UF UNIVERSITY of FLORIDA
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ENH 1146

# Sustainable Landscape Construction:

## *Materials and Products — Concrete*[1]

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**CONCRETE IS USED** in outdoor walkways, patios, and structures because it is durable and strong, has no known hazards once in use, and takes a variety of finish colors and textures. The pliability of concrete allows for many different forms and applications; as a result it is the most commonly used construction material in the world. The durability of concrete also makes it an excellent material to recycle and reclaim. The primary environmental impact of concrete is the manufacture of the key ingredient, Portland cement, which is energy intensive, releases a high amount of CO2, and causes habitat destruction in the mining process. Another environmental concern is the non-permeability of concrete and resultant stormwater runoff. This problem can be mitigated with porous concrete that allows water to drain through voids. New high-performance concrete can save resources because structures can be smaller and thinner and use less reinforcing steel. Several issues are important to consider when working with concrete:

### DESIGN STRATEGIES:

- **Save resources by using coloring agents or surface finishes on old or new concrete.** Surface treatments eliminate the need to cover old or new concrete with an additional layer of material such brick or stone.
- **Look for color pigments and texture materials made from recycled or natural materials.** These include mineral-based color pigments made from natural iron oxide products from abandoned coal mine drainage or natural clay or recycled steel and iron.
- **For more color options, choose recycled glass.** Fines from post-consumer (bottle glass) or post-industrial processes (glass cullet) make good alternative coloring agents.
- **Use a 6-inch-thick layer of porous concrete with a minimum subbase of 4 inches of open graded aggregate.** A thicker subbase will provide greater stormwater storage for slower percolating soils. Pre-cast porous concrete pavers are available in a wide range of colors and textures and can be recycled if used on dry-laid sand.

### CONSTRUCTION TECHNIQUES:

- **Use powder or paste surface coatings.** These harden the surface of the concrete. They come in a wide range of colors and textures.
- **Try a stain.** Use stains to lightly etch the surface and bond to the concrete. This technique works particularly well on old structures.
- **Choose a sustainable curing compound (applied to surface while curing).** Pick one that is low-solvent, low-VOC (50g/l or less), or made from bio-based resources (soy or plant based, water-based, or a combination of the two).
- **Look for water-based sealers.** These should contain less than 100 g/l VOCs and be free of hazardous chemicals. Bio-based, VOC-free sealers made from soybean oil are available but need more frequent application.
- **Choose water-based and bio-based concrete cleaners.** Citrus-based are water-soluble and biodegradable.

Adapted From:
Calkins, M. (2009). *Materials for sustainable sites: A complete guide to the evaluation, selection, and use of sustainable construction materials.* Hoboken, NJ: John Wiley & Sons, Inc.

Smith, C., Clayden, A. & Dunnett, N. (2008). *Residential landscape sustainability: A checklist tool.* Oxford, UK: Blackwell Publishing Ltd.

Sovinski, R. (2009). *Materials and their applications in landscape design.* Hoboken, NJ: John Wiley & Sons, Inc.

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