IA SOILS EVALUATION
PERFORMANCE EVALUATION

SiteManager ID: _____ **PHONE #:** _____

Technician: _____ **E-Mail:** _____

DATE: _____ **Level:** _____

	PASS	FAIL
AASHTO R-58 (Dry Preparation of Disturbed Soil)		
AASHTO R-76 (Reducing Sample of Aggregates)		
AASHTO T-11 (-200 in Mineral Aggregates by Washing)		
AASHTO T-88 (Particle Size Analysis of Soil)		
AASHTO T-89 (L.L.)		
AASHTO T-90 (P.L.)		
AASHTO T-99 (Moisture Density using 5.5lb Rammer)		
AAHTO T-180 (Moisture Density using 10.0lb Rammer)		
AASHTO T-85 (Specifice Gravity and Absorption)		
AASHTO T-310 (In-Place Density and Moisture Content)		

OVERALL RATING:	**PASS**	**FAIL**

OHCMTB#:

Technician (Signature): _____

OHCMTB#:

IA Observer(Signature): _____

IA Checklist
T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

	Procedure	P	F	NA
1	Allow the gauge to warm-up in accordance with the manufacturer's guidelines.			
2	Obtain standard counts on at least 100 pcf or 1631 kg/m ^{3}			
3	Standard moisture and density counts have been taken today.			
4	The gauge is at least 10' away from large objects and at least 30' away from other gauges.			
5	Test site is at least 6" [150mm] from any vertical object.			
6	Technician used and recorded the correct counts.			
7	Test site is scraped and smooth and all voids >1/8" are filled with native fines.			
8	Drill rod is driven to the correct depth (2" past test depth).			
9	Gauge is indexed to the correct depth.			
10	Gauge probe is in contact with the correct wall of the hole.			
11	Wet density, density count, and moisture count recorded correctly.			

Remarks:

IA Checklist
R-58
DRY PREPARATION OF DISTURBED SOIL AND SOIL-AGGREGATES SAMPLES FOR TEST

	Procedure	P	F	NA
1	Dry the soil sample as received from the field thoroughly in air or the drying apparatus at a temperature not exceeding 60°C [140°F]. Obtain a representative test sample of the amount required to perform the desired tests by splitting or quartering. Break up the aggregations of soil particles in the pulverizing apparatus in such a way as to avoid reducing the natural size of individual particles.			
2	Weigh the portion of the dried sample selected for particle- sized analysis and physical tests (including specific gravity), and record that mass as the mass of total sample uncorrected for hygroscopic moisture. Separate this portion into fractions by one of the following methods:			
3	***Alternate Methods Using 2.00-mm (No. 10) Sieve—***Separate the dried sample into two fractions using a 2.00-mm (No. 10) sieve. Grind the fraction retained on the sieve with the pulverizing apparatus until the aggregations of soil particles are broken into separate grains. Separate the ground soil into two fractions using the 2.00-mm (No. 10) sieve.			
4	**TEST SAMPLE FOR PARTICLE SIZE ANALYSIS AND SPECIFIC GRAVITY** Set aside the fraction retained on the 2.00-mm (No. 10) or that retained on the 4.75-mm (No. 4) sieve after the second sieving, for use in sieve analysis of the coarse material.			
5	Thoroughly mix the fractions passing the 2.00-mm (No. 10) sieve in both sieving operations by splitting or quartering, obtain representative portions having approximate masses that meet T-88, T-89 and T-90.			
6	**TEST SAMPLE FOR PHYSICAL TESTS (Liquid Limit and Plastic Limit)** Separate the remaining portion of the material passing the 2.00-mm (No. 10) sieve into two parts by means of a 0.425-mm (No. 40) sieve. Grind the fraction retained on the 0.425-mm (No. 40) sieve with the pulverizing apparatus in such a manner as to break up the aggregations without fracturing the individual grains. If the sample contains brittle particles, such as flakes of mica, fragments of sea shells, etc., carefully perform the pulverizing operation with just enough pressure to free the finer material that adheres to the coarser particles. Separate the ground soil into two fractions by means of the 0.425mm (No. 40) sieve, and regrind the material retained on the sieve. When Repeated grinding produces only a small quantity of soil passing the 0.425-mm (No. 40) sieve; discard the material retained on the 0.425-mm (No. 40) sieve. Thoroughly mix the several fractions passing the 0.425-mm (No. 40) sieve obtained from the grinding and sieving operations and set aside for use in performing the physical tests.			

Remarks:

IA Checklist
R 76 Reducing Samples of Aggregate to Testing Size

	Procedure	P	F	NA
	Method A: Mechanical Splitter			
1	Fine Aggregate: Check moisture condition of the sample. If the sample has free moisture on the particle surface, the entire sample may be dried to at least SSD condition prior to reduction by splitter. Coarse Aggregate: Moisture condition not specified in AASHTO R 76, Sect. 5.2.			
2	Check sample splitter openings. (Their number, no less than 8 for coarse aggregate and no less than 12 for fine aggregate, and width relative to maximum size of aggregate, for coarse the openings shall be approximately 50% larger than the largest particle in the sample)			
3	Place the field sample in hopper or pan and uniformly distribute it from edge to edge.			
4	The rate at which the sample is introduced shall be such as to allow free flowing through chutes into receptacles.			
5	Reintroduce the portion of the sample in one of the receptacles as many times as necessary to reduce the sample to specified testing size in accordance with Table 1, on page 3, of T 27 evaluation checklist.			
Method B: Quartering				
1	The sample is placed on a hard clean, level surface.			
2	Mix the material thoroughly by turning the entire sample over three times. With the last turning, shovel the entire sample into a conical pile.			
3	Flatten the conical pile to a uniform thickness and diameter by pressing down on the apex with a shovel so that each quarter sector of the resulting pile will contain material originally in it.			
4	The diameter should be approximately four to eight times the thickness.			
5	Divide the flattened mass into four approximately equal quarters with a shovel or a trowel and remove two diagonally opposite quarters, including all the fine material, and brush the cleared spaces clean.			
6	Remix and quarter the remainder of the sample until the sample is reduced to the appropriate test size. (See #5 above)			
Method C: Miniature Stockpile Sampling (Damp Fine Aggregate Only)				
1	Place the original sample on a hard clean, level surface where there will be neither loss of the original sample or accidental addition of foreign material to the sample.			
2	Mix the material thoroughly by turning the entire sample over three times. With the last turning, shovel the entire sample into a conical pile.			
3	If desired, flatten the conical pile to a uniform thickness and diameter by pressing down on the apex with a shovel so that each quarter sector of the resulting pile will contain material originally in it.			
4	Obtain a sample for each test by selecting at least five increments of material at random locations from the miniature stockpile, using a small sampling thief, small scoop, or spoon.			

Remarks:

IA Checklist
T 11 Total Materials Finer than 75-µm (No. 200) Sieve

Procedure		P	F	NA
1	Was correct size sample used? Was it split down to test size?			
2	Dry test sample to a constant mass 230+/- 9ºF (110 +/- 5ºC) and determine the mass to the nearest 0.1%			
3	Place sample in container, add sufficient water to cover it.			
4	Agitate the sample to separate fine particles from coarse particles. Bring fines into suspension.			
5	Immediately pour wash water over a nest of two sieves, between the range of the #8 to the #16, and, the 75-µm (#200).			
6	Take care to avoid transfer of coarse particles.			
7	Repeat steps 3 through 6 until wash water is clear.			
8	Return all particles retained on sieves to washed sample by flushing.			
9	Dry the washed aggregate to a constant mass 230+/- 9ºF (110 +/- 5ºC) and determine the mass to the nearest 0.1%			
10	Calculate the amount of material pass the No. 75-µm (#200) sieve by washing and add the amount of material pass the No. 75-µm (#200) sieve by mechanical shaking.			
11	Report the results to the nearest 0.1% of total mass of sample.			
Equipment		**P**	**F**	**NA**
1	Are Calibration records current?			
2	Sieves-A nest of two sieves, the lower being a 75-µm (#200), the top being something in the range between the #8 and #16 sieve, depending on the material being washed.			
3	Container-A pan or vessel of a size sufficient to contain the sample covered with water and to permit vigorous agitation without loss of any part of the sample or water			
4	Oven-Sufficient size capable of maintaining a uniform temperature of 230+/- 9ºF (110 +/- 5ºC)			
5	Balance-The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass, or better, and conform to the requirements of AASHTO M231, and have a current calibration.			
6	The use of a mechanical apparatus to perform the washing operation is not precluded, provided the results are consistent with those obtained using manual operations. The use of some mechanical washing equipment with some samples may cause degradation of the sample.			

Remarks:

IA Checklist
T-88
PARTICLE SIZE ANALYSIS OF SOILS

	Procedure	P	F	NA
1	The test sample for particle size analysis shall be prepared in accordance with R 58 for Dry Preparation of Disturbed Soil and Soil-Aggregate Samples for Test. The representative portion of the original air-dry sample selected for test shall be weighed.			
2	The size of the portion passing the 2.00-mm (No. 10) or 0.425-mm (No. 40) sieve shall be approximately 100 g for sandy soil and approximately 50 g for silty or clayey soils, and for hygroscopic moisture determination, at least 10 g. The test sample selected shall be processed by one of the following methods:			
3	***Alternate Method Using 2.00-mm (No. 10) Sieve—*** The sample shall be separated on the 2.00-mm (No.10) sieve as described in R 58. The portion retained on the 2.00-mm (No.10) sieve after the second sieving shall be processed and sieve Analysis of Fraction Retained on 2.00-mm No.10 Sieve. The portion passing the 2.00-mm (No.10) sieve in both sieving operations shall be weighed and prepared as described in R 58. Subsamples for hygroscopic moisture and sieve analysis shall be weighed immediately or placed in air-tight containers until tested.			
4	**SIEVE ANALYSIS OF FRACTION RETAINED ON 2.00-MM (NO. 10) SIEVE** The portion of the sample retained on the 2.00-mm (No. 10) sieve shall be separated into a series of sizes by the use of the (3 in., 2 in., 1 in., 3/8in., and the No. 4) sieves, and using other sieves as may be needed depending on the sample or upon the specification for the material being tested.			
5	The sieving operation shall be conducted by means of a lateral and vertical motion of the sieve, accomplished by jarring action so as to keep the sample moving continuously over the surface of the sieve. In no case shall fragments in the sample be turned or manipulated through the sieve by hand. Sieving shall be continued until not more than 1 percent by mass of the residue passes any sieve during 60 sec. When sieving machines are used, their thoroughness of sieving shall be tested by comparison with hand methods of sieving. The portion of the sample retained on each sieve shall be weighed and the mass recorded, although it shall be permissible to record the accumulated masses as the contents of each successive sieve are added to the fractions previously deposited on the scales pan.			
6	The Sample prepared according to R-58 is separated on the 2.00 mm (No.10) sieve to meet the minimum sample size requirements. (Note) With the Hydrometer portion omitted, the remainder of the test method is a wet wash of over the 0.075 mm (No 200) sieve followed by a dry sieve analysis.			
7	The sample passing the 2.00 mm (No. 10) sieve for sieve analysis is mixed with the dispersing agent and agitated using a malt mixer and washed over the 0.075 mm (No. 200) sieve. The portion retained on the 0.075 mm (No. 200) sieve is dried, weighed and the mass recorded.			
8	The dried portion retained on the 0.075 mm (No. 200) sieve is separated using finer sieves, typically the 0.425 mm (No. 40) sieve and 0.075mm (No. 200) sieve. The portion retained on each sieve is weighed and the mass recorded. Calculate corrected percent passing for total specimen.			
9	Determine the mass of the sample for the hygroscopic moisture determination. Dry the sample according to T 265 to determine the moisture content, and record the results. Sample weights corrected using hygroscopic moisture results.			

IA Checklist
T-89
DETERMINING THE LIQUID LIMIT OF SOILS

	Procedure	P	F	NA
1	**METHOD A:** All adjustment screws, retaining pins and screws be tight			
2	All surfaces in contact with the soil, contact between brass cup and cam, and point of impact of brass cup should be checked for wear.			
3	Height of drop of the brass cup should be adjusted to 10.0 +- 0.2 mm.			
4	The liquid limit should be conducted on a representative sample consisting of a 100 g of minus 0.425 mm (No. 40) material prepared as specified in R 58.			
5	The soil sample shall be place in the mixing dish and thoroughly mixed with 15 to 20 ml. of distilled or demineralized water by alternatively and repeatedly stirring, kneading, and chopping with a spatula. Once testing has begun, no additional dry soil should be added to the moistened soil. If too much moisture has been added to the sample, the sample shall either be discarded, or mixed and kneaded until natural evaporation lowers the closure point into acceptable range.			
6	When sufficient water had been thoroughly mixed with the soil to form a uniform mass. Mixture shall be placed in the cup above the spot where the cup rests on the base and shall be squeezed and spread with the spatula to level and at the same time trimmed to a depth of 10 mm at the point of maximum thickness. As few strokes of the spatula as possible shall be used. The excess soil shall be returned to the mixing dish and covered to retain the moisture in the sample.			
7	The soil in the cup of the device shall be divided by a firm stroke of the grooving tool along the diameter through the centerline of the cam follower so that a clean sharp groove of the proper dimensions will be formed. Turning the crank at the rate of approximately two revolutions per second until the two sides of the sample come in contact at the bottom of the groove along a distance of about 13 mm. The number of shocks required to close the groove this distance shall be recorded.			
8	A slice of soil approximately the width of the spatula, extending from edge to edge of the soil cake at right angles to the groove and including that portion of the groove in which the soil flowed together, shall be removed and place in a suitable container. The soil in the container shall be dried in accordance with T 265 to determine the moisture content, and the results recorded.			
9	The soil remaining in the cup shall be transferred to the mixing dish. The cup and grooving tool shall then be cleaned in preparation for the next trial. Repeat the foregoing operations, adding sufficient water to bring the soil to a more fluid condition. Obtain the first sample in the range of 25 to 35 blows, the second sample in the range of 20 to 30 blows, and the third sample in the range of 15 to 25 blows. The range of the three determinations shall be at least 10 blows.			
10	**METHOD B:** Same as above except for the following: For accuracy equal to that obtained by the standard three-point method, the accepted number of blows for groove closure shall be restricted to between 22 and 28 blows. The initial amount of water should be approximately 8 to 10 mL. After obtaining a preliminary closure in the acceptable blow range, immediately return the soil remaining in the cup to the mixing dish and, without adding any additional water, repeat as directed. If the second closure occurs in the acceptable range (22 to 28, inclusive) and the second closure is within two (2) blows of the first closure, secure a water content specimen.			

IA Checklist
T-90
DETERMINING THE PLASTIC LIMIT AND PLASTICITY INDEX OF SOIL

	Procedure	P	F	NA
1	Determine and record the mass of the moisture content container.			
2	Take a quantity of soil with a mass of about 20 g from the thoroughly mixed portion of the material passing the 0.425-mm (No. 40) sieve, obtained in accordance with R 58. Place the air-dried soil in a mixing dish and thoroughly mix with distilled or demineralized water until the mass becomes plastic enough to be easily shaped into a ball.			
3	Take a portion of this ball with a mass of about 8 g for the test sample. Select a 1.5- to 2.0-g portion from the 8-g mass of soil prepared. Form the selected portion into an ellipsoidal mass. Use one of the following methods to roll the soil mass into a 3-mm-diameter thread at a rate of 80 to 90 strokes per minute, counting a stroke as one complete motion of the hand forward and back to the starting position again.			
4	Roll the mass between the palm or fingers and the ground-glass plate or unglazed paper with just sufficient pressure to roll the mass into a thread of uniform diameter throughout its length. Deform the thread further on each stroke until its diameter reaches 3 mm. Take no more than 2 min to roll the soil mass to the 3-mm diameter.			
5	When the diameter of the thread reaches 3 mm, squeeze the thread between the thumbs and fingers and form the mass back into a roughly ellipsoidal shape. Repeat the rolling process until the soil can no longer be rolled into a thread and begins to crumble. Reform the soil into an ellipsoidal mass after each rolling of the thread to a 3-mm diameter. The crumbling may occur when the thread has a diameter greater than 3 mm. This is considered a satisfactory end point, provided the solid has been previously rolled into a thread 3 mm in diameter. Do not attempt to produce failure at an exact 3-mm diameter by allowing the thread to reach 3 mm, then reducing the rate of rolling or the hand pressure, or both, and continuing the rolling without further deformation until the thread falls apart.			
6	Gather the portions of the crumbled soil together and place in the moisture content container. Immediately cover the container with a close-fitting lid to prevent additional loss of moisture. Repeat the operations until the entire 8-g specimen is tested. Place all of the crumbled portions into the same moisture content container. Determine the moisture content of the soil in the container in accordance with T 265, and record the results.			

Remarks:

IA Checklist
T-99
MOISTURE-DENSITY RELATIONS OF SOILS USING A 2.5-KG (5.5-LB) RAMMER AND A 305-MM (12-IN.) DROP

	Procedure	P	F	NA
1	Sieve an adequate quantity of the representative pulverized soil over the 19.0-mm (3/4) or No.4 sieve. Discard the coarse material, if any, retained on the 19.0-mm (3/4) sieve. The discarded coarse material may be utilized in T 224. Thoroughly mix selected representative sample with sufficient water to dampen it to approximately four percentage points below optimum moisture content.			
2	Form a specimen by compacting the prepared soil in the 101.60-mm (4-in) mold (with collar attached) in three approximately equal layers to give a total compacted depth of about 125mm (5-in). Compact each layer by 25 uniformly distributed blows from the rammer dropping free from a height of 305mm (12-in). During compaction the mold shall rest firmly on a dense, rigid, and stabile foundation or base. This base shall remain stationary during the compaction process with a mass not less than 90kg (200-lbs)			
3	Following compaction, remove the extension collar, carefully trim compacted soil even with the top of the mold by means of the straight edge, and determine the mass of the mold and moist soil in Kg to the nearest 5g, or determine the mass in lbs. to the nearest 0.01 lbs.			
4	Remove the material from the mold and slice vertically thru the center. Take a representative sample of the material from one of the cut faces and weight immediately.			
5	Thoroughly break up the remainder of the test specimen and return it to the test sample, add the next increment of water (1% to 2%), mix thoroughly, and repeat the compaction process at the new water content. Continue this series of determinations until there is either a decrease or no change in the wet mass of compacted soil.			
6	Calculate the wet unit mass (Wet Density), water content, and dry unit mass (Dry Density). Determine the moisture content in accordance with T 265 and record the results.			
7	Use water content and dry unit mass (dry density) data to plot the moisture-density relationship and define the optimum moisture content and maximum dry density from the peak of the compaction curve.			
8	If the compaction test sample contains oversized particles and the test sample is used for field density control, corrections must be made according to T 224 (correction for coarse particles in the soil compaction test) to properly compare the field density with the laboratory compacted (Reference) test sample. If no minimum percentage of coarse particles is specified, corrections shall be applied to compaction test samples with more than 5% (by weight) of oversize particles.			

Remarks:

IA Checklist
T-180
MOISTURE-DENSITY RELATIONS OF SOILS USING A 4.54-KG (10-LB) RAMMER AND A 457-MM (18-IN.) DROP

	Procedure	P	F	NA
1	Sieve an adequate quantity of the representative pulverized soil over the 19.0-mm (3/4) or No.4 sieve. Discard the coarse material, if any, retained on the 19.0-mm (3/4) sieve. The discarded coarse material may be utilized in T 224. Thoroughly mix selected representative sample with sufficient water to dampen it to approximately four percentage points below optimum moisture content.			
2	Form a specimen by compacting the prepared soil in the 152.40-mm (6-in) mold (with collar attached) in five approximately equal layers to give a total compacted depth of about 125mm (5-in). Compact each layer by 56 uniformly distributed blows from the rammer dropping free from a height of 457mm (18-in). During compaction the mold shall rest firmly on a dense, rigid, and stabile foundation or base. This base shall remain stationary during the compaction process with a mass not less than 90kg (200-lbs)			
3	Following compaction, remove the extension collar, carefully trim compacted soil even with the top of the mold by means of the straight edge, and determine the mass of the mold and moist soil in Kg to the nearest 5g, or determine the mass in lbs. to the nearest 0.01 lbs.			
4	Remove the material from the mold and slice vertically thru the center. Take a representative sample of the material from one of the cut faces and weight immediately.			
5	Thoroughly break up the remainder of the test specimen and return it to the test sample, add the next increment of water (1% to 2%), mix thoroughly, and repeat the compaction process at the new water content. Continue this series of determinations until there is either a decrease or no change in the wet mass of compacted soil.			
6	Calculate the wet unit mass (Wet Density), water content, and dry unit mass (Dry Density). Determine the moisture content in accordance with T 265 and record the results.			
7	Use water content and dry unit mass (dry density) data to plot the moisture-density relationship and define the optimum moisture content and maximum dry density from the peak of the compaction curve.			
8	If the compaction test sample contains oversized particles and the test sample is used for field density control, corrections must be made according to T 224 (correction for coarse particles in the soil compaction test) to properly compare the field density with the laboratory compacted (Reference) test sample. If no minimum percentage of coarse particles is specified, corrections shall be applied to compaction test samples with more than 5% (by weight) of oversize particles.			

Remarks:

IA Checklist
T-85
SPECIFIC GRAVITY AND ABSORPTION OF COARSE AGGREGATES

	Procedure	P	F	NA
1	Sample the aggregate in accordance with T 2. Thoroughly mix the sample of aggregate and reduce it to the approximate quantity needed using the applicable procedures in R 76. Reject all material passing a 4.75-mm (No. 4) sieve by dry sieving and thoroughly washing to remove dust or other coatings from the surface.			
2	Dry the test sample to constant mass at a temperature of 110 ± 5°C (230 ± 9°F), cool in air at room temperature until the sample has cooled to a temperature that is comfortable to handle (approximately 50°C 122°F). Subsequently immerse the aggregate in water at room temperature for a period of 15 to 19 hours.			
3	Remove the test sample from the water and roll it in a large absorbent cloth until all visible films of water are removed. Wipe the larger particles individually. A moving stream of air may be used to assist in the drying operation. Take care to avoid evaporation of water from aggregate pores during the operation of surface-drying. If the test sample dries past the SSD condition, immerse in water for 30 min, and then resume the process of surface-drying. Determine the mass of the test sample in the saturated surface-dry condition. Record this and all subsequent masses to the nearest 1.0 g or 0.1 percent of the sample mass, whichever is greater.			
4	After determining the mass, immediately place the saturated surface-dry test sample in the sample container and determine it's mass in water at 23.0 ± 1.7°C (73.4 ± 3°F), having a density of 997 ± 2 kg/m3. Take care to remove all entrapped air before determining the mass by shaking the container while immersed. Maintain the water level in the bath at the overflow depth to obtain a constant water level throughout the test.			
5	Dry the test sample to constant mass at a temperature of 110 ± 5°C (230 ± 9°F), cool in air at room temperature until the aggregate has cooled to a temperature that is comfortable to handle (approximately 50°C), and determine the mass.			

Remarks: