International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

IJIEMR Transactions, online available on 1st Sept 2017. Link :http://www.ijiemr.org/downloads.php?vol=Volume-6&issue=ISSUE-7

Title: **EVALUATION OF STRENGTH PERAMETERS IN BASE LAYER OF PAVEMENT WITH RBI 81**

Volume 06, Issue 07, Pages: 603 – 607.
Paper Authors

[1]SANAPALA AVINASH, [2]POTHULA SANYASI NAIDU , [3]CHEBOLU SUDHEER

[1,2]Sankentika institute of technology and management, Visakhapatnam, A.P., India.
[3]National Institute of Technology, Tiruchirappalli, T.N ., india.

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

EVALUATION OF STRENGTH PERAMETERS IN BASE LAYER OF PAVEMENT WITH RBI 81

[1]SANAPALA AVINASH, [2]POTHULA SANYASI NAIDU , [3]CHEBOLU SUDHEER

[1]P.G.Student, M.Tech (Transportation Engg), Civil Department, Sankentika institute of technology and management, Visakhapatnam, A.P., India
[2]Assistant professor M.TECH (Transportation Engg), Civil Department, Sankentika institute of technology and management, Visakhapatnam, A.P., India
[3]P.G.Student, M.TECH (Transportation Engg)3, Civil Department, National Institute ofTechnology,Tiruchirappalli, T.N ., india
[1]avinash9239@gmail.com,[2] naidupothula957@gmail.com,[3] Sudheerchebolu107@gmail.com

Abstract— The performance of a flexible pavement structure under loading condition isgoverned by the properties of materials used in base and sub base layer. Base course is the layer of the material immediately beneath the surface of binder course and it provides the additional load distribution and contributes to the subsurface drainage and frost resistance. The highway construction industry has made rapid studies in the field of new technology up gradation and adoption with increase in traffic volume and increase in demand for innovative design, rehabilitation and repair of the aging transportation infrastructure. New materials and techniques have been tried with lot of emphasis on optimizing life cycle cost and minimizing design cost

Keywords : RBI Grade 81, CBR, Standard Proctor, Degree of compaction . silty sand (SM)

I. INTRODUCTION

A pavement structure can be designed either as a flexible pavement or a rigid pavement based on its structural behaviour, with flexible pavements being widely preferred in India due to its advantages over rigid pavements and in economical point of view also. Flexible pavements have low or negligible flexural strength and are rather flexible in their structural action under the loads. These pavements are layered structures with the following component layers Soil sub- grade , sub base course , base course , surface course The layered pavement structure transmits vertical or compressive stresses to the lower layers by grain to grain transfer through the points of contact in the granular structure with the strong graded aggregates and should transfer the compressive stresses to a wider area. A detailed structureof flexible pavement shown below in figure 1.1In developing international locations likeIndia the biggest handicap is to provide a whole community of avenue system with theconfined budget available by way of the traditional methods. In the purpose of network development, many a time, the alignment of road may have to be fixed through soils, which may not be suitable to sustain the traffic loads. It has been established that the stability and performance of road is reflected by the soil

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

sub grade. In many cases the existing pavements are failed before their design period, but the network and services keeps on increasing. It is a major problem for both the government and road users. Therefore, there is a want to lodge to suitable techniques of low cost street creation, observed via a procedure of degree development of the roads, to fulfill the developing needs of road traffic.

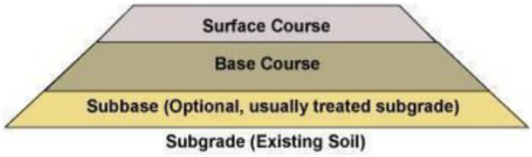


Fig. 1.1 Layers in Flexible pavement

2. PROPERTIES OF SOIL

1 Physical Properties of RBI Grade-81

Properties	RBI Grade-81
Appearance	Beige powder
Odour	Odourless
pH	12.5 (saturated paste)
Vapour pressure	Not measurable
Flammability	Inflammable
Specific Gravity	2.5
Solubility	In water 0.2pts/100pts
Freezing point	None, solid
Viscosity	None, solid

Table 2 Chemical Properties of RBI Grade-81

Properties	%By Mass
Calcium Oxide (CaO)	52-56
Silicon Dioxide (SiO_2)	15-19
Sulphur Trioxide (SO_3)	9-11
Aluminium Oxide (Al_2O_3)	5-7
Iron Oxide (Fe_2O_3)	0-2
Magnesium Oxide (MgO)	0-1
Fibers (polypropylene)	0-1
Additives	0-4

The concentration of Calcium (whichimparts the strength) is less in untreated soil which is supplemented by thestabiliser. Hence in case of the treated soil the concentration of calcium increases with percentage of stabiliser.

The increase in calcium concentration provides free Ca+ ions for the chemical reaction with silica and alumina present in the clay leading to the formation of cementitious compounds calcium silicate hydrate (C-S-H) and calcium aluminate hydrate (C-A-H).

The chemical equation for the formation of C-S-H and C-A-H can be written as:

Ca (OH) 2+ H4SiO4→ Ca2++ H2SiO4

2-+ 2 H2O → CaH2SiO4 2 H2O *(C-S-H)*

Ca (OH) 2+ Al (OH)4 →C4AH13, C3AH6 *(C-A-H)*

Spreading of RBI Material in field

Mixing of RBI with soil

3.EXPERIMENTAL STUDIES

Standard Proctor Test

To assess the quantity of compaction and the water content required within the discipline, compaction exams are important at the equal soil in laboratory. The water content at which

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

the most density is attained is received from the relationships supplied by way of the assessments. According to IS:2720(Part-7)the mould recommended is of 100mm diameter, 127.3mm height and 1000ml potential. The rammer endorsed is of 2.6kg with unfastened drop of 310mm.

California Bearing Ratio Test (CBR)

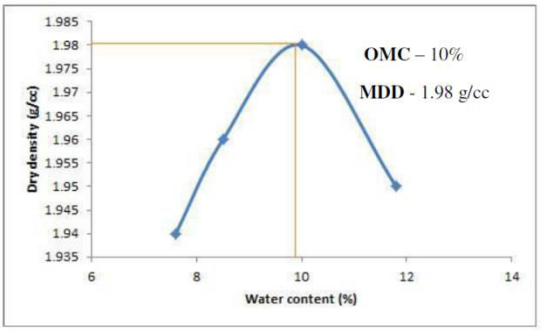
CBR take a look at changed into advanced by the California division of toll road in 1929. This test is used for comparing the suitability of sub-base materials. The check can be conducted on a organized specimen in a mould or on soil in-situ situations. The laboratory CBR apparatus consists of a mold 150mm diameter and 175mm high, having separate base plate and collar. The load is carried out by way of a loading body through a plunger of 50mm diameter. Dial gauges are used for measurement of the expansion of the specimen on a soaking and for dimension of penetration.

DETERMINATION OF FIELD DENSITY BY CORE CUTTER METHOD

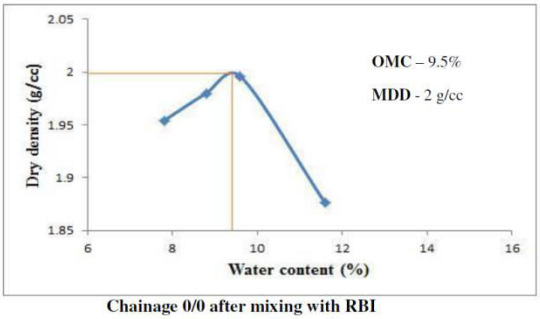
Measure the inner dimensions of the middle cutter and calculate its extent. Find the mass of the core cutter. Expose the small area, about 30cm square, to be examined and level it. Put the dolly at the pinnacle of the middle-cutter and pressure the meeting in to the soil with the assist of the rammer. Dig out the container from the surrounding soil, and trim flat the stop of the middle-cutter. Find the mass of the cutter complete of soil. Keep a few consultant soil specimen for water content dedication.

4.RESULTS AND DISCUSSIONS

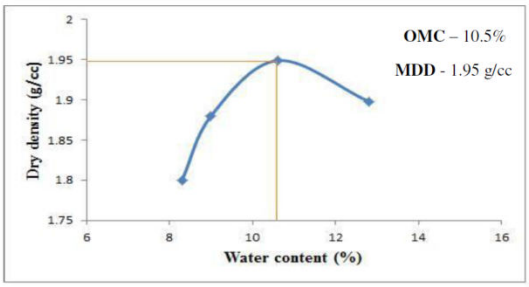
Proctor compaction results



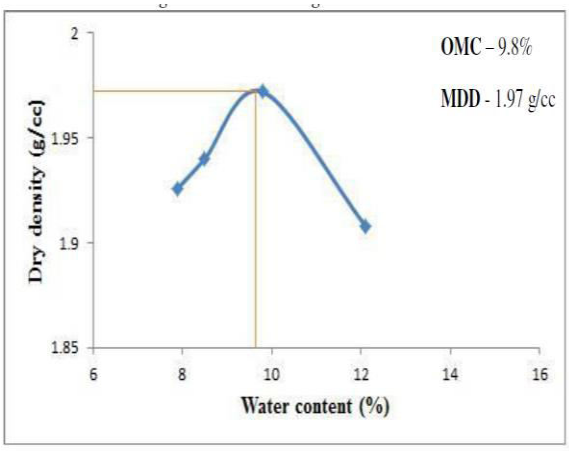
Chainage 0/0 before mixing with RBI



Chainage 0/0 after mixing with RBI



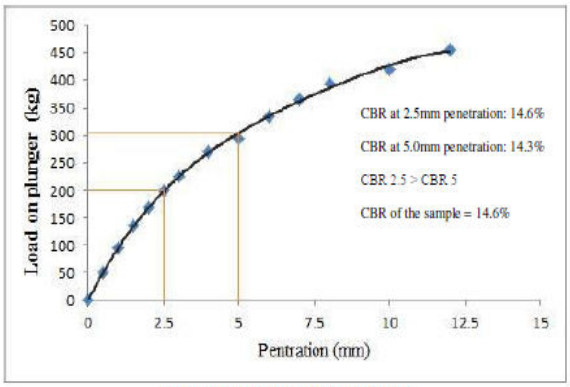
Chainage 0/350 before mixing with RBI



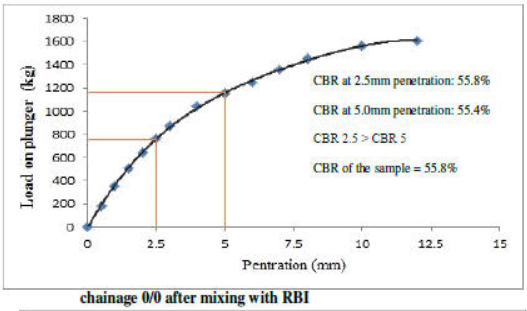
chainage 0/350 after mixing with RBI

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

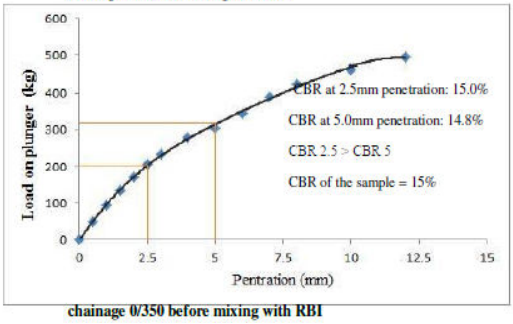
Chainage	OMC (%)		MDD (g/cc)	
	Before mixing with RBI	After mixing with RBI	Before mixing with RBI	After mixing with RBI
0/0	10	9.5	1.98	2
0/350	10.5	9.8	1.95	1.97
0/700	10.5	10.3	2.06	2.11
1/050	10.2	9.8	1.99	2.05
1/350	10.7	9.8	1.95	1.98



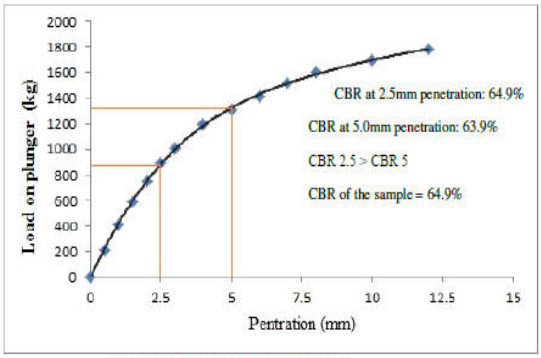
chainage 0/0 before mixing with RBI



chainage 0/0 after mixing with RBI



chainage 0/350 before mixing with RBI



chainage 0/350 after mixing with RBI

Chainage	CBR (%)	
	Before mixing with RBI	After mixing with RBI
0/0	14.6	55.8
0/350	15	64.9
0/700	15.3	54.8
1/050	16.1	58.4
1/350	14.2	62

Dry density results

Sample no	Dry density in field (g/cc)
1	1.82
2	1.86
3	1.83

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

5.CONCLUSIONS

Based on the comparison of the test results of soil before mixing with RBI and the stabilized soil with RBI the following conclusions are drawn

• Optimum Moisture Content of soil has been decreased from 10.3% to 9.8% after the addition of 3%RBI Grade 81 to it

• Maximum Dry Density of soil has been increased from 1.98g/cc to 2.02g/cc after the addition of 3% RBI Grade 81 to it

• The CBR value of soil has been increased from 15% to 59% after the addition of 3% RBI Grade 81 to it

• OMC, MDD, CBR values of samples collected from the project site are almost matching with the desiFrom economic analysis, a total cost savings of 26,000/- was achieved per kilometer by using RBI Grade 81 as compared to conventional section

• Relative compaction of 88% was observed in the base layer

6.REFERENCES

• Pandey B.B (2008), 'Use of RBI Grade 81 for soil stabilization and pavement Rehabilitation□,
Transportation Engineering Division, IIT Kharagpur.

• Yohannes Argu (2008), □Stabilization of light grey and red clay subgrade soil using cement,Addis Ababa University.

•Koloane. Paige-green. (2004), Standardized testing of RBI Grade 81 as a road materialstabilizer CSRI report.

• A.K.Sinha , Vasant G Havangi and Sudhir Mathur (2010), 'Powder based inorganic stabilizerfor construction of subgrade and sub-base layers of road pavement□, Journal of IndianHighways.

• Abu siddique and Bipradas Rajbongshi (2005), An analytical study on design and analysis ofstabilized rural roads□ Proceedings of the Easter Asia society for Transportation studies,Vol.5, pp.813-828.

K.V. Madurwar, P.P. Dahale, A.N.Burile (2013), Comparative Study of Black Cotton SoilStabilization with RBI Grade 81 and Sodium Silicate. International Journal of InnovativeResearch in Science, Engineering and Technology, 21,493-499