

# Walkability in The Musamus University Campus Area

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**Abstract.** As an embodiment of meso-scale architecture, Musamus University must continue to improve itself to meet the needs of the growing activity actors in the campus environment. Pedestrian needs are the basis of an area that needs to be reviewed in this context. The movement of activity actors still uses motorized vehicles which results in spatial conflicts. This study aims to determine the walkability score of the Musamus University campus area and provide suggestions to improve the score so that it becomes an area that stimulates walking. The 6 urban attributes (variables) used to determine the walkability score according to the context of this area are connections to destinations, pedestrian comfort, legible, accessible, safe and pedestrian zones. Data, analysis and scoring of the walkability of the Musamus University campus area showed a score of 1.4 (not met). Availability of pedestrian paths; connectivity and continuity of the path; availability of shelters, seats and shade; disability facilities and strollers; conflicts with other modes of transportation; and pedestrian zones are the most influential walkability parameters.

**Keywords.** Musamus University, pedestrian path, walkability.

## 1 Introduction

Musamus University embodiment of meso-scale architecture consists of the Faculty of Engineering, Faculty of Agriculture, Faculty of Teacher Training and Education, Faculty of Economics, Faculty of Social and Political Sciences and Faculty of Law. Walkability is an important aspect in this context. The area and many mass buildings that make up the campus area are a problem for policy makers related to the movement of activity actors at Musamus University. The movement of activity actors from one place to another in the campus area still uses motorized vehicles, often using

the same space as pedestrians. This conflict is one of the low interest in walking in the campus area. In addition, pedestrian paths are inadequate, not accessible to all groups, not connected to the entire campus area, and there is no shade.

Ideally the campus area accommodates the needs of pedestrians. The meso-scale design should be structured to stimulate walking as a practical and inexpensive form of transportation [1]. Three interrelated elements influence the urban form for pedestrians namely pedestrian permeability, connection to transportation and strategic planning [1].

**Table 1.** Important elements of urban form for pedestrians.

Element	Definition	Typical benefits
Pedestrian permeability	Accessible environment provides a walkway that is free from obstructions	<ul style="list-style-type: none"> <li>• There is reduced waiting time at traffic and crossings.</li> <li>• Pedestrians are priority at crossings.</li> <li>• The closed path can still be used by pedestrians.</li> <li>• Implementation of low-speed zones and shared zones.</li> </ul>
Connections to destinations	The extent to which the pedestrian network is integrated from origin to destination	<ul style="list-style-type: none"> <li>• Pedestrian networks connect to final destinations, such as schools, shops, supermarkets, parking lots, public spaces and community services.</li> <li>• Pedestrian paths provide shelter, shaded seating and pedestrian signage.</li> <li>• The environment around the public transportation nodes is pedestrian friendly.</li> <li>• There is land use planning and transportation planning.</li> </ul>
Strategic planning	The extent to which local strategies and policies encourage walking as a mode of transport	<ul style="list-style-type: none"> <li>• Policy development plans that promote walking.</li> <li>• Traffic can be managed.</li> <li>• Actively promote walking program.</li> <li>• There is clear coordination between parks and roads for pedestrian path plans, lighting and signage.</li> </ul>

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Further explained that there are 9 main characteristics to support a walkable community, namely connected, legible, comfortable, convenient, pleasant, safe, secure, universal and accessible [1]. We should interpret walkability as a basic form of movement of activity actors by paying attention to aspects of the safety, security, economy, and convenience of traveling by foot. The components of the global walkability index consist of safety and security, convenience and attractiveness, and policy support [2]. The key to encouraging activity actors to choose walking rather than driving is the quality of the pedestrian environment, there are six pedestrian network design criteria, namely connectivity, connectivity with other modes, the presence of guiding blocks, security, lane quality and lane context/clarity [3].

Walkability is a basic understanding of mobility, but now it is a lifestyle, a real need as well as a function of the area [4]. Some important factors that make the area more walkable are:

**Center:** an area designed to be more walkable requires an activity center to support community activities,

**Open space and parking:** an open area is needed for a place to gather and play,

**Walkable approach:** the building is as close as possible to the road and the parking location should be underground or behind the building,

**School and work environment:** should be designed to create an easy walking ecosystem,

**Complete streets:** streets should serve and provide a sense of security to cyclists, pedestrians and users of public transportation (transit) [4].

The main mode of transportation in a sustainable city should be walking, being more environmentally friendly, sociable, and health conscious [5]. Promoting walking and creating urban patterns that support pedestrian needs are the principles of New Urbanism (NU) [5]. The journal of Urbanism entitled Walkability-the New Urbanism principle for urban regeneration describes 10 urban attributes to assess the walkability of an area, as follows [5]:

**Table 2.** Urban attributes and explanation.

Urban attribute	Explanation
1. Pedestrian connectivity	<ul style="list-style-type: none"> <li>• Are there any communication barriers/obstacles along the pedestrian path, such as dead ends, fences, transit roads and if so, to what extent do these barriers interfere with communication?</li> </ul>
2. Access and control	<ul style="list-style-type: none"> <li>• How is the accessibility of the space, is it a closed space that is far from public access?</li> </ul>
3. Visual interest	<ul style="list-style-type: none"> <li>• Is the facade attractive to pedestrians (such as the presence of shopfronts, windows, entrances)?</li> </ul>
4. Convenience of use	<ul style="list-style-type: none"> <li>• Is the space adapted to the needs of pedestrians in terms of the width of the lane?</li> <li>• Is there street furniture or greenery?</li> </ul>
5. Historical identity	<ul style="list-style-type: none"> <li>• Are any historical constructs preserved or re-adapted?</li> <li>• Does the area have multiple functions?</li> </ul>
6. Mixed-use	<ul style="list-style-type: none"> <li>• Are there civil buildings? If so, what do you serve?</li> <li>• What types of services exist in the area, and how are they distributed (zoning)?</li> </ul>
7. Public transportation	<ul style="list-style-type: none"> <li>• to what extent is public transportation accessible?</li> </ul>
8. Pedestrian zone	<ul style="list-style-type: none"> <li>• Is there a special zone for pedestrians?</li> <li>• Are there zones where high density parking is allowed?</li> </ul>
9. Maintenance	<ul style="list-style-type: none"> <li>• How well is the area treated? (judging by the level of damage resulting from daily use and cleanliness)</li> </ul>
10. Accessibility for users with mobility challenges	<ul style="list-style-type: none"> <li>• Are there facilities that make it easier for wheelchairs (disabled) and strollers?</li> </ul>

This study uses 6 urban attributes in assessing walkability in the Musamus University campus area based on the literature study above. Urban attributes adapt to the context and condition of pedestrian facilities

at Musamus University as an embodiment of meso-scale architecture, while the urban attributes used are as follows:

**Table 3.** Urban attributes, explanations and walkability parameters in the Musamus University campus area.

Urban attribute	Explanation	Parameter
Conections to destinations	Continuity and connectivity of the pedestrian network from origin to destination	1. A connected and integrated pedestrian network in the Musamus University campus area
Pedestrian comfort	The pedestrian path has a standard width, is comfortable, provides shelter, seating, shaded with a flat surface	1. Pedestrian width 2. Pedestrians provide shelter, seating, and shade/greenery 3. Pedestrian surface condition
Legible	A clear, legible and understandable network of pedestrian paths	1. Batas jalur pejalan kaki (delineasi) 2. Signage yang memberi kemudahan dan kenyamanan bagi pejalan kaki

Accessible	Pedestrian paths that are easily accessible by all people of activity in the Musamus University campus area	<ol style="list-style-type: none"> <li>1. Facilities that facilitate wheelchairs (disability) and strollers (parents)</li> <li>2. Barrier-free pedestrian paths</li> </ol>
Safe	Pedestrian paths that are safe from traffic hazards, especially from motorized vehicle crossings	<ol style="list-style-type: none"> <li>1. Space conflicts with other modes of transportation</li> <li>2. Safe from traffic hazards</li> </ol>
Pedestrian zone	Clear zoning division between parking-only zones and pedestrian-only zones	<ol style="list-style-type: none"> <li>1. Clarity of parking zones</li> <li>2. Special zoning in the campus area for pedestrians</li> </ol>

## 2 Research Method

This research was conducted on the Education road, The focus of this study examines the condition of the pedestrian path network in the Musamus University area, as an infrastructure that supports the mobility of activity actors moving from one point to another in the campus area. It is necessary to know the extent of the walkability level of the Musamus University campus area based on the urban attribute and measured parameters. The scope of this research is as follows:

1. Determine and clarify the pedestrian path network throughout the Musamus University campus area that will be studied.
2. Using the researcher's perception in scoring walkability.
3. The 6 urban attributes that were formulated previously were used as research variables in scoring the condition of the pedestrian path.
4. Qualitative deductive is a research method used by collecting data through observation by researchers.
5. Observation through direct and thorough observation of the condition of the pedestrian network in the Musamus University campus area, aims to obtain walkability quality data.

Determination of the pedestrian path network based on observations of the movement of activity actors and frequently used routes that cover almost the entire campus area. There are 3 types of pedestrian paths, namely entrance and exit pedestrian paths, primary pedestrian paths and secondary pedestrian paths. The explanation of the three types of pedestrian paths is as follows:

1. Entrance and exit pedestrian paths are pedestrian paths used to enter and exit the campus area. The Musamus University implements a one-door system.
2. Primary pedestrian path is the backbone path that becomes the center of the pedestrian path to make movement to the building/point of each destination.
3. Secondary pedestrian path is a pedestrian path that connects the primary pedestrian path to the respective building/point of destination.

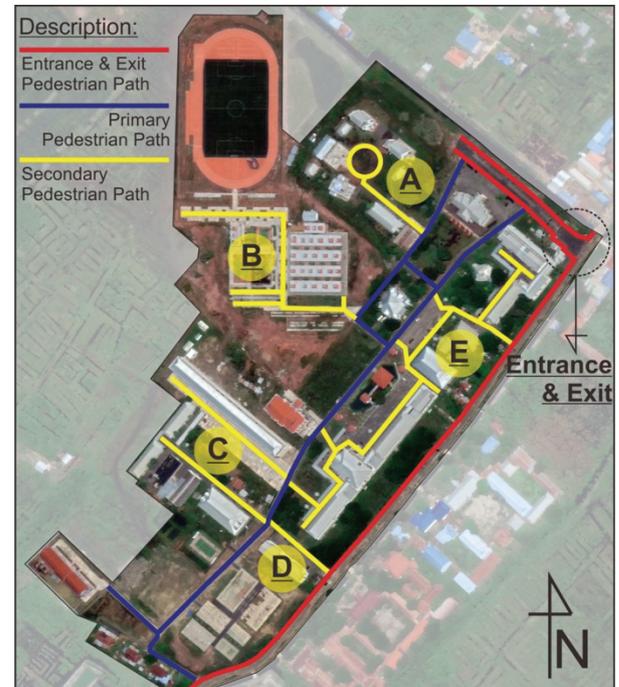
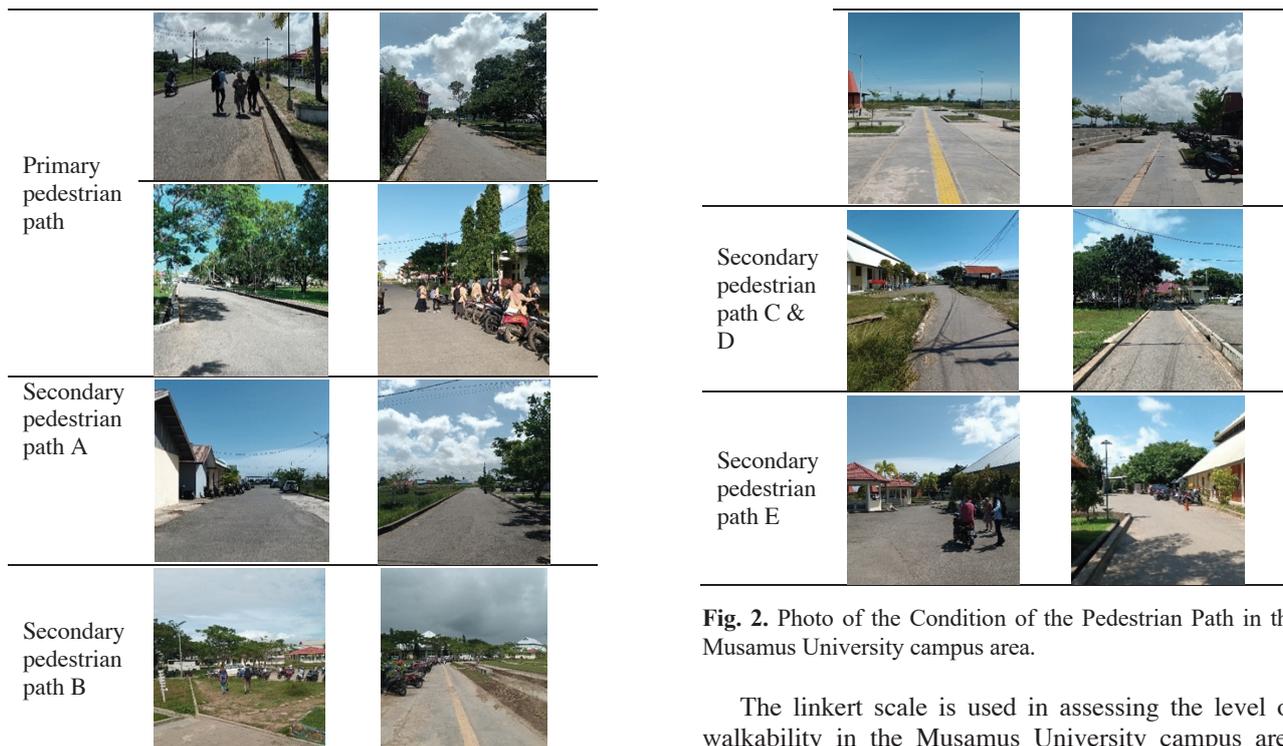


Fig. 1. Networks and types of pedestrian paths

The secondary pedestrian path is divided into 5 based on the final pedestrian destination. Secondary pedestrian path A with the final destination zone of places of worship and physics laboratory; secondary pedestrian path B with the final destination of sports zone I and canteen; secondary pedestrian path C with the final destination of the Faculty of Agriculture, majoring in Mechanical Engineering and teaching buildings; secondary pedestrian path D with the final destination majoring in Electrical Engineering and Department of Physical Education, Health and Recreation (Penjaskes); secondary pedestrian path E with the final destination of the Faculty of Engineering, Faculty of Teacher Training and Education (FKIP), Faculty of Economics and Faculty of Law. The primary pedestrian path, apart from being a backbone route, is also a route to the Rectorate building, PKM building, Musamus University Hotel and sports zone II.





**Fig. 2.** Photo of the Condition of the Pedestrian Path in the Musamus University campus area.

The linkert scale is used in assessing the level of walkability in the Musamus University campus area with a score of 1-5, namely 1 (not met), 2 (partially fulfilled), 3 (partially fulfilled), 4 (mostly fulfilled and 5 (all fulfilled). The following walkability level scoring guide is used:

**Table 4.** Walkability level scoring guide in the Musamus University campus area.

Urban attribute	Scoring
Conections to destinations	Path availability, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Connectivity and path continuity, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Path width, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
Pedestrian comfort	Availability of shelter, seating and shade, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Path surface condition, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
Legible	Path boundary/delineation, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Pedestrian signage, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
Accessible	Disabled facilities and strollers, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Path freeway, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
Safe	Conflicts with other modes of transportation, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Safe from traffic hazards, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
Pedestrian zone	Clarity of parking zones, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%
	Pedestrian zone, (1)<25%; (2) ≥25%; (3)≥50%; (4)≥70%; (5)≥90%

### 3 Results and Discussion

The results obtained from the analysis of all pedestrian paths in the Musamus University campus area are as follows:

1. Conections to destinations  
 The highest score of this urban attribute is at the entrance and exit of the pedestrian path, with a score of 100% lane availability and lane continuity. It can be said that both parameters are achieved on this path.
2. Pedestrian comfort  
 The highest score of the urban attribute of walking comfort at the entrance and exit of the pedestrian path, with a track width score of 75%; scoring the

availability of shelter, seating, and shade 20%; and scoring track surface conditions 90%.

3. Legible  
 The highest score of the urban attribute is legibility at the entrance and exit of the pedestrian path, with a 100% path delineation scoring and a signage scoring that makes it easy for pedestrians 10%. The path delineation parameter is reached, but there is no signage.
4. Accessible  
 The highest score for the urban attribute accessible at the entrance and exit of the pedestrian path, with a score of 10% for disability facilities and strollers; and the freeway scoring reaches 100%. The barrier-free path parameter is reached, while disability facilities and strollers do not exist on this route.

5. Safe

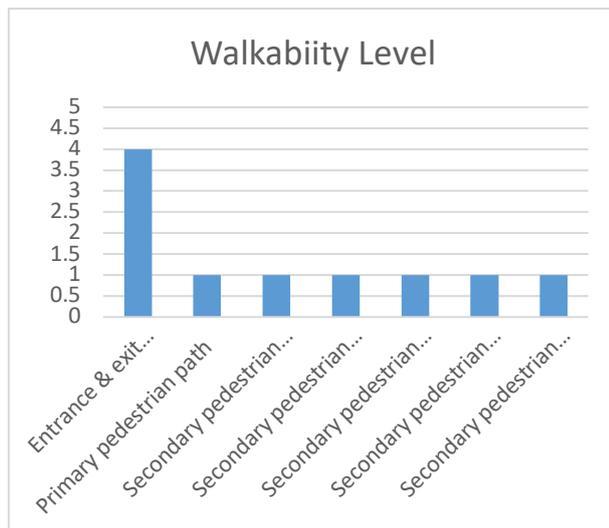
The highest score of the urban attribute safe at the entrance and exit of the pedestrian path, scoring conflicts with other modes of transportation is 100%; and safe scoring from traffic hazards reaches 100% as well. Both parameters are achieved because there is already clear space for pedestrians on this path.

6. Pedestrian zone

The highest score of the urban attribute of the pedestrian zone at the entrance and exit of the pedestrian path, the clarity scoring of parking zones is 10% and the pedestrian zone is 100%. Parking zone information boards are still very few.

**Table 5.** Scoring walkability level in the Musamus University campus area.

Path	Urban attributes						Scoring Walkability
	A	B	C	D	E	F	
Entrance & exit pedestrian path	5	3,5	3	3	5	3	4
Primary pedestrian path	1	1	1	1	1	1	1
Secondary pedestrian path A	1	1	1	1	1	1	1
Secondary pedestrian path B	1	1	1	1	1	1	1
Secondary pedestrian path C	1	1	1	1	1	1	1
Secondary pedestrian path D	1	1	1	1	1	1	1
Secondary pedestrian path E	1	1	1	1	1	1	1
Average	1,6	1,4	1,3	1,3	1,6	1,3	<b>1,4</b>



**Fig. 3.** Graph of walkability levels in the Musamus University campus area

**4 Conclusion**

The walkability level in the Musamus University Merauke campus area is 1.4 (not met) based on the data, analysis and scoring of the walkability level that has been carried out. Several parameters of the urban attributes that affect the walkability score in the Musamus University campus area, namely the availability of pedestrian paths; linkages and continuity of paths; availability of shelters; seating and shade; path boundary/delineation; pedestrian signage; disability facilities and strollers; conflicts with other modes of transportation; and pedestrian zones. There are still many aspects that need attention so that the Musamus University campus area becomes walkable, involving policy makers and support from all parties. Here's a suggestion to make the locus a walkable region:

**4.1 Entrance and exit pedestrian path**

This path, which varies in width from 1 meter to 1.2 meters, is the only path with good availability, continuity and connectivity. The following are suggestions for improving the walkability score of this path:

1. Increase pedestrian comfort by widening the lane according to the standards from the Urban Street Design Guide book to a minimum of 6 feet (1.8 meters) and providing shelter, seating, and shade.
2. Improve legibility by procuring signage in the form of information boards and wayfinding.
3. Improve accessibility by providing disability facilities and strollers.

**4.2 Primary pedestrian path dan secondary pedestrian path A-E**

Broadly speaking, this backbone path does not have the availability of paths, continuity and connectivity. Conflicts with other transportation modes are also inevitable due to the lack of clarity between the pedestrian and motorized vehicle lanes. The same thing also happened to the secondary pedestrian paths A to E. The following are suggestions to improve the walkability score of this path:

1. Increase connections to destinations by meeting path availability, connectivity and path continuity.
2. A minimum lane width of 6 feet (1.8 meters) with the availability of shelters, seats and shade to achieve the minimum requirements for pedestrian comfort.
3. Clear path boundaries/delineations and signage procurement to achieve minimum legal requirements.

4. Improve accessibility by creating barrier-free pedestrian paths, complete with disability facilities and strollers.
5. The absolute safe variable is met, pedestrians must avoid conflicts with other modes of transportation.
6. Clarify parking zones in the campus area, and determine pedestrian zones that cannot be entered by motorized vehicles. Canteen and sports zone I become 100% pedestrian space.

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