



**CITY OF BEVERLY HILLS**  
**PUBLIC WORKS DEPARTMENT**  
**MEMORANDUM**

**TO:** Public Works Commission

**FROM:** Manu Dhaliwal, P.E., Associate Project Manager MRD  
Daren Grilley, P.E., PTOE, City Engineer [Signature]

**DATE:** October 10, 2019

**SUBJECT:** Cool Pavements

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**RECOMMENDATION**

This item is for information and discussion purposes only.

**INTRODUCTION**

The Beverly Hills Public Works Commission requested City staff to investigate cool pavements and their potential use in the City. Cool pavements are generally installed with the goal of reducing pavement temperatures, which in turn decreases energy use in adjacent structures and reduces the urban heat island effect (rising air temperatures in urban environments).

**BACKGROUND**

A cool pavement generally refers to pavement that has a higher albedo compared to conventional pavement. The term albedo refers to a surface's solar reflectance on a scale from 0.00 to 1.00, the higher the albedo the more solar energy that is reflected from a surface, thereby leading to a relatively cooler surface. The implementation of cool pavements is generally done with two outcomes in mind, reducing greenhouse gas emissions and reducing cooling costs in adjacent structures. Cool pavements are one of the tools available to address the problem of rising urban temperatures and the urban heat island effect.

A report titled "Life-Cycle Assessment and Co-Benefits of Cool Pavements" was prepared by the Lawrence Berkeley National Laboratory, University of California Pavement Research Center, and University of Southern California for the California Air Resources Board and the California Environmental Protection Agency in 2017. The report details data driven analysis of cool pavement benefits and costs, which are used in the City's evaluation of cool pavements. The report is too large to attach to this memorandum, but may be accessed at the following URL: <https://ww3.arb.ca.gov/research/apr/past/12-314.pdf>.

The City of Los Angeles began a pilot project testing cool pavements at different locations throughout the City in 2017. The City of Los Angeles is currently in the process of installing cool pavement asphalt emulsions at locations in every Council District of Los Angeles (the closest location to Beverly Hills is the 8000 Block of Selma Avenue, installed in 2017). Staff contacted the Los Angeles Bureau of Street Services for information regarding their experiences and feedback regarding cool pavements.

## **DISCUSSION**

### ***Cool Pavement Performance***

Cool pavement performance is directly linked to how much the cool pavement increases a surface's albedo in comparison to existing surfaces. According to research, an albedo increase of 0.20 on a pavement surface equates to a 0.2 to 0.9 (0.55 average) degree Fahrenheit reduction in air temperature. Table 1 below details the average albedo of common pavement surfaces.

Table 1. Albedo Comparison of Various Pavements

Pavement Surface Type	Average Albedo
Asphalt Concrete, freshly paved	0.04
Asphalt Concrete	0.10
Concrete Pavement	0.25
Asphalt Concrete with reflective coating (Cool Pavement)	0.25

The City of Los Angeles utilized the CoolSeal by GuardTop asphalt emulsion in their cool pavement pilot project. The specifications for the CoolSeal product on application call for an albedo range of 0.33 to 0.42. Generally, cool pavement albedo decreases rapidly over the first month of use and then stabilizes at an average albedo of 0.25. The albedo will continue to decrease over time as the coating becomes increasingly stained by dirt, oil and tire marks and as it wears to reveal the underlying asphalt pavement.

Los Angeles staff report that newly installed coatings resulted in surface temperature reductions of about 8-10 degrees Fahrenheit. Beverly Hills staff visited several locations in September and found temperature differences of 3-5 degrees on coatings that were one to two years old.

### ***Impact & Costs***

The report estimated the impact on adjacent structures by quantifying the savings on air conditioning and avoided CO<sub>2</sub> in dollars. The estimated savings per square meter in air conditioning is less than one kWh valued at \$0.60 per year and less than \$0.01 per year for avoided CO<sub>2</sub>. Using the estimated savings and an assumed street width of 30 ft., we get a value of \$9,030 per year for a mile of roadway with a construction cost of \$110,000 per mile (\$0.60-\$0.80 per square foot). In addition, the production of cool pavement products generally consume more energy and carbon to produce than they save over the lifetime of the product (the manufacturer states that coatings should last seven years, however Beverly Hills staff observed significant staining and wear after only 1-2 years). Installation of a cool pavement asphalt emulsion generally requires the roadway to be closed to traffic for a minimum of eight hours and requires two applications; thus there is significantly more inconvenience for motorists as compared to typical asphalt overlays or seal coat applications.

### ***Maintenance***

One of the major concerns with the installation of a cool pavement asphalt emulsion is the maintenance of the emulsion. Like other seal coats, cool pavement emulsions require the underlying roadway structure to be in good structural condition prior to placement. Future pavement patches (e.g., related to utility work) will also be more visually conspicuous than traditional pavements.

A common resident concern that the City of Los Angeles experienced was that the cool pavement quickly became stained and darkened, which can only be mitigated by reapplying another coating of the asphalt emulsion. Tire marks and oil are more readily apparent compared

to a conventional asphalt surface. Staff visited locations in Los Angeles and observed that the coatings do exhibit significant staining, cracking, and wear marks. The degree to which the coating is stained or worn away is not just an aesthetic concern, but also raises concerns about loss of reflectance after a very short time.

### ***Conclusion***

The use of reflective coatings to create cool pavements is a relatively new strategy that is still being developed. Ideally, a cool pavement coating would provide the maintenance benefit and life span of a traditional slurry seal. Unfortunately, current products are not at this point yet. Available cool pavement reflective coatings have negative issues including cost, aesthetics, installation time and short life span. In addition, the environmental benefits may be at least partially, if not entirely, offset by the environmental impact of production of the coating, installation equipment and traffic congestion during installation. These issues may be addressed in the future as existing products are refined and new products are developed.

### **RECOMMENDATION**

At this time City staff does not recommend installing cool pavement coatings on Beverly Hills streets. Staff does recommend continued monitoring of developments related to cool pavements, including new products and pilot projects conducted by other agencies. If a pilot project were to be conducted, the best location would likely be a parking lot or other facility that does not directly impact residential homes.