

Molly Joseph Ward  
Secretary of Natural Resources



Clyde E. Cristman  
Director

Joe Elton  
Deputy Director of Operations

Rochelle Altholz  
Deputy Director of  
Administration and Finance

David Dowling  
Deputy Director of  
Soil and Water and Dam Safety

**REPLY TO:**

Div. of Soil and Water Conservation  
Eastern Area Regional Office  
P. O. Box 1425  
Tappahannock, VA 22560  
Telephone: (804) 443-1494  
FAX: (804) 443-4534

**COMMONWEALTH of VIRGINIA**  
DEPARTMENT OF CONSERVATION AND RECREATION

September 23, 2015

Mr. Robert Bennett, President  
Corrotoman By The Bay Association  
854 Pinckardsville Road  
Lancaster, VA 23113

RE: SEAS# T16004

Dear Mr. Bennett:

On September 10, I met with you, and other association members, at association property, on the Western Branch of the Corrotoman River in Lancaster County. The site visit was in response to your request for advisory assistance concerning a shoreline erosion problem.

The publication entitled Shoreline Situation Report: Lancaster County reports the historical erosion rate for your area averages less than 1 foot per year. The erosion on your property appears to be caused by elevated water levels and waves associated with storms. The following recommendations are made as a result of the site visit and subsequent analysis of the problem:

1. The trees and shrubs growing on the bank and within 20 feet of the bank edge should be selectively cut or trimmed. Trees undermined by erosion displace large amounts of soil when they fall. Tree removal should decrease the weight on the bank and reduce the chance of sloughing. The additional sunlight exposure should stimulate growth of the upland ground cover. Before cutting any trees, please contact Lancaster County at (804) 462-5220 for information concerning tree removal restrictions under the Chesapeake Bay Preservation Act.
2. Bank grading may not be practical due to the bank height and location of the road at the top of the bank. Although grading the entire bank may be impractical or cost prohibitive, portions of the bank may be selectively graded. In conjunction with or as an alternative to bank grading, a properly designed and constructed retaining wall system may be installed.
3. After tree removal or bank grading, a vegetative cover should be established. We recommend a mixture of native grasses or other low-growing vegetation. For further details about the establishment of vegetation and soil tests, contact the Virginia Cooperative Extension Agent for Lancaster County at (804) 462-5780.

600 East Main Street, 24<sup>th</sup> Floor | Richmond, Virginia 23219 | 804-786-6124

State Parks • Soil and Water Conservation • Outdoor Recreation Planning  
Natural Heritage • Dam Safety and Floodplain Management • Land Conservation

4. To prevent further bank erosion, we recommend a properly designed and constructed riprap (large rock) structure. The structure should be installed to minimize encroachment beyond the mean high water position. The riprap should be constructed on a 2:1 (horizontal/vertical) slope or flatter. A minimum of two layers of armor rock should be used. Each armor rock should weigh a minimum of 50 pounds. The toe of the riprap should be buried a minimum of 2 feet below the mean low water elevation. An alternative to the buried toe is a riprap apron. The apron consists of 2 layers of armor rock extending a minimum of 4 feet onto the bottom. A layer of filter cloth should be used under and behind the riprap. The riprap should be extended inland or properly connected to neighboring structures to prevent erosional flanking. Lists of filter cloth and riprap suppliers have been enclosed. See the enclosed cross-sectional view of a typical riprap revetment.
5. During the site visit we also discussed moving the existing road away from the eroding bank as an alternative to bank grading and construction of a riprap revetment.

The above recommendations are made in my capacity as an advisory agent in shoreline erosion control matters. The suggestions should not be considered as binding you to any particular course of action, as they are intended to indicate what we think would be the best solution in terms of cost and effectiveness. Our examination of the site or this report does not constitute permission by the Commonwealth, or its agencies, to proceed with implementation of control measures. Permits from State and Federal agencies are generally required for shoreline modification.

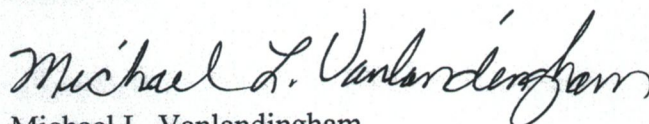
You should also be aware that success in shoreline erosion control cannot be guaranteed, as there are many variables involved. In this regard, we suggest care in selecting a contractor. Our comments concerning construction are intended as guidelines developed from our experience in viewing structures that have been successful or have failed.

If you decide to construct a control measure, an assessment of the impacts of the project on the environment will be given by the regulatory agencies. Our advice is given with the idea of reducing environmental impacts associated with our recommendations. Although this has been considered in our recommendations, the permit reviewing agencies may desire additional information or measures.

Services available through this office include: review of the permit application; review of design and construction plans; and inspection of structures under construction when plans have been reviewed by this office. We recommend that a copy of this report be attached to the permit application.

If we may be of further assistance or if you have any questions, please let me know.

Sincerely,

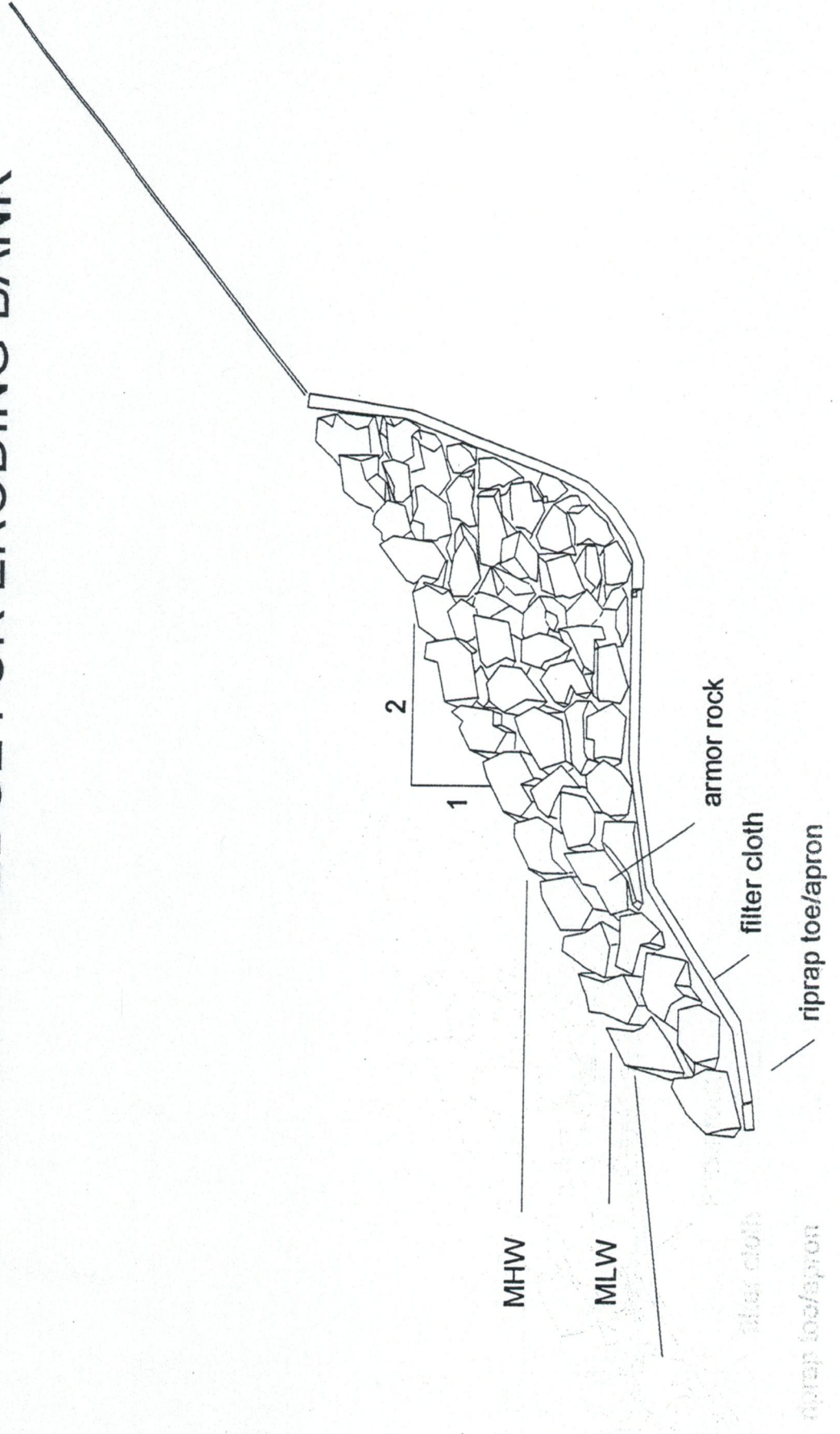


Michael L. Vanlandingham  
Shoreline Engineer

# REPRESENTATIVE CROSS SECTION RIPRAP WEDGE FOR ERODING BANK

Dept. of Conservation and Recreation  
P. O. Box 1425  
Tappahannock, VA 22560

Dept. of Conservation and Recreation  
P. O. Box 1425  
Tappahannock, VA 22560



MHW

MLW

armor rock

filter cloth

riprap toe/apron

2

1

## SHORELINE EROSION CONTROL CONTRACTORS

### CONTRACT AND DESIGN RECOMMENDATIONS

The Shoreline Erosion Advisory Service, SEAS, strongly recommends that property owners and contractors have a contract and design plan before implementing shoreline protection measures. One service offered by SEAS staff is the review of contracts and design plans received by property owners. If design plans and contracts have been reviewed, construction inspections can be provided upon request from the landowner or contractor. Contracts and plans should contain the following:

#### Design Plans:

1. Cross-sectional diagrams of the structure to be built. The diagrams should include the dimensions of the structure and identify the materials to be used.
2. A plan view drawing showing the location of the structure. All necessary dimensions concerning the proposed structure should be included in the plans view.
3. The mean low and mean high water elevations should be identified on all plans and diagrams.

#### Contracts:

1. A complete list of the materials and the quantities needed.
2. The proposed start and completion dates for the construction.
3. The contract should specify the permits needed and who is responsible for obtaining the permits.
4. The price of the completed job.
5. Additional work such as debris removal, bank grading, seeding, mulching, etc. should be identified and explained.
6. Liabilities and repair for utility lines, septic fields, property damage, etc. should be identified and explained.
7. Penalties for not meeting completion dates should be identified.
8. A payment schedule with deadlines and interest charges for late payments.
9. A billing process for work completed in conjunction with 8 above.

If you have any questions, please contact:

Department of Conservation and Recreation  
Tappahannock Regional Office  
P.O. Box 1425  
Tappahannock, VA 22560  
(804) 443-3803 or FAX (804) 443-4534

## SHORELINE EROSION CONTROL CONTRACTORS

Contractor	Types	License
American Dock and Boatlift Co. 105 Rens Road Poquoson, VA 23662 (757) 868-7976	Riprap (hand or machine placed), bulkheads	Class B
Andrews Development, Inc. Rt. 1, Box 235 Tappahannock, VA 22560 (804) 443-5537	Riprap, groins, beach nourishment, grading and tree removal.	Class A
Aquacon, Inc. P. O. Box 2889 Mechanicsville, VA 23111 (804) 569-9440 FAX: (804) 569-9442 Toll Free: (888) 957-3036 E-Mail: cahill@aquacon.net Web: www.aquacon.net	Riprap (hand or machine placed, bulkheads, groins, breakwaters, beach nourishment, grading and tree removal.	Class A
Atlantic Marine Construction Company, Inc. 4401 Pretty Lake Avenue Norfolk, VA 23518 (757) 362-0023 FAX: (757) 362-0024	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
Cedarcrest Marine, Inc. 13101 Sturgeon Point Road Charles City, VA 23030 (804) 829-2459	Riprap, bulkheads, groins, breakwaters, tree removal.	Class A
Coastal Design and Construction P. O. Box 650 Gloucester, VA 23061 (804) 693-4158	Riprap, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
L. Hill Cox - Builder/Marine Contractor 1948 Pine View Avenue Virginia Beach, VA 23456 (757) 468-0888	Riprap (hand or machine placed), bulkheads, grading, tree removal.	Class A
Crofton Diving Corporation 16 Harper Avenue Portsmouth, VA 23707 (757) 397-1131 FAX: (757) 397-8693	Riprap (hand or machine placed), bulkheads, groins, breakwaters.	Class A
C. W. Davis Construction, Inc. P. O. Box 625 Hayes, VA 23072 (804) 642-5562	Riprap, bulkheads, groins, beach nourishment, grading, tree removal.	Class A
Decked Out 179 Treakle Lane Colonial Beach, VA 22443 (804) 224-2324	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class B
Delta Marine Construction P.O. Box 500 Deltaville, VA 23043 (804) 776-7110	Riprap, bulkheads, groins, breakwaters, bank stabilization, dredging	Class A

## SHORELINE EROSION CONTROL CONTRACTORS

Contractor	Types	License
Dock Masters Box I West Point, VA 23181 Phone (804) 843-4214	Riprap (hand placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class B
Earth Resources, Inc. P. O. Box 520 Lancaster, VA 22503 (804) 435-1085	Riprap (hand or machine placed), groins (stone), breakwaters (stone), beach nourishment, grading, tree removal.	Class A
Evans Contractors HCR 67, Box 1800 Laneview, VA 22504 (804) 443-2877	Bulkheads, groins.	Class A
Fidler Marine Contractor 216 Lambs Lane Warsaw, VA 22572 (804) 333-3561	Bulkheads, groins.	Class B
Green Shore Solutions 664 N. Main St. Kilmarnock, VA 22482 (804) 436-8819	Riprap, excavation, marshgrass Installation, wetlands construction	Class B
Gregg Marine Construction 2517 Elon Dr. Virginia Beach, VA 23454	Riprap, Bulkheads, Groins, Jetties	Class A
H & H Enterprises 3623 Shipwright St. Portsmouth, VA 23703 (757) 484-0308	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
Hayden Construction, Inc. P. O. Box 653 Kilmarnock, VA 22482 (804) 435-6501 or (804) 435-6129	Riprap (hand or machine placed), bulkheads, groins, breakwaters, grading, tree removal.	Class A
Horton Waterfront Contractors 195 Messick Road Poquoson, VA 23662 (757) 868-0940	Riprap (hand or machine placed), bulkheads, breakwaters, beach nourishment, grading.	Class B
C. W. Hudgins, Jr. P. O. Box 307 Mathews, VA 23109 (804) 725-2850	Riprap (hand or machine placed), groins, breakwaters, beach nourishment, grading, tree removal.	Class B
W. R. Jessie, Jr. HCR Box 322 Deltaville, VA 23043 (804) 776-6737	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class B
L & M Marine Contractors, Inc. P. O. Box 837 Urbanna, VA 23175 (804) 758-3502	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
Land Contractors P. O. Box 94 Ware Neck, VA 23178 (804) 695-9797 (Office)	Riprap (hand or machine placed), groins, breakwaters, beach nourishment, grading, tree removal.	Class B

## SHORELINE EROSION CONTROL CONTRACTORS

Contractor	Types	License
(804) 694-4457 (FAX) (804) 366-0015 (Mobile)		
Glen Lester Co., Inc. P. O. Box 42 Wicomico Church, VA 22579 (804) 580-2020	Riprap (hand or machine placed), grading, tree removal.	Class B
W. F. Magann Corporation 3220 Mariner Avenue Portsmouth, VA 23703 (757) 484-2820	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
Middle Peninsula Marine Construction Terry Emerson P.O. Box 427 Deltaville, VA 23043 (804) 776-9719 www.mpmcpiers.com	Riprap, bulkheads, groins	Class C
Pembroke Construction Company, Inc. 802 West Pembroke Avenue Hampton, VA 23669 (757) 722-2591 Hampton	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
R & W Construction P. O. Box 157 Cobbs Creek, VA 23035 (804) 725-7516	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
Ranson Contractors 1572 Cowart Road Lottsburg, VA 22511 (804) 529-6578	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class B
Ransone's Nursery & Maintenance, Inc. Box 1237 Kilmarnock, VA 22482 (804) 435-3788	Riprap (hand or machine placed), grading, tree removal.	Class B
Rebel Marine, Inc. 1553 Bayville Street Norfolk, VA 23503 (757) 588-6022	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment.	Class B
Riverworks, Inc. P. O. Box 515 Gloucester, VA 23061 (804) 642-2826	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class B
SBH Construction HC 75, Box 17905 Mathews, VA 23109 (804) 725-4545	Riprap (hand or machine placed), breakwaters, grading, tree removal.	Class B
Sandy Bay Marine Contractors 62 Bay Front Place Hampton, VA 23664-1797 (757) 850-3555 (757) 868-7555	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A

## SHORELINE EROSION CONTROL CONTRACTORS

Contractor	Types	License
Seament Shoreline Systems, Inc. 8267 Lighthouse Lane King George, VA 22485 (540) 663-5135 (W) (540) 775-2651 (H); FAX: (540) 644-8009	Bulkheads, Groins, Breakwaters, (subcontracts grading and tree removal.)	Class A
Southern Landscaping & Construction, Inc. P. O. Box 275 Shacklefords, VA 23156 (757) 785-4242 (800) LAWN H2O FAX: (757) 785-4241	Riprap (hand or machine placed), bulkheads, groins, grading, tree removal.	Class A
TRF Enterprises P. O. Box 154 Knotts Island, NC 27950 (919) 429-3390	Riprap (hand or machine placed), bulkheads, grading, tree removal.	Class A
Virginia Marine Structures 5021 Broad Street Virginia Beach, VA 23462 (757) 497-7880	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A
Waterfront Marine Construction, Inc. 2809 Crusader Circle Virginia Beach, VA 23456 (757) 468-1500	Riprap (hand or machine placed), bulkheads, groins, breakwaters.	Class A
T/A Water's Edge Construction Box 352 Toano, VA 23168 (757) 566-0149	Riprap (hand or machine placed), bulkheads, groins, breakwaters, beach nourishment, grading, tree removal.	Class A



Rev. 12-21-01

**FILTER CLOTH SUPPLIERS**

A.C.F. Environmental, Inc.  
2831 Cardwell Rd.  
Richmond, Virginia 23234  
(804) 271-0633  
Toll Free Number: 1-800-448-3636

Adams Family Enterprises  
75 Merganser Court  
Montross, VA 22520  
(804) 472-3729

Richard B. Allison, Jr. and Associates  
P. O. Box 384  
Montross, VA 22520  
(804) 493-9066

American Dock and Boatlift Co.  
105 Rens Road  
Poquoson, VA 23662  
(757) 588-6383 or (757) 340-1780

Barrack, Inc.  
P. O. Box 639  
Lancaster, VA 22503  
(804) 462-5998  
(800) 448-4505

Coastal Design & Construction  
P. O. Box 650  
Gloucester, Virginia 23601  
(804) 693-4158

Construction Supply & Equipment Co.  
P. O. Box 2086  
1215 Executive Blvd.  
Chesapeake, VA 23320  
(757) 436-0010  
(757) 436-3782 (FAX)

Decked Out  
179 Treacle Ln.  
Colonial Beach, VA 22443  
(804) 224-2324

Earth Resources, Inc.  
P. O. Box 520  
Lancaster, VA 22503  
(804) 435-1085

Farmers Feed & Garden Supply  
Box 26  
Alfonso, VA 22421  
(804) 462-7325

Horton Waterfront Contractors  
195 Messick Road  
Poquoson, VA 23662  
(757) 868-0940

W. R. Jessie Jr., Inc.  
HCR Box 322  
Deltaville, VA 23043  
(804) 776-6737

L & M Marine Contractors  
P. O. Box 837  
Urbanna, VA 23175  
(804) 758-3502

Glen Lester Co., Inc.  
P. O. Box 42  
Wicomico Church, VA 22579  
(804) 580-2020

Pembroke Construction Co., Inc.  
802 W. Pembroke Avenue  
P. O. Box 486  
Hampton, Virginia 23669  
(757) 722-2591

Ranson Contractors  
Rt. 1, Box 654A  
Lottsburg, VA 22511  
(804) 529-6578

Over-

R & W Construction  
P. O. Box 157  
Cobbs Creek, VA 23035  
(804) 725-7516

Sandy Bay Marine Contractors  
62 Bay Front Place  
Hampton, VA 23664-1797  
(757) 850-3555  
(757) 868-7555

Saunders Oil Company, Inc.  
1200 W. Marshall Street  
Richmond, Virginia 23220  
Toll Free Number: 1-800-868-3804  
Richmond: (804) 358-7191

Saunders Oil Company  
817 Pollard Street  
Norfolk, VA 23504  
Toll Free Number: 1-800-868-1107  
(757) 622-7249

Seacoast Construction Fabrics, Inc.  
P. O. Box 6358  
Virginia Beach, VA 23456  
(757) 426-7440

Sea Port Marine Corporation  
P. O. Box 3108  
Chesapeake, VA 23327  
(757) 436-4400

Tri-State Stone & Building Supply, Inc.  
8200 Seven Locks Road  
P. O. Box 34300  
Bethesda, Maryland 20827  
(301) 365-2100

Voss Company of Virginia, Inc.  
6804 Virginia Circle  
Spotsylvania, Virginia 22553  
(540) 374-0400

Wilson Feed and Seed Co., Inc.  
2201 Decatur St.  
P. O. Box 31416  
Richmond, VA 23224  
(804) 232-6791

Wood Preservers, Inc.  
P. O. Box 158  
Warsaw, Virginia 22572  
(804) 333-4022

White Oak Equipment, Inc.  
4550 Bainbridge Blvd.  
Chesapeake, VA 23320  
(757) 543-2273  
(757) 545-3475 (FAX)

Whitlock Brothers, Inc.  
5588 Raby Road  
Norfolk, VA 23502  
(757) 461-3127

Whitlock Brothers, Inc.  
4801 Roanoke Avenue  
Newport News, VA 23607  
(757) 244-7558

RIPRAP SUPPLIERS

Andrews Development, Inc.  
Rt. 1, Box 235  
Tappahannock, VA 22560  
(804) 443-5537

Arundel Corporation  
34 Loveton Circle  
P. O. Box 5000  
Sparks, MD 21152  
(410) 329-5000

Martin-Marietta  
P. O. Box 8  
Doswell, VA 23047  
(804) 448-2800

Chesapeake Materials, Inc.  
P. O. Box 1036  
Dumphries, VA 22026  
(703) 221-3778

Coastal Design and Construction  
P. O. Box 650  
Gloucester, VA 23061  
(804) 693-4158

C. W. Davis Construction, Inc.  
P. O. Box 625  
Hayes, VA 23072  
(804) 642-5562

Decked Out  
179 Treakle Lane  
Colonial Beach, VA 22443  
(804) 224-2324  
FAX: (804) 224-2324

Earth Resources, Inc.  
P. O. Box 520  
Lancaster, VA 22503  
(804) 435-1085

Fairhaven Marine, Inc.  
P. O. Box 159  
Lottsburg, VA 22511  
(804) 529-7897

Hayden Construction, Inc.  
P. O. Box 653  
Kilmarnock, VA 22482  
(804) 435-6501  
(804) 435-6129

IA Construction Corporation  
P. O. Box 316  
Tasley, VA 23441  
(757) 787-4801

W. R. Jessie, Jr.  
HCR Box 322  
Deltaville, VA 23043  
(804) 776-6737

L & M Marine Contractors, Inc.  
P. O. Box 837  
Urbanna, VA 23175  
(804) 758-3502

Glen Lester Co., Inc.  
P. O. Box 42  
Wicomico Church, VA 22579  
(804) 580-2020

Luck Stone Corporation  
P. O. Box 29682  
Richmond, VA 23242  
1-800-255-5825  
(804) 784-5263

Maryland Materials, Inc.  
P. O. Box W  
North East, MD 21901  
(410) 287-8177

Pembroke Construction Co., Inc.  
P. O. Box 486  
802 Pembroke Ave.  
Hampton, VA 23669  
(757) 722-2591

R & W Marine Construction  
P. O. Box 229  
Cobbs Creek, VA 23035  
(804) 725-7516  
FAX (804) 725-4640

Ranson Contractors  
1572 Cowart Road  
Lottsburg, VA 22511  
(804) 529-6578

Ransone's Nursery & Maintenance, Inc.  
Box 1237  
Kilmarnock, VA 22482  
(804) 435-3788

Riverworks, Inc.  
P. O. Box 515  
Gloucester, VA 23061  
(804) 642-2826

Rohrers Quarry  
70 Lititz Road  
P. O. Box 365  
Lititz, PA 17543  
(717) 626-9771

SBH Construction  
HCO2, Box 17905  
Mathews, VA 23109  
(804) 725-5262 (Work)  
(804) 725-4545 (Home)

Sandy Bay Marine Contractors  
62 Bay Front Place  
Hampton, VA 23664-1797  
(757) 850-3555  
(757) 868-7555

Tidewater Quarries  
P. O. Box 42070  
Richmond, VA 23224-9072  
(804) 232-1200  
(Class AI riprap only)

Voss Company of Virginia, Inc.  
6804 Virginia Circle  
Spotsylvania, VA 22553  
(540) 374-0400

*Continued*

Vulcan Materials Company  
 VA State Sales Office  
 P. O. Drawer 1590  
 Manassas, VA 20108  
 1-800-444-9690 or (703) 631-9690

Vulcan Materials Sales Yards:

Norfolk/VA Beach (757) 622-0842  
 Portsmouth (757) 397-6494  
 Suffolk (757) 539-5617

Vulcan Quarries Located in:

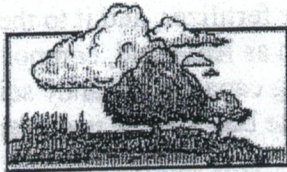
Lawrenceville (804) 848-4775  
 Lorton (703) 643-1145  
 (Metro #690-1172)  
 Royal Stone(804)360-2014 - (Richmond Area)  
 Stafford(703) 690-1876  
 Skippers(804) 634-4158

<b>GRADED RIPRAP - WEIGHT ANALYSIS</b>		
<b>Riprap Class/Type</b>	<b>Weight Range* (lbs.)</b>	<b>Requirements for Stone Mixture</b>
Class AI	25-75	Max. 10% > 75 lbs.
Class I	50-150	60% > 100 lbs.
Class II	150-500	50% > 300 lbs.
Class III	500-1,500	50% > 900 lbs.
Type I	1,500-4,000	Av. wt. = 2,000 lbs.
Type II	6,000-20,000	Av. wt. = 8,000 lbs.

\*In all classes/types of riprap, a maximum 10% of the stone in the mixture may weigh less than the lower end of the range.

**Source: Adapted from VDOT Road and Bridge Specifications**

To the extent of our knowledge, these are the companies who presently supply quarry stone. If you are aware of others, please inform us so the list may be as complete as possible.



## Selecting Landscape Plants: Ground Covers

Authors: Diane Relf, Extension Specialist, Environmental Horticulture and  
Bonnie Appleton, Extension Specialist, Nursery Crops, Virginia Tech

Publication Number 426-609, posted July 2000

Ground covers are low-growing plants that spread quickly to form a dense cover. They add beauty to the landscape and, at the same time, help prevent soil erosion. Grass is the best known ground cover, but grass is not suited to all locations. Other ground cover plants should be used where grass is difficult to grow or maintain.

Unlike grass, most ground cover plants cannot be walked on. They can be used effectively to reduce maintenance work and to put the finishing touch on any landscaping project.

### Location

Ground covers can be found to fit many conditions, but they are used most frequently for the following locations:

- Steep banks or slopes
- Shady areas under trees and next to buildings
- Underplantings in shrub borders and beds
- Where tree roots grow close to the surface and prevent grass from growing
- Very wet or very dry locations

When planted under trees, ground covers reduce the possibility of mower damage to the base of the tree. Some ground covers may be used to protect the roots of shallow-rooted trees. They shade the soil and keep it from drying out rapidly. Some ground covers don't require as much moisture and nutrients as grass. Therefore, they are in less competition with trees and shrubs.

### Selection

Selection of a suitable plant for ground cover depends on the area where it will be grown. Some ground cover plants prefer partial shade; others thrive in deep shade or full sun; and a few grow well in either sun or shade. The selected ground cover plants listed here grow well in a wide variety of soil types. Some, however, prefer moist soil, while others need dry or well-drained soil. All the ground covers discussed are reliably cold hardy throughout Virginia.

First, select types best suited to the conditions existing where the ground cover is needed. From these

selected types, choose one that ornamentally blends best with surrounding plantings.

## Establishment

**Bed preparation:** If you need to add a soil amendment, such as organic matter or fertilizer, add it to the entire planting bed, not just to individual planting holes. Organic materials, such as leaf mold, compost, or well-rotted manure, improve drainage in clay soils and improve water-holding capacity of sandy soils. Eight to ten bushels of organic materials per 100 square feet incorporated into the bed may be necessary in very poor or heavy soils.

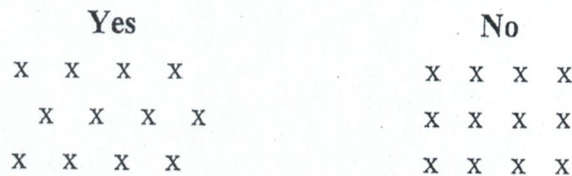
A soil test provides the best guidance for fertilizer usage. Without this information, a general rule would be to use 3 pounds of a commercial fertilizer, such as 5-10-5, per 100 square feet. Fertilizer can be mixed into the soil at the same time other amendments are incorporated.

**In open sites:** A well-prepared planting bed is necessary to develop a dense, healthy ground cover planting. The soil should be worked to a depth of 6 to 8 inches. Take care to eliminate perennial weeds and grass that might compete with the ground cover during establishment.

**In sites under trees:** When establishing a ground cover under existing trees, choose shallow-rooted plants, such as hostas. Since the majority of fibrous tree roots are found in the top 12 inches of soil, prepare the soil for planting only 2 or 3 inches deep to minimize disturbance of these roots and prevent damage to the tree.

Most ground cover plants can be planted any time during the growing season, but either spring or fall is preferred.

The arrangement and spacing of plants in the planting bed depends on the growth characteristics of the plant. Space plants so they will develop a uniformly covered area in a relatively short period of time. Plant in staggered rows, not straight lines, to get faster coverage. (Fig. 1., page 2.)



**Figure 1: Arrangement of plants in bed**

Plants that spread rapidly may be spaced much wider than slow-spreading types. Spacing also depends on how many plants you can purchase and how quickly a complete cover is wanted. Spacings from 6 inches to 2 feet are most frequently used. The following chart shows the area that approximately 100 plants will cover when set at various distances. For example, if plants are spaced 4 inches apart, 100 plants will cover about 11 square feet.

Watering, weeding, mulching, and feeding will be the main requirements of the new ground cover planting. Water during dry periods. An occasional thorough soil soaking is better than frequent light

waterings. Occasional hand weeding with a minimum disturbance of the soil may be necessary. A 1- to 2-inch mulch layer of leaf mold, compost, or similar organic material will conserve soil moisture and reduce weed growth.

## Recommended Ground Covers

### Creeping Juniper *Juniperus horizontalis*

Creeping juniper is an excellent, woody, evergreen ground cover that grows 1 to 2 feet tall, depending on the variety. It is a vigorous grower capable of covering a large area. The leaves are needle shaped and green or blue-green in color. The foliage frequently turns a purple or slate color in the winter.

Creeping juniper withstands hot, dry situations and prefers full sun. It is an excellent plant for slopes and banks. The plants may be improved by clipping the ends of main branches for two or three seasons after planting to induce a dense branching system. Space plants 2 to 4 feet apart.

Varieties most commonly planted for ground covers include: Andorra (*J. horizontalis* 'Plumosa'), Bar Harbor (*J. horizontalis* 'Bar Harbor') and Blue Rug, (*J. horizontalis* 'Wiltonii').

Andorra is a flat-topped variety with a compact growth habit, reaching a height of approximately 18 inches. The foliage is a light grey-green, becoming a purplish plum color in the winter. Bar Harbor is a low, vigorous-growing plant, usually no more than 8 inches tall. The foliage is grey-green in summer, turning a slate color in winter. Blue Rug or Wilton Carpet grows flat on the ground. The foliage is an outstanding blue color that is retained all winter.

An additional juniper species that is an excellent ground cover is Shore juniper (*J. conferta*), with the blue-green cultivar, 'Blue Pacific', and the green cultivar, 'Emerald Sea'. Winter temperatures below -10F may cause damage in colder portions of Virginia.

### Moss Pink *Phlox subulata*

Moss pink or creeping phlox is commonly used as a rock garden plant, but it also forms an effective ground cover on poor, bare soils where there is little competition. It forms a dense mat of moss-like foliage, which is covered in spring with masses of flowers in pink, purple, or white. In rocky areas, it will persist in the existing soil and drape itself over the stones. It is a plant for full sun and relatively dry soils. As plants age, they tend to develop dead spots. Periodic division to fill such spots may be necessary. In mild climates, the plants are evergreen, but where winters are cold and plants are exposed, browning may occur.

### Baltic English Ivy *Hedera helix* 'Baltica'

A hardy selection recommended for areas with severe winter conditions.

### Hosta, Plantain Lily *Hosta* spp

For partially shaded areas, hostas make effective ground covers. They appear most often in perennial borders as accent plants or edgings, but their large leaves provide a lush covering for the soil.



Hosta species vary in size and foliage color. Some have deep-green, yellow-green, blue-green, or grey-green foliage, while others are edged or variegated with white or cream. Hostas may also produce lily-shaped flowers in white or lavender. Flower stems may be 6 to 24 inches tall, and plant forms range from dwarf (3 to 4 inches) to tall (2 feet).

As a ground cover, hostas are best where the soil remains slightly moist. Excessively dry soil may cause the foliage to burn around the margins or partially die back. In full sun, leaf color is pale and leaf dieback may be more severe, especially during dry periods. In winter, the foliage of hostas dies back, leaving the ground exposed. However, new foliage develops quickly in spring and lasts well into the fall.

### **Pachysandra, Japanese Spurge**    *Pachysandra terminalis*

Pachysandra is a popular ground cover suitable for shaded landscape situations. This evergreen plant spreads by underground stems and attains a height of 1 foot. The foliage is tinged purple in spring, becoming bright green in summer and yellow-green in winter or when planted in sunny locations.

Occasionally, clusters of tiny, off-white blossoms appear above the leaves in early May, but they have little ornamental value. The plant is adapted to full or partial shade. When planted in full sun, growth is poor. It is one of the few plants that will grow under evergreens and in dense shade. The evergreen leaves commonly "burn" and turn brown in exposed places during the winter.

Established plants are usually planted 1 foot apart in the spring. Clipping the tips of vigorous growing shoots in the spring will induce the plant to become denser. The plants should not be cut all the way to the ground. Place pachysandra in a moist, highly organic, well-drained soil for best establishment. A planting of this ground cover is usually a uniform height throughout.

### **Yucca**    *Yucca filamentosa*

Yucca is a rugged plant able to take almost any situation. The plant is normally around 2 to 3 feet tall with all the leaves arising from a central point at ground level in a rosette fashion. The leaves are long, pointed, and rigid. In summer, the plant produces a flower stalk about 4 to 6 feet high with a large head of pendulous, creamy-white flowers. Yucca is used as an accent plant and is frequently used in modern ground plantings. The plant is suited best to hot, dry situations.

### **Liriope, Lilyturf**    *Liriope muscari*, *L. spicata*

The liriope or lilyturfs are very versatile grass-like ground covers that adapt to a wide range of conditions, including drought and salt spray. Most cultivars do well in heavy shade or full sun, although some cultivars, especially the variegated ones, are better used in shade. Liriope are used as ground covers under trees and shrubs, on slopes and banks, and even as low edging plants along paved areas and in front of foundation plantings.

The two species are separated by the size of their leaves. *L. muscari* has a longer and wider leaf, and the clumps it forms are generally taller (up to 2 feet). The spikes of lilac-purple flowers formed on it in the summer generally only stand as tall as the leaves, while the spikes of lilac to almost white flowers on *L. spicata* generally stand up above the smaller clumps of leaves. Blue-black berries are formed on both after the flowers and are somewhat ornamental.

Liriope spread readily, filling in areas quite quickly. There are many named cultivars of *L. muscari*,

with several white and yellow variegations and several inflorescence variations.

A related genus, *Ophiopogon*, generally called mondo grass, is less hardy (only into Tidewater and central Virginia) and bears its flowers buried well down into the foliage.

### **Sedum Stonecrop, *Sedum* spp**

Over 300 species and 500 cultivars of sedums exist; ranging from tiny mats only a few inches high to plants 2 feet tall. They are used as mass ground covers, in rock gardens, on slopes, between stepping stones, and even in containers.

Most sedums are spreading or creeping plants that will root from broken branches or fallen leaves. Related to the cacti, their thick, waxy, generally evergreen leaves mean that they do not require large amounts of water. Most sedums are very drought tolerant and will rot if kept too moist or if air circulation is poor.

Generally, all sedums will be hardy throughout Virginia. They are best used in full sun where they produce flowers ranging from tiny, yellow-green stars to large masses of small, pink to wine-colored flowers. Foliage color will also vary, from various shades of green to blues and bronzes.

### **Ornamental grasses (numerous genera, species, and cultivars)**

The group of ground covers increasing most rapidly in popularity at present is the ornamental grasses. With heights ranging from under 1 foot (blue fescue) to over 10 feet (fountain and maiden grasses), the ornamental grasses will generally have a member that can fit any landscape situation.

Often used strictly as ground covers and for erosion control on slopes, ornamental grasses also make outstanding specimen plants when used as individual plants in the landscape. In addition to a wide range of heights and spreads, there is tremendous variation in leaf size and color. Leaf colors range from pale greens to bright blues and blood reds, with many types of both vertical and horizontal stripe patterns.

Most of the ornamental grasses require full sun and will produce a wide variety of flowers, ranging from small, bottlebrush arrangements to large, showy plumes. Flower colors range from pale yellows and pinks to deep maroons. Many of the flower spikes persist well into the winter giving added landscape interest, though the leaf clumps will generally die to the ground and regrow each spring.

Additional ground covers to consider include bearberry, hypericum, candytuft, goutweed, santolina, ferns, many plants often classified as perennials (such as daylilies), and woody shrubs (dwarf yaupon holly, cotoneasters, etc.).

## **Common Invasive Ground Covers**

Beware of the "vigorous" ground cover. Sometimes, this term is applied to a plant that can be extremely aggressive in its growth habit even to the point of being considered invasive. Invasive plants exhibit rapid growth and maturity, are highly successful at self-propagating, and have the ability to compete and crowd out other plants. All this leads to a high cost for you in removing or containing such a plant. Ranking in parenthesis indicates the invasiveness level in natural areas and native plant habitats attributed to the ground cover by the Virginia Native Plant Society and the Virginia Department of

Conservation and Recreation.

### **Ajuga, Carpet Bugleweed**    *Ajuga reptans*

Ajuga is a good ground cover, forming a dense carpet of foliage over the soil. This semi-evergreen plant grows rapidly by producing mats of foliage in rosettes. As runners develop from the mother plants, take root, and produce new plants, it can become invasive. (Low)

The foliage grows about 4 inches high with upright clusters of blue flowers reaching 6 to 8 inches. The plant flowers in early May to mid-June. Ajuga will flourish in almost any soil with good drainage. It grows best in full sun, but also tolerates shade.

The foliage is deep green in color and partly evergreen, turning brown after severe freezing weather. Bronze and variegated varieties are also available. The extensive root system prevents soil erosion.

If established plants are set 12 to 15 inches apart in the spring, they will cover the soil in one growing season. Do not set the plants too deep. The crown should never be covered. In the spring or early fall, rooted "runner plants" can be dug from established plantings and replanted elsewhere.

### **English Ivy**    *Hedera helix*

English ivy is an evergreen, creeping vine that forms a dense mat of dark-green foliage 6 to 8 inches tall. The plant grows best in shade or in semi-shaded locations. It is most useful on north and east facing banks, under trees where grass will not grow, or as an underplanting between shrubs. If exposed to full sun or sweeping winds, the foliage "burns" or discolors in the winter. (Medium)

Although it can be planted 1 foot apart for cover in one year, it is more economical to transplant growing plants from pots or flats in the spring at a spacing of 18 to 24 inches. Vines may grow about 3 feet the first season.

When used next to buildings, walls, or trees, English ivy will climb, clinging by means of aerial rootlets. Its aerial roots have the ability to damage mortar between bricks and the density of vines in the trees can be damaging.

### **Common Periwinkle, Myrtle, or Vinca**    *Vinca minor*

Periwinkle or myrtle is an excellent, evergreen ground cover with dark-green foliage and purple, blue, or white flowers, depending on the variety. It blooms in April and sometimes again in the fall. The plant grows about 6 inches tall, spreading in all directions by sending out long, trailing and rooting shoots that make new plants. It is best in shade, but will grow satisfactorily in full sun. The foliage color is richer in partial shade, but more flowers are produced in the sun.

This ground cover is most commonly used for underplanting trees and shrubs, on shaded slopes, or on the north side of buildings. Rooted cuttings or established plants are normally spaced from 12 to 18 inches apart. At a 6-inch spacing, a complete cover will be produced in one year. Plant in the spring in areas with severe winters.

Spring-flowering bulbs interplanted with periwinkle will lend color and interest to the ground cover planting. Daffodils are particularly well suited to this since they bloom at the same time as periwinkle and do not require frequent division.

A second species, *V. major*, will do well in central and southeastern Virginia. It has larger leaves and may flower more frequently. A variegated cultivar is available. (Low)

### **Crown Vetch**    *Coronilla varia*

Crown vetch is a perennial legume used frequently to cover dry, steep, rocky slopes. It is most valued for its ability to prevent soil erosion and is often used for this purpose on highway slopes. The plant is suited for covering large areas, but is too vigorous and invasive for most residential landscapes.

Crown vetch grows 1 to 2 feet tall and bears small pink flowers from July to September. It spreads by underground stems, and one plant can cover an area up to 6 feet in diameter. It tolerates shade, but thrives in full sun. The foliage dies to the ground by December. It is propagated either from crowns or by seedlings. Crowns planted 2 feet apart will provide coverage in about two years. One crown per square foot is recommended for quick cover. Seeding should be at the rate of 1/2 pound per 1,000 square feet. The seed should be inoculated to introduce bacteria for nitrogen fixation. The seed can be sown without seedbed preparation into weedy, grassy areas if necessary, but this will delay coverage. Both crowns and seed may be planted any time during the year. (Medium) For more information on invasive plants, contact the Virginia Native Plant Society (P.O. Box 844, Annandale, VA 22003) or the Virginia Department of Conservation and Recreation (Division of Natural Heritage, Suite 312, 1500 East Main Street, Richmond, VA 23219).

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