



Characterization Of Ferrochrome Slag As On Embankment And Pavement Materials

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Abstract

In India as the population of the country gallops towards alarming proportions, the generation of waste has increased. Much attention is not imparted towards the development of methods to dispose or make use of the waste generated in a useful manner. In the soils moisture may come from flooding due to rain, leaking water or sewer lines, and reduction in surface evapotranspiration when an area is covered by building or a pavement. To improve performance of structures and achieve economy in construction, it is necessary to improve the geotechnical properties of soils. The process of improving the engineering properties of soil and thus making it more stable. It is required when the soil available for construction is not suitable for the intended purpose. It is commonly used to reduce the compressibility and to increase the bearing strength of the sub grade soil. Site feasibility study for geotechnical projects is of far most beneficial before a project can take off. Site survey usually takes place to understand the characteristics of subsoil upon which the decision on location of the project can be made. The improving soil strength and increasing resistance to softening by water through bonding the soil particles together, water proofing the particles or combination of the two. The simplest stabilization processes are compaction and drainage. The other process is by improving gradation of particle size and further improvement can be achieved by adding binders to the weak soils. In the present study tests are carried out in two phases. In the first phase of tests, stone dust is been used as an admixture and iron slag as a second admixture for the stabilization of soil. In the first phase to achieve the economy and for proper performance of structures it is necessary to improve the geotechnical properties of soil. Out of the different quarry wastes, quarry dust is one, which is produced in abundance. About 20–25% of the total production in each crusher unit is left out as the waste material-stone dust. Bulk utilization of this waste material is possible through geotechnical applications like embankments, back-fill material, and sub base material and like. This paper presents the results of an experimental program undertaken to investigate the effect of stone dust at different percentage on soil, the test results such as index properties, Proctor compaction, CBR test obtained at different proportions of stone dust admixture are presented and discussed. From the results, it is observed that at optimum percentage, i.e., 30% of stone dust admixture can be replaced. In the second phase utilization of industrial waste materials in the improvement of problematic soils is a cost efficient and environmental friendly method. It helps in reducing disposal problems caused by the various industrial wastes. However, it is

essential to understand the performance of these waste products prior to use. The present paper evaluated the potential of Iron Slag to stabilize the soil. From the results, it is observed that Iron slag admixture giving higher values when compared to stone dust at optimum percentage, i.e., 15% of Iron slag admixture can be replaced.

INTRODUCTION:

The process of increasing these engineering qualities of earth therefore so that it is more dependable. It can be widely used to scale back this compressibility also to raise the displaying durability in the bass speaker class earth. Website feasibility analyze intended for geotechnical assignments is of far most beneficial prior to some sort of project may take away. Website customer survey typically takes position prior to a pattern method starts so as to fully grasp this features of subsoil upon which choosing one with area in the project can be built. For virtually every land-based structure, the walls are very important and also needs to be sturdy to guide your entire structure. To ensure the walls to become sturdy, this earth all around the item represents an incredibly vital role. Therefore, to utilize soils, we need to get suitable understanding of his or her qualities and also variables that affect his or her actions. The process of earth stabilization assists to offer the expected qualities in a earth meant for this building do the job. Right from the start of building does the job, the requirement of enhancing earth qualities offers come to this mild. Early cultures in the Oriental, Romans and also Incas used different ways to improve earth durability for example., some of these methods ended up so successful in which his or her complexes and also roadways remain. Inside Asia, the present day period of earth stabilization started out throughout early on 1970's, with a



common general shortage of petroleum and also aggregates, the item grew to become essential for this engineers to consider methods to improve earth other than exchanging the poor earth at the developing web page. Earth stabilization ended up being employed although a result of the by using outdated methods and in addition a result of the lack of suitable approach, earth stabilization shed favor. In recent times, using the raise within the require intended for infrastructure, recyclables and also gasoline, earth stabilization offers begun to require a new shape. Using the accessibility to better research, components and also products, it is growing like a well-known and also cost-effective method for earth development. Right here, in this particular project, earth stabilization has been done by making use of jewel airborne dirt and dust and also metallic slag extracted from squander. These developments within the displaying capability parameters have been harassed after and also evaluation studies have been performed using various strategies of hardware stabilization. Forgotten web-sites because of unwanted dirt keeping volumes dramatically improved, along with the upshot of it were this deficiency regarding land and also improved desire pertaining to natural methods. Damaged areas incorporate those which were being vulnerable to liquefaction and those included together with gentle clay courts and also natural and organic garden soil. Other areas were being these in a very landslide and also infected land. Nevertheless, in many geotechnical assignments, it's not achievable to secure a construction site that could meet the design and style demands with no ground changes. The current exercise would be to change these design properties of the local challenging garden soil to fulfill the design technical specs. Nowadays, garden soil such as, gentle clays and also natural and organic garden soil could be improved upon to the city design demands. This specific advanced review is targeted on dirt stabilization approach which often is just about the several strategies to dirt development.

LITERATURE REVIEW:

Case study regarding literature implies that plenty of operate in connection with your undertaking in addition to guidelines strategies, in addition to

resolve regarding deformation attributes in addition to durability attributes regarding substantial earth is finished around the world. Expressed that will expansive dirt throughout Mississippi have been recognized throughout mid-1975 simply by Age. T. HILGARD connected with dirt scientific disciplines. He discovered any particular one clayey dirt include inclination for you to fractures throughout dry out conditions in addition to kind huge area fractures two to three inch wide, which are damaging to crops in addition to building. Hilgard commented that a majority of stone in addition to gemstone building throughout Knutson, definitely not anchored simply by wall membrane anchors or even tangible cosmetic foundations, created fractures in most paths after some time. The aims at strengthening land durability as well as growing level of resistance to conditioning by simply drinking water through bonding the land debris in concert, drinking water proofing the debris or combined the two. Typically, the technological know-how has an substitute supply structural solution to some sort of useful problem. Most effective stabilization functions are usually compaction as well as drainage (if drinking water drains away from damp land the item will become stronger). The other process is by simply strengthening gradation regarding particle measurement and additional development may be accomplished by adding binders to the poor hydrates

EXPERIMENTAL INVESTIGATIONS:

Jewel dust/crusher dust is obtained because soil sound squanders throughout smashing of gems to have aggregates. At this point any day's unique variations of products like lime, cement, travel ash and so forth. are used rock dust exhibits substantial shear strength which is hugely necessary for their use as a geotechnical stuff. It's got an excellent permeability in addition to variant with mineral water written content won't severely impact their desirable qualities rock dust can be utilized instead to boost the particular qualities of soil. Geotechnical qualities of soil used in motorway structure in addition to figure the particular CBR benefit continuously greater along with improve with percentage of rock dust. Plus the advancement with CBR benefit might be contributed to the substantial advancement with angle of shearing

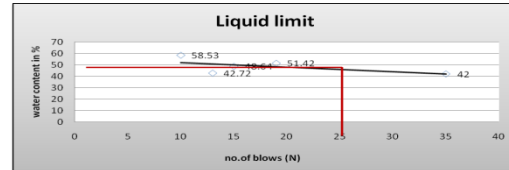
amount of resistance. Higher CBR prices of soil-stone dust combinations boost the prospect of use as a subwoofer bottom pertaining to variable pavement. Jewel dusts are believed among the nicely recognized as well as affordable surface advancement way of fragile soil deposits. They supply the leading function of support in addition to drainage; thereby enhance the strength in addition to deformation attributes of fragile soil deposits.



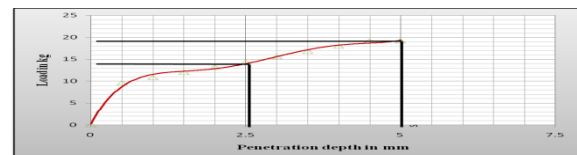
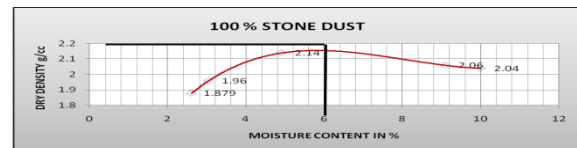
Land compaction is just about the most critical elements from the construction regarding tracks, airfields, embankments, and also cosmetic foundations. Your sturdiness and also stability of your design tend to be linked to the particular good results regarding proper soil compaction. Structural inability regarding tracks and also airfields and also the deterioration due to foundation pay out is often traced time for the particular inability to attain proper soil compaction. Compaction would be the strategy of mechanically identifying a new soil. Densification can be completed by pressing the particular soil allergens in concert in a near condition regarding contact with air flow currently being expelled from your soil size at the same time. Compaction, seeing that used in this article, implies powerful compaction or maybe densification by the use of transferring a good deal towards soil size. This really is not like the particular loan consolidation method for fine-grained soil when the soil can be slowly produced more lustrous as a result of the use of a new static heap. Having relation to compaction, the particular solidity of your soil is often stated regarding dried solidity or maybe dried unit weight.

EXPERIMENTAL INVESTIGATION ON SOILSAMPLE:

In this chapter, the soil sample is collected from the village by the name CHENNUR. the experimental investigations on soil sample are done to understand the index and engineering properties of the collected soil sample. This experimental study helps to classify the soil.

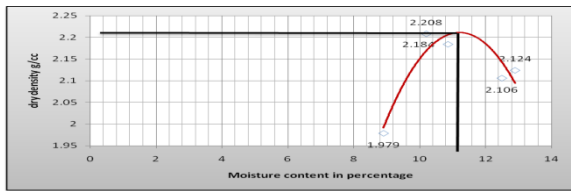


EXPERIMENTAL INVESTIGATION ON SOIL-STONE DUST MIXTURE: Replacement of soil using percentages of stone dust as an admixture is been carried out in the following process.

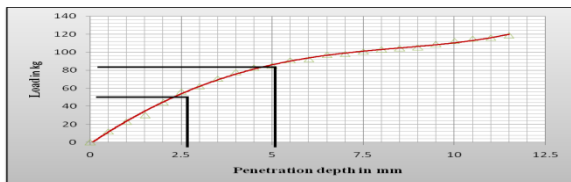
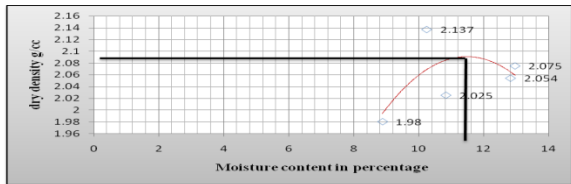


The replacement of stone dust for soil stabilization using California bearing ratio gives the maximum value at 30% at penetration depths of 2.5mm is 1.398%. In this thesis, variation of Dry density, Moisture content and CBR values for different mix proportions of stone dust admixture added to the soil

REPLACEMENT OF IRON SLAG



From the above replacement of Iron slag by Static compaction test we observed that the MDD value is 2.21 g/cc and OMC is 11.2% at 15%.

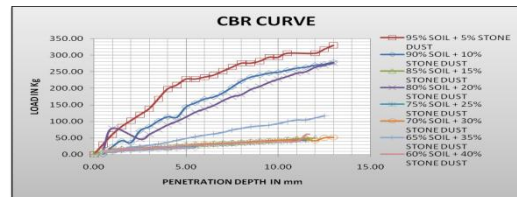
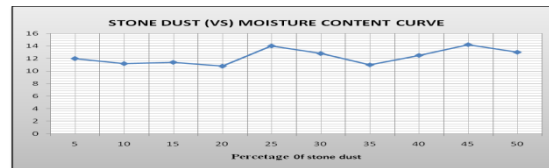
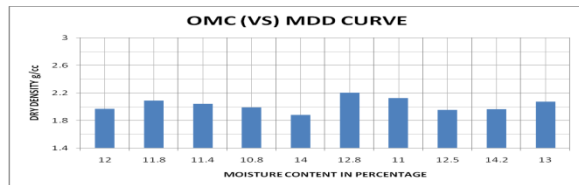
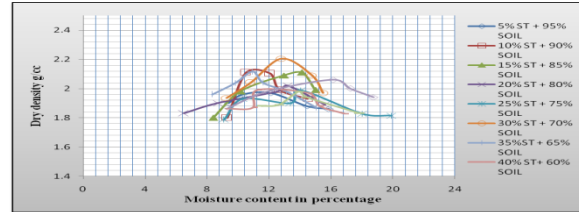


The replacement of soil with iron slag using California bearing ratio gives the maximum value is 2.098% at 15%. In this thesis, variation of Dry density, Moisture content and CBR values for different mix proportions of Iron slag admixture added to the soil. It can be observed that, the maximum dry density value is 2.4 g/cc occurred with minimum moisture content is 10.8% for the mix proportion of 70% soil+30% Iron slag.

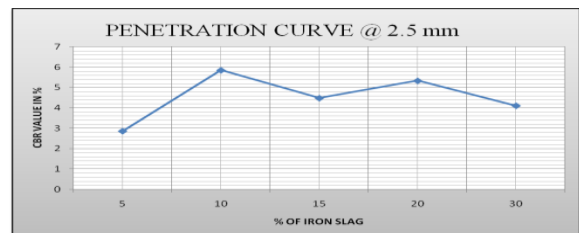
RESULT AND DISCUSSION:

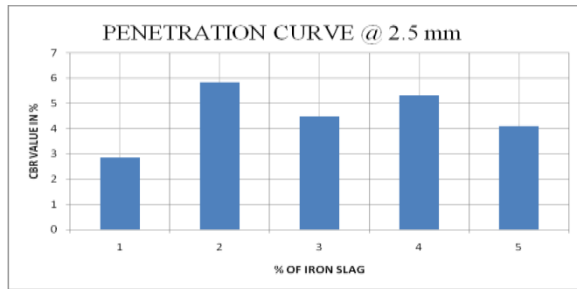
The following figure represents increasing and decreasing MDD values with corresponding their

OMC, when stone dust admixture added to the soil in different percentages from 5% to 50%.



From figure, it is observed that as the percentage of Stone Dust increases, CBR also increases in a reasonable trend. The optimum value of CBR is found at penetration depth of 2mm is 1.389% and at depth of 5mm is 1.33%





From the plot, it is seen the increase and decrease of Dry Density values at different percentages of stone dust from 5%-30%.

CONCLUDING REMARKS

Based on results of experimental investigation the following concluding remarks

- The soil retained on 0.075mm sieve is less than 50%.so the plasticity chart is used to classify the soil.
- The liquid limit value is $W_L = 45.9\%$
- The plastic limit value is $W_p = 26.73\%$
- The plasticity index value is $I_p = 19.17\%$
- The classification from the plasticity chart is clay with intermediate compressible
- The amount of soil passed through 0.075mm sieve is greater than 50%. From this the sample is well graded sand
- Based on ISSC classifications the soil is analyzed as clayey sand (SC).
- The free swell index is 13.64%.
- So the soil is low expansive soil
- The density obtained at 100% soil sample is 1.9 g/cc.
- It can be observed that the maximum Dry density value is 2.204 g/cc occurred with minimum Moisture content is 12.8% for the mix proportion of 70% soil +30% stone dust when compared to other mix proportions
- It can be observed that, the maximum dry density value is 2.4 g/cc occurred with minimum moisture content is 10.8% for the mix proportion of 70% soil+30%Iron slag when compared to other mix proportions

- It can be also observed that mix proportion of 85% soil+15% Iron slag giving maximum dry density of 2.2 g/cc when compared to mix proportion of 70% soil+30%stone dust
- It can be observed that, Iron slag admixture giving the higher dry density values corresponding to minimum moisture content than the stone dust admixture
- The value with increase in percentage of stone dust is observed that sample replaced with 30% of admixture yielded MDD of 2.204 g/cc and OMC of 12.8 %.

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