

CEEN 3320 - Behavior & Properties of Engineering Materials
Laboratory Experiment No. 7 - Superpave Mix Design

OBJECTIVE: To develop an E-10 HMA mix design following WisDOT and Superpave test protocols and specifications.

EQUIPMENT: Gyratory compactor, balance, ovens.

PROCEDURES:

Part A – Aggregate Analysis

1. Using the aggregate data and blend percentages provided, check to ensure that all WisDOT QMP aggregate specifications are satisfied. If any blend does not meet specifications, develop recommendations for correcting any observed deficiency.

Part B - Gyratory Compaction Analysis

1. Using all data provided, develop the initial binder content, P_{bi} , for use with each aggregate blend. Prepare two 4500 g and one 2000 g specimen of each blended aggregate and heat in 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 heat for 2 hours at the desired compaction temperature.
3. Transfer the heated specimen specimen to the gyratory compactor and compact to a 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.
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 %Gmm 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.