

## What is Terraforce?



**TERRAFORCE** is an award-winning South African company that developed a range of interlocking concrete blocks for **earth retaining walls and erosion control**.

*land reclamation ★ erosion control ★ sea shore protection ★ river and stream erosion control ★ garden landscaping ★ cut slope stabilization ★ noise and blast barriers and much more.*

A Terraforce retaining wall Jalila Children's Hospital, Dubai, United Arab Emirates. The blocks alternate between rock and round to create plant pockets.



The original hollow core, closed faced retaining wall system, since 1979

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## Products available...



There are four Terraforce systems available:

1. The “L” landscaping block , available in diff. sizes → (L11, L12, M12.5, L13, L15, L16, L17, L18, L22, M10, M15, S10)



2. The 4x4 Multi Step block for stairs/seating/arenas →



3. The Terrafix block for slope/embankment stabilisation →



4. The Terracrete block for paving of channels/roads/parking →



Check with your local supplier for availability

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Why Terraforce?

A proven product since 1979



**A living wall:** The unique hollow-core design allows you to make plants a part of your wall and allows water to drain back into the ground. Use low-water-use plants to create a landscape that's sustainable. Plant growth also deters graffiti.

**Durability:** Concrete will not rot and weaken over time, and no chemical preservatives are required. Blocks can be replaced if damage occurs.

**Uniquely interlocking:** The units are simply stacked up without mortar to provide a cost effective, do-it-yourself system. Can be used for light revetment cladding, medium-to-heavy gravity retaining walls, heavy duty composite walls in combination with earth reinforcing grids (fabrics) or reinforced concrete infill.

Multiple CMA Award winner since 1998

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## Why Terraforce?

Unmatched versatility in application



**Layout flexibility:** The half moon interlock easily handles convex and concave curves of unrestricted radius, and the wall angle can vary from vertical to shallow slopes. Create steps by reversing the block, either with a straight or curved alignment. Perfect spiral stairways can be constructed with ease.

**Colours and textures:** choose between round, straight or rock face finish. Consult your local supplier about available colours.

**Easy to use:** The blocks are **lightweight for easy delivery, handling and installation**, yet heavy in mass when filled with soil, gravel, or concrete. Fence and handrail posts can be set within blocks.

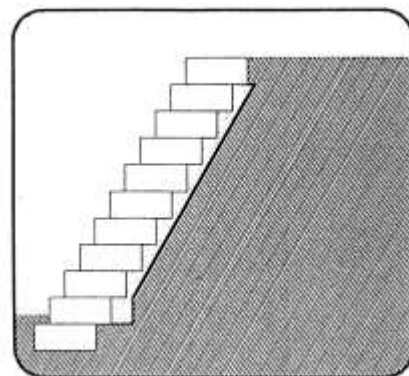
Level four BBEE, Member of the CMA

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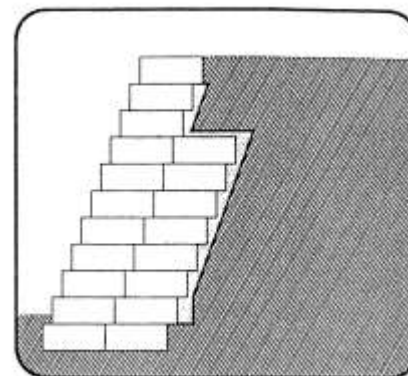
These drawings illustrate the most common planning options for L Range retaining walls:

The blocks interlock horizontally as well as vertically with optional keys or gravel infill, and contain no air voids. They have a closed vertical and open horizontal surface structure, and thus lend themselves ideally to the construction of **light terrace walls** but also **heavy gravity**, **composite** or **vertical RC filled retaining walls**.

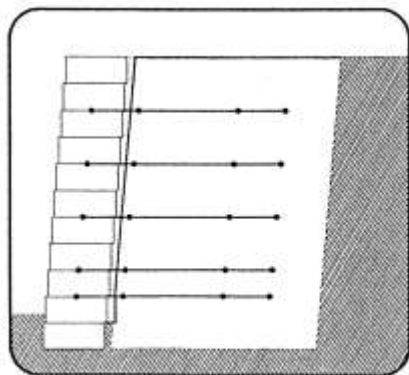
Factors influencing installation costs: as wall angles and heights increase so does cost. Due consideration has to be given to the presence of groundwater or unstable retained soil.



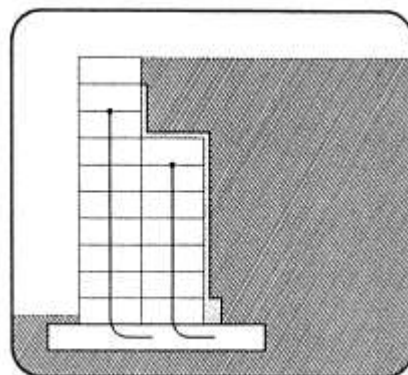
Light gravity wall



Heavy gravity wall



Composite wall (geofabrics)



Vertical / RC Filled wall

The planning stage of a retaining wall depends on environmental, structural and cost factors:

**Type of retaining system:** Resist the temptation to specify slender, stretched-out types or imitations of proven blocks. The system should be chosen for maximum structural mass (no air voids within wall) combined with optimal rooting conditions. This will help in binding the system and embankment together.

**Climatic conditions:** Exposure to factors such as coastal, salt-laden winds, long hours of direct sunlight, deep shadows, etc., should be taken into account.

**Function and type of vegetation:** Herbaceous, deep rooting (low maintenance) or attractive flowers (high maintenance) may be considered. Mixed complimentary species or uniform ground covers can be planted. Feeding values for birds and insects must be investigated for a complete bio-engineering approach.

**Maintenance:** Monitoring of soil fertility, irrigation and regular maintenance operations form an integral part of a growing investment. Indigenous plants are ideally adapted to prevailing climatic conditions. They generally require less water and maintenance, are deep rooting and can contribute considerably toward adding competence to these installations.



Once planning is complete, Terraforce offers various levels of design support

Terraforce offers a free, online design software called **Maxiwall Pro** - [www.maxiwall.com](http://www.maxiwall.com) - as well as a professional Terraforce retaining wall design service - **Terrasafe** - if needed. You can also consult our table calculator for quick checks on setback and wall angles.

Design charts, tables and manuals are freely available on the [downloads](#) page on our web site.



### TERRAFORCE

- UNIQUE HORIZONTAL INTERLOCK
- WITH OPTIONAL VERTICAL INTERLOCK
- HOLLOW CORE REVERSIBLE UNITS
- FULLY PLANTABLE

Block Name: **L22**  
 Block Height: **200** mm  
 Dimension B: **300** mm  
 Mass per block: **16** kg  
 No. blocks /m<sup>2</sup>: **22**

7.9" \*  
 11.8" \* from front to back  
 35.3 lb

L22		B = 300 mm	Mass = 352 kg/m <sup>2</sup>					
RETAINED SOIL	BACKSLOPE ABOVE CREST OF RETAINING WALL (degrees)	WALL INCLINATION FROM HORIZONTAL						
		60°	65°	70°	75°	80°	85°	90° inclination
		115	93	73	54	35	17	0 mm setback
		4.5	3.7	2.9	2.1	1.4	0.7	0 inch setback

SOIL TYPE	WALL INCLINATION	MAXIMUM ALLOWABLE UNREINFORCED WALL HEIGHT						
		18.5	13.2	10.3	7.9	6.0	4.6	3.6
FIRM CLAY & COMPACT SILT P>26°	0°	3.3	2.6	2.1	1.6	1.2	0.9	0.7
	10°	2.6	2.1	1.7	1.3	1.0	0.8	0.6
	22°	2.2	1.6	1.2	0.8	0.6	0.4	0.4
SILTY SAND & SAND P>32°	0°	5.1	3.9	3.0	2.2	1.6	1.3	1.1
	10°	4.5	3.4	2.5	1.8	1.3	1.0	0.9
	22°	3.5	2.7	2.0	1.4	1.0	0.7	0.7

**Maximum wall heights (in block height, metres, feet) for a single skin, mass gravity, block retaining wall system - without additional interlocking keys, reinforcements or backfill stabilizing.**

1. Wall height measured from top of foundation / leveling pad
2. Top of foundation / leveling pad a minimum of 150mm / 0.5 ft below ground level
3. No allowance made for surcharge above wall
4. Angle of internal friction used in calculations: P(firm clay)>26°, P(silty sand)>32°
5. Compaction effort at optimum moisture content to ensure maximum density achievable
6. Provided that groundwater conditions are controlled, a wide variety of soil types can be used for infill soil
7. Subsoil drainage is essential to intercept groundwater. Build-up of hydrostatic pressure and seepage forces minimised
8. Surface water run-off should be directed away from the wall
9. Factor of safety for shear and overturning = 1.5



Some illustrations of designs possible, depending on site conditions and height of the wall:

Single block layer



Light gravity retaining wall, rock face option

Single block layer



Light gravity retaining wall, round face option

Light retaining walls are suited for low/inclined walls only, unless extra reinforcement is provided.

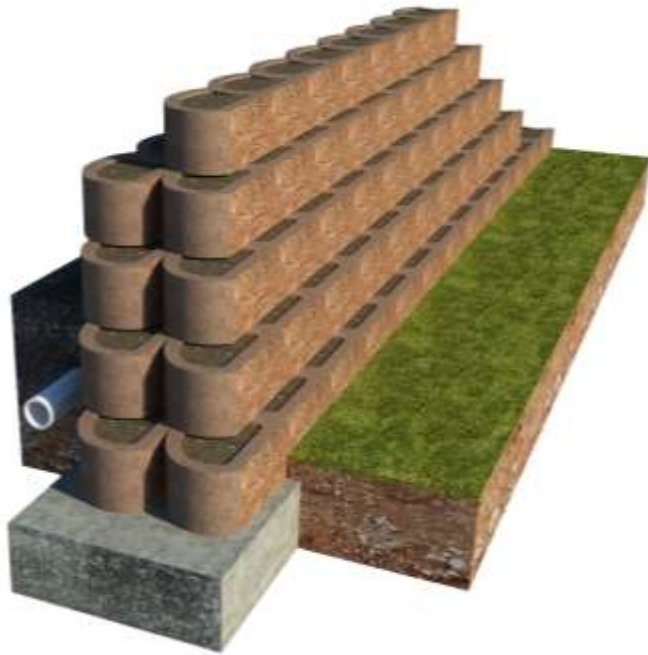
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A double layer of blocks can provide extra stability for higher or steeper walls

Double block layer



Heavy gravity retaining wall, rock face option

Double block layer

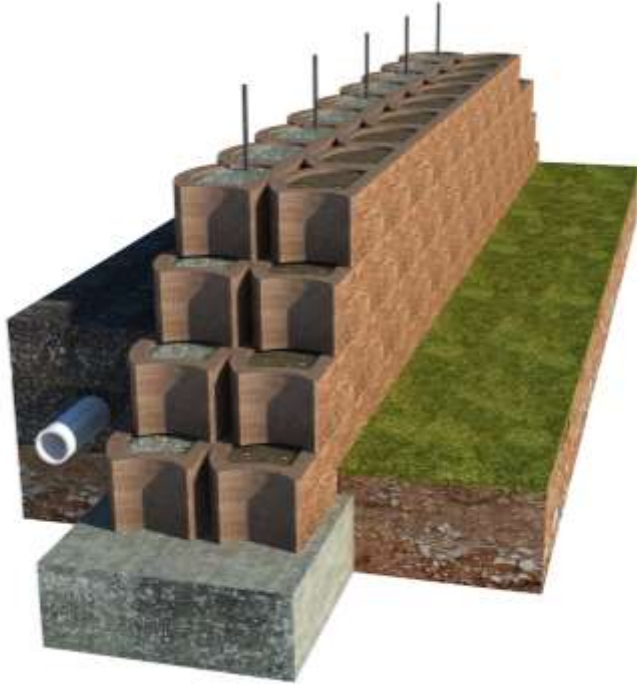


Heavy gravity retaining wall, round face option



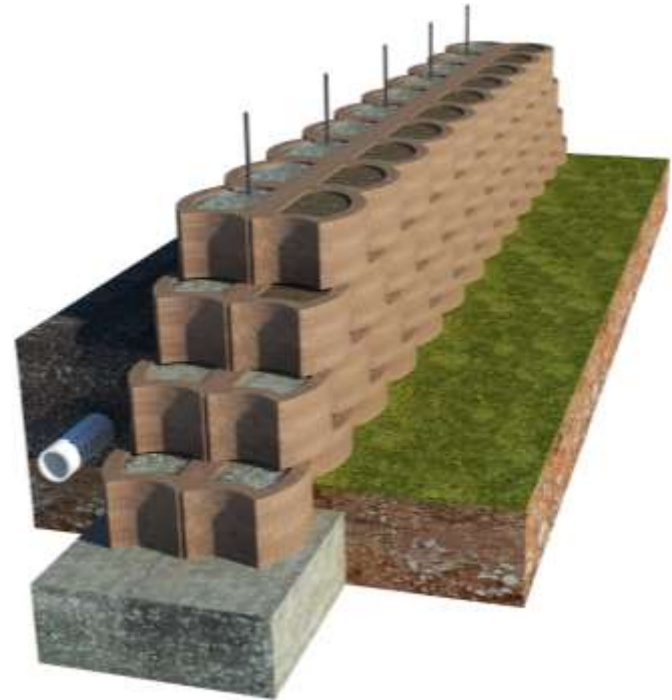
Sometimes severe lack of space calls for a double layer, with concrete infill and steel reinforcement

Two block layers. Concrete infill and steel rebar in back layer



Reinforced gravity retaining wall, rock face option

Two block layers. Concrete infill and steel rebar in back layer



Reinforced gravity retaining wall, rock face option

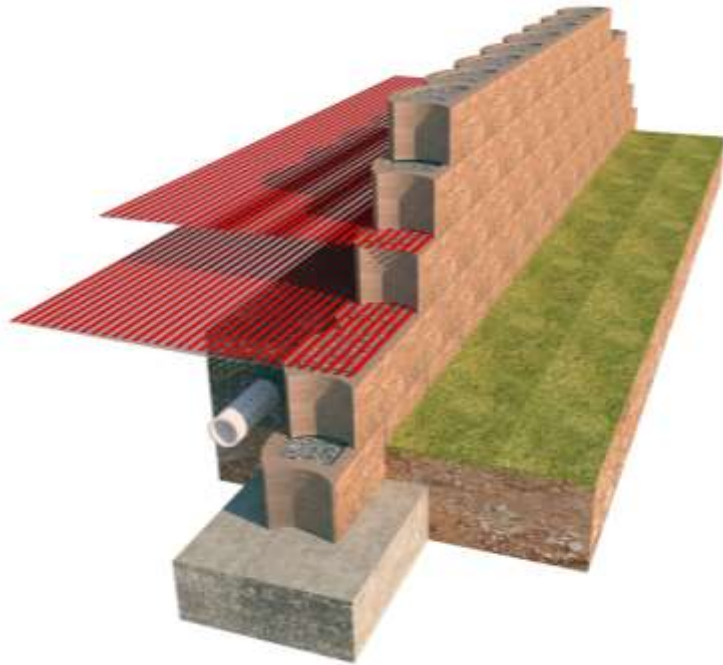
In addition, stabilized backfill (sand and cement mix) can also be considered

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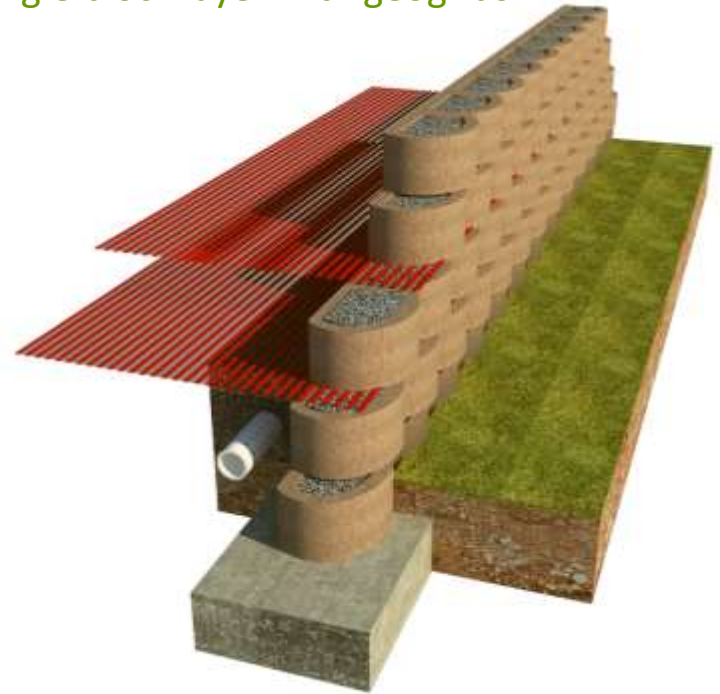
Geosynthetic reinforced walls utilize reinforcing sheets of geogrid or suitable woven geotextile

Single block layer with geogrids



Composite retaining wall, rock face option

Single block layer with geogrids



Composite retaining wall, round face option

These are attached to the fascia and are embedded in a body of engineered fill

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With these four basic walls types in mind, the design possibilities are endless!



With one block, you can create terraces, curves, corners, vertical walls and steps

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Follow slope contours with ease!



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The new International Convention Centre and five star resort, eZulwini, Swaziland:



The three terraces reach up to 18m in height when combined

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Terraforce has a solid Standards and testing background



Terraforce is a member of the **Concrete Manufacturers Association (CMA)** in South Africa and adheres to the **Canadian and US international Standard Specification for Loadbearing Concrete Masonry Units**, following a successful **ICBO evaluation** in 2002 (now ICC-ES, a leading US nonprofit, limited liability company that does technical evaluations of building products, components, methods, and materials). The system was also extensively tested by **Hawkins Hawkins & Osborne Consulting Engineers**, South Africa in 1992, resulting in a comprehensive design and specification manual and user guide.

Composite retaining wall design and construction procedures with Terraforce blocks have been subjected to **rigorous laboratory tests**. These were conducted on a large-scale test apparatus to evaluate the mechanical performance of, among others, the connection between blocks and grids. In all tests the primary mode of failure was rupture of the geogrid outside the blocks and performance was found to be above average. **See references on the next page →**

Terraforce products also undergo regular MPA testing, locally and overseas

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## References and Test results:



- **Guide to the design of Terraforce retaining walls**, Oct. 1992 by W G Technau of Hawkins, Hawkins & Osborn. Rivonia, South Africa.
- **Guidelines for the use of the Terraforce retaining wall design spreadsheet**, Nov. 1994 by G Bentel of Steffen, Robertson & Kirsten. Technology Park, W Australia.
- **Terraforce, the living retaining wall system: Design and installation manual for geosynthetic reinforced soil applications**, Feb. 1996 by Dr Richard J Bathurst of Royal Military College, Kingston, Ontario and Colin Alston of Alston Associates Inc., Markham, Ontario, Canada.
- **Terraforce design manual for Boral Besser Masonry Ltd**, Oct. 1997 by Andrew Shirley of Shirley Consulting Eng. Sydney, Australia.
- **Crushing tests of blocks subject to line loading**, July 1998 by Damon Clark Associates. Durban, South Africa.
- **Connection tests and interface shear tests**, Nov. 1998 and Feb. 1999 by Dr Richard J Bathurst of Royal Military College. Kingston, Canada.

Available on request

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Palm Jumeirah, sea shore protection and stairways, 2 million blocks used:



The project under construction, precast foundations used for the steps...

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The walls and steps nearing completion...



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Owners of the properties all landscaped the walls uniquely...



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Owners of the properties all landscaped the walls uniquely...



Plants are doing well in the harsh climate...

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## Seashore retaining walls and 4x4 Multi Steps at Durat Al Bahrain, UAE





The shape of the block allows for unlimited curves



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## Qatar, clover leaf interchange retaining wall with planting:





## Garden landscaping and erosion control at prestigious equine estate, Cavalli



Mainly water wise South African plants were used

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Terraforce offers green - or colourful - solutions!



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Terraforce offers green - or colourful - solutions!



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Terraced, vertical or sloped, you chose!



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Need a corner? Try these, no cutting required



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Need a corner? Try these, no cutting required



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For sharp or right-angle corners, cutting the blocks is possible





For sharp or right-angle corners, cutting the blocks is possible





Terraforce blocks are also used widely for lake and sea shore landscaping



The project: a large, composite retaining wall at a new 5 star Hotel, Ajman

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One of the pedestrian ramps under construction

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Steps in the process of installation above the drainage layer

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The project nearing completion. Sand will be filled in up to the red layer of blocks

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The end result



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Using the 4x4 Multi Step block for stairs and seating and ramps:



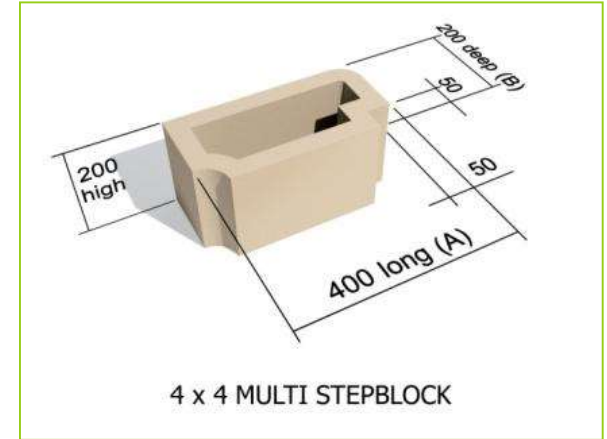
The Multi 4×4 Step block: a light, dry-stack concrete unit, generally used for constructing low terrace walls, stairs and seating arrangements:

Aimed at providing efficient and economical steps in conjunction with the original retaining blocks of his design, they soon became very popular not only for stairway access, but also to provide comfortable, practical stair and seating arrangements at leisure amenities and school sports facilities.

*Free standing staircases ★ integrated staircases ★ public seating ★ auditoriums or arenas ★ access and seating ramps*



## Amphitheatre for 2000 people - Turkey



## Amphitheatre for 500 people - Turkey

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## Seating arenas at recreational private and public facilities:





## Seating arenas at recreational private and public facilities:



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Various stairs, public and private:



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Various stairs, public and private:



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Award winning seating arena using the L18 block



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## The Terracrete Hard Lawn Paver for erosion control:



**Terracrete blocks are VERY versatile.** A grassed driveway, a rustic gravel driveway, or an attractive pattern of pavers can add the finishing touch to a home looking to stand out. Permeable grass pavers can add a park-like or pastoral feel to many areas that normally require hard paving.

### TERRACRETE blocks are used for erosion control of:

- ➔ 1. Roads and parking areas
- ➔ 2. Spillways and storm water channels
- ➔ 3. Embankments





Terracrete hard lawn pavers make excellent eco-surfaces:



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Award winning Terracrete installation – CMA Trophy 2014 in sustainable category



Terracrete hard lawn pavers were installed between the paddocks, to restore storm-water runoff

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The block offers a "hard", yet flexible surface that is permeable for water & vegetation

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If filled with topsoil the blocks can be grassed to create a green surface

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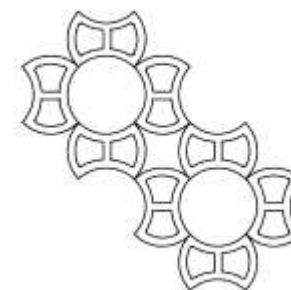
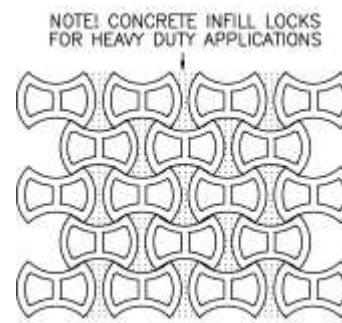
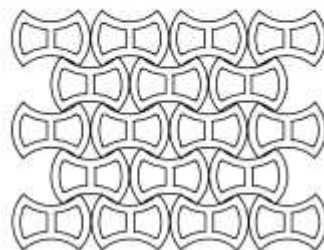
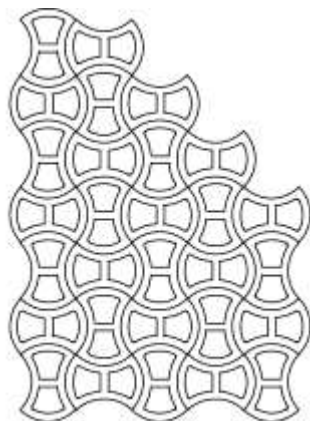
The **Terrafix** erosion control block, for slope stabilisation of any kind:



**Flexible and permeable erosion control block:**



**TERRAFIX** is an interlocking environmentally acceptable element made of high strength concrete. It is designed to provide a flexible lining where cost-effective protection against wind/water erosion is required. Available in 3 different thicknesses. Can be laid in a variety of configurations to suit site conditions.



Permeable eco-surfaces for embankments, storm water channels & river lining

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## Storm water channels and spillways:



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## Storm water channels and spillways:





## Embankment stabilisation:





## River and stream lining:





## Large scale embankment erosion control:



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## Large scale embankment erosion control:



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## Where to purchase TERRAFORCE blocks



The products are produced on 5 continents:



Send us your contact details and comments: [Contact us](#)

Or, alternatively, find your closest supplier:

[Find your closest supplier](#)

Call Terraforce directly: +021 465 1907 or email Karin: [karin@terraforce.com](mailto:karin@terraforce.com) or visit the web site: [www.terraforce.com](http://www.terraforce.com)

We also offer a [professional design service](#)



Professional design service that provides first-class engineering, management, and specialist technical service to users of any of the Terraforce products.