



Concrete Weavers LLC

it's a concrete miracle

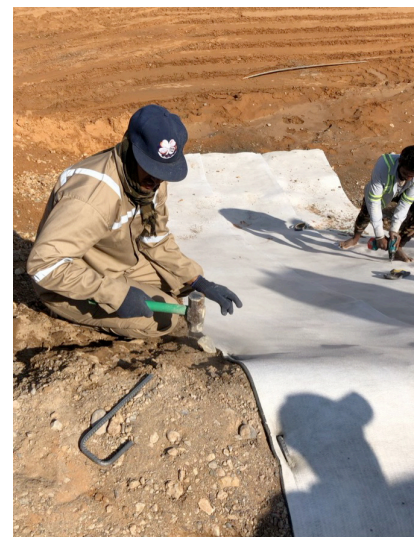
INSTALLATION USER GUIDE:
EROSION OR SLOPE PROTECTION

PRESENTATION

- ▶ Concrete Weavers is a new and revolutionary construction material called concrete rolls or concrete cloth. Essentially it is concrete on a roll.
- ▶ The finished product is a combination of two geotextiles with a dry concrete mix in between. The product initially is flexible and can be put in any shape desired. Once water is applied to it, it starts to set and becomes hard. No need for plant or mixing equipment on site, just add water.
- ▶ The bottom layer is a woven geotextile and the top layer is a non-woven geotextile.
- ▶ Between the top and the bottom layer, there is a special Concrete Weavers dry mix, developed by a Dutch company with many references such as; Nakheel Mall UAE , Abu Dhabi Plaza Skyscraper, Kazakhstan, Coen Underwater Tunnel Netherlands, Port house Belgium, Cairo's Grand Egyptian Museum Egypt, etc.
- ▶ Top and bottom layers are connected by needle punching technology.
- ▶ Concrete Weavers are available in 2 different thicknesses and strengths; the civil model used for erosion control, irrigation, ditch lining, dust suppression etc. and the military model used for runway construction over all kind of terrains, temporary parking for planes and vehicles, temporary military roads etc.

SCOPE / EXTENSION

- ▶ This record gives direction strategies to the installation of Concrete Weavers as Slope Protection in a way that maximize safety, proficiency, and the physical integrity of the material and channel.
- ▶ This record gives valuable data to installers, clients & specifiers of Concrete Weavers & gives an outline of installation methods for the lining of channels.
- ▶ The flexible idea of Concrete Weavers means that this record isn't exhaustive & is expected for direction purposes only. Exemptions to this rule might be required to address site-specific as well as product-specific conditions.
- ▶ The performance of the Concrete Weavers is completely dependent on the quality of its installment. It is the installer's responsibility to adhere to these rules where applicable & to the project specification, detail & drawings.



Determining & Specifying the right Concrete Weavers Thickness

- ▶ Concrete Weavers is available in two thicknesses, CW Civil 8 (8mm) and CW Military 18 (18mm).
- ▶ Concrete Weavers Civil is the standard thickness utilized for slope or erosion protection. & is appropriate for most of applications where surface water flow is from direct rainfall only.
- ▶ Concrete Weavers Civil should be considered for applications where the erosion or slope will take extra water run-off, for instance on spillways and outfalls and the flow rate is below 8.6m/s.
- ▶ Concrete Weavers Civil should be considered as where flow rates are above 8.6m/s or where the Concrete Weavers may be inclined to impacts from debris or a high level of abrasion.

| Product | Nominal Thickness (mm) | Batch Roll Size (m ²) | Bulk Roll Size (m ²) | Roll Width (m) |
|-------------|------------------------|-----------------------------------|----------------------------------|----------------|
| CW CIVIL | 8 | 10 | 100 | 1 |
| CW MILITARY | 18 | N/A | 100 | 1 |

Determining & Specifying The Right Concrete Weavers Roll Format

- ▶ Concrete Weavers is available in Mass Rolls or as littler Batched Rolls.
- ▶ Bulk or Mass Rolls offer the speediest installation but must be deployed utilizing heavy lifting equipment & a spreader beam/bar. Bulk or Mass Rolls are commonly more productive to use than Batched Rolls, in terms of material use and transportation.
- ▶ For sites where this isn't appropriate, man portable Batched Rolls can be installed without the requirement for plant & are appropriate to littler scale works in restricted access regions.
- ▶ Concrete Weavers is currently also available in Wide Rolls of up to multiple times the standard roll width. Contact Concrete Weavers for further details.

Determining / Specifying the right Concrete Weavers layup or Installation or Setup

- ▶ Standard practice is to lay Concrete Weavers vertically down the length of the slope (longitudinal) as this gives the quickest technique for installation & enables each roll to be safely fixed at the crest of the slope. In the event that a transverse layup is utilized, care should be taken to position the overlap toward water flow (like shingled roof tiles) & hydraulic driven shear force loads should be considered as while choosing the jointing technique.
- ▶ Concrete Weavers is a new and revolutionary construction material called concrete rolls or concrete cloth. Essentially it is concrete on a roll.
- ▶ The finished product is a combination of two geotextiles with a dry concrete mix in between. The product initially is flexible and can be put in any shape desired. Once water is applied to it, it starts to set and becomes hard. No need for plant or mixing equipment on site, just add water.
- ▶ The bottom layer is a woven geotextile and the top layer is a non-woven geotextile.
- ▶ Between the top and the bottom layer, there is a special Concrete Weavers dry mix, Concrete Weavers can be utilized to give a hard wearing erosion control surface for quickly protecting slopes, outfalls, spillways & over-toppings. Concrete Weavers is ordinarily utilized as an option in regular concrete, for example, shotcrete, and where vegetated slopes are unsatisfactory because of the high flow rates, dry atmosphere or poor soil conditions.

- ▶ The following guide gives helpful data to installers, clients and specifiers of Concrete Weavers as a diagram of installation methods for securing slopes with Concrete Weavers. It should be utilized together with the other significant guides, for example, the Concrete Weavers User Guide: Jointing and Fixing. The adaptable idea of Concrete Weavers means that this report or document isn't exhaustive & is proposed for direction purposes only.
- ▶ Here are some key inquiries that you may need to consider before specifying or purchasing Concrete Weavers.

Is the application Erosion Protection or Slopes Protection or Stabilisation?

Slope Protection:

- ▶ Slope Protection describes applications where the body of the slope is geotechnically steady or stable however the surface of the slope is prone to erosion from weathering & surface slip. Normally this may be on a sandstone rock face. Or on the other hand on slope developed from a mixture of rock & soil, where rainfall causes loss of fines which then causes loss of fines which at that point dangers destabilizing the slope.

Slope Stabilisation:

- ▶ Slope Stabilization describe applications where the body of the slope is geotechnically unstable & is in danger of deep slip (an large mass of the slope collapsing). This might be brought about by ground-water lubricating the soil or from different factors, for example, ground vibration. Traditional solutions or arrangements include shotcrete, steel mesh & soil nails which are utilized to balance the slope by giving basic structure reinforcement. Concrete Weavers can substitute for the shotcrete segment for many projects yet should be include as a part of solution designed by a geotechnical engineer.
- ▶ This guide focuses around Slope Protection / Erosion Protection, in spite of the fact that a ton of similar methods can be connected to slope stabilization.



Which Fixing Method or Technique?

- ▶ Concrete Weavers should be safely fixed & anchor trenched at the crest of the slope. The anchor trench is basic so as to avoid water flow below the material which may undermine the Concrete Weavers. Extra fixings should be utilized down the face for profiling or extra help as required.
- ▶ The following gives examples of appropriate fixings to various substrates. For full details of jointing & fixing strategies please observe the Concrete Weavers User Guide: Jointing and Fixing.
- ▶ **To Soil:** Concrete Weavers can be fixed to a slope substrate utilizing pegs, an anchor trench, soil nails or ground stays. The most widely recognized strategy for securing Concrete Weavers at the crest is utilizing a mix of pegs and an anchor trench. Peg length & dividing should be resolved dependent on the pull out power requirement (for example self-weight, water flow & so on.), however commonly separating is at each joint along the crest. It is essential to avert water entrance between the Concrete Weavers & the substrate at the crest as this can prompt undermining. A effective methods for fixing this top edge is by covering the uncovered Concrete Weavers in an anchor trench backfilled with concrete or site fill material. A anchor trench also gives a neat aesthetic change to the surrounding landscape.
- ▶ **To Concrete:** Concrete Weavers can be fixed to concrete substrate (example headwall) utilizing traditional masonry fixings, for example, self-tapping, masonry bolts, wedge anchors & "Hilti" type nails. We recommend a fixing with a base shank distance across of 3mm & least washer/head diameter of 16mm or a clamping bar to prevent pull-through.
- ▶ **To Rock:** Concrete Weavers can be verified onto rough or rocky substrates utilizing rock bolts; the number and kind of fixings should be chosen dependent on the pull out force requirement. An appropriate head design should be chosen to prevent pressure concentrations.
- ▶ A minimum head measurement of 15mm is regularly recommended & plates up to 150mm are frequently utilized. Large anchor plates should be round where possible or have radiused corners to avoid pressure concentrations.

Which Jointing Technique?

- ▶ A reasonable jointing strategy should be chosen dependent on the loading & water impermeability requirement of the project. The standard technique for jointing for slope protection is to utilize a screwed joint which gives a decent mechanical bond & adequate impermeability for most slope protection applications. We recommend utilizing stainless steel screws inserted at 200mm centers along the overlap. The screws should be situated between 30-50mm from the edge of the joint and connected before hydration or promptly a while later. The concrete inside Concrete Weavers will at that point set around the joint of the screws. Please follow the Concrete Weavers User Guide: Jointing and Fixing for all the more jointing techniques.
- ▶ If a higher level of impermeability is required (for example on an outfall) at then a bead of sealant, for example, Clearfix can be connected in the cover before screwing. In the event that screws are not reasonable (for example if laying on a geomembrane) at that point a twofold or double bead of adhesive sealant, for example, Clearfix or a thermally bonded joint might be utilized.

Concrete Weavers four key Installation Principles / Establishment Standards

The unique material properties of Concrete Weavers mean that it can be used for a variety of applications. Following the Four Installation Principles below will help ensure a successful installation.

Avoid Voids

Prepare or Set up the substrate so it is all around well compacted, geotechnically steady or stable & has a smooth & uniform surface.

- ▶ For soil substrates, expel/remove any vegetation, sharp or protruding rocks & fill any large void spaces. Ensure the Concrete Weavers reaches the substrate to limit soil bridging or potential soil relocation or migration under the layer.
- ▶ For Concrete substrates, remove or expel any loose, free or friable material, remove any protruding uncovered re-bar and fill any large cracks or breaks or voids.

Secure Weavers

Ensure that the Concrete Weavers is Jointed at each overlap between layers & that those layers are Fixed to the substrate.

- ▶ **Jointing:** Overlapped Concrete Weavers layers should be safely jointed together, ordinarily this is achieved utilizing stainless steel screws applied or connected with an auto-fed screw gun at regular intervals. Right screw position will help guarantee private contact between Concrete Weavers layers, prevent washout of the substrate, & limit potential weed development or growth. A adhesive or glue sealant can be applied or connected between the layers to improve the joint impermeability. A non-penetrative method for jointing is to 'thermally bond' the Concrete Weavers layers together. This also improves joint impermeability. For additionally jointing options see the Concrete Weavers User Guide: Jointing & Fixing.
- ▶ **Fixing:** When fixing to a soil substrate, ground pegs (eg J-Hook) are normally used. On rock or concrete substrates, Concrete Weavers layers can be jointed together & fixed to the substrate utilizing masonry bolts, percussion anchors or shot fired masonry nails. Stainless steel fixings with washers are recommended.

Prevent Ingress / Avert or Block Entrance

It is essential to avert or block water or wind entrance between the Concrete Weavers & the substrate, both around the perimeter of the installation & along the joints.

- ▶ For soil substrates, this is ordinarily achieved by capturing the whole edge of the Concrete Weavers within an anchor trench.
- ▶ On solid or rock or concrete substrates, the perimeter edge should be fixed with a concrete fillet or an adhesive sealant.
- ▶ All overlapped Concrete Weavers layers should be lapped toward water flow.

Hydrate Fully / Hydrate Completely

It is basic to appropriately hydrate Concrete Weavers, considering the amount of material utilized and surrounding temperature conditions.

- ▶ Always guarantee or ensure hydration through the fibrous top surface.
- ▶ Ensure to hydrate any overlapped areas & anchor trenched material before backfilling.
- ▶ Spray the fiber surface with water until it feels wet to contact for a several minutes after hydration.
- ▶ Follow the Concrete Weavers User Guide: Hydration.

Equipment Required

- ▶ Adequate or sufficient Concrete Weavers to finish project.
- ▶ Security cover, Safety Mask & Gloves
- ▶ Cutting equipment, snap off knife or disc cutter.
- ▶ Metal or plastic fixing pins.
- ▶ Hammer Lump.
- ▶ Screwdriver & stainless screws or elective technique to join the Concrete Weavers layers.
- ▶ Water supply.
- ▶ Follow Concrete Weavers Equipment List for full details. Dust hazard or risk. Wear proper PPE.

Ground Building / Preparation

- ▶ Concrete Weavers will adjust closely to the underlying surface shapes of the slope. For slope with a high level of surface undulation it is recommended to review the slope if possible or conceivable, to decrease voids from forming among Concrete Weavers & the substrate. Where it is not possible to grade the slope, voids can be reduced by profiling with reasonable fixings. For the best outcomes it is also recommended that loose soil, vegetation, delicate or soft ground and protruding rocks are expelled or removed.

Fixing & Installation & Laying Concrete Weavers

- ▶ The quickest and easiest demanding technique for laying Concrete Weavers is using Bulk or mass rolls hung from a spreader beam or bar. If access for heavy lift plant equipment is limited or restricted, batched rolls might be used. The method for laying bulk & batched rolls is the same.
- ▶ When laying the Concrete Weavers ensure that the fibrous surface of the Concrete Weavers is facing upwards & the PVC membrane is in contact with the ground. For longitudinal (vertical introduction) layup the Concrete Weavers should initially be verified at the crest of the slope, utilizing one of the techniques described above, and after that unrolled down the length of the slope.

Profiling & Positioning Concrete Weavers

- ▶ When situating resulting Concrete Weavers rolls, ensure that there is at least a 100mm overlap among layers & that all overlaps are toward water flow (essentially for transverse layups). Concrete Weavers may need to fixed down the face of the slope for profiling or to give extra help.
- ▶ It is desirable over find fixings along the overlaps where possible or conceivable, hydrating under the overlap first.

Hydrating Concrete Weavers

- ▶ Once situated, Concrete Weavers should be hydrated by splashing with water (ocean water might be utilized). Shower the fiber surface with water until it feels wet to contact for a several minutes after spraying or splashing. An excess of water should be used as Concrete Weavers can't be over hydrated (minimum proportion of water: Concrete Weavers is 1:2 by weight). Re-shower or spray the Concrete Weavers again after 1 hour if installing on steep slopes or installing in warm weather or atmospheres. It is important to ensure that overlapped & anchor trench areas are hydrated. Follow to the Concrete Weavers User Guide: Hydration, for directions on the right hydration method. Please note that you should not depend on rainfall to hydrate the material.

Jointing Concrete Weavers

- ▶ The quickest and easiest technique for jointing is using stainless steel screws at 200mm spacing. These can be applied or connected using an auto-fed collated screw driver. In the event that a screwed joint isn't suitable or appropriate, for example where a larger level of impermeability is required, thermal bonding or an adhesive or glue sealant joint can be used. Please follow to the Concrete Weavers User Guide: Jointing and Fixing.

Configuration / Adjustment / Setting

- ▶ There is a working time of 1-2 hours after hydration.
- ▶ In hot climates, working time may be reduced. Concrete Weavers will harden to 75% of its 28 day strength or quality in 24 hours and is then ready or prepared for use.

Maintenance and Upkeep and Repair

- ▶ In the correct conditions, Concrete Weavers will normally 'green' after some time with moss and mix in with the environment. The surface can also be painted with an reasonable masonry paint whenever required.



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