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EXECUTIVE SUMMARY

Red Lane Rehabilitation Project
LEVEL II FEASIBILITY STUDY

WYOMING WATER DEVELOPMENT COMMISSION

DECEMBER, 1990

CIVIL ENGINEERING PROFESSIONALS, INC.
IN ASSOCIATION WITH JAMES M. MONTGOMERY, CONSULTING ENGINEERS, INC.
EXECUTIVE SUMMARY

INTRODUCTION

The Red Lane Watershed Improvement District (hereinafter referred to as the "District") is located approximately 2 miles north of the Town of Thermopolis, Wyoming, along State Highway 20-789 (See Figure 1). The District encompasses approximately 200 acres, and includes approximately 57 different parcels of land and 44 landowners.

The District owns and operates an irrigation system that is used year-round for both irrigation, and winter time stock watering purposes. The source of supply for the system is a free flowing geothermal well, drilled in the 1920's and known as the "Maytag Well". The well's productivity is thought to have declined over the years. In addition, the ground surface around the well's "discharge bowl" is subsiding, and water can be seen leaking out of the ground near the subsidence. It is feared the well will soon fail.

The irrigation delivery system consists of small concrete lined ditches which are old, and failing. The system was poorly constructed and does not serve all properties in the District. Portions of the supply canals occasionally run out of their banks, flooding nearby property. The concrete lining is cracked and broken in many places resulting in water leakage from the system. The leakage is blamed for raising the groundwater table in some areas, and causing failures in subsurface wastewater disposal systems. The tailwater ditches which carry away the excess water are routed through a slough and eventually to the Big Horn River. The slough has been the focus of concern for many years, and is blamed for high groundwater tables and losses in property values.
FIGURE 1
RED LANE VICINITY MAP

Locations Shown are Approximate.
SCALE: 1" = 2000'

Civil Engineering Professionals, Inc.
In addition to the operational problems, the geothermal well supply has an extremely high mineral content. These minerals form travertine deposits in the concrete lined canals, and in the culverts crossing under roadways and private driveways. The mineral deposits reduce the carrying capacity of the canals and create serious maintenance problems.

In 1988, as a result of their growing concern over diminishing well flows, bank subsidence near the well, and delivery system inadequacies, the District applied to the Wyoming Water Development Commission (WWDC) for assistance with rehabilitation of the aging system. In March, 1989, the Wyoming Legislature authorized the WWDC to conduct a Level II Feasibility Study of the Red Lane Irrigation System.

The purpose of the Level II study was to identify the needed repairs and improvements to the District's facilities that would provide for more effective operation of the system (Phase I), and to prepare conceptual designs and cost estimates for the recommended improvements (Phase II).

**PHASE I STUDY**

The Phase I portion of the study consisted of a field inventory of the Maytag Well and the irrigation system. The field inventory was conducted through visual inspections, field surveying, video taping, and well probing and testing.

Two well investigations were performed in the summer of 1989. The initial investigation indicated the available flow from the well has declined over the past ten years by approximately 30 percent, from 630 to 380 gallons per minute. It was also believed that the well may contain a variety of debris which may affect the ability to rehabilitate the well.
The second well investigation was performed to attempt to extract the debris and other obstructions from the well and to perform a magnetometer surveying of the well. Results of the investigation indicated the well is at least 620 feet deep and the steel well casing extends to a depth of at least 227 feet. The well casing appears to be seriously deteriorated by a depth of 30 feet and is sufficiently deteriorated below 30 feet to allow sediment to pass through.

Results of the two well investigations led to the conclusion that the well could either be rehabilitated, by lining the well with a PVC liner, or the well could be abandoned and a new well could be constructed.

The remainder of the inventory identified needed repairs in the canal delivery system, the tailwater drainage system, service to unserviced properties, and some stormwater management improvements. The inventory also identified those areas of the District where easements were needed to assure the District's access for operating and maintaining the system.

The product of Phase I was an inventory report outlining the needed repairs in order of relative priority, and the approximate cost of the repairs. The total cost of all the identified repairs and improvements was estimated at $259,932 if the well was rehabilitated, or $304,548 if a new well was constructed. The District's current assessment is $17.50 per year for property up to 2.4 acres, plus an assessment of $6.68 per acre per year for each acre over 2.4 acres. The assessments would need to be increased nearly four times to pay the debt retirement costs for all the identified improvements.
PHASE II

The results of the inventory report were presented at a public meeting in the District. The District chose to scale the project down to a level that was more affordable. Two efforts were made to reduce the scope of the improvements to an acceptable cost range. The selected improvements chosen for conceptual design in Phase II portion are shown in Figure 2 and summarized below.

1) **REHABILITATE THE MAYTAG WELL**

A PVC casing liner would be installed to a depth of about 130 feet where the bedrock stratum. The annular space between the liner and the casing would then be cemented. The liner will eliminate the flow of water being lost through the deteriorated casing. The discharge basin should be lined with concrete and the unnecessary existing pipe penetrations eliminated. The estimated cost for rehabilitating the well is $13,500.

2) **REPLACE THE LOWER CANAL**

The existing Lower Canal would be replaced in its entirety. The canal would be reconstructed in a similar configuration as the existing canal, and all flat or adverse slopes eliminated. The estimated cost to remove and reconstruct the Lower Canal is $56,736.

3) **CONSTRUCT NEW SUPPLIES TO UNSERVED PROPERTIES**

New buried supply pipelines (rather than open canals) would be constructed on grade to service those residents in the District who are not currently served by the canal.
system. Control of the flows through the pipelines would be accomplished through gate valves. Four inch diameter pipelines would be constructed along Coventry Circle and Workman Street. The cost of constructing these two pipelines is estimated at $33,826.

4) **CONSTRUCT FOUR NEW DIVERSION STRUCTURES**

New concrete diversion structures would be constructed to provide more efficient operation of the system. New structures would replace existing structures at the Maytag Well, and the division of the Upper and Lower Canal. New structures would be located at the division of the Upper and Northern Lower Canal, and at the end of the Upper Canal. The estimated cost of the four diversion structures is included in the cost for Upper Canal repairs and Lower Canal replacement.

5) **CONSTRUCT THE LOCKHART DRAIN**

A new drain for the Upper Canal would be constructed across the Lockhart property to empty into the slough. The drain would be a concrete lined canal, of similar shape and size as the Upper Canal. The estimated cost of the Lockhart drain is $25,711.

6) **REPLACE CANAL CROSSING OVER RED GULCH**

The main supply canal from the Maytag Well currently spans the Red Gulch drainage ditch in a plastic pipe, encased in a corrugated metal pipe. The crossing structure is sagging and weak. A new structure should be constructed to span the gulch, and would consist of a new plastic pipe encased in a heavy walled steel pipe. The structure would
be reinforced against flood induced horizontal displacement with concrete anchor footings located at each end of the crossing. The estimated cost of the gulch crossing is $21,463.

7) **UPPER CANAL REPLACEMENT**

Portions of the Upper Canal are cracked, improperly sloped and/or ready to fail at any time. The most seriously deteriorated sections should be replaced. The estimated cost for the canal replacement is $11,702.

8) **EASEMENT ACQUISITION**

It is estimated that there are at least ten properties through which the canal system currently passes for which there is no recorded easement. In addition, there will be at least six properties affected by new construction. The estimates should be confirmed by title searches through local title companies. When confirmed, legal descriptions should be prepared and easement agreements executed with each property owner affected. The easement should then be recorded in the County Assessor's Office. The estimated cost of obtaining easements is $13,450.

The total cost to construct the selected improvements is estimated at $176,388.

An economic analysis was performed to determine the District's ability-to-pay and to evaluate the necessary increase in assessments to cover the project costs. The District has a very low ability-to-pay. Project financing is expected to be provided through a 50 percent grant and 50 percent loan for the rehabili-
tation work, and a 67 percent grant and 33 percent loan for the new construction through the WWDC. The total indebtedness is estimated at $78,073. The loan is expected to be provided at an annual interest rate of 4 percent, for a term of 50 years. The resulting assessments needed to retire the debt are estimated to increase from $17.50 to $42.76 per year for all parcels up to 2.4 acres. Properties larger than 2.4 acres would pay an additional $17.81 per acre per year. A summary of the funding scenario, and assessment costs is given in Tables 1 and 2 below.

**TABLE 1**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>TOTAL COST</th>
<th>GRANT</th>
<th>LOAN</th>
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<tr>
<td>New Construction</td>
<td>$59,537</td>
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<td>$19,647</td>
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<tr>
<td>Rehabilitation</td>
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<td>58,425</td>
<td>58,426</td>
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<tr>
<td>Total Project Cost</td>
<td>$176,388</td>
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<td>$78,073</td>
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**TABLE 2**

<table>
<thead>
<tr>
<th>LOAN AMOUNT (50 YR, 4%)</th>
<th>ANNUAL LOAN REPAYMENT COST</th>
<th>ANNUAL PER ACRE ASSESSMENT</th>
<th>REQUIRED BASE ASSESSMENT (2.4 Ac)</th>
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<tbody>
<tr>
<td>$78,073</td>
<td>$3,563</td>
<td>$17.81</td>
<td>$42.76</td>
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