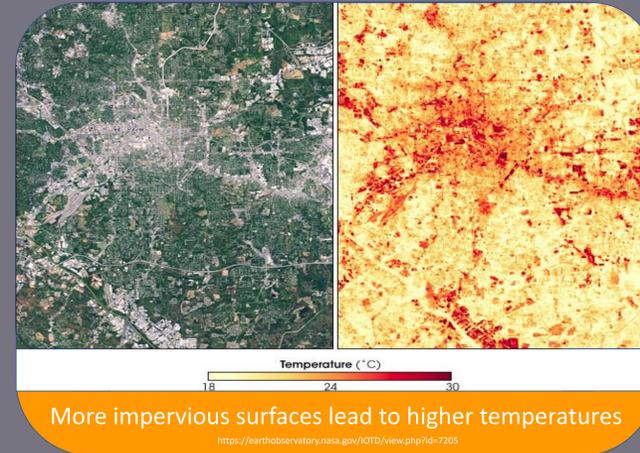
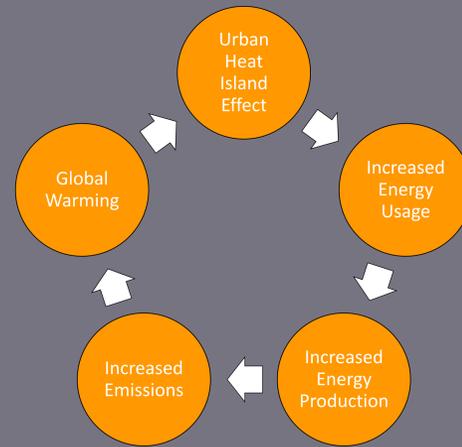




## What is a UHI?

Cities around the world are beginning to notice a major environmental problem that is known as the urban heat island effect (UHI). UHI's are urban areas that have a noticeably higher temperature than the surrounding rural areas. The urban heat island effect is one of the biggest contributors to climate change.



## Why Chip Seal?

Overall, the benefits of the chip seal method outweighed the benefits of the other two methods. The chip seal method is clearly the most cost effective and influential of all the possible solutions we looked over throughout our research. The small light colored aggregates in the chip seal help to reflect a safe amount of light away from the surface cooling the temperature. Also the chip seal method is much cheaper than destroying existing pavement and repaving because it uses existing pavement.

## Acknowledgements

We would like to give our thanks to our professors, Geoff Pfeifer and Marja Bakermans, our peer learning assistants, Elio Daci, Abigail King, Chris Tillotson, and Alyssa Konsko who assisted us throughout this project. We would also like to thank our contacts Rajib Mallick and Seth Tuler as well as Jim Monaco and Jessica O'Toole.

## References

Jin, Menglin (2012, April 12). American Meteorological Society. Retrieved October 11, 2017.  
Keet, C., McCormack, M., Pollack, C., Peng, R., McGowan, E., & Matsui, E. (2015). Neighborhood poverty, urban residence, race/ethnicity, and asthma: Rethinking the inner-city asthma epidemic. *Journal of Allergy and Clinical Immunology*, 135(3), 655-662. doi:10.1016/j.jaci.2014.11.022  
Kroodsma, David. "Record Warm Nighttime Temperatures: A Closer Look." *Climate Central*, 2 Aug. 2011.  
Mirzaei, P. & F. Haghighat, Approaches to study Urban Heat Island—Abilities and limitations, In *Building and Environment*, Volume 45, Issue 10, 2010, Pages 2192-2201, ISSN 0360-1323.  
NOAA Satellite Information System (NOAA-SIS) (2013, March 28). Retrieved October 11, 2017.  
Santamouris, M. Using cool pavements as a mitigation strategy to fight urban heat island—A review of the actual developments, In *Renewable and Sustainable Energy Reviews*, Volume 26, 2013, Pages 224-240, ISSN 1364-0321.  
Santamouris, M., Synneta, A., & Karlessi, T. (2011). Using advanced cool materials in the urban built environment to mitigate heat islands and improve thermal comfort conditions. *Solar Energy*, 85(11), 3085-3102. Retrieved October 9, 2017.  
Ting, M., Koomen, J., & Pomeroy, M. (2001). Preliminary evaluation of the lifecycle costs and market barriers of reflective pavements. Berkeley, CA: Ernest Orlando Lawrence Berkeley National Laboratory.  
Not a Pretty Picture: Climate Change and Health in Four Infographics. (n.d.). Retrieved December 05, 2017.  
Using cool pavements as a mitigation strategy to fight urban heat island—A review of the actual developments. (2013, June 19). Retrieved December 05, 2017.  
US EPA (2017). Heat Island Effect. Retrieved December 05, 2017.

## Project Goals

- Research solutions to urban heat island effect, pertaining to pavement
- Determine most effective solution to reduce surface temperatures
- Determine most cost effective paving method

37 States

Had record high temperatures in 2010

22°F

The highest reported temperature difference

7,415 Deaths

Attributed to excessive heat from 1999-2010

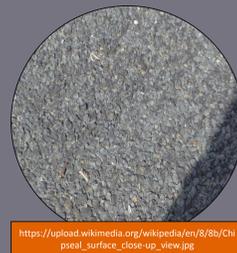
## Health Effects

The urban heat island effect can cause

- Dehydration
- Aggravated Cardiovascular Illnesses
- Heat Stroke
- Aggravated Respiratory Illnesses

## Chip Seal

- Top layer is light colored aggregate
- Aggregate is pressed into binder on asphalt



[https://upload.wikimedia.org/wikipedia/en/8/8b/Chipseal\\_surface\\_close-up\\_view.jpg](https://upload.wikimedia.org/wikipedia/en/8/8b/Chipseal_surface_close-up_view.jpg)

## Reflective Paint

- Light colored paint applied directly to the road



[https://upload.wikimedia.org/wikipedia/commons/d/dc/Flickr\\_-\\_IngolfBLN\\_-\\_Nantes\\_-\\_Busway\\_-\\_Ligne\\_4\\_-\\_%C3%8ELe\\_de\\_Nantes\\_%2881%29.jpg](https://upload.wikimedia.org/wikipedia/commons/d/dc/Flickr_-_IngolfBLN_-_Nantes_-_Busway_-_Ligne_4_-_%C3%8ELe_de_Nantes_%2881%29.jpg)

## Porous Pavement

- Contains holes which allows water to permeate pavement surface



[https://upload.wikimedia.org/wikipedia/commons/8/8f/Permeable\\_paver\\_demonstration.jpg](https://upload.wikimedia.org/wikipedia/commons/8/8f/Permeable_paver_demonstration.jpg)

	Best	Average	Worst	Initial Cost	Air Temp	Surface Temp	Durability	Reflectivity
Chip Seal								
Reflective Paint								
Porous Pavement								