Pavement Resource Program

Practical solutions, research, and testing for transportation agencies and industry

- Innovative materials and practices
- Roadway and airfield material design, characterization, and specification
- Performance-based evaluation and customized pavement design and modeling
- Pavement management and life-cycle analysis
- Up-to-date training on industry advances and practices
- AASHTO accredited for materials testing of asphalt mix, binder, and aggregate

The Pavement Resource Program (PRP) is an independent, university-based research lab and service provider for federal and state agencies, local municipalities, and industry. Together, they work tirelessly to maintain and improve the quality and durability of the region's roads and highways.

PRP conducts wide-ranging pavement research; tests materials for transportation agencies and commercial producers; develops materials and methods to improve and maintain roadway infrastructure; and educates working professionals and young people who will lead the field in the future. PRP is part of Rutgers' Center for Advanced Infrastructure and Transportation, a U.S. Department of Transportation-designated University Transportation Center.

RUTGERS
Center for Advanced Infrastructure and Transportation

Rutgers Asphalt Pavement Laboratory

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RAPL's capabilities include: materials, structural, and performance testing; pavement design and evaluation for conventional, modified, recycled, and specialty asphalts; advanced materials development; specifications assessment and formulation; and materials modeling.

RAPL focuses on practical solutions and implementation encompassing materials, pavement design, advanced materials development, pavement design practices, technology transfer, and training.

The lab is well equipped to perform all routine mixture design and quality control tests for aggregates, asphalt binder, and asphalt mixtures, as well as advanced- and research-grade test methods.

RAPL also performs significant forensic investigations to help customers determine cause of asphalt failure or underperformance.

Lab staff includes six full-time engineers with certification from the Society of Asphalt Technologists of New Jersey (NJSAT) and NorthEast Transportation Technician Certification Program (NETTCP).

For a full list of RAPL testing capabilities, equipment, and material and design services, contact PRP.

CASE STUDY

Project: Newark and JFK International Airports Asphalt Mixture and Binder Fatigue/Durability Performance and Their Correlation to Field Observations

Customer: Port Authority of New York & New Jersey

Newark International Airport and JFK International Airport were experiencing premature fatigue cracking on their runways.

Sample field cores were taken from runways that were different ages and exhibiting different levels of cracking.

Asphalt mixture and binder tests were conducted on the recovered cores and their performance was indexed. The study provided recommendations regarding asphalt mixture and binder performance tests to help mitigate fatigue cracking on asphalt airfield pavements in the future.

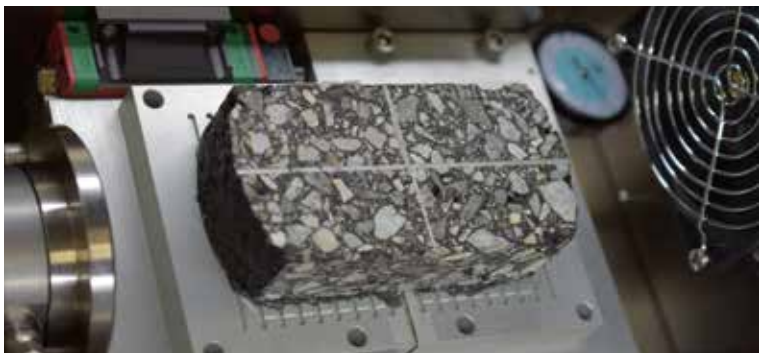
CASE STUDY

Project: Evaluation of Plant-Produced High-Percentage RAP Mixtures in the Northeast

Customer: FHWA Transportation Pooled Fund

PRP evaluated the use and performance of recycled asphalt pavement (RAP) containing high percentages of recycled materials, especially concentrating on plant-produced asphalt mixtures. This multi-faceted study showed significant performance differences can occur simply due to typical plant production variations and silo-storage times.

In addition, using "softer" asphalt binder did not always result in better performance, since effective asphalt content of these mixtures is critical. Performance-related specifications (PRS) and increased asphalt content—either by increasing in the void in mineral aggregate (VMA) in the mixture or reducing the amount of RAP binder in the total asphalt content—were found to be the best method to improve fatigue cracking resistance and durability of high-RAP asphalt mixtures.



Pavement Evaluation, Design, and Management Capabilities

The pavement experts at PRP provide a range of evaluation and assessment services to help better manage roadways. This may take the form of network-level pavement condition evaluation using a traffic-speed deflectometer or project-level pavement condition evaluation and overlay design.

Monitoring and understanding the condition of a road network is the first step in good pavement management. PRP has done manual condition-data surveys on more than 600 miles of New Jersey municipal roads since 2010 and has extensive experience with automated data collection using systems such as Pathway and Pavemetrics. PRP also supports agencies by developing and implementing data quality control procedures to ensure accurate data reporting.

Our professionals are well versed in mechanistic-empirical (ME) pavement design and characterizing material properties for ME. For example, PRP helped New Jersey DOT implement AASHTO standards for ME throughout the state.

CASE STUDY

Project: HMA Pay Adjustment for Quality Assurance

Customer: New Jersey Department of Transportation

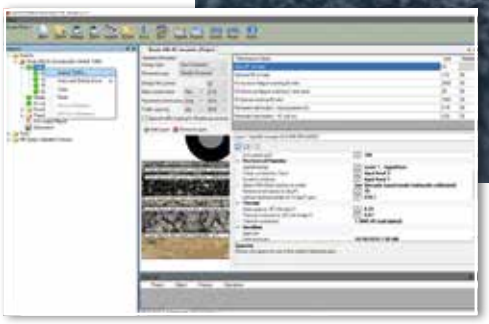
This project developed comprehensive and effective multi-characteristic acceptance specification for asphalt pavement construction.

Particular efforts developed a performance-related pay adjustment methodology for in-place air void and longitudinal joint density of asphalt pavement.

The team employed life-cycle cost analysis to develop a performance-related pay adjustment for in-place air voids. They also conducted laboratory tests to determine the upper limits of air voids at the longitudinal joint.

Pavement structural analysis and shear strength tests were conducted to identify the minimum bonding strength requirement to prevent premature pavement failure.

The project resulted in improved specifications that can be implemented by NJDOT to ensure quality control in pavement construction.



CASE STUDY

Project: Analyzing Noise Generated from Tire/Pavement Interaction on New Jersey Roadways Using OBSI

Customer: New Jersey Department of Transportation

Pavement preservation methods, which help increase pavement longevity and address safety issues, have become increasingly prevalent in New Jersey during the last 10-plus years.

The Rutgers PRP team helped NJDOT determine noise levels of a wide range of pavement preservation treatment surfaces—such as high-friction surface, micro-surface, and chip-seal—to assess the impact they have on noise levels.

Using on-board sound intensity (OBSI) equipment, PRP experts surveyed hundreds of road miles throughout the state collecting noise data. They confirmed that pavement surfaces that had preservation treatments are typically louder than their common hot mix asphalt (HMA) counterparts.

Understanding noise pollution associated with each preservation treatment helps determine the best treatment to use in areas where road noise will negatively impact quality of life.

Another important component of efficient pavement management is life-cycle cost analysis. Performance also is key.

PRP has calibrated performance transfer functions to ensure pavement design is accurate and appropriate for its environment. The group has done advanced modeling of tire-pavement interaction and pavement structure responses, and conducted environmental assessments of different designs, rehabilitation alternatives, and prevention techniques for common issues—such as reflective cracking—so agencies can make the right choice for their roads.

Generating models using data reported by multiple agencies is the best way to predict how roads perform over time. PRP and many partners are collaborating to formulate custom distress metrics based on issues that are of particular concern in New Jersey. The goal is to map performance metrics, proposed workplans, and other road features, and combine them to produce a robust geographic information system and better performance models. The New Jersey Transportation Asset Management Plan uses these models to query network health in correlation with different levels of funding, which can be a strong case for increasing investment in our roads.

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Partial customer list

Agencies

Federal Aviation Administration
Federal Highway Administration
Federal Highway Administration–New Jersey Division
Florida Department of Transportation
New Jersey Department of Transportation
New Jersey Turnpike Authority
New York State Department of Transportation
Pennsylvania Department of Transportation
Port Authority of New York & New Jersey
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation

Industry

Advanced Infrastructure and Design (AID)
Deighton Associates
Maher Terminals, LLC
Michael Baker International LLC
New Jersey Asphalt Pavement Association (NJAPA) and their member companies
Stantec

For a full list of customers from federal, state, and local agencies and private industry, contact PRP.

Funding and support

Agencies that have funded PRP projects include USDOT, the Federal Highway Administration, Federal Aviation Administration, Port Authority of New York & New Jersey, and several state departments of transportation including Florida, New Jersey, and Pennsylvania, among others.