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Center for Advanced Infrastructure & Transportation
Rutgers, The State University of New Jersey

PROJECT OVERVIEW REPORT

1. Center Identifying Number

PA RU9247

2. Project Title

Advanced Characterization Testing of the Port Authority of NY/NJ's Hot Mix Asphalt Materials

3. Principal Investigator

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4. Industry/Sponsor Principal

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5. Project Objective

Objective 1: To utilize advanced characterization testing procedures to evaluate the performance of asphalt mixes to be potentially placed on the George Washington Bridge.

Objective 2: To evaluate the bonding of asphalt interfaces placed on the Newark Liberty International Airport using advanced asphalt testing procedures to simulate "true" loading conditions.

Objective 3: To evaluate the influence of different performance graded asphalt binders on the rutting properties of a hot mix asphalt design used on airport runways.

6. Project Abstract

The PANYNJ is moving towards performance-based evaluations of hot mix asphalt (HMA) to verify the cost new and innovative HMA mixes for use on the George Washington Bridge and on airports, such as Newark Liberty International. HMA mixes for the George Washington Bridge were evaluated using repeated load testing, the Asphalt Pavement Analyzer, Flexural Beam Fatigue, and Dynamic Modulus. The various mixes evaluated consisted of Epoxy-based HMA, asphalt-rubber HMA, Rosphalt (which is an asphalt rubber based mix), and a PG76-22 asphalt binder with fibers. Laboratory

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testing concluded that the Epoxy-based HMA provided excellent rutting and fatigue properties, however, the mix has a tendency “set-up” and cure at sometimes unpredictable times, thereby, not lending itself to traditional paving delays that occur. The Rosphalt mix performed almost as well as the Epoxy-based HMA, but without the “set-up” issues. All “innovative” HMA mixes tested outperformed the current in-place I-5 PG76-22 in both rutting and fatigue testing. Work conducted on the interface bond testing of HMA cores taken from Newark Liberty International Airport showed clearly showed that HMA with a granite-gneiss aggregate had lower repetitions to debonding than HMA with Trap Rock aggregates. The laboratory results were validated by field observations of debonding in areas where granite-gneiss aggregates were used. Testing was conducted used a bi-axial repeated load test to simulate the axial and shear stresses developed during airplane trafficking. Asphalt Pavement Analyzer (APA) testing of different a FAA #3 surface course mix with various PG-graded asphalt binders showed that, as expected, asphalt binders with higher PG grades are less susceptible to rutting. The results indicated that the fuel resistance asphalt binder, high PG graded at 94°C, accumulated half of the total APA rutting as the PG64-22.

7. Task Descriptions

Task 1 – Conduct advanced characterization testing on HMA designed and proposed for use on the George Washington Bridge.

- Repeated Load Permanent Deformation Testing
- Flexural Beam Fatigue Testing
- Asphalt Pavement Analyzer Testing
- Dynamic Modulus Testing

Task 2 - Develop a test procedure to simulate airport-type trafficking and test the interface bond strength of cores taken from Newark Liberty International Airport.

- Evaluate Superspave Shear Tester, Repeated Shear at Constant Stress Ratio, as proposed test using laboratory prepared samples
- Test field cores from Newark Liberty International Airport

Task 3 – Rutting evaluation of different PG-graded asphalt binders in an FAA #3 surface course mix.

- Collect materials for testing and prepare samples
- Test compacted samples in Asphalt Pavement Analyzer

Task 4 –Quarterly progress reports and final report

8. Milestones/Dates

Task 1: George Washington Bridge Testing	3/30/2006
Task 2: HMA Core Interface Bond Strength Testing	5/30/2006
Task 3: APA Evaluation of PG Grade	6/30/2006



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9. Yearly and Total Budget

Yearly and Total Budget

Port Authority Sponsorship	(01/01/2006-6/30/2006)	\$15,000
USDOT Sponsorship	(01/01/2006-6/30/2006)	\$15,000

10. Student Involvement

One (1) Graduate Student Research Assistant

11. Relationship to Other Research Projects

- *BAY RU9247* Evaluation of Crumb Rubber in Hot Mix Asphalt
- *98 RU6677* Rut Testing of Hot Mix Asphalt

12. Technology Transfer Activities

The principal investigators (PI's) will meet with the research selection and implementation panel, at their convenience, to present the findings of the project. This will include the specifications, recommendations, and testing protocols described above. The results would provide the PANYNJ and other pavement engineers performance proven HMA mixture designs and a selection protocol for use on the George Washington Bridge. The technology transfer could take place at seminars with the PANYNJ and/or the Local Technical Assistance Program (LTAP) organization. The LTAP organization at Rutgers University currently conducts seminars at the Rutgers Asphalt/Pavement Laboratory. This provides an excellent means of a "hands-on" teaching seminar to fully illustrate the newer testing methods and concepts.

13. Potential Benefits of the Project

- Providing a material testing protocol to valid HMA use on steel orthotropic deck structures, such as the George Washington Bridge
- Providing a testing protocol to establish material types that may be prone to interface debonding due to excessive plane trafficking on runways.
- Providing justification to the PANYNJ on using polymer-modified asphalt binders to minimize the potential for rutting on airports.

14. TRB Keywords

Hot Mix Paving Mixtures, Steel Plates, Interfaces, Debonding, Polymer-Asphalt

15. TRB Code Words

Rbmueijph, Rbmdxsqr, Srbj, Smfd=, Rbmdpbyp