



South Carolina
Department of Transportation



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SUMMARY REPORT

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South Carolina
Department of Transportation
955 Park Street
P. O. Box 191
Columbia, SC 29202

Development of a Quality Assurance Program for Asphalt Paving Mixtures in South Carolina

SUMMARY OF THE PROCESS

A Joint Agency/Industry Quality Assurance Committee (QA committee) was created to evaluate and recommend potential modifications to the existing SCDOT hot mix asphalt (HMA) specification that used percent within limits (PWL) for determining acceptance. The QA committee was made up of SCDOT, contractor, and FHWA personnel selected by the SCDOT. The research principal investigator (PI) served as the facilitator for the QA committee.

To establish how well the PWL specification was working in the field and to uncover any problems users of the specification encountered, interviews were conducted with both SCDOT and contractor personnel. To ensure that all parties would feel free to give their honest opinions and experiences regarding the specification, separate interviews were held with contractor and SCDOT personnel.

After reviewing responses from all 7 SCDOT districts and 10 contractors, the results from those interviews were compiled and summarized. Those summaries were then presented to the QA committee.

During the interviews the participants were asked to provide the researchers with copies of test results from projects conducted under the existing specification. Analyses of these data provided typical project standard deviation values that were then compared with the values that the SCDOT had assumed when developing the limits for the existing specification. These actual field values were then used to determine whether or not new specification limits were warranted in the revised specification.

A subcommittee of the QA Committee, consisting of two SCDOT and two contractor members as well as the PI, was selected to prepare the drafts for the revised specification that were presented to the full committee for review and approval. This was considered to be a more efficient approach than trying to write a new specification with the entire QA committee.

Six educational seminars, attended by both SCDOT and contractor personnel, were then conducted to assist in the implementation of the revised HMA QA specification.

FINDINGS

Interviews. The interview results from both the contractors and the SCDOT personnel were compiled and studied for possible correlations. The results from the interviews were presented to the QA Committee. Some of the major findings from the interviews were related to the following areas:

Open Lots. A majority of both contractor and SCDOT personnel suggested making a lot one day's production to allow for a lot payment determination at the end of each day.

Paperwork. Excessive paperwork was an issue with both SCDOT personnel and the contractors. The SCDOT personnel reported problems with contractors not turning in their paperwork on time. Contractor roadway QC personnel reported difficulty in filling out numerous forms at the end of the day

Roadway QC Requirements. Contractor roadway QC personnel reported having difficulty keeping up with all of the QC testing and verification that was required of them under the specification.

Specification Interpretation. Contractor personnel cited inconsistencies among the various districts with respect to how they interpreted the provisions of the existing specification.

Quality of HMA. Approximately half of the contractors and almost all of the SCDOT districts reported that there was no visual improvement in the quality of HMA under the existing specification.

The interview findings resulted in the modification of many procedural issues in the new specification.

Data Analysis. A total of 1742 plant acceptance test results, for asphalt content (AC), air voids (AV), and voids in the mineral aggregates (VMA), were provided from 39 projects. Analyses revealed typical variability values smaller than those assumed by the SCDOT in the development of the existing specification limits. New Limits based on the new variability values were determined for the new specification. The analyses also showed that there was definitely a positive correlation between AC and VMA as well as between AV and VMA.

A total of 1060 density test results were provided from 18 projects. The typical process variability value for density from cores was less than that assumed by SCDOT in developing the existing specification, while the typical variability value for nuclear density was equal to the one initially assumed. Minor modifications to the density limits were made for the new specification.

Payment Risk Considerations. Calculations showed that the remove and replace provision in the existing PWL specification placed an unacceptably high risk on the contractor. For the new specification the provision was changed so that there is essentially zero chance of removal and replacement if all quality characteristics are at their acceptable quality level (AQL) values. Computer simulation was used to evaluate the payment risks, by developing operating characteristics (OC) and expected payment (EP) curves, for the new specification. After considering these risks, for the new specification the existing payment factor equation for each individual quality characteristic was maintained, and the composite payment factor equation was modified only slightly.

RECOMMENDATION

Any specification, but particularly a QA specification, must be an evolutionary process. Since new information is constantly becoming available in the form of additional test results, and as new construction or testing processes are employed, the specification must be continually monitored to see if modifications are needed. It is important that the SCDOT provide or make arrangements for this continuing monitoring process for all of its QA specifications.

James L. Burati, Jr., Ph.D. and Britton D. Corbin conducted this research project at Clemson University.
For further information, contact Terry Swygert at SCDOT: 803.737.6652; swygerttl@scdot.org