



Shoreland Restoration Techniques,
Bio-engineered Projects & Monitoring

2014

Wisconsin Lakes Partnership Convention

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Talking Points

Techniques

Possibilities

Materials Discussion

Project Examples - Before / After

Project Monitoring & Observations

Various Techniques or Combinations of Techniques

- Natural Shoreline
- Native Plantings
- Biolog w/ Plantings
- Branch Box Breakwater
- Brush Mattress
- Live Fascine
- Branch Packing
- Vegetated Geogrid
- Rock Riprap
- Rock Riprap w/ Live Stakes; "vegetated riprap"
- Demo/Experimental

Techniques

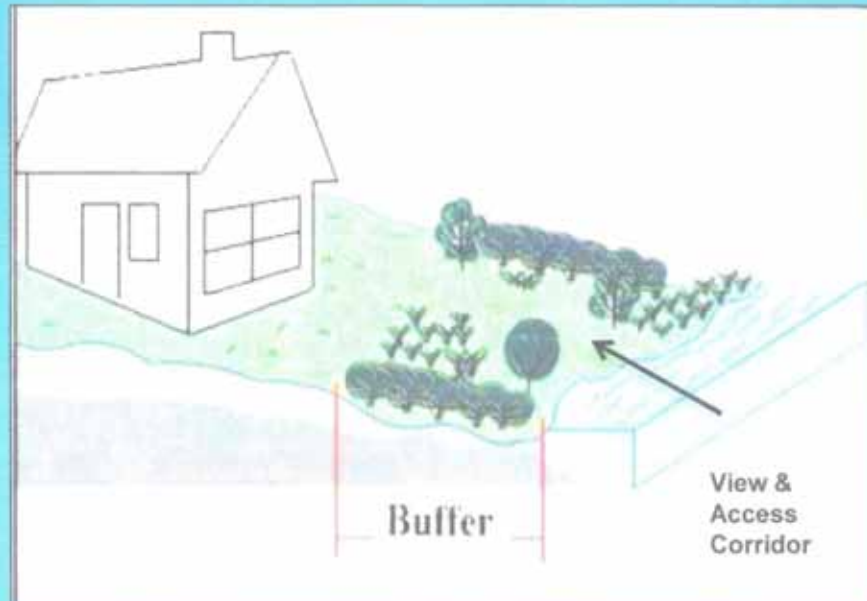
Natural Shoreline

- Left natural
- Buffer of vegetation left intact, i.e. no mow
- May have access to water, i.e. path, dock, stairway, etc.
- Removal of invasive species
- Easiest to maintain



What is a Shoreland Buffer?

Area of protected vegetation along the water





What is the Importance of maintaining a Shoreland Buffer?

- Erosion Prevention
- Fish & Wildlife Habitat Preservation
 - Protects spawning grounds
- Water Quality Protection & Improvement
 - Limits sedimentation and provides filtering of stormwater
- Natural Scenic Beauty
- Screening & Privacy from Boaters and Neighbors
- Increased Property Values

Undeveloped Apr - Oct Phosphorus/Sediment Runoff Model

- maple-beech forest
- 6% slope to lake
- sandy loam soil



IMPACT ON LAKE (April - Oct.)

- 1,000 ft³ runoff to lake
- 0.03 lbs. phos. to lake
- 5 lbs. sediment to lake

Developed with Shoreland Buffer – 1940s Apr - Oct Phosphorus/Sediment Runoff Model

- maple-beech forest
- 6% slope to lake
- grass corridor 20'-wide
- cottage 700 ft² perimeter
- gravel drive 800 ft²
- 35'-wide buffer strip

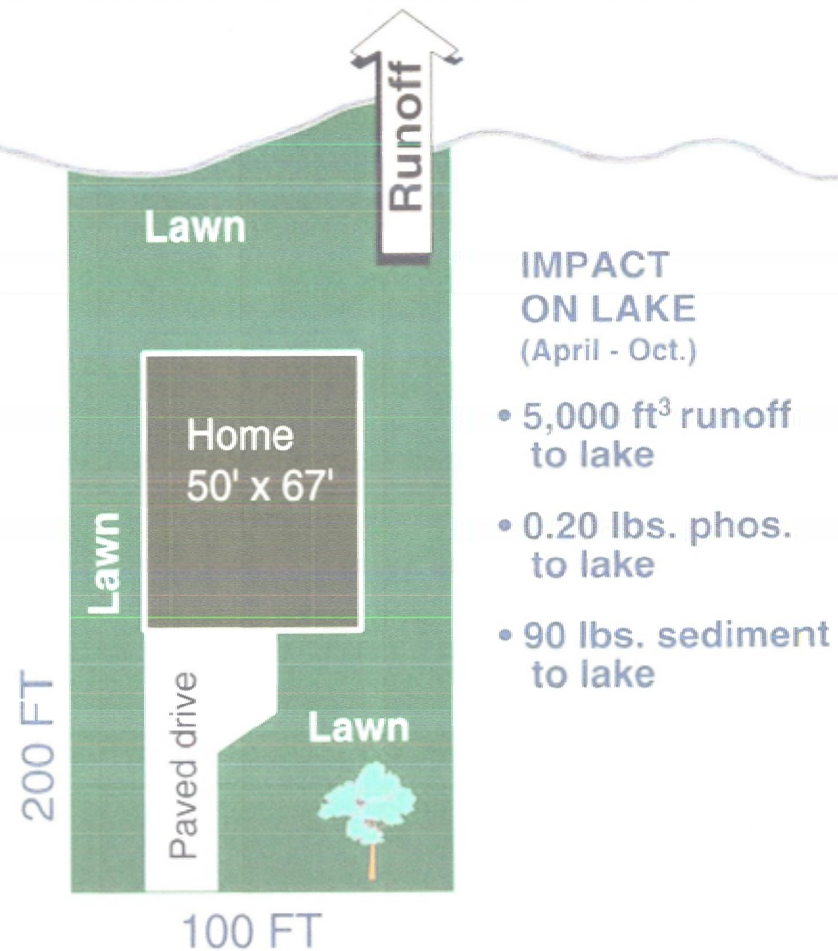


IMPACT ON LAKE (April - Oct.)

- 1,000 ft³ runoff to lake
- 0.03 lbs. phos. to lake
- 20 lbs. sediment to lake

Developed – 1990s Apr - Oct Phosphorus/Sediment Runoff Model

- maintained lawn, soil graded
- 6% slope to lake
- home 3,350 ft² perimeter
- paved drive 770 ft²



IMPACT ON LAKE (April - Oct.)

- 5,000 ft³ runoff to lake
- 0.20 lbs. phos. to lake
- 90 lbs. sediment to lake

Passive Restoration

Effective only when the shoreline hasn't been altered to a great extent and the native ground covers and plants can regenerate on their own



Active Restoration Needed



Natural shoreline vegetation has been removed and replaced with sod. More difficult to establish native seed bank.

Why Plant Native Plants?

- ~ Adapted to Fluctuations in Wisconsin Weather
- ~ Disease and Pest Resistant
- ~ Less Maintenance (no fertilizers)
- ~ Provide Food and Habitat for Native Wildlife -
Birds, Insects, Fish, Amphibians

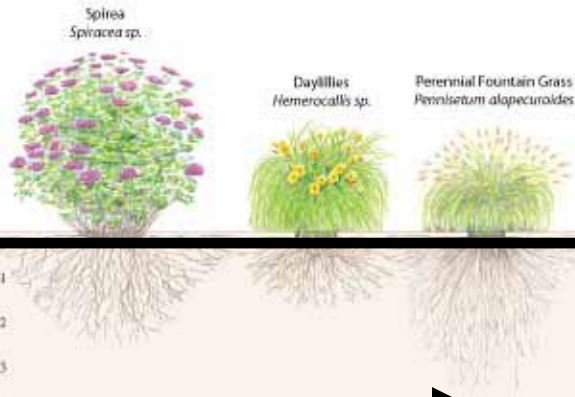
Techniques

Vegetation Holds Soil

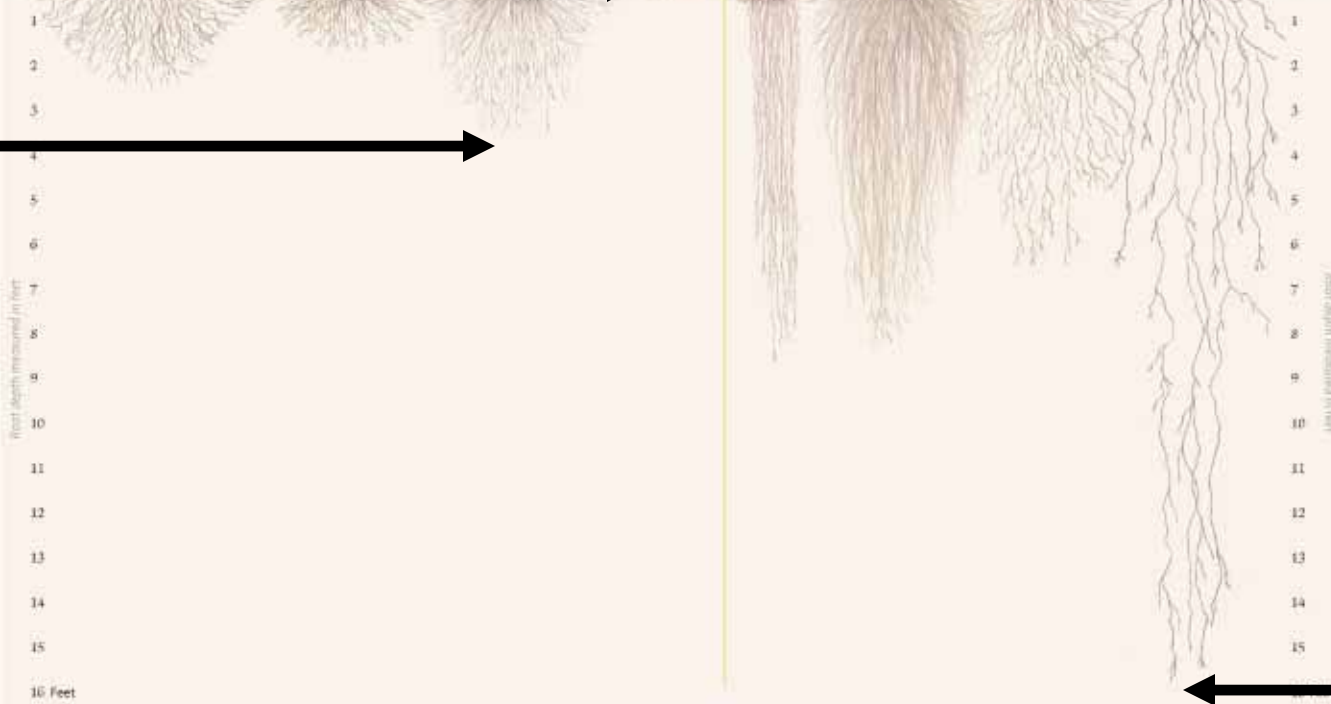
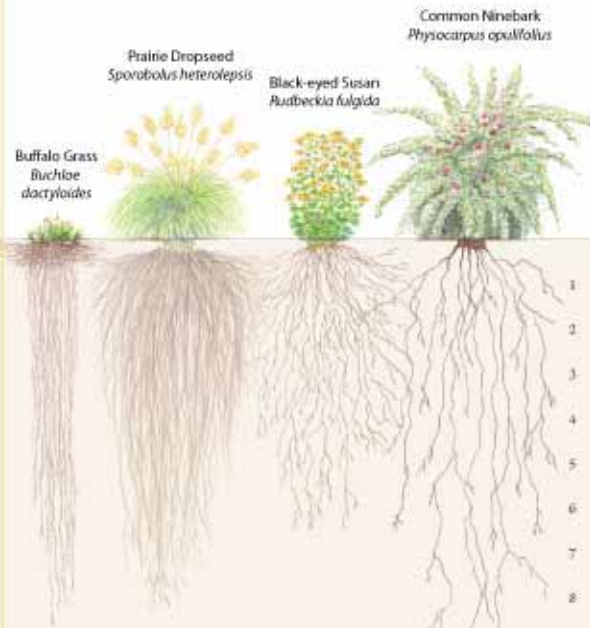
Turf
Grass

4.0 Ft

Non-Natives



Natives



16 Ft

Techniques

Shrubs & Trees



Techniques

Biolog



3 YEAR OLD BIOLOG

Techniques

Brush Mattress



Techniques

Live Fascine



Techniques

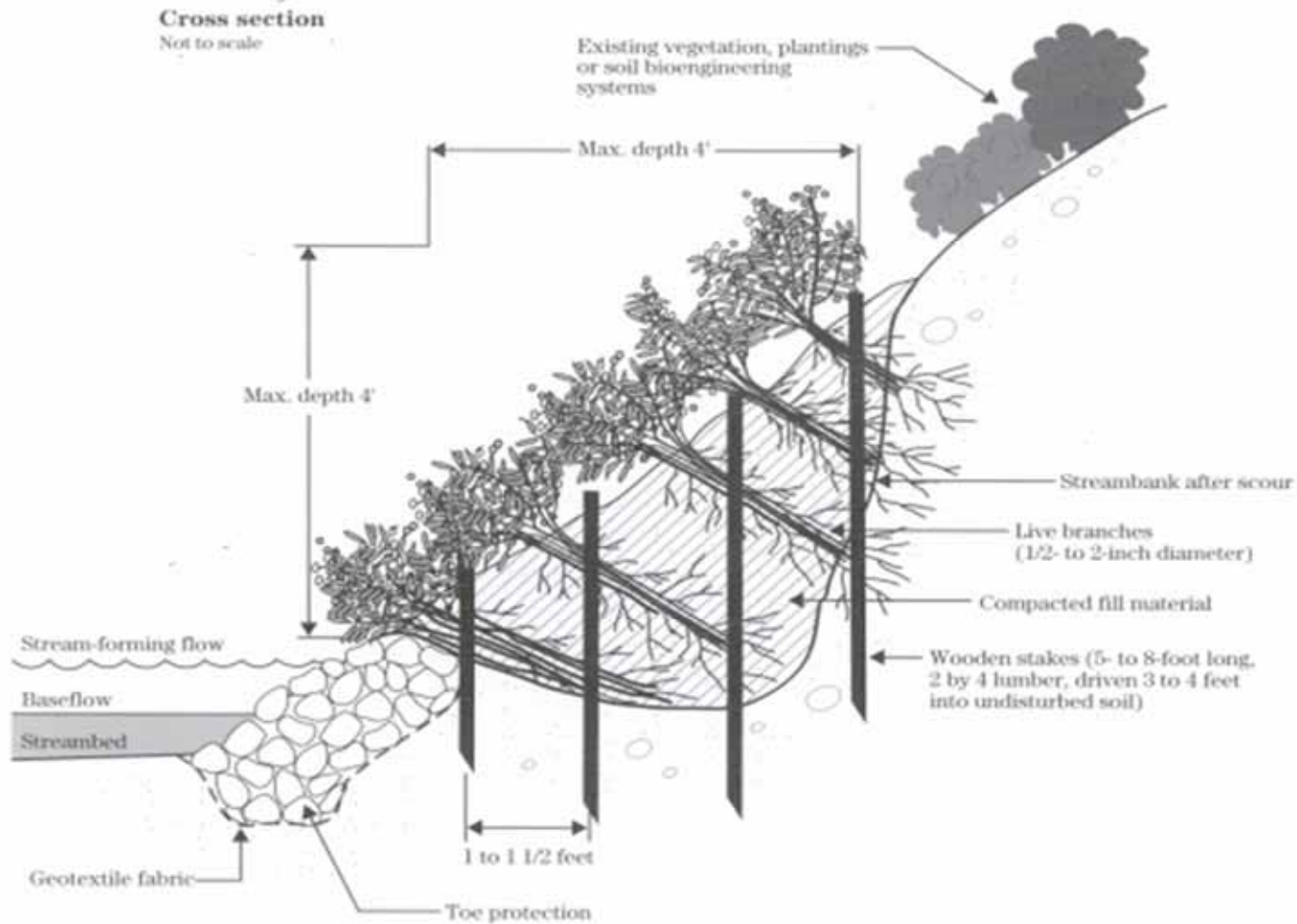
Branchbox Breakwater



Techniques

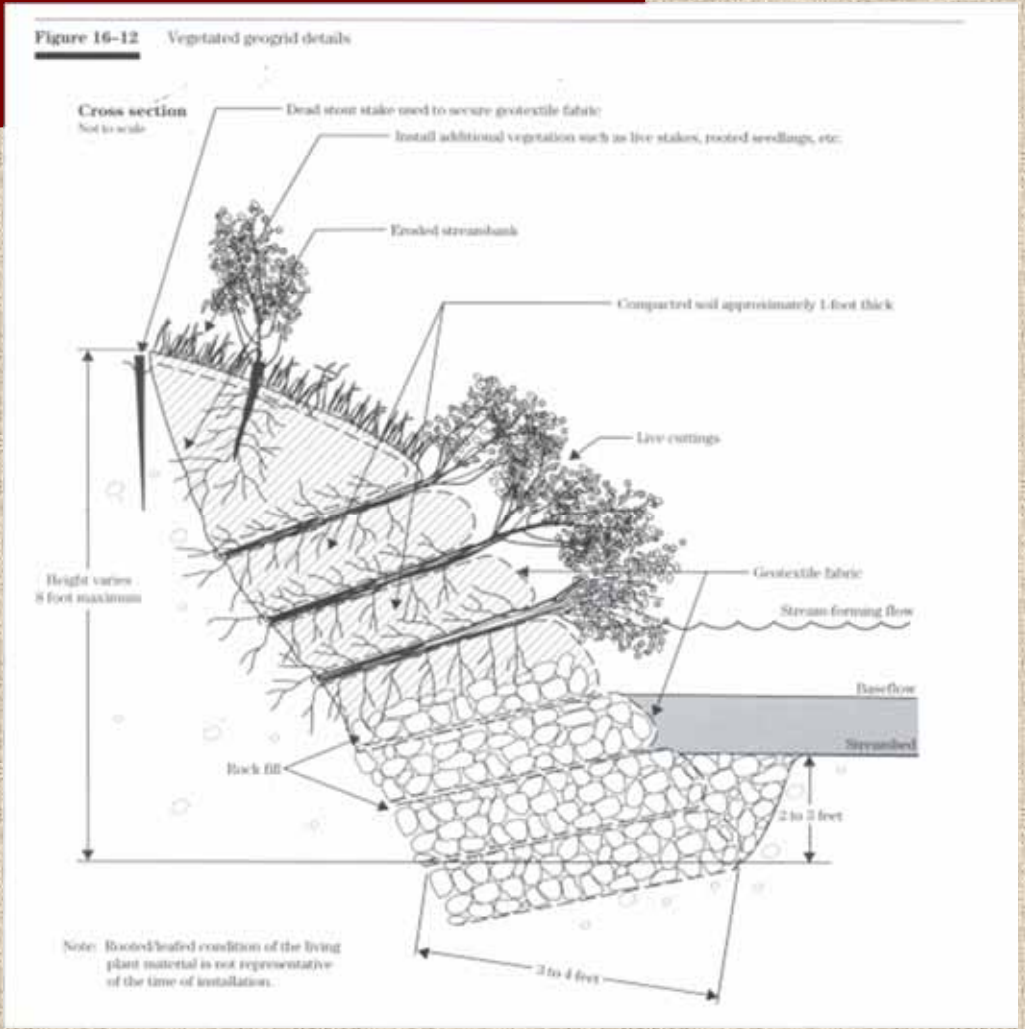
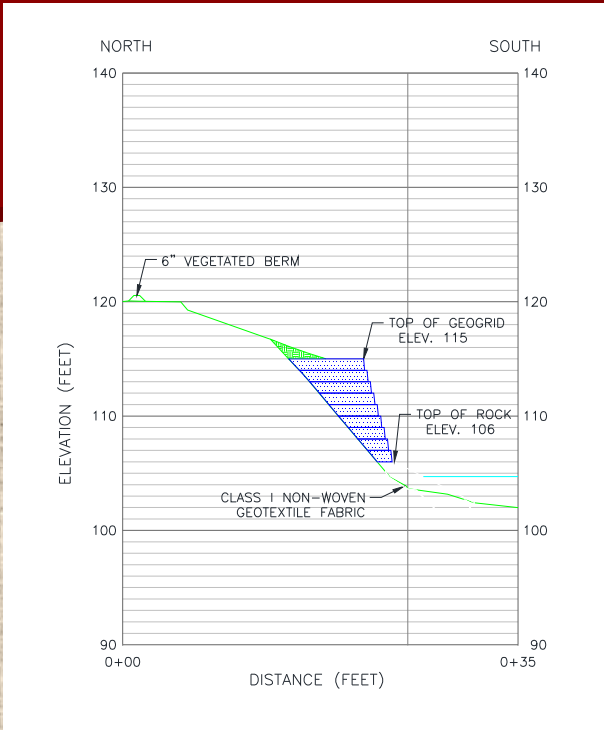
Branch Packing

Figure 16-10 Branchpacking details

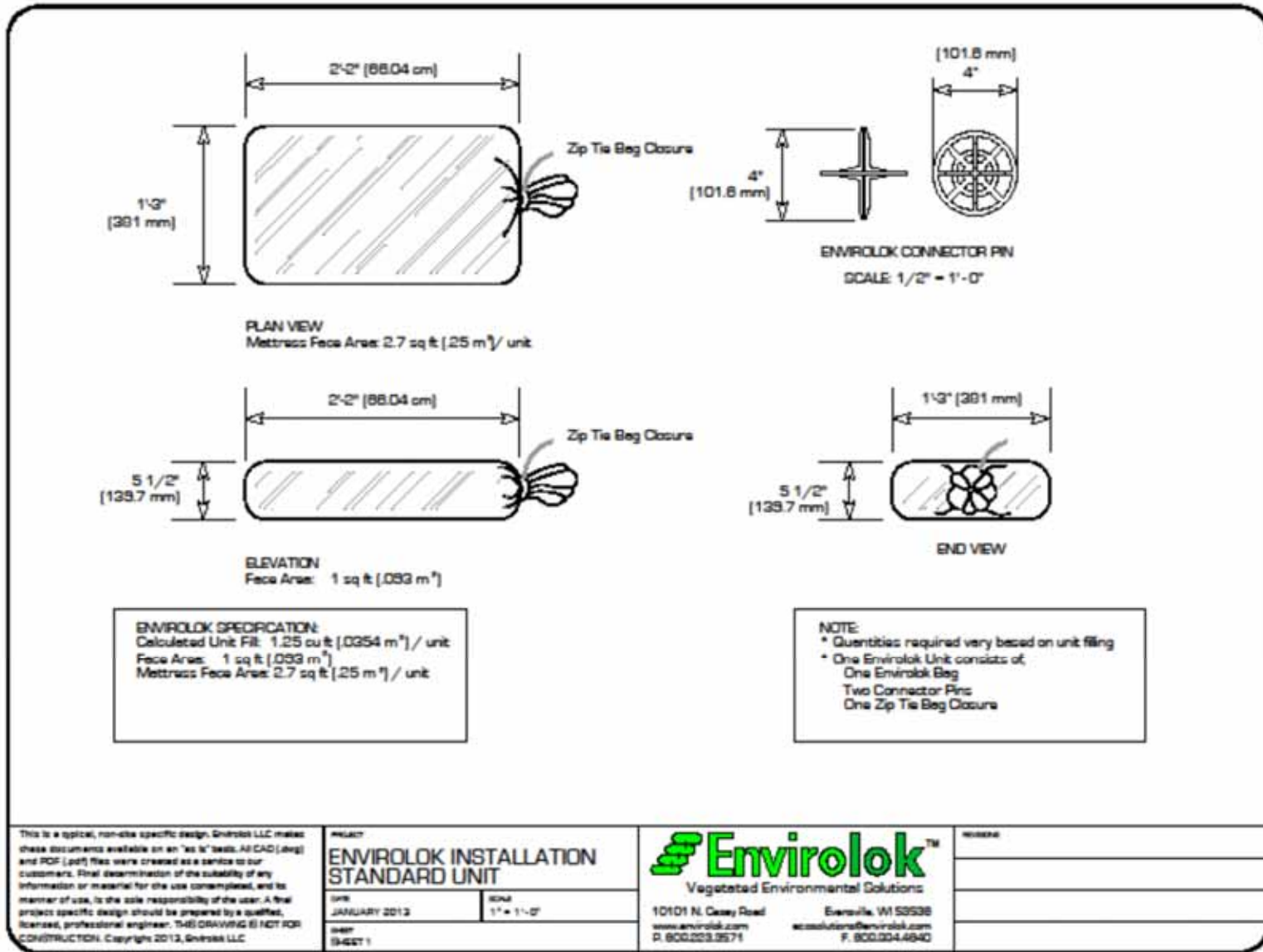


Techniques

Vegetated Geogrid



Geotextile Bag Wall





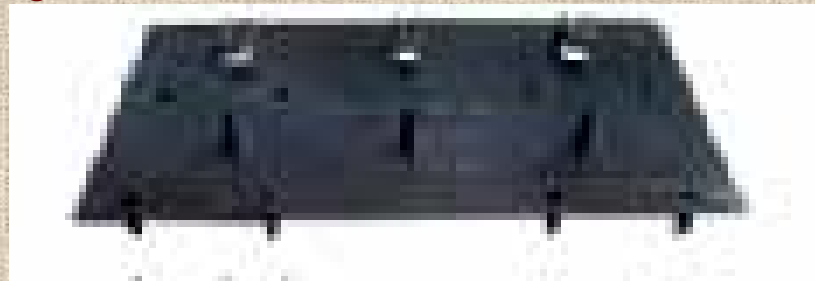
Deltalok GTX Bag

The Deltalok System evolves bag work construction practices by combining an innovative and patented interlocking method with a vegetation sustainable GTX soil bag.



Deltalok Standard Connector

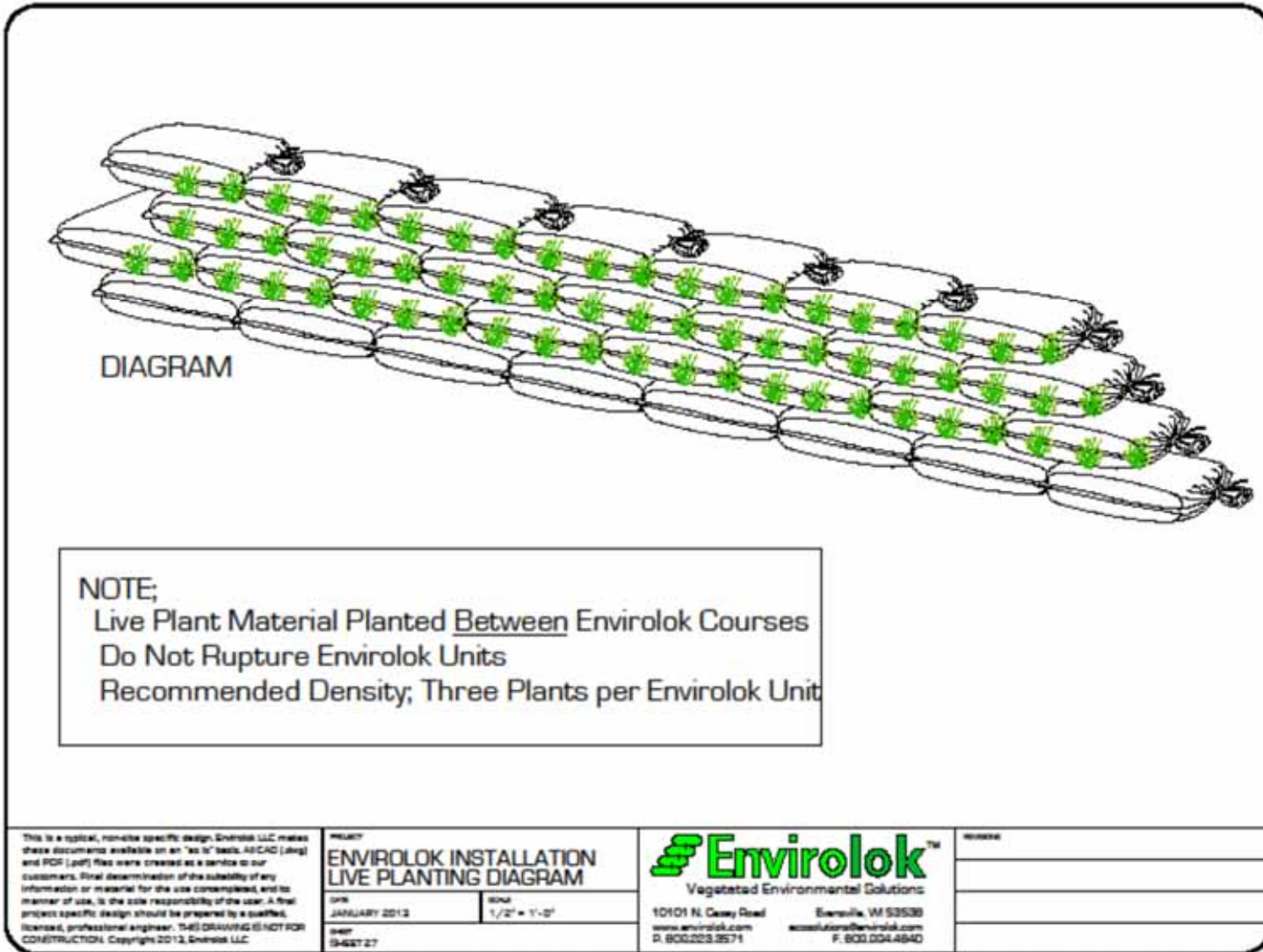
The Deltalok Connector is placed between sand/soil filled Deltalok GTX bags to dramatically increase the shear strength of the bag structure. The result is an interlocking soil mass that promotes and sustains vegetation.



Deltalok Engineered Connector

The connector also provides a positive mechanical connection to geogrid in the construction of steep slopes and retaining wall structures where needed.

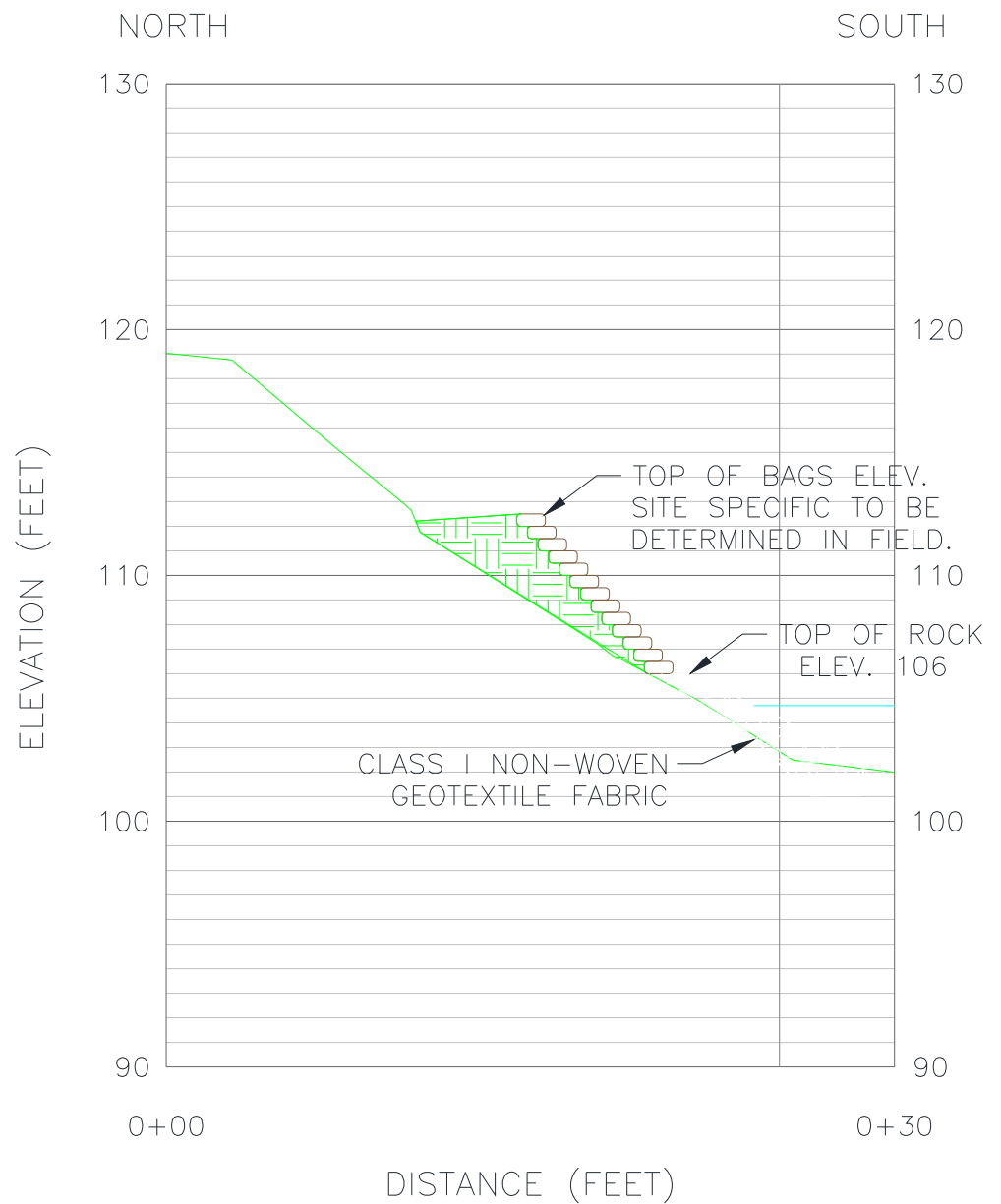
Geotextile Bag Wall



NOTE:
 Live Plant Material Planted Between Envirolok Courses
 Do Not Rupture Envirolok Units
 Recommended Density; Three Plants per Envirolok Unit

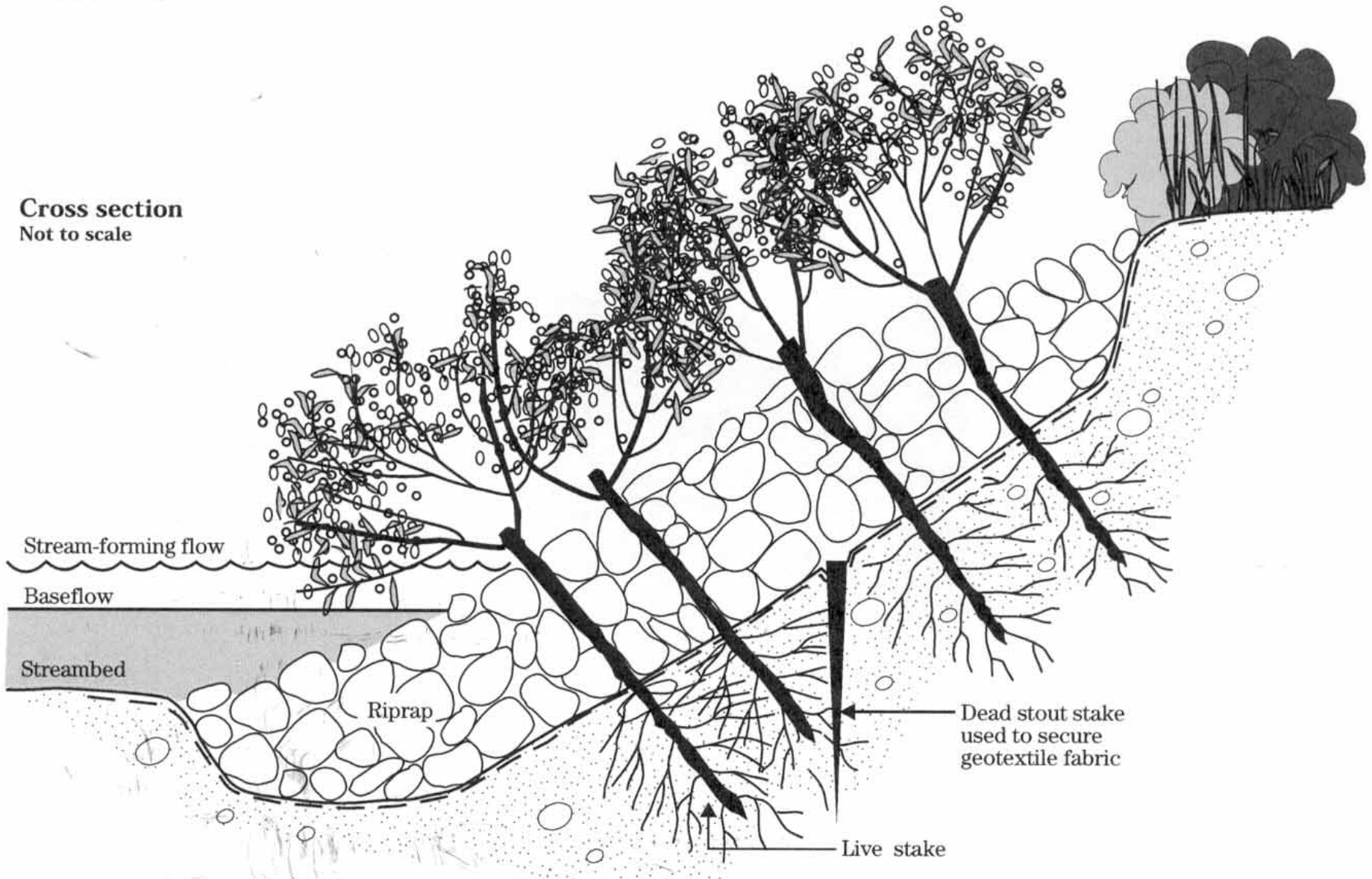
<p>This is a typical, non-site specific design. Envirolok LLC makes these documents available on an "as is" basis. ASCAD (.dwg) and PDF (.pdf) files were created as a service to our customers. Final determination of the suitability of any information or material for the use contemplated, and its manner of use, is the sole responsibility of the user. A final project specific design should be prepared by a qualified, licensed, professional engineer. THIS DOCUMENT IS NOT FOR CONSTRUCTION. Copyright 2012, Envirolok LLC.</p>	<p>PROJECT ENVIROLOK INSTALLATION LIVE PLANTING DIAGRAM</p>	<p>10101 N. Casey Road www.envirolok.com D. 800.223.3571</p>	<p>NUMBER</p>
	<p>DATE JANUARY 2012</p> <p>SCALE 1/2" = 1'-0"</p> <p>DRAWN 04-627-27</p>		<p>Envirolok, VA 53538 ecsolutions@envirolok.com F. 800.224.4840</p>

Geotextile Bag Wall



Techniques

Vegetated Riprap



NOESGES PHASE II
TYPICAL CROSS SECTION STATIONS 0+80 — 2+00

1+06

1+04

1+02

1+00

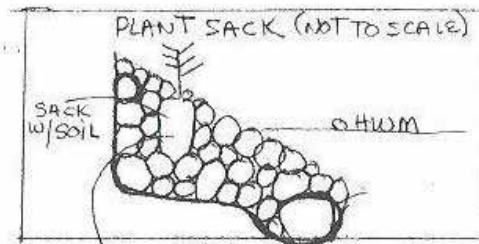
0+98

0+96

0+94

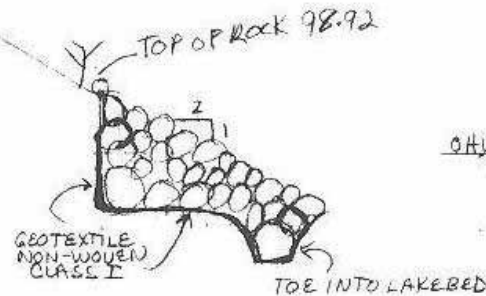
NOTES

1. TOE INTO LAKEBED 1' X 1'
2. NON-WOVEN CLASS I GEOTEXTILE PLACED UNDER ROCK
3. WRAP GEOTEXTILE ONE FOOT ON ENDS
4. ROCK - d 50 5 INCH
5. ROCK RIPRAP TO HAVE A FINISHED SLOPE OF 2:1
6. TBM - LAST PERMANENT STEP OF WOOD DECKING - NE CORNER - ELEVATION 100.00



NOTE: CHANGE EVERY OTHER SACK FROM VERTICAL TO HORIZONTAL.

ROCK GRADATION	
% PASSING	SIZE OF STONE (IN)
100	10-12.5
85	8-10
50	5-7.5
15	1.5-2.5



Shrubs for sacks

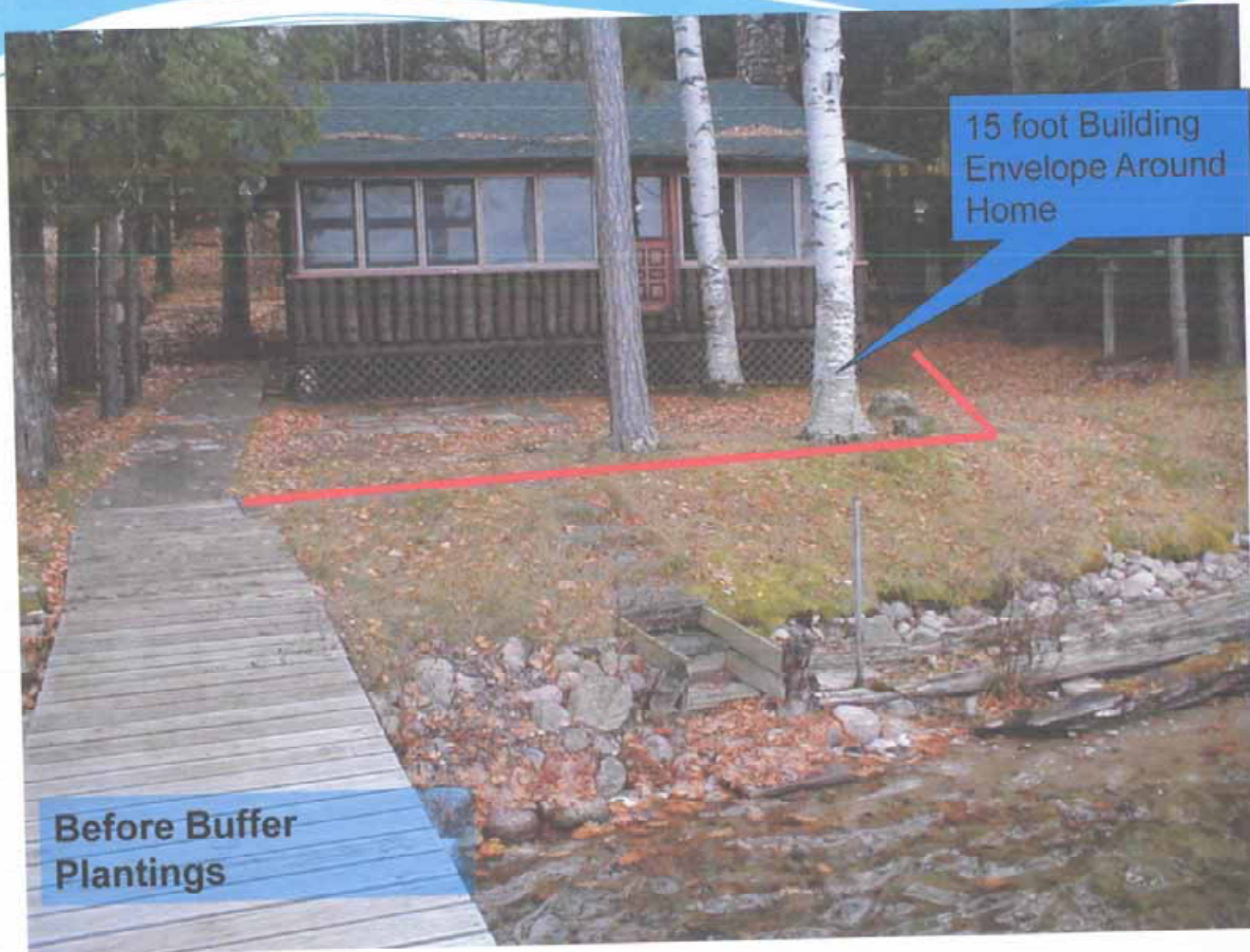
Meadowsweet	<i>Spirea alba</i>
Sweet Gale	<i>Myrica gale</i>
Speckled alder	<i>Alnus incana</i>

Vertical Geotextile Bag Photo





Project Examples Before / After



15 foot Building Envelope Around Home

Before Buffer Plantings



After Buffer Plantings

AMNICON LAKE

BEFORE



AFTER





BEFORE



Seawall Re



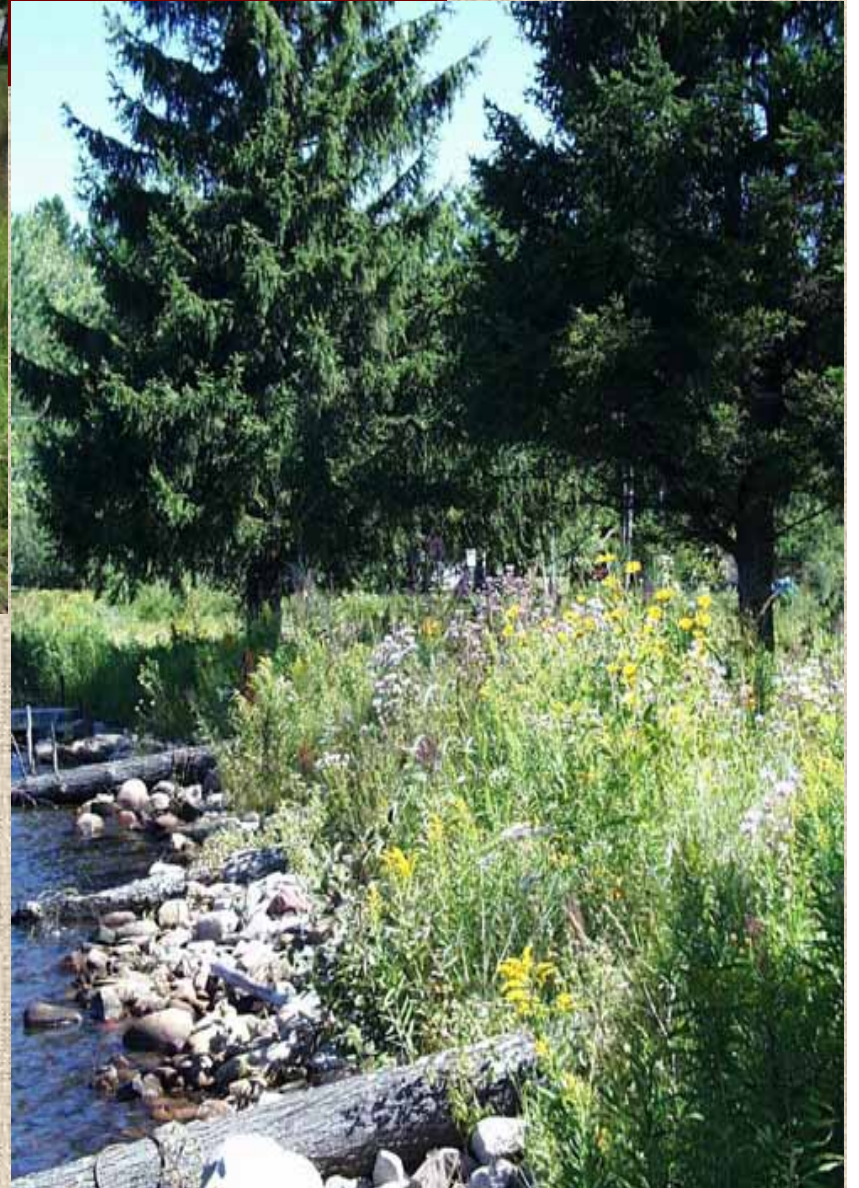
Rock Riprap
AFTER



BEFORE



AFTER













JUN 19 2009

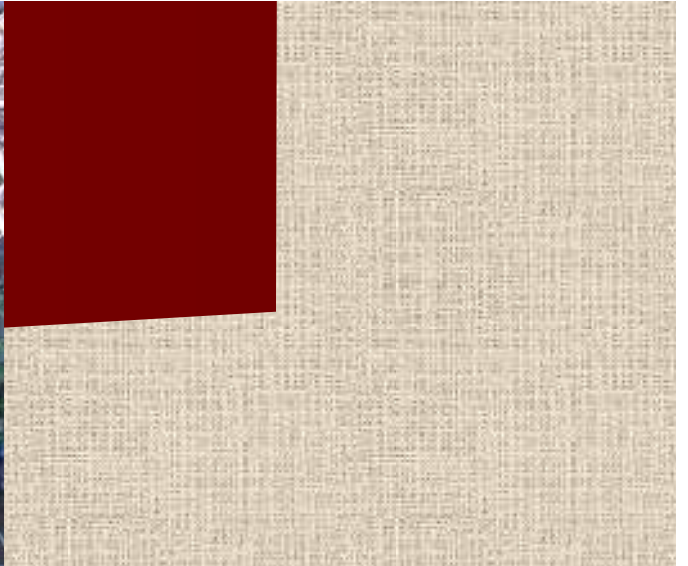


APR 25 2008

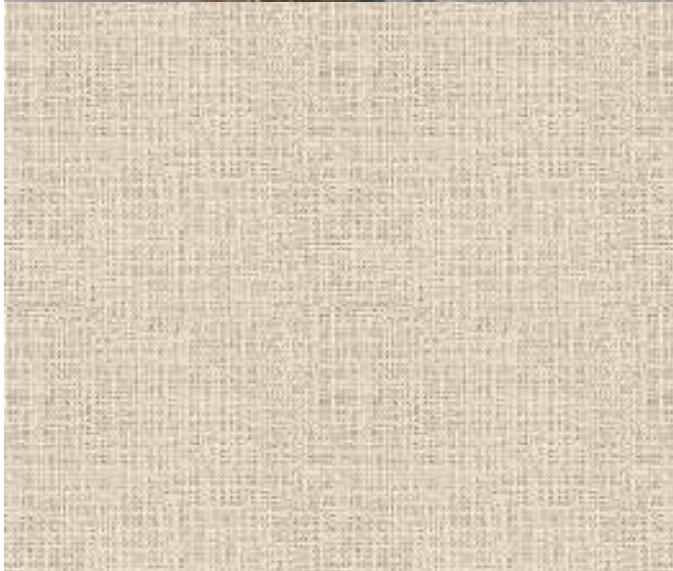








NOV 2 200









Before – Oct 2009



After - Oct 2012







After 5 months of growth (May 2010 to Oct 2010)





Vegetated Retaining Walls - Geotextile Bags (Install)



Vegetated Retaining Walls - Geotextile Bags (After)



**One growing season
later – Summer 2012**

(left side of stairs)

- Native plants are growing successfully
- Bags are camouflaged and will break down in time (biodegradable)

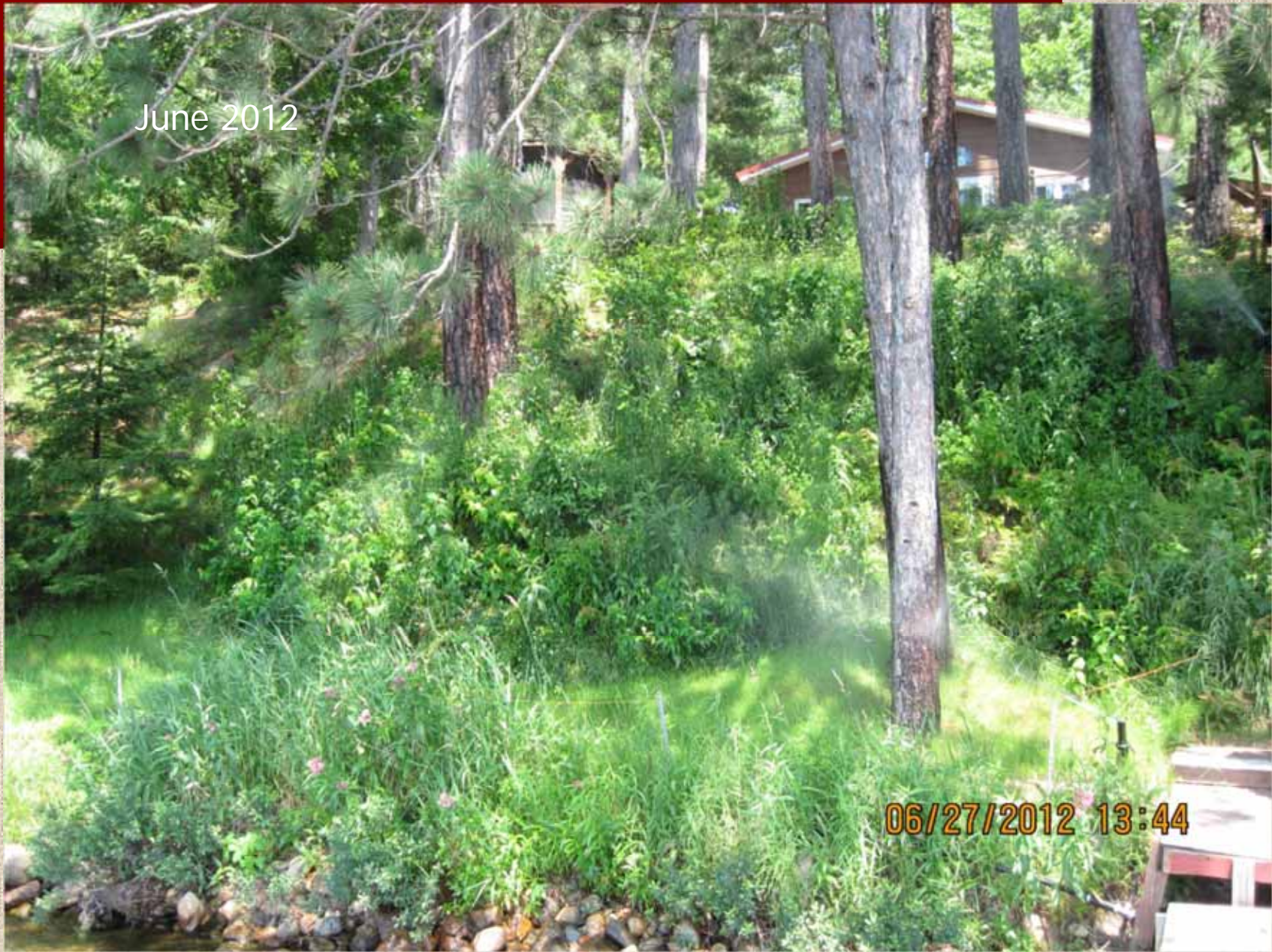
June 2010 Before



June 2011



June 2012



06/27/2012 13:44





After After

ShoreMax Product



ShoreMax™

Soft Revetment Scour Protection Mat

What is ShoreMax?

ShoreMax™ is a patent pending soft treatment scour protection that designed as mechanical protection over highly erodible areas. ShoreMax provides protection against much higher shear stresses and velocities than turf reinforcement mats (TRMs) alone. The ShoreMax system is comparable to hard armor products such as rock rip rap and articulated concrete blocks in turbulent flow and wave attack application.

ShoreMax is a unique, highly flexible 1/4" stabilized rubber mat designed with weils to allow vegetation establishment through the mat, or natural settling of sediment. ShoreMax is a versatile product that should be used in conjunction with other erosion control products such as turf reinforcement mats above water lines and geotextiles below normal water lines.

Typical Applications and Uses for ShoreMax

- Shoreline protection along rivers, streams, and lakes
- Boat docking areas
- High flow channel bottoms and bends
- Stormwater pipe inlets and outlets
- Curb inlets and downspouts
- Over flow structures (RA, weirs and spillways)
- Bridge abutments
- Anywhere extra scour protection is needed!

The flexible interlock system of the ShoreMax allows for easy installation in adverse conditions. ShoreMax can be installed with different fasteners including geotextile earth anchors, standard wire staples, or metal stakes.

For more information contact North American Green or your authorized distributor today by calling (800) 772-2040, emailing sales@na-green.com or visiting www.na-green.com.



Tensar NORTH AMERICAN GREEN

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After After

Not Advised!



Questions?

Thank you for your interest in
Shoreland Restoration and
Bioengineering Techniques!