The Natural Choice for Erosion Control Products
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COMPANY PROFILE

Nedia Enterprises offers a complete line of erosion control, sediment control, and bioengineering products made primarily from natural fibers. We provide innovative quality products and excellent service to our customers in the erosion control and bioengineering industry.

PHILOSOPHY

Nedia is committed to the conservation of the environment. We believe that the proper use of our erosion control products will contribute to improved environmental function and encourage widespread use of innovative and vegetation friendly bioengineering techniques.

INNOVATION

We are constantly striving to develop new and improved products that contribute to the enhancement and the protection of the environment. Some of our products were the result of innovative problem solving with customers who have specific needs. We also tailor our existing products to better suit specific project needs.

QUALITY CONTROL

Our products are subject to stringent quality control measures that meet or exceed industry standards. We routinely submit our products to independent testing laboratories for ASTM testing to ensure the highest quality and document performance.

TECHNICAL SUPPORT

Nedia offers sound technical advice on product selection and installation. We have a thorough understanding of the benefits and limitations of our products. We work closely with a network of experts in various facets of erosion control and bioengineering who offer additional design guidance.

PRICE & AVAILABILITY

We do our best to provide competitive pricing. A large inventory of products in several distribution centers across the country facilitate cost effective and timely delivery of our products.
THE BASICS OF BIOENGINEERING

Soil bioengineering is a cost-effective alternative to conventional engineering relying on vegetation to stabilize erodible soils providing exceptional benefits to the habitat. As a frequent component of modern bioengineering designs, coir erosion control products provide natural erosion protection, during the period of time it takes for the roots and shoots of native plants to colonize and stabilize streambanks, wetlands, or hillside soils. The extended longevity of coir erosion control products provides adequate time for the development of a well-established root system which eventually offers long-term erosion protection. Thus, coir erosion control products have become an important tool in modern bioengineering.

SUCCESS WITH BIOENGINEERING

Often bioengineering techniques are used as an alternative to traditional hard armor methods. For example, a riprap bank can be replaced with a well-designed, bioengineered streambank at a lower cost and with better environmental benefits. Since such innovative techniques often receive increased scrutiny, quality design and implementation are necessary. A few generalizations regarding success with bioengineering are given below:

- An ideal design team should consist of experts in various disciplines including engineering, plant ecology, hydrology and earth work.
- Ensure that plant roots and shoots will replace the structural function of erosion control products by the time fabrics weaken and degrade.
- Consider how the local climate and site conditions will affect plant growth rate and erosion control product degradation rate.
- Material installation can be the weak point of a project, even if the best materials are used. Consider the importance of secure staking, adequate fabric overlap, key trenching, skilled construction supervision and aggressive re-vegetation plans.
- Depending on the type of project, it is important to understand the inundation durations, mechanisms of hill slope and streambank failure, the depth to water table, soil compaction, planting densities, post-project land use, as well as the benefits of monitoring and maintenance.
- Understand the limitations of the erosion control product or the technique.

TYPES OF EROSION CONTROL PRODUCTS

Currently there are several varieties of erosion control and bioengineering products made with synthetic, natural or composite materials. Nedia Enterprises focuses primarily on those products made from natural fibers such as coir, jute and straw. We also offer composite products that combine straw or coir with synthetic fibers for additional strength and longevity. See the table on pages 4 and 5 for typical applications of our line of products.
# Applications

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<td>Fabric covered bank</td>
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<td>Shorelines with low height, Moderate slope and</td>
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<td><strong>Sediment Control</strong></td>
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<tr>
<td>Construction sites, Roadsides, Agricultural</td>
<td>Biodegradable Coir silt fence</td>
</tr>
<tr>
<td>runoff areas</td>
<td></td>
</tr>
<tr>
<td>Curb inlets, Drop inlets, Streams, Channels</td>
<td>Coir wattles, Coir silt fence</td>
</tr>
<tr>
<td>Forests damaged by fire</td>
<td>Coir wattles, Coir silt fence</td>
</tr>
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<td><strong>Channel Lining</strong></td>
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<td>Drainage ditches, Reservoir overflows</td>
<td>Fabric covered channel</td>
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<tr>
<td><strong>Temporary Haul Roads</strong></td>
<td></td>
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<tr>
<td>Temporary haul roads in forests, Mine sites and</td>
<td>Biodegradable stabilizer fabric</td>
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<tr>
<td>construction sites</td>
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<td><strong>Waste water Treatment</strong></td>
<td></td>
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<tr>
<td>Waste water treatment lagoons</td>
<td>Biological treatment using pre-vegetated mats</td>
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<td>Effluent treatment ponds</td>
<td>Pre-vegetated mats with mature vegetation</td>
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<td><strong>Nursery Products</strong></td>
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<tr>
<td>Inter-plant in rip-rap slopes or shorelines</td>
<td>Coir plant containers</td>
</tr>
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<td>Install rooted willow cuttings between fabric</td>
<td>Coir willow sleeves</td>
</tr>
<tr>
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<tr>
<td>Growth medium for rooted plants in wetland and</td>
<td>Pre-vegetated mats</td>
</tr>
<tr>
<td>shoreline use</td>
<td></td>
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</tbody>
</table>
PRODUCT SELECTION GUIDELINES

Slope Stabilization (Typically Uplands)

Streambank Stabilization

Shoreline / Lakeshore Stabilization

Wetlands/Tidal Marshes/Bays

Sediment Control

Channel Lining

Temporary Haul Roads

Waste water Treatment

Nursery Products

Pre-vegetated mats

Mild to moderate slopes, Landscaping

Fire rehabilitation, Disturbed sites

Steep or severely eroding slopes, Moist climates

Low bank heights, Low to moderate bank slopes

Lower erosion potential, Moderate bank slopes

Moderate to high energy, Steeper bank slopes

Higher erosional forces, Steeper bank slopes

Poorly-vegetated lakeshore, Low erosion risk

Shorelines with low height, Moderate slope and erosion risk

Higher erosion potential, Steeper or taller shorelines

Poorly-vegetated sites requiring rapid vegetation cover

Poorly-vegetated areas with moderate to high erosion

Damaged grass beds

Construction sites, Roadsides, Agricultural runoff areas

Curb inlets, Drop inlets, Streams, Channels

Forests damaged by fire

Drainage ditches, Reservoir overflows

Temporary haul roads in forests, Mine sites and construction sites

Waste water treatment lagoons

Effluent treatment ponds

Inter-plant in rip-rap slopes or shorelines

Install rooted willow cuttings between fabric lifts

Growth medium for rooted plants in wetland and shoreline use

Recommended Products

CoirMat 400, 700, 900; KoirWrap 1000, S400, SC400, C400, CTRM 500C

KoirWattle 6 and 9, KoirFence 1250

KoirMat 700, 900; KoirWrap 1000

KoirMat 700, 900; KoirWrap 1000, C400, CTRM 500C

KoirLog 12, 16, 20 - various densities

KoirMat 700 or 900 (w/optional C400 as inner fabric), KoirWrap 1000

KoirMat 900 or CTRM 500C with KoirLog 12, 16, 20 - various densities

SC400, C400, KoirMat 700, 900; KoirWrap 1000

KoirLog 12, 16, 20 - various densities

Stacked KoirLogs, KoirLog 16 or 20 with KoirMat 900

KoirBed, KoirPad 640, BM 2000

KoirMat or pre-vegetated KoirBed combined with KoirLog

KoirBed, KoirPad 640, BM 2000

KoirFence 1250

KoirWattle 6 or 9, KoirFence 1250

KoirWattle 6 or 9, KoirFence 1250

KoirMat 400, 700, 900; KoirWrap 1000, C400, CTRM 500C

BioJute 500

KoirBed, KoirPad 640, BM 2000

KoirBed, KoirPad 640, BM 2000

KoirPot

KoirTube

KoirBed, KoirPad 640, BM 2000

WHAT IS COIR?

Coir (pronounced as “coy-er”) is a vegetable fiber extracted from the fibrous husk (mesocarp) covering the inner shell of the coconut fruit grown on coconut trees (botanical name cocos nucifera). It contains approximately 46% by weight of lignin. This makes it one of the strongest and most durable of all natural fibers. Coir fiber is an ideal raw material for erosion control products because it has high tensile strength and extended longevity. It eventually biodegrades into humus adding fertility to the soil.
OVERVIEW: Nedia offers a full line of 100% natural woven coir (coconut fiber) erosion control fabrics. Our line of products in this category include: KoirMat™ 400, KoirMat™ 700, KoirMat™ 900.

KoirMat is made from well cleaned, high strength, fresh water cured coconut fiber. Coconut fiber is extracted from coconut husks which are submerged in fresh water streams or storage tanks for a period of several months. During this process known as retting, water constantly flows through the coir fiber matrix removing impurities present in the fiber. The clean fiber is extracted and spun into yarn which is then woven into KoirMat.

KoirMat erosion control matting is highly versatile with a wide array of applications in bioengineering and erosion control. KoirMat by far exceeds the demand for an environmentally friendly and economic erosion control product.

BENEFITS: Coir fiber has one of the highest durability and tensile strength among all natural fibers. The high lignin content (46% by weight) of KoirMat makes it naturally resistant to mold and rot and hence requires no chemical treatment.

KoirMat naturally absorbs and retains water while retaining its integrity providing an ideal microclimate for the growth of vegetation. KoirMat resembles the soil in its ability to absorb solar radiation to prevent overheating—a problem with many synthetic materials. The natural color of KoirMat makes it aesthetically pleasing. After years of effective erosion control and vegetation anchoring, KoirMat decomposes and joins the natural ecological cycle, providing soil nutrients in the process. Environmentally safe and biodegradable, KoirMat is the preferred choice of erosion control specialists around the world.

LONGEVITY: Depending on its application and exposure, KoirMat lasts about two to five years. This extended longevity period allows enough time to establish adequate vegetation allowing erosion control the way nature intended.

TYPICAL APPLICATIONS

- Stream and river bank stabilization
- Highways and rail embankments
- Slope and channel stabilization
- Mining operations and landfills
- Ski slopes and ski lift tracks
- High altitude planting
- Wetland construction
- Dams and reservoirs
- Construction sites
- Detention ponds
- Tidal marshes
- Golf courses
WHY SHOULD YOU CHOOSE KOIRMAT™?

- KoirMat is made from coir fiber which is 100% natural, organic and biodegradable.
- Available in rolls up to 4 meters (13.1 ft.) wide without stitched seams.
- More flexible than mattings made from stiff bristle coir fibers. This allows KoirMat to better hug the soil surface.
- High tensile strength and durability make it suitable for severe erosion problems.
- Easy to handle and install.
- Two to five years longevity allowing for complete vegetation establishment in most climates.
- Absorbs water and acts as a mulch on the surface as well as a wick in the soil mantle. This creates an ideal microclimate for the germination of seeds.
- Open mesh construction provides an excellent opportunity for vegetation growth.
- Safe for wildlife.
- Adds to the fertility of the soil after biodegradation.
- Accelerates the development of aquatic and riparian habitat.
- Accepts hydraulically applied products.
- Traps sediments and encourages deposition.
- Environmentally and aesthetically pleasing.
- Provides effective erosion control of steep slopes and high velocity channels.
- Provides economic and environmentally sound stabilization of streambank and shorelines.
- Ideal for most landscaping and bioengineering applications.

### Technical Specifications for KoirMat™ 400, 700, 900

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>KoirMat™ 400</th>
<th>KoirMat™ 700</th>
<th>KoirMat™ 900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Woven matting of coir yarn made from high strength white (retted) coconut fiber</td>
</tr>
<tr>
<td>Color</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>Natural/Earth tone</td>
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<tr>
<td>Thickness</td>
<td>ASTM D 5199</td>
<td>0.35 in.</td>
<td>0.35 in.</td>
<td>0.35 in.</td>
</tr>
<tr>
<td>Mass per unit area (min)</td>
<td>ASTM D 5261</td>
<td>11.8 oz/sq. yd</td>
<td>20.6 oz/sq. yd</td>
<td>26.5 oz/sq. yd</td>
</tr>
<tr>
<td>Wide width tensile strength - Dry MD x CD</td>
<td>ASTM D 4595</td>
<td>504 x 480 lbs/ft.</td>
<td>1512 x 1032 lbs/ft.</td>
<td>1968 x 1416 lbs/ft.</td>
</tr>
<tr>
<td>Maximum Elongation - Dry MD x CD</td>
<td>ASTM D 4595</td>
<td>33% x 31%</td>
<td>40% x 33%</td>
<td>46% x 34%</td>
</tr>
<tr>
<td>Wide width tensile strength - Wet MD x CD</td>
<td>ASTM D 4595</td>
<td>456 x 360 lbs/ft.</td>
<td>924 x 684 lbs/ft.</td>
<td>1260 x 768 lbs/ft.</td>
</tr>
<tr>
<td>Maximum Elongation - Wet MD x CD</td>
<td>ASTM D 4595</td>
<td>36% x 31%</td>
<td>69% x 34%</td>
<td>43% x 36%</td>
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<tr>
<td>Flexural Rigidity (Stiffness) MD x CD</td>
<td>ASTM D 1388</td>
<td>4070 x 3923 mg - cm</td>
<td>12896 x 8132 mg - cm</td>
<td>14019 x 9329 mg - cm</td>
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<tr>
<td>Slope (Recommended)</td>
<td>Observed</td>
<td>&lt; 1 : 1</td>
<td>&gt; 1 : 1</td>
<td>&gt; 1 : 1</td>
</tr>
<tr>
<td>Shear Stress (Recommended)</td>
<td>Flume Tests</td>
<td>3.2 psf</td>
<td>4.5 psf</td>
<td>5.0 psf</td>
</tr>
<tr>
<td>Water Velocity (Recommended)</td>
<td>Flume Tests</td>
<td>8 ft./sec</td>
<td>12 ft./sec</td>
<td>16 ft./sec</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D 1117</td>
<td>163%</td>
<td>146%</td>
<td>132%</td>
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<tr>
<td>“C” Factor</td>
<td>Flume Tests</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
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<tr>
<td>Open Area</td>
<td>Measured</td>
<td>65%</td>
<td>50%</td>
<td>39%</td>
</tr>
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</table>

STANDARD ROLL SIZES: 13.1’X 165’ (4M X 50M)

*KOIRMAT IS ALSO AVAILABLE IN D SERIES*
**Coconut Fiber Logs**

**KoirLog™ 12, 16, & 20**

**Overview:** KoirLogs are natural coconut fiber logs with applications in wetland mitigation, shoreline stabilization and streambank/channel protection. Nedia’s KoirLogs are made from double cleaned, unsorted coconut fiber encased in a high tensile strength coir twine netting. KoirLogs help to dissipate the impact from wave action and flowing water, trap sediments and encourage vegetation growth. During installation, seedlings or plant cuttings can be planted into the KoirLog. Sediments trapped by the KoirLog as well as the inherent property of the coir fiber to absorb and retain moisture provides an ideal medium for vegetation establishment and growth.

**Sizes:** KoirLogs are available in 12”, 16” and 20” diameters. The logs are typically 10’ or 20’ long.

**Densities:** KoirLogs are available in Normal Density (ND Series) of 7 lbs/cu.ft. and High Density (HD Series) of 9 lbs/cu.ft. KoirLogs with a normal density of 7 lbs/cu.ft. (ND Series) are easier to handle, install and plant. The normal density logs also encourage rapid root development. Designers must evaluate the site conditions in order to choose the appropriate size, density and number of tiers of KoirLogs to be used. Some parameters to consider are flow velocity, wave height, stream energy, soil type and accessibility to the project site.

**Longevity:** KoirLogs generally last for two to five years. As the KoirLog biodegrades, the plants develop a well established root system in the shoreline sediment which will retain the soil in place preventing further erosion. The decomposing KoirLogs provide valuable humus to the soil.

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**Typical Applications**

- Streambank stabilization
- Shoreline protection
- Wetland mitigation
- Channel edge liner
- Wildlife habitats
- Landscaping

**Advantages**

- Safe for wildlife and the environment
- 100% biodegradable
- An excellent planting medium
- Encourages deposition
- Easy to install
- Economical

For installation guidelines... see page 22
**Technical Specifications for KoirLog™ 12, 16, 20 (ND Series)**

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<tr>
<th>Product Specification</th>
<th>Unit Weight (lbs/ft)</th>
<th>Diameter (in)</th>
<th>Length *</th>
<th>Core Density (lbs/cu.ft)</th>
<th>Material</th>
<th>Breaking Strength (lbs)</th>
<th>Mesh Size</th>
<th>Inner Core</th>
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<tr>
<td>KoirLog 12 ND</td>
<td>5.5 (8.2 kg/m)</td>
<td>12 (30 cm)</td>
<td>10’ or 20' (3.05 m or 6.10 m)</td>
<td>7 (112 kg/m³)</td>
<td>3 ply coir 0.40 in dia. (1 cm dia.)</td>
<td>80 (356 N)</td>
<td>2” x 2” Rhombic mesh with hand-knotted junctions</td>
<td>Unsorted, double cleaned, well-graded, coir fiber</td>
</tr>
<tr>
<td>KoirLog 16 ND</td>
<td>9.5 (14.1 kg/m)</td>
<td>16 (40 cm)</td>
<td>10’ or 20' (3.05 m or 6.10 m)</td>
<td>7 (112 kg/m³)</td>
<td>3 ply coir 0.40 in dia. (1 cm dia.)</td>
<td>80 (356 N)</td>
<td>2” x 2” Rhombic mesh with hand-knotted junctions</td>
<td>Unsorted, double cleaned, well-graded, coir fiber</td>
</tr>
<tr>
<td>KoirLog 20 ND</td>
<td>15 (22.3 kg/m)</td>
<td>20 (50 cm)</td>
<td>10’ or 20' (3.05 m or 6.10 m)</td>
<td>7 (112 kg/m³)</td>
<td>3 ply coir 0.40 in dia. (1 cm dia.)</td>
<td>80 (356 N)</td>
<td>2” x 2” Rhombic mesh with hand-knotted junctions</td>
<td>Unsorted, double cleaned, well-graded, coir fiber</td>
</tr>
</tbody>
</table>

*CUSTOM LENGTHS AVAILABLE.*

KoirLogs are also available in KoirLog HD, KoirLog HDP and KoirLog NDP Series in 12”, 16” and 20” diameters.

**KOIRLOG HD** Series has a core density of 9 lbs/cu.ft and high strength coir netting with a breaking strength of 100 lbs.

**KOIRLOG HDP** Series has a core density of 9 lbs/cu.ft and has a synthetic fiber netting with a breaking strength of 200 lbs.

**KOIRLOG NDP** Series has a core density of 7 lbs/cu.ft and has a synthetic fiber netting with a breaking strength of 200 lbs.

**KOIRLOG HDP and KOIRLOG NDP** are available in hand-knotted as well as knotless synthetic netting.
Erosion Control Blankets & Composite TRM

Nedia offers a variety of straw & coconut stitched blankets for erosion control on slopes and channels. These blankets help to stabilize and reinforce the soil until vegetation is established. All blankets are available in photodegradable as well as biodegradable netting (denoted by suffix "B").

Straw Blankets

S300: Straw blanket with single lightweight photodegradable netting.
S300B: Straw blanket with single biodegradable netting.
S400: Straw blanket with top and bottom lightweight photodegradable netting.
S400B: Straw blanket with top and bottom biodegradable netting.

The single-netted straw blankets (S300 and S300B) are typically used on slopes 3:1 and flatter as well as in low flow channels. The double netted straw blankets (S400 and S400B) are ideal for 3:1 to 2:1 slopes and for moderate flow channels.

Straw/Coconut Blankets

SC400: 70% Straw / 30% Coconut blanket with top heavyweight UV stabilized polypropylene netting and bottom lightweight photodegradable polypropylene netting.
SC400B: Straw/Coconut blanket with top and bottom biodegradable netting.

These blankets can be used on 2:1 to 1:1 slopes and in channels with moderate to severe flow conditions.

Coconut Blankets

C400: Coconut blanket with top and bottom heavyweight UV stabilized polypropylene netting.
C400B: Coconut blanket with top and bottom biodegradable netting.

Suitable for steep slopes (1:1 or greater) with heavy run-off conditions. These blankets are made of double cleaned coconut fibers.

The C400B blankets have top and bottom biodegradable netting for more ecologically sensitive. These blankets with durable coconut fiber matrix create a highly effective liner for channels and shorelines where vegetation establishment is challenging.

For Installation Guidelines... see page 20
The CTRM Composite Turf Reinforcement Matting was developed for high velocity channels, steep slopes and other applications where temporary vegetation reinforcement as well as permanent erosion protection are required. CTRM consists of a coconut fiber matrix stitch-bonded between two layers of heavyweight UV stabilized polypropylene nettings overlaid with a permanent heavy-duty flexible biaxial geogrid. The coconut fiber matrix provides temporary erosion control and creates an ideal medium for rapid establishment of vegetation. The flexible biaxial grid offers permanent stem reinforcement and root zone protection for the established vegetation. Independent laboratory tests have shown that unvegetated CTRM can resist flow velocity of up to 20 ft/sec and shear stress of up to 8 psf. This level of erosion protection is equivalent to 24” rock riprap. Most other TRMs can provide this level of protection only in fully vegetated conditions.

**For Installation Guidelines… see page 22**

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**Technical Specifications for Erosion Control Blankets & Composite TRM 800**

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>S300</th>
<th>S300B</th>
<th>S400</th>
<th>S400B</th>
<th>SC400</th>
<th>SC400B</th>
<th>C400</th>
<th>C400B</th>
<th>CTRM 800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber type</td>
<td>Straw</td>
<td>Straw</td>
<td>Straw</td>
<td>Straw</td>
<td>Straw/Coir</td>
<td>Straw/Coir</td>
<td>Coir</td>
<td>Coir</td>
<td>Coir/Geogrid</td>
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<tr>
<td>Functional Longevity (years)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 to 2</td>
<td>1 to 2</td>
<td>2 to 3</td>
<td>2 to 3</td>
<td>&gt;3</td>
</tr>
<tr>
<td>Top Netting Type</td>
<td>Light PP</td>
<td>Light PP</td>
<td>Light PP</td>
<td>Heavy PP</td>
<td>Heavy PP</td>
<td>Heavy PP</td>
<td>Natural</td>
<td>Natural</td>
<td>Biaxial Geogrid</td>
</tr>
<tr>
<td>Bottom Netting Type</td>
<td>None</td>
<td>None</td>
<td>Light PP</td>
<td>Natural</td>
<td>Light PP</td>
<td>Natural</td>
<td>Heavy PP</td>
<td>Natural</td>
<td>Heavy PP</td>
</tr>
<tr>
<td>Top Netting Mesh (Inch x Inch)</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
</tr>
<tr>
<td>Bottom Netting Mesh (Inch x Inch)</td>
<td>N/A</td>
<td>N/A</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
<td>1/2 x 1/2</td>
<td>5/8 x 5/8</td>
</tr>
<tr>
<td>Top Netting Wt. (lbs/1000 sq.ft.)</td>
<td>1.6</td>
<td>9.3</td>
<td>1.6</td>
<td>9.3</td>
<td>3.0</td>
<td>9.3</td>
<td>3.0</td>
<td>9.3</td>
<td>40+3</td>
</tr>
<tr>
<td>Bottom Netting Wt. (lbs/1000 sq.ft.)</td>
<td>N/A</td>
<td>N/A</td>
<td>1.6</td>
<td>9.3</td>
<td>1.6</td>
<td>9.3</td>
<td>3.0</td>
<td>9.3</td>
<td>3.0</td>
</tr>
<tr>
<td>ASTM STANDARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D 5261 Mass per unit area minimum (oz/sq)</td>
<td>8</td>
<td>8</td>
<td>11.2</td>
<td>11.2</td>
<td>11.2</td>
<td>11.2</td>
<td>11.2</td>
<td>11.2</td>
<td>15.2</td>
</tr>
<tr>
<td>D 5199 Thickness Minimum (Inches)</td>
<td>0.25</td>
<td>0.25</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.32</td>
</tr>
<tr>
<td>D 4595 Tensile Strength - Dry (lb/ft.)</td>
<td>108 x 100</td>
<td>76 x 56</td>
<td>180 x 73</td>
<td>103 x 89</td>
<td>144 x 114</td>
<td>144 x 112</td>
<td>300 x 180</td>
<td>293 x 185</td>
<td>1788 x 1284</td>
</tr>
<tr>
<td>D 4595 Elongation - Dry (%)</td>
<td>22 x 23</td>
<td>8 x 4</td>
<td>25 x 16</td>
<td>9 x 11</td>
<td>5 x 11</td>
<td>5 x 12</td>
<td>26 x 22</td>
<td>27 x 20</td>
<td>14 x 15</td>
</tr>
<tr>
<td>D 4595 Tensile Strength - Wet (lb/ft.)</td>
<td>188 x 92</td>
<td>76 x 44</td>
<td>156 x 82</td>
<td>156 x 120</td>
<td>228 x 180</td>
<td>156 x 144</td>
<td>312 x 156</td>
<td>308 x 186</td>
<td>1740 x 1320</td>
</tr>
<tr>
<td>D 4595 Elongation - Wet (%)</td>
<td>23 x 18</td>
<td>5 x 5</td>
<td>20 x 17</td>
<td>5 x 6</td>
<td>19 x 26</td>
<td>6 x 6</td>
<td>25 x 20</td>
<td>27 x 19</td>
<td>12 x 11</td>
</tr>
<tr>
<td>D 1117 Water Absorption (%)</td>
<td>313</td>
<td>267</td>
<td>272</td>
<td>444</td>
<td>236</td>
<td>356</td>
<td>251</td>
<td>136</td>
<td>137</td>
</tr>
<tr>
<td>D 4491 Flow Velocities, Short Term (fps)</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>14</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Recommended Slope</td>
<td>4:1 to 3:1</td>
<td>4:1 to 3:1</td>
<td>3:1 to 2:1</td>
<td>3:1 to 2:1</td>
<td>2:1 to 1:1</td>
<td>2:1 to 1:1</td>
<td>1:1 or &gt;</td>
<td>1:1 or &gt;</td>
<td>1:1 or &gt;</td>
</tr>
<tr>
<td>Maximum Permissible Shear Stress (lbs/sq.ft.)</td>
<td>1.55</td>
<td>1.55</td>
<td>1.7</td>
<td>1.7</td>
<td>1.85</td>
<td>1.85</td>
<td>2.25</td>
<td>2.25</td>
<td>8.00</td>
</tr>
<tr>
<td>“n” Value Roughness Coefficient</td>
<td>0.021</td>
<td>0.021</td>
<td>0.019</td>
<td>0.019</td>
<td>0.018</td>
<td>0.018</td>
<td>0.014</td>
<td>0.014</td>
<td>0.026</td>
</tr>
</tbody>
</table>

**Standard Roll Sizes:** 8’ x 67.5’, 7.5’ x 96’, 15’ x 96’ except for CTRM 800 which is 7.5’ x 72’
SOIL WRAP FABRIC
KOIRWRAP™ 1000 & KOIRWRAP™ 1200

Fabric Wrapped Soil Construction is one of the most resilient bioengineering techniques to stabilize streambanks. This technique relies on the strongest type of coir fabric construction to reinforce soil lifts, high density plantings of rows of willow cuttings, native seeds, and in many cases a reinforced stone toe to protect against toe scour. Like all bioengineered designs using degradable fabric, the concept is to rely on fabrics during the initial (two to five years) soil stabilization period. As the fabric degrades, the installed vegetation provides the necessary erosion protection and aesthetic benefits. KoirWrap 1000 is an excellent fabric for this type of bank treatment. KoirWrap 1000 is a double-layered biodegradable erosion control fabric made up of an outer layer of high strength continuously woven coir matting and an inner layer of lightweight jute fabric connected together at regular intervals. KoirWrap 1000 is ideal for fabric wrapped soil construction on steep slopes and along streambanks.

Technical Specifications for KoirWrap™ 1000

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>ASTM D 5199</td>
<td>0.35 in (0.90 cm)</td>
</tr>
<tr>
<td>Mass per unit area</td>
<td>ASTM D 5261</td>
<td>33.3 oz/sq.yd.(1130 g/sq.m)</td>
</tr>
<tr>
<td>Wide Width Tensile Strength MD x CD (Primary Layer)</td>
<td>ASTM D 4595</td>
<td>1008 x 936 lbs./ft. (14.7 x 13.7 KN/m)</td>
</tr>
<tr>
<td>Maximum Elongation MD x CD (Primary Layer)</td>
<td>ASTM D 4595</td>
<td>30% X 26%</td>
</tr>
<tr>
<td>Wide Width Tensile Strength MD x CD (Secondary Layer)</td>
<td>ASTM D 4595</td>
<td>812 x 468 lbs./ft. (8.94 x 6.83 KN/m.)</td>
</tr>
<tr>
<td>Maximum Elongation MD x CD (Secondary Layer)</td>
<td>ASTM D 4595</td>
<td>8% X 8%</td>
</tr>
<tr>
<td>Puncture Strength (Secondary Layer)</td>
<td>GRI GS1</td>
<td>553 lbs. (2.461 N)</td>
</tr>
<tr>
<td>Flexural Rigidity (Stiffness)</td>
<td>ASTM D 1388</td>
<td>0.692 x 0.690 oz-in. (49.8 x 49.7 g-cm)</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>ASTM D 1117</td>
<td>146%</td>
</tr>
<tr>
<td>Permittivity</td>
<td>ASTM D 4491</td>
<td>3.07/sec.</td>
</tr>
<tr>
<td>Permeability</td>
<td>ASTM D 4491</td>
<td>1.03 in/sec.</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>ASTM D 4491</td>
<td>229 gal/min/sq.ft. (9.36 cu.m/min/sq.m)</td>
</tr>
</tbody>
</table>

Typical Applications
- Slope and streambank stabilization
- Landscaping and bioengineering
- Revegetation of construction damaged slopes
- Trapping sediment and to encourage deposition
- Reduction of pollution from storm-water run-off

Advantages
- An excellent product for Fabric Wrapped Soil Construction
- Outer layer of woven coir fabric provides strength
- Inner layer of woven jute fabric retains fines during period of plant establishment
- Easy to handle and install
- Cost effective and long lasting
- Ideal for steep slopes and high velocity channels

Standard roll size: 9.84’ x 83’ (3m x 25m)
PHASES OF FABRIC WRAPPED SOIL CONSTRUCTION
KoirFence™ 1250 is a tightly woven biodegradable silt fence made of high strength coir.

**TYPICAL APPLICATIONS**
- Perimeter sediment control
- To contain wind blown snow
- Storm drain inlet protection
- Matting for walkways

**ADVANTAGES**
- 100% natural and biodegradable - eliminates need for removal
- Environmentally friendly
- Safe for wildlife
- Easy and economical to install
- Excellent alternative to plastic silt fence in ecologically sensitive areas
- Excellent filtration characteristics

KoirFence 1250 shall be installed using 2" x 2" hardwood stakes at 3’ to 6’ on center. Bury the bottom edge of KoirFence in a 4" x 4" anchor trench. Tie KoirFence at top, bottom and midheight of the wood stakes using KoirTwine or BioTwine (See page 18). KoirFence shall be placed along the slope contours to maximize ponding efficiency. Inspect and repair KoirFence after each storm event and remove sediment when necessary. Removed sediment shall be deposited in an area that can be permanently stabilized.

### Technical Specifications for KoirFence™ 1250

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>ASTM D 5199</td>
<td>0.38 in (1.0 cm)</td>
</tr>
<tr>
<td>Mass per unit area</td>
<td>ASTM D 5261</td>
<td>37 oz/sq yd (1250 g/sq m)</td>
</tr>
<tr>
<td>Wide Width Tensile Strength</td>
<td>ASTM D 4595</td>
<td>2008 x 948 lbs/ft (36.60 x 13.80 KN/m)</td>
</tr>
<tr>
<td>Elongation at break MD x CD</td>
<td>ASTM D 4595</td>
<td>32% x 22%</td>
</tr>
<tr>
<td>Grab Tensile Strength MD x CD</td>
<td>ASTM D 4632</td>
<td>345 x 107 lbs (1535 x 475 N)</td>
</tr>
<tr>
<td>Elongation at peak MD x CD</td>
<td>ASTM D 4632</td>
<td>42% x 22%</td>
</tr>
<tr>
<td>Permeability</td>
<td>ASTM D 4533</td>
<td>337 x 115 lbs (1500 x 512 N)</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>ASTM D 4833</td>
<td>209 lbs. (930 N)</td>
</tr>
<tr>
<td>Permittivity</td>
<td>ASTM D 4491</td>
<td>2.27/sec.</td>
</tr>
<tr>
<td>Permeability</td>
<td>ASTM D 4491</td>
<td>1.06 in/sec (2.69 cm/sec)</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>ASTM D 4491</td>
<td>203 gal/min/sq ft (8.2 cu.m/min/sq m)</td>
</tr>
<tr>
<td>Mullen Burst Strength</td>
<td>ASTM D 3786</td>
<td>&gt;800 lbs/sq.in (&gt;5516 KPa)</td>
</tr>
<tr>
<td>Flexural Rigidity (Stiffness)</td>
<td>ASTM D 1388</td>
<td>1.76 x 0.60 oz-in (127 x 43 g-cm)</td>
</tr>
</tbody>
</table>

Standard roll size: 3’ x 100’ (0.92m x 30.5m)
**KOIRWATTLE™ 6 AND 9**

KoirWattle is a flexible cylindrical module of coir fiber encased in a tubular netting made of high strength coir. KoirWattle generally lasts two to five years and can replace silt fence and straw bales as a cost effective means of controlling erosion. It effectively traps sediments and improves water quality.

**TYPICAL APPLICATIONS**
- Storm drain inlet protection
- Check structure in swales and water ways
- Forest fire rehabilitation
- Storm water and construction run-off pollution control
- Vineyard erosion control
- Landscape edging
- Alternate to silt fence for perimeter sediment control

**ADVANTAGES**
- Reduces slope length
- Slows water flow velocity
- Reduces sheet erosion as well as rill and gully development
- 100% natural and biodegradable
- Cost effective
- Easy to install in shallow soils and hard substrates
- Safe for the environment
- Superior filtration & durability compared to straw and excelsior wattle
- Works as a vegetative filter
- Blends in well with existing landscape
- Excellent growing medium for vegetation

**Technical Specifications for KoirWattle™**

<table>
<thead>
<tr>
<th>Property</th>
<th>KoirWattle 6</th>
<th>KoirWattle 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>6.0 inch (15.3 cm)</td>
<td>9.0 inch (22.9 cm)</td>
</tr>
<tr>
<td>Unit Weight</td>
<td>1.5 lbs/ft (2.23 kg/m)</td>
<td>3.0 lbs/ft (4.46 kg/m)</td>
</tr>
<tr>
<td>Inner core</td>
<td>Double cleaned unsorted coconut fiber</td>
<td>High strength coir with knotted junctions</td>
</tr>
<tr>
<td>Outer netting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer netting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mesh opening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Density</td>
<td>7.0 lbs/cu.ft (112 kg/cu.m)</td>
<td></td>
</tr>
</tbody>
</table>

Standard sizes: 6” and 9” dia x 10’ and 20’ long
Coir Planting Media
KoirBed™

KoirBed features a 100% coir fiber matrix encased both top and bottom in high strength coir netting. The mesh opening size of the netting varies according to the application. KoirBed can be custom designed to various sizes and built-in holes can be incorporated for easy pre-planting.

Property                                      Typical Value
Thickness                                     2” to 4” (50 mm to 100 mm)
Top Netting                                   High strength coir fabric
Intermediate Layer                            Unsorted, double cleaned coconut fiber
Bottom Netting                                High strength coir fabric
Standard Size                                 2 in x 3 ft x 15 ft
Sizes                                         Thickness 2 in to 4 in
                                                 Width 2 ft to 12 ft
                                                 Length 2 ft to 30 ft

TYPICAL APPLICATIONS
- Hydroponic growing of pre-vegetated mats
- Rapid vegetation of wetlands
- Seed germination
- Protecting high wave impact shorelines
- Aquatic plant propagation
- Sediment trapping in construction run-off

ADVANTAGES
- Convenient, economic, and easy to install
- 100% natural and biodegradable
- Dimensionally sound and stable
- No need for removal after vegetation is established

Installation Guidelines similar to “Blankets & Mattings” on page 20
**KoirPad™ 640**

KoirPad 640 is a needle-punched coir fiber matrix bonded with latex binder.

**TYPICAL APPLICATIONS**

- Rapid restoration of disturbed sites
- Erosion control on steep slopes and high velocity channels
- Bioengineering planting media for live stake layering, live facines and brush layering
- Biodegradable filter fabric in fabric wrapped soil construction
- Streambank and shoreline stabilization Wetland remediation

**ADVANTAGES**

- 100% organic and biodegradable
- Has excellent moisture retention qualities
- Effectively filters fine sediments
- Safe for the environment

**Technical Specifications for KoirPad™ 640**

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>ASTM D 5199</td>
<td>0.25 in (0.64 cm)</td>
</tr>
<tr>
<td>Mass per Unit Area</td>
<td>ASTM D 5261</td>
<td>20.6 oz/sq.yd (700 gms/sq.m)</td>
</tr>
<tr>
<td>Wide Width Tensile Strength</td>
<td>ASTM D 4595</td>
<td>384 x 216 lbs/ft. (5.59 x 3.15 KN/m)</td>
</tr>
<tr>
<td>Permittivity</td>
<td>ASTM D 4491</td>
<td>3.98/sec</td>
</tr>
<tr>
<td>Permeability</td>
<td>ASTM D 4491</td>
<td>1.34 in/sec</td>
</tr>
<tr>
<td>(Constant Head)</td>
<td></td>
<td>(3.41 cm/sec)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>ASTM D 4491</td>
<td>297 gal/min/sq.ft. (12.0 cu.m/min/sq.m)</td>
</tr>
<tr>
<td>Water Holding Capacity</td>
<td>ASTM D 4250</td>
<td>166 oz/sq.ft.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5.63 kg/sq.m)</td>
</tr>
</tbody>
</table>

*Standard roll size: 3’ x 100’ (0.92m x 30.5m)*

**Installation Guidelines Similar to “Blankets & Mattings” on Page 20**
BM 2000™

BM 2000™ is a three dimensional coir fiber matrix needle-punched and bonded with latex adhesive.

**ADVANTAGES**

- Natural, organic and biodegradable
- Excellent for pre-planting in the nursery and for on-site planting
- Ideal for rapid re-vegetation of wetlands, tidal marshes, streambanks & shorelines
- Traps sediments and encourages deposition
- Easy to install

### Technical Specifications for BM 2000™

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>ASTM D 5199</td>
<td>1.5 to 2.0 in (5 cm)</td>
</tr>
<tr>
<td>Mass per Unit Area</td>
<td>ASTM D 5261</td>
<td>30.3 oz/sy (1027 gsm/sq.m)</td>
</tr>
<tr>
<td>Wide width Tensile Strength MD x CD</td>
<td>ASTM D 4595</td>
<td>180 x 96 lbs/ft. (2.62 x 1.40 KN/m)</td>
</tr>
<tr>
<td>Elongation at Break MD x CD</td>
<td>ASTM D 4595</td>
<td>41% x 25%</td>
</tr>
<tr>
<td>Trapezoidal Tear Strength MD x CD</td>
<td>ASTM D 4533</td>
<td>52 x 20 lbs (231 x 89 N)</td>
</tr>
<tr>
<td>Permittivity (Constant Head)</td>
<td>ASTM D 4491</td>
<td>5.3/sec</td>
</tr>
<tr>
<td>Permeability</td>
<td>ASTM D 4491</td>
<td>8.2 in/sec (20.8 cm/sec)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>ASTM D 4491</td>
<td>397 gal/min/sq.ft (16.1 cu.m/min/sq.m)</td>
</tr>
<tr>
<td>Water Holding Capacity</td>
<td>ASTM D 4250</td>
<td>75 oz/sy (2.54 kg/sq.m)</td>
</tr>
</tbody>
</table>

**Standard roll size: 3’ x 15’ (0.95m x 4.6m)**

*Installation Guidelines similar to “Blankets & Mattings” on page 20*
**BIODEGRADABLE STABILIZER FABRIC**

**BIOJUTE™ 500**

BioJute™ 500 is a 100% biodegradable geotextile made of tightly woven jute yarn.

### Typical Applications
- Geotextile separator fabric for temporary haul roads
- As a liner for KoirMat in fabric wrapped soil construction
- Erosion control in channels

### Advantages
- Fully biodegradable
- No need for removal
- Alternate to synthetic geotextiles
- Large coverage area

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Tensile Strength MD x CD</td>
<td>ASTM D4632</td>
<td>161 x 129 lbs (718 x 572N)</td>
</tr>
<tr>
<td>Elongation at Peak</td>
<td>ASTM D4632</td>
<td>72% x 9.4%</td>
</tr>
<tr>
<td>Wide Width Tensile Strength MD x CD</td>
<td>ASTM D4595</td>
<td>1272 x 1020 lbs/ft (18.6 x 14.9 KN/m)</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ASTM D 4595</td>
<td>4% x 4%</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>ASTM D 4833</td>
<td>90.6 lbs (403.2 N)</td>
</tr>
<tr>
<td>Trapezoidal Tear Strength MD x CD</td>
<td>ASTM D 4533</td>
<td>134 x 103 lbs (597 x 458 N)</td>
</tr>
<tr>
<td>Mullen Burst Strength</td>
<td>ASTM D 3786</td>
<td>268.5 lbs/sq.in (1,851 Kpa)</td>
</tr>
<tr>
<td>Apparent Opening Size</td>
<td>ASTM D4751</td>
<td>18 U.S. Std. Sieve</td>
</tr>
<tr>
<td>Permeability</td>
<td>ASTM D 4491</td>
<td>2.39/sec</td>
</tr>
<tr>
<td>Flow rate</td>
<td>ASTM D 4491</td>
<td>179 gal/min/sq.ft (7.3 cu.m/min/sq.m)</td>
</tr>
</tbody>
</table>

**Standard roll size: 12.5’ x 300’ (3.8 m x 9.5 m)**

**For installation guidelines...see page 20**

### Accessorial Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KoirPot™</td>
<td>Molded coir fiber pot reinforced with natural latex adhesive. Size: 2’ to 16’ dia</td>
</tr>
<tr>
<td>KoirTwine™ 80</td>
<td>High strength 2 ply coconut fiber twine with a breaking strength of 80 lbs. Ideal for securing KoirLog, KoirWattle, KoirFence, etc. Standard spool size: 500 LF</td>
</tr>
<tr>
<td>BioTwine™ 80 / 150</td>
<td>High strength single ply natural fiber twine with a breaking strength of 80 lbs and 150 lbs. Standard spool size: 2250 LF (BioTwine 80) 1000 LF (BioTwine 150)</td>
</tr>
<tr>
<td>KoirTube™</td>
<td>Woven coir fiber pot made from high strength coir yarn. Size: 3’ to 20’ dia</td>
</tr>
</tbody>
</table>
Installation Guidelines for Erosion Control Blankets & Mattings

General Guidelines

Site Preparation:
Grade and shape the area of installation. If applicable, prepare seedbed by loosening 2” to 3” of topsoil. Application of lime and mixed grade fertilizer is recommended prior to seeding and installation of blankets & mattings. Make sure soil is free of clods, rocks, wood and other obstructions so that the blankets & mattings are in direct contact with soil.

Seeding:
In most cases, it is recommended that seeding be done prior to installation of blankets. For turf reinforcement mat and open weave matting, seeding is often done after matting installation. Best results are achieved when a veneer of soil is raked over the broadcast seeded surface. Straw or hay mulch may be added after seeding. All check slots and other areas disturbed during installation process should be re-seeded.

Anchoring:
U-shaped metal staples (11-gauge minimum, 6” to 12” long) or wooden stakes (at least 12” long) can be used to anchor blankets to the ground. Keep a minimum edge distance of 2” from the edge of the blanket to the center of the staples or stakes.

Installation on Slopes

Grade soil, fertilize and seed as per general guidelines above.

Begin at the top of the slope and anchor blankets in a 12” deep and 12” wide initial anchor trench (see Fig. 2) and anchor with staples at 18” spacing.

Unroll blanket down slope in the direction of the water flow (see Fig. 1). The blanket should not be stretched but should have full contact with the soil. Anchor blanket using staples or stakes. See “Staple Pattern Guide for Slopes” on the right.

Overlap edges of adjacent parallel rolls by approximately 6” and anchor with staples at 24” to 36” spacing depending on the slope.

When blankets have to be spliced, place upper blanket end over lower blanket end (shingle style) with 12” overlap and anchor with two staggered rows of staples at 12” spacing.

Anchor, fill and compact ends of blankets in 12” deep and 6” wide terminal anchor trench. Anchor with staples at 18” spacing (see Fig. 7).

Staple Pattern Guide for Slopes

Fig. 1 Installation on slopes
Fig. 2 Initial anchor trench for slopes
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Fig. 2 Initial anchor trench for slopes
Fig. 1 Installation on slopes

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Dig a 12” x 12” initial anchor trench at the upstream end (Fig. 4). If there is concentrated flow at channel entrance, it is recommended that the initial anchor trench be made at least 12” upstream from the pipe opening. It is also recommended to adopt measures to reduce the velocity of flow at pipe opening.

Dig intermittent check slots (6” deep and 6” wide) across the channel at 25’ to 50’ intervals depending on the slope gradient of the channel (Fig. 5).

Dig 6” deep and 6” wide longitudinal trenches at the top of side slopes to anchor the blanket edges (Fig. 6).

Dig 12” deep and 12” wide terminal anchor trench at downstream end (Fig. 7).

Install the first blanket in the initial anchor trench, upstream, in the center of the channel and anchor with two staggered rows of staples at 6” spacing, backfill and compact. Do not stretch, but make sure there is full contact between blanket and soil.

In the same manner, position adjacent blankets in the initial anchor trench overlapping the preceeding blanket a minimum of 8” and anchor.

Unroll center strip downstream.

Unroll adjacent mats downstream in a similar fashion, maintaining an 8” wide overlap. Anchor the overlapped area with staples at 16” to 18” spacing depending upon the flow velocity.

For anchoring the middle of the blankets see “Staple Pattern Guide for Channels” below.

Secure the edges of the blankets along the longitudinal trenches on the top of slopes with staples at 12” centers (Fig. 6).

Fold and secure the matting snugly into all transverse check slots. Lay the matting in the bottom of the slot and then fold back against itself. Anchor through both layers of blanket at 6” intervals then backfill and compact soil (Fig. 5).

For noncritical installations, place two staggered rows of staples at 6” spacing in lieu of check slots.

When blankets need to be spliced, place upstream blanket over the downstream blanket with an overlap of at least 12”. Use two staggered rows of staples at 6” spacing.

Anchor, fill and compact downstream end blankets in terminal anchor trench (Fig. 7).
Determine on site where the installation should begin and end. Usually installation begins downstream. Sediment and erosion control measures such as silt fence and sediment barriers should be in place of disturbances on work site. Prepare the site of installation by removing large rocks or other such obstructions. Re-grade slope, if necessary. Gradual slopes flatter than 2:1 are preferred.

Determine the mean water elevation. Mark the level on a stake driven into the substrate 1 to 2 feet off-shore. KoirLogs should be 1/2 to 2/3 below mean water elevation for the survival of vegetation (Fig. 1).

KoirLogs must be level, installed along a horizontal contour and parallel to the streambank. KoirLogs can be installed adjacent to the shoreline (Fig. 2 & Fig. 3) or away from the shoreline (Fig. 4 & Fig. 5) depending on the prevailing physical conditions.

When KoirLogs are installed adjacent to the shoreline, drive pencil point hardwood stakes (2” x 2” x 36”) through at least 2 loops of the outer netting of the KoirLog on the waterside. Stakes can be spaced 3’ on center for medium flow conditions and 2’ on center for rapid flow conditions. KoirTwine or BioTwine can be used to tie the logs to the stakes. Stakes should be driven down so that the top of the stake is level with the top of the KoirLog. KoirLogs shall be placed along the streambanks at a height sufficient to protect the shore from flows or waves. Additional KoirLogs may be stacked above the lower logs to protect the upper shore or streambank (Fig. 3).

When KoirLogs are installed away from the shoreline, the area behind the logs can be backfilled and covered with KoirMat to create an aquatic shelf (Fig. 5). Alternatively, the area behind the log can be stabilized using pre-vegetated KoirBed (Fig. 4). For off-shore applications, drive stakes 1 to 2 feet on center along both sides of the KoirLog in parallel rows. Lacing across the stakes is a good method to hold the KoirLogs in place. Weave lacing back and forth across the KoirLog and attach the lacing to each stake using knots, notches, staples or nails.

Adjacent KoirLogs must be laced together, end to end, tightly and securely with KoirTwine or BioTwine (Fig. 6).

Ends of the KoirLog not abutting another KoirLog must be bent towards the shore and dug into the bank to prevent the water from flowing behind the KoirLogs causing them to be pulled out.

Plant the KoirLog with appropriate native plant species after the KoirLog has been submerged in water for a short period of time. Insert fingers or a planting iron through the outer netting to create a hole for the plant plug. Gently push the plug deep into the KoirLog. Recommended spacing of the plant plugs is 4” to 12” along two lines in a staggered pattern.

Cover the root ball by wrapping coir fiber around the base of the stem. Check to ensure that the plants have been firmly installed in the substrate. Plants and materials have to be monitored approximately 3-4 weeks after installation to ensure the success and survival of the plants and the integrity of the materials.
**Fabric Encapsulated Soil Construction using KoirWrap™ 1000**

Clean and grade the base of the slope or streambank to create a level and compact soil surface. Place a stabilizer board (3/4" plywood - wood cut to the lift height) vertically on the outside face of the base lift. Lift height usually varies from 9" to 18" depending upon desired slope, soil type, flow velocity, etc. and must be determined by the engineer. Secure the stabilizer board using 2" x 2" wood stakes or #4 rebar pins. In case of a streambank, KoirLogs can be used along the toe of the bank for additional stability (Fig 1).

Unroll KoirWrap parallel to the streambank or face of the slope as the case may be. Ensure that the secondary layer (jute fabric) is on top**. Drape KoirWrap over the stabilizer board so that it forms a 90° angle where the inner face of the stabilizer board meets the soil surface. Keep a minimum embedment length of 3’ as shown in Fig.2. Anchor KoirWrap using 2” x 4” wedge stakes at 3’ spacing along a line 6” from the stabilizer board and along a line 6” from the edge of KoirWrap. Backfill with a well graded mixture of rock and soil (Fig 2).

Compacted soil to the required degree of compaction specified by the engineer. Spread native seeds on the portion of the lift that will be exposed to sunlight. Stretch KoirWrap over the compacted soil and pull towards the slope. Anchor KoirWrap using wedge stakes at 3’ spacing in a key trench. This base lift forms the foundation for the upper lifts and provides adequate stability to the slope. Spread 2” to 3” layer of the soil on the top surface of KoirWrap and place live self-rooting cuttings (Fig 3).

Repeat the same procedure for the upper lifts. Native soil without rock can be used as backfill for upper lifts. Offset each lift 3” to 36” from the previous lift as specified on the plans (Fig 4).

On the topmost lift, spread topsoil, seed and fertilizer. Cover the top soil with KoirMat or an erosion control blanket as appropriate. Container seedlings or plant plugs can be inserted through the KoirWrap along the horizontal benches (Fig 5).

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* A combination of KoirMat 700 (or KoirMat 900) and C400 (or KoirPad 640) can be used in place of KoirWrap 1000. In such cases the KoirMat layer should be laid down first followed by the layer of C400 or KoirPad 640. When wrapping the soil, both layers are to be drawn together as tightly as possible around the soil.

**Primary layer (Coir Fabric) on top for installation on slopes and channel liners.
INSTALLATION GUIDELINES FOR KOIRWATTLE

INSTALLATION ON SLOPES

Place KoirWattle along horizontal contour of slopes in 2’ to 4’ deep anchor trenches (see Fig. 1, K.). Successive rows of KoirWattle can be placed 10’ to 20’ apart. Drive 1” x 1” x 24” hardwood stakes every 3’ to 4’ on center through the middle and ends of each KoirWattle. Place KoirWattle end to end, tying ends together securely with KoirTwine or BioTwine. The selection of trench depths and the placement of stakes depends on the slope and soil conditions. KoirWattle should always be placed and secured such that water flows through or over the KoirWattle and never underneath.

INSTALLATION IN CHANNELS

Place KoirWattle in 2’ to 4’ deep anchor trenches across the channel perpendicular to the direction of the flow (Fig. 2). Use 1” x 1” x 24” hardwood stakes at 2’ to 4’ intervals on centers and 1’ maximum from either ends to secure the KoirWattle. If two or more KoirWattles are used across a section, place KoirWattles end to end and tie the ends together securely with KoirTwine or BioTwine. For other details see “Installation on Slopes.”

INSTALLATION AROUND DROP INLETS AND CURB INLETS

Place KoirWattle around drop inlet and curb inlet in such a way that there is no space between the ends of the KoirWattle (See Fig. 3 and Fig. 4 respectively). KoirWattles must be secured to the ground using 1” x 1” x 24” hardwood stakes at 2’ on center. The top surface of the KoirWattle must be located above the ponding height. Use multiple tiers if necessary. For other details see “Installation on Slopes.”
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