

A Detailed Study of National Highway Development Programme from 2 Lane to 4 Lane

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Abstract: *The national highway development programmed (NHDP) in India is carried out by a national highway authority of India (NHAI). In India as well as in the whole world transport system plays very important role in the development of country as an economic way and in the other ways also such as development of agriculture and industries. It also helps us to reduce poverty by creating employment. Faster roads in India without sacrifices the safety are great achievement in development of highways also reduce the environmental pollution. The national highway development program was implemented by Mr. ATAL BIHARI VAJPAYEE in 1998. The total length of national highway in India is 66,590 kms. Recently the finance minister Mr. ARUN JAITLEY announce the budget for highways development of Rs. 2,18,000 crores. One of longest highway in India is National Highway from Agra and ends in Mumbai. The approximation length of National Highway is 1,190 kms. The development is going on becoming 4 lanes from 2 lanes. Some portions of highways are completed by becoming 4 lane highway from 2 lane but some portion are still the under construction.*

Keywords: NHDP, NHAI, VDF, MSA, Cost Estimation, VOC.

Introduction

A better road network plays very important role in the development of the country in many ways such as economy etc. From the last few years the traffic in the cities as well as on the highways are continuously increasing that why the rate of accident are also increasing. Government are continuously working on the development of roads for the safety of people. Many highways are already developed and some are going on. One of the developing highways is Agra to Mumbai. The some parts of National Highway are already developed by converting into 4 lanes from 2 lanes. But some part of highway are still under construction. The length of highways in India is 66,590 kms. This highway is one of the largest India national highways which starts from Agra in utter Pradesh and ends in Mumbai in Maharashtra. The highway is passes through the cities of utter Pradesh , Rajasthan , Madhya Pradesh and Maharashtra. The length of highway is 1,190 kms. Currently the road between Agra and Gwalior is four lanes. But the road from Gwalior to shivupuri , guna , maksu , dewas is not four lane . The condition of road is very poor but construction is going on . Transportation plays very important role in the development of the country. It contribute to the economical, cultural and industrial development. The development generally

based on the developed roads. The NHAI already developed some roads and highways into four lanes. The significance of the developed road are as following :

- A developed road saves the travelling time.
- A developed road reduce the accident.
- A developed road provide the better riding quality.
- A developed road reduce the fuel requirement of the vehicle.
- A developed road helps in the reduction of the environmental pollution specially the air and noise pollution.

OBJECTIVES OF THE STUDY:

The objective of the study states that what student or the researcher wants to do in the project. The main focus in this study is that how NHAI is playing important role in the development of the National Highway in the area of guna to raghogarh-vijaypur in Madhya Pradesh. The centre area in project are as follow-

- To design a four lane highway from two lane to reduce the traffic.
- To rupture the travel time.
- To develop easy, short and economic transportation system.
- To compare the economics of the pavements.
- Calculate the project costing.

Route Planning:

Planning with respect to road construction takes into the account of present and near uses of the transportation system to satisfy maximum service with a minimum of financial and environmental cost. The main objective of the initial phase of road network development is to establish specific goals and prescriptions for road network development along with the more general location needs the route planning phase is the time to calculate environmental and economic settlement and should set the stages for the remainder of the road development process.

Route Location:

A poor road can approximate always be fixed. However , no amount of quality surveying or design work can perfect any powerful location error. Some factors to remember when locating roads include :

- Avoid high consumption hazard sites , particularly where mass collapse is a possibility.
- Locate roads where maximum resources are available.
- Avoid sideslip locations on long, elevated, or unsettled slopes.
- Utilize natural terrain features such as stable benches, ridge tops, and low gradient slopes to minimize the area of road disturbance.

Pavement Design:

FLEXIBLE PAVEMENT DESIGN BY IRC 37:2001 PARAMETER FOR DESIGN :

- Design traffic in term of cumulative number of standard axles.
- CBR value of sub grade.
- Initial traffic after construction in terms of number of commercial vehicles per day(CVPD)
- Traffic growth rate r (%)
- Design life in number of years
- Vehicle damage factor(VDF)
- Distribution of commercial traffic over the Carriageway.

Design Data:

- Category: NH
- Type of road: Four lane divided road
- Initial traffic in each direction in: 2048 CV/day the year of completion of construction
- Design life: 20 years (as per IRC 37-2001 page no.11)
- Design CBR of sub grade soil: 3 % (as per test results of collected samples)
- Traffic growth rate: 7.5 % (as per IRC 37-2001 page no. 11)

Design Calculation:

- Vehicle damage factor: 4.5 (as per IRC 37-2001 page no.: 12)
- LDF: 75% of number of commercial vehicles in each direction Cumulative number of standard Axles $N = \{365[(1 + r)^n - 1]/r\} * A * D * F$
 $N = 365 * [(1 + 0.075)^{20} - 1] * 2048 * 0.75 * 4.5 / 0.075 = 109 \text{ MSA}$
 Total Pavement thickness = 870mm
 Thickness of BC= 50mm
 Thickness of DBM=190mm
 Thickness of Base=250mm
 Thickness of sub base=380mm

Cumulative Traffic (msa)	Total pavement Thickness (mm)	Pavement Composition			
		BC (mm)	DBM (mm)	Base	Sub Base
10	760	40	90	250	380
20	790	40	120	250	380
30	810	40	140	250	380
50	830	40	160	250	380
100	860	50	180	250	380
150	890	50	210	250	380

IRC37-2001 Design Chart MSA and CBR of 3% sub grade soil

Cost Estimation:

The cost of construction of pavement is a major criterion for choice of road type, flexible or solid, particularly when the funds are few and the government funding is limited. It is therefore required to examine the economics of various pavement types not only for the initial construction cost but also for the life cycle costs which includes the discounted maintenance and overlay costs that are incurred during the design life of the pavement. The cost of road thus includes (a) initial construction Cost (b) Maintenance and Re-habilitation Costs.

Item	Length	Breadth	Thickness	Volume	Rate (Rs)	Total (Rs)
Asphalt	1000	15	0.25	3750	4600	17250000
Base	1000	15	0.25	3750	741	2778750
Sub base	1000	15	0.38	5700	400	2280000
					Total	22308750

Economic Development:

Highways development program can contribute to economic development by encouraging the attraction of business to sites equipped with good access and by improving the travel efficiencies of existing business and to start a new avenues. They also help for Development of industries such as GAIL and NFL, Development of new project sites., Infrastructure projects, and Employment Opportunity Highway development project serves as an important employment generator and provide employment opportunity during construction period. Development of highway projects, especially 2/4 lanes divided carriageway of National Highway projects in reducing the number of accidents through the following developments. Improved crossing and alternatives access routes by use of signage, junctions, & alternate arrangement for local traffic circulation has been provided. Vehicle operating cost (VOC) will be reduced when a road is improved. Fuel consumption, wear and tear of tires, suspension will be benefited when a geometric design is improved and the road surface is made more even.

Conclusion:

Highway projects promote access to markets, materials and opportunities by facilitating movement of persons and goods and improve earning and thereby level of living. The ultimate aim of the development activities, such as National Highway is to promote societal welfare of Guna area of Madhya Pradesh State . The benefit of proposed widening of National Highway may also be seen from a different angle, viz, the local benefit and the wider regional or national level benefit. Development lead to changes in the level of well-being and human development, through their benefit of consumption level, educational attainment, health status etc. The road construction will provide better transportation facility for tourists visiting guna region. In this paper we design both rigid as well as flexible pavement. But rigid pavement is more comfortable than flexible pavement. We also compared the cost of both the pavement and we found that rigid pavement is more economic than flexible pavement after adding the 20 year life cycle cost. For

reduction in accident installation of proper road safety system through signage, barricades, crash barriers, edge posts/parapets will add to be safety of the vehicular traffic on the stretch of the road.

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