Global Cool Cities ALLIANCE

Cool Roadways Partnership

1500 Decatur St NW Washington DC 20011 • Email: Kurt@globalcoolcities.org • Phone: 202-550-5852

Cool Roadway Solutions: Request for Information
December 8, 2020

The Cool Roadways Partnership (CRP) represents 20 participants who recognize the need to build heat-resilient communities and are seeking cool roadway solutions to help meet that goal. Together, CRP participants anticipate investing $4.75 billion to add, maintain, or replace 70,000 lane-miles over the next 10 years. Through this Request for Information (RFI), the CRP is seeking industry partners to work collaboratively with its participants to identify, develop, demonstrate, and deploy cool roadway solutions that can be incorporated into their paving operations. The RFI submissions will be used to inform the CRP's near-term program activities and long-range planning.

Project Overview

Currently, replacing green space with paved surfaces and roadways is seen as a primary driver of increased heat in cities. This RFI is seeking input from manufacturers and distributors of roadway materials willing to invest the time and resources needed to identify or develop products that transform roadways from a barrier to a key solution for improving the heat resilience of our cities. This RFI supports the CRP's plans to:

1. ***Identify*** existing or develop new and innovative cool roadway solutions, that also may offer co-benefits of reduced lifecycle greenhouse gas (GHG) emissions;
2. ***Create*** opportunities to demonstrate cool roadway solutions in more places;
3. ***Quantify*** the market potential for cool roadway materials, leading to a multi-year bulk procurement arrangement with jurisdictions across the U.S.; and,
4. ***Establish*** a clear set of industry-approved design characteristics and performance criteria for cool roadways.

The Demand for Cool Roadways

Pavement makes up about one third of the surface area of an average city. Faced with long-term projections of rising urban temperatures and an increased frequency of dangerous heat waves, jurisdictions are seeking ways to reduce pavement temperatures to help achieve their sustainability and resilience goals. Cool pavement products and materials reflect, rather than absorb, solar energy which lowers surface temperatures and contributes to reduced air temperatures. A cost-effective, high-performing cool roadway solution is needed that can be smoothly integrated into municipal pavement management operations.

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CRP participants are pursuing a variety of ways to reduce the heat retention of roadways, as part of their efforts to manage urban heat. Reducing air temperatures with cool roadways also provides desirable health and air quality co-benefits, which is particularly important in marginalized, low income communities where the negative effects of heat are most apparent.

CRP participants are in various stages of exploring cool roadways. Some participants are still in the early phases of learning about their use and local benefits, others are already implementing demonstration projects, and a few are currently evaluating cool roadways for inclusion in their pavement management and maintenance operations.

RFI Market Size

The opportunity for cool roadway solutions is substantial. Together, the 20 CRP participants have annual road repair and replacement budgets of $475 million to address 7,000 lane-miles of streets. Based on current budgets, the participants will have the potential demand for 70,000 lane-miles and a financial investment of $4.75 billion in cool roadways over the next ten years.

Responding to the RFI

The RFI respondents are invited to provide the requested information and feedback on the attached Response Form. Responses should include input on the timeline to develop an innovative solution that meets the requested criteria and that can be integrated into roadway pavement operations within ten years.

Questions regarding this RFI shall be addressed to Maria Koetter (maria@globalcoolcities.org) no later than February 5, 2021. Responses to questions will be provided by February 19, 2021. Final responses will be collected through March 19, 2021.

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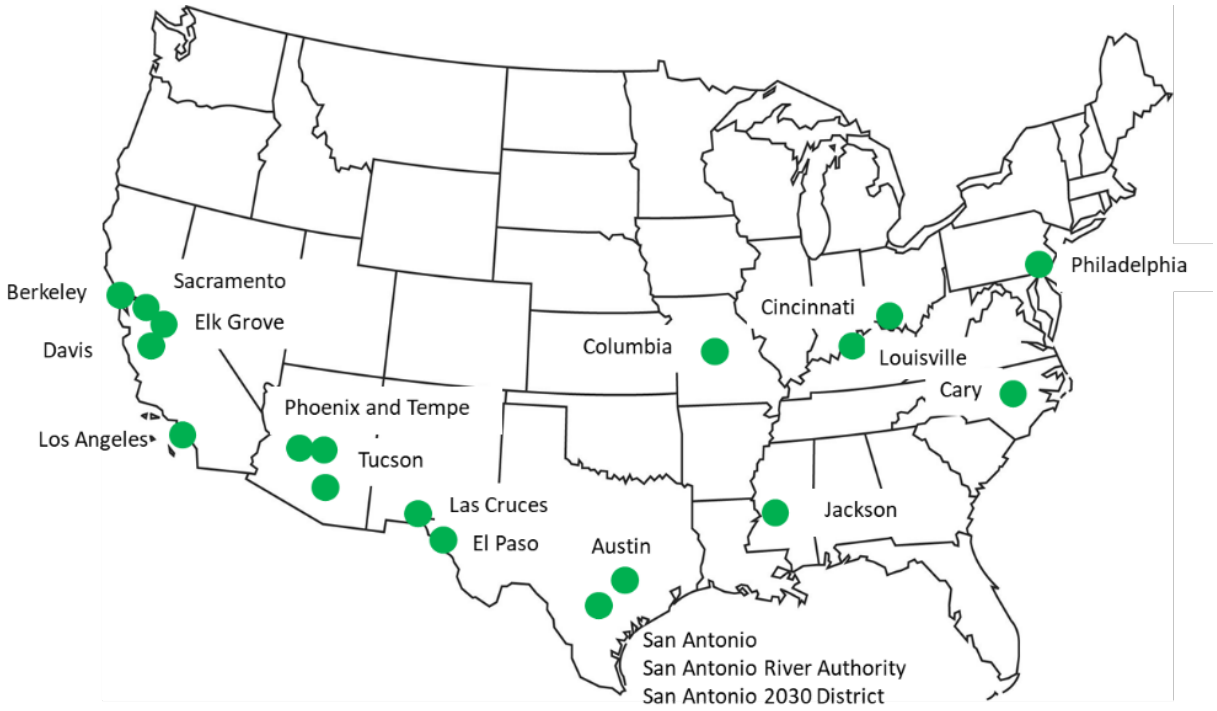
Cool Roadways Partnership Participants (as of December 8, 2020)



Austin, TX	Davis, CA	Los Angeles, CA	San Antonio, TX
Berkeley, CA	Elk Grove, CA	Louisville, KY	San Antonio River Authority
Cary, NC	El Paso, TX	Phoenix, AZ	San Antonio 2030 District
Cincinnati, OH	Jackson, MS	Philadelphia, PA	Tempe, AZ
Columbia, MO	Las Cruces, NM	Sacramento, CA	Tucson, AZ

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Please provide the requested information and feedback below. Responses should include input on the timeline to develop an innovative solution that meets the requested criteria and that can be integrated into roadway pavement operations within ten years. Please add your responses below each question and send the completed form in a Word file to Maria Koetter – maria@globalcoolcities.org.

Contact Name:	Steve Jackson
Company:	Western Colloid
Email:	stevejacksongroup@gmail.com
Phone:	N/A
Solution/Product Name:	ArmorTop (Stealth Gray #375-G and #375-G Environmental and California Tan #375-T and #375-T Environmental)

Describe how the proposed solution addresses the following (250 word maximum for each response):

1. What is the expected timeline to develop and commercialize the solution if it is not currently available?

   Western Colloid Inc. developed Stealth Gray #375-G in the mid 1990's. Because we were the leading manufacturer of cool roofing solutions, we were asked to come up with a solution to lighten the tarmac at Skunk Works, the manufacturer and creator of the Stealth Bomber. In order to avoid satellite surveillance from foreign spies, Skunk Works wanted the surface of their facility located at Edwards Airforce Base in California Desert to be the same Gray color as the color of the bomber so the bomber would essentially blend in and disappear when rolled out onto the tarmac. We created Stealth Gray so the radiant heat from the tarmac matched that of the gray bomber achieving our stealthy goal.
   Fun Fact: Once the bomber technology was completed the Stealth Bomber was painted Black because the project to color everywhere the Bomber went was massive and Black was a closer match to the asphalt surfaces around the world.

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In 2012 Western Colloid was asked by then Governor Jerry Brown to create a cool surface for playgrounds in the Mojave Desert. With the help of Lawrence Berkeley Labs, we developed California Tan #375-T to match the surface of the California Desert. Recently we have developed a non-asphaltic base product that is fuel resistant, long lasting and environmentally friendly. The product is designed for surfaces where fuel, oil and jet fuel are present and surfaces where the end user is looking for additional surface longevity. typical surface longevity for this product is four to six years depending on environmental issues. ArmorTop Environmental is available in Gray and Tan.

2. What surface and air temperature reductions resulting from the roadway solution, daytime and nighttime, have you identified?

   ArmorTop Stealth Gray and California Tan achieve a solar reflectivity greater than 30. The surface temperature typically will match the ambient temperature and immediately cools off when not in direct sun and at night. Unlike black or darker surfaces that absorb and radiate heat throughout the night thus creating a Heat Island, our cool seal coat products keep surface temperatures down.

3. How simply can the solution be integrated into existing roadway management and maintenance operations?

   ArmorTop Stealth Gray and California Tan feel and act like a typical asphalt seal coat product and can be applied by spray, broom, or squeegee. We always recommend a two-coat application.

4. What is the global warming potential associated with manufacturing the roadway solution in production and use phase?

   Western Colloid Inc. manufactures cool roofs, Cool pavement, and environmentally friendly pavement products. Our goal is to cool all surfaces down and complete this task in an environmentally safe way by using materials that are nonhazardous and non-carcinogenic.

5. Add any additional information for the proposed solution. Attach photos, videos or links to materials demonstrating application, installed condition, and relevant characteristics of the solution such as product material safety data sheets

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Cost and Installation (50 word maximum for each response):

1. Can the solution be purchased and installed by in-house department staff (i.e. does not require a licensed installer): Yes/No

   All ArmorTop Cool Seal products can be applied by any asphalt seal coat contractor

   - If so, does it require special equipment to install it: Yes/No
     If yes, what equipment is needed?

     The application process can be sprayed, broom or squeegee. The surface must be prepped prior to application by cleaning free of all loose debris, oil spots and other compromised areas that would inhibit proper adhesion to the surface. If the asphalt is aged and beyond its life cycle (evidence of raveling, softness, crumbling, cracking or alligator cracking) then we do not recommend an ArmorTop application.

   - If so, what is the cost per square yard for materials: $/SY

   N/A
2. What is the cost per square yard for material if installed by contractor: $/SY

   The cost per square yard for material typically runs in the range of $55.00 to $60.00 for material for a two-coat application. Labor charges are typically in the range of $1.00 to $1.40 per square yard.

3. What is the average installation rate: SY/Day?

   Contractors can apply anywhere from 25,000 to 50,000 square yards per day. This depends on their efficiency and skill level coupled with equipment used. Spray application is typically more efficient.

Use Cases (250 word maximum for each response)

1. What are the appropriate use cases for the solution (e.g., pavement type, age, condition, climate)? Please provide appropriate case studies, testing, and/or supporting research.

   All ArmorTop products are best applied to surfaces that have not reached the end of their life cycle. Conversely new asphalt surfaces should have a sufficient curing time of about

one year. This allows the asphalt binder to evaporate out the heavy oil and will allow the seal coat to adhere to the surface. Aged, raveled, cracked, alligatored and previously seal coated surfaces should not be seal coated until the surface has been improved. Our products are only as good as the surface we are going over. All ArmorTop products are designed for roads (25mph or less), parking lots, playgrounds, school parking lots, tarmacks and industrial properties. As part of our mix design, we use slate as an aggregate to give the product weight, skid resistance and durability. The beauty of slate is that it always lays flat and does not shed from the surface like a round sand pebble. Because the surface is flat, surface slipperiness is increased thus limiting speeds to at or below 25 miles per hour.

2. What are the safety, slipperiness, and friction characteristics (e.g. typical Surface Coefficient of Friction)?

   N/A

3. What is the curing time including how quickly the road can open to traffic after installation given average temperatures, partly sunny, and non-humid conditions? How does this compare to existing relevant products?

   Surface curing time is anywhere between eight and twenty-four hours depending on time of year and ambient temperature.

4. Is it sensitive to placement in cool weather, i.e. 50º F and falling? Yes/No

   ArmorTop should never be applied in Temperatures below fifty-five degrees or on moist and/or rainy days.

5. Is it sensitive to placement in high humidity or damp conditions? Yes/No

   The perfect application conditions are warm sunny days between 75 and 95 degrees.

6. How long does this treatment typically last under average traffic conditions in years? How does this compare to similar products?

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ArmorTop surfaces typically last anywhere between three to five years before reapplication is recommended. Longevity is largely based on environmental conditions (rain) and traffic loads.

7. Can it be re-applied over itself for renewal? Yes/No

   All ArmorTop products are designed to be reapplied over itself for renewal. If the surface was originally completed with a Coal Tar based seal coat, then a primer will have to be applied prior to application.

8. Is it recommended for heavy traffic conditions like urban arterials? Yes/No

   We do not recommend that ArmorTop be used on high-speed urban arterials.

9. Are standard MUTCD compliant white and yellow markings clearly visible? Yes/No

   Standard traffic paint and thermoplastic can be applied to all ArmorTop products.