Effect of Fine Percentage on Properties of Sub base Material

I.I.I.Inan[1] and W.K.Mapearachchi[2]

[1]Executive Engineer, Road Development Authority, Maho
irazinan@gmail.com,
[2]Senior Lecturer, Department of Civil Engineering, University of Moratuwa, Sri Lanka
wasanthak@civil.mrt.ac.lk

With the huge infrastructure development in Sri Lanka, construction of roads plays a vital role. Massive quantities of construction materials required for these highway and expressway constructions. Finding sub base material as per specification is a major issue in most part of the country. Therefore, in some road construction projects, crushed stone has been used as an alternative material to replace sub base material. Due to the scarcity of good quality material, there is a need of research to use marginal materials for sustainable development in the highway industry.

Standard Specification for Construction and Maintenance of Roads and Bridges (SCA/5) (SSCM) (ICTAD, 2009) used as a road construction specification in Sri Lanka. Liquid limit (LL), plastic limit (PL), maximum dry density (MDD), California bearing ratio (CBR) and sieve analysis are specified in selection of gravel sub base material. According to sieve analysis requirements in SSCM, percentage of passing 75 µm sieves should be 5-25 percent by weight. This grading limit for sub base material was adapted to the specification in second edition of SSCM in 2009. Questionnaire survey conducted among senior engineers has expressed that one of the least important parameter in material selections was grading (84%of the participants) and 16% of the engineers have expressed grading as the most difficult parameters to meet. This study was conducted to see the possibility of relaxing the passing percentage of fine fraction.

Experimental study was conducted altering the fine fraction of soils varying from 0-40%. Properties of those samples were tested. It was found that there is a linear relationship with high correlation factor between fine fraction of the material and it's properties (CBR, MDD, OMC). Only three samples out of ten samples were within the grading band requirement and nine samples out of ten samples satisfy CBR requirements. By scrutinizing the findings and available literature, it can be recommended that grading band of No.200 sieve passing can be relaxed up to 35% if soil sample satisfy the specified CBR requirement (30), PI value is less than or equal to 10 and swell percentage is less than 2%. Further, a linear regression model was fitted to assess the CBR of the material with reference to fine fraction

(Percentage passing of 425µm, 300µm, 75µm sieves). Statistical analysis shown that material passing 425µm & retained on 300 µm, and 75µm passing percentage are the significant parameters are when predicting CBR of the selected soil in this study.

Key words: California Bearing Ratio, Grading Band, Fine Fraction