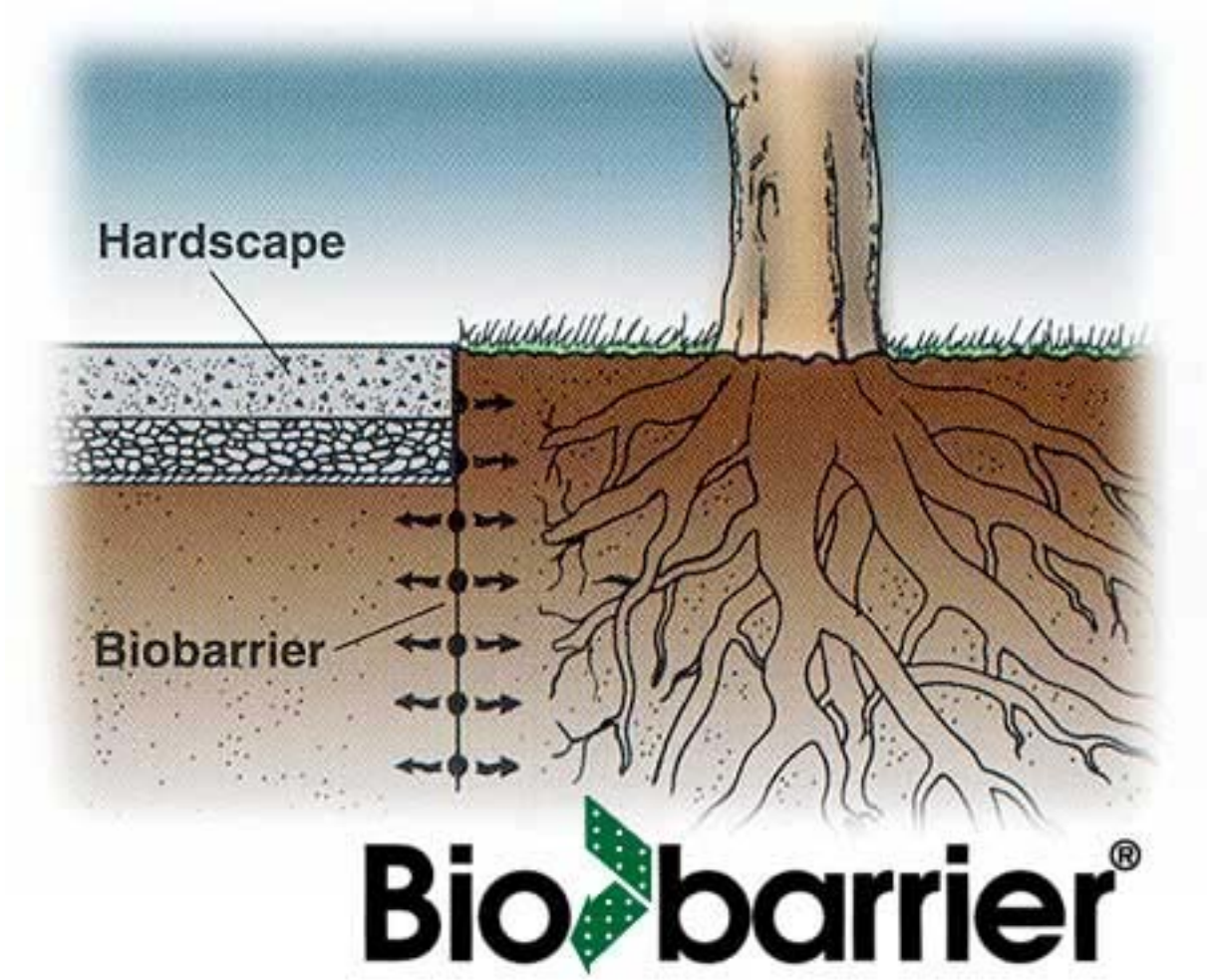
Technical Manual
With
Specifications
And
Cost



Biobarrier®

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Introduction

Biobarrier® is an award-winning, state-of-the-art technology using the finest materials. Designed as a long-term solution for vegetative root intrusion and possible structure damage, Biobarrier combines a proven geotextile fabric with the effective pre-emergence herbicide, trifluralin. Trifluralin, the active ingredient in Biobarrier, has been used extensively in commercial applications for more than 35 years and is widely recognized as a leading pre-emergence herbicide.

Utilizing a patented controlled-release process, Biobarrier delivers only the amount of trifluralin biologically necessary to inhibit root growth. Biobarrier's innovative technology ensures that precise amounts of herbicide will be dispersed at the correct location for an extended time. This provides a distinct advantage over repeated applications of herbicides required by conventional methods. **The U.S. EPA does not require a pesticide applicator license to install Biobarrier.***

On the following pages, standard installation procedures for a variety of Biobarrier applications are summarized. While schematic drawings are supplied for more common applications, this manual does not include drawings for all applications.

Mechanism

How Biobarrier® Works...

Biobarrier® consists of composite nodules injection-molded through Typar®*, a spunbonded polypropylene geotextile fabric. The through injection molding technique ensures permanent nodule attachment. Impregnated with trifluralin, the nodules function as a protective reservoir. The nodule composition is designed to slowly release trifluralin vapors which adsorb in the soil.

Outside the nodule, the trifluralin degrades but is continuously replaced by new material, building and maintaining a root inhibition zone. Accurate nodule spacing ensures the individual nodule zones overlap and reinforce each other. At equilibrium, the inhibition zone becomes contiguous, enveloping the Biobarrier fabric.

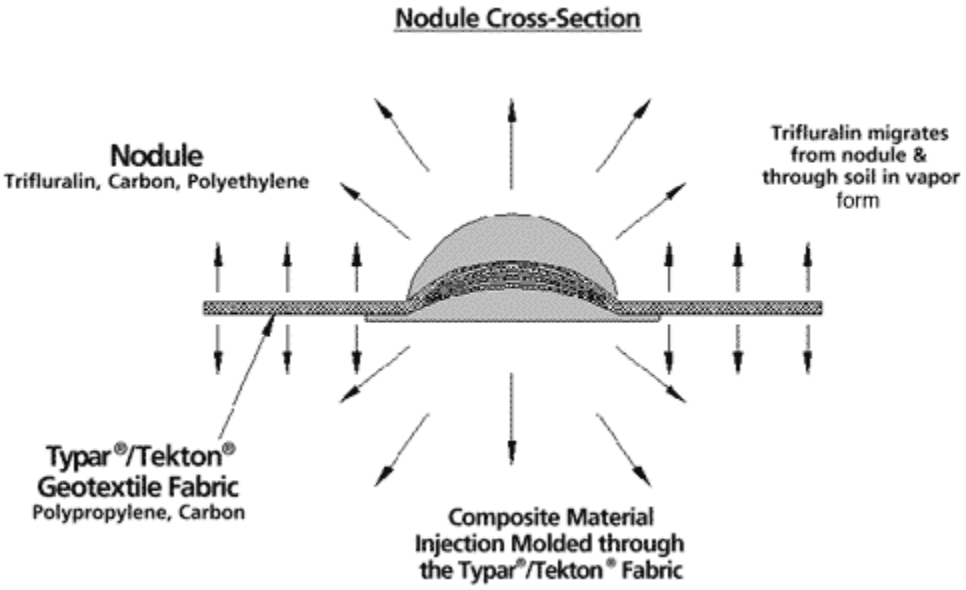
When roots enter the inhibition zone, root tip cells cannot divide, preventing growth in that direction. Trifluralin is not systemic; therefore, it is not taken into the plant. As a result, the root system is diverted away from the Biobarrier-protected structure without adversely affecting the desirable plants or trees. Root branches outside of the zone are not affected.

By utilizing a technology which combines a proven geotextile drainage fabric with an effective preemergence herbicide, Biobarrier II, marketed as a preemergence weed control fabric for landscaping, prevents grass and weed growth without affecting

desirable plants. When covered with 2" (50 mm) of mulch , stone, or other medium, the trifluralin inhibition zone both above and below the plane of the fabric blocks grass and weeds from establishing a viable root system needed to support growth. Additional protection is provided by the 4 oz./sq. yd. (136 g/sq. m) geotextile fabric which blocks existing grass and weeds from coming up through the fabric. New plants or desirable existing plants which have roots below the 2" (50 mm) inhibition zone are not adversely affected.

*Tekton is the trademark used for polypropylene products outside of North, Central and South America, Israel and South Africa.

Nodule Cross-Section

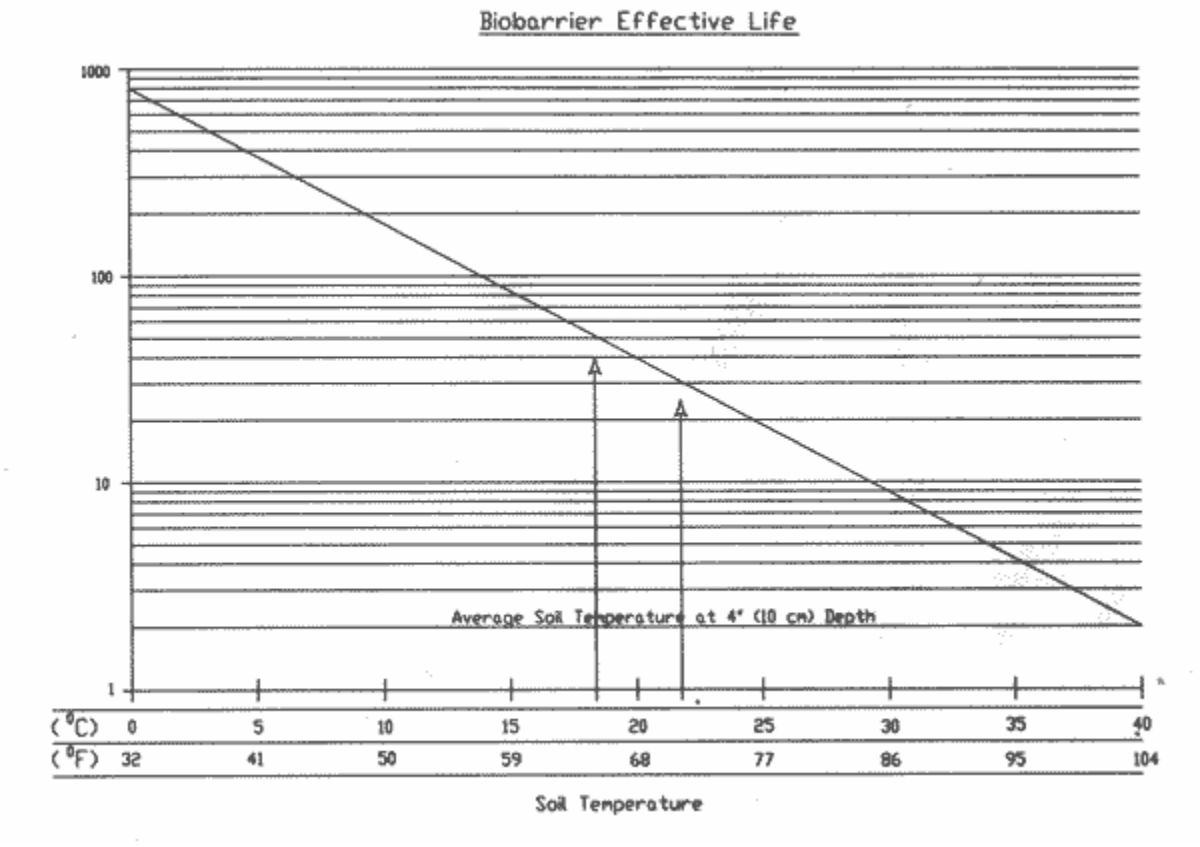


How Trifluralin Works...

The root inhibition zone is created and maintained by the trifluralin released from the nodules. Consequently, the highest trifluralin concentration in the soil is at the plane of the barrier, with concentration levels diminishing as distance from the barrier increases. The concentration level effective for all roots measured is less than 7.6 ppm. Plant species vary in resistance to trifluralin. This concentration level at zone equilibrium, based on field and laboratory measurements, occurs approximately 1" (25 mm) from the barrier. Some root branch elongation may occur after the root tip meets the effective concentration level, pushing the tip within the 1" (25 mm) zone.

With a water solubility of 0.3 ppm, trifluralin does not present a significant leaching problem. Additionally, trifluralin has a high soil adsorption and short half life.

With a U.S. EPA Class IV rating and an Oral LD50 of 10,000, technical grade trifluralin is considered practically non-toxic, ranking it between sugar (29,700) and salt (3,000). Since only a minute amount of trifluralin is emitted from the Biobarrier nodules at any point in time, the hazard is minimized. **The U.S. EPA does not require a pesticide applicator license to install Biobarrier.***



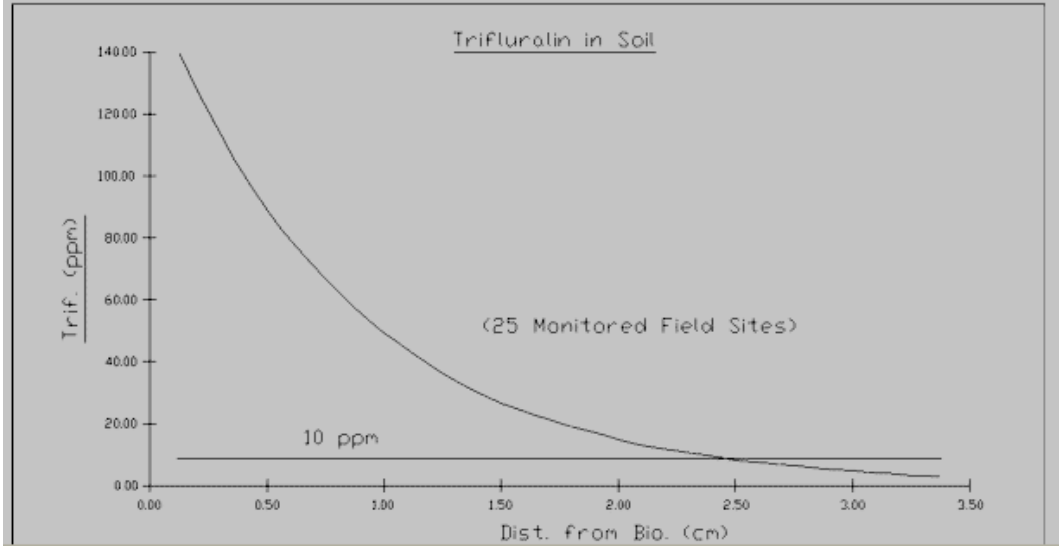
Technical Data - Biobarrier®

The hemispherical shaped nodules on Biobarrier contain one active ingredient (trifluralin) and two inactive ingredients (polyethylene and carbon black). Biobarrier is engineered to release the trifluralin very slowly in vapor form and establish a narrow (see chart below) protective chemical zone in soil adjacent to the fabric. This unique delivery method, combined with the chemical characteristics of trifluralin detailed below, ensure that the chemical zone remains very near the fabric and does not present a significant leaching problem. Trifluralin has been used extensively in commercial applications for over 35 years and widely recognized as a leading preemergence herbicide. See EPA Toxicity Rating for trifluralin below.

Environmental Fate of Trifluralin	
Solubility in Water	<0.3 ppm @ 25 c
Vapor Pressure (mm Hg @ 25 C)	1.0×10^{-4}
Degradation in Soil	1 to 6 Months
Half Life	
Air Photolysis	42 Minutes
Water Photolysis	9 Hours
Soil Photolysis (Dark)	41 Days
Soil Photolysis (Light)	66 Days

EPA Toxicity Ratings	
4 Classifications	***LD 50 (mg/kg)***
1. Extremely toxic	<50
2. Highly Toxic	50 to 500
3. Moderately Toxic	500 to 5,000
4. Practically Non-Toxic	5,000 to 15,000
Toxicity Examples	
1. Nicotine	32
2. Aspirin	1,000
3. Salt	3,000
4. Trifluralin	***10,000***
5. Alcohol	14,000
6. Sugar	29,700

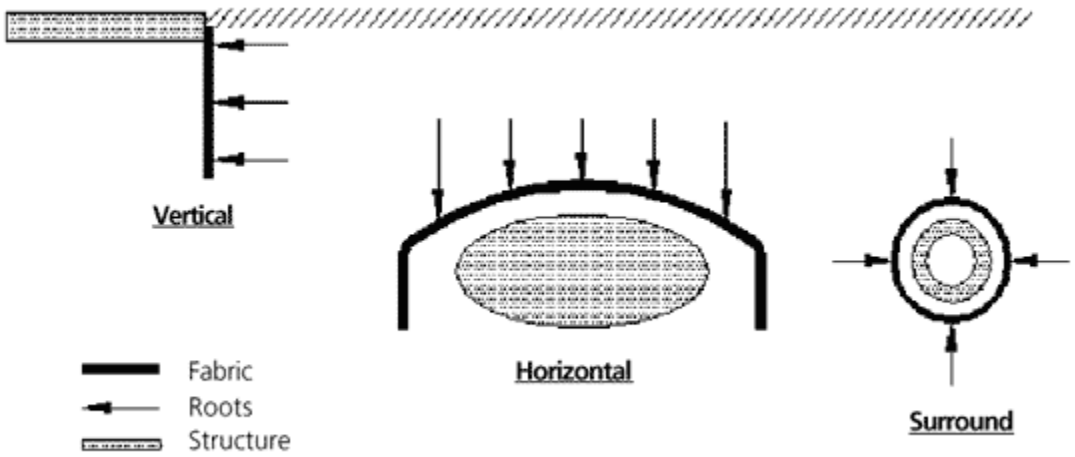
*Acute Oral (rats)



NOTE: The United States EPA does not require a pesticide applicator license to install Biobarrier®.

Application Categories

Biobarrier® is utilized in many ways to accomplish the common goal of preventing root intrusion and possible structural damage. The major application categories are: (1) Vertical, (2) Horizontal and (3) Surround, as illustrated below.



Vegetation roots are opportunistic, traveling long, erratic paths - when necessary - to survive. Lateral root growth, however, predominates. Under most conditions, 80% of the roots occupy the upper 18 inch (460mm) layer immediately below the grade level. Root system growth patterns are influenced by environmental and soil conditions. Typically, dry climate species' roots grow deeper. Densely packed soils, rock stratum, etc. sometimes produce the unexpected. The tree drip line is not a growth limitation.

Biobarrier is almost always used to exclude roots by diverting the growth path from protected areas. When used to confine root systems, care must be taken to provide sufficient soil volume within the confined area to support the mature species. Without sufficient soil volume, aerial growth will be stunted. In the worst case, the species will die from lack of nutrients, as with any method of reducing root growth. **Consult local arborist for site specific design**.

Root Control Applications

Purpose:

Biobarrier Root Control installations effectively divert lateral root growth. They are used to prevent hardscape damage by root encroachment and to separate root systems for nutrient allocation or to isolate diseased root systems.

In a vertical application, the top edge of the barrier is always positioned 1" (25 mm) below the soil surface. Selection of the barrier width is based primarily on the species involved, the lateral size of the hardscape, and the soil environment. Protection of subterranean structures usually involves overfills of 31 inches (800mm) or greater. This volume of soil permits normal vegetation growth, while excluding roots from structure encroachment. Most installations require no alteration for soil hydrology i.e. the drain layer in landfills or next to foundation or walls. If diversion of water flow is required, a geomembrane is used in conjunction with Biobarrier e.g. under landfill toe drains.

Typical Applications:

To Separate:

- Golf Course Greens
- Planting Beds
  Tree Farms

To Redirect Roots:

- Curbs, Sidewalks, Roads, Median Planters
- Bike/Golf Cart Paths, Golf Greens, Sand Traps, Fairways
- Tennis Courts, Swimming Pools
- Building Foundations, Drain Lines, Septic Fields
  Waste Landfill Caps and Drains, Utility Lines, Septic Fields, Burial Vaults, Earth Dams and Dikes

Note: In locations with a high water table, roots tend to resurface sooner. Biobarrier® may need to be installed deeper. Consult a local arborist for recommendation.

Vertical Installation Instructions

Contact your utility company prior to trenching if you suspect service lines are present. Consult a professional arborist if extensive root trimming is involved. Wear impervious gloves and goggles when handling Biobarrier to avoid possible irritation from rubbing eyes and to avoid staining hands.

1. Cut a trench 2-4 inches (50-100mm) wide and at least 20 ft. (6100mm) long centered on the root source and adjacent to the structure using clean-cutting trench digging equipment (See FIGURE 1).

2. Install Biobarrier as quickly as possible (within 12 hrs.) after opening sealed wrap; high temperatures and direct sunlight reduce effective life. Place excess material in original wrap and seal with spare ties provided.

3. Roll out the Biobarrier and trim the length of the trench (See FIGURE 2).

4. Remove the paper backing from tape located on one edge of the ll"x30' Installation strip (See FIGURE 3)

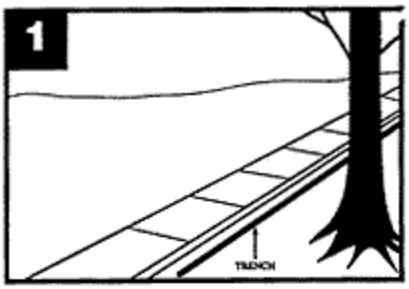
5. Place taped edge of strip between the first and second row of nodules starting at one end of the Biobarrier and press firmly to ensure good adhesion (See FIGURE 4).

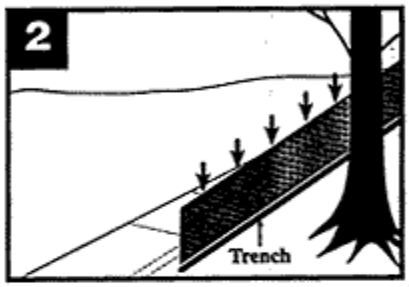
6. Place installation strips approximately 2.5 ft. (760mm) apart the entire length of Biobarrier.

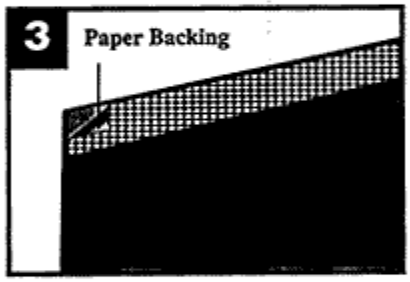
7. Use strips to lower Biobarrier into the trench and position the top edge of the fabric I inch (25mm) below the surface by folding the top edge of the strip over onto the flat soil or hardscape next to trench (See FIGURE 5).

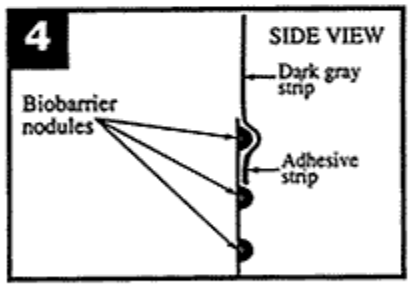
8. Anchor the Biobarrier by stapling the dark gray strips into the soil using staples provided, or by putting soil on top to hold in place; tamp backfill firmly and remove dark gray strips after job is complete.

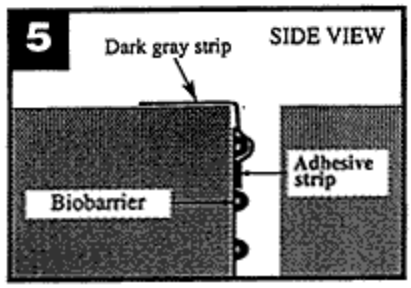
These guidelines treat a typical urban sidewalk application. Other installations such as property lines, building foundations, retaining walls, ornamental beds, septic systems and storm drains may require minor procedural adjustments.











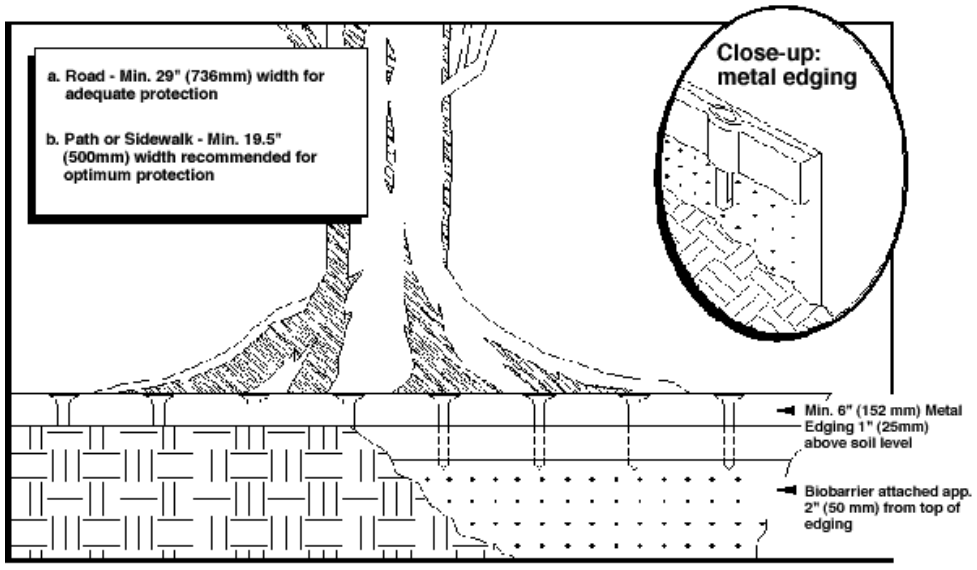
Special Installation Instructions
For Unusual Conditions

When two or more of the following conditions exist, special precautions, detailed below, should be followed for maximum prevention of root overgrowth of fabric.

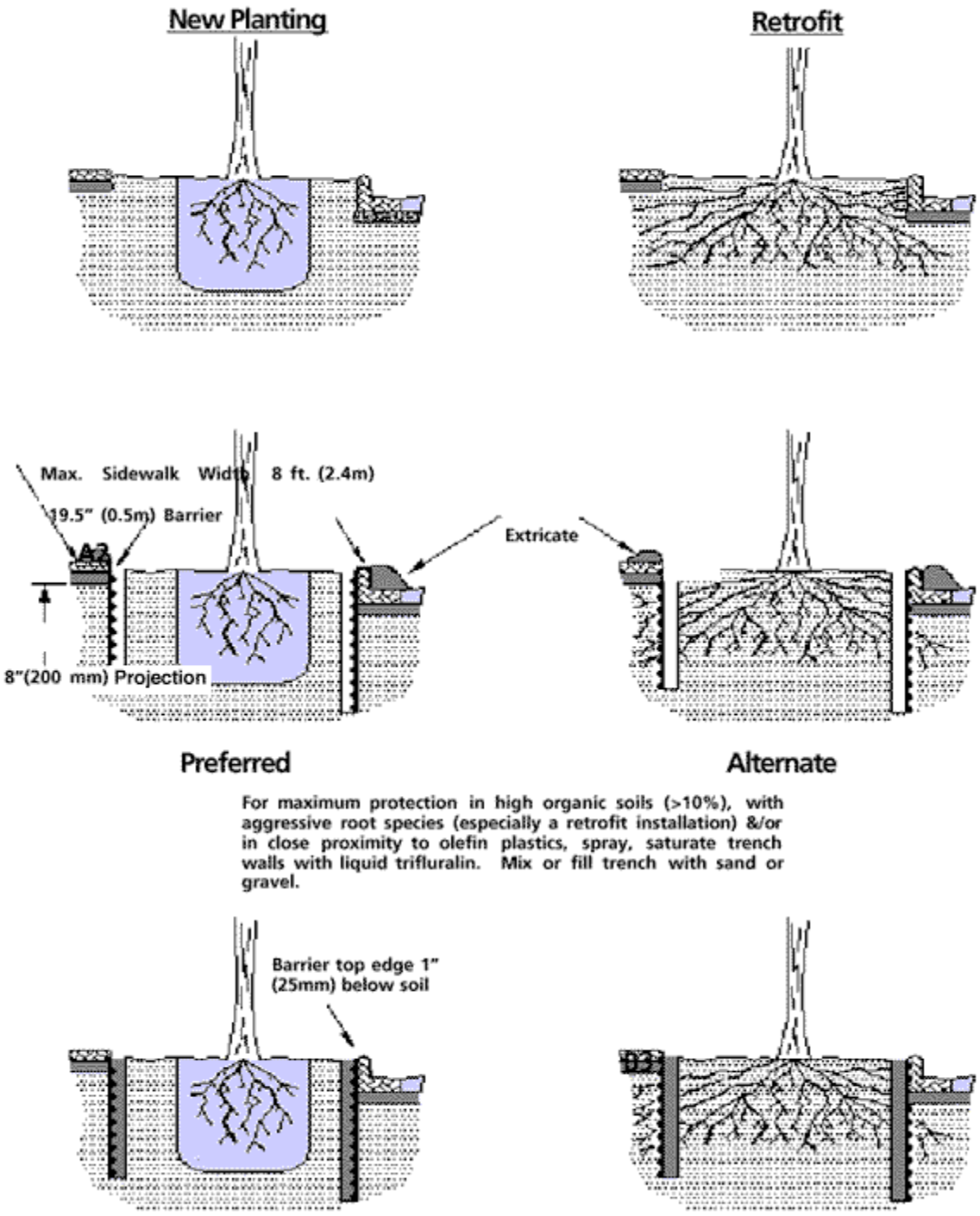
1. Base of potential problem tree is higher than protected hardscape
2. Soil is over 90% sand
3. Tree species is aggressive, top rooting variety such as maple, ficus, etc. Consult a local arborist for species questions or recommendations if necessary.
4. Tree is closer than eight feet (2400mm) from edge of protected hardscape.

Special Precautions (See Drawing Below)

1. Wherever practical, build level of soil adjacent to protected hardscape to a level even with or above base of tree.
2. Attach Biobarrier approximately two inches (50 mm) from the top edge of commercially available metal edging using hot or cold adhesive. For hot application use general adhesives hot melt #64x884 or equivalent. For cold applications use Macco adhesives "Fix-n-Seal" high performance clear sealant F S- U S, Prod. No. 1450113 or equivalent.
3. Install metal edging adjacent to protected hardscape with Biobarrier attached. Leave metal edging approximately one inch above grade to prevent root overgrowth. Edging should extend a minimum of 10 feet (3000mm) in each direction from center of tree. Landscape timbers with Biobarrier attached to the bottom may be substituted for edging.



Installations Sidewalk & Curb



Roots that have been severed should be removed or treated with a systemic herbicide, using caution not to come in contact with remainder of root on desired tree.

Surround Applications

Surround applications utilize an envelope of root control **Biobarrier**® to isolate root-sensitive objects from root systems. Therefore, they normally have a minimal effect on the soil volume available for root nutrients. Biobarrier provides the unique advantage of serving as a root barrier without affecting the soil hydrology.

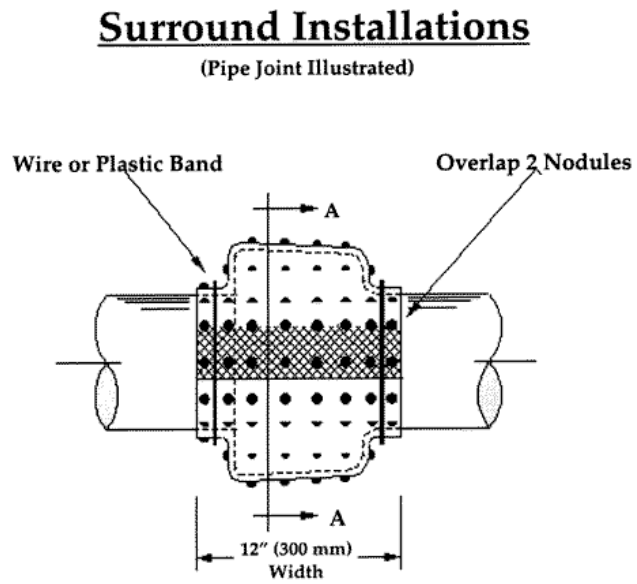
Biobarrier's fabric construction offers easy contouring to fit any configuration. It can be readily cut with a knife or scissors. Because of its inhibition zone, root exclusion seams are obtained simply by overlapping or seaming. To resist the forces of soil shifting, seams can be permanently cemented using various adhesives (see seaming instructions).

Surround applications involve a wide variety of installation techniques. Sketches illustrating a few specific examples of how Biobarrier is applied are offered as guides. For your specific application, use our toll-free number (1-800-284-2780) or 615-847-7000. Our Technical Department will be glad to assist you.These guidelines treat a typical installation for subterranean structure protection. Actual installations must conform to local standards and codes and may require additional technical assistance to assure full Biobarrier benefits.

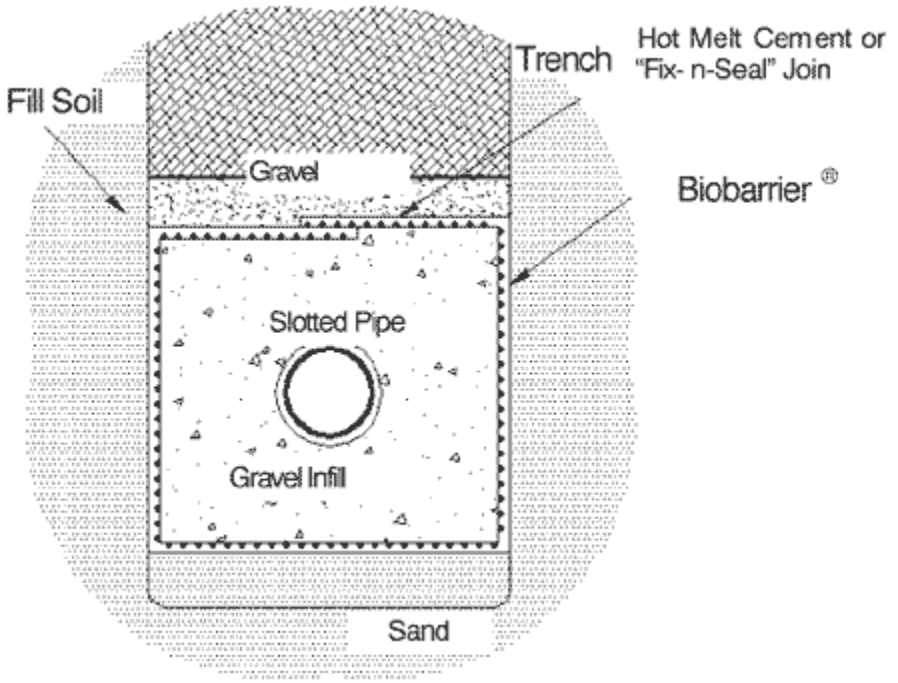
Typical Examples:

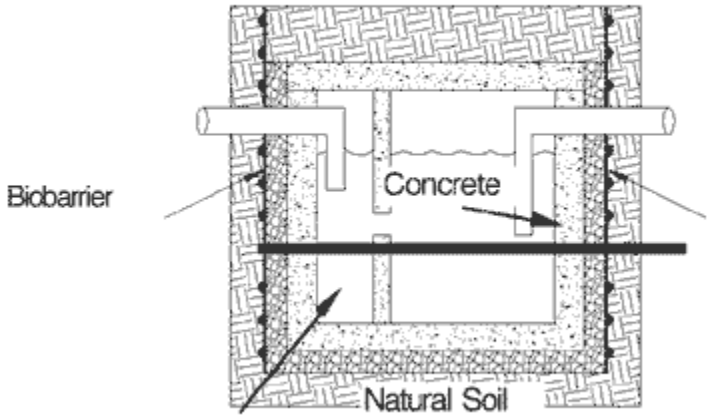
To Protect:

- Drain Lines, Septic Fields, Underground Pipes/Cables



Drain Line/Septic Tank Installation





For maximum protection, place Biobarrier root control fabric in the ground as shown. Completely surround the tank and seam by placing the Biobarrier outside of the stone. The geotextile fabric also serves to maintain the separation between soil and stone. Cut-outs for inflow and outflow pipe penetrations should be snuggly attached around pipes. Wrap each inflow and outflow pipe junction with Biobarrier.

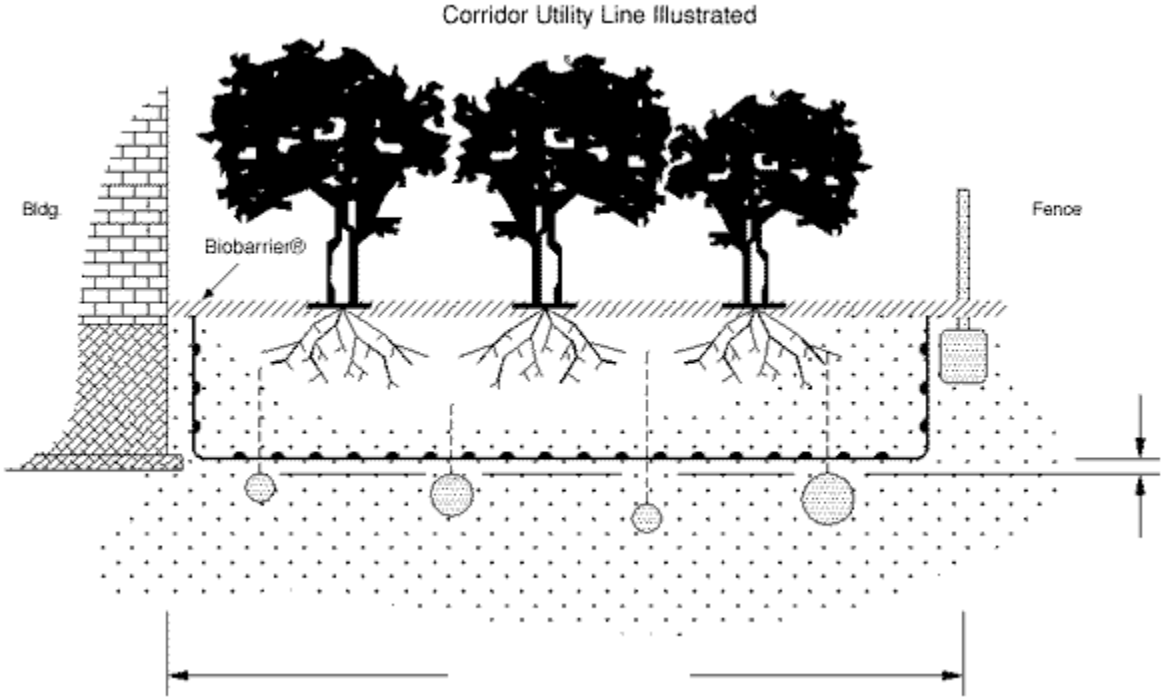
Combination Applications

Combinations of these application categories are often used to meet multiple protection requirements. **Biobarrier®** readily lends itself to these more complex installations because of its flexibility, conformity and permeability characteristics; consequently, an effective, contiguous barrier of virtually any shape is possible.

To protect utility lines in a corridor, Biobarrier is positioned to confine the roots to the corridor, providing protection to the adjacent buildings and the roadway, as well as the four utility lines. This is accomplished without unduly restricting soil volume available for root system growth or altering soil hydrology.

Typical Examples:

Utility Lines, Corridors,
etc.



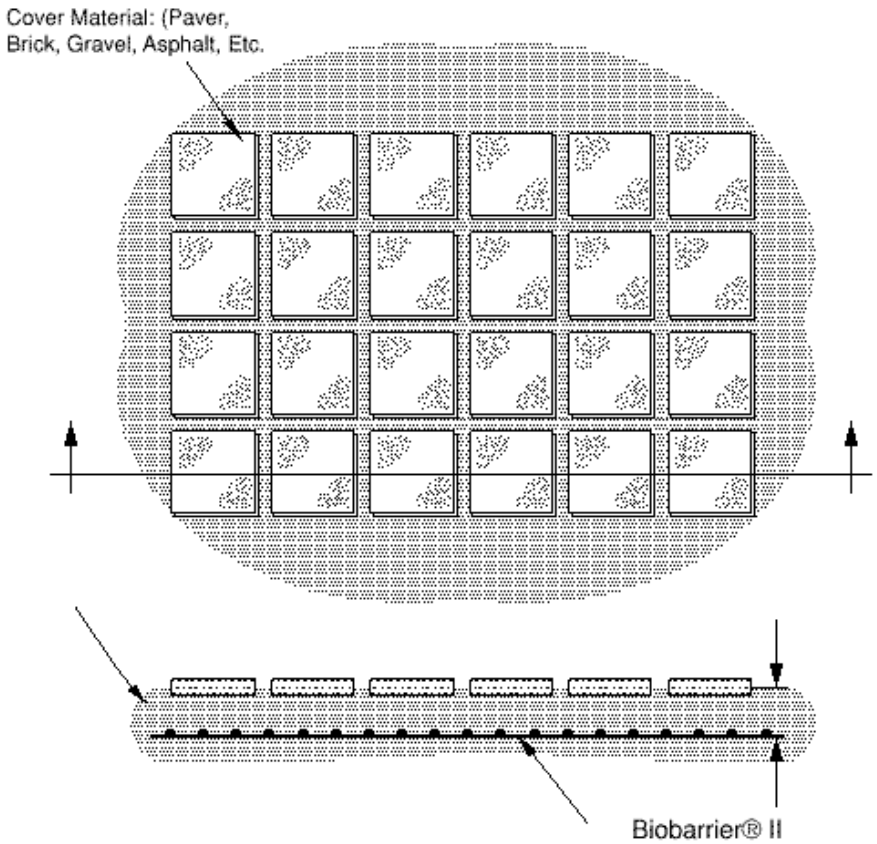
Weed Control Applications

Biobarrier® Pre-emergence Weed Control fabric is installed horizontally 2 inches (50 mm) beneath the surface for long-term weed control. Horizontal applications usually require flexible wide-width barriers capable of adjusting to soil shifts without damage. Biobarrier, utilizing a geotextile fabric, is designed for this purpose. Any required width can be obtained by overlapping the product or, preferably, hot-melt seaming.

When properly installed in weed control applications, Biobarrier limits soil available for weed roots to establish a viable root system. Trifluralin vapors migrate through the soil and into the cover material. Below a capped surface, the vapors are concentrated in cracks and crevices where unwanted vegetation would normally persist.

Typical Examples:

- Paver, Brick, Asphalt or Gravel Walkways, Planting Beds (Non-Food Ornamentals)
- Parking Lots, Playgrounds and Utility Substations



Biobarrier® II Weed Control Installation

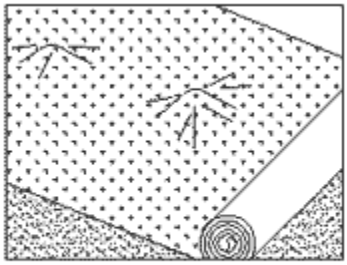
Installation Instructions:

1. Remove unwanted vegetation (particularly green foliage) and materials that can puncture the fabric.

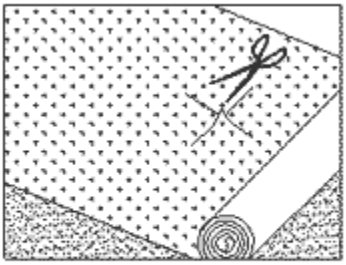
2. Wear gloves & eye protection (goggles); avoid contact with skin and clothing to prevent staining.

3. Open the sealed yellow barrier wrap and install Biobarrier as quickly as practical. High temperatures and direct sunlight can reduce effective life. Place unused material in the barrier wrap and seal with ties provided.

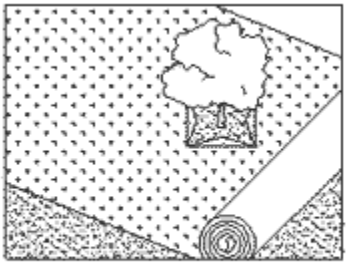
4. Position and cut the fabric allowing for existing or new plants. Add width, if required, and fix in place with stakes provided (see illustrations A through F):



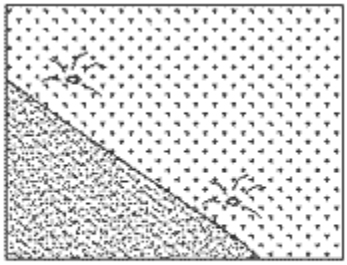
A. Simply roll fabric out gently over existing plants.



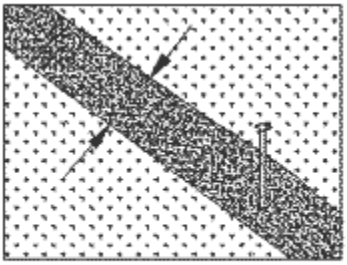
B. Cut "X" above each plant with household scissors or knife forming triangular flaps.



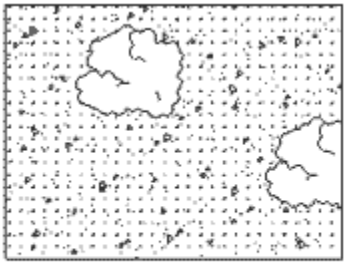
C. Fit fabric around each plant. Fold back flaps against plant stem.



D. Fix fabric edges in place, about every four feet (1.2 m) with stakes provided.



E. Add width if required by overlapping fabric three inches (75mm) and staking in place.

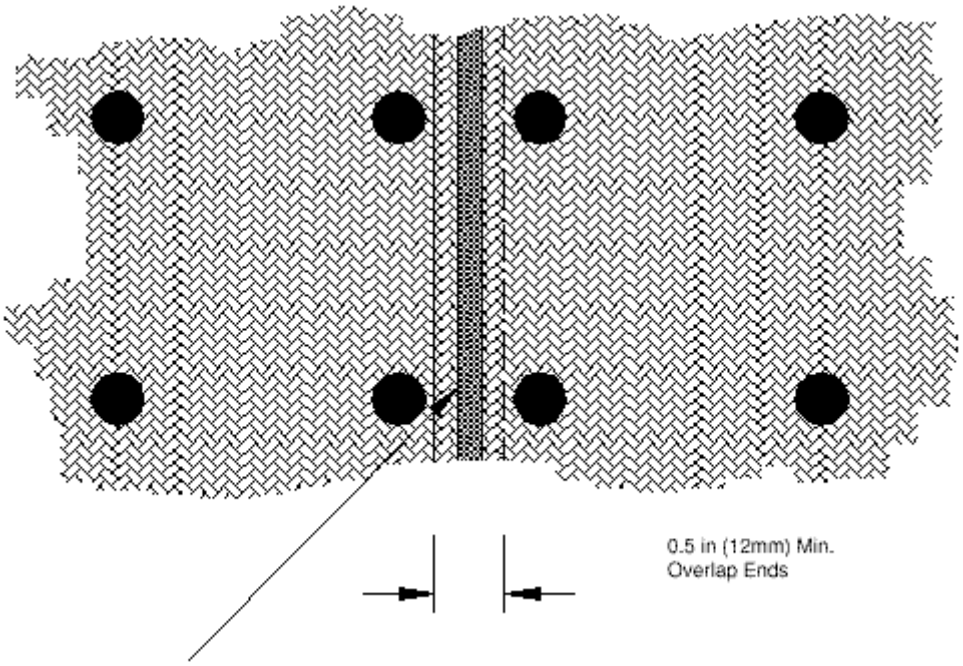


F. Cover fabric with 2" (50mm) of material.

Ensure a two inch (50 mm) cover material depth is maintained.

These guidelines treat a typical installation for surface vegetation control. Minor procedural changes may be required depending on your specific application.

Biobarrier® II Seaming Instructions



Continuous 6 mm Wide Bead

Hot Application
General Adhesive Co
Hot Melt #64 x 884
or equivalent

Cold Application
Macco Adhesives
"Fix-n-Seal"
High Performance Clear Sealant
FS-45, Product No. 1450113
or equivalent

Product Description Biobarrier® Root Control

Biobarrier®: is a long-term root control system which utilizes time release of a herbicide. When properly installed, it prevents damage to hardscape and other areas from root intrusion. Effective life of Biobarrier is more than 15 years with exact life depending on specific installation conditions.

		Typical
Active Chemical*:	Trifluralin (a,a,a-Trufluro 2,6 - dinitro - N,N, - Dipropyl - p - toluidine)	18.9%
Inert Ingredients:	100% Spunbonded Polypropylene, Polyethylene and Carbon	81.1%

Appearance: Gray (light) with Black Nodule

Specific Gravity: <1.00 **Odor:** No Appreciable

	English	Metric	Test Method*
Unit Wt. (Minimum Value)	12.0 oz/yd^2	410 g/m^2	ASTM D-5261
Typical Values			
Trifluralin Characteristics	**English**	**Metric**	**Test Method***
Vapor Pressure (mm Hg @ 25 ° C)	1x10^{-4}	1x10^{-4}	EPA CG 1600
Solubility in Water (ppm @ 25 ° C)	<0.3	<0.3	EPA CG 1500
Minimum Values			
Fabric Properties	**English**	**Metric**	**Test Method***
Unit Weight	3.9 oz/yd^2	130 g/m^2	ASTM D-5261
Grab Tensile Strength	130 lbs.	575 N	ASTM D-4632
Elongation at Break	60%	60%	ASTM D-4632
Puncture Strength	40 lbs.	175 N	ASTM D-4833
Trap Tear	60 lbs.	265 N	ASTM D-4533
Permittivity	0.7 sec.	0.7 sec.	ASTM D-4491
AOS (Max. Value)	0.21 mm	0.21 mm	ASTM D-4751
Ultraviolet Stability	70% @ 500 hrs.	70% @ 500 hrs.	ASTM D-4355

*Test methods and revision dates available on request

*Biobarrier Width (in.)

Intended Uses	19.5	29	39	58.5
Landscape Beds	*	*		
Sidewalks	*	*		
Driveways	*	*	*	
Curbs	*	*	*	
Walkways	*	*		
Parking Lots	*	*	*	
Tennis Courts	*	*	*	
Jogging/Bike Trails	*	*		
Drainage Pipes	*	*	*	*
Bldg. Foundations		*	*	*
Home Patios	*	*	*	
Greens	*	*	*	
Tees	*	*	*	
Fairways	*	*		
Cart Paths	*	*		
Bunkers/Traps	*	*		

Biobarrier Roll Sizes

Width in(cm)	Length ft(m)	Approx. Dia. in(cm)	Approx. Weight lb.(kg)	Approx. Area/Rl $ft^2(m^2)$
19.5(50)	20(6.1)	6(15)	6(2.7)	32.5(3.0)
19.5(50)	100(30.5)	11(28)	24(10.9)	162.4(15.1)
29(74)	20(6.1)	6(15)	8(4.8)	48(4.5)
29(74)	100(30.5)	11(28)	35(24.2)	242(22.4)
39(99)	20(6.1)	6(15)	10(5.5)	65(6.0)
39(99)	100(30.5)	11(28)	48(21.8)	325(30.2)
58.5(149)	20(6.1)	6(15)	16(7.3)	97.5(9.1)
58.5(149)	100(30.5)	11(28)	72(32.7)	487.5(45.3)

*This chart is a general guide only. Your specific applications may require slightly different sizes. As a general rule, the greater the fabric width, the greater the degree of protection against costly root damage. But, like any other barrier, the protection does not extend beyond the dimensions of the fabric. It is important to use adequate width to assure proper protection.

Specification-Root Control

EPA Reg. #59823-1 EPA Est. 59823-TN-1

1. SCOPE

1.1. This is a materials specification covering root control barrier in trenches, alongside hardscape structures such as sidewalks, curbing, pavements, concrete and building foundations to prevent structural damage due to root penetration. The product functions to provide both a physical and chemical barrier zone to restrict vegetative root encroachment.

1.2. This is a material purchasing specification and design review of its use is recommended.

2. REFERENCED DOCUMENTS

2.1. *ASTM Standards
Available from ASTM, 1916 Race Street, Philadelphia, PA 19103

D-5261	Test Method for Measuring Mass per Unit Area of Geotextiles
D-4632	Test Method for Grab Breaking Load and Elongation of Geotextiles
D-4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
D-4533	Test Method for Trapezoid Tear Strength of Geotextiles
D-4491	Test Method for Water Permeability of Geotextiles by Permittivity
D-4751	Test Method for Determining the Apparent Opening Size of a Geotextile
D-4355	Test Method for Deterioration of Geotextiles from Exposure to Ultroviolet Light and Water (Xenon-Arc Type Apparatus)

2.2. *EPA Standards (Reference EPA Label) Registration No. 59823-1 (Attached Exhibit B)

EPA CG 1500	Water Solubility
EPA CG 1600	Vapor Pressure

3. PHYSICAL AND CHEMICAL REQUIREMENTS

3.1. Fibers used in the manufacture of root control barrier substrate fabric shall consist of long chain synthetic polyolefins (at least 95% by weight) and a UV stabilizer. They shall be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to each other.

3.2. Nodules consisting of trifluralin, carbon black, and polyethylene compounded in a patented method utilizing time-released characteristics are permanently attached to the substrate fabric on 1-1/2" centers by a through injection molding process.

3.3. All substrate property values, with the exception of apparent opening size (AOS), in these specifications represent minimum average roll values (MARV) in the weakest principal direction (i.e., average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein). Values for AOS represent maximum average roll values .

3.4. Property values for the trifluralin are average run values.

4. CERTIFICATION

4.1. The Manufacturer shall provide to the Engineer a certificate stating the name, product name, style number, chemical composition and other pertinent information to fully describe the product.

4.2. The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.

4.3. The Manufacturer's certificate shall state that the root control product meets requirements of the specification as evaluated under the Manufacturer's quality control program. The certificate shall be attested to by a person having legal authority to bind the Manufacturer.

4.4. Either mislabeling or misrepresentation of materials shall be reason to reject those products.

5. SAMPLING, TESTING, AND ACCEPTANCE

5.1. Root control substrate product shall be subject to sampling and testing to verify conformance with this specification. Acceptance shall be based on manufacturer's certifications.

5.2. Testing shall be performed in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method.

6. SHIPMENT AND STORAGE

6.1. Product labels shall clearly show the manufacturer or supplier name, style number, and roll number and shall include a compliance statement certifying that all ingredients and inspection standards for this product have been met.

6.2. Each root control product roll shall be wrapped with a protective EVOH bag and placed in a box that will protect the product from damage due to shipment, water, sunlight, contaminants and to prevent premature release of herbicide. The protective wrapping shall be maintained during periods of shipment and storage.

6.3 During storage, root control product shall be elevated off the ground and out of direct sunlight. It shall remain sealed in EVOH protective bag inside shipping box at a temperature of not more than 110°F.

7. PRODUCT DESCRIPTION

Overall Product Major Composition and Ingredients		Typical
Active Chemical*:	Trifluralin (a,a,a-Trufluro 2,6 - dinitro - N,N, - Dipropyl - p - toluidine)	18.9%
Inert Ingredients:	100% Spunbonded Polypropylene, Polyethylene and Carbon	81.1%

Typical Values

Trifluralin Characteristics	English	Metric	Test Method*
Vapor pressure (mm Hg @ 25° C)	$1x10^{-4}$	$1x10^{-4}$	EPA CG 1600
Solubility in Water (ppm @ 25° C)	<0.3	<0.3	EPA CG 1500

Minimum Values

Fabric Properties	English	Metric	Test Method*
Unit Weight	3.9 oz/yd^2	130 g/m^2	ASTM D-5261
Grab Tensile Strength	130 lbs.	575 N	ASTM D-4632
Elongation at Break	60%	60%	ASTM D-4632
Puncture Strength	40lbs.	175 N	ASTM D-4833
Trap Tear	60lbs.	265 N	ASTM D-4533
Permittivity	0.7 sec.	0.7 sec.	ASTM D-4491
AOS (Max Value)	0.21 mm	0.21 mm	ASTM D-4751
Ultraviolet Stability	70% @ 500 hrs	70% @ 500 hrs	ASTM D-4355

*Test methods or revision numbers available on request (18.9% Average trifluralin in total composite, Min. of 20% trifluralin in nodules)

Specification-Weed Control

1. SCOPE

1.1. This is a materials specification covering pre-emergence weed control fabrics for use under guardrails along highways, under fences, around posts and signs, and in any other areas where surface weeds must be controlled by use of mechanical means or spraying. The product functions to provide both a physical and chemical barrier zone to prevent vegetative root encroachment, minimizing surface vegetation.

1.2. This is a material purchasing specification and design review of its use is recommended.

2. REFERENCED DOCUMENTS

2.1. *ASTM Standards
Available from ASTM, 1916 Race Street, Philadelphia, PA 19103

D-5261	Test Method for Measuring Mass per Unit Area of Geotextiles
D-4632	Test Method for Grab Breaking Load and Elongation of Geotextiles
D-4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
D-4533	Test Method for Trapezoid Tear Strength of Geotextiles
D-4491	Test Method for Water Permeability of Geotextiles by Permittivity
D-4751	Test Method for Determining the Apparent Opening Size of a Geotextile
D-4355	Test Method for Deterioration of Geotextiles from Exposure to Ultroviolet Light and Water (Xenon-Arc Type Apparatus)

2.2. *EPA Standards (Reference EPA Label) Registration No. 59823-1

EPA CG 1500	Water Solubility
EPA CG 1600	Vapor Pressure

3. PHYSICAL AND CHEMICAL REQUIREMENTS

3.1. Fibers used in the manufacture of pre-emergence weed control substrate fabric shall consist of long chain synthetic polyolefins (at least 95% by weight) and a UV stabilizer. They shall be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to each other.

3.2. Nodules consisting of trifluralin, carbon black, and polyethylene compounded in a patented method utilizing time-released characteristics are permanently attached to the substrate fabric on 1-1/2" centers by a through injection molding process.

3.3. All substrate property values, with the exception of apparent opening size (AOS), in these specifications represent minimum average roll values (MARV) in the weakest principal direction (i.e., average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein). Values for AOS represent maximum average roll values .

3.4. Property values for the trifluralin are average run values.

4. CERTIFICATION

4.1. The Manufacturer shall provide to the Engineer a certificate stating the name, product name, style number, chemical composition and other pertinent information to fully describe the product.

4.2. The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.

4.3. The Manufacturer's certificate shall state that the preemergence weed control product meets requirements of the specification as evaluated under the Manufacturer's quality control program. The certificate shall be attested to by a person having legal authority to bind the Manufacturer.

4.4. Either mislabeling or misrepresentation of materials shall be reason to reject those products.

5. SAMPLING, TESTING, AND ACCEPTANCE

5.1. Preemergence weed control substrate product shall be subject to sampling and testing to verify conformance with this specification. Acceptance shall be based on manufacturer's certifications.

5.2. Testing shall be performed in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method.

6. SHIPMENT AND STORAGE

6.1. Product labels shall clearly show the manufacturer or supplier name, style number, and roll number and shall include a compliance statement certifying that all ingredients and inspection standards for this product have been met.

6.2. Each preemergence weed control rproduct roll shall be wrapped with a protective EVOH bag and placed in a box that will protect the product from damage due to shipment, water, sunlight, contaminants and to prevent premature release of herbicide. The protective wrapping shall be maintained during periods of shipment and storage.

6.3 During storage, preemergence weed control product shall be elevated off the ground and out of direct sunlight. It shall remain sealed in EVOH protective bag inside shipping box at a temperature of not more than 110° F.

7. PRODUCT DESCRIPTION

Overall Product Major Composition and Ingredients		Typical
Active Chemical*:	Trifluralin (a,a,a-Trufluro 2,6 - dinitro - N,N, - Dipropyl - p - toluidine)	18.9%
Inert Ingredients:	100% Spunbonded Polypropylene, Polyethylene and Carbon	81.1%

Typical Values

Trifluralin Characteristics	**English**	**Metric**	**Test Method***
Vapor pressure (mm Hg @ 25° C)	$1x10^{-4}$	$1x10^{-4}$	EPA CG 1600
Solubility in Water (ppm @ 25° C)	<0.3	<0.3	EPA CG 1500

Minimum Values

Fabric Properties	**English**	**Metric**	**Test Method***
Unit Weight	3.9 oz/yd^2	130 g/m^2	ASTM D-5261
Grab Tensile Strength	130 lbs.	575 N	ASTM D-4632
Elongation at Break	60%	60%	ASTM D-4632
Puncture Strength	40lbs.	175 N	ASTM D-4833
Trap Tear	60lbs.	265 N	ASTM D-4533
Permittivity	0.7 sec.	0.7 sec.	ASTM D-4491
AOS (Max Value)	0.21 mm	0.21 mm	ASTM D-4751
Ultraviolet Stability	70% @ 500 hrs	70% @ 500 hrs	ASTM D-4355

*Test methods or revision numbers available on request (18.9% Average trifluralin in total composite, Min. of 20% trifluralin in nodules)

Precautionary Statements
Hazards to Humans and
Domestic Animals

CAUTION

Causes eye irritation. Harmful if swallowed, inhaled, or absorbed through the skin. Do not get in eyes, on skin, or clothing. The active ingredient trifluralin may cause skin sensitization reactions in certain individuals.

Use eye protection and protective clothing such as coveralls, a long sleeve shirt, and impermeable gloves when handling this product. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

Environmental Hazard:

This pesticide is toxic to fish. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark.

Physical Hazards:

Directions for Use:

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

STORAGE AND DISPOSAL

Storage: Store in original container only. Store in dry place out of direct sunlight.

Pesticide Disposal: Do not contaminate water, food, or feed by storage or disposal. Washes resulting from use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Completely empty container. Then dispose of wrap and/or box in a sanitary landfill or by incineration, or, if allowed by State and Local authorities, by burning. If burned, stay out of smoke.

General Directions:
Biobarrier® is a multi-year root control system which is strategically positioned in the soil to protect structures from plant root encroachment (see applications). Biobarrier controls roots by establishing an in-soil barrier plane of trifluralin, which prevents root tip cell division. Roots are either stopped or redirected away from structures. Trifluralin is not systemic but can limit root mass. The multi-year feature of Biobarrier is provided by a time-release mechanism which continues to meter trifluralin into the soil as the exposed trifluralin biologically and chemically degrades. Structure protection is provided by placing the Biobarrier fabric between the root source and the structure. Since the fabric is flexible and permeable, installation may be custom contoured to obtain the most desirable root system redirection for the application and/or to accommodate obstacles.

Bio barrier®

Root Control System 1-4

Biobarrier is a multi-year root control system consisting of time-release nodules impregnated with a herbicide. The nodules are attached permanently to a flexible and permeable geotextile fabric which can be contoured applied to a wide variety of applications and which will inhibit plant weed encroachment in the applications set forth below.

Active Ingredient:
Trifluralin (α,α,α-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine)..10.9%
Inert Ingredients..... 89.1%
TOTAL 100.0%

KEEP OUT OF REACH OF CHILDREN

CAUTION

If in eyes:	Flush eyes with plenty of water. Call a physician.
If swallowed:	Call a physician or Poison Control Center. Drink one or two glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person.
If on skin:	Wash with plenty of soap and water. Get medical attention if irritation develops.
If Inhaled:	Remove individual to fresh air. If breathing difficulty occurs, get medical attention.

See Side Panel for Additional Precautionary Statements

Mfg. By:

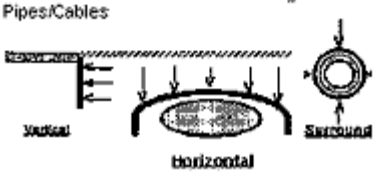
REEMAY

70 Old Hickory Blvd.
P.O. Box 511
Old Hickory, TN 37138
1-800-257-6687

EPA Registration No. 59823-1
Establishment No. 59823-TN-1

Biobarrier Applications*

Curbs	
Roads	Sidewalks
Septic Fields	Planting Beds
Swimming Pools	Tennis Courts
Bike/Golf Cart Paths	Building Foundations
Utility Substations	Hazardous Waste
Landfills	
Burial Vaults/Tombstones	Underground
Pipes/Cables	



*Non Food/Ornamentals

Applications Directions:

Biobarrier® is ready for in-soil installation as received. The fabric should be in soil as soon as practical after removal from the sealed shipping container minimizing exposure to direct sunlight and elevated temperatures. Prolonged exposure can reduce the effective life of the product. Store any unused portions of the product tightly resealed in the original container in a dry place.

Biobarrier can be installed in the soil vertically, horizontally, or as a surround. Vertical applications typically require standard ditch/trench digging equipment (follow all applicable codes when digging below surface). Vertical fabric position can be maintained by suspending it at the top with hangers. Horizontal applications may require seaming or hold down pegs. Surround applications may involve a variety of holding devices to assure fabric position. In all applications, nodules must be no further than 1-1/2' apart in order to assure a continuous weed control plane. Fabric should extend a minimum of 18" beyond structure area to be protected as roots can grow around edges of fabric. A minimum of 2" soil overlay should also be maintained for horizontal applications. For vertical applications, the top edge must be at least 1" below the soil surface.

Biobarrier used in retrofit applications, where roots are already present, requires roots be interrupted with a root pruner or equivalent device. Root control will not be effective if roots penetrate fabric at time of installation.

Disclaimer of Warranties

The Seller makes no warranties concerning this product or its use which extend beyond the standard specifications for the products. **The Seller makes no warranties of merchantability or fitness for a particular purpose, or any other express or implied warranty.**

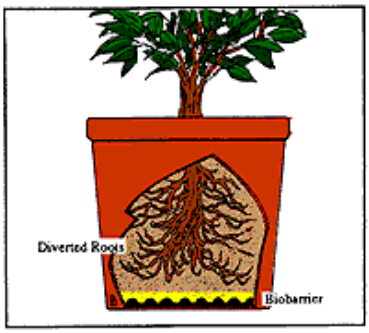
Buyer assumes all risk and liability resulting from use of the products delivered hereunder, whether used singularly or in combination with other products. All statements concerning this product apply only when used as directed.

Limitation of Damages

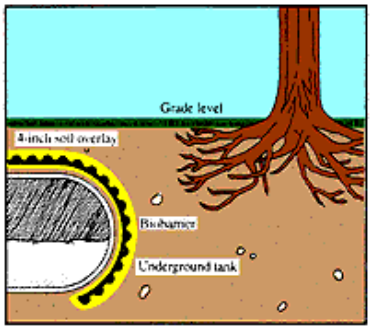
No claim of any kind, whether as to products delivered or for nondelivery of products, and whether or not based on negligence, shall be greater in amount than the purchase price of the products in respect to which damages are claimed. No charge or expense incident to any claims will be allowed unless approved by an authorized representative of Seller. Products shall not be returned to seller without Seller's prior permission, and then only in a manner prescribed by Seller. **The remedy hereby provided shall be the exclusive and sole remedy of Buyer, and in no event shall either party be liable for special, indirect or consequential damages, whether or not caused by or resulting from the negligence of such party.**

Biobarrier®

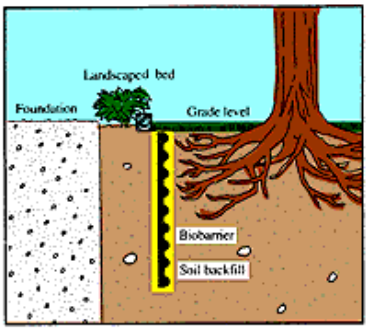
Suggested Uses



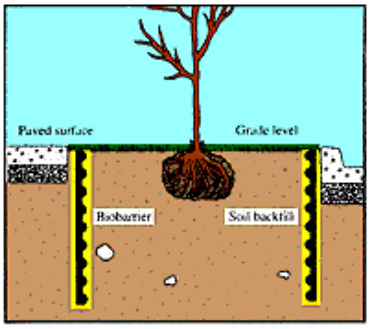
Nursery Potting



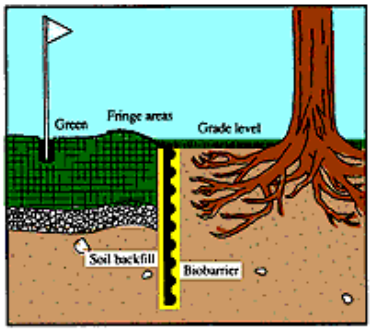
Underground Tanks



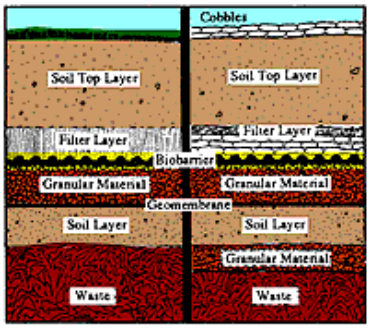
Building Foundations



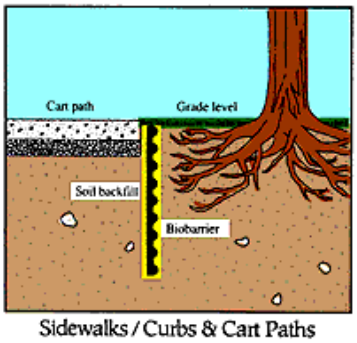
New Applications



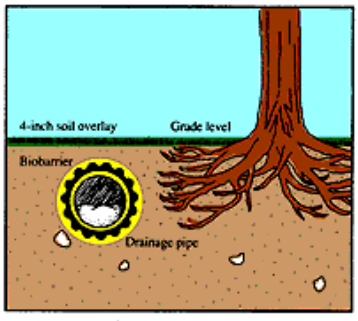
Greens / Tees



Hazardous Waste Caps



Sidewalks / Curbs & Cart Paths



Drainage Pipes

Use Biobarrier® for:

Landscape Beds
Septic Tanks
Sewer Lines
Sidewalks
Driveways
Curbs & Streets
Walkways
Parking Lots
Tennis Courts
Jogging Trails
Bike Paths
Drainage Pipes
Foundations
Retaining Walls
Home Patios
Golf Courses
Landfills
Underground Cables
Dams & Levees

Use Biobarrier® II for:

Landscaped Areas
Tree Skirts
Under Pavers
Under Guardrails
Under Fences
Utility Areas

Hort Enterprises
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