# Exhibit D

**Research project name: Thermally Conductive Pre-cast Concrete Pavement for Urban Heat Island mitigation**

**Recipient/Grant (Contract) Number:** University of Illinois Urbana-Champaign / University of Texas at San Antonio / Grant Number 69A3552348333.

**Center Name:** Transportation Infrastructure Precast Innovation Center (TRANS-IPIC)

**Research Priority:** Improving the Durability and Extending the Life of Transportation Infrastructure

**Principal Investigator(s):** Samer Dessouky, PhD, PE

**Project Partners:** City of San Antonio

**Research Project Funding: $**120,000 ($80,000 Federal and $40,000 Non-Federal)

**Project Start and End Date:** 09/01/2023 - 08/31/2024

**Project Description:**

The Urban Heat Island (UHI) effect refers to higher temperatures in urban areas compared to the surrounding countryside due to human development. Increased thermal energy storage in paving materials contributes to the UHI effect, leading to elevated surface temperatures. Precast concrete pavement with improved mix designs is recognized globally as an emerging technology for mitigating climate change and addressing UHI. The study investigates the use of precast concrete pavement to create cooler rigid pavement using various cooling mechanisms. These mechanisms involve modifying the thermal properties of pavement materials and reducing heat energy absorption or emission by pavements, while prioritizing environmental sustainability.

**US DOT Priorities:**

The study directly supports key priorities and RD&T strategic goals through:

* improve **Safety** by reducing extreme temperatures in urban areas, enhancing public comfort and lowering health risks related to heat,
* Enhance **Economic** Strength and Competitiveness with cooler pavements and energy-efficient solutions align with economic growth,
* Promote **Equity** by expanding more livable urban spaces, benefiting all residents, including vulnerable populations,
* improve **Climate and Sustainability** by mitigating excess heat and reducing energy demand,
* foster **Innovation** with sustainable pre-cast concrete pavement design and resilient infrastructure

**Outputs:**

* **Innovative Pre-Cast concrete Pavement design:** thermally conductive concrete pavement mix design optimized for UHI mitigation supported with guidelines for integrating into urban environments and health impact assessment
* **Advanced Modeling** for simulating pavement performance under varying conditions, aiding future design decisions.
* **Research Findings Report:** A consolidated research report summarizing outcomes, providing actionable insights to stakeholders.

**Outcomes/Impacts:**

* **Enhanced Urban Comfort:** Implementation of thermally conductive precast concrete pavement reduces Urban Heat Island effect, enhancing safety and livability for urban residents.
* **Energy Efficiency:** Lower energy consumption contributes to cost-savings and economic efficiency.
* **Environmental Sustainability:** Reduced greenhouse gas emissions aligns with sustainability goals, promoting eco-friendly urban spaces.
* **Informed Decision-making:** Research findings inform policy decisions, fostering resilient and sustainable transportation infrastructure practices.

**Final Research Report:** URL link to the project's final report will be provided upon the completion of the project.