Mailing Address:
Water Resources Data System
University of Wyoming, Dept 3943
1000 E University Avenue
Laramie, WY 82071

Physical Address:
Wyoming Hall, Room 249
University of Wyoming
Laramie, WY 82071

Phone: (307) 766-6651
Fax: (307) 766-3785

Funding for WRDS and the creation of this electronic document was provided by the Wyoming Water Development Commission (http://wwdc.state.wy.us)

CRAZY WOMAN WATERSHED PROJECT - LEVEL II

PHASE I
REHABILITATION PLAN
AND
PHASE II
CONCEPTUAL DESIGN AND COST ESTIMATES

EXECUTIVE REPORT

Prepared For:

WYOMING WATER DEVELOPMENT COMMISSION
Herschler Building
Fourth Floor - West
Cheyenne, WY 82002

Prepared By:

HKM ASSOCIATES
1842 Sugarland Drive, Suite 103
Sheridan, Wyoming 82801
307-672-9806

November 6, 1991

CRAZY WOMAN WATERSHED PROJECT - LEVEL II

PHASE I
REHABILITATION PLAN
AND
PHASE II
CONCEPTUAL DESIGN AND COST ESTIMATES
EXECUTIVE REPORT

Prepared For:

WYOMING WATER DEVELOPMENT COMMISSION
Herschler Building
Fourth Floor - West
Cheyenne, WY 82002

Prepared By:

HKM ASSOCIATES
1842 Sugarland Drive, Suite 103
Sheridan, Wyoming 82801
307-672-9006

November 12, 1991

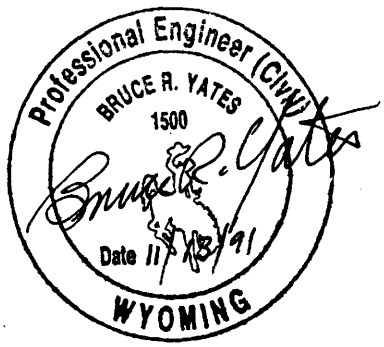

TABLE OF CONTENTS

LIST OF TABLES

PHASE I REHABILITATION PLAN

The purpose of this WWDC Level II Study is to assess the potential for rehabilitation or replacement of selected irrigation structures in the Crazy Woman Watershed Improvement District. The CWWID is situated along North Fork Crazy Woman Creek and Muddy Creek located approximately 15 miles south of Buffalo, Wyoming.

Phase I was a preliminary evaluation of the existing conditions with recommendations for improvements. After an initial scoping meeting, the criteria for the project was established and improvements were recommended at a local presentation meeting. As a result of that meeting, a conceptual design was prepared in Phase II of the study. The project was developed in conjunction with improvements being considered for funding under the Environmental Protection Agency (EPA) Title 319 program for non-point source pollution corrections. Consequently, the local SCS office in Buffalo was consulted several times during this Level II Study.

Criteria developed for this study included:

1. WWDC participation could only occur where multiple users were involved.
2. The minimum flow of 2 cfs per 70 acres will be used for sizing the system. (Where sprinkler irrigation only is planned, 1 cfs per 70 acres was used.)
3. The maximum flow will be governed by the historical diversion record and will be no greater than the capacity of the existing irrigation system.

Based on field inspections, and interviews with the landowners and lease holders, the ten original projects were narrowed to nine as one project was a single user system which did not qualify.

During Phase I of this study, it was determined that the CWWID has an irrigation system that relies heavily on the early spring

runoff, "flood flows," for the majority of the irrigation with limited reservoir storage to carry into the latter part of the irrigation season. Controversy over water rights occurs frequently as the records of water rights are unclear in some cases. As this project unfolds, some water right work will be needed in the Level III work.

Water rights on Crazy Woman Creek and its tributaries are primarily governed by a 1889 Court Decree and with some recent permits. Although the Court Decree establishes one priority date, there are 27 orders of priority established. When the number one and two priorities are diverting their full appropriation, the other 25 priorities are generally shut down or partially restricted. Some of the acreages shown in the court decree are not irrigated and the amount of appropriation in some priorities exceeds the current state restriction of 1 cfs per 70 acres. The State Board of Control has determined that anytime amendments to the appropriations are proposed, the Board will require that the acreage will be defined and the appropriation will be reduced to 1 cfs per 70 acres. For these reasons, the State Board of Control has advised that the improvements proposed by this Level II Study should not enlarge the facilities from the present capacity. Therefore, during this Level II study, the historic diversion records were studied and in some cases, stream flow measurements were made in some ditches.

The following Phase II identifies an opinion of cost and the projects recommended for Level III funding. Water right work perceived for the design stage of the Level III study is identified in Table 2.

PHASE II CONCEPTUAL DESIGN AND COST ESTIMATES

Opinion of Costs

The following Table 1 provides a summary of the Opinion of Costs for the nine recommended projects for the Crazy Woman Watershed Project. It is recommended that project funding be withheld from distribution until all water right work is completed and approved and funding should not be advanced until the local participants funding is in place.

TABLE NO. 1

TOTAL PROJECT COST ESTIMATE

Preparation of Final Design & Specifications:		$ 69,157
Permitting and Mitigation :		$ 9,000
Legal Fees :		$ 0
Acquisition of Access and Right-of-Way :		$ 0
Cost of Project Components		
No. 1 Rogers-Espy-Benson Ditch :	$ 117,665	
No. 2 Elsom-Espy-Benson Ditch :	$ 138,123	
No. 3 Daley-Patch-Tass-McPhee Ditch:	$ 72,588	
No. 4 Nimick-Fraley-41 Ranch Ditch :	$ 189,208	
No. 5 Tass-Patch-McPhee Ditch :	$ 120,599	
No. 6 41 Ranch-Bauer Ditch :	$ 135,496	
No. 7 Riprap Repair Muddy Guard Res.	$ 27,500	
No. 8 Replace H.G. & Div. Dam Cook (No. 9) Ditch :	$ 66,991	
No. 9 Jensen-McPhee-Clow Drop Pipe :	$ 0	
No. 10 Nimick-Fraley Pipeline :	$ 65,450	
Construction Cost Sub-total # 1 :	**$ 950,923**	
Engineering Costs = CCS # 1 x 10% :	$ 95,092	
Sub-total # 2 :	**$1,046,015**	
Contingency=Sub-total #2 x 15% :	$ 156,902	
Construction Cost Total :		$1,202,917
Project Cost Total :		**$1,281,074**

Conceptual Design

Introduction

Projects recommended to the WWDC for Level III funding are all part of the main ditch systems and reservoir facilities currently in use by the CWWID with the exception of Project No. 10. Project No. 10 is a proposed new pump lift to get Muddy Guard No. 2 Reservoir water into a existing ditch system. Project No. 9 was not recommended as it is a single user project.

The proposed projects were discussed with members of the CWWID in a Scoping Meeting on June 25, 1991 and two Presentation Meetings on September 23, 1991 and October 25, 1991. In addition, individual users were consulted in the field on each project. Discussions with Soil Conservation Service officials and Wyoming State Board of Control officials were also conducted. The resulting projects are summarized in the following descriptions.

Project No. 1 Rogers-Benson

This project will replace an existing ditch which is experiencing severe erosion on about one-half of the ditch. This project will include the following improvements to serve 293 acres with up to 7 cfs of flow.

- Concrete Lined Ditch - 2,225 feet
- 15 Inch PVC Pipeline - 3,275 feet
- Approach wasteways, inlets, outlets, and valves. (Wasteways are recommended to prevent users from attempting to force more water through the system than it was designed for. That appears to be the cause of some of the existing erosion problems.)

This project will not require water right work.

Project No. 2 Elsom-Espy-Benson Pipeline

Project No. 2 will replace an existing ditch which is experiencing erosion. Presently, irrigation water utilizes the same ditch as for water delivered to the Kingsbury-Todd No. 1 and No. 2 Reservoirs. As a result, the ditch is overloaded causing erosion problems. Water rights do not restrict the amount of water which can be diverted into the two reservoirs, therefore, the capacity varies depending upon the amount of water available. In this project, it is recommended that a new diversion and ditch should be constructed in Kelly Creek and the reservoir diversions can continue to be made through the old ditch.

Project No. 2 will serve approximately 613 acres of flood irrigated lands with up to 17.5 cfs. The following improvements will be made:

- 27-inch PVC Pipeline - 1,540 feet
- 18-inch PVC Pipeline - 4,290 feet
- Appropriate wasteways, inlets, outlets, and valves. (Wasteways are recommended to prevent users from attempting to force more water through the system than it was designed for. That appears to be the cause of some of the existing erosion problems.)

Water right work is not anticipated since the project involves the internal workings of the Cook Ditch. Kelly Creek is used as the means of conveyance in getting the Cook Ditch water to this lateral system.

Project No. 3 Daley-Patch-Tass-McPhee Drop Pipe

Project No. 3 will divert surplus (flood) flow from North Fork Crazy Woman Creek through the existing Thompson and Mathews Ditch and into a drop pipe to Muddy Creek. Water will then be rediverted from Muddy Creek into the headgates of existing ditches. The

project will replace an existing wasteway ditch that is experiencing significant erosion. Approximately 629.1 acres will be served by Project No. 3. A bifrication structure will direct 3.0 cfs of water into the extension of the Thompson and Mathews Ditch to serve 103.6 acres. A pipeline from that same bifrication will carry 15.0 cfs to Muddy Creek to serve 525.5 acres. The following improvements are recommended:

- 15-inch PVC Pipeline - 4,000 feet
- Appropriate wasteways, inlets, and valves
- 1 Energy Dissipator

Some of the acreage to be served by this project has no current water rights. A new filing will be needed for this project and the direct discharge to Muddy Creek might require a National Pollution Discharge Elimination System (NPDES) permit.

Project No. 4 Nimick-Fraley-41 Ditch

Project No. 4 will remain as a lateral off of the Cook Ditch. Minor repair and cleaning will be completed on approximately 5,440 feet of existing ditch. The remaining system will be replaced with 5,560 feet of PVC pipeline. The total acreage served will be 622 acres. The pipeline will serve 518.5 acres with a flow of 7.42 cfs. Since the pipeline is proposed to be used for sprinkler systems a design flow of 1 cfs per 70 acres was used to size the pipeline. The following improvements are recommended:

- Ditch cleaning and Repair - 5,440 feet
- 27-Inch PVC Pipeline - 771 feet
- 24-Inch PVC Pipeline - 4,789 feet
- Appropriate wasteways, inlet, outlets, and valves

Water right work needed on this project includes a Petition to the State Board of Control for a Change in Point of Diversion and means

of conveyance for three water rights. Minor wetland considerations will be necessary in the reclamation of existing ditches.

Project No. 5 Tass-Patch-McPhee Ditch

Project No. 5 will replace the Mitten Ditch which has experienced severe sloughing in a section adjacent to Muddy Creek. It is recommended that a new system be constructed which will divert water from Muddy Creek into the stable existing Bash's PX Ditch and then split flows off into a 24-inch inverted siphon across Muddy Creek. A total of 445.5 acres will be irrigated by this project with a design diversion rate of 12.7 cfs. A second inverted siphon having a diameter of 15-inch will be needed across Dry Muddy Creek to serve the lower end of the project. The following improvements are recommended:

- Clean and Enlarge Bash's PX Ditch - 1,400 feet
- 24-Inch Inverted PVC Siphon - 810 feet
- 15-Inch Inverted PVC Siphon - 400 feet
- Membrane Lined Ditch - 7,275 feet

Water right work will include the filing of a petition to the State Board of Control for a Change in Point of Diversion and means of conveyance for existing appropriations and the filing of new permits for lands not previously irrigated.

Project No. 6 41 Ranch-Bauer Ditch Pipeline

Project No. 6 will eliminate severe ditch erosion in two laterals of the Kennedy Ditch. Water will be diverted from the two ditches into a single pipeline carrying a maximum capacity of 7.9 cfs for irrigation of 553 acres. The following improvements are recommended:

- 27-Inch PVC Pipeline - 1,500 feet
- 15-Inch PVC Pipeline - 4,200 feet

- Appropriate wasteways, inlets, outlets, and valves

Water rights work is not expected for this Project No. 6.

Project No. 7 Riprap Repair - Muddy Guard No. 2 Reservoir

Riprap on the left (north) end of the south embankment is inadequate. In this Level II Study, it was determined that the amount of large rock is inadequate. Additional riprap is recommended on the left abutment area as follows:

- Riprap 1,000 Cubic Yards

Project No. 8 Replace Headgate and/Diversion Dam on the Cook (No. 9) Ditch

It is recommended that the headgate and diversion dam in the Little North Fork Crazy Woman Creek be replaced with a new facility. A sheet pile overflow dam with a rock gabion downstream face is recommended. The recommended design storm frequency is 50 years. Two 36-inch headgates are recommended for the canal inlet with a third headgate for returning water to the creek channel.

Project No. 9 Replace Jensen-McPhee-Clow Drop Pipe Extension

Project No. 9 is not recommended for funding by the WWDC because it is a single user system.

Project No. 10 Nimick-Fraley Pipeline

Project No. 10 will provide for pumping Muddy Guard No. 2 Reservoir water into the Watkins Lateral of Cook Ditch. An existing lateral off of the reservoir outlet ditch will be enlarged and a pump and pipeline will be installed. About 291 acres will be provided reservoir water at a design flow rate of 4.16 cfs. The following improvements are recommended:

- 12-Inch PVC Pipeline 1,800 Feet
- Membrane Lined Ditch 2,000 Feet
- Pump and Power Source 1 Each

Permitting

The improvements recommended for the Crazy Woman Watershed Project will require obtaining permits in the Level III design stage.

The following assumptions have been made regarding these permits:

- It is assumed that access and right-of-way will be provided by the Crazy Woman Watershed Improvement District members at no cost to the project.

- It is assumed that all construction related permits will be obtained by the Contractor.

- It is assumed that the Crazy Woman Watershed Improvement District will procure all EPA permits through the SCS work associated with the 319 Water Quality Program.

- It is assumed that the construction associated with this project will avoid the disturbance of major wetland areas.

- It is assumed that mitigation of minor wetland disturbances can be completed under a nationwide Army Corps of Engineers permit. (This applies to crossings and reclamation of minor areas.)

Permits anticipated for the Level III Design Stage are shown on Table 2.

TABLE 2

PERMITS REQUIRED IN THE LEVEL III DESIGN STAGE

CRAZY WOMAN WATERSHED REHABILITATION PROJECT

PROJECT NO.	PROJECT NAME	NPDES	WETLAND MITIGATION (MINOR)	STATE ENGINEER PERMITS	STATE BOARD OF CONTROL PETITIONS
NO. 1	ROGER-BENSON	----	----	----	----
NO. 2	ELSOM-ESPY-BENSON	----	----	----	----
NO. 3	DALEY-PATCH-TASS-MCPHEE	1	----	1	----
NO. 4	NIMICK-FRALEY-41 RANCH	----	1	----	3
NO. 5	TASS-PATCH-MCPHEE	----	1	2	1
NO. 6	41 RANCH - BAUER	----	----	----	----
NO. 7	RIPRAP REPAIR - MUDDY GUARD	----	----	1*	----
NO. 8	REPLACE H.G. & DIV. DAM	----	1	1*	----
NO. 9	JENSEN-MCPHEE-CLOW	----	----	----	----
NO. 10	NIMICK-FRALEY PIPELINE	----	----	----	----

* Notification only.