



Evaluation of Arterial Roads in the SWK Tegalega Area of Bandung City

*Ina Revayanti¹, An An Anisarida², Syapril Janizar³

¹Department of Regional and Urban Planning, Winaya Mukti University, Bandung

^{2,3}Department of Civil Engineering, Winaya Mukti University, Bandung
inarevayanti74@gmail.com

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Abstract

The arterial roads in the SWK Tegalega area play a vital role in the spatial structure of the city of Bandung; however, the dynamics of massive development often result in discrepancies between existing conditions and established spatial plans. This study evaluates the suitability of land use and arterial road infrastructure in the Tegalega Urban Sub-District based on the Bandung City Planning Line Map (Grand Design). The primary focus is to assess and update the geometric plans for urban facilities and infrastructure to ensure alignment between spatial policies and existing conditions on the ground, given the high intensity of land-use conflicts along this major corridor. The research method used is a Geographic Information System (GIS)-based superimposition method, which compares existing spatial data from field observations with City Planning Line regulations. Evaluation parameters include road width, road right-of-way (Rumija), and building boundaries. The results of this evaluation serve as a validation tool for communicating urban planning information and form the technical basis for issuing recommendations on Spatial Planning Activity Compliance (KKPR) and approving site plans. Through this update of geometric data, it is hoped that legal and technical certainty will be established in the planning of arterial roads, supporting sustainable urban mobility and minimizing future spatial planning violations.

Keywords: Arterial Road, Tegalega Sub-District, City Planning Zones, Land Suitability.

INTRODUCTION

The dynamic development of Bandung, which has undergone significant transformation through both horizontal expansion and vertical densification, has triggered massive changes in land use, thereby necessitating adaptive and precise spatial control instruments. Since 1988, the Department of Public Works, Construction, and Spatial Planning has implemented the City Spatial Technical Plan Outline Map as the primary geometric guideline for infrastructure development and the basis for issuing Spatial Planning Activity Compliance (KKPR) recommendations. However, the rapid growth

of residential and commercial areas today has caused discrepancies between old planning documents and actual conditions, making the updating of planning maps imperative to ensure sustainable infrastructure integrated development.

The evaluation of arterial roads in the Tegalega Urban Sub-District (SWK) is crucial for synchronizing the road geometric plans, drainage, wastewater systems, and Green Open Spaces (GOS) outlined in the digital recommendation map from the National Geospatial Information Agency (BIG) with physical realities and the region's fiscal

capacity. Through the sub-activities of Substantive Approval Implementation and the Establishment of the Detailed Spatial Plan (DSP), this evaluation is positioned as a fundamental foundation for formulating a more practical and implementable spatial plan. Therefore, this study aims to construct a structured methodological framework for updating spatial data to ensure legal certainty and orderly land use in the City of Bandung.

The primary objective of this study is to conduct a comprehensive assessment and update of the geometric plans for urban facilities and infrastructure as outlined in the Master Plan Map. This strategic step is taken to ensure that this spatial control instrument remains coherently aligned with contemporary physical changes in the city, while also serving as a precise technical parameter in the update of the RRTR. With these adjustments, it is hoped that every spatial policy adopted by the local government will possess strong technical validity and be capable of minimizing future spatial conflicts.

The objectives include aligning geographic data and adjusting road alignment plans by adopting the 2016 base map certified by the National Geospatial Information Agency (BIG). The field validation process is conducted systematically to identify the degree of alignment between the geometric plans on the map and actual physical developments, particularly in critical zones such as residential, commercial, and service areas. Through accurate identification, deviations between plans and reality can be minimized, ensuring that the resulting spatial data are highly accurate.

As a final product, this study aims to optimize policy implementation by providing credible geometric guidelines as the primary reference for disseminating urban planning information. This plays a vital role in land administration and spatial planning processes, particularly in the issuance of Spatial Planning Activity Compliance (SPAC) recommendations and the approval of site plans. Thus, this data synchronization not only supports bureaucratic efficiency but also fosters a healthy investment climate by ensuring legal certainty for both the public and businesses in the City of Bandung.

METODE

An evaluation of the performance of arterial roads in the Tegalega Urban Development Area (SWK), Bandung City, was conducted using a descriptive-qualitative method with an exploratory orientation. This approach aims to identify fundamental issues and formulate a comprehensive management framework by integrating technical standards and sectoral regulations as evaluative parameters. To enhance the relevance of the findings, this study also employs a prescriptive approach to provide a critical assessment of various policy alternatives. By synthesizing existing conditions and regulatory projections, this analysis is expected to generate practical strategic recommendations to support the effectiveness of future road infrastructure policies.

To ensure the validity and depth of the analysis, the data acquisition process was conducted systematically through the integration of secondary and primary surveys. The secondary survey focused on collecting authoritative data through literature reviews and official documents from relevant government and private institutions. Meanwhile, primary surveys were conducted to capture empirical phenomena in the field through direct observation, visual documentation, questionnaire distribution, and in-depth interviews. The synergy of these two data collection methods forms a strong empirical base for accurately describing spatial and social conditions to support targeted decision-making.

Analysis Methods

The analytical method implemented in the evaluation study of arterial roads in the Tegalega Urban Growth Area focuses on policy integration through a Master Plan analysis. This approach aims to align various spatial planning policy instruments in the City of Bandung, particularly those regulating road network development plans and the establishment of new road corridors. Technically, this analysis was conducted by applying the superimposition method—or the layering of thematic maps—as the primary evaluative tool.

Using the superimpose technique, various layers of spatial data and planning documents are systematically compiled to analyze existing conditions and development potential within the planning area. This process enables the identification of both conformity and deviations between on-site realities and spatial planning projections. The results of this overlapping analysis serve as the Grundlage for a comprehensive synthesis in formulating conclusions regarding the typology of the area and the direction of road network development relevant to the city's spatial structure.

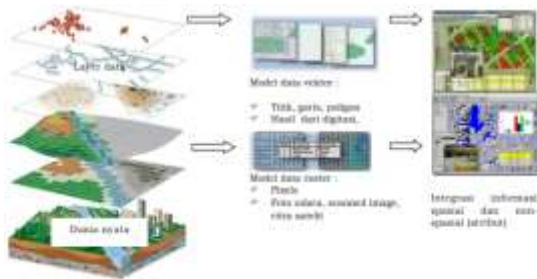


Figure 1 Superimpose Method

The next analytical method is Map Topology Analysis, which is used to define spatial relationships and mathematical interactions among objects in a geographic space. Within the framework of Geographic Information Systems (GIS), topology analysis serves as a crucial tool for validating the integrity of spatial data based on the connectivity between point, line, and polygon entities. These interactions not only represent absolute positions but also describe aspects of connectivity, adjacency, and inclusion among objects within the arterial road network in the Tegalega Urban Growth Area.

In cartographic processes and spatial modeling, topological rules are strictly defined based on geometric characteristics to ensure consistency in the relationships between map elements. In road network analysis, line topology plays a crucial role in modeling the continuity of the traffic system, while polygon topology is used to delineate the boundaries of zones that intersect with road right-of-way. The implementation of this method enables the study to produce an accurate, redundancy-free spatial database, allowing for precise evaluation of the road network structure.

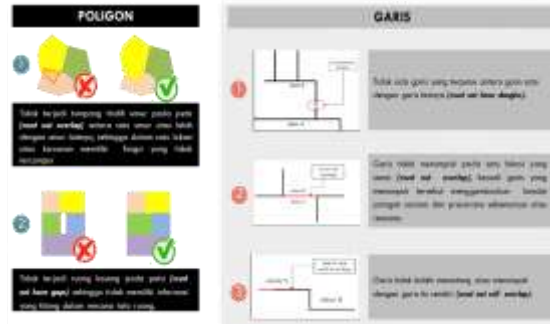


Figure 2 Topological Mapping Analysis Methods

RESULTS

A. Arterial and Collector Road Network Plan

The integration of the arterial and collector road network plans in this study refers to the Bandung City Master Plan Evaluation document, which is an integral component of the spatial structure as stipulated in the Bandung City Regional Spatial Plan (RTRW). Through Geographic Information System (GIS)-based data processing sourced from the RTRW Appendix, a spatial profile of the road hierarchy in the Tegalega Urban Development Area (SWK) has been identified.

Based on the results of this data extraction, the arterial and collector road network in the Tegalega Urban Growth Area comprises 19 strategic road sections with a total length of 57.27 km. These road sections serve as primary corridors supporting both urban and regional mobility, and are the subject of evaluation to assess the alignment between spatial planning and existing on-site conditions. The details regarding the distribution and classification of each road section are presented as follows:

- 1) Primary Arterial Roads: 2 road sections, 18.90 km
- 2) Secondary Arterial Roads: 9 road sections, 16.11 km
- 3) Primary Collector Roads: 4 road sections, 15.32 km
- 4) Secondary Collector Roads: 4 road sections, 6.94 km

Table 1 Plan for the Arterial and Collector Road Network in the SWK Tegalega Area

No.	Road Section Name	Existing Road Length (km)	Jurisdiction
Primary Arterial Road			
1	Sudirman Street	6,63	National
2	Soekarno-Hatta Street	12,27	Nasional
Secondary Arterial Road			
3	Asia Afrika Street	0,1	City
4	Astanaanyar Street	2,05	City
5	Gardujati Street	0,1	City
6	Jamika Street	6,55	City
7	Kopo Road (Sp, BKR-SP, Pasirkoja)	1,2	City
8	Leuwipanjang Street	2,22	City
9	Oto Iskandar Dinata Street	1,92	City
10	Pasirkoja Street	1,69	City
11	Cibeureum Street	0,28	City
Primary Collector Road			
12	Kopo Road (Sp, Jl. Peta-BTS, Bandung City/Regency)	3,61	Province
13	Moh. Toha Street (Junction of BKR-BTS Road, Bandung Regency)	3,62	Province
14	Peta Street	5,75	Province
15	Pasir Koja Extension Road (Jamika Intersection-Soekarno Hatta Intersection)	2,34	Province
Secondary Collector Road			
16	Caringin Street	2,59	City
17	Cibadak Street	0,62	City
18	Cibaduyut Street	2,52	City
19	Inhoftank Street	1,21	City
Total		57,27	City

Source: Bandung City Spatial Plan 2022-2042



Figure 3 Map of the Network Plan for Arterial and Collector Roads in the SWK Tegalega Area

B. Evaluation of Road Dimensions on Arterial Road Sections

The evaluation of road dimensions on sections of arterial roads in the city of Bandung is divided into several parts, including:

- 1) An evaluation of standard dimensions and planned dimensions from Hedge to Hedge based on the Bandung City Master Plan; and
- 2) An evaluation of planned road width dimensions based on the Bandung City Master Plan.

C. Evaluation of the Dimension of the Plan from Hedge to Hedge

An evaluation of the standards and plans for hedgerow-to-hedgerow distances (right-of-way) in the city of Bandung was conducted using a quantitative approach based on Geographic Information System (GIS) technology. This analysis integrates spatial

datasets derived from the digitization of the 2003 City Planning Line (GRK) documents and the 2016 land cover map at a scale of 1:1,000. Through an overlay analysis of these two data sources, this study successfully identified the extent of spatial impacts in the form of accumulated road lengths and the number of buildings indicated as violating or located within the planning line corridor.

GIS data processing results show that the arterial road network in the Tegalega Urban Growth Area consists of 18.9 km of Primary Arterial Roads and 16.06 km of Secondary Arterial Roads. A comparison between the existing conditions and the planned corridor revealed significant spatial deviations regarding land use. In the Primary Arterial Road category, there is building encroachment along 2.51 km, or 13.28% of the total road length. Meanwhile, the level of encroachment on Secondary Arterial Roads is more critical, reaching 8.1 km or 51.27% of the total network length. Details regarding the spatial distribution and significance of these evaluation results are comprehensively presented through the tables, graphs, and map visualizations below.

Table 2 Evaluation of the Compatibility of the Fence Plan Dimensions with the Arterial Road Fence in the SWK Tegalega Area

No.	Road Segment Name	Existing Road Length (km)	City Planning Line Width (m)	Length of Planning Line Affected by Buildings (km)	Percentage (%)
Primary Arterial Road					
1	Sudirman Street	6,63	20	2,41	18,2
2	Soekarno-Hatta Street	12,27	27	0,1	12,7
Total		18,9		2,51	13,28
Secondary Arterial Road					
1	Asia Afrika Street	0,1	17	0,06	33,2
2	Astanaanyar Street	2,05	30	2,82	69
3	Gardujati Street	0,1	20	0,17	84,6
4	Jamika Street	6,54	30	0,86	6,64
5	Kopo Road (Sp, BKR-SP, Pasirkoja)	1,19	20	0,52	21,9
6	Leuwipanjang Street	2,22	21	0,61	13,8
7	Oto Iskandar Dinata Street	1,92	18	1,4	36,5
8	Pasirkoja Street	1,66	22	1,66	49,2
9	Cibeureum Street	0,28	20	0	0
Total		16,06		8,1	51,27
Total Arterial Roads		34,96		10,61	30,35

Source: Analysis Results, 2025

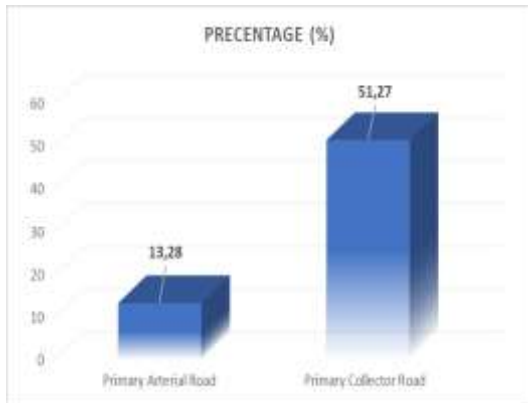


Figure 4 Graph of the Percentage of Compliance Evaluation for the Dimensions of the Proposed Fence Compared to the Arterial Road Fence in the SWK Tegalega Area



Figure 5 Map of the Evaluation of the Compliance of the Fence-to-Fence Plan Dimensions at the SWK Tegalega

D. Evaluation of the Alignment Dimensions of the Road Plan

An evaluation of road width plans in the city of Bandung was conducted using a comparative method that integrates Geographic Information System (GIS) calculations with empirical field measurement data. The spatial database used was derived from the digitization of the 2003 City Planning Line (GRK) documents, which were then compared with primary data from surveys of existing dimensions. By synchronizing these two sets of data, this study was able to identify the degree of alignment between the projected geometric design of the roads and the actual land use on-site.

The analysis of the planned road dimensions in the SWK Tegalega focused on comparing the regulatory corridor width (planned width) with the current effective road width (existing width). This evaluation aimed to identify road sections that meet the planned standards as well

as those experiencing a space deficit due to land constraints or other physical barriers. A detailed description of the results of the dimensional evaluation for each road section in the SWK Tegalega is presented as follows:

Table 3 Evaluation of the Dimensional Compliance of the Design Plan for the Arterial Road in the SWK Tegalega Area

No	Road Segment Name	Road Right-of-Way			Distance from Fence to Fence			Building Setback Line (BSL)		
		Minimum Road Width (m) Government Regulation No. 34 of 2006 on Roads	Existing Road Width (m)	Evaluation Results	Width of the Bandung City Line Plan (m)	Distance from Fence to Existing Fence (m)	Evaluation Results	GSB Plan (m)	Dominant Existing GSB (m)	Evaluation Results
Primary Arterial Road										
1	Sudirman Street	11	11 - 17	Suitable	20	18	unsuitable	8	4 - 8	Some Buildings Are Already Compliant
2	Soekarno-Hatta Street	11	22 - 27	Suitable	27	29	Suitable	22,5	10 - 25	Some Buildings Are Already Compliant
Secondary Arterial Road										
1	Asia Afrika Street	11	13 - 14	Suitable	17	15	unsuitable	7	0 - 7	Some Buildings Are Already Compliant
2	Astanaanyar Street	11	15 - 17	Suitable	30	18	unsuitable	5	0 - 5	Some Buildings Are Already Compliant
3	Gardujati Street	11	15 - 16	Suitable	20	14	unsuitable	5	0 - 5	Some Buildings Are Already Compliant
4	Jamika Street	11	22 - 23	Suitable	30	24	unsuitable	6	0 - 6	Some Buildings Are Already Compliant
5	Kopo Road (Sp. BKR-SP, Pasirkoja)	11	13 - 14	Suitable	20	15	unsuitable	8	0 - 8	Some Buildings Are Already Compliant
6	Leuwipanjang Street	11	14 - 17	Suitable	21	17	unsuitable	8	0 - 8	Some Buildings Are Already Compliant
7	Oto Iskandar Dinata Street	11	13 - 14	Suitable	18	15	unsuitable	8	0 - 8	Some Buildings Are Already Compliant
8	Pasirkoja Street	11	11 - 14	Suitable	22	16	unsuitable	5	0 - 5	Some Buildings Are Already Compliant
9	Cibeureum Street	11	15 - 17	Suitable	20	18	unsuitable	8	3 - 8	Some Buildings Are Already Compliant

Source: Analysis Results, 2025



Figure 6 Evaluation Map of Primary Arterial Roads on the Sections of Jl. Sudirman and Jl. Sukarno-Hatta



Figure 7 Evaluation Map of Secondary Arterial Roads on the Sections of Jl. Asia Afrika and Jl. Astanaanyar



Figure 8 Evaluation Map of Secondary Arterial Roads on the Sections of Jl. Gardujati and Jl. Jamika



Figure 9 Evaluation Map of Secondary Arterial Roads on the Sections of Jl. Kopo (Sp, BKR- Sp, Pasirkoja) dan Jl. Leuwipanjang

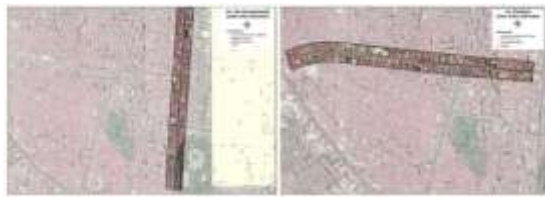


Figure 10 Evaluation Map of Secondary Arterial Roads on the Sections of Jl. Oto Iskandar Dinata dan Jl. Pasirkoja



Figure 11 Evaluation Map of Secondary Arterial Roads on the Sections of Jl. Cibereum

E. Recommendations Based on the Evaluation of Road Dimensions on Arterial Road Sections

Based on the evaluation of road dimensions in the Bandung City Plan, there is generally still a high degree of consistency between the planned road widths and the GSB (Building Setback Line) in the Bandung City Plan. Based on the evaluation of the planned road widths, the planned road widths outlined in the

Bandung City Master Plan Map, in the Tegalega Sub-Urban Area (SWK), generally meet the standard width requirements for arterial roads as stipulated in Government Regulation (PP) No. 34 of 2006 on Roads. Meanwhile, the planned GSB widths depicted in the Bandung City Planning Line Map, in the Tegalega SWK, are indeed somewhat difficult to implement on certain arterial road sections, given that the GSB calculations in the Bandung City Planning Line Map represent an ideal GSB distance.

To prepare for the permitting process for land use along arterial roads, the recommendations based on the evaluation findings are as follows:

1. Recommendations regarding the width of arterial roads in the Bandung City Master Plan are as follows:
 - a. As Planned/Actual: Based on the evaluation results, it was found that the width of the existing arterial roads is in line with or exceeds the plan. Therefore, it is recommended that these dimensions be maintained, and future land use permits may refer to the city plan map.
 - b. Adjusted to the city plan lines, as evaluation results indicate that the existing fence-to-fence width does not yet meet the planned dimensions. Therefore, it is proposed to adjust the width to the dimensions specified in the city plan lines.
 - c. Adjusted to road width standards in accordance with Government Regulation No. 34 of 2006; given the various characteristics of existing road widths, it is recommended that a minimum distance of 25 meters be maintained for existing primary arterial roads with a width of 14 meters or less, and where the planned distance between fences exceeds 25 meters.
 - d. Adjusted to Existing Conditions, for arterial roads with an existing fence-to-fence width of 15 meters or more.
2. The recommendations regarding the GSB width on arterial roads in the Bandung City Master Plan, based on the evaluation results, are as follows:
 - a. As it is in compliance/has been implemented, the recommendation is

to maintain the current status, and future land-use permits may refer to the GSB width specified in the city's master plan map.

- b. Adapted to Existing Conditions: Based on the evaluation results, there is a land use function on the arterial road that exhibits an arcade-like character and very high intensity.
- c. Adapted to the city plan: Based on the evaluation results, the arterial road still possesses characteristics that can meet the GSB width in accordance with the city plan.

In addition, for arterial road network plans not evaluated in this study—such as the Bandung Utara Toll Road, NS Link, and BIUTR plans—construction and development will be guided by the latest RDTR program guidelines.

For further details regarding the recommendations on road width and GSB for arterial roads in the Tegalega SWK, please refer to the table below.

Table 4 Recommendations for the Management of Arterial Roads in the SWK Tegalega Area

No.	Road Segment Name	Road Right-of-Way			Distance from Fence to Fence		Building Setback Line (BSL)		Management Guidelines		
		Minimum Road Width (m)	Existing Road Width (m)	Compatibility	Width of the Roadway City Plan (m)	Distance from Fence to Existing Fence (m)	GSB Plan (m)	Dominant Existing GSB (m)	Road Right-of-Way	Fence-to-Fence Distance	Building Setback Line (BSL)
Primary Arterial Road											
1	Sudirman Street	11	11-17	Suitable	20	18	unsuitable	8	4-8	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
2	Soekarno-Hatta Street	11	22-27	Suitable	27	29	Suitable	22.5	10-25	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
Secondary Arterial Road											
1	Asia Afrika Street	11	13-14	Suitable	17	15	unsuitable	7	0-7	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
2	Astanaanyar Street	11	15-17	Suitable	30	18	unsuitable	5	0-5	Some Buildings Are Already Compliant Routine maintenance In accordance with Government Regulation No. 34 of 2006, roads must be at least 25 meters wide	In accordance with the Bandung City Master Plan
3	Gardujati Street	11	15-16	Suitable	20	14	unsuitable	5	0-5	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
4	Jamika Street	11	22-23	Suitable	30	24	unsuitable	6	0-6	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
5	Kopo Road (Sp. BKR-SP, Pasirkoja)	11	13-14	Suitable	20	15	unsuitable	8	0-8	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
6	Lewuipanjang Street	11	14-17	Suitable	21	17	unsuitable	8	0-8	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
7	Oto Iskandar Dinata Street	11	13-14	Suitable	18	15	unsuitable	8	0-8	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
8	Pasirkoja Street	11	11-14	Suitable	22	16	unsuitable	5	0-5	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan
9	Cibeureum Street	11	15-17	Suitable	20	18	unsuitable	8	3-8	Some Buildings Are Already Compliant Routine maintenance In accordance with the Bandung City Master Plan	In accordance with the Bandung City Master Plan

Sumber: Hasil Analisis, 2025

Table 5 The Existing Conditions and Location Coordinates of the Study

Existing Conditions	Study Site Coordinates	Existing Conditions	Study Site Coordinates
	6°55'03,8"S 107°34'38,1"E Sudirman Street		6°56'03,8"S 107°35'45,4"E JKopo Road (Sp. BKR-SP, Pasirkoja)
	6°54'8,17"S 107°39'36,78"E Soekarno-Hatta Street		6°56'35,3"S 107°35'44,9"E Leuwipanjang Street
	6°55'14,0"S 107°36'11,3"E Asia Afrika Street		6°55'59,8"S 107°36'11,3"E Oto Iskandar Dinata Street
	6°56'01,7"S 107°36'08,8"E Astanaanyar Street		6°55'36,4"S 107°35'55,9"E Pasirkoja Street
	6°56'01,7"S 107°36'08,8"E Gardujati Street		6°55'03,8"S 107°34'38,1"E Cibeureum Street
	6°55'29,4"S 107°35'08,0"E Jamika Street		

Source: Site Survey Results, 2025

CONCLUSION

An evaluation of the City Master Plan in the Tegalega Sub-District (SWK) indicates that the width profiles of arterial roads are generally in compliance with the provisions of Government Regulation No. 34 of 2006. However, at the implementation level, the application of Building Setback Lines (BSL) faces significant obstacles due to discrepancies between the idealistic orientation of the plan and the complexity of actual conditions on the ground.

As a strategic measure, it is recommended that the land-use permitting mechanism continue to be guided by the city plan map for road corridors that already meet the standards. As for areas that have not yet met the technical criteria, intensive reconciliation and adjustments to the City Plan Guidelines document are required.

The regulatory approach is guided by the principle of flexibility, taking into consideration the diversity of existing conditions, particularly in areas with high building density or those with specific architectural characteristics, such as arcades. Furthermore, the integration of strategic infrastructure projects, including the North Bandung Toll Road, the North-South (NS) Link, and the Bandung Intra-Urban Toll Road

(BIUTR), must be accommodated through synchronization in the preparation of the latest Detailed Spatial Plan (RDTR). This is crucial to ensure coherence between the technical specifications of the road network and spatial realities in order to realize sustainable urban development in the future.

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