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Responsive front land boundary design parameters on urban main road corridors: A case study of Sudirman Street, Jakarta

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ABSTRACT

This study critically evaluates the design of front land boundaries for buildings situated along Sudirman Street, Jakarta. The assessment of design quality was conducted through systematically observed parameters, including access configuration, boundary height, transparency, materiality, signage, and lighting, each grounded in established urban design principles and the prevailing regulatory framework. Data were collected via systematic field observations of 24 buildings located along the west side of Sudirman Street. The results reveal considerable variation in design responsiveness: only six buildings exhibit high responsiveness, characterized by permeable interfaces, as well as thoughtfully integrated lighting and signage, whereas the majority demonstrate moderate to low responsiveness due to limited transparency and insufficient visual connectivity with the public realm. These findings are interpreted within the frameworks of urban design theory, CPTED (Crime Prevention Through Environmental Design), and Jakarta's regulatory standards governing land boundaries, highlighting that design elements such as transparency and lighting play a critical role in mediating the interaction between buildings and street life. This study thereby contributes to an empirical understanding of how the qualitative attributes of front land boundary design enhance urban spatial experience and responsiveness within densely developed metropolitan corridors.

Introduction

Major urban corridors function not only as conduits for movement but also as public spaces where social interactions and environmental conditions actively shape urban identity (Indriati and Ramadhani 2023). Urban transformations have traditionally emphasized infrastructure upgrades, mobility systems, and large-scale interventions in public spaces (D. A. K. Putri et al. 2025). However, the experiential quality of these corridors remains largely contingent on how private lands engage with the public realm (Utami 2019). Within this context, land front boundaries constitute the most immediate and influential interface, defining visual continuity, spatial legibility, and perceived safety along urban streets.

Urban design theory underscores that the quality of streets is significantly influenced by the character of land boundaries as their edges, rather than by the dimensions of the roadway itself (Wang, Huang, and Ye 2024). Land boundaries regulate visibility, accessibility, enclosure, and environmental exchange, thereby strongly affecting pedestrian comfort, safety, and social vitality (Cozens and Love 2015). Boundaries designed to allow visual permeability reinforce the corridor's function as an active and responsive urban space (Al Mushayt, Dal Cin, and Barreiros

Proença 2021). Consequently, responsive design entails the capacity to balance security, functional performance, and engagement between spatial environments and their users.

The responsiveness of front land boundaries depends on multiple factors, including material selection, height, signage, and lighting. Material choices communicate degrees of openness and permanence while simultaneously influencing thermal performance and maintenance requirements (Hens 2012). he height of front boundaries shapes both physical enclosure and psychological perception, particularly at eye level, where pedestrian experience is most sensitive (Tian et al. 2025). Transparency, achieved through glazing, openings, or layered boundary conditions, facilitates visual connectivity and informal surveillance, thereby enhancing perceived safety, promoting spatial continuity along the corridor, and supporting sustainability objectives (Alqalami 2020). Elements such as signage and lighting are pivotal in shaping street legibility and temporal performance (Talebzadeh and Nowghabi 2019). Integrated, pedestrian-scaled signage reinforces active frontage and urban identity, while appropriately designed lighting extends corridor functionality into evening hours, enhancing orientation, safety, and perceived continuity. Access points, including entrances and vehicular connections, further modulate the interaction between private lands and pedestrian movement, either strengthening street activation or disrupting sidewalk continuity (Nykiforuk et al. 2021).

Despite their critical role in shaping street character, pedestrian experience, and public–private interaction, land boundaries remain inadequately addressed within Jakarta's urban planning and building regulations. Existing policies predominantly define land limits in quantitative terms, such as setbacks and building envelopes, without specifying how boundaries should function at the street level. Consequently, an element central to everyday urban experience exhibits substantial variation in design. Sudirman Street, one of Jakarta's most prominent business corridors, exemplifies this condition. Comprehensive revitalization efforts have expanded sidewalks, integrated mass transit systems, and enhanced streetscape design, repositioning the corridor as a pedestrian-oriented urban axis. However, despite these improvements, the design of front land boundaries along Sudirman Street remains inconsistent.

Previous research on urban corridors has primarily focused on street design, pedestrian infrastructure, façade articulation, or land-use intensity, while land boundaries are typically addressed only as regulatory or defensive elements. Studies on walkability and bicycle accessibility indicate that enhancements in sidewalks, crossings, and multimodal integration have improved pedestrian accessibility along Sudirman Street, particularly within the Istora–GBK segment (C. N. Putri and Kurniati 2024). Other research highlights pedestrian comfort and urban tourism by emphasizing sidewalk dimensions, shading, street furniture, and public amenities as key determinants of street experience (Deskarina 2025). Investigations into building frontage underscore the role of active ground floors and façade transparency in supporting street vitality but often treat frontage primarily as a façade articulation, rather than as a boundary mediating public–private interaction (K.; Dimas Hartawan; Adam Ramadhan 2019). Across these studies, front land boundaries have not been examined as spatial interfaces with independent design logic and measurable performance outcomes. Existing corridor studies lack analytical tools to assess how boundary attributes influence visibility, pedestrian comfort, environmental exchange, and perceived safety at street level. Moreover, current planning regulations reduce land boundaries to quantitative controls, creating a disconnect between regulatory intent and lived spatial experience along major corridors. This study addresses this gap by systematically identifying and evaluating the design of building front land boundaries along Sudirman Street as a responsive urban interface, employing integrated and observable criteria, including access configuration, boundary height, transparency, materiality, signage, and lighting. These variables are conceptualized as interacting components that collectively shape spatial continuity, social engagement, environmental comfort, and safety along the corridor. By applying this framework to Jalan Sudirman, the research aims to elucidate how front land boundary design can more effectively support the performance of major urban corridors in dense metropolitan contexts, particularly with regard to functionality, aesthetics, and safety. The novelty of this research lies in its empirical, street-level assessment framework, which repositions land

boundaries as active spatial elements that contribute to continuity, safety, and social engagement within dense metropolitan corridors.

Theoretical basis

Front land boundaries as urban interfaces

Within urban design discourse, front land boundaries are not merely physical demarcations separating private property from public space but function as critical spatial interfaces that shape visual continuity, social interaction, and spatial perception along urban corridors (Alonso de Andrade, Berghauser Pont, and Amorim 2018). Gehl emphasizes the importance of visual contact and accessibility in land boundary design to foster social awareness and the liveliness of streets. (Gehl 2010; Hamraie 2025) demonstrates that integrating visual considerations in land boundary design can simultaneously preserve privacy while promoting social interactions in public spaces. Schindler et al. further show that visual transparency in land boundary design enhances social connectivity (Schindler and Dionisio 2024).

Lynch's foundational work on urban legibility underscores that edges and boundaries influence mental maps and determine how individuals orient themselves within the city (Lynch 1960). Boundaries mediate building-street engagement, shaping whether the public realm is perceived as inclusive, legible, and secure. Recent urban studies indicate that boundaries significantly affect perceptions of access and usability, especially within urban centers (Gałkowski and Antosz 2022). Bentley argue that responsive land boundary design is achieved when spatial elements facilitate permeability, legibility, variety, and visual appropriateness, enabling users to intuitively interpret and engage with space (Bently et al. 1985). Complementing this perspective, the principles of Crime Prevention Through Environmental Design (CPTED) emphasize natural surveillance, territorial clarity, and controlled access as mechanisms through which design can mitigate fear and enhance perceived security (Haider and Iamtrakul 2018).

Key aspects in front land boundary design

Several elements significantly influence the aesthetic, functional, and safety dimensions of front land boundary design. The use of sustainable and adaptive materials is widely recommended for contemporary land boundary design (Ayudya and Ikaputra 2022). Typically, concrete and steel form the structural backbone of front land boundaries due to their strength and durability, while alternative materials, such as stone, wood, glass, and vegetation, are incorporated not only as sustainable options but also to enhance visual integration with the natural environment. Vegetation, in particular, serves as a green buffer that mediates environmental and experiential conditions along urban streets, especially in high-intensity corridors. Recent research highlights that vegetated buffers significantly contribute to microclimatic regulation by reducing ambient temperatures, mitigating heat stress, and improving thermal comfort for pedestrians through shading and evapotranspiration mechanisms (Hamaide, Hamaide, and Williams 2022).

The height and transparency of front boundaries are fundamental in determining the degree of visual continuity along the street edge. According to the Jakarta Governor regulation (DKI 2024), land boundaries should maintain transparency and not exceed two meters in height to ensure visual continuity, enhance safety, and promote social interactions. Exceptions exist for buildings with specific functions, such as foreign representative offices, where boundary heights may exceed 2.5 meters to prioritize privacy and security.

Signage and lighting function as complementary visual devices that reinforce continuity and legibility, particularly in complex urban corridors. Strategically positioned signage communicates land function, access points, and movement hierarchies, reducing spatial ambiguity that may contribute to unsafe or uncomfortable conditions. Lighting, especially at boundary edges and access points, extends visual continuity into nighttime conditions by maintaining visibility and emphasizing transitions between public and private spaces. When integrated coherently with boundary design, signage enhances streetscape rhythm and recognizability (Furchtlehner, Lehner, and Lička 2022).

Beyond materiality, the configuration of access gates plays a critical role in shaping both functional efficiency and spatial clarity at land boundaries (Sevtsuk, Kalvo, and Ekmekci 2016). Fullilove stresses the importance of maintaining circulation and accessibility in land boundary design without compromising user comfort (Fullilove 2013). Clearly delineated entry and exit points improve circulation efficiency by minimizing conflicts between incoming and

outgoing flows, particularly in high-traffic urban corridors. From an urban design perspective, distinct in-out gates also enhance legibility, allowing pedestrians and drivers to intuitively comprehend movement patterns and territorial demarcations (Kadir and Jamaludin 2012).

Methods

This research employed a descriptive-analytical approach combining qualitative and quantitative methods. Conducted from June to November 2025, the study focused on Sudirman Street and Mercu Buana University. The study area encompasses buildings along the Sudirman corridor, concentrating on the west side of Sudirman Street, spanning from the "Pemuda" Statue to the “Bundaran Indonesia” Hotel. This section was selected due to the suboptimal responsiveness of many buildings’ front land boundary designs, which can negatively impact safety and visual quality.

As illustrated in scheme 1, the research commenced with field observation, conducted using a camera, measuring tape, and other stationery to document existing front land boundary designs. Boundary heights were manually measured using a roll meter, while other criteria were analyzed based on the photographic documentation. Observations were carried out during daytime and nighttime, with nighttime assessments focusing on the adequacy of lighting.

The collected observational data (primary data) were analyzed and categorized according to physical attributes, including material composition, height, transparency, signage, lighting conditions, and access configuration. This process enabled the identification of recurring design patterns and spatial tendencies along the corridor. Supplementary information regarding building ownership and function was gathered from literature sources, while the Sudirman Street map was sourced from OpenStreetMap.

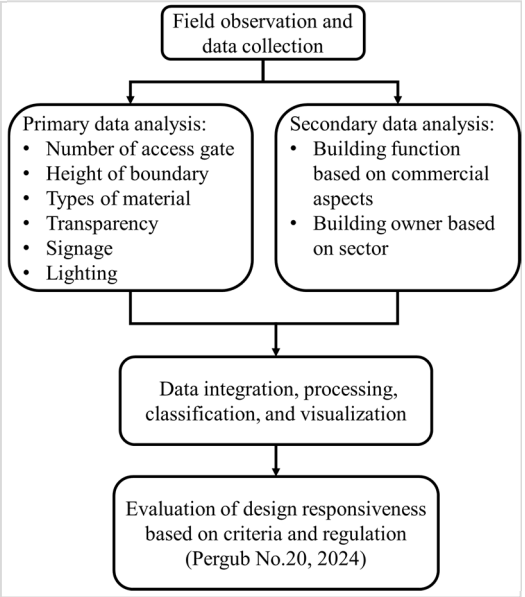

Figure 1. Research stages

Front land boundary heights were classified into three categories: below 2 m (DKI 2024), between 2–3 m, and above 3 m, the latter indicating visual obstruction. Transparency was similarly categorized into three types: massive (low transparency), semi-transparent (partial openings or spacing), and fully transparent boundaries.

The documented and systematically classified data on front land boundaries were subsequently analyzed to assess the level of design responsiveness. This evaluation involved examining each land boundary against the criteria previously outlined, while concurrently taking into account relevant planning and building regulations. By cross-referencing observed boundary conditions with regulatory provisions, the analysis delineates the extent to which existing front land boundary designs not only comply with formal requirements but also respond to the spatial, social, and environmental demands of the urban corridor.

Results and discussion

Identification of study subjects

A total of 24 front land boundary datasets were collected from diverse buildings, including banks, shopping malls, hotels, government offices, and other facilities. Notable examples include the Ministry of Education, Culture,

Research, and Technology (MoECRT) building and Gelora Bung Karno (GBK), the national stadium of Indonesia. Figure 2 presents the map and sample images of the front land boundaries of these buildings. As illustrated, despite the strategic significance of the corridor, front land boundary designs exhibit considerable variation in terms of materiality, height, and degree of engagement with the public realm.

Figure 2. Map of Sudirman Street and pictures of the front land boundaries of the buildings along the west side of Sudirman Street

As summarized in table 1, the buildings were categorized based on ownership, which was classified into the private and government sectors. The majority of the buildings are privately owned, with the exceptions of the MoECRT and BRI. Regarding functional use, the buildings were further subdivided into commercial and non-commercial purposes. Out of the total, 20 buildings serve commercial purposes, whereas the remaining four, the MoECRT, GBK, PT Indonesia Prima Property (PT Indo PP), and an empty plot of land, are designated for non-commercial use.

Front land boundary access is crucial in supporting circulation efficiency and user comfort along the street edge, accommodating both vehicular and pedestrian movement. The configuration of access points directly influences safety, spatial legibility, and the overall user experience within urban corridors. Observations identified two primary access patterns: combined access, in which vehicles and pedestrians share the same entry and exit routes, and separated access, where vehicular and pedestrian movements are distinctly segregated. The analysis revealed that 13 buildings (62.5%), including Panin Bank, Ratu Plaza, Sultan Hotel, and Two Sudirman, utilize combined in-and-out access. Conversely, the remaining nine buildings, such as MoECRT, FX Mall, GBK, and UOB Plaza, provide higher accessibility by employing separate in-and-out access. These configurations indicate a greater degree of spatial permeability, which positively contributes to pedestrian flow and enhances urban legibility along the corridor.

Table 1. Identification of the buildings

Building / Info	Panin Bank	Ratu Plaza	MoECRT	FX Mall	GBK	Sultan Hotel	GKBI Complex	BRI I / II	Mori Tower	Orient Hotel	PT Indo PP	Intiland Tower	Le Meridien Hotel	Empty land	Grand Sahid Jaya	Davinci Penthouse	Midplaza	Nugra Santana	BYD	Astra Tower	Prince Center	KEIAI Complex	Two Sudirman	UOB Plaza
Sector	P	P	G	P	G	P	P	G	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Function	C	C	NC	C	NC	C	C	C	C	C	NC	C	C	NC	C	C	C	C	C	C	C	C	C	C
Access gate	1	1	2	2	2	1	1	2	1	2	1	2	2	1	1	1	2	1	1	1	1	1	1	2

P= private, G= government, C= commercial, NC= noncommercial

Front boundary height and transparency

Figure 2 also illustrates the variations in front land boundary height and transparency across the buildings observed along Sudirman Street. The results indicate that front boundary heights range from 0.4 to 3.7 meters. Height variation was observed not only between buildings but also within individual structures for instance, Sultan Hotel exhibits front boundary heights of 1.8, 2.25, 2.4, and 2.7 meters. This observation suggests that front land boundaries are frequently designed in a segmented manner, responding primarily to functional requirements such as access points, security zones, or articulation of the building façade, rather than adhering to a uniform height. The wide spectrum of front boundary heights affects visual continuity, perceptions of safety, and connectivity between private and public space. As shown in figure 3, the majority of the buildings (61%), including Panin Bank, BRI, Mori Tower, and KEIAI Complex, have front boundary heights below 2 meters, indicating substantial compliance with the Jakarta government regulation (Pergub No. 20, 2024). Furthermore, most buildings in this category particularly privately owned commercial buildings feature front boundary heights below eye level (1.5 m), facilitating visibility of the building and promoting eye-level interaction between pedestrians and the built environment. Conversely, 30% of the studied buildings have front boundary heights between 2 and 3 meters, classified as buildings with specific functional requirements. Examples include PT Indonesia Prima Property, Le Meridien Hotel, and the vacant land plot. Except for Le Meridien Hotel,

these buildings are privately owned for non-commercial purposes, indicating that considerations of security and exclusivity outweigh street engagement. Although less frequent, buildings with front boundaries exceeding 3 meters account for 9% of the total sample. Such heights are visually obstructive, signaling a prioritization of territorial control over spatial engagement, which results in street edges that feel defensive and less accommodating to pedestrians.

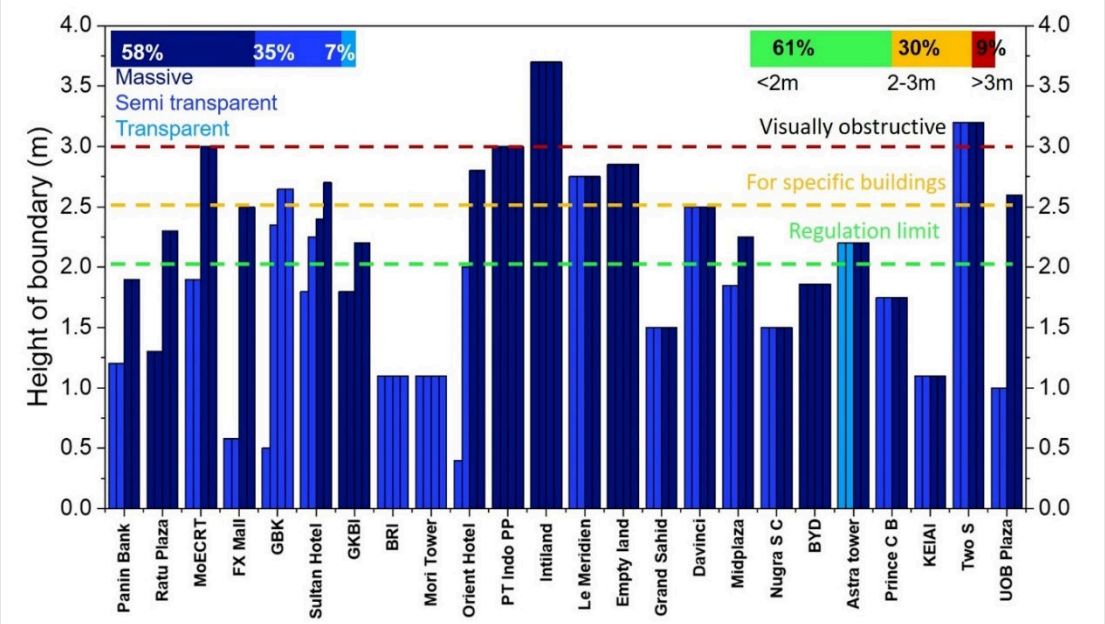

Figure 3. Distribution of front boundary height and transparency

In terms of transparency, the observations reveal a strong predominance of massive, low-transparency front boundaries, accounting for 58% of the surveyed cases. Semi-transparent front boundaries constitute 35%, while fully transparent boundaries are relatively rare at 7%, appearing solely in the Astra Tower. This distribution suggests that, even when boundary heights comply with regulatory limits, visual permeability is frequently constrained by material selection. Consequently, adherence to height regulations does not necessarily translate into visual openness or enhanced street-level engagement.

Many buildings display a combination of massive and semi-transparent front boundaries, such as Davinci Penthouse, Midplaza, Prince Center Building, and UOB Plaza. Some buildings exhibit consistent transparency, for instance, Ratu Plaza, GKBI Complex, Intiland Tower, the vacant land, and BYD, which feature predominantly massive (low-transparency) boundaries. All of these are privately owned buildings with commercial functions. Although the materials are generally massive, visual continuity, a critical aspect for commercially oriented buildings, can still be achieved by controlling boundary height below eye level, as demonstrated by BYD and Ratu Plaza. The integration of moderate heights with massive materials reinforces enclosure and limits natural surveillance, highlighting the necessity of evaluating transparency alongside height when assessing the responsiveness of front land boundary design.

Front boundary materials and elements

Figure 3 illustrates the range of materials used for constructing front land boundaries. Steel fences dominate the dataset, appearing in 18 boundaries and constituting 31.5% of the sample. Concrete walls account for 26.3%, vegetation or plant elements comprise 24.9%, and stone structures make up 12.3%.

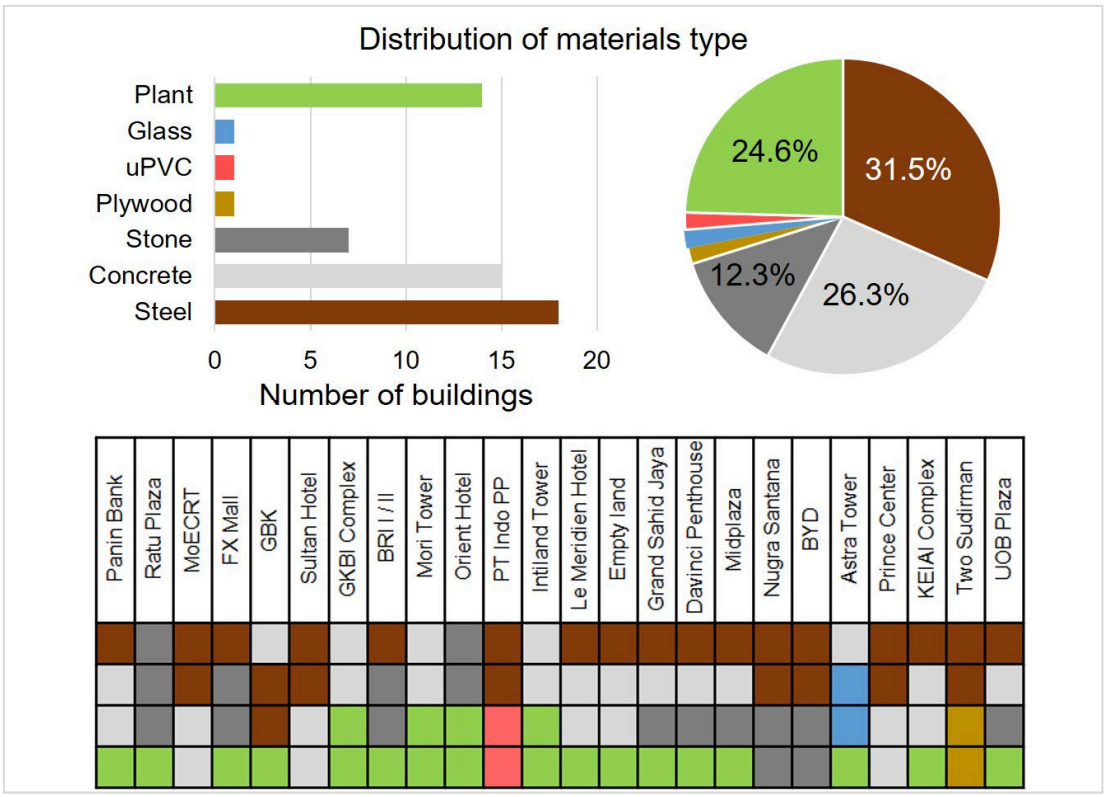

Figure 4. Types of materials used in the studied front land boundary structures

Concrete and stone walls are generally associated with solid boundary configurations that primarily function as physical barriers, offering minimal visual permeability between the interior of the property and the public sidewalk. This approach is acceptable for privately owned, non-commercial buildings, such as PT Indo PP. However, despite their commercial function, Intiland Tower (office building) and GKBI Complex (residential) exemplify massive boundary structures with low transparency. These variations indicate that material choice and transparency are influenced not solely by building function, but also by institutional image, security priorities, and site-specific interpretations of regulatory requirements.

In some cases, combining massive materials with steel or plant elements, while maintaining heights below eye level, can achieve adequate visibility and transparency. For instance, the front boundary designs of MoECRT, Midplaza, and Prince Center Building demonstrate effective transparency through the integration of concrete, steel, and uPVC materials. Previous studies highlight uPVC as a sustainable material option in construction due to its heat and cold resistance, energy efficiency, corrosion resistance, mechanical strength, and durability (Amorim et al. 2022). Ciampi et al reported that semi-transparent uPVC structures can reduce energy consumption by up to 6.1% (Ciampi et al. 2021). Plywood, while typically considered a non-permanent boundary material, is combined with steel in Two Sudirman to form a solid front wall. Glass, utilized exclusively in Astra Tower, enhances both transparency and aesthetic appeal. Glass facades allow daylight penetration, potentially reducing interior energy use (Jóźwik 2022). Bui et al demonstrated that glass construction in tropical climates can minimize unwanted solar heat gain, thereby lowering cooling loads and contributing to energy savings (Bui et al. 2017).

Plants and vegetation are commonly incorporated as complementary elements in front land boundary designs along Sudirman Street. As shown in figure 2, plants account for only a modest portion (24.56%) of the dataset. Their presence serves not only an aesthetic purpose but also reflects broader regulatory and environmental considerations embedded within Jakarta's urban planning framework. Vegetation

often functions as an additive green buffer layer within otherwise massive boundary structures, as observed at Jakarta Mori Tower, Intiland Tower, Oriental Jakarta Hotel, and Astra Tower. Studies emphasize the importance of integrating vegetation into boundary design, as plants foster connectivity to nature, mitigate urban heat island effects, reduce carbon emissions, and enhance thermal comfort in adjacent areas (Zhang et al. 2019; Li et al. 2022). Despite its importance, Bachtiar (2020) that only 49% of corridors along Sudirman Street comply with government regulations regarding the use of building setback lines as green buffers. Figure 5 illustrates the distribution of signage and lighting elements along the front land boundaries of the study corridor. Signage is widely implemented, appearing in 83% of plots, whereas only 17% lack boundary signage. This prevalence indicates that signage serves both visual and functional roles, marking identity, orientation, and access at the interface between land and street. In contrast, lighting is considerably less common: only 21% of boundaries incorporate lighting elements, while 79% do not provide illumination. This imbalance suggests that lighting is not consistently treated as a standard boundary component, despite its potential to improve nighttime visibility and safety.

The distribution of signage and lighting reflects a clear pattern in how front land boundaries respond to public-facing urban functions. The dominance of signage presence alongside limited lighting provision indicates a design tendency that prioritizes daytime visual identification over nighttime legibility and security, highlighting a gap in integrating visual and safety-oriented boundary elements. Commercial buildings such as plazas, office complexes, and hotels consistently incorporate signage as part of their frontage system, reinforcing visual identity and improving spatial legibility at the pedestrian scale. Meanwhile, lighting enhances visual continuity and supports natural surveillance. In the observed dataset, plots equipped with boundary or frontage lighting, such as Gelora Bung Karno, Mori Tower, Prince Center, and Two Sudirman, correlate with extended operating hours and high pedestrian interaction, emphasizing the role of illumination in perceived safety and nighttime activity.

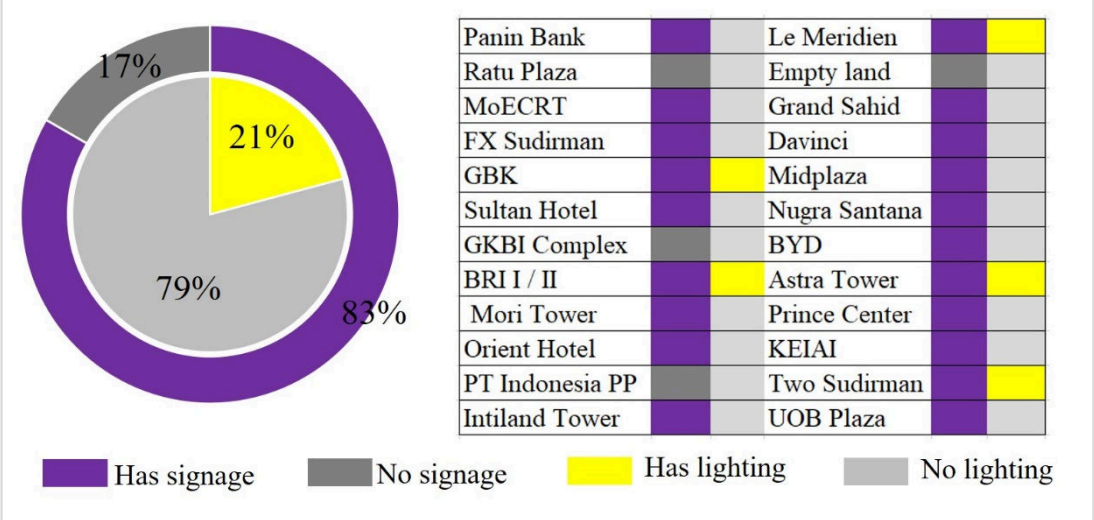

Figure 5. The presence of signage and lighting in the studied front land boundary structures

Front land boundary responsiveness

The assessment of building responsiveness along the Sudirman Street corridor reveals a spectrum of alignment between urban land boundary design and regulatory frameworks. Based on systematic observation, classification, and comprehensive analysis, the land boundary designs of the studied buildings were interpreted as exhibiting high, moderate, or low levels of responsiveness to the surrounding urban context (figure 6).

Buildings demonstrating high responsiveness are characterized by semi-transparent boundaries and clearly articulated access points,

complemented by integrated signage and lighting. The land boundary designs of Gelora Bung Karno, Mori Tower Jakarta, Nugraha Santana Complex, Prince Center Building, and KEIAI Complex exemplify how semi-transparent materials facilitate visual continuity between public spaces and private lands while maintaining a clear territorial definition. This observation aligns with Gehl's assertion that visual permeability strengthens the relationship between indoor activities and street life, enhancing pedestrian engagement and urban vitality (Gehl 2010). From a CPTED perspective, such configurations promote natural surveillance, particularly when combined with adequate lighting, thereby reinforcing perceived safety without reliance on defensive enclosure.

Figure 6. Classification of land boundary responsiveness (blue: low, yellow: moderate, green: high responsiveness)

Land boundary designs exhibiting moderate responsiveness generally demonstrate partial alignment with principles of responsive urban design. These buildings typically feature a combination of semi-transparent and massive boundaries, often with heights above eye level that permit limited visual interaction between public sidewalks and private lands, thereby supporting the continuity of the streetscape. Among the studied buildings, Panin Bank, Ratu Plaza, Sultan Hotel, BRI I/II, Le Meridien Hotel, vacant lands, Two Sudirman, and UOB Plaza represent moderate responsiveness, with boundary transparency and legible access points, though not consistently reinforced by integrated signage or lighting strategies. The limited application of lighting and signage in these moderately responsive buildings constrains their contribution to nighttime safety and spatial legibility, reducing their overall responsiveness 33e.

In contrast, buildings categorized as exhibiting low responsiveness are predominantly defined by massive boundaries that frequently exceed government-regulated height limits, resulting in minimal visual permeability, while simultaneously demonstrating weak articulation of access points. This classification encompasses Panin Bank, BRI Bank, Intiland Tower, BYD, as well as several non-commercial or vacant plots along the corridor. These boundaries primarily operate as defensive enclosures, emphasizing separation rather than engagement. Although such configurations may fulfill functional or security objectives, they contribute minimally to the experiential quality of the public realm. From a Crime Prevention Through Environmental Design (CPTED) perspective, these low-responsive boundaries diminish opportunities for natural surveillance and compromise perceived safety, particularly in the absence of adequate lighting. Environments characterized by low visual permeability and insufficient illumination are more likely to be perceived as unsafe, irrespective of actual crime statistics.

Conclusions

This study illustrates that land boundary design exerts a critical influence on visual continuity, safety perception, and public-private interaction along major urban corridors, as exemplified by Sudirman Street. While the majority of boundaries comply with Jakarta's height regulation (< 2 m), mere regulatory compliance does not guarantee responsive street edges, as many boundaries remain visually closed due to the use of massive materials and low transparency. Boundary performance is jointly determined by material selection, height, and transparency, with durable materials such as concrete and steel frequently prioritizing enclosure and security over visual engagement. Vegetation is generally applied as a complementary feature, whereas signage is widespread and contributes to daytime legibility; however, limited lighting provision restricts nighttime visibility and the perception of safety. Access configuration further shapes responsiveness, as separated in-out access points provide clearer circulation and enhanced spatial

legibility compared to combined systems. Overall, the findings indicate that existing regulations emphasize quantitative parameters but offer limited guidance on qualitative boundary performance. Among the 24 land boundary designs studied, only six were classified as highly responsive. These highly responsive boundaries integrate moderate height, calibrated transparency, clear access, and supportive visual elements, underscoring the need for nuanced regulatory and design frameworks that position land boundaries as active urban interfaces rather than purely defensive structures.

Based on these findings, enhancing the responsiveness of front land boundaries should prioritize the use of substantial yet visually permeable materials, such as low-height concrete or stone bases combined with transparent or semi-transparent upper elements, integrated planting, or glazed panels. Boundary lighting should be regarded as a mandatory design component, particularly at access points and along boundary edges, to improve nighttime legibility and safety. Signage should be pedestrian-scaled, seamlessly integrated into boundary design, and coordinated with lighting to reinforce both identity and spatial clarity throughout the day and night.

From a regulatory standpoint, this study recommends that future gubernatorial regulations advance beyond quantitative constraints to explicitly incorporate qualitative performance criteria for front land boundaries. Such criteria may include maximum eye-level opacity, minimum transparency ratios, mandatory boundary lighting, guidance on material combinations, and clear standards for access articulation. Implementing these measures would promote a more consistent and responsive street interface while accommodating functional and security requirements.

Finally, future research is advised to extend the study area to encompass both sides of Sudirman Street and other major Jakarta corridors, as well as to compare diverse land-use contexts. Subsequent studies could also incorporate expert analysis, user perception surveys, crime statistics, or microclimatic evaluations to deepen understanding of how front land boundary design affects urban livability and corridor performance at a metropolitan scale.

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Ramdhansyah conceptualization, methodology, investigation, data collection and analysis, writing original draft

Tin Budi Utami conceptualization, methodology, supervision, writing: review

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