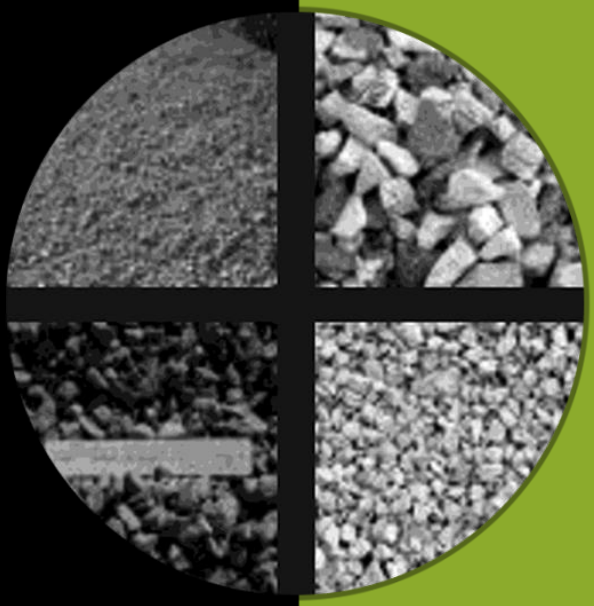
HMEC

Highway Materials Engineering Course

INDEPENDENT STUDY



Introduction to Aggregates

MODULE

D

U.S.Department of Transportation
Federal Highway Administration

Table of Contents

Important Note 2

Using This Independent Study Workbook 2

Lesson 1 Introduction 3

Lesson Resources 3

HMEC Overview 4

Module D Overview 6

Importance of Completing All Assignments 7

Introduction to Aggregates 7

Activity: Agency-Specific Standard Specifications Regarding Aggregate Properties 8

Preparation for Lessons 2 and 3 16

Resources Checklist 16

Important Note

You must complete Module D Lesson 1 and Lesson 2 before visiting your state or district laboratory in Module D Lesson 3.

Using This Independent Study Workbook

This self-guided workbook contains the information you need to complete this lesson. Throughout the workbook, instructions are provided that explain how to complete each section. Following the instructions provided ensures that you will successfully complete the independent study (IS) lesson. Make sure that you read all required information, complete exercises, document observations, and answer knowledge check questions as instructed.

Be sure to have your completed workbook available when you attend the Web-conference training (WCT) portion of this module, as the information and your answers, observations, and findings will be reviewed and discussed.

Lesson 1 Introduction

Welcome to Module D: Aggregates for Transportation Construction Projects, Lesson 1: Introduction to Aggregates. This independent study lesson will cover the following topics:

- HMEC overview
- Module D overview
- Introduction to aggregates
- Agency-specific standard specifications regarding aggregate properties

This lesson will take approximately 30 minutes to complete.

Lesson Resources

To complete this lesson, you will need the following resources:

- Your agency's standard specifications for road and bridge construction, or equivalent

You should have a copy of this resource. If not, you will need to obtain one from your agency.

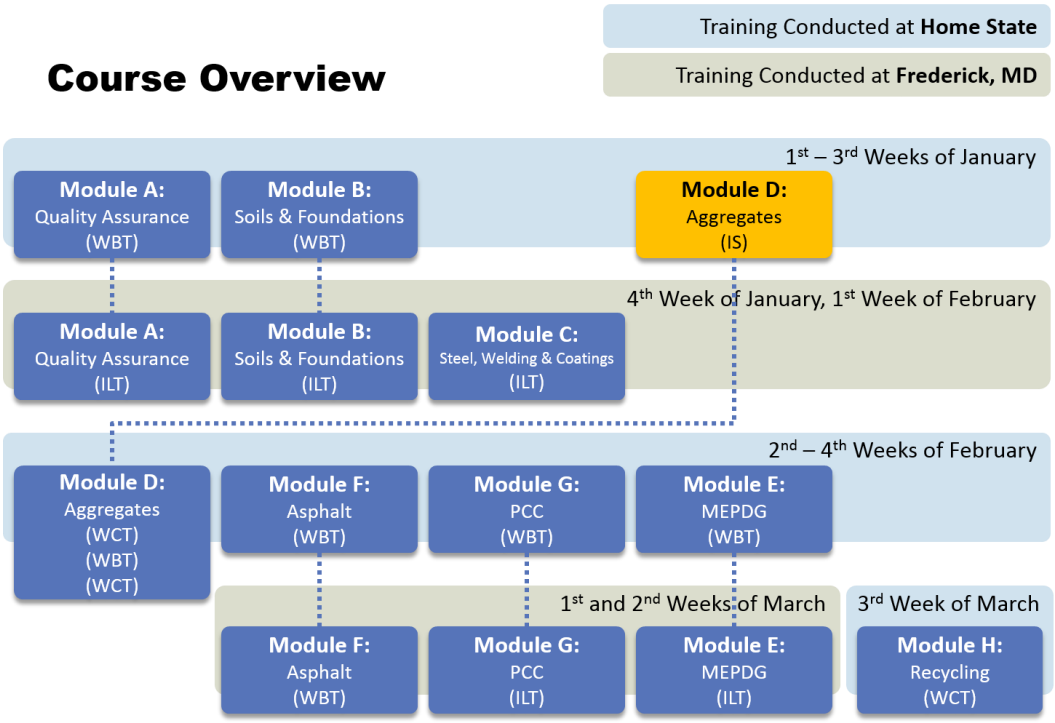
Instructions

Read the HMEC Overview section and learn how the components of Module D fit into the course.

HMEC Overview

- The module map provided in this section explains how Module D fits into the course.
- Module D begins with an independent study that is completed in early January.
- After completing the independent study portion of Module D, and completing all of Modules A, B, and C, you will return to your home State. In early February, you will convene in a Web conference, guided by an instructor/facilitator, to review and apply test results from the independent study content to aggregate quality and application requirements.
- Following the Web conference, a Web-based training covers aggregate use in asphalt concrete (AC) and Portland cement concrete (PCC).
- Finally, you will reconvene in another Web conference to discuss quality assurance concepts and share best practices, visit hot topics, and ask the instructor any questions regarding what you have learned about aggregates.

Course Overview

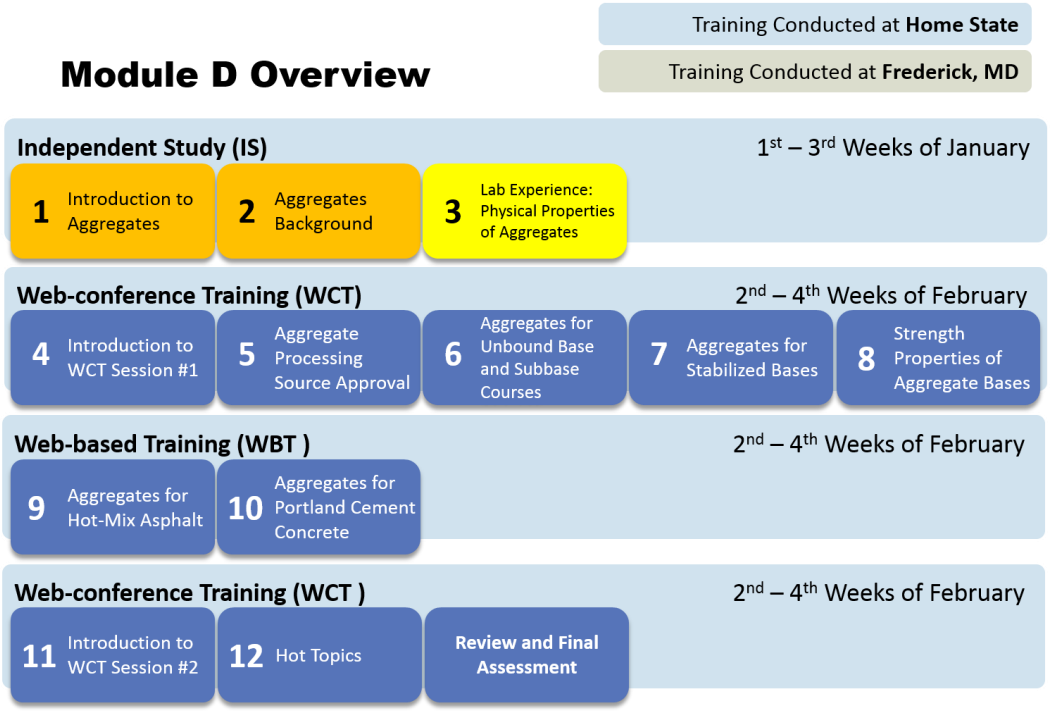


Instructions

Read the Module D Overview to learn about the lessons in Module D.

Module D Overview

- Module D consists of 12 lessons. Lessons 1–3 are completed in the independent study portion of the course, including a visit to your district or State laboratory facility (required in Lesson 3) for an independent laboratory experience. Lessons 4–8 are completed in a scheduled Web-conference training (WCT) session. Lessons 9 and 10 are completed as Web-based training (WBT) before you reconvene for Lessons 11 and 12 in another scheduled WCT session.
- The estimated duration for the independent study (Lessons 1–3) is 9.5 hours, including 1.5 hours of independent study in the workbook and 8 hours of lab work. The first WCT is 5.75 hours. The WBT is 2.75 hours. The final WCT session is 3.5 hours.
- The lesson structure, including the lesson duration and delivery type, is provided in the following lesson map. The independent study portion, which you are completing now, is highlighted.



Instructions

Read the remaining sections of this lesson and complete the activity that follows.

Importance of Completing All Assignments

- There is a significant amount of preparatory work you will complete in this lesson and in Lesson 2, before you can start Lesson 3: Laboratory Experience: Physical Properties of Aggregates.
- It is important that you complete all of this preparatory work prior to Lesson 3 so that you are ready to fully participate in the laboratory exercises and demonstrations.
- Due to the limited time available and the considerable amount of material to be covered during your laboratory experience, please make certain you are ready to participate and ask questions right from the beginning of Lesson 3.

Introduction to Aggregates

- Aggregates have many varied uses in transportation systems. The desirable properties and appropriate specifications are typically governed by the end use of the materials. In other words, aggregates that are well suited to a stabilized permeable base material may not be suitable for use in a PCC mixture.
- The physical properties of aggregates are generally used to determine acceptance for a particular purpose. In some cases, the chemical and mechanical properties may also be important.
- We will focus on all of the primary end uses for aggregates including PCC mixtures, AC mixtures, and stabilized and unbound bases and subbases.
- A substantial portion of this module is devoted to performing or observing common physical aggregate tests in your agency's laboratory.

Exercise 1: Agency-Specific Standard Specifications Regarding Aggregate Properties

In this exercise, you will be reviewing and familiarizing yourself with the aggregate standards for your agency. You must review this information prior to the lab visit in Lesson 3. You should be familiar with these specifications and able to easily reference them when you attend the lab visit.

Refer to your agency's standard specifications regarding aggregate properties. The information you need to review will be located in various sections of your agency standard specifications pertaining to PCC, AC, base and subbase materials, select borrow, etc.

Use the table provided to document any pertinent information. An example table is provided as a sample. As you deem necessary for reference, fill in your agency's standard specifications or information about the specifications.

Note: It is not required that you complete the table, as the information is readily available in your agency's standard specifications. Only complete or use the table if you find it to be a helpful ready reference.

Example: Table of Aggregate Standards

Division Number	Description	Section	Specific Description	Page number	Notes
100	Control of Materials	106	Control of Materials	24	
200	Earthwork, Landscaping, and Erosion Control	206	Granular Embankment, Special	87	
		207	Porous Granular Embankment	89	
		208	Trench Backfill	89	
		209	Porous Granular Backfill	90	
		281	Riprap	128	

Division Number	Description	Section	Specific Description	Page number	Notes
		283	Aggregate Ditch	132	
300	Subgrades, Subbases, and Base Courses	311	Aggregate Base Course	168	
		353	PCC Base Course	177	
		354	PCC Base Course, Widening	180	
		355	HMA Base Course	182	
		356	HMA Base Course, Widening	184	
		357	Pozzolanic Stabilized Base Course	185	
		358	Repair and Preparation of Base Course	187	
400	Surface Courses, Pavements, Rehabilitation, and Shoulders	402	Aggregate Surface Course	189	
		403	Bituminous Surface Treatment	191	
		406	Hot-Mix Binder and Surface Course	196	
		407	Hot-Mix Pavement (Full-Depth)	211	
		408	Incidental Hot-Mix Asphalt Surfacing	225	
		420	Portland Cement Concrete Pavement	226	

Division Number	Description	Section	Specific Description	Page number	Notes
		421	Continuously Reinforced PCC Pavement	242	
		442	Pavement Patching	255	
		481	Aggregate Shoulders	283	
1000	Materials	1003	Fine Aggregates	729	
		1004	Coarse Aggregates	735	
		1005	Stone and Broken Concrete for Erosion Control	746	
		1020	Portland Cement Concrete	786	
		1030	Hot-Mix Asphalt	821	

Table of Aggregate Standards

Division Number	Description	Section	Specific Description	Page number	Notes

Division Number	Description	Section	Specific Description	Page number	Notes

Division Number	Description	Section	Specific Description	Page number	Notes

Division Number	Description	Section	Specific Description	Page number	Notes

Division Number	Description	Section	Specific Description	Page number	Notes

Instructions

Read the following Preparation for Lessons 2 and 3 section. Verify that you have obtained all of the resources required in the Resources Checklist section.

Preparation for Lessons 2 and 3

The majority of agency specifications are based on either American Society for Testing and Materials (ASTM) standard test methods or American Association of State Highway and Transportation Officials (AASHTO) standards, frequently both.

In Lesson 2, the information compiled from your agency standards will be cross-referenced with the corresponding ASTM and/or AASHTO standard. To complete this comparison, you will need ready access to the ASTM and/or AASHTO standards.

Resources Checklist

- AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 33rd Edition AASHTO Provisional Standards, 2013 Edition
- ASTM Annual Book for Standards, Volume 04.02, Concrete and Aggregates