Illinois Tollway

APPROVED LIST OF ASPHALT BINDER AND MIXTURE MODIFIERS

September 27, 2019

(Applicable to the IllinoisTollway Asphalt Mixtures Special Provision)

Approved Supplier	**Approved Product**
Any supplier, as long as the product meets the requirements listed in the Illinois Tollway Asphalt Mixtures Special Provision	SBS PG 76-22, SBS PG 70-22, SBS PG 70-28 and SBS PG 64-34.
Seneca Petroleum Co. Inc. 13301 S Cicero Ave. Crestwood, IL 60445 Attn: Don Sjogren www.senecaco.com	Seneca GTR
Ingevity 5255 Virginia Avenue North Charleston, SC 29406 Attn: Trey Wurst www.ingevity.com	Evoflex RMA
Asphalt Plus, LLC 760 Industrial Drive, Ste. A Cary IL, 60013 Attn: Redmond Clark www.asphaltplus.com	Elastiko 100 Engineered Crumb Rubber (ECR)

For a supplier to become eligible for this Approved List, the supplier must prove performance capabilities, as laid out in the Approval Process below. In the case of Ground Tire Rubber (GTR), there are additional product material requirements listed on page 4 of this document.

Eligible Modifiers are as follows:

- SBS
- Terminal Blend GTR
- Dry Process GTR
- Combination of SBS and GTR
- Rejuvenators
- Reinforced Fibers

Modifier Supplier Approval Process

The Tollway may consider suppliers for approval provided they meet the following product requirements, as well as the approval requirements specified herein.

Step 1: Initial Submittal. The vendor/supplier shall provide an initial written submittal to the Tollway. The submittal shall include the following items for review.

1. Vendor/Supplier contact information.
2. Modifier description and history of use in similar applications.
3. Test results demonstrating the benefits of the modifier. At minimum a control mix/binder along with the proposed modifier incorporated into the mixture/binder shall be included in the analysis. Test results should be from mixtures with recycled material contents and compositions typical of current Tollway mix designs. Typical testing on the mixture could include, but not limited to:
    a. Proposed AASHTO M320 and ASTM D7643 continuous asphalt binder grade with modifier compared to control or base AASHTO M320 and ASTM D7643 continuous asphalt binder grade.
    b. Asphalt mixture volumetrics with modified binder compared to asphalt mixture with control or base asphalt binder.
    c. Asphalt mixture DCT (ASTM D7313) with modified binder compared to asphalt mixture with control or base asphalt binder.
    d. Asphalt mixture Hamburg wheel (Illinois Modified AASHTO T324) with modified binder compared to asphalt mixture with control or base asphalt binder.
    e. Extracted and Recovered AASHTO M320 and ASTM D7643 continuous grade asphalt binder grade compared to control mixture (Including Delta Tc calculation). The extraction shall be conducted with an Automatic Extraction unit, or according to AASHTO T164 (Method A). Only trichloroethylene solvent may be used in the extraction process. The ASTM D5404 recovery process shall be used, and the maximum time between the start of extraction and end of recovery shall be 8 hours.
    f. Other performance testing such as Texas Overlay, SCB, IFIT, AMPT, etc.
4. SDS/Safety information
5. The submittal shall be sent to:

    Cynthia M. Williams
    Illinois Tollway

    2700 Ogden Avenue
    Downers Grove, Illinois 60515-1703
    CMWilliams@getipass.com

Step 2: Modified Mix Design. The supplier shall conduct testing of a Tollway approved mix design, with the proposed modified asphalt binder (e.g. revised PG grade and modifier dosage) substituted for the approved asphalt binder.

1. The testing requirements of the modified mix design include:
   a. AASHTO M320 and ASTM D7643 continuous asphalt binder grading of the proposed PG grade with modifier compared to control or base asphalt binder grade.
   b. Asphalt mixture volumetrics with modified binder compared to asphalt mixture with control or base asphalt binder.
   c. Asphalt mixture DCT (ASTM D7313) with modified binder compared to asphalt mixture with control or base asphalt binder.
   d. Asphalt mixture Hamburg wheel (Illinois Modified AASHTO T324) with modified binder compared to asphalt mixture with control or base asphalt binder.
   e. Extracted and Recovered AASHTO M320 and ASTM D7643 continuous grade asphalt binder grade compared to control mixture binder grade (Including Delta Tc calculation). The extraction shall be conducted with an Automatic Extraction unit, or according to AASHTO T164 (Method A). Only trichloroethylene solvent may be used in the extraction process. The ASTM D5404 recovery process shall be used, and the maximum time between the start of extraction and end of recovery shall be 8 hours.
2. All testing will be conducted by a AASHTO Re:source accredited laboratory in the appropriate ASTM and/or AASHTO test methods. The lab shall be in no way affiliated with the modifier supplier/vendor/manufacturer.
3. The vendor/supplier will be responsible for costs incurred for all laboratory testing.

Step 3: Production Sampling. If laboratory testing of the modified mix design is favorable and supports the initial vendor/supplier test results, production and/or jobsite testing will be required of the modified mix design. This testing will be conducted by the Tollway. The first day of production shall be conducted as an asphalt test strip (300-500 tons of placement), and will include the following testing:

1. Production and jobsite tests:
   a. AASHTO M320 and ASTM D7643 continuous asphalt binder grading of an in-line production sample.
   b. Asphalt mixture volumetrics.
   c. Asphalt mixture DCT (ASTM D7313).
   d. Asphalt mixture Hamburg wheel (Illinois Modified AASHTO T324).
   e. Extracted and Recovered AASHTO M320 and ASTM D7643 continuous grade asphalt binder grade compared to control mixture (Including Delta Tc calculation). The extraction shall be conducted with an Automatic Extraction unit, or according to AASHTO T164 (Method A). Only trichloroethylene solvent may be used in the extraction process. The ASTM D5404 recovery process shall be used, and the maximum time between the start of extraction and end of recovery shall be 8 hours.
2. All testing will be conducted by a AASHTO Re:Source accredited laboratory in the appropriate ASTM and/or AASHTO test methods.

Final Approval.

1. A trial of 2500 tons of production must be completed with results that meet or exceed specification and performance requirements. Consideration will be given if this work has been completed by another Agency with a similar approval process.
2. This approval pertains only to the mix and modifier dosage (as supplied by manufacturer) tested. Dosage of the modifying agent may be increased one time during production in order to meet required specification and performance criteria. No further increases in dosage will be allowed without a resubmittal as outlined in Step 2: Modified Mix Design.
3. All test results submitted by the vendor/supplier must be confirmed through the laboratory, production, and jobsite testing.
4. The test results and product characteristics must support a financial and/or performance benefit to the Tollway.
5. A letter detailing the review, testing, and evaluation of the product by Tollway will be sent to the submitting vendor/supplier once all test results have been completed and a thorough evaluation of the product has been conducted. The letter will include the final determination of acceptance or rejection of the product for the given mixture tested.
6. Approval will remain in effect as long as satisfactory results are achieved. Any test results on the part of the supplier or Tollway that show the material is not meeting these requirements shall be cause to rescind approval. If the modifier chemical composition is changed, the supplier will notify Tollway immediately. The Tollway will determine if a new submittal, as outlined in Step 2: Modified Mix Design, or a new trial, as outlined in Step 3: Production Sampling, is required.

Modifier Product Requirements

The Tollway may consider the following products for approval provided they meet the requirements specified herein.

Terminal Blend GTR:

The GTR shall be produced from processing automobile and/or truck tires by the ambient grinding method. Heavy equipment tires, uncured or de-vulcanized rubber will not be permitted. The GTR shall not exceed 1/16 in. in length and shall contain no free metal particles. Detection of free metal particles shall be determined by thoroughly passing a magnet through a 2 oz. sample. Metal embedded in rubber particles will be permitted.

The GTR shall be stored in a dry location protected from the rain. When the GTR is combined with the asphalt cement, the moisture content of the GTR shall not cause foaming of the blend.

When tested in accordance with Illinois-modified AASHTO T-27, a 2 oz. sample of the GTR shall conform to the following gradation requirements:

Sieve Size	Percent Passing
No. 8 (2.36 mm)	100
No. 16 (1.18 mm)	98 ± 2
No. 30 (600 μm)	95 ± 5
No. 50 (300 μm)	50 ± 10
No. 100 (150 μm)	10 ± 5
No. 200 (75 μm)	2 ± 2

A mineral powder (such as talc) meeting AASHTO M17, Mineral Filler for Bituminous Paving Mixtures, requirements may be added, up to a maximum of 4% by weight of GTR particles, to reduce sticking and caking of the GTR particles.

GTR shall have a specific gravity of 1.15 ± 0.05 when tested in accordance with ASTM D-1817, Standard Test Method for Rubber Chemicals-Density.

Extender Oils or Polymeric Additions. With approval of the Engineer, compatible extender oils and/or polymers may be added to the GTR or if the material is compounded into a homogenous blend before the modification additive is added to the asphalt. The additional costs for the extender oils and/or polymer additions shall be borne by the Contractor. The Contractor shall provide material product information along with usage rates for approval.

The GTR blended asphalt shall comply with the specified PG Grade in accordance Table 1 of Article 1032.05 (b) of the Standard Specifications with exception to the Tests on Residue from Rolling Thin Film Oven Test (AASHTO T 240), and separation of polymer test. Dynamic Shear Rheometer tests shall use a 2.00mm gap for 25mm plates. In addition, the elastic recovery shall be a minimum of 75.

Dry Process GTR

The dry process GTR shall be produced from processing automobile and/or truck tires by ambient or cryogenic grinding methods. Heavy equipment tires, uncured or de-vulcanized rubber will not

be permitted. The GTR shall not exceed 1/20 in. in diameter and shall contain no free metal particles. Detection of free metal particles shall be determined by thoroughly passing a magnet through a 2 oz. sample. Metal embedded in rubber particles will be permitted.

The dry process GTR shall be packaged and shipped in closed-top, water resistant bulk bags. The dry process GTR bags shall be stored in a dry location protected from the rain before use in the field. When the GTR is combined with the asphalt cement and aggregate, the moisture content of the GTR shall not cause foaming of the blend.

When tested in accordance with Illinois-modified AASHTO T-27, a 2 oz. sample of the dry process GTR shall conform to the following gradation requirements:

Sieve Size	Percent Passing
No. 20 (841 μm)	100
No. 30 (600 μm)	99 ± 1
No. 40 (300 μm)	60 ± 10
No. 100 (150 μm)	10 ± 5

A mineral powder (such as talc) meeting AASHTO M17, Mineral Filler for Bituminous Paving Mixtures, requirements may be added, up to a maximum of 4% by weight of GTR particles in order to reduce sticking and caking of the GTR particles.

The dry process GTR shall have a specific gravity of 1.15 ± 0.05 when tested in accordance with ASTM D-1817, Standard Test Method for Rubber Chemicals-Density.

No extender oils or polymeric additions (elastomers, plastomers) shall be included in the dry process GTR.

If Dry Process GTR is to be used, GTR binder to be used for the mix design shall be produced by adding the dry process GTR to the required PG binder preheated to 350°F, and blending using a high shear blender operating at 3,000 rpm for 30 minutes.

Rejuvenators

Allowable rejuvenators must be derived from plant-based products (i.e. tall oil, soy oil etc.) as long as they do not trigger a significant environmental or health concern. Recycled Engine Oil Bottoms (REOB) is not allowed.