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TITLE PAGE

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WaterSMART: Water and Energy Efficiency Grant Program

PROJECT TITLE:

Improving Fort Shaw Irrigation District Water Efficiency
to
Improve Sun River Flow

APPLICANT:

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e. TECHNICAL PROPOSAL

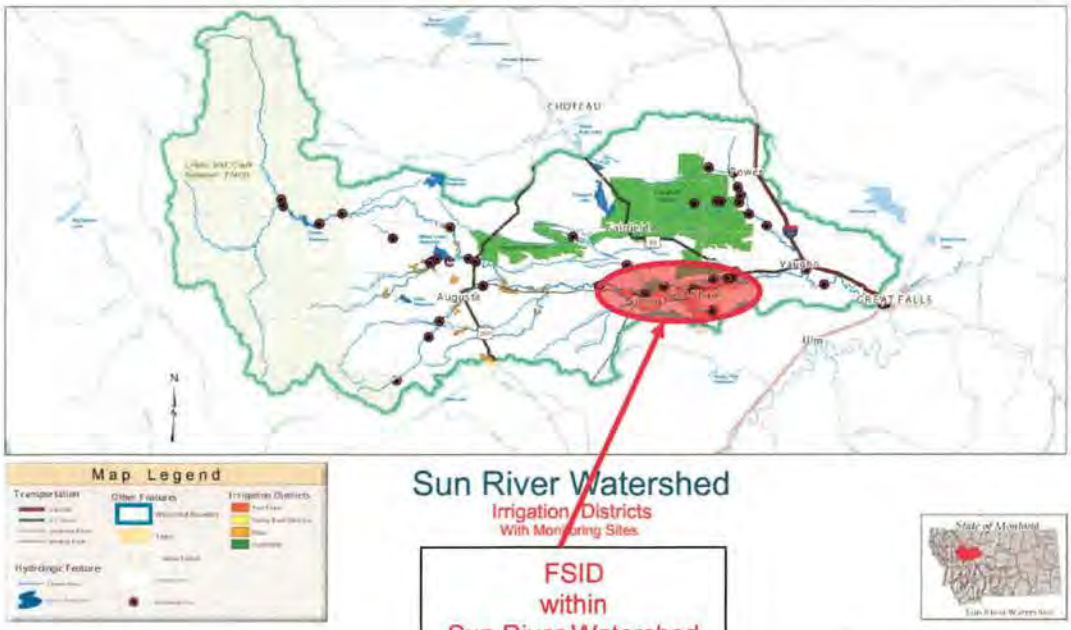
(1) Technical Proposal: Executive Summary

- **Date**: January 6, 2012
- **Applicant**: Fort Shaw Irrigation District
- **City**: Fort Shaw
- **County**: Cascade
- **State**: Montana

- **Project summary:** Task Area A - Water Conservation.
  The Fort Shaw Irrigation District (FSID or District) is an aging Bureau of Reclamation (BoR) facility with many needs that will be addressed in this proposal. The project proposal will take the most antiquated and wasteful delivery systems and upgrade them to improve water management while improving instream flows in the Sun River. The water savings will be 12 additional cfs (5,000 acre-feet) over the summer to the Sun River, which has recently gone dry below the District's headworks on numerous occasions over the past ten years. This will be accomplished by installing a bypass canal and pipe before the main canal siphon to allow for better management to 1/3 of the FSID lands in the A-system.
- **Project length**: two years
- **Estimated completion** December 31, 2013

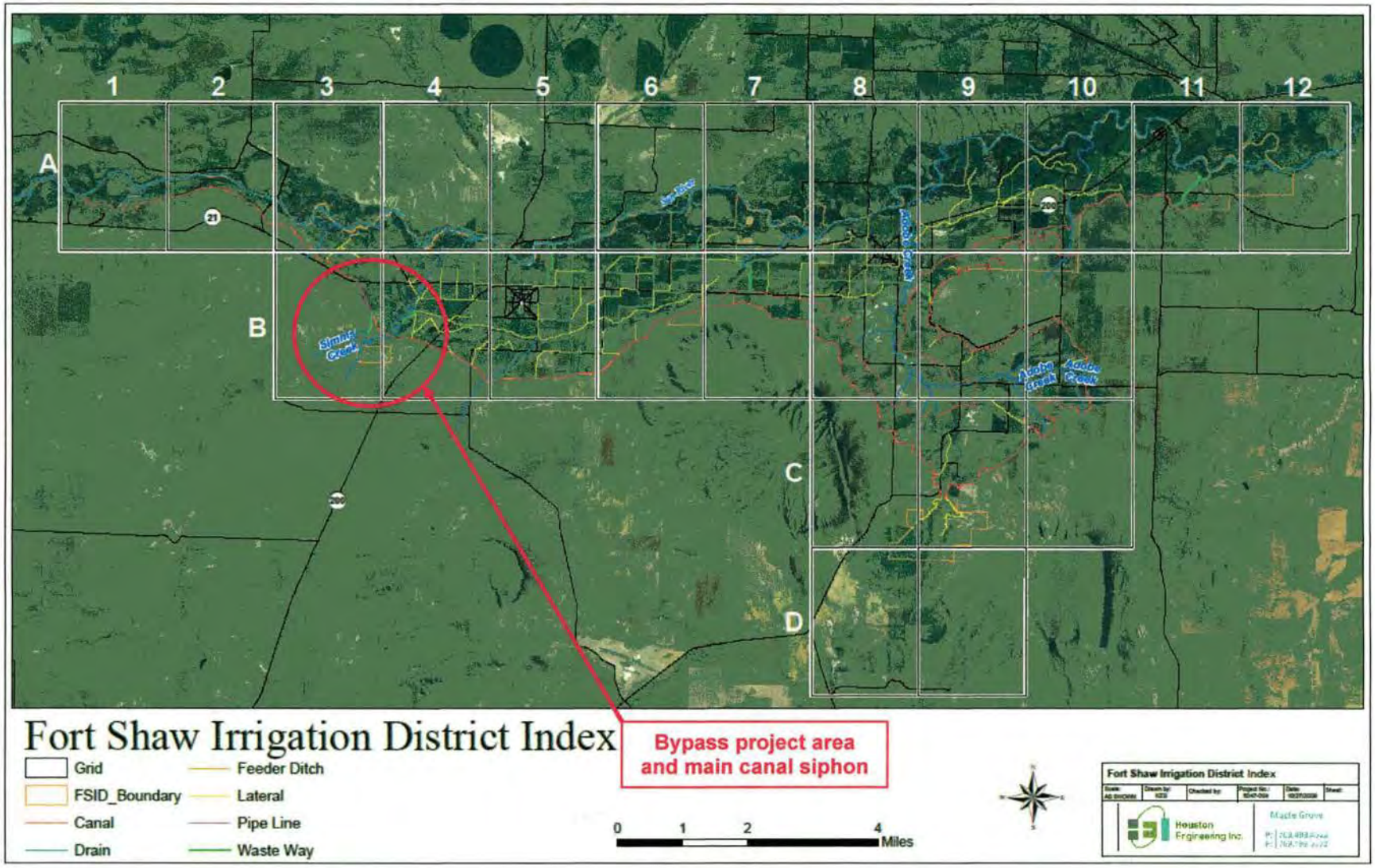
(2) Technical Proposal: Background Data –

- **Geographic location - state and watershed map:**

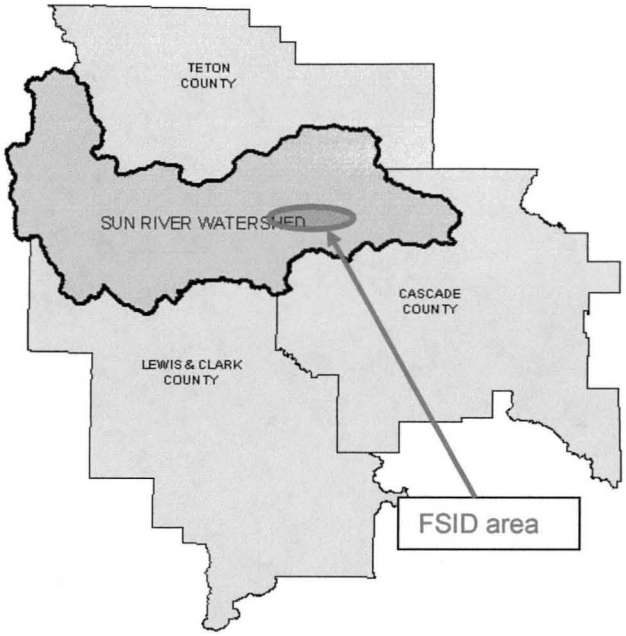


Montana map and Sun River Watershed location

Fort Shaw Irrigation District's map



Sun River Watershed/County Boundary Map



The Fort Shaw Irrigation District (FSID or District) is located 20 miles northwest of Great Falls, Montana, and involves the irrigation of agricultural crops (wheat, barley, alfalfa and grass) on more than 11,000 acres on 177 small farms. The irrigation project was originally completed in 1908 with a small rehabilitation program completed in 1961.

In 1982, the Bureau of Reclamation (BoR) reviewed the District's infrastructure status that identified many areas in immediate need of repair to enhance the District's efficiencies. An important part of that report listed the main canal siphon as a limiting factor to efficient delivery of water to 1/3 of the FSID irrigation acres as a need to improving water management. Because of the small size of the district and low net return from the crops, improvements to the project in the past have been minimal.

Water is supplied to the project from the Sun River to the Fort Shaw Canal, utilizing a rock overflow dam as a diversion structure. The water flows from the river by gravity through the main canal and into the distribution system. The Fort Shaw canal is 16 miles in length and the distribution laterals total 85 miles in length. The canal capacity is 225 cfs.

As the water diverted from the Sun River makes its way across the project, project inefficiencies and major seeps in the canals have an estimated efficiency of only 46% as identified from a 1982 BoR review. This loss is readily noticed in the loss acreage from the boggy areas and areas with high salinity. This water quantity issue impacts the small farmers, fisheries, wildlife and recreation in the area.

Willow Creek Dam and Reservoir with 32,000 acre-feet storage is the only facility for the District to supplement the Sun River stream flows as needed. This reservoir can be

critical to the water supplies of the district during dry years. The Greenfields Irrigation District of the Sun River project operates the reservoir.

A hydromet station at the headworks measures all inflows to the district. Water measurement devices have also been installed at three other key locations. Water Inventory Data Estimation:

- Diverted from Sun River = 45,000 acre-feet
- Delivered to farm units = 20,000 acre-feet
- Operation spills, seepage, evaporation, and transportation losses = 25,000 acre-feet
- On-farm efficiency is estimated at 50-75% depending upon soils and type of irrigation

All assessed lands within the district are taxed $17.50 for 2 acre/feet.

Gravity irrigation with contour ditches is the most common method of irrigation used in the area. Gated pipe is fast becoming a common tool for many farm operations. Several pivots have been installed recently as a means to increase efficiency. Some irrigators are evaluating gravity sprinkler systems as a possible alternative.

Soils throughout the irrigation district vary significantly. Those in the alluvial valley floor have medium to heavy textures and are underlain with sands and gravels. The old river terraces adjacent to the alluvium have medium gravelly-textured profiles. Soils adjacent to Shaw and Square Buttes are composed of silty clay loams and clay loams underlain by shale and sandstone parent materials. Drainage is a problem in the areas with heavier soils with some of the land having gone out of production.

Past twelve years of improvements working with BoR and many other watershed partners include:

- 1998 - Hydromet station at headworks and three key sites on main canal
- 1999 - Headwork gates automated allow for remote monitoring and operation
- 2000-2010 - Canal lining with "canal lining" on 6,000 feet of main canal
- 2000- 2010 - Replacement of 35 farm turnouts with larger size and that allow for measurements
- 2000-2010 - Replaced 2,000 feet of open canal with PVC piped system
- 2002 - Installed a ¾ mile pipeline that replaced 5 miles of open canal
- 2011 - Have replaced over 2,000 feet of open canal with PVC piped system and in the process of changing an additional 3,000 feet of canal with PVC.

BoR in each of these projects assisted District in design, NEPA review, and project oversight.

Operation and Maintenance Program - Since the District has very limited funds, past attempts to incorporate some of the BoR ideas have not taken place. Even previous grants with matching loan requirements were limited due to funding. Starting in 1997, in cooperation with local, state and federal grants and in-kind assistance, the district started an ambitious water conservation and management program. This has included the automation of the headworks, water measurement at several key locations, canal lining, a siphon to eliminate five miles of canal, landowner education programs, district board

education programs and district staff education programs. The result has been a savings of 20,000 acre-feet of water annually that has been utilized to improve Sun River flows and sustain the district to meet the demands of its producers in the ongoing droughts of this region.

(3) Technical Proposal: Technical Project Description

The overall goal of this project is to improve the irrigation efficiency of the District to benefit the entire Sun River Watershed. This will be accomplished by improving water management to 1/3 of the District, conserving water, and reducing losses so they may be utilized for reuse by the irrigation district in water short years, save water for the basin to allow more water for fisheries, drinking. Specifically, the District will:

Objective 1 - Improve irrigation efficiency of the District by 10% (5,000 acre/feet)

Task 1 - Bureau of Reclamation complete NEPA and NHPA Aug - Nov 2012
- Bureau of Reclamation with District assistance will complete a detailed environmental and historic compliance review for the proposed project.

Task 2 - Final engineering, review and certification of design Nov 2012 - Mar 2013
- District and BoR will work closely on final designs of project this major project to meet all state and federal requirements

Task 3 - Install 2,000 feet new lined canal and 2,310 feet of PVC pipe Apr - Dec 2013
- Solicit and award material bids for canal liner and PVC pipe
- FSID 3-person crew assist excavator dig canal, shape canal, lay canal lining material, and place overlay material/gravel
- FSID 3-person crew assist excavator dig trench, place bedding material, lay pipe, and pack around pipe
- FSID excavator digs trench, place bedding material and help pack material
- FSID dozer fills in trench
- FSID 3-person crew hook headgates, farm turnouts, and vents to PVC pipe
- FSID manager oversee construction phase

Task 4 - Reporting, compliance review and monitoring Aug 2012 - Dec 2013
- FSID manager bid materials, get permits, track funds, and file reports
- FSID and BoR project compliance review
- FSID test system for successful installation
- SRWG staff monitors water quantity in the Sun River for two years to track project success

Results - Better water management for 1/3 of FSID and water savings of approximately 5,000 acre-feet per year which will improve water quantity in the Sun River.

(4) Technical Proposal: Evaluation Criteria

Evaluation Criterion A: Water Conservation

- Subcriterion No. 1 - Water Conservation
- Subcriterion No. 1(a)—Quantifiable Water Savings:

Describe the amount of water saved. For projects that conserve water, state the estimated amount of water conserved in acre-feet per year that will result as a direct benefit from this project. Please provide sufficient detail supporting the estimate, including all supporting calculations. Please also include the following:

• What is the applicant's average annual acre-feet of water supply?

- 54,000 acre-feet is diverted from Sun River
- 24,800 acre-feet is delivered to farms

• Where is that water currently going (i.e., back to the stream, spilled at the end of the ditch, seeping into the ground, etc.)?

- 29,200 acre-feet is spills, seepage, evaporation, and transportation losses
  - 13,000 is operational spills into Sun River
  - 15,400 is delivery losses from evaporation and seeps into ground

• Where will the conserved water go?

- 5,000 acre-feet will be conserved from improved water management with savings to be left in the Sun River increasing summer flows by approximately 12 cfs. This 12 cfs is crucial when current river flows reach as low as 30 cfs, which is almost half of the desired bare minimum flows of 50 cfs that the watershed partners are trying to maintain.

- Subcriterion No. 2—Percentage of Total Supply:

- **Describe the percentage of total water supply conserved:** State the applicant's total average annual water supply in acre-feet. Explain how this calculation was made.

  - 54,000 acre-feet is diverted over the entire irrigation season that is measured in the canal just below the headworks where water is diverted from the Sun River.
  - 24,800 acre-feet delivered to the farms is measured at each farm turnout

- Subcriterion No. 3—Reasonableness of Costs:
Please include information related to the total project cost, annual acre-feet conserved (or better managed), and the expected life of the improvement. Use the following calculation:

$669,640
5,000 acre-feet x 40 years = 200,000 acre-feet

Relating to a $3.35 per acre-foot cost

The above calculation does not include the major water management improvement this project will benefit for almost irrigated 4,000 acres (1/3) of the district.

- For all projects involving physical improvements, specify the expected life of the improvement in number of years.

  - Life expectancy of the lined open ditch and buried PVC pipe per NRCS field guide specification is approximately 25 years however past actual experience is closer to 40 years

Evaluation Criterion E: Other Contributions to Water Supply Sustainability

(1) Will the project make water available to address a specific concern? Example:

- Will the project address water supply shortages due to climate variability and/or heightened competition for finite water supplies (e.g. population growth or drought)

  - The Sun River Watershed water rights are over three times average available water supply using known state water right records. The water conflict for this limited water supply become even more heightened in drought years which have been fairly frequent in the past ten years. In the past ten years the snowmelt and in-turn water runoff has been coming off sooner due to climate change making it less available for the irrigators and the aquatic life. Any water savings like this project that is beneficial for the District and the river need to be installed as soon as possible to help reduce water wars.

- Will the project market water to other users? If so, what is the significance (e.g., stretch water supplies in a water-short basin)?

  - The water will not be marketed to other users but will be part of a team effort to better share this limited resource in the water-short basin.

- Will the project make additional water available for Indian tribes?

  - No.

- Will the project help address an issue that could potentially result in an interruption to the water supply if unresolved? (e.g., will the project benefit endangered species)?

  - No, the water will not benefit any endangered species unless you count the limited farmers in this area as endangered. But it will help improve flows in the Sun River that will benefit other water users including the fisheries.

- Will the project generally make more water available in the water basin where the proposed work is located?

  - Yes, the project will benefit a segment of the Sun River that routinely gets too

low in the summer to sustain any aquatic life. Even the small amount of 10 cfs may be enough to help turn around the low numbers of fish in this stretch of the Sun River. Fish numbers are approximately 40 per mile and should be around 400 per mile.

(2) Does the project promote and encourage collaboration among parties?

- Is there widespread support for the project?

  - Yes, there is widespread support for this project. The Sun River Watershed Group (SRWG) that is a key part of this project is comprised of over 40 different groups and agencies including recreational, communities, businesses, other irrigation projects and state and federal agencies. For over 15 years the SRWG has worked hard to bring together these diverse groups to help solve natural resource issues. There have been many successes storing including the other FSID projects that have conserved annually almost 20,000 acre-feet of water.

- What is the significance of the collaboration/support?

  - When the SRWG was formed 15 years ago the area was in turmoil with irrigators fighting irrigators and irrigators fighting recreationists over the limited supply of this very important resource. Through hard-work and MANY meetings, the SRWG partners now work on solutions rather than pollution. To keep this team effort moving forward, more projects like this must be accomplished so even more water is available to share even in drought years.

- Will the project help prevent a water-related crisis or conflict?

  - Yes, the project will help divert a water related crisis in this watershed. Even though the SRWG has brought people together to solve local problems through local solutions there is a long ways to go. Getting this segment of the river to above 50 cfs is just the first step in meeting the water demands (see attachment #6 on page 30 for Sun River flow data). If there is going to be a healthy fisheries, the flow in the river must be raised to 130 cfs. This and many other projects being pursued will help reach that goal and reduce the chance of a fragile relationship between water users from failing.

  This will also eliminate friction between FSID water users because of current infrastructure limitations this project will eliminate. The project will install a pipe prior to the existing main canal siphon preventing adequate distribution to approximately 1/3 of the FSID water users.

(3) Will the project increase awareness of water and/or energy conservation and efficiency efforts?

- Will the project serve as an example of water and/or energy conservation and efficiency within a community?

- Yes, the project will serve as another example of teamwork and water conservation. By continuing to find ways to conserve water the community will see first-hand that the District is not giving up on ways to help other water users.

- Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?

  - Yes, the project will increase the capability of water conservation efforts for use of others, primarily recreationists, communities and fish.

- Does the project integrate water and energy components?

  - No, the project does not integrate those two components.

Evaluation Criterion F: Implementation and Results
- Subcriterion No. 1 -- Project Planning

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project.

- The District completed a Water Management and Water Conservation Plan on May 13, 2009. The District prepared this plan as a management tool to improve the efficient use of available water, prioritize projects, improve water quality in the Sun River, improve the agricultural economy within the district, and fulfill the water conservation planning requirements stipulated in the Reclamation Reform Act of 1982. On page 15 in the plan, selected conservation measures to improve water management and water savings included this project.

(2) Identify and describe any engineering or design work performed specifically in support of the proposed project.

- Initial design has been accomplished but final engineering work still needs to be completed prior to construction beginning. See <u>attachment #5 on pages 26-29</u> that shows part of the preliminary engineer design.

(3) Describe how the project conforms to and meets the goals of any applicable State or regional plans, and identify any aspect of the project that implements a feature of an existing water plan.

- Montana has a state water plan that can be seen on the web at: http://www.dnrc.mt.gov/wrd/water_mgmt/montana_state_waterplan/default.asp Part II of the plan includes "Subsection: Agriculture Water Use Efficiency" (See <u>attachment #8 on page 32</u>. That subsection describes the need to improve efficiency so agriculture can withstand periods of drought; improve performance of aging irrigation facilities; and improved water quality. This project fits the state plan by accomplishing water conservation as a tool to improve flows in the state waters.

- Subcriterion No. 2 -- Readiness to Proceed

(1) Are all necessary plans/designs complete? Are there any delays expected to result from environmental compliance?

- Not all design work has been completed yet but will be easily accomplished within six months of getting green light for the project to begin. The District and BoR have completed several other projects and are fully prepared to easily complete design and environmental compliance review.

- There are not any expected delays from environmental compliance review.

(2) Describe the implementation plan of the proposed project.

- The stages of project implementation include:
  - #1 - BoR work on design, NEPA and NHPA Aug 2012 - Feb 2013
  - # 2 - BoR and District complete final engineering design Aug - Apr 2012
  - # 3 - Install canal and PVC pipe - Apr 2012 - Oct 2013
  - # 4 - Reporting, compliance review and monitoring - Aug 2012 - Dec 2013

(3) Explain any permits that will be required and the process for obtaining such permits.

- Permits and the process required to obtain include:
  - A " Joint Application for Proposed Work in Streams, Lakes and Wetlands in Montana" to the Cascade Conservation District, Montana Department of Environmental Quality and Corps of Engineers for review and approval that describes how work will be accomplished when crossing stream with pipeline. Permit takes approximately 60 days for approval from all these agencies.

- Subcriterion No. 3 -- Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon project completion.

- Performance measures to document project benefits include the District comparing water delivered to the farms prior and after installing pipeline and the SRWG measuring flows in the Sun River for two years to comparing prior and post data changes that will occur after pipeline installed.

Evaluation Criterion G: Connection to Reclamation Project Activities

(1) How is the proposed project connected to Reclamation project activities?

- The BoR built the FSID as part of the Sun River project in 1908. Another part of the Sun River project is the Greenfields Irrigation District which this project

will benefit also by increasing water availability to the river. BoR continues to be a major partner in District water conservation projects by providing people resources to find best ideas for the SRWG team effort.

(2) Does the applicant receive Reclamation project water?

- Yes. FSID was a BoR built project.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

- Yes to BoR lands and BoR facilities.

(4) Is the project in the same basin as a Reclamation project or activity?

- Yes to same basin as a BoR project - the Sun River project.

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

- Yes, work will contribute water to same basin where BoR project is located.

- 5,000 acre-feet will be conserved eliminating a very wasteful delivery system and replacing with a new canal and PVC pipe. The water saved will be left in the Sun River increasing summer flows by approximately 12 cfs. This 12 cfs is crucial when current river flows reach as low as 30 cfs, which is almost half of the desired bare minimum flows of 50 cfs that the watershed partners are trying to maintain.

f. Performance Measure for Quantifying Post-Project Benefits

Estimated water savings of approximately 5,000 acre/feet annually will benefit the infrastructure reliability of water for the irrigation district while improving water quantity for all other uses in the basin.

Pre-project: Flow measurements have already been taken to identify potential savings

Post-project: Gauges on the Sun River, flow measurements on the canals, flow measurements on the wastewater by the District and SRWG will help track all water savings. See attachment #6 on page 30 for Sun River flow data.

g. Environmental Compliance

(1) Will the project impact the surrounding environment (i.e., soil [dust], air, water [quality and quantity], animal habitat, etc.)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area.

Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

- The project will have minor air disturbance during construction phase as the earth work of trenching and back-filling occurs. This will be minimized by reducing the length of time project is in construction phase.
- Other potential impacts to water quality and quantity will be almost negligible as erosion fencing is placed where water may return to streams
- With extensive farming in this area, no animal habitat impacts are expected

(2) Are you aware of any species listed or proposed to be listed as a Federal endangered or threatened species, or designated Critical Habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

- There are no species either listed or proposed to be listed in this area

(3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under Federal Clean Water Act jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.

- There are no wetlands that will be impacted by the project. But there are surface waters that fall under the Federal Clean Water Act jurisdiction requiring proper permits and care during construction.
- During construction, erosion/silt fences will be placed so prevent sediment entering the streams

(4) When was the water delivery system constructed?

- FSID delivery system was constructed in 1908

(5) Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? 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.

- The original delivery system is in disrepair and this will eliminate the need for its repair. Reclamation has reviewed the infrastructure in this area and has allowed projects like this to proceed.

(6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

- Cultural resource areas within the district do exist. Previous inventories by the Bureau of Reclamation have located and identified the resources that should not be disturbed. All regulatory compliance requirements are not completed at this

time; however they will be completed prior to initiation of this project. Fort Shaw Irrigation District will work closely with Reclamation to achieve compliance with both National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA).

(7) Are there any known archeological sites in the proposed project area?

- There are no known archeological sites where this work will be accomplished

(8) Will the project have a disproportionately high and adverse effect on low income or minority populations?

- The project will have a beneficial impact on low income families as it improves their ability to increase production on what is currently waste land due to seeps

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

- There are no Indian sacred sites in this area

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

- There are noxious weeds in the area but FSID staff takes proactive approached to controlling the weeds and will take extra precaution not to move equipment through known old patch sites that may still have weed seeds. After construction the sites will be monitored for new weed infestations that can be controlled immediately.

h. Required Permits or Approvals

- Corps 404 - For the activity included along a stream a Corps 404 permit will be required. This request will be submitted as soon as grant is awarded.
- Montana Department of Environmental Quality 3A Turbidity permit is required and submitted as a joint form with the Corps 404 permit.
- Cascade Conservation District Natural Streambed and Land Preservation Act (310) is required and submitted as a joint form with the Corps 404 permit.

i. FUNDING PLAN AND LETTERS OF COMMITMENT -

The District contributions to this project are $133,817 cash and $235,823 in-kind services of labor and equipment to install pipe and canal. SRWG will contribute $20,000 in-kind services to monitor instream flow changes over two years from this project. Program grant funds for $300,000 are requested. Total project cost is $669,640.

The Sun River Watershed Group has agreed to assist through cash match and in-kind services the monitoring program. See attachment # 2 on page 23 for commitment of

these resources.

These non-Reclamation funds and in-kind services exceed the 50% match required from this Challenge Grant program.

Table 2. Summary of non-Federal and Federal funding sources

Funding Sources	**Funding Amount**
Non-Federal Entities	
1. FSID cash	$133,817
2. FSID in-kind	$235,823
2. SRWG in-kind	$ 20,000
Non-Federal Subtotal:	$369,640
Other Federal Entities	
1. None	
Other Federal Subtotal:	-0-
Requested Reclamation Funding:	$300,000
Total Project Funding	$669,640

j. Official Resolution

- See attachment #1 on page 22 for FSID resolution to commit $133,817 cash contribution and $235,823 in-kind support to accomplish project within two-years.

k. Budget Proposal:

(1) General Requirements

Task 1 - BoR or contract work on draft designs, NEPA and NHPA
- BoR with District for compliance work for the proposed project.
  - BoR resources to accomplish - $98,890 - Grant
  - FSID labor, District manager - 100 hours x $30/hour = $3,000 - In-kind

Task 2 - BoR and District complete engineering, review and certification of design
- BoR and District will work closely on final designs and permitting of project to meet all state and federal requirements
  - BoR resources to accomplish ..... = $30,000 - cash match
  - FSID labor, District manager - 100 hours @ $30/hour = $ 3,000 - In-kind

Task 3 - Install 2,000 feet of lined open ditch and 2,310 feet of PVC pipe
- *FSID prepare and award bid for PVC pipe, vents, gates, turnouts, & canal liner*
  - FSID labor, District manager and secretary .....= $1,600 - In-kind
    - 40 hours @ $30/hour
    - 40 hours @ $10/hour
  - Buy 42,00 square feet of canal liner .....= $ 42,000 - cash match

- Buy PVC pipe, 2,310 feet of 36" pipe - $129,360 - Grant
- Buy canal headgates, field turnouts, vents - $ 71,750 - Grant
- Buy "unlisted costs" e.g., gaskets, concrete (10%) = $ 24,811 - cash match
- Buy pipe bedding material 1,200 yards @ $2.50/yard = $3,000 - cash match
- Buy and install fencing along canal @ total cost ..... = $2,000 - cash match

- *FSID crew dig canal, pack, lay liner and cover*
  - FSID labor to accomplish core work
    - 1,050 total hours for 3 people @ $15/hour .....= $17,100 - In-kind
  - FSID labor, District manager - to oversee proper installation
    - 200 hours @ $30/hour ..... = $ 6,000 - In-kind
  - FSID excavators to dig canal and place liner
    - 260 hours @ $140/hour ..... = $36,400- In-kind
  - FSID truck to haul bedding material
    - 165 hours @ $40/hour ..... = $ 6,600 - In-kind
  - FSID dozer to shape canal
    - 140 hours @ $60/hour ..... = $ 8,400 - In-kind
- *FSID crew dig trench, pack, lay pipe and refill*
  - FSID labor to accomplish core work
    - 1,050 total hours for 3 people @ $15/hour ..... = $17,100 - In-kind
  - FSID labor, District manager - to oversee proper installation
    - 200 hours @ $30/hour ..... = $ 6,000 - In-kind
  - FSID excavator to dig trench and place pipe bedding material
    - 530 hours @ $140/hour ..... = $74,200 - In-kind
  - FSID truck to haul pipe bedding material
    - 165 hours @ $40/hour .....= $ 6,600 - In-kind
  - FSID dozer to backfill and pack trench
    - 140 hours @ $60/hour ..... = $ 8,400 - In-kind

Task 4 - Reporting, compliance review and monitoring
- FSID District manager and secretary accomplish required grant and project monthly and final reporting and billing
  - FSID labor, District manager and secretary
    - 100 hours @ $30/hour ..... = $3,000 - In-kind
    - 225 hours @ $10/hour ..... = $2,250 - In-kind
- BoR resources for final project inspection ..... = $2,006 - cash match
- SRWG technician travel and labor to monitor flow over 2 years
    - 500 hours @ $40/hour ..... = $20,000 - In-kind

Other expenses - contingency and indirect
- Construction contingency @ 10% of grant
  - $300,000 total direct grant costs @ 10% .....= $30,000 - cash match
- Indirect costs FSID may incur including postage, paper, and incidental labor
  - $323,467 FSID @ 5% of direct costs.....= $16,173 - In-kind

TOTALS	**$369,640 match**	**$300,000 Grant**

(2) Budget Table

BUDGET ITEM DESCRIPTION	COMPUTATION		RECIPIENT/ PARTNERS COST SHARE	RECLAMATION FUNDING	TOTAL COST
	Unit/price	Quantity			
SALARIES AND WAGES					
- Employee 1 - worker	$15/hour	840	$ 12,600	$ 0	$ 12,600
- Employee 2 - worker	$15/hour	720	$ 10,800	$ 0	$ 10,800
- Employee 3 - worker	$15/hour	720	$ 10,800	$ 0	$ 10,800
- Employee 4 - oversight	$30/hour	400	$ 12,000	$ 0	$ 12,000
EQUIPMENT					
- Excavators - canal trench & liner	$140/hour	260	$ 36,400	$ 0	$ 36,400
- Excavator - dig trench& place pipe	$140/ hour	530	$ 74,200	$ 0	$ 74,200
- Dozer - shape canal refill trench	$60/hour	280	$ 16,800	$ 0	$ 16,800
- truck - haul fill	$40/hour	330	$ 13,200	$ 0	$ 13,200
SUPPLIES/MATERIALS					
- canal liner materials	$1.00/sq ft	42,000	$ 42,000	$ 0	$ 42,000
- canal inlet structure with gates	$3,000/ea	1	$ 0	$ 3,000	$ 3,000
- 36" PVC pipe	$56.00/ foot	2,310	$ 0	$ 129,360	$ 129,360
- pipe inlet structure	$1,250/ ea	1	$ 0	$ 1,250	$ 1,250
- outlet structure	$2,000/ea	1	$ 0	$ 2,000	$ 2,000
- canal turnouts	$500/ea	3	$ 0	$ 1,500	$ 1,500
- pipe turnout with tee/gate	$10,000/ea	1	$ 0	$ 10,000	$ 10,000
- pipe drain outlet	$10,000/ea	1	$ 0	$ 10,000	$ 10,000
- 30 degree elbow	$8,800/each	1	$ 0	$ 8,800	$ 8,800
- 15 degree elbow	$8,800/each	4	$ 0	$ 35,200	$ 35,200
- Gravel for pipe & canal	$ 2.50/yard	1,200	$ 3,000	$ 0	$ 3,000
- Fencing	$2,000 /ea	1	$ 2,000	$ 0	$ 2,000
- unlisted materials, i.e. gaskets and concrete	10% of material cost	1	$ 24,811	$ 0	$ 24,811
CONTRACTUAL					
- NONE					
OTHER					
Reporting	$10.00/ hour	265	$ 2,650	$ 0	$ 2,650
Compliance & reporting	$30.00/hour	340	$ 10,200	$ 0	$ 10,200
Monitoring -labor + travel	$40.00/ hr	500	$ 20,000	$ 0	$ 20,000
Engineering/NEPA/NHPA - USBR or contract	30% const costs	$436,321	$ 32,006	$ 98,890	$ 130,896
TOTAL DIRECT COSTS			**$ 323,467**	**$ 300,000**	**$ 593,423**
Contingency funds - 10%	10% direct	$ 300,000	$ 30,000	$ 0	$ 30,000
INDIRECT COSTS -_5_%	5% of direct	**$ 323,467**	$ 16,173	$ 0	$ 16,173
TOTAL PROJECT COSTS			**$ 369,640**	**$ 300,000**	**$ 669,640**

(3) Budget Narrative

Salaries & Wages

- FSID Program manager, Rich Boyle
  - $30/hour for all work
    - 400 hours for project crew oversight
    - 240 hours assisting BoR in compliance review, design and permitting
- FSID laborers - 3 person crew
  - $15/hour for canal and pipe installation
    - 2,280 total hours to dig trench, pack, lay pipe, refill, and lay lining
- FSID secretary
  - $10/hour - 40 hours to help manager with grant reports and material bids

Fringe Benefits - NONE

Travel - NONE

Equipment

- FSID excavators dig trench, lay pipe, bedding material, help backfill, dig canal
  - $140/hour which is going rate in this area
    - 790 hours for all tasks
- FSID truck to deliver pipe bedding material to the trench and canal project
  - $40/hour which is going rate in this area
    - 330 hours for all tasks
- FSID dozer to backfill trench and shape canal
  - $60/hour which is going rate in this area
    - 280 hours for all tasks

Materials & Supplies

- All materials below are for construction purposes and were estimated by acquiring quotes from local distributors
  - 42,000 square feet of canal liner .....= $42,000
  - 36" PVC pipe @ $56/foot x 2,310 feet .....= $129,360
  - Major parts including inlet, outlet, turnouts, and elbows .....= $71,750
  - Gravel for pipe and canal @ $2.50/yard x 1,200 yards ..... = $3,000
  - Fencing materials and installation along canal ..... = $2,000
  - Non-listed materials gaskets and concrete @10% of materials = $24,811

Contractual

- FSID will contract with BoR or private for NEPA, NHPA, final engineer design and project inspection estimated at 30% of total project costs ($436,321) = $130,896

Environmental and Regulatory Compliance Costs

- Part of BoR or private contractual costs listed above

Reporting

- FSID Program manager, Rich Boyle
  - $30/hour for all work
    - 100 hours assisting in compliance review, permitting and project reporting
- FSID secretary
  - $10 hour for all work
    - 225 hours to specifically help with writing financial, program performance, semi-annual and final reports

Other

- SRWG technician, Alan Rollo
  - $40/hour for all monitoring work
    - 500 hours - monitoring flow over 2 years

Indirect Costs

- 5% rate FSID is using for any remaining costs not listed above including postage, paper, copies and other labor. 5% x $323,467 = $16,173

Contingency Costs

- 10% of construction contingencies costs to take in account inflation and/or possible material price increases. 10% x $300,000 = $30,000

Total costs

- Entire project .....= $669,640
- Non-federal cost-share with $235,823 indirect and $133,817 cash = $369,640
- Federal cost-share .....= $300,000

Attachment #1

RESOLUTION

Fort Shaw Irrigation District
Board of Commissioners
Fort Shaw, MT 59443

RESOLUTION SPONSORING
BUREAU OF RECLAMATION 2012 WATER SMART GRANT
FOR INFRASTURTURE IMPROVEMNETS

WHEREAS, Fort Shaw Irrigation District's infrastructure is in dire need of immediate and long-term improvements to conserve water and enhance delivery to water users, and

WHEREAS, Fort Shaw Irrigation District's overall infrastructure is in need of many improvements to improve its water management for this and future generations, therefore

BE IT RESOLVED, the Fort Shaw Irrigation District's Board of Commissioners has reviewed and authorizes the board chairman to pursue a Bureau of Reclamation 2012 WaterSMART grant for infrastructure improvements; and

BE IT FURTHER RESOLVED, the Fort Shaw Irrigation District's Board of Commissioners by the authority given to it by the State of Montana is committing the necessary resources and funds to complete the infrastructure project by December 31, 2013.

Dated this 3rd day of January, 2011.

Keith V Rohr
President

Attest: Rich Boyle

Fred Hill

Dick Eisenzimer

Phil Johnson

Trevor McGuire

Sun River Watershed

a non-profit organization benefiting all water users in the basin
816 Grizzly Drive Great Falls, Montana 59404 406-727-4437

January 3, 2012

Bureau of Reclamation
Acquisition Operations Group
Attn: Michelle Maher
Mail Code: 84-27810
P.O. Box 25004
Denver, CO 80225

RE: Letter of Commitment

Dear Bureau of Reclcmation:

The Sun River Watershed Group is writing this Letter of Commitment for Fort Shaw Irrigation District's 2012 Reclamation WaterSMARTgrant application. The Sun River Watershed Group (SRWG) and the Fort Shaw Irrigation District (FSID) have been engaged for more than 15 years on several activities to improve the overall health of this basin. FSID's past and current irrigation project's compliment the overall efforts of the watershed program.

We will commit $20,000 of in-kind resources to monitor water quantity before and after project accomplishments to document any improvements.

The key enhancements of this project will be improved water quantity in the Sun River from more efficient use of the basin's limited water supply. This is a perfect fit of projects with positive goals under the SRWG's work-plan. The SRWG will assist FSID in a monitoring program to ensure this project actually meets these goals.

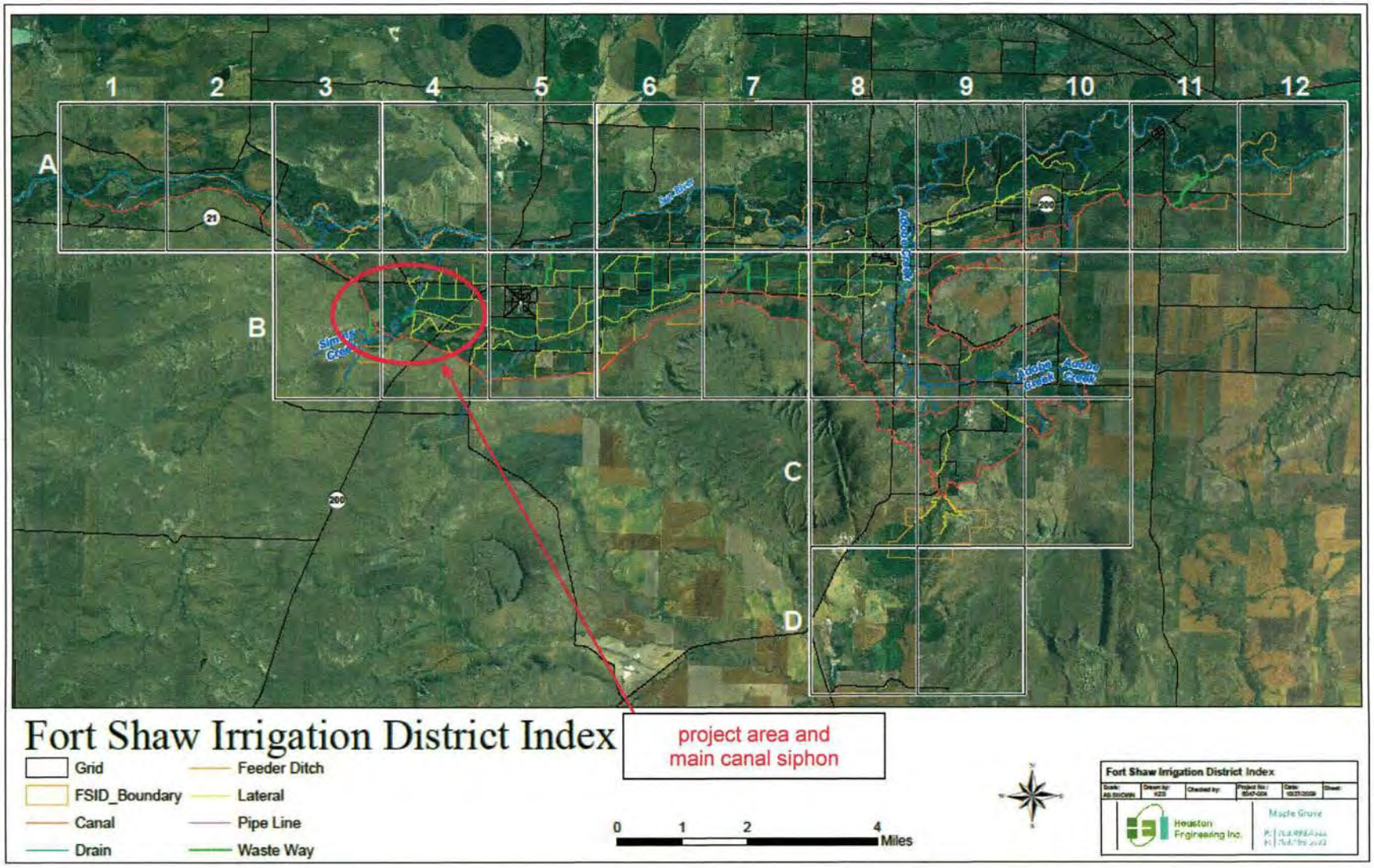
Call me at 406-727-4437 if have any questions concerning this project.

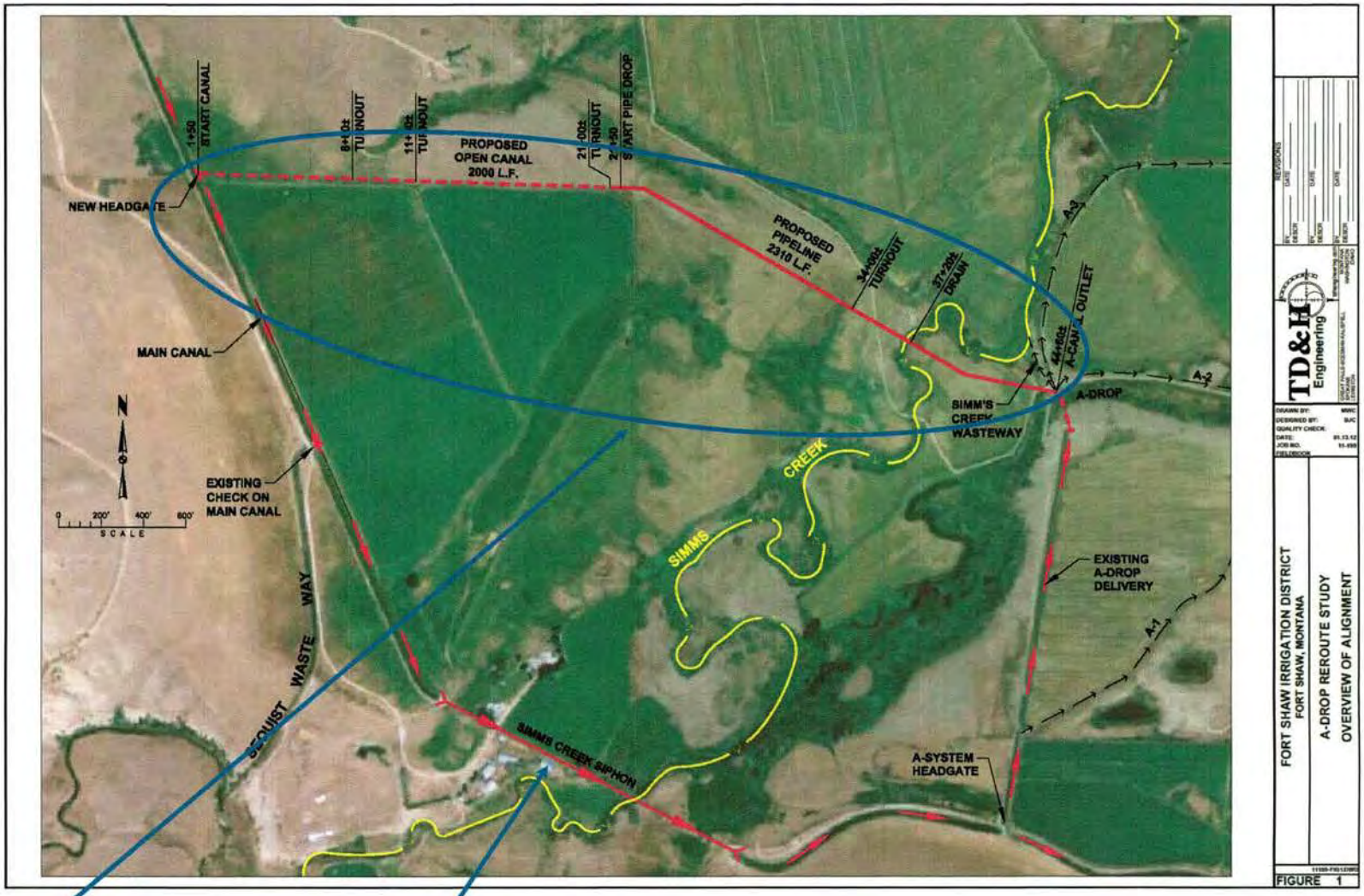
Sincerely,

Alan Rollo, Coordinator
Sun River Watershed Group

Cc: FSID

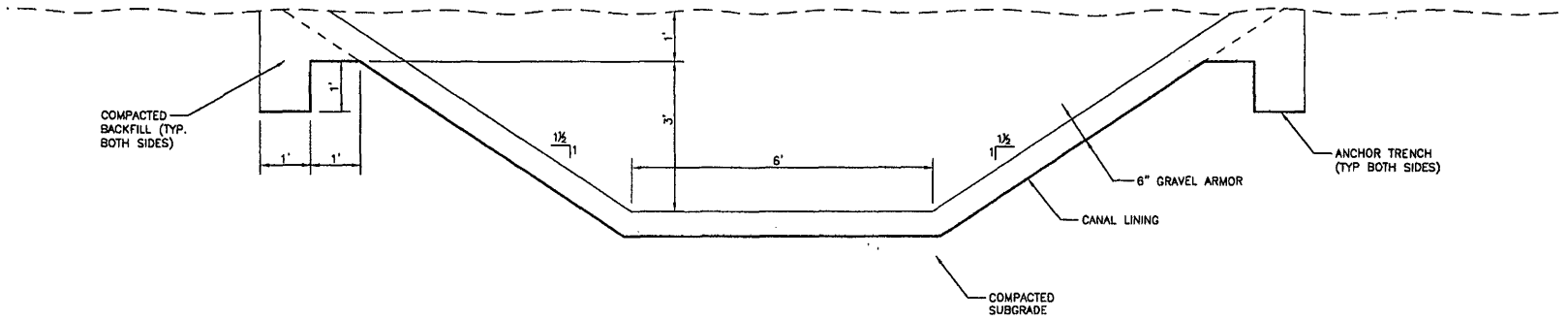
Attachment #3





Project canal and pipline

main canal siphon



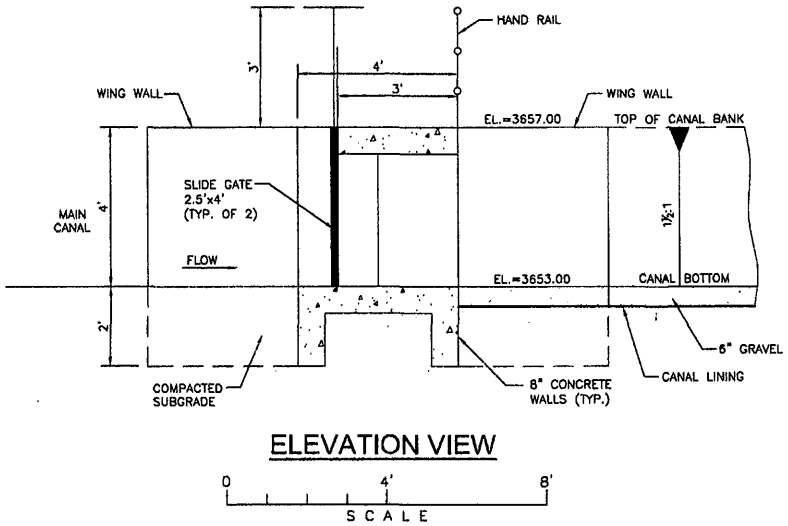
TYPICAL CANAL CROSS-SECTION

0 3' 6'

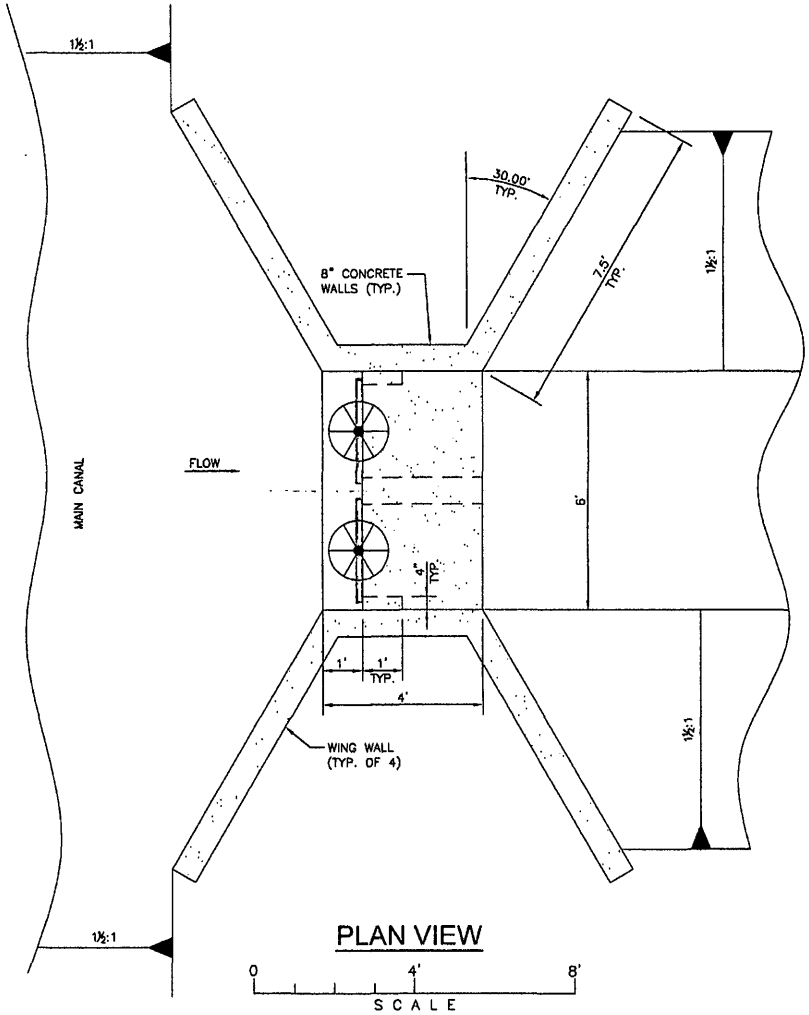
SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

FORT SHAW IRRIGATION DISTRICT FORT SHAW, MONTANA	TD&H Engineering tdhengineering.com GREAT FALLS-BOZEMAN-KALISPELL SPOKANE LEWISTON MONTANA WASHINGTON IDAHO	DRAWN BY: MWC DESIGNED BY: BJC QUALITY CHECK: DATE: 01.11.12 JOB NO. 11-195 CAD NO. 11195-FIG2	FIGURE 2
A-DROP CANAL CROSS-SECTION			



ELEVATION VIEW



PLAN VIEW

PRELIMINARY
NOT FOR CONSTRUCTION

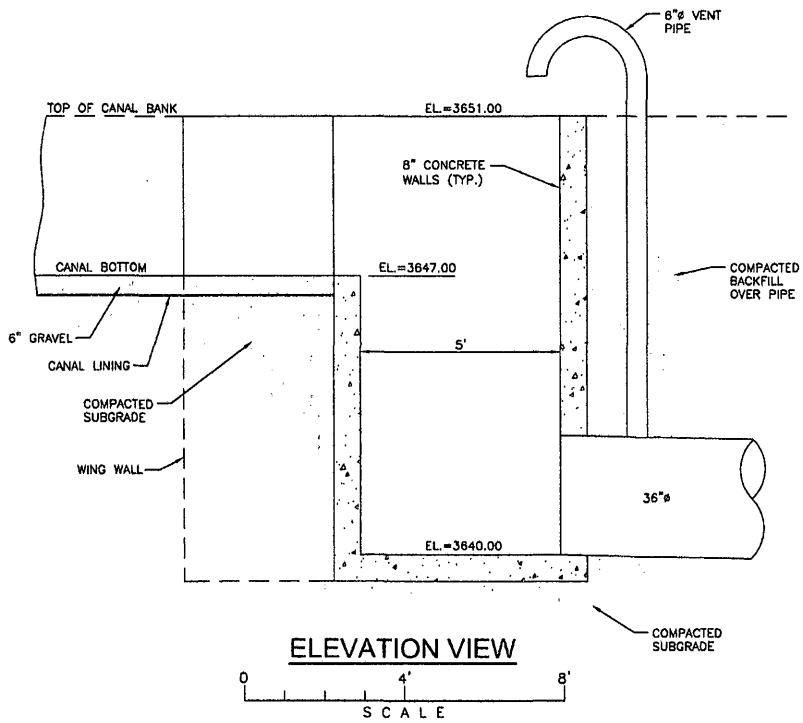
FORT SHAW IRRIGATION DISTRICT
FORT SHAW, MONTANA

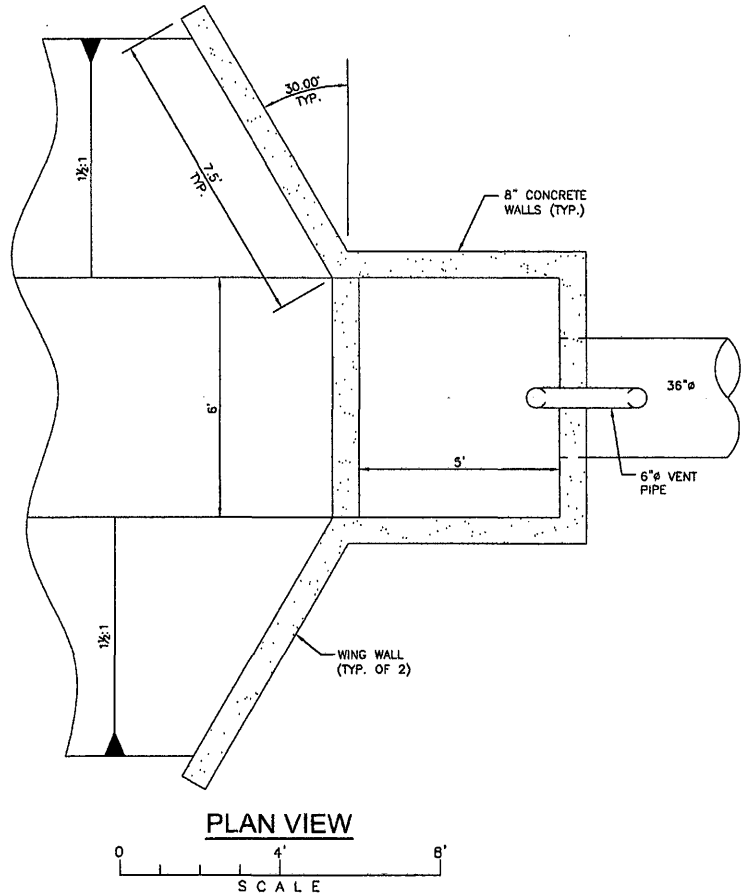
A-DROP CANAL INLET STRUCTURE

TD&H Engineering
tdhengineering.com
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON
LEWISTON IDAHO

DRAWN BY:	MWC
DESIGNED BY:	BJC
QUALITY CHECK:	
DATE:	01.11.12
JOB NO.	11-195
CAD NO.	11195-FIG3

FIGURE 3





PRELIMINARY
NOT FOR CONSTRUCTION

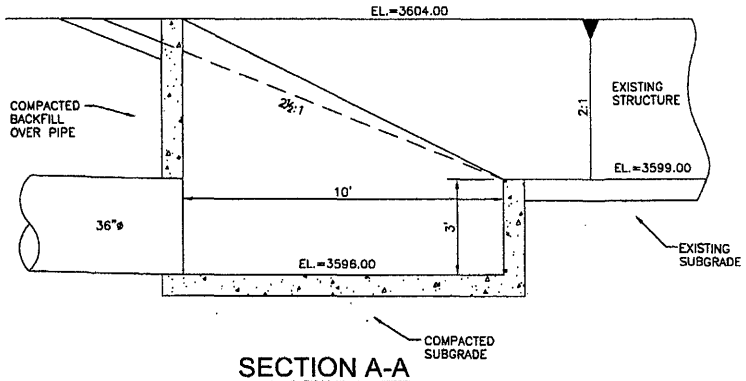
FORT SHAW IRRIGATION DISTRICT
FORT SHAW, MONTANA

A-DROP PIPE INLET

TD&H Engineering
tdhengineering.com
GREAT FALLS-BOZEMAN-KALISPELL
SPOKANE
LEWISTON
MONTANA
WASHINGTON
IDAHO

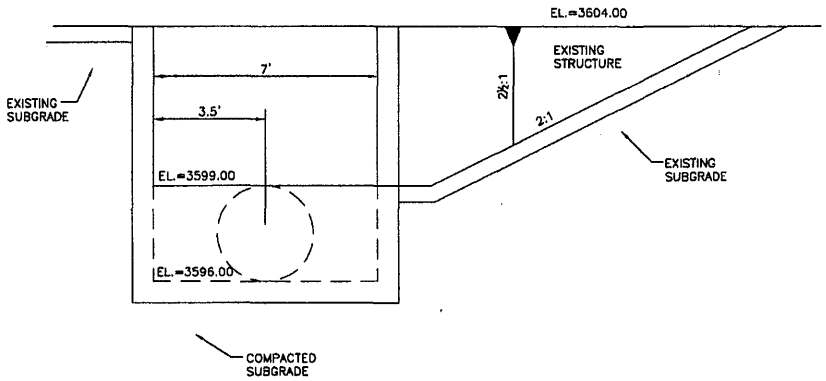
DRAWN BY:	MWC
DESIGNED BY:	BJC
QUALITY CHECK:	
DATE:	01.11.12
JOB NO.	11-195
CAD NO.	11195-FIG4

FIGURE
4



SECTION A-A

0 5' 10'
SCALE



SECTION B-B

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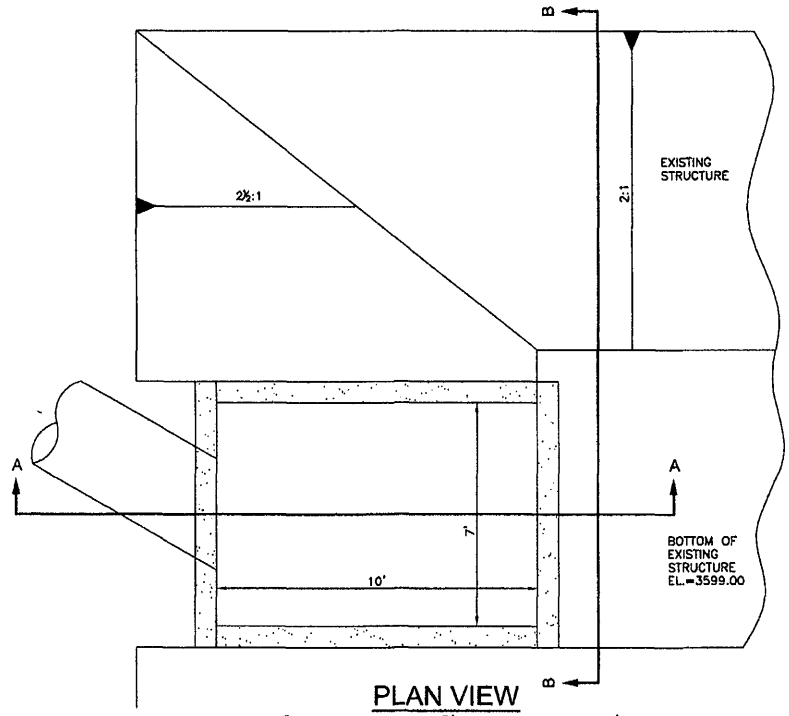
SCALE



PLAN VIEW

0 5' 10'
SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

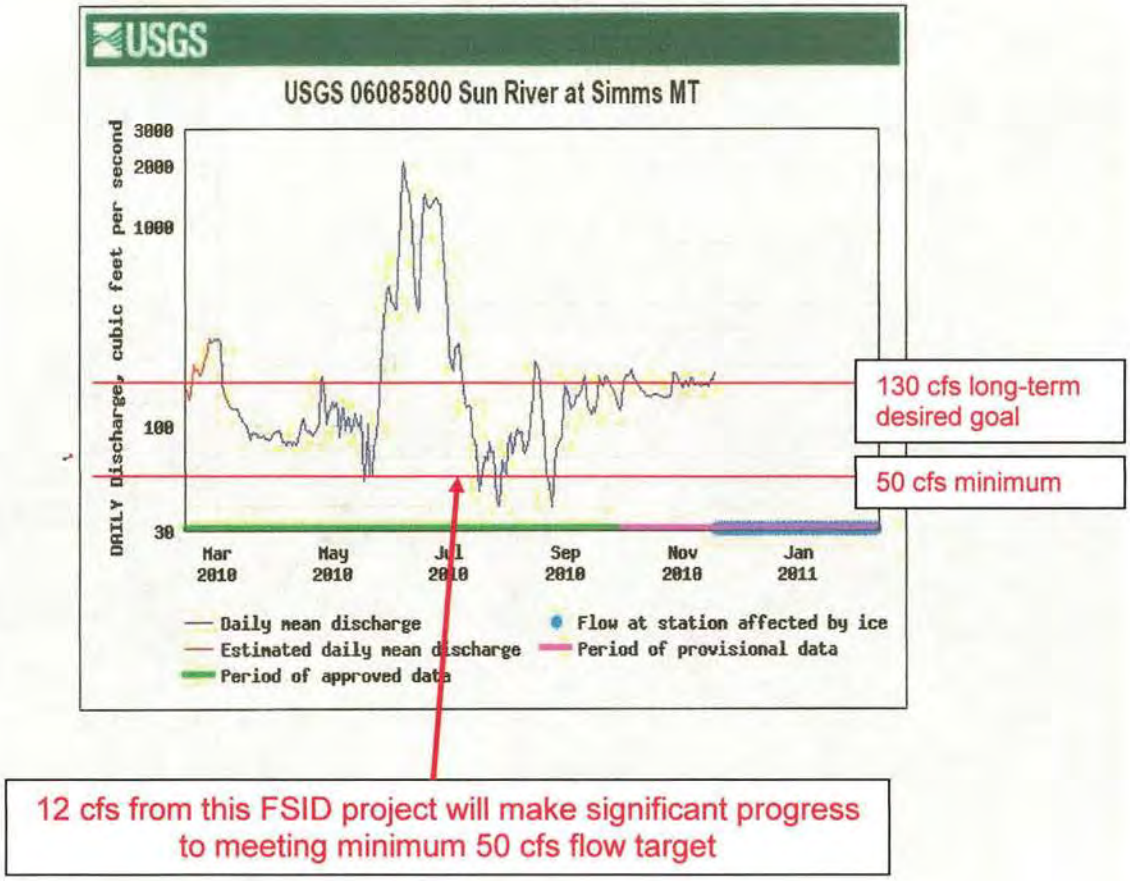
FORT SHAW IRRIGATION DISTRICT
FORT SHAW, MONTANA

A-DROP PIPE OUTLET STRUCTURE

TD&H Engineering
tdhengineering.com
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON
LEWISTON IDAHO

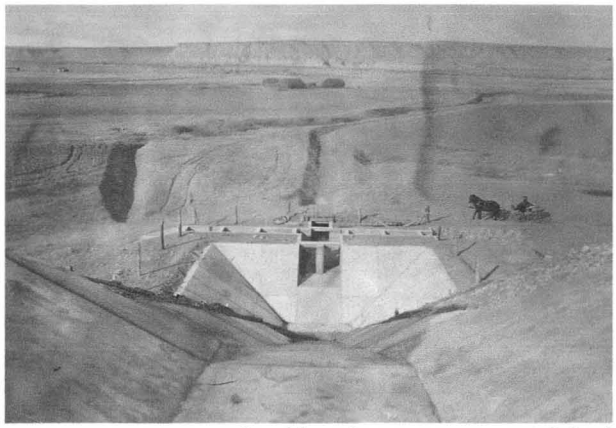
DRAWN BY:	MWC	FIGURE
DESIGNED BY:	BJC	
QUALITY CHECK:		
DATE:	01.11.12	5
JOB NO.	11-195	
CAD NO.	11195-FIG5	

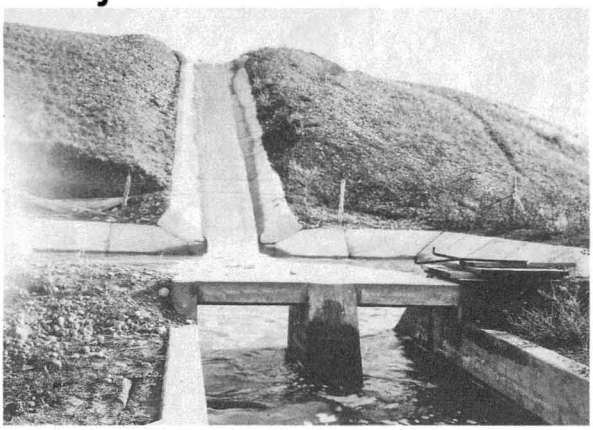
USGS flow data in Sun River at Simms BELOW FSID headgate used to track lower Sun River flow conditions (50 desired bare minimum flow)



12 cfs from this FSID project will make significant progress to meeting minimum 50 cfs flow target

Pictures of the Project Area

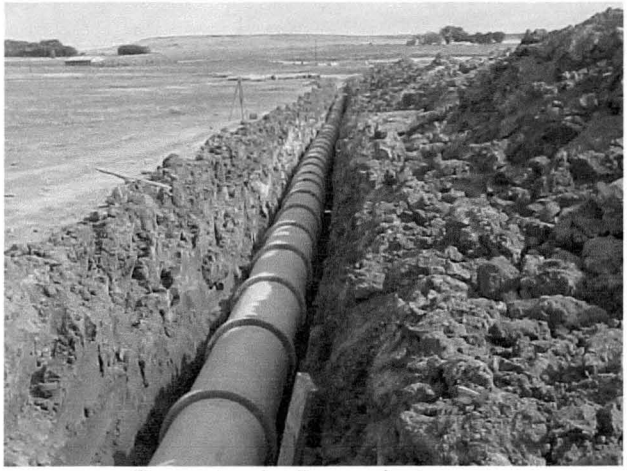




Looking down - original structure - looking up
now in a very leaky pipe

Current outlet works

Pictures of Past Project Work



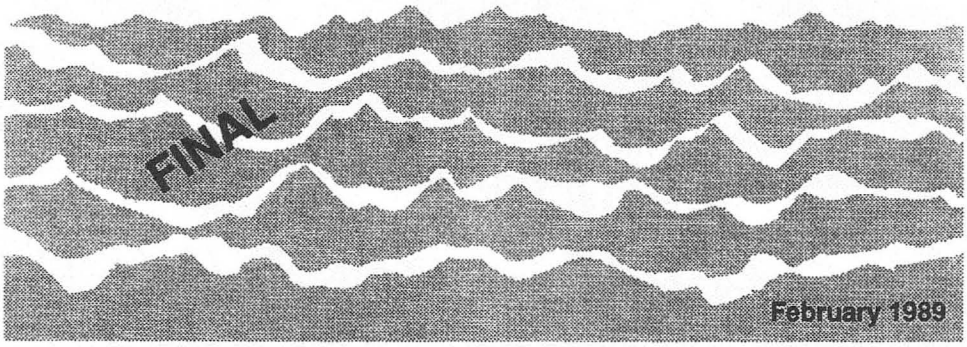
Concrete pipeline project
Converted 5 miles of open canal to 3/4 mile of pipe

PVC pipeline project
Converted 5,000 feet open ditch to PVC pipe

Both projects resulted in huge water savings benefitting FSID and the Sun River

MONTANA WATER PLAN

Management Section



Subsection: Agricultural Water Use Efficiency

Introduction 2
Background 2
Policy Statement 3
Issues and Recommendations 3
Issues 3
Recommendations 3
Plan Implementation 3
Legislative Action 3
Administrative Action 4
Financial Requirements and Funding Strategies 4
Time Schedule 4

WATER RESOURCES DIVISION • DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
1520 EAST SIXTH AVENUE • HELENA, MONTANA 59620 - 2301 • (406) 444-6637

INTRODUCTION

Agriculture is Montana's largest business, providing about one-third of the total state income from primary industries. Irrigation contributes roughly one-quarter of agricultural income and, importantly, stabilizes agricultural production during the all-too-frequent dry years. Satisfying agriculture's vital demand for irrigation water requires the development and extension of water supplies through a combination of management strategies, including water storage. Another method is to improve the efficiency with which water is used.

The benefits of improved agricultural water use efficiency are diverse and include:

1. Improved ability to withstand periods of drought.
2. Increased irrigated acreage through the use of saved water.
3. Improved performance of aging irrigation facilities.
4. Increased irrigators' profits when the benefits of more efficient water use (increased crop production and sometimes decreased operating costs) are greater than the investment cost.
5. Reduced soil erosion and improved water quality.
6. Help in meeting the needs of current water users once the prior reserved rights of Indian tribes and the federal government are quantified and put to use.

Along with these benefits, improving water use efficiency may be important in terms of interstate water allocation. The U.S. Supreme Court has indicated that state conservation efforts will be considered if it is called upon to divide the waters of interstate rivers. The Court could decide to award smaller shares to states making no effort to increase water use efficiency, reasoning that these states could meet their future needs by saving more water.

BACKGROUND

Any strategy to improve agricultural water use efficiency must reflect an appreciation of several difficulties. First, because each irrigation situation is different, improving water use efficiency requires a case-by-case consideration of a number of complex geologic, hydrologic, and economic factors. Second, irrigation efficiency improvements can be very expensive. Third, water uses within a basin can be extremely interdependent. One irrigator's return flows or recharge to ground water can be another irrigator's water supply. Therefore, improving the efficiency of one water user could adversely affect the water supply of others. Fourth, while Montana law protects water users from adverse effects caused by other people's changes in water use, the law does not clearly establish who owns the right to water saved without adverse effects to others.

A number of options are already available to overcome some of these problems. The Montana Cooperative Extension Service, local conservation districts, and a number of other state and federal agencies provide technical assistance and information on water conservation measures. The Montana University System also supports research to improve our understanding of the complex factors that affect irrigation efficiency. Research may also help develop improved irrigation practices and technologies.

Funding assistance is available for irrigation efficiency improvements from a number of sources. These sources include the U. S. Agricultural Stabilization and Conservation Service, Farmers Home Administration, Soil Conservation Service, and the Montana Water Development Program administered by the Department of Natural Resources and Conservation (DNRC).

Given that one irrigator's water losses can be another irrigator's water supply, improvements in water use efficiency may adversely affect some water users. In light of this, the law provides potentially affected parties the right to object to certain changes in water use. Accordingly, the objective of increased water use efficiency is not to reduce the amount of water that is later reused. Rather, it is to decrease losses such as: (1) water used by weeds or other unwanted vegetation; (2) evaporation of standing water; (3) water that is not consumed but becomes inaccessible for reuse; or (4) water that becomes unusable because its quality has deteriorated.

The final difficulty stems from the fact that our water law is not clear on the question of who holds the right to salvaged water. In Montana, water rights are based on the amount of water historically put to beneficial use. If an irrigator decreases his use over time because of improved efficiencies, the legal status of the water no longer needed can be called into question. By one interpretation, this part of the water right would be considered abandoned and the water would go to the next junior user. Obviously, this would not encourage increased efficiency. Under a second interpretation, an irrigator who increases his efficiency retains the right to the salvaged water, so long as other water users would not be adversely affected by the change in water use. The irrigator may then have the option to expand

his irrigated acreage, sell, or otherwise benefit from the right to the salvaged water. Using this interpretation, an irrigator may be rewarded, rather than penalized, for becoming more efficient.

STATE WATER PLAN POLICY STATEMENT

Voluntary improvements in agricultural water use efficiency that expand water supplies for agriculture and other uses should be encouraged. Where improvements in water use would adversely affect other existing beneficial uses, such improvements should not be allowed.

ISSUES AND RECOMMENDATIONS

Issues

To encourage voluntary improvements in agricultural water use efficiency, three groups of issues must be successfully addressed.

1. Adequate information and educational opportunities must be readily available to irrigators, and research must be continued. How difficult is it for irrigators to obtain this information? Is it presented in a manner that is clear and persuasive? Are there adequate data for evaluating applications for water right changes in terms of adverse effects upon other water users? Is improving irrigation technologies and practices receiving adequate priority in the competition for agricultural research dollars?
2. Funding assistance may be necessary for those wishing to improve irrigation efficiency. Are existing programs capable of meeting future demands for funding? Are the kinds and levels of support adequate? Should the state Water Development Program give special consideration to irrigation efficiency-improving proposals? Are other sources of funding available, particularly for the rehabilitation and betterment of aging irrigation projects?
3. Laws clarifying who owns the right to salvaged water must be enacted to provide clear incentives for more efficient use. But when an irrigator increases efficiency, how will the amount of water salvaged be determined? Will it include water that otherwise would have been return flows? How will other water users be protected from adverse effects? Should restrictions be placed on how the saved water can be used?

Recommendations

In response to these issues, the following recommendations have been adopted:

1. The adequacy and effectiveness of existing information and research programs should be evaluated. Information should be provided to the state's irrigation districts and other organized irrigation associations on the availability of technical and financial assistance for improving irrigation efficiency. Further, these entities should be informed of their option under state law for the use of salvaged water.
2. Support for federal programs providing financial and other local level assistance to irrigators should be maintained. Special consideration should be given in the state Water Development Program for projects that would improve the efficiency of existing irrigation systems. Funds from the federal Pick-Sloan Missouri Basin Program should be allocated for use in the rehabilitation and betterment of irrigation projects.
3. The law should clearly provide that if an irrigator salvages water, he maintains the right to use the water. However, salvaged water must be defined to include only water that has not been available for reuse by other water users.

PLAN IMPLEMENTATION

Legislative Action

To provide effective financial support, the legislature should adopt a resolution urging Congress to authorize and appropriate funds from the Pick-Sloan Missouri Basin Program for the rehabilitation of irrigation projects. Such funding can be justified as compensation for water development projects promised to Montana under the 1944 Flood Control Act, but never received.

Legislation also should be passed that clarifies the rights of water users to salvaged water. Such legislation should carefully define "salvaged water" to include only the saved water that otherwise would have become consumed or unusable for other existing appropriators. The use of salvaged water for a different purpose, in a different place, from a different point of diversion, or from a different source of storage would require a change in water right in accordance with Montana law.

Administrative Action

To improve education and research on irrigation efficiency, the DNRC, in cooperation with the Montana Cooperative Extension Service and the U.S. Soil Conservation Service, should evaluate the effectiveness of existing research and public education programs. A report should be prepared to the State Water Plan Advisory Council that sets forth recommendations for any improvements in these programs.

The state's irrigation districts and other organized agricultural water user groups should be informed of available technical and financial assistance for improving irrigation efficiency. They should also be informed of the opportunity to use salvaged water if the legislation recommended above is enacted.

To assure continued federal government support for improving agricultural water use efficiency, the DNRC should continue to monitor and support federal funding for programs or projects that improve agricultural water use. In addition, the Water Development Program should give special consideration to project proposals that improve the efficiency of existing irrigation projects. The Governor's Office and the DNRC should also pursue all administrative and intergovernmental channels available to obtain Pick-Sloan funding for irrigation project rehabilitation.

Financial Requirements and Funding Strategies

It is anticipated that the administrative actions can be accomplished with current levels of funding.

Time Schedule

Activity	Responsibility	Deadline
A. Development and Implementation Tasks		
1. Draft Legislation	DNRC	January 1989
2. Enact Legislation	Legislature	April 1989
3. Contact irrigation districts and water users' associations	DNRC	May 1989
4. Complete evaluation report on irrigation efficiency information and research	DNRC	September 1989
B. Ongoing Tasks		
1. Rank irrigation efficiency project proposals to the Water Development Program	DNRC	
2. Monitor and support federal funding, including Pick-Sloan Program Funding	DNRC/Governor's Office	

Attachment #9

SUN RIVER PROJECT

FORT SHAW IRRIGATION DISTRICT

WATER MANAGEMENT AND WATER CONSERVATION PLAN

May 13, 2009

Prepared by: FSID Board and manager, Alan Kinkaid

CONTENTS

I. Description of the District .....

II. Inventory of Water Resources .....

III. District Water Budget .....

IV. Existing Conservation Measures.....

V. Water Management, Opportunities and Goals .....

VI. Evaluation of Conservation Measures .....

VII. Adopted Plan Elements .....

VIII. Water Conservation Plan Summary .....

X. Appendixes

- District maps
- District Policies

INTRODUCTION: The Fort Shaw Irrigation District prepared this water management and conservation plan as a management tool to improve the efficient use of available water, prioritize projects, improve water quality in the Sun River, improve the agricultural economy within the district, and fulfill the water conservation planning requirements stipulated in the Reclamation Reform Act of 1982.

I. DESCRIPTION OF THE DISTRICT

A. **HISTORY** - Irrigation in this area began shortly after the establishment of Fort Shaw in 1867 as a means to supply water for the fort's fields and gardens. The Reclamation Act was proclaimed June 27, 1902 and appropriated receipts from the sale of public lands to construction of irrigation works for reclamation of arid lands. As part of the pursuit of irrigated lands, in 1903 the Reclamation Service made the first reconnaissance of the Sun River Project area. The Fort Shaw lands included 29,842 acres of which approximately 16,000 acres were considered irrigable. Of these acres, the Indian School utilized some. As the Reclamation Service moved to withdraw lands for future projects, the Sun River Project was considered a secondary project at that time. On February 26, 1906, the Secretary of Interior authorized the Sun River Project, which included Fort Shaw Irrigation District (FSID) and Greenfields Irrigation District (GID). On June 9, 1906, Congress approved a bill providing for the disposition on the non-school lands to the settlement, subject to withdrawal by the Reclamation Service as needed for the irrigation project. The Reclamation Service moved to withdraw the Fort Shaw lands from settlement on September 20, 1906. The Fort Shaw unit was selected as the first component of the Sun River Project to be undertaken. Construction began May 1907 and was completed in July 1908. The first water was delivered in 1909. The FSID operates and maintains the division facilities, which is still owned by Bureau of Reclamation (Reclamation). Division headquarters are in Fort Shaw, Montana.

B. **PHYSICAL CHARACTERISTICS** - The FSID is located within the bounds of the Fort Shaw Division of the Reclamation Sun River Project, Montana located in central Montana (See attachment #1 for area maps). The FSID is located south of the Sun River and surrounds the towns of Simms, Fort Shaw, and Sun River. It now contains approximately 11,500 irrigable acres on 177 small farms.

Water is supplied to the project from the Sun River to the Fort Shaw Canal, utilizing a rock overflow dam as a diversion structure. The water flows from the river by gravity through the main canal and into the distribution system. The main Fort Shaw canal is 16 miles in length and the distribution laterals total 85 miles in length. The initial capacity of the main canal was about 225 cfs. The table below shows approximate carrying capacity of primary structures within FSID.

Main Canal	Siphon	A-Canal	C-Canal	D-Canal	K-Ditch
235	195	85	35	70	35