

WISCONSIN CONSTRUCTION SPECIFICATION

22. TEMPORARY WAVE BARRIER (BREAKWATERS)

1. SCOPE

The work consists of installing a temporary wave barrier (breakwater) to assist with the establishment of shoreland erosion protection measures by providing an area of quiescent water. Temporary wave barriers are offshore structures consisting of biological components, such as jute, fiber rolls, willow stakes, or branches that will be removed or allowed to biodegrade after shoreland erosion protection vegetation is well rooted and established.

2. MEASURES

Erosion and sediment control measures shall be installed to prevent or minimize sediment production and transport offsite.

Care should be taken to prevent the re-suspension of sediment during removal.

3. LOCATION

Temporary wave barriers shall be installed offshore and located in 3 feet of water or less as shown on the drawings. The barriers shall be marked with reflectors and warning signs and shall not create an obstruction to navigation

4. LIVE MATERIALS

Vegetative materials shall be plant species which are native to the area of Wisconsin where the project is located. See Wisconsin Construction Specification 20, Soil Bioengineering, for requirements on live materials.

- a) Native logs posts should be 7 to 9 feet long and 3 to 5 inches in diameter. Taper the basal end of the log for easier insertion into the ground. The materials must be free from damage and be in good condition.
- b) Branches may range from 0.5 to 2.0 inches in diameter. The length shall be adequate to achieve the intended purpose, normally 4 to 9 feet long. Side branches should be trimmed to facilitate stacking.

5. INERT MATERIALS

Materials used in conjunction with the live materials may include but are not limited to wire, stakes, steel reinforcement bars, twine, etc. These materials shall be used when necessary but with limitation.

- a) *Wire* shall be smooth 16 gauge wire. The wire shall be new and free from rust and defects.
- b) *Wooden stakes/posts* should be 5 to 8 feet long and made from 3- to 4-inch diameter untreated poles or 4- by 4-inch nominal lumber.
- c) *Duckbill anchors* or other equivalent anchoring devices may be used according to manufacturer's recommendations.
- d) *PVC pipe posts* 5 to 8 feet long shall meet the *PVC pipe material requirement in Wisconsin Construction Specification 15, Plastic Pipe Conduits* .
- e) *Geotextiles used* shall meet the material requirement in *Wisconsin Construction Specification 13, Geotextiles*.

6. INSTALLATION

Existing vegetation shall be protected and preserved during the project. No more than 20% of the aerial coverage of any emergent vegetation or floating vegetation shall be removed during the installation of the wave barrier. Barriers should be installed using hand-held tools.

All posts or stakes shall be driven vertically into the bed materials a minimum of 4 feet. Wave barriers will be a grid or matrix of posts to create a structural box for placing materials inside or a single row of posts with a geotextile or jute fastened to them. Spacing between post shall be 3 to 4 feet with a row spacing of 1 to 1.5 feet installed in a zig-zag pattern.

BRANCHBOX BARRIERS

Place an initial layer of branches 4 to 6 inches thick in the bottom of the box between the vertical stakes. Compact the branches in the box. Subsequent layers of branches are then installed in the same fashion until the desired elevation is achieved. Wires or twine can be used to maintain the branch lifts and prevent them from floating using a zig-zag pattern between the posts. Additional anchoring can be used with the first two lifts of branches to ensure that they maintain contact with the bed materials and scour does not occur underneath. Furthermore, wiring or twining can be reinforced on the top of the box to ensure the top layers of branches are not dislodged with wave action or fluctuating water levels.

GEOTEXTILES BARRIERS

When using single layers of geotextiles or jute matting for the barrier, following manufacturers instructions as to the anchoring patterns and frequency of fastening the material to posts for ensuring durability and effectiveness.

FIBER ROLLS BARRIERS

Place the initial fiber roll in the bottom of the box between the vertical stakes. Subsequent fiber rolls are then installed in the same fashion until the desired elevation is achieved. The ends of the rolls shall be staggered between layers. Wires or twine can be used to maintain rolls and prevent them from floating using a zig-zag pattern between the posts. Additional anchoring can be used with the first two rolls to ensure that they maintain contact with the bed materials and scour does not occur underneath. Furthermore, wiring or twining can be reinforced on the top of the box to ensure the top layers of branches are not dislodged with wave action or fluctuating water levels.

7. MAINTENANCE, REMOVAL, AND RESTORATION

The temporary wave barrier shall be adequately maintained in a functional condition during the establishment of the shoreland protection measures. The temporary wave barrier shall be removed after near shore vegetation is well rooted and established or within three years of the installation, whichever is shorter. The site should be restored to near original condition with the removal completed.