

# Beyond Blocks and Bricks

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## Heat Islands and Reflective Paving

What do Disney Hall in Los Angeles, 20 Fenchurch Street in London, The Vdara Hotel & Spa in Las Vegas, and Museum Tower in Dallas share?

A nasty reputation for reflections from glass or stainless steel that create concentrations of light or heat that affect the operation of surrounding buildings, damage property, or injure humans.

Common to all four is some striking feature that collects and redirects solar radiation—not just the visible spectrum but the infrared and ultraviolet on either end of the visible—in ways that cause concentrations of visible and invisible energy. These concentrations created hot spots in adjacent buildings, melted parts of cars, burned sunbathers at an adjacent swimming pool, and so increased the level of daylighting in a nearby museum that some exhibits could no longer be viewed.

None of the designers of these buildings anticipated these problems; they were unintended consequences.

White or light-colored roofing specified to reflect incident solar radiation reduces cooling loads on buildings, reduces the urban heat island effect, and, perhaps, earns a LEED point. Usually, the reflected solar radiation is harmlessly directed back to the sky and roof temperatures and cooling loads are reduced.

Since reflecting solar radiation from roofs is so effective at reducing the urban heat island, LEED asks that the materials selected for the hardscape that surrounds buildings be reflective, too, reducing the urban heat island effect and lowering the temperature of the paving.

Great, right? Maybe not; there are unintended consequences:

- Because reflective pavements are colder, water does not evaporate as readily and snow and ice do not melt as quickly as a less reflective and thus warmer pavement.
- Because snow and ice do not melt as quickly, more deicing salts are required. The extra salt is more expensive, affects the environment, and may shorten the life of concrete pavements.
- Some of the solar radiation reflected from paving will be directed toward adjacent buildings, increasing cooling loads.
- Some of this radiation will hit pedestrians, increasing their body temperature (and cooling loads).
- Solar radiation reflected from paving can increase exposure to UV light, which causes sunburn.
- In addition to increasing light pollution, solar radiation reflected from paving can increase glare and make it more difficult to see irregularities in surfaces.

Researchers at Arizona State University examined these unintended consequences in their paper: "*Unintended Consequences: A Research Synthesis Examining the Use of Reflective Pavements to Mitigate the Urban Heat Island Effect.*" Read it at:

<http://www.greenbuildinglawupdate.com/2013/12/articles/sustainability-1/junk-science-and-heat-island-effect-the-unintended-consequences-of-reflective-pavements/index.html>