STRENGTHENING AND EVALUATING OF SUBDRADE SOIL BY USING RBI GRADE 81

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ABSTRACT

A viable stabilizer RBI Grade-81(polymer) utilized as a substance added substance and can likewise be utilized in sub grade, sub base and base layer. The mechanical waste like Fly Ash, Stone Dust, Steel Slag and so forth can be utilized with RBI Grade-81 as stabilizer to decrease the expense. The primary expect to improve the quality and quality of WBM and WMM street to diminish the ideal thickness of the asphalt. RBI level 81 have a decent potential to lessen the expense of asphalt layers if feeble sub-grade is experienced on the arrangement. On low volume cleared streets, planners ought to consider the establishment of RBI level 81 to improve the California Bearing Ratio. Decrease layer thickness and increment a basic number of asphalt. RBI level 81 help gave in a singular or multilayer to sublevel grows the nature of the earth and in this manner decline the thickness of black-top; along these lines decreasing the expense of asphalt development.

Keywords: *Soil stabilization, RBI Grade 81, Strength Parameters, Compaction Test, CBR Test.*

1. INTRODUCTION

- RBI Grade 81 meets the necessity for an all around demonstrated, solid and very savvy technique by making a solid and irreversible impermeable layer impervious to unfriendly climatic conditions, from extremely high temperatures to permafrost conditions, and obliging every single vehicular burden. RBI Grade 81 is naturally benevolent and accentuates the utilization of reused material, perceiving the absence of promptly accessible assets. Some trait of RBI Grade 81 is given in the accompanying.Patented worldwide including India
  - Cementitious powder
  - Non-toxic
  - Non inflammable
  - Gray color powder

2. PROPERTIES OF RBI Grade 81

Table 1. Physical Properties of RBI Grade 81

Physical Properties	RBI Grade -81
Odour	Odourless
Ph	12.5
Freezing point	None
Flammability	Non-flammable
Shelf life	12 months
Storage	Dry storage
Bulk density	700 kg/m^3

Table 2. Chemical Properties of RBI Grade 81

PROPERTIES	% BY MASS
Ca	Cao 52-56%
Si	SiO2 15-19%
S	SO3 9-11%
Al	Al2O3 5-7%
Fe	Fe2O3 0-2%
Mg	MgO 0-1%
Mn, K, Cu, Zn	0.1-0.3%
H2O	1-3%
Fibers	0-1%
Additives	0-4%

3. TEST PERFORMED ON SOIL:

- **Liquid Limit Test:**
  Preparation of Samples:
  - Air dry soil sample and break the clots. Remove the organic matter like tree roots pieces of bark, etc.
  - About 100g of specimen passing through 425µm IS sieve is mixed thoroughly with distilled water in the evaporating dish and left for 24 hours for soaking.

- **Plastic Limit Test:**
  Preparation of sample:
  - Take out 50 gm of air dried soil from a thoroughly mixed sample of soil passing through 4.25 µ m IS sieve. Mix the soil with the distilled water in an evaporating dish and leave the soil mass for nurturing. This period may be up to 24 hrs.

- **Standard Compaction Test (IS2720 Part VIII)**
  - The test consists in compacting soil at various water contents in the mould, in three equal layers, each layer being given 25 blows of the 2.5 kg rammer dropped from a height of 310 mm. The dry density obtained in each test is determined by knowing the mass of the compacted soil and its water content. The compactive energy used for this test is 5880 kg cm per 2250 ml of soil.

- **California Bearing Ratio Test (CBR Test)**
  - This is a penetration test developed by the California division of highways as a method for evaluating the stability of soil sub Grade and other flexible pavement materials. The load values are noted corresponding to penetration values of 0.0,05,1.0,1.5,2.0,2.5,3.0,4.0,5.0,7.5,10.0 and 12.5mm.The load corresponding to 2.5 and 5.0 mm penetration are values are noted. The CBR value is calculated using the relation:

$$\text{CBR\%} = \frac{\text{[Load sustained by the specimen at 2.5 or 5.0mm penetration]}}{\text{[Load sustained by standard aggregates at the corresponding Penetration level]}} \times 100$$

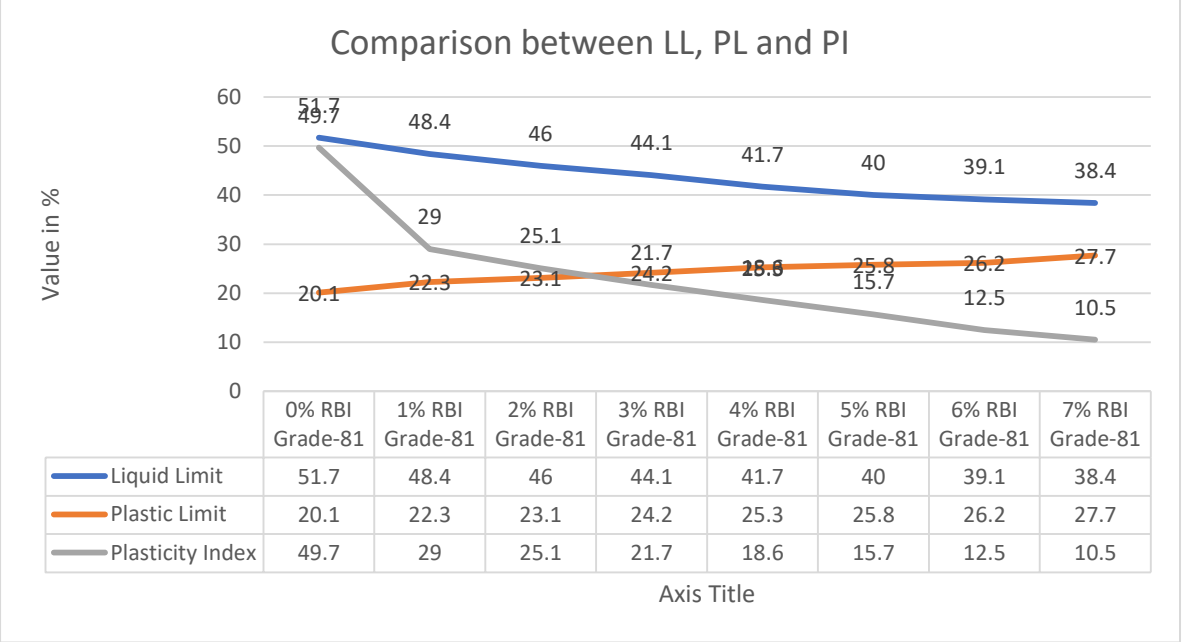
- Normally the CBR value at 2.5 mm penetration which is higher than that 5.0mm .Reported as the CBR value of test material .However, if the CBR value obtained from the test at 5.0mm penetration is higher than 2.5 mm then the test is to be repeated for checking if it comes at 5mm it is reported as CBR value of test material.

Table3. Characteristic Value of Soil

S.NO	CHARACTERISTICS	VALUE
1.	Optimum Moisture content	18%
2.	Maximum dry density	2.1gm/cm^3
3.	Plasticity limit	9.32
4.	Liquid limit	32%

4. TEST RESULT

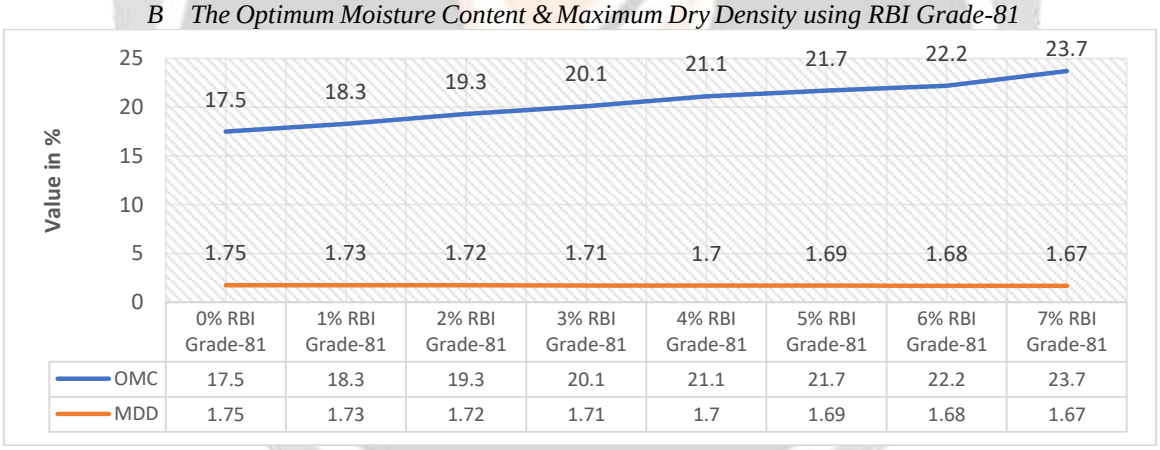
A. The Liquid Limit,Plastic Limit & Plasticity Index using RBI Grade-81



	0% RBI Grade-81	1% RBI Grade-81	2% RBI Grade-81	3% RBI Grade-81	4% RBI Grade-81	5% RBI Grade-81	6% RBI Grade-81	7% RBI Grade-81
Liquid Limit	51.7	48.4	46	44.1	41.7	40	39.1	38.4
Plastic Limit	20.1	22.3	23.1	24.2	25.3	25.8	26.2	27.7
Plasticity Index	49.7	29	25.1	21.7	18.6	15.7	12.5	10.5

Fig. 1: The Liquid Limit ,Plastic Limit & Plasticity Index using RBI Grade- 81

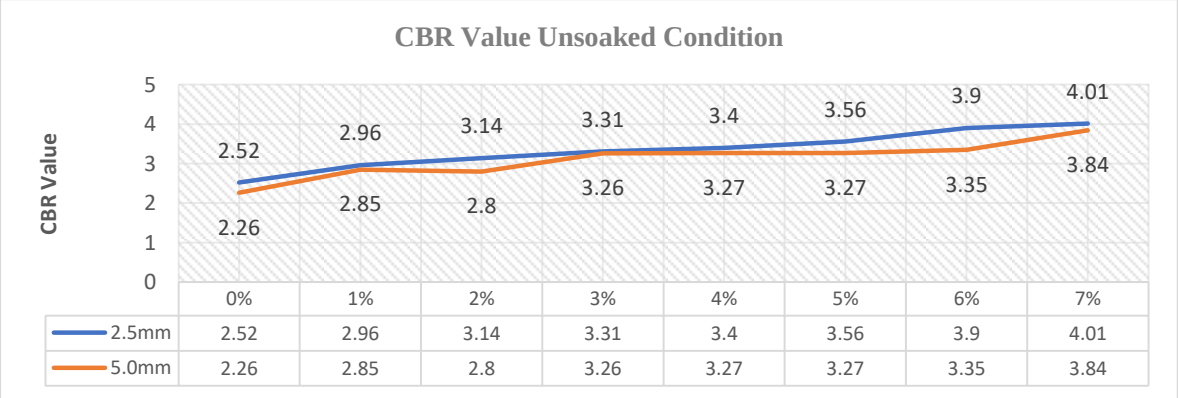
B The Optimum Moisture Content & Maximum Dry Density using RBI Grade-81



	0% RBI Grade-81	1% RBI Grade-81	2% RBI Grade-81	3% RBI Grade-81	4% RBI Grade-81	5% RBI Grade-81	6% RBI Grade-81	7% RBI Grade-81
OMC	17.5	18.3	19.3	20.1	21.1	21.7	22.2	23.7
MDD	1.75	1.73	1.72	1.71	1.7	1.69	1.68	1.67

Fig. 2: The Optimum Moisture Content & Maximum Dry Density using RBI Grade-81

C. 4 Day UN Soaked CBR Test Result



	0%	1%	2%	3%	4%	5%	6%	7%
2.5mm	2.52	2.96	3.14	3.31	3.4	3.56	3.9	4.01
5.0mm	2.26	2.85	2.8	3.26	3.27	3.27	3.35	3.84

Fig. 3: 4 Day UN Soaked CBR Test Result

D. 4 Day Socked CBR Test Result

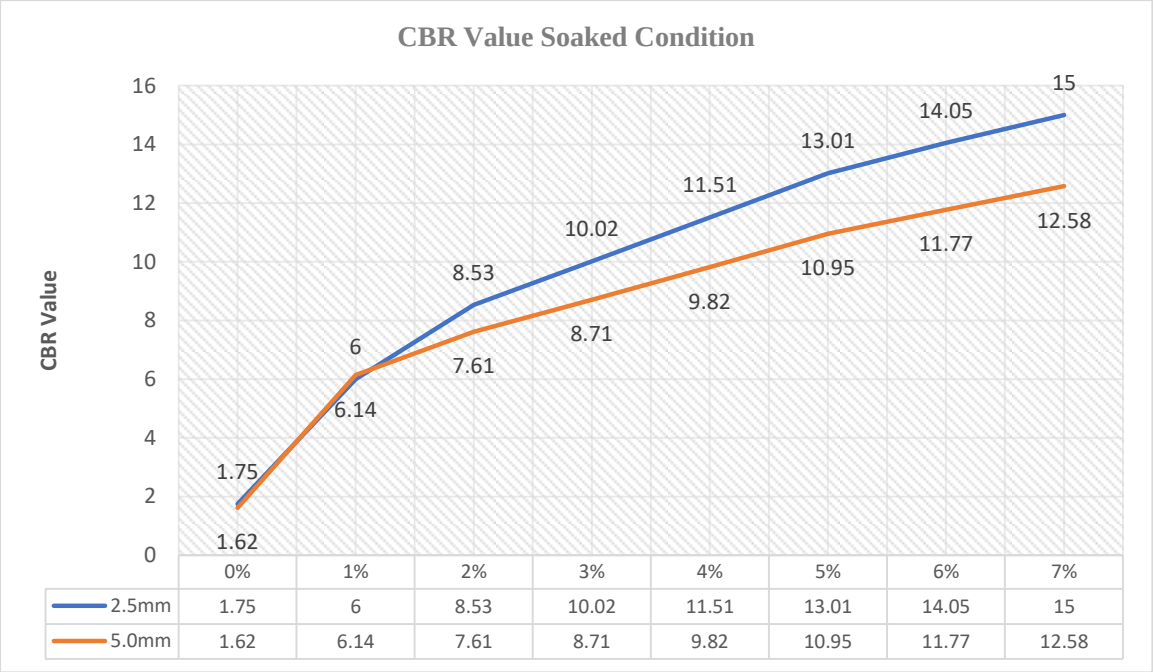


Fig. 4: 4 Day UN Soaked CBR Test Result

5. CONCLUSION

Based on the results of this study the following conclusions may be drawn:

- Liquid Limit of the Black cotton Soil increases with increase in percent of RBI Grade 81.
- Plastic Limit of Black Cotton Soil increases with increase in percent.
- Plasticity Index of the Black Cotton Soil decreases with increase in percent of RBI Grade 81
- The strength has been compared on the basis of CBR for virgin and RBI grade-81 reinforced soil under un-soaked and soaked conditions.
- The result implies that when sub-grade is reinforced with RBI grade-81 it's CBR increases as for virgin soil CBR is 2.52 and it increases to 4.01 with RBI grade-81 under un-soaked condition.
- For soaked condition CBR of RBI grade-81 as 15 which is higher than virgin soil CBR of 1.75 under soaked condition.

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