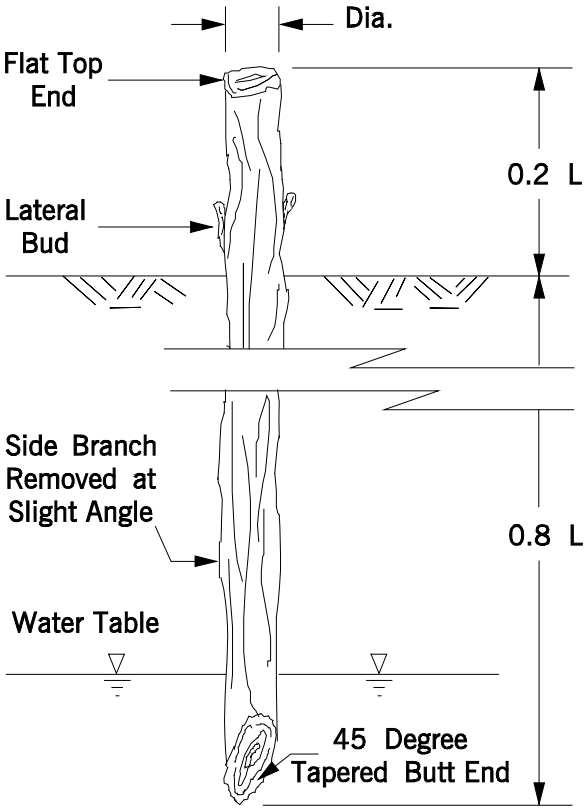
STREAM-SIDE PLANTING PLAN

Maryland's Guidelines To Waterway Construction
DETAIL 2.4: LIVE STAKES



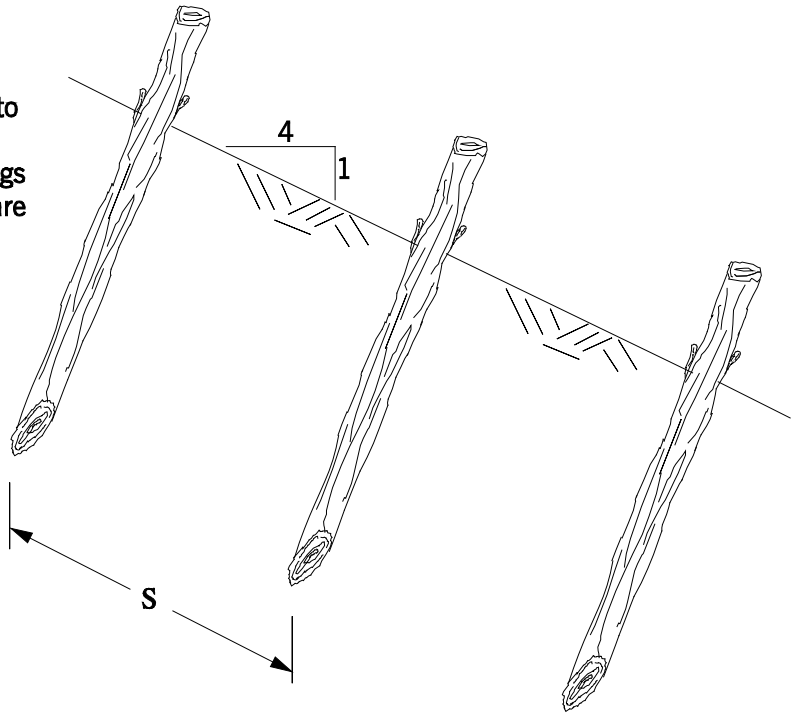
Adapted From USDA–SCS (1994)

DETAIL

Live stout stakes should be long enough to reach below the groundwater table. (Generally, a length of 2 to 3 feet, or 0.6 to 0.9 meters, is sufficient.) Additionally, the stakes should have a diameter in the range of 0.75 to 1.5 inches (2 to 4 centimeters).

SECTION VIEW

Live stout stakes shall be spaced 2 to 3 feet (0.6 to 0.9 meters) apart to give a density of 2 to 4 cuttings per square yard (0.8 square meters).



MGWC 2.4: LIVE STAKES

Approximate Cost ($1999):
$1 to $4 per stake

INSTALLATION GUIDELINES

Live stake installation should proceed as follows (refer to Detail 2.4):

1. Live stake rooting areas should be soaked in barrels of water for 24 to 48 hours just prior to installation.

2. While keeping the bark of the live stakes intact, the side branches should be cleanly removed, the basal ends angled for easy insertion, and the tops cut square.

3. The cuttings should be implanted with the angled basal end down and buds oriented up at a minimum angle of 10 degrees to the horizontal so that rooting will not be restricted. All stakes should be positioned above the normal baseflow level. Project planners may need to study an aptly chosen vegetated reference reach for further guidance when installing live stakes.

    - In soft soils, the stakes can be inserted perpendicularly into the slope using a dead blow hammer; in hard soils, however, a steel rod should be employed to create a pilot hole before the stakes are planted.
    - Twenty percent of the live stake, and a minimum of two lateral buds, should be exposed above the slope so that green, leafy shoots will readily grow.
    - Split or otherwise damaged stakes should be discarded.

4. After the stakes have been inserted into the ground, soil should be tamped firmly around their bases to encourage root growth.

5. Successive stakes should be arranged in a triangular configuration and spaced a distance of 2 to 3 feet (0.6 to 0.9 meters) apart, allowing for a typical density of 2 to 4 cuttings per square yard (0.8 square meters). Willow posts require additional room for growth and propagation and should be planted at 3 to 5-foot (1 to 1.5-meter) intervals. When inserted in arrays, the stakes should be spaced 12 to 18 inches (30 to 46 centimeters) apart to form chevron-like rows that point downstream.

6. Unstable slope toes should be reinforced against scouring and undercutting using live fascines or rock fill to give the live stakes the best opportunity to root and grow.

LIVE STAKES						
Common Name/ Scientific Name	**Location**	**Availability**	**Habitat Value**	**Size/Form**	**Root Type**	**Rooting Ability from Cuttings**
Silky dogwood *cornus amomum*	N, SE	very common	very good	small shrub	shallow/ fibrous	very good
Red osier dogwood *cornus sericea ssp. stolonifera*	N, NE, W	very common	very good	med.-small shrub	shallow	very good
Common ninebark *physocarpus opulifolius*	NE	common	good	med.-high shrub	shallow/ lateral	fair-good
Allegheny blackberry *rubus allegheniensis*	NE	very common	very good	small shrub	fibrous	good
Red raspberry *rubus strigosus*	N, NE, W	very common	very good	small shrub	fibrous	good
Prairie willow *salix humilis*	N, NE	very common	good	medium shrub	fibrous	good
American elderberry *sambucus canadensis*	NE, SE	very common	very good	medium shrub	fibrous	good
Meadowsweet spirea *spiraea alba*	N, E	common	good	small dense tree	dense/ shallow lateral	fair-good
Hardhack spirea *spiraea tomentosa*	NE	common	good	small shrub	dense/ shallow	fair
Snowberry *symphoricarpos albus*	N, NW, E	common	good	small shrub	shallow/ fibrous	good

Salix humilis
Prairie Willow
Min root depth 10”
10’ ht.

http://www.cedarcreek.umn.edu/plants1/pairs/psalicaceae-salix.htm

http://www.shoestringseed.com/plants/species/willow.html

Dirr, Michael. (1998 Rev Ed). *Manual of Wood Landscape Plants*. Champaign, Ill: Stipes Publishing, LLC.

Slattery, Britt E., Kathryn Reshetiloff, and Susan M. Zwicker. 2003, 2005. *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*. Annapolis, MD: US Fish & Wildlife Service, Chesapeake By Field Office.

United States Department of Agriculture Natural Resources Conservation Service. *Fact Sheets & Plant Guides*. May 2013. http://plants.usda.gov/java/factSheet

Sambucus canadensis
American Elderberry
Min root depth 16”
10-12’ ht.

http://www.all-creatures.org/pica/ftshl-elderberry-01.html

http://www.colostate.edu/Depts/CoopExt/4DMG/Trees/Shrubs/eldberry.htm

http://www.sierrapotomac.org/W_Needham/Elderberry_061106.htm

Dirr, Michael. (1998 Rev Ed). *Manual of Wood Landscape Plants*. Champaign, Ill: Stipes Publishing, LLC.

Slattery, Britt E., Kathryn Reshetiloff, and Susan M. Zwicker. 2003, 2005. *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*. Annapolis, MD: US Fish & Wildlife Service, Chesapeake By Field Office.

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Spiraea alba
Meadowseet spirea
Min root depth 12”
2-6’ ht.

http://winnebagophotography.blogspot.com/2011/07/plant-of-week-meadowsweet-spirea-alb.html

http://www.naturallandscapesnursery.com/spirea.html

Dirr, Michael. (1998 Rev Ed). *Manual of Wood Landscape Plants*. Champaign, Ill: Stipes Publishing, LLC.

Slattery, Britt E., Kathryn Reshetiloff, and Susan M. Zwicker. 2003, 2005. *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*. Annapolis, MD: US Fish & Wildlife Service, Chesapeake By Field Office.

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Spiraea tomentosa
Hardhack Spirea
Min root depth 14”
2-4’ ht.

http://www.illinoiswildflowers.info/wetland/plants/steeplebush.htm

http://www.naturallandscapesnursery.com/spiraea.html#Steeplebush1

Dirr, Michael. (1998 Rev Ed). *Manual of Wood Landscape Plants*. Champaign, Ill: Stipes Publishing, LLC.

Slattery, Britt E., Kathryn Reshetiloff, and Susan M. Zwicker. 2003, 2005. *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*. Annapolis, MD: US Fish & Wildlife Service, Chesapeake By Field Office.

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Symphoricarpos albus
Snowberry
Min root depth 18”
2-6’ ht.

http://commons.wikimedia.org/wiki/File:Symphoricarpos_albus.jpg

http://forums.steves-digicams.com/close-ups/162481-symphoricarpos-albus-snowberry-waxberry.html

http://commons.wikimedia.org/wiki/File:Symphoricarpos_albus3_ies.jpg

http://www.clmcd.org/shrubs.asp

Dirr, Michael. (1998 Rev Ed). *Manual of Wood Landscape Plants*. Champaign, Ill: Stipes Publishing, LLC.

Slattery, Britt E., Kathryn Reshetiloff, and Susan M. Zwicker. 2003, 2005. *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*. Annapolis, MD: US Fish & Wildlife Service, Chesapeake By Field Office.

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