Vegetated (Green) Retaining Walls and Bunds

A guide to the selection and specification of Webwall® vegetated retaining walls
ABG Retaining Structures

ABG provide a range of geosynthetic solutions for the creation of both green and hard-faced retaining structures and our designs incorporate some of the most innovative and sustainable solutions for the modern built environment. Our involvement in the design and construction of reinforced soil retaining structures began over twenty years ago when we enhanced modern design techniques and then developed and launched our own range of ground engineering solutions.

These ground-breaking systems include a comprehensive range of geocell webs, geogrids and soil erosion mats for a multitude of earth reinforcement solutions. Webwall®, ABG’s own cellular retaining wall system, was designed specifically as a sustainable green solution and provides a value engineered alternative to gabions, crib walls and other similar constructions.

Webwall® is a flexible, earth-retaining system for cut-and-fill faces or noise/visual bunds that allows structures with near vertical faces to be built quickly and easily in straight or curved profile. Webwall® offers cost savings over traditional earth retaining constructions and has a green, vegetated finish.

Webwall® is ideal for situations with weak foundation soils and where site won materials are the preferred fill medium. The reuse of site won materials significantly reduces costs of removal and dumping off-site and the importation of structural fills; carbon footprint is also reduced due to fewer vehicle movements. Construction of Webwall® is fast, which is ideal for projects with tight construction programmes.

Webwall® is manufactured by ABG in the UK. ABG provide a design service plus advice on the selection of low maintenance planting: for example, prickly vegetation for security or maybe fruiting plants for an urban garden. We also offer an installation service in cooperation with approved installers.

Green and brown are the standard facing colours but we also offer bespoke colours for particular environments or to assimilate a client’s corporate identity.

For ABG product datasheets, CAD details, design guidance & other technical information call 01484 852096 or email geo@abgltd.com
Webwall® Benefits

Environmentally Beneficial Structures
By using site won fill and reducing import and export on-and-off site, installing a Webwall® system can greatly reduce the carbon footprint of the development of the site, providing a sustainable and more environmentally friendly solution. Up to three BREEAM points are available with Webwall® depending upon species planted.

SuDS Compliant Solutions
Webwall® can be used to create swales, ponds and other sustainable solutions in line with current legislation to help meet the drainage requirements for the sustainable built environment.

Speed of Construction
Webwall® can be built in a matter of days rather than weeks without large equipment such as cranes, providing considerable savings by improving programme time. ABG provides supervision to impart simple but necessary skills or can offer a full installation service.

Flexibility
Webwall® offers great flexibility and can cope with the most challenging applications. Webwall® can be constructed to form straight lines, smooth curves or 90° bends and can be constructed at any desired inclination to suit site requirements.

Reinforced Soil Facing
Webwall® is the ideal facing for reinforced soil slopes and walls, even allowing vertical faces to be constructed.

Turnkey Solutions
ABG are able to provide a single point supply, with supervision, installation and maintenance all in one package, including optional PI design, to create a turnkey, retaining wall solution.
Webwall® offers many advantages over other retaining wall systems including lower labour costs, cheaper materials and reduced maintenance.

The Webwall® structure is formed from horizontal layers of geocellular panels, each panel being expanded and filled, layer-by-layer, until the required height is achieved. If the design requires, the structure can be reinforced by integration of a geogrid. As the layers are positioned, the front cells of the wall are filled with top soil and then vegetated, either through seeding or planting.

Webwall® can be constructed with a face angle (to the horizontal) up to 70° to ensure there is sufficient step-depth to allow successful planting, essential for the long-term protection of the wall face against UV light. Steeper angles require a protective facing.

**Fill Selection**
Webwall® constructions are designed to use site arising materials or ‘acceptable’ fill as backfill behind the face panels and around the reinforcing elements (if used). This reduces the need for haulage and consumption of high quality granular materials.

Granular materials including crushed rock, concrete or brick are necessary to fill the lower layers of the Webwall® when adjacent to a water course. Very soft clay may not be suitable. Soft or firm clay may be acceptable for small projects where placement and ramming are carried out by hand. If stiff or hard clay is the only material available, it must be broken up by rotavating or by excavating thin slices, to produce gravel size aggregate. The maximum particle size should not exceed 75mm for any backfill material.

**Applications**
- Retaining structures
- Visual/noise barriers
- Vegetation faced gravity walls
- Vegetation faced geogrid reinforced retaining walls
- Containment bunds
- Inlet/outlet headwalls
- Steepening bunds
- Steepening embankments
- Swale and channel construction
- Pond and detention basins

**Reinforced Webwall®**
Webwall® constructed with geogrid reinforcement usually comprises only Type A panels. In these constructions, Webwall® acts as a facia working with the geogrid to form a structure. When using geogrids the height of the structure is limited by the underlying ground conditions.
Unreinforced Webwall® constructed without geogrid is economic up to 3m high. When constructed without geogrid, a combination of Type A, B and C panels (see below) are used.

Fildrain geocomposite drainage strips to relieve groundwater pressure.

Panel Types

Type C

1.0m

2.0m

Type B

1.5m

4.0m

Type A

250mm
**Reinforced Webwall®**

**Description:** ABG Trigrid geogrid is used to create a reinforced soil block with ABG Webwall® panels as facing elements.

**Maximum Retained Height:** Typically up to 6.5m at an angle of 70°. Greater heights can be achieved at lower angles.

**Advantages:** Achieves the maximum retained height while still allowing re-use of site soils.

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**Unreinforced Webwall®**

**Description:** ABG Webwall® panels of various sizes backfilled with compacted soil to create a rigid block which retains soil.

**Maximum Retained Height:** Typically up to 3m at an angle of 70°. Greater heights can be achieved but reinforced Webwall® is usually more economic.
**Webwall® Bund**

**Description:** ABG Webwall® panels are used to create a bund for the purposes of noise reduction, visual bund or with specialised design, as a small dam for stormwater detention ponds.

**Maximum Retained Height:** Typically up to 3.0m at an angle of 70°. Greater heights can be achieved at lower angles or when reinforced with geogrid.

**Advantages:** Allows a bund to be constructed with a minimal footprint and a green finish.

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**Crash Barrier / Tree Rings**

Concrete foundation for handrail/crash barrier poured into Webwall® panels, with reinforcement if required as per engineer’s requirements. Typically extends to 0.75m below ground surface.

**Description:** A crash barrier or fence can be constructed at the top of ABG Webwall® by backfilling selected cells of the Webwall® panel with concrete to create a suitable foundation capable of resisting truck impact loads. Similarly, concrete rings can be inserted to create tree pits.

**Maximum Retained Height:** n/a.
**Terraced Webwall®**

Description: ABG Webwall® panels arranged to form a terrace for pedestrian access with a handrail if required. A terrace is a necessary feature for tall, curved, Webwall® structures.

Maximum Retained Height: Varies depending on the set-back of the Webwall® panels and the ground conditions on site.

Advantages: Flexible design options allow any combination of corners, bends and gradients without requiring abrupt changes in angle and expensive connections.

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**Hybrid Webwall®**

Description: An hybrid design incorporating a Reinforced Webwall® with an Unreinforced Webwall® on top.

Maximum Retained Height: Typically up to 6m at an angle of 70°. Greater heights can be achieved at lower angles.

Advantages: Allows the installation of buried services, drains or shallow foundations close to the crest of the Webwall® without interfering with geogrid reinforcement whilst maintaining a uniform face to the wall.
**Cutting Face Webwall®**

Description: ABG Webwall® panels as facing to cuttings.

Maximum Retained Height: Typically up to 10m.

Advantages: Reduced volume of materials particularly useful for cutting slopes.

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**Vertical Webwall®**

Description: ABG Webwall® with a vertical face.

Maximum Retained Height: Typically up to 3m.

Advantages: Maximum use of space.
Drainage of Earthworks

French drains and crushed stone drainage blankets are the traditional method of drainage for earthworks but they can be extremely inefficient and costly when compared with modern alternatives such as Fildrain geocomposite. Fildrain comprises a cuspatated HDPE drainage core bonded to a filter geotextile and is available in strips or wide-width blankets.

As a cost effective alternative to French drains, Fildrain strip can be installed vertically in a narrow trench or in replacement of stone blanket drainage, large rolls of Fildrain can be easily rolled out on site.

Excavated soil is re-used as backfill in both instances, reducing earthworks volume and wagon movements and yielding significant cost and carbon savings for the project.

Erosion Control of Slopes

ABG has a complete range of products for erosion control of existing and newly formed steep slopes. Soil loss during heavy rain flow is a major concern for stability of the slope and the resulting silt pollution of local rivers. ABG will help select the appropriate solution, whether that is a light-weight or a heavy-duty biodegradable mat, a permanent erosion control mat or a geocell web which can provide veneer stability to the soil layers.

Stabilisation of Haul Roads

Frequent trafficking by vehicles with heavy loads will result in ruts and constant re-grading of the road. ABG has a range of solutions to stabilise the road base such that the minimum quantities of stone can be used to build a road that subsequently requires minimal maintenance. The solution could be based on a robust woven geotextile, a geogrid or a geocell web, whichever is the most economic and practical for each design situation.

Porous Paving

Cellular porous paving systems have played a key role in managing flood risk for almost 30 years and infiltration control is recognised as an effective solution for sustainable drainage systems (SuDs). ABG offers a range of cellular porous paving systems to assist with flood control and ground-based attenuation. In addition to providing an aesthetically pleasing and cost effective solution they also deliver a number of significant environmental benefits.
ABG is a market leader in the design, development, manufacture and technical support of high performance geosynthetic systems for use in a wide range of civil engineering, environmental and sustainable building projects.

Formed in 1988, based in Meltham, in the heart of the Pennines, ABG have developed an excellent reputation for developing quality products and delivering outstanding service. The ability for rapid product development ensures that the most innovative, up to date and cost effective solution can be found for many engineering problems.

ABG's involvement in retaining walls goes back over twenty five years and we have a complete range of products developed specifically for use in this technically demanding application.

Technical support is provided by our trained and experienced staff, many of whom are Chartered Civil Engineers. This extensive support extends to design, design validation, feasibility studies, cost advice and advice on meeting regulatory requirements.

ABG is active in developing and driving knowledge within our industry including working with both international and local regulatory bodies on developing guidance and best practice in the use of innovative geosynthetics to solve complex engineering issues.

To discuss your project specific requirements contact:

+44 (0) 1484 852096

info@abgltd.com
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