



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

November 13, 2019

TO: Asphalt Contractors

FROM: Charles R. Colgate
Asphalt Materials Workgroup Supervisor

SUBJECT: Asphalt Mix Design Training School and Course Outline

Attached is the Asphalt Mix Design Training School requirements, description and tests to be covered in the laboratory portion of the course. The course outline is also included and is intended to be a guide for the contractors to use and to tailor the length and time to their needs as long as the entire range of activities related to asphalt mix design and testing are included. A minimum of 50% of the course time will be spent in the laboratory and the remaining time spent in classroom instruction. A written exam will be given and upon obtaining a satisfactory test score, a certification will be issued.

This Asphalt Mix Design Training School is the prerequisite for the NCDOT Mix Design Certification School. The Department shall audit all training schools and a class agenda and test must be provided to the NCDOT Mix Design Engineer and the Asphalt Materials Work Group Supervisor sixty days before the start of the training school for approval.

If additional assistance is needed, contact me at (919) 329-4060 or crcolgate@ncdot.gov or Tony Collins at (919) 329-4063 or tdcollins@ncdot.gov.

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Asphalt Mix Design Training School

Instructor Requirements

The instructor should be a certified NCDOT Level II Technician and Asphalt Mix Design Technician for at least five years.

Laboratory and Classroom Requirements

The laboratory building used for the asphalt mix design training school should be large enough to accommodate all equipment with adequate space remaining to perform all design-related tasks in a safe manner. The classroom should be large enough to accommodate room for at least five to ten students. If the laboratory is a production lab it should only be used during non-production time. The mix design equipment must meet all requirements and tolerances. Equipment calibration records shall be available for inspection at all times.

Description

The Asphalt Mix Design Training School should provide detailed, hands-on laboratory training on aggregate and asphalt mixture testing for both experienced and inexperienced technicians. Instruction covers the most current AASHTO and ASTM standards used in the asphalt mix design process. The course focuses on giving the students a thorough understanding of each test and related processes, while instructing students on the procedures and techniques which will maximize testing accuracy and repeatability. Students receive training over the entire range of activities related to asphalt mix design and testing: aggregate sampling and batching, testing aggregate properties, mixing, short-term aging, compaction, and testing of loose and compacted asphalt mixtures. The entry of data on the NCDOT mix design spreadsheet and the review of the mix design packet should be included. A minimum of 50% of the course time will be spent in the laboratory with the remaining time spent in classroom instruction. A written exam will be given to test the student's knowledge of the content delivered during the class. Upon obtaining a satisfactory test score, the technician will be issued a certification.

The exam takes four hours on average to complete. This mix design training school is the prerequisite for the NCDOT mix design certification school.

The Department shall audit all training schools and a class agenda and test must be provided to the NCDOT Mix Design Engineer sixty days before the start of the training school for approval.

Tests Covered in Laboratory Portion of Course

- NCDOT-T-11 Materials Finer Than 75 μm (No. 200) Sieve in Aggregates by Washing.
- NCDOT-T-27 Sieve Analysis of Fine and Coarse Aggregates.
- NCDOT-T-30 Sieve Analysis of Recovered Aggregate.
- NCDOT-T-84 Specific Gravity and Absorption of Fine Aggregate.
- NCDOT-T-85 Specific Gravity and Absorption of Coarse Aggregate.
- NCDOT-T-166 Bulk Specific Gravity of Compacted Asphalt Mix – SSD Method.
- NCDOT-T-176 Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.
- NCDOT-T-255 Moisture Content of Aggregate by Drying.
- NCDOT-T-209 Maximum Specific Gravity (Gmm) of Asphalt Mix – Rice Method.
- NCDOT-T-283 Tensile Strength Ratio (TSR) Test.
- NCDOT-T-304 Uncompacted Void Content of Fine Aggregate. (FAA)
- NCDOT-T-305 Draindown Characteristics of Uncompacted Asphalt Mix.
- NCDOT-T-308 Asphalt Binder Content of Asphalt Mix by the Ignition Method.
- NCDOT-T-312 Gyratory Compactor Field Test Procedure.
- NCDOT-T-331 Bulk Specific Gravity of Compacted Asphalt Mix – Vacuum Sealing Method.
- NCDOT-D-4791 Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregates. (5 : 1 Ratio)
- NCDOT-D-5821 Determining the Percentage of Fractured Particles in Coarse Aggregate. (CAA)
- NCDOT-D-6857 Maximum Specific Gravity (Gmm) of Asphalt Mix – Vacuum Sealing Method.

Asphalt Mix Design Training School

Course Outline

8:00 AM – 4:00 PM

Day One Classroom

Introduction

Basics of Asphalt Mixture

Overview of Superpave Volumetric Design

Superpave Aggregate Requirements

8:00 AM – 4:00 PM

Day Two Lab / Classroom

Specific Gravity Testing

Fine Aggregate Angularity

Sand Equivalency

Flat and Elongated

Fractured Faces

Aggregate Testing Calculations

8:00 AM – 4:00 PM

Day Three Classroom / Lab

Review of Aggregate Gradation Design Criteria

Power 45 Chart

Blending and Selection of Trial Aggregate Blends

Batch Trial Aggregate Blends

8:00 AM – 4:00 PM

Day Four Classroom / Lab

Review of Testing Procedure

Mixing trial Aggregate Blends

Review of Volumetric Calculations

Evaluation and Selection of trial Aggregate Blend

Batching Varying AC for Selected Blend

8:00 AM – 4:00 PM

Day Five Lab / Classroom

Mixing Varying AC Blends

Open Discussion

Evaluation and Selection of Optimum AC Content

8:00 AM – 4:00 PM

Day Six Classroom / Lab

Review of TSR Procedures and Calculations

Review of Rut Testing Procedures

Review of Asphalt Content Correction Factors

Review of Drain Down Procedures

Batch TSR Specimens, Rut Specimens, AC Burns,

Optimum AC Points, Blended Aggregate Specimen

8:00 AM – 4:00 PM

Day Seven Lab / Classroom

Mix TSR Specimens, Optimum AC Points, AC Burns

Quick Review of Aggregate Testing Procedures

Day Seven Lab / Classroom

Making of TSR Specimens, Ignition Test of AC Burns
Begin Blended Aggregate Testing

8:00 AM – 4:00 PM

Day Eight Lab / Classroom

Mix Rut Specimens
Saturation of TSR Specimens
Continue Blended Aggregate Testing

8:00 AM – 4:00 PM

Day Nine Lab / Classroom

Finish Blended Aggregate Testing
Breaking of TSR Specimens
Entry of Data on NCDOT Mix Design Spreadsheet
Review of Mix Design Packet and Submittal

8:00 AM – 4:00 PM

Day Ten Classroom

Review of All Material
Open Discussion
Test