EXPERIMENTAL STUDY ON REHABILITATION AND UPGRADATION OF NH-4
(NALAGAMPALLI TO AP/KARNATAKA BORDER)

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Abstract: The National Highway development programme (NHDP) is carried out by National Highway Authority of India. In India as well as in the whole world transport system plays a very important role in the development of the country as an economic way. In other ways also such as development of agriculture and industries. It also helps us to reduce poverty by creating employment. Our project deals with the detailed study on Rehabilitation and Upgradation of NH-4 from Nalagampalli to AP/Karnataka Border (from existing Km 171.590/ Design Km172.00 to existing Km216.912/ design Km219.687)(Design length =47.68Km) to four lane under NHDP=4 in the state of Andhra Pradesh on EPC mode. The study includes that material production, tests on materials and mix designs, which involves in up-gradation of highway. The project is carried out by the company DILIP BUILDCON LIMITED.

I. INTRODUCTION

The National Highways Authority of India (NHAI) is the nodal agency responsible for building, upgrading and maintaining most of the national highways network. It operates under the Ministry of Road Transport and Highways. The National Highways Development Project (NHDP) is a major effort to expand and upgrade the network of highways. NHAI often uses a public-private partnership model for highway development, maintenance and toll-collection.

While national highways constitute 1.8% of Indian roads, they carry 40% of the traffic. The majority of existing national highways are two-lane roads (one lane in each direction), though much of this is being expanded to four-lanes and some to six or more lanes. Some sections of the network are toll roads.

The National Highways Act, 1956 provides for private investment in the building and maintenance of the highways. Some existing roads have been reclassified as national highways. Bypasses have recently been constructed around larger towns and cities to provide uninterrupted passage for highway traffic. The hugely varied climatic, demographic, traffic, and sometimes political situation in India results in national highways being single lane in places with low traffic to six lanes in places with heavy traffic. National highways are being upgraded or are under construction. Some national highways are long while some are short spurs off other national highways to provide connectivity to nearby ports or harbours.

A stretch of national highway Mumbai to Pune to Hubli to Bangalore to Chennai was earlier called NH 4 before renumbering of national highways in year 2010. The former NH 4 is now renumbered as NH 48.
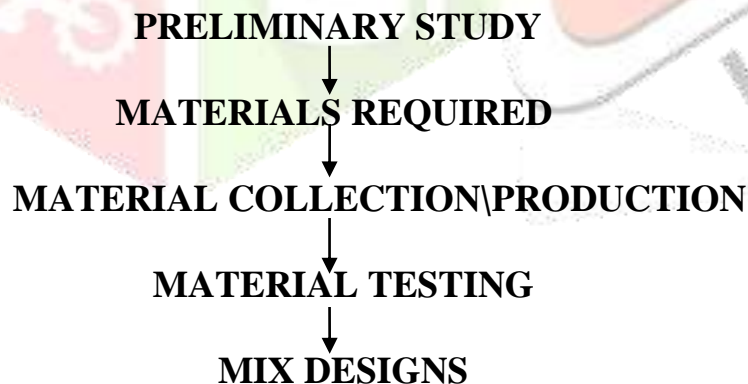
Transportation plays very important role in the development of the country. It contribute to the economic, cultural and industrial development. The development generally based on the developed roads .The NHAI already developed some roads and Highways into 4 lane.

II.MATERIAL USED:

1. SOIL
2. AGGREGATES
3. SAND
4. MANUFACTURED SAND(M. SAND)
5. GRANULAR SUB BASE(GSB)
6. WATER
7. CEMENT

III.METHODOLOGY:

PRELIMINARY STUDY

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MATERIALS REQUIRED

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MATERIAL COLLECTION\PRODUCTION

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MATERIAL TESTING

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MIX DESIGNS

IV.LITERATURE REVIEW:

1.Title of the journal is A study of Detailed Project Report for Upgradation of Nh-3 from Two to Four Lane
 Author's name: Nadeem khan1, Rakesh Gupta2, Mukesh Pandey.

Abstract - The national highway development programme (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 a 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 programmen 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 JAITELY announce the budget for highways development of Rs. 2,18,000 crores. One of longest highway in India is NH3. It starts from agra and ends in Mumbai. The approximation length of NH3 is 1,190 kms. The development is going on NH3 and its becoming 4 lane from 2 lane. Some portions of NH3 highways are completed by becoming 4 lane highway from 2 lane but some portion are still the under construction. The project area in this research paper are start at guna in madhya pradesh and ends in Raghogarh –vijaypur.

2. Title of the journal is Pavement Rehabilitation and Maintenance
Author's name: Mr.etikala Nagaraju

ABSTRACT- In India, the road traffic volume has increased manifolds during the post-independence period. The traffic axle loading may also in many cases be much heavier than the specified limit. As a result of which, the existing road network has been subjected to severe deterioration leading to premature failure of the pavements. In such a scenario, development of the effective pavement management strategies would furnish useful information to ensure the compatible and cost- effective decisions so as to keep the existing road network intact. The optimum maintenance and rehabilitation strategies developed in this study would be useful in planning pavement maintenance strategies in a scientific manner and ensuring rational utilization of limited maintenance funds. Once this strategy for urban road network is implemented and made operational; this would serve as window to the other urban road network of different regions.

3. Title of the journal is UPGRADATION OF EXISTING HILL ROAD TO A TWO LANE STATE HIGHWAY
Author's name: Jeenita Ngangbam1 and Dr.Th kiranbala Devi2

ABSTRACT: The paper is a report for the hypothetical task of upgrading a given stretch of existing underside hill road to a State Highway having two-lane. The existing road stretch taken for upgrading is within the RIST campus residing in vast stretch beside the National Highway No.37, Baridua, Meghalya which is found to be a mountainous terrain. In this project, the four stages for Engineering Surveys for Highway Alignment i.e., reconnaissance survey, preliminary survey and detailed survey along with the geometrical design of the road were carried out. Soil survey was carried out to know the sub grade soil classification and strength of the sub grade soil. The pavement is taken as flexible type and designed by the IRC recommended CBR method. Key Words : Soil survey, Pavement, Engineering survey, Highway, Hill road.

4.Title of the journal is STUDY AND COMPARISON OF SOIL COMPACTION BETWEEN LABORATORY AND FIELD TO SIMULATE FIELD COMPACTION FOR RURAL ROADS
Author's name :Vinay A 1, Hemanth Yadav M V 2

Abstract: Soil compaction is most prominent level in construction of pavement. It enhances engineering designing properties of fill and helps in achieving soil strength and stability. Compaction plays a major role in pavement strength and durability. Proper compaction is necessary to bear heavy axle loads of vehicles. The current situation demands high degree of compaction with limited time and man power, thus helps in completion of project in economical way. The compaction aims to achieving certain dry density in site. The main aim is to provide better technical background to the project also minimize the time delay caused. The project is mainly based on achieving required degree of compaction, by finding optimum number of passes of vibratory roller, dry density achieved with required amount of compaction effort also various parameters of vibratory roller. Soil samples are gathered from different diverse areas and 4 unique sorts of soils are acquired. In situ dry density is acquired from core cutter from every area. The research facility tests are completed discover dry density of every specimen. From this MDD and OMC of every specimen was found out. And subsequently relative compaction was ascertained for distinctive soil sorts. Also found out various equipment parameters affect the soil compaction and calculate the optimum value of each case. This is very logical for better compaction of soil.

5. Title of the journal is Thickness Requirement of a Rigid Pavement with varying Conditions of Subgrade, Sub-Base and Shoulders
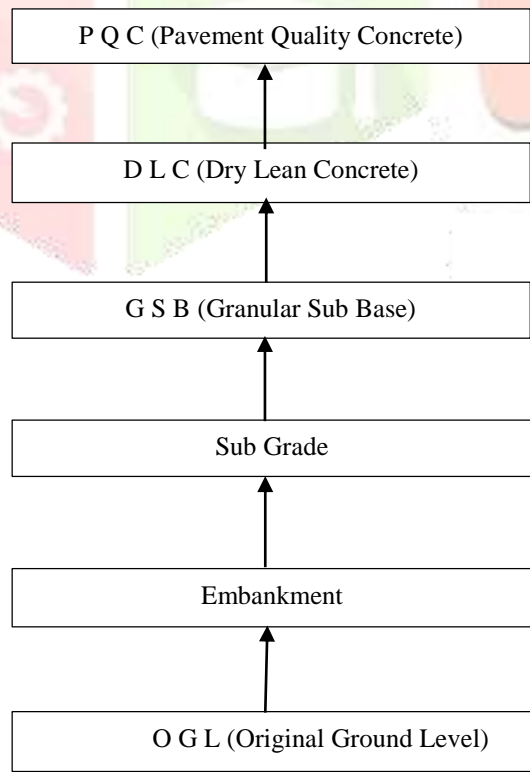Author's name : Surender Singh1, Dr.S.N.Sachdeva.

Abstract: From the past few years, the reliance is shifting more on rigid pavements because of its low maintenance cost, long service life and the smoother riding surface. The thickness of the concrete slab depends upon the strength of subgrade, axle load repetitions, type of sub-base and shoulders. Even a small decrease in the thickness of the concrete slab with proper design can result in appreciable economy to the project. Therefore, an attempt has been made to design a two lane two-way State Highway proposed to be laid in Haryana by considering all the available options of subgrade, sub-base and shoulders. The design has been carried out with Dry Lean Concrete, Granular and Cement treated subbase of different thickness with both tied and untied shoulder conditions. The pavement is provided with dowel and tie bars. It is observed from the design that an increase in the CBR value of subgrade and an increase in thickness of subbase layer has insignificant effect on the thickness of the pavement slab, but providing tied concrete shoulders reduce the slab thickness appreciably. Keywords - California Bearing Ratio, Shoulders, Subbase, Subgrade, Thickness.

LOCATION:
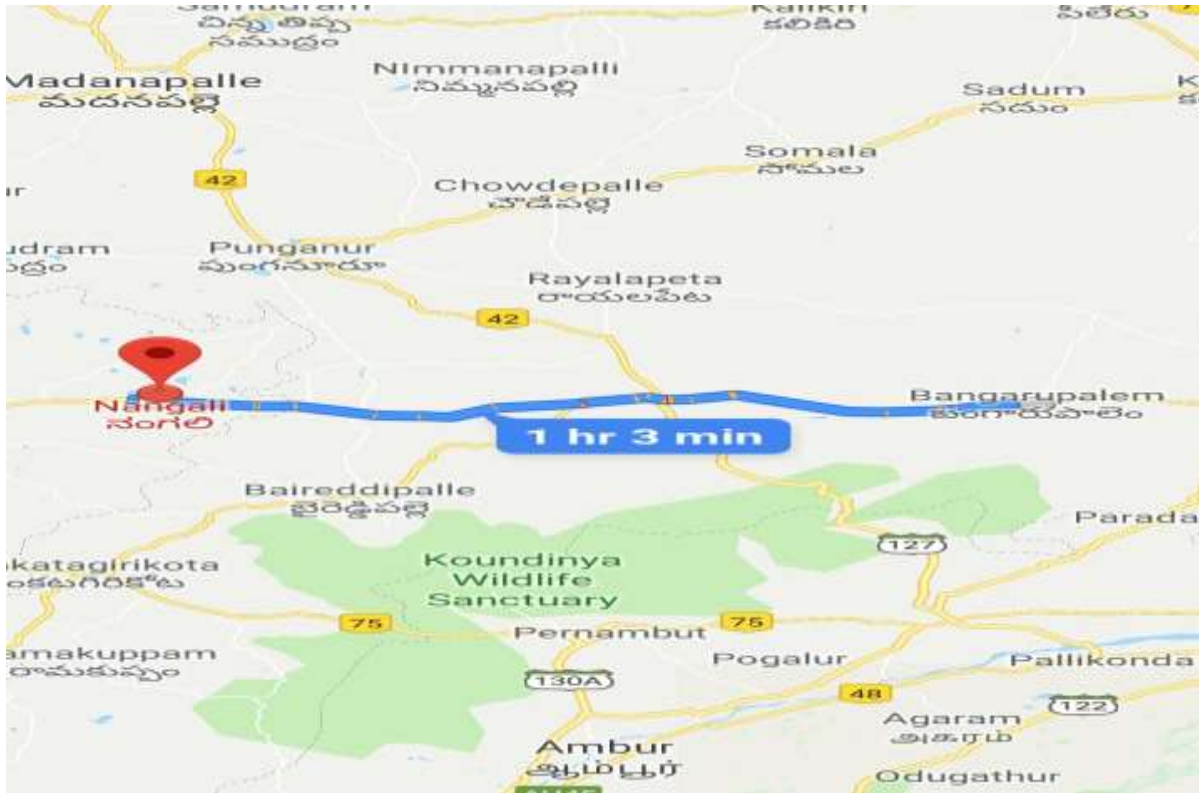
HIGHWAY LAYERS FOR RIGID PAVEMENT:

While constructing the rigid pavement the following major layers are involved,

P Q C (Pavement Quality Concrete)

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D L C (Dry Lean Concrete)

↑

G S B (Granular Sub Base)

↑

Sub Grade

↑

Embankment

↑

O G L (Original Ground Level)

ORIGINAL GROUND LEVEL(OGL):

EMBANKEMENT:

Sub-grade

GSB(Granular Sub Base)
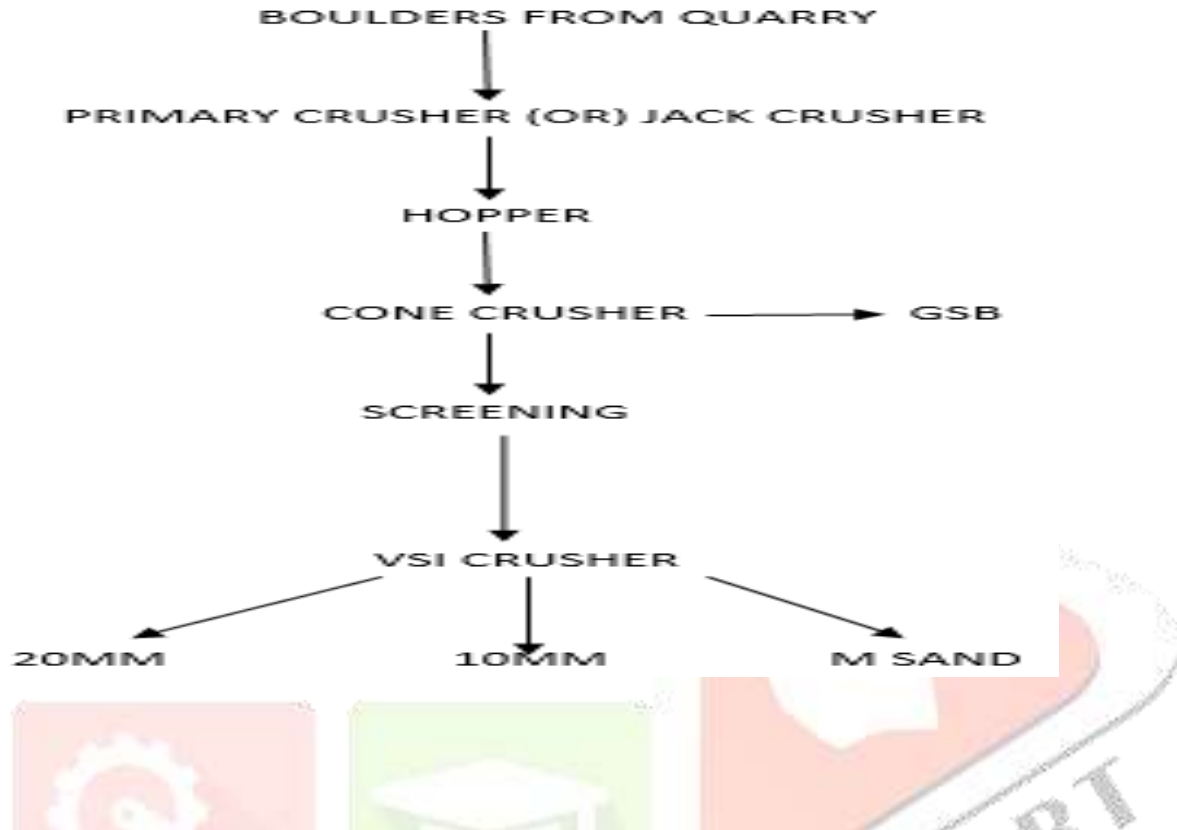

DLC(Dry Lean Concrete)

PQC(Pavement Quality Concrete)

MATERIALS PRODUCTION/COLLECTION:

MATERIALS PRODUCTION LIKE AGGREGATES,M.SAND,GSB ARE CARRIED OUT IN THE CRUSHING PLANT.

Various tests involved in the project:

1.Test on soil:

    a. Free swell index test of soil

    b. Plastic limit and liquid limit test of soil

    c. Modified proctor compaction test

    d. CBR(California bearing ratio) test

    e. Sieve analysis or gradation of soil

2.Test on aggregates:

    a. Aggregate impact value test

    b. Aggregate flakiness index and elongation index test

    c. Specific gravity and water absorption of aggregate

    d. Sieve analysis or gradation of aggregate

3.Test on cement:

    a. Consistency test

    b. Setting time test

    c. Fineness of cement

    d. Soundness of cement

    e. Compressive strength of cement

4.Test on concrete

    a. Slump cone test

    b. Compressive strength test

5.Determination of field density test

6.Mix designs

    a. Concrete mix design

    b. DLC (dry lean concrete)mix design

    c. PQC(pavement quality concrete)mix design

Observations from Concrete Mix Design

Mix was cohesive and homogeneous.

Slump = 120 mm

No. of cube casted = 9 Nos.

7 days average compressive strength = 52.07 MPa.

28 days average compressive strength = 62.52 MPa which is greater than 58.25MPa

Hence the mix accepted.

Observations from DLC Mix Design

Material	Cement	Fly ash	20mm	10mm	Crushed sand	Water(Lit)	MDD(g/cc)	OMC(%)
Kg/cum	124	31	930	465	930	161	2.260	6.50
%	80%	20%	40%	20%	40%			

Observations from PQC Mix Design

Cube Strength Results			
Age in days	**7 days**	**28 days**	**Remarks**
Compressive Strength	**45.25 N/mm^2**	**54.95 N/mm2**	

Beams Strength Results			
Age in days	**7 days**	**28 days**	**Remarks**
Flexural **Strength**	**4.71 N/mm^2**	**6.22 N/mm^2**	

CONCLUSION:

- It is mentioned in the IRC: 58-2011 that a minimum of 8% CBR is recommended for the 500 mm of the select soil used as subgrade. But results show that at 8% CBR, required thickness is the same for all types of subbase materials. Therefore, a detailed investigation should be done to discuss this problem.

- The design is made conforming to the IRC guidelines and recommendations. While designing the highway, the existing features of the road were thoroughly studied and data were collected. Soil samples were collected from five different locations and soil tests were performed in the soil lab.

- Significant savings can be obtained by choosing rehabilitation strategies that include recycled materials in the new layers (overall cost savings of up to 24% in the present project);

- Highway projects promote access to markets, materials and opportunities by facilitating movement of persons and goods and improve earning and thereby level of living

- 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.

- Soil compaction is such a important process which indicates the quality and durability of road and should be done with high precision

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ii. Jeenita Ngangbam1 and Dr.Th kiranbala Devi2 1. Student, Regional Institute of Science and Technology, Meghalaya 2. Faculty, Manipur Institute of Technology, Takyelpat, Imphal

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iii. 1Assistant Professor, Department of civil Engineering, Dayananda sagar college of Engineering, Bangalore, Karnataka, India 2M. Tech Highway Technology, Department of civil Engineering, Dayananda sagar college of Engineering, Bangalore, Karnataka, India.

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