Town of Crested Butte Drinking Water Diversion Project Final Report

Prepared For:
Colorado Watershed Restoration Program
Attn: Chris Sturm
Colorado Water Conservation Board

November 7, 2013

Prepared and Authored by:
The Coal Creek Watershed Coalition - Crested Butte, CO
Zach Vaughter, Executive Director
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Project Summary
The Board of Directors for the Coal Creek Watershed Coalition (CCWC) initiated a project to improve and restore the Town of Crested Butte’s drinking water diversion ditch in the spring of 2012. The CCWC partnered with the Town of Crested Butte (Town) to complete this project.

This project sought the following outcomes:

- Reduce the frequent maintenance of the existing structure, which disturbs instream habitat by releasing accumulated sediment into Coal Creek and disrupts adjacent riparian habitat;
- Construction of a more reliable diversion structure to withstand changing flows and improve water quality, instream habitat, and adjacent riparian habitat;
- Certification of no-rise structures using HEC-RAS modeling, and
- Improved longitudinal connectivity of Coal Creek.

The CCWC was awarded funding in the amount of $4,280 from the *Colorado Healthy Rivers Fund* grant program to draft a Request for Qualifications to hire an independent contractor to develop and implement an appropriate engineering design. An additional $1,000 was awarded to the CCWC from Trout Unlimited to assist in covering design costs. In September 2012, the CCWC hired Crane and Associates LLC to develop and implement the conceptual design. Crane and Associates LLC finalized and presented their “Crested Butte Municipal Water Diversion Reconstruction Project” engineering plan in January 2013. The work contained the necessary elements for the CCWC and the Town to seek grant money. The estimated total cost of the project was $25,743, not including the $4,280 to be utilized for the conceptual design.

Funding for design implementation was awarded from the Upper Gunnison River Water Conservancy District in the amount of $12,872 in the fall of 2012. Additionally, Chris Sturm of the Colorado Watershed Restoration Program, approved re-allocation of $6,630 remaining project funds following completion of the Halazon Ditch Reconstruction project (PO-12-20) by the CCWC and the Town of Crested Butte in September, 2011. This $6,630 was approved for implementation of the design.

The in-stream work began on October 7th 2013 and was completed on October 10th, 2013. Jeff Crane of Crane and Associates oversaw the implementation and construction of the design and the Town of Crested Butte provided staff, staff time, and equipment in the form of an in-kind donation. Additional structural monitoring will occur in the spring 2014 during high flows to assess proper engineering and stability. Monitoring work will be undertaken by Crane and Associates, as indicated in their contract.

It should be noted that during this 2-year project the CCWC experienced two changes in Executive Director and project leader. Following the initial design period, the CCWC’s Executive Director and project developer, Anthony Poponi left the organization to pursue a career opportunity in Honolulu, HI. Following Anthony’s departure, the CCWC hired Cathy Fornaris to be the organization’s Executive Director. Cathy resigned from the organization in July 2013, at
which point the current Executive Director, Zach Vaughter, assumed finalizing the on the ground implementation and culmination of the project. Rodney Due, the Director of Public Works for the Town of Crested Butte, was instrumental in acting as project lead during the organization’s time of transition, as well as assisting Zach in finalizing the project.

**Background**
At a CCWC Board of Directors meeting in the spring of 2012, a discussion developed pertaining to the success of the Halazon Ditch Reconstruction project undertaken by the CCWC the previous fall, and the applicability of developing a project similar in nature for the town’s drinking water diversion, which sits 6.5 miles downstream of Lake Irwin and approximately 1.5 miles upstream of the Town of Crested Butte. The state of the diversion ditch at that time, required regular maintenance by the Town of Crested Butte Public Works department to clear the ditch and diversion pipeline of accumulated sediment, often times by utilizing heavy machinery in Coal Creek to excavate the sediment. Sediment accumulation was exacerbated by the existing diversion structure, which caused the deposition of sediment at the site during seasonal flows, thus negatively impacted water quality, instream habitat, and adjacent riparian habitat. With partial project funding already available from remaining funds from the Halazon Ditch Reconstruction project and partnership with the Town, the CCWC Board of Directors approved the project and additional funding was sought from appropriate entities.
Project Approach and Implementation

Following project approval, the Board of Directors directed Anthony Poponi, CCWC Executive Director at that time, to begin seeking funding for an engineering design from an outside independent contractor. The CCWC was awarded funding in the amount of $4,280 from the Colorado Healthy Rivers Fund grant program to draft a Request for Qualifications to hire an independent contractor to develop and implement an appropriate engineering design. An additional $1,000 was awarded to the CCWC from Trout Unlimited to assist in covering design costs. In September 2012, the CCWC hired Crane and Associates LLC to develop and implement the conceptual design. Crane and Associates LLC finalized and presented their “Crested Butte Municipal Water Diversion Reconstruction Project” engineering plan to the CCWC Board of Directors in January 2013. The engineering design contained the necessary elements for the CCWC and the Town to seek additional grant money required to carry out project implementation.

The CCWC Board of Directors was pleased with the conceptual design work products and project costs were deemed reasonable. During the design period, applicable US Forest Service 2720 Special Use permitting and design oversight was not taken into account by the CCWC, or factored into implementation costs. The Town subsequently picked up the cost of these unanticipated expenses during implementation. The total cost of US Forest Service processing of the 2720 Special Use permit and reconstruction oversight totaled $1,183. This cost will be reimbursed to the Town by the CCWC upon receipt of reimbursement from the Colorado Watershed Restoration Program grant (PO-12-20). This issue is discussed in more detail in the “Lessons Learned” section of this report. The Town also had to apply for a U.S. Army Corps of Engineers 404 permit for conducting activities in the stream. That permit cost was also unanticipated.

Funding for design implementation was awarded from the Upper Gunnison River Water Conservancy District in the amount of $12,872 in the fall of 2012. Additional funding came from the Town. Additionally the Town of Crested Butte Public Works Department agreed to provide department staff and time, as well as equipment in the form of an in-kind donation.

The in-stream work began on October 7th 2013 and was completed on October 10th, 2013. Jeff Crane of Crane and Associates oversaw the implementation and construction of the design and the Town provided staff, staff time, and equipment.
## Project Budget

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<th>Item Description</th>
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Construction Implementation and Deliverables

To satisfy the requirements of the Colorado Healthy Rivers Fund and Colorado Watershed Restoration Program grants, as well as the desires of all those concerned, the instream re-engineering of the diversion ditch and structure was designed and implemented to withstand naturally occurring seasonal flows.

The conceptual design called for 75 cubic yards of 3’ diameter round rock/boulders and 25 cubic yards of 2’ diameter round rock/boulders. The site did not have an immediate rock source and therefore an off-site rock source was identified prior to October 7th, and delivered the Friday prior to excavation. In addition to in-kind matching services from the Town, Rodney Due-director of Public Works, coordinated all heavy machinery rentals, machine mobilization, identified rock sources, and coordinated off site rock delivery and donation. The Crested Butte Nordic Center donated 25 cubic yards of rock towards the project, which was left over from a Nordic trail expansion project they had undertaken earlier in the summer.

After some technical difficulties with the initial excavator (a pin on the track snapped while mobilizing to the site) a new excavator was mobilized to the site and decommission of the existing diversion structure began. The previous diversion structure was created by erecting two Jersey Barriers downstream of the diversion ditch in the center of Coal Creek, and allowing woody debris and large rocks deposited at high flow to accumulate. This structure was susceptible to high stress during times of high flows and had a history of washing out. Following decommission of the existing diversion structure, the accumulated sediment present in the diversion ditch was excavated and stored on site to be used as native bedload material.

Following decommission of the existing diversion structure and excavation of accumulated sediment from the drinking water diversion ditch, Jeff Crane of Crane and Associates oversaw implementation of the conceptual design and supervised construction of the new diversion structure. The previous diversion structure was replaced with a boulder structure with a constant top grade of 9245 feet, which was a similar elevation of the previous diversion structure and delivers the same head at the intake.

The excavated diversion ditch was lined and reinforced with 3’ boulders, additionally a boulder J-hook was constructed extending upstream from the existing diversion ditch approximately five feet into the main stem of Coal Creek. This provided a more gradual diversion of water to the right side of the existing intake ditch. Rocks utilized in the J-hook were anchored with cables to maintain design integrity during seasonal high flows. The diagonal alignment of the new structure provided a constant slope of 0.75% and reduces sediment deposition before the structure and ditch. This alignment provided improved stability and allows for fish migration past the diversion. Additionally, the new diversion structure reduces erosion on the right bank before entering into the diversion ditch and on the left bank during peak seasonal flows.
Implementation was completed on Thursday, October 10\textsuperscript{th} 2013. Above and below the project site, creek conditions were near optimal. Construction at each end of the project was carefully blended into the two end points so as to eliminate any visual discontinuities.

The Town Drinking Water Diversion design implementation achieved the desired deliverables as outlined in the scope of work:

\begin{itemize}
  \item Reduced need for frequent maintenance of the existing structure.
  \item Constructed a more reliable diversion structure to withstand changing flows and improve water quality, instream habitat, and adjacent riparian habitat;
  \item Constructed a certified no-rise diversion structure using HEC-RAS modeling, and
  \item Improved longitudinal connectivity of Coal Creek.
\end{itemize}
Lessons Learned
The Town Drinking Water Diversion project on Coal Creek was the second project of its type implemented by the CCWC in partnership with the Town of Crested Butte. The Halazon Ditch Reconstruction of 2011 provided useful experiences and references applicable to undertaking this project from an organizational level. However, one lesson that the CCWC learned through this project is the importance of thoroughly researching all applicable and necessary permitting requirements before undertaking a project similar in size on US Forest Service land.

The previous Executive Director, and project lead, was under the impression that no outside permitting was needed due to the fact that the Town of Crested Butte municipality operated the diversion and additionally held water rights as a 6 cfs direct flow right from Coal Creek and Wildcat Creek with a 1893 appropriation date and a 1933 administrative date with a 367 acre-foot storage right in Lake Irwin, which sits 6.5 miles west of the Town’s Drinking Water Diversion. The Town covered all applicable permitting costs with the US Forest Service’s Gunnison Field Office. They will be reimbursed for these associated costs.

Moving forward, the CCWC will conduct the proper research and apply for all applicable permitting as it relates to respective water quality and riparian improvement projects.

Conclusion
The Town Drinking Water Diversion project resulted in a major improvement from the previous diversion structure and ditch. The final cost of the project came in under budget by approximately $9,500, the final cost of the project was $16,123.92 compared to the original estimate of $25,743. This can be attributed to donations from the Town in the form of in-kind donation/match, rock donated by the Crested Butte Nordic Center, as well as an in-kind donation from Al’s Backhoe Service and Lacy Construction, both of Crested Butte.

Additionally, the Town Drinking Water Diversion design implementation achieved the desired deliverables on Coal Creek as outlined in the scope of work provided to the Colorado Watershed Restoration Program, in that this project:

• Reduced need for frequent maintenance of the existing structure.
• Constructed a more reliable diversion structure to withstand changing flows and improve water quality, instream habitat, and adjacent riparian habitat;
• Improved instream fish habitat;
• Constructed a certified no-rise diversion structure using HEC-RAS modeling, and
• Improved longitudinal connectivity of Coal Creek.
Appendix
The following are representative pictures showing “Before & After” shots of the project. Pictures do not do justice to the work that was performed, however an attempt was made to show the changes as accurately as possible.

Proposed Conditions as presented By Crane and Associates
Photo Point 1
Looking Northeast (downstream) from Ditch Bank

Before
After

Photo Point 2
Looking South from River Left Bank

Before

After
Photo Point 3
Downstream of Structure looking upstream

Before

After
Photo Point 4
Looking Northwest from Ditch Bank

Before

After
Photo Point 5
In Coal Creek Looking East at Diversion Ditch

Before

After