CHAPTER 14

Concrete Flatwork

Decorative concrete flatwork can be used as an affordable alternative to brick or flagstone and can be used for driveways, sidewalks and patios. Concrete is generally considered an environmentally friendly product because it is usually locally available, very durable, and Concrete's negative environmental impacts are primarily its large contribution to greenhouse gas emmissions, both from the chemical process of production and from the burning of fuel during production (high temperatures are required in the manufacture of concrete). The cement industry produces 5% of global man-made CO_2 emissions.

Another concern to address when designing flatwork is the potential for runoff.

Costs

Concrete's initial costs can be higher than other materials, but its lifecycle costs are much lower than competing materials due to lower maintenance costs. This means that the families living in your homes will save money down the road.

Pervious Surfaces

When installing exterior flatwork, consider using pervious surfaces – concrete that is designed to let water flow through instead of running off. Pervious (also called permeable) surfaces handle stormwater runoff, reduce erosion, are lighter weight and can help filter water. Permeable driveways are durable, and can support normal heavy vehicle loads. They can also help manage rain water from adjacent roof and road surfaces.

Implementation of Green Flatwork Practices

- If using concrete, add fly ash, a commonly used coal combustion product, for a total fly ash content of at least 30-0 percent.
- Use Eco-Crete, or other pervious concrete, for paths, sidewalks, and driveways.
- Use natural crushed stone, gravel, open paving blocks or pervious pavers, or Eco-Crete in lieu of cement. If using pervious pavers, experiment with either poured or pre-formed in interlocking pavers for extra durability.
- Minimize the surface area of flatwork as much as possible to avoid contributing to rainwater runoff if not using pervious materials.

- Use local materials.
- Use light-colored or natural-colored materials.

Benefits of Green Flatwork Practices

- Fly ash added to concrete results in a stronger product, disposes of the otherwise toxic material safely by containing it, and lowers the product’s carbon footprint by displacing a percentage of the high energy demanding concrete.
- Concrete stands up to natural disasters, wind-driven rain, moisture damage, and vermin. Less replacement means reduced resource requirements.
- Using light- or natural-colored material helps reduce the heat island affect.
- Concrete is commonly recycled in urban areas into fill and road base material at the end of service life. Materials are usually extracted and manufactured locally.

Challenges of Green Flatwork Practices

- Initial costs may be higher for concrete alternatives.
- The manufacture of concrete results in significant greenhouse gas emmisions.
- Installing pervious concrete flatwork in freeze-thaw climates requires attention to avoiding and limiting saturation during freezing months through the initial careful design of the subbase and other drainage factors. Consult the National Ready Mixed Concrete Association (NRMCA 2004) guidelines for using pervious concrete in areas prone to freeze-thaw conditions.
- The availability of fly ash is inconsistent regionally and locally.

Link and Learn

RMC Research Foundation, National Ready Mixed Concrete Association, *Ready Mixed Concrete Industry LEED Reference Guide* (2010): http://www.rmc-foundation.org/images/RMCREF LEED Guide Revised 01-10.pdf

Portland Cement Association, Concrete Technology: http://www.cement.org/tech/cct_con_design_pervious_hydro.asp

Portland Cement Association, *Solar Reflectance of Concrete*: http://www.cement.org/tech/cct_con_design_solar_reflectance.asp

University of Florida *Field Guide to Low Impact Development*: http://buildgreen.ufl.edu/Fact_sheet_Permeable_Surfaces.pdf

Sustainable Sources, with both fly-ash concrete: http://flyash.sustainablesources.com/ and pervious surfaces: http://perviouspaving.sustainablesources.com/

Concrete from Wikipedia: http://en.wikipedia.org/wiki/Concrete#Environmental_concerns

Headwaters Resource Tech Bulletin, *Fly Ash in Colored Concrete*: http://www.flyash.com/flyashenvironment.asp