STABILIZATION OF MARINE SOIL USING WOOD DUST AND TYRE POWDER

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Abstract: The marine clays are generally found in the states of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Maharashtra and some parts of Gujarat. Marine or soft clays exists in these region are weak and expansive in nature. It's becoming the great challenges for the geo-technical engineering to design the suitable foundations. In the present investigation, an attempt has been made to assess the change in geotechnical properties of the marine clay collected from Kakinada sea port ltd, A.P, India. The strength characteristics of marine soil such as unconfined compressive strength, California bearing ratio, due to addition of wood dust and tyre powder in different properties at 2%, 4%, 6%, 8%, 10%, and 12% of the soil.

Keywords: *Marine Soil, wood dust, tyre powder*.

1. INTRODUCTION

Marine soil often exhibit undesirable engineering properties such as low strength, swelling and shrinkage characteristics etc., to improve this properties a common method followed is stabilization. Stabilization is the process of improving the engineering properties of the soil and thus making it more stable. It is required when the soil available for construction is not suitable for the intended purpose.

The saturated marine soil was collected from Kakinada sea port limited, Kakinada, Andhra Pradesh state, India. Marine soil deposits of Kakinada were used for the testing with the aim to investigate its engineering properties and further make suitable for foundation construction or sub-grade over it. The soil was collected at shallow depths from the Kakinada sea port limited, Kakinada, Andhra Pradesh, India and used for the investigation.

2. MATERIALS

To study the engineering properties of marine soil in Kakinada region, the marine soil is collected at a depth of 1.0-1.5 from the ground level, the collected samples are tested for geo technical characteristics and to increase the engineering properties tyre powder & wood dust are used as admixtures.

3. TESTS AND RESULTS

To explain the behaviour of marine soil properties the following tests were conducted and shown below;

S.No	Properties of Soil	Values
1	**Grain Size Distribution**	
	Gravel (%)	0
	Sand (%)	3
	Fines (%)	97
2	**Index Properties**	
	Liquid Limit (%)	73.30
	Plastic Limit (%)	50.00
	Plasticity Index	23.3
3	Specific Gravity	2.37
5	**Compaction Characteristics**	
	Optimum Moisture Content (%)	27.90
	Maximum Dry Density (g/cc)	1.38
6	Unconfined Compression Strength Test (kPa)	38.8

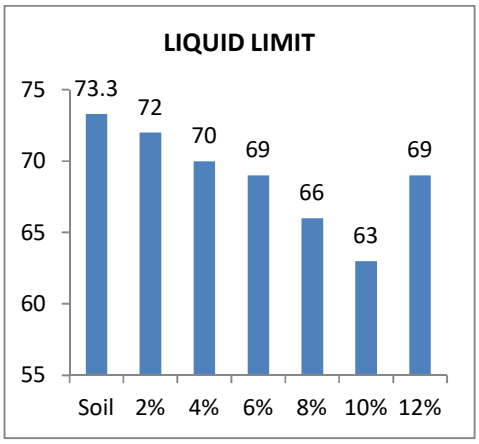
From the test results it is identified that the soil was fine grained soil. Grain size distribution analysis shows that marine soils collected are dominated by 97% of fine particles and sand particles of 3%. Index properties are identified that liquid limit of 73.30%, and plasticity index of 23.30. Compaction characteristics like optimum moisture content and maximum dry density are 27.90% and 1.38 g/cc.

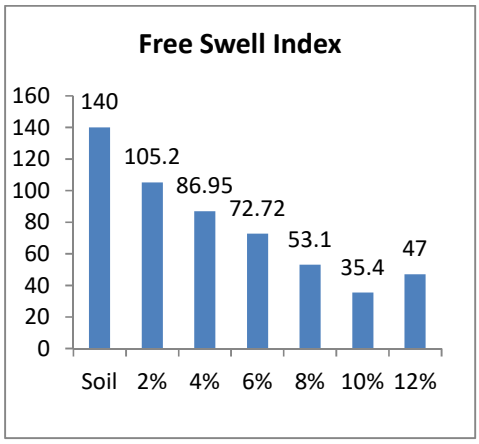
3.1CHARACTERISTICS OF SOIL AFTER ADDING AT DIFFERENT PERCENTAGES OF WOOD DUST AND TYRE POWDER:

Properties of soil after adding tire powder

S.No	Property	Soil	S+2%	S+4%	S+6%	S+8%	S+10%	S+12%
1	Liquid limit	73.3	72	70	69	66	63	69

2	FSI	140	105.2	86.95	72.72	53.1	35.4	47
3	MDD	1.38	1.38	1.39	1.44	1.48	1.50	1.21
4	OMC	27.90	27.00	25.80	24.30	22.56	21.34	35.7

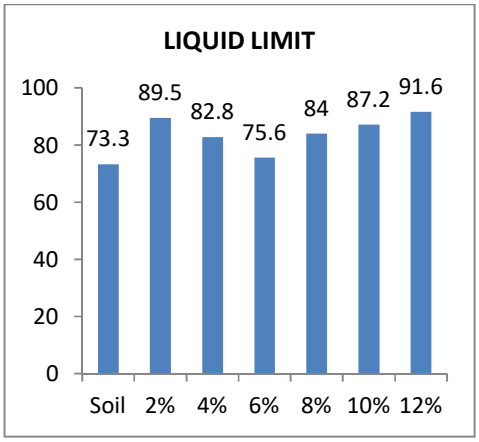


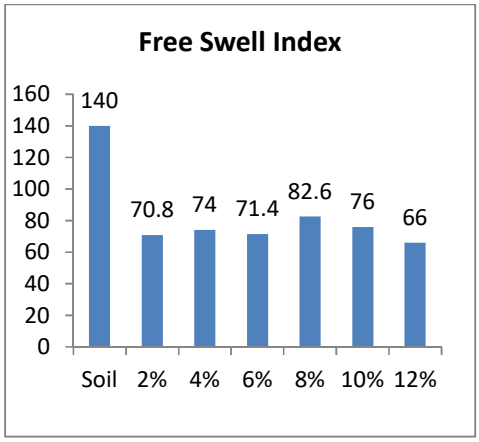


- The liquid limit of the treated soil varies between 73.3% to 63%, The liquid limit of the soil decrease with increase in tyre powder up to 10% after it goes on increasing with increase in lime content.
- Free swell index also changes it distinctly between 140% to 35.4% with increase in tyre powder, the lowest value was reached at 10% of tyre powder.
- As the free swell index decreases the maximum dry density increases and the optimum moisture content decreases.

Properties of soil after adding wood scrap

S.No	**Property**	**Soil**	**S+2%**	**S+4%**	**S+6%**	**S+8%**	**S+10%**	**S+12%**
1	Liquid limit	73.3	89.5	82.8	75.6	84	87.2	91.6
2	FSI	140	70.8	74	71.4	82.6	76	66
3	MDD	1.38	1.39	1.43	1.48	1.27	1.10	1.03
4	OMC	27.90	26	25.78	25.3	29.3	40	45.4





- The liquid limit of the treated soil varies at 2% and 6%. The liquid limit of the soil decrease with increase in wood scrap powder up to 6% after it goes on increasing with increase.
- Free swell index also changes it distinctly between 140% to 71.4% with increase in wood scrap, the lowest value was reached at 6% of wood scrap and in increasing the admixture the soil shows fluctuation.
- As the free swell index decreases the maximum dry density increases and the optimum moisture content decreases.

4. CONCLUSION

An immediate profit obtained by the addition of tyre powder to marine soil is to reduce the probable for bulge upon contact with water depending upon the condition the liquid limit decreases and the maximum dry density increases till the addition of 10% of admixture.

In addition of wood scrap to marine soil immediate change occurs till the 6% of the admixture and the soil will be in the fluctuation of increase in the wood scrap.

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