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# Accessibility of Visually Impaired Passengers at Urban Railway Stations in the Klang Valley

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**ABSTRACT**

Ensuring access to the built environment and public transportation is a crucial element in reducing the mobility constraints of people with disabilities. This study intends to investigate the accessibility of visual impaired passengers regards to interior design of Kelana Jaya Line LRT station. The access audit was evaluated at core area, transition area and peripheral area of selected LRT stations by using site observation and interview research method. A standard checklist was taken in accordance to the Malaysia Standards Code of Practice for Access of Disabled People to Public Buildings (MS1184:2002).The result shows that, although most of the stations accommodate access for disabled people however the design of facilities provided was not fully incorporate with standard requirement and user-friendly. These lead barriers to independent living for persons with disability. As a conclusion, aside from providing a complete of public access facilities, comprehension of social sensitivity and capability to plan for continuity and uniformity should be taken into consideration to eliminate the architectural barriers in the built environment in the future.



## 1. Introduction

The ability to move freely in either familiar or new environments leads us to freedom to

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pursue our everyday routine. Without a gift of vision, it is very difficult and sometimes a harrowing nightmare for visually impaired passengers to travel in unfamiliar built environment (Espinosa *et al*., 1998). Although a lot of research has been done regarding disabled people with respect to the built environment, however, there is a rarity of studies focusing on the usability of public facilities and actual wayfinding problems faced by the visually impaired passengers, especially at light rail transit (LRT) stations in Malaysia. Even though guidelines and policies requiring the presence of ideal facilities for the visually impaired at public buildings have been gazetted in Malaysia long ago, but, as to how far these rules and regulations are being implemented as per standard requirement is still a question mark. Do all facilities provided really meet the need? How do the visually impaired passengers react towards these facilities? It is important that people should be aware that accessible public buildings, in this case, LRT stations, is not only about providing the facilities for the disabled, but to also ensure that all the facilities provided is practical, optimally used and really meet the needs (Malaysian Association of Standard Users, 2010).Thus, this study is important to identify the current situation regarding public facilities provided for visually impaired passengers and their wayfinding problems inside LRT stations. The findings of this study will benefit train terminal designers as well as the government to improve the quality of train station design and to increase the level of comfort inside public transportation buildings.

## 1.1 Visual Impairment

According to the Malaysian Association of the Blind, there are differences between the blind and those with low vision. People with low vision may have some useful vision, while the blind are usually identified to have very little or no vision at all. The different levels of vision among the blind and low vision is due to a number of different diseases and conditions or accidents. According to the Malaysian Association of the Blind, the factors leading to blindness or visual impairment are inherited or congenital conditions, ageing and conditions related to disease or infections. In Malaysia, the recent statistics produced by the Department of Social Welfare in 2010, shows that the total number of blind/visually impaired people who have registered has increased from 26,155 in 2009 to 27,582 in 2010 and has been steadily increasing over the last few years.

Without sight, it is very difficult to move independently especially in a large-scale

architectural and built environment. Research by Passini and Proulx (1988) points out that the visually impaired and the blind usually rely on their previous training and experience to move around inside the built environment. Hence, the previous success in travelling experience helps them to gain confidence to navigate around the built environment which is primarily designed for the sighted people (Corn, 1990). With regards to this issue, previous research by Finkel (1994) identified that there are cues in the built environment that can influence the blind and visually impaired people in their wayfinding. Among them are materials, sensory cues and spatial configuration.

Although there are a lot of visual aids to help those with visual impairment to navigate around, however, it should be noted that the built environment is supposed to be user friendly by providing the needs of this minority group from the onset (Goldsmith, 1997).

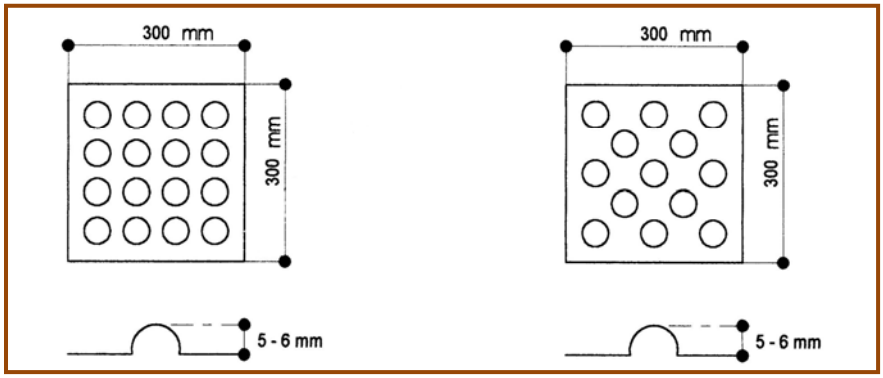


**Figure 1**: Line type blocks (Source: MS1184 (2002), p.19).

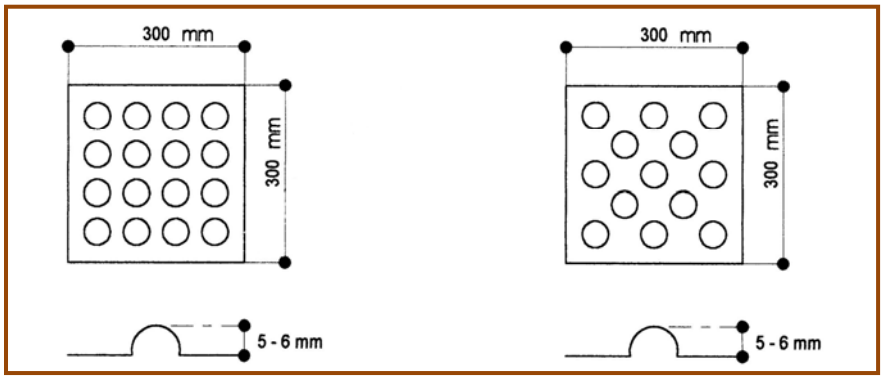


**Figure 2**: Dot-type blocks (Source: MS1184 (2002), p.19).

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## 2. Guidelines and Standards for the Visually Impaired/Blind

Design requirements for visually impaired people should be taken seriously among designers. It is to ensure that they have the same ability to move independently and safely within the built environment. Hence, many countries have gazetted laws, standards or guidelines with regards to barrier-free design. Although the guidelines may vary for each country but the objectives are usually similar. In Malaysia, the guidance for barrier-free public building is available in the Malaysian Standard Code of Practice on Access for Disabled Persons to Public Buildings (MS1184: 2002). It is made mandatory by authorities by means of regulations and local by–laws. The following are the standard requirements based on MS1184 (2002), set out for the visually impaired/blind.

### 2.1 Guiding Blocks

Guiding blocks which are also known as tactile ground surface indicators, are special tiles which are incorporated into walking surfaces that facilitate safe movement for those with vision impairment. The guiding blocks are designed with raised markings of a certain height which the visually impaired can feel through their feet. There are two types of blocks bearing different kinds of raised markings which define different meanings to those with vision impairment. The line type block or directional block, as in Figure 1, indicates the correct path or route to follow. The warnings block or Dot-type blocks, as in Figure 2, are designed to indicate hazards or destination facilities. It should be noted that there are certain distances for installing these warning blocks to avoid accidents. The distance between the hazard and the edge of the nearest guide block is usually 600mm. However, if it is a dangerous drop-off such as railway platforms, it should be installed at 900mm from the hazard. An example of a standard layout of guiding block is shown in Figure 3 and Figure 4. Besides this, based on the MS1184 (2002), the standard guiding block must follow the following requirements; it must be detectable underfoot, possess a durable non-slip material and must be contrasted with adjacent surfaces.

### 2.2 Floor Finishes

The floor finishes should apply a slip-resistant surface with texture. There are different types of floor finishes accepted for installation at wet locations or interior surfaces (areas that are frequently washed) and dry areas. Based on the International Building Code (ICC/ANSI) A117, 1 Section 4.5, (as cited in Ali *et al*., 2004), the floor materials with friction greater than

0.5 are preferable to be deemed as slip-resistant floor finishes. Besides this, the floor finishes should be contrasting in textures, colours and brightness to indicate the barrier or hazards such as ramps, staircase and others. It should also be noted that green and red should not be chosen as a pair of contrasting colours due to the deficiency in perceiving differences between some colors among the colour blind (MS1184, 2002).

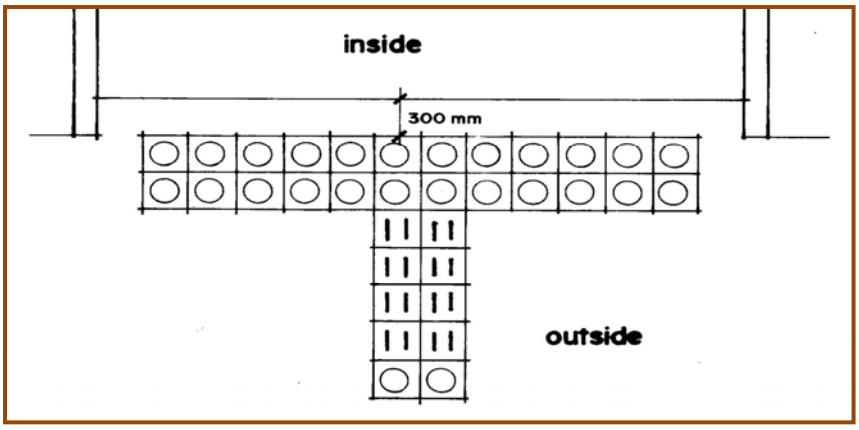


**Figure 3**: Guiding blocks used at entrance (Source: MS1184 (2002), p.20).

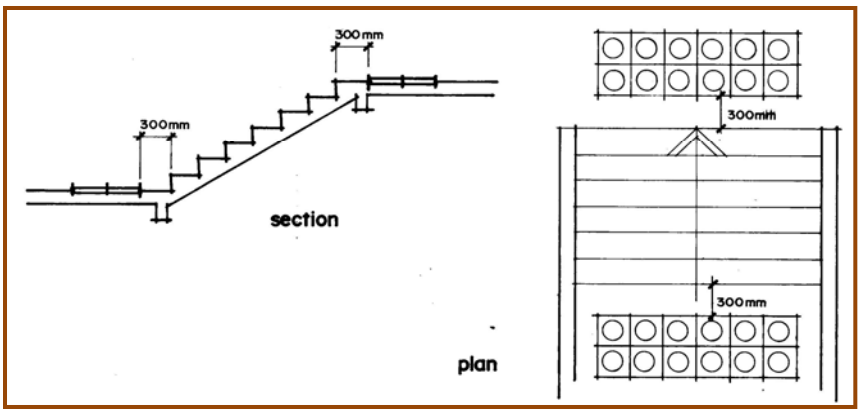


**Figure 4**: Guiding blocks used at stairs (Source: MS1184 (2002), p.20).

## 2.3 Signs and Symbols

The requirements for signs and symbols are referred from MS1184 (2002), 28.Signs and Symbols**.** The size of the symbol and the height of lettering used for signage play an important role to ensure that the information can be presented clearly. The height of letters varies based on viewing distance. Signs with Braille or embossed lettering, as shown in Figure 5 and Figure 6, will be very helpful to the blind or those with low vision. In addition to this, as reported by Wurm *et al.* (1993), colour differences enable people to get more reliable

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information about the object. Therefore, the background of the signage compared to the lettering should be contrasting in colour to especially help those with low vision.


**Figure 5**: Signage in Braille (Source: www.life4hire.berceloteh.com/caring).

**Figure 6**: Braille Lettering at Hand Rail (Source: Individual photo collection).

### 2.4 Level of illumination

An adequate level of illumination is required to enable people to move safely and independently. The illumination level for passageways or walkways, stairs and landing, ramps and lifts should be not lower than 150 lux as specified in MS1184 (2002).

### 2.5 Announcements, Signals and Warnings

According to MS1184, public announcement systems and emergency warning signals should be provided in both audible and visible forms. This will especially benefit people with defective sight. Audible announcements can help the vision impaired people in their wayfinding especially if there are no other cues. Besides this, all hazards for example, nosing of staircases, need to be emphasized with sufficient illumination guides or guiding block surfaces.

## 3. Methodology

The main objective of this research is to investigate the current condition of interior design with regards to wayfinding for visually impaired or blind passengers inside the Kelana

Jaya Line LRT station. This study was designed as a survey based research using a qualitative research approach. The qualitative data was collected through site observation and interviews. The interview sessions involved both the staff and the disable users. The questions are based on the current condition of the interior design in the LRT station which is related to wayfinding for visually impaired and blind passengers including the awareness on their needs to move independently. The primary data was also gained from site observation. A standard checklist was referred to the Malaysian Standard Code of Practice for Access of Disabled People to Public Buildings (MS1184:2002). All data collected were recorded and analyzed. For this particular study, the observation had been done through three stages. These three stages of observation was derived from the previous research done by Ali *et al.*, (2004). The first stage covered from the Main Entrance to the Ticketing Counter. This was followed by the route from the Ticketing Counter to the Platform and the last stage was from the platform into the subway car.

### 3.1 Case Studies

The case study was done at the Kelana Jaya Line LRT which reported the highest total number of passengers (Department of Statistic Malaysia, 2009). There are 24 elevated light rail (LRT) stations operating under the Kelana Jaya Line Light Rail Transit and 5 of them are underground stations. Most of the stations at the Kelana Jaya Line are designed within single buildings. However, there are certain stations that are integrated with other buildings or shopping complexes. Therefore, for this study, the main entrance is determined based on the location of the main entrance signage for each station. The site observation had been done to all 24 stations. The design of stations differs by the platform designs, where there are island platforms and side platforms. There are four main functional areas normally designed in most stations; core, transition, peripheral and administrative areas (Kandee, (2001), p.14).The study will only focus on the core area (which is the entrance to the ticketing and travel information area) and the peripheral area, also known as the platform of the LRT station. The stations usually receive a lot of passengers during weekdays, from 7am to 9am in the morning and between 5pm to 7pm in the afternoon.

## 4. Findings

Generally, the design of the Kelana Jaya Line LRT Station is either an above ground

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station or an underground station with both types being elevated stations. Although the stations are provided with similar facilities, the layout plan however, varies for each station.

## 4.1 Stage 1 (Main Entrance to Ticketing Counter)

The site observation for Stage 1 covered from the Main Entrance to the Ticketing Counter. Most of the station is provided with vertical circulation elements including escalators, elevators and ramps for disabled people. However, the location of each facility is not consistent and some of them are quite far and isolated from the main entrance. The stations are using ceramic floor tiles as floor finishes. Although there are different types of tiles, the color scheme is based on the grey color tone/range. The following are the results from the site observation conducted at the Kelana Jaya Line LRT station.

**Table 1:** Audit survey at Above ground (Island Platform) Stations of the Kelana Jaya Line LRT (Main Entrance to Ticketing Counter), 2011.

| Station | Element | | | | | | |
|---|---|---|---|---|---|---|---|
| | Guiding Block | Signage | | Floor Finish | | Lighting | |
| | | Braille | Normal | Slip-resistant | Color Contrast | Natural | Artificial |
| Asia Jaya | X | x | | | x | | |
| Universiti | X | x | | | x | | |
| Kelana Jaya | X | x | | | x | | |
| Pasar Seni | X | x | | | x | | |
| Damai | X | x | | | x | | |
| Setiawangsa | X | x | | | x | | |
| Wangsa Maju | X | x | | | x | | |
| Gombak | X | x | | | x | | |

### 4.1.1 Audit survey of Stage 1: Above ground (Island Platform) Stations of the Kelana Jaya Line

Table 1 summarizes the findings for the audit survey at above ground stations with island platforms. In overall, the elements provided at the above ground stations appeared to be similar for each station. There is no proper guiding block being installed at the main entrance. All stations were completed with standard signage which had basic designs for sighted people. There is neither a signage in Braille nor a tactile map provided to facilitate people with visual impairment. As described in Table 1, although all 8 stations comply with the slip-resistant floor finishes, however, implementation of color contrast floor finishes seem to be lacking at this area. Besides this, since it is an outdoor station, therefore, the illumination comes from a combination of natural and artificial lighting.

**Table 2**: Audit survey at Above ground (Side Platform) Stations of the Kelana Jaya Line LRT (Main Entrance to Ticketing Counter).

| Station | Element | | | | | | |
|---|---|---|---|---|---|---|---|
| | Guiding Block | Signage | | Floor Finish | | Lighting | |
| | | Braille | Normal | Slip-resistant | Color Contrast | Natural | Artificial |
| Taman Jaya | x | x | | | x | | |
| Taman Bahagia | x | x | | | x | | |
| Taman Paramounth | x | x | | | x | | |
| Kerinchi | x | x | | | x | | |
| Abdullah Hukum | x | x | | | x | | |
| Bangsar | x | x | | | x | | |
| KL Sentral | x | x | | | x | x | |
| Sri Rampai | | x | | | x | | |
| Taman Melati | x | x | | | x | | |
| Dato Keramat | x | x | | | x | | |
| Jelatek | x | x | | | x | | |

### 4.1.2 Audit survey of Stage 1: Above ground (Side Platform) Stations of the Kelana Jaya Line

In this part of the survey, architectural elements with regards to the needs and requirements of the visually impaired and blind at side platforms from the main entrance up to the ticketing counter had been sought (Table 2). Based on the survey, out of 9 stations, the Sri Rampai Station is the only station that has continuity in its guiding path. The guiding blocks for the other 8 stations do not comply with the standard requirements. Besides this, the signage concerned were again only for sighted people. No signage in Braille was provided for at this area except for a lift indicator. Based on the results shown in Table 2, the floor finishes of these stations seem to be typical to the island platforms which applied the slip-resistant type of floor tiles with a lack of colour contrast. Generally, all stations depend on both natural and artificial lighting except for the KL Sentral Station. Since the Main Entrance of the KL Sentral Station is located inside the building, therefore, it relies on artificial lighting.

### 4.1.3 Audit survey of Stage 1: Underground (Island Platform) Stations of the Kelana Jaya Line

The results of the Stage 1 survey for underground stations are as shown in Table 3. In this

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part of the survey, KLCC is the only station complete with proper guiding blocks from its main entrance to the ticketing counter. Apart from this, as described in Table 3, all 5 stations are designed with typical architectural design elements which consist of normal signage, non-slip floor tiles and rely on natural lighting as well as artificial lighting. Again it is highlighted that there is no signage in Braille provided.

**Table 3**: Audit survey at Underground (Island Platform) Stations of the Kelana Jaya Line LRT (Main Entrance to Ticketing Counter).

| Station | Element | | | | | | |
|---|---|---|---|---|---|---|---|
| | Guiding Block | Signage | | Floor Finish | | Lighting | |
| | | Braille | Normal | Slip-resistant | Color Contrast | Natural | Artificial |
| Masjid Jamek | x | x | | | x | | |
| Dang Wangi | x | x | | | x | | |
| Kg,Baru | x | x | | | x | | |
| KLCC | | x | | | x | | |
| Ampang Park | x | x | | | x | | |

## 4.2 Stage 2 (Ticketing Counter to Platform)

Stage 2 involves the ticketing counter area up to the platform area. Generally, most of the stations are provided with the same facilities and specifications. In fact, all stations are also provided with a special Automatic Fare Collection (AFC) gate line to facilitate people with disabilities. However, there is no special ticketing counter for the disabled people. Therefore, the disabled people usually will need assistance to purchase tickets. There are escalators, staircases and elevators provided as access to the platform. However, some of the elevators are located at an isolated area or are too far from the ticketing counter.

### 4.2.1 Guiding Blocks

There are guiding blocks installed from the ticketing counter leading to the elevators and some other areas including the curb ramps and staircases to assist blind persons to detect hazards along their pathway. However, most of the blocks installed at the station do not fulfill the by-law requirements and also lack of continuity. Furthermore, the size of the tactile and types of guiding blocks may differ from what has been stated in the guidelines.

### 4.2.2 Signage

Most of the directional signage is shown after the ticketing counter except for stations with island platforms. The directional signage for station with island platforms is only available at the platform area. There is no directional signage in Braille or embossed lettering (See Figure 7). Therefore, the visual impaired passengers may need assistance to guide them to the correct platform.

**Figure 7**: Directional signage at the platform area at the Dang Wangi Station.

### 4.2.3 Floor Finishes

The floor surfaces for the ticketing counter area and the platform areas are from ceramic tiles. Most of them are the slip-resistant which is in accordance to MS1184 (2002).

### 4.2.4 Lighting

Most of the stations are using a combination of natural lighting and artificial lighting except for the underground stations. The level of illumination may vary for each station. Normally, those with low vision rely on sufficient light levels to enable them to see contrast and details from the environment (Carreon, 2000).

### 4.2.5 Others

During the site observation, there were a few visually impaired passengers who had difficulties in their wayfinding from the platform to the AFC gate line exit as they lost the guidance path (see Figure 8). Besides this, there were also some visually impaired passengers who did not use the designated route for the disabled but instead, used the staircase as a

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shortcut to the platform.

## 4.3 Stage 3 (Platform into the subway car)

The designs of the platforms vary from the side platform and the island platform. The island platform is a single platform serving two tracks passing on either side. The side platform is usually determined by two platforms with double tracks of railway lines. The size of the platforms is almost similar for each type and has enough space for movement. Most of the guiding blocks are provided in front of the elevators (see Figure 9). However, the guiding blocks may not be provided along the tracks for every station. Although some platforms are complete with guiding blocks, the type and the size of the tactile are inconsistent and may not be according to the Malaysian Standard Code of Practice MS1184 (2002).

There is no audible indicator to give signals especially to the visually impaired passengers in terms of which platform is heading to the north terminal or to south terminal. In addition to this, there is no directional Braille signage provided at the stations.


**Figure 8**: Wayfinding by visually impaired passengers at the Ampang Park Station.


**Figure 9**: Guiding blocks at the platform area.

### 4.4 Interview

The population of passengers with disability using the LRT may not be as big as normal people. Even though it is quite difficult to find visually impaired passengers around, however, to fulfill the requirements of the research, the interview had been undertaken with the staff of the Kelana Jaya LRT as well as the visually impaired passengers. According to the staff, the visually impaired people who are using the system normally have been trained by their colleagues before they manage to move around independently. Although they have experience using the system, however, there is still a possibility of them being lost at the station. Besides this, according to one of the members of the Malaysian Association for the Blind, the guiding blocks provided at the station are not according to the requirements based on the Malaysian Standard Code of Practice for Access of Disabled People to Public Buildings (MS1184:2002). Furthermore, there was a low vision passenger who commented that he preferred to have railings instead of guiding blocks. According to him, there is a possibility that the tactile may be blocked by other objects which cause challenges for people like him to move around.

## 5. Discussion

A previous research by Mizuno T. *et al*. (2009) pointed out that tactile surface indicators play an important role to guide the visually impaired or blind to perform a safe journey. Moreover, as reported by Passini and Proulx (1988), compared to sighted people, the visually

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impaired people rely more on the textural nature of a surface. However, based on the results shown in Table 1, Table 2 and Table 3, the guiding blocks which are supposed to be a guidance path for the visually impaired passengers to start a journey are not available at most of the stations. In addition to this, based on the findings, most of the areas were not provided with a proper guidance block as per specification in the MS1184 (2002). The common error is usually due to the thickness of the height of the raised marking which does not comply with the requirements. Only a few stations used very strong colour contrast of the guidance blocks. As a result, the guiding blocks were not detectable underfoot. This can be seen from Figure 8, where the passengers became lost in the middle of finding their way to the exit. Therefore, compared to the literature review of previous studies, the results significantly show that lack of implementation of standard requirements can lead to an error in finding the correct guidance pathway for the blind or the visually impaired passengers.

Based on the results, it was also shown that signs in Braille were not something that could be commonly seen in the stations. In fact, Braille signage was only provided at the elevators and there were no directional signage in tactile. As the blind or visually impaired persons rely on tactile (Rashtian, 2003), the disabled passengers will face difficulties in finding the correct way independently. However, according to the staff working there, the blind and the visually impaired passengers always rely on training or guidance before they start travel independently. This has also been confirmed by a previous research by Passini and Proulx (1988) which indicated that training or previous experience does help the mobility of the disabled. In addition, the confidence level among the visually impaired or blind may increase by successful travelling experiences (Corn, 1990).

Besides these, another factor that was highlighted is the layout and design of the stations. The findings show that the layout and location of facilities varies for each station. Consequently, the lack of continuity and uniformity will cause challenges to those with visual impairment or the blind (Corn, 1990). As a result, although they may be familiar with the station, there is a possibility of them experiencing errors in their wayfinding.

## 6. Conclusion and Suggestions

Based on the research conducted, it can be assumed that not every station is provided with the facilities that comply with the requirements as listed in the Malaysian Standard Code

of Practice for Access of Disabled People to Public Buildings (MS1184:2002). Furthermore, lack of continuity and consistency in station design may cause difficulties for the visually impaired passengers to move around independently.

Besides this, there is an interesting outcome with regards to visually impaired passengers who prefer to use other than the designated routes for the disabled. Therefore, in future research, it is suggested that researchers may want to find out what other kind of cues or architectural elements inside the built environment that may lead these disabled people to their destination instead of merely using tactile ground surface indicators.

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