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Stabilization of Alluvial Soil from Ramsar Site with Lime and Bitumen

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ABSTRACT

Low in resistance, alluvial soils face technical changes as the water content changes. In order to build a road on pure terrain, more building materials are needed and the pavement thickness must be increased. Additionally, Bihar's government has outlawed the usage of road crossings. In order to lower building costs while preserving overall quality, innovative technologies should be implemented. A process called soil improvement raises the standard of the road surface while lowering the cost of construction. As a replacement, agrochemicals and standard materials like cement and lime are used to become stable the soil. The increasing cost of cement and the environmental issues related to its manufacture make cement's sustainability a great challenge. Therefore, specific materials and waste products are also frequently employed. Examples include fly ash, rice ash, bagasse, marble dust, and brick sand. We must encourage stability.

Key words: *Alluvial soil, Ramsar site, Wetland*

Introduction

An unlimited amount of organic material, minerals, gases, water, and elements necessary to support life on earth are all included in soil. Through related physical, chemical, and biological processes like weathering and erosion, soil is recycled or altered. To achieve the necessary engineering qualities on soft soils, numerous soil stabilising techniques are applied. Because of the vast surface area surrounding the teeth, small or thin items, like Sherwood, don't spread. As a result, clay is taller, flatter, and more elongated than other soils. On the other side, the seeds require a lot of care and are delicate to even slight water variations.

Soil is stored or formed under different environmental conditions. People cannot control the landscape. Therefore, this unmodified floor will be excavated and its construction depends on the construction site and soil conditions. The existing soil conditions in an area may not be suitable to support the necessary structures such as buildings, bridges, dams and roads. This is because the capacity of the soil is not necessarily capable of withstanding a certain load. Therefore, the current weak point will be strengthened in another way and the price will be controlled. Improvements to existing soft soils can be achieved through modification and / or stabilization. Soil characteristics can be improved or changed by adding a modifier such as lime to soil. This process is called ground transition.

Sambhar Salt Lake, Jaipur: A rapidly deteriorating

Ramsar Site in the Arid Zone of Asia

In the dry area of Rajasthan, there are 5 Vesaling lakes. Papadra Lake, Kuchaman Lake, Didwana Lake, Puru, La Lake, and Sambar Lake are all lakes in the Balmaa, Nagaur, and Jaipur districts, respec-

tively. Lake Prela is under danger and Lake Didwana has vanished. The largest salt lake in inland India, Sambhar Lake, has been producing tonnes of high salt for many years. It is roughly 60 kilometers away. The city of Jaipur in the southwest. Ponds are crucial ecologically for birds, and this cannot be overlooked. Each year, thousands of migratory waterfowl, primarily grebes, travel to one of the few sites in this area. In accordance with the 1990 Settlement on Wetlands of International Importance, the lake has been designated as a Wetland of International Rank.

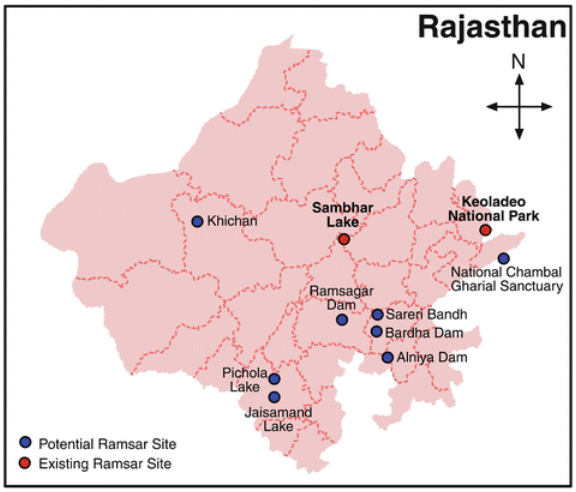

Fig. 1. Ramsar Sites in Rajasthan

Fig. 2. Selected Site for Study from Sambhar Lake

Alluvial soil

Alluvial soil is the most productive soil compared to other soils. It is located on the bank of the river and is replaced by the flow of water in the weathered rock. The land is covered with tall grass and woods, and a variety of crops such as rice, wheat, sugar cane, tobacco, corn, cotton, soybean, hemp, vegetable oil, fruits and vegetables are grown. The layer with the lowest nitrogen content in the humus but rich in phosphate. The content of iron and lime oxides varies by region. Alluvial soil is one of the most fertile soils and requires less water due to its high porosity. Alluvial soils vary widely, from fast sand and rich loam to coarse clay. India has one of the most fertile alluvial soils in the world, covering over 46% of its total area.

Stabilization of Soil

By integrating or blending additional materials, soil stabilisation is a technique for enhancing soil quality. By boosting the soil's shear strength, soil stabilisation increases the soil's bearing capacity. When the ground beneath a building's foundation cannot handle structural loads, it is frequently employed. Soil stabilization techniques are maintenance techniques that help reduce soil distribution and compaction of soil boundaries within the soil structure, increase shear strength and reduce structural deformation. Soil stabilization methods use stabilizers in soft soils to improve geotechnical properties such as compaction, strength, permeability and durability. A method for improving the technical qualities and performance of soil is referred to as a soil stabilisation method. In other words, many techniques for modifying soil qualities to enhance technical performance might be referred to as soil stabilising approaches.

Lime Soil Stabilization Method

Fig. 3. Stabilization with Lime

1. Bituminous Stabilization

Fig. 4. Stabilization with Bitumen

Objectives

To study the properties of soil before and after the stabilization process. To compare the data from lime stabilization and bitumen stabilization.

To get most suitable method for stabilization of alluvial soil.

To understand about Ramsar site condition for construction work.

Methodology

In this section of the study, specific experimental work is described. Let's begin with a description of its operation. Let's examine the experimental work done on the sample now that we are aware of the specifics of the procedure.

Step: 1 Select sites for collection of sample.

Step: 2 Choose Three Locations From Sambhar Lake.

First Site Located 5km away from bank of lake.

Second Site located 10km away from bank of lake.

Third Site located 15km away from bank of lake

Step: 3 Experimental work performed on Soil samples.

- Specific Gravity-Pycnometer
- Liquid limit-Casagrande Method
- Plastic limit- Atterberg's Limits
- Plasticity index- Atterberg's Limits
- Shrinkage limit- Atterberg's Limits
- Dry density-"Standard Proctor Test"
- CBR at 2.5mm-California Bearing Ratio [CBR] Test Machines
- CBR at 5mm-California Bearing Ratio [CBR] Test Machines

Sites located in google map

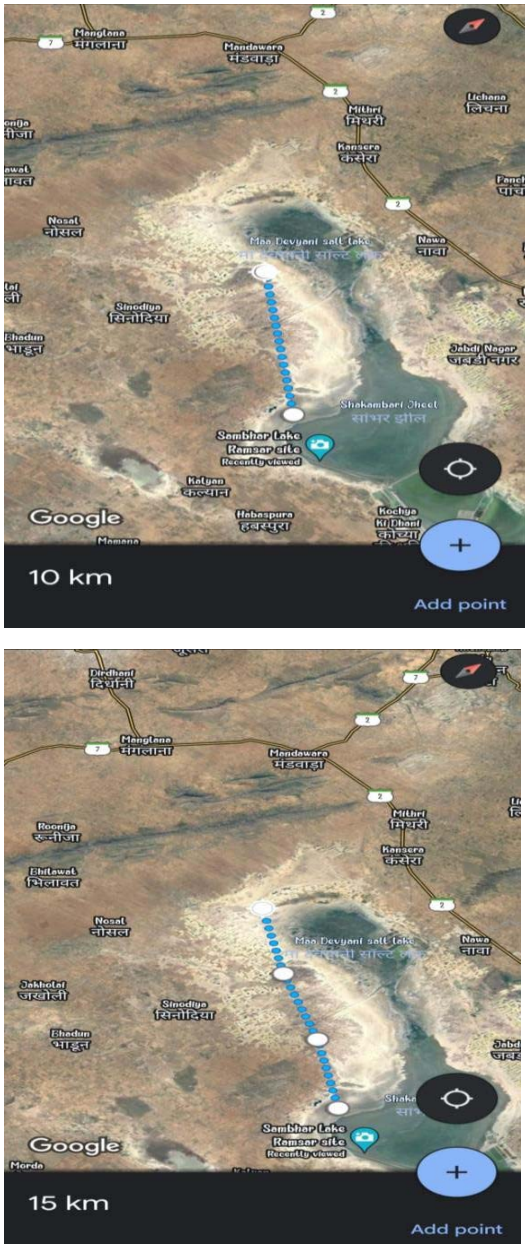

Fig. 5. Site-1 Located 5 km away from Ramsar Lake

Results and Discussion

In this section of study prepare data sheet of different samples performed for different properties of soil. Compare the result of soil with or without stabilization and check the best method of stabilization for particular parameters.

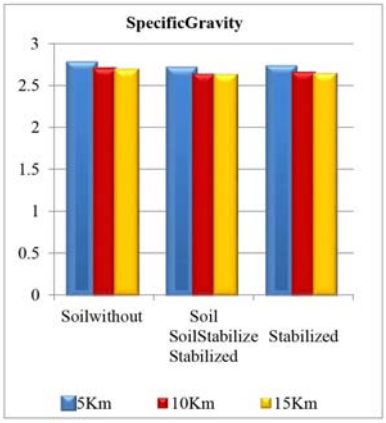

Fig. 8. Specific gravity of soil with or without stabilization at 5, 10 and 15 KM

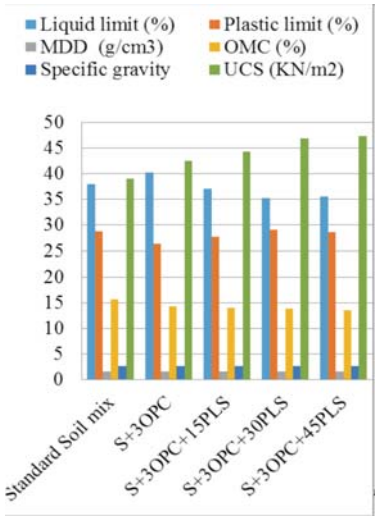

Fig. 9. Liquid limit of soil with or without stabilization at 5, 10 and 15 KM

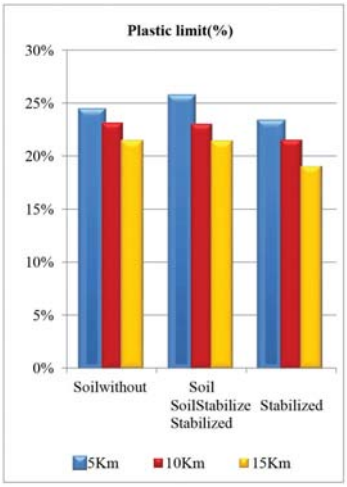

Fig. 10. Plastic limit of soil with or without stabilization at 5, 10 and 15 KM

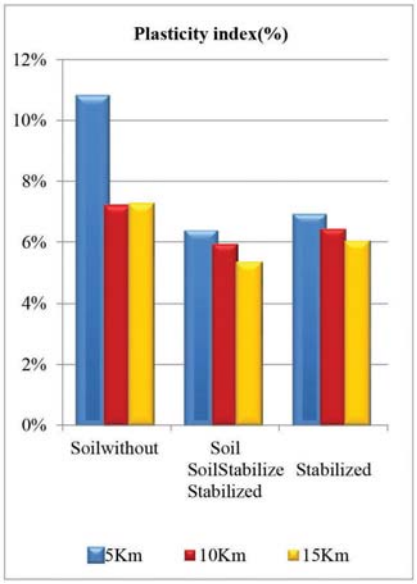

Fig. 11. Plasticity index of soil with or without stabilization at 5, 10 and 15 KM

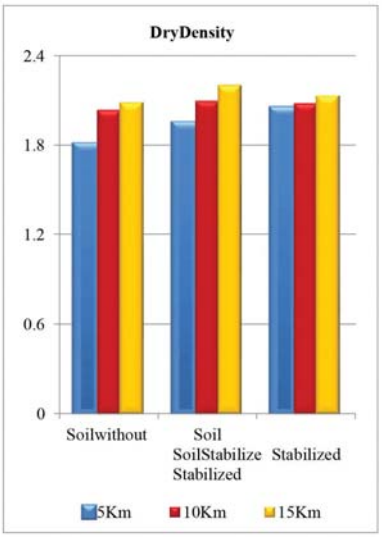

Fig. 12. Dry Density of soil with or without stabilization at 5, 10 and 15 KM

Results of Soil parameters

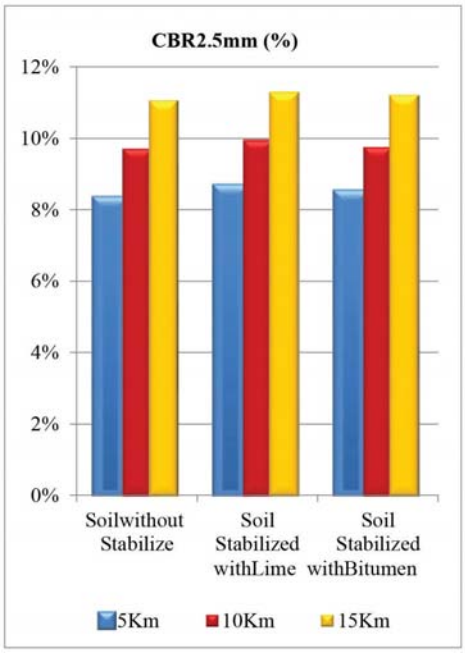

Fig. 13. CBR 2.5 mm (%) of soil with or without stabilization at 5, 10 and 15 km

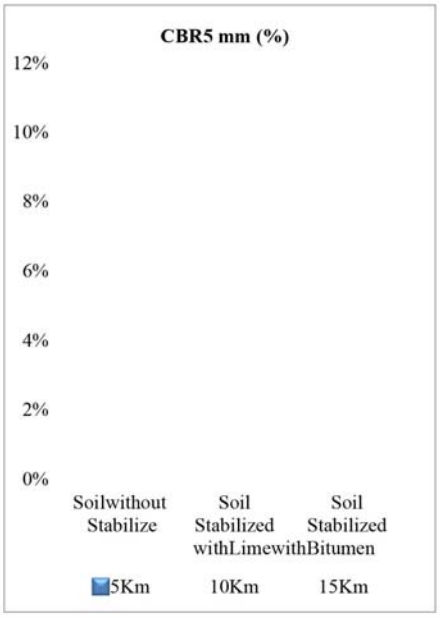

Fig. 14. CBR 5 mm (%) of soil with or without stabilize at 5, 10 and 15 KM

Conclusion

- Maximum Specific gravity of soil without stabilization present in sample collected from 5km is 2.74 and minimum specific gravity present in sample collected from 15km is 2.69 away from center of Ramsar site. After application of stabilization from lime and bitumen it is clear that lime stabilization is more effective than use of bitumen in stabilization.
- Maximum Liquid limit of soil without stabilization present in sample collected from 5km is 34.81% and minimum Liquid limit present in sample collected from 15km is 28.74% away from center of Ramsar site. After application of stabilization from lime and bitumen it is clear that bitumen stabilization is more effective than use of lime in stabilization.
- Maximum Plastic limit of soil without stabilization present in sample collected from 5km is 24.13% and minimum Plastic limit present in sample collected from 15km is 21.47% away from center of Ramsar site. After application of stabilization from lime and bitumen it is clear that lime stabilization is more effective than use of bitumen in stabilization.
- Maximum Plasticity index of soil without stabilization present in sample collected from 5km is 10.68% and minimum Plasticity index present in sample collected from 10km is 7.21% away from center of Ramsar site. After application of stabilization from lime and bitumen it is clear that lime stabilization is more effective than use of bitumen in stabilization.
- Maximum Dry density of soil without stabilization present in sample collected from 15km is 2.085 and minimum Dry density present in sample collected from 5km is 1.792 away from center of Ramsar site. After application of stabilization from lime and bitumen. Bitumen is being more effective as compare to lime when distance increases.
- Maximum CBR at 2.5mm of soil without stabilization present in sample collected from 15km is 10.18% and minimum CBR at 2.5mm present in sample collected from 5km is 7.93% away from center of Ramsar site. After application of stabilization from lime and bitumen. Bitumen is being more effective as compare to lime when distance increases.
- Maximum CBR at 5mm of soil without stabilization present in sample collected from 15km is 10.18% and minimum CBR at 5mm present in sample collected from 5km is 7.93% away from center of Ramsar site. After application of stabi-

lization from lime and bitumen. Bitumen is being more effective as compare to lime when distance increases.

Further Scope of Work

- To improve the mechanical properties of soil use some waste materials like fly ash and motor oil.
- Onsite testing will be done in advance stage to study this work in future.
- Samples from different ramsar sites of the Rajasthan also carried in future for comparative study.
- To study in further Soil Stabilization using Waste Cotton Clothes Coated with Bitumen also an interesting method of stabilization.

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