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GROUND IMPROVEMENT TECHNIQUES BY USING LIME IN SOILS OF SURGUJA DISTRICT

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ABSTRACT

It was required to build an overhead water tank under " Hargharnaljal Scheme" in Purusottampur in Surguja C.G. but the subgrade soil at the location was very unstable so we decided to perform soil stabilization by Lime to increase the stability of soil to retain the load of overhead water tank.
By adding the lime to the soil will improves the properties such as stability impermeability and load carrying capacity of the subgrade. It is seen by the recent studies that the lime highly stabilizes the soil instability so we performed the test to get the optimum lime content for soil stabilization and thus improve the soil standard of the place.

Keywords :CBR, Dry Density, Proctor, Lime, Soil Stability, Water tank

I. INTRODUCTION

The scheme of government of India to improvise the living standard of village area where there are lots of water scarcity it is decided to launch "HarGharNalJal Yojna" launched in 2019 and implemented on 28 august 2020 so that all gram Panchayat get the water availability for household purpose which enhance the health standard of villagers.

The soil of Chhattisgarh is highly unstabilized in various areas where these villages have been setup. And the villages of Chhattisgarh is located in very remote area where soil are Unstabilized as they were depend on agricultural productions and live near that areas. SO for the development of those community which were setup on that remote areas were Unstabilized or have low bearing capacity.

We need to create the structures which developed that community living standard so this scheme is launched and numerous water tanks are under construction. We have improved the soil condition by using lime.

II. OBJECTIVE OF STUDY

1. To classify the soil and find the Soil Gradation
2. To improve the soil bearing capacity of purusottampur to construct the overhead water head tank
3. To perform the proctor test and find the CBR value. and compare the values to get optimum lime value for enhancing the soil properties.

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III. METHODOLOGY

Soil Obtained from site is tested in laboratory and grain size classification is carried out. With it we performed the proctor test to get optimum moisture content and dry density thus working onCBR of the soil sample to get the optimum percentage of lime content in the soil for its property enhancement.

Table 1 Grain size classification of soil sample

Particle size Distribution			Total Sample =1 Kg	
Sieve size	Weight retained	Cumulative wt Retained	Cum % wt Retained	% finer
4.74	61	61	6.1	93.9
2.36	96	157	15.7	84.3
1.18	46	203	20.3	79.7
600 micron	213	416	41.6	58.4
425 micron	138	554	55.4	44.6
300 micron	131	685	68.5	31.5
150 micron	140	825	82.5	17.2
90 micron	95	920	92.0	8.
75 micron	23	943	94.3	5.7
pan	57			

Cu =D60/D30 = 600μ/90μ = 6.66
Cc =(D30)2/D60xD10 =(300)2/600x90 =1.66
Plastic Index (Ip) = Liquid limit – Plastic limit
= 28.3 – 24.8 = 3.5 < 4%

SW – SM fulfills all criteria therefore the soil is well graded sand containing fineness of silt.

After Soil Classification we perform the CBR test with varying percentage of lime and compare its values

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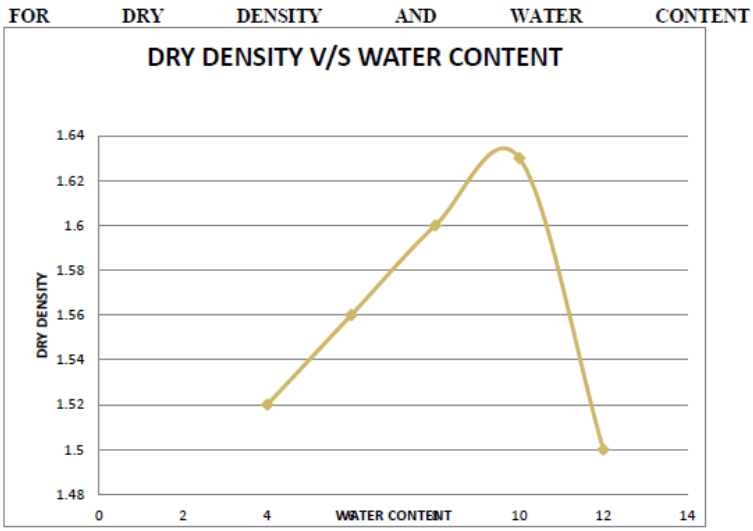
Table 2 Dry density and water content Graph for 2 % Lime in soil

Water Content	**Dry Density**
4	1.52
6	1.56
8	1.6
10	1.63
12	1.5



Graph 1 Dry density and water content for 2 % lime

Table 3 Dry density and water content Graph for 5 % Lime in soil

Water Content	Dry Density
4	1.47
6	1.52
8	1.62
10	1.71
12	1.74
14	1.71

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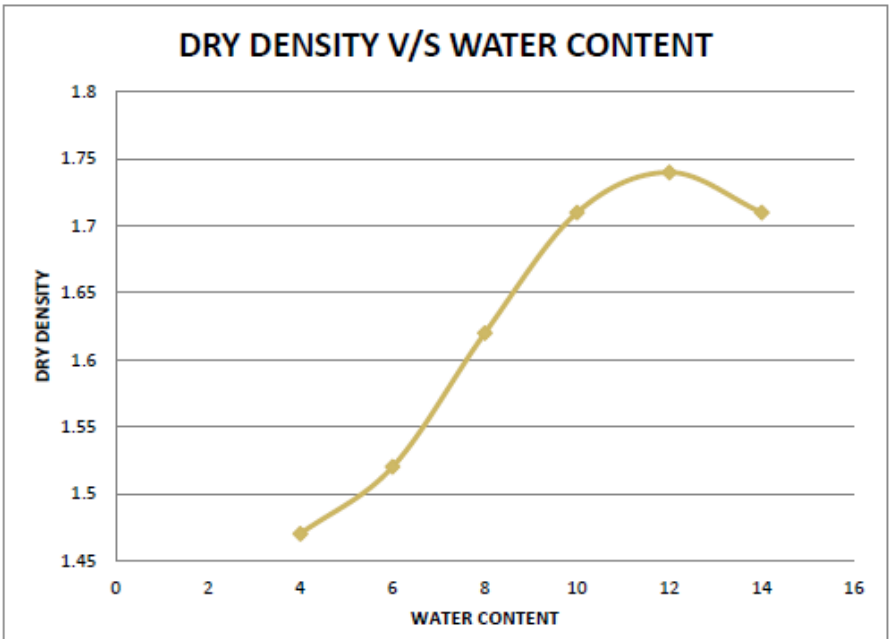

Graph 2 Dry density and water content for 5 % lime

Table 4. Dry density and water content Graph for 7 % Lime in soil

Water Content	Dry Density
4	1.57
6	1.61
8	1.65
10	1.69
12	1.73
14	1.78
16	1.81
18	1.77

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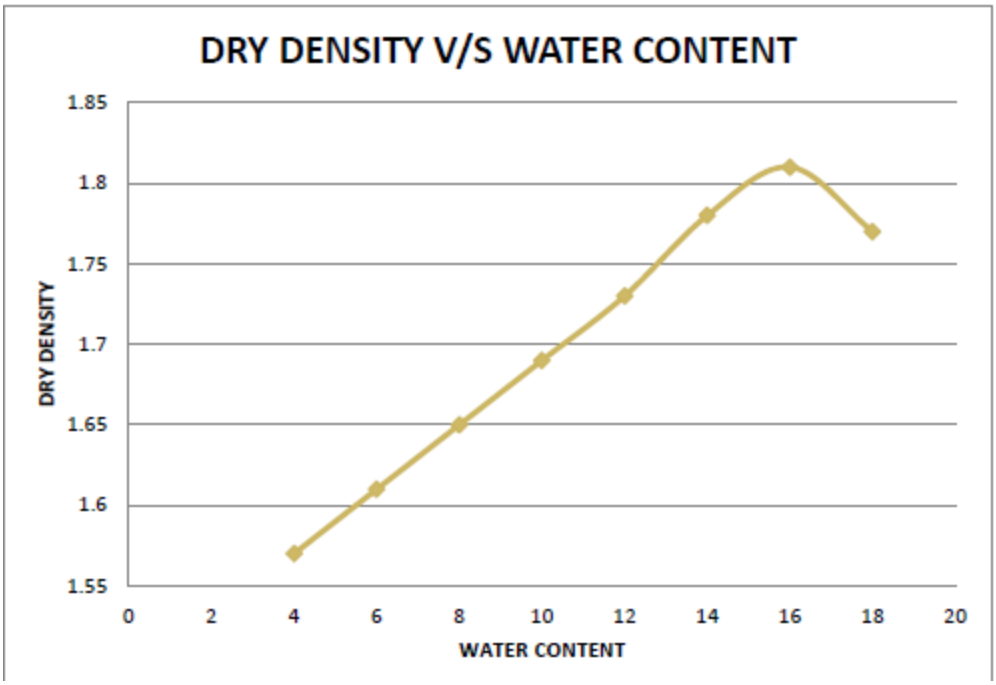

Graph 3 Dry density and water content for 7 % lime

Table 5.CBR Value for different value of Lime Content

Penetration	0 % Lime	2 % Lime	7 % Lime
0.5	0.14	0.18	0.31
1.0	0.37	0.29	0.82
1.5	0.68	0.44	1.56
2.0	1.01	0.60	2.19
2.5	1.39	0.76	2.92
3	1.71	0.86	3.54
3.5	1.95	1.03	4.16
4	2.17	1.15	4.74
4.5	2.38	1.27	5.25
5	2.55	1.37	5.75
6	2.86	1.66	6.64
7	3.10	1.68	7.55

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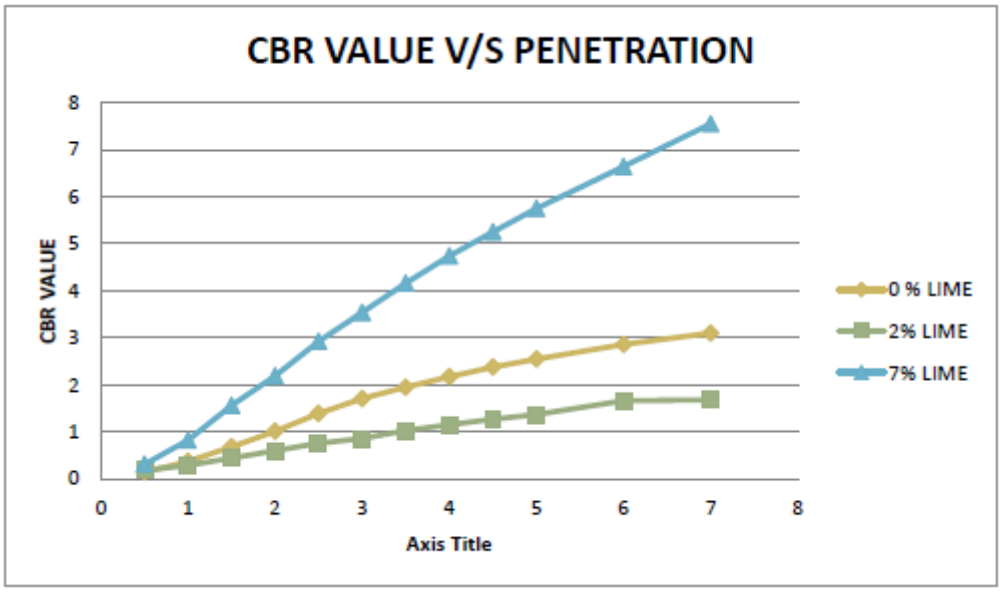

Graph 4 CBR Value and penetration for 0% , 2% and 7 % lime

IV. CONCLUSION

Lime soil stabilization offers several benefits, including improved soil strength, increased bearing capacity, reduced plasticity, and enhanced durability. However, its applicability should be assessed on a case –by-case basis, considering the specific soil conditions and project requirements. Consulting with a geotechnical engineer or soil stabilization expert is recommended to determine the feasibility and effectiveness of lime soil stabilization for a particular project. In our case we have enhanced the soil of the area to withhold the overhead tank and the construction is under progress. From the Test result we get that when we add 7 % lime in the sample of soil obtained from purusottampur with 16 % water content the soil is highly improvised its property to bear the water tank load of 10 tonne.

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