

## CSR Proposal of Social Relevance

**1. Title of Project:** Thermochromic material usage to enhance performance of bituminous mixtures

**2. Background/Motivation:** Bituminous layers of a flexible pavement are subjected to distresses like permanent deformation due to high service temperatures during summers and thermal cracking due to low service temperatures during winters. The black color of the binder makes bituminous mixtures absorb more heat during the summers which further aggravates the permanent deformation, aging of the mixtures and fatigue cracking due to aggravated aging. To reduce the absorption of heat in the presence of higher temperatures and increase the absorption of heat during low temperature presence, thermochromic material addition to the binders is being considered as a feasible alternative. Thermochromic material addition into the binders is a very recent area of focus to achieve sustainable pavements. The effect of use of this material in a neat or modified binder is to be further studied in order understand the effectiveness of its usage up on the mechanical, rheological and performance characteristics of the binders as well as the mixtures.

**3. Objectives of the project:** The objective of the current project is to identify compatible thermochromic materials for binders used to construct bituminous pavements and also characterize the performance of the mixtures made using these identified materials.

**4. Brief Methodology:** Thermochromic materials that shall reverse their colors through their transition temperatures and that are compatible with the binders will be identified. Binders and mixtures will be prepared using different dosages of the thermochromic materials to characterize mechanical, rheological and performance characteristics. Fatigue resistance, rut resistance and moisture damage resistance will be examined as a part of performance studies. Aging characteristics of these mixtures will also be examined for short term and long term aging. Optimal dosage of these thermochromic materials shall be identified. Comparison of these mixtures with the performance of the regularly used mixtures will be done. Life cycle analysis shall be carried out to examine the cost benefit that shall be offered by the mixtures prepared using thermochromic materials.

**5. Target population:** Entire nation will be benefited in terms of using less amount of materials for road construction by having a better performing binder/mixture. By using the thermochromic binders that will change their color according to the temperature, road construction is going to consume less materials for a stipulated design life.

**6. Expected Outcome:** Identification of sustainable materials which will be better resistant to the distresses that occur during the design life of a bituminous pavement. This will assist the use of new kind sustainable materials for road construction.

**7. Timeline and Budget:**

	Year 1	Year 2	Year 3
<b>Budget (in Rs lakhs)</b>	75 lakhs (For equipment (Dynamic shear rheometer, Brookfield viscometer, temperature chamber, rolling thin film oven), material procurement, contingency, Travel, and JRF)	7 lakhs (For material procurement, contingency, Travel and JRF)	8 lakhs (For material procurement, contingency, Travel and SRF)
<b>Milestones</b>	Identification of Thermo-chromic materials and their characterization	Mixture designing and mechanical properties of the mixes at different climatic conditions	Performance characterization of the identified mixtures for varied climatic conditions

**8. Proposer Name & Designation:**

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