SUSTAINABLE PAVING SYSTEMS, LLC

GRASSCRETE LEED GUIDE

This guide is to assist the LEED accredited professional in accruing points towards LEED certification of a particular building or project. The selection of a Grasscrete System is one of the easiest ways to achieve points due to the reduction in heat island effect, management of storm water runoff, recycled content used in the application process as well as the concrete and sub-base, the long lifespan and the low maintenance required. Grasscrete Systems are highly sustainable with a very low life-cycle cost and the ability to be completely recycled and used in a future project.

Grasscrete design varies somewhat with that of traditional no-fines pervious concrete systems. There is a large difference in the application procedures when using a formed or molded void system such as Grasscrete versus simple no fines concrete. There is also a difference between a Grasscrete System and a plastic or pre-cast unit system for fully grassed applications. Grasscrete Systems combine the robustness of concrete with the benefit of complete porosity without detrimental effects from clogging or lack of structural capacity as exhibited by other systems.

Grasscrete Systems are referenced generically as Void Structured Concrete or concrete with a defined pattern of holes through it. Several different systems are employed dependant upon the application, the fill type desired in the voids themselves and the degree of sustainability required. All Grasscrete systems are continuously reinforced with greater load bearing capacity than any other pervious pavement product. Grasscrete is utilized for light duty residential applications through concealed emergency access capable of handling all current fire fighting apparatus as well as exposed parking lots and roads designed for daily use by hundreds of vehicles.

There are three basic Grasscrete Systems:

1. **Concealed** – A layer of soil or sod is installed over a rough finished Grasscrete installation. This conceals Grasscrete to a degree while providing periodic access such as that required for emergency vehicles or occasional maintenance. The finished product percolates water much like undisturbed grass or vegetation of the same type planted in comparable soil conditions would.
2. **Partially Concealed** – Sand or sandy soil is installed in the voids only of a coarse broom or more carefully finished Grasscrete installation. This minimizes the Grasscrete appearance (dependant upon vegetation selected) while providing sustained access to both pedestrian and vehicular traffic such as parking lots and driveways or roads. A Grasscrete Partially Concealed installation is commonly used for slope protection applications or erosion control in lieu of traditional concrete such as found in storm water channels or reservoir embankments. The finished product percolates water much like undisturbed grass or vegetation of the same type planted in comparable soil conditions would.
3. **Stone Filled** – Clear, no-fines crushed stone is installed in the voids only of a coarse broom or more carefully finished Grasscrete installation. This application works well in dry, hot climates where grass or vegetation is difficult to grow without repeated irrigation. This application provides sustained access to both pedestrian and vehicular traffic such as parking lots and driveways or roads. A Grasscrete Stone Filled application is commonly selected for heavy industrial vehicles or utilitarian applications. The finished product percolates extremely well with most installations in conjunction with a properly prepared sub-base retaining virtually all rainfall.

Grasscrete has been utilized since 1982 throughout the US with millions of square feet installed to date. The latest developments include bio-degradable formers or molds as well as improved application techniques and processes allowing for the construction of exposed surfaces.

LEED NC 2.2 NEW CONSTRUCTION AND MAJOR RENOVATIONS

SS Credits 5.1 & 5.2 Reduced Site Disturbance - 1-2 points

- Grasscrete Systems minimize the footprint required for storm water runoff management. Therefore less grading and site work compared to non-pervious products is required. Little or no requirement for retaining ponds minimizes the need for excavation of site areas that could otherwise be left undisturbed.
- A steep embankment or hill excavated to maximize building size or position could be restored and made more stable than if using traditional woven textiles or relying on the vegetation itself. Using **any** Grasscrete System will help towards accrual of these points.

SS Credits 6.1 & 6.2 Stormwater Management - 1-2 points

- A Grasscrete System reduces the amount of Stormwater runoff that occurs from any given site. A Stone Filled Grasscrete installation has phenomenal first flush capacity combined with a natural resistance to water flow due to its surface finish. A Partially Concealed Grasscrete System can also be employed for more traditional storm flow channels used to move water. In either case rainfall is directly infiltrated into the ground rather than going to a storm sewer. Rainfall from roof tops can be diverted to the Grasscrete system and if incorporating a thick aggregate drainage blanket or sub surface rainfall harvester, the water can be retained for an extended period of time if necessary.
- Allowing water from a parking lot to pass through a Grasscrete System means that any contaminants such as hydrocarbons from automotive fluids are processed through bioremediation. Naturally occurring enzymes and bacteria in the soils themselves in essence clean the water prior to reintroduction to the aquifer. This avoids the flush of contaminants to sensitive water bodies in high concentrations during rainfall events. Additionally the Grasscrete System can be used to capture water, to channel water away from the site or down a gradient while allowing the water to percolate into the sub-soils and be treated. These channels can then be mechanically cleaned of retained silt that normally would have to be removed from a stormwater substructure or pipe. Using **any** Grasscrete System will help towards accrual of these points.

SS Credits 7.1 Landscape and Exterior Design to reduce Heat Islands (non-roof) - 1-2 points

- A Concealed Grasscrete System minimizes heat island effect through lower Albedo or heat storage. Additionally a grassed surface is cooler due to evaporation of water from the plants.
- An exposed system such as a parking lot can utilize conventional concrete and light colored aggregates to achieve an Albedo number <.29. Using white cement or slag as a SCM can further improve the solar reflectance. Using **any** Grasscrete System will help towards accrual of these points.

WE Credits 1.1 & 1.2 Water Efficient Landscaping (Reduce by 50% and No potable water use or No Irrigation) 1-2 points

- A Grasscrete System maintains water that would otherwise run off for use by returning it to the sub soils for plants. Additionally this water can be economically channeled using non-pervious membrane to collection points or to planting beds adjacent to the parking area.
- Water can be captured under a Grasscrete System for use as irrigation. An exposed system could employ Xeriscape rather than conventional plants so as to avoid irrigation completely. Using **any** Grasscrete System will help towards accrual of these points.

MR Credit 2.1 & 2.2 – Construction Waste Management 1-2 points

- Using reclaimed or recycled concrete processed onsite can help contribute to these points. Reclaimed concrete aggregate used in the Grasscrete System, as sub-base and as void fill for exposed applications can all contribute to the require 50% or 75% criteria. Using **any** Grasscrete System will help towards accrual of these points.

MR Credit 4.1 – Recycled Content – 1 point

- Using concrete with a high reclaimed or recycled content can help contribute to this point. Reclaimed aggregate used in the concrete slab or as sub-base along with Fly ash or other Supplementary Cement Material replacing cement content in the new concrete pour are both possible. Using **any** Grasscrete System will help towards accrual of this point.

MR Credits 5.1 & 5.2 Regional Materials - 1-2 points

- Using products manufactured within a 500 mile radius of a LEED project may contribute to a point. Concrete is manufactured as close a proximity to construction sites as possible so as to minimize transport of both the raw materials and mixed product. Potential points are dependant upon project location and proximity to cement manufacturing, supplementary cementitious materials and recycled aggregates. Using **any** Grasscrete System will help towards accrual of these points.

EA Optimize Energy Performance - 1 – 10 points

- An exposed Grasscrete System may help contribute to this point due to the light color of concrete and its high light reflectivity. The use of light colored aggregates in a void filled project in addition to the use of white cement or slag in the mix can also improve the light reflectivity of the finished surface.
- An exposed Grasscrete System improves light reflectivity which reduces the amount of lighting required and therefore energy consumed. Additionally, this lessens the amount of lighting required to keep the parking area safe for traffic as well as staff. Using **Stone Filled or Partially Concealed** Grasscrete System will help towards accrual of these points.

Innovation in Design – 1-4 points

- **All** Grasscrete Systems can contribute towards the accrual of this point.
- An exposed Grasscrete System could potentially be used to harvest gray water for landscape irrigation or even gray water use within the building itself. A heavy layer of recycled concrete, Cisterns or rainfall harvesters can be employed to capture the water that not only falls on the slab itself but from rooftops and other non-porous paving areas. Material re-use could include the re-use of existing tanks or vessels found onsite during construction and incorporated into a portion of this system.
- An exposed pervious system with vegetation growing in the voids can be used as a daily parking lot or roadway while at the same time being a work of art as viewed from upper floors in the surrounding buildings or by air. Multiple colors of plants such as ground cover could be used to create images or corporate logos as examples. The concrete itself can be integrally colored or topically stained to complement the design.
- Xeriscape can be used in conjunction with a hybrid of grassed and exposed Grasscrete System to create a Xeriscape plaza with flowing lines funneling traffic or pedestrians through space not defined by traditional curbs or borders. Colored recycled glass aggregate or reclaimed porcelain aggregate could be used to fill the voids to create interesting bands of color and texture that circumvent the area. No irrigation required with the potential for large shade plants whose roots would be fed by rainfall passing through the system or localized drip irrigation.
- An exposed Grasscrete System could be used vertically to restore vegetation on rock faces or exposed hillsides that have been revealed as part of the local site construction process or because it was previously used as a quarry when harvesting aggregate for construction. Grasscrete formers can be affixed to faces and shot-creted much like a conventional slope protection application. The advantages would be that the product has over 35% void space to allow for soil and then vegetation to be blown in place. Grasses through shrubs and even small trees would have access to a stable source of moisture retaining and nutrient rich soil. In addition to rock faces, steep hillside subject to slides from stormwater runoff could be stabilized permanently with a system that is not reliant upon vegetation for performance (concrete) while providing a stabilized condition for vegetation to thrive.
- Storm water channels or water ways running through the development could be designed using a grassed system. This would allow recharge of the ground water through its length rather than a conventional non-pervious channel that removes all water from the site during an excessive rainfall event. Grasscrete Systems can be scraped by heavy equipment when excess silt has developed and needs to be removed. The root structure of the grass remains intact in the voids and quickly repopulates.

The information provided in this document is to the best of Sustainable Paving Systems, LLC knowledge. It is up to the individual specification professional to determine which points can be attained through the use of Grasscrete Systems. For specification assistance and product information visit www.sustainablepavingsystems.com or contact Technical Services.