



South Carolina  
Department of Transportation



UNIVERSITY OF  
SOUTH CAROLINA



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## SUMMARY REPORT

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# INVESTIGATION OF GRADED AGGREGATE BASE (GAB) COURSES

This report summarizes a study undertaken to investigate the feasibility of relaxing current South Carolina Department of Transportation (SCDOT) graded aggregate base (GAB) gradation specifications and layer thickness restrictions. The study included a review of historical and current SCDOT specifications and practices, a literature review and survey of state highway agency practice, and laboratory and field data collection and analysis.

Seven granular base materials commonly used in South Carolina were included in full-scale laboratory cyclic and static plate load tests and Soil Stiffness Gauge (SSG) tests. In addition, two field test sections were constructed and tested using a Falling Weight Deflectometer (FWD) and SSG. Routine laboratory tests were also performed on the granular materials to determine basic physical properties and compliance with SCDOT specifications.

Finite element analysis was performed to compare the stress-strain conditions and deflections under wheel and plate loadings. A linear program was developed to backcalculate the GAB moduli from static plate load test results. The GAB moduli inferred from plate load tests were compared with SSG measured moduli. Permanent deformation resistance of the GAB materials was evaluated using laboratory cyclic plate load tests. FWD field test results were analyzed using SNSC and EVERCALC programs. The backcalculated moduli were compared with field SSG measurements.

Based on tests results, it is proposed that the maximum percent passing the No. 4 sieve for Macadam be relaxed from the current specification limit of 50 % to 60% (the current SCDOT limit for passing the No. 4 sieve for Marine Limestone). It is also proposed that the SCDOT allow GAB layer thickness greater than 8 in. on a trial basis.

Differences in backcalculated layer coefficients for base layers constructed in the laboratory and at field sites were observed in this study. Laboratory test results are in good agreement with results reported by other researchers. It is recommended that the SCDOT consider the feasibility of re-evaluating layer coefficients used for GAB materials.

Also included in the study was a preliminary investigation of SSG applicability for assessing compacted GAB materials. Study results suggest that the SSG offers an alternative tool for pavement material quality assurance and construction control. It is suggested that the SCDOT study the SSG further and consider SSG implementation for material characterization in future mechanistic-empirical pavement design approaches.