Analysis of The Appropriateness of Barrier Free Design Implementation Towards The Easiness of Earthquake Evacuation Process For People With Disabilities in Palu Grand Mall

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***ABSTRACT**: As the biggest shopping centre in Central Sulawesi and is the only mall left in Palu in 2020 when this research was held, Palu Grand Mall (PGM) holds many important roles and one of it is making sure the social interactions in it stay safe. This even becomes a bigger urgency considering the terrible geographical location of Palu where it lies on top of the active fault that was estimated to move up to 44 mm per year and has a cycle of a massive earthquake per 50 years. It means, the earthquake threat to PGM is a very important thing to be watched out for. This research glances up the level of safety of PGM by focusing on the evacuation process during the earthquake since the people with disabilities find it harder to evacuate theirselves during the disaster. The level of safety refers to the Barrier Free Design implementation with the Regulation of Ministry of Public Works and Public Housing Number: 30/PRT/M/2006 about Technical Facilities and Accessibilities in a Building and Environment as the main standard reference. Researcher also referred to several related scientific papers in formulating the research variables which are the availability and appropriateness of basic space dimension, door, ramp, and signage in PGM. This research aims to be a valid reference for the future development and in creating safety public spaces towards the threat of earthquake specially for people with disabilities in Palu.*

Keyword: Barrier Free Design, People With Disabilities, Earthquake, Mall, Closed Public Space.

BACKGROUND

Background of Function

Public space is a space and vessel where people interact to one and another. This is because this type of spaces are able to be accessed by everyone. Public space is also known as the central of many vessels for human to interact and socialize in a city. There are more than one type of public space depends on the shapes and its functions. However, this paper focused the research object into a type of public space which is categorized as closed public space, known as Palu Grand Mall (PGM), located in the City of Palu, Central Sulawesi. PGM construction project was started in 2012 and is inaugurated in the 2014. As the biggest and the only mall in Palu in 2020, PGM became a vessel for a at least 50 tenants per floor and even more. This made PGM not only is one of the biggest centre of social interaction in Palu, but also the biggest shopping centre in Central Sulawesi.

Background of Location

Palu City is the capital of Central Sulawesi. According to *Palu Municipality in Figures 2019* by Statistics Indonesia, the city is populated by 385.619 people. On the other hand, this large number of population live on top of a serious threat by geographically located on top of the worst position of *Ring of Fire*. The city is divided into two by an active fault named Palu Koro, the second fault with the biggest movement per year in Indonesia. This fault was also the cause of the famous national disaster back in 2018 in Central Sulawesi. The threat of this active fault forced local people to adapt to the current situation. The adaptation phase can be started by learning the proper procedures of evacuating people from a building when earthquake happens, and providing facilities which will ease the process.

Background of Problem

When earthquake happens, generally there is an interval until the building totally collapses. This interval is supposed to be used for the users of the building to evacuate theirselves by immediately getting out of the building. This made a building needs to be equipped by proper accessibility design in order to avoid obstructed people and everyone to be totally outside of the building before it collapses.

However, there are conditions that needs to be watched out for, those are people with disabilities. People with disabilities specially those with movement problems, basically will find it harder to evacuate theirselves compared to normal people. These conditions necessitated a building to apply the *Barrier Free Design* concept in its design concept.

Barrier Free Design is a term which explains a movement of relieving boundaries due to the easiness of people with disabilities accessibilities. The terms was first known in the early 1950s by referred to the standards of *Americans with Disabilities Act* (ADA).

The use of *Barrier Free Design* generally aims to ease people with disabilities in using every facilities in a building just like the normal users. In Republic of Indonesia, the obligation of any architectural design in applying or implementing this concept was regulated in Regulation of Ministry of Public Works and Public Housing Number : 30/PRT/M/2006 about Technical Facilities and Accessibilities in a Building and Environment. In that regulation, Chapter I, Part One, Article 1, point 2 explained :

"*Facilities are all or part of the completeness of the infrastructures and facilities in a building and its environment so that it can be accessed and utilized by everyone, including people with disabilities and the elderly.*"

The Regulation of Ministry of Public Works and Public Housing where is known in Indonesian as *Peraturan Menteri Pekerjaan Umum* (*PerMen PU*) above formulated the standardization of facilities and accessibilities in a building into 16 variables which are mentioned in Chapter II, Part Two, Article 4, point 1 :

Basic space dimension; Pedestrian pathway; Guide path; Parking area; Door; Ramp; Stairs; Lift; Stairway lift; Toilet; Douche; Sink; Telephone; Control equipment; Furniture; Signage.

In the scientific paper which was entitled with *Experience of people with physical disability: Mobility needs during earthquakes*, (Pakjouei, 2018) interviewed several people with disabilities who have experienced the evacuation process during the earthquake. The interview involved 18 participants with different type of experiences. For instance, the interviewee number 14 with research code P14, a woman who suffers from Paraplegia explained that she found it hard to run out of the house during the earthquake. Another interviewee with research code P7, a 40 years old man who also suffers from the same disease, mentioned that he could not escape from his house due to the exisitence of a stair which means he needed to be carried by a person from his family to get out from the house.

The research above by (Pakjouei, 2018) is a reference for the researcher in formulating the research variables by pursing the variables in PerMen PU into several points which only focusing in mobility and evacuation accessibility of people with disabilities during the earthquake. The points are :

Basic space dimension; Door; Ramp; Signage.

This paper aims to analyze the availability and appropriateness of the 4 variables above as a part of Barrier Free Design application and implementation due to the easiness of evacuation process of people with disabilities during the earthquake in the building of PGM.

RESEARCH METHOD

Research Framework

Researcher did a literature studies first about the urgency of impelenting Barrier Free Design concept towards the evacuation process during the earthquake from several source of books and scientific papers and journals. Next step was try to fnd the local regulations that regulated the implementation of Barrier Free Design where in this case refers to Regulation of Ministry of Public Works and Public Housing Number : 30/PRT/M/2006 about Technical Facilities and Accessibilities in a Building and Environment. After that researcher determined the variables which later became the main unit to be analyzed.

Location and Time

The research location was in the building of PGM in Diponegoro St., Lere, Sub-district of Palu Bar., Palu City, Central Sulawesi 94221. The research started in June 2020 until it finished.

Unit of Analysis

The research objects are 4 variables (basic space dimension, door, ramp, signage) in eeach floor in PGM which will be compared to the standards from PerMen PU to find out the availability and the appropriateness of the facilities in a form of Barrier Free Design implementation.

Technique To Collect the Data

Data Type

The type of the used datas in this research is primary data where the informations are directly sourced from a survey by the researcher in PGM. The collected data towards the objects in PGM then be analyzed by using the benchmarks before it is finally concluded as a result.

Data Source

Datas are obtained by a direct survey by firstly went through a literature studies to ensure the quality of a valid data and are able to be accounted for.

Data Collection Technique

Data collection process was started by a direct observation in PGM. After that for each floor, researcher tried to find the availability of each variable, if the variable exists, then the research continues to analyze the variable by referring to the standard above by PerMen PU to find out whether it fulfils the criterias or not. This phase will be repeated on each floor in PGM.

For the basic space dimension variable, the spaces which were used as research objects by code S.(number) are samples as the representatives for the same size spaces.

Data Analyzing Technique

The analyzing technique that is used by the researcher is descriptive analysis. Descriptive analysis is a statistic which has function to describe or give a picture towards an object which is researched from a data sample or population as it is, without doing additional analysis and creating a conclusion that will be prevailed generally (Sugiyono, 2013: 29)

Literature Review of Theoritical Framework For The Problem Research Basics

Table 1 Literature Review of Theoritical Framework For The Problem Research Basics

Indicator	Parameter	Variable	Benchmark
Appropriateness	• Lower Ground Floor • Ground Floor • 1st Floor • 2nd Floor	Basic space dimension	• Main access width (Minimum width of 95 cm for crutch users and 160 for wheelchair) • Floor to ceiling height • Turning space width for wheelchair (Minimum width is 215 cm for the access)
		Door	• Door leaf width (Good door width is 90 cm) • floor level differences in both sides of the door • Kick plate availability
		Ramp	• Ramp slope (Maximum slope is 7 degrees for indoor and 6 degrees for outdoor) • Ramp height to slope ratio (Good ratio is 1 : 8 for indoor and 1 : 10 for outdoor) • Minimum width of ramp (120 cm) • Bordes availability • Safety sides width (120 cm) • Handrail height (65 – 80 cm) • Lighting availability
		Signage	• Braile characters availability • Embossed logo availability • Contrast level between the background of the signage and the symbol or logo • Width and height of characters ratio (Ratio between height and width of the characters is 3 : 5 and 1 : 1 and

Indicator	Parameter	Variable	Benchmark
			thickness is 1 : 5 and 1 : 10)
Availability			• Available • Unavailable

Source : Researcher

RESEARCH FINDINGS AND ANALYSIS

Lower Ground Floor (First Level Floor)

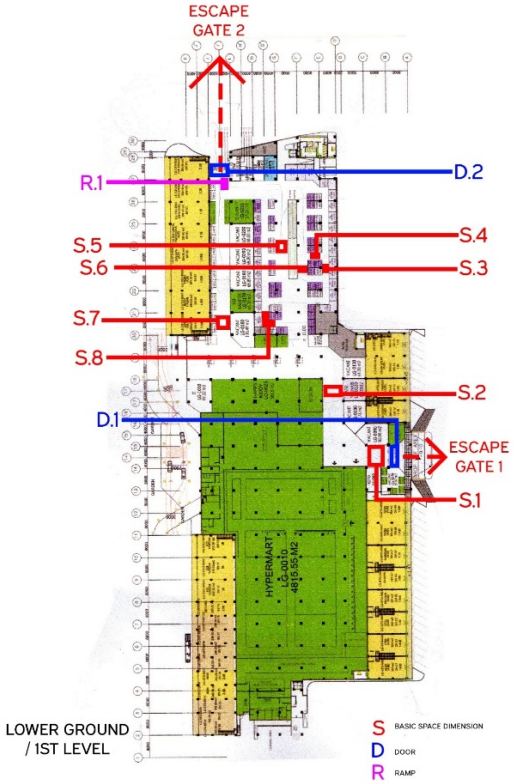

Figure 1 Lower Ground of PGM
Source : Management of PGM

a) Basic space dimension

- Availability : Available
- Appropriateness :

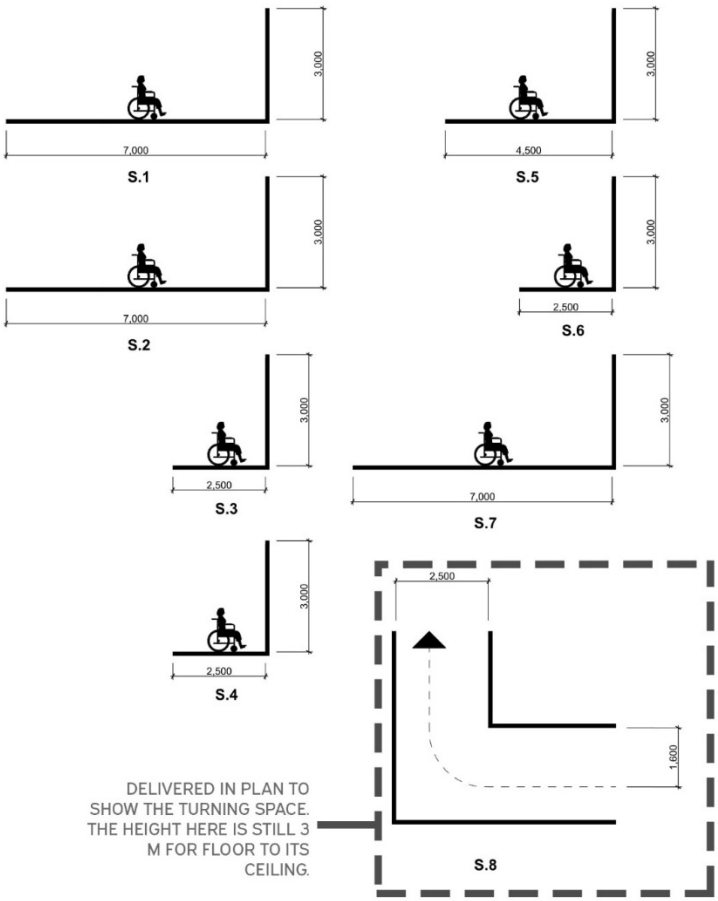

Figure 2 Basic Space Dimension For Lower Ground
Source : Researcher Measurement in PGM

b) Door

- Availability : Available
- Appropriateness :
  1. D.1
     - Door leaf width : 90 cm
     - Floor level differences
     - in both sides of the door : No differences
     - Kick plate availability : Unavailable
  2. D.2
     - Door leaf width : 90 cm
     - Floor level differences
     - in both sides of the door : No differences
     - Kick plate availability : Unavailable

The doors in PGM do not fulfil the standards yet. Even with the proper floor level, as can be seen that no kick plate there, which will complicate the users with crutch or wheelchair.

c) Ramp

- Availability : Available
- Appropriateness :

1. R.1
    - Ramp slope : 8°
    - Ramp height to slope ratio : 1 : 6
    - Minimum width of ramp : 2 m
    - Bordes availability : Unavailable
    - Safety sides width : Unavailable
    - Handrail height : Unavailable
    - Lighting availability : Available

The ramp in PGM does not fulfil the standards. As mentioned before, maximum slope for indoor ramps is 7° where PGM has 8°. Even more, there is only one ramp there with no bordes, safety sides, and even handrail. The facility here can be categorized as poor design.

d) Signage

- Availability : Unavailable
- Appropriateness : -

Ground Floor (Second Level Floor)

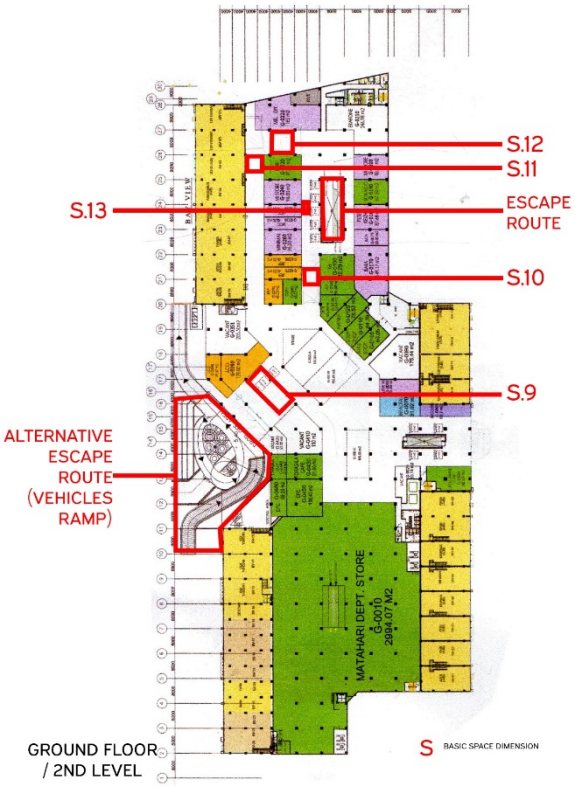

Figure 3 Ground Floor of PGM
Source : Management of PGM

The weakness of the design here can already be seen where the escape route is bad. There are no special elevators, or even ramps. The only way for people to exit the building is by using the (ESCAPE ROUTE) which is a set of travelators. Another alternative exit route is by passing through the vehicles ramp. However, if people with disabilities are about to use the vehicles ramp, they will need the help of normal people.

a) Basic space dimension

- Availability : Available
- Appropriateness :

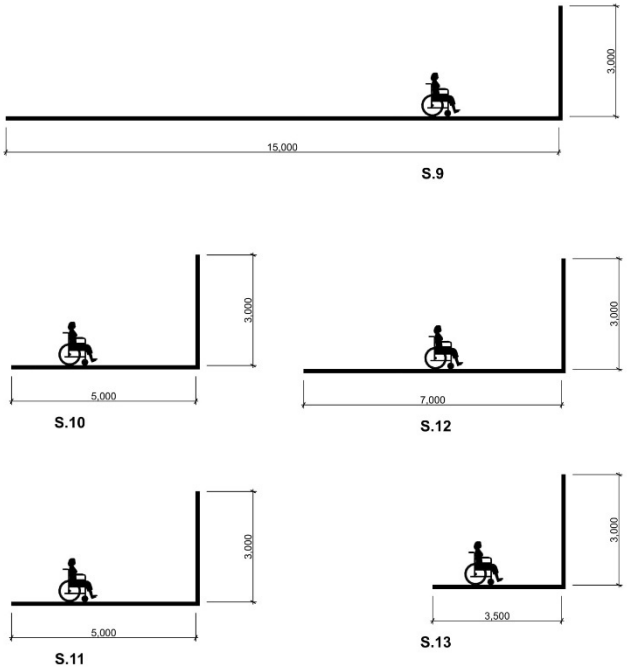

Figure 4 Basic Space Dimension For Ground Floor
Source : Researcher Measurement in PGM

b) Door

- Availability : Unavailable
- Appropriateness : -

c) Ramp

- Availability : Unavailable
- Appropriateness : -

d) Signage

- Availability : Unavailable
- Appropriateness : -

First Floor (Third Level Floor)

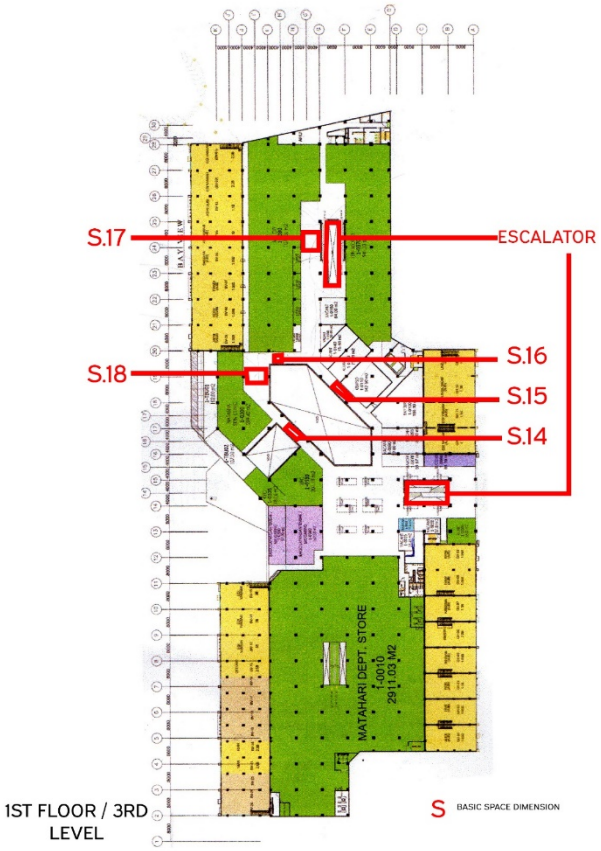

Figure 5 First Floor of PGM
Source : Management of PGM

a) Basic space dimension

- Availability : Available
- Appropriateness :

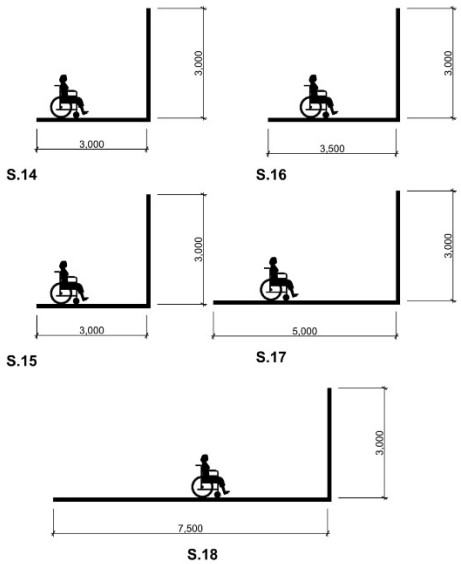

Figure 6 Basic Space Dimension For First Floor
Source : Researcher Measurement in PGM

b) Door

- Availability : Unavailable
- Appropriateness : -

c) Ramp

- Availability : Unavailable
- Appropriateness : -

d) Signage

- Availability : Unavailable
- Appropriateness : -

Rooftop (Fourth Level Floor)

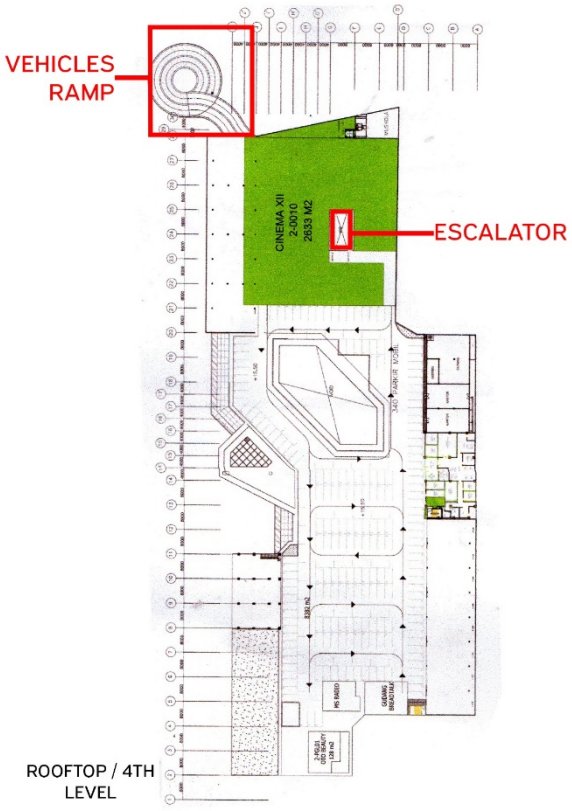

Figure 5 First Floor of PGM
Source : Management of PGM

The rooftop is mostly a parking area. Another part of it is for cinema of XXI. Therefore the calculation of space dimension here was not done. However, if the people from the cinema wants to evacuate, it is recommended to go through the normal escalator since the vehicle ramp here is spiral and it will only make the situation more dangerous. Unfortunately there are no recommended escape route for people with disabilities here.

a) Basic space dimension

- Availability : Available
- Appropriateness : -

b) Door

- Availability : Unavailable
- Appropriateness : -

c) Ramp

- Availability : Unavailable
- Appropriateness : -

d) Signage

- Availability : Unavailable
- Appropriateness : -

CONCLUSION AND RECOMMENDATION

Conclusion

Palu Grand Mall (PGM) as how the findings show, does not yet provided a good facilities for people with disabilities. The poor availability of ramp and even there are no signage for evacuation during the earthquake, will absolutely be obstacles for everyone.

However, despite of its weaknesses, as can be seen PGM provided a good design for the basic space dimension. The mobility inside will be absolutely comfortable, at least on each floor.

But again, the purpose of this research paper is to find out the appropriateness of every facilities needed for people with disabilities to evacuate their selves during the earthquake. On the other hand, it is clear that PGM failed to apply a proper concept of Barrier Free Design and to fulfil the standards given by Ministry of Public Works and Public Housing.

Recommendation

First, researcher suggests the management or everyone who are in charge of doing the development of PGM to provide signage of evacuation route. This thing might be little but the existence is really important.

Second, as PGM does not have a big space for ramps, it is better for the developer to provide special elevators for people with disabilities during the earthquake. The standards were not included on this research paper but it is recommended to replace the ramps.

Third, the proper evacuation route. As can be seen on each floor, PGM does not have a strategic evacuation route specially to face the possibilities of earthquake.

REFERENCE

(n.d.). Retrieved from https://media.lanecc.edu/users/howardc/PTA103/103UniDesign2/103UniDesign25.html

10 Benefits of Creating Good Public Spaces. (2009, January 1). Retrieved from PROJECT FOR PUBLIC SPACES: https://www.pps.org/article/10benefits

Bustan, M. T. (2014, May 2). *Pusat Perbelanjaan Terbesar di Sulawesi Tengah Beroperasi*. Retrieved from Liputan6 : https://www.liputan6.com/bisnis/read/2044794/pusat-perbelanjaan-terbesar-di-sulawesi-tengah-beroperasi

Carmona, M. (2008). *Public Space: The Management Dimension.* Routledge.

Council, S. C. (2008). *BARRIER-FREE DESIGN GUIDE.* Alberta: Government of Alberta.

Encyclopedia.com. (n.d.). Retrieved from https://www.encyclopedia.com/education/dictionaries-thesauruses-pictures-and-press-releases/barrier-free

Firmansyah, T. (2018, October 4). *Sesar Palu-Koro Belah Sulawesi Jadi Dua*. Retrieved from Republika.co.id: https://republika.co.id/berita/nasional/news-analysis/18/10/04/pg2s8x377-sesar-palukoro-belah-sulawesi-jadi-dua

Indonesia, K. P. (2006). *PERATURAN MENTERI PEKERJAAN UMUM NOMOR : 30/PRT/M/2006 TENTANG PEDOMAN TEKNIS FASILITAS DAN AKSESIBILITAS PADA BANGUNAN GEDUNG DAN LINGKUNGAN.*

Pakjouei, S. (2018). Experience of people with physical disability: Mobility needs during earthquakes. *Journal of education and health promotion*.

Saferspaces. (n.d.). *Public spaces: More than 'just space'* . Retrieved from Saferspaces: https://www.saferspaces.org.za/understand/entry/public-spaces

Sekolah, M. (2018, January 10). *Patahan Palu-Koro gempa Bumi, Tsunami dan Likuifaksi*. Retrieved from Manajemen Sekolah: https://www.manajemensekolah.web.id/2018/10/patahan-palu-koro-penyebab-gempa-bumi.html

Sugiyono. (2013). *Metode Penelitian Kuantitatif Kualitatif dan R & D.* Bandung: Alfabeta.