Special Requirements	Test Method	Test Designation	Page
A Technician can be certified in any of these tests through special arrangements with NAQTC.	Standard Practice for Sampling bituminous Materials (Sampling from place of manufacture) Sampling at point of shipment delivery)	AASHTO T40	2
	Sulfate Soundness – Sodium Sulfate Only	AASHTO T104	3
	Resistance R-Value – Exudation Only	AASHTO T190	5
	Resistance to Deformation of Bituminous Mixtures by Means of Hveem Apparatus	AASHTO T246	7
	Resistance to Moisture (TSR)	AASHTO T283	9
	Standard Test Method for Methylene Blue Index of Clay	ASTM C937	11

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

STANDARD PRACTICE FOR SAMPLING BITUMINOUS MATERIALS
(Sampling from place of manufacture)
(Sampling at point of shipment delivery)
(AASHTO T40)

Procedure

		1st	2nd
Sample size of liquid materials			
1.	For routine lab examination: 1L (1qt)?		
2.	From bulk storage: 1L (1 qt)?		
Containers for liquid materials			
1.	For bituminous: double-friction top cans, square can with screw top, small-mouth can?		
Sampling at place of manufacture			
1.	Sampling valve method?		
2.	Min. of 1 gal. of the product shall be drawn from each sample valve and discarded before taking the sample for test?		
3.	First valve in the top third of the tank?		
4.	Second valve in the middle one third of the tank?		
5.	Third valve in the bottom third of the tank?		
Sampling at point of shipment delivery			
1.	Sampling as soon as the bituminous material arrives at plant site?		
2.	Required samples shall be taken from each delivery?		
3.	Sampling is done using the following method:		
	a. Using the methods described in "sampling at place of manufacture?"		
	b. By bleeding through a sample valve in the transfer line during unloading in the middle third of the load?		
	c. By means of a sampling device inserted to a level of approximately the middle third of the tank?		
4.	Min. of 1 gal. of the product shall be drawn from each sample valve and discarded before taking the sample for test?		
5.	Test for acceptability on one of the samples taken. Retain the other sample for confirmation in the event the first sample test fails to comply with requirements.		
Labeling			
1.	Immediately after filling, the containers shall be sealed?		
2.	Containers shall be properly marked for identification on the container itself?		

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

SOUNDNESS OF AGGREGATE BY USE OF SODIUM SULFATE OR MAGNESIUM SULFATE (AASHTO T104)

Course or Fine

Procedure

Fine Aggregate		1st	2nd
1.	Passed through a 9.5 mm (3/8 in) sieve?		
2.	Washed on a 300-µm (No. 50) sieve?		
3.	Dried to constant mass at 110 ± 5°C (230 ± 9° F)?		
4.	Sample rough graded to obtain 110 g or more of each of the following sizes, if possible:		

9.5 to 4.75 mm	3/8 in.	No. 4
4.75 to 2.36 mm	No. 4	No. 8
2.36 to 1.18 mm	No. 8	No. 16
1.18 to 0.600 mm	No. 16	No. 30
0.600 to 0.300 mm	No. 30	No. 50

(not required to be memorized)

		1st	2nd
5.	If sample contains less than 5% of any specified size, that size not tested?		
6.	Each size sieved a second time to refusal?		
7.	Aggregates sticking in sieve openings discarded?		
8.	100 ± 0.1 g of each size weighed out and put in separate containers?		
Coarse Aggregate			
1.	Material finer than 4.75 mm (No. 4) removed?		
2.	Aggregate thoroughly washed and dried to constant mass at 110 ± 5° C (230 ± 9° F)?		
3.	By sieving to refusal, sample separated into the following sizes:		

63 to 37.5 mm	2 ½	1 ½ in.
37.5 to 19.0 mm	1 ½	¾ in.
19.0 to 9.5 mm	¾	3/8 in.
9.5 to 4.75	3/8 in	No. 4

(not required to be memorized)

		1st	2nd
4.	Weight of each fraction present as follows:		
	63 to 37.5 mm: 643 to 50 mm 3000 ± 300 g? (2 ½ to 1 ½ in) (2 ½ to 2 in)		
	50 to 37.5 mm 2000 ± 200g. (2 to 1 ½ in)		
	37.5 to 19.0 mm: 37.5 to 25.0 mm 1000 ± 50 g? (1 ½ to ¾ in) (1 ½ to 1 in)		
	25.0 to 19.0 mm 500 ± 30 g?		
	19.0 to 9.5mm: 19.0 to 12.5 mm 670 ± 10g? (3/4 to 3/8 in) (3/4 to ½ in)		
	12.5 to 9.5 mm 330 ± 5 g?		
	9.5 to 4.75 mm: 300 ± 5 g? (3/8 into No. 4)		
5.	If sample contains less than 5% of any specified size, that size not tested?		

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

SOUNDNESS OF AGGREGATE BY USE OF SODIUM SULFATE OR MAGNESIUM SULFATE
(AASHTO T104)
-Continued-

Procedure		1st	2nd
1.	Salt cake in bottom of solution container broken up and stirred?		
2.	Specific gravity of solution checked?		
3.	Each sample immersed in depth at least 12.5 mm (1/2 in) above its top?		
4.	Samples kept immersed for 16 to 18 hours?		
5.	After removal from solution, each sample drained 10 to 20 minutes?		
6.	Dried to constant mass at 110 ± 5°C (230 ± 9° F)?		
7.	Cooled to room temperature 20 to 25° C (68 to 77° F)?		
8.	Temperature of aggregate checked by thermometer or other acceptable means before placing in sulfate solution?		
9.	Re-immersed and process continued until required number of cycles is completed? Note: If test must be interrupted, samples should be left in oven 110 ± 5° C until resuming the test.		
10.	Temperature records from recording unit reviewed to verify solution temperature limits were not exceeded?		
11.	After final cooling, sample washed by circulating water at 43 ± 6° C (110 ± 10° F) through the samples in their containers?		
12.	Hot water introduced near bottom and allowed to pass through samples and overflow?		
13.	Impact or abrasion of samples avoided during washing operation?		
14.	Barium chloride used to check completeness of washing? Note: If barium chloride reacts with lab water, completeness of washing must be determined by other means.		
15.	Each fraction dried to constant mass at 110 ± 5°C (230 ± 9° F)?		
16.	Fine Aggregate: Sieved over same sieves used before test and in the same manner (i.e. if hand sieved originally, should be hand sieved at the end)?		
17.	Course Aggregate: Hand sieved over:		
	31.5 mm sieve for 63 to 37.5 mm? (1 ¼ in sieve for 2 ½ to 1 ½ in)		
	8.0 mm sieve for 19.0 to 9.5 mm? (5/16 in sieve for ¾ to 3/8 in)		
	16.0 mm sieve for 37.5 to 19.0 mm? (5/8 in sieve for 1 ½ to ¾ in)		
	4.00 mm sieve for 9.5 to 4.75 mm? (No. 5 sieve for 3/8 into No. 4)		
18.	Mass of material retained to each sieve determined?		

Comments:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

Resistance R-Value and Expansion Pressure of Compacted Soils (AASHTO T190)

Procedure

		1st	2nd
Soil Preparation			
1.	Any coatings removed from coarse aggregate and clay lumps broken to pass 4.75 mm No. 4 sieve?		
2.	When material is retained on 19.0 mm (3/4 in.) sieve: (a) When 75% or more passes 19.0 mm sieve, that part of sample passing 19.0 mm sieve used? (b) If less than 75% passes 19.0 mm sieve, that part of sample passing 25.0 mm (1 in.) sieve used?		
Specimen Preparation			
1.	Four 1200 g samples mixed with amount of water estimated to equal ½ to 2/3 of water required to produce saturation?		
2.	Samples placed in covered containers and allowed to stand overnight?		
3.	Just prior to compaction, samples mixed with final amount of water to produce saturation?		
4.	First sample is pilot specimen to assist in determining final amount of water required?		
5.	Enough material weighed out to fabricate compacted sample 101.6 mm (4 in.) in diameter by 63.5 mm (2.5 in.) high?		
6.	Mold placed in mold holder approximately 3 mm (1/8 in.) from base of holder by placing shim under mold edge and tightening set screw, if available, on mold holder?		
7.	Compactor foot pressure set at 1724 ± 172 kPa [250 ± 25 psi]?		
8.	76.2 mm (3 in.) of soil is trough fed into mold?		
9.	Balance of soil fed into mold in 20 equal increments, with one application of ram after each increment?		
10.	Soil leveled with 10 additional tamps?		
11.	Rubber disk placed on top of specimen (AASHTO: set screw, if available, loosened and shim removed)?		
12.	100 additional tamps applied with foot pressure of 2413 kPa [350 psi]? Note: Use lower compaction pressures when necessary to limit penetration of ram into soil to not more than 6.35 mm (1/4 in.)		
13.	Compaction stopped at any time before 100 tamps if water appears around bottom of mold?		
14.	Mold removed and tamped surface leveled by hand tamping with tamping rod?		
15.	Phosphor-bronze disk placed on tamped surface, and filter paper placed on disk?		
16.	Mold inverted and placed on exudation device, so that filter paper is on bottom?		
17.	Uniformly increasing pressure applied to soil with compression machine at rate of 8896 N. [2000 lbf] minute?		
18.	Water exuded from soil at 2068 kPa [300 psi], as evidence that enough moisture is present to produce saturation?		
19.	Loading stopped and exudation pressure recorded when either 5 of 6 outer lights on device are lighted or when 3 outer lights are lighted and free water is visible around bottom of mold?		
20.	Loading does not exceed 5516 kPa [800 psi]?		
21.	At least two more specimens molded with different amounts of water so range of exudation pressures from 689 to 5516 kPa [100 to 800 psi] is obtained, which brackets the 2068 kPa [300 psi] value?		

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

Resistance R-Value and Expansion Pressure of Compacted Soils (AASHTO T190)

-Continued-

	Adjustment of Stabilometer	1st	2nd
1.	Bronze nut on stabilometer stage base adjusted so top of stage is 89 mm (3 1/2 in.) below bottom of upper tapered ring of stabilometer?		
2.	With standard metal specimen in chamber, air amount in stabilometer cell adjusted so that 2 ± 0.05 turns of pump handle increase liquid pressure from 34.4 to 689 kPa [5 to 100 psi]?		
	Resistance Value Testing		
1.	Water poured off top of specimen, and mold with specimen placed on top of stabilometer? *Note: If all water had drained through specimen, water should be added to top and allowed to stand for 15 minutes. Any excess water should then be poured off and test continued?*		
2.	Follower placed on top of specimen and specimen forced from mold into stabilometer?		
3.	Testing machine head lowered until it just engages follower?		
4.	Horizontal pressure of 34.5 kPa [5 psi] applied to specimen with displacement pump?		
5.	Uniform vertical load applied at rate of 1.3 mm/minute (0.05 in./minute)?		
6.	Vertical load stopped at 8896 N [2000 lbf] and horizontal pressure recorded?		
7.	Vertical load reduced to [1000 lbf]?		
8.	Horizontal pressure adjusted to 34.5 kPa (5psi)with displacement pump? *Note: This will result in further reduction in applied load and should be ignored.*		
9.	Stabilometer pump handle turned approximately 2 turns/second and number of turns (using turns-displacement indicator on stabilometer) required to raise horizontal pressure from 34.5 to 689 kPa [5 to 100 psi] recorded?		
10.	R-value calculated using book equation?		

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

RESISTANCE TO DEFORMATION AND COHESION OF BITUMINOUS MIXTURES BY MEANS OF HVEEM APPARATUS – Stability value only (AASHTO T246)

Adjustment of Stabilometer		1st	2nd
1.	Base adjusted so that distance from bottom of upper tapered ring to top of base is 89 mm (3 ½ in.)?		
2.	Calibration cylinder inserted into stabilometer?		
3.	A horizontal pressure of 34.5 kPa (5 psi) applied?		
4.	Turns indicator dial adjusted to zero?		
5.	Pump handle turned until the stabilometer dial reads 689 kPa (100 psi)?		
6.	Pump handle turned at approx. two turns per second?		
7.	Turns indicator dial reads 1.95 to 2.05 turns?		
8.	If not, is the air in the cell adjusted and procedure repeated?		
9.	Horizontal pressure released and calibration cylinder removed?		
Resistance to Deformation			
1.	Test specimens are 102 mm (4 in.) in diameter and 64 ± 3 mm (2.5 ± 0.1 in.) high? *Note: If specimens are not correct height or diameter, the stabilometer value shall be corrected.*		
2.	Test specimens mixed an compacted in accordance with AASHTO T247		
3.	Specimen brought to 60 ± 3° C (140 ± 5° F)? *Note: Bring specimen to room temperature when desired to test with whatever moisture is present.*		
4.	Specimen transferred from mold to stabilometer by means of the push out device?		
5.	Tamped end of specimen is up?		
6.	Follower placed on top of specimen?		
7.	Horizontal pressure of 34.5 kPa (5 psi) applied?		
8	Vertical movement of press begun?		
9	Speed of 1.3 mm/min (0.05 in./min)?		
10.	If locking shims used on spherical head of loading device, shims removed prior to stabilometer test?		
11.	Stabilometer gauge readings recorded at vertical loads of AASHTO: 2.23, 4.45, 8.90, 13.4, 17.8, 22.3, and 26.7 kN (500, 1000, 2000, 3000, 4,000,5000, and 6000 lbf)?		
12.	Vertical movement of press stopped at 26.7 kN (6000lbf) load?		
13.	Vertical load immediately reduced to 4.45 kN (1000 lbf)		
14.	Horizontal pressure adjusted to 34.5 kPa (5 psi)? *Note: this will result in a further reduction of the vertical load and is normal.*		
15.	Pump handle turned until the stabilometer dial reads 689 kPa (100 psi)?		
16.	Pump handle turned at approx. two turns per second?		
17.	Number of turns recorded as the displacement reading? (D)		
18.	Stabilometer value calculated correctly?		
19.	If height of specimen is not 64 ± 3 mm (2.5 ± 0.1 in.0, is stabilometer value corrected according chart?		

$$S = \frac{22.2}{P_h * D / (P_v - P_h) + 0.222}$$

Where:

S = stabilometer value
P_h = horizontal pressure (kPa)
P_v = vertical pressure (kPa)
D = displacement

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

RESISTANCE TO DEFORMATION AND COHESION OF BITUMINOUS MIXTURES BY MEANS OF HVEEM APPARATUS – Stability value only (AASHTO T246)

-Continued-

Procedure			
Cohesion (if demonstrated) [*AASHTO only: Cohesion testing is optional and not required to determine Stability]*		1st	2nd
1.	Specimen in oven at 60 ± 1°C (140 ± 2°F) for minimum of 2 hours?		
2.	Cohesiometer preheated to 60 ± 1°C (140 ± 2°F)?		
3.	Specimen clamped in cohesiometer?		
4.	Temperature allowed to recover before testing?		
5.	Shot allowed to flow into receiver at 1800 ± 20 g/min?		
6.	Flow stopped at break or at 13 mm (1/2 in.) deflection?		
7.	Mass of shot used recorded?		
8.	Cohesiometer value calculated from formula in (T246/D1560)?		

C = $\dfrac{L}{W * (0.20H + 0.044H^2)}$

Where:
C = cohesiometer value
L = mass of shot
W = diameter, cm (or in.)
Or width, cm (or in.)
D = height, cm (or in.)

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

RESISTANCE OF COMPACTED BITUMINOUS MIXTURES TO MOISTURE INDUCED DAMAGE (TSR / Lottman) (AASHTO T283)

Procedure

		1st	2nd
Sample Preparation *(laboratory mixed and compacted)*			
1.	Specimen size: a. 4 in. diameter and 2.5 ± 0.1 in. (63.5 ± 2.5 mm) thick specimens used?		
or	b. 6 in. diameter and 3.55 – 3.95 in. (90 – 100 mm) thick? *Note: 6 in. specimens should be used if aggregate larger than 1 inch is present.*		
2.	After mixing: a. Mixture placed in a pan and cooled at room temperature for 2.0 ± 0.5 hours?		
	b. Mixture placed in a 140°F (60°C) oven for 16 ± 1 hour for curing?		
	c. Placed on spacers if shelf is not perforated?		
3.	After curing: a. Mixture placed in an oven at compaction temperature, ± 3°C (± 5°F), for 2 hours ± 10 min. prior to compaction?		
	b. Mixture compacted to 7.0 ± 0.5 percent air voids, or a void level expected in the field?		
4.	After extraction from molds, test specimens are stored for 24 ± 3 hours at room temperature?		
Sample Preparation *(field mixed and laboratory compacted)*			
1.	Specimen size: a. 4 in. diameter and 2.5 in. thick specimens used?		
Or	b. 6 in. diameter and 3.55 – 3.95 in. (90 – 100 mm) thick? *Note: 6 in. specimens should be used if aggregate larger than 1 inch is present.*		
2.	Field-mixed asphalt mixtures sampled in accordance with ASTM D979?		
3.	No loose mix curing shall be performed?		
4.	After sampling mixture placed in oven until it reaches compaction temperature to within ± 3°C (± 5°F)?		
5.	Mixture compacted to 7.0 ± 0.5 percent air voids, or a void level expected in the field?		
6.	After extraction from molds, test specimens are stored for 24 ± 3 hours at room temperature		
Sample Preparation *(core test specimens)*			
1.	At least 6 cores for each set of mix conditions?		
2.	Separate core layers as necessary by sawing or other suitable means, and layers to be stored at room temperature?		
Evaluation of Test Specimens and Grouping			
1.	Theoretical maximum specific gravity of mixture determined by AASHTO T209?		
2.	Specimen thickness determined by ASTM D3549 (average four thickness measurements at quarter points)?		
3.	Bulk specific gravity determined by AASHTO T166?		
4.	Volume of specimens expressed in cubic centimeters?		
5.	Air voids calculated by AASHTO T269?		
6.	Specimens sorted into two equal subsets of at least three specimens each so that average air voids of the two subsets are approximately equal?		
Dry Subset Preconditioning of test specimens			
1.	Specimens stored at room temperature for 24 ± 3 hours?		
2.	Specimens wrapped with plastic or placed in a heavy duty leak proof plastic bag?		
3.	Specimens placed in a 77 ± 1°F (25 ± 0.5°C) water bath for at least 2 hours ± 10 min. and then tested?		
4.	At least 1 in. of water above surface?		

COMMENTS:

Date:_____ Participant Name:_____ Proctor:_____

RESISTANCE OF COMPACTED BITUMINOUS MIXTURES TO MOISTURE INDUCED DAMAGE (TSR / Lottman)
(AASHTO T283)
-Continued-

Conditioned Subset Vacuum Saturation Procedure		1st	2nd
1.	Specimens placed in the vacuum container supported above bottom by a spacer at least 1 in. from bottom?		
2.	Container filled with potable water at room temperature to at least one inch above specimen surface?		
3.	A partial vacuum 10-26 inches Hg partial pressure (250-660 mm Hg partial or 13-67 kPa absolute) applied? *Note to Assessors: This is not the same amount of vacuum applied to Rice samples (T209/D2041), which is 27.5 mm Hg. A Typical manometer that reads in mm Hg will not even more under the correct vacuum for T283.*		

Correct TSR Pressure	TSR Pressure in.	TSR Pressure mm Hg
Absolute gauge (if vacuum is off reads 1 atm)	10-26 in.	254 – 660 mm Hg
Relative gauge (if vacuum is off reads 0)	˜ 20 – 4 in.	˜500 – 11 mm Hg

		1st	2nd
4.	Vacuum applied for a short time, approximately 5-10 min as needed to achieve correct saturation? *Note to Assessors: The vacuum pressure and time is much less important than achieving 70-80% saturation.*		
5.	Vacuum removed and specimens left submerged for a short time (5-10 min)?		
6.	Mass of the SSD specimen after partial vacuum saturation determined by T166?		
7.	SSD mass of conditioned samples compared with air dry mass and volume of absorbed water calculated?		
8.	Degree of saturation determined by comparing volume of air voids with volume of water absorption?		
a.	If the volume of water is less than 70 percent, is the procedure repeated using more vacuum and/or more time?		
b.	If the volume of water is more than 80%, is the specimen discarded?		
c.	If the volume of water is between 70 and 80%, is the test continued?		
Conditioned Subset – Temperature Conditioning Procedure			
1.	Vacuum saturated specimens covered tightly with a plastic film and each specimen placed in a plastic bag containing 10 ± 0.5 mL of water and placed in a freezer at 0 ± 5°F (-18 ± 3°C) for a minimum of 16 hours?		
2.	Specimens placed into a 140 ± 2°F (60 ± 1°C) water bath for 24 ± 1 hours with a minimum of 1 in. of water above specimen?		
3.	Plastic bag and film removed from the specimens as soon as possible after placement in the water bath?		
4.	After 24 hours in the water bath, the specimens removed and placed in a water bath, already at 77 ± 1°F (25.0 ± 0.5°C), for 2 hours ± 10 min.?		
a.	If necessary, ice used to prevent water temperature from rising above 77°F (25°C)?		
b.	The water bath should not require more than 15 minutes to reach 77°F (25°C)?		
Testing			
1.	The indirect tensile strength of dry and conditioned specimens determined at 77 ± 1°F (25.0 ± 0.5°C)?		
2.	The specimens in the 77°F water bath removed and placed in the steel loading strips?		
3.	Loading strips placed between the bearing plates in the testing machine?		
4.	Care taken that the load applied is along the diameter of the specimen as illustrated in Table 1?		
5.	Load applied to the specimen by means of the constant rate of movement of the testing machine head of 2 in. (50 mm) per minute?		
6.	Is maximum compressive strength on the testing machine recorded?		
7.	Is load continued until crack appears, specimen removed from the machine, pulled apart at the crack, inspected for stripping, and observations recorded?		
8.	Calculations determined as follows (see Section 12 for standard units calculation also in IDT test)?		

COMMENTS:

Tensile Strength (kPa)	2000 *P	P = maximum load (N)
		T= specimen thickness (mm)
	π * t * D	D = specimen diameter (mm)

TSR = (average tensile strength of conditioned subset / (average tensile strength of dry subset)

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____

BLUE INDEX OF CLAY
(ASTM C837-99)

	Specimen Preparation	1st	2nd
1.	Weigh 2.00g of clay that has been dried in accordance with C324 and placed in 600 ml beaker?		
2.	If clay not tested immediately after drying, it should be stored in a desiccators?		
3.	Add 300 ml of distilled water to the beaker and stir with mixer until clay is uniformly dispersed?		
4.	Determine the pH of the slurry and add sulfuric acid to bring pH between 2.5 to 3.8?		
5.	Continue stirring while the pH is being adjusted?		
6.	Continue stirring for 10 to 15 min. after last addition of acid?		
7.	Again, test the slurry for pH, adding additional acid if needed to restore pH to 2.5 – 3.8 range?		
8.	With slurry still under mixer, fill the buret with the methylene blue solution?		
9.	Add 5 ml of the solution to the slurry and stir for 1 to 2 min?		
Testing			
1.	Remove a drop of the slurry, using the dropper or the glass stirring rod, and place on the edge of the filter paper?		
2.	The end point is indicated by the formation of a light blue halo around the drop?		
3.	Continue adding the methylene blue solution to the slurry in 1.0 mL?		
4.	1 to 2 min. of stirring after each addition, then testing until the end point is reached?		
5.	After end point is reached, continue stirring for 2 min. and retest?		
6.	Calculations determined by section 7?		

COMMENTS:

1st	2nd
Pass	Pass
Fail	Fail

Date:_____ Participant Name:_____ Proctor:_____