Hard Surface, Soft Appearance

The architects for the Eltham Community Centre, Victoria, Whitford and Peck Pty. Ltd., chose 'Grasscrete' for the overflow car park, shown here in 1979, one year after completion.

Photo: The Shooting Gallery Pty. Ltd.

A REPORT ON A PRODUCT WITH ENVIRONMENTAL IMPLICATIONS RECENTLY INTRODUCED TO AUSTRALIA.

THE CONSERVATION MOVEMENT in the USA in the early 1970s embarked on a vast search for a new technology which will reduce the external costs of development, such as pollution and erosion.

Termed 'convivial technology' (from *con viviere*: with life), such a technology attempts to sustain the natural cycles which before the impact of modern civilization operated without much interference from man's activities.

One of these natural cycles is the water cycle, which has been interfered with in a number of ways in the last century, with the clearing of forests, from water pollution, and by the use of water for every purpose in enormous quantities. However, more than anything else, perhaps, the increase in the impervious hard surfaces causing faster run-off, has led to a major interference, with stream erosion and flooding on a large scale.[1]

The water falling on a given site should, in an ideally designed situation, be absorbed or retained on site. After development, the quantity and rate of water leaving the site would, ideally, not be significantly different than if the site had remained undeveloped.[2]

In areas of especially heavy urban use, such as shopping centres and business districts, the peak volume of run-off can be six times as high as the same area generated before development.[3] Not only does this storm water run off more rapidly from streets and roofs than areas covered by natural vegetation, but it also flows towards streams much faster in gutters and storm water drains than it does in swales and minor streams. Stream bed and bank erosion with associated sedimentation is the inevitable result.[4]

Convivial technology's answer is to provide all-weather pavements which allow the absorption of rainwater along with the desirable concomitant of recharging the groundwater. This is made possible by porous paving systems which permit infiltration of water through the surface into a crushed stone base and ultimately into water bearing rock formations. In addition the surface of such pavements is such that they act as a reduction device to decrease the quantity of peak flow, and increase the lag time of the movement of rain water from its origin to stream channels.[5]

The inevitable result of a wide scale use of such porous pavements, would be the minimising of erosion in stream beds and preservation of their natural character; the reduction of sedimentation and improvement of water quality.

One such paving system which fulfills the requirements is 'GRASSCRETE', a paving system which was invented by a British architect and patented world wide in 1972.

The licensee for the system in Australia, Strathtex

Constructions Pty. Ltd., does not however claim that it is a replacement for other paving used where intensive vehicular usage is normal. However, for situations in which traffic is not continuous, but light or of a spasmodic nature, it provides an aesthetically pleasing pavement with the added benefit of water absorption.

Apart from reduced run-off, surface water drainage systems may be simplified with the use of 'Grasscrete', if not omitted altogether, and this fact should be borne in mind when cost comparisons with solid surfaced pavements are made.

Pierced concrete paving systems allowing the growth of grass in the openings, are not new, and have been popular in Europe for years. What is new about 'Grasscrete'? The system is unique in that it is poured in situ and is designed to allow for the introduction of steel mesh reinforcing in areas of unlimited extent and conforming to changes in grade or contours.

This reinforcement provides great stability and as a result 'Grasscrete' has also been used where doubtful sub grade conditions were present.

PEDESTRIAN AREAS

'Grasscrete' is unique in pierced paving systems, in that it is not difficult to walk on. This means that it is more suitable for use in areas where heavy foot traffic can be expected, but where the softening effect of grass is desirable. One example of this nature is at the Rosanna Golf Club, Victoria, where it has been used near the changerooms where golf buggies are parked, and around large eucalypts within the asphalt car park. Sometimes solid paving around such trees causes conditions which lead to untimely death.

CAR PARKS

'Grasscrete' is not recommended for car parks in regular use, but many car parks are only used a few times a week. Examples of such car parks where 'Grasscrete' is used include the visitors' car park for elderly citizens' home units now being built for the Victorian Housing Commission at Broadmeadows and elsewhere, the overflow car park for the Eltham Community Centre at Eltham Victoria and the car park at the new boat ramp at Concord NSW.

CARAVAN PARKS

'Grasscrete' has been used successfully in caravan parks in the United Kingdom and would seem to be ideally suited to this application in Australia.

EMERGENCY FIRE PATHS

Frequently fire access routes are through lawn areas. When 'Grasscrete' is used the visual impact is almost negligible, but the reinforcement enables heavy vehicles to use the route without any damage.

OFF STREET PARKING

One application of 'Grasscrete' in England is at Bradford where it is used on grassed roadside verges with roll-over kerbs so that cars can park free of the carriageway, without losing the aesthetic appearance of the verge. There would seem to be an application in Australia for use in roadside rest areas.

EROSION CONTROL

Apart from its absorption qualities 'Grasscrete' provides the necessary 'hard' protection in situations where serious erosion would otherwise occur, while at the same time the grass growing in the openings provides the desirable compatability with the natural landscape. Sometimes the use of precast concrete slabs in such situations is not satisfactory because individual slabs may be dislodged, which does not occur with surfaces such as 'Grasscrete' which provides a continuously reinforced perforated concrete slab.

In Britain this system has been used extensively in water storage systems. For example in 1971 at Hemlington, North Yorkshire, it was used in preference to other systems for a spillway. There were three separate but inter-linked reasons for this choice.

* It provided a grass surface which was important from the environmental aspect.
* It afforded a concrete base giving a scour resistant surface not achieved by grass alone.
* Through its design concept, it provided a continuous yet flexible reinforced slab coupled with good drainage properties.

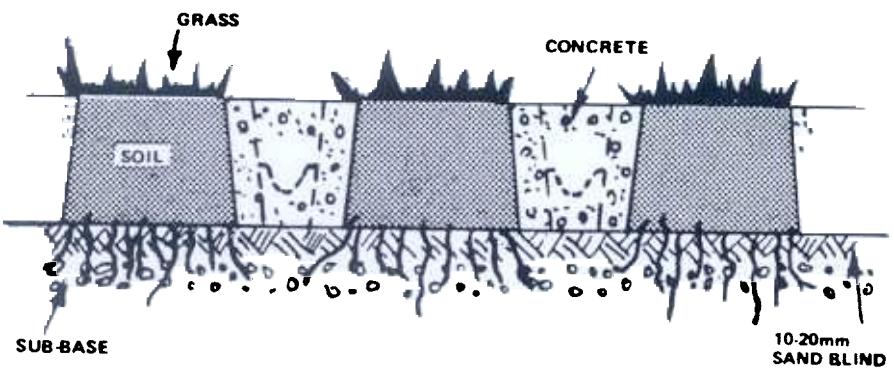
In this case 'Grasscrete' 150 mm deep was used to resist water flows of 4.5 m per second that were anticipated. The soil was allowed to cover the whole of the 'Grasscrete' slab, and the area was sown with a grass seed capable of developing a deep growth of root.

At Thornton Reservoir, Yorkshire, 'Grasscrete' was used on 19 000 square metres of embankments, both above and below waterlevel. Below water the voids were filled with gravel, and above water level with soil which was grassed to provide compatability with the surrounding landscape.[6]

Use of this system for erosion control is now beginning in Australia with the Melbourne and Metropolitan Board of Works using it to prevent scour under peak flows in drainage channels and also on drainage retarding basins.

Technical Aspects of 'Grasscrete'

The accompanying photographs adequately describe the 'Grasscrete' system, but some details are not easy to illustrate.



An important advantage of **GRASSCRETE** is its self-draining properties. The specially designed holes in a **GRASSCRETE** surface have the unique benefit of providing a greater area at the base, so preventing compaction of the soil and ensuring the maximum rate of perculation. The natural drainage of surface water to the sub-base reduces and can eliminate the need for expensive drainage systems.

SUB-BASE

An adequate sub-base for drainage is absolutely essential for the success of the system, as otherwise it will be impossible to maintain the necessary cover of grass in the openings. It is recommended by the licensees that a minimum consolidated sub-base of 50 mm of granular bedding material be established. On this base the polystyrene formers are laid.

As regards drainage, it should be noted that the holes in the finished surface have been designed so that they enlarge towards the bottom of the slab: This is an important point, for it allows the soil in the opening to recover from compression, not to become compacted as occurs when the opening becomes smaller with depth, as occurs in systems where formers have to be withdrawn after manufacture. This helps maximum rate of percolation at all times.

REINFORCEMENT

The system has been designed to take F 62 (minimum) steel reinforcement mesh which sits on rests in the formers at the correct depth.

CONCRETE

The licensees recommend that the concrete mix used should be of minimum compressive strength 25 MPa at 28 days, having graded aggregate of 12 mm maximum size stone and a slump of 125 mm.

Expansion joints are recommended at 10 m intervals. Dowelled joints can be used on areas subject to frequent heavy loadings to obtain maximum load transfer between concrete pours. A solid concrete edge of minimum 100 mm wide must be provided to the perimeter of the 'Grasscrete' area.

COSTS

The licensees are giving as an approximate figure, the price of $21 per square metre in the Melbourne area. This price is without the cost of excavation which varies from site to site.

CONCLUSION

Grass and concrete surfacing systems provide not only designers but also engineers with the opportunity to create a 'hard' surface with a 'soft appearance. Under imposed or hydro-static pressures 'Grasscrete' remains stable because of its continuous reinforcement.

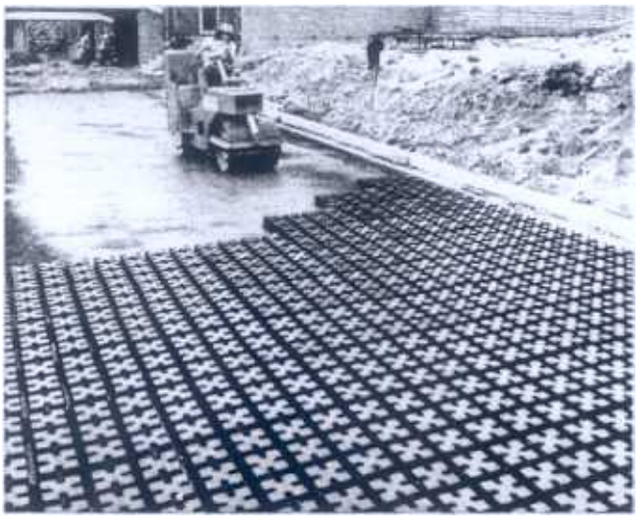
For further information:

Victoria:	Strathtex Constructions Pty. Ltd. — Australasian Agents. 362 Bell Street, Pascoe Vale Sth. 3044. Phone: 350 5077.
NSW:	Sunsurge Agencies Pty. Ltd. P.O. Box 313, Bowral NSW, 2576 (048) 61 2070.
Queensland:	Design Domus 33 Merivale Street, South Brisbane 4101 (07) 44 1373.
SA:	M & B Earthmovers Pty. Ltd. 35 Graves Street, Newton, 5074 (08) 336 5144.
WA:	Construct Pty. Ltd. 19 Hardy Street, South Perth, 6151 (09) 367 7398.

REFERENCES:

1. Tourbier J. and Westmacott R. 'Convivial Technology' *Landscape Architecture*, May 1979 pp. 265-266.
2. Day, Gary E., 'Investigation of Concrete Porous Pavements' Virginia Polytechnic Institute and State University, USA, 1977.
3. Ibid
4. Ibid
5. Ibid
6. *The use of grass concrete in the water environment* Grass Concrete Ltd. Wakefield (England) 1979.

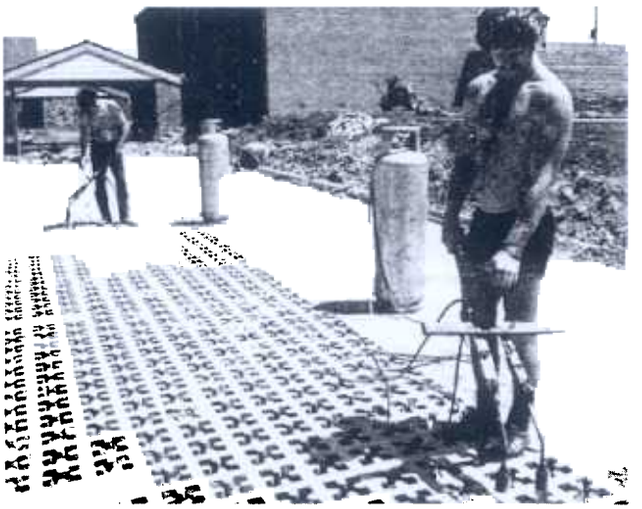
'Grasscrete' in pictures



Compacted granular subgrade preparatory to laying of polystyrene formers.

Polystyrene formers set up ready for pouring, showing steel reinforcing mesh being positioned.

Concrete pouring, and screeding level with the former tops.



The melting away of the exposed former tops, quickly accomplished with LP gas burners, to leave the voids ready for soil filling.

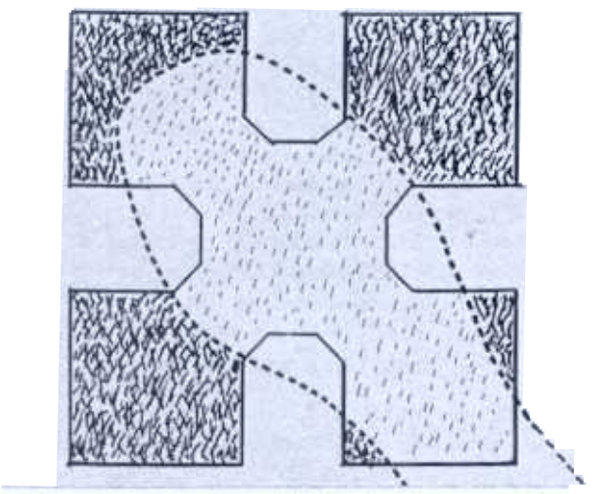
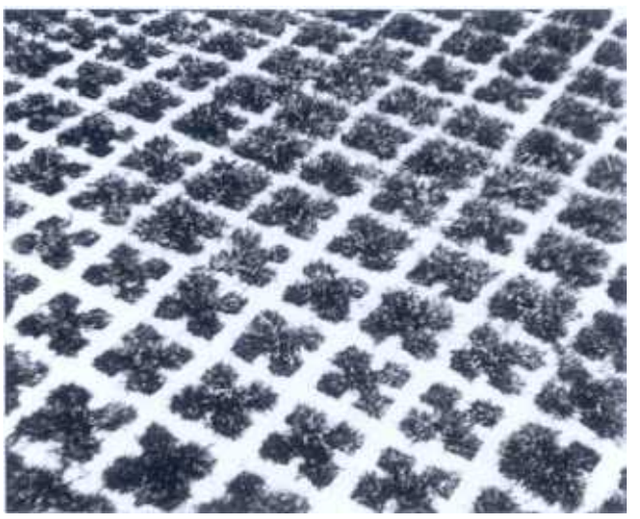


Diagram showing grass filled void with average sized woman's shoe outline superimposed.

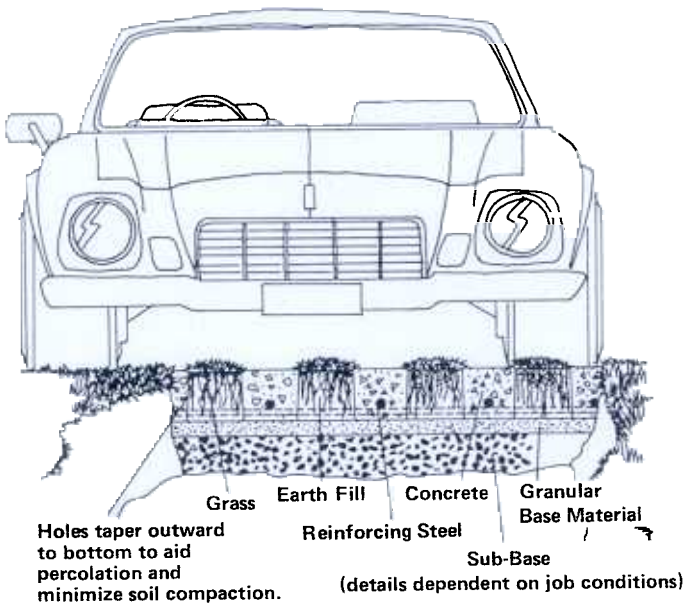


The finished product one year after completion. This example is the overflow car park for the Eltham Community Centre, Victoria. Architects: Whitford and Peck Pty. Ltd.

All photos: The Shooting Gallery Pty. Ltd.

Grasscrete

AT LAST
PARKING AREAS CAN BE "LANDSCAPED" WITH A STRUCTURALLY SOUND GRASS/CONCRETE SURFACE.
GRASSCRETE IS POURED ON SITE. IT IS A CONTINUOUSLY REINFORCED GRASS/CONCRETE PAVEMENT AND DOES NOT HAVE THE PROBLEMS OF UNEVEN SETTLEMENT AND TILTING INHERENT IN PRECAST SYSTEMS.



SOME APPLICATIONS

- Car Parks and Service Roads
- Emergency Vehicle Access
- Erosion Control
- River Bank Improvements
- Flood Control
- Boat Ramps and Trailer Parks

SOME ADVANTAGES

- Reduces Solar Glare and Heat
- Natural Drainage
- Compatibility with Landscape
- Hardstanding Capability with the Appearance of Grass
- Easily Mown
- Environmental Appeal

Further Information:—

Victoria & Tasmania — Strathtex Construction Pty. Ltd.,
1st Floor, 362 Bell Street,
Pascoe Vale South,
Victoria 3044
Ph.: (03) 350 5077

N.S.W. & A.C.T. — Sunsurge Agencies Pty. Ltd.,
P.O. Box 313,
Bowral,
N.S.W. 2576
Ph.: (048) 61 2070

Queensland — Design Domus,
33 Merivale Street,
South Brisbane,
Queensland 4101
Ph.: 378 6717
44 1373

Western Australia — Costruct Pty. Ltd.,
19 Hardy Road,
South Perth,
W.A. 6151
Ph.: (09) 367 7398

South Australia — M & B Earthmovers Pty. Ltd.
35 Graves Road,
Newton,
S.A. 5074
Ph.: 336 5144

AUSTRALASIAN AGENTS — STRATHTEX CONSTRUCTIONS PTY. LTD
1st Floor, 362 Bell Street,
Pascoe Vale South,
Victoria 3044
Ph.: (03) 350 5077