SUSTAINABLE PAVING SYSTEMS, LLC

Grasscrete®

Comparison of Plastic-Type Grassed Pavements

vs.

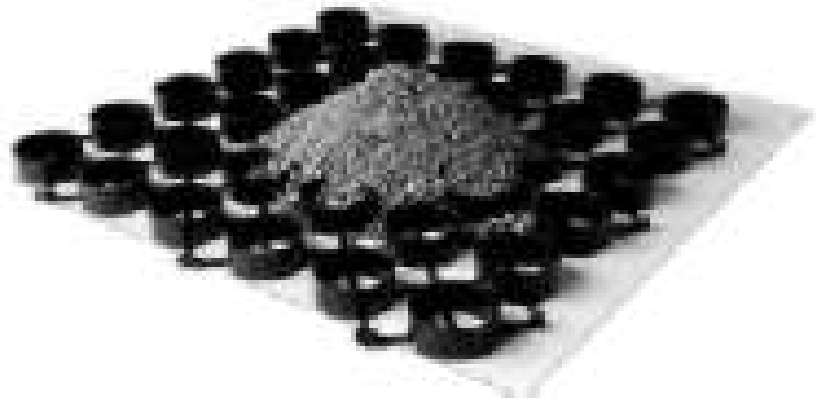
Grasscrete Systems

This document describes the primary differences between the SPS Grasscrete Systems and competitive plastic type grassed pavement systems.

***SPS Grasscrete Systems** is a selection of structural concrete slab systems that have a series of voids in the concrete that are subsequently filled with sand or soil and fully or partially grassed or filled completely with gravel dependant upon the application.*

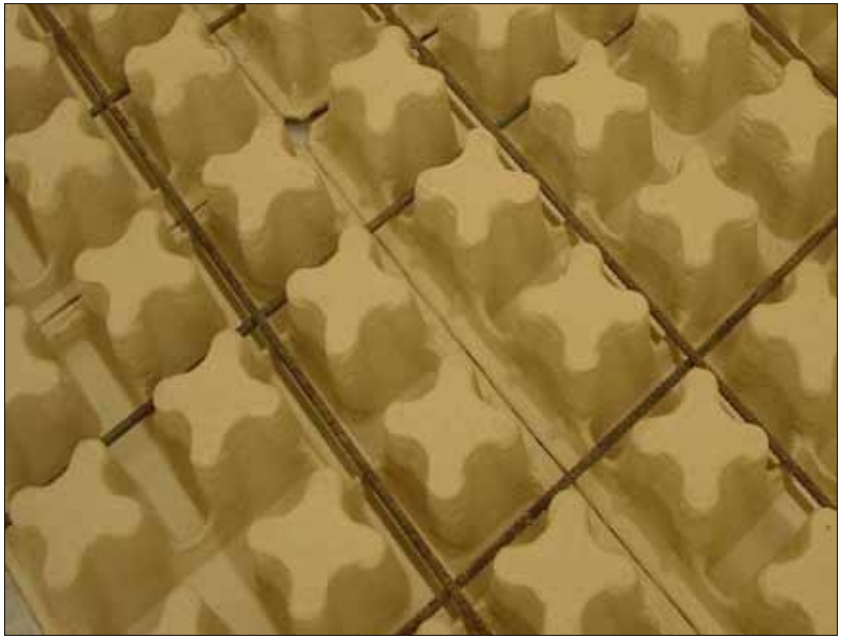
***The Competitors Products** are plastic ring/grid type products of varying dimensions laid over a prepared based and filled with sand or soil and grassed or filled completely with gravel dependant upon the application.*

SPS Grasscrete System



Typical Competitors Product

*The current U.S. installed **SPS Grasscrete Systems** are offered in a 5 ½" and a 6" thick version capable of handling the very heaviest of loads without deflection into the sub-base. Grasscrete is continuously reinforced with either steel or fiberglass rebar 6", 8" or 16" on center dependant upon selected system which spreads tire load over several square feet making variations in the sub-base condition such as saturation virtually irrelevant. Grasscrete has the greatest load bearing capacity of any grassed paving product and even exceeds traditional Pervious Concrete or "no fines" concrete load bearing capacity.*



Molded Pulp Former - 5 ½" Thick Concrete Capacity

The Competitors Products *range in thickness from 1” to 2” and use interconnecting panels or rolls of cells that may be flexible or rigid in design. Once a connection’s strength has been exceeded, it is common to see displaced units, broken units or cells torn apart.*

SPS Grasscrete Systems *Single-Use Molded Pulp Formers come in 24” x 48” units, weigh less than 5 lbs each and can be placed including reinforcement and concrete at a rate of 4000 square feet per day by a crew of four unskilled workers with a lead foreman – only basic concrete knowledge is required.*

The Competitors Products *quantify their products ability to bear vehicles with the following statement:*

"The rings act as a rigid load transfer device (through vertical ring walls) from the pavement surface to a load bearing road base below the paving structure. The depth of road base required will vary to match load requirements with subsoil load requirements, such as that needed for an asphalt wearing course"

Translation: In order to function as per design, the sub-base must be prepared in a comparable fashion to that of a vehicle bearing asphalt road in order to avoid the rutting phenomenon. Measures such as pre-loading, additional excavation and others may be required which may dramatically effect the skill level required to install the product as well as required time and cost.

Reality: While appearing to be more cost effective to install initially due to the unit price of the product, plastic products are less robust than concrete requiring exceptional sub-base design –especially for a parking lot application.

SPS Grasscrete Systems

For Concealed Grasscrete systems in most environments, a sand or sandy soil fill amended with a polyacrylamide (PAM) or similar moisture retaining additive is recommended prior to a layer of seeded soil or sod being placed over the concrete. 35% to 100% soil coverage is achieved dependant upon the system selected with the standard system containing a minimum 260 cubic inches of root zone not subject to compaction per square foot.

The Competitors Products

Most plastic systems use soil or sand to fill the voids and then are seeded or sod covered dependant upon application. 87 to 100% soil coverage is achieved dependant upon the system with as little as 138 to a maximum of 250 cubic inches of root zone not subject to compaction per square foot.

SPS Grasscrete Systems

The ability for concrete to foster grass growth is not much different than that required by plastic type products. Concrete is porous so it absorbs water – it does not consume water though so once equilibrium is reached with the surrounding soils the water demand stops. Concrete is also a heat sink, meaning that it will absorb heat from direct sunlight and then dissipate it slowly as the heat source is removed. In most grassed applications the concrete is shielded and remains comparable in temperature to the sub-base below much like basement walls in a home.

Broomfield, CO
Elevation 5400'
USDA Zone 4
Semi-Arid
Installed 1997
Photo 2006
Irrigated

The Competitors Products

Plastic products may utilize water retaining soil amendments or additives to promote the growth of grass dependant upon the environment the project has been installed in. The landscape contractor and landscape maintenance staff will have to maintain all types of grassed pavements in a similar fashion. Issues such as grass burnout are not isolated to any one type of grassed pavement.

SPS Grasscrete Systems

Dependant upon the system, Grasscrete uses from a 3,000 PSI concrete for applications up to 75,000 pounds GVW. 3,000 to 12,000 PSI concrete is available through ready mix sources for applications requiring greater load bearing capacity such as 130,000 pound GVW or greater. Grasscrete does not require the same workability as concrete designed to be finely finished so mix designs can utilize > 40% cement replacement with fly ash or granulated slag pozzolans making for very green applications.

46% Class F Fly Ash mix with 100% Reclaimed Crushed Concrete Aggregate

The Competitors Products

They advertise a 400 to <6000 PSI range in compressive strength after being filled as per manufacturers recommendation and are made from 50% to 100% recycled plastic. Some products have a wall thickness as thin as 0.16” or 8 gauge versus a minimum 2” wall thickness for Grasscrete.

SPS Grasscrete Systems

The combination of concrete, steel and aggregate interlock ensures that Grasscrete can bear isolated loads such as downriggers placed in an emergency situation with no support blocks- even if the concrete has cracks from sub-grade soil movement. The robustness of the system minimizes the potential for failure during critical use. Additionally a Partially Concealed Grasscrete System can be employed for slopes where traction during emergencies may be an issue - especially in wet conditions.

The Competitors Products

In an emergency access situation, the condition of the soils my have changed dramatically from the time of initial plastic system installation. Increased rainfall, higher water tables, heavy snowfall melt and the like can lead to saturated soils and subsequently to heavy rutting or displacement of a plastic type system. The emergency vehicle may be able to gain access but using the route to exit may be an issue or at the very least the system may have to be significantly repaired. The more robust Grasscrete System will stand the test of time and may require inexpensive repairs to the grass itself but will not require structural repairs.

SPS Grasscrete Systems *can be installed as a Partially Concealed System which means that the vehicle tires contact the concrete surface at all times and the grass or groundcover selected grows in the protected pocket or void. This allows for traffic of any type, any size, any frequency and any reasonable speed to traverse the Grasscrete without issue. Grasscrete can also be designed as a pervious pavement using graded stone for projects requiring maximum drainage that can be reinforced to bear multiple heavy vehicles per hour.*

The Competitors Products *are made from plastic that when placed under load that exceeds the sub-base bearing capacity will rut and may become displaced. The compressive value of a product is only one aspect of bearing load. If the product is rigid and only locks together with post applied clips or plastic hardware or is flexible, then it has little ability to spread this load over a large area which is why concrete surfaces are so commonly selected for access critical applications. Reinforced concrete spreads load over a greater surface area and can not be displaced or even crushed like a plastic product.*

SPS Grasscrete Systems

A major advantage to having thicker walls and greater load spread is the minimization of "sub-grade pumping" which is a combination of downward pressure forcing the pervious system into the ground while the saturated sub-base is forced up into the voids. The footprint of Grasscrete and its greater depth of void virtually eliminates this condition which causes compaction of the root zone.

The Competitors Products *in addition to the rutting problem can be subject to "sub-grade pumping" if the sub-base is not adequately prepared or the product is used in an area with poor soils and high water content. Some plastic products have a fabric attached to them to attempt to mitigate this issue while other products have a slightly larger surface contact area. In either case if an unforeseen load is applied to the plastic systems, they can rut and fill with compacted material causing compaction of the root zone.*

SPS Grasscrete Systems *parking lots do not require snow plows to be equipped with special blades or attachments unlike plastic products. More importantly, a robust Grasscrete System can withstand the abuse of light duty trucks that plow snow in smaller lots by independent contractors whose employees may not be aware that there is a pervious surface under the snow. Additionally snow on an emergency access or periodic access route using a grassed pavement is a completely different scenario than compacted snow on a parking lot which must be scraped thoroughly to avoid liability issues and access issues for staff or customers. A Stone Filled Grasscrete System can handle any abuse from scraping that would cause other plastic pavements to fail.*

Grasscrete Stone Filled System installed in 1988 picture taken in 2006, Stamford, CT

The Competitors Products *are subject to damage and displacement by snow plows not equipped with special attachments on their blades. And unlike Grasscrete, they are dependant upon fill to provide them with resistance to displacement or cell tear out as seen here on a graveled plastic product installed in 2003.*

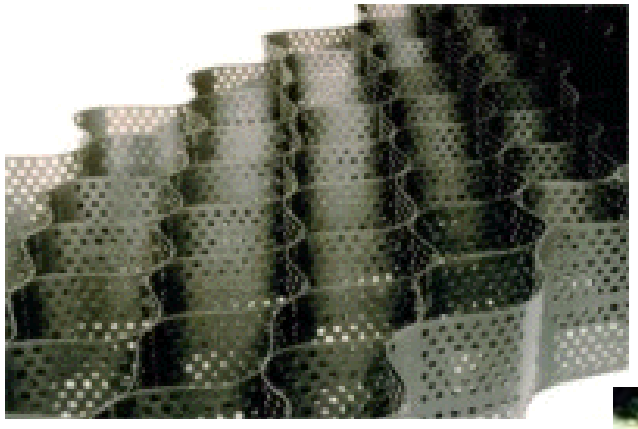
SPS Grasscrete Systems

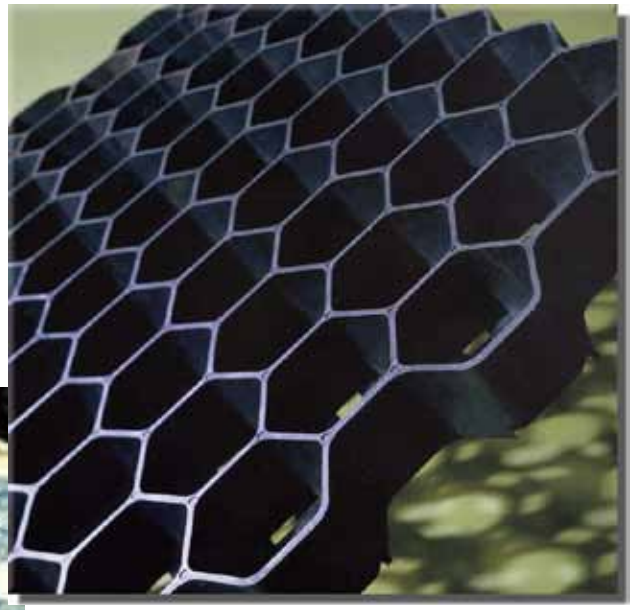
Being able to withstand the abuse of snow plows is one thing, being able to withstand the abuse of a front end loader is quite another. Grasscrete is an excellent choice for retaining ponds that require mechanical cleaning of silt or debris. Any surface grass lost is quickly repopulated by the root structure contained within the voids and rather than having a large impervious surface, the Grasscrete will allow water to percolate through it enhancing the capacity and the sustainability of the retaining pond.

SPS Grasscrete Systems

Grasscrete has been used successfully for over 35 years in the U.S. and internationally with its popularity increasing year after year because it is proven to be more durable in a wider range of conditions for a wider range of applications than plastic. Period.

The Competitors Products *speak for themselves.*





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Grasscrete®

For more information visit:

www.sustainablepavingsystems.com

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