

Cost Analysis of Road Performance Improvement on Yos Sudarso Road, Baubau City

Jamiludin Nasir*, Budi Witjaksana, Jaka Purnama

Universitas 17 Agustus 1945 Surabaya, Indonesia

Email: jamilbone87@gmail.com*, budiwitjaksana@untag-sby.ac.id,
jakapurnama@untag-sby.ac.id

ABSTRACT

Yos Sudarso Road in Baubau City is a major urban corridor that has experienced a decline in traffic performance due to intensive activities in commercial, tourism, and port areas, resulting in high side friction caused by on-street parking and vehicle maneuvering. These conditions reduce the effective road capacity and degrade the level of service. This study aims to estimate the cost required to improve road performance as a basis for practical and applicable traffic management recommendations. The research employs a quantitative approach by identifying improvement alternatives, calculating work volumes, and estimating costs based on the 2022 Indonesian Public Works Unit Price Analysis for Road and Bridge Works and the 2024 Baubau City Standard Unit Cost (*Harga Satuan Pokok Kegiatan, HSPK*). The results indicate that traffic management measures in the form of one-side on-street parking arrangement and installation of no-parking traffic signs require a total cost of IDR 57,000,000.00. This cost is relatively economical and effective in improving road capacity and traffic performance without physical road widening.

Keywords: Road Improvement Cost; Traffic Management; PKJI 2023.

INTRODUCTION

The rapid urbanization worldwide has significantly strained transportation infrastructures, especially in developing cities. As urban areas expand, vehicle volumes increase, exacerbating issues such as congestion, traffic accidents, and pollution (Buyannemekh et al., 2024; Oh & Lu, 2023; Ventriglio et al., 2021). In many cases, urban roads cannot support the increasing demand for transportation services, leading to diminished road performance and service levels. The global challenge lies in finding cost-effective and sustainable solutions to improve road infrastructure without extensive and costly physical modifications (Alonso-Díaz et al., 2024; Marović et al., 2018; Nasution et al., 2025; Renzi & Trifarò, 2022).

In Baubau City, Yos Sudarso Road, a key transportation corridor, is experiencing significant traffic performance decline. This is largely due to high side friction caused by on-street parking, vehicle maneuvering, and the proximity of commercial, tourism, and port areas. These conditions reduce the effective road capacity, resulting in increased congestion and a degraded level of service (Patkar & Dhamaniya, 2019; Srivastava & Kumar, 2023). Addressing these problems without resorting to costly road widening is a critical concern for the city's urban planners.

While numerous studies have examined road performance—particularly in terms of widening roads and improving infrastructure—few have focused on the cost-effectiveness of

traffic management strategies. This research introduces an innovative approach by proposing traffic management interventions, such as parking regulation and signage adjustments, as feasible alternatives to expensive road construction projects. By integrating a comprehensive cost analysis, the study presents a new perspective on improving urban road performance with minimal financial and environmental impact.

As urban congestion becomes a growing issue, local governments face the challenge of improving road performance without incurring exorbitant costs. The urgency of this research is evident, as cities like Baubau are limited by land acquisition constraints and escalating property prices, which make traditional road widening projects impractical. Thus, affordable and effective alternatives are necessary to maintain urban traffic flow and improve road safety and capacity.

This study aims to analyze and estimate the costs associated with improving the performance of Yos Sudarso Road through traffic management strategies. The primary objective is to provide a practical and economically viable solution for urban traffic congestion, focusing on enhancing road capacity without physical road expansion. By quantifying the costs of implementing such strategies, the research intends to offer local governments actionable insights for effective transportation policy decisions.

The findings of this study are significant for both transportation management and urban planning. By highlighting the economic feasibility of traffic management interventions, the research offers a cost-effective solution that can be implemented in urban areas facing similar issues. This approach not only enhances traffic flow but also contributes to better utilization of existing infrastructure, potentially leading to more sustainable urban development.

The results of this study are expected to influence urban transportation policies, particularly in cities where space constraints limit traditional road expansion. By demonstrating the economic and practical benefits of traffic management measures, the study supports the implementation of alternative approaches that focus on optimizing road use and improving public safety. This could serve as a model for other cities grappling with similar challenges in urban road management.

The long-term benefits of this research include improved traffic flow, reduced congestion, and enhanced safety on urban roads. Additionally, the proposed solutions align with sustainable urban development goals by minimizing the environmental and financial costs associated with traditional infrastructure expansion. This research provides valuable insights for local governments aiming to enhance the quality of urban life through efficient and affordable traffic management practices.

METHOD

The research was conducted on the Yos Sudarso road section, Wolio District, Baubau City. The study was carried out in 2025, taking into account the existing traffic conditions and road facilities.

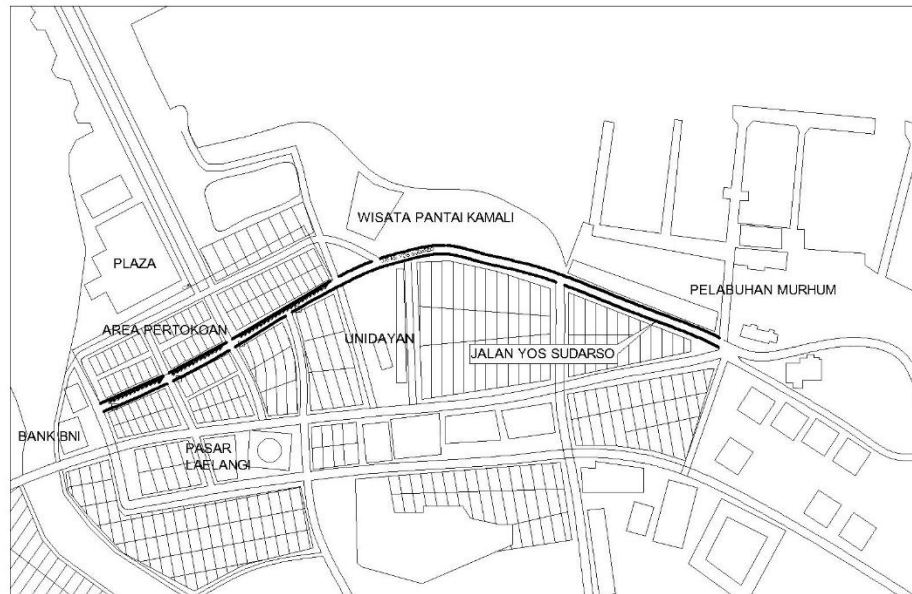


Figure 1. illustrates the Yos Sudarso Road segment as the study location
 Source: Author's Analysis (2025)

The data used in this study consist of primary and secondary data. Primary data include the existing geometric conditions of the road and an inventory of traffic facilities. Secondary data comprise the Unit Price Analysis for Road and Bridge Works (AHSP) issued by the Ministry of Public Works and Housing in 2022 and the Standard Unit Cost (HSPK) of Baubau City for the year 2024.

The cost analysis procedure for improving road performance was conducted through several sequential stages, including the determination of appropriate improvement alternatives based on the results of road performance evaluation, identification of the types of road performance improvement works, calculation of the work volumes for each activity, analysis of unit prices, and compilation of the total cost required for road performance improvement.

RESULTS AND DISCUSSION

Field observations indicate that the Yos Sudarso Road segment experiences a high level of side activities, particularly during peak hours. On-street parking significantly reduces the effective lane width, resulting in decreased road capacity and unstable traffic flow conditions.

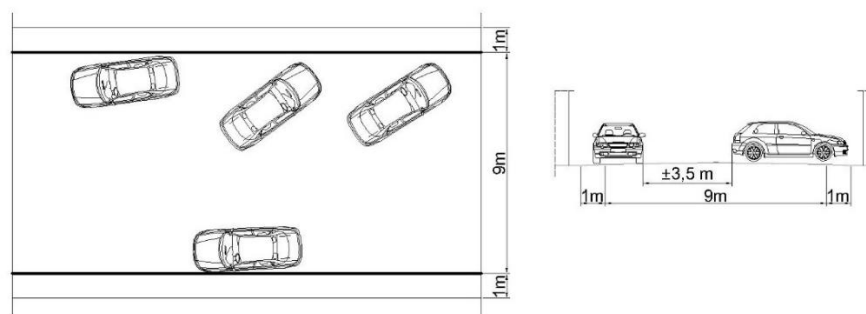


Figure 2. Existing Details and Cross-Sections
 Source: Author's Analysis (2025)

Based on the analysis results, capacity improvement through road widening cannot be implemented because the roadside space is fully occupied by rows of commercial buildings, making land acquisition or demolition infeasible. Therefore, the recommended improvement alternatives include: (1) implementing one-side on-street parking with a 30° parking angle, (2) installing no-parking traffic signs on the opposite side of the road, and (3) applying thermoplastic pavement markings as parking markings and edge lines. These alternatives were selected because they do not require geometric modifications to the road and can be implemented in the short term.

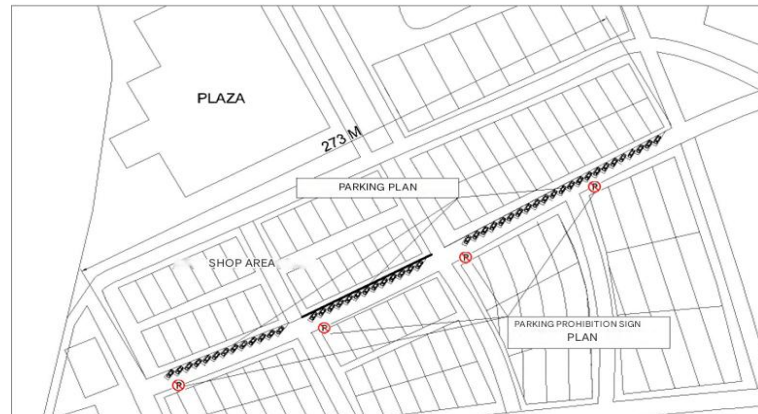


Figure 3. Parking and Traffic Sign Layout Plan

Source: Author's Analysis (2025)

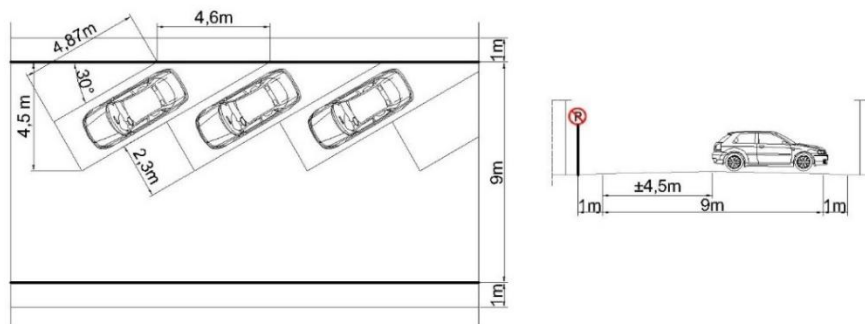


Figure 4. Proposed Details and Cross-Sections

Source: Author's Analysis (2025)

Table 1. Pavement Marking Work Volumes

Segment	Segment Length (m)	Spacing/ Stall (m)	Number of Stalls/ Segment	Length per Stall (m)	Total Length per Segment (m)	Width (m)	Volume (m ²)
a	b	c	d=b/c	e	f=dxe	g	h=fxg
I	65	4,6	14	15,05	210,7	0,12	25,284
II	62	4,6	13	15,05	195,65	0,12	23,478
III	115	4,6	25	15,05	376,25	0,12	45,15
Total	242		52				93,912

Source: Author's Analysis (2025)

The work volumes were calculated based on the effective length of the road segment and the required traffic facilities. The main works consist of the installation of thermoplastic pavement markings and traffic signs. In addition to pavement markings, no-parking signs are installed on the right-hand side of the road to eliminate on-street parking activities. A total of four traffic signs is required, with installation intervals of 50 meters, considering the characteristics of the commercial area, which has a high intensity of side friction. Based on the volume calculations and unit price analysis, the total cost required to improve the performance of Yos Sudarso Road is estimated at IDR 57,000,000. This cost includes pavement marking works, traffic signs, and other supporting activities, as presented in Table 2.

Table 2. Cost Breakdown for Road Performance Improvement

No. Pay Item	Description	Unit	Quantity	Unit Price (IDR)	Amount (IDR)
DIVISION 1. GENERAL					
1.2	Mobilization	LS	1	2.000.000,00	2.000.000,00
SKh-1.1.22	SMKK	LS	1	15.144.400,00	15.144.400,00
Total Cost for DIVISION 1					17.144.400,00
DIVISION 9. DAY WORKS & MISCELLANEOUS WORKS					
9.2	Miscellaneous Works				
9.2.(1)	Thermoplastic Road Markings (Parking)	M2	93,912	313.738,13	29.463.775,18
9.2.(3a)	Single Traffic Sign with Engineering Grade Reflective Surface (including Post and Buah Foundation)		4	1.200.000,00	4.800.000,00
Total Cost for DIVISION 9					34.263.775,18
Subtotal					51.408.175,18
PPN (11%)					5.654.899,27
TOTAL					57.063.074,45
TOTAL (rounded)					57.000.000,00

IN WORDS: Fifty-seven million Indonesian Rupiah

Source: Author's Analysis (2025)

The performance of urban roads is strongly influenced by the level of side friction occurring along the road segment. According to the Indonesian Highway Capacity Guidelines (PKJI 2023), side friction factors such as on-street parking, vehicle ingress and egress, and pedestrian activities significantly reduce effective road capacity and increase the degree of saturation (Q/C). The higher the side friction intensity, the lower the level of service that can be achieved, even when the geometric width of the road is theoretically sufficient.

From a theoretical perspective, traffic management is a non-structural approach aimed at optimizing the utilization of existing road capacity without substantial physical modifications. Tamin (2000) states that controlling on-street parking is an effective strategy for improving capacity and traffic flow performance in urban areas with high activity levels. Proper parking management can reduce traffic conflicts and enhance traffic flow stability.

The results of this study demonstrate that one-side angled parking at 30 degrees combined with the installation of no-parking signs on the opposite side can increase the effective traffic lane width. This finding is consistent with road capacity theory, which emphasizes that capacity

is highly dependent on effective lane width and the level of side friction (Khisty & Lall, 2005). By eliminating parking on one side of the road, vehicle maneuvering space is improved, allowing traffic flow to operate more smoothly.

From the perspective of transportation economics, cost analysis of road performance improvement through traffic management measures is considered more efficient than road widening alternatives. Soeharto (1995) explains that transportation infrastructure investments must consider cost efficiency and the benefits generated. Road widening in urban areas generally involves very high costs due to land acquisition, utility relocation, and significant social impacts. In contrast, the implementation of pavement markings and traffic signs requires relatively low investment while delivering substantial operational benefits.

The findings of this study are also consistent with previous research conducted by Putra and Hardjomuljadi (2017), which concluded that traffic facility management and roadway space allocation are strategic measures for improving urban road performance. Another study by Sari et al. (2021) reported that regulating on-street parking can improve the level of service from category D to category C without any geometric road modifications.

With a total road performance improvement cost of IDR 57,000,000, this study demonstrates that traffic management-based policies represent a realistic and feasible solution for local governments. The required cost is relatively small compared to the benefits obtained, including increased effective capacity, improved traffic flow, and enhanced road safety. Therefore, this approach can serve as a model for similar treatments on other urban road segments characterized by mixed land-use activities.

CONCLUSION

The cost analysis for improving the performance of Yos Sudarso Road in Baubau City leads to several key conclusions. Firstly, the decline in road performance is primarily attributed to the high level of side friction caused by on-street parking activities. Secondly, the study identifies that traffic management-based improvement alternatives are not only effective but also economical in addressing the traffic-related issues. The total cost for the proposed improvements is IDR 57,000,000, a figure deemed feasible for the local government to implement. Lastly, future research should focus on analyzing the economic benefits and long-term impacts of parking management policies on the overall urban traffic performance, which could provide further insights into sustainable solutions for traffic congestion.

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