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TRB COOPERATIVE RESEARCH PROGRAMS (CRP) RESEARCH TRIANGLE INSTITUTE (RTI)

TRB-FHWA Program Evaluation (TFPE)

Status Report

To the Research and Technology Coordinating Committee

> VIRTUAL ASSEMBLY April 26, 2021

Summary of Evaluations Status

<u>Objective</u>: conduct evaluations of specific projects within the FHWA R&T program... quantitative and indicative of observable contributions of research results to FHWA's mission and returns on investments of public funds



Summary of Evaluations Status

Project	Start Date	Status
Evaluation of FHWA's Asphalt Binder Quality Testing Program (ABQT)	March, 2020	Final Scoping Report Delivered to FHWA.
		Final Evaluation Plan Delivered to FHWA
		Draft Interim Report under review with TRB
Evaluation of Exploratory Advanced Research Program (EAR)	April, 2020	Final Scoping Report Delivered to FHWA
		Final Evaluation Plan Delivered to FHWA
		Data collection continues
Evaluation of UHPC Connections for Precast Bridges and Elements (UHPC)	August, 2020	Final Scoping Report Delivered to FHWA
		Final Evaluation Plan Delivered to FHWA
		Data collection continues and Draft Interim Report in preparation



Summary of Evaluations Status

Asphalt Binder Quality Tester (ABQT)

The Device and Technology

- Very accurate in measuring the PG grade
- Simple to use, fast, and required minimal training/expertise
- Would be good as a screening tool
- Concerns with the calibration process and the device's ruggedness
- AASHTO certification not yet obtained
- Limited capabilities, cannot fulfill current multiple testing requirements and other testing equipment

Market Potential

- Agencies—Could allow screening more samples in field or districts, e.g., to prioritize some for full test in central labs
- Asphalt suppliers—Could be useful to test samples quickly when they receive binder shipments or just prior to shipping asphalt, especially at terminals lacking laboratory facilities
- Mix plants—Dubious

Potential Benefits

• Economic impacts maybe modest: unlikely to replace existing testing and pavement problems caused by subpar binder currently are rare



Summary of Evaluations Status

Ultra High Performance Concrete Connections (UHPC)

The Material and Technology

- Connections of prefabricated bridge elements (PBEs)
- Concrete performance enhancements pivotal in adoption of accelerated bridge construction (ABC) using PBEs
- Concerns about proprietary and imported materials

Market Potential

- UHPC currently more expensive to produce
- Benefits and costs of UHPC connections not distributed equally among stakeholder groups within the procurement process

Potential Benefits

- Service life maintenance expense reduction may justify increased construction price
- Reduced traffic congestion, vehicle emissions, and construction and roadway accidents



Summary of Evaluations Status

Exploratory Advance Research Program (EAR)

The Process

- Very diverse experience, strategic focus (Representative case studies on next slide)
- Near-term outcomes will primarily influence follow-on research rather than producing a specific technology or innovation
- Early "failure" may be a success

Market Potential

- Many topics, many markets
- Government can manage higher commercial risk than market will typically take on

Potential Benefits

- Broader benefits through university participation: workforce, intellectual property
- Few very substantial "successes" may outweigh many modest "failures"



Summary of Evaluations Status

Exploratory Advance Research Program (EAR) – Cases

• Video Analytics and Data Fusion

- Quantifying Driver Distraction and Engagement using Video Analytics
- Machine Learning for Automated Analysis of Large Volumes of Highway Video

• Connected Highway and Vehicle System Concepts

- Partial Automation for Truck Platooning
- Heavy Truck Cooperative Adaptive Cruise Control for Near-term Deployment

Breakthrough Concepts in Materials Science

- Novel Alternative Cementitious Materials for Development of the Next Generation of Sustainable Transportation Infrastructure
- Mechanisms of Hydration and Setting of Ordinary Portland Cement in Simple and Complex Systems

• Agent-Based Simulation and Modeling to Simulate and Analyze Traffic Conditions

- VASTO Evolutionary Agent System for Transportation Outlook
- Agent-based Approach for Integrated Driver and Traveler Behavior Modeling

Technology for Assessing Performance

- Ultra-low Power Wireless Sensing System for Multimetric Self-Powered Monitoring of Bridge Components
- A Self-Sensing Adaptive Material for New Generation of Multifunctional Highway Bridge Bearing System

• Assistive Technology for Vulnerable Pedestrians

- Navigation Guidance for People with Vision Impairment
- Intelligent Situation Awareness and Navigation Aid for Visually Impaired Persons



Summary of Evaluations Status Evaluation Process: Emerging meta-lessons about probability of "Success"

- Quick failure can be a success
- Stakeholders, experts, and perspectives
- Hindsight and foresight in topic selection
- "Champions" for new technology and FHWA role
- Limits of evaluation measures and B/C analysis

