ARDOT TRC TRANSPORTATION RESEARCH COMMITTEE

PROBLEM STATEMENT
No. 28

RESEARCH PROBLEM STATEMENT

DATE: 09/09/2019	**PROJECT AREA:** Pavements

TITLE: Maximum Sandstone Content for Superpave Mixes

PROBLEM STATEMENT:

In recent years, the Department has decreased the amount of asphalt binder in its mixes in an effort to create more economical asphalt mixes. This coupled with the increased use of recycled asphalt pavement (RAP) can cause the mixes to be dry.

The current specifications for Hot Mix Asphalt (HMA) pavement limits the maximum amount of limestone in the wearing surface to prevent aggregate polishing that can lead to lower skid resistance values. However there is not a upper limit on the amount of other aggregates allowed in other HMA mixes. These other allowed aggregates include but are not limited to: sandstone and novaculite. Both sandstone and novaculite typically have a higher absorption capacity than that of limestone. This higher absorption capacity could be potentially detrimental to HMA pavement if the mix is already on the dry side. This dry mix can cause constructibility and durability issues such as difficulty obtaining specified compaction as well as early oxidation and cracking.

OBJECTIVES:

- Examine durability comparisons between HMA mixes containing predominantly sandstone (or other highly absorptive aggregate) and those with a mix or sandstone and limestone.
- Create recommendations for maximum aggregate amounts by type based on in situ pavement investigations.

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

Potential savings could be realized by the Department by increasing longevity and constructibility of asphalt pavements. Money that would be spent on rehabilitation of early failure pavements (attributed to absorptive aggregates) could be spent on other needed projects.

Estimated Project Duration: 24 **Months**

PREPARED BY: Chris Dailey

AGENCY: ARDOT - Research Section

PHONE: (501) 569-2599 **REVIEWER:**

Standing Subcommittee Ranking	Advisory Council Ranking	Statement Combined with Statement Number(s)

ARDOT TRC TRANSPORTATION RESEARCH COMMITTEE

PROBLEM STATEMENT
No. 32

RESEARCH PROBLEM STATEMENT

DATE: 9/6/2019	**PROJECT AREA:** Pavements

TITLE: Compatibility of Mineral Aggregates and Binders Used in Asphalt Concrete

PROBLEM STATEMENT:

According to ArDOT Maintenance Division Engineers, there exist some issues with the use of certain northeast Arkansas aggregates in asphalt concrete and maintenance projects as these aggregates pose serious durability and performance issues. In particular, aggregates originating from some quarries (e.g., Vulcan Materials Grand Rivers Quarry at Gilbertsville, KY, and Capital Quarries at Pocahontas AR) are suspected to be problematic and non-compatible with some asphalt products (e.g., hot mix asphalt and chip seals). The non-compatibility issues of these aggregates can be mitigated by selecting appropriate binder sources as they can be acidic or basic based on their crude sources ((e.g., Arabian and Canadian crude). The proposed study will seek to identify the problematic aggregates and their compatible asphalt binders through science-based approaches such as Surface Free Energy. Physical (e.g., absorption) and mechanical properties (e.g., abrasion resistance and sulfate resistance) of aggregates will be evaluated in the laboratory. The compatibility of these aggregates with different binder sources will be determined by measuring their surface free energy and adhesion properties.

OBJECTIVES:

The primary objective of this proposed research project is to assess the durability of local aggregates and their compatibility with asphalt binders from different crude sources. Specific objectives of this study are: (i) Evaluate physical and mechanical properties (e. g., absorption and durability) of aggregates; (ii) Determine surface free energies and adhesion properties of binders and aggregates; (iii) Develop a database of compatible aggregate-binder systems.

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

Potential implementations of this project are: (i) asphalt suppliers and contractors can further actions so that more durable aggregates are used in construction and maintenance projects; and (ii) asphalt contractors can use compatible aggregate-binder systems in the mix designs. The main benefit of this project is to facilitate the use of more durable and compatible aggregate-binder systems, thus reducing premature pavement distresses and life-cycle cost.

Estimated Project Duration: 24 **Months**

PREPARED BY: Zahid Hossain

AGENCY: Arkansas State University

PHONE: 870-680-4299 **REVIEWER:**

Standing Subcommittee Ranking	Advisory Council Ranking	Statement Combined with Statement Number(s)