

ASSESSING PEDESTRIAN FACILITIES FOR THE BLIND IN THE URBAN ENVIRONMENT OF AN EMERGING ECONOMY

L. Mohamed Yusof, S. Minhad, N.A. Mohamed, N. Azmy

Abstract

In highlighting the sustainable urban environment of an emerging economy, walkability becomes a key trait. The criteria that can improve walkability in urban areas are the provision and ease of access to pedestrian facilities for everyone, including people with disabilities (PWDs). The mobility of PWDs in urban areas is very challenging, as they face physical, cultural and social barriers that hinder their participation in society. In line with this concern, this study intends to assess the current provision and accessibility aspect of pedestrian facilities for the blind in Kuantan city by using on-site assessment. The findings reported that the pedestrian facilities for the blind in Kuantan city are lacking in the provision and not entirely accessible, specifically on walkway or sidewalk, tactile block, pedestrian crossing, handrail, and ramp. The barriers underlined in the findings may act as a direction for local authorities and industry to improve the pedestrian facilities for the blind, and consequently, will be equally beneficial for all pedestrians.

Keywords Accessibility, Kuantan City, People with Disabilities (PWDs), Sustainable Environment, Universal Design

L. Mohamed Yusof, S. Minhad, N.A. Mohamed, N. Azmy

Faculty of Civil Engineering Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang Kuantan Pahang Malaysia

L. Mohamed Yusof (Corresponding Author)
e-mail: liyanam@ump.edu.my

© Universiti Malaysia Pahang 2021
Faculty of Civil Engineering Technology, UMP Research Series: Construction Engineering and Management, Vol. 1, [insert doi here later]

Introduction

Pedestrian facilities are important components of public facilities that enable people to walk safely from one place to another. Enhancing these facilities will support the walkability concept that is able to reduce the dependency on cars, pollution and congestion around the city, and encourage the community towards a better lifestyle and health (Schoon, 2010; Shamsuddin et al., 2012). These make the pedestrian zone a primary section of every street in a city. A zone that can ensure comfortable, smooth and conflict-free movement for pedestrians and public transport users, and concurrently shapes social interactions, safety and quality of life of people in the city (Bhagat et al., 2014). However, a pedestrian zone without pedestrian facilities contributes incomplete infrastructure for the urban environment.

The provision of pedestrian facilities can be accomplished through appropriate sustainable development planning. The planning commonly comprises sidewalk or walkway, curb ramp, handrails, marked crosswalks, crosswalk material, transit stop treatment, roadway lighting, pedestrian underpasses or overpasses, and street furniture. Pedestrian facilities are crucial, as pedestrian circulation is vital in developing modern countries (Bhagat et al., 2014). Therefore, to encourage the public to use pedestrian facilities to lead them to practise a healthy lifestyle, consideration of pedestrian facilities in urban areas is essential.

Consequently, every citizen in Malaysia has the right for a safe and healthy lifestyle, including people with disabilities (PWDs) (Mazifah et al., 2010). Walking is the economical, healthiest and universal mode of transportation (Zainol et al., 2014). Thus, everyone has the right to walk independently without obstructions in their urban environment, especially PWDs who are restricted by physical limitations. It is emphasised in the Person with Disability Act 2008 that the right of PWDs takes account of accessibility to the physical environment, health, social and economy, and opportunity to participate in sport, culture and social activities. Consequently, as city value can be measured based on the urban ability to manage demands and needs by the

citizen, designers must consider the physical needs required and the abilities of pedestrians to provide universal access facilities (Nuzir & Dewancker, 2014). Moreover, PWDs require time to adapt to their participation in the built environment (Stillman et al., 2017). In line, these concerns should also cater to a friendly environment for people with vision impairment. Out of 592,856 PWDs who are registered with Jabatan Kebajikan Malaysia (JKM), vision impairment, either low vision or blindness, was the third-highest of disability categories (Jabatan Kebajikan Malaysia, 2021).

According to Mascetti et al. (2016), independent mobility is a challenge for the blind, as they need to face a lot of barriers that limit them from participating in the built environment. However, despite pedestrian facilities for the blind require specific physical attributes, their needs and requirements are often neglected during the planning and designing of pedestrian facilities (Frazila & Zukhruf, 2018; Jeong et al., 2018). Their rights have been denied and have not been treated as equals from various aspects, where they also want to be included in social activities and to move freely without limitations (Hesla & Kennedy, 2008). Therefore, planners and researchers must constantly assess the condition of the built environment for the blind pedestrian (Aghaabbasi et al., 2018). Hence, assessing the provision and accessibility of pedestrian facilities in an urban area for the blind becomes vital to facilitate their mobility independently, especially in urban area such as Kuantan city.

Furthermore, to enhance the sustainability and environmental quality for the Malaysian urban area, and embrace the rights of the PWDs, emphasising pedestrian facilities for the blind becomes significant and calls for exploration of the barriers that hinder its implementation in the Malaysian urban environment. Thus, this study is conducted to assess the current provision and accessibility aspect of pedestrian facilities for the blind in Kuantan city, and the barriers that may hinder its implementation.

Methodology

In assessing the current provision, accessibility and barriers of pedestrian facilities for the blind in Kuantan city, the study employed on-site audit method at Urban Transformation Centre (UTC) Kuantan, which is the centre of commercialisation, business, government offices and welfare of Kuantan, by using a formulated checklist designed specifically for blind pedestrian (refer Table 1).

Zoning of the On-Site Audit

The overall assessment of existing pedestrian facilities was conducted at the surrounding of UTC Kuantan. The on-site audit was divided into five areas that indicated the focal point of connectivity, with the highest possibility that the pedestrian including the blind to walk to and from UTC Kuantan as in Figure 1, and namely as Zone 1, Zone 2, Zone 3, Zone 4 and Route 5, as in Figure 2. Through on-site auditing, the assessment focused on the connectivity and accessibility of the blind pedestrian to walk around and to UTC Kuantan. The connectivity is measured by the provision of facilities that may facilitate the pedestrian and by barriers that may hinder their mobility.

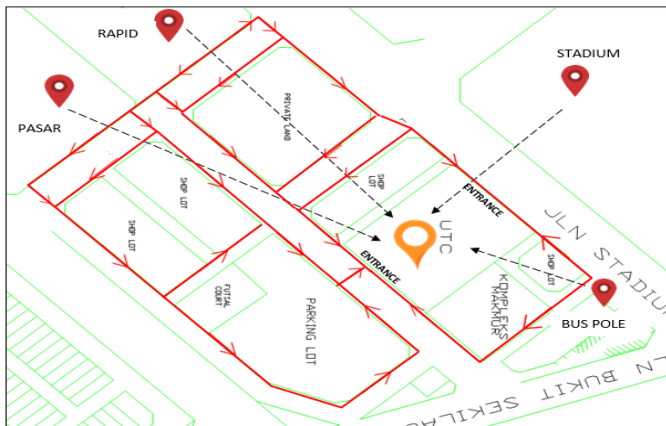


Figure 1: The focal point of connectivity of the on-site audit

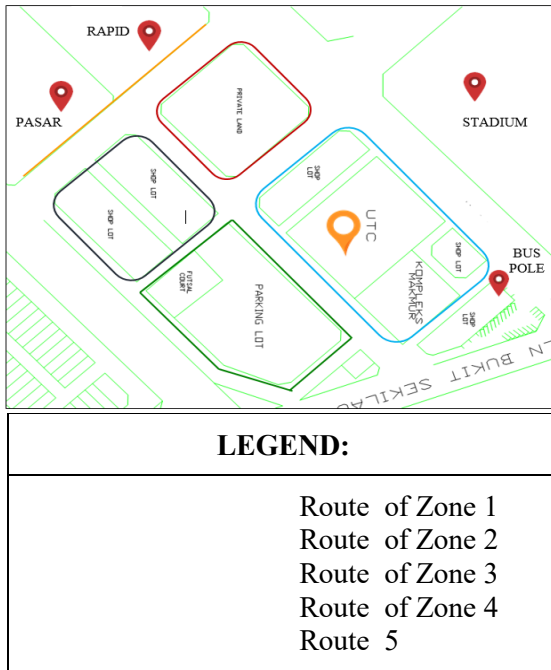


Figure 2: Zoning of the on-site audit

This paper only seeks to discourse the findings in Zone 3 (Figure 3), the area that is facing the main entrance of the UTC building. Zone 3 is located in front of UTC Kuantan and at the side of the futsal court. This zone is also alongside Jalan Tun Ismail, which is one of the main roads in Kuantan city. Each side of the route in Zone 3 is named Zone 3 – Route A/B/C/D.

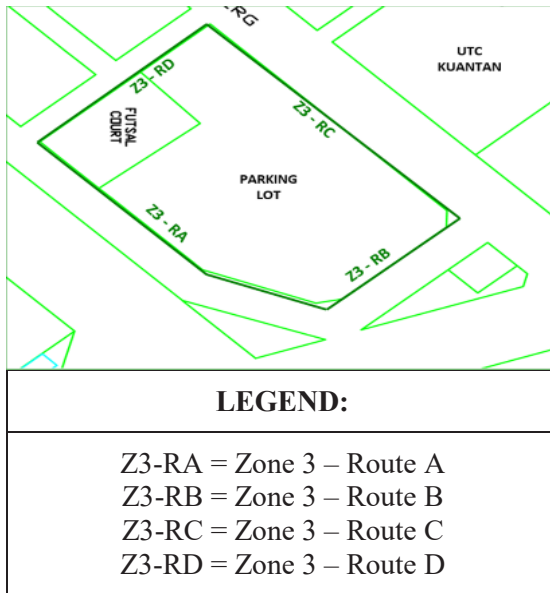


Figure 3: Zone 3 of the on-site audit

Checklist and Specification of Pedestrian Facilities for the Blind

The on-site audit was conducted by using a formulated checklist, shown in Table 1. The checklist was developed based on Universal Design Guideline published by the Federal Department of Town and Country Planning Peninsular Malaysia (2011); Code of Practice for Access of Disabled Person Outside Building (MS1331:2003); Checklist of Accessibility based on Universal Design (MS1184:2014) and; Checklist of PWDs Facilities for an Application of Development Order published by Petaling Jaya City Council.

Table 1: Pedestrian facilities checklist for the blind

Pedestrian Facilities	Checklist
Walkway /Sidewalk	Barrier-free
	Walkway surface: Suitable and non-slip material
	Width:Min-1500mm, Max-3000mm
	Without Kerb -Height: Max - 10mm
	Grating installation should be opposite the walkway direction.
Tactile Block	Continuous along on the walkway from the main entrance to the building entrance.
	Provided from the PWDs parking lot to each building entrance.
	Size: 300mm x 300mm
	Distance from danger area: a) Dot Type: 600mm, b) Line Type: 300mm
Ramp	Slope: Min - 1:12, Width: Min - 1200mm
	Ramps without railing on the left and right should be provided with kerb and not less than 100mm height.
Handrail	Provided at pedestrian walkway
	Diameter: not more than 450mm
	Height from floor level: Min - 850mm, Max - 1000mm
Street Furniture	Street furniture such as tree, flower pot, lamp pole, signage and benches shall be placed at the side of walkway.
	The lower edge of the signage should have clearance not less than 2100mm above footpath surface.
Pedestrian Crossing	Provide a textured zebra crossing at both direction.
	Step Ramp or Dropped Kerb surfaces should have different colour and texture from other surfaces
	Step Ramp / Dropped Kerb with slope minimum 1:12
	Tactile Block should be provided at both direction of zebra crossing

Result and Discussion

Specification Compliance of Existing Pedestrian Facilities for the Blind

The facilities audited at Zone 3 are walkway, tactile block, ramp, pedestrian crossing, handrail and street furniture. Overall findings, as shown in Table 2, indicate that the pedestrian facilities for the blind at Zone 3 are either not provided or not according to the specifications and not specifically used by the blind pedestrian. Walkway, pedestrian crossing and street furniture are not in compliance with the standards specification, while tactile block, ramp and handrail are not provided. Non-provision of tactile block and handrail for the blind may increase the chances of collision with the vehicle from the road beside them. These acted as barriers and became unsafe for the blind pedestrian.

Table 2: Provision, usability and safety for blind pedestrians at Zone 3

Zone - Route	On-site Audit Finding (Walkway/Sidewalk)	Compliance	
		Yes	No
Z3 - RA	Existence of barriers such as signage and litter bin in the middle of a walkway.		x
Z3 - RB	Existence of big grating (size: 2630 x 2630mm) with 260mm height in the middle of a walkway.		x
Z3 - RC	Existence of a litter bin in the middle of the walkway and a big grating (size: 2630x 2630mm) with 230mm height in the middle of the walkway.		x
Z3 - RD	No walkway/sidewalk at this route	-	-
Z3 - R A/B/C/D	Use non-slip material	x	
Z3 - RA	Sidewalk width 2900mm	x	
Z3 - RB	Sidewalk width 1980mm	x	
Z3 - RC	Sidewalk width 960mm		x
Z3 - RD	No walkway/sidewalk at this route	-	-

Zone - Route	On-site Audit Finding (Tactile Block)	Compliance	
		Yes	No
Z3 - 5 A/B/C/D	Non-provision of tactile blocks at this zone.		x
Zone - Route	On-site Audit Finding (Step Ramp)	Compliance	
		Yes	No
Z3 - 5 A/B/C/D	No Step ramp/Dropped Kerb provided.		x
Zone - Route	On-site Audit Finding (Pedestrian Crossing)	Compliance	
		Yes	No
Z3 - RA	Pedestrian crossing at Jalan Tun Ismail (main road).	x	
Z3 - RB	No pedestrian crossing was provided.		x
Z3 - RC	Pedestrian crossing in front UTC Kuantan entrance	x	
Z3 - RD	No pedestrian crossing was provided.		x
Z3 - RA	At this pedestrian crossing, it used a ramp instead of a step ramp. It has no different texture/colour.		x
Z3 - RB	No pedestrian crossing was provided on this route.		x
Z3 - RC	Ramp at this route has no different texture/colour.		x
Z3 - RD	No pedestrian crossing was provided on this route.	-	-
Z3 - RA	Slope - 1:5, Width - 1520mm	x	
Z3 - RB	No pedestrian crossing was provided on this route.		x
Z3 - RC	Slope - 1:6, Width - 1500mm	x	
Z3 - RD	No pedestrian crossing was provided on this route.	-	-
Z3 - R A/B/C/D	No tactile block was provided.		x
Z3 - RA	The audio signal traffic light is provided but broken.		x

Z3 - R B/C/D	Not provide an audio signal traffic light.			x
Zone - Route	On-site Audit Finding (Handrail)	Compliance		
		Yes	No	
Z3 - R A/B/C/D	No handrail is provided in this zone.			x
Zone - Route	On-site Audit Finding (Street Furniture)	Compliance		
		Yes	No	
Z3 - RA	Existence of a signage pole and litter bin in the middle of the walkway			x
Z3 - RB	No street furniture at this route.	-	-	
Z3 - RC	No street furniture at this route.	-	-	
Z3 - RD	Existence of litter bin is in the middle of walkway			x
Z3 - RA	The signage high clearance is 1650mm, while the distance clearance is 1000mm			x
Z3 - RB	No street furniture at this route.	-	-	
Z3 - RC	No street furniture at this route.	-	-	
Z3 - RD	The distance clearance of bin litter for pedestrian is 250mm.			x

The Physical Barriers of the Blind Pedestrian

The on-site audit indicated the existence of physical barriers that act as obstructions for the blind to walk independently at Zone 3 (refer to Table 3). The barriers include improper placing of street furniture such as signage pole and litter bin; non-provision of pedestrian facilities such handrail; insufficient provision of pedestrian facilities such as tactile blocks, step ramp or dropped kerb and pedestrian crossing; incorrect installation and size of grating bars and; unmaintained pedestrian facilities such as broken audio signal at traffic lights.

Table 3: The physical barriers for the blind to use the pedestrian facilities

Item	Provision	Compliance to Specification	Usability	Safety
Walkway	Provided	Not in accordance with specifications.	Yes	Not safe for vision impairment.
Tactile Block	Not provided	No	No	Not safe for vision impairment.
Ramp	Not provided	No	No	Not safe for vision impairment.
Pedestrian Crossing	Provided (Z3-RA & Z3-RC)	Not in accordance with specifications (Z3-RA & Z3-RC).	Not usable for vision impairment (Z3-RA & Z3-RC).	Not safe for vision impairment.
Handrail	Not provided	No	No	Not safe for vision impairment.
Street Furniture	Provided	Not in accordance with specifications.	No	Not safe for vision impairment.

Conclusion

The findings indicate the existence of barriers such as perforated walkway, falling signage pole, unpaved walkway, walkway obstructions from shop's street furniture, signage pole and litter bin, and gratings bars that are installed in parallel with walkway direction, which will threaten the blind pedestrians' safety. There are also no provisions of the tactile block that will provide direction-finding for the blind, and handrail or kerb that will assist their navigation. Although pedestrian crossing is provided at this zone, the provision is not in accordance with the specification. The audio signal installed at the pedestrian crossing traffic light that

will assist the blind to cross the road safely is unusable, as it is not working.

The existence of barriers and insufficient pedestrian facilities for the blind in this area imposed difficulties and danger for the blind pedestrian. These hinder them from moving around independently. The lack of consideration towards the provision, accessibility and usability of pedestrian facilities for the blind at the surrounding of UTC Kuantan demands a crucial improvement in terms of planning and implementation

Acknowledgement

The authors would like to express their gratitude to RDU1703285 for providing support and assistance to this research.

References

- Aghaabbasi, M., Moeinaddini, M., Shah, M.Z., & Asadi-Shekari, Z. (2018). Addressing Issues in The Use of Google Tools for Assessing Pedestrian Built Environments, *Journal of Transport Geography*, Volume 73, pp.185-198.
- Bhagat, S.S., Patel, M.L., & Shah, P.S. (2014). Pedestrian Priority in Urban Area and Usefulness Towards Community, *International Journal of Research in Engineering and Technology*, Volume 3(1), pp.526–530.
- Code of Practice for Access of Disable Person Outside Building (MS1331:2003). Department of Standards Malaysia. Selangor.
- Code of Practice for Universal Design and Accessibility in Built Environment (MS 1184: 2014). *Department of Standards Malaysia*. Selangor.
- Frazila, R.B. & Zukhruf, R. (2018). Exploring Physical Attributes of Walkability from Perspective of Blind Pedestrians: *MATEC Web of Conferences*.
- Hesla, B. & Kennedy, M. K. (2008). We Have Human Rights. *Harvard Project on Disability*, Harvard.

- Jabatan Kebajikan Malaysia. (2021). *Pendaftaran Orang Kurang Upaya*. Available online at: <https://www.jkm.gov.my/jkm/index.php?r=portal/full&id=ZUFHTB1NnJWM0EreGtwNC9Vb1hvdz09>, Accessed on 3 September 2021.
- Jeong, D.Y., Kwahk, J., Han, S.H., Park, J., Lee, M., & Jang, H. (2018). A Pedestrian Experience Framework to Help Identify Impediments to walking by Mobility-Challenged Pedestrians, *Journal of Transport & Health*. Volume 10, pp.334-349.
- Laws of Malaysia Act 685. (2008). *Persons with Disabilities Act*. Percetakan Nasional Berhad. Kuala Lumpur.
- Mascetti, S., Ahmetovic, D., Gerino, A., & Bernareggi, C. (2016). ZebraRecognizer: Pedestrian Crossing Recognition for People with Visual Impairment or Blindness, *Pattern Recognition*. Volume 60, pp.405-419.
- Mazifah, S., Mohd Faizal, N., & Ahmad Rasidi., Y. G. (2010). *Panduan Rekabentuk Sejagat (Universal Design) – Kemudahan Rekreasi Taman Awam*. Kuala Lumpur, Jabatan Landskap Negara, Kementerian Perumahan dan Kerajaan Tempatan.
- Nuzir, F.A. & Dewancker, B. J. (2014). Understanding the Role of Education Facilities in Sustainable Urban Development: a Case Study of KSRP, Kitakyushu, Japan, *Procedia Environmental Sciences*, Volume 20, pp.632-641.
- Schoon, J. G. (2010). *Pedestrian Facilities-Engineering and Geometric Design*. Thomas Telford. London.
- Shamsuddin, S., Abu Hassan, N. R., Ilani Bilyamin, S. F. (2012). Walkable Environment in Increasing the Liveability of a City, *Procedia - Social and Behavioral Sciences*, Volume 50, pp.167-178.
- Stillman, M. D., Bertocci, G., Smalley, C., Williams, S., & Frost, K. L. (2017). Healthcare Utilization and Associated Barriers Experienced by Wheelchair Users: a Pilot Study, *Disability and Health Journal*, pp.1-7
- Universal Design Guideline*. (2011). Federal Department of Town and Country Planning Peninsular Malaysia. Kuala Lumpur.

Zainol, R., Ahmad, F., Nordin, N. A., & Aripin, A. W. (2014). Evaluation of Users Satisfaction on Pedestrian Facilities Using Pair-Wise Comparison Approach: *8th International Symposium of the Digital Earth (ISDE8)*, pp. 1–6.

Author(s) Biodata



Liyana Mohamed Yusof holds a Ph.D. in Architecture from Deakin University, a Master of Architecture from The University of Adelaide and a Bachelor of Science (Architecture) from Universiti Teknologi Mara Shah Alam, Malaysia. She has been with Universiti Malaysia Pahang since 2016 and at present she is a senior lecturer in the Faculty of Civil Engineering Technology.

Email: liyanam@ump.edu.my

DOB: 20 March 1984



Shaliha Minhad holds a Bachelor of Engineering Technology (Infrastructure Management) from University Malaysia Pahang and Diploma in Civil Engineering from Port Dickson Polytechnic. She graduated from Universiti Malaysia Pahang in 2018, and at present, she is an executive in a non-destructive testing company in Negeri Sembilan.

Email: shaminhad@gmail.com

DOB: 31st December 1991



Noor Asiah Mohamad holds a Master of Engineering (Civil) from Universiti Teknologi Malaysia and a Bachelor of Civil Engineering (Hons) from Universiti Teknologi Petronas. She has been with Universiti Malaysia Pahang since 2013, and at present, she is a lecturer in the Faculty of Civil Engineering Technology

Email: noorasiah@ump.edu.my

DOB: 11th May 1985



Nurhidayah Azmy is a senior lecturer from the Faculty of Civil Engineering Technology in Universiti Malaysia Pahang (UMP). Previously, she graduated from Iowa State University with a Doctor of Philosophy (Civil Engineering). Currently, she is the Deputy Director at the Centre of Academic and Innovative Competitiveness (CAIC), UMP. She has expertise in construction project management, specifically in safety and quality in construction, as well as human factors in construction. Her current projects include the development of a self-assessed quality checking system for residential housing. Email: hidayahba@ump.edu.my
D.O.B: 6th November 1980