

---

# Ncat National Center For Asphalt Technology

---

Accelerated Pavement Testing to Transport Infrastructure Innovation

National Center for Asphalt Technology (NCAT).

Asphalt Pavements

2003 NCAT Test Track Conference Report

Structural Study of Cold Central Plant Recycling Sections at the National Center for Asphalt Technology (NCAT) Test Track

Sustainability, Eco-efficiency, and Conservation in Transportation Infrastructure Asset Management

Mix Design Practices for Warm Mix Asphalt

Accelerated Pavement Testing

Evaluation of Asphalt Pavement Analyzer for HMA Mix Design

Effect of aggregate gradation on measured asphalt content

Summary of National Center for Asphalt Technology Test Track Findings

Asphalt Content by Ignition Round Robin Study

System Dynamics for Complex Problems in Pavement Engineering

Asphalt Paving Technology 2012

Efficient Transportation and Pavement Systems: Characterization, Mechanisms, Simulation, and Modeling

Validation of Ncat Structural Test Track Experiment Using Indot Apt Facility

Introduction to Unmanned Aircraft Systems, Second Edition

Structural Study of Cold Central Plant Recycling Sections at the National Center for Asphalt Technology (NCAT) Test Track: Phase II

The Roles of Accelerated Pavement Testing in Pavement Sustainability

Structural Study of Cold Central Plant Recycling Sections at the National Center for Asphalt Technology (NCAT) Test Track: Phase III

Preventive Maintenance of Asphalt Concrete Pavements

Phase VI (2015-2017) NCAT Test Track Findings

Mechanistic Design Data from ODOT Instrumented Pavement Sites

Advances in Pavement Design through Full-scale Accelerated Pavement Testing

Design and Instrumentation of the Structural Pavement Experiment at the National Center for Asphalt Technology Test Track

Bearing Capacity of Roads, Railways and Airfields

Evaluation of Pavement Bleeding on I-55 in Illinois

Bearing Capacity of Roads, Railways and Airfields, Two Volume Set

Experience with Stone Matrix Asphalt in the United States

Pavement Drainage: Theory and Practice

Asphalt Materials Science and Technology

Hot Mix Asphalt Materials, Mixture Design, and Construction

Advances in Materials and Pavement Performance Prediction II

A study of in-place rutting of asphalt pavements

Heavy duty asphalt pavements in Pennsylvania: an evaluation for rutting

NCAT Test Track Design, Construction and Performance

Density of asphalt concrete

Asphalt Paving Technology 2013

Refinement of Current WisDOT HMA Mixture Application Guidelines Related to NMAAS and Aggregate Characteristics

*Ncat National Center For  
Asphalt Technology*

*Downloaded from  
[dev.mabts.edu](http://dev.mabts.edu) by guest*

---

## JANIAH DIAZ

---

[Accelerated Pavement Testing to Transport Infrastructure Innovation](#) CRC Press

This compendium gathers the latest advances in the area of Accelerated Pavement Testing (APT), a means of testing full-scale pavement construction in an accelerated manner for structural deterioration in a very short term.

Compiling novel research results presented at the 5th International Conference on Accelerated Pavement Testing, San Jose, Costa Rica, the volume serves as a timely and highly relevant resource for materials scientists and engineers interested in determining the performance of a pavement structure during its service life (10+ years) in a few

weeks or months.

### **National Center for Asphalt Technology (NCAT).**

The Virginia Department of Transportation (VDOT) contracted with the National Center for Asphalt Technology (NCAT) in 2012 to install, instrument, and monitor three pavement test sections at the NCAT Test Track. The purpose of this current study was to assess the performance of two of the original three test sections after approximately 30 million 18-kip single equivalent axle loads (ESALs). Both of these test sections, Sections N4 and S12, included a 5-in-thick cold central plant recycling (CCPR) layer placed on top of either a compacted aggregate base (Section N4) or a cement-stabilized foundation (Section S12) produced using equipment and procedures used in full depth reclamation (FDR). The test sections were assessed using pavement

instrumentation and periodic performance monitoring to capture the response and any distresses developing from truck loading. The study concluded that the two test sections are examples of new or reconstructed pavement structures that include CCPR or CCPR and a stabilized base layer (similar to FDR) that can achieve a long service life under heavy truck traffic. Section S12, containing the stabilized base layer (similar to FDR), was found to have very low strain levels and no deterioration evident at the surface after 30 million ESALs. The superior performance of this section was attributed to the use of the stabilized base layer. Section N4, having an aggregate base, was found to have cracking that was evident at the surface at approximately 29.6 million ESALs. This was expected at some point during the testing given the evidence of reduced moduli values for the

asphalt/CCPR layer; greater and more erratic strain values; and increasing vertical base and subgrade pressures noted during the 2015-2018 NCAT Test Track cycle. Further trafficking of Section N4 is expected to provide additional information that might be used to determine a suitable design approach for similar pavement sections. Following trafficking, a forensic investigation of the test sections should be conducted to identify the specific layers in which any deterioration occurred. The study recommends that VDOT modify their design manuals to include using a stabilized base layer (similar to FDR) beneath a CCPR layer when CCPR is included on pavement sections having high traffic volumes. It is also recommended that VDOT investigate if designing a pavement section consisting of both CCPR and a stabilized base layer (similar to FDR) is more appropriate using a flexible or a semi-rigid approach. The study further recommends that VDOT continue to sponsor trafficking on Section N4 for the 2021 NCAT Test Track cycle to understand better the behavior of the CCPR material in terms of its eventual deterioration. Following completion of testing on these sections, a forensic study should be conducted to help identify the specific layers in which any deterioration occurred. The benefits to VDOT of implementing the study recommendations include the anticipated longer service life of a pavement section built using pavement recycling techniques where CCPR and a stabilized base layer (similar to FDR) are included. Determination of an appropriate design methodology; additional trafficking of Section N4 containing the aggregate base layer; and a forensic study of both sections following trafficking will provide VDOT a better understanding of the behavior of the CCPR material in terms of its eventual deterioration.

#### *Asphalt Pavements* CRC Press

Internationally, significant attention is given to transport sustainability including planning, design, construction, evaluation, safety and durability of the road system. The 4th International Gulf Conference on Roads: Efficient Transportation and Pavement Systems - Characterization, Mechanisms, Simulation, and Modeling, hosted by the University of  
*2003 NCAT Test Track Conference Report* Butterworth-Heinemann

The proliferation of technological capability, miniaturization, and demand for aerial intelligence is pushing unmanned aerial systems (UAS) into the realm of a multi-billion dollar industry. This book

surveys the UAS landscape from history to future applications. It discusses commercial applications, integration into the national airspace system (NAS), System function, operational procedures, safety concerns, and a host of other relevant topics. The book is dynamic and well-illustrated with separate sections for terminology and web-based resources for further information.

#### Structural Study of Cold Central Plant Recycling Sections at the National Center for Asphalt Technology (NCAT) Test Track CRC Press

Inspired from the legacy of the previous four 3DFEM conferences held in Delft and Athens as well as the successful 2018 AM3P conference held in Doha, the 2020 AM3P conference continues the pavement mechanics theme including pavement models, experimental methods to estimate model parameters, and their implementation in predicting pavement performance. The AM3P conference is organized by the Standing International Advisory Committee (SIAC), at the time of this publication chaired by Professors Tom Scarpas, Eyad Masad, and Amit Bhasin. *Advances in Materials and Pavement Performance Prediction II* includes over 111 papers presented at the 2020 AM3P Conference. The technical topics covered include: - rigid pavements - pavement geotechnics - statistical and data tools in pavement engineering - pavement structures - asphalt mixtures - asphalt binders The book will be invaluable to academics and engineers involved or interested in pavement engineering, pavement models, experimental methods to estimate model parameters, and their implementation in predicting pavement performance.

#### Sustainability, Eco-efficiency, and Conservation in Transportation Infrastructure Asset Management DEStech Publications, Inc

Worldwide there is a growing interest in efficient planning and the design, construction and maintenance of transportation facilities and infrastructure assets. The 3rd International Conference on Transportation Infrastructure ICTI 2014 (Pisa, April 22-25, 2014) contains contributions on sustainable development and preservation of transportation infrastructure assets, with a focus on eco-efficient and cost-effective measures. *Sustainability, Eco-efficiency and Conservation in Transportation Infrastructure Asset Management* includes a selection of peer reviewed papers on a wide variety of topics: • Advanced modeling tools (LCA, LCC, BCA, performance prediction, design tools and

systems) • Data management (monitoring and evaluation) • Emerging technologies and equipments • Innovative strategies and practices • Environmental sustainability issues • Eco-friendly design and materials • Re-use or recycling of resources • Pavements, tracks, and structures • Case studies Sustainability, Eco-efficiency and Conservation in Transportation Infrastructure Asset Management will be particularly of interest to academics, researchers, and practitioners involved in sustainable development and maintenance of transportation infrastructure assets.

#### **Mix Design Practices for Warm Mix Asphalt** Transportation Research Board

"TRB's National Cooperative Highway Research Program (NCHRP) Report 539: Aggregate Properties and the Performance of Superpave-Designed Hot-Mix Asphalt examines technical literature available since the conclusion of the Strategic Highway Research Program in 1993 on the impact of the aggregate properties specified by the Superpave mix design method on the performance of hot-mix asphalt. The performance of hot-mix asphalt (HMA) is largely determined by the characteristics of its constituents: asphalt binder and aggregate. In developing the Superpave mix design method, the Strategic Highway Research Program (SHRP, 1987-1993) targeted the properties of asphalt binders and HMA and their effects on pavement performance"-- Publisher's description.

Accelerated Pavement Testing CRC Press  
TRB's National Cooperative Highway Research Program (NCHRP) Report 691: *Mix Design Practices for Warm-Mix Asphalt* explores a mix design method tailored to the unique material properties of warm mix asphalt technologies. Warm mix asphalt (WMA) refers to asphalt concrete mixtures that are produced at temperatures approximately 50°F (28°C) or more cooler than typically used in the production of hot mix asphalt (HMA). The goal of WMA is to produce mixtures with similar strength, durability, and performance characteristics as HMA using substantially reduced production temperatures. There are important environmental and health benefits associated with reduced production temperatures including lower greenhouse gas emissions, lower fuel consumption, and reduced exposure of workers to asphalt fumes. Lower production temperatures can also potentially improve pavement performance by reducing binder aging, providing added time for mixture compaction, and allowing improved compaction during cold weather paving.

Appendices to NCHRP Report 691 include the following. Appendices A, B, and D are included in the printed and PDF version of the report. Appendices C and E are available only online.

Purdue University Press

Increasingly, segments of the civil infrastructure are considered to be parts of larger systems, which requires a systems approach for a fuller and proper understanding of and solutions to problems. Unfortunately, the subject of a system or a systems approach is barely covered in a standard civil and environmental engineering curriculum. Most, if not all, civil engineering problems involve interdependency, and hence segmented approaches of learning one individual topic at a time make it difficult for students to learn, understand, and apply rational concepts for the design, construction, and maintenance of larger infrastructure components. *System Dynamics for Complex Problems in Pavement Engineering* presents an introduction to a systems approach to help readers evolve and develop their capabilities of learning, communicating, and researching through system dynamics modeling and experimentation. Furthermore, it helps students appreciate the need for systems thinking in modeling, analyzing, and proposing solutions for multidisciplinary problems in pavement engineering.

[Evaluation of Asphalt Pavement Analyzer for HMA Mix Design](#) DEStech Publications, Inc

Asphalt is a complex but popular civil engineering material. Design engineers must understand these complexities in order to optimize its use. Whether or not it is used to pave a busy highway, waterproof a rooftop or smooth out an airport runway, *Asphalt Materials Science and Technology* acquaints engineers with the issues and technologies surrounding the proper selection and uses of asphalts. With this book in hand, researchers and engineering will find a valuable guide to the production, use and environmental aspect of asphalt. Covers the Nomenclature and Terminology for Asphalt including: Performance Graded (PG) Binders, Asphalt Cement (AC), Asphalt-Rubber (A-R) Binder, Asphalt Emulsion and Cutback Asphalt Includes Material Selection Considerations, Testing, and applications Biodegradation of Asphalt and environmental aspects of asphalt use

**Effect of aggregate gradation on measured asphalt content** Springer Pack: Book and CD Internationally, full-scale accelerated pavement testing, either on test roads or linear/circular test tracks,

has proven to be a valuable tool that fills the gap between models and laboratory tests and long-term experiments on in-service pavements. Accelerated pavement testing is used to improve understanding of pavement behavior,

[Summary of National Center for Asphalt Technology Test Track Findings](#) Springer Nature

*Bearing Capacity of Roads, Railways and Airfields* focuses on issues pertaining to the bearing capacity of highway and airfield pavements and railroad track structures and provided a forum to promote efficient design, construction and maintenance of the transportation infrastructure. The collection of papers from the Eighth International Conference **Asphalt Content by Ignition Round Robin Study** CRC Press

Presents the National Center for Asphalt Technology (NCAT), located at Auburn University in Alabama. Explains that NCAT was created through an agreement between the University and the National Asphalt Pavement Association (NAPA) Education Foundation and in conjunction with companies associated with the Hot Mix Asphalt (HMA) industry. Describes the purpose of the Center to be research, education, and information about this industry. Offers access to NCAT newsletters and publications. Provides information and a point of contact for upcoming training courses. Includes information about the Southeastern Superpave Center used for the implementation of results from the Strategic Highway Research Program. Contains information on the staff and the facilities. Posts contact information via mailing address, telephone and fax numbers, and e-mail.

[System Dynamics for Complex Problems in Pavement Engineering](#) CRC Press

This book comprises over 30 new and not previously published technical papers from the Association of Asphalt Paving Technologists on all phases of asphalt research and applications, including mixing, mixture elements, and testing. Includes an accompanying CD-ROM.

*Asphalt Paving Technology 2012*

Transportation Research Board  
In 2012, the Virginia Department of Transportation (VDOT) contracted with the National Center for Asphalt Technology (NCAT) to install, instrument, and monitor three pavement test sections at the NCAT Test Track during the 2012-2014 track cycle. The work consisted of constructing, instrumenting, and trafficking the test sections with heavily loaded trucks until approximately 10 million 18-kip equivalent single axle loads (ESALs) were applied.

Embedded instruments were installed to capture the temperature and pavement response from truck loading. The three test sections, having a length of 200 ft each, consisted of two different asphalt overlay thicknesses placed on top of a five-in cold central-plant recycled base. One of the three sections also contained a cement-stabilized base designed to simulate a full-depth reclaimed layer. The purpose of this study was to evaluate the performance of the three test sections constructed using cold central plant recycling (CCPR) over the initial 2-year track cycle. The performance was documented by analyzing the results of laboratory testing from collected cores, as well as deflection testing from falling weight deflectometer, temperature, pressure, and strain measurements from embedded instruments, and surface-observable deterioration of the pavement sections. The study found that none of the three sections showed any surface-observable deterioration after 10 million ESALs of loading. Throughout the cycle, the average measured strain from Section N3 (having a 6-in asphalt overlay) was 40% less at 68°F than that of Section N4 (having a 4-in asphalt overlay). The strain from Section S12 (having a 4-in asphalt overlay and a cement-stabilized foundation) was approximately 69% and 49% less than the strain levels for Sections N3 and N4, respectively, at 68°F. The structural layer coefficient of the CCPR material was estimated to range from 0.36 to 0.39 based on falling weight deflectometer testing. The temperature-normalized asphalt mixture/CCPR modulus of Section S12 was found to increase with respect to time. This indicates that the cement-stabilized foundation is increasing in strength over time, likely attributable to continued curing of the layer. The study recommends that VDOT continue to emphasize the use of pavement recycling methods for new pavement construction and pavement rehabilitation projects. To this end, VDOT will work to identify locations for future pavement recycling projects where performance data suggest that maintenance activities take place more often than the average. VDOT will also review existing memoranda with district pavement management and design staff that state pavement recycling should be considered for projects where it is a viable option. This study shows that the three pavement designs used in the three test sections constructed at the NCAT Test Track to be adequate for a minimum of 10 million ESALs and likely much longer. This report is an interim report in that the test sections are still

being trafficked. A final report will be prepared upon the completion of testing. *Efficient Transportation and Pavement Systems: Characterization, Mechanisms, Simulation, and Modeling* CRC Press

The Virginia Department of Transportation (VDOT) contracted with the National Center for Asphalt Technology (NCAT) in 2012 to install, instrument, and monitor three pavement test sections at the NCAT Test Track. These sections were subjected to approximately 20 million 18-kip equivalent single axle loads between 2012 and 2017. Pavement instrumentation was included in each test section to capture the temperature and pavement response from truck loading. The three test sections, having a length of 200 ft each, included two different asphalt overlay thicknesses placed on top of a 5-in cold central plant recycled base. One of the three sections also contained a cement-stabilized base designed to simulate a full-depth reclaimed layer. The purpose of this study was to conduct a second round of testing during the 2015-2017 research cycle and to evaluate the performance of the three test sections constructed using cold central plant recycling (CCPR) material. This study follows an earlier effort performed during the 2012-2014 research cycle. The performance of the sections was documented by analyzing the results of deflection testing using a falling weight deflectometer; temperature, pressure, and strain measurements from embedded instruments; and observable surface deterioration of the pavement sections. The study found that the performance of the three recycled sections continues to be excellent after 20 million equivalent single axle loads of traffic loading. This was evidenced by the following examples of functional performance: no observable cracking at the pavement surface, rut depths less than 0.3 in, and steady measurements of ride quality. The claim of excellent performance is also supported by the following examples of structural performance: steady or increasing modulus values for the asphalt/CCPR layer and steady or slightly increasing tensile strain at the bottom of the CCPR layer, vertical base pressure, and vertical subgrade pressure. The study recommends that VDOT continue to sponsor trafficking of two of the recycled sections for the 2018 track cycle and further recommends that VDOT find ways to identify and fund additional projects to implement the pavement recycling concepts on in-service pavements in Virginia.

Validation of Ncat Structural Test Track

Experiment Using Indot Apt Facility  
Transportation Research Board  
SUMMARY This book provides complete coverage of surface and subsurface drainage of all types of pavements for highways, urban roads, parking lots, airports, and container terminals. It provides up-to-date information on the principles and technologies for designing and building drainage systems and examines numerous issues, including maintenance and designing for flood events. Practical considerations and sophisticated analysis, such the use of the finite element method and unsaturated soil mechanics, anisotropy and uncertainties, are presented. This book allows civil engineers to make the best use of their resources to provide cost effective and sustainable pavements. Features  
Presents a holistic consideration of drainage with respect to pavement performance. Includes numerous practical case studies. Examines flooding and the impacts of climate change. Includes PowerPoint slides which include quizzes, schematics, figures, and tables.

Introduction to Unmanned Aircraft Systems, Second Edition CRC Press  
The National Center for Asphalt Technology (NCAT) operates a full-scale test road for studying the response and performance of asphalt pavements. During the 2003 - 2005 testing phase, NCAT instrumented eight of their test sections with stress and strain gauges. Two of the test sections were later replicated, along with embedded instrumentation, for subsequent testing in the accelerated pavement testing (APT) facility operated by the Indiana Department of Transportation. The availability of similarly constructed and instrumented pavement systems loaded in different conditions offered a unique opportunity to develop and test the forecastability of pavement models. Exploring this aspect is the topic of the present work, in which an attempt is made to use the APT experiment in conjunction with laboratory test results, and forecast resilient responses obtained at NCAT that were generated under completely different loading and environmental conditions. The modeling and analysis methodologies are outlined in detail and the calculation results are compared with NCAT measurements. Findings are discussed and recommendations for future research are given.

**Structural Study of Cold Central Plant Recycling Sections at the National Center for Asphalt Technology (NCAT) Test Track: Phase II** CRC Press  
Bearing Capacity of Roads, Railways and

Airfields includes the contributions to the 10th International Conference on the Bearing Capacity of Roads, Railways and Airfields (BCRRA 2017, 28-30 June 2017, Athens, Greece). The papers cover aspects related to materials, laboratory testing, design, construction, maintenance and management systems of transport infrastructure, and focus on roads, railways and airfields. Additional aspects that concern new materials and characterization, alternative rehabilitation techniques, technological advances as well as pavement and railway track substructure sustainability are included. The contributions discuss new concepts and innovative solutions, and are concentrated but not limited on the following topics: · Unbound aggregate materials and soil properties · Bound materials characteristics, mechanical properties and testing · Effect of traffic loading · In-situ measurements techniques and monitoring · Structural evaluation · Pavement serviceability condition · Rehabilitation and maintenance issues · Geophysical assessment · Stabilization and reinforcement · Performance modeling · Environmental challenges · Life cycle assessment and sustainability Bearing Capacity of Roads, Railways and Airfields is essential reading for academics and professionals involved or interested in transport infrastructure systems, in particular roads, railways and airfields.

The Roles of Accelerated Pavement Testing in Pavement Sustainability  
National Center for Asphalt Technology (NCAT).Presents the National Center for Asphalt Technology (NCAT), located at Auburn University in Alabama. Explains that NCAT was created through an agreement between the University and the National Asphalt Pavement Association (NAPA) Education Foundation and in conjunction with companies associated with the Hot Mix Asphalt (HMA) industry. Describes the purpose of the Center to be research, education, and information about this industry. Offers access to NCAT newsletters and publications. Provides information and a point of contact for upcoming training courses. Includes information about the Southeastern Superpave Center used for the implementation of results from the Strategic Highway Research Program. Contains information on the staff and the facilities. Posts contact information via mailing address, telephone and fax numbers, and e-mail.NCAT Test Track Design, Construction and PerformanceSummary of National Center for Asphalt Technology Test Track FindingsValidation of Ncat Structural Test

Track Experiment Using Indot Apt Facility  
This volume gathers the latest advances, innovations, and applications in the field of accelerated pavement testing (APT), presented at the 6th International Conference on Accelerated Pavement Testing, in Nantes, France, in April 2022. Discussing APT, which involves rapid testing of full-scale pavement

constructions for structural deterioration, the book covers topics such as APT facilities, APT of asphalt concrete and sustainable/innovative materials, APT for airfield pavements, testing of maintenance and rehabilitation solutions, testing of smart and multi-functional pavements, data analysis and modeling, monitoring and non-destructive testing, and efficient means of calibrating/developing pavement

design methods. Featuring peer-reviewed contributions by leading international researchers and engineers, the book is a timely and highly relevant resource for materials scientists and engineers interested in determining the performance of pavement structures during their service life (10+ years) in a few weeks or months.

Related with Ncat National Center For Asphalt Technology:

[© Ncat National Center For Asphalt Technology Ap Us History Exam 2023 Pass Rate](#)

[© Ncat National Center For Asphalt Technology Ap Stats Practice Tests](#)

[© Ncat National Center For Asphalt Technology Ap Statistics Chapter 7 Test Answers](#)