Project Name: **Coyote Gulch**

Category : 5 – 2011 Environmental Restoration and Reclamation

Project Location: Morrison Rd & C-470 - Jefferson County, Colorado

Summary: Coyote Gulch, in Lakewood's Bear Creek Lake Park, was realigned in 1982 with the construction of the Mount Carbon Dam by the U.S. Army Corps of Engineers (USACE). The new steeper configuration, coupled with urbanization upstream, created channel instability resulting in dangerous levels of erosion, channel degradation, and poor water quality. This further impacted the surrounding park area by creating hazardous conditions for visitors and decreasing the quality of water entering Bear Creek Lake.

Purpose of the Project: Stabilization and restoration of the ecological function of the degraded stream and enhancement of the surrounding area became paramount for the City of Lakewood, the Urban Drainage and Flood Control District (UDFCD), and Jefferson County when safety and water quality issues were recognized. Under contract with the UDFCD, the Engineer and Landscape Architect successfully developed an innovative plan to meet the needs of the participants by realigning the channel and stabilizing the creek with Near Vertical Grouted Boulder Drop Structures at seven critical locations. Each of the drop structures provided a 5-foot tiered descent that managed the grade, reducing the channel slopes from 7% to ½% and creating non-erosive subcritical velocities. Using non-standard materials, specifically donated boulders blasted from a mountain construction site, the Engineer and Landscape Architect collaboratively saw that each drop structure maintained the qualities of natural rock outcrops and blended seamlessly into the surrounding environment. The boulder drop structures also maintained the sound of splashing water, a feature important to the client. To further enhance visitor experience, educational interpretive signage was developed and provided along the adjoining trail, which serves the dual purpose of recreational trail and maintenance access trail. In addition to meeting all of the objectives, the project had no adverse impact on the storage capacity of Bear Creek Lake, which is a flood control reservoir. This sustainable innovative approach to reclamation incorporating sound engineering principles with aesthetic enhancements will be emulated on future projects with similar site conditions and challenges providing a reference for other design teams. The implications of this project's success are far-reaching, greatly enhancing the visitor experience of the park itself through improved safety, additional trails and restored wetland areas, and educational interpretive signage.

Construction Budget Amount: $558,000.00

Role of L.A. versus role of other participants, including owner/client and collaborators: The Landscape Architect drew upon extensive experience creating unique, vibrant, and engaging environments to develop the educational interpretive signage included along the trail, to develop a successful plan for revegetation with native species, and to restore the surrounding wetlands. The Landscape Architect also attended meetings and collaborated with the client team, the Army Corps of Engineers, and the engineer to stabilize the channel bed and banks and restore the ecological function of the stream corridor. Stream water quality improvements, and ultimately improvements to Bear Creek Lake, were the impetus for these improvements. The water quality of the lake influences the entire ecological system while creating better opportunities for anglers, bird watchers, trail users, and boaters. The safety of the visitor and their improved experience due to the aesthetically pleasing stream corridor with its small waterfalls and sound, is a testament to how landscape architects design to re-claim natural systems and improve quality of life simultaneously.

Special Factors: The design team's successful restoration of Coyote Gulch included: Enhanced visitor experience by improving safety, providing educational enrichment with interpretive signage, and restoring wetlands; minimized construction costs by incorporating non-standard materials; reduced ecological impact of impaired waters by stabilizing Coyote Gulch; integrated waste product from mountain blasting site as an amenity for the park; and expansions and improvements to the area's trail system and the addition of new signage aid in educating visitors about the tenuous ecological environment at Bear Creek Lake.

Significance of the project: Coyote Gulch is significant to the public perception of Landscape Architecture because it weaves the ecological reclamation of the natural environment in with the needs and experiences of the user to create a holistically sustainable environment. We raise the bar for our profession every time we complete a project that improves both the environmental and the human condition. By improving the overall health of the stream and the lake, we increase the biodiversity that is important to long term sustainability of the site.

Coyote Gulch as a completed project fully integrates into the surrounding landscape because the Landscape Architect specified native plant materials that are found in the rest of the park and planted them at the appropriate time for their maximum growth potential. By seamlessly incorporating functional needs with aesthetics, the site looks as though it was always there in its present form.

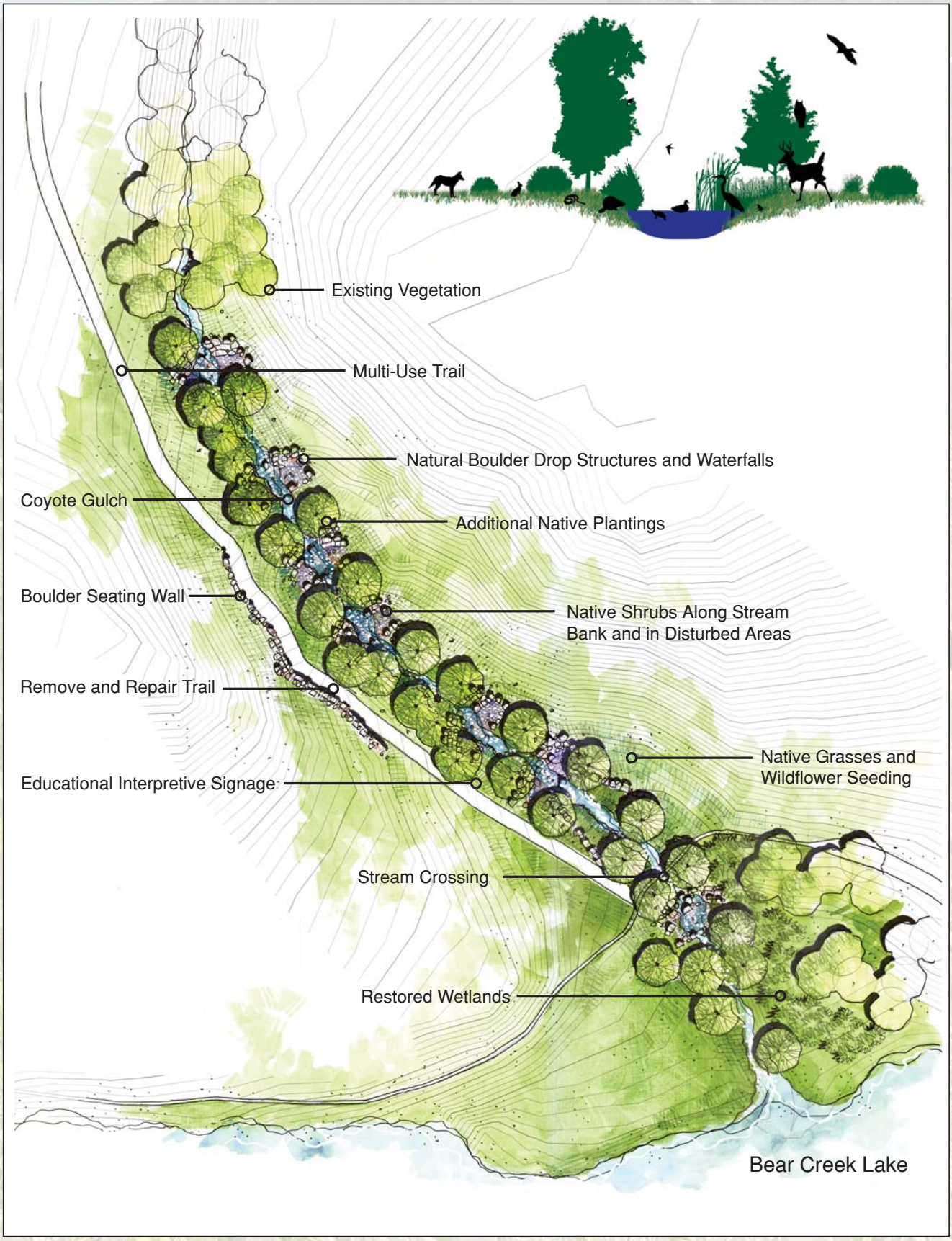
The intended user of this site is very diverse, and each park visitor is affected by the improvements in different ways. The addition of the rock wall on the west side of the trail improved the user experience because it doesn't have water flowing down the steep slope onto the trail. The casual walker has a better chance of seeing more diverse animals because of the increased riparian habitat. By improving the water quality the lake can support more fish, which positively improves the fishing experiences. Boaters and horseback riders benefit from the overall aesthetic of the healthy stream and boulder features.

This project is unique in that from the beginning we knew that we needed to use boulders that were available but not necessarily our first choice for the site. By creating pockets of diverse native plantings the rock features became an integral part of the overall design aesthetic that looks natural on the site. Placing the drop structures in a way that they had a large enough fall that they created a nice sound was something that not only was imaginative, but it was one of the elements of this project that is compelling to the visitor every time they are nearby.

This project incorporates the principles of sustainability because it has diminished the erosion flowing into the stream and lake. By spreading out the water, the plant diversity has increased along the banks of the stream and a true riparian corridor has been developed that will continue to improve the quality of the water and forage for both birds and animals. The addition of the western rock wall eliminated the erosion that was flowing onto the trail system making the maintenance more difficult and the trail unsafe.

Additional L.A.s on team: There were no additional Landscape Architects on this team.

Extent of Involvement in Entry: The Landscape Architect was an integral part of the design team working closely with the Civil Engineer, Urban Drainage and Flood Control District, and the City of Lakewood.



Coyote Gulch

Photographic Descriptions for Coyote Gulch

Coyote Gulch 01_The before picture of Coyote gulch shows how steep the side slopes were approaching the stream from the eastern parking lot. The silt from the degradation was moving directly into Coyote Gulch and Bear Creek Lake.

Coyote Gulch 02_The recycled boulders were placed into the site to mimic a natural waterway while eliminating the steep side slopes and extensive erosion.

Coyote Gulch 03_Small pools were created to catch sediment before it enters Bear Creek Lake. These small pools raised the water table so that wetland plants could thrive and improve water quality.

Coyote Gulch 04_Boulders were placed across the previous incised channel to spread the water out and decrease the velocity that was causing severe erosion.

Coyote Gulch 05_A stacked boulder wall was incorporated into the project to keep the trail from eroding due to the impact from the steep slope to the west.

Coyote Gulch 06_Cottonwood trees were placed to enhance the native habitat and to create instars and shade.

Coyote Gulch 07_Boulders and pools were placed before the stream entered the lake to control erosion and improve water quality.

Coyote Gulch 08_Interpretive educational signage was designed to inform the visitor about water quality, history of the area, and the wildlife that may be seen in the Park.

Coyote Gulch 09_After two years the wetlands and stream looked like they had always been there.

Coyote Gulch 10_The shrubs and grasses have grown in and around the boulders so that they are seamlessly incorporated into the landscape.

Coyote Gulch 11_After three years wildflowers and native shrubs bloom along the banks of the stream and the trees are beginning to provide shade.

Coyote Gulch 12_All kinds of recreationalists are using the lake and the trails to maintain a healthy lifestyle.

Coyote Gulch 13_Plan view

Coyote Gulch 14_Conceptual Rendering