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## **WHEELCHAIR ACCESS IN STAR LRT STATION, KUALA LUMPUR**

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### **SUMMARY**

Kuala Lumpur was honored to host the 1998 Commonwealth Games, the second largest game after the Olympics. Inline with this event, the Malaysian Government decided to upgrade the public transportation in the city to be accessible to all, mentioned by the Disabled Persons Transport Advisory Committee. The rate and level of new investment will ensure that improvements in the accessibility of public transport are brought forward more rapidly. Building in accessibility for disabled persons in all new investment is a condition of public money being well spent. Local authorities and transport operators should ensure that the transport needs of disabled persons are factored into their plans and that the full benefits of improved public transport are accessible to all. In order to improve the public transportation facilities, the government had planned a new system of transportation in the city by using Light Rail Transportation (LRT), which was officially launched by former Prime Minister of Malaysia, Tun Dr. Mahathir Mohamad at the Bukit Jalil station on 11 July 1998. An initial study was carried out by the Accessibility and Safety Research Centre (ACCESS) in the Faculty of Built Environment, University Malaya to investigate and identify the issue of accessible design on selected Light Rail Transits (LRT) stations in the city of Kuala Lumpur, mainly focusing for the wheelchair users. The objectives are to ensure that the design of accessibility is comply with the law, regulations, standard requirements and guidelines; to understand the recent condition and their needs in LRT stations and to allow their secure equal rights and opportunities as others. The research began by obtaining reliable information from literature review. A checklist of building audit was prepared to ensure the design of accessibility. A building access survey was carried out on selected stations which covered three main stages to indicate the pattern of passengers' path in using the system. Stage 1: From the road curb to the ticket counter. Stage 2: From the ticket counter to the platform. Stage 3: From the platform until reaching the LRT train. A series of questionnaire was also constructed to examine selected target of users in relation to accessible design. Result of findings in this study had been analyzed to assist the LRT management and the station concerned in upgrading their station facilities to a comfortable, accessible, friendly and safe environment in order to encourage more users, including disabled persons to benefit from it.

### **KEYWORDS**

Accessibility, Public Transportation, Wheelchair users.

## **1.0 INTRODUCTION**

Accessibility for disable persons in public transport is a rare issue that seldom discusses compare to accessibility for disable persons in public building. The word “*accessibility*” does not just mean “*easy to reach*”, but also means “*easy to use*” (Disabled Persons Transport Advisory Committee, 2001). In order to encourage disable people to use the public transport, better facilities must be provided to ensure the public transports are accessible to these people. Although the governments have provided ideal facilities to the public transport but is it really easy to access by disable people? Is it complying with the law, regulations, standard requirements and guidelines for disable people? Does it meet the needs of disable persons? Nearly all the LRT station in Kuala Lumpur are easy to access but this is not taking account from sidewalk to the main entrance of the LRT station and finally to the LRT train. This study is important to determine whether the facilities provided meet the standard and to give consciousness to public, local authority and designer to take further responsibility in providing convenient access for disable person to these useful and comfortable facilities especially for wheelchair user.

### **1.1 Disability and accessibility**

Accessibility in its widest sense may stand for people can get to the building but takes limited account of the difficulties they experience in doing so. Governments and design industry organizations have to develop standards and laws in order to allow equal access to buildings and facilities for those with physical disabilities. The term “*disability*” may mean disabled by physical, sensory impairment, medical conditions or mental illness. Access for disabled persons means a continuous path of travel to or within a building capable of being negotiated by a person using a wheelchair or otherwise with limited mobility and not incorporating any stairway, revolving door, escalator or other impediment to travel. Access for disabled persons should extend from the doorway:

- (a) to any vertical access within the building
  - (b) to and from the vertical access to every floor level
- (MS1184:1991)

The person in a wheelchair moves on wheels, so for vertical circulation the person in a wheelchair needs a lift, and if there is no lift he has to be carried up or down steps by helpers (MA (Cantab), 1984).

## **2.0 THE REQUIREMENTS IN DESIGN**

The requirements in design for wheelchair users should be considered so that they can reach entrances to the building from the boundary or car park. This also ensures that elements of the building do not create hazard and allow them to use the facilities and services the building offers. The requirements which refer to MS 1184 are discuss in the section below.

## **2.1 Wheelchair Size and Clearance**

The clear floor area required for a single wheelchair is 30 inch wide by 48 inch long. The clear width required for a wheelchair in an accessible passageway is 36 inch, with 32 inch allowed at reductions in width, such as columns or portals, for a distance of not more than 24 inch. Reductions in width must be separated by 48 inch of passageway length that the minimum 36 inch.

## **2.2 Accessible Route**

At least one accessible route must connect all accessible elements and spaces, as specified in IBC 1104.2, and all accessible levels, including mezzanines, in multistory buildings. The accessible route may not pass through kitchens or storage rooms, since these rooms can be sources of hazards. The accessible route inside a dwelling unit, however, may pass through the kitchen. When a floor or level is less than 3000 sq ft in area and does not contain health-care provider facilities, IBC Group Business or Institutional, an accessible route is not required. Any floor or level in IBC Groups Assembly, Institutional, Residential, or Storage that does not contain the facilities *required* to be accessible need not have an accessible route (Smith & Smith, 2001).

## **2.3 Minimum width**

The minimum width of accessible routes is 36 inch, except at doors and other conditions as described above under clearances. Spaces allowing two wheelchairs to pass must be located at not more than 200 *ft* along the accessible route.

## **2.4 Floor surfaces**

The requirements for floor surfaces are found in ICC/ANSI A 117.1, Section 4.5. Floor surfaces in accessible rooms and routes must be stable, firm, and slip-resistant. Since no specific definition is provided for the term *slip-resistant*, flooring materials with a coefficient of friction greater than 0.5 are preferred.

## **2.5 Change in level**

Changes in floor level in accessible routes must be level, not to exceed 1 in 48 (about 2 percent). Changes in level not exceeding ¼ inch can be vertical. Changes in level not exceeding ½ inch must be beveled at a slope not more than 1 in 2. Changes in level more than ½ inch high and any slope steeper than 1 in 48 (2 percent) are considered ramps and must comply with the provisions for ramps discussed in the following sections (Smith & Smith, 2001).

## **2.6 Accessible stairs**

Stairs must have uniform tread and riser height, with risers from 4 to 7 inch high and treads not less than 11 inch deep. Treads and risers must be designed with tread nosing.

## **2.7 Accessible handrails**

Handrails are required on both sides of stairs and ramps, and must be continuous within the full length of each run or flight. The top surface of the handrail must be mounted 34 to 38 inch above the floor. Handrails must be from 1½ to 2 inch outside diameter and easily grasped. Other shapes are allowed if the largest dimension is 2¼ inch and the outside perimeter is 6¼ inch maximum. There must be at least 1½ inch clearance between the handrail and the wall. Handrail extensions must be provided at the top and the bottom of accessible stairs and ramps. The handrail extension may return to a wall or guard, or may continue to the handrail of another ramp or stair. These requirements are found in ICC/ANSI A117.1, Sections 4.3.10 and 4.3.11 (Smith & Smith, 2001; MS 1184:1991).

## **2.8 Tactile Paving**

An approach route into a building which is intended for use by disabled persons should have areas of its surface formed in such a way that a disabled person is aware of the information being given. This may be achieved by the use of tactile paving slabs which should be placed where the access route crosses a carriageway and also at the top of steps. Dropped kerbs should be provided for wheelchair users (Barritt, 1996; Stephenson, 2001).

## **2.9 Kerb Ramps**

Kerb ramps are used wherever there is a difference in level on pedestrian paths or cross paths to overcome changes in level between the pavement and the road surface and also on the pavement itself. Kerb ramps should be positioned out of the usual line of pedestrian flow. The unobstructed width of the pathway should be not less than 0.90 meters. There are 2 types of kerb ramps: standard kerb ramp which cut back into the pavement with flared sides providing transition in three directions, and returned curb ramps which providing slope in one direction.

## **2.10 Railway and Subway Car Doors**

Car doors should be wide enough for wheelchair users (minimum 900 mm). The gap between car doors and the platform should be reduced to an absolute minimum.

## **3.0 METHODOLOGY**

The objective of this research is to investigate and identify the issue of accessible design on selected Light Rail Transits (LRT) stations in Kuala Lumpur, mainly focusing for wheelchair users. Case studies were carried out by performing a building audit and interviews with staff, person-in-charge of the building and disable user. Primary data from the selected person will be collected through an interview session. This is to include awareness on the current situation of the disable persons' needs. The data collected will be analyzed and comparisons will be made to literature review. Primary data was also collected through an access survey of the case studies. A standard checklist was prepared with references to MS 1184 and UBBL literature review to ensure the design of access for wheelchair users to LRT station until get into

car. The audit was done visually, by interviewing and measuring on site. The main intention of the audit was to verify and identify facilities provided for in the audited buildings and its suitability for use by the disabled persons. Data collected will then be analyzed and compared with the other selected stations.

### **3.1 Case studies and findings**

There are twenty five stations that currently operate in Kuala Lumpur. Four elevated LRT stations that represent eight elevated stations were selected as case studies to understand the level of accessibility for the wheelchair user. This is to investigate and measure elements of assessable in the site building provided as well as interview session with the related staff and wheelchair user it self.

#### **3.1.1 LRT Station 1 (LS1)**

The LS1 was constructed over the Gombak River in Kuala Lumpur. The landmarks: Legend Hotel and The Mall Shopping Center are situated beside this station. Putra Bus Station is also located nearby where travelers can board on buses for trips to the east coast. The station was proposed in 1996 and was built two years later.

#### **3.1.2 LRT Station 2 (LS2)**

This station has been proposed on 20 December 1994 and completed in December. Majority of the commuters consist of students from various multi-racial schools located around the station. Located near the Gombak River, this station also caters to workers from the Mara Holding, Wisma Sime Darby and Hotel Grand Continental.

#### **3.1.3 LRT Station 3 (LS3)**

This is a station within a building. From here commuters can get to the Central Market and Kota Raya Complex. The ever-famous Chinatown, which is situated in Petaling Street is accessible from this station. Its proposal had been submitted as the same year with LS2. This station is always crowded at all times because of its strategic location.

#### **3.1.4 LRT Station 4 (LS4)**

The main attraction of this station is the National Sports Complex, which was built to hold the Sea Games and Commonwealth Games in 1998. This station was designed with poly canvas sail roof in line with the stadium design, which makes it most significant among others. Besides that, commuters can easily make way to the Endah Parade, a local shopping center where the popular Carrefour supermarket is located inside it.

### **3.2 Finding from Access Survey**

Below are results from the access survey conducted on the four LRT stations mentioned in the case study.

### 3.2.1 Comparative studies

The comparisons of four LRT stations have been analyzed based on different stages.

#### a) Stage 1 (Road Kerb to Ticket Counter)

The road kerbs of the four stations are almost the same. They have kerb ramp or change in level following the Standard which allows the wheelchair users to pass-by. All four stations have a walkway connected from 30 to 50 meters away from the station. The walkways in front of LS2 and LS4 have different types of grating. However, only grating of LS4 follows the Standard. LS1 and LS2 also had tactile paving along the walkway with the sizes meeting the Standard.

Among four stations, LS1 and LS4 station have ramp to enable the wheelchair users enter the station. However, there were no handrails at LS4. Meanwhile, there is a temporary walkway and ramp at LS3. Wheelchair users will encounter problem when accessing LS3 and LS2 station as the entrance level of LS2 station is quite high. Moreover there are only one escalator and two staircases provided. Thus, wheelchair users are unable to access into the station unless there is assistance from the public or the management. For LS3, the wheelchair users have to be careful with the two steps staircase at the end of the temporary walkway.

In the area of ticket counters, wheelchair users are able to enjoy the ample space for accessible route and maneuvering area. The internal floor surfaces of the four stations are from ceramic tiles but different patterns. Anyway, they would not have any problem in purchasing the ticket.

Table below shows comparison at stage 1 between four stations.

**Table 1: Comparison at stage 1 between four stations**

No	Element	LS1	LS2	LS3	LS4	standard
1	Width of accessible route (entrance)	2.85m	5.00m	3.00m	7.50m	> 1.53m
2	Width of kerb ramp	-	1.26m	1.50m	-	> 0.90m
3	Slope of kerb ramp	-	3°	2°	-	< 5°
4	Tactile paving	0.36m <sup>2</sup>	0.36m <sup>2</sup>	-	-	> 0.09m <sup>2</sup>
5	Width of ramp	3.50m	-	3.00m	7.50m	> 0.88m
6	Steeper of ramp	1:11	-	1:9	1:8	1:12<x<1:8
7	Height of handrail	920mm	-	870mm		865mm-965mm
8	Bar spacing for grating	-	30mm	-	10mm	< 13mm
9	Grating orientation	-	Predominant	-	Perpendicular	Perpendicular

### b) Stage 2 (Ticket Counter to Platform)

In this stage, the accessibility of wheelchair users for all stations has the same issue. All stations have different in level between ticket counters and platforms. Only escalators and staircases are provided to access the platform from different level. However, wheelchair users are unable to use it without assistance.

Table below shows comparison at stage 2 between four stations.

**Table 2: Comparison at stage 2 between four stations**

No	Element	LS1	LS2	LS3	LS4	Standard
1	Width of escalator	1.20m	1.23m	1.20m	1.20m	0.9m
2	Width of staircase	2.20m	1.80m	1.50m	5.00m	0.9m
3	Treads of staircase	0.20m	0.20m	0.20m	0.20m	0.26m – 0.3m
4	Rises of staircase	0.20m	0.20m	0.20m	0.20m	0.15m – 0.165m

### c) Stage 3 (Platform into Subway Car)

Platform for LS1, LS2 and LS3 are almost the same size and there is enough space for movements and maneuvering of wheelchair users. Platform of LS4 has much ample space compared to other stations. This is to cater for more passengers who come over to Stadium Bukit Jalil. Floor surfaces at platforms to ticket counter for all stations are made of ceramic tiles. Another similarity is having corduroy paving with 0.90 meters away from the edge of the platforms, which meets the Standard. This corduroy paving serves to give warning signal for disabled persons who are waiting at the platform. The width of the car door is enough to accommodate the size of one wheelchair. Clearance and level difference between platform and the car door is almost same for the four stations. The minimum gap enables the wheelchair to pass-by in ease.

Table below shows comparison at stage 3 between four stations.

**Table 3: Comparison at stage 3 between four stations**

No	Element	LS1	LS2	LS3	LS4	Standard
1	Width of corduroy paving	25mm	25mm	25mm	25mm	25mm
2	Height of corduroy paving	5mm	5mm	5mm	5mm	5mm
3	Clearance between car door and platform	70mm	70mm	70mm	70mm	As minimum as possible
4	Level in different between car door and platform	30mm	30mm	30mm	30mm	As minimum as possible

### 3.2.2 Structural interview analysis

Apart from building auditing, interview with manager planning services and wheelchair user have been done to make a comparative study. According to manager planning services, among 10,000 passengers, only 1 or 2 is a wheelchair user. To fulfill the requirement of the study, an interview with one of the wheelchair user who

regularly use the LRT have been done and the result of these four stations have been analyzed separately based on different stages that had been stated before.

**Table 4: Comparisons between four stations**

<b>STATION ELEMENT</b>	<b>LS1</b>	<b>LS2</b>	<b>LS3</b>	<b>LS4</b>
<b>Kerb ramp</b>	The slope & width are able to access.	The slope & width are able to access.	The slope & width are able to access.	-
<b>Change in level</b>	-	-	-	The slope & width are able to access.
<b>Walkway</b>	The width is enough for access. Floor is slip resistant if dry.	The width is enough for access. Floor is slip resistant if dry.	The width is enough for access. Floor is slip resistant if dry.	The width is enough for access. Floor is slip resistant if dry.
<b>Grating</b>	-	Bar spacing too wide for crossing & its predominant orientation burdened the wheelchair.	-	Bar spacing & orientation are able for access.
<b>Tactile paving</b>	Enable to cross.	Enable to cross.	-	-
<b>Ramp</b>	The slope & width are able to access.	-	The slope & width are able to access.	The slope & width are able to access.
<b>Handrail</b>	It is prepared along the ramp to help for access.	It is prepared along the staircase to help for access.	It is prepared along the walkway & ramp to help for access.	It is no prepare along the ramp to help for access.
<b>Staircase</b>	-	It is prepared but hard to use without helping.	It is prepared but hard to use without helping.	-
<b>Escalator</b>	-	It is prepared but hard to use without helping.	-	-
<b>Accessible route (entrance)</b>	Width enough to access	Width enough to access	Width enough to access	Width enough to access
<b>Escalator</b>	The width is enough but need assistant to help.	The width is enough but need assistant to help.	The width is enough but need assistant to help.	The width is enough but need assistant to help.

<b>Staircase</b>	The width is enough & handrail is prepared but need assistant to help	The width is enough & handrail is prepared but need assistant to help	The width is enough & handrail is prepared but need assistant to help	The width is enough & handrail is prepared but need assistant to help
<b>Floor surface</b>	Width enough & slip resistant for maneuvering & moving if dry.	Width enough & slip resistant for maneuvering & moving if dry.	Width enough & slip resistant for maneuvering & moving if dry.	Width enough & slip resistant for maneuvering & moving if dry.
<b>Corduroy paving</b>	Can be seen clearly.	Can be seen clearly.	Can be seen clearly.	Can be seen clearly'
<b>Car door</b>	Width enough to enter or exit.			
<b>Clearance &amp; different level between car door and platform</b>	Can be entered or exit without assistant.			

#### **4.0 CONCLUSION**

From the research carried out, not all stages at the stations concern about the accessibility for wheelchair users. Furthermore, not all facilities designed for wheelchair users fulfill the Standard requirement. Sometimes, wheelchair users are able to access the station. However, without lift they will encounter problems to reach the platform level.

Wheelchair users are also unable to enjoy the facilities provided as they are not sufficient. However, the management has covered the lack by providing Good Customer Service especially for disabled persons. The staffs at every station are trained and prepared to serve for them by carrying wheelchair users from the ticket counter to the platform level until getting into the LRT.

#### **5.0 RECOMMENDATION**

Besides the Good Customer Service effort, there are a few suggestions the management can take into consideration in order to encourage more wheelchair users using the LRT.

- a) General
  - (i) Facilities

It is suggested to set an intercom at the main entrance and platform for every station to facilitate the wheelchair users whenever they are requesting assistance.

(ii) Services

The staffs should be more aware to care for passengers not only the able but also the disable persons. Thus, the floor surfaces should be ensured always dry to avoid them from slipped. The management should also put a suggestion box in every station in order to collect opinion from passengers and take discipline action if necessary to the staffs.

b) Specific

(i) Facilities

Notification shall be given to the grating at Sultan Ismail station so that it meets the Standard for the safety of wheelchair users. Handrail should be provided along the ramp at the main entrance of LS4.

(ii) Services

The attitude of staffs at those four stations should be improved and supervised under the management in order to give good customer services to all users.

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