Hobson Creek Restoration Project, Oakbrook, IL

RoLanka International, Inc. 2004

Last fall, Ted Gray and Associates, Inc., a stream and lake management and restoration firm in Oakbrook Terrace, IL, became one of the first in the Midwest to use a recently-developed biodegradable system of densely-packed coir blocks and woven coir matting to build an environmentally-friendly vegetated wall for stabilizing streambanks.

The use of geotextiles to confine soil in lifts between layers of live plants has become an increasingly popular soil bioengineering technique for creating vegetated retaining walls. However, in this case, the vegetated walls were not only equal or less costly to build than conventional fabric-wrapped soil lift walls, but they are easier to construct, stronger and more durable.

The Hobson Creek Corridor Restoration Project was undertaken to stabilize a stream channel and banks where the stream passed through a townhouse development in Naperville, IL. Hobson Creek has a slope of 0.5% which is steep for northeastern Illinois streams. The high stream slope along with high rates of discharge of urban runoff from the 1.7 square mile urbanized watershed has caused severe erosion problems along the stream corridor. Since the watershed was developed prior to the implementation of stormwater detention ordinances, the 1-year peak flow rate is over 490 cfs, and the 2-year peak flow rate is approximately 720 cfs. The streambank erosion caused channel migration from the common space onto private property to within approximately 12 feet of the home foundations and within only 8 feet of utility lines. Other causes for erosion include invasive plant species such as Buckthorn and Honeysuckle shaded out desirable bank-stabilizing native plant ground cover leaving the highly-erodible streambanks even more vulnerable to erosion. As a result, severe erosion was threatening utilities and building foundations. Over 80% of the $180,000 Phase 1 construction cost for the project was funded by an Illinois Environmental Protection Agency Section 319 Grant Program and by DuPage County.

The funding programs available for this project encourage the use of environmentally sound stream stabilization techniques and discourage the use of hard armor practices to stabilize streambanks, reports Ted Gray. For instance, past hard armor practices such as retaining walls, concrete channels, or even extensive use of rock rip-rap in some cases can worsen erosion in downstream unprotected areas since they efficiently deflect stream energy. In contrast, the use of practices in this project such as BioD-Block coir block system, a-jacks, BioD-Roll, densely packed coir rolls, natural rock riffle grade control, natural channel cross section design, and other measures along with native plantings can dissipate stream energy, improve on-site and downstream bank stability, enhance aesthetic and recreational value, and provide wildlife habitat. Moreover, adjacent residential property values can increase where natural stream channel design occurs. A Professional Engineer (P.E.) and Certified Professional in Erosion and Sediment Control (CPESC) with a Master's degree in Aquatic Ecology, his calculations of shear stress forces in the stream showed that soil bioengineering techniques would likely stabilize many areas of the eroding streambank over the long term. "Streambank soil bioengineering stabilization combines permanent or biodegradable structures to stabilize the toe of slope, along with the deep root structure of native plant materials to provide deep-seated stability in bank slopes," he says. Instead of soil-filled burlap bags covered with erosion control blankets to build soil lifts or re-shaping bank slopes to the point where residents would lose their backyards, Gray specified the coir block and fabric system, BioD-Block, made by Rolanka International, Inc. "This coir system is an easier, more efficient way," he says. "Rather than relying on combining several different materials on-site to maintain the shape of the soil lifts, the coir block system provides an all-in-one structure to shape and construct a stabilized and vegetated bank," he says.

This system played a key role in the Hobson Creek project. The Phase 1, which was completed last October, involved a 750-ft. reach of the stream. Patrick Engineering, Lisle, Ill., provided surveying and permitting assistance while Ted Gray & Associates designed the channel and streambank stabilization work and provided construction services. Construction services

were awarded to Landscape Resources, Inc. Rock riffle grade control structures were installed to prevent further downcutting of the stream channel. After reshaping the eroded streambanks to a 3:1 (H:V) slope or flatter, 12-in. diameter densely packed coir rolls, (BioD-Roll made by Rolanka) were installed in a 6-in. trench and secured with 2-in. diam. wood stakes fastened with 1/8-in. cord to provide structural support for the toe of the slopes. In other areas where more severe erosion occurred, one to three rows of concrete a-jacks were used to stabilize the toe of slope. BioD-Block was then installed in layers directly above the fiber roll and/or a-jacks. Averaging two to three blocks high, but ranging up to five blocks high in some places, the layers were stepped back to produce a finished wall face with about a 2.5:1 slope.

The coir fabric attached to the BioD-Block was staked in place behind the blocks. The contractor devised a strategy to tie the top of the blocks and anchor them to the slope with wooden stakes. "We added these tie backs as extra insurance to prevent any of the blocks from overturning until the establishment of native plantings at the site," Gray says. The coir wall system was then backfilled and planted with a native plant seed mixture. various types of native plantings were specified for each site depending on the level of sunlight exposure and the anticipated erosive forces. For instance, in the less-eroded sites that received more sunlight, herbaceous 2-in. diam. plugs such as switch grass, fox sedge, or cord grass were installed. In the more highly eroded areas, shrubs were installed including dogwood, willow and viburnum along with native plant plugs along the top of bank.

As of August, the BioD-Block re-constructed slope remained fully intact. "So far, it's performing very well," Gray says. "Our intent was to design the slope so that in the future, when the materials biodegrade, the slope will be vegetated at a stable angle. The big test will be in about three years after the coir material degrades and the plant roots are stabilizing the slopes. Then, we'll know exactly how the project performed. Based on results thus far, I think it will work out well."

As a result of the initial success of Phase I, Phase 2 of the project, which will involve stabilizing another 850 ft. section of the streambanks with the coir block and fabric system, is scheduled to be constructed beginning fall of 2004. For more information, contact Gray at 630-261-1133 or TedGray@msn.com or www.streamandlakerestoration.com .