Form 2

Dissertation Abstract

Report no.	(Course-based) No. 1109	Name	Aung Aung Soe
Dissertation title	Study on the behavior of geogrid-reinforced soil layer system for the pavement (ジオグリッドにより補強された舗装用二層地盤の挙動に関する研究)		

Abstract

※ The abstract should be in keeping with the structure of the dissertation (objective, statement of problem, investigation, conclusion) and should convey the substance of the dissertation.

Nowadays, there are increasing demands for the infrastructures, including road pavements for transportation. With the increase in the traffic volume, the heavier axle load of vehicles, and the shortage of good quality materials for pavement construction, the solution using geosynthetics has been introduced for the purposes of reduction in material usage and extension of road service life. However, the incorporation of geosynthetic benefits in the design method is still in empirical and it highly depends on the geosynthetic types, especially for the newly developed ones. In this study, a newly developed triangular geogrid was used to investigate its reinforcement behavior and mechanisms; and to verify its potential benefits for the pavement construction. This study included two main parts: the laboratory tests and field tests. Laboratory tests included (1) cyclic loading tests, (2) direct shear tests and (3) verification tests. Field tests included the verification tests. In the laboratory, the different pavement conditions were modelled and tested considering the effects of base course thickness, geogrid position, and geogrid types in different aggregates. In addition, the confinement zone of triangular geogrid was estimated by means of direct shear test in the laboratory. Both laboratory and field verifications included the plate loading test and the portable falling weight deflectometer test (PFWD). From this study, the followings were observed. The benefit of geogrid reinforcement at bottom of base course became insignificant with the increase in thickness. Changing the geogrid position inside the base course layer could effectively reduce the lateral flow of aggregate particles. The optimum reinforcement position was known to be at the middle of the base course layer in which the largest traffic benefit ratio (TBR) was achieved under the given test conditions. It was also realized that the effect of geogrid types was minimal on the performance when the geogrids were placed inside the well-graded aggregates. In the poorly-graded aggregate, however, it was

observed that the triangular geogrid outperformed biaxial geogrid. From the direct shear test, the confinement zone of triangular geogrid was larger than five times of the average particle size (D_{50}) from geogrid location, estimated by using the shear resistance ratio (SRR) as an index. In the verification, both PFWD test and plate loading test (K_{30} test) in the field could not able to detect the reinforcement benefit due to small displacements used in both tests. On the other hand, the reinforcement effect and mechanisms were able to be examined by the laboratory plate loading test. The effect of reinforcement was noticed at the surface settlement between 2.5% and 3.6% of the geogrid depth from the surface, and the reinforcement mechanism mobilized at 0.2% of pure strain regardless of geogrid depth.