



Volumetrics

Section 5 – Sampling of Asphalt Mix

Sampling Asphalt Mix

- **AASHTO T 168 (WYDOT 401)**
- **This procedure involves sampling mix after it has been processed through the plant.**
- **from a windrow, augers at the paver, and the roadway surface after placement.**
- **The special provision allows for others if the windrow sampling is not possible. Windrow is preferred as it's safest.**

Use

- **This procedure is used to obtain representative samples of mix before it is compacted. Samples may be used for quality control, quality acceptance, and verification of mix volumetrics and voidless unit weight. An authorized WYDOT inspector will be present for sampling.**

Apparatus

Ensure all tools and equipment are clean and dry before sampling.

1. Scoop, 4 inch wide x 8 inch long x 1½ inch deep OR square nosed shovel, approximate blade size of 9 inch wide x 11 inch long x 2 inch deep.

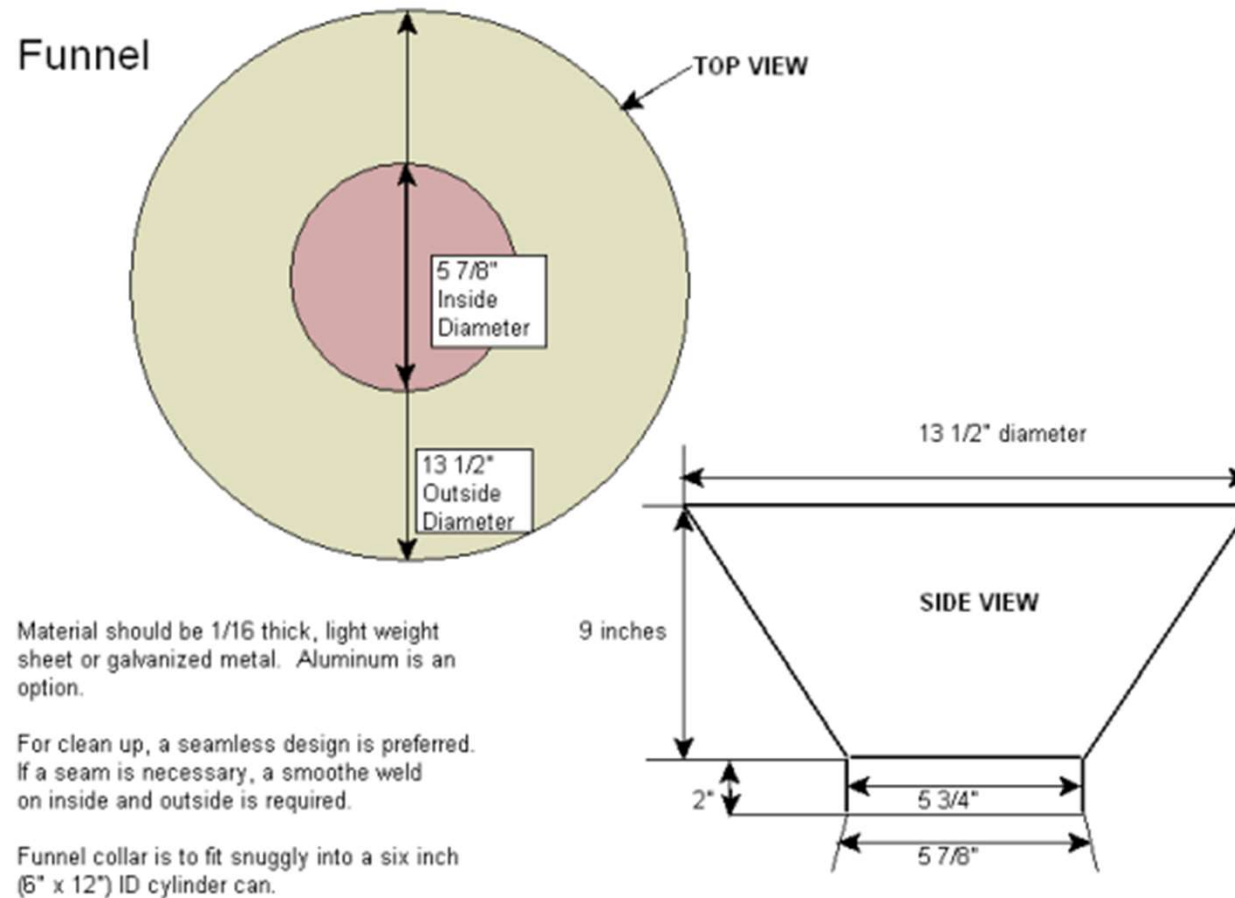
2. Cylinder cans, suggest 6 inch in diameter x 12 inch tall, with lids

3. Protective garments, to keep mix or heated surfaces from burning skin.

**4. Funnel or similar device to minimize material loss
Funnel top width should be at least 3 inch wider than the cylinder can.**

5. Round or square pan, approximately 15 inch diameter and 3½ inch deep for sampling from paver augers.

Funnel Diagram



Procedure

- **Sampling should be random and representative of the entire mix.**
- **The point of sampling will be designated during the pre-construction or pre-paving meeting.**
- **It is essential that samples be collected the same way every time.**
- **Avoid sampling the initial or final few tons delivered.**

Procedure (Continued)

- **The field mix sample will consist of three samples; typically nine cylinder cans for volumetric verification, divided as follows;**
 - ▶ **One sample, three cylinders to be tested by the contractor**
 - ▶ **One sample, three cylinders submitted to WYDOT, and**
 - ▶ **One sample, three cylinders retained by WYDOT as a referee sample.**

Sampling from Windrows

- a. When sampling from a windrow, select a location in the middle third of a truck load. Note the truck type.**

- b. Remove the top 2 inches to 4 inches of mix. This is done by carefully inserting a clean, dry square nosed shovel into the top center portion of the windrow, then placing the removed material aside. Avoid flattening the mix since this may cause segregation.**

- c. Insert the shovel into the cleared space at approximately a 45 degree angle. Push the shovel into the windrow to about 75 percent of the shovel head length within about 3 inches of the bottom of the windrow, whichever is less. Avoid contaminating the sample with the underlying material.**

Sampling from Windrows

d. When the shovel is full, lift it straight up and out of the windrow. Keep the shovel level.

e. Transfer the material from the shovel into a cylinder can with the funnel placed on top. Collect enough mix to fill the cylinder can, generally one shovel-full per cylinder.

➤ **Note: The intent is to collect a representative sample of adequate quantity. If a cylinder is not full, another cylinder should be provided. Likewise, if a shovel full is more than a cylinder, do not overfill; split into two cylinders.**

Sampling from Paver Augers

- **This procedure may present considerable risks if conducted in an unsafe manner. Use due care at all times.**
- **Ensure adequate flow before obtaining samples.**
- **Observe the paver augers from the center slat conveyors to both sides of the screed. The amount of material carried in the augers should be consistent. The depth of material in the augers should be in the middle of the auger shaft or slightly higher for its entire length. The augers should be operating smoothly, not surging, and creating a consistent head of material.**

Sampling from Paver Augers (Continued)

- Observe the paver speed, inconsistent speed results in fluctuating material flow. The paver hopper between truck loads should be partially full. The mix should be maintained near or above the bottom of the flow gates.**
- Be sure the paver operator knows you are sampling. Try to sample the approximate middle third of a truck load.**

Sampling from Paver Augers (Continued)

- a. Sample as close as possible to the end of the auger guard, directly below the flow sensor or next to the paver wheel or track.**
- b. Place a flat bottom scoop or square nosed shovel on the existing surface parallel to the direction of motion of the paver.**
- c. Allow the mix to flow into the scoop or shovel without moving the scoop or shovel.**
- d. When the scoop or shovel is full, lift the scoop or shovel up and toward you slowly, trying to maintain all material on the scoop or shovel.**
- e. Empty the scoop directly into a cylinder can. Collect enough material to fill the cylinder cans.**

TRANSPORTING MIX SAMPLES WYDOT 411.0

- **This procedure describes transporting mix (hot plant mix, recycled hot plant mix, warm plant mix) samples from the sampling site to a testing facility.**
- **It is intended to minimize temperature loss from mix sampled in the field according to WYDOT 410.0. Temperature loss of approximately 1 °F per minute can be expected when following this procedure.**
- **Districts have used Gatorade water barrels to hold the asphalt 6” sample cylinders to deliver from the windrow to the volumetrics lab.**

WYDOT 411.0 Use

- **This procedure is to be used for handling times less than 45 minutes. For travel times greater than 45 minutes, reheating will be required according to WYDOT 412.0.**
- **Mix samples will be in a workable state until subsequent testing is done in accordance with WYDOT 414.0. This procedure reduces reheating time for mix samples.**

Apparatus

- 1. Five gallon buckets with lids, lined on the sides, bottom, and top with loosely placed, paper backed fiberglass or semi-ridged 6 inch ID insulation**
- 2. Insulated safety gloves**
- 3. Cylinder cans, 6 inch in diameter x 12 inch, with lids**

Procedure

- **Obtain the sample following procedure WYDOT 410.0. The lid should be on the cylinder can. Carefully put the cylinder can with lid into the insulated five gallon bucket. Place the top piece of insulation on top of the cylinder lid. Secure the insulated lid on the five gallon bucket.**
- **To reduce handling of the hot cylinder can, place the cylinder inside the insulated bucket prior to sampling.**
- **At the testing facility, determine the sample temperature. If the temperature loss is less than 50 °F, immediately obtain a sample for the moisture content of the mixture. Determine the moisture content of the mix in accordance with WYDOT 413.0. The moisture content of the mix cannot be obtained from a sample that has cooled more than 50 °F.**

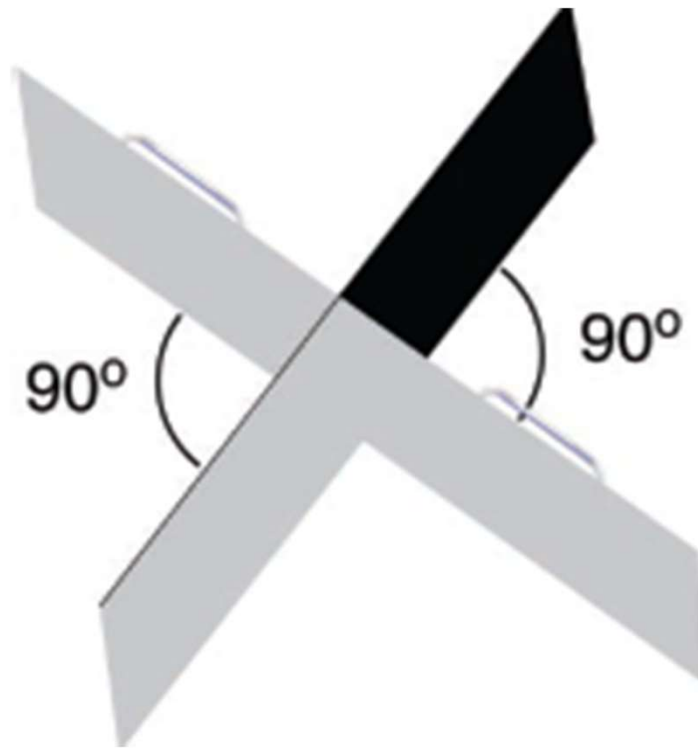
Reducing Samples of Asphalt Mixtures to Testing Size AASHTO R 47

- **WYDOT uses the quartering method.**

APPARATUS

- **Quartering Template—A quartering template manufactured from a suitable metal that withstands heat and use without deforming formed in the shape of a 90-degree cross with equal length sides that exceed the diameter of the flattened cone of material sufficient to allow complete separation of the quartered sample. The height of the sides must be sufficient to extend above the thickness of the flattened cone of the asphalt mixture sample to be quartered**

Quartering Template



APPARATUS (CONTINUED)

- **Flat-Bottom Scoop**—A large, straight-edged, flat-bottom scoop should be used to sample the asphalt mixture. A square shovel or trowel will meet this requirement.
- **Straightedge**—Large spatula, trowel, or metal straightedge.
- **Nonstick paper.**
- **Asphalt Release Agent**—Shall not contain any solvents or petroleum-based products that could affect asphalt binder properties.

PROCEDURE

- **Place the original sample on a hard, “nonstick,” clean, level surface where there will be neither a loss of material nor the accidental addition of foreign material. The surface can be made nonstick by the application of an approved asphalt release agent or nonstick paper. The template and other tools may be heated, not to exceed the maximum mixing temperature of the asphalt mixture.**
- **Mix the material thoroughly by turning the entire sample over a minimum of four times with a flat-bottom scoop or by alternately lifting each corner of the paper and pulling it over the sample diagonally toward the opposite corner, causing the material to be rolled. Create a conical pile by either depositing each scoop or shovelful of the last turning on top of the preceding one, or lifting both opposite corners.**

PROCEDURE (CONTINUED)

- **Carefully flatten the conical pile to a uniform thickness with a diameter four to eight times the thickness by pressing down the top with a shovel or large, flat-bottomed, square scoop. Make a visual observation to ensure that the material is homogeneous.**
- **Divide the flattened mass into four quarters by inserting the quartering template and pressing down until the template is in complete contact with the surface on which the sample is placed. Straightedges may be used in lieu of the quartering device to completely separate the material into approximately equal quarters.**
- **Reduce the sample using one of the following procedures:**
- **Quartering:**
 - ▶ **Remove two diagonally opposite quarters, including all fine mastic material.**
 - ▶ **Remove the quartering template.**
 - ▶ **If necessary, repeat splitting until the required sample size is obtained.**
 - ▶ **The final test sample consists of two diagonally opposite quarters.**

PROCEDURE (CONTINUED)

➤ **Sectoring:**

- ▶ **Cool the material down completely so that you can break it down by hand into its smallest components.**
- ▶ **Using a straightedge, obtain a sector by slicing through a quarter of the asphalt mixture from the center point to the outer edge of the quarter.**
- ▶ **Pull or drag the sector from the quarter holding one edge of the straightedge in contact with the quartering device. Two straightedges may be used in lieu of the quartering device.**
- ▶ **Remove an approximately equal sector from the opposite quarter.**
- ▶ **If necessary, repeat Sections 10.5.2.1 through 10.5.2.3 until the required sample size is obtained.**

REHEATING MIX SAMPLES WYDOT 412.0

- **This procedure describes reheating (hot plant mix, recycled hot plant mix, warm plant mix) mix samples in a testing facility.**
- **This procedure is used to attain appropriate temperatures of field sampled mix prior to volumetric verification testing or voidless unit weight verification testing.**

Apparatus

- **Ventilated oven capable of maintaining temperature for tests to be performed.**

Procedure

- **Place the appropriate quantity of the sample into a preheated oven that is set at the appropriate reheating temperature.**
- **The reheating temperatures should be determined from the following table according to the asphalt binder grade used in the sample being reheated.**
 - PG 58-xx 285 °F**
 - PG 64-xx 295 °F**
 - PG 70-xx 305 °F**
 - PG 76-xx 305 °F**
- **Warm Plant Mix CONTACT MATERIALS PROGRAM The Materials Program will provide the appropriate reheating temperatures for asphalt binder not included in the table above or for warm plant mix.**
- **Heat the sample until the sample reaches a uniform temperature throughout.**