

Sustainable Pervious Parking Lot

Storm Water Collection Case Study

University of California, Merced

Background

While a parking lot seems like an unlikely poster child for sustainable building practices, UC Merced's new lot demonstrates an innovative approach that minimizes contamination from stormwater runoff and greatly reduces heat island effect.

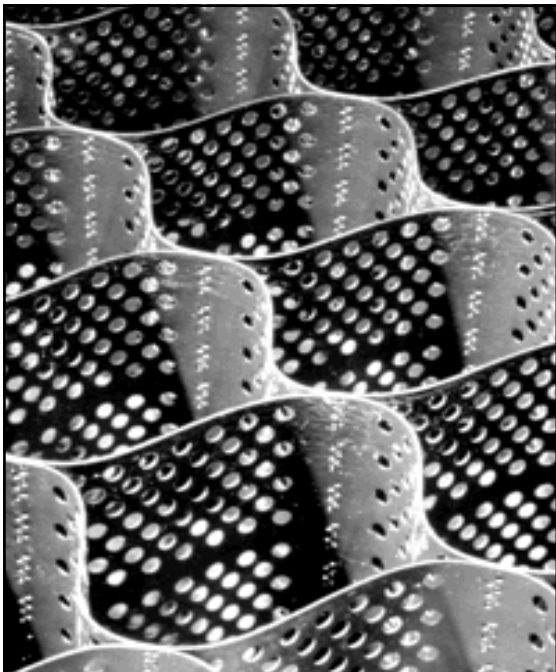
Heat island effect and stormwater pollution are significant drawbacks associated with conventional parking lots. Dark, non-reflective surfaces, like black asphalt parking lots, trap heat and radiate it into the surrounding area. By raising ambient temperatures, the heat island effect negatively impacts local flora and fauna, exacerbate air pollution, and strain building cooling systems, thus contributing to increased energy use. Stormwater runoff from conventional, impervious parking lots requires costly and energy-intensive treatment.

By using a GEOWEB system, Mark Maxwell, Physical Planning, Design and Construction, and designing engineer, Daniel Leary, were able to create a parking lot that replaces black asphalt with pervious gravel stalls.



GEOWEB is a plastic cellular confinement system that stretches out like an accordion when it is installed and filled with gravel rock. It was originally developed for military applications (such as stabilizing troop supply routes in the Desert Storm campaign), but is now used mainly for earth retention, slope protection, and channel protection. On the UC Merced campus, Maxwell and Leary used GEOWEB to provide structural support for the parking lot's pervious gravel stalls.

These light grey gravel stalls make up about 70% of the lot's surface. The gravel is a substitute for black asphalt. Because it is significantly lighter in color than asphalt, the gravel traps and radiates less heat into the surrounding area. The pervious stalls allow water to percolate through the gravel and replenish groundwater aquifers and any excess runoff is channeled to UC Merced's stormwater treatment system. UC Merced treats 100% of its stormwater runoff onsite.



Project Summary

- Contains gravel filled GEOWEB to give the lot's stalls an effective load support system for parked cars.
- The light grey-colored gravel (as opposed to black asphalt), is not only pervious, but also reduces heat island and makes up 70% of the lot.
- Six-inch diameter underground perforated piping is installed beneath each gravel stall to take any overflow water to the existing retention pond on campus.
- Landscape bio-swales were installed at the front of the parking lot with river rock and plantings that collect storm water. Swales channel water to existing catch basins and also slow the flow of storm water, which allows the ground water to recharge.
- The GEOWEB was flat when it was shipped to site, and had to be manually stretched out. After stretching the web out like an accordion, stakes were driven into the ground to hold it in place.

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Landscape bio swells to reduce storm water runoff



GEOWEB system installment



Gravel covering the GEOWEB for effective car load support



Perforated piping below parking stalls to collect storm water overflow



Light grey colored gravel, covering over 70% of the lot, reduces heat Island effect



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Despite some early delays and the labor intensive installation process, the projects proceeded on schedule.

Lessons Learned

To better anticipate and plan for difficulties, campuses considering using GEOWEB, or any other new technology, should invest time early in the project and contact other entities that have previously employed the product in question.

If you are using the GEOWEB system to build a parking lot with gravel stalls, make sure you use a rock that will not get stuck in an ordinary tire tread. Doing so will help avoid the need to sweep asphalt driveways. UC Merced used 3/4-inch gravel, and this has proved successful

Gravel parking spots can not be striped. To avoid confusion, the UC Merced project team installed concrete curbs in each stall. These curbs have lines painted on them indicating the boundaries of each parking spot.

Additional Information

UC Merced Environmental Sustainability Program:

<http://administration.ucmerced.edu/2.asp?uc=1&lv12=39&contentid=94>

GEOWEB Soil Stabilization Products Company:

http://www.sspco.com/geoweb/geoweb_OV.html;
<http://www.sspco.com/pdf/3998.pdf>

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