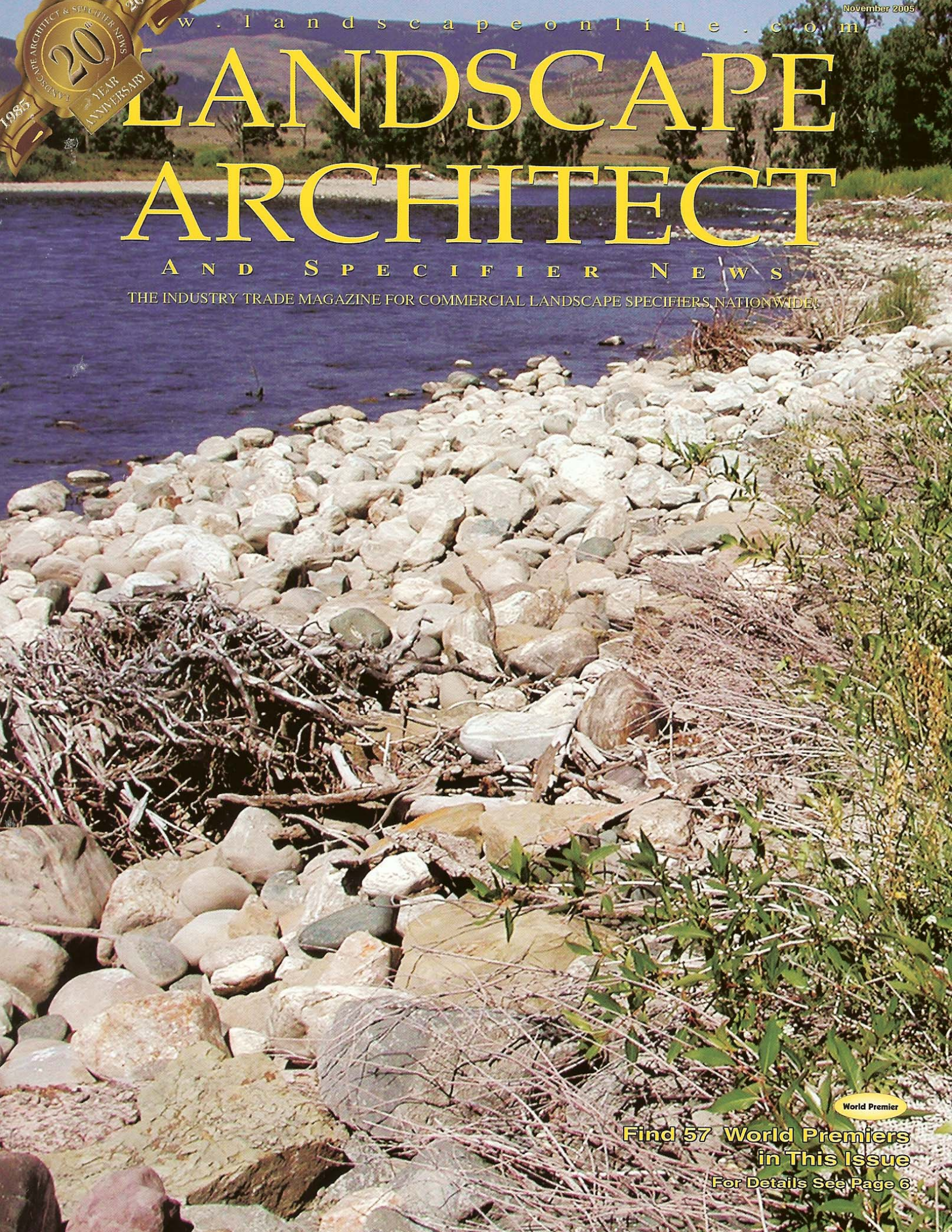




LANDSCAPE ARCHITECT

AND SPECIFIER NEWS

THE INDUSTRY TRADE MAGAZINE FOR COMMERCIAL LANDSCAPE SPECIFIERS, NATIONWIDE!



World Premier

**Find 57 World Premiers
in This Issue**

For Details See Page 6

LEVEE/BANK STABILIZATION

Along Montana's **Yellowstone**



River

Riprap along the banks of the Yellowstone River in Montana is commonly used to protect properties, but when waters rise, water propelling off these “armored” banks can create damage to downriver banks and levees.



A broad view of the slope (TOP) and a close-up of the riverbank (LEFT) one year after restoration reveal the stabilization of the bank and slope with a combination of deep creek stones consistent with the size of native materials, plant materials and the use of “soft” technology—erosion control blankets (ECBs) and permanent turf reinforcement mats (TRMs). Trout Head Inc. (THI) disdained the more expensive “hard armor” solution of rock riprap, which is less appealing visually, can alter the flow of the waters and create more erosion for downriver banks and slopes.



Phase I of the project involved stabilizing a 1,200-foot levee face. Along with dormant plant material THI workers put down 53 rolls of permanent turf reinforcement mat. Here they are anchoring the mats with live willow stakes, willow wattle and fascines. The mats are manufactured with a colored thread stitched along the outer edges as an overlap guide for adjacent mats. Schindler Excavation, Manhattan, Mont., handled the heavy equipment for phase I; Stream Works, Inc., Lincoln, Mont., was the primary heavy equipment contractor for phase II.

In February 2002, the multidisciplinary team from Trout Headwaters, Inc., in Livingston, Mont., heeded the urgent call of a property owner by the Yellowstone River to stabilize a levee and manage the eroding river bank just upstream from the levee.

Phase I of the project involved stabilizing the levee. THI decided that vegetation along the 1,200-foot levee face would best reduce erosion and not threaten other river

properties. Along with dormant plant material THI put down 53 rolls of permanent turf reinforcement mat, anchored with live willow stakes, willow wattle and fascines. The mats and vegetation treatments worked. However, THI kept an eye out for bank erosion on the property just upriver from the levee. The bank held in 2002, but later that year, as Phase I was completed, an upriver bank stabilization project

(Continued on page 72)



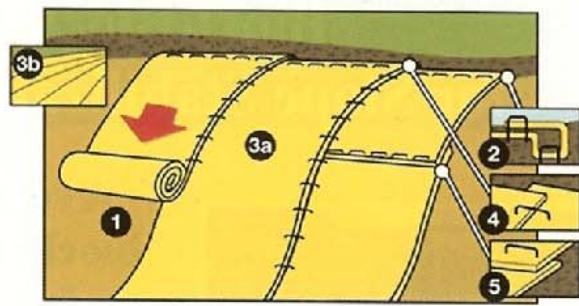
ABOVE: C125 double-net, 100% coconut fiber blankets were installed on the upper slope. These slow-degrading fiber and stabilized nettings blankets provide up to 36 months of protection for slopes exceeding 1:1.

RIGHT: Top soil, a native grass and a forb seed mixture have been added over the slope erosion control blankets. Irrigation lines are in place on the slope.



MAT INSTALLATION

- 1 The soil is prepared before installing blankets, including any application of lime, fertilizer and seed. Lime (calcium chloride) is used to stabilize soft subgrades.
- 2 The blanket is anchored at the top of the slope in a 6" deep x 6" wide trench with approximately 12" of blanket extended beyond the up-slope portion of the trench. The blanket is anchored with a row of staples/stakes about 12" apart in the bottom of the trench. The trench is backfilled and compacted after stapling/staking. Seed is applied to the compacted soil and the remaining 12" of blanket is folded over the seed. The blanket is then secured over the compacted soil with a row of staples/stakes spaced approximately 12" apart across the blanket width.
- 3 Blankets can be placed vertical (3a) or horizontal (3b) to the slope. Blankets unroll with appropriate side against the soil surface. All the blankets must be secured to the soil surface by placing staples/stakes (THI uses willow stakes) at the locations indicated on staple pattern guide.



- 4 The edges of parallel blankets must be secured (stapled/staked) with approximately 2"-5" of overlapping blanket.
 - 5 Consecutive blankets spliced down the slope must be placed end over end (shingle style) with an approximate 3" overlap. Staple through overlapped area, approximately 12" apart across entire blanket width.
- Note: In loose soil conditions the use of staple or stake lengths greater than 6" may be necessary to secure erosion control blankets.

INSTRUCTIONS COURTESY OF NORTH AMERICAN GREEN.



LEFT: The toe of the slope was secured with deep creek stones, consistent with the size of native materials and C350 permanent turf reinforcement mats, 6.5 ft. wide by 55.5 ft. long, covering 40 sq. yards. Coir fiber is evenly distributed across the width of the matting and stitch bonded between three layers of heavy-duty netting, based on one estimate for protecting a 16 ft. x 1,000 ft. drainage channel, 30 inches of rock riprap would cost \$32,000 and \$21,300 in labor, while use of a permanent mat would cost \$7,800-9,900 with labor costs of \$6,400-7,900.

RIGHT: With the toe of the slope secured with stone and permanent turf reinforcement mats, the 46,410 lb. Komatsu PC200LC-7 goes to work to prepare the upper slope for erosion control blanketing by backsloping (lowering) and smoothing the grade. Applications of lime, fertilizer and seed, if required, are applied before the biodegradable blankets are rolled out.



(continued from page 72)

(riprap) directed more water to the monitored bank, which began losing many feet of slope and threatened the owner's home. Phase II kicked in: stabilizing 570 feet of eroding streambank with a combination of rock, blankets and vegetation. Deep creek stones, consistent with the size of native materials, were placed at the toe of the slope. Double-net temporary erosion control blankets of coir fiber and

permanent turf reinforcement mats were anchored with live willow stakes, willow wattle and fascines.

Installation for Phase II was completed during February 2004. Peak flows on the Yellowstone last year reached 12,200 cubic feet per sec., but THI reports the Phase I and Phase II bank stabilization and restoration treatments have remained intact as the vegetation continues to mature.