

METHOD FOR CORING AND DETERMINING PERCENT OF SOLID DENSITY
OF IN-PLACE, COMPACTED, ASPHALT MIXTURE COURSES

1. SCOPE: This method documents the procedure for obtaining, storing, and transporting density cores extracted from asphalt pavement. This method also covers separating the uppermost layer of in-place, compacted, asphalt mixture from full- or partial-depth cores and determining the percent of solid density of that layer for the determination of pay values.
2. APPARATUS:
 - 2.1. Coring equipment: Provide a truck or portable core-drill rig with a masonry bit capable of obtaining a core with a minimum diameter of approximately 4 in. and a depth that allows the core to be removed without affecting the density of the asphalt mixture course to be measured.
 - 2.2. Provide a masonry saw capable of separating the asphalt core across its diameter without fracturing, cracking, or otherwise affecting the density of the asphalt mixture course to be measured.
 - 2.3. The Department will provide a fan capable of producing airflow sufficient to dry the cores in a timely manner.
 - 2.4. Provide scales and a suspension apparatus conforming to AASHTO T 166, *Bulk Specific Gravity of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens*.
 - 2.5. Provide a water bath, conforming to T 166, of a suitable size for immersing cores and capable of maintaining a temperature of $77 \pm 1.8^{\circ}\text{F}$.
3. CORE SAMPLING:
 - 3.1. Frequency: As specified in Subsection 402.03.02 of the Department's *Standard Specifications for Road and Bridge Construction*.
 - 3.2. Location: As determined by Kentucky Method (KM) 64-113, *Sampling Materials by Random Number Sampling*.
 - 3.3. Size: Entire thickness of the uppermost course placed, not less than approximately 4 in. and not more than approximately 6 in. in diameter.

4. PROCEDURE:

- 4.1. After completing the entire compaction process and allowing the mat to cool sufficiently to permit the removal of the core without damaging it, core at locations determined by the Engineer according to Subsection 3.2 of this method. Under inspection by the Engineer, core to a depth that allows the course designated for testing to be removed from the core hole without affecting the density of that course.
- 4.2. After removing the core, label it in such a manner that all cores may be identified for each subplot within each lot. As an example, in the second lot, second subplot, label the first core obtained as "2-2-A." Further, in the third lot, fourth subplot, label the third core obtained as "3-4-C." Label joint density cores obtained from surface courses in like manner. As an example, in the second lot, second subplot, label the first joint core obtained as "2-2-J1." Further, in the third lot, fourth subplot, label the second joint core obtained as "3-4-J2."
- 4.3. If, during the process of removing the core from the roadway, the course to be tested is damaged, move approximately 6 in. forward (in the direction of the paving operation), and take another core for density determination.
- 4.4. Promptly fill each core hole with compacted asphalt mixture or non-shrink grout before the next lift of asphalt pavement is placed.
- 4.5. Once the core has been removed from the compacted pavement, determine the lift thickness to be separated. If this thickness can't be determined, measure to the planned thickness, and mark a line on the core. Separate the core by sawing it at the determined thickness, taking care to remove all material other than the uppermost course. Perform this operation at the coring site. Do not apply excessive pressure and possibly damage the core. Remove any fines, mud, dust, etc., on the core that may have been generated by the coring or sawing process.
- 4.6. Retain the uppermost course that was placed for testing; discard all other material. Immediately provide the retained portion of the density core to the Engineer at the coring site.
- 4.7. The Engineer will transport the density cores to the Section Supervisor's office or District Materials laboratory with the utmost care. The Engineer will ensure that the cores are not transported or stored at elevated temperatures or in direct sunlight (e.g., in the cab of a vehicle without ventilation, in the bed of a truck, etc.). The Engineer will also secure the cores during transport so that damage (e.g., the loss of material) does not occur.

NOTE 1: Density cores should not be stored or transported on an uneven surface. Cores should be placed flat on the cut face or stood on end in order to avoid damage.
- 4.8. The Engineer will expose the cores to airflow from a fan until they reach a constant mass (normally overnight, but a minimum of 8 h). The cores should be arranged in a single layer such that all exposed surfaces receive constant and uniform airflow in order to expedite the drying process.

4.9. The Engineer will test the retained portion according to T 166.

5. CALCULATION:

5.1. Calculate the bulk specific gravity (G_{mb}) of the core according to T 166.

5.2. Determine the percent of solid density of the core from a given subplot using the following formula:

$$\text{Percent of Solid Density} = 100 \left(\frac{G_{mb} \text{ of core}}{G_{mm} \text{ of subplot}} \right),$$

where:

G_{mb} of core	=	the bulk specific gravity of the core; and
G_{mm} of subplot	=	the theoretical maximum specific gravity of the plant-produced mixture for that subplot.

6. REPORT:

6.1. Report all “percent of solid density” results to the nearest 0.1 percent.

6.2. Report all results on the applicable *Asphalt Mixtures Acceptance Workbook* (AMAW).

6.3. The Department will report the core density results to the Contractor no later than two working days after, but preferably within one working day of, receiving the cores.

APPROVED

DIRECTOR
DIVISION OF MATERIALS

DATE

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