on the steps, this slope will certainly reduce the dimensions of the stair width when used when going downstairs.

The dimension height of GB stairs on the side doors are more than 18 cm, except for the middle steps to enter the mosque. This will certainly be a big hassle for normal users, as well as making it difficult for people with disabilities (blind people and crutch users). The height of the stairs will be relieved for the user, only this stair can use to access all floor (5th floor



without elevator). The dimensions of the stairs also have not met the requirements and dimensions of less than 30 cm. The handrail is all available, but the height is still too high all above 80 cm. The shape of the stairs is relatively safe with a slight slope, but if it is associated with a less width dimension, then at the time of descending it will certainly be more space for the foot. For the GU Building, it has excessive stair height that makes the users get tired quickly. For the width dimension, it meets the requirements. The provision of hand towels is available, but the height still exceeds 80 cm. the shape of the stairs is safe, where the stairs are vertical upright. For stairs in GPs on the south staircase and stairs in the GPs are more than the standard. The height of the handrail on all stairs is also too high, more than 80 cm, while the shape of the steps is quite safe considering the width of the steps is more than 30 cm, not on the east staircase.

Table 6. Evaluation of Stairs for Diffable (Analysis, 2018)

No	Building Name	Width (cm)	Antrade		Optrode		Height of Handrail		Shape of Antrade	
			Standard (cm)	Exist (cm)	Standard (cm)	Exist (cm)	Stand ar d (cm)	Exist (cm)	Standar d	Standard (cm)
1	GP									
a	Main Stair	682	15-18	18	...>30	31	65-80	None	Save	Save
b	East Stairs	162	15-18	18	...>30	34	65-80	87-96	Save	Save
c	West Stairs	200	15-18	18	...>30	30	65-80	100	Save	Save
2	Balairung									
a	South Stairs	175	15-18	19	...>30	33	65-80	110	Save	Save
b	Center Stairs	310	15-18	20-21	...>30	28-29	65-80	95	Save	Dangerous
c	North Stairs	175	15-18	19	...>30	33	65-80	110	Save	Save
3	GB									
a	South Stairs	165	15-18	19	...>30	29	65-80	109	Save	Save
b	Mosque Stairs	370	15-18	17	...>30	28,5	65-80	84	Save	Save
c	North Stairs	165	15-18	19	...>30	29	65-80	109	Save	Save
4	GU									
a	Front Stairs	118	15-18	20,5	...>30	30	65-80	118	Save	Save
b	Back Stairs	175	15-18	20	...>30	31	65-80	111	Save	Save
5	GPs									
a	1 <sup>st</sup> South Stairs	139	15-18	20	...>30	30,5	65-80	91	Save	Save
b	2 <sup>nd</sup> South Stairs	140	15-18	15	...>30	30	65-80	94	Save	Dangerous
c	East Stairs	208	15-18	17	...>30	29	65-80	84	Save	Save
e	1 <sup>st</sup> East Stairs	142	15-18	19	...>30	30	65-80	91	Save	Save
E	2 <sup>nd</sup> East Stairs	140	15-18	18	...>30	30	65-80	90	Save	Save

### 3.2.2 Ramp

The use of the ramp for the pedestrian is practically non-existent for all buildings, therefore every difference in floor height will be a major obstacle for wheelchair users (Indonesian, 2017).

In GP, it is necessary to have a ramp at the main entrance from the west, because the floor difference is around 30 cm. Problems in Balairung are also similar, where the ramp is also provided for motorized vehicles with very high slopes. Access for persons with disabilities makes it impossible to enter the main floor (3rd floor) from any entrance.

In GU building, the ramp is not available for access from the road to the ground floor of the building, it requires the addition of a ramp in this building, therefore users with disabilities can access the elevator and move to all floors. For GPs there is already a ramp outside with a gentle slope, so wheelchair users can access the elevator for distribution to all rooms in the GPs. The library building does not have the ramp, so wheelchair users cannot access the main floor (2nd floor).

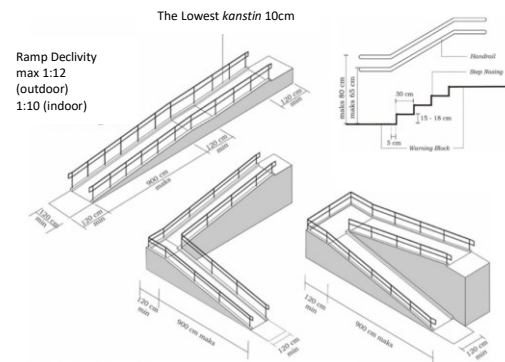


Figure 7. Standard of Ramp  
(Minister Regulation PUPR No.14, 2017)

Table 7. Evaluation of the Ramp for Diffable  
(Analysis, 2018)

No	Building Name	Function	Length	Height	Slope		Width		Height of Handrail	
					Standard (°)	Existing (°)	Standard (cm)	Existing (cm)	Standard (cm)	Existing (cm)
1	GP									
	Ramp for car	Car	1870	350	<20		95-120	407	65-80	100
	Ramp for bicycle	Motorcycle	921	280	<20		95-120	126	65-80	81
	Ramp for Pedestrian	People	None	None	3	None	95-120	None	65-80	None
2	Balairung									
	Ramp for car (front)	Mobil	19	4,02	<20	12,9	95-120	332	65-80	83
	Ramp for car (back)	Car/Motorcycle	2000	350	<20	None	95-120	400	65-80	12
	Ramp for Pedestrian	People	None	None	3	None	95-120	None	65-80	None
3	GB	People	None	None	5	None	95-120	None	65-80	None
4	GU	People	None	None	5	None	95-120	None	65-80	None
5	GPs	People	220	50	5	None	95-120	None	65-80	None

### 3.2.3 Lift

Lift is an electrical mechanical device to assist in the vertical plane movement inside the building. The provision of elevators is used to access vertical transportation with easily and effectively. Problems regarding these lifts are found in the GP building because the lift only works from floors 2-7, so to access the building from the 1<sup>st</sup> floor must go up the stairs. For the Balairung building that only consists 3 floors, it is not required to have an elevator, but the current condition there is a big obstacle for wheelchair users to be able to access the main floor.

Table 8. Evaluation Elevator for Diffable (Analysis, 2018)

No	Building Name	The dimension of Car Lift		Number of Floor Services		Width of Door		Floor Services	
		Length	Width	Standard (Floor)	Existing (floor)	Standard (cm)	Existing (cm)	Length	Width
1	GP	160	150	>5	7	.....>110	90	All	2-7
2	Balairung	None	None	>5	None	.....>110	None	All	None
3	GB	None	None	>5	None	.....>110	x	All	None
4	GU	160	150	>5	6	.....>110	90	All	1-6
5	GPs	160	150	>5	5	.....>110	90	All	1-5

GB is a 5-story building with all its regular functions, the height of stairs and limited width of stairs making access to the upper floors very tiring. An alternative to adding a lift is needed for this building because its function can be extended to the PKM building. For elevators at GU, it is quite ideal with service to all floors. The problems are in the library building which is directly connected to the GPs, even though the two building have been connected directly, but it turns out that all the height of the main hall is not the same, it even has a level difference of around 150 cm.

### 3.3 Requirements of completeness of the facilities and infrastructure

#### 3.3.1 Toilet

From the results of the study, the availability of toilets in all buildings was not planned for diffabled people. The use of closed seatings is still not available, except in the Balairung Building and GU. The dimensions of the toilet room are all still not sufficient for the use of wheelchair users, so it requires careful designing because it requires some changes to the layout of the bathroom space.

Table 9 Evaluation of Toilets for Difabled (Analysis, 2018)

No	Building Name	Type of Toilet		Width of Cubical		Door Closer		Kick Door Plate	
		Standard	Existing	Standard (cm)	Existing (cm)	Standard	Existing (cm)	Standard	Standard
1	GP	Sitting	Squat	152,5x227,5	126x158	Exist	None	Exist	None
2	Balairung	Sitting	Sitting	152,5x227,5	103x134	Exist	None	Exist	None
3	GB	Sitting	Squat	152,5x227,5	119x125	Exist	None	Exist	None
4	GU	Sitting	Squat	152,5x227,5	165x240	Exist	None	Exist	None
a	GPs	Sitting	Squat	152,5x227,5	186x190	Exist	None	Exist	None

#### 3.3.2 Handwashing

The provision of new handwashing facilities is available in GPs and Balairung, but for GP wheelchair users can use it because of the design of a hand sink that has not allowed the foot to come under the sink, and the dimensions of space are very limited. For handwashing in the Balairung has been qualified to be used by wheelchair users.

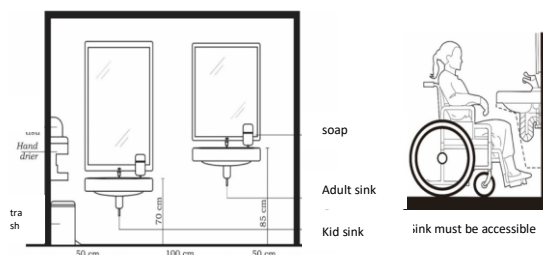


Figure 8. Standard of Handwashing (Minister Regulation PUPR No.14, 2017)

Table 10. Evaluation of Handwashing Function for Diffable

No	Building Name	Width		Height		Deployment of wheelchair users		Handrail		Circulation dan Free Area	
		Standard (cm)	Existing (cm)	Standard (cm)	Existing (cm)	Standard	Existing	Standard (cm)	Standard (cm)	Existing (cm)	Standard (cm)
1	GP	..>60	97	75	92	Exist	Can't	Exist	None	120	140
2	Balairung	..>60	99	75	80	Exist	Can	Exist	None	120	88
3	GB	..>60	None	75	None	Exist	None	Exist	None	120	None
4	GU	..>60	None	75	None	Exist	None	Exist	None	120	None
5	GPs	..>60	None	75	None	Exist	None	Exist	None	120	None



### 3.3.3 Urinal

The provision of new urinal facilities available for GP, Balairung, and GB. The height of the urinal has met the standard, but all of them have no boundary chamber (except GB). For the needs of people with disabilities, all of those above have not provided handrail.

Table 11. Evaluation the Urinal for Difabled

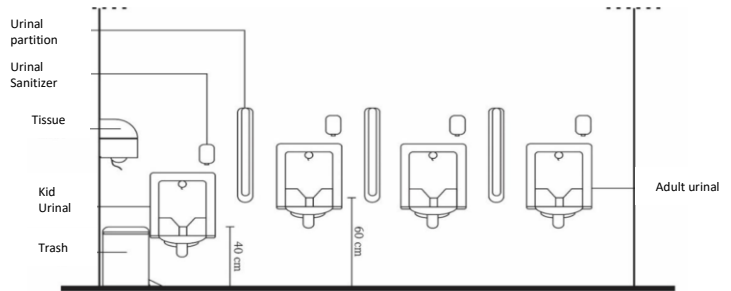


Figure 9. Standard of Urinal  
(Minister Regulation PUPR No.14, 2017)

No	Building Name	Existed of Partition	Width		Height		Full Height of Urinal		Handrail	
			Standard (cm)	Existing (cm)	Standard (cm)	Existing (cm)	Standard	Existing	Standard	Existing (cm)
1	GP	x	>60	84	60	60	Exist	None	Exist	None
2	Balairung	x	>60	89	60	45	Exist	None	Exist	None
3	GB	Exist	>60	67	60	52	Exist	None	Exist	None
4	GU	x	>60	None	60	None	Exist	None	Exist	None
5	GPs	x	>60	None	60	None	Exist	None	Exist	None

### 3.3.4 Parking lot

The building is determined for the termination of vehicles within a certain period of time in the form of a parking lot, parking in a building. The results of research on the existence of this parking lot are as follows: For all buildings, none of them provides special facilities for persons with disabilities, it will make it difficult for visitors to have the facilities that bring the car to go down or ride easily (Indonesian, 2017).

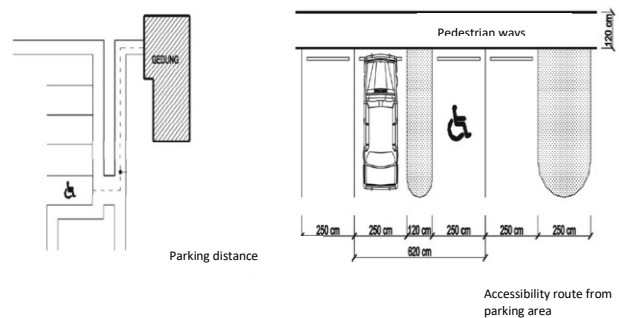


Figure 10. The standard of Parking Lots  
(Minister Regulation PUPR No.14, 2017)

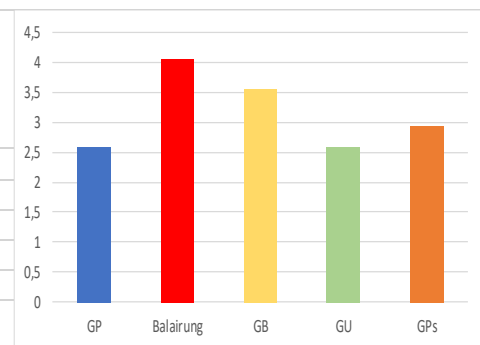
### 3.3.5 Comparison between Buildings

From all result of the analysis, we can compare from each building as see below:

Table 12. Compare of constraint between Buildings

NO	Building	Main Door	Lavatory Door	Breeze way	Corridor	Stairs	Ramp	Lift	Toilet	Handwashinh	Urinal	Parking Lot	Summary of obstacle	Score	Ranking
		15%	15%	5%	5%	5%	10%	20%	10%	5%	5%	5%			
1	GP	2	3	0	0	3	4	2	4	4	2	4	28	2,60	IV
2	Balairung	8	4	0	0	8	5	3	3	3	2	4	40	4,05	I
3	GB	6	4	0	0	8	3	2	4	5	2	4	38	3,55	II
4	GU	2	4	1	0	4	3	1	3	5	4	4	31	2,60	IV
5	GPs	1	3	1	1	10	3	2	4	5	4	4	38	2,95	III

Figure 11. Rank of priority to retrofit



#### 4. Conclusion and Suggestion

##### Conclusion:

1. The biggest problem with accessibility is Balairung Building with 4,05 points, the second score is GB with 3,55 points, the third score is GPs with 2,95 points.
2. In GP, the wheelchair users cannot access public spaces because the elevator is not available to be accessed from the ground floor. Accessibility problems also occur in the GB and Balairung Building which does not have an elevator.
3. Provision of toilets for persons with disabilities is not yet available in all existing buildings. The main obstacle is the insufficient dimensions of the toilet space and the door width are less than 80 cm. The provision of a hand sink is appropriate for the Balairung Building, but for GP it has not met the standards. This facility is not yet available in other buildings.
4. Dimensional conditions of the antrade and otrade of stairs in almost all buildings are very limited so that in addition to being difficult and defeating to go through, it is also very dangerous to go down the stairs, especially in emergency situations. The most dangerous condition is on the main staircase of the Balairung building.
5. The direction of the opening of the main doors and classes are all still made with the direction of opening inward-only (except the main door in the GP and GPs), this is very dangerous when an emergency occurs.

##### Suggestion:

1. Addition of elevators for Balairung and GB to be accessible to all users, including the diffabled people.
2. Need designing in the provision of special toilets for diffabled people in all building.
3. Need to add hand-washing facilities that can be used easily by the diffabled people, except in the Balairung which is already available well.
4. Repair of stair dimensions, especially in the main door of the Balairung to make it more secure and comfortable.
5. Change the direction of the opening the main doors to the outside for all building.

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