Triton Marine Mattresses offer non-corrosive stream restoration solution for nearly 20 years

CLIENT CHALLENGE

The California Gulch mine reclamation project in Leadville, CO, posed two basic problems. First, snowmelt and runoff were eroding the area where three channels, instead of the one original stream, were carving up the hillsides. Second, as the area had been named a Superfund site in the mid 1980s, contaminants from waste rock needed to be contained.

Directing water flow into one, instead of three, channels, and then armoring that one channel, was the initial task. “We wanted to improve water quality and reduce sedimentation of the Arkansas River, which begins here in Colorado,” says Todd White of Resurrection Mining. “Snowmelt would come down through here in several braided channels, picking up sediment and metals on its way. Making one flow path decreases erosion and makes it easier to direct the runoff to a water treatment plant.”

ALTERNATIVE SOLUTION

The project designer, MWH Engineering, initially considered three solutions. The first would have lined the reconstructed stream with riprap. The second would have used a cast in place concrete pilot channel with riprap lined or vegetated overbanks. The third alternative would have incorporated an articulating concrete block system. MWH concluded that none of the traditional approaches was appropriate for the site’s challenging conditions. The riprap sections would have required a very large median stone diameter to withstand the 500 year flow. The concrete pilot channel was vulnerable to small ephemeral springs and seeps that would have lifted the structure out of position. Finally, there were concerns that the long term effectiveness of the concrete block system would have been degraded by the stream’s acidic water.

California Gulch

Leadville, Colorado

MWH Engineers
Engineer

Nielsons Skanska, Inc.
Contractor

Resurrection Mining Company
Owner

2002
Installation Date

Triton UX200 Marine Mattresses
Product

Tensar®

www.TensarCorp.com
800-TENSAR-1

Site Re-visited in 2020

TENSAR SOLUTION

The decision was made to line the channel with Tensar Triton ® Marine Mattresses. “We used these mattresses because it was the best option for the job,” explains Design Engineer Mike Ross. “We were also trying to meet the EPA’s requirements, and Tensar’s mattresses filled the bill.” The mattresses’ physical properties made them a logical choice. “Other materials available, such as gabion baskets made of galvanized wire, can corrode, due to the water’s pH,” White explains. “This material was resistant to corrosion. Because they’re made of co polymer HDPE & PP, the mattresses wouldn’t break down in the water,“ Ross adds. “They’re also 100% UV stabilized, so the environment won’t degrade them.” The project installer, Nielsons Skanska, Inc., used a mobile crane to lift and place a total of 300 units using a stack bond pattern. The installer manufactured the mattress jig and lifting frame on site.

Constructed with Tensar Uniaxial Geogrid (UXTriton200), each mattress measured 12 in. thick by five ft. wide by 20 ft. long. Transverse compartments were created by specifying internal baffles at 1.5 ft. intervals, and each compartment was filled with 4 to 6 in. stones. The channel was excavated, and then a crane was used to put the 300 flexible mattresses in place. “The first time they picked one up, I was surprised the mattress stayed together. I thought the material might break, but didn’t,” White says.

The mattresses were not seeded, nor was any growth material installed, but White says, “I anticipate sediments carried by runoff will consolidate in the rocks, and then vegetation may establish.” The mattresses also allowed the channel to be secured for nearly any water event.

“We designed it for a 500 year flood, which should handle discharge greater than 350 cubic feet per second,” Ross explains. “We wanted to eliminate the wastewater from going over the rock, to control all the water,” White adds. “We don’t anticipate replacing these mattresses.”

SITE VISITED 18 YEARS LATER

The site was revisited in September of 2020 with the goal of inspecting the job site to determine how well the mattresses had performed after weathering 18 harsh Colorado mountain winters. Visual inspection showed the mattresses had remained stable with no movement or settling. No erosion or scour was observed. Triton marine mattresses had proven to be a highly effective solution for this once problematic site.