## SPSRW-XX: BRUSH MATTRESS

Version Date: 05/22/2015 Revision Date: XX/XX/XXXX by XXX

### Description

ENGINEER TO UPDATE PLANTING SEASON. THIS WARRANTY SECTION IS BASED ON A PLANTING SEASON BEING DEFINED.

The work covered by this provision shall consist of installing brush mattresses along selected stream banks to ensure stability of the banks following construction. Brush mattress shall be installed over graded and prepared stream banks as specified by the designer.

Brush mattresses are layers of live branches which are laid against a graded bank. The brush layers are partially covered with fill soil and secured to the bank with wire wrapped around evenly spaced stakes which are driven into the bank. A coir fiber roll is installed at the toe of slope. The wire wrapped brush layers create an erosion resistant mat. The soil application initiates growth of the live branches. Over time, areas where brush mattresses are installed become densely vegetated banks which are highly resistant to erosive velocities.

### Materials

ENGINEER TO UPDATE IF THEY FEEL THAT THIS SPECIFICATION IS INADEQUATE FOR SITE CONDITIONS.

Stakes and retaining wire are required for secure installation. Stakes and retaining wire shall be approved by the Engineer prior to installation. 12 gauge non-galvanized wire is required. With written approval from the Engineer and without additional compensation, twine may be substituted for wire. Coir fiber rolls are also required, and should be approved by the Engineer prior to installation. If bristle coir twine is used, it should be machine spun bristle coir, thickness 0.2 to 0.25 inches, with breaking strength of 70 to 100 pounds, and 100% biodegradable. Stakes should be untreated hardwood, with a size and length, as specified in the Contract Documents. Live stakes meeting the requirements of the Live Stake specification may be used in lieu of dead stout stakes pending review and approval by the City.

Live branches shall be cut from fresh, green, healthy, dormant parent plants that are adapted to the site conditions whenever possible with following guidelines:

Woody branches up to one-inch in diameter and not less than five feet and not more than ten feet in length shall be used for brush mattresses.

Brush mattresses must be installed during the dormant season (planting season) between November 15 and March 15.

If channel construction occurs outside of the dormant season (November 15-March 15) in areas where brush mattresses are shown, brush mattresses shall not be installed. Rather, these areas shall be temporarily stabilized by grading to a stable slope, seeding, mulching, and matting. The brush mattress shall be installed at a later time during the dormant season. Remove temporary measures and install brush mattresses per the Contract Documents.

Brush mattresses must be a mixture of equal parts of the species listed. Live branch cuttings shall be kept covered and moist at all times.

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| --- | --- |
| **Scientific Name** | **Common Name** |
| *Cornus amomum* | Silky Dogwood |
| *Sambucus canadensis* | Elderberry |
| *Salix sericea* | Silky Willow |

Coir fiber rolls shall meet the requirements of the Coir Fiber Roll specification.

### Methods

ENGINEER TO UPDATE IF THEY FEEL THAT THIS SPECIFICATION IS INADEQUATE FOR SITE CONDITIONS.

Scour Locations:

* 1. Clear and grub brush mattress installation areas, as needed, then place and compact backfill material where applicable per the Contract Documents. The backfill shall be placed and compacted so that enough room remains for the installation of the brush mattress, at the designed thickness, leaving the surface of the finished brush mattress flush with the adjacent stream bank.
  2. Place the live cuttings on the surface of the application area, perpendicular to the stream flow, with the basal end down, per the design thickness. Live cuttings, until compressed and tied, may initially be higher than the proposed design stream bank slope surface.
  3. Stakes should be installed perpendicular to the slope of the bank, per the specified pattern and spacing. Live stakes may be used in lieu of hardwood stakes.
  4. Secure the live cuttings in place with biodegradable twine or non-galvanized tie-wire, as specified by the designer. The twine or wire should be run perpendicular to the cuttings and diagonally from stake to stake and tied by use of clove-hitch. Twine must be used in lieu of wire to fasten the brush mattress if live stakes are used.
  5. Once the twine or wire is secure the stakes shall be driven into the ground a little further to compress the cuttings to the slope face. The top of the stakes should be flush with the proposed stream bank surface / installed mattress.
  6. Moist soil shall be placed on top of the brush mattress so that there is contact between the cuttings and the soil. All but the outer layer of live dormant cuttings should be covered with soil.
  7. Repeat steps a) through f) until the brush mattress installation area is in compliance with the Contract Documents.
  8. Place coir fiber rolls along the toe of bank while inserting the distal end of the last layer of brush mattress under the coir roll and into the soil beneath. Submerge the coir fiber roll at a constant depth of 1/2 to 2/3 of the coir fiber roll’s diameter into the stream bank. It is important to note that proper submersion of the coir fiber roll is critical for survival of the brush mattress along the toe of bank.

Tie the ends of adjacent coir fiber rolls together with coir twine. Make a number of passes with the twine in the end netting of the adjacent coir fiber rolls – effectively lacing the logs together. Install stakes at each end of the coir fiber rolls along the up slope and down slope sides and at the center up slope side of the top most and center down slope side of the bottom most rows to prevent slipping. Install the stakes so that the top of the stake is level with the top of the coir fiber roll. Inspect the rolls to be sure they are in firm contact with the soil. Level coir roll installation areas and place soil within the voids between the rolls, with prior approval from the Engineer. If necessary, press the rolls firmly into contact with soil and install additional wood stakes.

* 1. Secure the log between the stakes with 14 gauge non-galvanized wire. Where a coir fiber roll does not abut another coir fiber roll, bend the end in toward the channel bank and embed it into the toe of the bank. This will prevent water collection behind the log and subsequent movement of the logs away from the channel bank and brush mattress.

No Scour Locations:

* 1. For areas without bank scour, over-excavate the stream bank to a depth so that enough room remains for the installation of the brush mattress, at the designed thickness, leaving the surface of the finished brush mattress flush with the adjacent stream bank.
  2. Place the live cuttings on the surface of the application area, perpendicular to the stream flow, with the basal end down, per the design thickness. Live cuttings, until compressed and tied, may initially be higher than the proposed design stream bank slope surface.
  3. Stakes should be installed perpendicular to the slope of the bank, per the specified pattern and spacing. The top of the stakes should be flush with the proposed stream bank surface / installed mattress.
  4. Secure the live cuttings in place with biodegradable twine or non-galvanized tie- wire as specified by the designer. The twine or wire should be run perpendicular to the cuttings and diagonally from stake to stake and tied by use of clove-hitch. Twine not wire must be used to fasten the brush mattress if live stakes are used.
  5. Once the twine or wire is secure the stakes shall be driven into the ground a little further to compress the cuttings to the slope face. The top of the stakes should be flush with the proposed stream bank surface / installed mattress.
  6. Moist soil shall be placed on top of the brush mattress so that there is contact between the cuttings and the soil. All but the outer layer of live dormant cuttings should be covered with soil.
  7. Repeat steps f) through m) until the brush mattress installation area is in compliance with the Contract Documents.
  8. Place coir fiber rolls along the toe of bank while inserting the distal end of the last layer of brush mattress under the coir roll and into the soil beneath. Submerge the coir fiber roll at a constant depth of 1/2 to 2/3 of the coir fiber roll’s diameter into the stream bank. It is important to note that proper submersion of the coir fiber roll is critical for survival of the brush mattress along the toe of bank.
  9. Tie the ends of adjacent coir fiber rolls together with coir twine. Make a number of passes with the twine in the end netting of the adjacent coir fiber rolls – effectively lacing the logs together. Secure the logs by driving in the stakes at a spacing of five feet on center on both sides of the log as shown in the detail. Install the stakes so that the top of the stake is level with the top of the coir fiber roll. Secure the log between the stakes with 14 gauge non-galvanized wire. Where a coir fiber roll does not abut another coir fiber roll, bend the end in toward the channel bank and embed it into the toe of the bank. This will prevent water collection behind the log and subsequent movement of the logs away from the channel bank and brush mattress.

Site conditions may require slight deviation from the planting plan and shall be approved by the City

### Warranty

All brush mattresses installed by the Contractor shall be assessed by the Engineer or representative thereof at the end of the same planting season they were installed. One hundred percent of the brush mattresses must be installed correctly and still be alive at the time this assessment is completed. If dead plant material is found, the Contractor is responsible for replacing that material before the completion of that planting season. At the completion of one full growing season following planting, each brush mattress installed by the Contractor will be assessed by the Engineer or representative thereof again. The brush mattress must have at least 70 percent of the surface area covered with healthy, established (green) live cuttings. If a brush mattress does not meet these criteria as determined by the Engineer, the Contractor shall remove the existing brush mattress (plant material, wire, stakes, and coir fiber rolls) and install a new brush mattress at the Contractor’s expense. The new brush mattress will also be under warranty, and be assessed at the conclusion of the next full growing season.

The Contractor shall be responsible for furnishing equipment, materials, labor, incidentals and water to maintain plant survival in accordance with these specifications during the construction contract and during the warranty period.

The Contractor shall be responsible for traffic control through the life of the project and warranty period.

### Measurement

UPDATE IF TOE PROTECTION OTHER THAN COIR FIBER ROLLS IS SPECIFIED.

The quantity of brush mattresses measured shall be the actual number of square yards measured horizontally along the surface of the ground over which the brush mattress is properly installed and accepted by the Engineer. No measurement for payment shall be made for improperly installed material.

There shall be no separate measurement for clearing and grubbing, placement and compaction of backfill material, over-excavation, coir fiber roll, dormant woody cuttings, wire or twine, and stakes or live stakes.

### Payment

UPDATE IF TOE PROTECTION OTHER THAN COIR FIBER ROLLS IS SPECIFIED.

The quantity of brush mattress, measured as provided above, will be paid for at the contract unit price per square yard of brush mattress installed and accepted by the City. Such payment will be full compensation for all work covered in this special provision, including, but not limited to grading, installation, harvesting, preparation, hauling, staking, repair, replacements, maintenance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents or as directed by the Engineer.

Payment will be made under:

BRUSH MATTRESS SY