CHAPTER II

LITERATURE REVIEW

According to the research by Wiqoyah (2003) about soils in Jono Village, Tanon, Sragen, is un-organic clay with high plasticity, it is stated that: “In the rainy season, the soil becomes soft and its strength is very weak while in the dry season it becomes hard and cracks due to shrinkage.” Physical behavior and the strength of clay soils is important to be considered, in order to overcome the problem in the construction sites soil stabilization is needed to be conducted.

In his study, Ramaji (2012) mentioned that “Several reinforcement methods are available for stabilizing expansive soils. These methods include stabilization with chemical additives, rewetting, soil replacement, compaction control, moisture control, surcharge loading, and thermal methods.”. Clay as expansive soils needs to be stabilized in order to increase its strength. One of the ways to stabilize clay expansive soils such as clay is by using chemical additives.

Saeid (2012) “Soil stabilization performed the use of technique to adding a binder to the soil in order to improve the engineering performance of soil. Researches were illustrated that adding the additives leads to progress in workability and mechanical behaviour of soil after stabilization. Lime and fly ash as local natural and industrial resources were applied for chemical stabilization. These additives could improve the mechanical properties of soil such as strength, swelling, plasticity index and compressibility. The obtained results were indicated

that, for progressing in soil properties the combination of lime and fly ash might be more effective than use of only lime or fly ash."

Through his observation done by Fusheng (2008) about potential use and the effectiveness of expansive soils stabilization using fly ash and fly ash-lime as admixture, it is mentioned that "Plasticity index, activity, free swell, swell potential, swelling pressure, and axial shrinkage percent decreased with an increase in fly ash or fly ash-lime content. With the increase of the curing time for the treated soil, the swell potential and swelling pressure decreased. Soils immediately treated with fly ash show no significant change in the unconfined compressive strength. However, after 7 days curing of the fly ash treated soils, the unconfined compressive strength increased significantly. The relationship between the plasticity index and swell-shrinkage properties for pre-treated and post-treated soils is discussed."

Ramesh (2013) through his paper presents about the effect of abundantly available fly ash, on the index properties namely liquid and plastic limit and compaction characteristics of shedi soil stated that: "Shedi soil is a problematic soil that lies between top low level laterite and bottom high level laterites in the western coastal area of Karnataka, India. The effect of sodium salts on this shedi soil optimized with Neyveli Fly ash has also been studied. Considerable changes in the index properties and compaction characteristics were observed which are explained based on series of experimental results. Addition of Neyveli fly ash improved the workability of shedi soil considerably. The addition of sodium sulphate to the optimum combination of shedi soil-Neyveli fly ash mixture

increases the shear strength of the mixture. The maximum dry density also found increased with the addition of sodium sulphate."

According to Arora (2005) "Class F fly ash cannot be used alone in soil stabilization applications as it is not self-cementing. An activator such as Portland cement or lime must be added to produce cementitious products often called pozzolan stabilized mixtures. The developed mixture must possess adequate strength and durability, should be easily compacted, and should be environmentally friendly. Results of the study show that the strength of a mixture is highly dependent on the curing period, compactive energy, cement content, and water content at compaction."

In his research, Sahoo (2010) reports the outcome of an experimental investigation into the effect of fly ash mixed with small amount of lime on the strength characteristics of soil, to ascertain its suitability for use as a construction material. It is mentioned that "A series of laboratory tests (Compaction tests, Triaxial tests, Unconfined compressive strength (UCS) tests and California bearing ratio (CBR)) were conducted on soil specimens added with various percentages of fly ash and fly ash mixed with lime by the weight of dry soil. The test result reveals that the optimum content of admixture for achieving maximum strength is approximately 15% fly ash mixed with 4% lime of the dry weight of the soil."

Susanto (2013) “In this study soil is stabilized using 8% lime and bagasse ash with variation of 0%, 3%, 6%, 9%, 12%, and 15% of the weight of the sample. In the soil of stabilization results, along with the increasing of the percentage of bagasse ash addition the value of specific gravity, liquid limit, plastic limit, plasticity index and percentage pass sieve 200 tend to decrease, the shrinkage limit turns to increase. From the standard Proctor test the optimum moisture content tends to decrease and the dry weight has a tendency to increase. Shear strength values with 3 days and 7 days of care tends to increase along with the addition of bagasse ash. Cohesion and friction angle values are the highest in the soil sample with 7 days of treatment with the addition of 15% bagasse ash which amount 0,360 kg/cm2 and 51,23°.”