

This Technical Note provides guidance on the pins that can be used to fix **Erosaweb** to a slope, how to install them, the number of pins required, and their layout. This Technical Note does not cover **Erosaweb** installed over a sensitive membrane, or revetments which may require large stones or concrete infill. These solutions are covered in separate Technical Notes.

Pin Type

The pins used should be specified in the Project drawings. The dimension of J Pin required will vary depending on which type of **Erosaweb** is used on site (see **Table 1**).

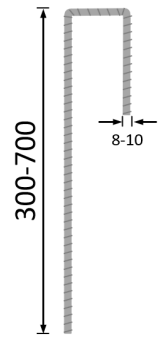


Table 1: Pin Types for use with ABG Erosaweb

Pin	Type	Length	Diameter	ABG Erosaweb Compatibility
Abpin 300/8	J Pin	300 mm	8 mm	GWX 100/300
Abpin 500/8	J Pin	500 mm	8 mm	GWX 200/300
Abpin 700/10	J Pin	700 mm	10 mm	GWX 300/300

Pin Installation

J Pins are hammered into the slope using a mallet and are installed at the apex of the **Erosaweb** cell with the hook looped over the top of the cell wall (see **Figure 2a**). All pins should be installed at approx. 10° from perpendicular to the slope as shown in **Figure 2**.

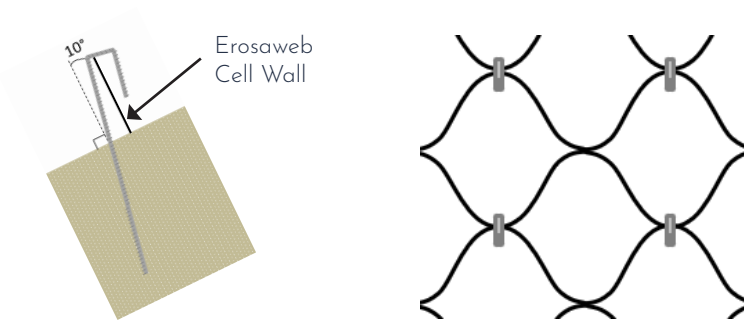


Figure 2: Pin Installation

The in-plane flows are expressed at a hydraulic gradient of 1/50 and have been reduced by a partial factor for long term creep. The crushed stone is based on a permeability of $1 \times 10^{-3} \text{m/s}$. The long term pressure is based on load spread through a paved surface and sub-base layer. Deckdrain SD is available when an additional smooth interface is required.

Notes

- (1) In-plane flow testing is to EN ISO 12958 with SOFT FOAM platens to simulate textile intrusion into the core due to soil pressure.
- (2) Long term 120 year creep has been assessed by ASTM D7361 SIM tests with product specific flow reduction of 10-20% in 120 years.
- (3) The geotextile filter has zero breakthrough head and is compatible with typical soils. Seek advice from ABG for unusual soils or critical applications.
- (4) This information is produced for comparison only and is not intended for design purposes.

Pin Layout

The layout of pins across an **Erosaweb** panel can be difficult to translate from a specification to practical application on site. In addition, the layout will vary depending on the slope angle and soil conditions, and the type of pin used (J pin or Helical Pin). Appended to this document are diagrams illustrating the pin layout for each of the following situations:

- Erosaweb 300 - J Pin Layout
- Erosaweb 300 - Helical Pin Layout

These diagrams are collectively referred to as the '**Erosaweb** Pin Layout Diagrams' and should be read in conjunction with the advice in this Technical Note.

Pin Frequency

As with the pin layout, the frequency of pins varies depending on the slope angle and soil conditions, the type of pin used and the type of **Erosaweb**. The total quantity of pins required will depend on the number of 'Intermediate Pins' (pins dispersed evenly across the slope) and 'Panel Connection and Edge Pins' (pins located between **Erosaweb** panels and at the edges of the slope).

Intermediate Pins

The number of Intermediate Pins required is specified as a 'Pinning Pattern' which matches the size of the **Erosaweb** cells, and on a per m² basis to quickly assess quantities. Table 2 lists typical Intermediate Pin frequencies for average ground conditions and the Pinning Pattern to use in accordance with the **Erosaweb** Pin Layout Diagrams. For site specific advice the ABG Technical Team should be contacted for recommendations.

Panel Connection and Edge Pins

Additional Panel Connection Pins are often required where **Erosaweb** panels abut (Connection Pins) and at the edges of **Erosaweb** slopes (Edge Pins). Further details on this are contained in the **Erosaweb** Installation Guide. Both Connection Pins and Edge Pins should be the same type of pin as used for intermediate pinning.

The location and frequency of connection pins is described diagrammatically in the Erosaweb Pin Layout Diagrams. When pinning in the downslope direction where Erosaweb Panels abut, adjacent panels should have their cells nested together with pins connecting the cell walls. When pinning across the slope adjacent panels should be in contact at cell edges only.

If a cell already has a pin in it as part of the Intermediate Pinning regime, an additional connection pin is not required. For example, if Intermediate Pins in Erosaweb 300 are at a rate of 18 per m² then every cell already has a pin in it and no Connection Pins are required. If intermediate pins in Erosaweb 500 are at a rate of 2 per m² (one in every fourth cell) then Connection Pins are required across the slope, but not required down the slope.

When using J Pins, the hook of the J Pin should extend over into the adjacent panel. When using Helical Pins, the Webgrips should extend through the perforations of both abutting panels (see Erosaweb Pin Layout Diagrams).

Edge Pins

At the top, bottom, and sides of a slope covered in Erosaweb, the Erosaweb should be buried in trenches along each side. Additional Edge Pins should be installed at the base of each trench. At the top of the slope there should be a pin in every cell. Along the sides of the slope Edge Pins should be in every third cell (similar to Panel Connection Pins in the downslope direction). At the bottom of the slope Edge Pins are only required to help expand the Erosaweb panel prior to backfilling - so every 1.5m to 2.0m should be adequate.

Table 2: Typical Pin Frequencies

Erosaweb	Pin Type	Slope \leq 1:2 ($\leq 26^\circ$)	Slope $>$ 1:2 to \leq 1:2 ($> 26^\circ$ to $\leq 45^\circ$)	Slope $>$ 1:1 to \leq 2:1 ($> 45^\circ$ to $\leq 65^\circ$)
GWX 100/300	Abpin 300/8	2 pins / m ² (Pattern P3-8)	6 pins / m ² (Pattern P3-4)	9 pins / m ² (Pattern P3-3)
GWX 150/300	Abpin 400/8	3 pins / m ² (Pattern P3-6)	9 pins / m ² (Pattern P3-3)	14 pins / m ² (Pattern P3-2)
GWX 200/300	Abpin 500/8	5 pins / m ² (Pattern P3-5)	9 pins / m ² (Pattern P3-3)	14 pins / m ² (Pattern P3-2)
GWX 300/300	Abpin 700/10	5 pins / m ² (Pattern P3-5)	9 pins / m ² (Pattern P3-3)	14 pins / m ² (Pattern P3-2)

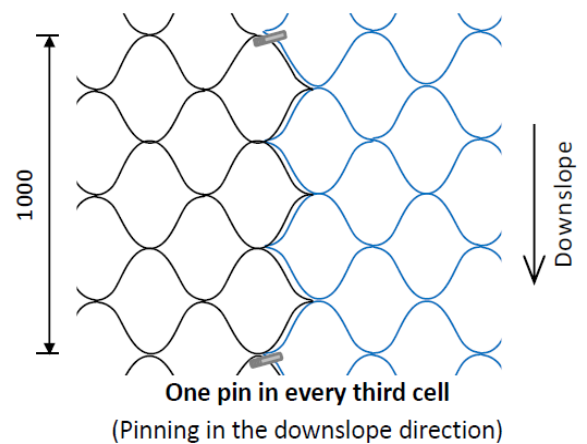
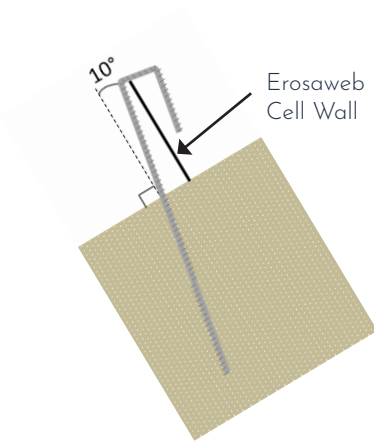
The frequencies shown above include additional pins for connecting adjacent panels and edge pins.

Notes:

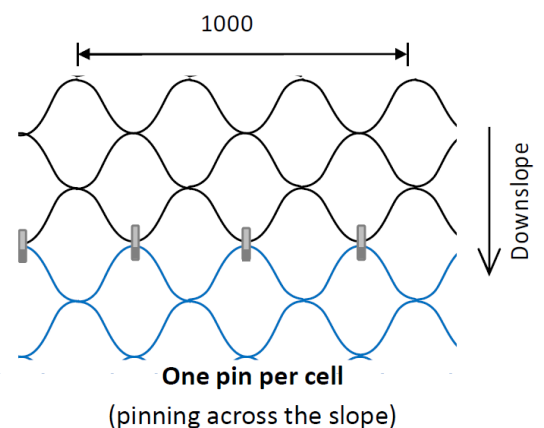
1. The pinning frequencies outlined above should be used for budget pricing only. Contact Technical for advice before finalising the design. Particularly for slopes not specifically equal to 1:2, 1:1, or 2:1, more economic pin spacings than those outlined above can be achieved.
2. On slopes steeper than 45° **Erosaweb** will be suitable provided the cells are filled with suitably cohesive fill to ensure the soil is contained within the **Erosaweb** cells. If cohesive soil is not available, contact ABG for alternative soil retention solutions.
3. The final spacing of Intermediate Pins is heavily dependent on the ground conditions on site. As such the values given above are indicative only and no guarantee is given that they are accurate for all sites.
4. Intermediate Pin spacings are based on pins installed in average ground conditions, backfilled with typical topsoil. Spacings may be reduced if pins are to be installed in firmer ground and test pin installation shows improved performance. If poor ground conditions exist the ABG Technical Team must be contacted to provide site specific advice.
5. Further information on the **Erosaweb** installation process is provided in the **Erosaweb** Installation Guide.

J Pin - Pinning Patterns

Pattern Name	Pins per m ²	Distribution				Pattern Name	Pins per m ²	Distribution			
P3-1	18	a: 1/1	b: 1/1	c: 1/1	d: 1/1	P3-5	5	a: 1/2	b: 0	c: 1/2 [O]	d: 0
P3-2	14	a: 1/1	b: 1/2	c: 1/1	d: 1/2 [O]	P3-6	5	a: 1/3	b: 1/3	c: 0	d: 0
P3-3	9	a: 1/1	b: 0	c: 1/1	d: 0	P3-7	5	a: 1/4	b: 0	c: 1/4	d: 0
P3-4	6	a: 2/3	b: 0	c: 2/3 [O]	d: 0	P3-8	5	a: 1/5	b: 1/5 [O]	c: 0	d: 0



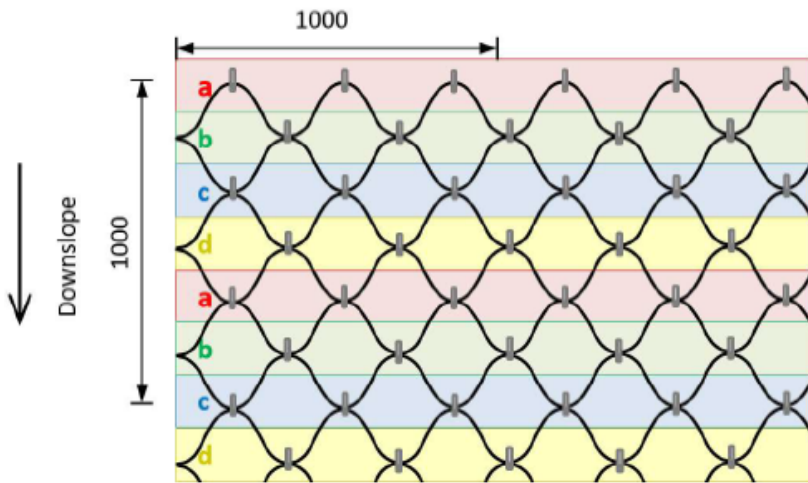
Trench Location	Pins at Base of Trench
Top of Slope	J Pin
Slope Sides	One pin per cell
Base of Slope	As required to hold cells in place prior to backfilling



Notes:

1. The pins shown in the figures are not to scale.

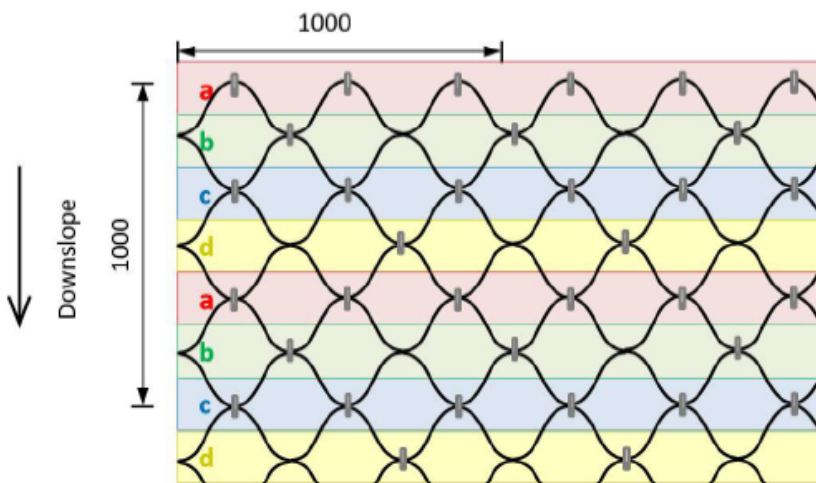
J Pins - Pinning Pattern P3-1 - 18 pins/m²



Row Ref.	Pin Distribution	Description
a	1/1	One pin in every cell
b	1/1	One pin in every cell
c	1/1	One pin in every cell
d	1/1	One pin in every cell

Pattern repeats below

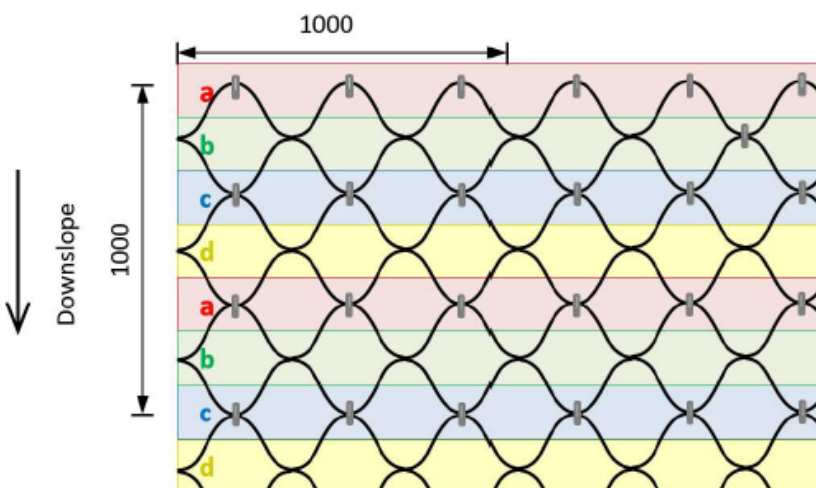
J Pins - Pinning Pattern P3-2 - 14 pins/m²



Row Ref.	Pin Distribution	Description
a	1/1	One pin in every cell
b	1/2	One pin in every cell
c	1/1	One pin in every cell
d	1/2 [O]	One pin in every cell (offset)

Pattern repeats below

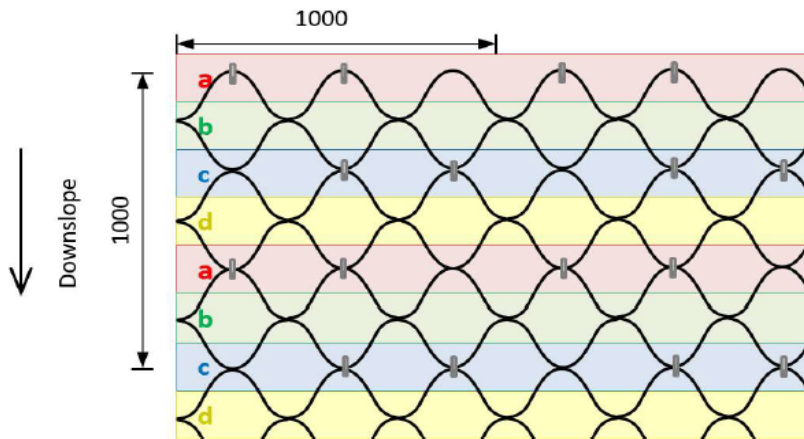
J Pins - Pinning Pattern P3-2 - 9 pins/m²



Row Ref.	Pin Distribution	Description
a	1/1	One pin in every cell
b	0	None
c	1/1	One pin in every cell
d	0	None

Pattern repeats below

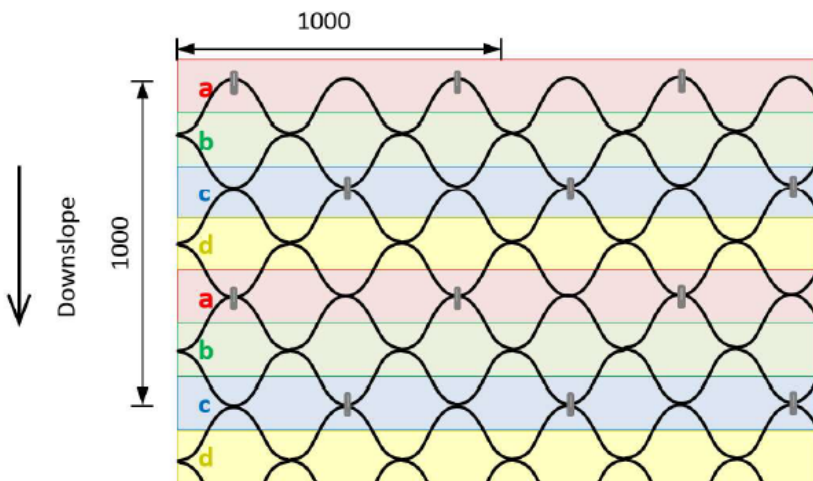
J Pins - Pinning Pattern P3-4 - 6 pins/m²



Row Ref.	Pin Distribution	Description
a	2/3	Two pins in every 3 cells
b	0	None
c	2/3 [O]	Two pins in every cells (offset)
d	0	None

Pattern repeats below

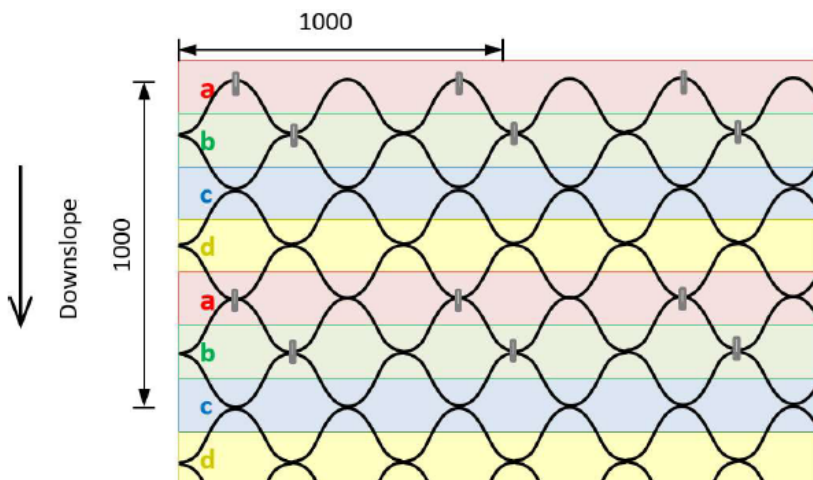
J Pins - Pinning Pattern P3-5 - 5 pins/m²



Row Ref.	Pin Distribution	Description
a	1/2	One pin in every 2 cells
b	0	None
c	1/2 [O]	One pin in every 2 cells (offset)
d	0	None

Pattern repeats below

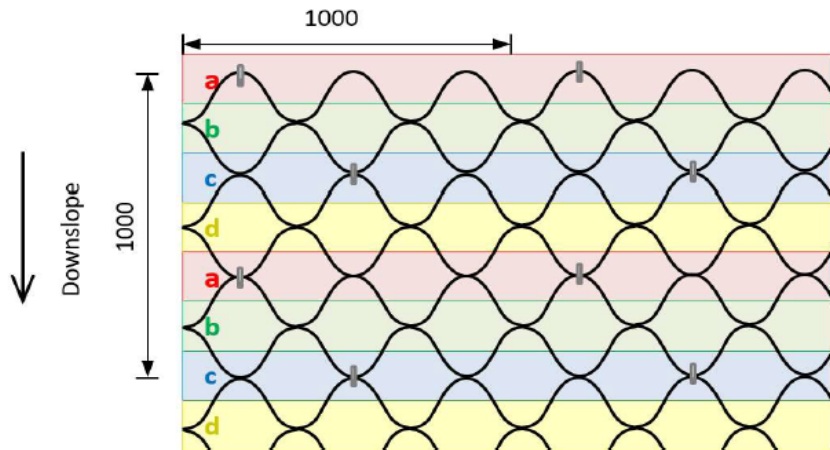
J Pins - Pinning Pattern P3-6 - 3 pins/m²



Row Ref.	Pin Distribution	Description
a	1/3	One pin in every 3 cells
b	1/3 [O]	One pin in every 3 cells (offset)
c	0	None
d	0	None

Pattern repeats below

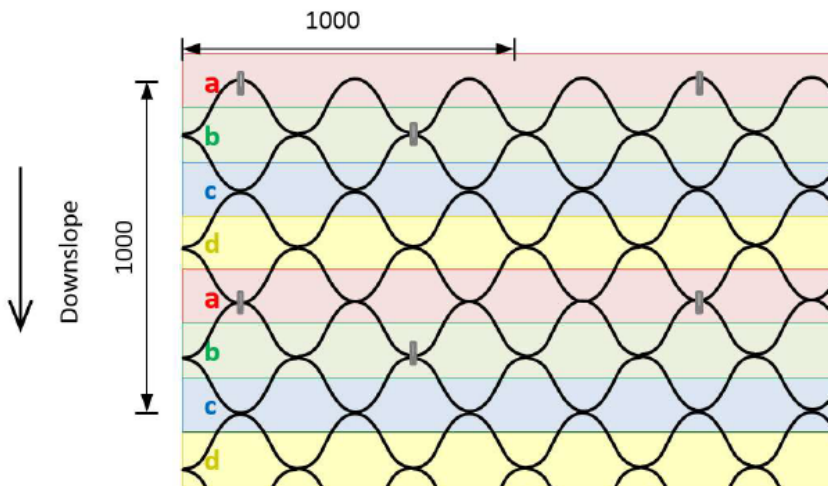
J Pins - Pinning Pattern P3-7 - 2 pins/m²



Row Ref.	Pin Distribution	Description
a	1/4	One pin in every 4 cells
b	0	None
c	1/4 [0]	One pin in every 4 cells (offset)
d	0	None

Pattern repeats below

J Pins - Pinning Pattern P3-8 - 2 pins/m²



Row Ref.	Pin Distribution	Description
a	1/5	One pin in every 5 cells
b	1/5 [0]	One pin in every 5 cells (offset)
c	0	None
d	0	None

Pattern repeats below