International Journal of Architecture and Urbanism Vol. 06, No. 01, 2022 | 86 – 95

Disability-Friendly Flats with Ecology Architecture Approach

Cyndi Natalia Hutabarat[1*], Nelson M Siahaan[1]

[1] Department of Architecture, Faculty of Engineering, Universitas Sumatera Utara, Medan, Indonesia

Abstract. A disability-friendly flat is a vertical residence that can be accessed and used by everyone including persons with disabilities and the elderly. The implementation of access in vertical buildings that are friendly to people with disabilities has not become a particular concern, especially in Indonesia. Hence, they still experience difficulties and obstacles in carrying out their activities. Disability-friendly flats located in an urban area and close to various public facilities aim to accommodate the problem of the high demand for housing in urban communities, overcome the problem of limited land and green space, provide easy access and achievement, and also realize the life of disability users that is more qualified, fair, physically and mentally prosperous, independent, and dignified. This flat was designed by using an Ecological Architecture approach to decrease environmental issues and problems in an urban area, also create comfort and independence for disability users through the application of these ecological principles that applied to building zones, materials, vegetation, and rainwater that can stimulate the human senses to recognize or identified place. The research method uses descriptive qualitative methods and data collection is obtained through field surveys, comparative studies, and literature studies. The design of this flat considered the vertical access inside the building by providing facilities such as stairs, ramps, and lifts to make it easier for all flat users, including persons with disabilities and the elderly.

Keywords: disability, ecology architecture, flats, urban

Received 20 February 2022 | Revised 28 February 2022 | Accepted 4 Maret 2022

1 Introduction

There are many people with disabilities in Indonesia who live in vulnerable, backward, and poor conditions because there are still restrictions, difficulties, obstacles, and the reduction or elimination of the rights of persons with disabilities [1]. The reasons are the completeness of infrastructure and facilities in buildings and environments that have not been fulfilled due to high costs and not planned from the beginning (so it had to renovate), the stigma of exceptional

*Corresponding author at: Department of Architecture, Faculty of Engineering, Universitas Sumatera Utara, Perpustakaan Street, J07 Building, Medan, 20155, Indonesia

E-mail address: cyndinatalia1@gmail.com

ISSN: 2622-0008 e-ISSN: 2622-1640 | DOI: 10.32734/ijau.v6i1.8674
Journal Homepage: https://talenta.usu.ac.id/ijau

facilities, less innovation, and lack of users in design planning, and design does not consider decent accommodation [2].

Every building, including open space and greenery that is visited and used by everyone, is necessary to provide adequate and integrated/inclusive facilities and accessibility for all people, including people with disabilities and the elderly, to realize equality, position, rights, and obligations as well as increase the role of people with disabilities and the elderly. Flats are one of the buildings with a residential function that should have implemented development guidelines and references based on Peraturan Menteri Pekerjaan Umum No. 30 tahun 2006 [3]. Several flats in Indonesia, especially in Medan, still have not considered the provision of access and facilities for persons with disabilities such as ramps, guiding blocks, parking, elevators, stairs, toilets, signs, and markings for disabilities. The location of the Flats is also generally far from urban areas and public facilities.

The housing location for persons with disabilities in urban areas that are not far from public services, such as health services, education, sports, recreation, and public transportation, is significant so that persons with disabilities can fulfill their needs efficiently and safely comfortably. In Indonesia, especially in urban areas, housing continues to grow, land area is minimal, the presence of green spaces is decreasing, and land prices and the construction of Landed Houses are high. For this reason, vertical residential planning, especially flats, is an alternative in accommodating the needs of urban communities that can increase the effectiveness and efficiency of land use, overcome slum settlements, provide green open space in urban areas, safe, decent, and harmonious housing [4]. The provision of Disability-Friendly Flats aims to realize a higher quality, fairer, physically and spiritually prosperous life, and independent for persons with disabilities.

In the design of these flats, the use of the Ecological Architecture approach focuses on realizing the balance of nature and overcoming climate issues and problems in the urban with a minimum of negative impacts on the environment and geared to meeting the needs of the current residents without compromising the ability of future generations of residents to meet their own needs [5].

2 Literature Review

Flats

The construction of flats is expected to encourage urban development, which is a solution to improve the quality of settlements. Flats are vertical buildings built in an environment divided into functionally structured parts, both horizontally and vertically, and are units that can be owned by each and used separately, especially for residential areas equipped with shared parts objects and shared land. The purpose of the construction of flats is to create affordable and livable housing in a healthy, harmonious, safe, and sustainable environment and to create

integrated settlements to build economic, cultural resilience and social, [4]. Facilities are located around the flat environment, namely educational facilities, commercial facilities, houses of worship, medical facilities, open spaces, government and public services [6]. There are several criteria for flats that can be seen in Table 1 [7].

Table 1 Flats Criteria

No.	Criteria	Description
1	Location	Refers to the regional and zoning spatial plan, easy to reach by public transportation, clean water, and electricity network services.
2	Design	Able to perform sublimation between the technical function and the social function of the building, able to reflects the harmony of the building with its environment, construction can be carried out in a short time and can be used as soon as possible.
3	Building Equipment	Equipped with a clean water network, electricity, gas, drainage, sewerage, garbage canal or landfill, telecommunication, means of transportation (stairs, elevator, corridor), parking, emergency exit, emergency stairs, extinguisher fire protection, fire alarm systems, lightning rods, and electric generators.
4	Units	Living room, Bedroom, Bathroom, and Service Room (Kitchen and washing room)

Disability

Disability is any condition of body or mind (impairment) that makes people with these conditions have difficulty carrying out certain activities (activity limitation) and interacting with the world around them. There are many disabilities: movement, vision, thinking, learning, remembering, communicating, mental health, hearing, and social relationships [8]. Almost every individual has experienced a disability at one stage of their life. People who reach a long life are more likely to experience difficulties in physical and social functioning [9]. People with disabilities experience poorer health outcomes, less access to education and work opportunities. They are more likely to live in poverty than those without a disability because there are still many buildings and environments that are not accessible for persons with disabilities, so it is difficult for them to carry out their activities even in looking for work and affect their inability to afford their healthcare [10]. Therefore, it is necessary to provide access and facilities that are feasible, accessible, and easily understood by persons with disabilities to realize equality of opportunity so that they can channel their potential in all aspects of the administration of the state and society, as for the facilities and accessibility provided, such as toilets, parking lots, public telephones, guidelines, signs and markings, doors, ramps, stairs, and lifts. Buildings must provide disability-friendly access and facilities that are easy, safe, comfortable, and independent entry and exit to and from buildings and activities in buildings [7].

Ecology Architecture

The natural environment is affected by human activity [11]. The use of Eco-architecture seeks to minimize the negative impact on the environment and buildings by increasing efficiency and discretion in applying materials, energy, and spatial arrangements. Architectural Ecology also requires an increase in health to increase the quality of life towards sustainable development. Therefore, Ecology in Architecture refers to architectural activities that preserve nature in terms of energy efficiency and natural resources to achieve sustainable living for the environment, economy, society, and culture. The implementation of its development also does not disturb the balance of the ecosystem but also helps build the ecosystem so that it is more stable and more diverse. There needs to integrate design with spatial planning that considers the condition of biodiversity (ecological conditions), environmental carrying capacity (other physical ailments), as well as socio-economic conditions that affect the area [12]. This building must apply several criteria in buildings with eco-architecture or green architecture based on GBCI (Green Building Council Indonesia), namely appropriate site development, water conservation, energy efficiency and conservation, indoor health and comfort, material resource and cycle, and building environmental management [13].

3 Methodology

The method used in the Design of Disability-Friendly Flats is a qualitative descriptive method by observing and seeking information directly to the site location to clearly understand conditions and phenomena in the field. Then, the data is processed descriptively in writing, pictures, and schematics to conclude from the observations. The stages that support this method are site selection, idea search, data collection methods (divided into primary data, namely field surveys and documentation as well as secondary data from literature and comparative studies with similar functions and themes), analysis (analysis is carried out on user activities, space requirements, design site, mass and appearance, structure, and utility), and concepts as a solution to the problems obtained after the analysis.

4 Results and Discussion

The site location of this Disability-Friendly Flats is on Jalan Syailendra, Petisah Hulu, Kecamatan Medan Baru (Figure 1). The existing condition of this project site is a high-density residential area with middle to upper community levels [14]. Based on calculations from the satellite map, the site has a total area of ± 0.9 Ha with relatively flat contours. At a macro level, this site is bordered by several sub-districts, namely Medan Petisah (North), Medan Polonia (East), Medan Johor (South), Medan Selayang, and Medan Sunggal (West). Meanwhile, on a micro-level, the location of the site is bordered by Mojopahit Street and residential areas (East), residential areas (South), Darma Agung University (West), and Syailendra Street and Herna

General Hospital (North). The site is also close to the Medan train station, a TOD (Transit Oriented Development) area plan.

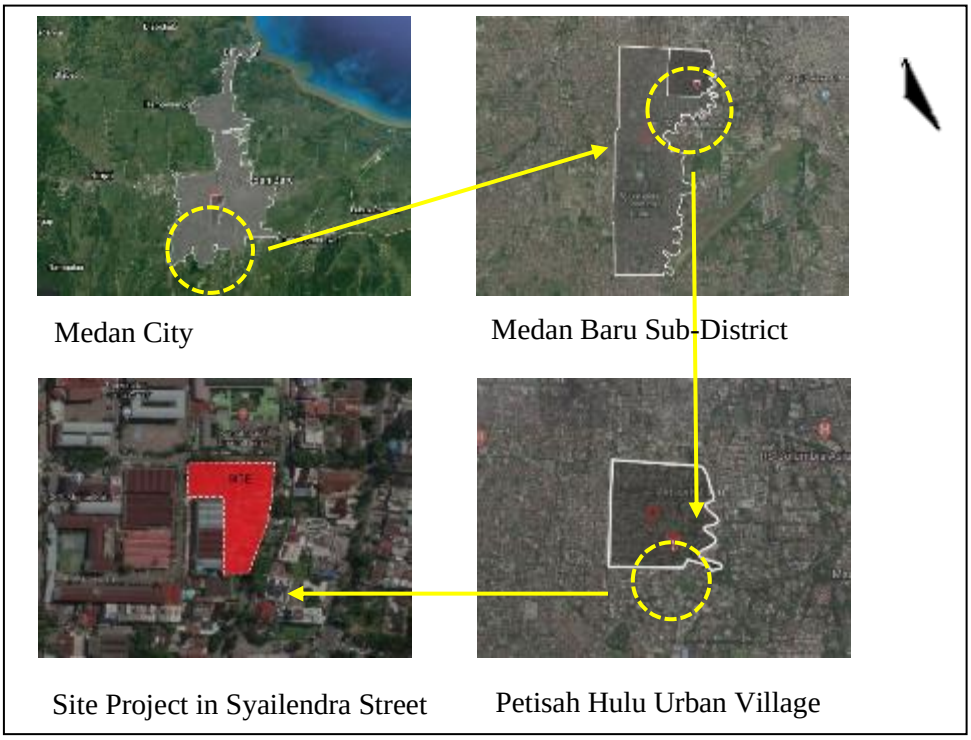

Figure 1 Project Location

4.1 Site Potential

This site has good potential as an area for disability-friendly flats because it is surrounded by public service facilities such as BRT public transportation, Markets, Schools, Hospital, Houses of Worship, Shopping Center, Government Offices, Parks, and various commercial buildings (Figure 2), not too close to the main road, so it is safe and comfortable when walking or using a wheelchair for people with or without disabilities. Mobility conditions around the site are also not too high, so noise is also low because there are many secondary roads so that they are not the only circulation to the primary road.

Figure 2 Facilities and Infrastructure around the Site

4.2 Building Mass Concept

Limited land makes the building mass responsive to the site's shape so that land can be utilized as much as possible and still provide green and communal space for residents. The following is the transformation of the mass form of the flat building (Figure 3). a) The shape of the site tends to be slanted on one side, b) the mass of the building is separated to cope with the limited land, c) the mass of the building is responsive to the sloping side by using an additive transformation. d) separate building masses connected by a sky bridge, e) final mass concept.

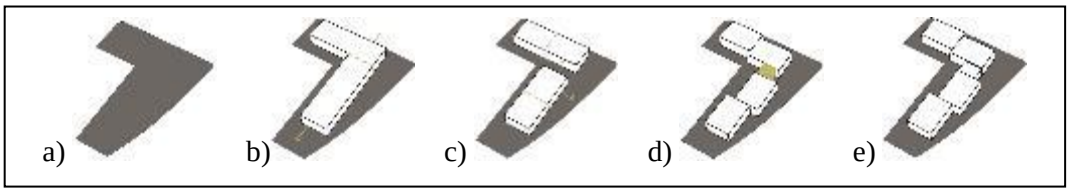

Figure 3 Building Mass Concept

4.3 Outdoor Concept

The outdoor space zone is divided into parking areas, building masses, and outdoor building facilities, such as a park, playground, and jogging track. The placement of the main entrance is only on Jalan Syailendra and for exit is on Jalan Majapahit using the linear circulation concept that considers the safety of persons with disabilities and overcomes land limitations. Meanwhile, the semi-public area is surrounded by building mass, so it becomes a positive view for residents, safe from vehicles, and not just anyone can enter because the laying of the mass of the building limits the public and semi-public area.

Figure 4 Outdoor Zoning Concept

(a) Site entrance, (b) The car park area is on the east side of the building, and disabled parking is also provided, (c) The motorcycle circulation path to the parking area inside the building, (d) Site exit, (e) The mass of the building separating public and semi-public areas, f) Park, playground, and jogging tracks in the middle so that easily accessible to all residents of the flats, (g) Vegetation around the site serves as a buffer for heat, noise, and land boundaries (Figure 4).

4.4 Indoor Concept

The 1st floor is focused as a recreational function, retails to meet the daily needs of residents, multipurpose room, management room, and service rooms. Its location is in the middle so that the functions of these spaces become the center of the building that can be easily reached and visible to the residents. In addition, there is also a private zone which is a flat housing unit located at the end of the building mass. The vertical circulation is located in the middle and end of each building mass so that access to the circulation of residents is easy to reach. The circulation in the middle of the building mass also functions as a separator for semi-public and private zones to maintain residents' privacy on the first floor. There is an inner court on the void ramp, which becomes a communal space for guests or residents of the flats (Figure 5).

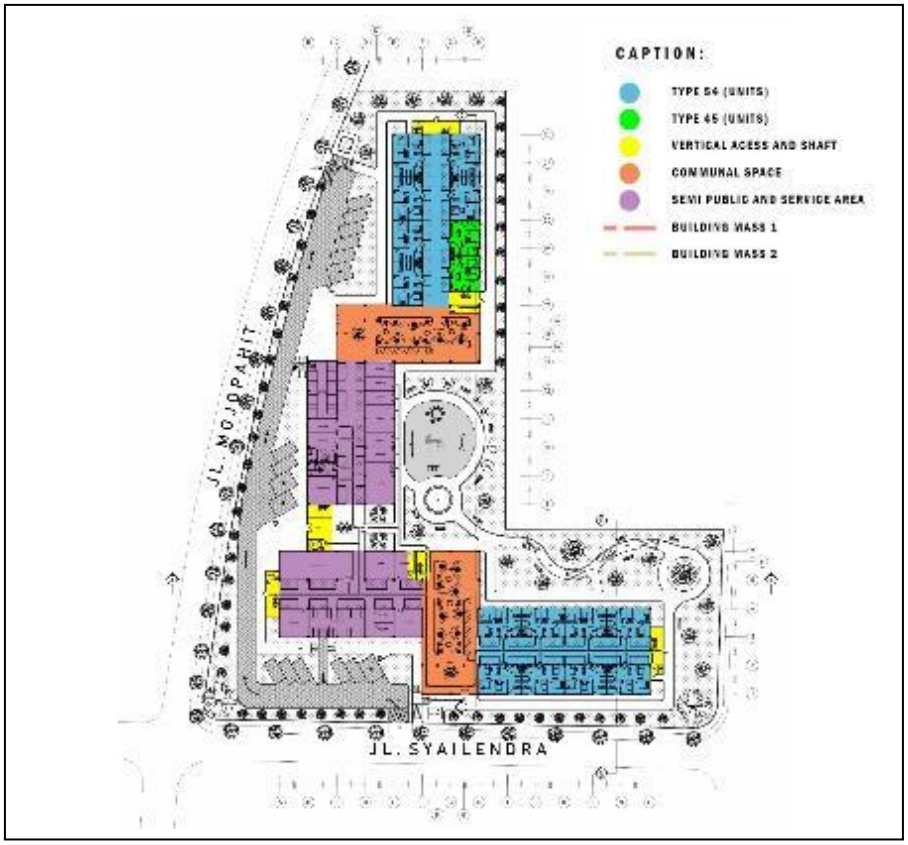

Figure 5 1st Floor Zoning Concept

The 2nd to 4th plans focused on residential units. Each floor is also provided a communal space to gather and interact between residents of the flat (Figure 6).

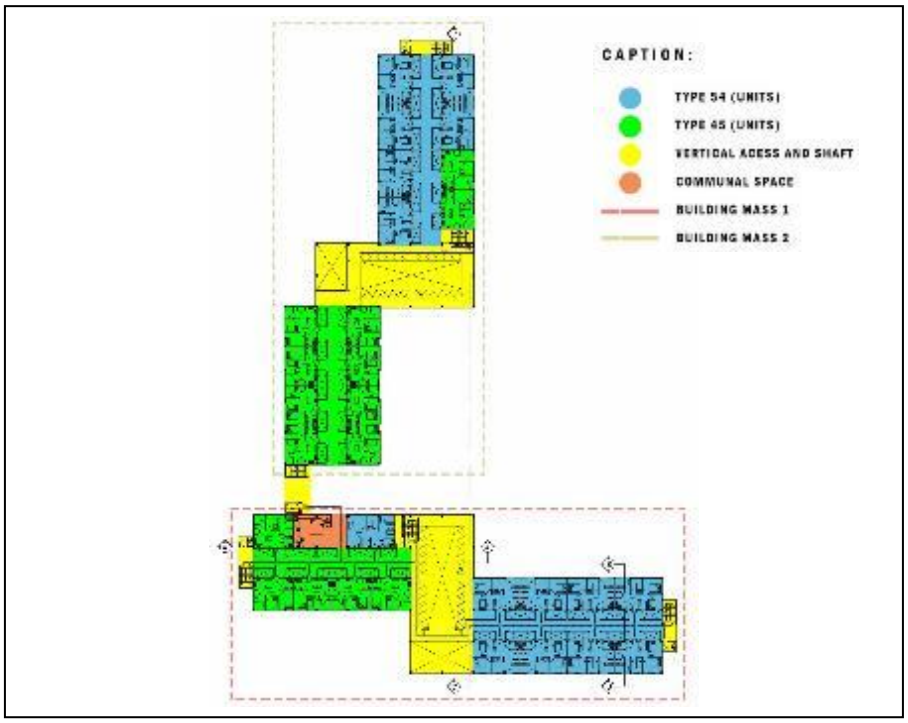

Figure 6 2nd - 4th Typical Floor Concept

On the concept of accessibility and facilities in this flat, ramps are provided that can be accessed up to the 4th floor of the building, guiding blocks for building mass 1, elevators that located at the connecting building masses and close to the parking lot, stairs with contrasting step nosing, as well as materials and vegetation which is applied in blind access by creating a narrative that can stimulate the human senses [15], and bathroom that provides a handrail near the sink, closet, shower, shower seat and floor using anti-slip material so that users do not fall when bathing Figure 7).

Figure 7 Accessibility and Facility in Disability-Friendly Flat

4.5 The Application of Ecology Architecture

The concepts of applying ecology architecture in the design of this building are choosing a location that is close to public facilities, public services, and being passed by public transportation to reduce mobility and pollution in addition, applying natural lighting through roof skylights and natural openings in windows—then applying natural cross ventilation and optimizing indoor air circulation by providing ventilation such as windows, roster walls, and voids. Furthermore, reprocessing rainwater as a water source for irrigation on vegetation in the site, fire systems (sprinklers and hydrants), and being used as a recreational facility with fountains to add to the beauty of the apartment environment. and stimulate the sense of hearing of the blind.

5 Conclusion

This Disability-Friendly Flat is a vertical residence that responds to the high demand for housing in limited urban areas by accommodating the needs of people with disabilities to access and facilities in the building. The design that considers everyone universally aims to overcome the problem of access for persons with disabilities that is still often experienced today.

The location in urban areas makes it easier for residents to have easy and safe access to public facilities around the flats. In addition, the facilities in the apartment building itself can also accommodate the daily needs of residents through the available retails. Other supporting facilities such as gardens, communal rooms, and multipurpose rooms are provided so that interactions between visitors and residents and fellow residents can be well established. While access facilities are provided, such as stairs, ramps, and lifts, that can facilitate access for all residents according to their needs.

Architectural Ecology is applied in the design due to the limited land and green space in urban areas. Therefore, to answer environmental problems in urban areas, an approach is needed by maximizing the design of green open spaces and applying natural ventilation and lighting to the spaces inside the building so that it is comfortable inside and outside the building.

REFERENCES

[1] Undang-Undang Republik Indonesia Nomor 8 Tahun 2016, " Penyandang Disabilitas," [Online]. Available: https://pug-pupr.pu.go.id/_uploads/PP/UU.%20No.%208%20Th.%202016. [Accessed 16 October 2020].

[2] M. A. Rotinsulu, *Membangun Lingkungan Rumah Susun yang Ramah bagi Penyandang Disabilitas,* 2020.

[3] Kementrian Pekerjaan Umum dan Perumahan Rakyat, "Peraturan Menteri Pekerjaan Umum No. 30 Tahun 2006, Pedoman Teknis Fasilitas dan Aksesibilitas pada Bangunan Gedung dan Lingkungan," [Online]. Available: https://pug-pupr.pu.go.id/_uploads/PP/Permen%20PU-No%2030-2006. [Accessed 29 October

2020].

[4] Undang-Undang Republik Indonesia Nomor 20 Tahun 2011, "Rumah Susun," [Online]. Available: https://pug-pupr.pu.go.id/_uploads/PP/UU.%20No.%2020%20Th.%202011. [Accessed 15 October 2020].

[5] H. Priemus, "How to make housing sustainable? The Dutch Experience," *Environment and Planning B: Planning and Design,* vol. 32, pp. 5-19, 2005.

[6] Standar Nasional Indonesia, "Tata Cara Perencanaan Fasilitas Lingkungan Rumah Susun Sederhana," 2004. [Online]. Available: https://fdokumen.com/document/sni03-7013-2004.html. [Accessed 7 April 2021].

[7] Kementrian Pekerjaan Umum dan Perumahan Rakyat, "Peraturan Menteri Pekerjaan Umum Nomor 5 tahun 2007 tentang Pedoman Teknis Pembangunan Rumah Susun Sederhana Bertingkat Tinggi," [Online]. Available: https://www.nawasis.org/portal/download/digilib/466-PermenPU_2007_05. [Accessed 7 April 2020].

[8] Centers for Disease Control and Prevention, "Impairments, Activity Limitations, and Participation Restrictions," 16 September 2020. [Online]. Available: https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html. [Accessed 6 September 2021].

[9] M. Safiie, "Pemenuhan Aksesibilitas bagi Penyandang Disabilitas," *Inklusi,* vol. 1, pp. 269-290, 2014.

[10] World Health Organization, "Disability," [Online]. Available: https://www.who.int/health-topics/disability#tab=tab_1. [Accessed 6 September 2021].

[11] P. F. Downtown, Ecopolis: Architecture and Cities for a Changing Climate, Australia: Springer Science+Business Media B. V., 2009.

[12] G. Tanuwidjaja, "Desain Arsitektur Berkelanjutan di Indonesia: Hijau Rumahku Hijau Negeriku," in *Seminar Workshop Lingkungan Hidup, Tema: Mensinergikan Kehidupan Mewujudkan Keberlanjutan, Scientific Repository: Universitas Kristen Petra*, Surabaya, 2011.

[13] Green Building Council Indonesia, "Greenship untuk Bangunan Baru Versi 1.2 Greenship New Building," April 2013. [Online]. Available: https://www.gbcindonesia.org/. [Accessed 10 April 2021].

[14] Pemerintah Kota Medan, "Rencana Detail Tata Ruang (RDTR) dan Peraturan Zonasi Kota Medan tahun 2015-2035," [Online]. Available: https://dpmptsp.pemkomedan.go.id/userfiles/dpmptspmedan/dpmptspwebaplikasi/files/Peta/9_PETA_M._BARU. [Accessed 10 December 2020].

[15] D. I. Baktara and W. Setyawan, "Fasilitas Pendidikan Bagi Anak Tunanetra dengan Pendekatan Indera," *Jurnal Sains dan Seni ITS,* vol. 9, pp. 2337-3520, 2020.