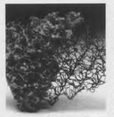
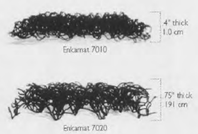
GREENARMOR SYSTEM

GreenArmor™ 7010
Extend the Boundaries of Natural Vegetation



The GreenArmor™ System begins with Enkamat® TRM (Turf Reinforcement Mat), which provides a permanent, lofty and open matrix. It is then hydraulically infilled with Flexterra® FGM™ (Flexible Growth Medium™) to intimately bond soil and seeds while accelerating growth. This unique system protects against elevated levels of hydraulic lift and shear forces while encouraging turf establishment and long-term root reinforcement. The synergistic combination of cost effective technologies enables the GreenArmor System to provide unprecedented levels of design safety.



GENERAL

1.01 SUMMARY

(Section 35 43 00 - Permanent Geosynthetic Turf Reinforcement Mat)

A. This section specifies a permanent Geosynthetic Turf Reinforcement Mat (TRM) with Flexible Growth Medium (FGM) infill, to prevent long term soil and vegetation loss resulting from excessive water flow (velocity and shear stress) in which unreinforced vegetation could not resist. The FGM provides immediate and temporary protection against movement and/or loss of soil until vegetation can be established. The FGM infill also provides an ideal environment for rapid seed germination and accelerated plant and root establishment within the matrix of the TRM.

B. Related Sections: Other Specification Sections, which directly relate to the work of this Section include, but are not limited to the following:

1. *Section 01 57 13 - Temporary Erosion and Sedimentation Controls*
2. *Section 31 25 00 - Erosion and Sedimentation Controls*
3. *Section 31 35 00 - Slope Protection*
4. *Section 32 91 00 - Planting Preparation*
5. *Section 32 92 00 - Turf and Grasses*
6. *Section 35 30 00 - Shoreline Protection*

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials and application rate.

B. Certifications: Manufacturer or shall submit a letter of certification that the product meets or exceeds all physical property, endurance, performance and packaging requirements.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in UV and weather-resistant factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations.

PRODUCTS

2.01 MANUFACTURERS/OR THEIR REPRESENTATIVES

A. PROFILE Products LLC
750 Lake Cook Road—Suite 440
Buffalo Grove, IL 60089
800-508-8681 (Fax 847-215-0577)
www.profileproducts.com

2.02 MATERIALS

A. Turf Reinforcement Mat shall be Enkamat 7010, manufactured for the purpose of permanent channel lining and turf reinforcement. The TRM shall be made from 100% synthetic material and contain no biodegradable or photodegradable components or materials.

1. The TRM shall be a homogeneous, three-dimensional matrix made of continuous monofilament yarns which are thermally fused at the crossover points to provide a structure that will maintain its three-dimensional stability without laminated or stitched layers. No nettings or stitching shall be permitted. The TRM shall have a sufficient Area Holding Capacity and a minimum 95% open space available for soil, FGM and root interaction. The TRM shall not lose its structural integrity and shall not unravel or separate when TRM is cut in the field.
2. The TRM shall exhibit no buoyancy factor (i.e., the specific gravity of the fibers used should be greater than 1.0) so as to allow the TRM to maintain intimate contact with the soil (particularly between fasteners) under low flow or submersed conditions.

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3. The TRM, when infilled with FGM, shall meet the property values noted.

B. Flexible Growth Medium for hydraulic infill of TRM shall be Flexterra® FGM™ and conform to the property values as presented in the Flexterra data sheet.

All components of the FGM shall be pre-packaged by the Manufacturer to assure material performance and in compliance with the following values. **Under no circumstances will field mixing of additives or components be accepted.**

Thermally Processed Wood Fibers – 74.5% ± 3.5%

Proprietary Crosslinked Hydro-Colloid Tackifiers and Activators – 10% ± 1%

Proprietary Crimped, Interlocking Fibers – 5% ± 1%

Moisture Content – 10.5% ± 1.5%

	TEST METHOD	ENGLISH	SI
PHYSICAL			
Mass Per Unit Area	ASTM D6566	19.5 oz/yd²	661 g/m²
Thickness	ASTM D6525	0.40 in	10 mm
Tensile Strength - MD	ASTM D6818	170 lb/ft	2.5 kN/m²
Light Penetration	ASTM D6567	1.0%	1.0%
Ground Cover	ASTM D6567	99.0%	99.0%
Absorption	ASTM D1117	498.0%	498.0%
UV Resistance	ASTM D7238 & D6818	80.0%	80.0%
Bench Scale C-Factor[2] (average)	ASTM D7101	0.01	0.01
Resiliency	ASTM D6524	90.0%	90.0%
ENDURANCE			
Functional Longevity[1]	Observed	>36 months	>36 months
PERFORMANCE			
C-Factor	Large Scale[3]	0.01	0.01
Manning's n Range	ASTM D6460	0.022 - 0.045	0.022 - 0.045
Permissible Vegetated Shear	ASTM D6460	8.0 lb/ft²	0.38 kN/m²
Permissible Vegetated Velocity	ASTM D6460	16.0 ft/s	4.9 m/s
Permissible Unvegetated Shear	ASTM D6460	3.3 lb/ft²	0.16 kN/m²
Permissible Unvegetated Velocity	ASTM D6460	12.0 ft/s	3.7 m/s
Vegetation Establishment	ASTM D7322	800%	800%

1. Functional longevity depends on moisture, light and environmental conditions.
2. Cover Factor is calculated as soil loss ratio of treated surface versus an unprotected control surface.
3. Large scale testing conducted at Utah Water Research facility using rainfall simulator on 2:1 H:V slope, sandy-loam soil, at a rate of 3" per hour for a duration of 60 minutes.

EXECUTION

3.01 PREPARATION

A. The installation site shall be prepared by clearing, grubbing and excavation or filling the area to the design grade.

B. The surface to receive the TRM shall be prepared to relatively smooth conditions free of obstructions, rocks, dirt clods, roots, stumps, depressions, debris and soft or low density pockets of material. The material shall be capable of supporting a vegetative cover.

C. Erosion features such as rills, gullies, etc. must be graded out of the surface before TRM deployment. Smooth roll drum compaction will be required before deploying TRM to make sure the TRM makes immediate contact with the soil and to ensure that the soil has been compacted.

D. Cut trenches for initial anchor trenches, termination trench and longitudinal anchor trenches (12 inches wide and 12 inches in depth) as shown on the drawings.

3.02 INSTALLATION

A. Care shall be taken during installation to avoid damage occurring to the TRM as a result of the installation process. Should the TRM be damaged during installation, a TRM patch shall be placed over the damaged area extending 1 m (3.28 ft) beyond the perimeter of the damage.

B. Install anchoring devices at a frequency of 2½ pins/staples per square yard. Additional anchoring devices may be required depending on site conditions or alignment of the slope or channel. Always staple (1" centers) the seams between individual TRM rolls.

C. When overlapping successive TRM rolls, the rolls shall be overlapped upstream over downstream and/or upslope over downslope.

D. For channels, begin at the downstream end in the center of the channel. Inspect trenches for position accuracy and depth and re-dig to required dimensions. If trenches have not yet been constructed, dig initial anchor trenches, check slot trenches and longitudinal anchor trenches as illustrated in installation guidelines or as directed on the plans. Unroll approximately 10' of the TRM, positioning the roll face down (as it unrolls) over the initial anchor trench, extending several inches beyond the trench with the roll sitting on the down stream side of the anchor trench. Positioning roll in this manner permits backfilling and compaction of soil into the trench while allowing installer to proceed with proper deployment of TRM by unrolling upstream, over the anchor trench.

E. Position second TRM with a minimum 4-inch overlap of the previous TRM and secure it into the anchor trench. After entire width area is installed with the TRM, then backfill and compact the anchor trench.

F. Continue deploying TRM upstream to the next check slot. Overlay a minimum of 18 inches the ends of rolls with the next roll(s) being deployed, or position in bottom of check slot, anchor and backfill and compact check slots. Continue the processes until you reach the upstream starting point of the TRM.

G. For slopes, construct top anchor trench 1-3' beyond crest of slope, or as illustrated in drawings or shown in manufacturers recommended installation guidelines. Position TRM roll at crest of slope with sufficient material to line the entire anchor trench plus enough material left over to cover the trench. Position adjacent rolls to facilitate 6" overlaps. Anchor TRM in trench with appropriate pins/staples at 1' centers. Once several rolls are anchored in trench, begin to backfill and compact trench to original elevation. The preferred method of deploying roll down slope is to stand in front of the roll and pin it as it rolls out down the slope, minimizing foot traffic on TRM, which will eliminate depressions under the mat. Always allow the mat to drape over the soil, never pulling it taut, to minimize tenting. Place additional pins into any apparent depressions to maintain contact with the soil.

H. Hydraulically fill the TRM with 0.35 inches of FGM, applied with hose at close range. Optimum application rate is 3500 lbs/acre or to the depth of where the tips of TRM are still exposed.

I. Strictly comply with FGM manufacturer's installation instructions and recommendations. For optimum FGM pumping and application performance, use approved mechanically agitated, hydraulic seeding/mulching machines, hose of sufficient length to reach the TRM, use of a 50 degree tip/nozzle is highly recommended. Apply FGM from hose positioned over shoulder with nozzle approximately at chest level (48-60") to achieve optimum TRM infill.

J. For optimum hydraulic performance and vegetative establishment, be careful not to overfill the TRM. The tips of the TRM shall be slightly exposed.

K. Apply supplemental water over the area as directed by site personnel during germination and initial three months of vegetation growth.

3.03 CLEANING AND PROTECTION

A. Clean spills promptly. Advise owner of methods for protection of treated areas. Do not allow treated areas to be trafficked or subjected to grazing.

An electronic text file of this CSI formatted specification can be obtained by contacting a technical service representative at 888-508-8681.

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GA-04 6/08

GRAPHIC SCALE

30 0 15 30 60 120

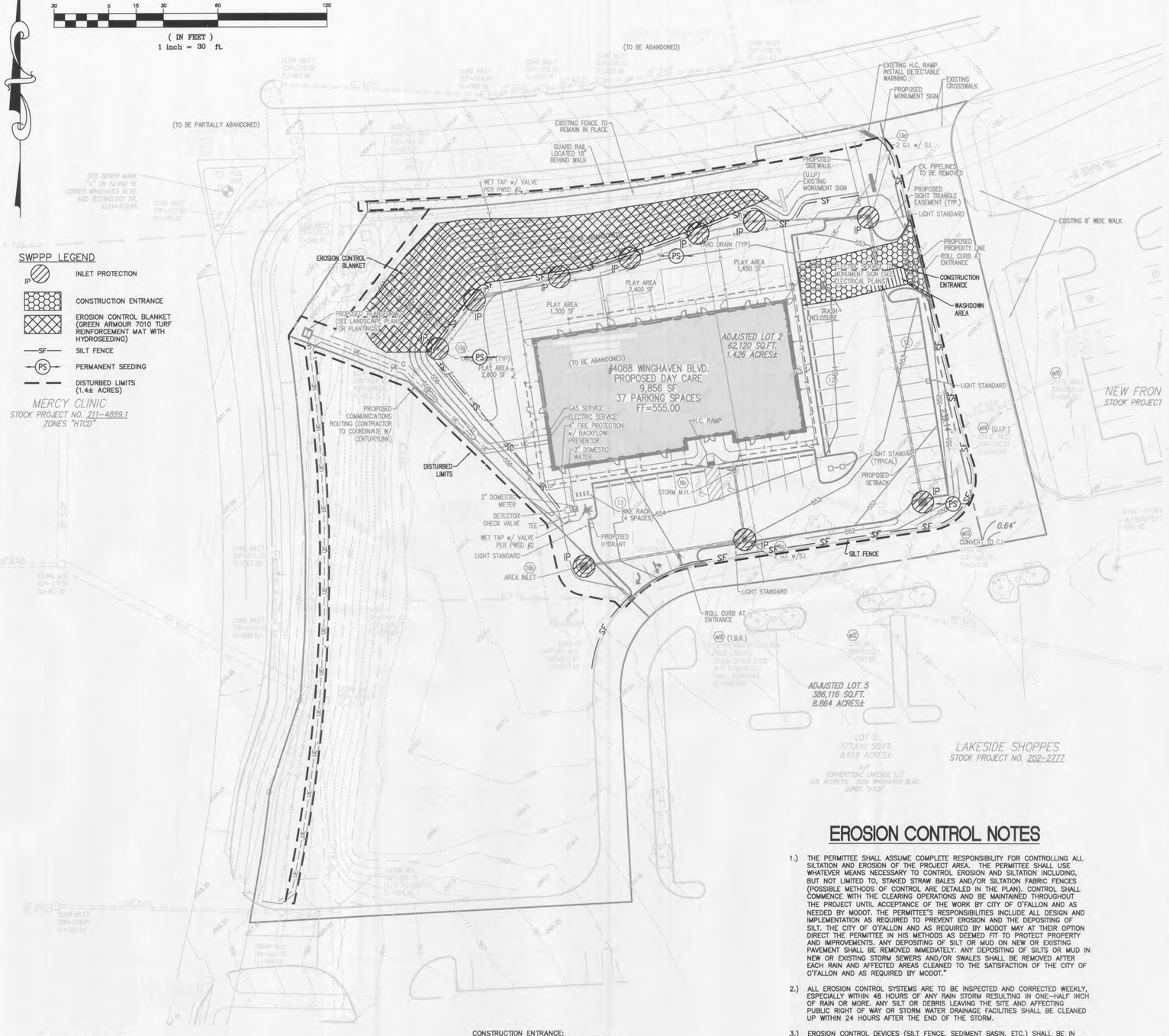
(IN FEET)
1 inch = 30 ft.

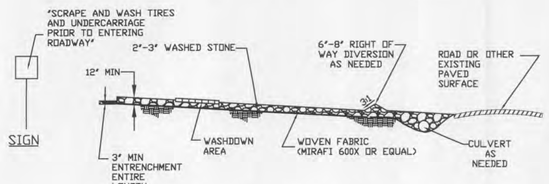
SWPPP LEGEND

- IP — INLET PROTECTION
- CONSTRUCTION ENTRANCE
- EROSION CONTROL BLANKET (GREEN ARMOUR 7010 TURF REINFORCEMENT MAT WITH HYDROSEEDING)
- SF — SILT FENCE
- (PS) — PERMANENT SEEDING
- DISTURBED LIMITS (1.4± ACRES)

MERCY CLINIC
STOCK PROJECT NO. 211-4889.1
ZONES "HTCD"

M & I BANK / DENTAL CLINIC
STOCK PROJECT NO. 204-3385
ZONES "HTCD"





CONSTRUCTION ENTRANCE/WASHDOWN/PARKING AREA - PROFILE

CONSTRUCTION ENTRANCE:
INSTALLATION/CONSTRUCTION PROCEDURES:

1. GRADE AND COMPACT AREA OF CONSTRUCTION ENTRANCE
2. INSTALL CULVERT UNDER ENTRANCE IF NEEDED TO MAINTAIN POSITIVE DRAINAGE
3. PLACE FABRIC AND COVER WITH AGGREGATE, FORMING DIVERSION ACROSS ENTRANCE IF NEEDED TO DIRECT RUNOFF AWAY FROM ROADWAY
4. SEE WASHDOWN STATION BMP FOR ADDITIONAL STEPS

O & M PROCEDURES:

1. IMMEDIATELY REMOVE ANY MUD OR DEBRIS TRACKED ONTO PAVED SURFACES
2. REMOVE SEDIMENT AND CLODS OF DIRT FROM CONSTRUCTION ENTRANCE CONTINUOUSLY
3. REPLACE ROCK IF NECESSARY TO MAINTAIN CLEAN SURFACE
4. REPAIR SETTLED AREAS

SITE CONDITIONS FOR REMOVAL:

REMOVE WHEN VEHICLES AND EQUIPMENT WILL NO LONGER ACCESS UNPAVED AREAS

EROSION CONTROL NOTES

1.) THE PERMITTEE SHALL ASSUME COMPLETE RESPONSIBILITY FOR CONTROLLING ALL SILTATION AND EROSION OF THE PROJECT AREA. THE PERMITTEE SHALL USE WHATEVER MEANS NECESSARY TO CONTROL EROSION AND SILTATION INCLUDING, BUT NOT LIMITED TO, STAKED STRAW BALES AND/OR SILTATION FABRIC FENCES (POSSIBLE METHODS OF CONTROL ARE DETAILED IN THE PLAN). CONTROL SHALL COMMENCE WITH THE CLEARING OPERATIONS AND BE MAINTAINED THROUGHOUT THE PROJECT UNTIL ACCEPTANCE OF THE WORK BY CITY OF O'FALLON AND AS NEEDED BY MODOT. THE PERMITTEE'S RESPONSIBILITIES INCLUDE ALL DESIGN AND IMPLEMENTATION AS REQUIRED TO PREVENT EROSION AND THE DEPOSITING OF SILT. THE CITY OF O'FALLON AND AS REQUIRED BY MODOT MAY AT THEIR OPTION DIRECT THE PERMITTEE IN HIS METHODS AS DEEMED FIT TO PROTECT PROPERTY AND IMPROVEMENTS. ANY DEPOSITING OF SILT OR MUD ON NEW OR EXISTING PAVEMENT SHALL BE REMOVED IMMEDIATELY. ANY DEPOSITING OF SILTS OR MUD IN NEW OR EXISTING STORM SEWERS AND/OR SWALES SHALL BE REMOVED AFTER EACH RAIN AND AFFECTED AREAS CLEANED TO THE SATISFACTION OF THE CITY OF O'FALLON AND AS REQUIRED BY MODOT."

2.) ALL EROSION CONTROL SYSTEMS ARE TO BE INSPECTED AND CORRECTED WEEKLY, ESPECIALLY WITHIN 48 HOURS OF ANY RAIN STORM RESULTING IN ONE-HALF INCH OF RAIN OR MORE. ANY SILT OR DEBRIS LEAVING THE SITE AND AFFECTING PUBLIC RIGHT OF WAY OR STORM WATER DRAINAGE FACILITIES SHALL BE CLEANED UP WITHIN 24 HOURS AFTER THE END OF THE STORM.

3.) EROSION CONTROL DEVICES (SILT FENCE, SEDIMENT BASIN, ETC.) SHALL BE IN ACCORDANCE WITH ST. CHARLES COUNTY SOIL AND WATER CONSERVATION DISTRICT EROSION AND SEDIMENT CONTROL GUIDELINES.

4.) THIS DEVELOPMENT IS REQUIRED TO PROVIDE LONG TERM POST CONSTRUCTION BMP'S SUCH AS; LOW IMPACT DESIGN, SOURCE CONTROL AND TREATMENT CONTROLS THAT PROTECTS WATER QUALITY AND CONTROLS RUN OFF TO MAXIMUM EXTENT PRACTICAL IN COMPLIANCE WITH PHASE II ILLICIT STORM WATER DISCHARGE GUIDELINES. (ORD. 5082, SECTION 405.0245)

5.) GRADED AREAS SHALL BE SEEDED AND MULCHED (STRAWED) WITHIN 14 DAYS OF STOPPING LAND DISTURBANCE ACTIVITIES. UNLESS IT CAN BE SHOWN TO THE CITY ENGINEER THAT WEATHER CONDITIONS ARE NOT FAVORABLE, VEGETATIVE GROWTH IS TO BE ESTABLISHED WITHIN 6 WEEKS OF STOPPING GRADING WORK ON THE PROJECT. THE VEGETATIVE GROWTH ESTABLISHED SHALL BE SUFFICIENT TO PREVENT EROSION AND THE STANDARD SHALL BE AS REQUIRED BY EPA AND DNR. (70% COVERAGE PER SQUARE FOOT) ORD. 5242, SECTION 405.070

Kiddie Academy®
LOTS 2 & 3 OF LAKESIDE SHOPPES
4088 WINGHAVEN BLVD.
CITY OF O'FALLON
STATE OF MISSOURI

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St. Louis, MO 63005 PH. (636) 530-9100 FAX (636) 530-9130
e-mail: general@stockassoc.com
Web: www.stockassoc.com

STATE OF MISSOURI
GEORGE MICHAEL STOCK
NUMBER PE-25116
PROFESSIONAL ENGINEER
3/26/13

GEORGE M. STOCK E-25116
CIVIL ENGINEER
CERTIFICATE OF AUTHORITY
NUMBER: 000996

STORM WATER POLLUTION PREVENTION PLAN

Developer / Owner (Under Contract)
Chesterfield Childcare Properties, LLC
23 Bopp Lane
St. Louis, Mo 63131

Facility Operator
Concord Properties, LLC
23 Bopp Lane
St. Louis, Mo 63131

DRAWN BY:	CHECKED BY:
A.C.D.	G.M.S.
DATE:	JOB NO.:
01/15/13	212-5043

REVISIONS:

1	02/05/13 – CITY/WATER REVISIONS
2	03/12/13 – CITY REVISIONS
3	03/26/13 – CITY REQUIRED SETS

P-I-Z No. 9831.41.04
(APPROVED JANUARY 4, 2013)
City No.

Page No.
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