



# Cool Roadways Partnership

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

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## 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.

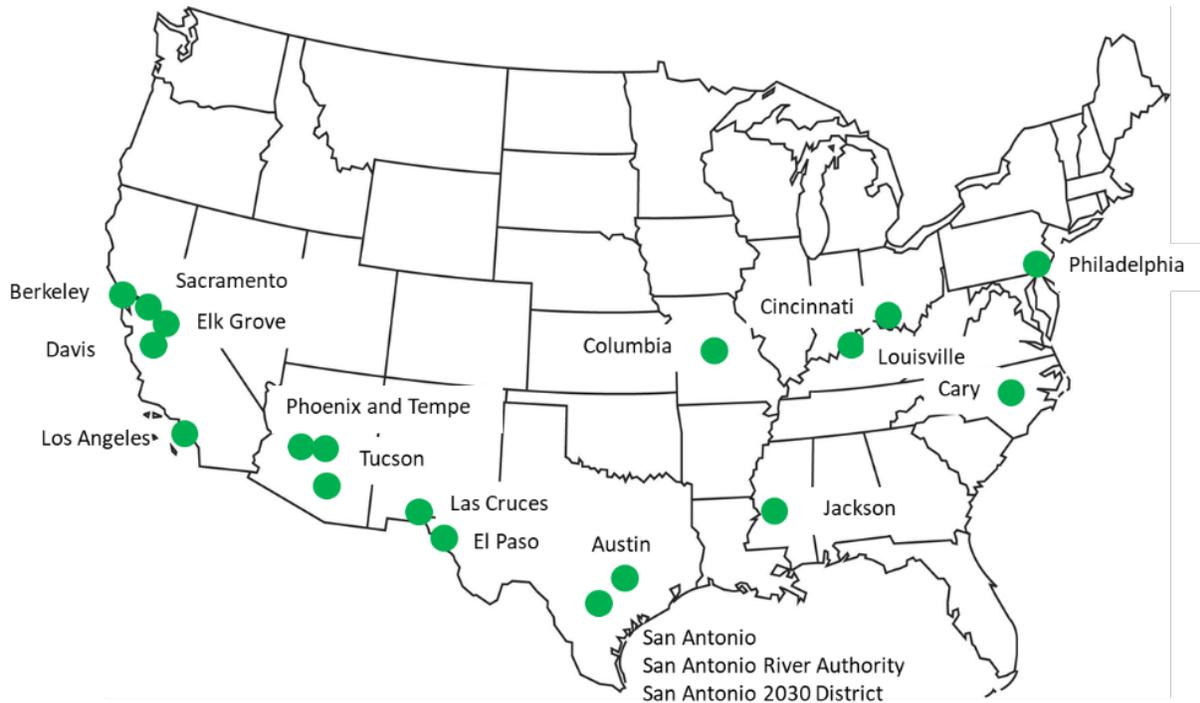
Questions regarding this RFI shall be addressed to Maria Koetter (maria@globalcoolcities.org) no later than February 5, 2021. Responses to questions will be provided by February 19, 2021. Final responses will be collected through March 19, 2021.



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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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## Cool Roadway Solutions - Request for Information Response Form December 8, 2020

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](mailto:maria@globalcoolcities.org).

|                               |                         |
|-------------------------------|-------------------------|
| <b>Contact Name:</b>          | Mark Ryan               |
| <b>Company:</b>               | Shepherd Color          |
| <b>Email:</b>                 | mryan@shepherdcolor.com |
| <b>Phone:</b>                 | N/A                     |
| <b>Solution/Product Name:</b> | N/A                     |

**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?

Shepherd Color specializes in high-performance inorganic pigments that are widely used in building products. Besides being highly durable color, they also have functional properties like IR reflectivity. We have a wide range of IR reflective black pigments that form the basis of cool coating products by absorbing in the visible for dark colors and reflecting the IR for less solar induced heat build-up. These pigments can be used in a wide range of materials such as paints, coatings, plastics and concrete.

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

IR Black pigments allow about a 0.20 increase in reflectance values, which often leads to about 10-15C difference in surface temp.

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



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IR Black pigments are used in coatings and directly in concrete. Shepherd Color has the ability to tailor pigment properties and chemistry for specific properties. Timeline for customization would be about 6 months for an optimization of current pigment chemistry (lab to pilot plant production) or 6-18 months for a new pigment chemistry- depending on regulatory approvals.

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

At this time we don't have a direct measurement of embodied carbon, but we are working to determine it.

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

Paints can be readily made with rudimentary equipment and applied with common equipment. Pigment can be readily mixed into cementitious materials like concretes, stucco or other materials.

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

IR Black pigments are around \$20/kilo. A kilo of paint would make a gallon of paint, that at 100microns/4mils and cover about 40sq.meters. Of course, that is without a binder, solvent and additives.

If used in plastics, pigment is used at about a 1% wt/wt loading

2. What is the cost per square yard for material if installed by contractor: \$/SY  
Unknown
3. What is the average installation rate: SY/Day?

Average install rate is that for common coatings.

## 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.

Use cases: None published on cool roads.

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

Surface effect: Color pigment at normal loadings does not affect surface properties.



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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?

Curing Time: Color pigment doesn't affect curing time.

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

Cool pavement effect: Color pigment doesn't affect application window.

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

Humidity: Color pigment doesn't have an effect.

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

Product life cycle: Color pigment is inorganic and has multidecade color retention. Life cycle determined more by resin/binder resistance.

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

Recoat: Color pigment doesn't negatively affect recoatability.

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

Color pigment can be used in high traffic systems.

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

Contrast with MUTCD depends on shade chosen.