

A Review on Alternative Pavement Construction Materials

P. V. V. I. Panagoda¹, H. M. D. M. Herath² and A. Anburuvel³

Abstract

In Sri Lanka, a significant amount of gravel is used for road and embankment construction as it is relatively cheap and have significantly high load bearing capacity. Gravel is of particle size between 2 mm and 64 mm according to the unified soil classified system, formed by weathering and erosion of rock, typically used in road constructions. With the urbanization and civil and infrastructure development, demand for gravel is escalating in a rapid pace. On the other hand, the available natural gravel deposits have depleted due to over exploitation and the pertaining laws by the forest department, department of archaeology and central environmental authority further prevent excavation of gravel. Gravel, therefore has become scarce. Studies have been undertaken to find alternative materials for pavement construction which are of high load bearing ability, economical and environmentally friendly. Researchers widely recommend Fly Ash (FA), Waste Recycled Products (WRP), Construction Demolition Waste (CDW), Recycled Asphalt Pavement (RAP), plastic fibers/strips, scrap tyres and geosynthetics as potential replacement for conventional pavement construction materials (Ossa, 2016 and Pérez, 2013). The selection of the above materials was determined in terms of strength, durability, cost and Eco friendliness. The strength parameters were determined from Los Angeles abrasion test, modified compaction test, California bearing ratio (CBR) test unconfined compression test, direct shear test and static tri-axial test.

Composition and compaction efforts are the main factors affecting the physical and mechanical behavior which should be seriously concern before and the after application in recycle aggregates to improve the quality of the recycle materials required to sorting, separation and processing (Dahlbo et al., 2015). Application of recycled CDW as an alternative is an environmentally friendly option and a sustainable approach for the CDW waste problem (Zezhou, Ann, Liyin & Guiwen, 2014). Geogrid reduces the gravel requirement in base and sub base construction (Moustafa Ahmed, Satish & Praveen, 2004). Geogrid provides frictional interaction and interlocking between soil particles by which the shear resistance of 1. Soil got enhanced is one of methods (Tang, Ghassan and Angelica, 2008). Choudhary et al. (2010) demonstrates that the inclusion of waste High Density Polyethylene (HDPE) strip with locally available granular soil improves the strength and deformation in highway sub base and also in embankments. Reusing waste materials for road construction is a viable solution in terms of

environmental conservation and economy. The quantity and quality of waste material can be collected from site visit method, waste generation rate method, life time analysis method, classification system accumulation method, variable method, empirical investigations, web-based estimation systems or waste estimation model (Zezhou et al., 2014) and laboratory or field tests. In Sri Lanka, the potential set of wastes could be considered for pavement construction are CDW, industrial polymer waste, rice husk, used vehicle tyres, wrapping material in industries.

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Author Details

1. Undergraduate student, Faculty of Engineering, University of Jaffna. 2016e024@eng.jfn.ac.lk
2. Undergraduate student, Faculty of Engineering, University of Jaffna. 2016e014@eng.jfn.ac.lk
3. Senior Lecturer, Faculty of Engineering, University of Jaffna. aanbu007@eng.jfn.ac.lk

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