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Samruddhi Mahamarg: A Pathway to Progress and Sustainability Concerns

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Abstract: India's vast 6.3 million km road network is crucial for transportation, trade, and regional development. Modern expressways enhance connectivity, reduce travel time, and boost economic growth amid rapid urbanization and industrialization. This research paper presents a comprehensive case study on the Hrudaysamrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg, a 701 km expressway connecting Nagpur to Mumbai. The paper will explore the history of the project, covering its planning, execution, and challenges. It will analyze the advantages, such as reduced travel time (from 16 hours to 8 hours), improved connectivity, and economic benefits, alongside disadvantages, including high accident rates, land acquisition issues, and socio- environmental concerns. A key focus will be on the impact on travel distances, evaluating how it enhances logistics and trade efficiency. Additionally, the research will assess the environmental impact, examining deforestation, ecological changes, and mitigation efforts. Through data analysis, case studies, and expert insights, this paper aims to provide a comprehensive evaluation of the expressway's long-term viability and socio-economic implications.

Index Terms **- Samruddhi Mahamarg, Travel time reduction, Accident rates, Socio-environmental concerns, Land acquisition issues**

I. INTRODUCTION

Civic and industrial growth is based on its highway networks. An efficient highway network is essential to spur industrial development, provide accessibility to remote areas, and facilitate the seamless movement of people and goods in India where sectors for the economy are varied and the economy is also on a growth path. The overall economic impact of highways is made up of the direct effects that highways have on GDP growth by reducing travel time, lowering transportation costs, and enhancing regional integration. They also bolster national security with strategic mobile support to defense forces

India has one of the largest road networks in the world with highways being an integral part of this infrastructure. National highways promote interstate commerce, agricultural supply chains and tourism. However, the development of the Motorways and modernized highway corridors like the Golden Quadrilateral has increased the efficiency of logistics while reducing fuel consumption and wear and tear of vehicles. In addition, the widening of highways has resulted in the urbanization of transport corridors, and this has increased job opportunities and improved access to essential services such as health care and education. Smart highways equipped with advanced traffic management systems and tolling automation enhance safety and efficiency.

The Indian Government has always put highway development as a priority and strategically planning to improve the current state of the highways in India as well as taking the legal route where need be. One of the early legislative efforts for road construction was the Central Road Fund Act of 1929. After independence, multiple Five-Year Plans guided expansive highway construction:

- The Agra Plan (1943-1963) envisaged a well-defined classification of roads as national, state (of inter-state nature) and rural.
- Targets for road length expanded in The Bombay Plan (1961–1981), which emphasized connectivity between major cities.
- Lucknow Plan (1981-2001) integrated highway development into growth-oriented policies, leading to motorway projects.
- The Bharatmala Project (2017-Present) - Describes ways to optimize freight movement and reduce the distance travelled by employing a corridor-centric approach to road organization.

The NHAI Act of 1988 set up the body that builds and maintains highways. The National Highways Act of 1956 marked a turning point in law-making. It labelled key economic roads as National Highways ensuring they got central funds and oversight. India's big highway network has several main routes that boost economic and social growth.

- Golden Quadrilateral (GQ): This 5,846 km highway network links Delhi, Mumbai, Chennai, and Kolkata. It has caused a revolution in trade and shipping.
- North-South and East-West Corridor: This route improves connections between regions. It links Srinagar- Kanyakumari and Silchar-Porbandar helping goods and people move faster.
- Delhi-Mumbai Expressway: This fast road cuts travel time between two big money hubs. It should give a boost to industrial growth.
- Chennai-Bengaluru Expressway: This road strengthens links between tech and manufacturing areas in South

Another recent major roadway connecting the Economic Capital of the country Mumbai and The Emerging Industrial Powerhouse of Maharashtra Nagpur is the Hrudaysamrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg or more commonly referred to as just Samruddhi Mahamarg. This is a 701 km expressway connecting Nagpur to Mumbai, passing through 10 districts and linking 26 talukas. It boasts extensive infrastructure, including 25 interchanges, 18 proposed townships, numerous bridges, tunnels, viaducts, and culverts. The designed speed limit is 150 kmph, with reduced limits in mountainous areas, the expressway aims to connect 392 villages and establish 19 Krushi Samruddhi Nagar, potentially fostering regional development and connectivity. The following Table No.1.1 summarizes the salient features of Samruddhi Mahamarg.

Table 1.1 Salient Features of Samruddhi Mahamarg.(9)

Length Of Hindu Hrudaysamrat Balasaheb Thackrey Maharashtra Samruddhi Mahamarg	701 Km
Hindu Hrudaysamrat Balasaheb Thackrey Maharashtra Samruddhi Mahamarg Route	Nagpur To Mumbai
Number Of Districts the Mahamarg Passes Through	10
Number Of Talukas It Connected	26
Number Of Villages Connected by The Expressway	392
Number Of Proposed Krushisamruddhi Nagar	19
Land Required for the Project (Expressway +Krushisamruddhi Nagar)	24,555 Acres (9900 Ha) Approximately
Total Project Cost	Rs. 55,000 Crores
Proposed Project Completion Date	2022

II. RESEARCH METHODOLOGY

1. Finding India's Major Highways: An analysis of India's roads and highways, taking into account their infrastructure, traffic patterns, and importance. After assessment, we decided to focus this research project on Samruddhi Mahamarg.

2. Research Paper Collection: We collected research papers that looked at the development, impact, and design of Samruddhi Mahamarg and other important highways. Key findings were determined by reviewing these studies.

3. Analysis of Research Papers: After reviewing the gathered research papers, the main characteristics and problems that arose before, during, and after construction were noted.

4. The difficulties faced and the socioeconomic effects of the Samruddhi Mahamarg were studied. To ascertain wider implications, their effects were assessed.

III. CASE STUDY

3.1 BENEFITS DUE TO SAMRUDDHI MAHAMARG:

The Samruddhi Mahamarg will link the state of Maharashtra to the Delhi-Mumbai Industrial Corridor (DMIC) and the Western Dedicated Freight Corridor. Various regions in Maharashtra will gain direct access to these corridors as well as JNPT, the nation's largest container port. This improved connectivity is expected to significantly boost the state's EXIM trade.

The thruway and its confluent network will promote overall sightseer development connecting colorful sightseer locales like Shirdi, Verul, Lonar, Ajanta, etc and will boost the profitable exertion in the developing corridor of Vidarbha and Marathwada.

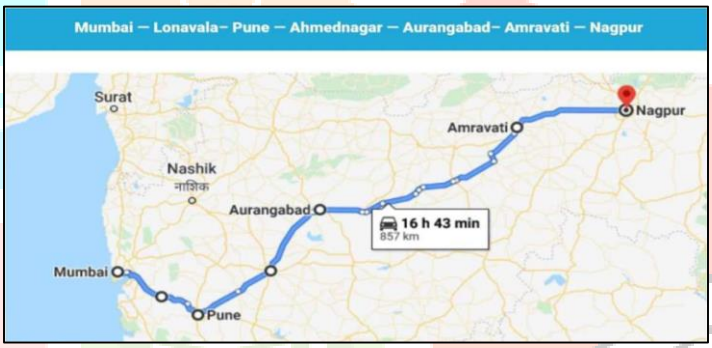
Krushi Samruddhi Nagar and agro-based diligence that will be set up around the Mahamarg to will give tone- employment and other employment openings as well as help in perfecting agrarian inflows.

Opportunities for employment beyond agriculture will be expanded in rural parts of the state. This shift is expected to support greater social equity and regional economic growth. Each Krushi Samruddhi Nagar is projected to create jobs for approximately 20,000 to 25,000 individuals. Landowners who voluntarily contribute their land for pooling will be allotted developed plots equivalent to 30% of the total area pooled for Krushi Samruddhi Nagar development, and 25% for the land contributed toward the expressway.

Residents in these newly developed zones will benefit from improved infrastructure, including public parks, playgrounds, green spaces, roads, reliable electricity, and water supply. Those who contribute land will be compensated annually over ten years—₹30,000 per acre for rain-fed plots, ₹45,000 for seasonally irrigated land, and ₹60,000 for fully irrigated fields. This compensation will increase by 10% annually to adjust for inflation.

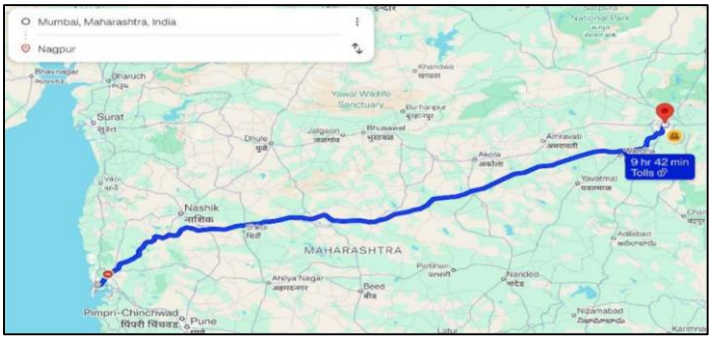
In addition, one eligible member from each contributing family will be entitled to free vocational training. Should the landowner be unable to sell their developed plot after a decade, the state government has committed to buying back the plot at the original agreed value, with an annual simple interest of 9%, as per the provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.

Prior to the development of the Samruddhi Mahamarg, the journey between Mumbai and Nagpur typically required 16 to 18 hours due to traffic congestion and longer, indirect highways. These routes primarily are Route A which passed through Mumbai– Lonavala–Pune–Ahmednagar–Aurangabad–Nagpur and Route B which passed Mumbai-Igatpuri-Nashik-Dhule-Khandwa-Betul- Nagpur, refer Figure- 3.1.1. After the 701 km expressway, this has dropped to just 8-10 hours, refer Figure- 3.1.1. Fuel efficiency improved from ~12 km/l to ~16 km/l due to smoother traffic flow. This reduced fuel use from ~70 litres to ~ 44 litres, saving 26 litres per trip. At ₹110/litre, that's a saving of about ₹2,860 per journey. Time and cost efficiency now benefit logistics, tourism, and private travel. The expressway also reduces vehicle wear, emissions, and improves road safety.



Before – Route A

Before – Route B



After – The Samruddhi Mahamarg

Fig No. 3.1.1: Route map from Mumbai to Nagpur before & after development of Samruddhi Mahamarg

Table No. 3.1.1: Difference in distances before and after the development of Samruddhi Mahamarg (9)

DISTRICTS	BEFORE (KM)	AFTER (KM)
NAGPUR	840	770
WARDHA	780	698
AMRAVATI	735	631
WASHIM	700	538
BULDHANA	675	452
JALNA	420	392
AURANGABAD	335	331

3.2 CAUSES OF ACCIDENT:

The VNIT Nagpur study determined the following reasons for accidents on the Samruddhi Mahamarg Highway

1. High Operating Speed: Cars travel at over 120 km/h, which reduces driver's available reaction time to about 0.7 seconds.
2. Issues with Tyre Bursts: Due to high speeds, tires heat up, which causes air to expand and ultimately burst.
3. Driver Fatigue Highway Hypnosis – Long highway sections without a break induce driver fatigue, and the driver either falls asleep or is less alert while driving.
4. Animal Crossings – Animals on the highway present sudden hurdles that result in accidents.

These are the reasons for the increasing number of accidents, and safety measures including tyre baths, leisure stops, and sophisticated monitoring systems were recommended to reduce the risk by the study.

3.3 MEASURES TAKEN BY MSRDC:

In the midst of an increasing number of accidents on Samruddhi Mahamarg, an Intelligent Transportation System (ITS) will soon be installed on the 701-kilometer access-controlled greenfield motorway. For this reason, a Request for Proposal (RFP) has been published by the Maharashtra State Road Development Corporation (MSRDC), which is carrying out the project.

The design, supply, installation, commissioning, and maintenance of the ITS system, which includes the Advanced Traffic Management System (ATMS) and Toll Collection System (TCS), are all included in the scope of work as stated in the RFP. In order to lower the frequency of collisions and fatalities on the motorway, the AI-enabled system will guarantee appropriate monitoring and enforcement of traffic laws, as well as prompt incident and accident management, efficient traffic flow, and shorter transit times.

Since December 2022, there have been 1,282 accidents on the motorway, with 135 people killed in the eleven-month span. It is anticipated that the use of ITMS will increase traffic safety and drastically lower the number of infractions on these roads.

3.4 SAMRUDDHI MAHAMARG TOLL RATES:

Table No.3.4.1: Table showing toll prices on Samruddhi Mahamarg

Type of vehicle	Samruddhi Mahamarg toll charges per km	One way toll charges between Mumbai & Nagpur
Light Motor Vehicle (Car, Jeep)	Rs 1.73	Rs 1,212
Light Motor Commercial Vehicle (Light goods vehicle, mini bus)	Rs 2.79	Rs 1,955
Heavy Vehicle (two axle like Bus, truck)	Rs 5.85	Rs 4,100
Heavy commercial vehicles (three axle vehicles)	Rs 6.38	Rs 4,472
Heavy construction machinery	Rs 9.18	Rs 6,435
Oversized vehicles (multi axle- seven or more axle)	Rs 11.17	Rs 7,830

IV. LITERATURE STUDY

1. G. Athipathi, S. Nagan and T. Baskaran, (2017), "Accident Prediction on National Highways in India" emphasis on the economic impact on road accidents is significant; road accidents in India cause an annual social cost of about 3% of India's GDP. The study points out that the accident rates on national highways are high as the share of national highways is only 2% of the total road network, however, it handles 40% of the traffic. A model on one dataset could predict the converted data on another dataset with an accuracy rate of 1-2% using linear regression based on accident and road features Communications of the International Conference would process accidents information for their specific location while considering it would process it for infrastructure, signage, driver error, etc., yet it noted variations due to driver behavior and external factors.

2. S. S. Charkha, C. R. Rathod, A. T. Gavhane, R. R. Galande, and S. S. Nikam (2024) titled “Accidental study on NH-48 Dehu road Pune - Satara stretch” highlights the increasing risk of road accidents on a certain stretch of the National Highway 48 (NH-48) in India which is about 140.3 km long. Yo also reports that overspeeding was the leading cause of road accidents, accounting for 46.6 per cent over the three years. The study used visual surveys and accident data from toll plazas and statistical regression techniques to identify human errors, mechanical vehicle failures, and problems with road infrastructure as major factors in the accidents. The study also points to “black spots”, and insists that road safety and traffic law enforcement need to be improved to cut down on accidents.

3. iRAP Safety Assessment of the Golden Quadrilateral (Delhi-Mumbai and Mumbai-Chennai sections) evaluates the safety of the GQ highway network in India using the iRAP Star Rating system. The study identifies infrastructure deficiencies such as poor road design, signage, and lighting, and proposes safety improvements to reduce road traffic fatalities and injuries. It emphasizes the need for significant investments in road safety infrastructure, highlighting the high fatality rate in India, which led to the development of a Safer Roads Investment Plan (SRIP) to prioritize safety enhancements.

4. Hamid Noori and R. Shrivasa Kumar (2022) in their study "Driving Behaviour Modelling and Evaluation of Traffic Stream Characteristics in Heterogeneous Traffic Flow Condition" conducted a comprehensive analysis of drivers' behavior using parameters like microscopic driving behavior, car flow models, lane changing, and gap changing. The research involved data collection from roads and intersections to understand traffic flow characteristics and outlined a three-phase methodology for constructing, calibrating, and validating simulations influencing driving behavior. The study identified important parameters for future modeling and for implementing long-term, sustainable traffic strategies.

5. Oad, Pardeep, and Stephen L. Kajewski, along and Arun Kumar (2020) “Innovation in Road Construction Industry: An Analysis of Different Case Studies,” In this they noted what appears to be a significant problem with government agencies being able to assess claims of innovation for road construction in most proposals. They note that in government undertakings, there is an objective to achieve value for money, however, assessing innovation in tenders is multifaceted because of issues like degree of project definement, innovation, and the level of contractor’s engagement. This paper seeks to study several cases in order to comprehend innovation psychology in this domain better.

6. Wu, Yucai, Wei Wang, Wang Dan, Liu Zhiqiang, and Qiang Rongrong, (2020) also participated in "Research on the Construction of Green Highway Construction Technology System" concerning the work being done in Guangdong Province towards improving the development of "green" modes of transportation. Their work commenced in 2016 and it addresses the issue of how to combine ecological protection and the construction of an expressway. This project is aimed at implementing resource conservation, energy and pollution minimization, environmental protection, and the sustainable development of mountain highways in Guangdong. They also strongly support the objective of helping to make the province's highways blend well with the environment as beautifying the province as to set the stage for further development of green roads in the province.

V. CONCLUSION

The Samruddhi Mahamarg is an expressway that connects Nagpur to Mumbai over a distance of 701 kilometers. It is one of the most important infrastructure projects in India. The expressway has several advantages such as; reducing travel time and increasing connectivity and tourism, improving logistics, generating employment opportunities, and developing regions. Regardless, the project still has challenges such as high accidents rates, land acquisition problems, costs exceeding budgets, and environmental issues. To make sure that the Samruddhi Mahamarg is successful in the long run MSRDC is installing Intelligent Transportation System (ITS) throughout the highway to tackle the problems faced head-on through better road safety, stronger traffic law enforcement, public education, environmental offsets, and expansion of the expressway. With these methods, it is expected that the Mahamarg will help in the further development of the state of Maharashtra and the entire country.

VI. ACKNOWLEDGMENT

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A special thanks to our teammates, whose dedication, collaboration, and hard work made this research possible. This project was truly a team effort, and we appreciate each member's contributions. Lastly, we are deeply grateful to our families and friends for their unwavering support, motivation, and encouragement throughout this journey. Their belief in us kept us going through challenges and successes alike.

VII. REFERENCES

[1] Pardeep Oad, Stephen L. Kajewski, Amn Kumar (2020) "Innovation in Road Construction Industry: An Analysis of Different Case Studies"

[2] Yucai Wu, Wei Wang, Dan Wang, Zhiqiang Liu and Rongrong Qiang (2020) "Research on the construction of green highway constmction technology system"

[3] Highway Research Journal -Indian Road Congress (IRC). Volume II No :2Hamid Noori, Shrivasa Kumar (2022) Driving behaviour modelling and evaluation of traffic stream. Characteristics in heterogeneous traffic flow condition.

[4] RAP Safety Assessment of Golen Quadrilateral (Delhi-Mumbai and Mumbai-Chennai sections)

[5] G.Athipathi, S.Nagan, T.Baskaran (2017) "Accident Prediction on National Highways in India"

[6] S. S. Charkha, C. R. Rathod, A. Gavhane, R. R. Galande, S. S. Nikam (2024) "Accidental study on NH-48 Dehu Road Pune - Satara stretch"

[7] Press Information Bureau (pib.gov.in)

[8] Themetrorailguy.com - Mumbai — Nagpur Expressway — Information & Status Update (08/07/2024)

[9] The Logical Indian (7th June 2025) Samruddhi Mahamarg Complete: CM Fadnavis Inaugurates Final 76 km, Cuts Mumbai–Nagpur Travel Time from 16–17 Hours to Just 8

https://thelogicalindian.com/samruddhi-mahamarg-complete- cm-fadnavis-inaugurates-final-76-km-cuts-mumbai-nagpur-travel-time-from-16-17-hours-to-just-8/

[10] My Pulse Pune (7th May 2025) Travel Time from Nashik to Mumbai to be Reduced to Just 2.5 Hours with Samruddhi Mahamarg's Final Phase Inaugurated on May 1 https://www.mypunepulse.com/travel-time-from-nashik-to-mumbai-to- be-reduced-to-just-2-5-hours-with-samruddhi-mahamargs-final-phase-inaugurated-on-may-1/