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| **Demonstration of Rubberized Asphalt Concrete (GTR Asphalt Concrete) in Oklahoma using recycled finely Ground Tire Rubber (GTR)** |
| **STIC/State Name:** Oklahoma | **FY:** 2018 |
| **Innovation:**Incorporation of ground tire rubber (GTR) into asphalt concrete mixes, called GTR Asphalt Concrete in this proposal, has been found to enhance mix properties and improve pavement durability. On ODOT projects, depending on the highway and location in the pavement structure, a modified asphalt binder is often specified for heavy traffic loads. The typical modified asphalt is a polymer modified asphalt (PMA). GTR Asphalt Concrete can be an alternative binder and is cost comparable.There are several methods to incorporate GTR into Hot Mix Asphalt / Warm Mix Asphalt HMA/WMA including wet methods, rubber chip seals, rubber micro seals and dry methods.In the dry process, GTR is added to the hot aggregates in an asphalt plant by the same method as reclaimed asphalt pavement (RAP) and mixed with asphalt binder.In the wet process, GTR is added to the liquid asphalt at the asphalt terminal and transported to the asphalt plant as a finished product.In the chip seal method, up to 35% aggregate chips are replaced by GTR chips.In the micro seal method, GTR is added to the slurry as the mixture is placed on the pavement.Many states are using these methods and have seen mixed experience based on their benefits, mix production and constructability. In the past, Oklahoma has demonstrated the blended (wet process) technology on several projects in the late 1990’s through the early 2000’s and saw improved performance of those sections. Since then, technology has improved significantly pertaining to GTR/Liquid blending, mix design process and construction techniques.**Description of the Proposed Work:**ODOT will demonstrate the dry process. This project will be designed with an improved mix design (Balanced Mix Design) processes and placed with advanced production techniques.In the project, a pavement test section, a single days’ production, will be constructed as part of a suitable ODOT project.The work will include, identifying a suitable project, designing the project with test and control sections, constructing and evaluating materials, and monitoring pavement performance. The work has been divided into three phases detailed below:* Pre-Construction Design phase, performed by ODOT Materials Division with assistance from DEQ and the GTR industry, includes testing of materials and development of GTR Asphalt Mix Design.
* Construction phase includes the construction of test & control sections. Proposed STIC $ 60,000.00 and 20% ODOT matching funding will be used for this purpose. In this phase, the majority of materials testing and evaluation would be performed by ODOT Materials Division.
* In the Post Construction phase, limited evaluation and testing will be performed by OU and OSU teams as necessary.

This proposed project has multi-agencies involvement.New special provisions will be developed and plan notes will be added to the ODOT pavement project for construction of future specialized GTR asphalt test sections. The plan note will allow a new item line into future contracts for supply of materials and construction.ODOT Materials division and the Office of Research and Implementation will oversee the project evaluation process and will have oversight of the STIC Incentive project. Oklahoma Department of Environmental Quality (ODEQ) will assist ODOT in identifying the GTR sources and other environmental impacts. |

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| **End Product:**An 800 to 1500 ton section of GTR Asphalt Concrete will be constructed and compared with conventional HMA control section for materials production, construability and performance of pavement.  |
| **Deliverables:**The construction of GTR Asphalt Concrete using GTR supports sustainability and a clean environment by recycling used tires destined for Oklahoma landfills.* The Dry Process is a simple process to set up. A blower is attached to the asphalt plant and GTR is loaded into the blower. The blower is integrated into the control system of the asphalt plant for complete control of the GTR going into the mix.
* By adding the GTR alternative (Dry Process) to the PMA market, the contractor/supplier will be able to control the progress of the project as the supply of PMA from the liquid asphalt suppliers is sometimes interrupted.
* The use of the Dry Process does not involve the ‘melting’ of the GTR into the liquid; rather the GTR granules are suspended in the liquid and act as a terminal point for cracking of the pavement.
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| **Proposal Schedule: FY-2018**The start date will be within three months from issuance of funds with a qualified project and applicable technologies identified, and project deliverables (specialized testing, pavement evaluation, developing special provisions). The construction of test and control sections will be completed with initial results and reports within 12 months. Performance evaluation and test & control sections of pavements and final reports will be completed by ODOT Materials, Oklahoma University and Oklahoma State University within 24 months. Final report and presentation will be presented to FHWA, ODOT and DEQ staff. |
| **Champion(s):**Kevin Suitor, Oklahoma Department of Transportation (ODOT) Asphalt Branch Manager, Ferrella March, Oklahoma Department of Environmental Quality (ODEQ) and Waseem Fazal, Federal Highway Administration (FHWA-OK) Pavement and Materials Engineer. |
| **Estimated Total Cost:** $80,000 | **Amount of STIC****Funds Requested:** | $60,000 |
| **Estimated Total Cost/Budget Breakdown:**The total estimated cost would be $80,000.00. This includes $60, 000.00 for construction and testing the test sections STIC $60,000.00 and $20,000 state matching funds ($12,000 minimum required). Oklahoma DEQ will be contributing $20, 000.00 for testing equipment. The suppliers of the technology will be supporting the project with time, materials, equipment and testing. |