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## SUMMARY REPORT

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# Aggregate and Concrete QC/QA Certification of Contractors and SCDOT Personnel Phase II: Pilot and Implementation of Coarse Aggregate Program

In 1998, a research project was initiated by SCDOT to explore the *Development of a QC Program for Aggregates in South Carolina*. The primary goal of this project was to develop a program of supplier self-testing and control. This type of program shifts a larger amount of testing onto the supplier and subsequently increases the level of monitoring for the SCDOT. With limited personnel, however, the SCDOT is unable to provide the same level of coverage as its neighboring states. Therefore it is essential that the suppliers' QC/QA personnel is highly qualified and certified in standard aggregate testing. Variances in specifications and test procedures, coupled with personnel turnover, result in potentially variable material quality control. A successful certification program aims to minimize the impact of these problems on material quality.

In 2000, the principal investigators completed a research project on *Technology Transfer Programs for Aggregate and Concrete QC/QA Certification of Contractors and SCDOT Personnel, Phase I: Planning*. The outcome of this Phase I study was the plan for a certification program based on SCDOT needs and a review of existing state programs. All technicians involved in the testing of aggregate for SCDOT projects, including SCDOT personnel, are required to attend a course and pass a series of examinations. With this program in its initial stages, no state-to-state reciprocity of aggregate technician certification is permitted. As this program continues to develop, and states move towards more standardized certification measures, reciprocity may be considered within the SCDOT program.

This report describes the pilot program and implementation phase for certification of aggregate technicians. It is important to note that the certification program is not intended to function as a training school. Attendees should have prior experience with aggregate testing before attempting certification through this program. The goal is to provide a pool of technicians who are familiar with SCDOT specifications, familiar with the newly adopted *Policy for Approval of Coarse Aggregate Sources (Aggregate QC/QA Program)*, and are certifiably competent in the necessary aggregate test procedures. To achieve this goal, the examinations must include a hands-on demonstration of each test procedure by each technician. This hands-on testing requires time and resources, but is considered essential for verifying technician competence in each test being performed.

This program consists of two levels of certification. *Level I: Sampling and Grading* is intended for all participants and provides a strong background in issues affecting QC/QA for aggregate suppliers. *Level II: Testing* is aimed at suppliers' QC/QA technicians and appropriate SCDOT personnel who are required to perform and regulate necessary aggregate QC/QA tests. The *Level I* course serves as the primary certification required of all QC technicians and focuses on field sampling, sample reduction and grading.

During this course, technicians must be certified for proficiency in Sampling of Aggregates (AASHTO T 2), Reducing Samples of Aggregate to Testing Size (AASHTO T 248), and Sieve Analysis of Fine and Coarse Aggregates (AASHTO T 27).

The *Level II* course is an advanced course that focuses on physical property testing. Technicians at this level are certified for proficiency in Specific Gravity and Absorption of Coarse Aggregate (AASHTO T 85), Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine (AASHTO T 96), Plastic Fines in Graded Aggregate and Soils by Use of the Sand Equivalent Test (AASHTO T 176), and Method for Determining Flat and Elongated Particles in Coarse Aggregate (SC T 77).

Course instruction is provided through modular presentations on course topics and hands-on demonstrations of standard test procedures. Course manuals consist of printed versions of each modular presentation developed in Microsoft PowerPoint. For each required test, a module describes the test significance, equipment, major steps required to perform the test correctly, and common errors associated with the test. For both certification levels, instruction is covered in one day and the examination is conducted during the next day. To be certified, technicians must pass a one-hour, open-book written examination and demonstrate individual proficiency in each of the required tests. During the pilot programs, 17 *Level I* technicians and 11 *Level II* technicians were certified. Changes to both the course content and the examination procedures were adopted based on the Aggregate Technician Certification Task Force evaluation of pilot programs at each level.

To fully implement this program, a total of 10 certification courses were offered during the year 2000. 76 *Level I* technicians and 24 *Level II* technicians were certified. The certification rate for *Level I* was significantly higher than for *Level II*. The certification rate for all *Level I* courses offered in 2000 is 89%, but the certification rate for all *Level II* courses is only 57%. The majority of all attendees were not familiar with major steps of the standard procedures prior to the certification program. The following list indicates some of these observed problems during *Level I*:

- Lack of awareness on minimum field sample and test sample sizes
- Lack of understanding standard drying of aggregate (“constant mass”)
- Lack of awareness of minimum and maximum shaking time for aggregate gradation
- Difficulty in calculating and reporting percent passing correctly
- Lack of awareness of minimum percent loss requirement for aggregate gradation

The instructors now spend more time on these problematic areas. However, the impact this program can have on the technicians’ state of knowledge is limited. One of the major challenges of the *Level II* program is that most technicians do not normally perform all four required tests as part of their job responsibilities. Therefore, many attendees are not properly prepared for this level of certification, resulting in the low certification rate.

This program is intended to certify suppliers’ technicians and SCDOT personnel and not to train them. It is therefore essential that technicians registering for this program arrive well prepared on the required standard procedures. To ensure continued success of this program, communication of this intention to certify, not train, is vital. The program directors have established a list of aggregate supplier contacts and continue to communicate the necessity of having all participants prepared for the certification course. This program aims to be self-sustaining, offering courses continuously, as necessary, to certify currently employed technicians yet to be certified, newly hired technicians, and eventually re-certify technicians when the five-year term expires.

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