



# SUPERPAVE VOLUMETRIC MIX DESIGN WORKSHOP Year 2024

This workshop is intended for technicians and engineers who understand and are experienced with the basic principles and procedures of asphalt concrete mixture design, testing, and voids analysis calculations. Applicants must be PennDOT Certified Level 1 Plant Technicians to attend, or equivalent for out of state participants. This workshop fulfills the volumetric mix design requirements for PENNDOT Level 2 Plant Technician certification. The course includes one day of online (virtual) presentation, 1-1/2 days of hands-on laboratory testing, half a day of mix design calculations, and finally, half a day allocated to written exam. This workshop has been updated to reflect the latest changes in test procedures, specifications, and implementation information. Time required for the various sections may vary as needed.

The participants should accomplish the following towards successful completion of the course based on the 75 percent passing grade:

- Conduct laboratory tests as required by the course in a proper manner (20 percent of the grade) – **Minimum required score for laboratory performance to pass the course: 75 percent**
- Prepare a simple report on the Superpave mix design prepared (20 percent of the grade) – See participant's reporting document below. – **Minimum required score for mix design report to pass the course: 75 percent**
- Pass a written exam (60 percent of the grade) – **Minimum required score for written exam: 75 percent**

**Overall minimum required score to pass the course: 75 percent**

## Participant's Reporting Document

The brief report includes two pages with test result forms attached and must be submitted on the last day of the course before the exam date and should include the following.

1. The Results of the Volumetric Calculations
2. Bulk and Apparent Specific Gravities of the Combined Aggregate
3. Effective Specific Gravity of the Aggregate
4. Maximum Theoretical Specific Gravity of the Mix
5. Bulk Specific Gravity of the Compacted Mixes
6. Percent Air Voids for the Compacted Mixes
7. Voids in the Mineral Aggregate (VMA)
8. Voids Filled with Asphalt (VFA)
9. Percent Density at  $N_{\text{design}}$
10. Dust/AC Ratio (Ratio of Fines to Effective Asphalt)
11. The Estimated Binder Content (i.e., the binder content giving design air voids content)
12. Volumetrics at the Estimated Binder content
13. Compaction Chart (percent density versus gyrations) for the Compacted Mix
14. Gradation Chart for the Aggregates Used

The formulas for calculation of volumetrics will be provided as part of the course material.

The forms required for data recording and plotting compaction charts will be provided as part of the course material.



**UPERPAVE VOLUMETRIC MIX DESIGN WORKSHOP**

**COURSE AGENDA**

**DAY 1**

**Module 1: LECTURE**

**Presentations**

**LTI - Research Building B, Room 107**

<b>Time*</b>	<b>Topic</b>
01:00 p.m. – 01:10 p.m.	Orientation & Introduction to the Course
01:10 p.m. – 01:30 p.m.	Safety Concerns when working in the Laboratory
01:30 p.m. – 2:00 p.m.	Introduction to Superpave Mix Design System
02:00 p.m. – 2:30 p.m.	Mix Design: Concepts, Tests, and Balanced Mix Design
2:30 p.m. – 2:45 p.m.	<b>Break</b>
2:45 p.m. – 3:25 p.m.	Understanding Binders and Use in Superpave Mix Design
3:25 p.m. – 4:05 p.m.	Understanding Aggregate and Use in Superpave Mix Design
4:05 p.m. – 4:30 p.m.	Design Using Superpave Gyratory Compactor
4:30 p.m.	<b>Dismissal</b>

\*Times allocated for various topics are subject to change.



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**DAY 2 - Morning**  
**Module 2: HANDS ON LABORATORY TESTING**  
**LTI – Research Buildings B and C**

Time	Activity – Group I	Activity – Group II
7:30 – 8:00 a.m.	Morning refreshments in B107	
8:00 – 9:10 a.m.	Volumetric Requirements in Superpave Mix Design and Review of BMD (B107)	
9:10 – 9:15 a.m.	<b>Break</b>	
9:15 – 10:35 a.m.	Weigh & batch aggregates for gyratory compaction of specimens for mixture design & for AASHTO T283 (Room C101)	Mixing specimens for Volumetric Mix Design (Room C101)
10:35 – Noon	Mixing specimens for Volumetric Mix Design (Room C101)	Weigh & batch aggregates for gyratory compaction of specimens for mixture design & for AASHTO T283 (Room C101)
Noon – 1:00 p.m.	<b>Lunch Break</b>	

**DAY 2 - Afternoon**  
**Module 3: HANDS ON LABORATORY TESTING**  
**LTI – Research Building C**

Time	Activity – Group 1	Activity – Group 2
1:00 – 2:00 p.m.	Conduct Tests for Fine Aggregate Sp. Gr. and Coarse Aggregate Sp. Gr. (Room C102)	Gyratory compaction of mixture design specimens (Room C101)
2:00 – 3:00 p.m.	Gyratory compaction of mixture design specimens (Room C101)	Conduct Tests for Fine Aggregate Sp. Gr. and Coarse Aggregate Sp. Gr. (Room C102)
3:00 – 3:10 p.m.	<b>Break</b>	
3:10 – 4:30 p.m.	Demonstration: Sand Equivalent, Flat & Elongated particles, Coarse Agg. Angularity, Fine Aggregate Angularity (Room C102).	
	<b>Dismissal</b>	



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**DAY 3 - Morning**  
**Module 4: HANDS ON LABORATORY TESTING**  
**LTI – Research Building B and C**

Time	Activity – Groups 1	Activity – Group 2
8:00 – 8:15 a.m.	Orientation for Thursday Work with Morning Refreshments	
8:15 – 9:30 a.m.	Measure Aggregate Oven Dry Masses. Do Aggregate Sp. Gr. Computations. Do the Lab Tour (Research Building C)	Measure bulk density of compacted specimens & Gmm for Volumetric Design (Room C111)
9:15 – 10:15	Measure bulk density of compacted specimens & Gmm for Volumetric Design (Room C111)	Measure Aggregate Oven Dry Masses. Do Aggregate Sp. Gr. Computations. Do the Lab Tour (Research Building C)
10:15 – 10:30 a.m.	Break	
10:30-12:15	Bulk density and degree of saturation of AASHTO T 283 compacted specimens. TSR and Demo of HWT & IDEAL-CT (Room C111)	
12:15 – 1:00 p.m.	<b>Lunch in Building B</b>	

**DAY 3 - Afternoon**  
**Module 5: Class Work**  
**LTI – Research Building B and C**

Time	Activity – Groups 1	Activity – Group 2
1:00 – 2:00 p.m.	Discussion of Moisture Damage Computations and Report Preparation	
2:00 – 4:15 p.m.	<b>Conduct Calculations, Analysis, and Report Preparation (Room B107)</b>	
4:15 – 4: 30 p.m.	Course Evaluation & Dismissal	

**DAY 4**  
**Module 6: WRITTEN EXAM**  
**LTI – Research Building B, Room 107**

Time	Activity
8:00 am – 11:30 am	Written Exam (Exam Duration is Two and a Half Hours)



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**NOTES:**

- Times shown for lecture and all activities are approximate & may be varied as needed.
- You will need a calculator & pen/pencil to use in the laboratory and for the online written exam.
- Hands-on portion of the Course will be conducted at NECEPT Laboratories of Penn State, University Park, PA.
- Long pants and closed toe shoes are required for testing activities in the laboratory. please dress appropriately for working with mechanical equipment and hot materials. Due to Covid-19, personal protection equipment cannot be shared. **You need to bring your own safety glasses and gloves.**
- Participants are responsible for their own hotel accommodations. A list of local hotels including telephone numbers is available upon request. It is not always possible for NECEPT to arrange for discounted room rates for workshop attendees but be sure to ask if such rates are available when making your hotel arrangements.