Proceeding International Conference on Economy, Education, Technology, and Environment
Vol. 3, No. 1, July 2025
https://prosiding.utp.ac.id/index.php/ICEETE

Design and Cost Estimation for Residential Pedestrian Revitalization in Rewwin, Sidoarjo

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ABSTRACT

The issue concerning pedestrian facilities occurs in the RW 09 area of the Rewwin Housing Complex, Wedoro Village, Waru Subdistrict, Sidoarjo Regency. The existing condition of the pedestrian path has shifted in function, rendering many segments unusable. This community service activity aims to redesign the spatial layout to improve functionality and comfort for pedestrians. Methods include field surveys, geometric measurements, technical design using AutoCAD and SketchUp, and preparation of a Cost Estimate Plan (RAB) based on local construction unit prices. The outputs are a proposed sidewalk design using paving blocks and a corresponding cost estimation document. These serve as a technical reference for future construction implementation. Evaluation was conducted through phased consultations with the local community to ensure applicability. Findings indicate that design interventions based on actual field conditions and community needs can restore the function of pedestrian paths effectively. The final cost estimation for a 500-meter revitalization project reached IDR 981,261,318.69. The process also highlighted the importance of involving residents in planning stages to ensure the long-term sustainability of public infrastructure improvements. This project contributes a replicable model for residential pedestrian revitalization efforts and offers practical insights for efficient budgeting in neighborhood-scale urban planning. The results may serve as a reference for further studies focusing on participatory urban design and cost-effective pedestrian infrastructure development.

KEYWORDS: drainage planning; public space; sidewalk redesign; urban revitalization

INTRODUCTION

The growth of residential areas in urban regions often presents significant challenges in the provision and management of public infrastructure, especially pedestrian facilities. In RW 09 of the Rewwin Housing Complex, Wedoro Village, Waru Subdistrict, Sidoarjo Regency, sidewalks that were originally designed as pedestrian pathways have undergone functional and physical degradation. These include conversion into informal dumping areas, illegal structures, and general neglect, leading to reduced safety, comfort, and accessibility for pedestrians (Winansih et al., 2020).

This condition reflects a broader issue found in many Indonesian urban areas, where pedestrian infrastructure has not yet become a key planning priority, unlike in developed countries that implement targeted policies for pedestrian-friendly cities (Hamdani, 2024). Assessments in major cities like Jakarta and Bandung confirm that poor sidewalk quality—such as narrow paths, damaged surfaces, and absence of proper lighting and signage—impacts user safety and discourages walking (Kuswanto, 2019; Erlangga et al., 2020).

International studies further support the link between sidewalk design and walkability. For example, the presence of obstructions and inadequate path dimensions significantly limit pedestrian mobility, particularly among the elderly and disabled (Gebremariam et al., 2024; Khan et al., 2024). Revitalization programs like the "road diet" in Jakarta and intersection redesign in Beirut have demonstrated increased pedestrian satisfaction and public transport use (Mulyadi et al., 2022; Said et al., 2020). Moreover, sidewalk connectivity plays a vital role in promoting community inclusivity and accessibility to public spaces such as schools and parks (Honiball et al., 2024; Fonseca et al., 2022).

Despite the issuance of technical guidelines such as Circular Letter No. 02/SE/M/2018 by the Ministry of Public Works and Housing, implementation on the ground remains inconsistent and lacks adaptation to local conditions. Most existing research focuses on central business districts, whereas studies on pedestrian facilities in residential zones like Rewwin are still limited (Sutandi et al., 2019; Tarawneh, 2020; Stabile et al., 2023). The growing availability of tools like VR-assisted simulations, satellite-based mapping, and automated sidewalk inspection has enabled deeper, scalable analyses of walkability and infrastructure needs (Facchini et al., 2025; Hosseini et al., 2021; Zhang et al., 2023). In line with the "15-minute city" approach being adopted globally to promote urban accessibility and sustainability, neighborhood-level sidewalk design is increasingly recognized as critical public infrastructure (Rhoads et al., 2023; Carvalho et al., 2023). Therefore, a context-sensitive redesign effort in RW 09 is not only urgent but contributes to filling a gap in the literature on localized pedestrian infrastructure development in Indonesia.

This study aims to develop an integrated technical plan and cost estimate (RAB) for pedestrian pathways in RW 09 of the Rewwin Housing Complex. The proposed hypothesis is that a redesign based on field surveys and community needs will yield a functional, inclusive, and implementable planning document. Observed variables include sidewalk dimensions, elevation and drainage slope, pavement materials, and supporting components such as lighting, signage, and channeling systems. The methods applied consist of site condition surveys, technical measurements, needs analysis, and the preparation of working drawings and cost calculations based on current local price units and national technical standards.

METHODOLOGY

Research Design. This study employs a quantitative-descriptive approach focusing on the development of technical designs for micro-scale environmental infrastructure. This approach was selected because it enables an objective depiction of existing conditions while producing measurable and applicable technical solutions. The research design adopts a case study method, with RW 09 of the Rewwin Housing Complex as the single study site. This case study allows for an in-depth exploration of existing pedestrian issues and the planning of specific solutions based on actual field conditions.

Population and sample used. The population in this study includes all elements of neighborhood road infrastructure in RW 09 of the Rewwin Housing Complex, particularly those related to pedestrian pathways and surface drainage systems. The population focus covers road segments with damaged sidewalks, sidewalks obstructed by materials, or those that no longer function as pedestrian pathways. The sidewalk segments that are prioritized are those along the roads throughout RW 09 of the Rewwin Housing Complex, Sidoarjo.

Data Collection Techniques. Data collection was carried out through direct field surveys to document the existing conditions of sidewalks and drainage channels in RW 09 of the Rewwin Housing Complex. Observations were conducted by recording physical conditions such as sidewalk width, road slope, the presence of obstructions, and the functionality of drainage channels. Technical measurements were performed using measuring tools such as a roll meter and manual waterpass to obtain dimensional and elevation data. In addition, visual documentation was conducted through photography at strategic points. Supplementary data were gathered through informal interviews with local residents to obtain information regarding daily sidewalk use and locations prone to waterlogging during the rainy season.

Tools or Instruments Used. Several technical tools were used in the data collection and processing stages. A roll meter was utilized for measuring the length and width of the sidewalks, while a waterpass or total station was used to determine the elevation slope of the drainage channels. A digital camera was employed to document the existing visual conditions as supporting data for analysis and design. In the technical design preparation process, AutoCAD and SketchUp software were used to redraw the plans and technical sections of the pedestrian pathways and drainage channels. Meanwhile, the preparation of the Cost Estimate Plan (RAB) was conducted using Microsoft Excel, referencing the local unit prices of Sidoarjo Regency.

Data Analysis Methods. The data obtained from measurements and observations were analyzed descriptively to identify the existing physical conditions and technical requirements for each road segment. The analysis began with checking sidewalk dimensions against the minimum standard width for pedestrian pathways, assessing the slope of drainage channels, and identifying critical points requiring improvement. These measurement results served as the basis for preparing technical drawings (plans and sections) using AutoCAD. Subsequently, work volumes were calculated based on the technical drawings and used to prepare the Cost Estimate Plan (RAB) through the unit price analysis method (AHSP). All analyses were conducted by referring to technical guidelines issued by the Ministry of Public Works and Housing (PUPR) and were adjusted to the local conditions of the study area.

RESULTS AND DISCUSSION

The field survey conducted in RW 09 of the Rewwin Housing Complex revealed that most pedestrian pathways are no longer functioning as intended. Observations documented sidewalks with significant physical damage, encroachment by temporary structures, and usage as informal parking or waste disposal areas. The existing condition survey was performed using a 50-meter interval measurement to map physical disruptions along the sidewalk network.

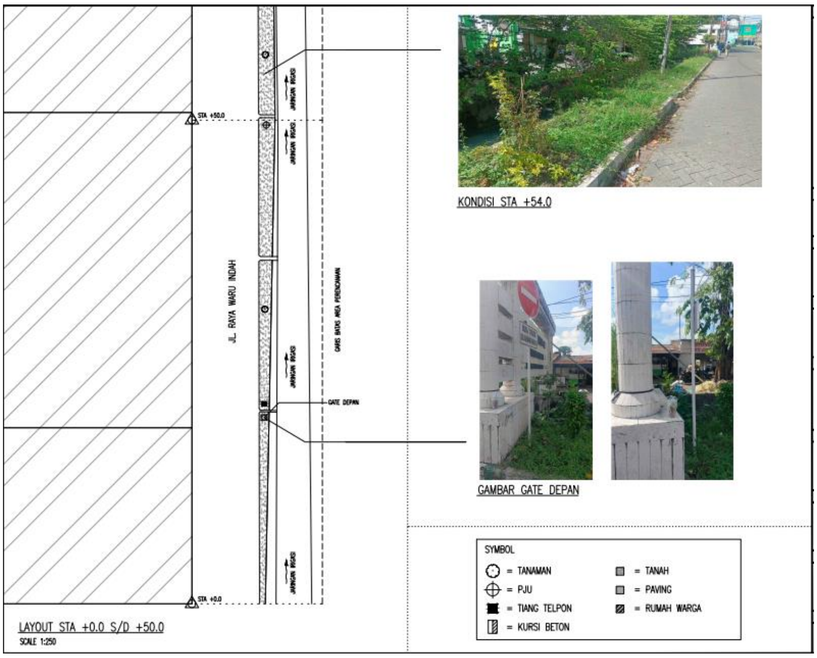

Figure 1. Documentation of sidewalk blockage and clogged drainage in RW 09 *(Source: Field observation, 2025)*

These conditions indicate a severe functional shift in pedestrian areas. The findings are consistent with Erlangga et al. (2020), who argue that degradation of pedestrian infrastructure compromises safety, accessibility, and the visual coherence of urban environments. As a result, redesigning sidewalks and drainage systems is crucial to restoring order and improving the quality of life in the neighborhood.

The issue is not unique to this area. Kuswanto (2019) reported similar trends in other residential settings, emphasizing that poor initial design, insufficient maintenance, and low community awareness often lead to the deterioration of pedestrian zones. This study reinforces those conclusions while demonstrating a practical response—namely, generating site-specific technical design documents to address the unique spatial and hydrological characteristics of RW 09.
Aside from technical flaws, social and institutional factors also contribute to sidewalk misuse, including minimal enforcement and a lack of public awareness regarding pedestrian space functions. This suggests that future improvements must pair infrastructure development with community engagement and local policy enforcement.

Design Output – Placeholder
The proposed design introduces a standardized pedestrian pathway with 1.5-meter width using interlocking paving blocks, supported by tactile paving for inclusivity. Drainage upgrades include resizing of culverts and adjusting slope gradients for effective water flow. These interventions are expected to:

- Improve pedestrian safety and comfort
- Encourage walking as a sustainable transport mode
- Reduce localized flooding through better water management
- Enhance visual appeal and spatial order in the neighborhood
- Foster community ownership of public infrastructure

Figure 2. Placeholder: Technical Design Drawing

Cost Estimation (RAB) – Placeholder
Based on the design drawings, the estimated cost for revitalizing approximately 500 meters of sidewalk and drainage infrastructure is IDR 981,261,318.69. The Bill of Quantities (BoQ) includes detailed calculations of materials, labor, and technical specifications. Cost transparency is crucial for community deliberation and funding strategies.

Pedestrian, Total Price					Rp 981,261,318.69
No	**Job description**	**Volume**	**Unit**	**Unit Price (Rp)**	**Total Price (Rp)**
1	Brick Installation	1009	m2	257,984.00	260,249,099.52
2	Railing Fence Installation	548	m2	896,445.00	491,475,971.25
3	Kanstin installation	439	m1	103,630.08	45,452,153.09
4	Brick Sand Backfilling	101	m3	253,800.00	25,602,836.40
5	Demolition of Existing Bricks	877	m2	877.20	769,479.84
6	River Channel Stone Repair	579	m2	177,300.00	102,656,700.00
7	Railing Fence Support Sloof Work	20	m3	2,789,435.00	55,055,078.60

Figure 3. Cost Estimation

Implications and Future Research

This study demonstrates that a data-driven, context-sensitive design approach can yield practical infrastructure solutions at the community scale. The proposed improvements not only address physical and functional deficiencies but also create opportunities for safer mobility and better public health outcomes. However, this research is limited by the absence of quantitative feedback from residents regarding perceived usability, aesthetics, or satisfaction with the proposed design. A future study is planned to evaluate user experience post-implementation through structured surveys and performance monitoring.

CONCLUSION

This study successfully developed a technical design for the revitalization of pedestrian pathways in RW 09 of the Rewwin Housing Complex, Sidoarjo, in response to the functional changes and physical deterioration of sidewalks in the area. The proposed design took into account the existing conditions, technical requirements, and input from local community representatives. The cost estimate calculation indicates that the revitalization of a 500-meter sidewalk requires a budget of IDR 981,261,318.69. These findings highlight the importance of data-driven and locally contextualized technical planning as a foundation for decision-making in pedestrian infrastructure management. Practically, the design and cost estimate documents produced can serve as a reference for the physical implementation of the project. Theoretically, this study contributes to the body of knowledge on micro-urban spatial planning in secondary residential areas. Further research is recommended to incorporate quantitative data on residents' preferences and perceived comfort levels to produce designs that are increasingly responsive to the needs of pedestrians.

Acknowledgments

The authors would like to sincerely thank the residents’ committee of RW 09, Rewwin Housing Complex, Sidoarjo, for their cooperation and valuable input during the field survey and design process. We are also grateful to the local authorities of Sidoarjo Regency for providing access to data and technical guidelines that supported the implementation of this study. Special thanks are extended to our colleagues at Universitas 17 Agustus 1945 Surabaya who contributed their expertise and assistance throughout the completion of this research.

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