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COMPREHENSIVE STUDY OF BITUMEN EMULSION ON GRAVEL ROADS

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Abstract: ***The soil is one of the most natural designs in nature. Virtually all types of construction are built or grounded. The most important part of the road road is to improve its soil and energy. If soil strength is low, then stability is required. Sometimes the Subgrade is stabilized or modified by solid soils to enhance power. Such stability is also appropriate when available to weak soil. Increases the power beyond the range can result in the economy of the size of the road infrastructure. Cement, fly ash, lime, fibers etc. are widely used for soil consolidation. The main purpose of this study is to develop grid soil structures by adding a bitumine emulsion. An effort was made to utilize the grid soil emulsion generated in terms of the potential CBR principles. In this study, the entire laboratory function corresponds to the basic structures of the soil and its capacity in terms of the CBR. Minimum calorie is added to provide better soil strength. It is evident that the energy of good soil results in the use of the cationic bitumen emulsion (CMS) of the amount used to fill it. The mixing conditions for mixing soil soil with the CMS Bitumen emulsion have attempted to begin. This is followed by determining the four physical characteristics of the dryer and the number of CBRs to achieve the best soil conditions.***

Keywords: Gravel soil, CBR, Bitumen Stabilization, bitumen emulsion

I. INTRODUCTION

The soil stands among the many building materials. Almost every kind of building is based or on the ground. Long-term use of road construction is completely disrupted by the energy and stability of the small country. In-sub sub-marks often do not provide the required support to achieve acceptable performance under automotive uploads in natural growth measures. Despite stability is a well-known method for developing soil engineering properties, but places placed in focus on overall stability due to heterogeneity in the creation of soil, differ between small and medium-sized geological properties, geologic properties, and chemical differences in combining interaction between soil and certified use. These buildings need to consider some specific site-specific treatment procedures that should be accepted in soil-stabilizer testing.Whether the road is changing or difficult, it remains on the ground floor in the catch or cutting, often called a refinement. It may be described as a mixed layer, usually from the soil of the site just under the pavement crust, providing the right base for movement. Underground subgrade is often emphasized at low levels of stress due to car loads. Subgrade soil should be quality and well-integrated to use its full potential to cope with stress due to certain pavement carriers. This leads to the economic situation of a full-fledged race. On the other hand, substrate is reflected in its power for designing any transmissions. Any water-based structure depends on its basic features. For this reason, soil is a very serious factor that influences the success of the construction work. The ground is the first part of the foundation or one of the used materials used for all construction processes. So the main thing related to us is soil consolidation, but the process of expanding the CBR soil for the built-in process. Many functions are made of samente, lime or fly ash stabilization. But very few jobs have been found in the bitumen soil consolidation.

II. LITERATURE REVIEW

Chinkulkijniwat and Man-Koksung (2010) direct a study study on the ingredients of the Nongravel and the Soil very badly using a small integration device. The maximum guest test is widely used and allowed to distinguish the globe and control the field integration. Here's a further addition about the impact of the grid size and the gravel content in the general search results for the messengers. In this lesson the relationship is organized between summarized water sources of good soil soil and general grid content using the integration effects from the proposed small device.

Razouki et al. (2002) to promote a survey of the Granular Stabilized Roads. Bitumen is used as a certifying agent that may serve as a disturbance or as a waterproofing vessel. Bitumen systems had very high utilization in the streets and in the street.

Michael (1993) has proposed Bench-Scale Evaluation of Asphalt Emulsion Stabilization of Soils Contaminated. In this study, it was discussed about the use of heat temperatures such as asphalt emulsion technology resilience and discussing the environmental rehabilitation of polluted organic matter.

Paul et al. (2011) proposes an introduction of soil consolidation into a gravel and graded gravel mix or crushed aggregate. After integration it provided a lot of unlimited quantity of subbase quality or race quality. The basic system involved in strengthening the asphalt well-sown field is a miracle for preventing water. The particles of the ground or gloves were mixed with asphalt in the forest or stopped unnecessary water supply to bring about the quality of soil quality. In addition, asphalt strengths can improve attributes by keeping the soil from invisible to the laws of water, for example, the volume. In non-metal objects, for example wheels and gravel, carved gravel, and crushed stone, two basic systems change: water entry and adhesion. Asphalt clothing for non-unions provide a film that prevents or hinders water flows; and reduce the tendency to lose quality of water near the water. The second tool was classified by

adherence to the features of the recorded ground.

Marandi and Safapour (2012) apply to Base Course Modification through Strengthening through samam and bitumen. The main purpose of this study was to analyze the use of bitumen emulsion in strengthening studies. So it is assessed as a part of traveling normally in fields with low quality materials. Soil consolidation and aggregates and bitumens indicate that they are very different from stability in the samente. The basic method involved in strengthening bitumen was a waterproof problem.

Jones et al. (2012) conducted a test study in the form of bitumen soil consolidation. Here the asphalt emulsion is combined with asphalt binder, water, and agent e-emulsifying. In this case, a series of Intelligent Insight (ITS), Unconfined Compressive Strength (UCS) and Branch Tests are conducted. It is a very hot substance for easy handling in low temperatures. Emersion inflammation and the extra power to start dealing with the road during the healing session are urgent.

Cokca et al. (2003) focuses on the effects of the small water content in the header of the unused field. In this study, compaction moisture compaction is a drug and is focused on sugar sheets of unsaturated shear quality. The ratings are made to consolidated companies with a high water content, on the dry side of optimal water and other wet waters. It has been found to reduce the decrease in the rapid increase in the increase in alcoholism, part of the cut quality unions that reached the highest level of importance for all heavy drugs and then reduced them.

Hussain (2008) performed a large amount of configuration of the integration between the CBR value and the cut weight ratio of the cut test. It was shown that the untreated shear number was limited and the number of CBR increased by the amount of plasticity. Finally, it was concluded that the beauty and quality capacity of CBR is unique in proportion to the water content of these strategies.

L. Lauren (2011) conducted research and took shooting of solidarity products such as the polymer emulsion having all the markmarks for steering drivers for the future. All three polymer-emulsions have been used as part of this test project that clearly illustrates all those who provide the appropriate CBR qualities in ways. CBR tests were used for this operation because they are directly related to the quality of the subgrade, the subbase, and the base base for use in road development and road development centers.

Martinet al. (2009) make paper deals with foam bitumen stabilization. Bitumen with a foamed mixture of bitumen, wind and water. Here are about 2 percent of samente and 3.5 percent bitumen foam used. From here it has been found that the renewal of using bitumen with foam has been successful due to the luxury and speed of construction, its compatibility with various types of species and its protection that is accompanied by weather effects.

A. P. Chritz (2006) discussed an experimental test complemented in the bituminous epoch area. Here shown by economic retention on the shoulders of the mines, the most common problem is facing leading organizations.

III. EXPERIMENT PROGRAMME

The average between the pluralities of precipitated material that is separated from the same quantity of water is called Specific Gravity. In the soil, the number of bees of soil is complicated in assessing the same amount of water. So the basics of the soil are more complex than water. The clear embryos of different types of soil are different. During the test should be concentrated on warming and water should be clean water free of charge. This clear decrease in soil is shown by 'G'. Specific maturity is the most important material that is used to calculate some of the engineering properties of the soil as a different level, size, and porosity and saturation status.

As discussed, the ratio between the weight of the mass and the weight of several equal water is called Specific Gravity. The estimate is made in the purse for the operation of a test where the soil volume is found and its weight is further divided into the same amount of water.

G is Specific Gravity

$$G = (M2-M1) / ((M4-M1) - (M3-M2))$$

Here,

M1= Weight of bottle

M2= Weight of bottle and Dry soil

M3= Weight of bottle, Dry soil and Water

M4= Weight of bottle and Water

Specific gravities for different soil are not same generally, the general range for specific gravity of soil can be categorized are:

Table 1 Standard Specific Gravity

Type of soil	**Specific gravity**
Sand	2.63 to 2.67
Silt	2.65 to 2.7
Clay and Silty soil	2.67 to 2.9
Organic soil	1+ to 2.6

IV. RESULTS AND DISCUSSION

Specific gravity Test

Specific gravity of soil is very important property to understand the soil condition. As previously discussed here M1 is empty bottle weight, M2 is mass of bottle and dry soil, M3 is weight of bottle, dry soil and water and M4 is weight of bottle with water.

Table 2: Specific gravity test result

Sample No	M1 (gm)	M2 (gm)	M3 (gm)	M4 (gm)	Sp. Gravity
1.	114.67	164.67	383.56	351.87	2.73
2.	113.76	163.76	384.41	352.86	2.71
3.	115.34	165.34	385.69	353.94	2.74

Here soil material is tested three times. And the average specific gravity value comes 2.726. But here no temperature correction is done. This test have been done in room temperature nearly 25*C.

Liquid limit and Plastic limit Test

The gravel soil used in this study was a thoroughly refined soil on the local area of the Routkela NIT. The soil is tested by the gravity, the water limit, the plastic limit and the grain distribution of the grain so as to properly absorb the body parts of this type of soil. From these results to evaluate the correct concept about soil type.

Liquid Limit (WL): 28.91%
Plastic Limit (WP): 21.67%
Plasticity Index (IP): 7.24%

Grain size distribution (sieve analysis)

Various physical and engineering structures with the help of the unfamiliar soils are called reference properties. The grain of soil depends on the individual's solid grain and the permanence of the soil in which the soil is located.

Here the 2000 gm of sample soil was taken and dried at the oven for 12 hours. The most common trial used for spreading grain distribution distribution is sieve analysis. Eleven beads are used. And the results of the sieve soil analysis are sorted in the log log and particle width or sieve size in the X axis and the percentage of the axis Y.

Table 3: Sieve analysis result.

Sieve No. #	Sieve size	Mass of soil retained in each sieve (gm)	Percent retained (%)	Cumulative retained (%)	Percent finer (%)
1/2 Inch	12.5 mm	0	-----	0	100
3/8 Inch	9.5 mm	99.1	4.95	4.95	95.05
1/4 Inch	6.3 mm	318.8	15.94	20.84	79.16
#4	4.75 mm	397.5	19.88	40.77	59.33
#8	2.36 mm	510.2	25.51	66.28	33.72
#16	1.18 mm	255.1	12.71	79.03	20.97
#30	600 micron	166.2	8.31	87.34	12.66
#50	300 micron	132.1	6.61	93.95	6.05
#80	150 micron	48.7	2.44	96.39	3.61
Pan	-----	72.3	3.6	100	0

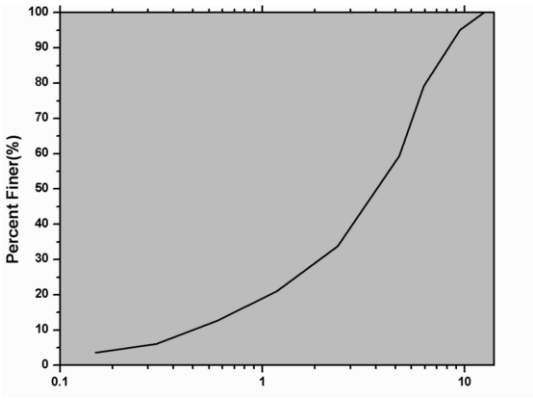

Fig. 1Grain size distribution graph

Compaction Test

The most commonly used protorta test has been used for a 3000 gm. soil sample taken by each test. Converted protorta testing is followed according to standard IS. From this test, the specimen maximum was found to be 2.026gm./cc and the OMC of 10.52%.

Yuehaun et al. research was undertaken to investigate the strengthening of foamed bhitumen for Western Australia. And likewise the work of Foam bitumen was established by Martin Queensland in 2011. The common issue of both functions is to provide a large percentage of bitumen per cent of 3% to 4%. After examining a percentage of 3%, 5% and 7%, it seems that the acute quantity of the soil does not change significantly. Used as an active agent for operation it

Should be a saving. Therefore, a 3% emulsion is taken from this study.

As I said earlier that a few jobs have been done to strengthen the soil of the government. The bitumen code for stabilization only is the code available. Therefore, the method of mixing grid soil with an emulsion is a major problem. Therefore, four experimental conditions are used here to assess the variation of dry soil quantities mixed with the emulsion.

Case A: Normal available tested soil is used for testing

Case B: Normal available soil tested with 3% MS emulsion added

Case C: Normal available soil tested with 3% MS emulsion and 2% cement added

Case D: Normal available soils tested mixing with 3% of emulsion and 2% of cement added and wait 5 hour before testing

In this case a condition modified proctor test is made and edited by percentage of humid content in X axis and dry water equilibrium at Y axis. From the edges of the graphs arranged, there is a crown point where the number of dry density is high. Here content with humidity is nutritious in moisture content. Of these four situations tested by the converted proctor graph described below. Those graphs clearly indicate that Case D offers a large amount.

V. CONCLUSION

From this study it is clear that there is a great improvement in the sub-grade California Bearing Ratio (CBR) due to the use of the MS bitumen emulsion when mixing should be done. It is clear that good results are available when the mixing ground is emitted from about 5 to 5 hours after mixing. Each situation has been found that the CBR value has increased successively from Case A to Case D. In this study a CBR value study has increased to 50 percent less than CBRs. Recognizing its economic and quality impetus for strengthening stability, it is clear that this type of stabilization may operate on the ground or main roads.

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