

# INTEGRA

## Porous Paving

SOURCE CONTROL  
SYSTEMS LIMITED

### The Concept

SCS INTEGRA is a key product within a sustainable urban drainage system (SUDS), whereby the porous paving effects the efficient attenuation, infiltration and treatment of stormwater runoff at or near its source - in accordance with current Best Management Practices (BMPs). It is also an ideal product for grass and gravel reinforcement.

### The Product

Made in the EU from recycled high/low density polyethylene, SCS INTEGRA is a modular unit which works in conjunction with its neighbouring units to create an exceptionally durable, permanently porous, high load bearing structure.

Infilled with either grass or natural aggregate in completed form, SCS INTEGRA remains in harmony with current environmental considerations whilst complying with increased governing legislation.



### Applications

SCS INTEGRA is a heavy duty grass and gravel reinforcement system and is therefore ideal for:

- Emergency access roads
- Car parks
- Pedestrian areas
- Grass Verges
- Vehicular hard-standings
- Cycle ways
- Helicopter landing pads
- Sport & leisure facilities
- Holiday complexes
- Sheltered accommodation
- Domestic driveways
- Caravan sites

### Product Data

NOMINAL SIZE	500mm x 500mm x 70mm
COVERAGE RATE	4 blocks/m <sup>2</sup>
UNIT WEIGHT	1.9 kg
INFILTRATION RATE	>5000mm/hour
RUN OFF COEFFICIENT RANGE	0.05 - 0.25
LATERAL DRAINAGE VOID RATIO	20.8%
INFILL SURFACE AREA	>90%
COMPRESSIVE STRENGTH (FILLED)	2,400 kN/m <sup>2</sup>

The above data indicates typical values - further details of structural and hydraulic properties of the system are available on request.



The SCS INTEGRA system has the unique benefit of full scale independent physical hydraulic modelling, providing the necessary data for developing validated porous paving designs on a scientific basis.

### SUDS - The Principle

SUDS are physical structures built to receive surface water runoff, being located as close as possible to where the rainwater falls, providing the option of infiltration and attenuation stormwater source control solutions. They also provide treatment for surface water using the natural processes of sedimentation, filtration, absorption and bio-degradation.

Recent research shows that typically up to 80% of sediment; 60% of phosphorous and; 80% of nitrogen can be removed from rainwater through porous paving, together with substantial levels of heavy metals and hydrocarbons. This natural treatment provides the ideal opportunity for rainwater conservation and re-use for a variety of non-potable applications e.g. toilet/urinal flushing, irrigation, laundry, process water, vehicle washing, refrigeration, coolant use. etc.

Such source control principles and techniques are now inherent within best practice and are increasingly becoming the norm within development projects.

### Design Details - SUDS

Within the concept of porous paving there exists two, more commonly specified, system constructions:

#### The Attenuation System

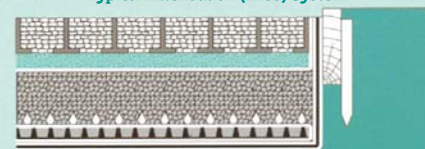
- utilised when direct infiltration is not appropriate and when water storage is required.

Figure 1 shows SCS INTEGRA, containing either grass or natural aggregate, installed on a layer of clean stone overlying an appropriate SCS GT geotextile separation/filtration layer.

Beneath this is a voided sub-base which is encased within an appropriate SCS GM geomembrane.

Collected runoff is discharged via an appropriate SCS storage device (SCS Aquavoid®) positioned within or below the sub-base and sealed where it exits the geomembrane storage reservoir.

Figure 1  
Typical Attenuation (lined) System



#### The Infiltration System

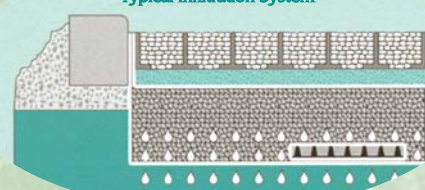
- utilised whenever possible, subject to appropriate soil conditions and environmental considerations.

Figure 2 shows SCS INTEGRA, containing either grass or natural aggregate, installed on a layer of clean stone overlying an appropriate SCS GT geotextile separation/filtration layer.

Beneath this is a sub-base which is encapsulated within an appropriate SCS GT geotextile separation/filtration layer.

Collected runoff is allowed to permeate naturally, through the geotextile separation/filtration layer, into the sub-grade obviating the need for a positive discharge facility.

Figure 2  
Typical Infiltration System



## Installation

### Subgrade

Excavate to formation level as indicated on the drawing, providing a minimal (1:30 - 1:100) fall to the drainage collection system. Compact subgrade, using either a vibrating roller or vibrating plate, making good soft spots with suitable material.

### For Attenuation Systems

If the exposed subgrade surface displays hollows and/or sharp protrusions (and is therefore unsuitable for the direct installation of the geomembrane) then the specified SCS GT geotextile should be incorporated above and beneath the geomembrane, to afford protection.

Installation of the specified SCS GM geomembrane system must be by an approved welding technique, with the benefit of a comprehensive on-site CQA (Control Quality Assurance) procedure. Install the specified SCS Aquavoid® drainage network in accordance with the detail design.

### For Infiltration Systems

Lay the specified SCS GT1900 geotextile, overlapping the joints by 200mm, ensuring that sufficient geotextile protrudes beyond the anticipated wearing course level to allow final trimming.

### Sub-base

Use granular material (crushed gravel, rock or concrete) as specified, which must be sound, clean, non friable and free from clay or other deleterious matter. Install the designed depth of sub-base as specified, in layers not greater than 200mm thick, (taking care not to puncture the underlying membrane within the Attenuation System). Compact each layer in turn with a vibratory plate, type DVP 75/22" plate, or suitable roller. Overlay the sub-base with the specified SCS GT geotextile, overlapping the joints by 200mm.

### Bedding Layer (if required)

Lay, screed and compact to level, a 30mm depth of appropriate bedding layer material (sharp sand). The requirement for, and selection of, the bedding layer

material is entirely dependant upon the application and design criteria of the specific project. For grass reinforcement mix the bedding layer 4:1 with a good quality top soil to ensure good root growth.

### Wearing Course

SCS Integra should be laid such that each modular unit abuts its neighbouring units, each being positively interlinked with the others by means of the triangular locating lugs within the corresponding slots. Each unit should be mechanically interlocked by means of tapered locking pins (inserted through the locating lugs) to prevent lateral displacement. (N.B. 16 pins/m<sup>2</sup> are provided for use with both grass and gravel. Once a fully interlocked matrix has been formed, then the specified rootzone/grass seed infill material or natural aggregate should be used to infill each cell such that a continuous, permanently porous, high load bearing structure is thereby created.

### Infill Materials

#### (sand and soil mix/aggregate)

The selected infill material should be specified on a project specific basis dependant upon the application and design requirements, but the following could act as a guide:

**For Sand Bed:** A good quality compacted silica sharp sand should be used approximately 30mm thickness after compaction.

**For Gravel Fill:** Aggregate size should not exceed 15mm and should ideally not be below 6mm (typically 10mm single sized crushed rock). The use of an angular gravel rather than a river washed rounded gravel will aid compaction and prevent migration from the units.

**For Grass Fill:** A good quality topsoil should be used to infill the units to the top and allowed to settle; grass seeding followed immediately by a top dressing of a good quality fertiliser should ensure adequate grass growth.

Seeded areas should be regularly watered for a period of 6 weeks following installation.

## Bibliography

### Reference Sources and Information

#### EA

(Environment Agency) In England and Wales

Planning Policy Guidance Notes

PPG 1: General Policy and Principles (1997)

PPG 9: Nature Conservation

PPG 15: The Historic Environment

Nature's Way

: a guide to surface water disposal

- Best Management Practices (leaflet)

A Guide to Sustainable Urban Drainage

Environmental Good Practice Guide: Urban

Redevelopment for Industrial and Commercial Uses

: Surface Water Disposal

Sustainable Urban Drainage Systems

: an introduction (1999)

#### SEPA

(Scottish Environmental Protection Agency)

State of the Environment Report (1996)

#### CIRIA

(Construction Industry Research and Information Association)

Sustainable Urban Runoff Management (RP555)

Sustainable Urban Drainage Systems

: Design Manual for England and Wales (C522)

: Design Manual for Scotland and

Northern Ireland (C521)

: Best Practice (C523)

: Source Control using permeable surfaces - hydraulic and structural performance (RP637)

#### MAFF

(Ministry of Agriculture, Fisheries & Food)

#### DETR

(Department of the Environment, Transport and the Regions)

### Complimentary product ranges presently offered by Source Control Systems include:

SCS Agrablock - Medium Duty Porous Paving  
SCS Aquavoid® - Surface Water Storage & Infiltration  
SCS GT GeoTextiles  
SCS GM GeoMembranes  
SCS Rainwater Harvesting Systems  
SCS Smart Sponge - Hydrocarbon Removal Systems

## Products for Environmental Protection Projects

Source Control Systems (SCS) is a 'solution provider', created specifically to offer multi-product systems within the environmental protection sector of the UK construction industry.

Within this specialised sector SCS is totally dedicated to 'source control' and more specifically to:

### Porous Paving, Surface Water Storage and Infiltration, Rainwater Harvesting and Surface Water Quality Improvement

#### Specification Clause

To assist in the correct specification of the SCS INTEGRA porous paving and grass reinforcement system we would suggest the following clauses:

##### Clause

The porous paving system shall be SCS INTEGRA supplied by Source Control Systems Ltd. (SCS). The porous paving /grass reinforcement system shall incorporate positive interlocking facility by means of 16 tapered fixing pins per m<sup>2</sup> and shall allow both vertical and horizontal hydraulic movement between each individual cell. The system shall be manufactured in the EU from recycled high density polyethylene (HDPE) each unit measuring nominally 485 mm x 485 mm in plan x 70 mm in depth and shall have integral water reservoirs built into the system to ensure grass growth in dry periods.

For more specification information relating to other elements within the system including Agrablock; geotextiles; geomembranes; Aquavoid® water storage & infiltration systems; Rainwater Harvesting and Smart Sponge® hydrocarbon removal systems please contact Source Control Systems.



### Product manufactured in the EU

Information contained herein is subject to change without notice. Customers should check with SCS to ensure that they have the latest details. Liability in respect of any statements, conditions, warranties and representations made on behalf of SCS is limited in accordance with the terms set out in the Standard Conditions of Sale.

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