

# Ainsworth Irrigation District

## Automation of Bone Lateral Check

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## Technical Proposal

### Executive Summary

**Date:** 5 May 2017

**Applicant Name:** Ainsworth Irrigation District

**City:** Ainsworth

**County:** Brown County

**State:** Nebraska

The Ainsworth Irrigation District board members and management are committed to delivering water to our water-users in the most efficient way possible. One of the objectives of our water conservation plan is system automation. As we continue our efforts to automate our system, we are seeking cost share funds through the United States Bureau of Reclamation WaterSMART grant program to install a Rubicon automated FlumeGate on Bone Lateral at Station 17.4 to replace the current 48 inch manual slide gate. This 4 foot Rubicon FlumeGate will make the deliveries below this point much more accurate thereby saving the district approximately 400 acre feet of water each year. The cost of the project will be \$42,000. This will include \$31,590 for automation equipment and \$10,410 for labor and machine hire to revamp the existing structure to accommodate the new equipment.

The timeline to complete this project will be October 1, 2017 until November 31, 2018.

The proposed project is located in the Bureau of Reclamation's Pick Sloan Missouri River Basin Project, a Federal facility.

## Background Data

The Ainsworth Unit is located in north-central Nebraska. The District's location is indicated by the star in the map in Figure 1 below.



*Figure 1 - Location of Ainsworth Irrigation District*

The Ainsworth Irrigation District is an integral part of the Bureau of Reclamation Pick Sloan Missouri River Basin Project and was authorized on August 21, 1954. Construction of Merritt Dam, the Ainsworth Canal and the distribution system began in 1961. The Ainsworth Irrigation District took over operation and maintenance in 1967.

The Ainsworth Irrigation District provides a full water supply for the irrigation of 34,571 acres of land in the Brown and Rock County area. Project facilities include Merritt Dam and Reservoir, the Ainsworth Canal, a system of laterals, and surface and subsurface drains. Although essentially a single-purpose irrigation development, additional benefits accrue from recreation, fish and wildlife, and water quality control.

The storage facilities are on the Snake River approximately 14 miles upstream from its confluence with the Niobrara River in Cherry County southwest of Valentine Nebraska. The irrigation lands extend 22 miles from west to east and 14 miles from north to south, beginning near Johnstown and continuing eastward to a point near Long Pine, all in Brown and Rock Counties.

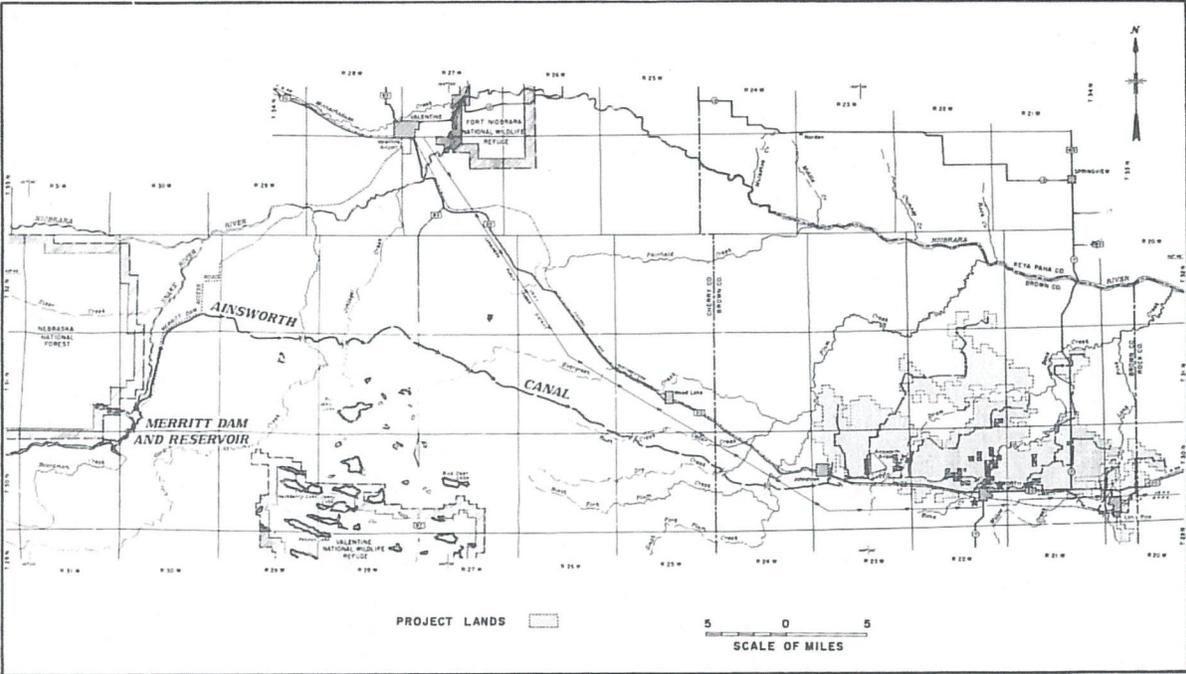


Figure 2 - Map showing counties and nearest towns

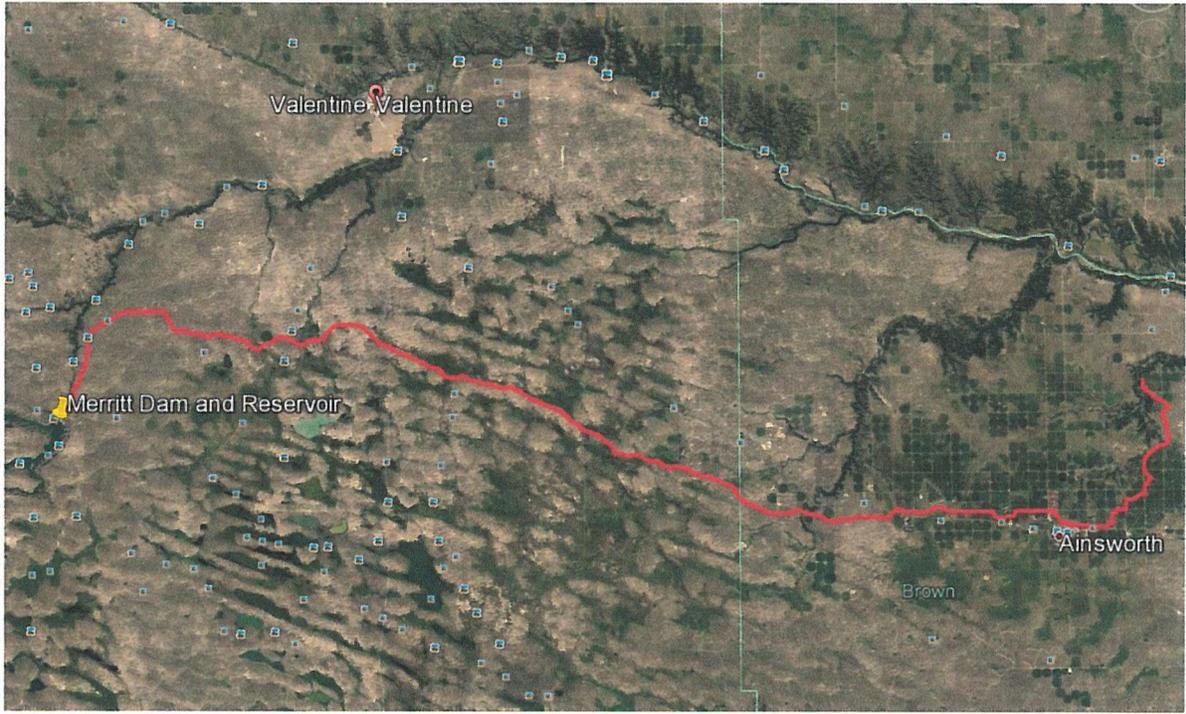


Figure 3 - Ainsworth Canal supplying Project Lands in Ainsworth, Brown County

The water supply for the unit comes from the Snake River and is stored in Merritt Reservoir for timely release into the Ainsworth Canal by which it is conveyed to project lands for irrigation.

The Snake River originates in the Sandhills region of Nebraska, an area characterized by highly permeable sands and many closed basins. Precipitation falling into these basins seeps into the ground or ponds temporarily, and feeds the streams with a large, steady baseflow. Because of the underground flow, the total drainage area contribution to the Snake River above Merritt Dam is about 600 square miles.

The Ainsworth Canal originates at Merritt Dam outlet works and extends eastward through the Sandhills to the project lands. The canal is concrete lined for its entire 53 mile length to minimize seepage losses in the sandy soil.

The lateral system which delivers the water to the project lands has a total length of 169.7 miles consisting of 147.7 miles of earth lined canal and 22 miles of pipeline the District has installed over the past 20 years. The distribution system has initial capacities of 530 cubic feet per second. Five miles of surface water disposal drains and a series of disposal ponding areas have been constructed.

The Ainsworth Irrigation District is governed by a three member board of directors and a manager who is employed by the District.

### Project Description

This project involves the installation of an automated flow measurement and control structure at the 17.4 Mile Check of the Bone Lateral, located approximately 5.75 miles north-east of the City of Ainsworth.

The check presently consists of a 4ft gate valve supplying a siphon which passes beneath a road crossing.

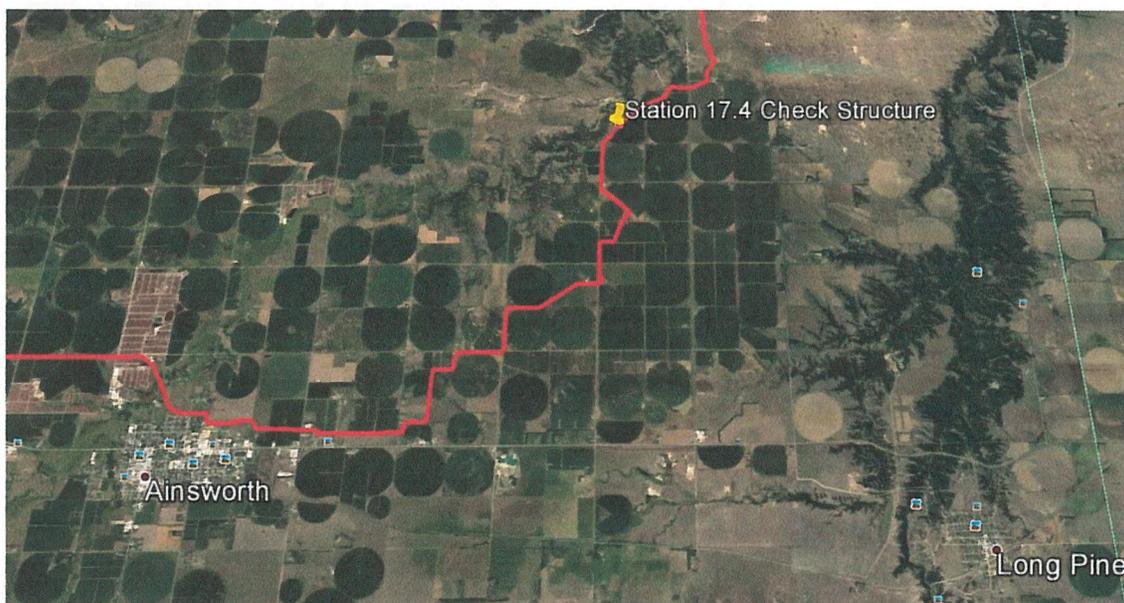
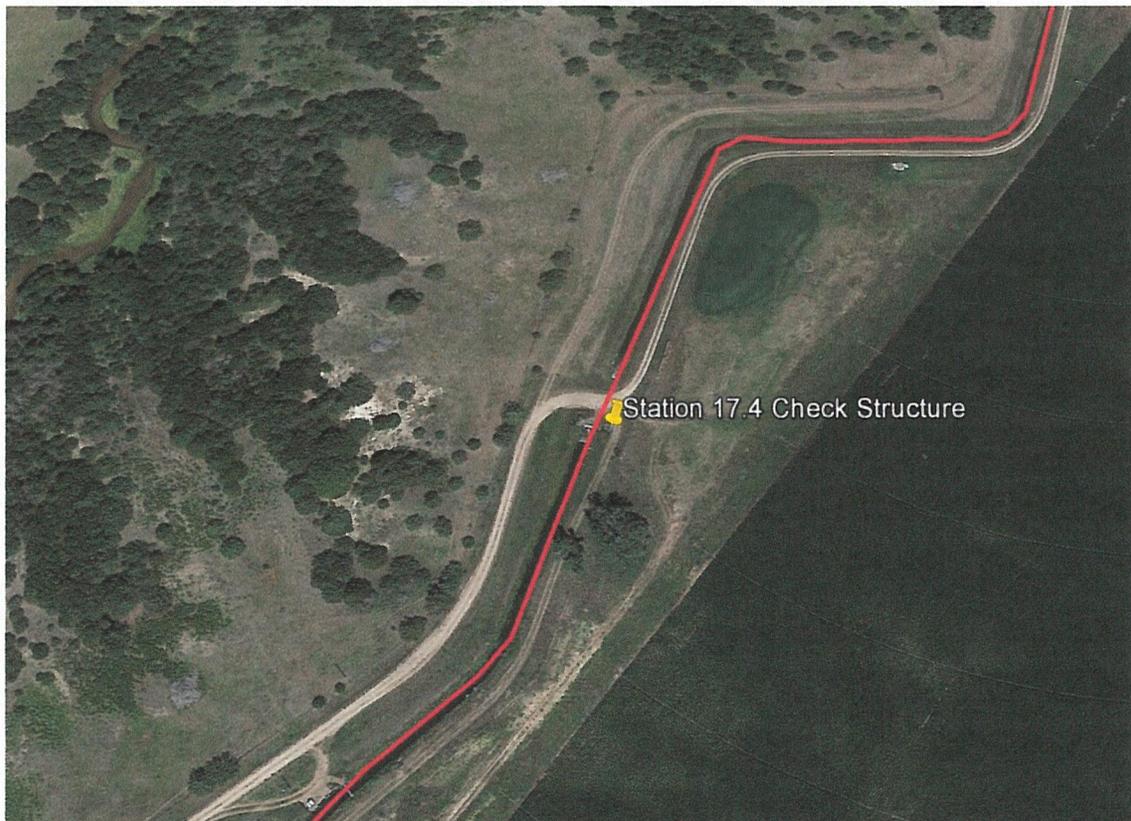


Figure 4- Location of Station 17.4 Check Structure

This check is presently manually operated using an undershot gate with poor measurement accuracy. The poor measurement accuracy makes it difficult to set the flow past the structure to meet the needs of downstream deliveries and commonly results in over-deliveries to ensure that downstream demand is met.

Another problem presented by the manual undershot gate is a lack of real-time flow information available to operators further upstream in the system. This lack of information makes it challenging to match flows upstream to demand at the 17.4 Mile Check, resulting in spill from the waste-way located upstream of the Station 17.4 Check structure.



*Figure 5 - 17.4 Check Structure and Upstream Waste-way (at bottom of image)*

The installation of a precise flow measurement device with real-time telemetry at this check will provide accurate real-time flow information at this point of the system to allow accurate flows to be set to match the downstream demand, and will thereby reduce spill from the bottom of the network.

This project will install a Rubicon FlumeGate telemetered precision flow measurement solution to address these problems. The FlumeGate is a mature product which has been deployed for more than 20 years with a quantity of more than 20,000 deployed worldwide. The FlumeGate is shown in Figure 6 below.

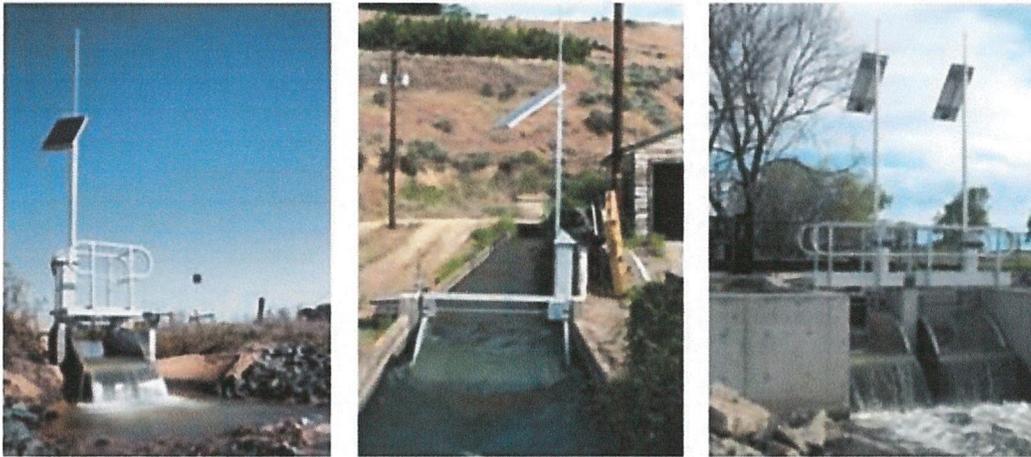


Figure 6 - Rubicon FlumeGate

The FlumeGate's real-time flow readings will be available to canal operators to make informed upstream flow control decisions which will reduce the surplus flows which pass to the waste-way upstream of the Station 17.4 Check Structure.

The combined reduction in surplus deliveries past the 17.4 Check and the reduction in spill from the upstream waste-way is expected to recover approximately 400 acre feet of water each year.

## Evaluation Criteria

### E.1.1 Evaluation Criterion A – Planning Efforts Supporting the Project (35 points)

**Does the proposed project implement a goal or address a need or problem identified in the existing planning effort?**

The Ainsworth Irrigation District board members and management are committed to delivering water to our water-users in the most efficient way possible. We strive to save water by continuing the good water management practices the district has put into place over the last 50 years.

The Ainsworth Irrigation District has had a water conservation plan in effect for many years. This Ainsworth Irrigation District Water Conservation plan was revised in 2005. One of the objectives of this water conservation plan is system automation and converting open laterals to pipe line. The district has now converted approximately 25 miles into pipeline and has installed one 200 cfs automated ramp flume and one 100 cfs ramp flume.

This project further contributes to the system automation component of our water conservation plan.

**Explain how the proposed project has been determined as a priority in the existing planning effort as opposed to other potential projects/measures.**

The automation of the Station 17.4 Check Structure was selected as a priority in our existing planning efforts because of the challenges the present gate presents to accurate and efficient water deliveries. The existing slide gate has been difficult to set correctly due to the challenges associated with flow measurement inaccuracy and slow system response times. Significant water is spilled past this structure, and it is challenging to avoid losses at the upstream waste-way given the uncertainty in flow passing past the Station 17.4 check structure. Our experience gives us confidence that automation of this structure will easily achieve water savings – and the ease of achieving these savings makes this work a priority for us.

**E.1.2 Evaluation Criterion B – Project Benefits (35 points)**

**What are the benefits to the applicant's water supply delivery system?**

Installing the FlumeGate to replace the current manual slide gate will make the deliveries below this point much more accurate thereby saving the district approximately 400 acre feet of water each year. Presently surplus flows of around 7-9 cfs are typical below this point in the system. With better control, we can drop this down to 3-4 cfs. Over 100 days of service this reduction would conserve an estimated 400 acre feet of water each year.

This project will provide accurate real-time flow information to assist with efficient water delivery management with reduced operational spills. The ability to accurately set and maintain flow downstream of the check structure will allow downstream deliveries to be serviced without surplus flows resulting in spill.

The real-time knowledge of this flow rate will make information available to operators further upstream in the system to allow them to better match flows upstream to the demand at the 17.4 Mile Check, resulting in reduced spill from the waste-way located upstream of the Station 17.4 Check structure.

These reductions in spill will result in reduced diversions from Merritt Dam and Reservoir, retaining more water in storage to be made available for future beneficial use.

**Other benefits:**

**Extent to which the proposed project improves overall water supply reliability**

The project will result in reduced diversions from Merritt Dam and Reservoir, retaining more water in storage to be made available for future beneficial use. This additional water retained in storage, expected to be in excess of 400 acre-feet per year will benefit agriculture, recreation, fish and wildlife, and water quality control.

Reduced warm water flows into Pine Creek at the confluence of Bone Creek and Pine Creek will have benefit to the local trout populations with improved water quality.

**The proposed scope of positive impact from the proposed project (local, sub-basin, basin)**

The project will have a positive impact on all users of Merritt Dam and Reservoir, along with the wildlife and recreational users of Pine Creek.

**Extent to which the proposed project will increase collaboration and information sharing among water managers in the region**

Real-time knowledge of flow rate at this point in the system will provide information to assist in better operation and management of the system throughout the network upstream.

**Any positive impacts to local sectors and economies.**

By retaining more water in storage to be made available for future beneficial use, the project will have positive impacts to local agriculture, recreation, and fish and wildlife economies. Reduced drawdown on the reservoir will provide to fish, wildlife and recreational users.

**E.1.3 Evaluation Criterion C – Project Implementation (15 points)**

Applicants that describe a detailed plan (e.g. estimated project schedule that shows stages and duration of proposed work) will receive the most points under this criterion.

**Describe the implementation plan for the proposed project. Include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.**

Project works will commence at the end of the 2017 irrigation season following dewatering of the canal. It is expected that the project works will commence in March 2018. The works will progress as follows:

- Preparation of existing concrete structure, including any required formwork and concrete work will occur in February 2018
- Installation and commissioning of the FlumeGate will occur in March 2018
- All works will be complete by mid-April 2018.

The construction schedule is weather dependent, but it is expected that these dates will be achieved under typical spring conditions.

**Describe any permits that will be required**

No permits will be required. No work will be conducted outside the existing canal right-of-way area.

**Identify and describe any engineering or design work performed in support of the project**

The supplier of the FlumeGate, Rubicon Water, has worked with the District to specify the appropriate control gate sizing to achieve the required hydraulic performance and has confirmed dimensional suitability for the structure and provided reference installation details.

**Describe any new policies or administrative actions required to implement the project.**

There are no new policies or administrative actions required to implement the project.

**E.1.4 Evaluation Criterion D – Nexus to Reclamation (15 points)**

Extent that the proposal demonstrates a nexus between the proposed project and a Reclamation project or activity.

**How is the proposed project connected to a Reclamation project or activity?**

The Ainsworth Irrigation District is an integral part of the Bureau of Reclamation Pick Sloan Missouri River Basin Project.

**Will the project help Reclamation meet trust responsibilities to any tribe(s)?**

Not Applicable.

**Does the applicant receive Reclamation project water?**

Yes, supplied from Merritt Dam and Reservoir as a component of the Pick Sloan Missouri River Basin Project.

**Is the project on Reclamation project lands or involving Reclamation facilities?**

Yes, the project is within the Pick Sloan Missouri River Basin Project.

**Is the project in the same basin as a Reclamation project or activity?**

Yes.

**Will the proposed work contribute water to a basin where a Reclamation project is located?**

Yes.

**Environmental and Cultural Resources Compliance**

**Will the proposed project impact the surrounding environment? Please briefly describe all earth-disturbing work and any work that will affect air, water or animal habitat in the project area. Also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.**

The proposed project does not require earth-disturbing work that will affect air, water or animal habitat in the project area.

**Are you aware of any species listed or proposed to be listed as Federal threatened or endangered species, or designated critical habitat in the project area?**

No.

**Are there wetlands or other surface waters inside the project boundaries that potentially fall under Clean Water Act jurisdiction as “Waters of the United States”?**

No.

**When was the water delivery system constructed?**

The system was constructed from 1961 - 1967.

**Will the proposed project result in any modification of or effects to individual features of an irrigation system? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.**

This project will modify the Bone Lateral Station 17.4 Check Structure, which was constructed in 1961-1967. There have not been any extensive alterations or modifications to this structure previously.

**Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?**

No.

**Are there any known archaeological sites in the proposed project area?**

No.

**Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?**

No.

**Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?**

No.

**Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?**

No.

#### **Required Permits or Approvals**

There are no permits or approvals required.

<b>Equipment</b>				
Excavator	\$140 / hr	20	Hours	\$2,800
Truck	\$40 / hr	25	Hours	\$1,000
<b>Supplies and Materials</b>				
Concrete	\$98.50 / yard	14 yards	Yard	\$1,380
Rubicon FlumeGate	\$31,590			\$31,590
<b>Contractual/Construction</b>				
No External Contractors will be employed				\$0
				\$
<b>Other</b>				
Other				\$
<b>TOTAL DIRECT COSTS</b>				<b>\$</b>
<b>Indirect Costs</b>				
Type of rate	percentage	\$base		\$
<b>TOTAL ESTIMATED PROJECT COSTS</b>				<b>\$42,000</b>

## (3) Budget Narrative

Discussion and explanation for items included in the budget proposal.

Include the value of in-kind contributions of goods and services and sources of funds provided to complete the project.

**Salaries and wages** – The project will be managed by Rodd Imm. 100 hours has been assigned for project management, reporting and coordination. Joe Moody and Larry Ziegler will assist in site preparation and associated works. 60 hours have been budgeted for these tasks. The labor is priced at an hourly rate of \$25.51 per hour.

It is estimated that 40 hours will be spent on reporting requirements for the project.

**Fringe benefits** – Fringe benefits include health and dental and retirement contributions.

**Travel** – no travel expenses are included in this FOA application.

**Equipment** – We will utilize District equipment including an excavator and truck to prepare the site for concrete formwork for minor structural modifications and to assist in installing the FlumeGate into the structure.

**Materials and Supplies** – Supplies and materials include formwork and concrete to prepare the structure for the installation of the FlumeGate and equipment listed in Rubicon Water's Quote Number Q500760 will be purchased. The equipment is required to provide accurate flow measurement and real-time reporting of flow measurements to support operations management decisions. The District will utilize our own excavators to assist with equipment installation.

**Contractual** – It is not intended to sub-contract any works.

**Environmental and Regulatory Compliance Costs** – The proposed project does not include ground disturbing activities outside the existing canal, and there are no associated environmental compliance costs.

**Other Expenses** – No other costs are included in this grant application.

**Indirect Costs** – There are no indirect costs associated with this grant application.

**Total Costs** – The total costs budgeted for this project are \$42,000 as detailed above.

OFFICIAL RESOLUTION

Ainsworth Irrigation District

87822 432nd Avenue

Ainsworth, NE 69210

**Official Resolution for BOR-DO-17-F011**

**Date: 8 May 2017**

By this resolution, the Board of Directors of Ainsworth Irrigation District supports the accompanying District application for the BOR-DO-17-F011 WaterSMART funding opportunity.

The District has the capability to provide the amount of funding and/or in-kind contributions specified in the funding plan out of our annual operating budget.

That the District will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement.

Signed by: Brent Johnson

Date: 5-8-17

Position: President