

Urban Stream Restoration Protects Access Road



Workers install gabion baskets (above). Concrete foundation poured and ready for gabion basket installation (inset).

The City of Atlanta's SWAT team has a single two-lane road as the only access point to their main training center. Located south of Atlanta this access road is situated on a narrow tract of land between an in-remediation landfill (closed to dumping) and Intrenchment Creek. Across Intrenchment Creek is a City of Atlanta sewer treatment plant. Due to severe bank erosion along the creek, the access road had been reduced to a single lane. The

road was lined with concrete barriers as a band-aid fix, but with time, the road would be completely lost. The main objective of this project was to restore the access road to the SWAT facility in a permanent manner. Fortunately, Bill Brigham, lead architect with the City of Atlanta and manager of the city's streambank restoration program, saw the opportunity to incorporate a modern habitat restoration program with the roadway rehabilitation. Working closely



with the design engineering firm CH2M Hill, a set of plans were produced where the roadway would be protected with the more traditional method of a gabion wall due to spacing constraints. The location of the existing roadway could not be



Crews complete final restoration before landscaping (above). Two months after completion the stream has begun to stabilize (below).



moved away from the creek due to the adjacent landfill and the slope was too steep for bank sloping or armament. Natural stream channel structures consisting of Cross-Vanes, J-Hooks and benching were designed into the stream itself and the opposite creek bank to provide an environment for habitat.

Funding

Through their Dept. of Watershed

Management, The City of Atlanta allocates approximately \$250,000.00 per year to their annual streambank restoration contract. However, the project at Intrenchment Creek was an estimated \$850,000.00 in construction costs. After one year of meetings and negotiations with the City of Atlanta, two departments came together to provide funding. The Dept. of Sanitation & Public Works, because of the proximity of the landfill,

had concerns over the stormwater run-off and consequences of further erosion toward their property and so provided the bulk of funding from their Solid Waste Disposal operating budget. The Watershed Management annual stream restoration contract added the remainder as it was a good opportunity to restore a damaged stream and showcase the project.

Communication

Site Engineering Inc. is a local contractor and currently holds the City of Atlanta annual streambank restoration contract. From the contractor's perspective you are working for the owner as a single entity, in this case the City of Atlanta, and your contract and direction should be straightforward and from one person. In reality this is rarely the case;

The non-woven fabric would prove durable enough to last until flow was transferred back to the main channel five months later.

ultimately this project was subdivided into two individual contracts that had become very difficult to separate with so much overlap. The roadwork and gabion wall would be one project billed to the Solid Waste Department and the stream restoration would be billed to the Streambank Restoration Contract. Typical progress meetings involved these two City of Atlanta departments, the Police Department (who had an interest in keeping the sole access to their SWAT training facility open), and the design engineering firm and their joint venture partner, along with compliance with all state regulations – such as NPDES. During construction, there were visits daily from inspectors of the different City of Atlanta departments. Good communication and a clear delegation of decision making on the owner's part was critical.

Construction

After receiving permits from the Army Corps of Engineers and the State of Georgia, Site Engineering, Inc. began



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View looking upstream to downstream of completed project (above). Temporary by-pass channel (inset).

construction in early August 2008. The first step of construction was a temporary by-pass channel for Intrenchment Creek. Working downstream to upstream, an 800 ft long bypass channel was excavated by removing 3000 cubic yards of dirt. Before flow was transferred into the temporary by-pass channel, the newly excavated area was lined with a 6 mil plastic liner. However, after about two weeks of usage, it was obvious the thin plastic liner wasn't able to withstand rain events and was already tearing. Portions of the stream flow were threatening to undermine the liner entirely. The decision was made to switch to 180EX, a non-woven geotextile fabric from Thrace-LINQ, Inc., manufactured from polypropylene staple fiber. The geotextile was installed during a low-flow event one 10 foot section at a time. The non-woven fabric would prove durable

enough to last until flow was transferred back to the main channel five months later.

Once stream flow had been transferred to the temporary by-pass channel, construction on the main Maccaferri gabion wall began. The design plans had called for rebar to be drilled and grouted into the bedrock below the gabion wall. Upon excavation no bedrock was found up to 10 feet below the existing stream bottom. The soils report, which showed bedrock 1 to 2 feet under the stream, had been incorrect or misinterpreted with the design work. To ensure the stability of the gabion wall without a connection to bedrock, the design firm CH2M Hill reworked the requirements and requested a concrete footing with a solid interface to the gabion wall. Eventually an 18-inch concrete footing was poured below the

lowest gabion and steel reinforced bollards were extended to coincide with the middle of each 6x3x3 gabion basket. It was critical to construct the gabion wall as quickly as possible to secure the roadway. Intrenchment Creek epitomizes urban stream flow where rapid flow increases occur following any substantial storm events. The typical flow along Intrenchment Creek is around 7 CFS and at the work site this equated to a water depth of around 1 - 2 feet. During one severe storm event over 2 inches of rain fell across Atlanta in a few hours and the worksite water levels rose to over 10 feet in about that same amount of time. It was difficult at first to anticipate the amount of power and erosion that these flows are capable of when looking at the stream during normal flow conditions.

Once the gabion wall was in-place

and the roadway secure from further catastrophic erosion, attention was turned to stream restoration with a more natural affect. The City of Atlanta lead architect William Brigham worked closely with the design firm to incorporate a mixture of the latest design trends in stream bank restoration with the traditional methodology of gabion walls and rip-rap stabilization. Where possible, soil encapsulated lifts were installed with Rolanka Bio-D blocks – typically at higher elevations. The soil encapsulated lifts provide a natural surface of coconut fibers and dirt that enables plants and grass to grow that would normally be covered with type III rip-rap. In the actual channel a series of Cross-Vanes and J-Hooks were added along with benching a flood plain on the opposite side of the creek. These structures, in addition to reducing erosion and dissipating the creeks energy during high flow, provide excellent habitats for fish. The added aeration of the water helps increase the variety and quantity of water life. Site Engineering installed over 2000 CY of gabions and hauled in 600 tons of large toe rock boulders to complete the in-stream structures.

Erosion and sediment control measures were used throughout this project to minimize environmental impacts. BMP's

used included mulching, type C silt fence, coir fabric, stone filter dams, hay bale check dams, hay bale filters and sediment ponds for pumping water.

After the hardscape features had been completed, landscaping began. Seeding was done after final grading and installation of Rolanka BioD-Mat 70 blanket to support growth and development of vegetation. Eight hundred live stakes were planted and all disturbed areas were seeded with a native grass seed mix prepared by Mellow Marsh Farms. Finally, native trees and bushes completed a very park like feel to the area with the accent of water tumbling over the cross vane structures. The project was completed the end of May 2009 at a final cost of \$815,000. The access road leading to the SWAT training facility was restored to it's fully functioning two-lanes due to the 35 feet gained from the streambank stabilization project.

Lessons Learned

Do not underestimate urban flow conditions during storm events. Also, galvanized gabion baskets were used on this project – but would recommend only using PVC coated galvanized baskets in the future. They are easier to work with, usually cost only a few dollars more per

basket and they are less likely to corrode over time. Invasive species control must be maintained as well. The wall had an outbreak of Japanese Hops, a ground covering vine similar to kudzu, which the City of Atlanta maintenance crews removed by hand.

Nature Restored

“This project was a good example of how everyone came together (City Police Department, Dept. of Watershed Management, Dept. of Sanitation & Public Works, the consultant and contractor) to transform a seriously incised stream channel back into an environmentally stable waterway. It amazes me every time I visit these types of restoration projects just how quickly nature recovers itself and reclaims the surrounding area. It's like inserting a small slice of the north Georgia Mountains back into the city.” Bill Brigham. **L&W**

by Paxton Billingsley

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