

# **DEVELOPMENT OF A QUALITY ASSURANCE PROGRAM FOR PORTLAND CEMENT CONCRETE IN SOUTH CAROLINA**

RESEARCH PROJECT SPR-583

## **REPORT SUMMARY**

This report describes the development of a quality control program for the South Carolina Department of Transportation (SCDOT). Quality Control / Quality Assurance (QC/QA) specifications are the basis for this program, and through this type of specification many objectives can be realized. The detection of structural concrete quality can be improved, the responsibility for producing quality concrete is shifted to the contractor, and the State's responsibility for accepting the concrete based on the contractor's and the State's test results is enhanced.

The report documents the specification development and the associated implementation plan and training, both of which are necessary to the ultimate successful usage of the quality control program by the State of South Carolina. Transtec believes that this program will enable the State of South Carolina both to improve the quality of structural concrete and to be more comfortable with the concrete that is placed. Both of these are due to the enhanced quality control measures and tools that are placed in the hands of the Department of Transportation.

The South Carolina Department of Transportation realized the need for a specification which would include the principles of quality control and quality assurance for portland cement concrete structures. In order to fill this need and to attain their goal of implementing a QC/QA specification, the SCDOT convened a committee to oversee the development of such a specification.

The SCDOT and the PCC QC/QA Committee authorized Transtec to begin development on the QC/QA specification on June 7, 1998, for a period of two years. At that time, Transtec's engineers and consultants conducted a review of existing literature and called on the experience of their consultants to develop an outline for such a specification for SCDOT. These consultants, Drs. Frank McCullough and David Fowler, whose extensive experience in the areas of concrete, specifications, and other aspects of the project made invaluable contributions to the project.

The QC/QA specification developed for this project includes changes in contractor and department responsibility, modification to the required tests and testing frequencies, the introduction of quality control plans and statistical methods for evaluating concrete quality, changes to the acceptance criteria, and the introduction of percent within limits and pay factors. Acceptance criteria, according to the new specification, will be compressive strength and air content. Other quality control parameters that must be met, however, include concrete slump, temperature, unit weight, and various fine and coarse aggregate properties.

The implementation plan included in the final report includes recommendations for developing a pilot project program that would enable both the Department and contractors the training and experience using the new specification prior to its full implementation by the SCDOT. The pilot program would include two phases of projects, after each of which the specification and related requirements would be reviewed and modified, if necessary.

The Quality Control Plan (QCP) is required of the contractor for every project. A sample QCP is included in the final report. The purpose of the QCP is to provide the SCDOT with a guide by which the contractor will fulfill all his duties with respect to concrete quality. The document is intended to encourage the contractor to put some thought into its content, but that after some time it will become routine and will not cause much additional cost or effort to be incurred by the contractor.

Finally, four workshops were taught at various locations around the state of South Carolina to inform DOT employees as well as contractors about the new specification and to solicit comments and positive criticism regarding its content, important changes, and ultimate implementation.