

Horsefly Irrigation District

Dairy Canal (Brady Section) Piping Project

**WaterSMART Small-Scale Water Efficiency
Project Grants for Fiscal Year 2019**

**Funding Opportunity Announcement No.
BOR-DO-19-F005**

By

Horsefly Irrigation District
Klamath Basin, Oregon

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Technical Proposal and Evaluation Criteria

Executive Summary

Date: April 24, 2019
Applicant Name: Horsefly Irrigation District (HID)
City, County, State: Bonanza, Klamath County, Oregon
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Project Name: Dairy Canal (Brady Section) Piping Project

This project is being submitted under the WaterSMART Small-Scale Water Efficiency Projects Grant funding opportunity announcement. Funding would be utilized for the conversion of approximately 3,100 feet of open canal to a buried pipe system. If funded, the completed project is anticipated to conserve approximately 350 to 700 acre-feet of water annually. Water savings resulting from this project would aide in conserving water resources in the reservoirs and rivers of the Klamath Project, an area that has experienced much controversy over water availability in the previous decades.

Upon receiving confirmation of Reclamation funding, and completion of NEPA and NHPA compliance, HID anticipates they will complete the project within roughly two years. The following schedule assumes that both the NEPA and the NHPA process would require approximately six to twelve months for completion, and thus, construction would be delayed until after the following irrigation season in October 2020.

Project Schedule (dependent on NEPA/NHPA compliance)

April 2019 – Submit grant application
September 2019 – Anticipated Grant is awarded
September 2019 – Begin NEPA and cultural resources process
March 2020 – Anticipated finalization of NEPA and NHPA compliance
March 2020 – HID requests final bids for pipe and materials
September 2020 – Purchase pipe and materials
October 2020 – March 2022 – (weather dependent) construction

The proposed project location is on HID privately owned lands, and all facilities affected by the project are both owned and maintained by HID.

Background Data

HID receives its water supply from several different sources under a number of contracts with Reclamation and the Oregon Department of Water Resources. HID obtains pre-project water from Lost River, flowing from the tributaries and sources of the Lost River watershed, with a

priority right of 1903. In addition, HID holds a water right from the Big Springs, originating from Lost River in Bonanza, Oregon. Lastly, HID is in contract with the Bureau of Reclamation to 4,200 acre-feet from storage of Clear Lake Reservoir, as well as 3,800 acre-feet of natural flow from the Lost River.

There are approximately 90 landowners served by HID over an area of approximately 10,000 acres. Crops grown on these acres include alfalfa (approximately 5,000 acres), grain (approximately 2,000 acres), irrigated pasture (approximately 2,971 acres), and potatoes.

The District is composed of a system of canals, constructed between 1915 and 1950. These facilities are solely dedicated for agricultural purposes. The original delivery system consisted of 25 miles of open canals. Through previous grants with Reclamation, approximately 5 miles of open canal has been converted to a piped system. It is HID's goal to have the entire system piped in the future years.

The Klamath Basin sits at 4,100 feet in elevation, with average annual moisture of 12" to 14" per year, the majority being winter snowpack. Klamath County has been experiencing major shortages in snowpack, however, with below annual snowfall recorded in many of the previous years. As such, water supply in the Klamath Project can become very limited in certain years, and it is extremely important to conserve as much water as possible. To meet both this conservation objective and HID's piping program goals, this proposed project includes the piping of one section of Dairy Canal located within HID.

HID has been working with Reclamation for over one hundred years in every aspect involving irrigated agriculture in the Klamath Basin. Our piping program began in 2004 through grants with Reclamation under both the WaterSMART and Water Conservation Field Services Programs. Below is a breakdown of the previous grants that HID was awarded by Reclamation.

- Bonanza Town pipe project in 2004
- Dairy Project in 2005
- Continuation of the Dairy Project in 2006, 2007, 2008, 2009, 2010, and 2011
- Yonna Project in 2008
- Horsley Project in 2009
- Somers Project in 2009
- Armstrong Projects in 2009
- Dairy and Yonna Canals Piping Project in 2014
- Horsley and Somers Canals Piping Project in 2016
- Dairy Canal and Nobel Section Piping Project in 2017

Throughout all these projects, HID has had a good working relationship with Reclamation and has been successful in all projects. Most of these projects were managed out of the Klamath Basin Area Office.

Project Location

The proposed project includes the conversion of roughly 3,100 feet of a section of Dairy Canal (known also as the Brady section) into subterranean piping. The Brady section is located within HID in Klamath County, Oregon about four miles west-northwest of the town of Bonanza, Oregon in Section 6 of Township 39S, Range 11E (see a project location map in Appendix A). Coordinates for the northern tip of the section are 42° 13' 22.2" N and 121° 27' 40.4" W, and coordinates for the southern tip of the section are 42° 12' 57.9" N and 121° 27' 15.7" W.

Project Description and Milestones

In performing water measurement activities from previous piping projects, HID has discovered that, after piping approximately five miles of open canal, it has conserved roughly 30% of the water which is delivered through the systems. The district continues to reduce their water demand through these piping projects. Due to the 5 miles of piped system, HID has reduced their water diversion demands from 35,000 acre-feet in 2006, to 25,000 acre-feet in 2018.

Additionally, Reclamation identified HID's 2014 WaterSMART project (Dairy and Yonna Canals Piping Project) as a good candidate for a water savings verification. An analysis was performed in April of 2015, and the results of the study indicated that HID's water saving estimate of 720 acre-feet, as stated in the associated grant proposal, was reasonable (Reclamation report in Appendix B). As this currently proposed project is located along the same canal as the 2014 project, with relatively uniform soils, geology, and hydrologic characteristics, and the length of open canal to pipe conversion is similar between the two projects, HID predicts that a comparable water savings would result from this proposed project.

HID is proposing to convert approximately 3,100 feet of the opened, unlined Dairy Canal (Brady section) to a piped system using 30-inch diameter High-Density Polyethylene (HDPE) pipe. This section of canal experiences high rates of seepage, evaporation, and occurrence of aquatic weeds. Converting the open conveyance to enclosed piping, would eliminate these factors as well as erosion and labor involved in maintenance of the ditch. HID, through prior grant projects, has experienced excellent results to address these problems.

If this proposal is awarded, HID would procure the necessary supplies and materials for the pipe installation. HID would provide the labor and equipment for the pipe installation.

To begin the piping project, equipment and materials would be transported from the District headquarters to the project sites as needed. Any existing turnouts, drop structures, or checks within the canal that would impede the placement of the pipe would be removed; fencing in and near the project sites that would prohibit construction would also be removed. HID would utilize an excavator and D-4 Caterpillar to laser level the existing canal bed. The canal bed would be leveled to allow the pipe to lay properly at grade and allow for gravity flow through the piping system; no excavation beyond the depth of the existing canal bed is anticipated. Once the ground is leveled, HID employees would begin installing pipe in the ground. Concrete control structures, or cleanouts, which would allow for maintenance access, would be built and installed to accommodate existing turnouts; existing, worn headgates would be replaced as necessary.

One control structure would be placed at the beginning of the pipeline, and a second structure would be installed at the end of the pipeline. Once the pipe and cleanout boxes are installed, the pipe would be backfilled with soil from the existing canal banks. Once backfilled, the new pipe would have a minimum cover of two feet and would be approximately four feet in the ground. In an effort to not distort the underlying pipe, compaction above the piping would be minimal. The disturbed areas on and neighboring the buried pipe would be revegetated with drought tolerant pasture grass.

HID anticipates that the project, from purchasing materials to finalizing construction, could be completed within roughly 1 ½ years (weather permitting). An estimated project schedule, which assumes NEPA compliance to be completed six months after the grant agreement is signed, is in the executive summary section of this application.

Evaluation Criteria

Evaluation Criterion A: Project Benefits

Describe the expected benefits and outcomes of implementing the proposed project.

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

The District anticipates an estimated water savings in the 300 to 700 acre-feet per year range, as a result of the proposed project. This data was derived from reports produced by CH2M Hill, who has completed similar projects. Additionally, HID has performed water measurement activities and calculations from previous piping projects. HID has discovered that after piping 5 miles of their open canal system, they have conserved approximately 30% of the water which is delivered through these systems.

As a result of past programs with Reclamation HID has reduced the usage of a 75-horsepower pump by 50%. This pump represents a consumption of approximately 3,000 gallons per minute, as indicated by CH2M Hill. HID also uses rectangular weirs to determine how much water we are losing in a given open canal section. After repeated measurements, HID has determined that through an open canal system, the District loses approximately 30% of the total amount of water diverted. A water savings verification was performed by Reclamation in 2015, and the results of that analysis indicated that HID's water loss estimate of 30% (as stated in HID's 2014 WaterSMART proposal) was reasonable (see Reclamation report in Appendix B).

- *If other benefits are expected explain those as well. Consider the following:*
 - *Extent to which the proposed project improves overall water supply reliability.*

As mentioned in the executive summary and background sections, Klamath Basin has experienced water shortages in many of the previous years to which it is incumbent on irrigators to make their infrastructure as efficient as possible. HID's piping program has resulted in water savings of approximately 10,000 acre-feet since its inception as losses of about 30% occur in the existing open canals. Water saved remains in-stream and is passed along to other water users, tribes, and wildlife refuges and also allows greater

flexibility in Reclamation's management of the Klamath Project, particularly in dry years. Further, piping canals results in decreased pumping costs.

- *The expected geographic scope benefits from the proposed project (e.g., local, sub-basin, basin).*

Benefits would be primarily within the Klamath Project, but, again, HID's saved water would make beneficial contributions for all within the larger Klamath Basin.

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

The project is a coordinated effort with HID and Reclamation and will have a positive impact to the District and to other water users. This water conservation project is meant to increase the available surface supply through improved delivery systems. This increased supply will be truly beneficial to District water users and the Klamath Project. Also, this project includes a benefit to endangered species (Lost River and Short Nose Suckers) and other wildlife in the Klamath Basin including waterfowl populations in nearby refuges and Clear Lake.

Water users within HID are seeing the benefits of the piping program. We are at the point of making necessary and serious savings, which will be of great benefit during the dry years and the challenges to come. As HID has now converted about 50% of its water delivery system to pipe, a great deal of support and encouragement has been generated not only within the District but also within the larger Klamath Project from federal, state, and local agencies.

- *Any anticipated positive impacts/benefits to local sectors and economies (e.g., agriculture, environment, recreation, tourism).*

HID anticipates several positive impacts as water quantity and water quality issues would be improved. As mentioned, local wildlife refuges (a recreation and tourist resource) would benefit with additional water provided from this project. Water saved from this project would also remain instream for neighboring farming communities and other downstream interests.

- *Extent to which the project will complement work done in coordination with NRCS in the area (e.g., with a direct connection to the district's water supply). Describe any on-farm efficiency work that is currently being completed or is anticipated to be completed in the future using NRCS assistance through EQIP or other programs.*

The District, and irrigators therein, are experiencing an ongoing improvement in irrigation methods that includes installation of pivots, linears, and updated wheel lines. Most of these on-farm improvements have been in coordination with NRCS and the local Klamath Soil and Water Conservation District office. These on-farm improvements blend nicely with HID's piping program as piping provides a consistent and improved

supply of water to the water user. The water is cleaner than supplied by open canals and the discharge constant. This also allows HID management to provide water to users in a more timely and efficient fashion.

Evaluation Criterion B: Planning Efforts Supporting the Project

Describe how your project is supported by an existing planning effort (water management plan, water conservation plan, System Optimization Review, or other planning effort).

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

HID has a water conservation plan developed with the support of Reclamation and technical research conducted by CH2M Hill. The Klamath River Basin Study completed in August 2016 by Reclamation in partnership with the Oregon Water Resources Department and the California Department of Water Resources explored the decreasing of water demand as an adaptation strategy category. Agricultural water conservation was one concept within that category, and it includes canal lining and piping projects as an activity to obtain water conservation goals.

HID's proposed project would support this effort as seepage would be eliminated along section of Dairy Canal and approximately 350 to 700 acre-feet of water would be saved annually. All conserved water would remain instream within the Lost River; however, if Klamath Project operations and other conditions allow, the conserved water could be routed into the Klamath River system to support further agricultural water uses, environmental needs, Tribal treaty rights, and other interests that were identified in the Study.

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

The Klamath River Basin Study stated that climate change has already impacted water resources and that the trend will continue in the future. Because of this, it is imperative that measures are identified that would reduce water supply and demand imbalances. The Study indicated that agricultural water conservation techniques, which reduce water demand, would assist in addressing this imbalance by allowing increased flow downstream in the Klamath Basin. This proposed piping project would support that goal.

Evaluation Criterion C: Project Implementation

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

An estimated project schedule, which assumes NEPA compliance to be completed six months after the grant agreement is signed, is in the executive summary section of this application.

Describe any permits that will be required, along with the process for obtaining such permits.

Compliance with NEPA is the only required action known at this time.

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

Pre-designing and engineering in the canal bed to accommodate the pipe. This is needed because of “overdig” and destruction by animals and weather in the 100 year period in which the facilities have existed.

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

Outside of HID Board directives, none are known.

Describe how the environmental compliance estimate was developed. Have the compliance costs been discussed with the local Reclamation office?

HID consulted with KBAO staff in developing the cost estimate for environmental compliance.

Evaluation Criterion D: Nexus to Reclamation

Is the proposed project connected to a Reclamation project or activity? If so, how? Please consider the following:

Yes, it is connected.

- *Does the applicant receive Reclamation project water?*

Yes

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

HID is situated within the Klamath Reclamation Project boundaries. There are no Reclamation facilities (i.e., reserved works) within the District.

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

Yes, in the Klamath Basin as part of the Klamath Project.

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

Yes. The conserved water will remain in the Lost River System to benefit downstream users, federally listed endangered species, and the Klamath Basin wildlife refuges. There is also a possible potential that water could be diverted into the Klamath River.

- *Will the project benefit any tribe(s)?*

It has not been documented that conserved water from HID's prior piping projects has been made available for Tribes, and HID suspects that surplus water from this proposal will yield little direct benefits for Tribes because much of the water will remain in the Lost River system. If conditions allow, however, there is potential to divert conserved water from the Lost River into the Klamath River system that could prove beneficial to be Tribes.

Evaluation Criterion E: Department of the Interior Priorities

1. Creating a conservation stewardship legacy second only to Teddy Roosevelt

a. Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment.

As the climate in the Klamath Basin continues to warm, where evaporation of surface water has increased, piping of open canal is a great approach in mitigating this issue. Once implemented, Reclamation would have that much more flexibility in managing the scarce water resource in the Klamath Project and Klamath Basin.

d. Review DOI water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity.

HID's piping program has been recognized by other Klamath Project entities and individuals. In fact, HID was awarded the Regional Director's Water Conservation Award in 2018 for its water conservation efforts.

e. Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands.

Water saved by this project, and HID's prior projects, can potentially contribute to local wildlife refuges and other habitats in the Lost River and Lower Klamath River systems.

2. Utilizing our natural resources

a. Ensure American Energy is available to meet our security and economic needs.

An indirect benefit of this project is that pumping of water would be reduced through water conservation.

3. Restoring trust with local communities

a. Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands.

HID considers itself as brother to its neighboring districts. Executing these water conservation projects indicates HID's willingness to do its best to manage the resource properly.

b. Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities.

The District has, and will continue to, work and communicate in harmony with the above entities. As mentioned, water saved through this project, as well as HID's prior projects, has the potential to benefit several parties as the conserved water would remain in stream.

4. *Striking a regulatory balance*

b. Ensure that Endangered Species Act decisions are based on strong science and thorough analysis.

This project would not directly impact this issue, but, as mentioned, local wildlife refuges and ESA-listed species (suckers) would benefit from water being saved as a result of this project.

5. *Modernizing our infrastructure*

a. Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure.

HID's piping program is directly in line with this initiative. HID facilities are aging; this program intends to modernize and make more efficient these facilities.

b. Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs.

HID's piping program has gained interest of others in the Klamath Basin and, hopefully, has served as an example of the type of beneficial results that can be achieved.

c. Prioritize DOI infrastructure needs to highlight:

1. Construction of infrastructure.

The intent of HID's piping program, including this project, is to modernize its water conveyances and minimize maintenance.

2. Cyclical maintenance.

See response above.

Project Budget

Funding Plan and Letters of Commitment

Describe how the non-Federal share of project costs will be obtained. Reclamation will use this information in making a determination of financial capability.

- The amount of funding commitment.*

HID would commit \$94,696.80 to this project. The greater portion of this amount is in-kind contributions of labor, management, and equipment. The total amount of the project is \$169,696.80 with \$74,400.00 requested under the WaterSMART opportunity.

- *The date the funds will be available to the applicant.*

HID anticipates of having its cost share available at the time of signing the financial assistance agreement.

- *Any time constraints on the availability of funds.*

None known by HID at this time.

- *Any other contingencies associated with the funding commitment.*

None.

Please identify the sources of the non-Federal cost share contribution for the project, including:

- *Any monetary contributions by the applicant towards the cost-share requirement and source of funds (e.g., reserve account, tax revenue, and/or assessments).*

HID will primarily provide its cost share through in-kind contributions of labor, management, and equipment from which funding has been obtained through in-District irrigation assessments.

- *Any costs that will be contributed by the applicant.*

Same as above. HID will primarily provide its cost share through in-kind contributions of labor, management, and equipment from which funding has been obtained through in-District irrigation assessments.

- *Any third-party in-kind costs (i.e., goods and services provided by a third party).*

HID is not seeking funds from third-parties.

- *Any cash requested or received from other non-Federal entities.*

HID is not receiving funding nor has requested funding from any other non-Federal entities.

- *Any pending funding requests (i.e. grants or loans) that have not yet been approved and explain how the project will be affected if such funding is denied.*

N/A

In addition, please identify whether the budget proposal includes any project costs that have been or may be incurred prior to award.

No expenditures prior to award are expected.

Budget Proposal

Total Project Cost Table

Funding Sources	Percent of Total Project Cost	Total Cost By Source
Recipient Funding	56%	\$94,696.80
Other Recipient Funding		\$0.00
Reclamation Funding	44%	\$74,400.00
Other Federal Funding		\$0.00
Totals	100%	\$169,096.80

Budget Proposal Table

Budget Item Description	Computation		Quantity Type	Total Cost
	\$/Unit	Quantity		
Salaries and Wages				
Engineering	\$40.00	40	Hour	\$1,600.00
Administrative	\$35.00	24	Hour	\$840.00
Project Manager	\$35.00	200	Hour	\$7,000.00
Labor/Helper	\$25.00	200	Hour	\$5,000.00
Labor/Helper	\$25.00	200	Hour	\$5,000.00
Equipment				
CAT 312 Excavator	\$38.00	200	Hour	\$7,600.00
CAT D4 Dozer	\$38.00	200	Hour	\$7,600.00
Semi-Tractor	\$63.50	12	Hour	\$762.00
Low Boy – Haul Truck	\$26.00	12	Hour	\$312.00
Supplies and Materials				
HDPE Control Structures	\$4,000.00	2	Ea	\$8,000.00
Waterman Headgate	\$1,200.00	2	Ea	\$2,400.00
30" HDPE Pipe	\$24.00	3100	Ft	\$74,400.00
Seed	\$1.00	400	LBs	\$400.00
Other				
Reclamation environmental and cultural compliance costs	\$15,000.00	1	LS	\$15,000.00
Reporting	\$5,000.00	1	LS	\$5,000.00
Contingency	\$140,914.00	10%	LS	\$14,091.40
Total Direct Costs				\$155,005.40
Indirect Costs				
De Minimis	10%	\$140,914.00	MTDC	\$14,091.40
Total Estimated Project Costs				\$169,096.80

Budget Narrative

The project budget consists of five major components: 1) Salaries and Wages, 2) Equipment, 3) Supplies and Materials, 4) Other (Environmental Compliance/Reporting/Contingency), and 5) Indirect Costs. Based on previous similar projects, pricing quotes from local vendors, and the Army Corps of Engineers Operating Expense Schedule, HID has budgeted for all related tasks, labor, and materials necessary for this project. An itemized breakdown of these costs is included in this report.

Salaries and Wages

The wages of the employees are not separated as indirect costs because of the direct nature of the project; their time is essential for material and labor coordination as well as other necessary functions of the project. No wage increases are anticipated at this time.

Budget Item Description	Computation		Quantity Type	Total Cost
	\$/Unit	Quantity		
Engineering	\$40.00	40	Hour	\$1,600.00
Administrative	\$35.00	24	Hour	\$840.00
Project Manager - Don Russell	\$35.00	200	Hour	\$7,000.00
Labor/Helper	\$25.00	200	Hour	\$5,000.00
Labor/Helper	\$25.00	200	Hour	\$5,000.00
Total				\$19,440.00

Fringe Benefits

Fringe benefits are included in the hourly wage of each employee.

Travel

No travel expenses are anticipated.

Equipment

The below listed equipment that is to be used during construction of this project is owned by HID. The rates in the table are based the Army Corps of Engineers Operating Expense Schedule.

Budget Item Description	Computation		Quantity Type	Total Cost
	\$/Unit	Quantity		
CAT 312 Excavator	\$38.00	200	Hour	\$7,600.00
CAT D4 Dozer	\$38.00	200	Hour	\$7,600.00
Semi-Tractor	\$63.50	12	Hour	\$762.00
Low Boy – Haul Truck	\$26.00	12	Hour	\$312.00
Total				\$16,274.00

Supplies and Materials

Costs associated with supplies and materials are based on previous similar projects and pricing quotes from local vendors (see Appendix C for estimates).

Budget Item Description	Computation		Quantity Type	Total Cost
	\$/Unit	Quantity		
HDPE Control Structures	\$4,000.00	2	Ea	\$8,000.00
Waterman Headgate	\$1,200.00	2	Ea	\$2,400.00
30" HDPE Pipe	\$24.00	3100	Ft	\$74,400.00
Seed	\$1.00	400	LBs	\$400.00
Total				\$85,200.00

Contractual

HID is not anticipating the use of contractors for this project.

Environmental and Regulatory Compliance Costs

It is anticipated Reclamation will conduct the environmental (i.e., NEPA) compliance. However, based on prior experiences, the NHPA requirement may necessitate the hiring of a private cultural consultant where Reclamation will assume a review role. The costs listed below for the NHPA private consultant and the Reclamation NEPA/NHPA line items are based on HID's previously awarded WaterSMART projects as they are similar in scope to this proposed project and in coordination with Reclamation Klamath Basin Area Office staff.

A line item for reporting (\$5,000.00) has been included to cover costs associated with the WaterSMART grant reporting requirement and other reporting obligations from the state or local level.

The contingency category has been included to support any unforeseen inflation involved in cost estimates for any of the budgeted line items. HID does not intend to purchase any materials or supplies until NEPA and NHPA requirements have been met; however, given the timeframe that may be involved, the current estimates may change by the time the necessary compliances have been completed.

Budget Item Description	Computation		Quantity Type	Total Cost
	\$/Unit	Quantity		
Other				
Reclamation environmental and cultural compliance costs	\$15,000.00	1	LS	\$15,000.00
Reporting	\$5,000.00	1	LS	\$5,000.00
Contingency	\$20,000.00	10%	LS	\$2,000.00
Total				\$22,000.00

Indirect Costs

A line item for indirect costs has been included to cover any overhead and general costs. HID has budgeted for the de minimis rate of 10% of the total direct costs minus the contingency line item (i.e., \$140,914.00).

Budget Item Description	Computation		Quantity Type	Total Cost
	\$/Unit	Quantity		
Indirect Costs				
De Minimis	10%	\$140,914.00	MTDC	\$14,091.40

Environmental and Cultural Resources Compliance

Please answer the questions from Section H.1. Environmental and Cultural Resource Considerations in this section.

- Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? 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 proposed project is expected to have a minimal impact on the surrounding environment. The temporary disturbance of the soil caused by profiling or trenching existing canal and drilling for the well will be minimal to the extent possible in preparation for pipe and well installation. It is the intent of HID to keep all soil movement to a minimum and perform construction during the non-irrigation season to protect water resources. The District also intends to plant native grasses on the disturbed areas after construction.

- Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?*

HID is not aware of any critical habitat or threatened or endangered species occurring in the project area that would be affected by the proposed project.

- Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.*

No.

- When was the water delivery system constructed?*

1915 through 1950.

- *Will the proposed 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.*

It is the District's intent to replace open canals with buried pipe and replace all necessary control structures; these features were constructed in the early to mid-1900s.

- *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.*

HID is not aware of any historic sites within the project area. Prior studies, conducted by Reclamation staff and private organizations, have found no historic or cultural resources in any of the sites of HID's prior WaterSMART projects.

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

HID is not aware of any archeological sites in the project area (see above response).

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

The proposed project is not expected to have an impact on low income or minority populations. Assessments performed for HID's prior WaterSMART projects have not identified impacts to these populations.

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

The project will not limit access to Indian sacred sites nor will it impact tribal lands.

- *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?*

HID will use best management practices during construction to prohibit the spread of noxious or invasive species. Additionally, after construction is complete, HID will seed the project area with native grasses and utilize herbicides as appropriate to eliminate occurrence of invasive species.

Required Permits or Approvals

No permits or approvals, outside of NEPA compliance, will be necessary for this project.

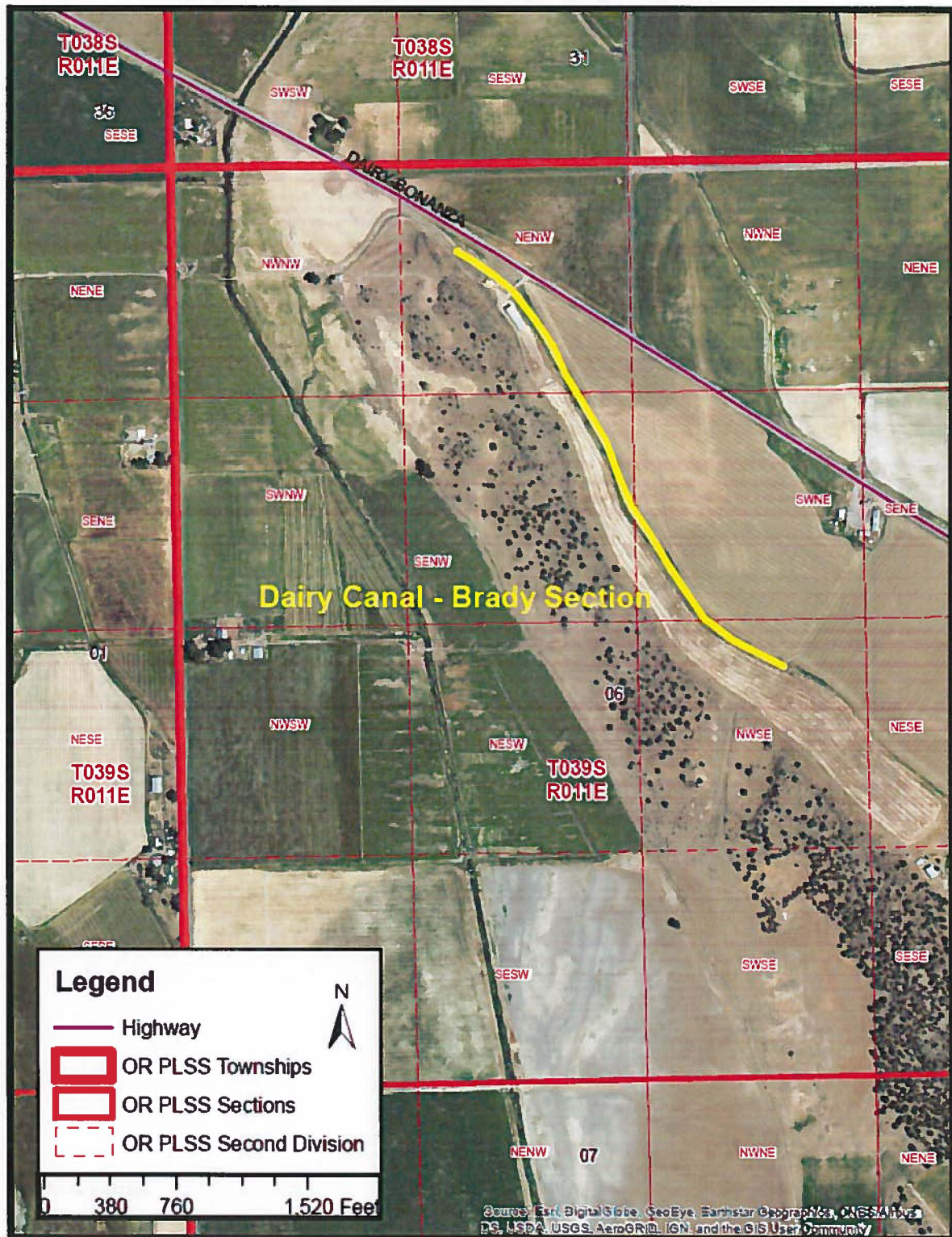
Official Resolution

HID will submit a Board resolution that: 1. Identifies the official(s) with authority to enter into an agreement with Reclamation; 2. Identifies HID's ability to provide cost share for the project; 3. Identifies HID's willingness to work with Reclamation to meet established milestones for the project.

The HID Board will convene on May 7, 2019 to draft, review, and sign a resolution. Per the funding announcement, HID will present the resolution to Reclamation within 30 days after submitting this grant application.

APPENDIX A

HID FY19 WaterSMART Project Location



APPENDIX B

RECLAMATION

Managing Water in the West

Horsefly Irrigation District Yonna Canal WaterSMART Ponding Test

Summary of Findings Report

Mid-Pacific Region



U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center

January 2016

Horsefly Irrigation District Yonna Canal WaterSMART Ponding Test

Summary of Findings Report

Mid-Pacific Region

Prepared by Merlynn D. Bender

**Technical Service Center
Project Management
Mark Spears, Hydraulic Engineer**



**U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center**

January 2016

Acronyms and Abbreviations

AFY	acre-feet per year
cfs	cubic feet per second
HID	Horsefly Irrigation District
Reclamation	Bureau of Reclamation
SMART	Sustain and Manage America's Resources for Tomorrow
TSC	Technical Service Center
WEEG	WaterSMART Water and Energy Efficiency Grant

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Background

The Horsefly Irrigation District (HID) applied for and received a Reclamation WaterSMART Water and Energy Efficiency Grant during 2014 (WEEG-14-082). Reclamation's Technical Service Center (TSC) staff identified this HID piping project as a good candidate for water savings verification. This project will replace one Yonna Canal section and two Dairy Canal sections with plastic pipe to reduce seepage. HID staff (Eric Mockridge and Nicholas Mockridge) provided equipment and performed the ponding test. TSC staff (Merlynn Bender) and Reclamation's Klamath Basin Area Office staff (Tyler Hammersmith) observed and facilitated the ponding test.

During April 9, 2015 through April 13, 2015, HID conducted a ponding test on Yonna Canal because the Dairy Canal pumps were not operable. Because those pumps were not operable, the reach for the ponding test was changed that morning to an open channel canal section just downstream of the Yonna Canal reach to be piped. The Yonna Canal reach to be piped was too steep for a ponding test. However, the reach downstream was flat enough for a ponding test. The purpose of the ponding test was to provide pre-project estimates of seepage losses that could be used to compare against the estimates given in HID's original proposal for the grant. The bottom of the earthen canal ditch used for the ponding test appeared to be hard-packed clay loam soil. Soil density was observed by driving a metal bar into the soil near the downstream temporary ponding test dam on Yonna Canal.

HID was provided a ponding test guidance document prior to the test.¹ After a beginning safety meeting, HID constructed the downstream dam with a tarp placed over the upstream culvert opening of a road crossing and then with excavated soil placed over and in front of the culvert opening using HID's backhoe (figure 1). Preparation for the ponding test occurred the same day as the beginning of the ponding test which began at 9 p.m. April 9. The backhoe was also used to cut an overflow key in the road crossing at the temporary downstream ponding test dam to prevent flooding fields. The backhoe and hand shovels were used to fill the downstream dam site culvert opening with soil to eliminate dam pond leakage. Three staff gauges were installed in Yonna Canal near the downstream dam, 0.3 miles upstream of the downstream dam, and about 0.3 miles upstream of the upstream end of the pond test section. The upstream gauge was used to show passage of the water draining off the steeper upstream reach and was not used for measurements after recordings for the ponding test period were initiated. Water was pumped slowly into Yonna Canal over a six hour period so as to not wash out the earthen dam while filling. Unfortunately, water seeped through the downstream closed-off dam culvert during filling. Repairing the

¹ Guidance document: "Measuring Seepage Losses from Canals Using the Ponding Test Method," by Eric Leigh and Guy Fipps, AgriLIFE EXTENSION, Texas A&M System, B-6218, 1-09 (January 2009).

Horsefly Irrigation District Yonna Canal WaterSMART Ponding Test

downstream dam required the addition of a stiff plywood cover and additional soil over the culvert opening. The pond banks were allowed to saturate and the pond water surface to level off for three hours before beginning the ponding test. Gauge readings were initially taken every hour at each of the measuring stations just upstream of the downstream dam as the water surface elevation stabilized to a flat pool and calm pool condition at 9 p.m. on April 9. No wind or waves in the pond were observed and no precipitation occurred overnight.



Figure 1. Downstream dam on Yonna Canal for HID ponding test.

As shown by the report cover figure, the water surface elevation dropped 0.42 feet over a 12-hour period indicating considerable seepage from the canal which had been saturated for six hours before beginning the ponding test at 9 p.m. on April 9. Because no temporary upstream dam was constructed, slight drainage from the upper portion of Yonna Canal may have seeped into the ponded section during the early part of the ponding test period. Before ponding the reach and during the ponding test, canal bottom and top widths were measured using a tape line. These field measurements were performed at the test site to determine wetted perimeter and top width of the ponded section. Staff gauge measurements were initiated at each of the two pond test measurement locations three hours after it was determined that the inflow was complete and the downstream dam was water tight. The two measurement locations, at a distance of 0.3 miles apart, indicated a still calm pond condition without waves about two hours before starting the pond seepage drawdown measurements. The pond test consisted of recording the date,

Horsefly Irrigation District Yonna Canal WaterSMART Ponding Test

time of day, and water level on the staff gauges as well as the distance of water level drop from a baseline maximum pool datum on stationary objects. Those stationary objects were a rust-colored culvert pipe (see report cover) over the pond near the downstream dam and a turnout headgate about 0.3 miles upstream of the downstream dam.

The drawdown rate of the pond test determined how long the measurements were taken as well as the extent of the pool length to use for seepage calculations. A pond reach length of one mile (excluding road-crossing culvert sections) allowed potentially 18 inches of water surface drop at the upstream end of the pond section chosen for seepage calculations over a three day period if needed. The ponding test was completed within 72 hours. Based on drawdown measurements from the rust-colored culvert pipe by TSC and HID, the ponded section lost forty percent of the initial ponded section water volume during the ponding test period of three days. The ponding test period extended 72 hours from 9 p.m. April 9 to 9 p.m. April 12.

Results

The initial observed seepage rate of 10 inches per day (0.83 feet/day or 0.83 cubic feet per foot of canal per day) was used for canal seepage calculations. It was assumed that the canals to-be-piped would run continuously for 180 days during the irrigation season. An assumed rectangular upper canal volume loss and an average canal width of 18 feet, based on field measurements, was used for seepage calculations resulting in a loss of 15 cubic feet per day per foot of canal to be piped. Multiplying the seepage loss rate by the total 1.26 mile length (6,653 feet) of canal to be piped in the three reaches resulted in 412 acre-feet per year (AFY) seepage loss based on the ponding test located just downstream of the to-be-piped reach of the Yonna Canal. HID estimated 720 AFY total seepage loss for the three canal reaches to-be-piped. The applicants estimate was based on the difference between the amount pumped and amount diverted. HID estimated that 30 percent of the water diverted is lost.

The unlined canal section tested during the ponding test is a flat reach with ten road-crossing culverts that dam as well as restrict the flow. Fine sediments observed in the canal bottom (figure 1) drop out of the water column and partially seal the canal bottom upstream of the road-crossing culverts potentially reducing the amount of canal seepage. Each road-crossing culvert constricts flow and dams water thereby reducing velocities causing fine sediments to settle to the canal bottom upstream of the culverts. Fine sediments were observed by TSC staff before and during the ponding test while walking the dry canal and wading the saturated canal. The apparent sediment sealing is suspected to have partially sealed the canal in the ponding test reach, thereby reducing the amount of seepage

Horsefly Irrigation District Yonna Canal WaterSMART Ponding Test

observed in the ponding test relative to the more typical canal sections. With no temporary upstream dam, slight upstream drainage from rainfall, bank drainage, and groundwater seepage may have entered the ponding test section after the beginning of the ponding test which would decrease the ponding test seepage rate calculated. After saturating the unlined canal for six hours, the HID Yonna Canal ponding test for one mile of unlined channel was considered successful.

Conclusions

The Yonna Canal ponding test indicated seepage water loss from the unlined earthen canal was 57 percent of that estimated by the applicant. However without an upstream dam on the ponded section, the actual amount of seepage may be more due to previous precipitation or pump drainage entering the ponded section after the start of the ponding test. The ponded section is located in a flat wetland area which is expected to experience less seepage than a more typical reach with better drainage pathways to the groundwater table. There may be more seepage on the Dairy Canal and Yonna Canal reaches to be piped where there are less road crossings with culverts and more rodent burrows. The many variables affecting net seepage into the hard-packed soils where the ponding test occurred reduces the certainty of testing and subsequent interpretation of data. A post-project test is typically not required for a piping project which should not leak.

Although the ponding test of the earthen Yonna Canal in flat terrain downstream of the reaches to be piped provided useful information in regards to seepage reduction, additional information would be required to potentially better estimate pre-project seepage in other reaches. Overall, the grant applicant's water saving estimate appears to be reasonable based on the information provided in the grant application and based on the Yonna Canal ponding test observations; however without additional data, the larger seepage rate estimated by the applicant on the three canal sections to be piped was not verified on the flatter Yonna Canal ponding test reach located downstream of the steeper reach to be piped.

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APPENDIX C

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SHEET NO. 1

NAME Horse Fly Irrigation

PROJECT Ads

ADDRESS

SALESMAN Leon Langley

DATE 4-23-19

[illegible]

THIS QUOTATION IS SUBJECT TO THE FOLLOWING CONDITIONS: (a) Errors are subject to correction. (b) All prices are subject to change without notice. (c) Prices FOB point of origin unless specified otherwise. (d) Quotations are made for immediate acceptance unless stated otherwise. (e) All orders are subject to approval by our credit dept. (f) Claims for corrections, reductions or shortage must be made within 10 days after receipt of goods.

FORWARD OR TOTAL