SUSTAINABLE CONSTRUCTION CASE HISTORY: FLY ASH STABILIZATION OF ROAD-SURFACE GRAVEL

Bulent Hatipoglu[1], Tuncer B., Edil[1], and Craig H. Benson[1]

1. University of Wisconsin-Madison, Department of Civil and Environmental Engineering, Madison, WI 53706, USA

A case history is described where Class C and off-specification self-cementing fly ashes were used to stabilize road-surface gravel (RSG) during conversion of a 3.5-km section of a gravel road to a flexible pavement in Chisago County, MN. The project consisted of blending the existing road-surface gravel to a depth of 254 mm with fly ash (10% by dry weight) and water and compacting the stabilized RSG (S-RSG) to form a firm base and placement of a new HMA surface. This approach is consistent with "green highways" concept where pavement base was formed without using any additional natural materials. Furthermore, the cost of construction is estimated to be approximately one third of conventional reconstruction of a gravel road as a paved road. California bearing ratio (CBR), resilient modulus (M_r), and unconfined compression (q_u) tests were conducted on the RSG alone and the fly-ash stabilized RSG (S-RSG) samples prepared in the field to evaluate how addition of fly ash improved the strength and stiffness. After 7 d of curing, S-RSG compacted in the field from a field-mixed sample had CBR ranging between 48 and 90, M_r between 96 and 125 MPa, and q_u between 197 and 812 kPa, whereas the RSG alone had CBR of 24 and M_r of 51 MPa. Laboratory freeze-thaw tests indicate only 17% drop in resilient modulus of the S-RSG after 5 cycles of freeze-thaw. Soil stiffness gauge employed in the field gives 50% higher moduli compared to the modulus obtained from the laboratory resilient modulus test. *In situ* falling weight deflectometer (FWD) testing conducted in November 2005 (2 months after construction but during early winter freeze) gave anomalously high modulus compared to other data here and elsewhere. However, FWD testing conducted next Spring (May 2006) showed comparable results to the laboratory resilient modulus for the S-RSG. Analysis of leachate collected in the lysimeter showed that concentrations of all trace elements were below USEPA maximum contaminant levels.

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