AASHTO
AASHTO INNOVATION INITIATIVE

AASHTO Innovation Initiative

[Proposed] Nomination of Innovation Ready for Implementation

Sponsor

Nominations must be submitted by an AASHTO member DOT willing to help promote the innovation. If selected, the sponsoring DOT will be asked to promote the innovation to other states by participating on a Lead States Team supported by the AASHTO Innovation Initiative.

1. Sponsoring DOT (State): Maryland DOT

2. Name and Title: Soils and Aggregate Technology Division, Lab Team (Amanuel Welderufael (Team Leader), Darren Swift (Asst. Division Chief), Intikhab Haider (Division Chief), Eric Frempong (Deputy Director), Sejal Barot (Director) of Office of Materials Technology

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Innovation Description (10 points)

The term “innovation” may include processes, products, techniques, procedures, and practices.

3. Name of the innovation:

Standard Practice (AASHTO PP 103): Sample Preparation and Polishing of Unbound Aggregates for Dynamic Friction Testing.

4. Please describe the innovation.

The standard practice provides ways of sample preparation and polishing of unbound aggregates, used in asphalt pavements, for Dynamic Friction Testing. A sample of unbound aggregate is polished by the Three Wheel Polishing Device that simulates the polishing action of vehicular traffic on the coarse aggregate or High Friction Surface Treatments used on asphalt pavements. After polishing the sample, the terminal friction value of the aggregate sample is evaluated by the Dynamic Friction Tester (DFT) and the result is used to rate or classify different types of aggregates for their friction characteristics and resistance to polishing under traffic. Classifying aggregates based on their friction characteristics and resistance to polishing action of vehicular traffic helps select the appropriate type of aggregate that can satisfy the friction demand of asphalt pavements.

5. What is the existing baseline practice that the innovation intends to replace/improve?

AASHTO Standard Method of Test for Accelerated Polishing of Aggregates Using the British Wheel (T-279)

6. What problems associated with the baseline practice does the innovation propose to solve?

The baseline practice (T-279) uses the British Pendulum Tester that requires careful adjustment of the pendulum height to obtain the correct span of the test surface and often results in inconsistent results. The new practice, however, uses a more advanced testing device, the Dynamic Friction Tester (ASTM E 1911) and provides a more consistent measurement. It doesn't require manual adjustment of the device and the device evaluates the friction characteristics of coarse aggregates over a range of speeds, usually 20kms/ hr., 40kms/ hr., 60kms/ hr. and 80kms/ hr.

7. Briefly describe the history of its development.

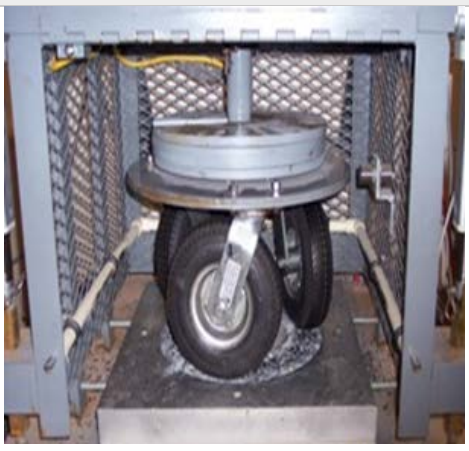
The Dynamic Friction Tester was designed to measure the frictional characteristics of pavements and was a more accurate device that the British Pendulum Tester. However, Maryland DOT was much more interested in characterizing the unbound aggregates that are used in asphalt mixes pre-pavement operations. Therefore, a specimen-mold and a sample-holder that fit the dimensions of the Dynamic Friction Tester were designed and fabricated. The specimens that were prepared using these molds were able to be tested by the Dynamic Friction Tester. Maryland DOT was also interested to evaluate resistance of the aggregates to polishing action of vehicular traffic and therefore acquired a Three Wheel Polishing Device that simulates the polishing action of vehicles. By preparing specimens of unbound aggregate and polishing them using the Three Wheel Polishing Device and eventually testing them with the Dynamic Friction Tester, coarse aggregates used in Maryland roads were classified into three broad categories, High Friction, Standard Friction and Low Friction Aggregates. Maryland roads are usually paved with High Friction Aggregates and less often with Standard Friction Aggregates; Low Friction Aggregates are disqualified from being used in surface asphalt pavements, greatly improving the safety of the travelling public. When Maryland DOT started using High Friction Surface Treatments, a separate sample preparation and polishing of bauxite material, that is used for HFST treatment, was also developed so that it can be tested by the DFT. All in all, the sample preparation and polishing of Unbound Aggregate for the Dynamic Friction Tester was developed and had been in use over the last 10 years. In

2018, Maryland in collaboration with other State DOTs formed a task force to develop an AASHTO Standard Practice that would standardize the in-house developed procedure. The standard was finalized and published in July 2020, as PP103-20 “Sample Preparation and Polishing of Unbound Aggregates for Dynamic Friction Testing”.

8. What resources—such as technical specifications, training materials, and user guides—have you developed to assist with the deployment effort? If appropriate, please attach or provide weblinks to reports, videos, photographs, diagrams, or other images illustrating the appearance or functionality of the innovation (if electronic, please provide a separate file). Please list your attachments or weblinks here.

The Standard Practice has been published as AASHTO PP 103-20
https://store.transportation.org/Item/PublicationDetail?ID=4488

Attach photographs, diagrams, or other images here. If images are of larger resolution size, please provide as separate files.



State of Development (40 points)

Innovations must be successfully deployed in at least one State DOT. The AII selection process will favor innovations that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.

9. How ready is this innovation for implementation in an operational environment? Please select from the following options. Please describe.

☐ Prototype is fully functional and yet to be piloted

☐ Prototype has been piloted successfully in an operational environment

☒ Technology has been deployed multiple times in an operational environment

☐ Technology is ready for full-scale implementation

Maryland DOT developed this procedure in 2009 and have been applying since 2011 in the Maryland state to categorize the aggregates based on their friction characteristics.

10. What additional development is necessary to enable implementation of the innovation for routine use?

The Standard Practice is fully developed. The necessary equipment must be professionally manufactured by Testing Equipment Companies and purchased by states for implementation of the Standard Practice.

11. Are other organizations using, currently developing, or have they shown interest in this innovation or of similar technology?? ☒ Yes ☐ No

If so, please list organization names and contacts. Please identify the source of this information.

Organization	Name	Phone	Email
New York DOT	Thomas Festa, P. G.	(518) 457-5957	Thomas.Festa@dot.ny.gov
Florida DOT	Timothy J. Ruelke, P.E.	(352) 955-6620	timothy.ruelke@dot.state.fl.us
Pennsylvania DOT	Patricia Baer, Unit Manager	(717) 787.2489	patrbaer@pa.gov

Potential Payoff (30 points)

Payoff is defined as the combination of broad applicability and significant benefit or advantage over baseline practice.

12. How does the innovation meet customer or stakeholder needs in your State DOT or other organizations that have used it?

This standard practice will provide a method of sample preparation and polishing of an aggregate source for rapid evaluation of its friction characteristics and predicting its long-term performance in providing the friction demand of pavements. A pavement that doesn't provide enough friction is a public safety hazard. Equally, a pavement that rapidly loses its friction characteristics due to polishing action of vehicular traffic is a safety hazard and an economic drawback as it needs to be resurfaced more often. DOTs can use the standard practice to select the best aggregates that would provide long-term friction demand of pavements.

13. Identify the top three benefit types your DOT has realized from using this innovation. Describe the type and scale of benefits of using this innovation over baseline practice. Provide additional information, if available, using quantitative metrics, to describe the benefits.

Benefit Types	Please describe:
Improved Safety	Maryland roads are being paved with properly evaluated high friction aggregates that greatly benefit the safety of the travelling public.
Shorter Schedule	The long-term friction performance of aggregates can be evaluated within a week.
Cost Savings	By selecting high friction aggregates, pavements can be in service for longer period, without the need to resurface them every so often.

Provide any additional description, if necessary:

Public safety is the # 1 priority for all states. The developed standard practice (PP-103) would help to achieve this goal in transportation infrastructure.

14 How broadly might this innovation be deployed for other applications. in the transportation industry (including other disciplines of a DOT, other transportation modes, and private industry)?

The standard practice can be used to evaluate the long-term friction characteristics of High Friction Surface Treatments and Pavement Markings in the transportation industry.

Market Readiness (20 points)

The AII selection process will favor innovations that can be adopted with a reasonable amount of effort and cost, commensurate with the payoff potential.

15. What specific actions would another organization need to take along each of the following dimensions to adopt this innovation?

Check boxes that apply	Dimensions	Please describe:
☐	Gaining executive leadership support	Click or tap here to enter text.
☐	Communicating benefits	Click or tap here to enter text.
☒	Overcoming funding constraints	An organization need to acquire a Three Wheel Polishing Device and a Dynamic Friction Tester.
☒	Acquiring in-house capabilities	Technicians need to be trained on the Standard Practice.
☐	Addressing legal issues (if applicable) (e.g., liability and intellectual property)	In case of accident, the data regarding road surface friction could be very helpful to resolve claims against DOT.
☐	Resolving conflicts with existing national/state regulations and standards	Click or tap here to enter text.
☐	Other challenges	Click or tap here to enter text.

16. Please provide details of cost, effort, and length of time expended to deploy the innovation in your organization.

Cost: Three Wheel Polishing Device = $18,000 and DFT =$35,000

Level of Effort: Some level of effort is required for laboratory set-up.

Time: The Standard Practice can be adopted within three months.

17. To what extent might implementation of this innovation require the involvement of third parties, including vendors, contractors, and consultants? If so, please describe. List the type of expertise required for implementation.

Vendors will be required for providing the required equipment. Troxler https://www.troxlerlabs.com can provide the Three Wheel Polishing Device and SHIMA American https://www.shimaamerican.com can provide the Dynamic Friction Tester.