APPENDIX A

AASHTO NTPEP Draft Work Plan for Material Additives and Processes for Warm Mix Asphalt

Introduction
This appendix provides the AASHTO NTPEP test framework for warm mix asphalt proposed for consideration by the governing committee. It is formatted in conformance with the typical draft work plan for materials submitted to the highway product evaluation program. The draft work plan is entitled, Material Additives and Processes for Warm Mix Asphalt.
AASHTO National Transportation Product Evaluation Program

Draft Work Plan
(For products submitted in 2012)

Material Additives and Processes for Warm Mix Asphalt

2012
STATE CONTACTS

Member departments or selected private laboratories will test warm mix asphalt materials. The lead state will act as coordinator and generate summaries and reports, testing states will perform lab tests. The contact persons for the member departments are as follows:

Field Testing State (example below):

**Brad Young, PE**
New Products Engineer
Ohio Department of Transportation
1600 W. Broad St
Columbus, OH 43223
Phone: 614-351-2882
Fax 614-275-1354

Additional Independent Labs will be included for the testing of WMA materials.
SUMMARY

The American Association of State Highway and Transportation Officials (AASHTO) hosts a nationally recognized testing program called the National Transportation Product Evaluation Program (NTPEP). NTPEP is a voluntary program whereby Manufacturers may submit their products for a coordinated group evaluation. Individual Manufacturers/suppliers are assessed a testing fee that covers costs for actual laboratory testing and/or field evaluation by either state highway agencies or an approved test facility. The Material Additives and Processes for Warm Mix Asphalt (WMA) program operates with capabilities of AASHTO member departments and private testing facilities. A portion of the testing fee is used for maintaining the online data repository and reports that are accessible to all member departments and other end users.

This document is furnished for the benefit of Manufacturers interested in participating in the program by submitting their products and AASHTO Member Departments that are interested in reviewing and utilizing the data generated through this product evaluation. The testing format has been established to provide the end user with test results which can be used to assess the performance of material additives or processes applied to traditional hot-mix asphalt production and result in WMA. Manufacturers’ are encouraged to submit products that they believe will perform well and meet the demands of the highway industry.

This work plan defines the evaluation procedures for material additives and processes for WMA which will serve as the standard testing protocol for AASHTO’s National Transportation Product Evaluation Program for these products.

The testing facility may be either a state highway laboratory, university laboratory, or a private independent laboratory appropriately equipped and capable of performing the required evaluations. All laboratories performing these evaluations shall be contracted through AASHTO NTPEP. AASHTO NTPEP testing programs do not provide pass/fail acceptance criteria. Evaluation reports will provide performance data and AASHTO does encourage member departments to take advantage of the program. However, the state highway agency will make the final determination regarding specification compliance and use of the products based on the data that is reported.

TERMINOLOGY

* Accelerated pavement testing (APT) – The controlled application of a prototype wheel loading, at or above the appropriate legal load limit to a prototype or actual, layered, structural pavement system to determine pavement response and performance under a controlled, accelerated accumulation of damage in a compressed time period.

* Air voids (Va) – The total volume of small pockets of air between the coated aggregate particles throughout a compacted paving mixture, expressed as a percent of the bulk volume of the compacted paving mixture.
Chemically-Processed Warm Mix Asphalt – Asphalt mixing process which includes technologies that use a combination of emulsification agents, surfactants, polymers, and additives to improve coating, mixture workability, and compaction, as well as adhesion promoters. The chemical additive package is used either in the form of emulsion or added to bitumen in mix production process and then mixed with hot aggregate.

Creep – The time-dependent portion of strain that results from stress.

Creep compliance – The time-dependent strain divided by the applied stress.

Dynamic modulus - \(|E^*|\), the absolute value of the complex modulus calculated by dividing the peak-to-peak stress by the peak-to-peak strain for a material subjected to a sinusoidal loading.

Dynamic modulus master curve – A composite curve constructed at a reference temperature by shifting dynamic modulus data from various temperatures along the log frequency axis.

Flow number – The number of load cycles corresponding to the minimum rate of change of permanent axial strain during a repeated load test.

Foaming-Processed Warm Mix Asphalt - Asphalt mixing process which includes processes that introduce small amounts of water to hot asphalt, either via a foaming nozzle, damp aggregate, or a mineral filler such as zeolite.

Organic-Additive Warm Mix Asphalt - Asphalt mixing process which includes technologies that use organic or wax additives to achieve the temperature reduction by reducing viscosity of binder.

Tensile strength – The strength shown by a specimen subjected to tension.

Voids in the mineral aggregate (VMA) – The volume of the intergranular void space between the aggregate particles of a compacted paving mixture that include air voids and the effective binder content, expressed as a percent of the total volume of the specimen.

Voids filled with asphalt (VFA) – The percentage of the VMA filled with binder (the effective binder volume divided by the VMA).

Warm Mix Asphalt (WMA) – Warm mix asphalt refers to asphalt concrete mixtures that are produced at temperatures approximately 10°C (50°F) or more cooler than typically used in the production of hot mix asphalt. The goal with warm mix asphalt is to produce mixtures with similar strength, durability, and performance characteristics as hot mix asphalt using substantially reduced production temperatures.
Manufacturers of Material Additives and Processes for Warm Mix Asphalt (WMA) who elect to participate in the AASHTO NTPEP program must submit a completed NTPEP Product Evaluation Form (PEF) to the attention of the AASHTO NTPEP Coordinator. This process is completed electronically through the NTPEP Data Mine program. For the purposes of this testing program, products intended for vertical or any non-highway applications will not be evaluated.

Under agreement with The American Road & Transportation Builders Association (ARTBA), this panel has two industry representatives. This ensures that industry concerns, experience, and technical knowledge are considered in the testing and evaluation of products, material, and/or devices that are commonly used by the AASHTO Member Departments.

The Manufacturer shall supply sufficient quantities of each product to perform the required testing. The testing facility determines sufficient quantities for laboratory testing and installation. The Manufacturer shall supply bulk mixture samples of WMA (commonly referred to as plant-mixed, laboratory-compacted (PMLC) specimens), preferably compacted immediately after sampling to eliminate the need for mixture reheating (commonly referred to as plant-mixed, quality control laboratory-compacted (PMQLC) specimens). The Manufacturer shall also supply cores extracted from the testing facility test pavement (commonly referred to as plant-mixed, field-compacted (PMFC) specimens). The test materials shall be labeled with traceable sample numbers to WMA produced.

TESTS/TEST METHODS

The standard tests and methods are detailed in this work plan. The Lead State and the NTPEP Material Additives and Processes for Warm Mix Asphalt Technical Committee shall address any questions regarding the testing procedures or exceptions to any testing procedure.

TEST REPORT

The primary testing facility is responsible for entering data generated in its facility and reviewing any data generated at subcontracted facilities in the NTPEP online database.

All information noted in the Test Report Section of this work plan shall be included in the test report.
PRODUCT SUBMISSION GUIDELINES

This testing program will accept products once in each calendar year. The deadlines for product submission will be posted on the NTPEP website.

- The AASHTO NTPEP Coordinator and Lead State will verify receipt of testing fees and all appropriate documentation.
- Once the Manufacturer is notified the system has been accepted for evaluation, the test facility will request that the Manufacturer submit clearly marked samples of the products. State Department of Transportation (DOT) representatives will select samples for the Manufacturers to ship to the testing facility.
- The test facility shall notify the Lead State and the AASHTO NTPEP Coordinator of receipt of samples for evaluation.

When the laboratory testing has been started or the installation process is complete the Manufacturer is bound by the Non-Interference Policy as detailed in the General Terms and Conditions Section of submittal documents. After this time all written or verbal correspondence between the Manufacturer and the Testing Laboratory or Installation Facility must be done through the Lead State. Any implication of interference from the Manufacturer during the testing and evaluation process will be cause for the evaluation to cease. Any written or verbal communication between the Manufacturer and the Testing Facility or Installation Facility that is not shared with the NTPEP Coordinator or the Lead State will be considered a violation of the non-interference policy.

TESTING FEES

Testing fees are assessed to cover all costs associated with laboratory testing, material installation, field evaluation, administrative costs incurred by the NTPEP lead state, (electronic) report generation and distribution by AASHTO, document preparation, and distribution to AASHTO member departments. Specific pricing for submission of products may be found at www.ntpep.org.

Laboratories will be reimbursed for testing performed if a system is withdrawn after testing has begun. If the Manufacturer elects to withdraw initial samples after testing begins and resubmit products, the Manufacturer will be charged additionally for all costs incurred by the laboratory during the initial testing.

POLICIES FOR WITHDRAWING MATERIALS FROM NTPEP MATERIAL ADDITIVES AND PROCESSES FOR WARM MIX ASPHALT EVALUATIONS

A written request to withdraw the product from the evaluation cycle must be received by the NTPEP Coordinator at least five (5) business days before scheduled sampling is to occur. If sampling has occurred, a handling fee of ten (10) percent of the testing fee will be charged in addition to any
laboratory test costs that may have been incurred for evaluation. Results released through Data Mine up until the time of withdrawal will be removed. In this event, the material will be listed in the final report with a note that it was withdrawn from the evaluation program.

**POLICY FOR REVIEW OF NTPEP REPORTS**

The *NTPEP Information and Operations Guide* contains policies for review of reports. A copy of the guide may be viewed and downloaded from the NTPEP website at: [www.ntpep.org](http://www.ntpep.org).

**TESTING AND REPORTING REQUIREMENTS**

The following information defines the laboratory and field evaluation procedures consisting primarily of American Society for Testing and Materials (ASTM) and AASHTO tests for the evaluation of Material Additives and Processes for Warm Mix Asphalt. It should be noted that this evaluation program is intended for structural asphalt mixtures; thus, bituminous seals, coatings, preservation, or other experimental materials are not included as part of this work plan. The evaluation procedures included herein will serve as the standard for NTPEP in serving the AASHTO states.

Results of the laboratory and field evaluations will be entered directly into the additives and processes for Warm Mix Asphalt Materials module of Data Mine. A timeline for product evaluations is included on the last page of this document.

**MATERIAL CRITERIA**

The study will allow submittals from the following three categories:

*Foaming-Processed Warm Mix Asphalt* includes processes that introduce small amounts of water to hot asphalt, either via a foaming nozzle, damp aggregate, or through mineral filler such as zeolite.

*Chemically-Processed Warm Mix Asphalt* includes technologies that use a combination of emulsification agents, surfactants, polymers, and additives to improve coating, mixture workability, and compaction, as well as adhesion promoters. The chemical additive package is used either in the form of emulsion or added to bitumen in mix production process and then mixed with hot aggregate.

*Organic-Additive Warm Mix Asphalt* includes technologies that use organic or wax additives to achieve the temperature reduction by reducing viscosity of binder.

In order to be classified as warm mix asphalt, the mixture must be produced at a plant temperature less than or equal to 132°C (270°F) which is approximately 10°C (50°F) lower than current HMA production temperatures.

Materials may be limited per Manufacturer per year. A generic material composition
description and Material Safety Data Sheet (MSDS) must accompany the submittal for classification purposes.

Materials additives and processes for warm mix asphalt are required to be resubmitted and tested (in laboratory only) every seven (7) years. A signed certification from the Manufacturer will be required with the seven year re-submittal stating that the formulation has not changed since the original submission.

Once a Manufacturer has submitted a product and a NTPEP sample ID has been assigned, the Manufacturer and product name will remain the same throughout the reporting cycle.

LABORATORY TESTS

Laboratory Testing to be Performed:
There are certain standard tests which should be used to evaluate Material Additives and Processes for Warm Mix Asphalt. There are also some provisional non-standard procedures which can assist in assuring materials are tested to best evaluate their quality. Both bulk mixture sampled during production and cores extracted from test sections will be evaluated in the laboratory. Any testing of bulk mixture sampled during production must be conducted after 5 days but before 30 days after specimen fabrication. An exception to the 30-day maximum can be applied only if specimens are vacuum-sealed and stored at temperature and humidity.

Binder Testing:
The continuous performance grade of original WMA binder and extracted WMA binder shall be tested to ascertain the impact of WMA additive or process on stiffness. A dynamic shear rheometer (DSR) that has been established by Manufacturers as proficient for testing stiff binders shall be utilized. The test shall be run on original and extracted WMA binder both before aged in the pressure aged vessel (PAV) and after PAV aging. The same process shall then be completed on rolling thin-film oven (RTFO) aged binder for short-term aging performance. Asphalt binder extraction shall be performed using AASHTO T 164 Method A or ASTM D5404. The use of Trichloroethylene (TCE) solvent is not permitted for extraction. One 1-gallon sealed bucket of asphalt binder should be sampled from the plant.

Aggregate Testing:
Contractor quality assurance (QA) data shall be submitted from aggregate tests conducted prior to production of the test mixtures by the Manufacturer. Data must be furnished for the following aggregate properties: gradation, bulk specific gravity, absorption, stockpile moisture content, coarse aggregate angularity, fine aggregate uncompacted voids, flat and elongated, and sand equivalent. For gradation properties, AASHTO T 27 will be employed, while bulk specific gravity and absorption details will be obtained through AASHTO T 84 and T 85 procedures.
Mixture Volumetric Testing:
Reheat bulk mixture sampled during production from ambient temperature for 2.5 hours at the WMA compaction temperature. Conduct mixture design verification (with test data from specimens produced by contractor or state DOT laboratory) with 150-mm (6-inch) diameter and 115-mm (4.5-inch) high Superpave gyratory specimens at the design number of gyrations ($N_{\text{design}}$). Conduct in place density and thickness tests on cores extracted from the WMA test section to compare with properties tested on bulk mixture samples.

Sealed metal buckets totaling to 300 kg (660 lbs) of loose asphalt mixture should be sampled from the multiple points in the truck bed at the production site or plant. One-hundred fifty (150)-mm (6-inch) outside diameter cores should be extracted to include all asphalt layers down to the interface with the aggregate base.

Mixture Performance Testing:
There are certain standard laboratory tests that should be used to evaluate the performance of WMA. All laboratory test specimens shall be prepared from bulk mixture sampled during production of the test materials (PMLC) and cores extracted from the paved surface (PMFC). The Manufacturer will have the option of providing PMLC or plant-mixed QC laboratory-compacted (PMQLC) material for mixture testing. It is preferred that the Contractor producing mixture for the evaluation shall have a Superpave gyratory compactor equipped to compact tall specimens in its quality assurance laboratory.

Compactability:
Determine the number of gyrations to 92 percent relative density in accordance with AASHTO R35 draft appendix section 8.3 with the following modifications: maximum increase in gyrations of 25 percent at 12°C (54°F) below the planned field compaction temperature, and at the planned field compaction temperature.

Dynamic Modulus:
Bulk mixture test specimens shall be conditioned two hours at the WMA compaction temperature, followed by 16 hours at 60°C (140°F), and an additional two hours at the WMA compaction temperature. A target air void level of 7 percent ± 1 percent shall be used for compacting bulk mixture test specimens. AASHTO TP 79/PP 61 shall be followed to determine the dynamic modulus of the mixture.

Rutting:
Various tests shall be performed to evaluate the test mixture’s propensity to rut. The rutting analysis shall be done on both loose bulk mixture from the plant and extracted cores from the test facility’s field section. Air void tolerance for test specimens and specimen size shall be in accordance with AASHTO TP 79. Condition specimens for two (2) hours at the WMA compaction temperature, followed by 16 hours at 60°C (140°F), and an additional two (2) hours at the WMA compaction temperature.

Repeated load testing (triaxial confined) shall be done on bulk mixture sampled during production. The repeated axial load applied shall be 483-kPa (70-psi), a confining pressure of
69-kPa (10-psi) shall be used, and AASHTO TP 79 Flow Number for HMA using Asphalt Mixture Performance Tester (AMPT) shall be followed.

AASHTO T 324 shall be conducted on bulk mixture laboratory-compacted samples and extracted core specimens at standard conditions and 50°C (122°F) under water. Top and bottom of cores shall be sawed in accordance with AASHTO PP 60, followed by measurement of bulk specific gravity (AASHTO T 166 or T 275) and calculation of air voids per specimen (AASHTO T 269). For comparison, laboratory-compacted samples shall be compacted to a common air void content for verification purposes.

AASHTO T 340 shall also be conducted on bulk mixture laboratory-compacted samples and extracted core conditions using the Asphalt Pavement Analyzer for rutting considerations. Six (6) cylindrical specimens, with 150-mm (6-inch) diameter and 75 ± 2-mm (3.0 ± 0.1-inch) tall, are required to be tested at the high grade temperature of the Performance-Grade (PG) binder to evaluate rutting susceptibility of the mixture. Air voids shall be determined through the measurement of the bulk specific gravity (AASHTO T 166) after sawing. For test result verification purposes, laboratory-compacted specimens shall be compacted to a common air void content.

**Durability:**

Bulk mixture test specimens shall be compacted to 150-mm (6-inch) diameter and 62-mm (2.5-inch) height for analysis with AASHTO T 283. The amount and type of anti-strip additive included in test mixture shall be recorded and the WMA Appendix to AASHTO R 35 shall be followed for evaluation of moisture sensitivity using AASHTO T 283. Specimens shall be conditioned 16 hours at 60°C (140°F) followed by 2.5 hours at the compaction temperature. One (1) freeze/thaw cycle shall be included in the test sequence. AASHTO T 283 and T 324 tests shall be run on both specimens prepared from bulk mixture sampled during production and on those extracted from the pavement mat at the accelerated pavement testing facility.

**Summary of Laboratory Tests:**

**Binder:**

<table>
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<tr>
<th>TEST</th>
<th>SPECIFICATION</th>
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<tbody>
<tr>
<td>Performance grade of original binder</td>
<td>AASHTO R 28, R 29, and T 240</td>
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<tr>
<td>Performance grade of extracted binder</td>
<td>AASHTO R 26, R 28, R 29, and T 240 or AASHTO T 164 with Rotovap recovery</td>
</tr>
<tr>
<td>Performance grade of base binder</td>
<td>AASHTO R 28, R 29, and T 240</td>
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**Aggregates:**

<table>
<thead>
<tr>
<th>TEST</th>
<th>SPECIFICATION</th>
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</table>
Gradation | AASHTO T 27
---|---
Bulk specific gravity and absorption | AASHTO T 84 and T 85
Flat and elongated or AIMS method | ASTM D 4791 or use state or contractor data
Sand equivalent | AASHTO T 176 or use state or contractor data
Stockpile moisture content | AASHTO T 255 or use state or contractor data
Coarse aggregate angularity | AASHTO T 335 or use state or contractor data
Fine aggregate uncompacted voids | AASHTO T 304 or use state or contractor data
Geologic type | Use state or contractor data
Soundness | AASHTO T 104 or use state or contractor data
LA abrasion or Micro Deval test | AASHTO T 96 or T 327, or use state or contractor data

### Mixture Volumetric:

<table>
<thead>
<tr>
<th>TEST</th>
<th>SPECIFICATION</th>
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<tbody>
<tr>
<td>Theoretical maximum specific gravity and density of HMA</td>
<td>AASHTO T 209</td>
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<tr>
<td>Preparing and Determining Density of HMA Specimens by Means of Superpave Gyratory Compactor</td>
<td>AASHTO R35 and T 312</td>
</tr>
<tr>
<td>Practice for Superpave Volumetric Design for HMA</td>
<td>AASHTO R35</td>
</tr>
<tr>
<td>Laboratory confirmation of extracted core density</td>
<td>AASHTO T 166 or T 275</td>
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<tr>
<td>Laboratory confirmation of extracted core thickness</td>
<td>ASTM D 3549</td>
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### Mixture Performance:

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<th>TEST</th>
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<tr>
<td>Mixture design verification with 150-mm diameter</td>
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<td>Rutting</td>
<td>AASHTO TP 79, T 324, and T 340</td>
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<td>Dynamic modulus</td>
<td>AASHTO TP 79 / PP 61</td>
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<tr>
<td>Compactability</td>
<td>AASHTO R35 draft appendix section 8.3</td>
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<tr>
<td>Durability</td>
<td>AASHTO T 283 and T 324</td>
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</table>

Products may be tested either as supplied (neat) or modified with the maximum amount of 15 percent recycled asphalt pavement allowed according to the Manufacturer’s written instructions. However, the same mix design used in the field installation must be used in the laboratory testing.
FIELD PERFORMANCE SERVICE TEST:

Accelerated Pavement Testing

One pavement location will be selected at an accelerated pavement testing facility. Sites will generally have the following characteristics:

- 102-mm (4-inch) WMA surface lift, excluding overlays or interlayers.
- Wet, no freeze climate and wet, freeze climate.
- 205-mm (8-inch) stabilized granular aggregate base, suitable for rutting and fatigue cracking testing applications.
- Subgrade conditioned to optimal water content and maximum dry unit weight.
- Field test areas will be 60-m (200 feet) long and 3.7-m (12-feet) to 4.2-m (14 feet) wide.
- Equivalent HMA control section adjacent to the WMA section. The HMA control pavement shall have the same dimensions, compaction target, aggregate source, mixture design (excluding any elements of the WMA process or additives), structure, and traffic applications.
- Load level of 44-kN (10-kips) on single axle.
- Testing conducted at ambient temperature of the facility location.

Installation:

The Manufacturer will supply all labor and equipment to completely install the properly sampled and produced WMA mixture. The testing state will provide site preparation, preparing the subgrade and stabilized base layers. Paving of the WMA and HMA surfaces will be the Manufacturer’s responsibility. At the time of installation the Manufacturer will provide written instructions to the paving contractor for the proper installation of the material.

Traffic control and installation scheduling will be provided by the Field Testing State, if deemed necessary by the nature of the accelerated pavement facility. The Manufacturer's representative will certify that the WMA mixture produced is constructed in accordance with the construction specifications identified for use and to their satisfaction. If the representative indicates that the installation using their product was unsatisfactory, they will inform the representative of the Field Testing State of this fact in writing, within one (1) week of the installation. Upon notification, the Field Testing State may drop that Manufacturer's installation from further testing without a refund of fees. If no written notification is received within the first week, the installation will be accepted and included in the field testing.

If the Manufacturer is not present during the scheduled production and paving of WMA and HMA sections, all costs associated with labor, materials and equipment, for preparation of the test site, and repair of same will be charged to the Manufacturer.

If an alternate date can be arranged it will be the Manufacturer’s responsibility to furnish traffic control (if necessary), prepare the pavement underlying layers, and provide for the construction and placement of both the HMA control section and the pavement section with
WMA manufactured using their product/process.

**Field Observations:**

Testing will commence upon completion of the installation and continue for one (1) year. Field observations will be made during the installation; at three (3) months and six (6) months (interim); and 12 months (final). Accelerated loading will be applied in equal frequencies and cycles to both the HMA and WMA test sections over a 12-month period.

Field Performance service test results shall be compiled into an electronic report that will be provided to all participating states on the NTPEP website. That report shall include, as a minimum, the following field performance monitoring information:

- Rut depth profile at construction using profilograph.
- ASTM E965 sand patch test for moisture susceptibility of the compacted mat.
- Visual distress survey using Long-Term Pavement Performance (LTPP) manual to capture percentages of fatigue cracking, thermal cracking, and other distress types.
- Ground penetrating radar (GPR) or other seismic analysis surface waves (SASW) equipment at construction.
- Falling weight deflectometer (FWD) to predict cracking potential and in situ stiffness.
- Bond strength between layers by taking three (3) cores at construction (West et al., 2005).
- In-place thickness and density by extracting cores at the frequencies: nine (9) cores at construction; three (3) cores in-wheelpath at three (3), six (6), and 12 months; three (3) cores between three (3), six (6), and 12 months.
- Level of compactive effort during placement of test section.

During this field evaluation period, if a product fails to the extent that it becomes a safety issue for the traveling public (if installed on an accelerated testing facility that includes real-time traffic), as determined by the Lead Field State representative, the Manufacturer will be charged for the actual cost incurred by the DOT to fix the pavement section. This charge will include all labor, materials, maintenance and protection of traffic (MOT) set-up, and equipment costs.

**TESTING FACILITY CRITERIA**

Candidate facilities to be considered for classification as an authorized test facility for AASHTO NTPEP shall meet the following requirements:
Facilities Requirements:

- Provide documentation to demonstrate experience in performing testing of bituminous materials and mixtures.
- Provide verification that it has the equipment, facilities, and capability to perform the required testing procedures contained in this work plan. The laboratory shall provide a list of equipment that it uses for testing bituminous materials and mixtures.
- Identify its policies regarding qualifications and training of its staff to ensure a high-quality level of performance. This shall include performance reviews of testing proficiencies and Standard Operating Procedures for each testing procedure as detailed in the Quality Control/Quality Assurance portion of this document.
- Identify the administrative procedures that have been implemented to ensure a high-quality level of comparative testing results.
- Complete all laboratory testing of the WMA materials within three (3) months from the date samples are received.
- Provide verification that facility is in conformance with Federal and State regulations related to health and safety.
- Provide verification that it has performed all testing procedures in conformance with requirements of the specified individual test methods. Accreditation by the National Voluntary Laboratory Accreditation Program, International Organization for Standardization (ISO) Technical Committee 176 (TC 176, Quality Management and Quality Assurance) ISO 9000 and TC 261 (Additive Manufacturing); AASHTO Accreditation through Asphalt Materials Reference Laboratory (AMRL); or other nationally recognized accreditation program shall be considered as verification.

Personnel Requirements:
Provide an organizational chart that identifies the names and positions of management personnel and each person that will be involved in or associated with testing and the review of the AASHTO NTPEP reports. A laboratory Quality Control Manager shall be designated for review of all Standard Operating Procedures and Proficiency evaluations of technicians as described.

Provide resumes or credentials for all persons identified in the organizational chart. It is recommended that the responsible person supervising the laboratory and the staff performing the testing have adequate levels of formal education.

Quality Control/Quality Assurance:
The laboratory shall identify the procedures being used to ensure a quality level of testing. The process used for quality control should be based upon statistically evaluated conclusions. The conclusions should verify that the laboratory is capable of producing testing results that are accurate and reproducible. The preferred technique for comparative conclusions is to obtain results based on tests performed on identical samples by other laboratories that are statistically evaluated for their comparative similarity. The comparative testing must be performed using the testing procedures required by AASHTO NTPEP.

Testing proficiencies of all technicians shall be evaluated and documented by the laboratory.
Quality Control Manager. These evaluations shall be performed at six (6)-month intervals unless the technician does not routinely perform the test. In this case, proficiency of the technician shall be evaluated and documented prior to testing of products for this program.

**Testing Capability:**
The testing facility shall be comprised of a single entity or the combination of no more than three (3) entities.

When more than one facility is used, a single lead facility shall be responsible for the coordination and oversight of all testing and reporting and for the compilation of the final report. The lead facility is responsible for identifying the tests that will be subcontracted and for providing the qualification, experience, and quality control programs of each of the facilities for review and approval of AASHTO NTPEP. Subcontracted facilities cannot be changed without the approval of AASHTO NTPEP.

The field testing shall be at an appropriate testing facility as designated by the AASHTO NTPEP Material Additives and Processes for Warm Mix Asphalt Technical Committee.
## TIMELINE FOR NTPEP EVALUATION PROCESS

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