Terrace Irrigation Company, Inc.

Spillway Replacement Project

June 2012 – August 2013

Final Report

Introduction

The Terrace Irrigation Company had been receiving an unsatisfactory rating for our dirt spillway for several years. In a cooperative effort between the Alamosa River Keepers, Colorado Water Conservation Board, and the Terrace Irrigation Company shareholders, we successfully replaced the earth fill spillway with a new one cycle labyrinth weir spillway. The new spillway is capable of passing the revised PMF. The installation included a drainage system and foundation anchors to relieve the uplift pressures from seepage through the saddle dike. The crest elevation of the saddle dike was raised approximately four feet. Funding of 4.2 million was obtained from the Colorado Natural Resources Damages Fund, a grant from the Rio Grande Basin Round Table and CWCB Grant Fund, and a 30-year loan from Colorado Water Conservation Board to complete the new spillway project.

Construction

URS Corporation of Denver, Colorado was retained to design the new spillway and submit the project for bids. ASI Constructors, Inc. of Pueblo West, CO was awarded the bid in June of 2012. Construction began on July 16, 2012 with the removal and stockpiling of topsoil from the area of the dam and demolishing the existing spillway from the site.

After the demolition of the existing spillway, ASI prepared the subgrade for the new spillway. Blasting of the foundation rock was necessary to reach the required subgrade in the stilling basin. Yenter Companies, Inc. blasted the foundation rock and ASI excavated the rock and graded the chute slope while working on the labyrinth spillway slab, a 4" thick mud mat was placed and 96 foundation anchors were embedded ten feet into the subgrade at a grid spacing of approximately seven feet on center. The cutoff walls were then constructed and the spillway slabs were placed. After the spillway slabs were completed, ASI continued down the chute by preparing the subgrade, installing the drainage system, placing the cutoff walls, and placing the chute slabs. The spillway chute walls were placed as the slab concrete test results indicated that the concrete met specifications.

Following the blasting of the foundation and excavation of the rock and embankment material from chute slope, ASI installed 84 foundation anchors in the bedrock of the stilling basin before placing the slabs and the drain system.

Foundation anchors were embedded a minimum of 10' into the bedrock at a grid spacing of approximately seven feet on center.

Due to over excavation in the stilling basin, ASI placed backfill concrete to bring the subgrade up to the design elevation prior to placing the stilling basin slabs. The gravel of the foundation drains was placed down to the rock foundation.

ASI began to backfill against the spillway apron on October 22, 2012. The backfill material from the existing embankment was reused after being processed to a maximum particle size of three inches. Material was placed in 8" lifts and compacted using a sheep's foot roller and a walk behind plate compactor. The plate compactor was used within 3' of walls and within 2' of pipes to keep from damaging the structures.

A 5' wide sand filter diaphragm was installed, extending 15' from the apron wing walls on each side along the centerline of the embankment crest. Upstream of the filter diaphragm, select fill was used to backfill the spillway walls. All other material used for the embankment was classified as embankment fill.

The date of substantial completion was February 2, 2013, which was 33 days past the contract date of December 31, 2012. The delay was due to ASI over excavating during the beginning of the project and a few inclement weather days.

The right and left access roads were adjusted to smoothly transition onto the crest of the spillway dike. The crest of the dike was finished with a 9" layer of road base aggregate. The downstream face of the embankment was reseeded in August of 2013 with native grasses to aid in reclamation and erosion control. Six piezometers were drilled into the embankment, 3 on either side of the spillway, approximately 250' from the centerline of the spillway. The piezometers were installed in a line down the downstream face of the embankment, spaced at approximately 80' intervals. Six new movement monuments were placed on the downstream edge of the spillway dike crest at 100' intervals. Four structural survey points were installed on the spillway walls. Final work on the saddle dike was completed on August 30, 2013. The dike was not required to be completed by the substantial completion date of December 31, 2012.

As-Built drawings are included in the final construction report submitted by Ed Toms, URS Corporation. Pictures are attached.


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