

DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
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METHOD OF TEST FOR SAMPLING HIGHWAY MATERIALS AND PRODUCTS USED IN THE ROADWAY PAVEMENT STRUCTURE SECTIONS

A. SCOPE

This test method describes the procedures for obtaining representative samples of various highway materials and products that are incorporated in roadway pavement structure sections.

Representative sampling is defined as the taking of all materials in the same proportion as they exist or will be used. Good sampling practices must be followed during the process of obtaining materials or products for testing. If the sample does not represent the true conditions of the material under consideration, the subsequent test results and analysis of the data will be erroneous.

The sampler will review the requirements for the tests being performed to ensure that a sufficient quantity of material is sampled, e.g., California Test 214, Schedule A for aggregates.

Each sample container must have proper sample identification. At minimum, sample identification cards must include the following: name of the sampler, location, date and time that the sample was taken, material being sampled, contract number if applicable. Appendix F provides an example of a California Department of Transportation (Caltrans) identification card.

The materials or products to be sampled are listed in Appendices A through E of this test method. For ease of use, procedures for sampling groups of similar materials are included in appendices as follows:

- Appendix A – Aggregates, Soils, and Lime
- Appendix B – Hot Mix Asphalt (HMA)
- Appendix C – Cement and Cementitious Materials
- Appendix D – Bituminous Materials
- Appendix E – Concrete Admixtures

This test method addresses acceptable locations that are routinely used for sampling. If it is necessary to sample from other locations, check the references or contact the Transportation Laboratory.

B. REFERENCES

AASHTO R 47	Reducing Samples of Asphalt Mixtures to Testing Size
AASHTO R 66	Sampling Asphalt Materials
AASHTO R 76	Reducing Samples of Aggregate to Testing Size
AASHTO R 90	Sampling Aggregate Products
AASHTO T 209	Theoretical Maximum Specific Gravity (G _{mm}) and Density of Asphalt Mixtures
AASHTO T 275	Bulk Specific Gravity (G _{mb}) of Compacted Asphalt Mixtures using Paraffin-Coated Specimens
AASHTO T 283	Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
AASHTO T 308	Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method
AASHTO T 312	Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyrotory Compactor
ASTM C183	Sampling and the Amount of Testing of Hydraulic Cement
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C702	Reducing Samples of Aggregate to Testing Size
ASTM D140	Sampling Asphalt Materials
ASTM D75	Sampling Aggregates
ASTM D3665	Random Sampling of Construction Materials
ASTM E300	Sampling Industrial Chemicals
California Test 306	Reducing Samples of Asphalt Mixtures to Testing Size
American Public Health Association	
American Water Works Association	
Water Environment Federation	– “Standard Method for the Examination of Water and waste Water.” Collection and Preservation of Samples

C. APPARATUS

1. Sample Splitters: sample splitters (riffle splitters) must have an even number of equal-width permanently fixed chutes which discharge alternately to each side of the splitter. There must be no less than a total of 8 chutes for

splitters used for coarse aggregate and 12 chutes for fine aggregate. The minimum width of the individual chutes shall be approximately 50% larger than the largest particles in the sample to be split. For dry, fine aggregate in which the entire sample will pass the 3/8 in sieve, the minimum width of the individual chutes should be at least 50% larger than the largest particles in the sample to be split with a maximum width of 3/4 in.

The splitter must be equipped with 2 receptacles to hold the 2 halves of the sample following splitting. It must also be equipped with a hopper or straight-edged pan by which the sample may be fed at a controlled rate to the chutes. The hopper or straight-edged pan must have a width equal to or slightly less than the overall width of the assembly of chutes. The splitter and accessory equipment must be so designed that the sample will flow smoothly without restriction or loss of material.

Note: Typically, 3 different sized splitters (large, medium, and small) are sufficient.

2. Quartering Canvas: a sheet of canvas approximately 5 ft × 5 ft used to quarter aggregates in the field.
3. Sample Containers: various sized heat resistant containers are required. Some should have the following approximate capacities: 65 lb, 15 lb, 7.5 lb, 1 lb, and 0.5 lb.
4. Fan, Forced Air Heater, or Oven: to remove moisture from wet samples. When air drying is not practical, typical equipment may be fans with or without heating coils or a vented, forced draft oven capable of maintaining a temperature of $140^{\circ} \pm 9^{\circ}\text{F}$ ($60^{\circ} \pm 5^{\circ}\text{C}$) or $230 \pm 9^{\circ}\text{F}$ ($110^{\circ} \pm 5^{\circ}\text{C}$).
5. Automatic Sampling Device: a device capable of taking homogenous samples. The device may be electric, hydraulic, pneumatic, or any combination of the three. The device must be capable of capturing and discharging material into a container without overflowing.

D. DRYING OF SAMPLES

1. Dry wet samples sufficiently to permit a complete separation on the No. 4 sieve and to develop a free-flowing condition in the portion passing the No. 4 sieve. Drying may be performed by any means that does not heat the aggregate in excess of 140°F (60°C) or cause degradation of the particles. Sunlight, oven, or forced drafts of warm air are the most common drying methods:
 - a. Drying can be expedited by occasionally stirring the material during the drying process.
 - b. Drying may be done at 230° ± 9°F (110° ± 5°C) when all subsequent tests require or permit drying at this temperature or above.
2. When drying aggregate samples containing reclaimed asphalt pavement (RAP), the oven drying temperature must not exceed 100°F. After drying, articles of RAP can be separated by hand so that the particles of the fine aggregate portion are no larger than ¼ in. Care must be taken to avoid fracturing the aggregate.

E. COMBINING OR REDUCING SAMPLES

Some sampling procedures result in excess material. It is practical to reduce the amount to a sample size equal to or slightly in excess of the minimum weight required before transporting or shipping to the laboratory. The use of a riffle splitter is preferred. However, splitting with a quartering canvas is acceptable if carefully performed. Splitting with a quartering canvas of any HMA is not acceptable.

If combining samples will result in a sample weighing in excess of 100 lb, split each sample separately and combine the smaller portions.

Splitter, accessory equipment, and tools may be heated to 230°F (110°C).

1. Splitting samples with a riffle splitter

The procedures for splitting and reducing samples with riffle splitters are as follows:

- a. The sample must be at a free-flowing condition.

- b. Thoroughly mix the sample and spread it evenly across the pan or hopper.
 - c. Open the hopper gate or pour the material from the pan so that the material flows evenly through all the chutes. Control the rate of discharge as necessary to maintain a continuous flow of materials through the chutes.
 - d. Continue to split or combine successive portions until the desired sample size is achieved.
 - e. Clean excess material from riffle splitters after each use.
2. Splitting aggregate samples with a quartering canvas

A quartering canvas can be used for splitting a sample weighing up to 100 lb. The procedures for splitting samples with a quartering canvas are as follows:

For samples weighing between 20 and 100 lb:

- a. Place the sample in a conical pile in the center of the canvas. Mix the sample by shoveling material from around the bottom edges to the center of the pile. Place each shovelful so that the material spills over the cone equally in all directions.
- b. Flatten the cone with the shovel, spreading the material to a circular layer of uniform thickness.
- c. Insert a stick (or pipe or shovel handle) under the canvas at the center of the pile and lift both ends, dividing the sample into 2 equal parts. Remove the stick leaving the canvas in a folded position. Insert the stick (or pipe or shovel handle) under the canvas at the center of pile at right angles to the first division and again lift both ends, dividing the sample into 4 equal parts. In lieu of dividing by use of a stick, a square point shovel may be used to divide the sample into 4 equal parts.

- d. Take samples from 2 diagonally opposite quarters being careful to clean all the fines from the canvas.
- e. Repeat steps a through d, combining split portions as necessary until the desired sample size is achieved.

For samples weighing less than 20 lbs:

- a. Place the sample on the canvas or a clean sheet of paper. Mix thoroughly with a trowel and form into a conical pile.
- b. Flatten the pile by pressing downward with the trowel.
- c. Separate into quarters with trowel at right angles.
- d. Take samples from 2 diagonally opposite quarters being careful to clean all the fines from the canvas or paper.
- e. Repeat steps a through d combining split portions as necessary until the desired sample size is achieved.

F. REPORTING OF RESULTS

When required, submit sample identification information electronically in accordance with the DIMEXML format and guidance documents found at the following link:

<<https://dime.dot.ca.gov/index.php?r=help/submittestresult>>

G. HEALTH AND SAFETY

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing, or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Refer to the Safety Manual for your Laboratory.

End of Text
(California Test 125 contains 31 pages)

Appendix A

AGGREGATES, SOILS, AND LIME

A. SCOPE

Appendix A contains the procedures for sampling coarse and fine aggregates at various locations for HMA, portland cement concrete, aggregate base and subbase, treated bases, bituminous seals, polymer concrete, soil, and lime.

B. PROCEDURES

Obtain sufficient materials to equal or exceed the minimum sample weight required. If taking material from multiple locations for a composite sample, obtain approximately equal amounts of material from each location and combine to form a field sample which is equal to or in excess of the minimum weight required. Quarter or split the sample to the required size.

Aggregates

A. From HMA Batch Plants

1. At each aggregate storage bin, the contractor is required to provide a safe and suitable sampling device that will provide a sample of the aggregate as it is being discharged into the weigh hopper. This device normally consists of a pan of sufficient size to intercept the entire cross-section of the discharge stream and hold the required quantity of material without overflowing. A set of rails is necessary to support the pan as it is passed under the discharge stream.
2. Supplemental fine aggregate may be sampled from the feed line or surge tank preceding the proportioning device. The selected location must not be pressurized.
3. Baghouse dust may be sampled from the bottom of the baghouse, under the feed screw with a sampler that is fixed under the baghouse. The sampler consists of a valve, a section of pipe, and a cap for the bottom end of the pipe. To sample, close the valve, remove the pipe cap, and clean the pipe. Then, replace the cap and reopen the valve. When the pipe is full, close the valve, remove the cap, and collect the sample of dust.

Baghouse dust may also be sampled similarly to supplemental fine aggregate.

B. From HMA Continuous Mixing Plants

1. The contractor is required to provide a safe and suitable aggregate-sampling device for obtaining a sufficient sample of the combined aggregate while the plant is in full operation. The device must be located in advance of the point where the aggregate enters the dryer-drum mixer.

Some plants are equipped with a sampling device (pan) similar to ones used for batch plant bins. This device normally consists of a pan of sufficient size to intercept the entire cross-section of the discharge stream and hold the required quantity of material without overflowing. A set of rails is necessary to support the pan as it is passed under the discharge stream.

Devices used to divert the stream of combined aggregate into a container must be used with care. Samples taken using diverters that move vertically to cut the stream are not permitted.

Side-to-side diverters are less susceptible to segregation problems as the aggregate stream will normally be layered horizontally. A representative sample may be obtained by diverting the whole stream into an 8 to 12 in. diameter pipe and wasting the first and last quarter of the sample. This method often requires splitting the remaining portion of the sample. Systems that divert the stream of aggregate to a belt for sampling allow the sample size to be selected. Use 2 templates that conform to the shape of the belt to separate an appropriate size section from the middle half of the diverted aggregate. Sample all the material between the templates.

2. Supplemental fine aggregate may be sampled from the feed line or surge tank preceding the proportioning device. The selected location must not be pressurized.
3. Baghouse dust may be sampled from the bottom of the baghouse, under the feed screw, with a sampler that is fixed under the baghouse. The sampler consists of a valve, a section of pipe, and a cap for the bottom

end of the pipe. To sample, close the valve, remove the pipe cap, and clean the pipe. Then, replace the cap and reopen the valve. When the pipe is full, close the valve, remove the cap, and collect the sample of dust.

Baghouse dust may also be sampled similarly to supplemental fine aggregate.

C. From Portland Cement Concrete Batch Plants

The contractor is required to provide safe and suitable facilities, including necessary splitting devices, for obtaining samples of aggregates.

Sampling the belt feeding; the continuous mixer or the batch plant bins immediately preceding the weigh hopper is the most prevalent location for pulling aggregate samples. Use 2 templates that conform to the shape of the belt to separate an appropriate size section. Sample all the material between the templates. Completely remove the aggregate from a section of the stopped conveyor belt. Quarter or split the sample to the required size.

Many plants are equipped with large storage bins (i.e., 100 to 150 cu yd). On small projects, samples from the belt that feeds the bins may not be representative of the aggregate used on the project if the bins have material in them. In this case, empty the bins prior to sampling. To eliminate this problem, a request that the plant operator keep the bins empty or near empty prior to sampling is recommended.

D. From Windrows

Obtain samples from within the middle half of the windrow. Sample the entire cross section of the windrow before water is added. This can be done using steel plates or plywood to isolate the initial sample.

An alternate procedure is to remove a cross section of the windrow at least the width of 1 shovel. From either remaining face, select an appropriate width to provide the needed sample and make a vertical cut. Be sure to include the material that sloughed after removing the cross section.

E. From Roadways

Obtain at least 3 approximately equal portions selected at random locations transversely across the width of the roadway after the material has been spread

and prior to compaction. Take all portions from the roadway for the full depth of the material, taking care to exclude any underlying material. Combine the 3 portions to form a field sample that is equal to or in excess of the minimum weight required.

F. From Transportation Units

Obtain samples from a hauling vehicle from at least 3 points a minimum of 12 inches below the surface and evenly distributed over each individual vehicle. Establish the sample location at a distance from the edge that is approximately one-third of the bed.

G. From Stockpiles

In some cases, it may be necessary to sample from stockpiles for testing. In such cases, the procedure should ensure that segregation does not introduce a serious bias in the results.

At times, "one sized" materials such as No. 4 screenings are stockpiled at the job site. This type of material may be sampled for acceptance testing from the stockpile.

It is very difficult to ensure unbiased samples when sampling from stockpiles. This is due to segregation that occurs when material is stockpiled and coarser particles roll to the outside base of the pile. For all aggregates, use a loader to develop a separate, small sampling pile composed of materials drawn from various levels and locations in the main pile. Drag off the top half of the new pile. Take a shovel full of material from several locations of the remaining half of the pile.

Where power equipment is not available, samples from stockpiles should be made up of at least 3 portions, 1 each from the top third, at the midpoint, and the bottom third of the volume of the pile. A board shoved into the pile just above the sampling point can prevent further segregation.

When sampling stockpiles of fine aggregate, remove the outer layer that may have become segregated and take the sample from the material beneath. If available, sampling tubes (with a diameter of approximately 1 in. and a minimum length of 5 ft) may be inserted into the pile at random locations to extract a minimum of 5 portions of material to form the sample.

Samples can be taken from the stream of material at the end of the moving belt that discharges onto the stockpile. These belt systems can be lowered and moved back and forth to assist sampling. Care must be exercised to intercept the entire discharge stream without overflowing the sampling device.

Soil

A. From the Source

Sample by means of test holes (augured, dug with post-hole digger or shovel, or by other mechanical means). Ensure the method of sampling does not change the physical characteristics of the material. Sample the test holes to the required depth. Take separate samples to represent different material types so that all material types are represented. Reference the location of each sample on the sample identification card.

B. From the Job Site

Sample from within the middle half of the deposit. Take a composite sample from at least 3 locations in a line transversely across the section.

Lime

If lime slurry is being sampled, obtain a minimum of two 1 qt cans with friction lids or poly containers with screw-on lids. Use care to ensure uniform distribution of the solids before sampling.

If quicklime or hydrated lime is being sampled, obtain a minimum of 2 lb in a can with a friction lid or a poly container with a screw-on lid.

A. At the Production Plant

Take samples from the conveyor system with the conveyor stopped. Scoop samples (grab samples) from the sample port opening.

When sampling granular lime for grading analysis, take the entire cross-section of the conveyor.

B. At the Job Site

Take samples from the distributor truck during application.

C. From Pneumatic Tanker

Normally, a thief sampler is used to obtain the sample through the inspection cover or loading hatch. The thief is pushed 2 ± 0.5 ft into the material, withdrawn, and emptied into the can or container.

APPENDIX B

HOT MIX ASPHALT (HMA)

SCOPE

Appendix B contains the procedures for sampling plant-produced hot mix asphalt (HMA). HMA includes non-rubberized asphalt mixtures (Type A HMA, Open Graded Friction Course (OGFC), and Bonded Wearing Course (BWC)) and rubberized asphalt mixtures (Rubberized HMA – Gap Graded (RHMA-G), Rubberized HMA – Open Graded (RHMA-O), and BWC). Procedures are provided for sampling at the plant, from transport vehicles, or on the project site. For reducing samples to testing size, refer to California Test 306.

SAMPLE REQUIREMENTS

The minimum sample weight required for routine testing will depend upon the type of testing and the tests to be performed. Table 1 summarizes minimum required sample containers for routine testing. The quantity of sample containers must be evaluated based on actual project requirements.

The sample location must be selected at random, and not systematically or by the judgement of the inspector. Determine a random sample location using procedures such as those outlined in American Society for Testing Materials (ASTM) D 3665 or similar. From this location, fill the necessary amount of collection or sample containers to obtain the approximate sample weight.

TABLE 1

Minimum Required Sample Containers for Routine Testing

Source of Material / Testing to be Performed	Type of Testing	Number of Sample Containers	Approximate Total Weight (lbs)^a
Production, individual sublots (AASHTO T 209 and T 308)	QC or Acceptance	4	60
Production, individual sublots (AASHTO T 209 and T 308)	QC, Acceptance, and Dispute	12	180
Production, individual sublots (AASHTO T 209, T 308, T 312, and T 275)	QC or Acceptance	8	120
Production, individual sublots (AASHTO T 209, T 308, T 312, and T 275)	QC, Acceptance, and Dispute	24	360
JMF Verification or Production Startup (AASHTO T 209, T 308, T 312, T 275, T 283, and T 324)	QC or Acceptance	16	240
JMF Verification or Production Startup (AASHTO T 209, T 308, T 312, T 275, T 283, and T 324)	QC, Acceptance, and Dispute	48	720

^a Based on approximately 15 lb per sample container

EQUIPMENT

Square-point shovel(s), release agent, and sample containers are required. For non-rubberized asphalt mixtures, collection containers, a metal spatula, and a mechanical quartering device with a minimum of 4 receptacles, are required. Refer to AASHTO R 47, Section 7.1.

Sample containers must be cardboard boxes 8 in. x 8 in. x 4 in. or 8½ in. x 8½ in. x 4½ in. For RHMA-O, BWC, or OGFC, use parchment paper or other release liner to line boxes.

Collection containers used for sampling non-rubberized asphalt mixtures and receptacles used with a mechanical quartering device must be appropriately-sized galvanized steel pails or similar heat-resistant metal containers.

The sample identification must classify containers of material from multiple locations or sections as 1 sample regardless of the number of containers.

PROCEDURES

General

Anti-stick or release agents that do not contain solvents may be used on tools if the tool is cleared of residual material before sampling. Tools may be preheated to prevent accumulation of material.

Place the collection or sample containers as near as practical to the sampling location to minimize handling time.

Using a clean, square point shovel, fill shovel with one single push. Do not overfill the shovel and lift it slowly to avoid the material from rolling off. Deposit HMA material into appropriate containers. Do not overfill the sample containers.

Preparing Sampling Locations

A. Silo or Batch Plant Discharge (non-rubberized asphalt mixtures only)

1. With a trailer-mounted bulk sampler system, take a single drop or multiple drops from the silo or batch plant discharge into a material hopper that will hold the material.
2. Discharge the material directly into a mechanical quartering device to reduce material to sample size.

B. Plant – Deposited Pile

1. Place a single drop or multiple drops from a loader bucket or end dump truck for a total of 2 to 4 tons of material on a level pad (e.g., compacted soil, concrete, or asphalt).
2. Back-drag the deposited pile with a loader to form a pile approximately 16 in. high.
3. Divide the pile into 4 approximately equal quadrants using paint or a shovel. See Figure B.1.

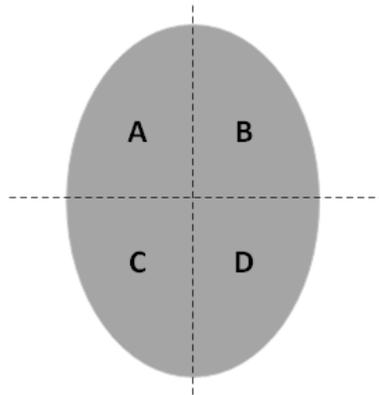


FIGURE B.1 Plant – Back-dragged Deposited Pile

C. Plant - Conveyor System – Automatic Sampler Only

When sampling at HMA plants with an automatic sampling device between the drum discharge and storage silos, sample 4 individual times (4 “pulls”) equivalent to full belt cuts or full stream diversions. Fill containers from separate pulls 1 to 4 minutes apart.

D. Plant - Windrow

1. From a bottom dump, produce a windrow of 1 to 2 ft in height, 2 to 5 ft in width, and a minimum of 14 ft in length. The edge of the sample area should be at least 3 ft from either end of the windrow.
2. Divide the sample area into 4 sections of approximately equal length. See Figure B.2.
3. At each sample location, remove and discard approximately 0.5 ft from the top of the windrow.
4. Trim and discard the front of each sample location creating a 60 to 90 degree angle to the vertical face.

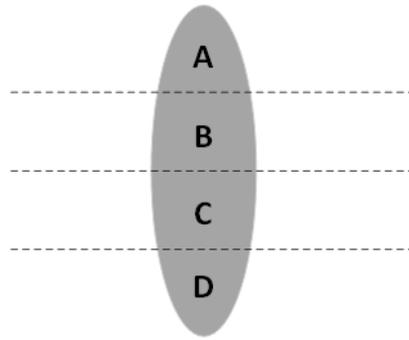


FIGURE B.2 Division of Windrow at the Plant

E. Transportation Units – Automatic Sampler Only

1. For trucks with a single bed configuration, divide the truck bed into 4 sections of approximately equal length. See Figure B.3.

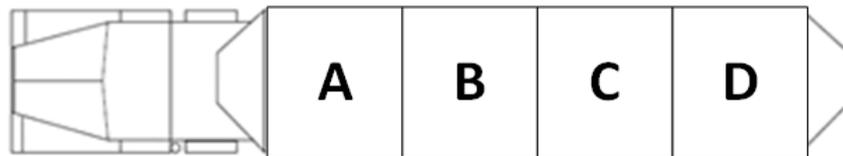


FIGURE B.3 Single Bed Configuration

2. For trucks with a tandem bed configuration, divide each tandem bed into 2 approximately equal sections to create a total of 4 sections of approximately equal length. See Figure B.4.

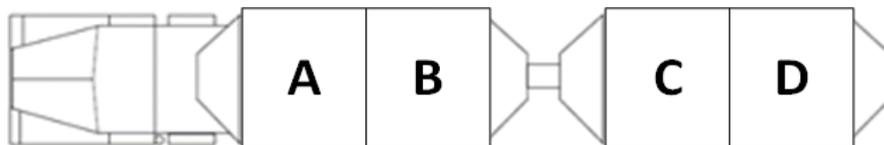


FIGURE B.4 Tandem Bed Configuration

F. Jobsite - Mat Behind the Paver

Select 4 sections of approximately equal width immediately behind the paver starting at a minimum of 1 ft from edge and spaced equally in a line transversely across the mat. See Figure B.5.

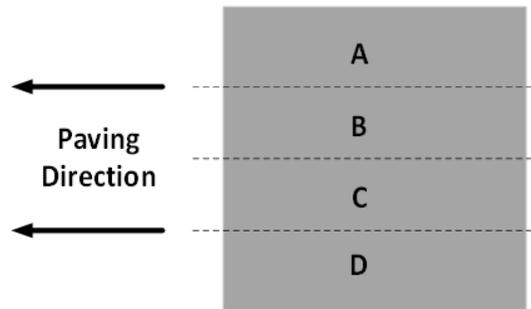


FIGURE B.5 Mat Behind the Paver

G. Jobsite - Windrow

1. Select a sample area of the windrow at a minimum of 8 ft in length. The edge of the sample area should be at least 3 ft from either end of the windrow.
2. Divide the sample area into 4 sections of approximately equal length.
3. Follow procedure for Plant – Windrow, section D, steps 3 and 4.

Sampling, Combining, and Reducing

A. Non-rubberized Asphalt Mixtures

For non-rubberized asphalt mixtures, a sample container includes a portion of the sample and one sample container should be representative of the entire sample.

1. Label 4 appropriately-sized collection containers A, B, C, and D.
 - a. For a trailer-mounted bulk sampler, fill collection containers directly from an attached mechanical quartering device.
 - b. For a deposited pile at the plant, windrow at the plant, mat behind the paver, or windrow at the job site, shovel material from each quadrant or section directly into its corresponding collection container. Collection containers must be approximately half full.
 - i. Plant – Deposited Pile: Do not sample material within 1 ft of the pile edge or within 1 in. of the base material.

- ii. Plant and Jobsite - Windrow: Obtain sample(s) from the middle of each of the 4 sections by digging into the vertical face across the entire cross-section of the windrow with a shovel in a horizontal motion. Do not take material within 1 ft of the windrow linear edge, or within 1 in. of the base material.
 - iii. Jobsite - Mat Behind the Paver: Include the full depth of the material. Exclude any underlying material (e.g., aggregate base or tack coat).
 - c. For a conveyor system with an automatic sampler at the plant, fill collection containers directly from separate pulls 1 to 4 minutes apart. Collection containers must be approximately half full.
 - d. For transportation units, fill collection containers directly from the automatic sampler. Collection containers must be approximately half full.
 - i. For each section, use an automatic sampling device to take samples at least 1 ft from the edge of the bed or section borderlines.
 - ii. Take the sample at least 1 ft below the surface of the material.
- 2. Use a mechanical quartering device to combine collection containers into a composite sample:
 - a. Prior to use, assure the mechanical quartering device is cleared of residual material to prevent cross contamination.
 - b. Level the mechanical quartering device to ensure an even flow of material.
 - c. Make sure the hopper door is closed and latched before placing the material into the mechanical quartering device.

- d. Pour all 4 collection containers evenly into the mechanical quartering device using a continuous pour from multiple directions around the hopper to avoid segregation.
 - e. Prior to releasing the hopper, level the material with a metal spatula or another appropriate, heat-resistant tool.
 - f. Place 4 receptacles under the mechanical quartering device and release the hopper door.
 - g. To ensure a composite sample, repeat steps c through f with the contents of all 4 receptacles.
3. Reduce to sample container size:
- a. Make sure the hopper door is closed and latched before placing the material into the mechanical quartering device.
 - b. Remove 2 diagonally opposite receptacles from the composite sample produced in step A.2.g and load them into the mechanical quartering device using a continuous pour from multiple directions around the hopper to avoid segregation. Set aside the remaining 2 receptacles of material.
 - c. Prior to releasing the hopper, level the material with a metal spatula or another appropriate, heat-resistant tool.
 - d. Place 4 receptacles under the mechanical quartering device and release the hopper. This will yield 4 receptacles each containing half the amount of material from the 2 diagonally opposite receptacles in step b.
 - e. Repeat steps a through d to produce 4 receptacles that yield enough material to fill 4 sample containers.
 - f. Once the necessary amount of material has been obtained, use this material to reload the mechanical quartering device using a continuous pour from multiple directions around the hopper. Level

the material with a metal spatula or another appropriate, heat-resistant tool.

- g. Place 4 sample containers under the mechanical quartering device so that material will flow directly into each sample container without overflowing. Release the hopper door to fill the 4 sample containers.
- h. Repeat steps a through g to fill additional sample containers as required.

B. Rubberized Asphalt Mixtures

For rubberized asphalt mixtures, one sample consists of 4 sample containers. See Figure B.6. Prior to sampling, label sample containers A, B, C, and D.

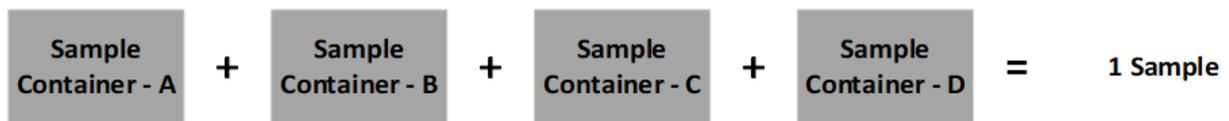


FIGURE B.6 Sample Container Identification

1. For a deposited pile at the plant, windrow at the plant, mat behind the paver, or windrow at the job site, shovel material from each quadrant or section directly into its corresponding sample container.
 - a. Plant – Deposited Pile: Do not sample material within 1 ft of the pile edge or within 1 in. of the base material.
 - b. Plant and Jobsite - Windrow: Obtain sample(s) from the middle of each of the 4 sections by digging into the vertical face across the entire cross-section of the windrow with a shovel in a horizontal motion. Do not take material within 1 ft of the windrow linear edge, 3 ft from either end, or within 1 in. of the base material.
 - c. Jobsite - Mat Behind the Paver: Include the full depth of the material. Exclude any underlying material (e.g., aggregate base or tack coat).

2. For a conveyor system at the plant, fill sample containers directly from separate pulls 1 to 4 minutes apart.
3. For transportation units, fill sample containers directly from the automatic sampler.
 - a. For each section, use an automatic sampling device to take samples at least 1 ft from the edge of the bed or from section borderlines.
 - b. Take the sample at least 1 ft below the surface of the material.

APPENDIX C CEMENT and CEMENTITIOUS MATERIAL

SCOPE

Appendix C contains the procedures for sampling cementitious products and water to be used in portland cement concrete, lean concrete base, and cement treated permeable base.

PROCEDURES

Cement and Cementitious Material

Place the samples directly into plastic bags (double bag) and seal immediately after filling and eliminating excess air.

A. At the Concrete Plant

Sample at the weigh hopper or from the feed line immediately in advance of the hopper. In many plants, a thief sampler is installed in the trough feeding the weigh hopper, the weigh hopper itself, or a cement-holding hopper. If samples are obtained in this manner, the plant must be equipped with appropriate safety measures.

Some plants would require extensive plant modification to make these sampling locations available and safe. In this case, an adequate sample can be obtained by dropping at least 100 lb of cement or supplementary cementitious material from the weigh hopper into the clean bucket of a loader. Then, it can be lowered to ground level where the material can be sampled. Take a minimum of 3 equal scoops to represent a sample. Take the scoops at different locations but avoid sampling near the edges of the loader bucket.

B. From Package with Tube Sampler

Sample from packaged cement using a tube sampler. Insert the tube sampler diagonally into the valve of the bag (20 in. for packaged cement) and place the thumb over the air hole. Withdraw the sampler. Take a sample from 1 bag for each 4.5 ton or fraction thereof.

C. From Pneumatic Tanker

Sample with a thief sampler through the inspection cover or loading hatch. The thief is pushed 2 ft \pm 0.5 ft into the material and withdrawn.

Water

Place a water sample in a clean 2 qt plastic jug with a lined, sealed lid. Prior to obtaining the sample, fill and rinse the jug 3 times with the water being collected. Fill the container to the top, mark the outside of container with time and date, refrigerate or ice to approximately 40°F, and deliver to the laboratory within 24 hr.

A. From Distribution Systems

Flush the lines sufficiently to ensure the sample is representative of the supply. Consider the diameter and length of the pipe to be flushed and the velocity of flow.

B. From Wells

Collect samples from wells only after the well has been pumped sufficiently to ensure the sample represents the ground water source. Sometimes, it will be necessary to pump at a specified rate to achieve a characteristic draw down.

C. From Rivers and Streams

If equipment is available, take an integrated sample from top to bottom at mid-distance horizontally in the stream in such a way that the sample is representative of the river or stream.

If only a grab sample can be collected, take it in the middle of the stream and at mid-depth.

D. From Lakes and Reservoirs

Lakes and reservoirs are subject to considerable variations from normal causes such as seasonal stratification, rainfall, runoff, and wind. Choose the location, depth, and frequency of sampling depending on local conditions and the purpose of the sample. Avoid surface scum.

E. In Concrete or Lime Mixing Plants

Sample from the line that feeds water into the mix at the plant facilities.

APPENDIX D BITUMINOUS MATERIALS

SCOPE

Appendix D contains the procedures for sampling liquid, semi-solid, or solid bituminous material at various locations.

PROCEDURES

Except for emulsions, all binder samples, including asphalt rubber binder, must be placed in double-seal friction-top 1 qt metal, cylindrical shaped cans. See Figure 1.

NOTE: For asphalt rubber binder that requires the hand-held viscosity test (ASTM D7741), the asphalt rubber binder must also be placed in a 1 gal metal cylindrical shaped can with double-seal friction top.

Fill each metal with binder to about 1 in from the rim.



FIGURE 1 Binder Sample Containers

For emulsions, samples must be placed in 1 L (or 1qt) wide-mouth plastic bottle with screw on lids that are sealed with tape. See Figure 2.



FIGURE 2 Emulsion Sample Container

All samples containers must be new, clean, and dry.

Avoid contamination of the sample with solvent, diesel, or other parting agents. After pouring the sample, place the lid on as tightly as possible. Any binder or emulsion spilled on the can or the outside of the container must be wiped off at once. Under no circumstances must the container be placed in a bucket of solvent to remove spillage.

Emulsion samples must not be subjected to extremes of temperatures as this will negatively affect the test results. The Sample Identification Card (TL-101) must include a copy of the Certificate of Compliance showing material complies with the specifications, including the undiluted emulsions residual rate percentage. The TL-101 must also show parts of added water to parts original undiluted emulsion. For example, 1 part added water to 4 parts emulsion, or 80% of original emulsion and 20% added water.

After taking the sample, mark the outside of the container with the project number, type of material, and the date and time sampled. For samples sent to the Transportation Laboratory attach a completed TL-101 to each container prior to shipping. Each TL-101 must represent one container.

Asphalt Binders

A. At the Manufacturing Source

Sample bituminous materials in bulk storage tanks equipped with or without mechanical agitators by using existing sampling valves or taps at the lower locations of the tank. Withdraw a 1 qt sample after taking and discarding a minimum of 1 gal of material.

B. From Tank Cars, Tank Trucks, or Re-circulating Storage Tanks

Tanks must be equipped with a sampling valve. The inlet to the valve must be located a minimum of 12 in. from any wall. Withdraw a 1 qt sample after taking and discarding a minimum of 1 gal of material.

C. From Distributor Trucks

Sample from the sample valve of distributor trucks at mid-load during operations. Do not sample from the spray bar. Withdraw a 1 qt sample after taking and discarding a minimum of 1 gal of material.

An acceptable alternative is as follows: Secure the sample with an oil thief. Lower a clean oil thief to the bottom of the tank and withdraw it at such a rate

that when removed from the binder, some unfilled space remains in the thief. To prevent contamination of the sample by material remaining in the thief from previous sampling or from traces of solvents used in cleaning, discard the first 2 samples removed with the thief. Pour the third sample drawn into the sampling can.

D. HMA Plant Feed Line

The contractor is required to provide a suitable sampling device in the binder feed lines connecting plant storage tanks to the binder weighing system or spray bar.

The sampling device must consist of a 1/2 or 3/4 in. valve constructed in such a manner that a 1 qt sample may be withdrawn slowly at any time during plant operations. The valve must be maintained in good condition, and if it fails to function properly, it must be replaced. The sampling device must be readily accessible, in an area free of dangerous obstructions, and must be between 24 and 30 in. above the platform. A drainage receptacle must be provided for flushing the device prior to sampling.

Flush the sample valve plumbing with a minimum of 1 gal of material prior to taking the sample.

Emulsions

Circulate asphaltic emulsion in the distributor truck before sampling. Sample asphalt emulsion or polymer modified asphalt emulsion at the job site from the distributor truck at mid-load during operations.

Sample from the sample valve of distributor trucks at mid-load during operations. Do not sample from the spray bar. Withdraw a 1 qt sample after taking and discarding a minimum of 1 gal of material.

Crack Filler Material

Sample the smallest prepackaged container available. Take 1 sample per lot delivered to the project.

APPENDIX E CONCRETE ADMIXTURES

SCOPE

Appendix E contains the procedures for sampling air entraining agents, chemical admixtures, and curing compounds for use in portland cement concrete and lean concrete base.

Also, Appendix E contains the procedures for sampling polyester resins and high molecular weight methacrylates and their promoters and initiators that are used in polymer concrete.

PROCEDURES

Liquid Air Entraining Agents and Chemical Admixtures

All liquid admixtures must be thoroughly agitated, without introducing air, immediately prior to sampling. Place the samples in clean, moisture proof, airtight cans or plastic bottles.

A. At the Manufacturing Source

Take a 1 qt sample from the mix tank at the conclusion of the mixing operation.

B. From Large Holding Tanks or Bulk Storage Tanks

Sample equally from the upper, intermediate, and lower levels by means of drain cocks in the sides of the tanks or a weighted sampling bottle fitted with a stopper that can be removed after the bottle is lowered to the desired depth.

Each grab sample must have a volume of at least 1 pt. Take a minimum of 3 grab samples. Combine and mix the 3 samples thoroughly and sample the resultant mixture to provide a composite 1 qt sample.

C. From Drums or Other Smaller Containers

Obtain a 1 qt sample to represent 1 or more selected drums or containers.

D. At Concrete Batch Plants

Take samples from a sampling valve located on the liquid admixture dispensing system. Flush the valve and discard a minimum of 1 qt of admixture. Then, take a 1 qt sample.

Non-Liquid Air Entraining Agents and Chemical Admixtures

Samples must be packaged in moisture proof, metal or plastic, airtight containers.

A. From Bulk Storage Tanks or Transportation Units

Take a minimum of four 1 lb grab samples from different locations. Combine and thoroughly mix the grab samples. Split the combined material to obtain a resultant composite sample of 2 lb or more.

B. From Packages

Obtain samples by means of a tube sampler. Insert the tube sampler diagonally into the material, transversing the package. Place the thumb over the air hole. Withdraw the sampler. Repeat to obtain at least 2 lb. Take 1 sample per lot.

Curing Compounds

All curing compounds must be thoroughly agitated, without introducing air, immediately prior to sampling. Place the samples in clean, moisture proof, airtight cans or plastic bottles.

Take a 1 qt sample to represent 1 or more selected drums or containers.

A. From Manufacturing Source

Take a 1 qt sample from the mix tank at the conclusion of the mixing operation.

B. From Large Holding Tanks or Bulk Storage Tanks

Sample equally from the upper, intermediate, and lower levels by means of drain cocks in the sides of the tanks or a weighted sampling bottle fitted with a stopper that can be removed after the bottle is lowered to the desired depth.

Each grab sample must have a volume of at least 1 pt. Take a minimum of 3 grab samples. Combine and mix the 3 samples thoroughly and sample resultant mixture to provide a composite 1 qt sample.

Polyester Resins, High Molecular Weight Methacrylates, and Promoters and Initiators used in Polymer Concrete

Minimum composite sample sizes are:

- Polyester Resin - 1 gal
- High Molecular Weight Methacrylates – 2 qt
- Promoters and Initiators – 1 pt

Place all samples in rust proof cans with screw neck or friction top lids.

A. From Storage Tanks, Tank Trucks, and Tank Cars

Sample equally from the upper, intermediate, and lower levels by means of drain cocks in the sides of the tanks or a weighted sampling bottle fitted with a stopper that can be removed after the bottle is lowered to the desired depth.

Each grab sample must have a minimum volume which is designated in the above minimum composite sample sizes. Take a minimum of 3 grab samples. Combine and mix the 3 samples thoroughly and sample resultant mixture to provide a composite 1 qt sample.

B. From Drums or Other Smaller Containers (5 gal or larger)

Obtain samples from drums and smaller containers using a tube sampler. The sampler must be designed so that it will reach to within 1/8 in. from the bottom of the drum or container.

Thoroughly agitate the material in the drum or container. Withdraw some liquid with the tube sampler. Rinse the tube with the liquid by holding it horizontally and turning it so the liquid comes in contact with the inside of the tube. Discard the rinse liquid and allow the tube to drain.

Obtain a full depth sample by inserting the tube with the upper end open. When the tube reaches within 1/8 in. from the bottom, place the thumb over the hole and remove the tube quickly.

APPENDIX F

TL-101 Caltrans Sample Identification Card

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION		SAMPLE NUMBER:
SAMPLE IDENTIFICATION CARD		
TL-0101 (REV. 10/12)		
TEST TYPE:	SAMPLE SENT TO:	FIELD NO.
<input type="checkbox"/> DIST. LAB	<input type="checkbox"/> HDQRS. LAB	_____
<input type="checkbox"/> TRANS. LAB	<input type="checkbox"/> BRANCH LAB	DIST LAB NO.
	<input type="checkbox"/> DIST. LAB	_____
	SHIPMENT NO.	LOT NO.
	_____	_____
	AUTHORIZATION NO.	P.O. OR REQ. NO.
	_____	_____
SAMPLE OF:		

FOR USE IN:		

SAMPLE FROM:		

DEPTH:		

LOCATION OF SOURCE:		

THIS SAMPLE IS SHIPPED IN NO. CONTAINERS)	AND IS ONE OF A GROUP OF	SAMPLES REPRESENTING (TONS, GALS, BBLs, STA, ETC.
_____	_____	_____
OWNER OR MANUFACTURER:		
_____	_____	_____
TOTAL QUANTITY AVAILABLE	TEST RESULTS DESIRED	DATE NEEDED
_____	<input type="checkbox"/> NORMAL <input type="checkbox"/> PRIORITY	_____
REMARKS:		

DATE SAMPLE:		

BY:		

TITLE:		

DIST, CO, RTE, PM:		

LIMITS:		

CONT. NO.:		

FED. NO.:		

RECIPIENT(S):		

CONTRACTOR:		

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