

INDEPENDENT STUDY







Lab Visit Guidance



MODULE

Suggested Labs and Guidelines for the Highway Materials Engineering Course (HMEC) Student Visit and Lab Experience

Please note that we will discuss this document during your scheduled Orientation Session.

IMPORTANT: Before completing this lab (Module D Lesson 3), you must complete the following independent study lessons: Module D Lesson 1 and Lesson 2.

Purpose of this Document: This document should be provided to the State or District Laboratory that you intend to visit during the Highway Materials Engineering Course (HMEC) Module D Lesson 3 Laboratory Experience: Physical Properties of Aggregates.

Directions for Lab Technicians: This guide provides a list of tests that are strongly recommended for demonstration to students, and those that are optional, and should be performed if the capabilities of the lab allow. It is understood that the capabilities of laboratories vary and that routinely performed tests may also differ. Students will be responsible for documenting the labs that they are able to view or participate in. The goal is to expose students to as many labs as possible and practical during the visit.

This guide provides a list of aggregate related tests and guidance on whether the test is strongly recommended or optional. Following the list of tests, it also provides suggestions for how you could prepare for the HMEC student visit.

Test Y/N	AASHTO	ASTM	Test Name
	Standard	Standard	
Recommended	Т2	D 75	Sampling of Aggregate
Recommended	T 248		Reducing Samples of Aggregate to Testing Size
Recommended	Т 27	C 136	Sieve Analysis of Fine and Coarse Aggregates
Recommended	T 11	C 117	Materials Finer than Materials Finer than 75- μ m (#200) Sieve in
			Mineral Aggregates by Washing
Optional	T 88		Particle Size Analysis of Soils: Hydrometer Test
Optional	T 176	D 2419	Plastic Fines in Graded Aggregates and Soils by Use of the Sand
			Equivalent Test
Optional	Т 330	C 837	The Qualitative Detection of Harmful Clays of the Smectite
			Group in Aggregates Using Methylene Blue
Optional	T 89 and		Determining the Liquid Limit, Plastic Limit and Plasticity Index of
	Т 90		Soils
Optional			Method of Test for Evaluating Cleanness of Aggregate
			(California CT 227 Standard)
Optional	T 207		Determining the Resilient Modulus of Soils and Aggregate
	1 307		Minerals
Recommended			Mohs Hardness
Optional	Т 279		Accelerate Polishing of Aggregates Using the British Wheel

Aggregate Tests

Test Y/N	AASHTO	ASTM	Test Name
	Standard	Standard	
Recommended	Т 96	C 131	Resistance to Degradation of Small-Size Coarse Aggregate by
			Abrasion and Impact in the Los Angeles Machine
Optional		C 535	Resistance to Degradation of Large-Size Coarse Aggregate by
			Abrasion and Impact in the Los Angeles Machine
Recommended	Т 327	D 6928	Resistance of Coarse Aggregate to Degradation by Abrasion in
			the Micro-Deval Apparatus
Optional		D 7/20	Resistance of Fine Aggregate to Degradation by Abrasion in the
		D 7420	Micro-Deval Apparatus
Optional	T 335	D 5821	Determining the Percent of Fracture in Coarse Aggregate
Recommended		D 4791	Standard Test Method for Flat Particles, Elongated Particles, or
			Flat and Elongated Particles in Coarse Aggregate
Recommended	Т 326		Uncompacted Void Content of Coarse Aggregate (as Influenced
			by Particle Shape, Surface Texture, and Grading)
Recommended	Т 84		Specific Gravity and Absorption of Fine Aggregate
Recommended	T 85		Specific Gravity and Absorption of Coarse Aggregate
Optional	Т 336		Coefficient of Thermal Expansion of Hydraulic Cement Concrete
Optional		C 1260	Test Method for Potential Reactivity of Aggregates (Mortar-Bar
			Test)
Optional		C 205	Standard Guide for Petrographic Examination of Aggregates for
		C 255	Concrete

Suggestions for Lab Preparation

The following guidelines represent a sequencing of sample preparation and tests that maximizes the time spent in the laboratory as part of the HMEC. The following are only suggestions and you may wish to modify them to suit your needs.

The first 5 steps should be completed prior to the scheduled laboratory session.

Step 1. Sample an appropriate amount of course aggregates from your stockpile or hopper. This should be done according to AASHTO T 2. These aggregates will be used for a variety of tests.

Step 2. Split the coarse aggregate sample according to AASHTO T 248. The sample should be quartered with each quarter labeled A thru D.

Step 3. Sample an appropriate amount of fine aggregates from your stockpile or hopper. This should be done according to AASHTO T 2. These aggregates will be used for a variety of tests.

Step 4. Split the fine aggregate sample according to AASHTO T 248. The sample should be quartered with each quarter labeled E thru H.

Step 5. All fine and coarse aggregate samples (8 total) should be oven dried.

The next steps should be demonstrated or conducted with the help of the participant:

Step 6. Sample A should be used for the wash loss test T 11. Following the test, the sample should be oven dried and the minus No. 200 material determined. Retain the sample for possible later use.

Step 7. Sample E should be used for the wash loss test T 11. Following the test, the sample should be oven dried and the minus No. 200 material determined. Retain the sample for possible later use.

Step 8. Sample B should be used for the sieve analysis T 27. Calculate the gradation parameters. Retain the sample for possible later use.

Step 9. Sample F should be used for the sieve analysis T 27. Calculate the gradation parameters. Retain the sample for possible later use.

Step 10. Using the Moh's Hardness kit supplied to the participants, determine the hardness of the aggregates from Sample B and other aggregates that may be available in the lab.

Step 11. Sample C should be used for the L.A. abrasion test, T 96 or Micro-Deval test, T 327. Calculate the abrasion of the sample. The sample may then be discarded.

Step 12. Sample B can be used for the fractured faces test, T 335 or flat or elongated pieces test, ASTM D 4791 if desired. Calculate the percentage fractured faces and/or flat or elongated pieces. Retain the sample for possible later use.

Step 13. Sample D can be used to determine the un-compacted void space of coarse aggregates, T 326 and/or Sample G for fine aggregates, T 304. Calculate the un-compacted void space for coarse and/or fine aggregates. Retain the sample for possible later use.

Step 14. Sample D should be used for the bulk specific gravity (BSG) and absorption of coarse aggregates, T 85. Calculate the BSG and absorption of the coarse aggregate. Retain the sample for possible later use.

Step 15. Sample G should be used for the bulk specific gravity (BSG) and absorption of fine aggregates, T 84. Calculate the BSG and absorption of the fine aggregate. Retain the sample for possible later use.

The tests listed above are basic to most aggregate characterization. Numerous other tests may be performed or demonstrated if time allows.