

CEEN 3320 - Behavior & Properties of Engineering Materials
Laboratory Experiment No. 8 - Superpave Mix Design

OBJECTIVE: To develop an E-3 HMA mix design following WisDOT and Superpave test protocols and specifications.

EQUIPMENT: Gyratory compactor, balance, ovens.

REFERENCE: WisDOT Standard Specification for Hot Mix Asphalt (Section 460)

PROCEDURES:

Part A – Aggregate Analysis

1. Using the aggregate data from Labs 4 and 7, develop two trial blends that meet all applicable WisDOT specifications from the Standard Specification Sections 460.2.2.3 and 460.2.7.

Part B - Gyratory Compaction Analysis

1. Using applicable aggregate and binder data, develop the initial binder content, P_{bi} , for use with each aggregate blend developed in Part A. Prepare two 4500 g specimens and one 2000 g specimen of each aggregate blend and heat in an oven for 2 hours at the desired mixing temperature.
2. Transfer the heated aggregates to the mixing pan and add sufficient binder to meet the target P_{bi} developed in Step 1. Blend the aggregates and binder until all aggregates are properly coated with binder. Transfer the mixture to an oven and age for 2 hours at the desired compaction temperature.
3. Transfer the aged specimen to the gyratory compactor and compact to the required gyration level of N_{design} . Record the specimen height at selected numbers of gyrations. Extrude the specimen and place on a flat surface to cool.
4. After cooling, obtain the mass of the compacted specimen in air. Bring the specimen to the saturated, surface dry (SSD) condition and obtain the mass in air and submerged in water.
5. Repeat Steps 1 - 4 for each replicate specimen.
6. Using the 2000 g specimen of uncompacted HMA, obtain the mass in air and submerged in water.

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Report

1. Using the aggregate data from Part A, prepare a plot of each gradation on the 0.45 Power Chart and indicate the prevailing control points. Verify that each trial blend meets all applicable Wis DOT specification requirements.
2. Using the weight data from Part B, determine the bulk specific gravity (G_{mb}), theoretical maximum specific gravity (G_{mm}), and percent air voids (%VTM) for each specimen.
3. Using the compaction data from Part B, prepare a plot of average % G_{mm} versus gyrations for each mixture. Based on the results of this plot and related volumetric analyses, provide your recommendations for which mixture should be selected for further testing and indicate which additional tests should be conducted.