WaterSMART Grant

Water & Energy Efficiency Grant for Fiscal Year 2023

Funding Opportunity Announcement No. R23AS00008

July 2022

Cottonwood Irrigation District Lateral L-7 Replacement Project

Smoot, Wyoming

Applicant

Cottonwood Irrigation District

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SUNRISE ENGINEERING

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Date:	July 22, 2022
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Contact:	Jason Linford, PE Sunrise Engineering, Inc PO Box 609. Afton, Wyoming 83110 jlinford@sunrise-eng.com 307.885.8500

The water users of the Cottonwood Irrigation District currently experience significant water losses due to extensive seepage on lateral L-7. This 30-inch welded steel pipeline is located at the head of a branching distribution system serving 5,185 acres under 336 separate accounts. The pipe was installed in the early 1970's and in recent years has experienced unplanned and planed repair and replacement projects.

For this project, 3,542 feet of 30-inch pipe is proposed to be replaced along with refurbishment of a PRV station at the end of this pipe segment. This work will do the following:

- Improve sustainability of rural communities through water conservation
- Reduce operation and maintenance costs
- Improve delivery pressures
- Reduce unplanned service outages

Approximate Project Length:	12 months
Completion Date:	June 2024
Federal Facility:	This is not a Federal facility.

The Cottonwood Irrigation District is a category A applicant and owns and operates the intake and pipeline that obtains water from the Cottonwood Creek Drainage. The system has water rights for 61.62 CFS from the Cottonwood Creek.

Irrigators in the Cottonwood Irrigation District utilize sprinkler irrigation. Sprinkler irrigation mainly consists of hand lines, wheel lines and some center pivots. Crops grown are primarily alfalfa, barley, and pasture grass.

The District's water rights are associated with the original ditches that were replaced by pipelines in the early 1970s under a Soil Conservation Service led project. The following ditches or enlargements of the ditches were transferred to the pipeline:

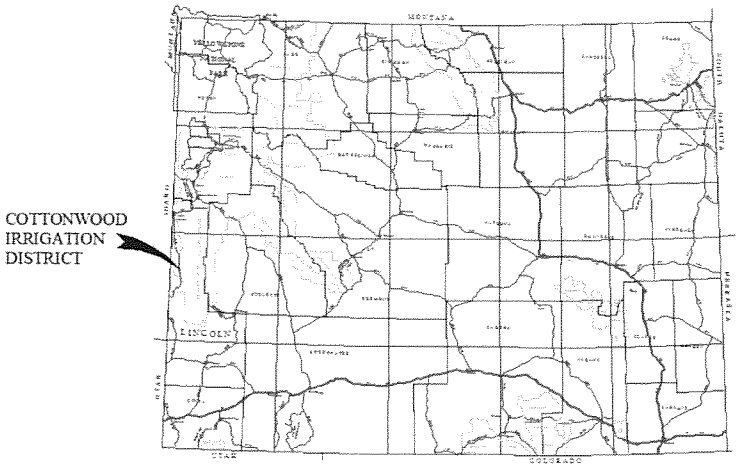
Table 1: Cottonwood Irrigation District Water Right Information

Water Rights Associated with the Original Ditches	
Ditch Name	***Flow CFS**
American Ditch	1.41
Bruce Ditch	1.13
Cottonwood South Ditch	21.1
Creger Ditch	14.39
Jensen Ditch	0.37
Schwab Ditch	3.98
Smoot Ditch	0.53
Upper North Canal	7.54
West Fork Creggar Ditch	3.97
Wilber Ditch	7.2
Total CFS	**61.62**
* Flows include enlargements	

Project Location

The Cottonwood Irrigation District Lateral L-7 Replacement Project is in Lincoln County, Wyoming in the vicinity of the unincorporated community of Smoot, Wyoming. The upper end of the proposed project is located latitude is 42°36'59.95" N and longitude is 110°54'51.41" W. Figure 1 illustrates the location of the District in relation to its surroundings.

Figure 1 – District Location



Technical Project Description

Cottonwood Irrigation District currently owns and operates 174,200 feet of pipeline. Pipe sizes range from 42-inch down to 4-inch. Pipe materials include concrete, welded steel, asbestos cement and more recently PVC. The District has experienced significant increased maintenance and un-planned outages associated with corrosion and internal erosion on its welded steel pipes. The largest steel pipes at the head of the system including L-7 have caused the most difficulty. The purpose of this project is to improve the most problematic section of the welded steel pipe to reduce seepage and un-planned maintenance.

The Wyoming Water Development Commission (WWDC) has stated their support for this project by approving 67% funding, which was recently approved through the Wyoming State Legislature. A Level II engineering study was completed in 2017 using WWDC funding. The study identified several needs including the improvements proposed at this time. This proposal has been prioritized over other projects in the original study as unexpected leak repairs have revealed the critical condition of this segment.

The District has undertaken in recent years to replace one 400 foot section upstream of this project using maintenance and WWDC funds. Coupons cut from the invert of the pipe indicate severe internal pitting across the bottom for a width of 8 inches and full penetration holes 3mm to 15mm about every 4 inches along the invert. The exterior of the pipe is in good condition with no visible corrosion originating on the exterior. Figure 2 is a photo of one of the coupons.

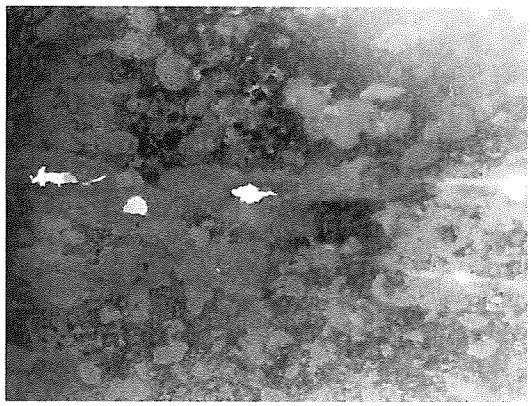


Figure 2 Invert of Replaced Pipe

The project will replace the main 30-inch pipeline from its upper connection point to a new line to its lower terminus at a vault where the line transitions to 27-inch asbestos cement.

With funding secured from both the WaterSMART Grant and the WWDC, a full engineering design of the proposed pipeline will be completed by a professional engineering firm to ensure proper design and safety considerations. The design will be in accordance with industry design standards.

Evaluation Criteria

E.1.1. Evaluation Criterion A—Quantifiable Water Savings

Describe the amount of estimated water savings: Water loss from the pipe is currently lost to deep percolation in the rocky allvium deposits that underly the soil in the project area. It is estimated a 6mm orifice with an internal pressure of 50 psi and an exterior pressure of 49 psi could pass up to 1.1gpm. At this flow rate, with an estimated one hole per foot, water losses for the project area are estimated as follows:

3,542 ft x 1 hole/ft x 1.1gpm/hole = 3,896gpm

3,896gpm = 8.6 cfs

8.6 cfs over a 120 day season = 2,047 ac-ft per season

The use of PVC pipe with gasketed fittings will result in an almost complete elimination of water loss from the pipe. Irrigation risers and fittings will introduce some losses. Recent replacement projects within the District have specified the allowable leakage after construction as follows:

$$L = 10xSD(P^{0.5})/133,200$$

where: L = Leakage rate (gal/hour)
S = Length of tested pipe (feet)
D = Nominal diameter of pipe (inches)
P = Average test pressure (psi)

Under this formula the allow able leakage post construction will be as follows:

$$L = 10 \times 3,542 \times 30D(100^{0.5})/133,200 = 80gph$$

80gph = 0.16cfs

0.16 cfs over a 120 day season = 38 ac-ft per season

The net water savings is estimated at (2,047 – 38) 2,009 acre feet.

Describe current losses: Water losses from the bottom of the pipe are typically lost to deep percolation in the rocky alluvium underlying the pipe. It some areas, the leaks do surface if the topsoil is deep and enough leaks occur in close proximity. Generally speaking leaks are difficult to find as the bottom of the pipe is about five feet below grade in rocky material.

Describe the support/documentation of estimated water savings: The pipe condition has been confirmed by observation of the pipe when leaks reach a critical state such that the water is surfacing and the pipe must be banded or replaced. During these repairs the invert condition has been found to reflect the holes shown in the photograph of Figure 2.

Please address the following questions according to the type of infrastructure improvement you are proposing for funding.

1. *Canal Lining/Piping:* This project was a historic canal piping project that has surpassed its material life in certain corrosive soil types found in the project area.

a. *How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of data/measurements from representative sections of canals.*

Not applicable as there are no canal improvements proposed.

b. *What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?*

Not applicable as there are no canal improvements proposed.

c. *What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?*

Not applicable as there are no canal improvements proposed.

d. *How will actual canal loss seepage reductions be verified?*

Not applicable as there are no canal improvements proposed.

e. *Include a detailed description of the materials being used.*

The project will utilize PVC piping to replace steel piping.

E.1.2. Evaluation Criterion B Renewable Energy

E.1.2.2 Increasing Energy Efficiency in Water Management

All conserved water will remain in the system. The District currently experiences shortages and goes on turns sometime in July or August. The conserved water will delay turns providing growers with important late season water. It is expected that all 8.6 cfs of conserved water will be put to beneficial use in the sprinkler irrigation systems. This availability through the District gravity system delays the need for irrigators to pump water from wells and river diversions. The number of wells and river diversions that operate is unknown.

During the 2017 Level II study funded by the State of Wyoming several hydro power sites were investigated. One of the sites was directly connected to the proposed project while to additional sites were downstream and relied on the proposed project for water supply. Generators ranged in size from 220kW to 520kW. The study identified an avoided cost rate of six cents per kWh as the minimum necessary for feasibility at the best site. Given the current avoided cost of power in the area of three and a half cents a hydro project is not viable at this time.

E.1.3. Evaluation Criterion C—Sustainability Benefits

Enhancing Drought Resiliency: The primary beneficiary of the water savings will be to the agricultural sector. Because Cottonwood Creek is fully appropriated in some seasons very limited water passes the diversion structure. Because of this project, in certain seasons, the conserved water will remain in Cottonwood Creek for recreation and to maintain the fishery. The elimination of leakage will delay dewatering of the creek by an estimated two to three weeks and also allow water to return to the creek earlier in the fall.

Common threatened or endangered species with a potential to be in the area are Ute ladies'-tresses (threatened) and the Yellow-billed cuckoo (candidate). The proposed project would benefit any of these species if present by extending the seasons when water passes the diversion structure.

This project will enable reduced diversions from the Cottonwood Creek, leaving more water for any downstream uses. This could provide positive impacts downstream.

This project will not have adverse impacts to any listed species.

Addressing a specific water and/or sustainability concern: The primary sustainability concern is with the management of water as drier conditions appear to be a future trend. The conservation and management of the available water dictates that the system must convey water in an efficient manner to the end user.

Other Project Benefits: The primary

(1) Combating the Climate Crisis:

The project will conserve water for the irrigators as well as leave water in the creek downstream of the diversion for longer periods. The trees and habitat along the creek will benefit from the water remaining in the creek. This seemingly small benefit can combat the effects of climate change which are often imperceptible but deadly to the habitat.

The previously discussed benefit of conserving water reduces power consumption as irrigators

(2) Disadvantaged or Underserved Communities: This project will support rural communities. The majority of the Cottonwood uses users live in or near Smoot, Wyoming. Most of the irrigators affected by this project live in rural areas outside of the any incorporated municipal limits.

(3) Tribal Benefits: This project will not benefit an Indian tribe.

(4) Other Benefits: As described under the similar question above, the conserved water will be used by District users with the primary benefit occurring during the summer months. In addition to irrigators, residential lots rely on this water for lawns and stock water. When not required by the users the conserved water will remain in Cottonwood Creek extending the periods and volume of flow in the stream channel.

E.1.4. Evaluation Criterion D—Complementing On-Farm Irr. Improvements

All farms utilize sprinkler irrigation. By increasing water availability and reliability in the delivery pipeline, the on-farm sprinkler use will be extended. This increases the benefit to irrigators who have previously installed on-farm improvements.

There is ongoing interest in the installation of center pivot system where possible to improve efficiency. By delaying the implementation of turns the center pivot O&M is reduced by not starting and stopping the systems as is required during turns.

Hand and wheel lines are typically moved twice per day by irrigators to avoid deep percolation losses.

Reduction in water losses in the delivery pipeline will result in more dependable water availability and pressure, which in turn helps the efficiency of existing pivot systems. Better water reliability will also increase crop production, which in turn could help fund on-farm improvements such as additional center pivot systems.

E.1.5. Evaluation Criterion E—Planning and Implementation

E.1.5.1 Project Planning: The District has recognized areas of system deficiencies in both condition and the way the system is used by irrigators. In recent years the District has helped with the purchase of flow control nozzles and has purchased a portable flow meter to monitor the on-farm deliveries. Irrigators maintain their gaskets and valve openers to prevent unnecessary water loss. The watermaster actively monitors the on-farm systems to insure nozzle size, nozzle number and overall system flow.

In the event of drought or water shortages the District implements "turns" using an established system where-in irrigators alternate days of irrigation use to insure all irrigators have an

opportunity for water. These processes are largely based in experience and knowledge of system performance.

Studies completed for the Wyoming Water Development Commission include:

Cottonwood Lake Enlargement Project Level II Study, Sunrise Engineering, Inc., 2009
Cottonwood Lake Enlargement Project Level II, Phase II Study, Sunrise Engineering, Inc., 2013
Cottonwood Irrigation District Master Plan, Sunrise Engineering, Inc., 2017

Each of these studies is available at the Wyoming Water Development Commission website (wwdc.state.wy.us).

The Cottonwood Irrigation District initially began a search for late season water with the above listed studies of the enlargement of Cottonwood Lake. These studies were a direct approach at storing water to meet late season demands. The enlargement of the lake would yield about 360 acre feet. After the USFS confirmed the annual user fee would be over $13,000 the District wisely dropped the enlargement of Cottonwood Lake. Looking inward, the District implemented and enforced water on-farm conservation measures. In addition, in intervening years the District learned more about the scope of its transmission and distribution system. The 2017 Master Plan confirmed system leaks were significant and even surpassed by several magnitudes the storage they were trying to achieve with the lake enlargement. The Master Plan recommended several projects one of which is the subject of this application.

E.1.5.2 Readiness to Proceed: The District has secured funds from the State of Wyoming that will allow a Spring or Fall 2023 construction timeframe. Design will be completed in the interim. The District will bid the project once all funds are approved and proceed with construction at either the end or beginning of the following irrigation season. The District will need to secure a right of way permit from Lincoln County Wyoming to cross Road 148 and possibly a nationwide permit from the Corps of Engineers to cross Cottonwood Creek and a consultation with US Fish & Wildlife Service.

The following schedule outlines major tasks or milestones along with estimated dates:

Release for Design:	September 2022
Design:	September 2022 to March 2023
Permitting:	February 2023 to April 2023
BOR Funding:	May 2023
Bidding:	July 2023
Construction:	October to November 2023 and April to June 2024.
Project Completion:	June 2024

E.1.6. Evaluation Criterion F—Collaboration

The Cottonwood Irrigation District regularly holds meetings and encourages input and recommendations from its users. The District affects both residential and agricultural lands and consequently affects many lives in the community it serves. Other entities that interact with the

District include the Star Valley Conservation District, NRCS, Lincoln County, Smoot Water and other utilities and interests using the common lands and rights of way.

This project in particular passes near residential areas and discussions with land owners about the disruption will be part of the design process. Where possible land owner requests will be accommodated provided the location and cost of the pipe are not affected. Letters of support obtained for other projects on this line segment are attached.

E.1.7. Evaluation Criterion G—Additional Non-Federal Funding

The project will utilize non-federal funding in the amount of $1,333,000. As a percentage of overall cost it will be $1,391,000/$1,891,000 = 73%. In section D.2.2.3 Project Budget the funding is discussed in more detail.

E.1.8. Evaluation Criterion H—Nexus to Reclamation

The proposed project lies within the Snake River drainage upstream of the Palisades Dam and other Minidoka Project installations. Water conservation will ultimately benefit these downstream federal installations and associated irrigation districts.

Performance Measures
Upon installation of the new PVC pipe pressure testing will be conducted to determine water leakage and this leakage will be compared to leakage estimates based on the removed pipe and any further defects discovered in the existing pipe and appurtenances. The comparison of leakage rates will allow a quantification of the gallons saved or acre-feet saved.

With regard to the PRV aspect of the project, the success of the refurbishment of the PRV station will be measured in terms of steady downstream pressures and elimination of over pressurization of the downstream piping and subsequent over use of water by the spray nozzles. Pressure gauges installed a the PRV will be monitored to insure stable downstream pressure settings.

D.2.2.3. Project Budget

The funding plan for the project is as follows and will be split as follows:

- 55.7% Wyoming Water Development Commission Grant: $1,053,782
  - WWDC funding has been approved in March of 2022.
- 17.7% Wyoming Water Development Commission Loan: $337,218
- 26.4% Reclamation Water SMART Grant: $500,000
- For information, the following funding has been previously awarded to the Cottonwood Irrigation District for other related work on pipeline replacement:
  - Wyoming Water Development Commission Grant: $558,780
  - Wyoming Water Development Commission Loan: $275,220
  - Wyoming Water Development Commission Grant: $1,029,629
  - Wyoming Water Development Commission Loan: $206,741
  - US BOR WaterSmart Grant: $300,000
  - NRCS: $270,000

Budget Proposal

Table 2: Total Project Cost Table

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	$ 500,000
Costs to be paid by the applicant	$ 337,218
Value of third party contributions	$ 1,053,782
TOTAL PROJECT COST	$ 1,891,000

Table 3: Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Personnel Salaries and Wages				
Included within Contractual	N/A	N/A	N/A	$ 0
Fringe Benefits				
Not Applicable for Current Budget	N/A	N/A	N/A	$ 0
Travel				
Not Applicable for Current Budget	N/A	N/A	N/A	$ 0
Equipment				
Included within Contractual	N/A	N/A	N/A	$ 0
Supplies and Materials				
Included within Contractual	N/A	N/A	N/A	$ 0
Contractual/Construction				
Engineering Professional Services	Refer to Appendix C			$ 99,100
Construction	Refer to Appendix C			$ 1,585,560
Environmental	Refer to Appendix C			$ 18,300
Legal Professional Services	$ 2,800	1	Lump Sum	$ 2,800
Permitting	Refer to Appendix C			$ 12,700
Other				
Inflation/Contingency (one year)	$172,540	1	Lump Sum	$ 172,540
TOTAL DIRECT COSTS				**$1,891,000**
Indirect Costs				
Not Applicable for Current Budget	N/A	N/A	N/A	$ 0
TOTAL ESTIMATED PROJECT COSTS				**$ 1,891,000**

Budget Narrative

Salaries and Wages

The District maintains no full time salaried employees. The water master position is seasonal with wages paid but no fringe benefits.

Salaries and Wages for project consultants are included in Contractual Costs. With the Contractual Costs, the budgeted amounts have been broken down to Salaries and Wages (Fee Schedule) where applicable. These cost break downs are included in Appendix C.

Fringe Benefits

Fringe Benefits are not included in this budget. All compensation for employees with the engineering firm are expressed in the Fee Schedule attached in Appendix C. All other compensation for employees outside of the engineering firm are included in their Contractual Costs.

Travel

Travel Costs included in the budgets in Appendix C are associated with travel to and from the site during design and construction. The construction observer and project personnel will reside within 10 miles of the project. It is anticipated they will accumulate 4,300 miles during the course of the project at $0.59 per mile.

During design and permitting the surveyor will travel as a single person with one overnight stay. Environmental and cultural consultants will travel to the site from their homes located between 60 and 200 miles away for a site visits or meetings. It is anticipated they will accumulate 2,800 miles during the course of the project at $0.59 per mile.

Equipment

Equipment Costs are included in Contractual Costs. Documentation of all equipment costs on the fee schedule incurred during the project will be properly documented and shown on invoices. No new equipment purchases are anticipated for this project.

Materials and Supplies

Materials and Supplies are included in Contractual Costs. Survey supplies, office supplies, binding, publishing, mailing and other materials are incidental to the tasks and will not be billed separately. No additional material needs are anticipated for this project.

Contractual

Funding for the project will be used to pay for contractors, construction material, engineering consultants, environmental consultants, and attorney consultation. This includes construction, engineering, environmental, and legal services. A breakdown of probable costs for these services can be viewed in Appendix C.

The probable costs found in Appendix C were prepared by a professional engineering firm. Costs for construction were taken from recent bid documents from similar type of work and projects. This information is available for review upon request.

Third-Party In-Kind Contributions

N/A

Environmental and Regulatory Compliance Costs

A budget of $34,000 is planned to complete the environmental requirements of this project. It is anticipated that a team of consultants will be used to prepare the environmental documents to a level acceptable by the National Environmental Policy Act (NEPA) requirements.

Other Expenses

There are no other expenses that have not been accounted for in the previous sections and previous budgets.

Indirect Costs

There are no Indirect Costs associated with this proposed project.

D.2.2.4. Pre Award Costs

The project design is expected to occur during the fall of 2022 and spring of 2023. The incurred costs during design will be associated with engineering and professional services on Table 3 above. The expenditures will result in survey, detail design, specifications, bid documents, environmental and permitting applications.

D.2.2.5. Environmental and Cultural Resources Compliance

The project will have temporary effects on the environment during construction such as vegetation disturbance, dust, noise and traffic disruptions. Some effects such as dust can be mitigated with physical processes others such as noise and traffic will be mitigated the time of day work is conducted.

The project is in an area with listed species however past projects have indicated these species (the ute-ladies-tresses and yellow billed cuckoo) and their habitat have not been found to be present in this area.

The original system was completed in the early 1970's. There are no historical features or structures along this segment of the pipeline that will be removed and replaced.

The Lander Cutoff of the Oregon Trail passes through Star Valley however it was located further west of this project along the Salt River. Also, no known native ceremonial or archeological sites are known to exist along this pipe segment.

There are noxious weeds in the project vicinity and project limits. Care will be taken during construction to keep top soils segregated on site and replaced at the same location. Removed subsoil and rock will be taken to disposal sights and buried.

D.2.2.6. Required Permits or Approvals

As described previously, the following permitting activities will be completed during the project:

Endangered Species Act review: consult with US Fish & Wildlife Service
Wyoming State Historical Preservation Office: cultural review (survey completed)
Wyoming Department of Environmental Quality: stormwater permit
Lincoln County: Permit for work in roadway right-of-way.

D.2.2.7. Overlap or Duplication of Effort Statement

The route of this pipeline and its connection points are located away from other utilities or potential improvement work by the County or Municipalities. There will be no overlap in survey, photography, and design of improvements.

D.2.2.8. Conflict of Interest Disclosure Statement

There are no known conflicts of interest with regard to the District or its members and the proposed project application for funding. The membership of the District will receive irrigation benefits in terms of system reliability and water conservation.

D.2.2.9. Uniform Audit reporting Statement

The District has not expended more than $750,000 in U.S. dollars in the District's fiscal year.

D.2.2.10. Letters of Project Support

The membership of the District has voted a rate increase to pay for pipeline replacement. This segment of pipeline was one the membership considered for replacement at the time of the vote. Additional letters of support are included in the Appendix D. These letters were collected in previous years for this L-7 lateral replacement.

D.2.2.11. Letters of Partnership

The membership

D.2.2.12. Official Resolution

An official resolution meeting the criteria set forth above is attached in Appendix E.

D.3. Unique Entity Identifier and System for Award Management

The Cottonwood Irrigation District is currently registered with SAM, under DUNS number 099319196.

Appendix A

System Map


LEGEND
4 INCH PIPE
6 INCH PIPE
8 INCH PIPE
10 INCH PIPE
12 INCH PIPE
14 INCH PIPE
15 INCH PIPE
16 INCH PIPE
18 INCH PIPE
20 INCH PIPE
21 INCH PIPE
24 INCH PIPE
27 INCH PIPE
30 INCH PIPE
36 INCH PIPE
42 INCH PIPE
DISTRICT BOUNDARY
3 PHASE OHE
PRESSURE REDUCING VALVE
PRESSURE RELIEF VALVE
SYSTEM DRAIN OR FLUSHING VALVE
AIR/VACUUM RELIEF VALVE
BUTTERFLY VALVE
ORIFICE METERING DEVICE
LEAK - R=RISER, P=PIPE
INTAKE STRUCTURE
Project Area
SUNRISE ENGINEERING
WWDC COTTONWOOD IRRIGATION
MP LEVEL 1 STUDY
COTTONWOOD IRRIGATION DISTRICT MAP
SYSTEM MAP
EXHIBIT 3-A