Wisconsin Department of Transportation

Wisconsin Highway Research Program

Request for Proposals
FFY 2027

Artificial Intelligence (AI) Analyses of Balanced Mix Design (BMD) Mixtures

	Request for Proposals Timeline and Information
November 28, 2025	Issue Date of this Request for Proposal (RFP). This RFP has been posted at: http://wisdotresearch.wi.gov/rfps-and-proposals.
	Please read the WHRP Proposal Preparation Instructions as this document has been updated recently and contains important information, including tables and templates, necessary for writing a proposal for submission.
January 5, 2026 12:00 PM (CST)	Questions regarding this RFP are due by this date and time. Questions need to be submitted with the project name to research@dot.wi.gov. Questions submitted after this date and time will not be considered.
January 13, 2026 4:30 PM (CST)	Responses to Questions will be posted on the WisDOT Research and Library website at: http://wisdotresearch.wi.gov/rfps-and-proposals
February 3, 2026 4:30 PM (CST)	**Proposals are due by this date and time.** Proposals must be submitted in a PDF version to: research@dot.wi.gov. Proposals submitted after this date and time will not be considered.
April 30, 2026	Award and Deny letters will be sent by email to all proposal submitters (only lead investigator will be notified)
	Project Budget and Schedule
$250,000.	**Project Budget shall not exceed this amount.** Matching funds will not be considered in the proposal evaluation process. Proposals which exceed this amount will be disqualified.
24 Months	Period of Performance / Duration of Project
October 1, 2026	**Anticipated Start Date of Project**
July 1, 2028	Researcher's Final Report due
September 30, 2028	**Anticipated End Date of Project**
Flexible Pavements	WHRP Technical Oversight Committee
	For more information regarding this RFP contact the WisDOT Research Program at: research@dot.wi.gov.

NOTICE: Submission of a proposal does not guarantee an award. The Wisconsin Department of Transportation (WisDOT) reserves the right to reject any and all proposals received; however, in the event WisDOT does award a project, such award will be based on uniform evaluation criteria.

Wisconsin Highway Research Program
Flexible Pavements Technical Oversight Committee
Request for Proposal

Artificial Intelligence (AI) Analyses
of Balanced Mix Design (BMD) Mixtures

Acronyms and Definitions
AC – Asphalt Content
AI – Artificial Intelligence
BMD – Balanced Mix Designs
COP – Close-Out Presentation
DMP – Data Management Plan
FHWA – Federal Highway Administration
HWTT – Hamburg Wheel-Tracking Test
IDEAL-CT – Indirect Tensile Asphalt Cracking Test
LLM – Large Language Models
PI – Principal Investigator, lead researcher
POC – Project Oversight Committee comprised of subject matter experts who are the main point of contact with the PI
PPE – Personal Protective Equipment
RAP – Recycled Asphalt Pavements
RAS – Recycled Asphalt Shingles
RFP – Request for Proposal
R&L – WisDOT Research and Library Unit providing administrative support
TOC – Technical Oversight Committee develop projects and provide leadership
UWTS – University of Wisconsin Technical Support
WHRP – Wisconsin Highway Research Program
WisDOT – Wisconsin Department of Transportation

1 Background and Problem Statement

Large Language Models (LLMs) can sift through and compare large datasets; however, they require high-quality data, validation of laboratory versus field mixtures, and fine-tuning to filter out nonsensical results and yield meaningful, actionable outputs. If these models are effective, they have the potential to help optimize binder content, gradation, additives, and other key balanced mix design (BMD) factors. Furthermore, if set up and maintained correctly, LLMs can help save design engineers' time in mixture evaluations, potentially assist forensic investigations, and, hopefully, improve the overall performance of flexible pavements.

Therefore, WisDOT engineers would like to evaluate the capabilities of LLMs in (1) correlating performance to measured volumetrics (i.e. gradation, VMA, asphalt content, AC source) and performance properties (i.e., aggregate properties such as Los Angeles Abrasion, FAA, CAA, etc.), and (2) establishing recommended BMD targets based on the above correlations given design constraints such as expected traffic volume, percentage of heavy weights trucks, etc.

2 Research Objectives

Research objectives include evaluating if AI models can be used to assess the degree of variability of changes to volumetric mixture parameters (air content, voids, asphalt content (AC), recycled asphalt materials (RAP, millings, shingles, etc.) with respect to BMD parameters, to potentially eliminate or narrow down the list of mixtures to evaluate for further testing, and estimate the impacts to expected performance associated with normal production mixture variability.

As part of this study, the research team is expected to:

2.1 **Evaluate the applicability of LLMs for analyzing and synthesizing asphalt mixture design data.** The research team will assess whether these models can effectively process laboratory and field datasets to identify relationships between volumetric parameters (including air voids, voids in mineral aggregate, asphalt content, recycled asphalt pavement percentage, etc.) and balance mix design (BMD) performance indicators (e.g., moisture damage indices, cracking and rutting indices). This research objective will help WisDOT engineers assess the feasibility of using LLMs as analytical tools to characterize the performance of asphalt mixtures based on volumetric parameters.

2.2 **Validate AI-based workflows for correlating volumetric variability with BMD parameters.** The research team will develop data-driven processes that integrate validated laboratory and field performance datasets to quantify the impact of variations in volumetric mixture parameters on BMD performance metrics. These data-driven processes will include model training, fine-tuning, and performance evaluation to ensure predictive accuracy and the ability to filter out spurious or non-physical results.

2.3 **Assess the potential of LLM-assisted decision tools for mixture screening and optimization.** The research team will investigate how properly trained and maintained LLMs can support design engineers in narrowing down candidate mixtures for testing, optimizing binder content and gradation, and assisting in forensic evaluations. This objective will quantify potential time savings, accuracy improvements, and practical benefits for WisDOT's mixture evaluation and design workflow.

2.4 **Develop a strategy to allow the training for LLMs to predict mixture field performance.** The research team will propose a methodology for incorporating LMMs into pavement mixture design using volumetric parameters, based on the Balance Mix Design methodology for Wisconsin's pavements.

3	**Research Approach - Scope of Work/Work Plan/ Experimental Design**

3.1 Task 1: Literature Review

The research team will conduct a comprehensive literature review and assessment of current practices in the use of AI and LLMs for predicting performance and designing flexible pavements. This literature review will include experience from other DOTs across the United States, ministries of transportation in Canada, and leading European and Asian pavement agencies. Upon completion, the results of this literature review will be submitted with a presentation to the Project Oversight Committee (POC).

The deliverable for this task will be a Literature Review interim report, which will be emailed to the POC and discussed at a POC meeting.

3.2 Task 2: Data Compilation and Quality Assessment for the Application of LLMs

The research team will collect and curate laboratory- and field-mixture datasets from WisDOT and other relevant sources, including volumetric parameters (e.g., air voids, VMA, asphalt content, RAP/RAS percentages) and corresponding BMD performance metrics (e.g., IDEAL-CT, HWTT). The researchers will evaluate data completeness, consistency, and quality to establish a validated dataset suitable for AI analysis and LLM training. POC members will assist with the research team in identifying and collecting the laboratory and field mixture datasets, as needed.

The deliverable for this task will be an informal presentation to the POC to trigger a discussion about the quality of laboratory and field mixture properties and flex pavement performance data needed to train LLLs.

3.3 Task 3: Development of Data Representation and Preprocessing Frameworks

Design standardized data formats and preprocessing pipelines to prepare mixture design data for training LLMs and other AI models. This will include normalization, unit consistency, parameter encoding, and protocols to distinguish between laboratory and field mixtures.

The deliverable for this task will be a document describing the standardized data format and the preprocessing protocols recommended by the research team for use with the LLMs.

3.4 Task 4: Model Training, Fine-Tuning, and Validation

The research team will train and fine-tune LLMs (and other AI tools, as needed) to identify relationships between volumetric parameters and BMD performance indicators. Validate model predictions against independent laboratory and field datasets to assess accuracy, reliability, and the ability to recognize non-physical or spurious outputs. POC members will assist with research to identify and collect laboratory mixture datasets that can predict the documented performance of WisDOT pavement mixtures without prior knowledge.

The deliverable for this task will be an interim report documenting the training results and validating the LLM's output for the provided mixture and fleet pavement performance data.

3.5 Task 5: Evaluation of AI-Driven Screening and Optimization Capabilities

The research team will apply the trained models to test cases that simulate mixture design evaluations. Assess whether LLMs can effectively predict which mixtures merit further laboratory testing and quantify the potential reduction in testing scope or engineer time. Evaluate performance in optimizing binder content, gradation, and additives within BMD frameworks. Provide recommendations for implementing the model in the prediction and design of asphalt pavements.

The deliverable for this task will be an informal presentation documenting the LLM's performance in optimizing binder content, gradation, and additives within BMD frameworks. The research will

also document recommendations for implementing LLMs for the prediction and design of asphalt pavements within WisDOT practices.

3.6	**Task 6: Development of Implementation Guidelines and Decision-Support Tools**

The research team will summarize research findings into practical recommendations for WisDOT engineers. In addition, the research team will develop user guidelines, prototype scripts or interfaces (if applicable), and documentation that describes how LLMs can be integrated into mixture evaluation workflows. Highlight limitations, data requirements, and best practices for model maintenance and continual improvement as applied to WisDOT practices.

The deliverable for this task will be an informal presentation outlining proposed recommendations for WisDOT engineers on the use of LLMs in Wisconsin flex pavements, including limitations, data requirements, and best practices.

3.7	**Task 7: Project Final Report**

The research team will prepare and submit a Project Final Report following the timeline and requirements detailed in the WHRP Final Report and Close-Out Presentation (COP) Instructions for Preparation and Submission. The Project Final Report will include a summary of the project background and problem statement, research objectives and approach, best practices, recommendations, and interpretations developed during the project as well as a discussion of implementation options.

The Technical Oversight Committee (TOC) and POC members will review this report. Questions and comments will be submitted to the researcher and will require edits and revisions, or a response and explanation in a Summary Report. The Final Report will be considered complete and approved when the TOC chair accepts all revisions and responses. Any data files collected from the lab and/or field testing/survey should be included for future use, analysis, and interpretation.

3.8	**Task 8: Close-Out Presentation (COP)**

The research team will create and present a one-hour PowerPoint presentation that includes a summary of the background and problem statement, research objectives and approach, best practices, recommendations, and interpretations developed during the project.

4	**Required Testing/Equipment/Materials**

4.1	**Required Testing**

None required.

4.2	**Equipment**

Include costs in research proposal budget if equipment will be necessary for Tasks.
Provide explanation if cost for any piece of equipment is over $1,000.

None required.

4.3	**Non-WisDOT Equipment and Materials**

None required.

4.4	**Materials**

Include costs in research proposal budget if materials will be necessary for Tasks.
Provide explanation if cost for any materials is over $1,000.

None required.

5	**Required Travel and Meetings**

WisDOT will only fund travel expenses if they are included in the research project proposal budget.

5.1	**Travel for Tasks and/or Field Work**

Travel may not be required to complete this research project.

5.2	**Meetings**

A kick-off meeting, periodic progress meetings, and a close-out presentation are required. Meetings are anticipated to be virtual.

Please see WHRP Meeting Information for additional Information.

5.2	**POC Meetings**

At the start of the project the POC Chair, lead PI and R&L will determine points in the project where discussions and decisions are needed. 1 hour to 1½ hour-long meetings will be set for the full POC, the researchers, and R&L staff at those times, based on meeting needs.

The researcher will typically have a short presentation with relevant information and progress updates.

5.3	**Check-In Meetings**

Projects of less than 20 months duration - If there are gaps of more than 8 weeks between meetings, check-in meetings of 20-30 minutes may be scheduled for the POC Chair, lead PI and R&L staff.

Projects of 20 months or longer duration - Meetings four times per year are anticipated. If there are gaps of more than four months between meetings, check-in meetings of 20-30 minutes may be scheduled for the POC Chair, lead PI and R&L staff.

A presentation is not expected at check-in meetings.

5.4	**Close-Out Presentation (COP)**

WisDOT welcomes a virtual Close-Out presentation; however, the researcher may present the results in person, paid by contract funds, if included in the project budget.

5.5	**Conferences**

While researchers are encouraged to present research results in conferences and workshops, funding from this project cannot be used for their participation.

WisDOT will NOT fund travel expenses apart from what is included in the research project proposal budget.

6	**WisDOT/TOC Contribution**

WisDOT will provide the following support through the Project Oversight Committee (POC) to support the successful completion of the project.

Work will be conducted with project oversight by WisDOT staff and WHRP Flexible Pavement Technical Oversight Committee (TOC). The TOC members will appoint a POC to support the successful completion of the project.

The research team may assume that WisDOT staff/POC members can contribute a maximum of 40 hours over the project's duration.

The research team will not assume the availability of WisDOT staff or equipment in the proposal. If WisDOT or another entity donates equipment or staff time, a commitment letter must be included in the proposal.

The TOC and POC will coordinate access to WisDOT aggregates used in laboratory test programs, if needed. The TOC and POC will also coordinate access to WisDOT databases, if needed, as requested and approved

The POC will provide the researchers with Wisconsin mixtures properties and flex pavement performance to train and test LLMs, as needed.

7   Traffic Control (if needed)

Traffic control will not be needed for this project.

If fieldwork to conduct this research is anticipated on or around in-service facilities the researcher shall specify the nature and extent of traffic control needs. The proposal should specify if county maintenance departments or traffic control businesses will be utilized. The researcher will make accommodations in their proposal budget for traffic control if it is needed.

Please see the WHRP Proposal Preparation Instructions for additional information.

WisDOT will NOT fund traffic control expenses apart from what is included in the research project proposal budget.

8   Deliverables – Research Results and Implementation Plan

WisDOT seeks to fund research with high implementation potential. Implementation potential will be tracked throughout the lifecycle of this research project and may include changes to expected implementation. The research plan must include specific statements describing anticipated research results and an assessment of implementation potential.

8.1   Research Results

Proposals should detail the research results in terms of a specific deliverable(s).

8.2   Implementation Plan and Deliverables

This section also includes an implementation plan to address the planned implementation type(s) indicated in the RFP. While the plan may change as the research progresses, at a minimum the proposal should indicate:
- The product expected from the research.
- The stakeholder or intended audience that will most likely be impacted by the research results.
- Potential impediments to implementation.
- Activities necessary for successful implementation.
- Implementation deliverables
- Measures of success
- Data collection requirements

Please see the WHRP Proposal Preparation Instructions for specific directions related to Research Results and Implementation including completing the table below.

Provide information and details regarding the deliverables included in the Implementation Plan and Deliverables table.

Implementation Plan and Deliverables

Please add and describe implementation plans and keep this table in the Proposal.

	Successful implementation of this research will be achieved through the development of the following items:		
Implementation Type	**Description**	**Researcher's Deliverables/ Products/ Activities**	**Timeline**
☒ Develop a Model:	Evaluate the applicability of LLMs for analyzing and synthesizing asphalt mixture design data.	The research team will assess whether LLMs can effectively process laboratory and field datasets.	
☒ New Design Method or Guidance:	- Validate AI-based workflows for correlating volumetric variability with BMD parameters - Assess the potential of LLM-assisted decision tools for mixture screening and optimization.	- A data-driven process that integrates validated laboratory and field performance datasets to quantify the impact of variations in volumetric mixture parameters on BMD performance metrics. - Training and maintaining LLMs supporting design engineers in narrowing mixtures for testing, optimizing binder content and gradation, and assisting in forensic evaluations.	
☒ New Product Implementation:	Development of Implementation Guidelines and Decision-Support Tools	Development of practical recommendations for WisDOT engineers, including user guidelines, prototype scripts or interfaces, and documentation that describes how LLMs can be integrated into WisDOT's mixture evaluation workflows.	
☒ Recommend Future Studies:	Develop a strategy to enable LLM training to predict mixture field performance.	A methodology to incorporate LMMs into the design of pavement mixtures using volumetric parameters	
☐ Revise a Specification:			
☐ Inform Policy:			
☐ Other:			

Deliverables – Reports and Presentations

9.1 Interim Reports & Meeting Updates

Interim reports may include the Literature Review and others as designated.
Meeting updates are typically short PowerPoint presentations.

Interim Reports are flexible in format and length. These may be papers, graphs, tables, surveys, or other formats. The POC and researcher will determine what format and length is most appropriate for each report.

Presentations with updates are typical at POC meetings but are not expected for check-in meetings.

Email the meeting presentation and/or updates to R&L staff 1 week prior to the meeting.

| 9.2 | **Final Report Requirements, Process and Timeline** |

The Final Report for the research project will go through three stages as it is reviewed by the TOC/POC and edited by the researcher(s): Project Report, Revised Report and Approved Final Report.

For full details please see [WHRP Final Report and Close-Out Presentation (COP) Instructions for Preparation and Submission.](#)

| 9.3 | **Project Report** |

Submit to www.Scholastica.com 13 weeks before the project end date.

Email the Project Report in both Word and PDF formats to R&L. Send the cover, technical documentation, and disclaimer pages in a separate file, in Word format.

| 9.4 | **Revised Report and Summary Document** |

Edits and revisions within the Project Report are expected. The PI is required to respond to all comments and questions submitted by reviewers and submit a Revised Report and Summary document to Scholastica. Any items not integrated into the report are put into a Summary document with explanations or responses.

Submit to Scholastica and email to R&L in both Word and PDF formats.

The Revised Report and Summary document are due 6 weeks before the contract end date.

Revisions and responses will be reviewed and the researcher may need to repeat the revision process if edits or responses are unclear or incomplete.

| 9.5 | **Approved Final Report** |

The TOC/POC will make the determination that all edits and responses are complete and the Final Report is approved.

The TOC/POC Chair will notify the PI of approval and email the APPROVED version to R&L.

R&L will prepare the Approved Final Report for posting.

| 9.6 | **Close Out Presentation (COP) for Project** |

The PI presents a PowerPoint summary to the POC of the research project two weeks before the contract end date.

The PowerPoint presentation includes a summary of the background and problem statement, research objectives and approach, best practices, recommendations, and interpretations developed during the project.

The PowerPoint is a deliverable of the project.

| 9.3 | **Research Data** |

All research data will be identified and made available per the Data Management Plan (section 16).

Reports, Presentations and Deliverables

Please add reports and presentations and keep this table in the Proposal.

Report / Presentation	Description of Deliverable	Format	Task	Timeline
Literature Review	Literature Review presented and discussed in a POC meeting. Emailed to POC and R&L 1 week prior to meeting.	Word and PDF	1	
POC Meeting Updates	Throughout the project, PowerPoints and meeting updates are emailed to R&L 1 week before POC meetings for POC review and preparation for meeting discussion.	Power Point		1 week before meeting
Data Compilation and Quality Assessment for the Application of LLMs	The deliverable for this task will be an informal presentation to the POC to trigger a discussion about the quality of laboratory and field mixture properties and flex pavement performance data needed to train LLLs.	Presentation	2	
Development of Data Representation and Preprocessing Frameworks	A document describing the standardized data format and the preprocessing protocols recommended by the research team for use with the LLMs.	Word and PDF	3	
Model Training, Fine-Tuning, and Validation	An interim report documenting the training results and validating the LLM's output for the provided mixture and fleet pavement performance data.	Interim report	4	
Evaluation of AI-Driven Screening and Optimization Capabilities	An informal presentation documenting the LLM's performance in optimizing binder content, gradation, and additives within BMD frameworks. The research will also document recommendations for implementing LLMs for the prediction and design of asphalt pavements within WisDOT practices.	Informal presentation	5	
Development of Implementation Guidelines and Decision-Support Tools	An informal presentation outlining proposed recommendations for WisDOT engineers on the use of LLMs in Wisconsin flex pavements, including limitations, data requirements, and best practices.	Informal presentation	6	
Researcher's Final Report	Submit to https://hrp.scholasticahq.com Email Word and PDF versions to R&L See WHRP Final Report and Close-Out Presentation (COP) Instructions for Preparation and Submission		7	13 weeks before end date
Revised Final Report and Summary document	Submit to https://hrp.scholasticahq.com Email Word and PDF versions to R&L.		7	6 weeks before end date
COP Presentation	See WHRP Final Report and Close-Out Presentation (COP) Instructions for Preparation and Submission	Power Point	8	2 weeks before end date

10	**Deliverables – Required Project Documentation**
10.1	Quarterly Progress Reports (QPRs)
	1-2 page summaries of project activities, next steps and expenditures for the quarter.
10.2	Quarterly Invoices

11	**Project Schedule**
	The duration of the research project is provided on page 2 of this RFP.
	The researcher will provide a work schedule which should be based on the assumed contract start date.
11.1	**Summary of Hours–** The proposal must include template WHRP Proposal Summary of Hours
11.2	**Gantt Chart** - The project schedule must include a Gantt chart.

12	**Budget**
12.1	**Budget Worksheet**
	The researcher will completely fill-in the WHRP Proposal Budget Worksheet template.
12.2	**Budget Justification**
	The researcher will provide a detailed description of costs related to travel, materials and supplies and other direct costs.
	See the WHRP Proposal Preparation Instructions for details.

13	**Qualifications of the Research Team**
	The proposer will provide information on the qualifications and background of the research team.

14	**Other Commitments of the Research Team**
	The proposer will complete the **Summary of Commitments** template in WHRP Proposal Commitments of Research Staff.

15	**Facilities and Information Services**
	The proposer will provide their laboratory and technical certifications for project related activities.

16	**Data Management Plan**
	The research team will include a Data Management Plan (DMP) documenting all field/laboratory data and analyses to ensure accessibility and transparency of research data as required by the USDOT per the Public Access Plan (https://ntl.bts.gov/ntl/public-access/creating-data-management-plans-extramural-research).
	All research data will be identified and made available per the Data Management Plan.
	See the WHRP Proposal Preparation Instructions for details.

17	**References**
	The proposer will provide references of the research team**.**

| 18 | **Proprietary Information in Proposal** |

DOA-3027 Designation of Confidential and Proprietary Information Form

Any restrictions on the use of data contained within a proposal must be clearly stated in the proposal itself. Proprietary information submitted in response to a request will be handled under applicable Wisconsin procurement regulations and the Wisconsin public records law. Proprietary restrictions usually are not accepted. However, when accepted, it is the proposer's responsibility to defend the determination in case of an appeal or litigation.

Any material submitted in response to this request that the proposer considers confidential and proprietary information and which qualifies as a trade secret, as provided in s. 19.36(5), Wis. Stats., or material which can be kept confidential under the Wisconsin public records law, must be identified on a **Designation of Confidential and Proprietary Information form (DOA-3027).**

Proposal prices cannot be held confidential.

| 19 | **Public Records** |

WisDOT intends to maintain an open and public process in the solicitation, submission, review, and approval of procurement activities. Notwithstanding the foregoing, records may not be available for public inspection before issuance of the award of the proposal.

The proposer shall retain all records produced or collected under an awarded contract for five (5) years following final payment under the contract and allow access to such records in accordance with requirements established under 49 Code of Federal Regulations 18.42, subch. II of Chapter 19, Wis. Stats. and Chapter 16, Wis. Stats.

| 20 | **Evaluation Criteria** |

The Evaluation Criteria and Scoring Matrix are in the WHRP Proposal Preparation Instructions.

| | **End of Request for Proposal** |