



Application of The Building Infill Concept in New Buildings within the Historic Semarang Old Town Area

Ciptety Trisyapramesti^{1, a)} and Agung Budi Sardjono^{1, b)}

¹Magister of Architecture, Faculty of Engineering, Diponegoro University. Jl. Prof. Soedarto, SH, Tembalang, Semarang

^{a)} Corresponding author: ciptety.trsyap@gmail.com

^{b)} agungbsardjono@gmail.com

Abstract. The Old City of Semarang, as a national-level cultural heritage site, has inherited its function as a cultural center with unique architecture and urban layout that has remained. Over time, the development of the economy and high tourism demands exert significant pressure on the city's heritage. New functions with their commercialism often lead to inappropriate new buildings that potentially threaten the historic area's authenticity. Applying the infill building concept becomes a conservation solution that emphasizes optimizing vacant spaces in well-developed urban areas, including historic areas. Research has been conducted on several new buildings in the Semarang Old City that have changed in function and physical appearance. This research aims to analyze the existing conditions of new buildings and examine how infill development can be applied to structures in historical areas without damaging the architectural characteristics. The method employed includes descriptive analysis of observed objects by observing buildings, analyzed based on elements within the building infill approach. The results indicate that applying infill building in new constructions in the Old Town area requires a sensitive design approach, considering several elements, including mass, height, material color, ornamentation, and harmonious integration with the surrounding historical buildings. Additionally, it is suggested to the government that this research can initiate more detailed policies and active supervision regarding the construction of new buildings to maintain their authenticity. In conclusion, building infill can be an effective solution to support the economic development of historical areas without compromising cultural heritage, provided it is carried out with proper planning and regulations.

Keywords: Building infill, Conservation, Contextual Area, Historic Area, Semarang Old Town

INTRODUCTION

The Semarang Old Town Site area has the characteristics of cultural heritage colonial buildings, which makes it one of the strategic areas. Semarang, as a port city in the era of Dutch colonialism, played a role in commercial food supply activities and security defense. The Old City area's many magnificent colonial architectural buildings marked the subsequent development into the center of government and the European elite's settlement. Over time, the colonial buildings of cultural heritage that are getting older must continue to be maintained in terms of aesthetics and building functions. It is recorded that the Old City of Semarang has 316 buildings, 116 of which are cultural heritage buildings in the core area and are still being maintained [1]. At least 45% of the repurposed building became a trade and service function that supports economic growth and tourism in the Old City of Semarang [2].

The existence of new functions as a trade and service area often causes many new buildings to be present improperly. The building design usually does not highlight the contextuality of the surrounding buildings due to the incessant architectural trends that try to appear different without caring about the surrounding environmental conditions [3]. This is why regional conservation is so important. Area conservation is carried out to protect historical

areas, including their contents so that their development is controlled and not displaced by development and modernization [4].

One of the approaches to maintaining a balance between the preservation of historical areas and the city's development is the concept of building infill. Building infill has a close relationship in the context of conservation, where building infill is defined as development carried out on land that has not been used or is considered less productive, where the land is surrounded by buildings that already exist around it [5]. At the same time, conservation understands maintenance efforts and what we have wisely [6]. The building infill approach includes reconstruction actions that can restore a building to its original condition using old and new materials. The concept of building infill is a significant variable in a building design that ensures that new development does not damage the historical character and existing architectural value and is in line with the concept of conservation.

The application of building infill to new buildings in historical areas as much as possible must focus more on a "sense of place" than a "sense of time" [7] because historical regions already have a unique identity derived from their history, culture, and local architectural character, where the sense of place emphasizes the sustainability of a location's identity so that new buildings can be in harmony with the surrounding environment without eliminating existing historical values [8]. Suppose a greater sense of time is emphasized. In that case, new buildings may be more representative of modern architectural trends or styles that tend to ignore the local context, thus risking damaging the harmony of the historic area and depriving visitors or the local community of the emotional experience.

The research was conducted by analyzing several existing conditions of new buildings in the Old City of Semarang and comparing those buildings with their surroundings through indicators in building infill. Is the latest development ideal with the building infill approach applied in historical environments? Does the new building align with preserving the area that appreciates the historical buildings in its vicinity?

The expected goal of this writing is to observe the existing conditions of the buildings in the Old Town of Semarang as a whole and to analyze the government policies that have been implemented. In addition, the research aims to understand the concept of building infill as one of the efforts in environmental preservation in historical areas, specifically in the Old Town of Semarang, a National Heritage site [9]. The integration of the building infill approach with the surrounding historical buildings is expected to serve as a guide for the construction of new buildings and as a subsequent step for the government to develop more detailed policies regarding new building construction related to functions and other elements to remain contextual and not undermine the historical value of the area.

METHODOLOGY

The research was carried out using a survey method or visual observation with descriptive analysis of samples/objects of observation. The observation results will be analyzed and compared with the building infill approach. Primary data is obtained by direct observation and poured into a panoramic image (a serial image) to describe the condition of the new building with the surrounding buildings. Secondary data was obtained through a literature study on building infill. The results of the observation will be analyzed and compared with the building infill approach as a variable, and the elements in the building infill as an indicator of whether the new building is following the building infill concept and/or the new building is in harmony with the surrounding buildings or not.

Selecting observation objects uses purposive sampling methods by establishing the criteria and boundaries determined for the research. The established criteria are as follows:

1. The building is new in the core area of Semarang's Old City, adjacent to historical buildings (cultural heritage buildings that have been designated)
2. The building can be observed directly.
3. The building has the potential for future development.

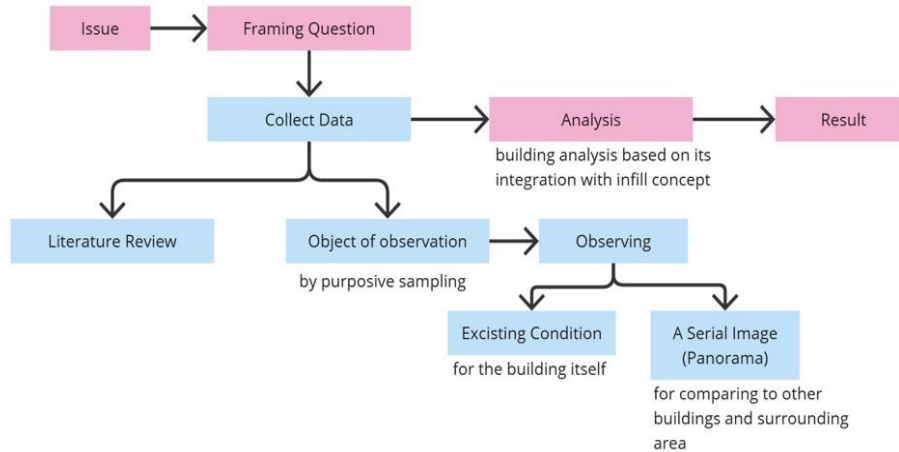


FIGURE 1. Research methods flowchart.

RESULT AND DISCUSSION

KAWASAN SITUS KOTA LAMA SEMARANG

Semarang Old City in picture (a) was once a fortified city formed due to the influence of the VOC, who built a fort called Vijfhoek to protect this area from enemy attacks. The construction of this fort is an effort to supervise and guard where there are essential facilities such as warehouses, trade offices, and settlements [10]. Over time, the walls or forts were destroyed because they were no longer relevant, and the situation was conducive; many Europeans left the fort and established new settlements outside the fort; the Old Town changed its function to become an Industrial and Trade Center in 1940. The economy in the Old City was getting more and more paralyzed because the Japanese took it over during its colonial period. Since then, Semarang Old Town has inherited its function as a cultural center, especially in the urban spatial planning and architectural style in existing buildings, namely Indies architectural style and local or Javanese architecture [2].



FIGURE 2. (a) Site Map of Semarang Old Town in 1824. [10]
(b). Site Map of the Old City of Semarang (Oudestat) in 2020, [9]

The spatial setting of the Semarang Old Town area from its establishment still shows the same spatial setting (picture b). This area still shows a typical urban spatial layout, namely worship rooms (churches) located in the city's center, government centers, public spaces, and entertainment spaces adjacent to worship rooms [10]. Although the face of the Old City still shows the same setting when it was established, there has been a decline in the physical aspects of the original and new buildings in the location [11]. The rapid economic development and high tourism

demands, accompanied by inevitable physical changes, put significant pressure on the city's heritage, potentially damaging the region's economic, social, and cultural functions. Tourism is a sector where cultural commercialization is very visible. Cultural heritage sites are often marketed as tourist attractions, with their artistic value reduced to economic benefits, where they are altered to meet tourist expectations and cause a perceived loss of authenticity [12]. Since physical and economic development is inevitable, creating balanced and harmonious change is the main challenge.

The Semarang City Government has initiated several conservation efforts, both in action and in formulating policies that regulate the protection of the Cultural Heritage Site of Old Semarang City. Among these is the Urban Design Guidelines (UDGL) of Semarang Old Town, namely *Perda Kota Semarang Nomor 2 Tahun 2020 tentang Rencana Tata Bangunan dan Lingkungan Situs Kota Lama* [13]. This policy primarily regulates the preservation and conservation of existing Cultural Heritage Buildings; however, it has not comprehensively governed the unity of the area, including new buildings that may arise. Furthermore, it is crucial to monitor upcoming new developments actively. Supervision serves as urban management that can assess how the implementation within the Old Semarang City area deviates from the established guidelines. The presence of BPSKL (Old City Site Management Agency) or the management agency can act as a liaison and one-stop management of the Old City Site. However, the presence of this management still overlaps with related agencies [14].

INFILL BUILDING AS A PRESERVATION METHOD OF HISTORIC AREA

A historical area, in the sense of being preserved, does not mean that it cannot follow the developments that occur in a city, both the development of architectural styles and the development of urban land use. Applying the building infill method to historic neighborhoods or buildings is a way to upgrade landmarks so that they are not regarded as ancient or outdated and can still accommodate new activities.

In the application of building infill in a historical area, it is necessary to underline that new buildings in a historical area must focus more on the "sense of place" rather than the "sense of time" [7]. This means that new buildings built with the application of building infill are required to follow the architectural style or style that each building element evokes from the surrounding environment (sense of place) rather than following the style or style of architecture that is currently popular and many used at that time (sense of time). Creative approaches to integrate buildings with the surrounding environment in the infill method, according to [15], include:

1. Mimicry Approach

The mimicry approach is a method that directly imitates the style, shape, materials, and architectural details of the old buildings around it. This approach aims to create visual uniformity so that the new building looks like an original part of the area. This approach may help maintain visual harmony in the region. Still, the original buildings can lose their identity, and new buildings can look "fake" because they only imitate without innovation [15]. The mimicry approach can be done in various ways, namely by being able to equalize the shape of the building and the similarity of colors, structures, textures, and others. The mimesis approach can be done in various ways, namely by being able to equalize the shape of the building and the similarity of colors, structures, textures, and others. On the other hand, the mimesis approach is an effective method for preserving vernacular architecture, as the concept often tends to be abandoned or endangered [16].

2. Associative Approach

The Associative Approach is a construction method in which the infill building adjusts to the spirit or characteristics of a place by transferring or projecting the characteristics of the surrounding buildings. This approach does not directly imitate but takes some aspects of the old building, such as proportions, materials, patterns, etc., and adapts them to the new design. The result is a new building with the surrounding buildings' character. This approach is directed at the process of producing contextual designs, as well as maintaining a balance between preservation and modernity. The Nike Store at 529 Broadway, New York, adopts an associative approach in the middle of the historic Soho Cast Iron District, New York. It can be seen that the building takes wall-to-wall window elements, vertical and horizontal lines, and the height of the surrounding buildings. So that this building still shows its difference from the surrounding buildings by using visible materials.

3. Contrast Approach

The contrasting approach is a building infill design method highlighting the difference between the new and old buildings, where the object visually deviates from the surrounding buildings. With a clear and prominent

building identity, it is often considered a form of freedom and a high expression of creativity [15]. However, incorrectly designed can damage the area's visual harmony and disrupt the historic environment's original character. Space Asia Hub Singapore is one example of a building with a Contrast approach; this building was built behind a cultural heritage building that uses a much more modern concept than the building in front of it. This building has successfully applied a contrasting approach without dwarfing the role of older existing buildings. The cultural heritage building in front of it seems to shine more because of the light refraction from the new building [13]

Several sources reveal the elements of the success of the building infill concept applied to historical areas in various cities [14],[15]; here is a summary of some of these elements, including:

1. Setback

The concept of Infill must respect the distance of the building from the street and the distance of the surrounding buildings. The street landscape should not be dominated by new construction to appreciate the harmony of the existing façade.

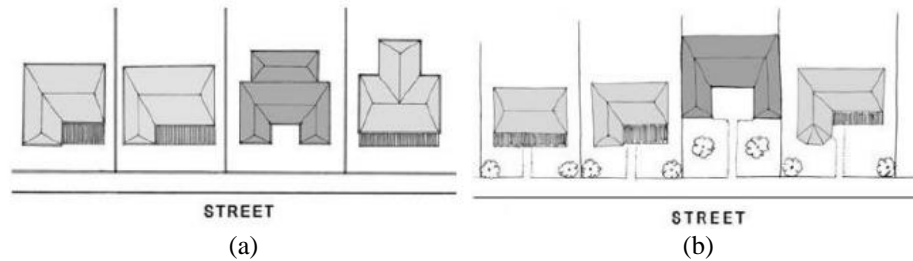


FIGURE 3. Example of applying building setbacks to the building infill concept (a). Before applying the Setback element (b) After applying the setback element. [17]

2. Height

The height of the walls, cornices, roofs, niches, chimneys, and more contributes to the character of the building and the surrounding environment. New buildings should be designed to match the height of existing buildings, although they do not have to be the same. Generally, if a new building is half to one story lower than an old building that is all the same height, it will appear out of place.



FIGURE 4. An example of the application of building massing to the building infill concept. [17]

3. Massing

Mass is the general shape and size of a building. The building mass contributes significantly to the street's character, especially in areas with row houses and commercial buildings side by side. So, the new construction must follow the mass of existing neighboring buildings [18]. The apparent mass of the building can be changed through the appearance of the gable roof, towers, and other roof protrusions, as well as façade protrusions such as niches, verandas, and staircases. [19]



FIGURE 5. Unsuccessful example of infill due to significantly smaller massing and height compared to adjacent heritage buildings. [19]

4. Colour and Detail Ornament

Existing details and ornaments can be used as a basis for details and ornaments on new buildings, but they should not be replicated precisely. Contemporary interpretations of historical details and ornaments should be used to distinguish between cultural heritage buildings and appropriate new constructions. [20]

ANALYSIS

Several observation objects in the Old Town of Semarang will be analyzed based on their compatibility with the surrounding environment using building infill principles, including height, massing, color, detail ornament, and architectural style.

1. New Building on Jalan Gelatik

The building on Jalan Gelatik is a new building established around 2018 with an office function; this building stands on land that was previously vacant for a long time. It can be seen that the office building is visually different from the surrounding environment or the building next to it. In front of the building is one of the cultural heritage buildings, namely the Pringsewu Restaurant, which used to be a historical building in the heyday of the Semarang sugar king, Oei Tiong Ham, namely the NV Head Office. Kian Gwan. On the right is a row of cultural heritage buildings with the character of an indigenous building.



FIGURE 6. Panoramic image of the new building on Jalan Gelatik. (Source: Author's Documentation, 2024)



FIGURE 7. Images of the new building and the surrounding cultural heritage buildings (Source: Author's Documentation, 2024)

TABLE 1. Analysis of building infill elements in a new building on Jalan Gelatik

Building Infill Elements	
Approach	This building is included in the building that uses an associative approach, which does not adopt the elements that exist around the area. However, some aspects of building infill are still applied to buildings.
Height	This building is the same height, with two floors next to it. So, when viewed from the height perspective, this building is still in harmony with the surrounding buildings.
Massing	The building mass is a single building with a massive mass composition on the hook.
Colour and Ornament	This building does not use many colors, so it does not make it more striking than the surrounding buildings. This building emphasizes the characteristics of the current structure, which is modern and minimalist, so that there are no traditional ornaments and so on.

Architecture Style	The style seen in this building is modern architecture, where the materials and shapes of the building have applied current architecture. The style of the building next to the building is Indische architecture that adapts to the tropical climate.
--------------------	--

Source: Author's analysis, 2024

2. Hotel Kotta Semarang

The Kotta Semarang Hotel was built by utilizing an old building that used to be a banking building that operated from 1985 to 1986; until then, the banking building collapsed, and in 2022, it was repurposed as a hotel. In its renovation, the building retains its original structure, with some changes to the façade visualization.



FIGURE 8. Panoramic image of Hotel Kotta and the surrounding buildings. (Source: Author's documentation, 2024)



FIGURE 9. The building of the Hotel Kotta and the surrounding buildings. (Source: Author's documentation, 2024)

TABLE 2. . Analysis of building infill elements in the Kotta Hotel Semarang building

Building Infill Elements	
Approach	This building is included in the building that uses an associative approach, which does not adopt the elements that exist around the area. However, some aspects of building infill are still applied to buildings.
Height	This building has four floors, with the average height of the surrounding buildings being two floors. However, it can be seen that the height composition is still in harmony with the surrounding buildings.
Massing	A single building mass with a parking lot in front of it. This building is located in the middle of the area, surrounded by several buildings, including the Blenduk Church and Spiegel, and is adjacent to Srigunting Park.
Colour and Ornament	This building is dominated by white; only a few elements with different colors are the vocal points of the building. There are several ornaments on the façade of the building, but the same color does not make the ornament striking.
Architecture Style	The style of this building is modern architecture, which can be seen in the shape of the components and the use of ornaments on the façade. Meanwhile, the buildings around the area have Rococo/Late Baroque

Building Infill Elements	
	architectural styles in the Blenduk Church and Modern Indische in the Spiegel building.

Source: Author's analysis, 2024

3. New Building on Jalan Letjen Suprpto

The building on Jalan Letjen Suprpto is a new building that is quite different from the surrounding buildings. Before this new building, it was empty land with dilapidated construction steel. The building is dominated by glass, allowing users inside to see directly towards the Blenduk Church.

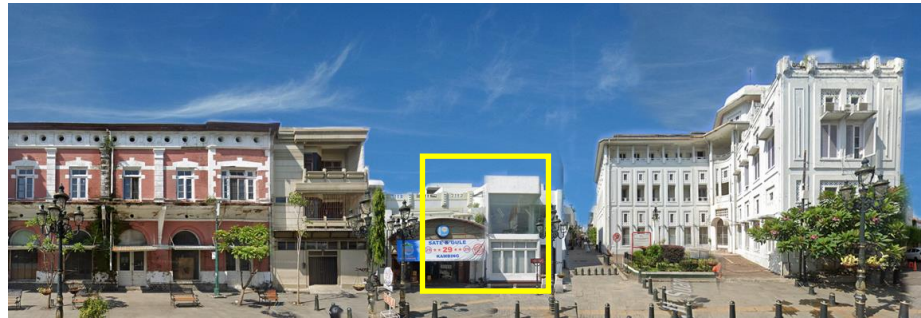


FIGURE 10. Panoramic image of the new building on Jalan Gelatik. (Source: Author's documentation, 2024)



FIGURE 11. Images of the new building and the surrounding cultural heritage buildings. (Source: Author's documentation, 2024)

TABLE 3. Analysis of building infill elements in a new building on Jalan Letjen Suprpto

Building Infill Elements	
Approach	This building is included in a building that contrasts with the surroundings, where it does not adopt the elements around the area.
Height	This building has a height of 1 floor, with the average height of the surrounding buildings being 1-2 floors. The composition of the height of this building is still in harmony with the height of the surrounding buildings, namely the Jiwasraya Building and the Marba Building.
Massing	The buildings are single and adjacent to the cultural heritage buildings of Rumah Makan Sate and Gule 29, the ex-Jiwasraya Building, and the Marba Building.
Colour and Ornament	This building is dominated by white color that is in harmony with the surrounding buildings, but the presence of glass components makes the building seem to stand alone with its modernism. There are no visible ornaments other than the shape of the building itself.
Architecture Style	The building style is modern minimalism, which can be seen from the shape of the building and the use of glass that dominates. This looks different from the surrounding buildings, which have an Indische Colonial architectural style with distinctive ornaments on the walls.

Source: Author's analysis, 2024

TABLE 4. Table of conclusions

Building Infill Elements	Explanation
Approach	Of the three objects of observation above, 2 use an associative approach (New Building on Jl. Gelatik and Hotel Kotta), while New Building on Jl. Letjen Suprpto uses a contrast approach. From these results, the successful approach to maintaining a sense of place in the region is associative.
Height	The three buildings observed have a height that does not contrast with the surrounding buildings, so the application of building height in the building infill approach is not to create a high contrast in terms of height. This is very important because the height of a building can affect the balance of scale and the proportion of human visibility.
Massing	All three buildings have a single mass. The mass arrangement in the Kotta Hotel building applies a building setback so that the building mass does not dominate from the street. The building infill approach is as much as possible to use building setbacks so that the surrounding historical buildings are not obstructed.
Colour and Ornament	The three buildings use colors and ornaments that are still in harmony with the surrounding buildings. Differences in the use of color materials and ornaments are acceptable as long as the façade details are still associative; the use of color can see the surrounding buildings so as not to cause excessive contrast.
Architecture Style	The three buildings use modern architectural styles. Differences in style are acceptable if the surrounding buildings are still considered. The new building on Jalan Letjen Suprpto is dominated by glass, which is very different from the buildings next to it, which have ornaments typical of Indische Colonial architecture.

Source: Author's analysis, 2024

Based on the table above, the building that has been the most successful in implementing building infill is the Kotta Hotel building, as seen from the application of building mass, color, and height, which shows the difference but is still in harmony with the surrounding buildings. Kotta Hottel is an example of the application of building infill that is not only related to aesthetics and visual integration but also provides a catalyst for local economic growth. The presence of new functions, in this case, trade and service functions in the heritage area, can attract more visitors and increase the attractiveness of the area who are looking for an authentic cultural and historical experience. The Kotta Hotel, which is located in the middle of a cultural heritage building with modernization, can revive this area without damaging the existing heritage area.

CONCLUSION

From the research results conducted on several new buildings in the Old City of Semarang, it is concluded that some buildings apply contextuality to the surrounding buildings. The building infill approach is carried out to maintain the area's sense of place so that historical buildings are not lost and replaced with new buildings very different from the area. This approach is based on several elements that are interconnected or in harmony with other buildings, including aspects of height, building mass, ornaments, and colors, with an associative approach that uses the characteristics of the area to be applied to the building to make the building not the same as other buildings but still pays attention to the contextuality of its existence to the surrounding buildings.

In the analysis above, one of the visible things is that the new buildings are not much different in terms of the height and the surrounding buildings, so the buildings are still harmonious and inconspicuous even with a different number of floors. This is especially important because the height of a building can affect the balance of scale and the proportion of human visibility.

The Old City is a silent witness to an area's historical development, so every element, including buildings, has meaning. The presence of new buildings that are not in harmony with the old architectural style can damage the visual harmony of the area and reduce its aesthetic and historical value. In addition, neglect of local architectural characteristics can make the area lose its identity, which in turn can have a negative impact on the tourist attraction, regional economy, and pride of the local community. In addition to the aesthetic aspect, development in the Old City also needs to consider environmental impacts and sustainability. New buildings must be designed with an approach that respects the structure of the old building and maintains the uniqueness of the spatial layout of the area.

As a suggestion, the government as a management stakeholder needs to make strict regulations regarding development in the Old City area. The government can inventory every building in the core area of the Old City as a reference for new development in the future; new development can look back at how suitable and authentic the existing area is. The government and stakeholders can determine the design provisions for new buildings to follow the surrounding buildings' characteristics, including the maximum building height, setback, use of materials, use of style, and others. The provisions and the government can actively carry out the supervisory function by routinely supervising every inch of development in the historical area, including monitoring the procurement of building permits. In addition to the government, community participation is vital to maintaining every element in the Semarang Old Town so that its authenticity is maintained and the Old City can develop into a harmonious area, combining historical values with modern and sustainable needs.

REFERENCES

- [1] Pemerintah Provinsi Jawa Tengah, “Keputusan Walikota Semarang Nomor 646/1254 Tahun 2019 tentang Penetapan Kawasan Kota Lama Semarang sebagai Kawasan Cagar Budaya Peringkat Kota Semarang,” pp. 1–23, 2019.
- [2] Media Komunikasi BPK2L, “Mengenal Bangunan Cagar Budaya di Kota Lama Semarang,” *Book*, 2018.
- [3] M.- Rakha and R. P. Herwindo, “Telaah Nilai Kontekstualitas pada Konfigurasi Rancangan Masjid Menara Kudus,” *J. Arsit. TERRACOTTA*, vol. 3, no. 3, 2022, doi: 10.26760/terracotta.v3i3.7015.
- [4] S. R. Sari, A. R. Harani, and H. Werdiningsih, “Pelestarian Dan Pengembangan Kawasan Kota Lama Sebagai Landasan Budaya Kota Semarang,” *Modul*, vol. 17, no. 1, p. 49, 2017, doi: 10.14710/mdl.17.1.2017.49-55.
- [5] P. N. Glendening, R. Kienitz, and C. Information, “Models and Guidelines for Infill Development,” *Rehabilitation*, pp. 1–52, 2001.
- [6] R. S. Rukayah, “Konservasi dan Revitalisasi, Buku Ajar Konservasi, Arsitektur Jurusan Arsitektur, Fakultas Teknik, Universitas Diponegoro,” 2020.
- [7] S. Barucco, C. Schelter, B. Kaplan, E. Bronstein, G. Clafien, and L. Spina, “Sense of Place : Design Guidelines for New Construction in Historic Districts,” *A Publ. Preserv. Alliance Gt. Philadelphia*, pp. 5–7, 9, 22, 2007, [Online]. Available: <https://www.preservationalliance.com/preservation-alliance-publications/>
- [8] C. Dameria, R. Akbar, P. N. Indradjati, and D. S. Tjokropandojo, “Tinjauan Ulang Potensi Sense of place dalam Pelestarian Kawasan Pusaka Perkotaan,” *Tataloka*, vol. 22, no. 3, pp. 379–392, 2020, doi: 10.14710/tataloka.22.3.379-392.
- [9] Kementerian Pendidikan dan Kebudayaan Republik Indonesia, “Keputusan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 682/P/2020 tentang Kawasan Cagar Budaya Kota Lama Semarang sebagai Kawasan Cagar Budaya Peringkat Nasional,” pp. 1–16, 2020.
- [10] Tim Departemen Sejarah Universitas Diponegoro, *Riwayat Kota Lama Semarang dan Keunggulannya Sebagai Warisan Dunia*. 2020.
- [11] M. Chawari, A. Novida, and R. Sugeng, *Wajah Kota Lama Semarang*. 2019. [Online]. Available: http://repositori.kemdikbud.go.id/17008/1/Abbas%2C%20Chawari%2C%20dan%20Riyanto_Semarang_2019.pdf
- [12] I. Idrus, N. Padiyatu, and S. Latif, “Mengintegrasikan Warisan Budaya dalam Arsitektur Modern : Tinjauan Literatur Tentang Menyeimbangkan Keberlanjutan dan Identitas,” vol. 7, no. 2, pp. 69–88, 2024.
- [13] Pemerintah Provinsi Jawa Tengah, “Peraturan Daerah Kota Lama Semarang Nomor 2 Tahun 2020 tentang Rencana Tata Bangunan dan Lingkungan Situs Kota Lama Semarang,” vol. 2507, no. February, pp. 1–9, 2020.
- [14] H. N. Agastya Grahadwiswara, Zaenal Hidayat, “Pengelolaan Kawasan Kota Lama Semarang Sebagai Salah Satu Kawasan Pariwisata di Kota Lama Semarang,” p. 11, 2020, [Online]. Available: https://www.mendeley.com/catalogue/6e6d9758-be99-3ac2-8623-771f2eb618ac/?utm_source=desktop&utm_medium=1.19.5&utm_campaign=open_catalog&userDocumentId=%7Bda453a5c-1ed9-4b0d-be83-7ee91d218a98%7D
- [15] D. Alfirevic and S. Simonovic-Alfirevic, “Infill architecture: Design approaches for in-between buildings and ‘bond’ as an integrative element,” *Arhit. i Urban.*, no. 41, pp. 24–39, 2015, doi: 10.5937/a-u0-8293.
- [16] A. L. Rahmawati, L. S. Arifin, and Y. B. Dwisusanto, “Pendekatan Mimesis untuk Keberlanjutan Arsitektur Vernakular,” *J. Archit. Hum. Exp.*, vol. 1, no. 1, pp. 23–36, 2023, doi: 10.59810/archimane.v1i1.3.
- [17] A. M. Fenty and D. Maloney, “New Construction in Historic Districts,” p. 11, 2010.
- [18] F. Rahmat, “Kajian Infill Architecture sebagai Strategi Pengembangan Kontekstualitas Kawasan Bersejarah Melalui Panduan Desain Studi Kasus: Koridor Jalan Balaputradewa Borobudur,” *Tesis*, vol. 9, pp. 356–363,

2022.

- [19] H. Neighbourhoods, "Practical Conservation Guide for Heritage Properties," pp. 1–9, 2013, [Online]. Available: <https://www.regionofwaterloo.ca/en/exploring-the-region/resources/Documents/PracticalGuideInfill-access.pdf>
- [20] B. Stavreva, "New vs. Old: New Architecture of Purpose in Old Settings," 2017, [Online]. Available: <https://vtechworks.lib.vt.edu/handle/10919/78392>