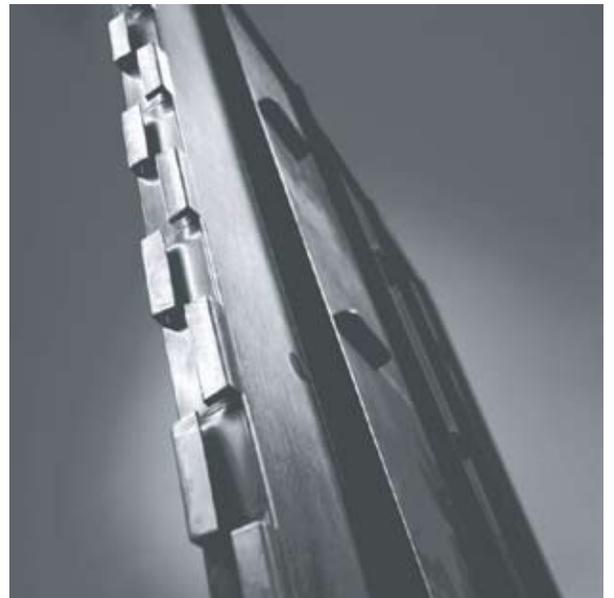


Tree Root Guides



Specification and Installation Manual for DeepRoot
Tree Root Guides

DeepRoot Tree Root Guides

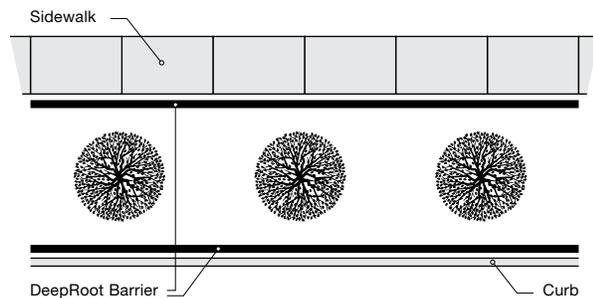
DeepRoot Tree Root Guides are patented mechanical barriers that redirect tree roots down and away from hardscapes, preventing costly root damage and preserving the health and beauty of mature trees. Our Tree Root Guides are used for linear, surround and root pruning applications on both new plantings and existing trees.

DeepRoot developed the first commercial root barriers in response to specific needs for hardscape protection, and we have been refining and improving our products and manufacturing process for 30 years. Our barriers are made in the USA in ISO 9002 certified factories to ensure consistent quality control. We incorporate post-consumer waste materials wherever possible.

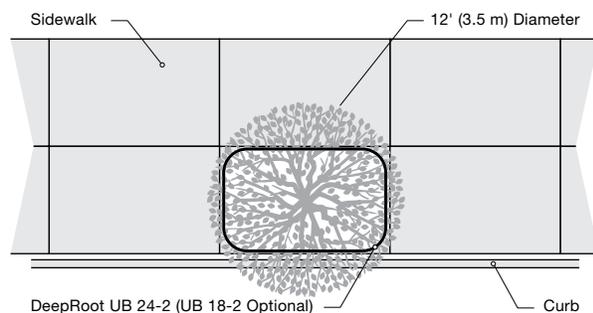
APPLICATIONS, PANEL FEATURES, MATERIALS & PACKAGING

APPLICATIONS

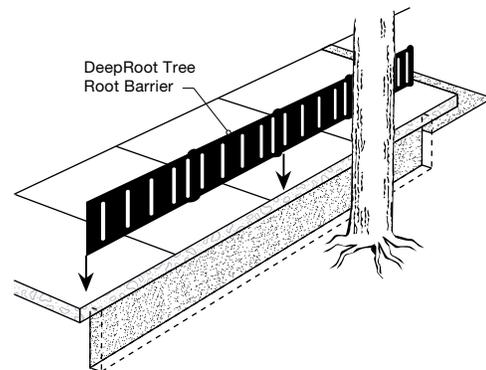
Linear Applications: Provide maximum hardscape protection while utilizing all available rooting space for improved tree health by placing barriers in a straight line directly along the hardscape to be protected.



Surround Applications: Protect hardscapes that surround a planting on all four sides. Plan to line the perimeter of the planting area with the panels – this provides the maximum available uncompacted soil volume for immediate root growth.



Root Pruning Applications: Root pruning can help prevent injury and preserve existing trees that are causing hardscape damage. Disruptive roots are cleanly cut and removed; linear Root Barrier is then installed. There are limitations to root pruning and a qualified Certified Arborist should be consulted.



Specialty Applications: Help protect sites with unusual requirements – like tennis courts, slopes, cemeteries and retaining walls – from root damage. DeepRoot Tree Root Guides of different sizes can be used in combination in areas of variable depth.

Root Block: In some circumstances it may be more desirable to prevent root intrusion by blocking roots, not redirecting them. Please see our Geomembrane catalog for details.

APPLICATION STYLES

Product #	Linear	Surround	Root Pruning	Specialty
LB 12-2	•		•	
UB 18-2	•	•	•	
UB 24-2	•	•	•	•
UB 36-2	•		•	•
UB 48-2	•		•	•

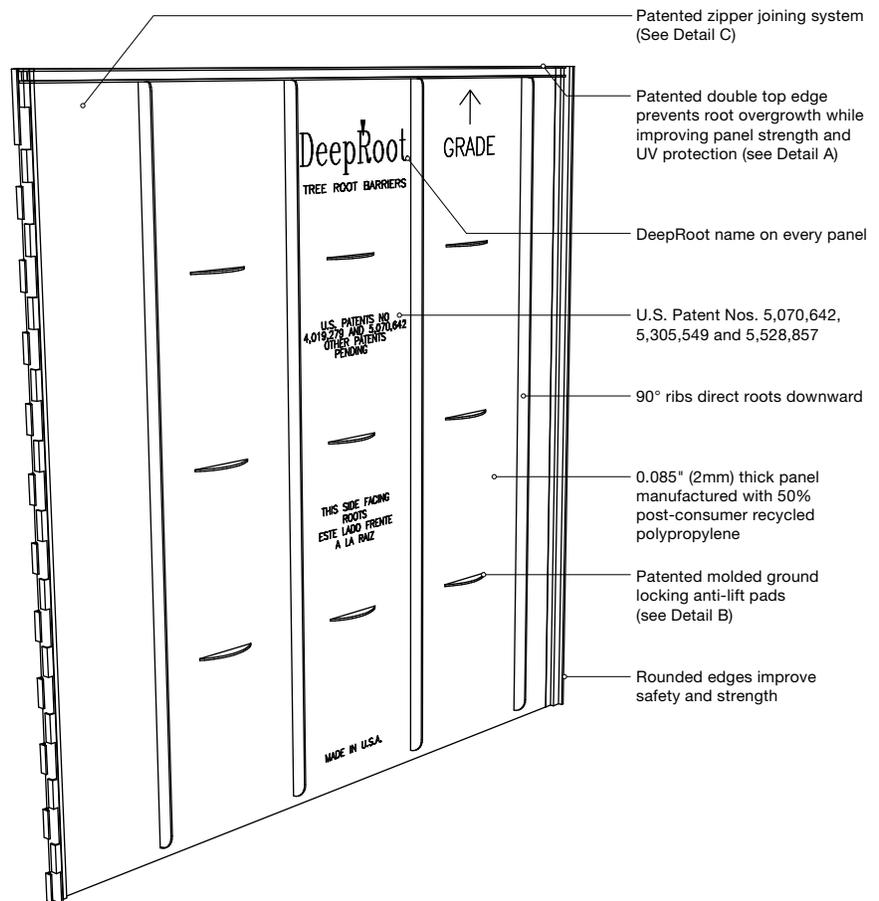
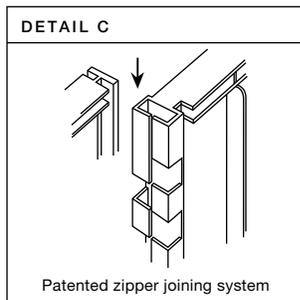
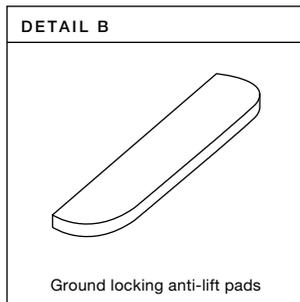
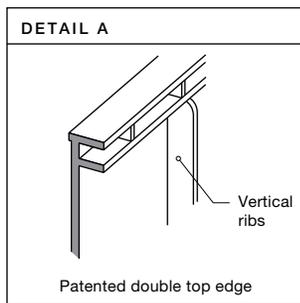
PRODUCT USES

Product #	Sidewalks	Curbs & Gutters	Paths	Medians	Patios	Specialty
LB 12-2			•			
UB 18-2	•		•		•	
UB 24-2	•	•	•	•	•	•
UB 36-2						•
UB 48-2						•

PANEL FEATURES

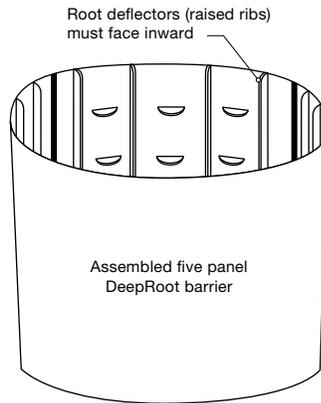
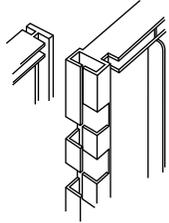
LB 12-2, UB 18-2, UB 24-2:

- 90° Root Directing Rib: Integral vertical ribs redirect root growth downward and out from underneath the barrier, preventing hardscape damage from shallow buttress roots.
- Integral, Reinforced, Double Top Edge: Improves the finished appearance and prevents UV breakdown, as well as acting as a root channel and fortifying the guide to withstand repeated foot traffic.
- Anti-Lift Ground Locks: Secure panel in the ground to prevent roots from pushing the barrier up.
- Made in the USA of 50% post-consumer recycled waste.
- Rounded Safety Edges: Minimize job site injuries and fortify panel strength.



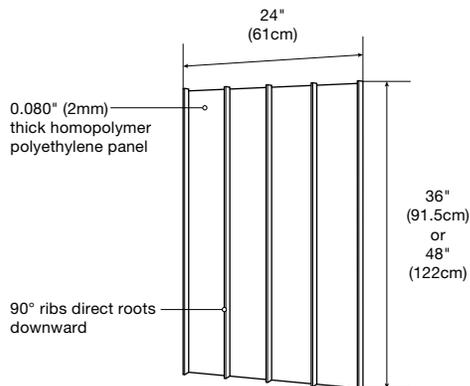
UB 18-2/ UB 24-2 ASSEMBLY:

To join panels together,
slide zippered edge
of one panel onto the
edge of the next



UB 36-2 AND UB 48-2

- Instant assembly: Easily slide one panel onto the next
- Sizing adjustable: 1 foot modules allows for adaptability to any site.
- 90° Root Directing Ribs: Integral vertical ribs redirect root growth downward and out from underneath the barrier, preventing hardscape damage from shallow buttress roots.
- Versatile: Combine with UB 24-2 or UB 18-2 where terrain requires varying depths.
- Made in the USA



MATERIALS

LB 12-2, UB 18-2, UB 24-2

LB 12-2, UB 18-2, and UB 24-2 Tree Root Guides are manufactured using high-quality 50% post consumer recycled co-polymer polypropylene plastic. Co-polymer polypropylene is a durable, flexible material with added UV inhibitors to prevent breakdown from sun exposure. Each product is injection molded adhering to ISO 9002 manufacturing standards, ensuring a consistent fit and finish and enabling them to stand up to the rigors of construction.

UB 36-2 AND UB 48-2

UB 36-2 and UB 48-2 Tree Root Guides are manufactured using high-quality homopolymer polyethylene—a durable, flexible material with added UV inhibitors to prevent breakdown from sun exposure. Each product is extruded adhering to ISO 9002 manufacturing standards, ensuring a consistent fit and finish and enabling them to stand up to the rigors of construction.

PACKAGING:

- LB 12-2: 40 panels (80 linear ft/24m) per carton
- UB 18-2: 26 panels (52 linear ft/16m) per carton
- UB 24-2: 20 panels (40 linear ft/12m) per carton
- UB 36-2: 14 Panels (28 linear feet/8.5m) per carton
- UB 48-2: 10 Panels (20 linear feet/6m) per carton

Linear Installation

Depending upon the actual planting plan and the number of trees involved the number of panels needed will vary, but as a general rule of thumb take the anticipated mature canopy diameter of the tree and add 2 feet (61cm). This will be the length of tree root guide necessary for a linear style planting application (see chart below.)

INSTRUCTIONS

- A. Choose the tree root guide that best suits the application. Generally if a sidewalk, patio or driveway is to be protected, 18"/46cm UB 18-2 is a sufficient depth. For curb and gutter protection or more aggressive roots, 24"/61cm UB 24-2 is generally the better choice.
- B. Dig the trench to the depth based upon the particular tree root guide chosen.
- C. Place the tree root guide in the trench with the vertical ribs facing toward the tree and align with the hardscape, if possible. Using the hardscape as a guide, backfill against the tree root guides to promote a clean, smooth fit to the paving. Be sure to keep the double top edge at least 1/2" (12.7mm) above grade to ensure roots do not grow over the top.
- D. Plant the tree(s). Linear installation planting offers an expansive root growth area, but adverse soil and drainage conditions may exist in the actual planting area. Take steps to ensure healthy growth of the tree at planting. Consult with a local arborist for planting tips and recommendations.

- E. If staking or guying is required we recommend using ArborTie®, a soft, safe and economical alternative to traditional wire and hose (see www.deeproot.com for details). If the tree(s) will be subject to maintenance work such as lawn mowing or weed trimming we recommend using ArborGard+® Tree Trunk Protectors to shield them from damage by weed trimmers, lawn mowers and rodents (see www.deeproot.com for details).
- For technical support contact DeepRoot toll-free at 800/458.7668 or visit us on the web at www.deeproot.com.

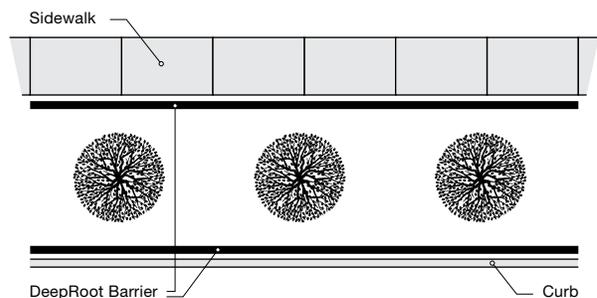
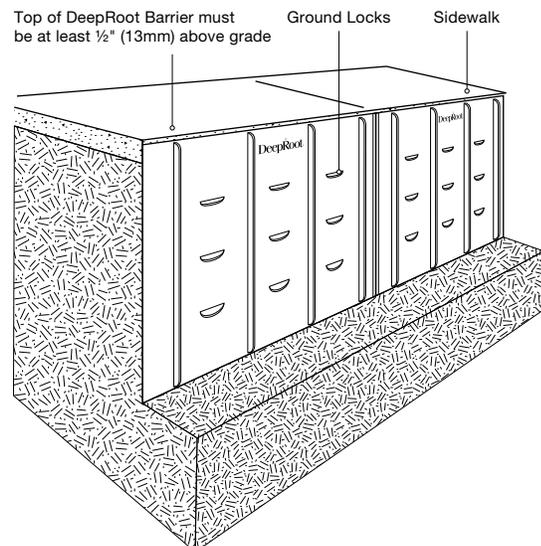
TO CALCULATE THE NUMBER OF LINEAR PANELS NEEDED:
 Estimated diameter of the tree canopy at maturity + 2' (61cm)
 = Length of Tree Root Guide per side.

FOR ONE SIDE OF TREE

Expected Tree Canopy at Maturity	Length of Barrier	Number of Panels
12' (3.6m) Dia. +2' (61cm)	14' (4.2m)	7
18' (5.5m) Dia. +2' (61cm)	20' (6.1m)	10
24' (7.3m) Dia. +2' (61cm)	26' (7.9m)	13

As little as one side of the tree may need guides for root direction if there is no other hardscape requiring protection.
 Line can be separated at any two foot interval.

DEEPROOT LB 12-2, UB 18-2 OR UB 24-2



LINEAR PLANTING DETAILS

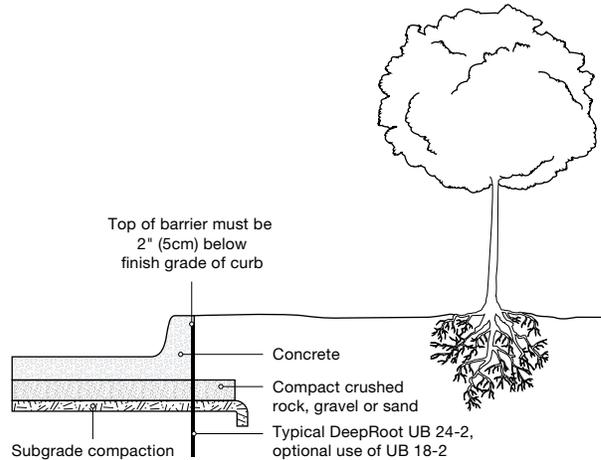
A. CURB AND GUTTER

Typical section of curb and gutter with DeepRoot Tree Root Guide inset into concrete.

Guide is installed in a trench in subgrade which is then compacted. Guide is set so that top edge will be 2" (5cm) below finish grade of curb and set flush with edge of curb. Vertical ribs face toward tree roots.

INSTALLATION INSTRUCTIONS:

1. Prepare base and subgrade.
2. Trench to appropriate depth for installation so that top of barrier is 2" (5cm) below finish grade of top of curb.
3. Place tree root guide in trench. Vertical ribs must face toward tree roots.
4. Backfill and compact to requirements.
5. Place form material against guide. (It may be nailed from the outside of the form.)



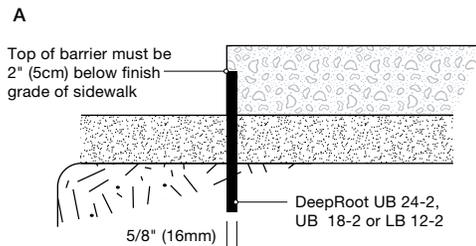
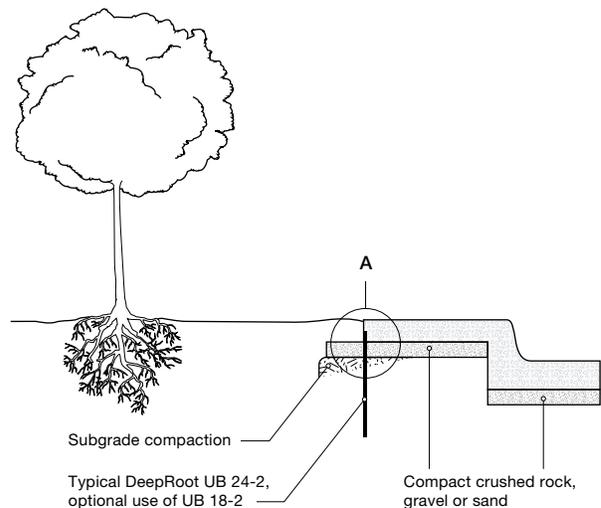
B. SIDEWALK

Typical section of sidewalk with DeepRoot Tree Root Guide inset into concrete.

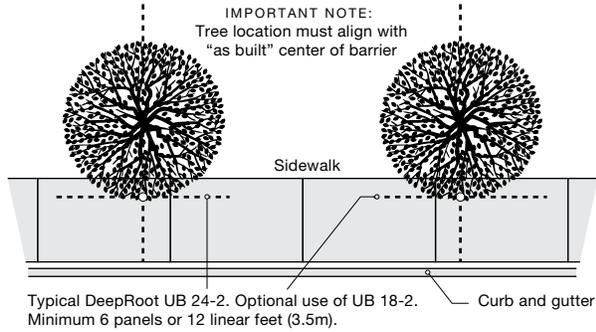
Guide is installed in a trench in subgrade which is then compacted. Guide is set so that top edge will be 2" (5cm) above compacted rock, gravel or sand (or halfway between rock and finish grade of SW). Vertical ribs face toward tree roots.

INSTALLATION INSTRUCTIONS:

1. Prepare base and subgrade.
2. Trench to appropriate depth for installation of root guide so that top of guide is 2" (5cm) below finish grade of sidewalk (or halfway between top of compacted rock and finish grade of SW).
3. Place tree root guide in trench. Vertical ribs must face toward tree roots.
4. Backfill and compact to requirements.
5. Place form material against guide. (It may be nailed from the outside of the form.)

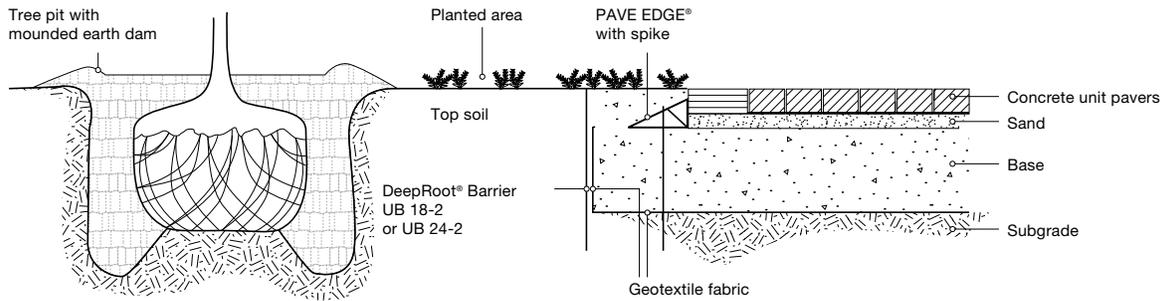


B. SIDEWALK (CONT'D)

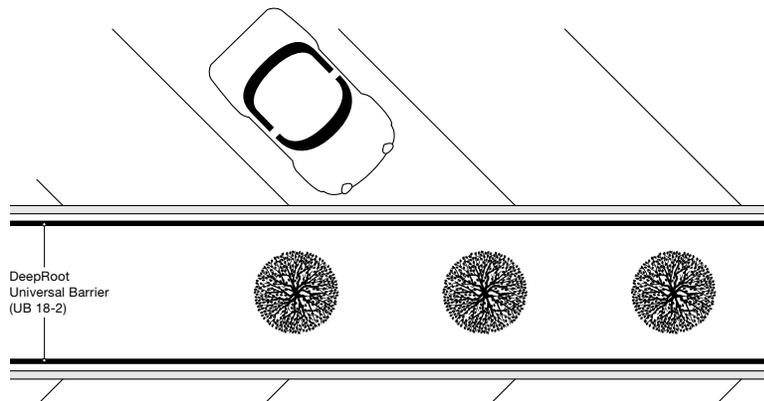


C. PAVER DETAIL

LINEAR STYLE PLANTING USING DEEPROOT AND GEOTEXTILE FABRIC WITH CONCRETE PAVERS



D. PARKING MEDIAN

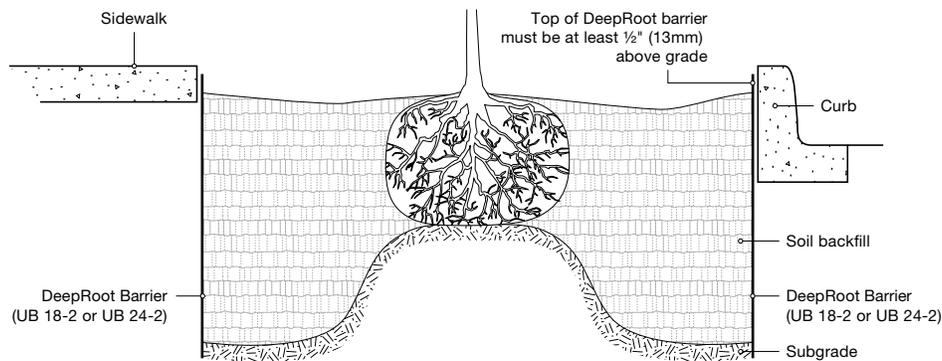


Surround Installation

INSTRUCTIONS

- A. Prepare the initial planting hole as illustrated below. This is based upon the combination of desired diameter and depth. Consider if drainage devices or amendments are needed to correct any adverse soil or planting conditions in the backfill area.
- B. Assemble the appropriate number of DeepRoot panels. The vertical root deflecting ribs on the panel must face inward toward the root ball (otherwise the roots will become girdled by traveling around the smooth walled surface).
- C. Place in the planting hole, keeping in mind that the double top edge of the panel should be positioned approximately 1/2" (13mm) above grade. This helps retard potential root overgrowth. Failing to position the top edge above grade can lead to root overgrowth and uprooted hardscapes.
- D. Backfill and compact with soil inside the barrier to the level where the bottom of the root ball will be when positioned correctly, keeping the crown of the root ball approximately 1" (26mm) above grade.
- E. Remove the tree from its container or cut away the top portion of burlap and position in the center of the assembled panels. Complete the backfill of the soil.
- F. Distribute evenly to maintain the shape of the barrier and compact the backfill every 4"-6" (10cm-15cm). Roots will die quickly if left exposed to the elements, so keep exposure to a minimum.
- G. If staking or guying is required we recommend using ArborTie, a soft, safe and economical alternative to traditional wire and hose (see www.deeproot.com for details). If the tree(s) will be subject to maintenance work such as lawn mowing or weed trimming we strongly recommend the installation of ArborGard+ Tree Trunk Protectors to prevent damage from weed trimmers, lawn mowers and small rodents (see www.deeproot.com for details).
- H. Water and follow proper tree maintenance practices. Trees require care and nurturing after planting. Consult with your local supplier for proper care procedures for the species you are planting. The planting instructions given here are by no means a comprehensive guide. Conditions will vary and it is recommended that an arborist be consulted before planting.

TYPICAL SURROUND PLANTING INSTALLATION



PRODUCT SELECTION FOR SURROUND PLANTING

TREE SIZE AT PLANTING TIME				UNIVERSAL BARRIER		
Caliper at Planting	Gallons	Ball & Burlap	Box	UB 18-2	UB 24-2	Diameter
1½"-2" (38mm-51mm)	5-15	20"-24" (51-61cm)	20" (50.8cm)	5 Panels	5 Panels	38" (96.5cm)
2½"-3" (64mm-76mm)	15	28"-32" (71-81cm)	20" & 24" (51 & 61cm)		6 Panels	45" (114.5cm)
3½" (89mm)		38" (96.5cm)	30" (76cm)		7 Panels	52" (132cm)
4-4½" (102mm-114mm)		42"-48" (107-122cm)	36" (91cm)		8 Panels	61" (155cm)

The Universal Barrier size allows 6" to 8" (152mm-203mm) clearance between the root ball and the wall of the barrier. Do not use fewer panels than recommended above. To do so would reduce clearance and may impede backfill, creating air pockets and limiting the effectiveness of the product. We have shown the smallest sizes which will still avoid hazard to tree health and survival consistent with the proper function of the barrier.

When planting a tree over 24" (61cm) trunk caliper at maturity, consult your local arborist.

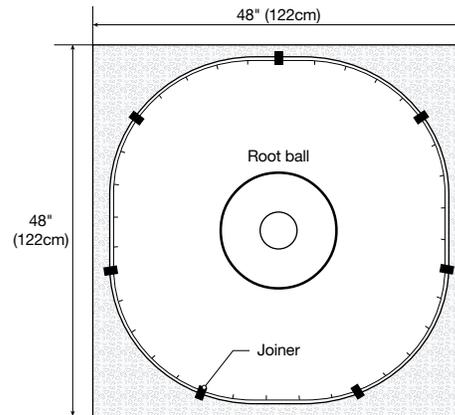
TREE OPENING CALCULATIONS

In some situations the number of panels may be limited by the size of the planting area (for example, a sidewalk cutout that is surrounded on all four sides by hardscape). If there is no design alternative to this difficult planting situation, we recommend providing the tree with the maximum available soil volume possible by lining the perimeter of the planting hole with the barrier. The following guide will help determine the maximum number of panels that can comfortably fit in a square cutout.

TO CALCULATE THE NUMBER OF PANELS NEEDED:

Perimeter in feet minus 2 feet (61cm), divided by 2

Example: A 4' x 4' sidewalk cutout has an outside perimeter of 16' (4' + 4' + 4' + 4'). Subtracting 2' leaves 14', divided by 2 equals 7. This is the maximum number of panels that will comfortably fit in a 4' x 4' planting zone.



Seven (7) panels of DeepRoot UB 18-2 or UB 24-2 with a circumference of 151" (383.5 cm) fit into the square hole to form an oval.

Root Pruning

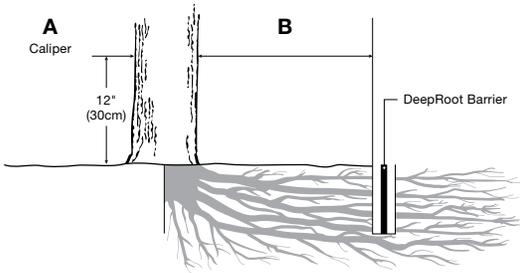
Root pruning can save a mature tree from being cut down and prevent future damage to hardscapes, however it must be done cautiously and professionally to ensure success. The following steps are designed to serve as general guidelines for root pruning. For more detailed information consult with your local arborist.

SUGGESTED GUIDELINES

1. **Soil Amendments:** Trees that tend to go into shock when their root systems are disturbed will recover more rapidly by adding the proper soil mix into the root prune cut on the tree side of the barrier.
 2. **Pruning of Crown:** Pruning of larger roots or pruning closer to the trunk inevitably impairs anchorage to some extent, therefore the foliar canopy should be thinned before roots are pruned to reduce wind resistance.
 3. **When to Prune:** When feasible, root pruning should be done after the end of local high wind season (where those occur), or five or six months before onset of seasonal high winds. When there is a likelihood of excessive wind and/or rain, risk of post-pruning tree loss is high, and exceptional care must be taken in any root pruning operations.
 4. **Limit of Annual Root Pruning:** When root pruning is done within seven trunk diameters of the tree base, pruning and DeepRoot Tree Root Guide installation should be limited to one side per year. For installations on more than one side there should be an interval of one year between successive prunings.
 5. **Minimum distance from Trunk:** Follow the table and illustrations shown. Root pruning closer than three trunk diameters from the tree base is not recommended due to increased injury/infection at pruning site and to increased danger of treefall from impaired anchorage.
- **Note:** Because trees and their related root problems vary considerably, specific guidelines cannot be prescribed. These guidelines are broad in scope and each tree must be evaluated individually using sound judgment. Always consult your local ISA Certified Arborist before root pruning.

GENERAL GUIDE FOR MINIMUM DISTANCE FOR ROOT PRUNING

A Trunk Caliper Measured 12" (30cm) Above Ground	B Root Cut Distance (3X Trunk Caliper)
4" (10cm)	12" (30.5cm)
6" (15cm)	18" (45.5cm)
8" (20.5cm)	24" (61cm)
10" (25.5cm)	30" (76cm)
12" (30.5cm)	36" (91.5cm)
14" (35.5cm)	42" (106.5cm)
16" (40.5cm)	48" (122cm)
18" (45.5cm)	54" (137cm)
20" (51cm)	60" (152.5cm)



TO CALCULATE THE NUMBER OF PANELS NEEDED FOR A ROOT PRUNING APPLICATION:

Estimated diameter of the tree canopy at maturity + 2' (61cm)
 = Length of panels per side.

LB 12-2

12" Linear Barrier

Specified tree root guides are mechanical barriers and root deflectors to prevent tree roots from damaging hardscapes and landscapes. LB 12-2 panels are preassembled with flexible joiner strips in 80' (24m) lengths for linear applications directly beside a hardscape adjacent to the trees. Each preassembled section can be separated or reconfigured in any 2' (61cm) module.

A. MATERIALS

1. The contractor shall furnish and install tree root guides as specified.

The tree root guides shall be product # LB 12-2 as specified on these drawings as manufactured by Deep Root Partners, L.P., 530 Washington Street, San Francisco, CA 94111 (800/458.7668), or approved equal. The guide shall be black, injection molded panels, of 0.080" (2.03mm) wall thickness in modules 24" (61cm) long by 12" (30.48cm) deep; manufactured with a minimum 50% post consumer recycled polypropylene plastic with added ultraviolet inhibitors; recyclable. Each panel shall have:

Not less than 4 molded integral vertical root deflecting ribs of a minimum of .06" (1.52mm) thickness protruding 1/2" (12.7mm) at 90 degrees from the interior of the panel, spaced 6" (15cm) apart. (See panel drawing below).

A double top edge consisting of two parallel, integral, horizontal ribs at the top of the panel of a minimum 0.06" (1.52mm) thickness, 3/8" (9.53mm) wide and 1/4" (6.35mm) apart with the lower rib attached to the vertical root deflecting ribs. (See Detail A)

Not less than 3 anti-lift ground lock tabs consisting of integral horizontal ridges of a minimum 0.06" (1.52mm) thickness in the shape of a segment of a circle, the 2 1/4" (57mm) chord of the segment joining the panel wall and the segment, protruding 3/8" (9.53mm) from the panel. The minimum of 3 ground locks on each panel shall be about equally spaced between each of the vertical root deflecting ribs (1 between each set of ribs, see Detail B).

A preassembled self locking flexible (0-180 degrees) joiner strip to connect one panel to the next (see Detail C).

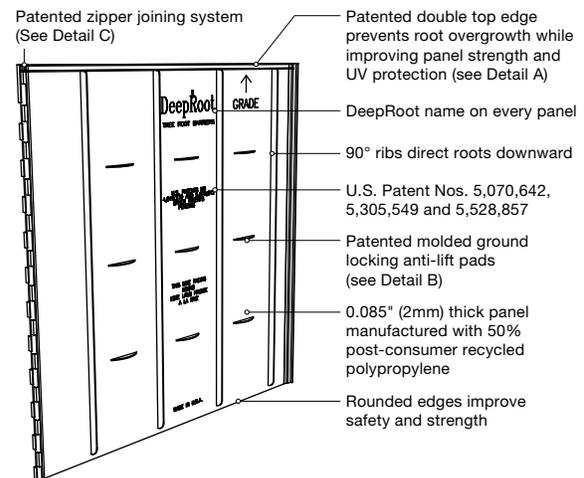
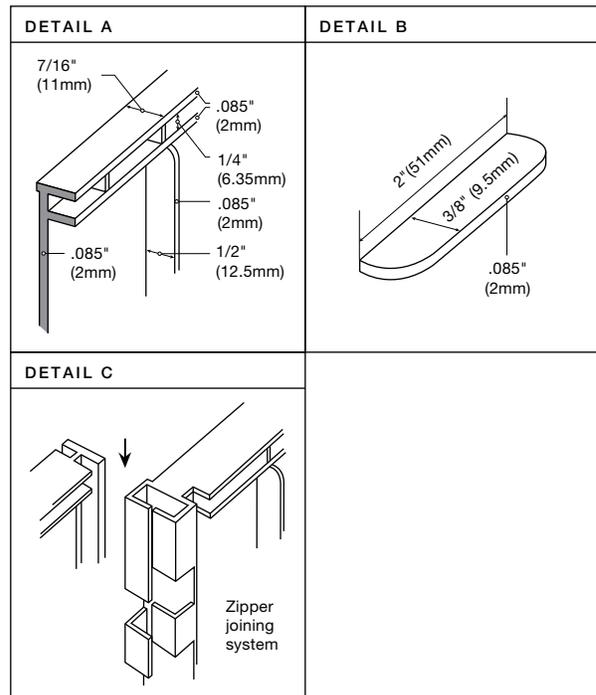
2. The basic properties of the material shall be:

Test	ASTM Test Method	Typical Value Copolymer Polypropylene
Tensile stress @ yield	D638	3,800 PSI
Elongation @ yield	D638	6.3%
Flexural Modulus	D790B	155,000 PSI
Notched Izod Impact	D256A	7.1
Rockwell Hardness r. scale	D785A	68

U.S. Patents: 5,070,642 and 5,305,549.

B. CONSTRUCTION AND INSTALLATION

- The contractor shall install the tree root guides in the length and in the manner shown on the drawings.** The vertical root deflecting ribs shall be facing inwards to the root ball and the top of the double top edge shall be 1/2" (13mm) above grade. Each of the required number of panels shall be connected with the flexible joiner strips to the required length for the linear application.
- Excavation and soil preparation shall conform to the drawings.**



UB 18-2

18" Universal Barrier

Specified tree root barriers are mechanical barriers and root deflectors to prevent tree roots from damaging hardscapes and landscapes. Assembled in 2' (61cm) long modules for linear applications directly beside a hardscape adjacent to one side of the trees or to create varying sizes of cylinders for surrounding root balls (surround planting style).

A. MATERIALS

1. The contractor shall furnish and install tree root guides as specified.

The tree root guides shall be product # UB 18-2 as manufactured by Deep Root Partners, L.P. 530 Washington Street, San Francisco, CA 94111 (800/458.7668), or approved equal. The barrier shall be black, injection molded panels, of .080"(2.03mm) wall thickness in modules 24" (61cm) long by 18"(46cm) deep; manufactured with a minimum 50% post consumer recycled polypropylene plastic with added ultraviolet inhibitors; recyclable. Each panel shall have:

Not less than 4 molded integral vertical root deflecting ribs of at least 0.06"(1.52mm) thickness protruding 1/2"(12.7mm) at 90° from interior of the barrier panel, spaced 6"(15.24mm) apart (see panel drawing below).

A double top edge consisting of two parallel, integral, horizontal ribs at the top of the panel of a minimum 0.06"(1.52mm) thickness 3/8"(9.53mm) wide and 1/4"(6.35mm) apart with the lower rib attached to the vertical root deflecting ribs (see Detail A).

A minimum of 9 anti-lift ground lock tabs consisting of integral horizontal ridges of a minimum 0.06"(1.52mm) thickness in the shape of a segment of a circle, the 2 1/4"(57mm) chord of the segment joining the panel wall and the segment, protruding 3/8"(9.53mm) from the panel. The nine ground locks on each panel shall be about equally spaced between each of the vertical root deflecting ribs (3 between each set of ribs, see Detail B).

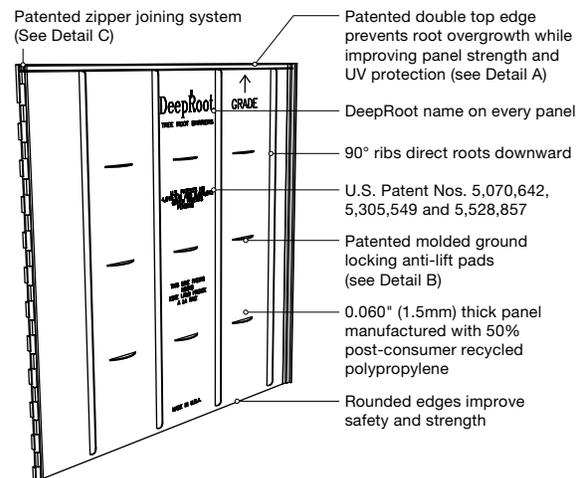
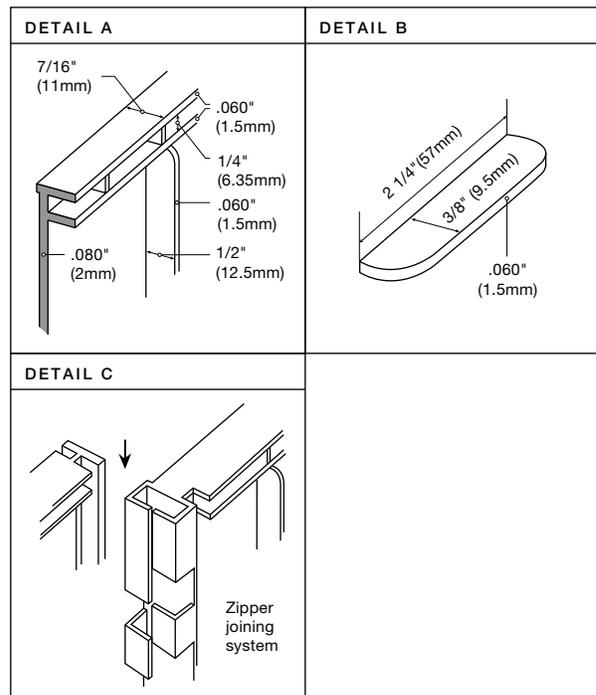
An integrated zipper joining system providing for instant assembly by sliding one panel onto another (see Detail C).

2. The basic properties of the material shall be:

Test	ASTM Test Method	Value Copolymer Polypropylene
Tensile strength @ yield Wall	D638	2,383 PSI
Tensile strength @ yield Hinge	D638	2,483 PSI
Yield Elongation-Wall	D638	7.71%
Yield Elongation-Hinge	D638	7.58%
Flexural Modulus	D790B	120,785 PSI
Notched Izod Impact-Wall	D256A	2.54 (ft-lbs.)
Rockwell Hardness r. scale-Wall	D785A	84.1

B. CONSTRUCTION AND INSTALLATION

- 1. The contractor shall install the tree root barriers with the number of panels and in the manner shown on the drawings.** The vertical root deflecting ribs shall be facing inwards to the root ball and the top of the double edge shall be 1/2" (12.7mm) above grade. Each of the required number of panels shall be connected to form a circle around the root ball or joined in a linear fashion and placed along the adjacent hardscape.
- 2. Excavation and soil preparation shall conform to the drawings.**



UB 24-2

UB 24-2 24" Universal Barrier

Specified tree root guides are mechanical barriers and root deflectors to prevent tree roots from damaging hardscapes and landscapes. UB 24-2 is assembled in 2' (61cm) long modules to create varying sizes of cylinders for surrounding root balls (surround planting style) or for linear applications directly beside a hardscape adjacent to one side of the trees (linear planting style).

A. MATERIALS

1. The contractor shall furnish and install tree root guides as specified.

The tree root guides shall be UB 24-2 as manufactured by Deep Root Partners, L.P., 530 Washington Street, San Francisco, CA 94111 (800/458.7668), or approved equal. The guide shall be black, injection molded panels, of 0.085" (2.16mm) wall thickness in modules 24" (61cm) long by 24" (61cm) deep; manufactured with a minimum 50% post consumer recycled polypropylene plastic with added ultraviolet inhibitors; recyclable. Each panel shall have:

Not less than 4 molded integral vertical root directing ribs of a minimum 0.085" (2.16mm) thickness protruding 1/2" (12.7mm) at 90° from interior of the guide panel, spaced 6" (152.4mm) apart (see panel drawing).

A double top edge consisting of two parallel, integral, horizontal ribs at the top of the panel of a minimum 0.085" (2.16mm) thickness, 3/8" (9.53mm) wide and 1/4" (6.35mm) apart with the lower rib attached to the vertical root deflecting ribs (see Detail A).

A minimum of 9 anti-lift ground lock tabs consisting of integral horizontal ridges of a minimum 0.085" (2.16mm) thickness in the shape of a segment of a circle, the 2" (50.8mm) chord of the segment joining the panel wall and the segment, protruding 3/8" (9.53mm) from the panel. The nine ground locks on each panel shall be about equally spaced between each of the vertical root directing ribs (3 between each set of ribs; see Detail B).

An integrated zipper joining system providing for instant assembly by sliding one panel onto another (see Detail C).

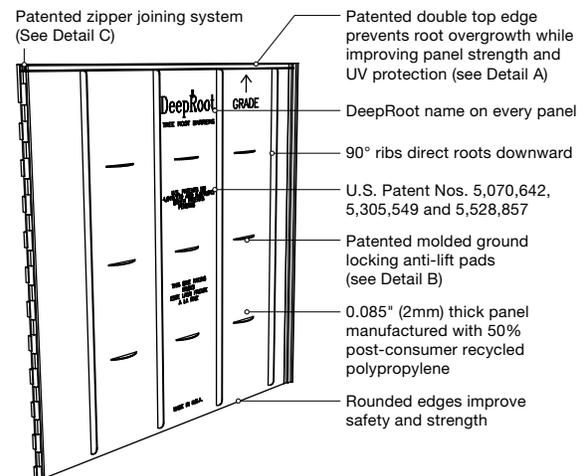
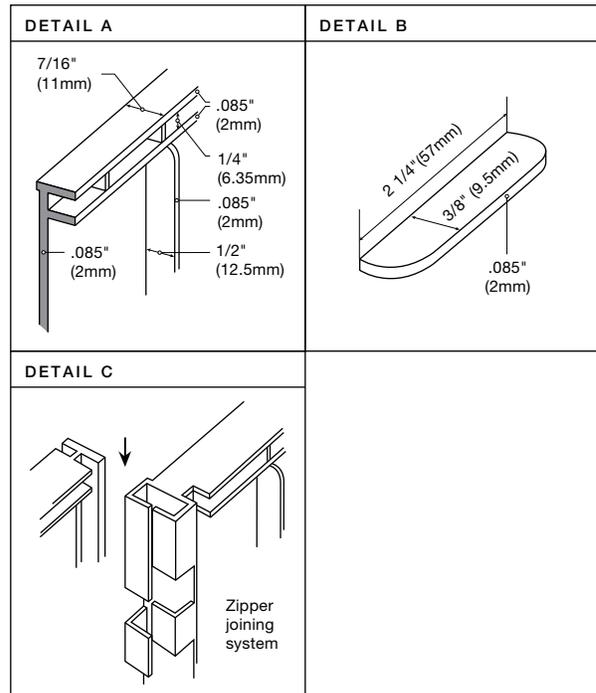
2. The basic properties of the material shall be:

Test	ASTM Test Method	Value Copolymer Polypropylene
Tensile strength @ yield Wall	D638	2,354 PSI
Tensile strength @ yield Hinge	D638	2,846 PSI
Yield Elongation-Wall	D638	7.44%
Yield Elongation-Hinge	D638	7.01%
Flexural Modulus	D790B	119,625 PSI
Notched Izod Impact-Wall	D256A	3.84 (ft-lbs.)
Rockwell Hardness r. scale-Wall	D785A	84.4

U.S. Patents: 5,070,642, 5,305,549 and 5,528,857. Other Patents Pending

B. CONSTRUCTION AND INSTALLATION

- The contractor shall install the tree root guides with the number of panels and in the manner shown on the drawings. The vertical root directing ribs shall be facing inwards to the root ball and the double top edge shall be 1/2" (12.7mm) above grade. Each of the required number of panels shall be connected to form a circle around the root ball or joined in a linear fashion and placed along the adjacent hardscape.
- Excavation and preparation shall conform to the drawings.



UB 36-2/UB 48-2 36" / 48" Universal Barriers

Specified tree root barriers are mechanical barriers and root deflectors to prevent tree roots from damaging hardscapes and landscapes. Assembled in 2' (61 cm) long modules to create varying lengths for linear applications directly beside a hardscape adjacent to one side of the trees or for large perimeter surround applications with a minimum 8' (2.43 m) diameter using 12 panels.

A. MATERIALS

1. The contractor shall furnish and install tree root barriers as specified.

The tree root barriers shall be either product # UB 36-2 or UB 48-2 as manufactured by Deep Root Partners, L.P., 530 Washington Street, San Francisco, CA 94111 (800/458.7668), or approved equal. The barriers shall be black, extruded panels, of 0.080" (2.03mm) wall thickness in modules 24" (61cm) long either 36" (91 cm) or 48" (122 cm) deep; manufactured with homopolymer polyethylene with added ultraviolet inhibitors; recyclable. Each 2' (61 cm) section shall have:

Not less than 4 molded integral vertical root directing ribs of a minimum 0.080" (2.03mm) thickness protruding 1/2" (12.7 mm) at 90° from interior of the barrier panel, spaced 6" (152.4 mm) apart. See panel drawing.

An integrated joining system providing for instant assembly by sliding one panel into another.

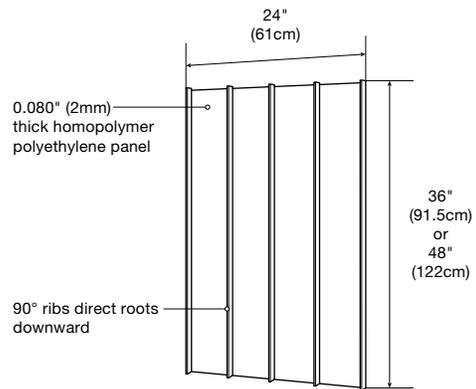
2. The basic properties of the material shall be:

MATERIAL & THICKNESS

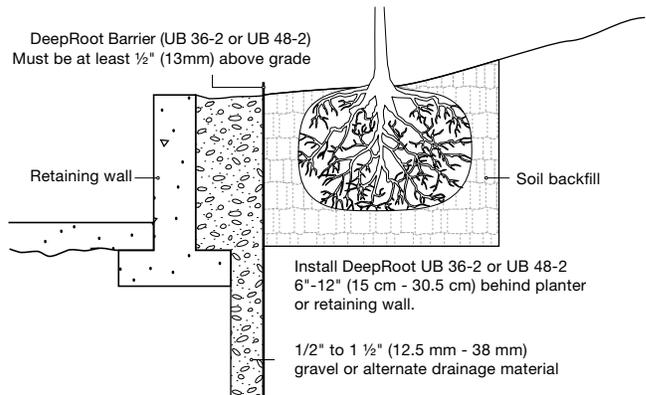
Properties	ASTM Test Method	Typical Value
Tensile stress @ yield	D638	3,800 PSI
Elongation @ break %	D638	10%
Tensile Modulus	D638	155,000 PSI
Notched Izod Impact	D256A	0.4 - 4.0
Flexual Modulus 73 ± PSI	D790	145,000
Hardness Shore	D2240	P66

B. CONSTRUCTION AND INSTALLATION

- 1. The contractor shall install the tree root barriers with the number of panels and in the manner shown on the drawings.** The vertical root directing ribs shall be facing inwards to the root ball and the top edge shall be 1/2" (12.7 mm) above grade. Each of the required number of panels shall be joined in a linear fashion and placed along the adjacent hardscape or where specified connected to form a circle around the root ball.
- 2. Excavation and preparation shall conform to the drawings.**



TYPICAL PLANTING INSTALLATION USING DEEPROOT UB 36-2 OR UB 48-2



CSI SPECIFICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. SECTION INCLUDES:

1. Tree root barriers; various depths and combinations may be required.
2. Tree trunk protectors.
3. Water barriers.
4. Staking and guying materials.

B. RELATED SECTIONS:

1. Section 02722: Field Subdrainage System
2. Section 02800: Site Improvements
3. Section 02813: Lawn Irrigation
4. Section 02905: Plants, Planting, and Transplanting
5. Section 02930: Exterior Plants

1.02 REFERENCES

A. STANDARDS OF THE FOLLOWING AS REFERENCED:

1. American National Standards Institute (ANSI).
2. ASTM.

1.03 DEFINITIONS

A. TERMS:

1. Tree root barrier: Mechanical barrier and root deflector to prevent tree roots from damaging hardscapes and landscapes.
2. Tree trunk protector: Material to protect young tree trunks from rodents, string trimmers, and lawn mowers.
3. Water barriers:
 - a. Controls run-off, preventing hardscape damage.
 - b. Prevents irrigation water from percolating under pavement.
 - c. Water corral for planting areas preventing pavement damage and saves water.
 - d. Prevents snow, ice, and saltwater run-off from polluting planting areas adjacent to roadways and parking areas.
 - e. Liner to separate golf greens and turf.
 - f. Bamboo control.

1.04 SUBMITTALS

A. PRODUCT DATA:

Manufacturers standard literature defining materials for use on this Project.

B. SHOP DRAWINGS:

1. Indicate locations and extent for tree root barrier material.
2. Indicate trees receiving tree trunk protectors.
3. Indicate locations and extent of water barriers.
4. Indicate trees and plants to be staked and guyed.

C. SAMPLES; IF REQUIRED BY ARCHITECT:

1. Tree root barrier: One full length panel.
2. Tree trunk protector: One unit.
3. Water barrier: One lineal foot of material.
4. Staking and guying: One lineal foot.

**D. QUALITY CONTROL SUBMITTALS;
MANUFACTURER'S INSTRUCTIONS**

Complete installation instructions for each item specified; may be combined with product data.

1.05 QUALITY ASSURANCE

A. QUALIFICATIONS; MANUFACTURER:

Minimum 20 years experience in tree and plant protection and accessories.

1.06 DELIVERY, STORAGE, AND HANDLING

A. PACKING AND SHIPPING:

Provide materials in original unopened containers with manufacturer's labels intact and legible.

B. ACCEPTANCE AT SITE:

1. Damaged materials determined by visual inspection will not be accepted.
2. Remove rejected materials from project site immediately.

C. STORAGE AND PROTECTION:

Store materials in dry area in manufacturer's protective packaging; in original containers with labels and instruction instructions intact.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. ACCEPTABLE MANUFACTURERS:

1. Products specified as standard of quality are manufactured by Deep Root Partners, L.P. (Deep Root); 530 Washington Street, San Francisco, CA 94111; 415/781.9700; 800/458.7668; fax 800/277.7668; www.deeproot.com.
2. Products of manufacturers meeting indicated standards and specified manufacturer's product data characteristics are acceptable for use subject to approval of product list and samples.

2.02 MANUFACTURED UNITS

A. TREE ROOT BARRIERS:

1. 12" depth:
 - a. Product standard of quality: DeepRoot; Tree Root Barriers; LB 12-2.
 - b. Material: 0.080" wall thickness, nominal, injection molded 50% post-consumer recycled polypropylene panels with UV inhibitors.
 - c. Panel specifics:
 - 1) 7/16" wide integral molded 0.080" thickness double top edge with stiffening ribs; bottom edge attached to vertical root deflecting ribs.
 - 2) Integral molded 0.080" thickness by 2" deep vertical root directing ribs spaced at 6" O.C.
 - 3) Integral molded 0.080" thickness by 2" long by 3/8" wide horizontal anti-lift ground lock tabs; minimum three per panel.
 - d. Size: 24" wide by 12" deep.
 - e. Preassembled joiner system for panel connection to adjacent panel.
 - f. Color: Black.
2. 18" depth:
 - a. Product standard of quality: DeepRoot; Tree Root Barriers; UB 18-2.
 - b. Material: 0.080" wall thickness, nominal, injection molded 50% post-consumer recycled polypropylene panels with UV inhibitors.
 - c. Panel specifics:
 - 1) 7/16" wide integral molded 0.080" thickness double top edge with stiffening ribs; bottom edge attached to vertical root deflecting ribs.
 - 2) Integral molded 0.080" thickness by 2" deep vertical root directing ribs spaced at 6" O.C.
 - 3) Integral molded 0.080" thickness by 2" long by 3/8" wide horizontal anti-lift ground lock tabs; minimum nine per panel.
 - d. Size: 24" wide by 18" deep.
 - e. Integrated zipper joining system for panel connection to adjacent panel.
 - f. Color: Black.
3. 24" depth:
 - a. Product standard of quality: DeepRoot; Tree Root Barriers; UB 24-2.
 - b. Material: 0.085" wall thickness, nominal, injection molded 50% post-consumer recycled polypropylene panels with UV inhibitors.
 - c. Panel specifics:
 - 1) 7/16" wide integral molded 0.085" thickness double top edge with stiffening ribs; bottom edge attached to vertical root deflecting ribs.
 - 2) Integral molded 0.085" thickness by 2" deep vertical root directing ribs spaced at 6" O.C.
 - 3) Integral molded 0.085" thickness by 2" long by 3/8" wide horizontal anti-lift ground lock tabs; minimum nine per panel.
 - d. Size: 24" wide by 24" deep.
 - e. Integrated zipper joining system for panel connection to adjacent panel.
 - f. Color: Black.
4. 36" depth:
 - a. Product standard of quality: DeepRoot; Tree Root Barriers; UB 36-2 and UB 48-2.
 - b. Material: 0.080" thickness extruded Homopolymer Polyethylene with UV inhibitors, root deflecting ribs at 6" O.C. vertically, and built-in joining system.
 - c. Panel size: 24" wide by 36" deep.
5. 48" depth:
 - a. Product standard of quality: DeepRoot; Tree Root Barriers; UB 36-2 and UB 48-2.
 - b. Material: 0.080" thickness extruded Homopolymer Polyethylene with UV inhibitors, root deflecting ribs at 6" O.C. vertically, and built-in joining system.
 - c. Panel size: 24" wide by 48" deep.

SECTION 02911

TREE, PLANT, AND HARDSCAPE PROTECTION

B. TREE TRUNK PROTECTORS:

1. Product standard of quality: DeepRoot; ArborGard+ AG 9-4.
2. Material: 0.060" thickness polyethylene with UV inhibitors, recyclable.
3. Size: 9" high by single length accommodating tree up to 4" dia.
4. Larger trees indicated for protection: Couple two or more sections together.

C. WATER BARRIERS:

1. Product standard of quality: DeepRoot; Water Barrier WB Series.
2. Material: ** 0.030" ** 0.040" ** thickness High Density Polyethylene (HPDE). (SELECT THICKNESS DESIRED - DELETE OTHER)
3. Sizes: 24", 30", and 36" wide by 300'-0" rolls.
4. Manufacturer's standard sealing tape.
5. Sealant: Silicone type recommended by water barrier manufacturer for certain applications; applications requiring sealant indicated in manufacturer's product data.

D. STAKING AND GUYING MATERIALS:

1. Product standard of quality: DeepRoot; ArborTie+.
2. Material: Flat, woven polypropylene; 900 lb. break strength; 2,500 lb. break strength.
3. Size: ¾" wide by manufacturer's standard roll lengths.
4. Color: ** Green. ** White. ** (SELECT COLOR)

2.03 ACCESSORIES

A. PROVIDE RELATED MATERIALS FOR COMPLETE INSTALLATION OF SPECIFIED MATERIALS.

PART 3 - EXECUTION

3.01 EXAMINATION

A. VERIFICATION OF CONDITIONS:

1. Verify other work in other sections, in, at, and around landscaping work is complete to the extent that no damage will occur to newly planted materials or, any possible construction related damage will be minimal and replacement plant material is readily available for planting at no additional cost.
2. Obtain verification, in writing, from work required in other sections directly involving work in this section regarding correct grades have been provided, coordination of topsoil spreading, and lawns and grasses planting.
3. Beginning work without fulfilling conditions below requiring removal or replanting work in this section becomes responsibility of this section.
 - a. Not providing written notification to Architect of unacceptable conditions indicates acceptance of site.
 - b. Not receiving verification indicated above.
 - c. Work required not indicated as unacceptable requiring removal or replanting work.

3.02 PREPARATION

A. SURFACE PROTECTION:

Use methods necessary to prevent damage to completed sitework performed in other sections. Protect access to and areas around planted materials. Restore damaged areas to original compaction, grades, and lines; repair damaged grassed areas.

3.03 INSTALLATION

A. TREE ROOT BARRIERS:

Install in accord with manufacturer's reviewed installation instructions where indicated on reviewed shop drawings with vertical root directing ribs facing inwards towards trees or plants; connect panels together as required.

B. TREE TRUNK PROTECTORS:

1. Install in accord with manufacturer's reviewed installation instructions where indicated on reviewed shop drawings.
2. Join two or more segments together for trees over 4" dia.

C. WATER BARRIERS:

1. Install where indicated on reviewed shop drawings in accord with manufacturer's reviewed installation instructions using material widths required for conditions encountered.
2. Seal to hardscape surfaces with specified sealant where necessary.
3. Join material lengths with manufacturer's sealing tape.

D. STAKING AND GUYING MATERIALS:

1. Immediately after planting, guy and stake designated trees and large plants.
2. Include tightening of guying materials to bring trees and plants to upright position.



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