

National Center for Asphalt Technology

Summary of Projects

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Outline

- Test Track
- Cracking Research
- BMD Implementation
- Training



NCAT Test Track



Pavement Test Track

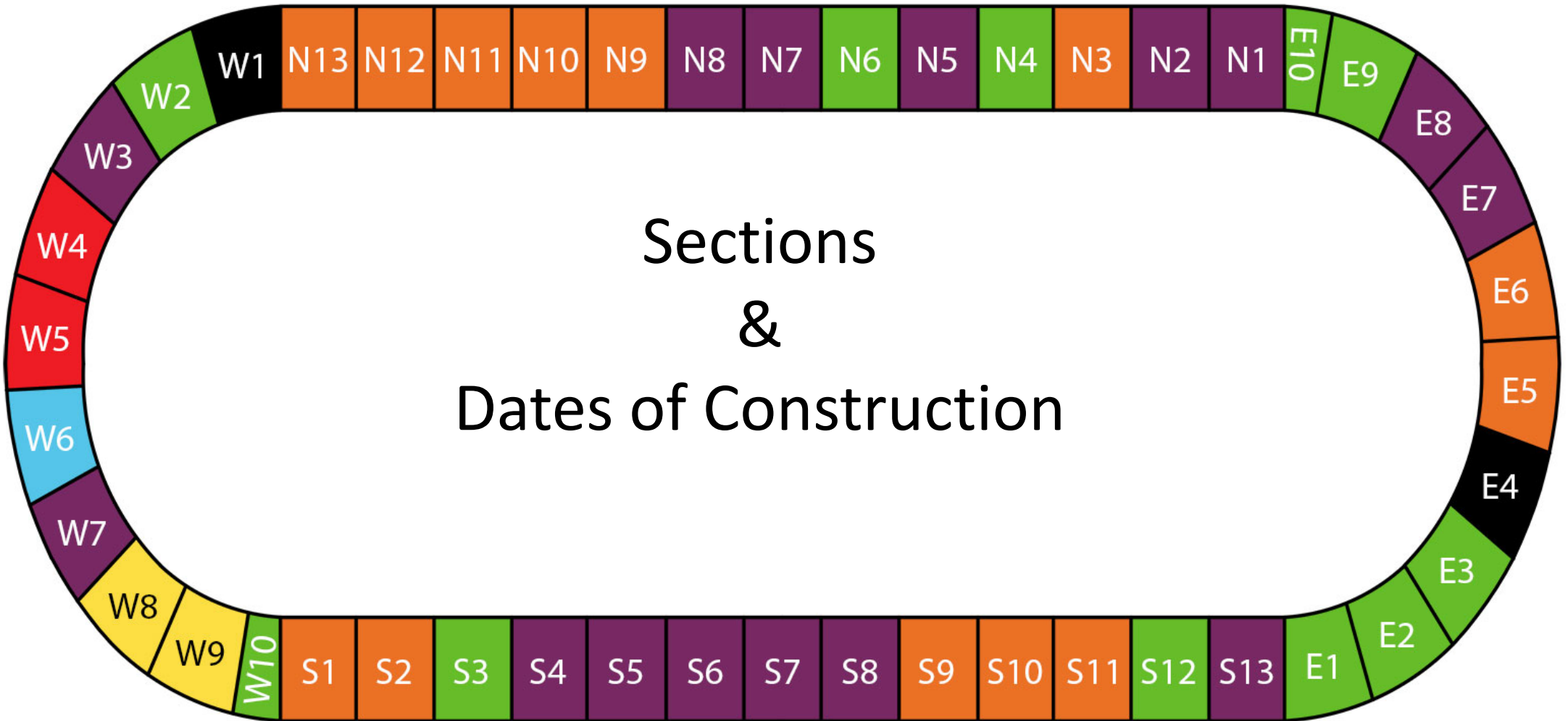
- 1.7 mile oval track
- 2018 started 7th research cycle
- 46 Test Sections, 200 ft. each
- 5 trucks each pulling 3 heavily loaded trailers
- Test sections are evaluated continuously
 - 3 year cycles

5 Trucks with three trailers
20,000 lbs./axle
152,000 lbs./truck
400 laps/day



10 Million ESALs applied over 2 years

Black = 2000 Blue = 2003 Red = 2006 Yellow = 2009 Green = 2012 Purple = 2015 Orange = 2018



Sections & Dates of Construction

Summary of 7th Cycle Experiments

- Lab-field correlation of top down cracking tests
- **Balanced Mix Design**
- Cold Central Plant Recycled Base
- Mixture rejuvenators
- Spray-on fog seal rejuvenators
- Effect of in-place density
- Durability of open-graded friction course
- Full-depth, one-lift reconstruction
- Mechanistic Empirical Pavement Design validation for lime treated subgrade
- Interlayer treatments for reflection cracking
- Friction aggregates
- Biopolymer/rejuvenator

Modes of Cracking

Fatigue



Top-Down



Reflection



Block



Thermal

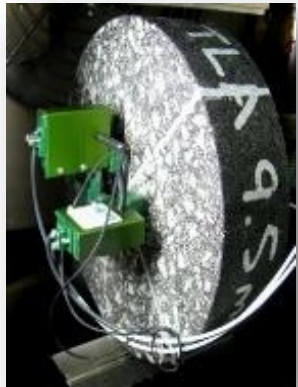


Load Related



Environment Related

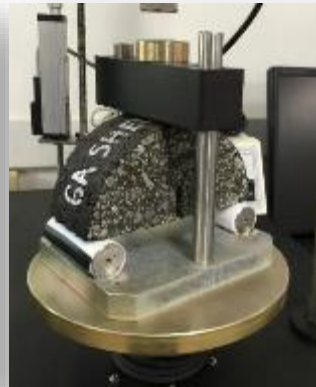
Selected Top Down Cracking Tests



Energy Ratio



SCB-LA



I-FIT



OT-TX



OT-NCAT



IDEAL-CT



*AMPT
Cyclic Fatigue*

All tests* were conducted on:

1. lab prepared mix after short-term aging
2. lab prepared mix after short-term and critical aging
3. plant mix samples that were reheated
4. plant mix samples that were reheated and critically aged

*AMPT Cyclic Fatigue Tests were tested only on plant mix samples

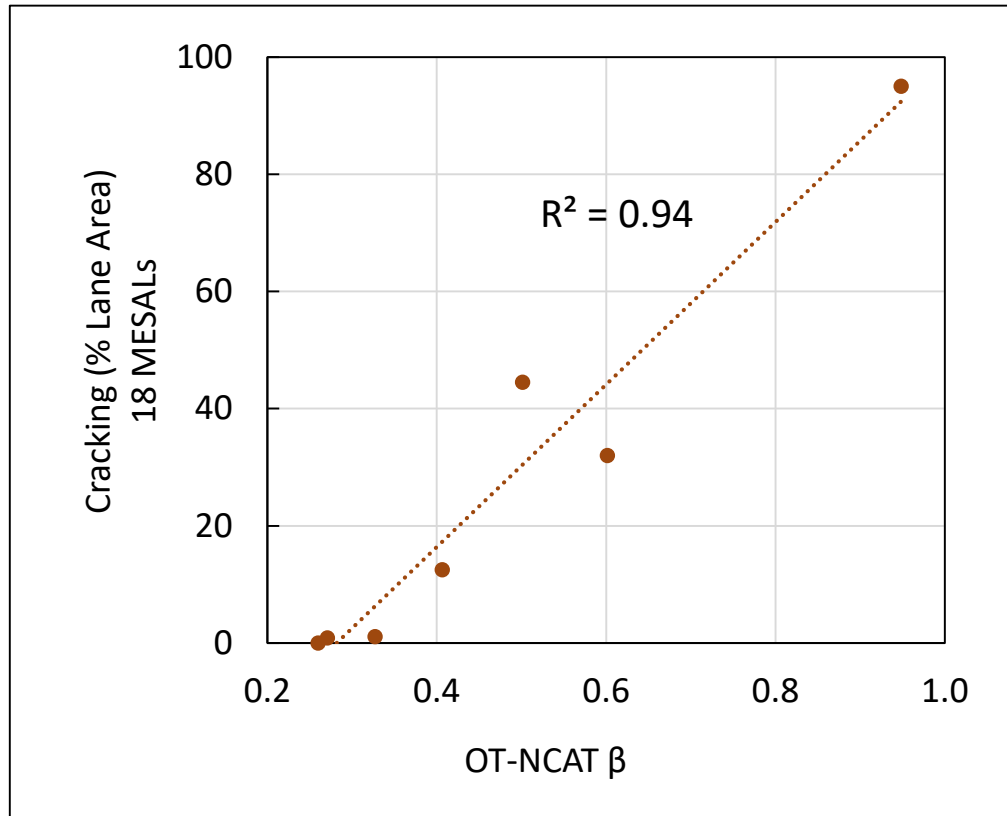
NCAT CG Experiment - Performance

Section	Description	As-Const. Density (%G _{mm})	% Lane Area Cracked	
			Feb. 2020 16 MESALs	Sept. 2020 18 MESALs
N1	20% RAP (Control)	93.6	11.2	44.5
N2	Control w/ High Density	96.1	7.7	12.5
N5	Low AC, Low Density	90.3	21.1	32*
N8	20% RAP 5% RAS	91.5	70.8	95*
S5	35% RAP PG 67-28	92.2	0.2	1.1
S6	Control w/ HiMA	91.8	0	0.9
S13	AZ Rubber Mix	92.7	0	0

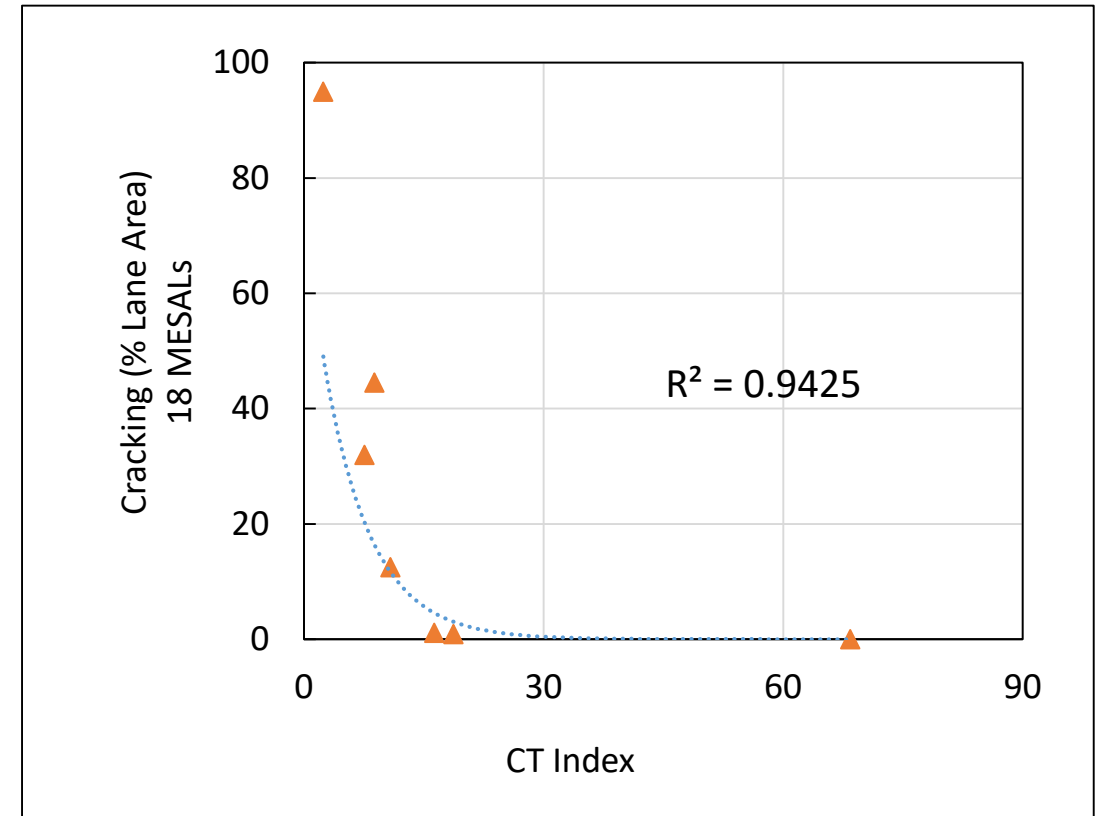
* Projected based on data from 16 million ESALs using a sigmoidal function

Correlation Between Test Data and Performance

Overlay Test



IDEAL Cracking Test



PMLC Samples Critically Aged 8 hrs. @ 135°C

Correlation to Field Cracking at 18 MESALs: R²

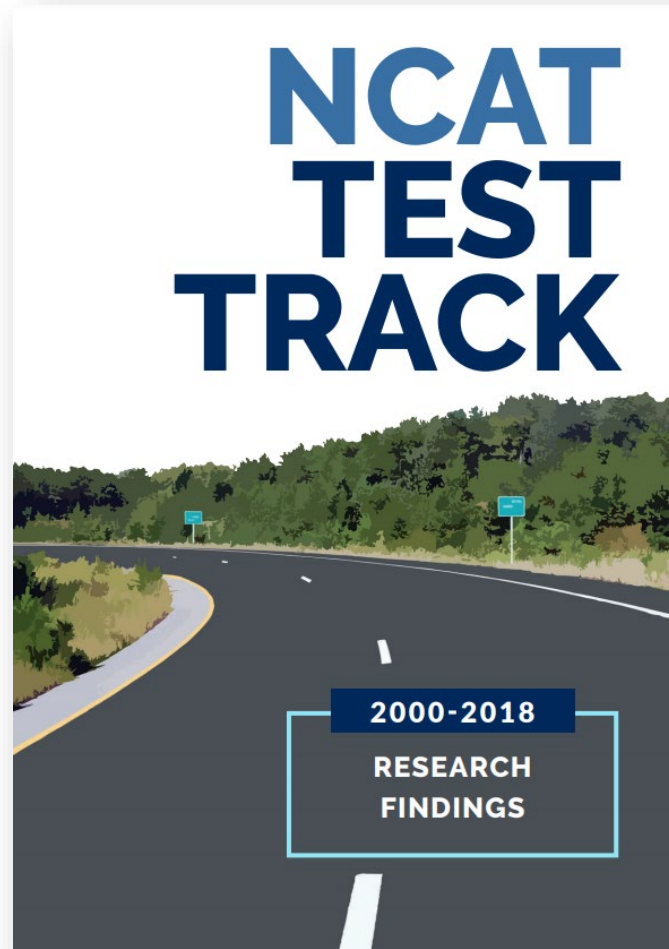
Test	Plant Mix	
	Reheated	Critically Aged
Energy Ratio	0.30	0.01
SCB-LA	0.11	0.77
I-FIT	0.88	0.82
OT-TX (β)	0.81	0.76
OT-NCAT (β)	0.80	0.94
IDEAL-CT	0.87	0.94

Critically Aged
8 hrs. @ 135°C

Upcoming Test Track Schedule

- Loading to-date: 9.9 million ESALs – Completion this week!
- Test Track Conference – June 22nd – 24th
- Reconstruction starts – June 28th
- Reconstruction ends – Late August 2021
- 8th Cycle starts loading in September 2021

Summary of Research Findings



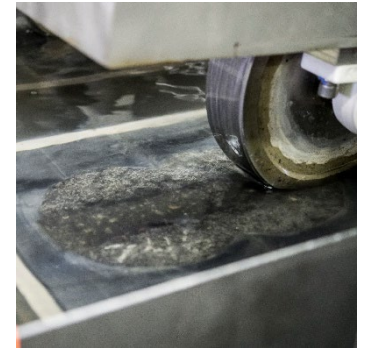
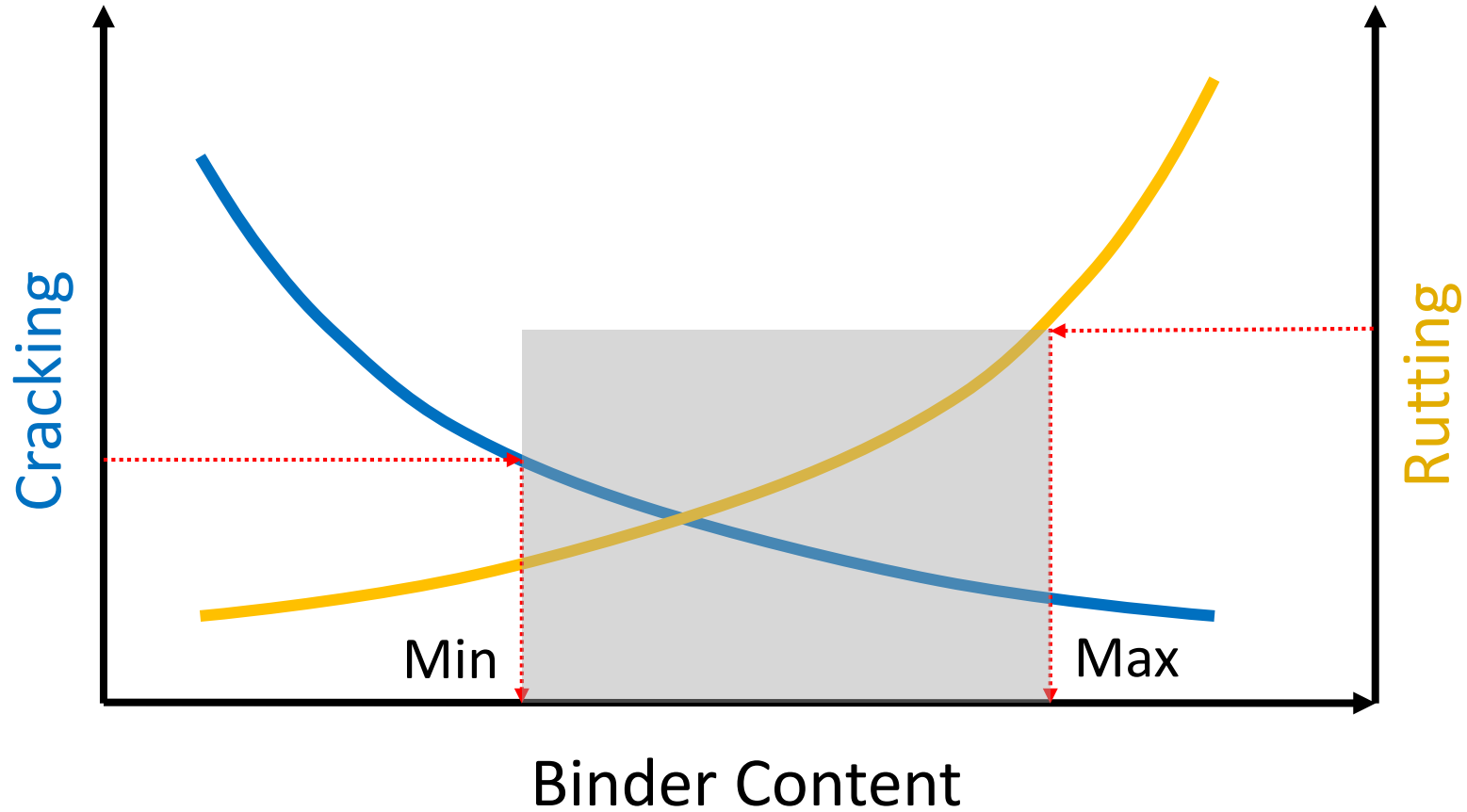
<http://eng.auburn.edu/research/centers/ncat/files/ttfindings.pdf>

Balanced Mix Design (BMD) for Asphalt Mixtures



“Asphalt mix design using performance tests on appropriately conditioned specimens that address multiple modes of distress taking into consideration mix aging, traffic, climate and location within the pavement structure.”

BMD Concept



With the current volumetric mix design system...



Fractionated RAP



Recycled Shingles



Recycled Tire Rubber



WMA additives



Recycling agents



SBS Polymer

BMD Activities

Test Track:

- TXDOT Sections: Comparing BMD to Superpave Design performance
- OKDOT Sections: Verifying preliminary cracking criteria

State DOT Sponsored Research:

- Alabama & Georgia: Implementing cracking tests
- Wisconsin & Virginia: Implementation support
 - WI: Verifying criteria
 - VA: Evaluating variability

BMD Activities

Training/Technical Support:

- BMD Workshops
 - 19 Workshops (In-person) – NAPA
 - 20 Workshops (Virtual) – NCHRP
- BMD Resource Document – NAPA
- NCHRP 10-107 Guide for Implementing Performance Specifications

FAA Project

In-Service Performance of Airport Pavements Constructed Following State Specifications for Highway Materials

- Document the performance of airport pavements constructed following state highway specifications compared to performance of pavements constructed following FAA standard specifications
 - For aircraft less than 60,000 pounds.
- Compile, summarize, and review construction and loading data, along with pavement performance.

Airfield Asphalt Certification Program



Airfield Asphalt Certification Program

- Developed to increase the quality of construction for work performed under the Unified Facilities Guide Specifications (UFGS) for asphalt airfields.
- AACCP is now included as part of:
 - UFGS 32 12 15.13 – Asphalt Paving for Airfields
 - UFGS 32 12 17.19 – Fuel Resistant Asphalt Paving for Airfields – Surface Course
- Three Certification Courses
 - Asphalt Lab Technician – NCAT
 - Asphalt QC Manager – NCAT
 - Asphalt Paving inspector – Asphalt Institute

Asphalt Lab Technician

- 4 days (3 + ½)
- Prerequisites
 - 2 years experience, or
 - 2 year college degree
- Valid for 4 years
- 9 Modules
- 12 hours of laboratory training

Modules:

1. Introduction
2. Random Sampling
3. Sampling Aggregates
4. Aggregate properties
5. Sampling mixtures
6. Volumetrics
7. Mix Design
8. Binder content and gradation
9. Sampling and testing for density

Asphalt QC Manager

- 3 days (2 + ½)
- Prerequisites
 - 4 years experience, or
 - 2 years experience + 2 year college degree
 - Certified as lab or paving technician
- Valid for 4 years
- 11 Modules

Modules:

1. Introduction
2. QC-QA Program
3. Specification Overview
4. Mix Design Review
5. Plant Production
6. Surface Preparation
7. Placement
8. Compaction
9. Quality Control
10. Mix Adjustment and Troubleshooting
11. Performance Problems

AACP Schedule

- QC Manager: March 2 – 4, 2021 (NCAT)
- Lab Technician: April 6 – 9, 2021 (NCAT)

AACP Website



<http://airfieldasphaltcert.com/>

Thank You

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