



**SPECIAL PROVISIONS  
FOR  
SOIL BIOENGINEERING (LIVE STAKES/POSTS)**

**Johnson County  
NHSN-218-4(048)--2R-52**

**Effective Date  
August 20, 2024**

**THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**230206.01 DESCRIPTION.**

- A.** The purpose of this special provision is to describe soil bioengineering techniques that shall be incorporated into the project. Soil bioengineering is specialized use of plant materials to stabilize soil by combining engineering principles with plant science.
- B.** Live stakes and live posts are standard bioengineering 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 the contract documents.

**230206.02 MATERIALS.**

- A. Live Stake Cuttings.**  
Live stake cuttings shall be healthy, well branched, disease free stock 1 inch DBH (diameter at breast height, prior to harvesting). Cuttings shall be at least 5 feet in length and 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 authorized plant species.
- B. Live Post Cuttings.**  
Live post cuttings shall be healthy, well branched, disease free stock 3 inches DBH. Cuttings shall be at least 5 feet in length and 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 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)

**230206.03 CONSTRUCTION.**

**A. General.**

All proposed construction techniques must be approved by the Engineer prior to implementation. Submit construction techniques in a planting plan to the Engineer a minimum of 14 calendar days prior to beginning of work. The planting plan shall include:

- Method of harvesting dormant plant materials.
- Source.
- Method of storing plant material.
- Schedule of work.
- Method of installation of live stakes and live posts.

**B. Harvesting & Storing.**

1. Harvest dormant plant materials of the species indicated. Use refrigeration if necessary to maintain the temperature of harvested dormant plant materials below 41°F and humidity greater than 90% while in storage. A thermometer and hygrometer shall be affixed 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 typically should be made 0.5 feet to 1.0 foot from the ground and should be flat or at a slight angle to ensure that the source sites will regenerate rapidly.

**C. Live Material Preparation.**

Dormant plant material harvested shall have smooth 30 to 45 degree cuts. Once ready to place dormant plant materials, protect plant materials from drying and overheating until installed. Store dormant plant materials in water or moist soil (healed in) for a maximum of 2 days. Outside storage locations shall be continually shaded and protected from the wind. If the temperature is 50°F or greater, the dormant plant material shall not be stored on site but installed 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 upright so that at least 3 feet of the total length is buried and a minimum of 1 foot is above the ground and at least two undamaged bud tips are exposed above the ground.
2. Plant the 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 granular backfill (sand) after the stake/post is installed. Use water, poured in each hole as backfilling progresses, to ensure that the cutting is in firm contact with the granular backfill. Ensure each cutting reaches the water table when installed.
3. Total live stake density shall be three stakes per square yard. Total live post density shall be one post per square yard. Provide at least 1 foot spacing between all plantings. 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, re-trim the top after installation to remove the damaged portion as long as two undamaged buds remain.

**E. Schedule.**

Complete placement of live stakes/posts by April 1. Submit any changes due to unforeseen circumstances to the Engineer for review and approval.

**F. Site Inspection.**

Upon completion of the planting, the Engineer will inspect all plantings. Correct all deficiencies within 10 calendar days of the inspection. If after the first growing season more than 50% of the live stakes/posts are dead, the Contractor will replace the dead live stakes/posts at no additional cost.

**230206.04 METHOD OF MEASUREMENT.**

The Engineer will measure the area of Soil Bioengineering in square yards.

**230206.04 BASIS OF PAYMENT.**

- A. For the number of square yards of Soil Bioengineering 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.