



WHRP

Wisconsin Department of Transportation Wisconsin Highway Research Program

Request for Proposal

Regressing Air Voids for Balanced HMA Mix Design Study

Questions submitted to research@dot.wi.gov regarding the content of this RFP are due no later than 4:30 PM (CST) on May 16, 2016

Responses to questions will be posted to the WisDOT Research and Library website <http://wisdotresearch.wi.gov/rfps-and-proposals> by 4:30 PM (CST) on May 23, 2016

Proposers must submit a PDF version of their proposal by 4:30 PM (CST) on June 24, 2016 to: research@dot.wi.gov

Proposers will be notified by August 1, 2016

For more information regarding this RFP contact the WisDOT Research Program at: research@dot.wi.gov. This RFP is posted to the Internet at: <http://wisdotresearch.wi.gov/rfps-and-proposals>.



**Wisconsin Highway Research Program
Request for Proposals
Flexible Pavements Technical Oversight Committee**

Regressing Air Voids for Balanced HMA Mix Design Study

I. Background and Problem Statement

The Wisconsin Department of Transportation (WisDOT) is currently working towards specifications to increase the percentage of asphalt binder in our Hot Mix Asphalt (HMA) pavements. This desire to increase the amount of asphalt binder is due to some performance and durability concerns related to low asphalt binder content. One method to achieve higher asphalt binder content is to use air void regression. The concept of regression is to design a mix for 4.0 percent air voids, current WisDOT practice, and then predict the amount of additional virgin asphalt binder needed to obtain 3.5 percent or 3.0 percent air voids. This will increase design asphalt content up to 0.4 percent from current WisDOT mix designs. Several states have done this to address the issue of dry mixes, most notably Illinois and Michigan in the Midwest. This research project is intended to evaluate the impacts regression has on cracking, rutting and overall pavement performance. The research would validate the appropriate air void target for our three mix design categories (Low, Medium and High Traffic). The research is also expected to address any recommendations for further specification changes such as in-place density targets that may be needed in connection with air void regression.

II. Objectives

The objective of the study will be to make recommendations regarding increasing asphalt binder contents by modifying air void regression targets.

- Develop protocols to test WisDOT's three (3) different mix types (High, Medium and Low Traffic) produced at varying air voids.
- Evaluate the effects of air voids and mixture traffic level on laboratory measured and in-service performance properties.
- Use laboratory procedures to evaluate the various mixtures for rutting and cracking performance characteristics of different air void targets.
- Make recommendations to WisDOT specifications regarding air void regression.



III. Scope of Work

Task 1: Synthesis of Current Practices and Research

- Provide an initial assessment of the effects of air void regression based on current practices on a national level. The assessment should include (but is not limited to):
 - Synopsis of other states' specifications regarding air void deviation from 4.0 percent.
 - Synopsis of research on air void regression.
 - Summary and comparison of other state specifications to current WisDOT practice regarding mix design procedures for air void regression.
 - Summary of the balanced mix design concept and how it is being implemented on a national level.

Task 2: Work Plan Development

- Develop a work plan for laboratory evaluation of the low traffic, medium traffic and high traffic mix types each produced at varying air voids. *Please note, WisDOT will need to be part of the process to identify projects for sampling and work with contractors to obtain mix samples.*
- Consider the following factors at a minimum when developing the work plan proposal:
 - Asphalt Binder Type
 - Please define different grades and modification levels to be included in the work plan as defined by AASHTO M332.
 - Asphalt Binder Content
 - Mix Traffic Level
 - Recycled Asphalt Material Content
 - Number of aggregate sources
 - Additives: Anti-strip, softening agents, etc.
- Collect plant-produced materials to include in performance testing.

Task 3: Interim Presentation and Project Memorandum

- Present findings from Task 1 and the proposed laboratory work plan to the WHRP Technical Oversight Committee (TOC).

Task 4: Execution of Work Plan and Analysis of Results

- All materials testing will use standardized test methods (ASTM/AASHTO) or tests that have yet to be standardized but are accepted as current practice in the HMA community as agreed upon by the TOC.

Task 5: Project Deliverables

- The researcher is responsible for submitting a draft final report to the TOC. Conclusions and recommendations will specifically address WisDOT's efforts to



improve asphalt concrete durability through enhanced mix design practice and/or quality management program improvements. Any changes to existing practice should be addressed using the aforementioned value-based approach in an effort to balance performance and cost.

- Project Closeout Presentation: The researcher will present findings and recommendations to the TOC. The TOC will supply/document any comments or concerns regarding the final product of the research.
- Final Report: The researcher is expected to address or incorporate any TOC comments prior to delivery of the final report in a format specified by WHRP.

IV. Required Testing

- Moisture Damage Resistance and Stability – Hamburg Wheel Tracking Testing of Compacted HMA (AASHTO T-324)
 - Limits should include rut depth and stripping inflection point
- Tensile Strength Ratio (TSR) (AASHTO T-283)
- Intermediate and Low Temperature Cracking Resistance (ASTM D7313 or other)
- Asphalt Binder Content by ignition oven or other method

Other Tests for Consideration

- Other testing proposed by the researcher.

Requirements for Laboratory/Technician Certifications: HTCP AGGTEC 1 and HMA IPT at a minimum.

V. WisDOT/TOC Contribution:

- WisDOT will identify projects where material may be sampled and provide those locations to the selected researcher. There is a possibility material may be sampled by WisDOT during the 2016 construction season for use in the study.
- The researcher is responsible for their own traffic control.
- Expected level by staff/TOC members: Maximum of 40 hours.
- WisDOT Equipment: It is not anticipated that any WisDOT equipment will be needed as part of this study. The research team will not assume the availability of WisDOT equipment in the proposal. If WisDOT or another entity donates equipment, a letter of commitment must be included in the proposal.



VI. Required Travel

This project will require travel for a meeting to finalize the work plan with the Project Oversight Committee (POC). Travel is also required to deliver the final presentation.

VII. Deliverables

- Submittal and reporting of progress as required by WHRP and WisDOT.
- Reporting Requirements: Seven (7) hard copies and an electronic copy of the final report delivered to WisDOT by the contract end date.
- Presentation Requirements: All projects require the researcher to give a closeout presentation after submittal of the draft final report.

VIII. Schedule and Budget

- Proposed project duration is **21 months** starting before October 1, 2016.
 - Deadline for submittal of draft final report is three (3) months prior to the contract end date.
- Project budget shall not exceed **\$150,000**.
- The researcher is expected to submit the draft final report with quality technical writing and proper grammar. It is acceptable to include a technical editor on the research team to ensure these requirements are met.
- Matching funds will not be considered in the proposal evaluation process.

IX. Implementation

At its conclusion, this research project should, at a minimum, provide the following:

- Recommended potential changes in specifications.
- Recommended potential changes in mix design procedures.
- Impacts and language changes to the Facilities Development Manual, Standard Specifications, Construction and Materials Manual, and any other manuals that may be impacted.
- Draft special provision or standard special provision language, if needed.