

A Result Paper on Experimental Study on Stabilization of Soil Subgrade by Adding Stone Dust

Deepak Kumar¹ Magandeeep Bishnoi²

¹M.Tech Scholar, ²Assistant Professor

^{1,2}Department of Civil Engineering, Om Institutes of Technology & Management, Juglan Hisar, Haryana, India

How to cite this paper: Deepak Kumar | Magandeeep Bishnoi "A Result Paper on Experimental Study on Stabilization of Soil Subgrade by Adding Stone Dust" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-4, June 2019, pp.1065-1071, URL: <https://www.ijtsrd.com/papers/ijtsrd24044.pdf>



IJTSRD24044

ABSTRACT

There are various technique for improving strength and CBR value of soil. But by this method lot of investment require. So we improved the strength of soil by adding waste slurry of stone which contain lime. We find that when Kota Stone Dust is added in the soil then optimum moisture contains will be increased from 13.80 % to 19.70 %. Because in the Kota Stone Dust lime is available so lime absorb the water it moisture contain value increased. We also conclude that when Kota Stone Dust are added in the soil then maximum dry density will be decreased 1.72 to 1.593 g/cc. We also conclude that by adding Kota Stone Dust are added in the soil then UCS will also increased from 0.213MPa to 0.274Mpa but after more than 4 % Kota stone Dust are added then strength will not increased.

Copyright © 2019 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



1. INTRODUCTION

Transport is need of human being from ancient time to fulfill all needs which may otherwise cant fulfilled. For development of civilization transportation is must as trade Is not possible without effective transportation system. There are various mode of transportation from one place to other which includes Road, railway, airways, canal, pipeline, water etc. It makes possible to use specific type of vehicle, operation and infrastructure. Highway pavement is hard, strong surface on which vehicle travels. It should be water permeable, even, friction on pavement should be reasonable because too less and too high friction cause problems. Soil Subgrade is lowermost layer of a highway; it is nothing but layer of natural soil over which other layers of pavement are placed Sub-base and Base courses these courses provide a medium to spread the wheel load to the subgrade. Boulder stone, brick on edge and stabilized are also used for sub - base.

2. Literature Review

Soil stabilization is the old concept. Many studied carried out to soil stabilization by adding different mineral and admixture to improved the properties of soil.

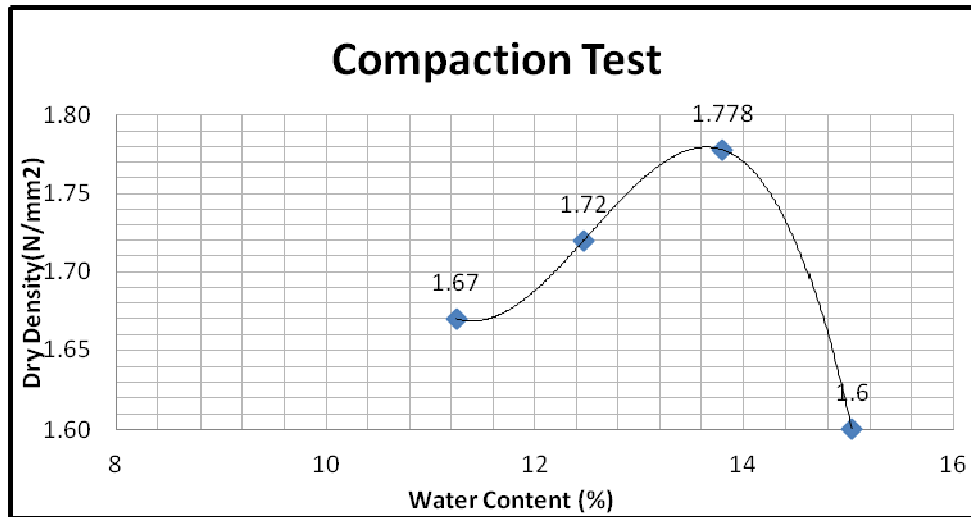
Aakanksha Gautam and S.K, Mittal et al. (2018) Black cotton soil are expensive soil which are more shrinkage and swelling properties and not suitable for subgrade as well as foundation. So bagasse ash and coir fiber are added to improvement the properties.

Arun Kumar et al (2018) Soil subgrade can be improved by adding bituminous mixture. By adding this soil becomes more stable.

Chansoria et al. (2016) Studied improvement of Black cotton soil by adding of dust which are the waste material obtained by quarrying stone. Black cotton soil samples are blended with 10%, 20%, 30% and 40% of quarry dust were prepared and series of laboratory experiments have been performed.

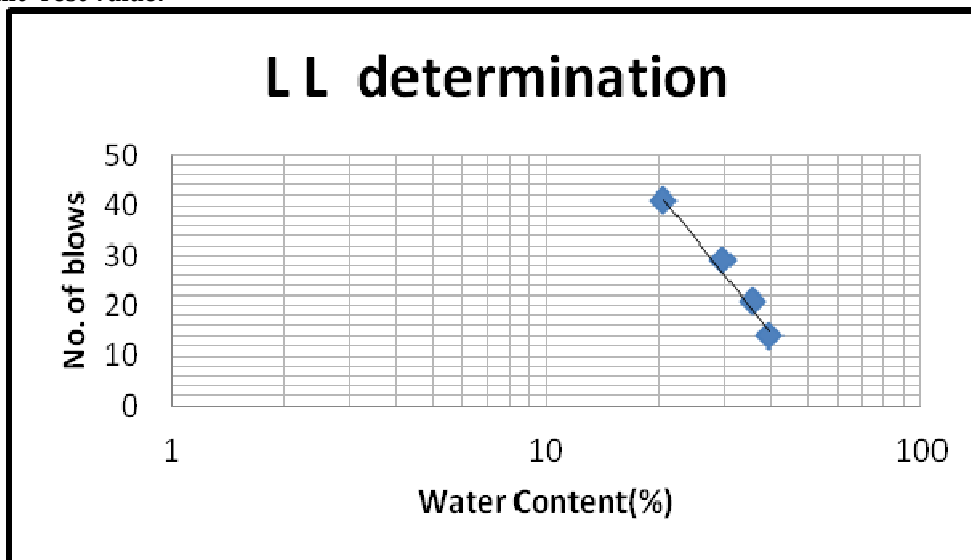
3. Experimental Programme:-

1. Compaction Test:-



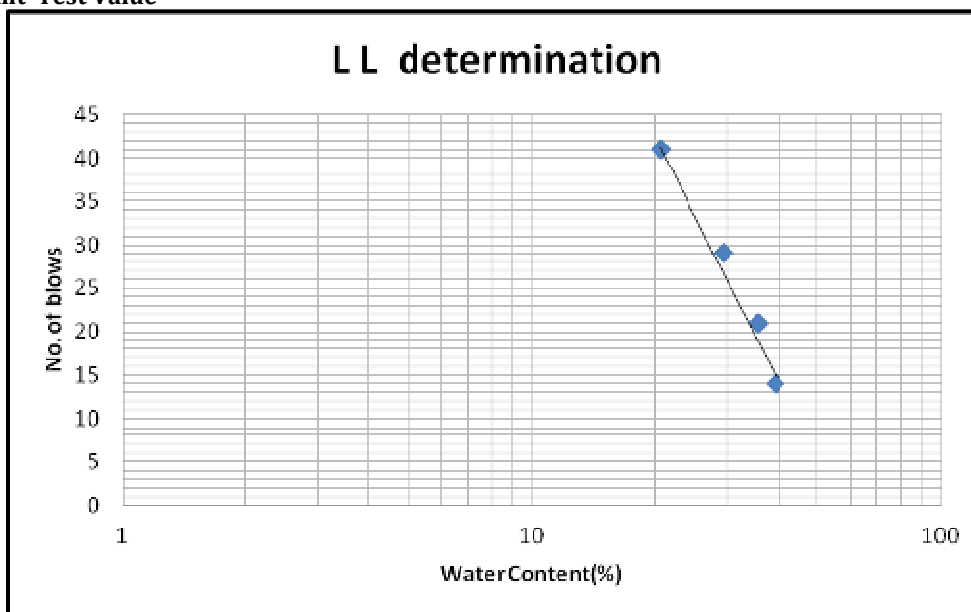
Graph: Water content and Dry Density

2. Liquid Limit Test Value:-



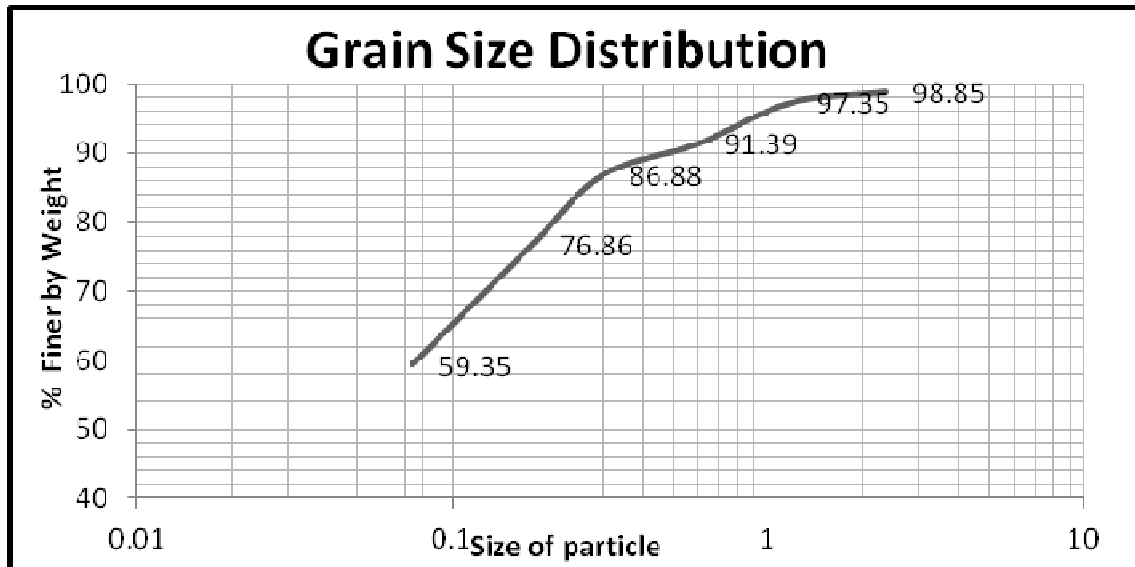
Graph: Water Content & No. of Blows

3. Liquid Limit Test Value



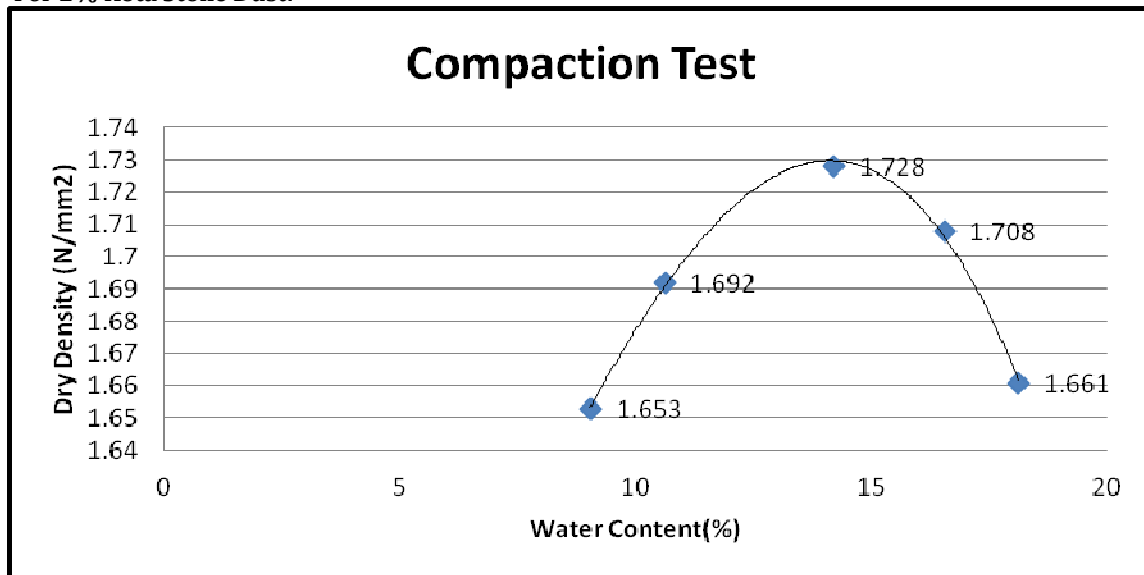
Graph: Water Content & No. of Blows

4. Grain Size Distribution:-

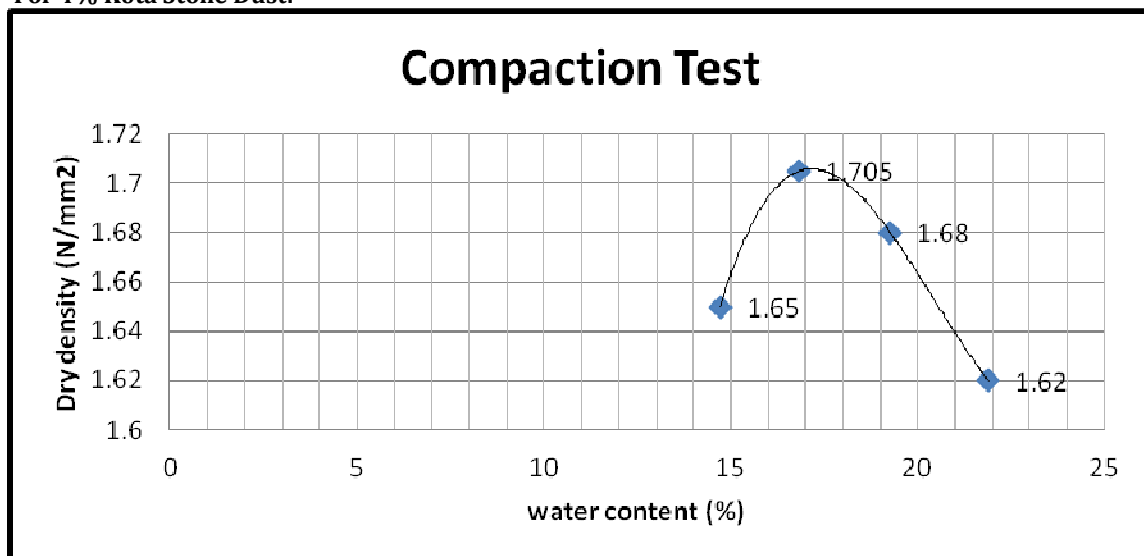


5. COMPACTION TEST OF MIX:-

I. For 2% Kota Stone Dust:

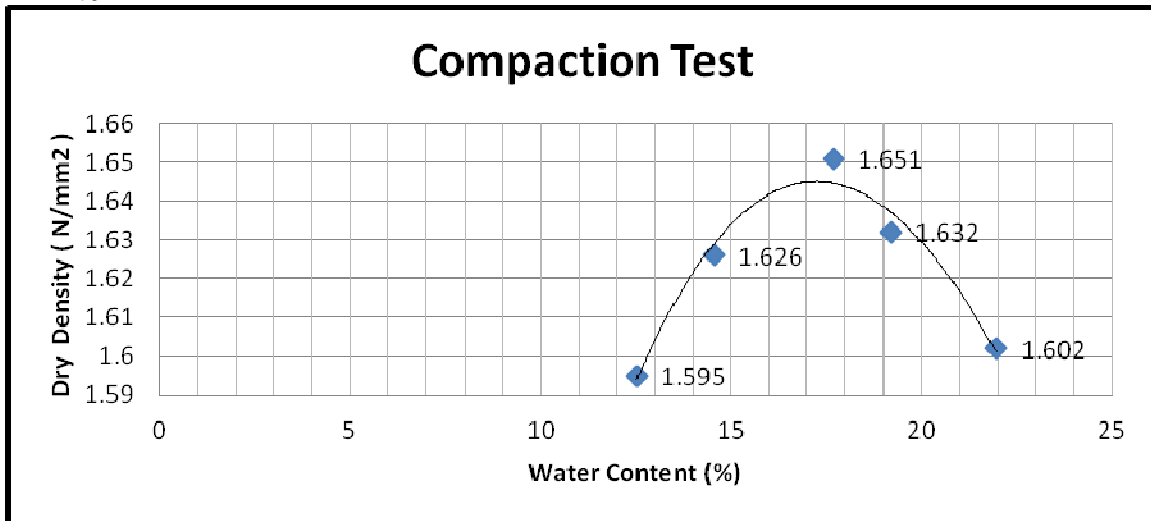


II. For 4% Kota Stone Dust:-



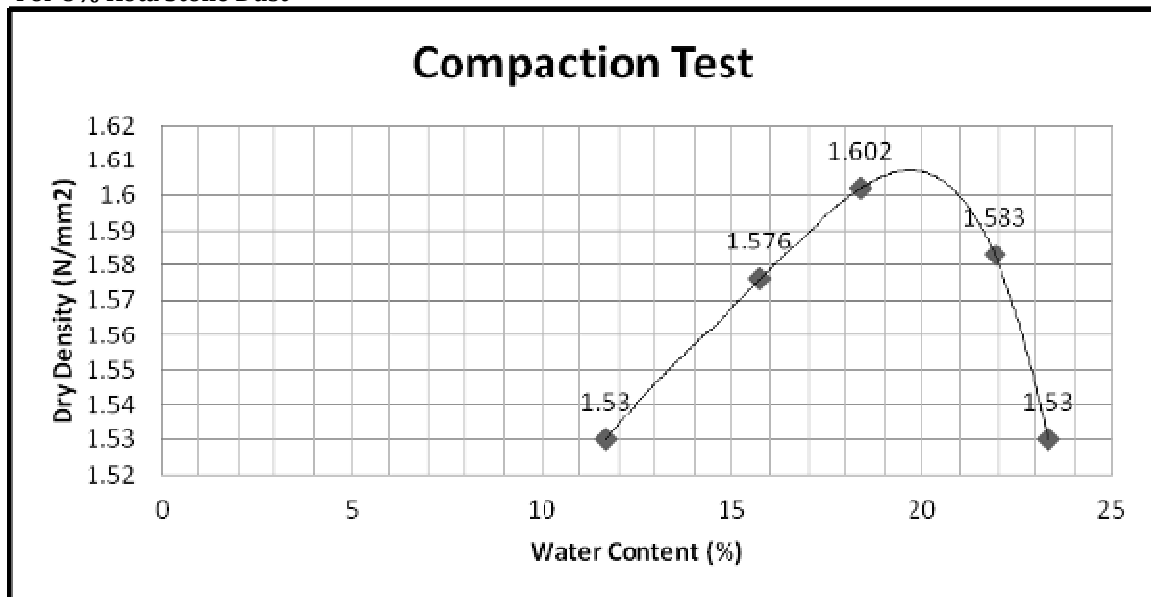
Graph: Between water content and Dry Density for 4% KSD addition

III. For 6% Kota Stone Dust:-



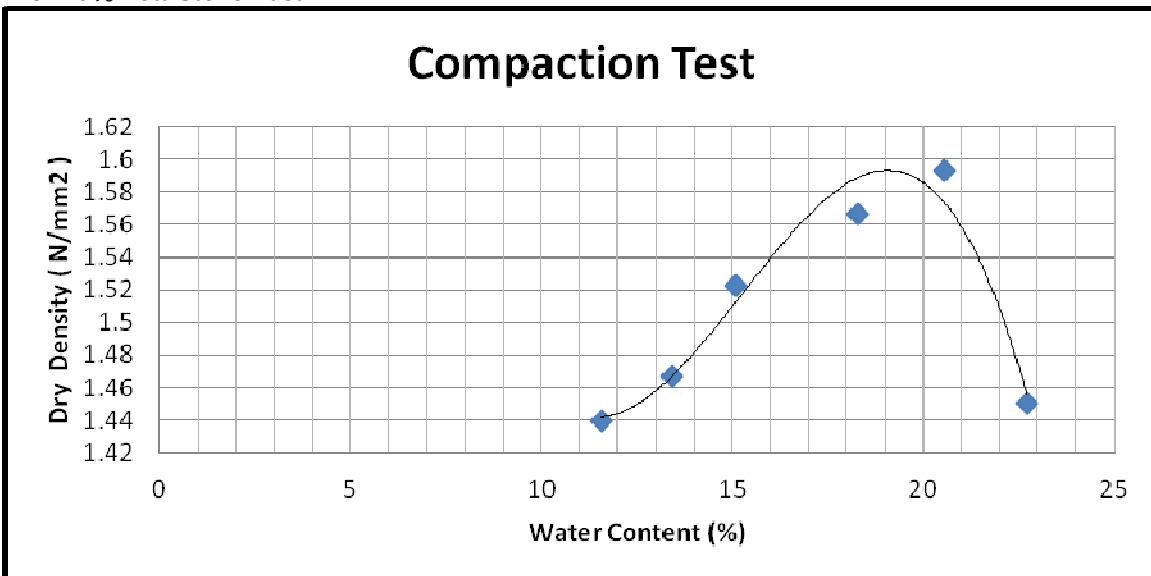
Graph:- water content and Dry Density for 6 % KSD addition

IV. For 8% Kota Stone Dust



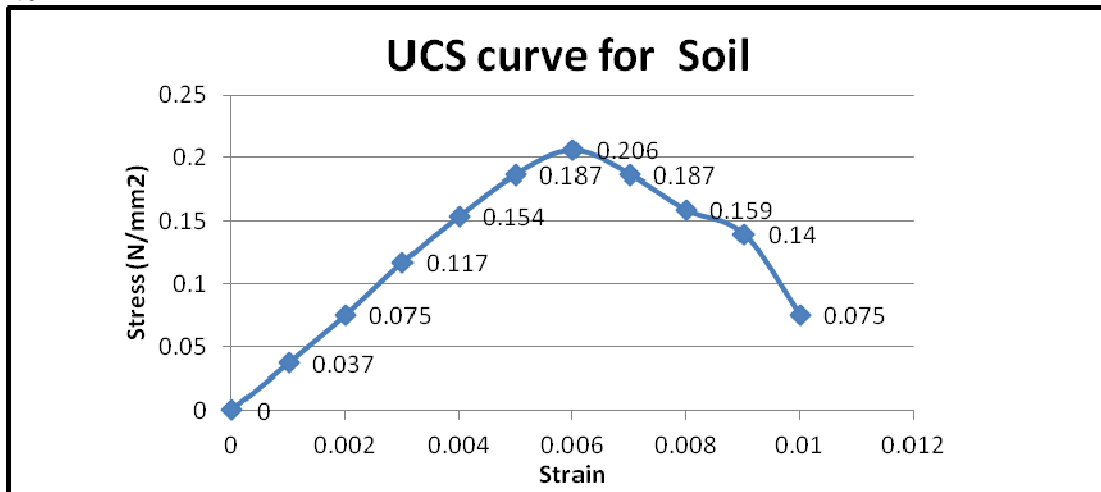
Graph:- Water content and Dry Density for 8% KotaStone Dust

V. For 10% Kota Stone Dust



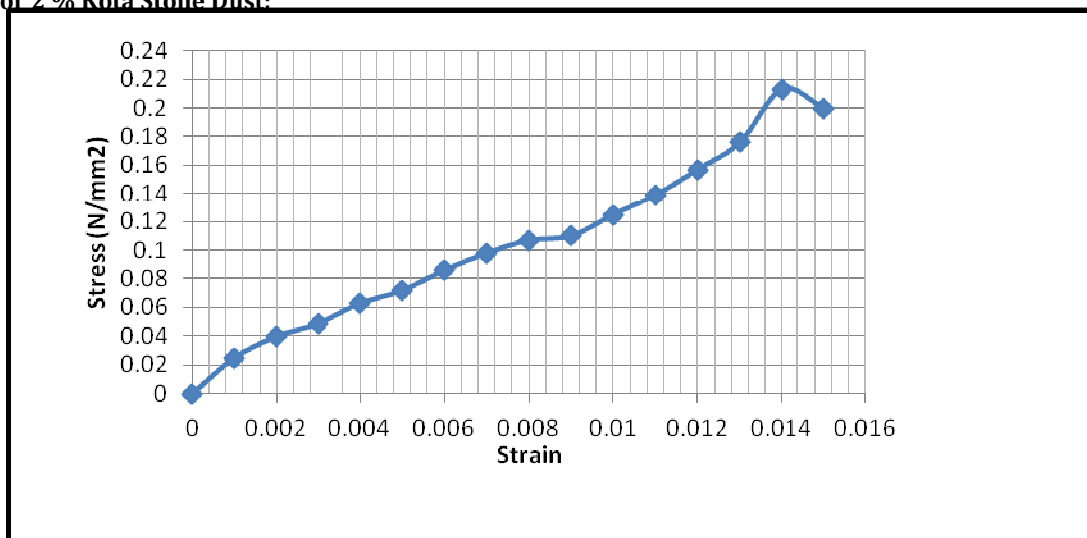
Graph:-Water Content and Dry Density for 10% Kota Stone Dust

6. UNCONFINED COMPRESSION TEST:-
For 0 % Kota Stone Dust:



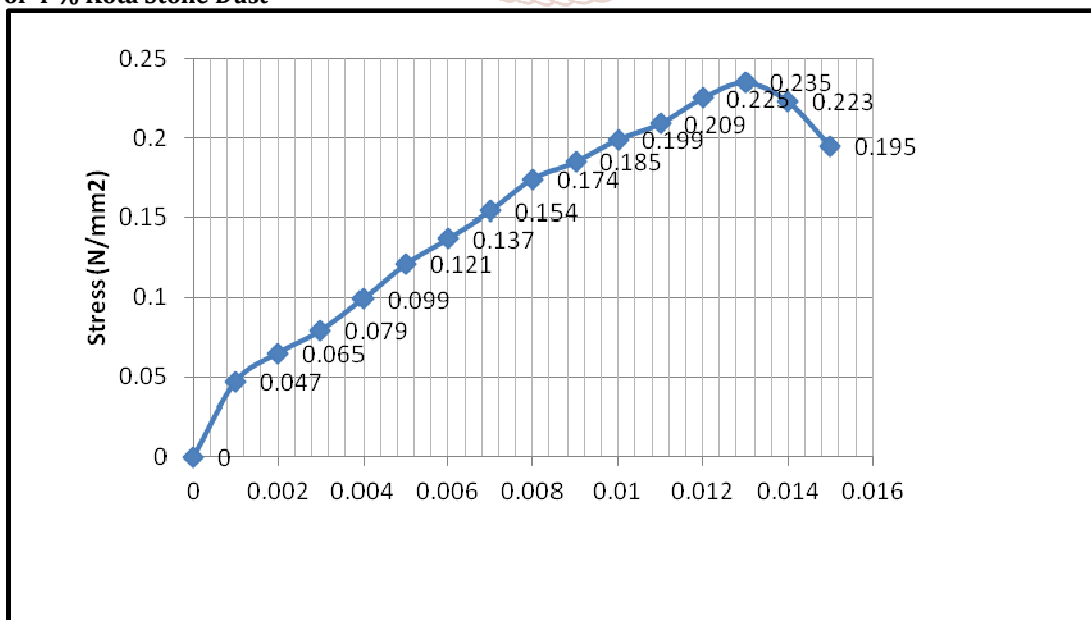
Graph:- Graph between Stress and Strain curve for UCS Test

I. For 2 % Kota Stone Dust:



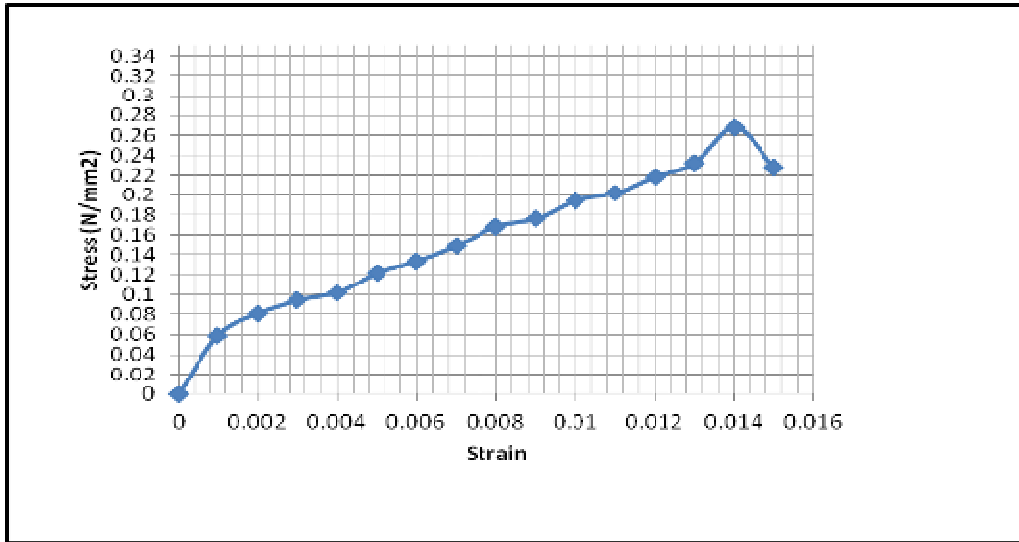
Graph: Stress and Strain in UCS Test (2%)

II. For 4 % Kota Stone Dust



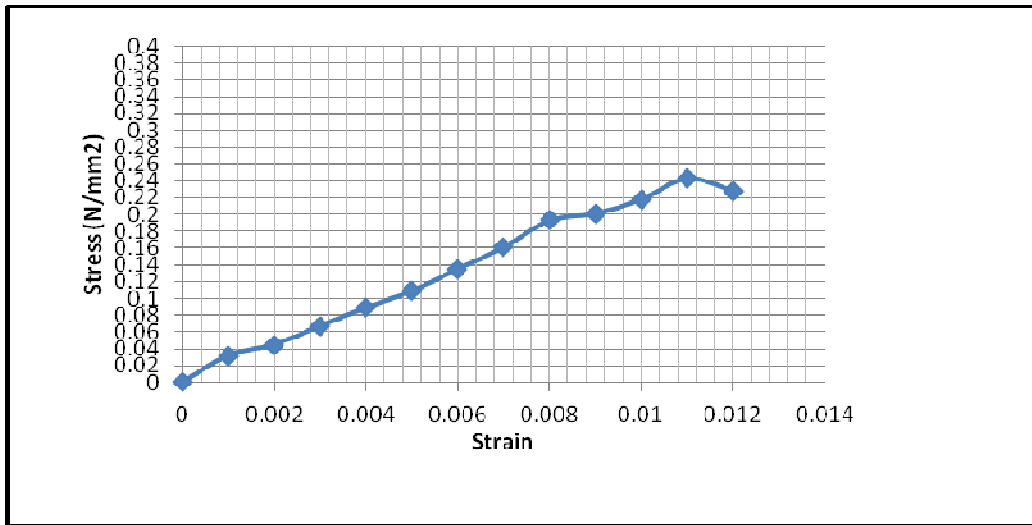
Graph:-Graph between Stress and Strain for KSD (4%)

III. For 6 % Kota Stone Dust:



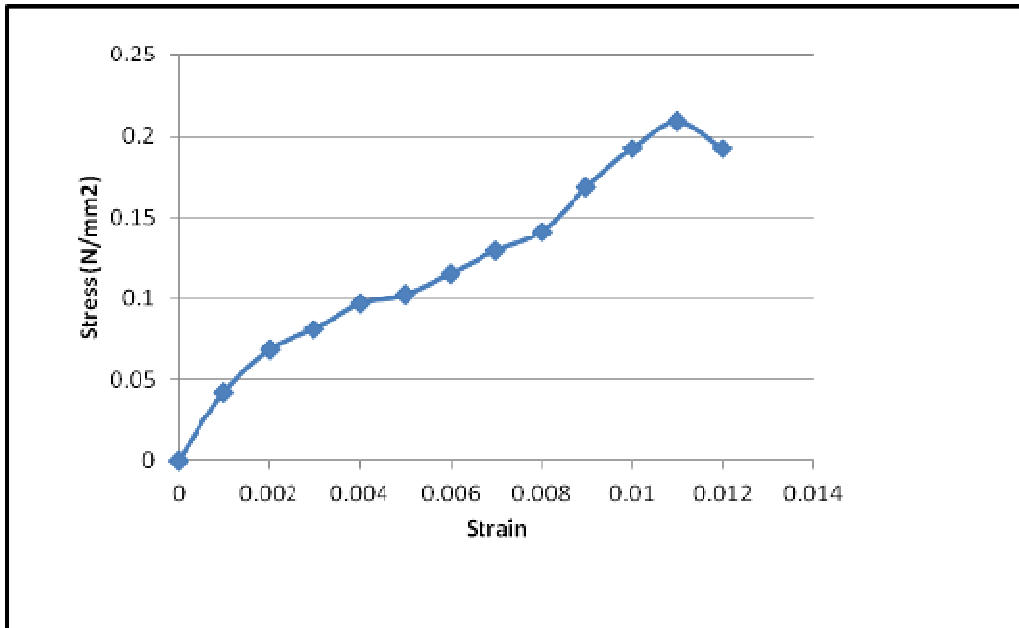
Graph:-Stress and Strain for KSD (6%)

For 8 % Kota Stone Dust:



Graph:- between Stress and Strain for KSD (8%)

IV. For 10 % Kota Stone Dust:



Graph: Stress and Strain for KSD (10%)

4. CONCLUSION

1. Kota Stone show high range of OMC and it maximum dry density is low.
2. We find that when Kota Stone Dust is added in the soil then optimum moisture contains will be increased from 13.80 % to 19.70 %. Because in the Kota Stone Dust lime is available so lime absorb the water it moisture contain value increased.
3. We also conclude that when Kota Stone Dust are added in the soil then maximum dry density will be decreased 1.72 to 1.593 g/cc.
4. We also conclude that by adding Kota Stone Dust are added in the soil then UCS will also increased from 0.213MPa to 0.274MPa but after more than 4 % Kota stone Dust are added then strength will not increased.
5. In this research work we conclude that optimum value of Kota Stone Dust will be taken 4 %.
6. When percentage of Kota Stone Dust will be increased in the soil then maximum dry density will increased and optimum moisture contained decreased.

5. REFERENCES

- [1] Rishabh singh and D.S.roy et.al (2018) comparative study of soil stablization with widely used admixtures international journal of engineering trends and technology -volume 58 issue 2 -April 2018
- [2] Ankit singh negi , Mohamand faizan et.al.(2018) soil stabilization using lime International Journal of Engineering Research and Science & Technology ISSN-2395
- [3] Aakanksha Gautam and S.K, Mittal et al. (2018)) "Stabilization of black cotton soil using bagasse ash and coir fibre " International journal advance research ideas and innovation in technology Vol. 4, No. 5, 2018.
- [4] Sabat "A Study on Some Geotechnical Properties of Lime Stabilised Expansive Soil – Quarry Dust Mixes" IJETED ISSN 2249-6149Volume 1 Issue 2 2012
- [5] Sabat Akshay, Radhikesh, P.Nanda (2011) "Effect of marble dust and durability of Rice Husk Ash Stabilised Expansive Soil", International Journal of Civil and Structure Engineering volume 1, no 4,2011
- [6] AkshaykumarSabat,Radhikesh P. Nanda(2011) "Effect of marble dust and durability of Rice Husk ash stabilized expansive soil", International journal of Civil and structure engineering volume 1, no 4,2011
- [7] J. Choobbasti,H. Ghodrat,M. J. Vahdatirad "Influence of using rice husk ash in soil stabilization method with lime" Frontiers of Earth Science in ChinaDecember 2010, Volume 4, Issue 4, pp 471-480
- [8] Peethamparan & Olek,"Study of the Effectiveness of Cement Kiln Dusts in Stabilizing Na-Montmorillonite Clay" volume 21 Issue 11 2009
- [9] Tandel, Yogendra K., (2008), "Utilization of Copper Slag to improve geotechnical properties of soil", M. Tech (SMFE) Thesis, SVNIT, Surat.
- [10] Musa Alhassan "Permeability of Lateritic Soil Treated with Lime and Rice Husk Ash" AU J.T. 12(2): 115-120 (Oct. 2008)
- [11] Kumar B."Evaluation of Properties of High-Volume Fly-Ash Concrete for Pavements" American Society of Civil Engineers Volume 19 Issue 10 2007
- [12] Bhuvaneshwari, S. and Robinson, R.G., "Stabilization of Expansive soils using Flyash", Fly Ash India 2005, New Delhi, pp. VIII 5.1-5.10.
- [13] Kumar,A.V.P.,Ramakrishna,A.N., "Influence of Coffee husk layer on CBR value in Black Cotton Soil", Highway Research Bulletin, No. 71, December 2004.
- [14] Shenbaga&Havangi "Behavior of Cement-Stabilized Fiber-Reinforced Fly Ash-Soil Mixtures" JGGE 127 (7) 2001
- [15] Subba Rao K.S. (2000) "Swell-shrink Behaviour of Expansive Soils-Geotechnical Challenges", Indian Geotechnical Journal, 30(1), 1-68
- [16] Indraratna, B. and Kuganinthira, N. (1991), "Stabilization of Weak Tropical Soils by Fly Ash", Proceedings of Asian Regional Conference on Soil Mechanics & Foundation Engineering, Vol. 1, Bangkok, Thailand, pp. 491-496.
- [17] Petry, T.M and Armstrong, J.C (1989), "STABILISATION of Expansive Clay Soils", TRR -1219, TRB, pp 103-112
- [18] Sharma, M.C (1988), "Lime STABILISATION Used In Construction of Some Roads in Rajasthan", Vol. 16, No. 12, Indian Highways, pp 75-85.
- [19] Sivapullaiah, P.V., Sitharam, T. G. and Rao, K. S. Subba, "Modified Free Swell Index for Clays", Geotechnical Testing Journal, GTJODJ, Vol. 10, No. 2, June 198780-85.
- [20] Sahu,B.K."Improvement of California Bearing Ratio of Various soils in Botswana by Fly Ash", International Ash Utilization Symposium,Center for Applied Energy Research, University of Kentucky, pp. 90.