



Permeable paving for a boat lifter facility

Permeable paving stands the test of time

The days of slapping concrete and asphalt down to construct a paved parking lot, driveway or storm water channel are numbered, time for a change – ecosurfaces. Commercial properties, public spaces, and residential developments are demanding a higher standard on what is required from a paved surface.

Land restrictions, storm water management, and other environmental regulations have turned the growing housing market and other land developers to seek solutions that can address these issues.

David Wheeldon, editor Building Products News (BPN)

magazine and Infolink Architecture & Design writes that much of Australia's urban environment is paved in an impermeable skin of concrete, stone and other materials, leading to related problems like flash flooding and urban heating, that are driving ever more stringent planning and construction regulations.

Says Wheeldon: "Storm water management in particular comes under closer scrutiny, with councils requiring that greater percentages of sites under development be 'soft landscaped area'. In many cases, pervious, or 'permeable paving' will meet or exceed the requirements, be it pavers with porous material between, special pavers or gravel stabilised with epoxy resin or other bonding agents."



The blocks withstand heavy weights



Blocks are underlain with 100mm compacted sand, over sub base of rubble

Situated in Geraldton, Western Australia, The Blocks Makers have, for the past 8 years, been manufacturing Terracrete – a Terraforce Product. Terracrete is a permeable, interlocking, concrete paver, which encourages water infiltration, prevents rain water runoff. Large volumes of urban runoff can cause serious erosion and siltation in surface water bodies. Permeable paving surfaces also help to control pollutants, as they capture heavy metals, preventing them from washing downstream and accumulating inadvertently in the environment.

The naturally occurring micro-organisms that exist in the soil in the blocks and in the sub base, digest oils and spills, another important advantage. Recently,



Blocks were tested by spinning wheels of the 100 ton boat lifter on the spot

demand for this product has substantially increased. Says Tracey Foster, of the Block Makers: “Landscape Architects, property developers, and the general public are showing a real interest in this product – they are looking for a product that provides enough permeability to reduce storm water runoff and soil erosion, but that still maintains a drivable surface. They are also looking for a product that helps combat urban heating. ”

The first major project using the Terracrete paver was installed in 2007, by a local landscaping company – JD’s Landscaping. This 1.2 hectare hard stand area was designed for a boat lifting facility at the Geraldton Fisherman’s Wharf, and it has proved to be a huge success. The blocks were manufactured using a 40 MPa concrete mix with EPC Bar Chip “Macro”, (Elasto Plastic reinforcement) added, to stop the blocks from fragmenting when the wheels of heavy trucks and boat lifter turn.

Once it was calculated that the loading exerted by the balloon tires would be about 750Kpa, Sam Nejad, from Engineering Online, set about designing the sub-base.

He decided that the blocks, (100 mm thick) should be underlain with 100mm of compacted sand (greater than 10 blows per 300mm with a Standard Perth Penetrometer) over a sub-base of gritty sand and rubble, compacted to greater than 95% relative dry density.



The surface provides water infiltration and prevents rain water runoff

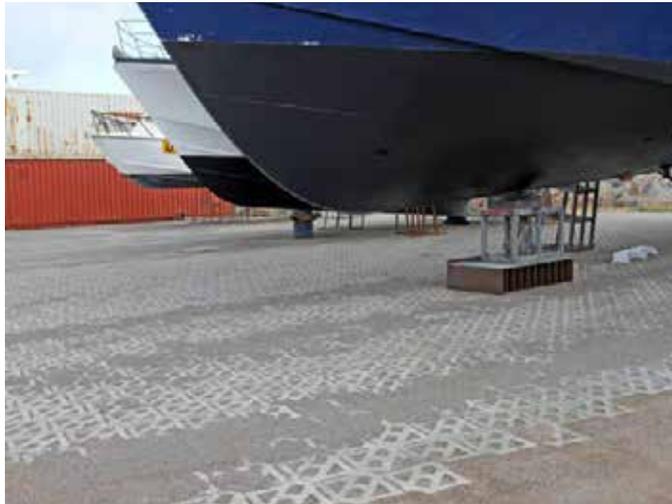
Says Nejad: Small amounts of pollutants will be digested by bacteria, naturally present in the soil. Big spills, should they occur, are immediately cleaned up by lifting the blocks and sand layer and replacing with fresh sand and blocks."

As the project was completed, Nejad was very satisfied with the strength performance of the blocks: "We tested areas of the paving where the 100 ton boat lifter stood in one place and spun its wheels on the spot. There was no damage to the blocks. Of course in reality it won't do that, but will move slowly and turn gradually – but the test showed an extreme example and the blocks are undeniably working as designed.

If standard pavers had been used, they would have been shattered."

Seven years later his words ring true. Karin Johns, Marketing Manager, Terraforce, visited the site in March 2014 and the hard stand area is in pristine condition, with little to no breakage, and no deterioration of the blocks.

Project: Boat Lifter with Maintenance / Storage Area
Client: Geraldton Boat Lifters W. Australia
Consulting Eng: Sam Nejad of Structerre
Contractor: JD's Landscaping
Manufacturer of Terracrete: The Block Makers



Seven years later and the eco-surface is still in great condition



Storm water channel, using the interlocking, permeable Terracrete blocks

Storm water control, the eco-friendly way

Another project in Geraldton, a storm water channel, using the Terracrete blocks in conjunction with the environmentally friendly Terraforce L11 retaining wall blocks, was recently completed. The site required a semi-permanent structure allowing periodic access to the gas and water mains.

Terracrete Permeable pavers were used on the base, and filled with 10mm stone. The pavers encourage rainwater infiltration and aid in the prevention of erosion, common to such sites after heavy rains. They also reduce rainwater runoff.



Pavers to be filled with 10mm stone

They are strong enough to withstand light, vehicular traffic e.g. a bobcat – which maintenance crews require when removing silt build-up, on occasion

On the road-side, the Terraforce Blocks were concrete filled for strength and built to the contour of the road, and on the opposite side, a standard gravity retaining



Sides built using Terraforce L11 Smooth blocks

wall was built, which has been designed to allow removal of some units, when access is required.

Project: Storm water drainage
Client: City of Greater Geraldton
Contractor: Geraldton Limestone and Retaining Walls
Manufacturer: The Block Makers