Energy Optimization in Compaction of Unbound Material in Road Construction

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Compaction of Unbound Material in road construction projects, plays one of major role, as it directly contributes to project cost, quality, time and natural environment. Compaction effort is optimized significant amount in soil compaction according to its moisture content. But unfortunately this is not applied to Aggregate Base Course (ABC) compaction in most cases. Water is used as lubricant in traditional practice of macadam base construction & Optimum Moisture content (OMC) concept is not applicable there as it compacts until fines come out with water. Based on that practice, ABC is compacted at high moisture level disregarding compacting effort. In order to achieve the optimum energy level, the relationship between OMC, Maximum dry density (MDD)& Compaction effort (Compaction Energy) should be identified. Understanding of the importance of this concept is a question in present Sri Lankan context.

Questionnaire survey was done to collect information of current compaction practice, which are the compaction effort& moisture levels they compact in order to achieve the compaction. Lab and field studies were done to observe the compaction behavior of ABC at different moisture conditions &energy levels. The lab study was performed at four difference energy levels(Standard proctor, Modified proctor, Standard mould with 52 blows & Modified mould with 25 blows), while field was done at six different energy levels (2,4,6,8,10, & 12 roller passes by 11 ton single drum vibratory roller) & at five different moisture levels. Furthermore sieve analysis tests were done after compaction at some selected locations in order to compare the variation with its initial gradation.

By analyzing questionnaire survey results, it is reviled that ABC compaction is done at higher moisture levels. Based on the field trial results it is observed that higher compaction effort is ineffective, when compacts at moisture level which is not closed its OMC. Furthermore, it shows that dry unit weight is increased rapidly with lesser no. of roller passes, when it has

moisture content lower than the OMC. Finally dry densities are reached to constant value after higher no. of roller passes in all range of moisture levels.

It can be concluded that selection of compaction effort mainly depends on it moisture content. But felid in charge officers are trying get required compaction only at higher MC. Therefore ineffective compaction procedures should be brought to end by convincing felid officers. Thus appropriate compaction effort should be identified after testing it's moisture content prior to compaction, in order to achieve cost effective, better quality, timely completion & environment friendly Job.

Key words: Compaction, Energy Optimization, Moisture Content, Dry Density