The International Conference on Education, Social, Sciences and Technology (ICESST)
Vol. 3, No. 1 January-June 2024
e-ISSN: 2964-2671; p-ISSN: 2964-2701, Pages 112-122

Design of a Building Connection Bridge at the Main Plaza of Al-Amin Living Lab and Industrial Park in Sampe Cita Village, Kutalimbaru District

Dara Wisdianti, Novalinda, Faurantia Forlana Sigit, Ida Khairani Siregar
Panca Budi Development University, Indonesia

Corresponding author: darawisdianti@dosen.pancabudi.ac.id

Abstract*. The design of the building connection bridge at the main plaza is a crucial step in urban infrastructure development, allowing pedestrians to move safely and efficiently between various key points within an area. This study aims to understand the design of the building connection bridge at the main plaza of Al-Amin Living Lab and Industrial Park in Sampe Cita Village, Kutalimbaru District, and its function for pedestrians. The research material focuses on the site location in Sampe Cita Village, Kutalimbaru District, Deli Serdang Regency, with observed parameters being the physical condition of the design location and the non-physical condition. The results of this study explain that the facilities and infrastructure of the Mixed-Use Building Connection Bridge at Al-Amin Living Lab and Industrial Park consist of circulation connecting the Mixed-Use buildings and a Viewing Deck and that the design guidelines for the Mixed-Use buildings at Al-Amin Living Lab and Industrial Park have met the criteria.*

Keywords*: Connection Bridge, Design, Plaza Building.*

INTRODUCTION

Densely populated urban areas with various buildings, business centers, shopping centers, or public facilities face an increasing need to provide safe and efficient access for pedestrians moving from one building to another. The growing awareness of walking as a sustainable mode of transportation has driven the demand for better pedestrian infrastructure, including pedestrian bridges.

Pedestrian safety is a primary consideration; building connection bridges help reduce the risk of incidents on roadways by providing pathways separate from vehicular traffic. In some cases, the design of connection bridges can be part of area development or revitalization. These bridges can enhance the attractiveness and accessibility of an area, supporting economic growth and social activities. The demand for accessibility necessitates the design of connection bridges that can be comfortably accessed by everyone (Wisdianti et al., 2023).

Design is the process of planning, conceptualizing, and developing a concept or plan to achieve a specific goal. It involves creative thinking, planning, and analysis applied to create effective solutions or products that meet established needs or objectives.

Received on Febuary 7th, 2024; Revised on March 2nd, 2024; June 30nd, 2024
*Corresponding author, darawisdianti@dosen.pancabudi.ac.id

Design can be an effective and high-quality solution or plan, and it is not limited to designing houses or buildings; it can also encompass the design of roads or bridges.

The design of a building connection bridge at the main plaza is a crucial step in urban infrastructure development, allowing pedestrians to move safely and efficiently between various key points within an area. This bridge is expected to enhance connectivity between surrounding buildings, providing easy accessibility for local residents and visitors. During the design phase, careful consideration of the bridge's function, aesthetics, safety, and sustainability is essential.

In bridge design, the analysis of gradients and pedestrian pathways is a primary focus. Steep gradients can make access difficult for people with disabilities or those using wheeled vehicles. Therefore, the design must account for appropriate accessibility needs and ensure that the bridge is accessible to everyone without obstacles. Additionally, the bridge can serve as an architectural element that creates an area's identity. A well-designed aesthetic can enhance the area's appeal and create a visual icon (Fitri & Siregar, 2023).

LITERATURE REVIEW

Definition of a Bridge

According to Law No. 38 of 2004, roads and bridges, as part of the national transportation system, play an important role, particularly in supporting the economic, social, and cultural sectors, as well as the environment. They are developed through a regional development approach to achieve balance and equitable development between regions.

A bridge, in general, is a structure that functions to connect two segments of a road that are interrupted by obstacles such as deep valleys, river channels, lakes, irrigation channels, streams, railway lines, or intersecting highways, among others (Barokah & Purwantoro, 2014). A bridge is a construction used to extend a road over an obstacle that lies at a lower level. These obstacles typically include other roads (waterways or regular traffic routes).

A bridge is a type of structure that, when modifications are needed, cannot be easily altered, requires relatively high costs, and impacts traffic flow during the construction work (Busri, 2014). Bridges are built with a design life of 100 years for major bridges, with a minimum usable life of 50 years. This means that, in addition to the strength and capability to serve traffic loads, good maintenance of the bridge must also be considered (Siregar et al., 2023).

Classification of Bridges

The classification of bridges based on their function, location, construction materials, and structural types has evolved rapidly with advances in time and technology, ranging from simple to state-of-the-art constructions. According to their purpose, bridges can be classified as follows (Asrizal et al., 2015) :

1. Highway bridge
2. Railway bridge
3. Waterway bridge
4. Pipeway bridge
5. Military bridge
6. Pedestrian bridge or footbridge
7. Sky bridge

Skybridge

A skybridge is a type of enclosed pedestrian bridge that connects two or more buildings in densely populated areas. Sometimes referred to as skyways or skywalks, a skybridge is a pedestrian pathway elevated to a certain height, developed over centuries (Ikhsan, 2020). In modern times, skybridges are often found in transit hubs, airports, malls, and apartment complexes. Beyond serving as pedestrian walkways, contemporary skybridges are also designed to offer scenic views.

Types of Skybridges

Generally, skybridges can be categorized into two types based on ownership or purpose, and based on the distribution of loads they support (Ilmawan & SM, 2019).

1. Public Skybridge

This type of skybridge is freely accessible to the general public. Anyone can access both the connected buildings and the skybridge itself. As the name suggests, public skybridges serve as public facilities aimed at facilitating ease of movement for people between different buildings. Examples include the Calgary Skybridge and the Terminal Tirtonadi Solo Skybridge. Public skybridges are typically located in government or privately-owned buildings or public facilities. They are mostly built and managed by the government, connecting public facilities such as airports, terminals, stations, hospitals, and other public amenities, where the connected buildings are generally also government-managed (Wardiningsih & Hendarto, 2019). Besides public facilities, public skybridges are also constructed by the government to connect multiple buildings, whether owned by the government or private sector, to alleviate traffic congestion.

e-ISSN: 2964-2671; p-ISSN: 2964-2701, Pages 112-122

(a)

(b)

Figure 1. Examples of Public Skybridges: (a) Palembang Airport Skybridge and (b) Tirtonadi Terminal Skybridge

2. Private Skybridge

Unlike public skybridges, not everyone can access private skybridges. Private skybridges are managed by specific institutions or companies that oversee all or part of the connected buildings. Access to the skybridge is restricted to users of the connected buildings or by permission of the skybridge manager (PUTRI, 2019). Private skybridges often serve not only as pedestrian walkways but also as iconic features of buildings and places that offer beautiful views. In some world-renowned apartments and hotels, skybridges are used as luxurious amenities, featuring rooms with luxurious facilities such as swimming pools, cafes, gyms, and restaurants. For example, the Petronas Twin Towers in Malaysia have skybridges that serve as tourist destinations (Novalinda, 2023).

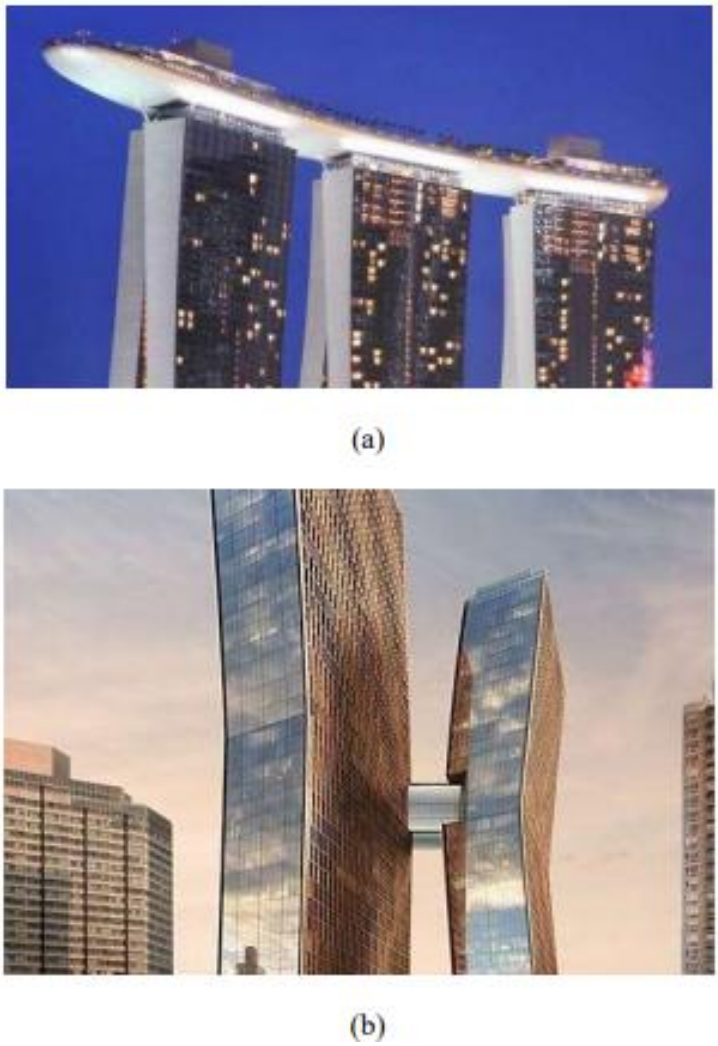

Figure 2. Examples of Private Skybridges: (a) Marina Bay Skybridge and (b) American Copper Buildings Skybridge

Skybridges Seen from Load Distribution

1. Attached Skybridge

An attached skybridge is connected to a building or buildings and is used in specific conditions. One such condition is when the elevation of the skybridge from ground level is sufficiently high. For instance, skybridges located at mid-level or rooftop of skyscrapers that need to be connected (Suseno & Widiyastika, 2022). Another condition is when the area below the skybridge does not allow for support pillars, such as skybridges located above highways. Examples of attached skybridges include the Petronas Twin Towers in Malaysia and Linked Hybrid in China.

e-ISSN: 2964-2671; p-ISSN: 2964-2701, Pages 112-122

Figure 3. Attached Skybridge at Linked Hybrid, Beijing, China

2. Independent Structure Skybridge

Independent Structure Skybridge is a type of skybridge where the structure stands on its own without being attached to the buildings it connects. This type of skybridge can independently support all the loads it receives (SIDDIQ, 2021). The main characteristic of an independent structure skybridge is the presence of support pillars. These pillars distribute the load from the skybridge structure to its foundations.

Figure 4. Independent Structure Skybridge at University of Leeds, Ohio

3. Semi-Independent Skybridge

In this type of skybridge, it can be said to combine characteristics of both attached and independent structure skybridges. The skybridge structure is attached to the buildings it connects and also has support pillars. The loads received by the skybridge are distributed to the connected buildings and the support pillars, which then transfer the loads to the foundations—either the building foundations or the foundations of the support pillars themselves (Rahayu et al., 2020).

Figure 5. Semi-Independent Skybridge in Davenport, USA

Skybridge Seen from Structural Types

1. Simple Bean

Simple Beam Skybridge is the simplest type of structure where the skybridge consists of horizontal beams supported by columns or pillars at both ends. An example is the Petronas Towers Skybridge, which features girder beams supported by rollers at both ends and a joint in the middle span.

2. Suspension Skybridge

Suspension Skybridge operates similarly to conventional suspension bridges. The skybridge is suspended using steel cables that are connected to support pillars or buildings that the skybridge connects.

3. Truss Skybridge

Truss Skybridge utilizes a truss structure, which is the most commonly used type in skybridge design. It typically employs steel materials. Truss structures are efficient in construction and maintenance of skybridges due to easy installation and maintenance processes.

RESEARCH METHOD(S)

This research is a qualitative descriptive study using the literature review method through library studies based on previous research journals (Kurniawan, 2014) related to the title, as well as through accessing data obtained from websites as sources of information publication. Qualitative descriptive research can be interpreted as the researcher being the key instrument, where data collection techniques are carried out through data compilation and inductive data analysis (Sugiyono, 2012), thus resulting in processing and presenting descriptive data such as narrating interview results and/or observations.

FINDINGS AND DUSCUSSION

e-ISSN: 2964-2671; p-ISSN: 2964-2701, Pages 112-122

Kecamatan Kutalimbaru is located within Deli Serdang Regency, North Sumatra Province. The natural conditions of Kutalimbaru generally experience two seasons: dry season and rainy season, influenced by both sea winds and mountain winds. Administratively, Kutalimbaru borders several areas: to the north with Sunggal and Pancur Batu Districts, to the south with Sibolangit District, to the east with Pancur Batu District, and to the west with Langkat Regency (BPS Deli Serdang, 2021).

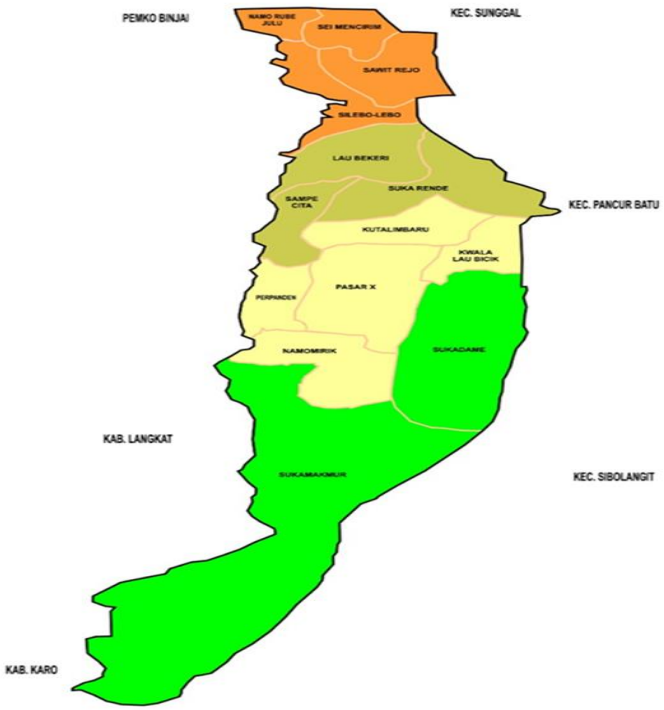

Figure 6. Map of Kutalimbaru District, Deli Serdang Regency

The bridge connecting the buildings to the main plaza aims to facilitate pedestrians moving between buildings in a safe manner. It also helps reduce the risk of accidents that often occur on the roads. This building-to-plaza bridge is crucial for providing comfort to pedestrians who want to move between buildings without worrying about crossing the street, as there is already a bridge in place (Nuraini et al., 2022).

The bridge connecting the buildings at the main plaza of Al-Amin Living Lab and Industrial Park in Sampe Cita Village, Kutalimbaru District, is highly diverse and encompasses various aspects that provide significant benefits to the community. The bridge links the buildings in the main plaza, allowing pedestrians to move easily from one point to another without having to traverse vehicle traffic. This enhances connectivity between buildings and encourages people to walk more, supporting a more active and sustainable lifestyle.

The bridge also provides a dedicated path for pedestrians separated from vehicle traffic, thereby enhancing their safety. This reduces the risk of traffic incidents and pedestrian accidents, especially in densely populated urban areas.

The research findings are expected to assist the local community in improving the quality of life for residents and supporting the economic and social development of the area. This represents a strategic step towards building a more sustainable and future-oriented city.

CONCLUSION AND RECOMMENDATION

Conclusion

1. The facilities and infrastructure of the Mixed Use Bridge at Al Amin Living Lab and Industrial Park consist of:
    1. Connecting circulation between Mixed Use buildings
    2. Viewing Deck (observation area)
2. Guidelines for the design of the Mixed Use buildings at Al Amin Living Lab and Industrial Park meet the following criteria:
    a. Align with the overall concept of the Al Amin Living Lab and Industrial Park area planning;
    b. Harmonize with the design of the Mixed Use buildings at the main plaza of Al Amin Living Lab and Industrial Park;
    c. Synergize with the landscape design of the surrounding area, considering the site's location surrounded by agricultural areas;
    d. Adhere to intensity, building codes, and applicable regulations;
    e. Innovative and implementable in terms of construction and financing;
    f. Serve as a focal point and viewing area for the entire Al Amin Living Lab and Industrial Park area.

Recommendation

The Mixed Use Bridge at the main plaza of Al Amin Living Lab will serve as a facility for discussion and teaching among the academic community of Panca Budi University and the surrounding residents. It will not only focus on agriculture and livestock but also function as a central activity area, particularly as a viewing deck overlooking the entire area. Therefore, it needs to be developed early in the implementation phase to serve as an activity generator and catalyst for other activities within the Al Amin Living Lab and Industrial Park area.

REFERENCES

Asrizal, D., Amiuza, C. B., & Nugroho, A. M. (2015). Museum Jembatan sebagai Bangunan Ikonik Pulau Madura. Brawijaya University.

Bachtiar, R. (2018, October). Analysis a policies and praxis of land Acquisition, use, and development in north sumatera. In International Conference of ASEAN Prespective and Policy (ICAP) (Vol. 1, No. 1, pp. 344-352).

Barokah, I., & Purwantoro, D. (2014). Pengaruh variasi debit aliran terhadap gerusan

maksimal di bangunan jembatan dengan menggunakan program HEC-RAS. INERSIA Lnformasi Dan Ekspose Hasil Riset Teknik Sipil Dan Arsitektur, 10(2).

BPS Deli Serdang. (2021). Kecamatan Sunggal Dalam Angka.

Busri, H. (2014). Analisis Alternatif Desain Bangunan Jembatan dengan Value Engineering. Surabaya: Jurnal Teknik Sipil, 7(1), 31–38.

Fitri, R., & Siregar, H. F. (2023). Pelatihan Pembuatan Kursi Taman Ecobrick Sebagai Material Hardscape Berbahan Dasar Plastik. Amaliah: Jurnal Pengabdian Kepada Masyarakat, 7(2), 301-306.

HARDIANTO, A. (2022). MODIFIKASI STRUKTUR BALOK SKYBRIDGE PADA GEDUNG RISET ITS SURABAYA DENGAN STRUKTUR SKYBRIDGE KOMPOSIT. UPN VETERAN JATIM.

Ikhsan, M. N. (2020). Pengaruh Jenis Tumpuan Jembatan Penghubung (Skybridge) terhadap Kestabilan Struktur Bangunan Berlantai Banyak. Universitas Hasanuddin.

Ilmawan, B. D., & SM, H. (2019). Analisis Faktor–Faktor Yang Mempengaruhi Produktivitas Pada Proyek Konstruksi (Studi Kasus: Jembatan Penyeberangan Multiguna Tanah Abang "Skybridge"). Sekolah Tinggi Teknik PLN.

Lapis, J. O., Balamba, S., Sompie, O. B. A., & Sarajar, A. N. (2013). Analisis Kestabilan Pondasi Jembatan Studi Kasus: Jembatan Essang-Lalue. Jurnal Sipil Statik, 1(11).

Lubis, R. P. (2024). Analisis Persepsi Dan Pengaruh Kondisi Sosial Ekonomi Terhadap Pemanfaatan Air Isi Ulang Masyarakat Sebagai Perencanaan Di Wilayah Klambir Kecamatan Hamparak Perak, Deli Serdang. Jurnal Teknovasi, 11(01), 1-13.

Novalinda, N. (2023). Kajian Prinsip Arsitektur Hijau pada Pasar Baru di Pangkalan Kerinci. Innovative: Journal Of Social Science Research, 3(2), 13562-13574.

Nuraini, C., Alamsyah, B., & Negoro, S. A. (2022, August). SPATIAL CONCEPT OF HOUSING ENVIRONMENT BASED-ON SABB PRINCIPLE AS INDIGENOUS KNOWLEDGE ON COVID-19 DISASTER MITIGATION IN MANDAILING NATAL. In Proceeding International Conference Keputeraan Prof. H. Kadirun Yahya (Vol. 1, No. 1, pp. 72-84).

PUTRI, T. E. K. A. (2019). ANALISIS PERBANDINGAN METODE PELAKSANAN ERECTION JEMBATAN DENGAN SISTEM CANTILEVER DAN CRANE DARI SEGI WAKTU (Studi Kasus: Proyek Pembangunan Gedung ASEAN di Jakarta). Universitas Mercu Buana Jakarta.

Rahayu, G. D., Sardiyarso, E. S., & Handjajanti, S. (2020). PENERAPAN PRINSIP ARSITEKTUR IKONIK DAN CIRI VISUAL TERHADAP PERANCANGAN BANGUNAN SEKRETARIAT ASEAN. Prosiding Seminar Intelektual Muda, 2(1).

Santoso, F. (2009). Tinjauan bangunan bawah (abutment) jembatan Karang kecamatan

Karangpandan kabupaten Karanganyar.

Saputra, S. A. (2022). Penentuan Jenis Jembatan Penyambung (Skybridge) dari Stasiun Bojonggede ke Terminal Bojonggede Dengan Memperhatikan Dampak Terhadap Lalu Lintas. Universitas Islam Sultan Agung (Indonesia).

SIDDIQ, M. R. (2021). Pengaruh Hubungan Kepercayaan Politik Pedagang Blok G Tanah Abang Dalam Kebijakan Skybridge Terhadap Tingkat Partisipasi Politik Pasif di Masa Pemerintahan Anies Baswedan. Universitas Jenderal Soedirman.

Siregar, H. F., Fitri, R., & Andiani, R. (2023). Sosialisasi Status Mutu Air Babar Sari dalam Perencanaan Eco-Tech-Edu Wisata Al-Amin Living Lab dan Industrial Park. JURNAL PENGABDIAN KEPADA MASYARAKAT, 90-93.

Suseno, D. P., & Widiyastika, A. (2022). Analisis Efektivitas JPO (Jembatan Penyeberangan Orang) di Jalan Pandanaran Kota Semarang. Journal of Civil Engineering and Technology Sciences, 1(2), 1–12.

Wardiningsih, S., & Hendarto, D. (2019). Kajian Jembatan Penyeberangan Orang (JPO) Sebagai Elemen Perkotaan (Studi Kasus: JPO Stasiun Lenteng Agung, Jakarta Selatan). IKRA-ITH Teknologi Jurnal Sains Dan Teknologi, 3(2), 36–45.

Wisdianti, D., Rangkuty, D. M., & Prasetya, M. R. (2023). Pemanfaatan Ruang Terbuka Bawah Fly Over Kota Medan Sebagai Taman Kota. JURNAL PENGABDIAN KEPADA MASYARAKAT, 86-89.