



**SPECIAL PROVISION
FOR
SOIL BIO-ENGINEERING (LIVE STAKES/POSTS)**

**Montgomery County
NHSN-071-2(43)--2R-69**

**Effective Date
August 16, 2011**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

090132.01 DESCRIPTION.

- A.** The purpose of this Special Provision is to describe soil bio-engineering techniques that shall be incorporated into the project. Soil bio-engineering is specialized use of plant materials to stabilize soil by combining engineering principles with plant science.
- B.** Live Stakes and Live Posts are standard bio-engineering techniques which involve planting dormant plant cuttings which are of a species known to produce rooting from cuttings. Cuttings are live plant material without a previously developed root system. Work under this Special Provision includes the harvesting, storing, preparation, and installation of Live Stakes and Live Posts on areas shown in project plan set.

090132.02 MATERIAL.

A. Live Stake Cuttings.

Live Stake cuttings shall be healthy, well branched, disease free stock approximately 0.5 inches to 1.5 inches in diameter. Cuttings shall not exceed 2 inches in diameter. Cuttings shall be between 2 feet and 3 feet in length and reasonably straight. Cuttings shall have a minimum of two undamaged bud tips while the side branches shall be removed and the bark left intact prior to installation. Live Stake cuttings shall consist of any mix of approved plant species as set forth in Article 090132.02, C, Authorized Plant Species.

B. Live Post Cuttings.

Live Post cuttings shall be healthy, well branched, disease free stock approximately 2 inches to 4 inches in diameter and shall not exceed 6 inches in diameter. Cuttings shall be between 4 feet and 8 feet in length and reasonably straight. Cuttings shall have a minimum of two undamaged bud tips while the side branches shall be removed and the bark left intact prior to installation. Live Post cuttings shall consist of any mix of approved plant species as set forth in Article 090132.02, C, Authorized Plant Species.

C. Authorized Plant Species.

The following plant species are authorized for use as Live Stake or Live Post cuttings:

- *Salix exigua* or *Salix interior* (Sandbar Willow)
- *Salix nigra* (Black Willow)

090132.03 CONSTRUCTION METHODS.

A. General.

All proposed construction techniques must be approved by the Engineer prior to implementation by the Contractor. Submit construction techniques in a Planting Plan to the Engineer a minimum of fourteen days prior to beginning of work. The Planting Plan shall include:

- Method of harvesting dormant plant materials (include substitute source if requested),
- Method of storing plant material,
- Schedule of work,
- Method of installation of Live Stakes, and
- Method of installation of Live Posts

B. Harvesting & Storing.

1. Harvest dormant plant materials of the species indicated in Article 090132.02, C, Authorized Plant Species, after November 15, 2011. Use refrigeration as necessary to maintain the temperature of harvested dormant plant materials below 41°F and humidity greater than 90% while in storage. Affix a thermometer and hygrometer in the refrigeration unit.
2. Equipment such as chainsaws, bush axes, loppers, and pruners may be used for harvesting provided that they leave clean cuts. Cuts should be made 0.5 ft to 1.0 ft from the ground and should be flat or at a slight angle to ensure that the source sites will regenerate rapidly.
3. Obtain live materials from the locations shown on the plans. It is anticipated that the area identified on the plans as the primary area of willow stake/post harvesting will be sufficient to achieve the planting densities indicated in Article 090132.03, D, Live Stake/Post Placement. If more cuttings are needed, use the area identified on the plans as secondary area of willow stake/post harvesting.
4. A substitute source for obtaining plant materials may be requested. Locate and flag any proposed substitute harvest sites and conduct a joint inspection of the plant material with the Engineer. Obtain the necessary approvals for harvesting and landowner's permission for any substitute harvest sites.

C. Live Material Preparation.

Dormant plant material harvested shall have smooth 30 to 45 degree cuts. Protect plant materials from drying and overheating until installed. Store the dormant plant materials in water or moist soil (healed in) for a maximum of 2 days. Continually shade and protect outside storage locations from the wind. If the temperature is 50°F or greater, do not store the dormant plant material on site, but install the day removed from refrigeration. Do not use dormant plant materials that do not meet these requirements.

D. Live Stake/Post Placement.

1. Install the Live Stakes/Posts so that 50% to 80% of the length is buried. Plant the Live Stakes/Posts upright with a minimum of two undamaged bud tips exposed above ground.
2. Plant all Live Stakes/Posts such that the stake/post is tamped and has full contact between the soil and cutting. In the event that an auger is used to pre-drill holes for Live Posts or a bar

is used to initiate a pilot hole for Live Stakes, fill the holes with loose soil after the Stake/Post is installed. Use water, poured in each hole as backfilling progresses, to insure that the cutting is in firm contact with the wetted soil. Each cutting shall reach the water table when installed.

3. Spacing for Live Stakes shall be 2.0 feet to 3.0 feet apart using a triangular spacing. Total Live Stake density shall be 2 to 4 stakes per square yard. Spacing on Live Posts shall be 4.0 feet to 6.0 feet apart in a staggered pattern. Total Live Post density shall be 1 to 2 posts per square yard. See contract documents for locations of Live Stakes/Posts.
4. Remove and replace Live Stakes/Posts which are split, or if the split is less than 1/6 of the cutting length, the top may be trimmed after installation to remove the damaged portion as long as two undamaged buds remain.

E. Schedule.

Place Live Stakes/Posts prior to January 1, 2012. Submit any proposed changes to the Engineer for approval.

F. Site Inspection.

Upon completion of the planting, the Engineer will inspect all plantings. Correct all deficiencies within ten calendar days of the inspection.

090132.04 METHOD OF MEASUREMENT.

The Engineer will measure the area of soil bio-engineering in square yards.

090132.05 BASIS OF PAYMENT.

- A. For the number of square yards of soil bio-engineering installed, measured as provided above, the Contractor will be paid the contract unit price per square yard.
- B. This payment shall be full compensation for harvesting, storing, preparation, and installation of Live Stake and Live Post cuttings. All costs associated with replacement shall be incidental.