RUAS (Review of Urbanism and Architectural Studies)
eISSN: 2477-6033 | pISSN: 1693-3702
journal homepage: https://ruas.ub.ac.id
RUAS Vol. 22 No. 2 (2024) DOI: https://doi.org/10.21776/ub.ruas.2024.022.02.3

The Role of Landscape Architecture in Sustainable Urban Development: Implementation of Universal Design

Nahdatunnisa[1], Fajar[2], M. Arzal Tahir[3], Ahsan Hidayat Setiadi[4]

[1,4] Department of Architecture, Universitas Muhammadiyah Kendari, Kendari, 93127, Indonesia
[1,2]Magister Arsitektur, Fakultas Teknik Sipil dan Perencanaan, UII, Yogyakarta, 55584, Indonesia
[3]Department of Architecture, Halu Oleo University Kendari, Kendari, 93232, Indonesia

ARTICLE INFO

Article History:
Received: April 5, 2024
Received in revised form: November 30, 2024
Accepted on: November 25, 2024
Available Online: December 2024–May 2025

Keywords: design, implementation, landscape architect, sustainable
(desain, implementasi, arsitek lansekap, berkelanjutan)

Corresponding Author:
Nahdatunnisa
Universitas Muhammadiyah Kendari
Email: 20922008@students.uii.ac.id
ORCID ID: 0009-0007-2796-4730

ABSTRACT

Arsitektur lanskap berperan penting dalam pembangunan berkelanjutan melalui integrasi prinsip desain universal pada pengembangan ruang terbuka publik. Taman kota, jalur hijau, dan plaza dirancang ramah lingkungan dan inklusif. Desain universal mencakup aksesibilitas menyeluruh, seperti ramp, jalur taktil, dan material yang aman, sambil mendukung keberlanjutan ekologis melalui infrastruktur hijau seperti taman resapan dan bioswale. Penelitian ini menggunakan studi kasus di area publik kota Kendari, dengan metode observasi dan wawancara. Teknik analisis dan sintesis diterapkan untuk memahami kebutuhan, potensi, dan tantangan, serta mengintegrasikan elemen ekologis, sosial, dan teknis dalam desain yang harmonis. Hasil penelitian berupa panduan dan rekomendasi praktis untuk mengimplementasikan desain universal dalam arsitektur lanskap, termasuk tata letak yang mendukung interaksi sosial, penggunaan material ramah lingkungan, dan strategi pengelolaan air. Penelitian ini menunjukkan bahwa desain universal tidak hanya meningkatkan inklusivitas tetapi juga memberikan manfaat ekologis, sosial, dan budaya, sehingga berkontribusi pada terciptanya ruang publik yang adaptif, inklusif, dan mendukung keberlanjutan kota.

Landscape architecture significantly contributes to sustainable development by incorporating universal design principles in the design of public open spaces. The design of urban parks, green corridors, and public squares prioritizes ecological sustainability and accessibility. Universal design incorporates accessibility features like ramps, tactile paths, and safe materials, while also promoting ecological sustainability through the use of green infrastructure like catchment parks and bioswales. This case study takes place in a public area in Kendari. We gathered the data through observational and interview techniques. We utilize analytical and synthetic methods to understand requirements, capabilities, and obstacles while integrating ecological, social, and technical components into a cohesive design. The research findings consist of practical principles and recommendations for the implementation of universal design in landscape architecture, encompassing layouts that facilitate social interaction, the utilization of sustainable materials, and solutions for water management. This research demonstrates that universal design enhances inclusivity while offering ecological, social, and cultural advantages; therefore, it aids in the development of public places that are adaptable, inclusive, and promote urban sustainability.

1. Introduction

The rapid global expansion of cities poses significant challenges to sustainable urban development (Benson & Roe, 2020). Striving to achieve a balance between urbanization development and environmental preservation, the role of landscape architecture has emerged as a pivotal element in shaping sustainable urban spaces (Sanjaya et al., 2017) This study focuses on applying landscape architecture design principles to urban parks because they are an important element of urban infrastructure that functions as a public green space with ecological, social, and cultural benefits (Masruroh et al., 2015). Urban parks have a strategic role as spaces for social interaction, recreational areas, and support for environmental sustainability, such as climate change mitigation, air quality improvement, and water management. Serving as a case study that embodies a genuine effort to establish open spaces conducive to sustainable urban development (Adhitama et al., 2023; Faizah & Fatimah, 2020).

City parks represent public outdoor spaces that citizens can utilize for various activities without charge (Fatimah & Fadhilah, 2021). Consequently, city parks must be capable of manifesting themselves as spaces for diverse user activities (Budiyanti et al., 2018). City parks serve two functions: ecological and social (Dewang & Leonardo, 2010). Ecologically, they act as custodians of the city environment's quality, while socially, they offer venues for social interaction, exercise, play, and recreation (Fatimah & Fadhilah, 2021). As public facilities, city parks must cater to all demographic groups, including those with normal conditions, small children, people with disabilities (disable), and the elderly (Uniaty, 1992). One approach to meeting these diverse needs is through the application of seven design principles (Fadila & Angestiwi, 2023). Propose environmentally friendly paving materials, such as permeable concrete, or local materials that support rainwater absorption, reduce heat, and improve the aesthetics of pedestrian paths in green spaces. The selection of green open space (RTH) MTQ Tugu Religi Park as a case study object in this research is based on its important role in creating a sustainable and inclusive urban environment. Green spaces not only provide ecological benefits, such as rainwater absorption and air pollution reduction but also serve as public spaces that support people's physical and mental health (Nahdatunnisa et al., 2023b).

2. Method

This research is field research, where data collection was conducted to observe a phenomenon in its natural context, as emphasized by Susanto (Nahdatunnisa et al., 2023a). This study employed descriptive qualitative research, aiming to portray a social phenomenon and describe the nature of an ongoing situation at the time of the study. This qualitative approach ensures comprehensive information for scientific development and applicability to various problems (Nahdatunnisa et al., 2022).

The research focuses on MTQ Tugu Religi Park and Kendari Mayor City Park, prominent city parks that are currently receiving considerable attention from the

residents of Kendari. This research used a case study approach to green open spaces (RTH) in urban areas, focusing on direct observation, interviews, and analysis of public space design documents. The research process began with the identification of the RTH location, followed by data collection through observation of design elements such as pedestrian pathways, accessibility, comfort, and sustainability. The researchers conducted interviews with space users and stakeholders to gain their perspectives on the effectiveness of the design. We analyzed the data using qualitative and quantitative techniques to evaluate the design's suitability with universal design principles and ecological sustainability.

Research variables included accessibility, comfort, ecological sustainability, and social interaction. Accessibility was measured by observing elements such as ramps and tactile pathways; comfort was evaluated through user surveys; ecological sustainability was assessed by looking at the use of eco-friendly materials and infiltration gardens, while social interaction was measured based on the level of user engagement in green open spaces. The assessment tools are based on international criteria, such as the ADA for accessibility, as well as the quality of spaces that support various social and physical activities. The literature review established a theoretical foundation for universal design, accessibility, and green open spaces in Ahmad Yani's sustainable urban planning.

The results of field observations were categorized based on city park elements, and subsequent analysis assesses compliance with accessibility standards and universal design principles (Kurniawan, 2014). The findings led to the formulation of a design direction as a solution (Fatimah & Fadhilah, 2021).

3. Results and Discussion

The pedestrian path environment of the green open space of MTQ Tugu Religi public incorporates various facilities, including distinct areas designated for jogging and sports agility, business zones for MSME entrepreneurs featuring coffee shops and restaurants (culinary), as well as parking and pedestrian path areas, spanning an approximate area of 6 hectares. Towards the front of the area, a parking lot for private vehicles is present; however, certain sections are utilized by street vendors for selling purposes. Notably, the vegetation density in this public space is markedly low, constituting less than 50% of the total open space area. The existing vegetation primarily comprises unkempt shrubs.

Universal design is an approach that aims to create spaces that can be used by everyone, regardless of their age, physical ability, or socioeconomic status. According to Preiser & McDonald in the “Universal Design Handbook” (2010), universal design includes not only elements of accessibility but also qualities of space that encourage wider social participation. The concept of ecological sustainability is very important in the design of green open spaces in urban areas. In Sustainable Urbanism by Douglas Farr (2010), urban sustainability is not only determined by technological aspects and natural resource management but also by spatial design that effectively integrates green

elements. Green open spaces designed with sustainability principles, such as infiltration gardens and the use of environmentally friendly materials, play an important role in increasing the city's resilience to climate change (Nahdatunnisa and Arzal Tahir 2024).

Figure 1. Reseach Location
(Soure: Nahdatunisa, 2024)

Table 1. Implementation Analysis of Universal Design

No.	Element	Condition	Standard of the Ministry of Public Works and Housing regulation no 14, 2017	Conclusion
1.	Stairs (Area Entrance)	The size of the stairs complies with accessibility standards, but there is no handrail.	Step height maximum of 18 cm and minimum if 15 cm, and width minimum of 30 cm. Material is non-slip and edges are anti-slip. Maximum slope is 350, equipped with handrail.	Reduce accessibility
2.	Plaza, Parking and Culinary Area	Plaza, parking and culinary areas do not meet accessibility standards because they are not equipped with clear markers and do not provide special parking for disabilities.	Equipped with clear directions and markers Disabled parking is available with a symbol with a maximum slope of 20, 370 cm wide.	Less accessibility
3.	Ramp	The size of the ramp available in segments 1, 2 and 3 has a non-uniform size, making it challenging for people with disabilities.	Lebar min. 120 cm , Width minimum of 120 cm, max slope 6°. Effective width of mininum 95 cm Textured, non-slip surface, equipped with warning tiles. Equipped with hand railing	Less accessibility
4.	Pedestrian path	The size is not up to standard and there is no guideway. Some sections have barriers, making it difficult for users with special needs.	The surface must be stable, strong, weatherproof and non-slip. The minimum width of 150 cm for one-way and 160 cm for two-way lanes. Equipped with tiles with a minimum height of 10 cm and width of 15 cm Equipped with guideway/marker.	Less accessibility
5.	Park bench	Access to the park bench is difficult for users of assistive devices, because the circulation path is cut off and there are many obstacles along the path.	Surface must be flat with maximum stand height of 45 cm, width of 60 cm, and length of 120 cm	Less accessibility
6.	Signs and Markings	Lack of availability of signs and markings as information for visitors, especially for people with disabilities.	Must be informative and easy to find. There are signs and markings for disabilities Placement must be appropriate and properly sight-free	Reduce accessibility

(Soure : Nahdatunisa, 2024)

The accessible public spaces designed for disabled people, the elderly, and other vulnerable groups require design elements consideration that can reduce physical barriers (Hanson, 2024). Based on the analysis, the elements within the green open space of Tugu Religi have not been fully aligned with the standards of the Ministry of Public Works and Housing Regulation No. 14 of 2017 (table 1).

Table 2. Implementation of Universal Design Principles in Tugu Religi

No.	Description	Design principe	Implementasi
1.	***Tolerance For Error***	• Minimize hazards and losses due to accidents or unintentional events.	• The surface of the pedestrian path is slippery and potholes can pose a danger to its users. • There is a difference in the height of the pedestrian path • There is no connection between lanes so circulation is interrupted. • Open drainage channels that are prone to accidents for visitors. • Park benches are only available in segment 2 and segment 3. • Lack of availability of markers as directions
2.	***Perceptible information***	• Provision of important supporting information for users. • Existing parking areas are equipped with parking instructions and parking lines. • Vehicle parking patterns that require drivers to park their vehicles in an organized manner. • Special parking for the disabled.	• Signposts are not yet available to direct users. • Information about the location of facilities in the park area is not yet available. • Signs about non-smoking areas and • No littering in any place. • There is no disabled park symbol yet.
3.	***Low physical effort*** (Upaya fisik rendah)	• Existing facilities can be used efficiently and comfortably in all conditions. • The elements of the outdoor space are safe for users. • Parking areas directly adjacent to highways with high intensity are designed in such a way as to minimize the occurrence of traffic accidents.	• The unavailability of handrails on the stairs poses a risk of injury or accident for crutch users, the elderly, and even the blind. • The absence of guideways on stairs and pedestrian paths. • The difference in elevation/height of the path. • Drainage channels that interfere with circulation.
4.	***Equitable use***	• The design minimizes the occurrence of hazards and losses due to accidents or accidental events. • Easy to access by all people including people with disabilities	• Wheelchair users cannot access the park independently • Segments of the area have not been connected so circulation is interrupted
5.	***Simple and intuitive use***	• The design of park facilities should be easily accessible. • Stairs and ramps should be accessible to all and have a simple and easy design.	• People with disabilities have not been able to access the area independently
6.	***Size and space for approach and use***	• Requiring the use of space size in design by approaching the posture, size and movement of users. • The width of the existing pedestrian path is following accessibility standards and also uses materials with rough surfaces so that they are not dangerous for people with disabilities.	• The size of the stairs is also following accessibility standards but there is no handrail. • The ramp available does not meet the standard of the three ramp models available, only ramp Model 2 is close to the required standard.
7.	***Flexibility in use***	• Accommodating a variety of circumstances and individual abilities. • Entrances can be accessed from all points and provide multiple entry options for use. • Ramp is easily accessible to all.	• The sizes of the pedestrian paths are varied • Ramps and guiding blocks are not yet available in segments 4,5 and 6 area.

(Soure: Nahdatunisa, 2024)

The facilities in Tugu Religi do not fully adhere to the accessibility standards established by the government (table 1). Stairs, ramps, and pedestrian paths are only classified as meeting the criteria for sufficient accessibility, indicating that these elements fail to satisfy some of the accessibility requirements. Moreover, certain issues persist, such as steep slopes, the absence of handrails, and a lack of guiding paths. Elements categorized as having sufficient accessibility may still be utilized by the majority of visitors, yet they remain challenging for specific individuals, such as those with disabilities. The accessibility of pedestrian paths is deemed inadequate as some paths fail to meet most requirements, posing difficulties for users, particularly individuals with disabilities. The construction of buildings and their surrounding environments should incorporate universal design principles in each design to ensure accessibility for everyone. This concept has been formalized in Regulation No. 14 of 2017 by the Minister of Public Works and Public Housing, outlining the requirements for building facilities.

Not all elements in Tugu Religi have fully embraced the principles of universal design (table 3). Therefore, there is a need to enhance the facilities and amenities of the city park to ensure inclusivity for everyone. The universal design principles that are least adhered to include the principles of Tolerance for Error and Equitable Use, whereas the most applied principle is the provision of size and space for approach and use. When examining the elements within the existing city park, the least applied universal design principles pertain to markers/signs, pedestrian paths, park benches, and stairs(Tahir, Syah, and Hidayat 2024). These elements require improvement and adjustment to predetermined standards to foster inclusivity for everyone.

Universal design is a philosophy aimed at creating things and environments that are highly accessible for everyone without necessitating significant adaptations. This approach, while catering to people with disabilities, also considers the needs of the elderly, pregnant women, children, and foreigners.

The analysis and observations conducted at the green open space of Tugu Religi revealed that the majority of existing facilities do not adhere to universal design principles. Consequently, there is a need for a design direction to enhance the elements of the current city park in Kendari city. This design direction aligns with the guidelines outlined in the regulation of the ministry of public works and housing No. 14 of 2017, which addresses the requirements for the convenience of buildings, and also refers to the Universal Design Guide for Public Places.

Pedestrian paths encircling the the green open space of Tugu Religi park are recommended to have a width ranging from 150 cm to 160 cm. The height of the pedestrian path from the main road should be between 25 cm and 30 cm, with a platform length of 175 cm and a slope ranging from 7° to 8°. To enhance accessibility for visitors with disabilities, the pedestrian path should feature guiding blocks (yellow lines). Additionally, a ramp should be incorporated from the main road to the pedestrian path, facilitating independent access for visitors who use wheelchairs without requiring assistance.

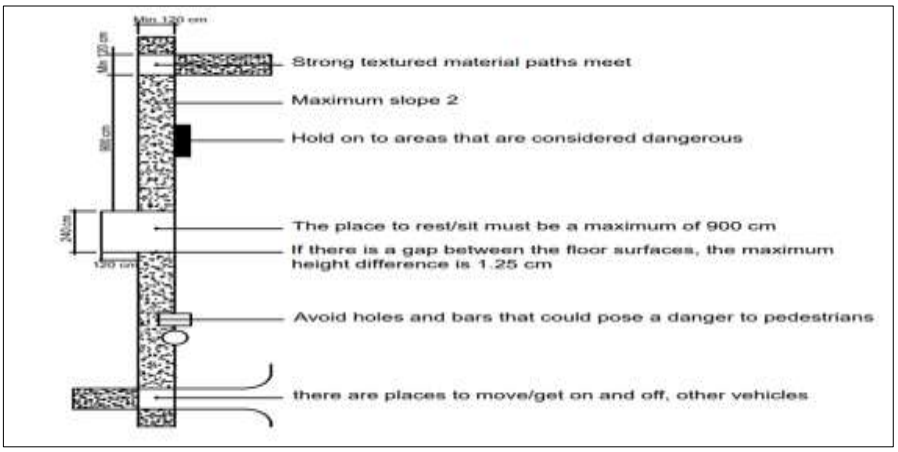
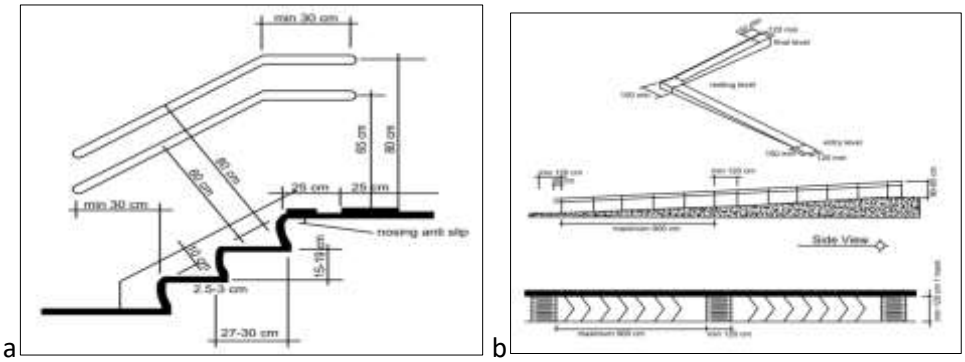


Figure 2. Pedestrian Path Plan
(Soure: Nahdatunisa, 2024)

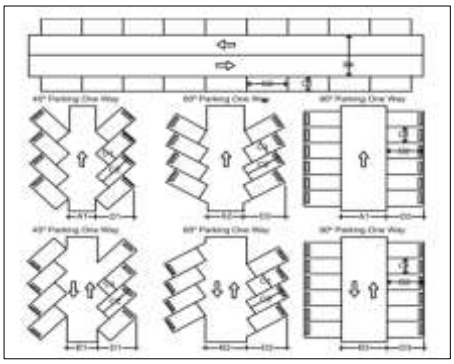
Recommendations for the height of steps in the green open space of Tugu Religi vary, with a height ranging from approximately 15 cm to 19 cm, and the width of steps around 27 cm to 30 cm. An optimal stair design should have a slope of less than 60° and include a handrail on at least one side of the stairs. The handrail should be easy to grasp, positioned at a height of 65 cm to 80 cm from the floor, free from distracting construction elements, and with rounded or well-deflected ends towards the floor, wall, or pole. The ends of the handrail should extend by 30 cm at both the top and bottom (figure 1). The recommended ramp specifications include a width of 150 cm, a height of 25 cm, a runway length of 175 cm, and an approximate slope ranging from 7° to 8°. Additionally, the ramp should be equipped with handrails, adhering to standard heights of 80 cm for adults and 65 cm for children (figure 3b).



a b

Figure 3. Details of Standard Stairs Ramp
(Soure : Personal documentation, year 2024)

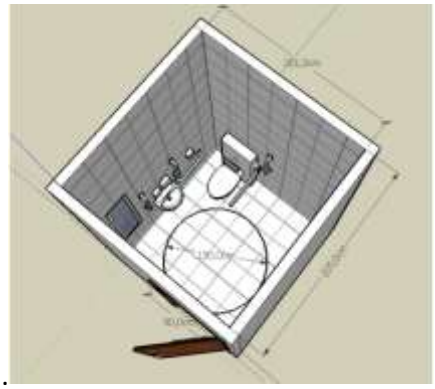
Parking recommendations consider layout, site shape, and also consider economic benefits. Structuring parking pockets by grouping types of vehicles such as: cars, motorbikes, bicycles and preparing special parking for vehicles with disabilities.



Number of Parking Spaces Which are available	Number of Parking Spaces which are accessibility
1 - 25	1
26 - 50	2
51 - 75	3
76 - 100	4
101 - 150	5
151 – 200	6
201 – 300	7
301 - 400	8
401 - 500	9
501 - 1000	2 % of the total
1000 – and so on	20,1 +1 for every hundred

Figure 4. Parking Design and Number of Disabled Parking Spaces
(Soure : Personal documentation, year 2024)

Recommendations for toilets where the space inside the toilet can also be utilized by persons with disabilities has a minimum size of 1520cm x 205 cm. Recommendations for the avaibility of signs and main markings that accommodate the special needs of people with disabilities.

a. 

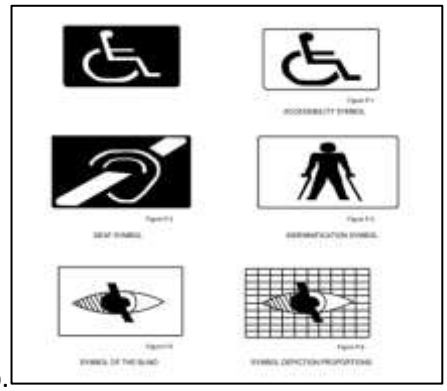
b. 

Figure 5. Awesome Disabled Bathroom (a); Special Signs for the Disabled (b)
(Soure: Nahdatunisa, 2024)

Waste management recommendations for the green open space of Tugu Religi suggest the placement of at least 30 trash bins at various points throughout the park. The positioning of these bins should be carefully considered to ensure easy accessibility for users of wheelchairs, crutches, and for individuals with visual impairments, allowing everyone to access the rubbish bin locations. Efforts to design pedestrian paths inclusive for people with disabilities in the urban public green open space area are guided by universal design principles. Drawing from discussions with experts and the observed characteristics of the research area, the proposed model for an optimal pedestrian path is presented in figure 6.

Figure 6. Lay Out Plan of Public Green Open Space Area
(Soure : Personal documentation, year 2024)

This research makes a significant contribution to the field of urban green open space design by incorporating universal design principles and ecological sustainability. The results of this research are relevant to Gehl's (2010) theory in “Life Between Buildings”, which states that public open spaces should be designed to facilitate social interaction and community activities. This research explores how inclusive green open spaces can enhance social connectivity through designs that consider accessibility and convenience, which is in line with Whyte's (1980) findings on the importance of social elements in public spaces.

In addition, this research also develops an understanding of ecological sustainability integrated in green open space design, in line with Beatley's (2011) theory in “Biophilic Cities”, which suggests that the integration of nature in urban design not only improves quality of life but also supports biodiversity. The main contribution of this research is to provide practical recommendations for creating green open spaces that are not only environmentally friendly but also inclusive, support social interaction, and improve the quality of life of city residents, as well as strengthen the link between spatial design and urban sustainability.

4. Conclusion

Based on the survey results and field data analysis, it is evident that the design of the green open space of Tugu Religi as a public space has not fully embraced universal design principles. Numerous public facilities design within the area fail to accommodate

the needs of people with disabilities, children, and the elderly. To address these issues, the researchers propose design solutions that align with universal design standards. For the development of the green open space of Tugu Religi as a public space, the planners and government authorities of Southeast Sulawesi Province should strategize the implementation of universal design across all factors. This comprehensive approach aims to provide facilities that cater to all users, including those with physical limitations.

In the current state of the green open space of Tugu Religi, renovations can be undertaken in line with the design solutions provided by researchers, with further adjustments made based on existing conditions. These proposed design solutions are tailored to facilitate ease of use for all users, encompassing individuals with disabilities, children, and the elderly in utilizing the available public space facilities.

Acknowledgment

This research is supported by the Kendari City Government, particularly the Kendari City Public Works and Housing (PUPR) Office, the Southeast Sulawesi Provincial Research and Development Agency (Balitbang) Office, and the Kendari City Environment Office. The authors would like to express gratitude to all parties who have contributed data and provided information support for this research.

References

Adhitama, M. S., Wulandari, L. D., Asikin, D., & Pamungkas, S. T. (2023). Spatial - Functional Characteristics of Green Open Spaces in Sports-Recreational Parks and Children's Playgrounds in Trunojoyo Park, Malang City. *Review of Urbanism and Architectural Studies*, 21(1), 72–80. https://doi.org/10.21776/ub.ruas.2023.021.01.8

Benson, J., & Roe, M. (2020). *Landscape and sustainability*. Routledge. New York.

Budiyanti, S., Erawati, T., & Maulida, D. (2018). The Study of Sustainability on Islamic Education Subjects in the Islamic Kindergarten and Elementary Schools. *Image*, 3(4).

Dewang, N., & Leonardo, L. (2010). Accessibility of Public Open Spaces for Certain Community Groups. Study of Public Facilities for Disabled People in the Taman Suropati Menteng Area, Central Jakarta. *Planesatm Journal*, 1(1)

Fadila, D., & Angestiwi, T. (2023). Asset Quality Analysis of Road Corridor Facilities as Public Spaces. *Review of Urbanism and Architectural Studies*, 21(2), 90–99. https://doi.org/10.21776/ub.ruas.2023.021.02.11

Faizah, I. R., & Fatimah, I. S. (2020). Redesign of Malabar Park as a Therapy Park in Bogor City. *Journal of Architecture and Planning (JUARA)*, 3(1), 65–80. https://doi.org/10.31101/juara.v3i1.1014

Fatimah, I. S., & Fadhilah, S. (2021). Evaluation of Road Design Aspects on Pedestrian Paths on the Outer Ring Road of the Bogor Botanical Gardens. *Review of Urbanism and Architectural Studies*, 19(2), 13–27. https://doi.org/10.21776/ub.ruas.2021.019.02.2

Kurniawan, H. (2014). Implementation of Accessibility in the New UGM Library Building. Indonesian Journal of Disability Studies ISSN: 2355-2158

Masruroh, F., Mauliani, L., & Anisa, A. (2015). *Study of Universal Design Principles that Accommodate Accessibility of Disabilities Case Study Taman Menteng*.

Nahdatunnisa, Adi, H. P., Wahyudi, S. I., & Tahir, M. A. (2023a). *Optimizing Pedestrian Path Infrastructure Services in Urban Public Green Open Space Areas*. Unissula.

Nahdatunnisa, Adi, H. P., Wahyudi, S. I., & Tahir, M. A. (2023b). Pedestrian Path Infrastructure in Urban Public Green Open Space (Case Study: Green Open Space Tugu Religi Kendari City, Indonesia). *Civil Engineering and Architecture*, 11(5), 2631–2643.

Nahdatunnisa, Wahyudi, S. I., Adi, H. P., & Tahir, M. A. (2022). Evaluation of the Performance of Pedestrian Paths in Urban Public Green Open Space Areas. *ESEC Proceedings*, 136–142.

Sanjaya, R., Soedarsono, & Mudiyono, R. (2017). Analysis of the Function and Comfort of Regional Pedestrian Paths in Pangkalan Bun City. https://123dok.com/document/zgd2e12z-analisis-fungsi-kenyamanan-jalur-pedestrian-kawasan-kota-pangkalan.html

Nahdatunnisa, and M. Arzal Tahir. 2024. "Assessing the Performance of the Pedestrian Path Accessibility Standards for People with Disabilities." *Sinergi (Indonesia)* 28(3):669–84. doi: 10.22441/sinergi.2024.3.022.

Tahir, M. Arzal, Andi Al-mustagfir Syah, and Ahsan Hidayat. 2024. "Inclusive and Disabled Friendly Pedestrian Path Strategy Strategi Jalur Pedestrian Inklusif Dan Ramah Difabel." 2(6):1029–42.

Uniaty, Q. (1992). *Pedestrian Path Model: Perceptual Study of the Phenomenon and Characteristics of Pedestrian Paths as Part of City Architectural Space* [Thesis]. ITB.