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TRANSPORTATION DIRECTOR

18 July 2003

Technical Advisory #4-03

To: All Division Materials Engineers

From: Larry Lockett, Materials & Tests Engineer *Larry Lockett*

RE: Care and Storage of Cores used to calculate roadway densities

Follow these guidelines for cores used to determine roadway densities.

AASHTO T-166, "Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens", recommends that the core diameter be at least four times the maximum aggregate size of the mix to be tested; thus, 4" [100 mm] diameter cores are adequate for mixes up to the 1 1/2" [37.5 mm] mix. Use 6" [150 mm] diameter cores for the 1 1/2" [37.5 mm] mix. Obviously, the 6" [150 mm] diameter cores are acceptable for the smaller maximum aggregate size mixes as well. All cores must be handled carefully; however, special care and attention should be used handling the thinner cores.

For underlying layers, the contractor may cut companion cores (in addition to running the nuclear gage) for quality control. For surface layers do not allow the contractor to cut companion cores. When the core holes are more than 3" [75 mm] deep, fill the hole in layers. Each layer should be no more than 3" [75 mm] thick. Thoroughly compact each layer by tamping as the hole is filled. For safety, fill the core holes while traffic control is still available for that section of roadway.

The State will take immediate possession of the cores after they are cut. Do not send the cores back to the laboratory using contractor personnel (i.e. truck drivers). Protect the cores from vibration and heat damage. Use an ice chest that has been padded with sample sacks or a similar method to protect the cores.

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Take the cores to the laboratory most convenient for the State. In some cases, this will be the division laboratory; in other cases, this will be the contractor laboratory (the cores do not have to be tested at the Contractor's laboratory). Some technicians are skilled enough to separate the layer to be tested from the underlying layers using a chisel. Contractors have complained that State technicians were damaging the layer to be tested using this method. If there is any doubt, use a masonry or concrete saw to separate the layers. If the cores are tested in the contractor's laboratory, require the contractor to purchase the saw.

Use ALDOT 403, "Roadway Core Bulk Specific Gravity Determination in the Field", first. Record the bulk specific gravity, the percent density, and the absorption for each core. These results should be furnished to the contractor as soon as possible; emphasize to the contractor that these are preliminary results. Then use AASHTO T-166, Method A. Record the bulk specific gravity, the percent density, and the absorption for each core. These results should be furnished to the project engineer as soon as practical. Emphasize to your technicians that the cores must be dried to a constant mass overnight at  $125 \pm 5^\circ\text{F}$  [ $52 \pm 3^\circ\text{C}$ ]. Drying "overnight" does not have to literally mean drying from sundown to sun-up. It means drying to a constant weight [mass] at  $125 \pm 5^\circ\text{F}$  where the mass does not vary more than 0.05 percent in a two-hour drying interval with the first weight measurement occurring a minimum of 8 hours after drying begins. If the absorption is greater than 2.5% use the Corelok or paraffin method. The Corelok, ASTM D 6752, "Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method", is the preferred method. If the Corelok is unavailable use T-275, "Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens", Method A.

Send the absorption, the bulk density, and the percent density values by both ALDOT 403 and T-166 to the Bituminous Engineer (Randy Mountcastle). Also send the bulk density and percent density values by the Corelok or paraffin method where applicable. Please complete the worksheet in Excel and e-mail the results to: [colek@dot.state.al.us](mailto:colek@dot.state.al.us) and [quillinc@dot.state.al.us](mailto:quillinc@dot.state.al.us) (Kerry Cole and Clint Quillin).

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Compute the core densities using the running average of the contractor's last four Rice gravities as long as the State and the contractor results for air voids compare within the tolerances shown in 410.08(c) Table V of the specifications. When the results do not compare, substitute the State's Rice value for the contractor's Rice value to obtain a preliminary result to furnish the contractor; emphasize to the contractor that these are preliminary results. Calculate the final core densities based on the Rice values determined by M&T referee testing. Emphasize to your technicians that when referee testing is required the entire lot's referee tests should be submitted to M&T.

Keep all the cores for a pay item until that pay item is complete or until the contractor agrees with the density results that the State has determined for the cores in question.

WRM/khd

cc: Terry McDuffie  
Dave Hubbard  
FHWA (Steve Mills)  
Randy Mountcastle  
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