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Traffic Study for Proposed Thane Coastal Road (Kharegaon-Gaimukh) for Decongestion of Ghodbunder Road

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Abstract - *Rapid urbanization, industrial expansion, and exponential growth in private vehicle ownership have led to severe traffic congestion across major metropolitan corridors in India. Ghodbunder Road in Thane City serves as a critical arterial highway carrying heavy local commuter traffic and regional freight movement connecting the Eastern Express Highway, Western Express Highway, and National Highway-48. Due to severe capacity saturation, mixed traffic characteristics, and limited options for surface widening, the Mumbai Metropolitan Region Development Authority (MMRDA) has proposed the Thane Coastal Road (Kharegaon–Gaimukh) as an alternative high-capacity coastal corridor. This extended research paper provides an in-depth evaluation of existing traffic characteristics, traffic composition, Level of Service (LOS), road geometry, and travel demand forecasting on Ghodbunder Road. Comprehensive Classified Traffic Volume Count (CTVC) surveys conducted continuously over seven days indicate an Average Daily Traffic (ADT) of 78,811 vehicles per day, translating to an overwhelming 125,163 Passenger Car Units (PCU) per day. Advanced traffic diversion and capacity modeling demonstrate that the proposed six-lane coastal road will successfully divert 25–30% of through traffic and heavy commercial vehicles from Ghodbunder Road, significantly reducing travel times, lowering vehicle operating costs, curbing vehicular emissions, and establishing sustainable transportation efficiency within the Mumbai Metropolitan Region.*

Key Words: Traffic Congestion, Ghodbunder Road, Thane Coastal Road, Level of Service (LOS), Traffic Diversion, Urban Transportation Planning, Capacity Analysis.

1. INTRODUCTION

Transportation infrastructure acts as the vital economic backbone of urban development, facilitating the seamless movement of people, raw materials, and finished commodities. However, unprecedented urbanization and exponential growth in private vehicle ownership have severely strained urban road networks across developing nations, particularly in India. The Mumbai Metropolitan Region (MMR), encompassing Mumbai City, Thane, Navi Mumbai, Mira-Bhayandar, and surrounding urban centres, faces acute traffic bottlenecks on major arterial links. Thane City has emerged as a premier residential, commercial, and industrial hub within MMR, acting as a gateway connecting Mumbai with Navi Mumbai, Nashik, Gujarat, and northern Maharashtra.

Ghodbunder Road, extending approximately 20 km from Kapurbawdi Junction to Gaimukh Junction, serves as the primary arterial corridor connecting the Eastern Express Highway (EEH) with National Highway-48 (NH-48). Continuous real estate expansion, high-rise residential developments in Kolshet, Waghbil, and Kasarvadavali, alongside heavy freight traffic moving towards industrial clusters, have pushed Ghodbunder Road far beyond its practical capacity. Because physical road widening is severely constrained by dense urban fabrics, public utilities, and environmentally sensitive mangrove zones, traditional solutions are infeasible. Consequently, the Mumbai Metropolitan Region Development Authority (MMRDA) has proposed the Thane Coastal Road (Kharegaon–Gaimukh) as an alternative high-capacity coastal corridor.

1.1 Background of the Study

Rapid population growth and urban sprawl have converted Ghodbunder Road from a regional connecting link into a heavily congested urban arterial corridor. During peak commuting hours, vehicle speeds drop drastically, resulting in long queues at major intersections such as Kapurbawdi, Manpada, and Kasarvadavali. This congestion not only causes severe economic losses due to wasted fuel and man-hours but also elevates air and noise pollution levels. Evaluating the operational performance of this corridor and examining the efficacy of the proposed coastal road is therefore paramount.

2. OBJECTIVE

To achieve the primary aim of evaluating existing traffic conditions and assessing the proposed coastal road, the following specific objectives were formulated:

1. To study the existing transportation network of Thane City with special emphasis on Ghodbunder Road and its importance within the Mumbai Metropolitan Region.

2. To collect and analyse existing traffic data on Ghodbunder Road through appropriate traffic surveys, including classified traffic volume count, traffic composition, and peak hour traffic analysis.

3. To identify the major causes of traffic congestion along Ghodbunder Road by examining traffic flow characteristics, roadway geometry, land-use patterns, and intersection performance.

4. To evaluate the existing operational performance of Ghodbunder Road by assessing traffic volume, roadway capacity, volume-to-capacity (V/C) ratio, travel speed, traffic delay, and Level of Service (LOS) in accordance with relevant Indian Roads Congress (IRC) guidelines.

5. To analyse the composition of traffic by determining the percentage of different categories of vehicles such as two-wheelers, cars, buses, auto-rickshaws, light commercial vehicles, and heavy commercial vehicles using the study corridor.

6. To estimate future traffic demand by applying suitable traffic growth rates and forecasting techniques considering urban development, population growth, economic activities, and increasing vehicle ownership in the study area.

7. To evaluate the traffic diversion potential of the proposed Thane Coastal Road (Kharegaon–Gaimukh) and estimate the proportion of through traffic and freight vehicles likely to shift from Ghodbunder Road to the proposed corridor.

3. STUDY AREA, DATA COLLECTION AND METHODOLOGY

The study area encompasses Ghodbunder Road and the alignment of the proposed Thane Coastal Road extending from Kharegaon Toll Plaza to Gaimukh along Thane Creek. Primary traffic data were gathered through comprehensive Classified Traffic Volume Count (CTVC) surveys conducted continuously for seven consecutive days (22 August 2022 to 28 August 2022) by MMRDA, capturing weekday and weekend traffic variations. Field investigations, road inventory surveys, and spot speed studies were executed in strict adherence to Indian Roads Congress (IRC) specifications, notably IRC:106-1990 ('Guidelines for Capacity of Urban Roads in Plain Areas') and IRC:SP:19-2001.

Table 1: Summary of Classified Traffic Volume Count on Study Corridor

Vehicle Category	Average Daily Traffic (ADT) (Vehicles/Day)	Traffic Composition (%)	IRC PCU Factor	Total PCU / Day
Two-Wheeler	17,498	22.20%	0.75	13,124
Three-Wheeler (Auto)	11,719	14.87%	2.00	23,438
Car / Jeep / Van / Taxi	30,609	38.84%	1.00	30,609
Light Commercial Vehicle (LCV)	4,762	6.04%	1.50	7,143

As detailed in Table 1, the surveyed data indicate an Average Daily Traffic (ADT) of 78,811 vehicles per day, equivalent to a staggering 125,163 PCU per day. Passenger cars form the largest segment at 38.84%, followed by two-wheelers at 22.20% and three-wheelers at 14.87%. Significantly, heavy freight vehicles (2-axle and multi-axle trucks) constitute 13.79% of the stream. This heavy freight proportion underlines the corridor's critical role in regional logistics connecting JNPT and Gujarat industrial belts with northern Maharashtra.

4. TRAFFIC FORECASTING AND DIVERSION ANALYSIS

Travel demand forecasting was executed utilizing comprehensive transportation planning models incorporating a standard 2% annual traffic growth rate. The analysis projects continuous traffic escalation along Ghodbunder Road, pushing the operational capacity well beyond critical thresholds. To relieve this pressure, traffic diversion modeling indicates that the proposed six-lane Thane Coastal Road will successfully attract 25% to 30% of through traffic and commercial freight vehicles currently traversing Ghodbunder Road.

Initial diverted traffic is estimated at 1,519 northbound and 1,495 southbound vehicles during the opening year, scaling dramatically to over 3,341 vehicles per direction by the ultimate design horizon in 2051. Based on a practical lane capacity of 900 PCU/hour/lane, the six-lane configuration of the proposed coastal road provides ample capacity to absorb this regional shift while maintaining a smooth Level of Service (LOS).

5. EVALUATION OF PROPOSED THANE COASTAL ROAD

The proposed Thane Coastal Road spans 13.215 km and has been meticulously engineered to negotiate diverse coastal and urban constraints. The project features a 40 m Right of Way (ROW) accommodating a six-lane divided carriageway constructed using high-durability M40 cement concrete pavement over dry lean concrete and granular sub-base. To mitigate ecological disruption in sensitive coastal areas, approximately 3.0 km (22.7%) of the alignment is constructed on stilts through mangrove zones to preserve natural tidal flow.

Furthermore, the project incorporates a 500 m cut-and-cover tunnel near the Air Force Station to respect national security boundaries, alongside 740 m of open-to-sky ramps.

Grade-separated interchanges at strategic nodes such as Kharegaon, Kolshet Road, Reti Naka, and Gaimukh eliminate conflicting turning movements, ensuring uninterrupted high-speed mobility and superior network safety.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The research concludes that Ghodbunder Road is severely saturated, carrying an average traffic volume exceeding 125,000 PCU/day under mixed traffic conditions. The proposed Thane Coastal Road (Kharegaon–Gaimukh) is a technically sound and highly effective engineering intervention. By diverting up to 30% of heavy commercial and through traffic away from the urban core, the project will drastically improve travel speeds, reduce travel delays, lower vehicle operating costs, curb greenhouse gas emissions, and ensure sustainable urban mobility across the Mumbai Metropolitan Region.

6.2 Recommendations

Based on the findings, it is recommended that construction of the Thane Coastal Road be expedited. Intelligent Transportation Systems (ITS) such as CCTV surveillance, variable message signs (VMS), and automated incident management systems should be integrated. Periodic traffic audits and strict enforcement against illegal roadside parking on Ghodbunder Road will further optimize traffic operations.

REFERENCES

[1] Indian Roads Congress (IRC), "Guidelines for Capacity of Urban Roads in Plain Areas," IRC:106-1990, New Delhi.
[2] S. R. Marve, M. Bhorkar, and P. Baitule, "Traffic Congestion Minimization Study for Hingna Area of Nagpur City," IJERT, vol. 4, 2018.
[3] R. R. Thoker, R. Gupta, and N. Kumar, "Review Paper on Study on Traffic Congestion in National Highways," IRJET, vol. 7, no. 2, pp. 62–66, 2020.
[4] A. I. Koukounaris, K. P. Marousi, and P. Y. J. Stephanedes, "Congestion detection and diversion in coastal urban traffic," Transportation Research Procedia, vol. 41, pp. 255–259, 2019.
[5] M. Gangwal and H. K. Mahiyar, "Study of Traffic Congestion Analysis on Urban Road: A Case Study of Indore City," IJRASET, vol. 13, 2025.