

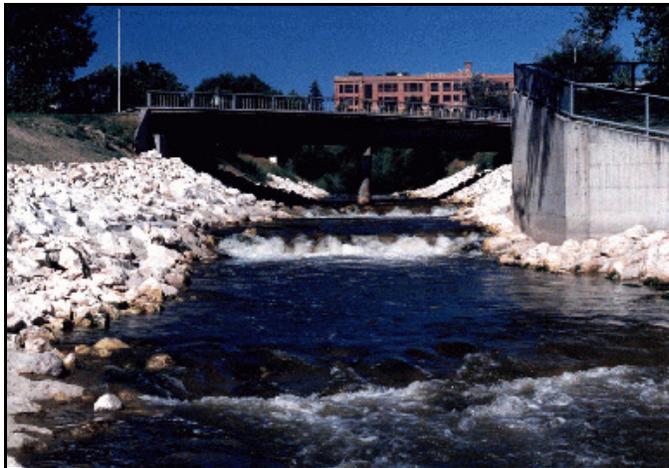
Big Goose Creek Drop Structure Sheridan, Wyoming

Client: Mr. Abe Knapp
Wyoming DEQ/AML Division
3030 Energy Lane, Suite 200
Casper, Wyoming 82604
(307) 473-7461



ANDERSON CONSULTING ENGINEERS, INC.
Civil • Water Resources • Environmental

Anderson Consulting Engineers, Inc. (ACE) while previously affiliated with Lidstone & Anderson, Inc., completed the award winning evaluation, design and construction management of the Big Goose Creek drop structure located in Sheridan, Wyoming. **This project won the 1995 Wyoming Engineering Society President's Project of the Year Award.** The original drop structure was built by the US Army Corps of Engineers in 1963. Big Goose Creek was conveyed over a vertical, 8-foot concrete drop structure into a plunge pool/stilling basin that incorporated baffle blocks for additional energy dissipation. The structure performed its hydraulic functions well, however, the nature of the energy dissipation within the stilling basin created a hazard to public safety, especially given the urban setting of the structure. This hazard was exemplified by the death of two children who became trapped within the basin while swimming in Big Goose Creek and the unsuccessful attempts to rescue them. Therefore, the objectives of the investigation were to mitigate the existing health and safety problems, while maintaining the flood protection, energy dissipation and channel stability functions of the existing structure. In order to meet these objectives, ACE staff completed the following tasks:



Hydrologic Analysis: A hydrologic analysis of the Big Goose Creek drainage area was completed to develop peak discharge data for the 10-, 50-, 100-, and 500-year events. USGS gaging data were utilized in conjunction with procedures provided in the Water Resources Bulletin #17B.

Hydraulic Analysis: This task consisted of (a) a comparative analysis of design details and field data; (b) field observations of the drop structure and pertinent hydraulics within the study reach; and (c) a detailed hydraulic analysis of the flow conditions through the existing drop structure. Important hydraulic

design features included minimizing hydraulic forces by replacing the single drop structure with four smaller structures. The design facilitated the removal of the uniform roller at the toe of the structures which could trap objects or persons. This was accomplished by designing an irregular crest within each drop structure which concentrated flows to the center of the structure.

Development of Design Alternatives: Several design alternatives were evaluated. The selected alternative consisted of a series of four two-foot high grouted rock drop structures. This alternative resulted in elimination of hazardous hydraulic conditions while maintaining the functional integrity of the original structure. The final design is also aesthetically and environmentally superior to the original configuration. Design plans and specifications were developed for the selected alternative.

Construction Management: ACE staff were responsible for the construction management of the project.

Environmental Permitting: All of the necessary environmental permits and clearances were obtained by ACE staff. These included the Environmental Assessment (NEPA) and the Section 404 permit (Clean Water Act). Design and construction required approval of the Omaha District Corps of Engineers.