Cambridge Canal Automation Project

Funding Opportunity No. R12SF80049
Funding Group I

WaterSMART: Water and Energy Efficiency Grants for FY 2012

Fiscal Year 2012

By

Frenchman Cambridge Irrigation District

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Cambridge Canal Automation Project
Frenchman Cambridge Irrigation District

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(1) EXECUTIVE SUMMARY:

Date: January 10, 2012
Applicant Name: Frenchman Cambridge Irrigation District
City, County, State: Cambridge, Furnas County, Nebraska
Contact: Brad Edgerton
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Project Name: Cambridge Canal Automation Project

- A **one-paragraph project summary that specifies the Task Area** (A, **B, C, or D) and briefly identifies how the proposed project contributes to accomplishing the goals of this task area (see Section III.B, "Eligible Projects").**

Task Area A: Water Conservation

Frenchman-Cambridge Irrigation District (District) utilizes the storage supply from three Federal Reservoirs via Reclamation repayment contract No. 009D6B0122 to supply irrigation water to 45,669 Reclamation project acres. (See Appendix C) Excessive groundwater development upstream of Swanson Reservoir, Hugh Butler Reservoir and Harry Strunk Reservoir has significantly limited the District's ability to provide a dependable and adequate water supply to all 45,669 project acres served by these three Reservoirs. In addition groundwater development along the river and creek corridor downstream of the Reservoirs has greatly reduced the ability to convey the limited storage water to all Diversion Dam downstream. The Cambridge Canal Automation Project will provide for a more accurate and efficient delivery system, enabling the District to physically capture the water granted to the District via the surface water appropriations listed on Appendix B. The Project goal would be achieved by eliminating approximately 95% of by-pass at the Cambridge Diversion Dam. This should also reduce up to 25% of the tail water due to the ability to store extra water in the larger bays near the top end of the canal until it can be utilized. Water saved would remain in Harry Strunk Reservoir and made available for all its authorized purposes.

Task Area B: Energy-Water Nexus

The District will utilize solar panels to power the gate operation and SCADA system. In addition, the networked gate automation system with SCADA has alarm level notification capabilities and would eliminate daily inspections at the Cambridge Diversion Dam and several key waste ways throughout the canal system. These reduced trips would save approximately 5 miles of travel per day during the irrigation season. These miles were estimated by eliminating the afternoon inspection of the Cambridge Diversion Dam.

5 miles X 90 days = 450 miles per year
450 miles divided by 15 miles per gallon = 30 gallons of fuel saved
30 gallons at $3.20= $96 saved per season.

Task Area C: Benefits to Endangered Species

Higher Reservoir pool elevations in Harry Strunk Reservoir would benefit several threatened species in Nebraska. Although no longer listed as an endangered or threatened species, Bald Eagles are commonly spotted visiting Harry Strunk Reservoir and some have made Harry Strunk Reservoir their permanent habitat. Higher pool elevations tend to provide more open water during the winter months, which attract water fowl and migrating birds for the Bald Eagles dietary needs. In addition, a very significant number of American White Pelicans utilize Harry Strunk Reservoir as well as the Harlan County, Hugh Butler, and Swanson Reservoirs in the service area of the District.

Task Area D: Water Markets

Nebraska has overdeveloped its groundwater resource in the Republican River Basin and struggles to comply with the Republican River Compact. With the recently adopted Integrated Management plans *(IMP are plans jointly developed by the State and local NRDs to regulate groundwater and surface water uses in the Basin.)* in the Basin Nebraska has identified surface water leases as one method to achieve compliance with the Republican River Compact and would ease regulations. The District is currently discussing water banking and water marketing opportunities with the Natural Resource Districts located within the Republican River Basin. Frenchman Cambridge Irrigation District can help Nebraska with compliance by conserving storage water during wet periods then marketing it during dry periods when Nebraska has a reduced Compact allocation and must supply Kansas with her share of the Compact allocation. Some of this supply for water marketing could come from all three District contracted Reservoirs. In 2007 the District marketed 26,000 acre-feet to the Natural Resources Districts that was delivered to Kansas Bostwick Irrigation District for beneficial use on Reclamation project acres. The water marketed in 2007 did bring Nebraska into compliance in 2008 with the Republican River Compact. In 2000 during Contract Renewal the District agreed to a higher minimum pool elevation in all three Reservoirs thus reducing the amount of irrigation supply available and increased the water in storage for fish, wildlife and recreation benefits.

- **State the length of time and estimated completion date for the project.**

Project Schedule:

January 2012	**Submit Grant**
April 2012	**Grant awarded**
August 2012	**Site preparation**
September 2012	**Start Construction**
June 1, 2014	**Complete Installation, test installation and draft final report**

BACKGROUND DATA

- **Provide a map of the area showing the geographic location (State, County and directions from nearest town).**

  Please refer to Appendix "A" for maps of the geographic location and directions from the nearest towns. The Automated Headgate and SCADA are located at the Cambridge Canal Diversion Dam and are located in Furnas County approximately two miles east of Cambridge Nebraska. The Canal systems which will house the automated check structures travels through all of Furnas County and most of Harlan County and ends approximately 49 miles downstream near Alma Nebraska.

- **Describe the source of water supply, the water rights involved, current water uses (agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demands. Also identify potential shortfalls in water supply. If water is primarily used for irrigation, describe major crops and total acres served.**

1. The source of water supply is the waters of the Republican River and more specifically water captured in Swanson Reservoir, Hugh Butler Reservoir and Harry Strunk Reservoir, and the natural flows of the Republican River which were appropriated to the Bureau of Reclamation and the District by the State of Nebraska in the mid 1940s and early 1950s.

2. Please see Appendix "B" for a list of all the water rights involved.

3. The current water use is agricultural with recreation listed as a non-contributing benefit.

4. Frenchman Cambridge Irrigation District currently provides water to nearly 450 water users located between Swanson Reservoir near Trenton Ne. downstream to Alma Ne. located at the west end of Harlan County Reservoir.

5. Frenchman Cambridge Irrigation District this past decade has not been able to deliver a "full supply" and actually had one canal system sit empty for six consecutive years and two others (Red Willow and Bartley Canals) were empty five years out of six. This is an accumulated total of 157,684 acres that had no water supply available during this past decade. After four wet years in the Basin the District can still only deliver each permitted acre an eight inch supply of water. Consequently only 60% to 70% of the permitted acres are being irrigated with the water being stacked on the most productive lands. As Nebraska increases regulations on groundwater use for compliance with the Republican River Compact going forward the demand for storage water will increase. District officials anticipate delivering up to 100% of the permitted acres during "Compact Call Years". (*A Compact Call Years is a year when Nebraska forecast non-compliance and closes all natural flow and storage permits)* This will require the District to call for nearly all the contracted water supply from our three Reclamation Reservoirs which will exceed the inflow in most years regardless of whether a Compact Call is in place; this is <u>not sustainable.</u>

In November of 2009 a serious Safety of Dams (SOD) issue was discovered at Hugh Butler Reservoir (Red Willow Dam) which required Reclamation to evacuate all storage water in this Reservoir and maintain the elevation at dead pool. Due to this action 4,800 acres under Red Willow Canal will have no water supply until the SOD issue is repaired, the scheduled completion date is February 2014; in addition the District is responsible for 15% of the SOD remedy.

6. Short falls in the water supply exist due to unrestrained groundwater development upstream of the Federal Reservoir resulting in a steady decline of inflows since project construction. (See Appendix C) Last year Frenchman Cambridge Irrigation District was awarded a grant to build the Bartley Pumping Plant and Pipeline; up to 2,400 acre-feet of water will be used to supplement Bartley Canal from Harry Strunk Reservoir. Automating Cambridge Canal was anticipated as a water saving project that could help with this pumping project water supply.

7. The primary use of water is for irrigation and the major crops are corn and soybeans.

(2) Technical Project Description.

Frenchman Cambridge Irrigation District is requesting fund for a project that will utilize the Cambridge Diversion Dam and Cambridge Canal located approximately two miles east of Cambridge Nebraska. Cambridge Canal diverts Republican River flows and storage water from Harry Strunk Reservoirs into the Cambridge Canal. The headgate will be automated and programmed with SCADA to capture the storage releases from Harry Strunk Reservoir along with the natural flows of the River granted to the District. Automation will monitor the upstream pool elevation at the Diversion Dam and adjust the gates to capture nearly all the flows. In addition to the automated headgate, the first section of the Canal will be converted to automated check structures. This will allow extra water to be stored in the larger bays of the canal until the release from Harry Strunk Reservoir can be adjusted. When the canal is approaching maximum storage capacity the network system will notify both District personnel and Reclamation personnel via the SCADA system so releases from Harry Strunk Reservoir can be adjusted back.

(3) Evaluation Criteria A: Water Conservation

- **Subcriterion No. 1 - Water Conservation:**

(a.) Quantifiable Water Savings:

The amount of water saved by the installation of automate head gates controls will be approximately 95% of 2,750 acre-feet per year. (Table No. 1a) This number is the average by-pass during July and August from 2003 thru 2011. The Data for 2007 is missing. No data was recorded prior to 2003. Historical data from Reclamation's web site. *http://www.usbr.gov/gp-bin/arc050_form.pl?CDNE (required parameters are QD and year)*

Table No. 1a Cambridge Diversion Dam By-pass

	2004	2005	2006	2007	2008	2009	2010	2011	AVERAGE
JULY	1,019	512	970	M	1,852	848	2,492	2,146	1,406
AUGUST	755	632	575	M	1,911	854	2,262	2,436	1,346
TOTAL	**1,774**	**1,144**	**1,545**	**M**	**3,763**	**1,702**	**4,754**	**4,582**	**2,752**

M = Missing Data

Estimated Total savings from headgate: 95% X 2752 = 2612 AF

The amount of water saved by the construction and installation of four automate check structures will be approximately 25% of the total discharge at the Orleans Waste way. (Table No. 1b) (This number is the average waste way discharge near Orleans Ne. for 2010 and 2011 this data has only been recorded starting in 2010 to present. It should be noted that Cambridge Canal has approximately five more waste ways that are not recorded therefore are not included in the data. Additional water savings are expected at these non-recorded waste ways also. (The 25% was based on the estimated extra capacity of the large bays to store that amount of water)

Table No. 1b - Cambridge Canal Waste way Near Orleans

	2010	2011	Average
JULY	367	850	609
AUGUST	1,060	778	919
SEPTEMBER	312	333	323
TOTAL	**1,739**	**1,961**	**1,850**

DATA SOURSE: http://www.usbr.gov/gp-bin/arc050_form.pl?cawne

Estimated Total savings from check structure: 25% X 1,850 = 462 AF

Estimated Total Project Water Savings: 2,612 + 462 = 3,074 Acre-Feet per year

- **What are the applicant's average annual acre-feet of water supply?**
  The total average annual water supply is approximately 52,000 acre-feet (The data below is provided by the Bureau of Reclamation, McCook Nebraska Office and is calculated from the last two decades (1990 to 2011) to reflect recent developments in the Basin. (See Table No. 2) The District's net supply is based on the actual canal diversions.

Table No. 2

Year	District's Net Supply	Return Flows or Recharge	% Return Flows	Cambridge Canal Diversions
1990	78,960	24,488	31%	28,378
1991	66,859	21,417	32%	25,803
1992	55,432	23,473	42%	22,404
1993	47,123	26,293	56%	14,105
1994	83,960	36,232	43%	29,533
1995	86,770	33,635	39%	31,748
1996	53,007	25,424	48%	14,542
1997	80,618	28,100	35%	29,527
1998	75,036	29,696	40%	27,464
1999	58,117	22,128	38%	21,536
2000	70,214	27,050	39%	26,292
2001	48,672	20,201	42%	19,629
2002	37,900	14,960	39%	21,152
2003	18,332	8,309	45%	18,332
2004	21,964	10,660	49%	21,964
2005	19,732	9,974	51%	19,732
2006	25,522	13,724	54%	19,692
2007 **	26,000	26,000	100%	0
2008	23,476	13,502	58%	19,387
2009	63,112	45,319	72%	23,961
2010	52,338	34,671	66%	24,280
2011	60,106	38,529	64%	28,850
Average in AF	**52,420**	**24,263**	**49%**	**22,196**

*** 26,000 acre-feet of Harry Strunk Supply marketed to Nebraska for Compact Compliance.*

- **Where is that water currently going?**
  Currently 51% of the average annual water supply is consumed by irrigated crops on less than 45,669 Reclamation project acres; 49% is recharge to the groundwater aquifer and or direct return flows to the river. Transit loss or evaporation of storage water is not considered as part of the District's water supply. The water conserved will go towards higher pool elevations for recreation and habitat, water marketing and the District's water supply.

(b.) Improved Water Management

The total amount of water that can be better managed per year would be approximately 3,074 acre-feet. 2,612 acre-feet managed at the Cambridge Diversion Dam and 462 Acre-feet managed within the Canal system. The total 3,074 acre-feet will be managed at Harry Strunk Reservoir

Subcriterion No. 2 – Percentage of Total Supply:

As mentioned above the total average annual water supply is approximately 52,400 acre-feet; 3,074 acre-feet conserved and better managed is approximately 14% of the historic average annual diversions of the Cambridge Canal system (3,074 / 22,196 = .138) and approximately 6% for the entire Frenchman Cambridge Irrigation District average annual water supply of 52,420 acre-foot. (3074 / 52,420 = .058) *Calculations based on 1990 to 2011 data to reflect current conditions!*

Subcriterion No. 3 – Reasonableness of Costs:

The total project cost is approximately $632,301 (See Attached Budget)

Total Project Cost
Acre-feet Conserved and better managed X improvement life of 75 years

$632,301
3074 Acre-feet X 75 years

$632,301/ (3074 acre-feet X 75 yrs) = $2.74 per acre-foot conserved or better managed.

Evaluation Criteria B: Energy-Water Nexus

The District has consulted with Rubicon Water and all Canal Automation and SCADA will be powered with solar panels and direct current (DC) operating motors.

Evaluation Criteria C: Benefits to Endangered Species

The Republican River area within the District, especially including Reclamation project waters in Harry Strunk Reservoir, is also host to many additional migratory bird species that use the Central Flyway on their annual journeys. Harry Strunk Reservoir is located on the western edge of the Central Flyway. The migratory species, including shorebirds and songbirds, travel through by the millions and land on and near our lake and waterways, and although no longer listed as an endangered species, a significant population of protected Bald Eagles as well as Golden Eagles also remain resident in our district during portions of each year; several nesting pair of Bald Eagles now make a year-round home at Harry Strunk Reservoir.

In addition, a very significant number of American White Pelicans utilize the Harry Strunk Reservoir within the boundaries of the District (as well as the Harlan County, Hugh Butler, and Swanson Reservoirs in the service area of the District) on their annual spring and fall migrations, and although the American White Pelican has been removed from the national list of threatened species, it is still listed as threatened in Nebraska, is still considered endangered in other parts of the world (e.g. Alberta, Canada, location of one of the primary nesting grounds), and is protected under the Migratory Bird Treaty Act. Only approximately 100,000 American White Pelicans are believed to exist in the wild, their migratory journeys have been made more difficult in this century due to drainage of prairie wetlands and water bodies in the Great Plains, and a very

large percentage of the existing birds now rely heavily on the reservoirs within our local area as some of the only remaining feeding grounds still able to support their migratory needs.

The proposed project will make more water available to benefit these species and possibly help prevent some of the species from being re-listed as threatened or endangered. The species discussed above are not adversely impacted by any current Reclamation project; to the contrary, they are highly benefitted by the availability of Reclamation waters, low Reservoir pools at any of Reclamation Reservoirs in our area would pose a serious threat to these species. A low pool elevation for extended time also allows invasive vegetation to establish which also threatens animal habitat and recreation areas.

The Environmental Protection Agency (EPA) has listed a few of the Federal Reservoirs as "impaired waters in Nebraska"; the 2010 pollutant identified Chlorophyll A, which is carried over from the 2008 list, total nitrogen and total phosphorus are new to the impaired waters list in 2010. Higher pool elevations would mitigate some if not all of these listed pollutants.

(Species-specific information utilized above was obtained from the Nebraska Nature Conservancy, the Nebraska Game and Parks Commission, the Nebraska Bird Partnership, and the U.S. Army Corps of Engineers at Harlan County Lake).

Evaluation Criteria D: Water Marketing

(1.) Estimated amount of water to be marketed.

Approximately 3,074 acre-feet per year could be banked in Harry Strunk Reservoir.

(2.) A detailed description of the mechanism through which water will be marketed.

With the newly developed Integrated Management Plans (IMP) developed by the State of Nebraska and local Natural Resources Districts (NRD) one management action identified as a tool to help Nebraska achieve compliance is "Surface Water Leases". This concept was successfully implemented in 2007 when Frenchman Cambridge Water users on the Cambridge Canal system agreed to forgo irrigation and allow Reclamation to move Storage water from Harry Strunk Reservoir downstream to Harlan County Reservoir. The water was then available to the Kansas Bostwick Irrigation District. Nebraska was able to reduce consumptive use by approximately 12,000 acre-feet by not operating the Cambridge Canal which served 17,687 acres and approximately 26,000 acre-feet of water was conveyed downstream 60 miles to Harlan County Reservoir and made available to Kansas Bostwick Irrigation District. If not for this action Nebraska would not have achieved compliance in 2008. This project would make 3,074 acre-feet available via this same marketing mechanism.

(3.) Number of uses, types of water used, etc. in the water market.

The use would remain as irrigation and could only be used on approved Reclamation project acres in Kansas. When made available to Kansas Bostwick Irrigation District in 2007 it met all NEPA and Reclamation criteria. It also met the State of Nebraska's criteria in reducing Nebraska's consumptive uses and delivering more water to Kansas as required under the 1943 Republican River Compact and the 2003 Final Settlement Stipulations.

(4.) A description of any legal issues pertaining to water marketing.

In 2007 all the legal issues were identified by Reclamation. Some of Reclamation criteria were that Storage water could only be used on Reclamation project acres. The storage releases had to emulate irrigation releases to comply with all NEPA requirements and other Reclamation projects could not be harmed.

(5.) Estimated duration of the water market.
Water marketing will be required for several decades until the benefit of reduced groundwater pumping is realized in the stream.

Evaluation Criteria E: Other Contributions to Water Supply Sustainability

(1.) Will the project make water available to address a specific concern?
This project does address the immediate concerns for the District and also allow for adaptive management in the future. It serves as a prototype for future projects.

- **Will this project address water supply shortages due to climate variability and / or heightened competition for finite water supplies?**

This project helps Frenchman Cambridge Irrigation District deal with climate changes in the future. Nebraska is a diverse climate and on average rainfall declines one inch per every twenty-five miles you travel from east to west. This project allows the Irrigation District to utilize water in storage from Harry Strunk Reservoir which is located in an area with an average rainfall that is approximately two inches per year greater than the average rainfall at Swanson Reservoir.

- **Will the project market water to other users?**

Yes, this project would allow for water marketing, and more specifically would allow water to be used as an offset for over pumping the groundwater supply. This is needed to allow time for the reduction in pumping to manifest itself at the stream. Nebraska must comply with the Republican River Compact and this would allow time for Nebraska management options to be implemented and take effect.

- **Will this project make additional water available for Indian tribes?**

No, there are no Indian tribes in this area.

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

This project will make more water available in the Basin for beneficial use. The largest amount of transit loss is due to groundwater pumping however some of the loss is to phreatophytes and invasive species along the river which is a non-beneficial use that is very difficult to quantify at this time. In 2007 with the passage of LB 701 in Nebraska Legislature Nebraska appropriated two million dollars for fiscal years 2007 and 2008 towards invasive vegetation problems on the Republican and Platte Rivers. Nebraska acknowledges the non-beneficial use of river water is hampering Nebraska's ability to comply with the Republican River Compact. By retaining this water in the Reservoir less water is exposed to invasive species and groundwater pumping along the current transit route.
(See news article at: http://www.nebraskaruralliving.com/essays/republican_river.asp)

(2.) Does the project promote and encourage collaboration among parties? This project does promote and encourage collaboration among parties; currently five Irrigation Districts and 4 Natural Resource Districts have organized and meet quarterly to collaborate on water projects and

studies that would benefit the entire Basin, water marketing is one of the highest priorities of the group.

- **Is there widespread support for the project?** Yes, Frenchman Cambridge Irrigation Districts extends over 100 miles. The District recently had an annual water user meeting to discuss this project and the benefits.
- **What is the significance of the collaboration/support?** The Republican River Compact allocates 49% of the Basin water supply to Nebraska, It is important to all water users in the Basin (groundwater pumpers, municipalities, industrial users and surface water irrigators) to work together so everyone gets their fair allocation of the limited Republican River water supply.
- **Will the project help to prevent a water-related crisis or conflict?** Water marketed by the District in 2007 brought Nebraska into compliance for the first time since the Final Settlement Stipulations was approved in 2003 by the U.S. Supreme Court.

(3.) **Will the project increase awareness of water and /or energy conservation and efficiency efforts?** Due to the implementation of the Final Settlement Stipulation and the Republican River Compact water conservation within the Basin has a high level of awareness. This project should encourage more conservation.

- **Will the project serve as an example of water and/or energy conservation and efficiency within a community?** Yes, in the local community as well as the three State area of the Basin.
- **Will the project increase the capability of future water conservation or energy efficiency efforts for the use by others?** Yes, the value of this project will be an example of the types of conservation that can be achieved.
    - **Does the project integrate water and energy components?** Yes, the water saving can be accomplished without drawing energy from the utility grid, the system is powered with solar energy.

Evaluation Criteria F: Implementation and Results.

Subcriterion No. 1. – Project planning

Does the project have a water conservation plan, system Optimization Review (SOR), and/or district or geographic area drought contingency plans in place?

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

Repayment contract No. 009D6B0122 renewed in 2000 requires the District to continue its ongoing water conservation program and to establish a water conservation fund to finance ongoing and planned water conservation related activities. Water conservation commitments by the District date back to the early 1980s when the District spent 5 million dollars on converting open ditch laterals to buried pipe laterals, the District also dedicated these funds to finance conservation activities within the District. (See Appendix D - District Operating Plan")

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

Frenchman Cambridge has consulted with engineers from Rubicon Water and has developed a design scope, collected design data, and provided the initial cost estimate. Reclamation engineers have also be consulted and provide input and advice and will also review the final plans.

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

Currently Nebraska does not have a state water plan for the Republican River Basin. The main driver in water conservation has been strict regulations of groundwater allocations and surface water administration. This Project does conform to the goals of regional Integrated Water Management Plans (IMP) to market and bank water to lessen State regulations.

Subcriterion No. 2. – Readiness to Proceed

- **Are all necessary plans / designs complete?**

The Scoping and data collection is complete with a draft design completed. Frenchman Cambridge Irrigation District has taken action at the Jan. 3, 2012 board meeting to proceed with this project. Frenchman Cambridge Irrigation District would like to have some of this project installed prior to the 2012 irrigation season.

- **Are there any delays expected to result from environmental compliance?**

Reclamation has been contacted and an initial field inspection has been completed. There are no expected delays anticipated at this time. Work could begin this spring if approved.

- **Describe the implementation plan of the proposed project.**

Cambridge Canal Automation Project Schedule of Actives	
Date:	Description of Work
March 2012	Grant Awarded
June 2012	Finalize Design and order Hardware
September 2012	Sign Agreement
September 2012	Start Modification
June 2014	Complete Modification

- **Permits Required:**

  None

Subcriterion No. 3. – Performance Measures

Due to the nature of this project a simplistic approach in measuring performance is to measure the tail water and by-pass The goal would be to eliminate 25% of the tail water and 95% of the by-pass with the water saved in Harry Strunk Reservoir as storage water.

Evaluation Criteria G: Connection to Reclamation Project Activities

1. **How this proposed project is connected to Reclamation project activities?**
   The District has a repayment contract with Reclamation for 156 miles of main canal and many more miles of lateral and surface drains (Contract No. 009D6B0122)
2. **Does the applicant receive Reclamation project water?**
   The District contract is for 143,000 acre-feet of Storage water in three Reclamation Reservoirs. (Hugh Butler, Harry Strunk and Swanson Reservoirs)
3. **Is the project on Reclamation project lands or involving Reclamation facilities?**
   The automated gates will be constructed on Reclamation project lands.

4. **Is the project in the same basin as a Reclamation project or activity?**
   Reclamation has several major projects in the Republican River Basin.
5. **Will the proposed work contribute water to a basin where a Reclamation project is located?** Yes.

f. Performance Measure for Quantifying Post-Project Benefits.

Measuring structures have been installed on the waste ways. Annual totals will indicate how much water was wasted back to the River. The by-pass at Cambridge Diversion Dam will also be computed and will indicate this projects success.

g. Environmental Compliance

1. **Will the project impact the surrounding environment, air, water, animal habitat, etc.?** This project will have a minimal construction related impacts on the surrounding environment. Some concrete work will be required to modify existing check structures.
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?** Yes, this project will benefit these species with more water in Harry Strunk Reservoir.
3. **Are there wetlands or other surface waters inside the project boundaries that potentially fall under Federal Clean water Act jurisdiction as "water of the United States?** I recently met with the Corp of Engineers at the project site and the initial indication is that there are no wetland issues in the project area.
4. **When was the water delivery system constructed?** Reservoir construction began in the late 1940s and construction of the canal systems started shortly thereafter in the early 1950s. The District and Reclamation signed the repayment contract in 1951.

5. **Will the project result in any modification of or effects to individual features of an irrigation system?** Some minor modification will occur to features of the irrigation system.
6. **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?** Reclamation Area Office or the District is not aware of any eligible historic places within the District.
7. **Are there any known archeological sites in the proposed project area?** No sites are currently known, this site was under heavy construction activities during the original build, none were identified at that time. A final determination will be made when this project is funded.
8. **Will the project have disproportionately high and adverse effect on low income or minority populations?** None, it will actually help the local farm economy.
9. **Will the project limit access to any ceremonial use of Indian sacred sites or result in other impacts on tribal lands.** None exist in the 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?** No, the area weed management district has been working with local landowners on eradication and control of noxious and invasive species known in the area.

h. Required Permits or Approvals:

No permits required, final design approval will come from Reclamation.

i. Funding plan and Letters of Commitment:

The District currently has funds which can be committed to this WaterSMART 2012 funding opportunity and the District owns the equipment needed to complete the in-kind match and has the personnel with the adequate training to complete the task.

1. **The amount of funding commitment:**
   The District currently has funds and is committed to provide for 52.6% of the project cost.
2. **The Date the funds will be available to the applicant:**
   The funds are currently available.
3. **Any time constraints on the availability of funds:**
   No time constraints are on the Districts funds.
4. **Any other contingencies associated with the funding commitments:**
   No other contingencies associated with the funding commitments.

j. Official Resolution:

Frenchman Cambridge Irrigation District approved going forward with this project at the January 3, 2012 Borad meeting. An official resolution will be adopted at the February 13, 2012 Board meeting and will be sent to Michelle Maher.

k. Budget Proposal

Table No. 3 *Cambridge Canal Automation Project - FCID*

Budget Item Description	Computation		Recipient Funding	Reclamation Funding	Total Cost
	$/Unit And Unit	Quantity			
Salaries And Wages (District Staff)					
Heavy Equipment operators	$19/hr	16	$304		$304
General Construction Labor	$17.33/hr	128	$2,218		$2,218
Office / Clerical (1 employee)	$13.50/ hr	10	$135		$135
Fringe Benefits					
Heavy Equipment operators	$15.63/hr	16	$250		$250
General Construction Labor	$15.63/hr	128	$2,001		$2,001
Office / Clerical (1 employee)	$12.75/ hr	10	$128		$128
Travel					
* Pickup and Utility Truck with generator	$1.5/mile	32	$375		$375
* Pickups Truck (IRS Std. Rate)	$0.51/mile	500	$255		$255
Equipment					
* Backhoe	$150/hr	16	$2,400		$2,400
Supplies / Materials					
13 gates (Rubicon Water)	$29,000/gate	13	$77,285	$299,715	$377,000
Headgate automation & Controls	$40,000	2	$80,000		$80,000
Radio Comms - Base System (Master Station)	9852	1	$9,852		$9,852
Radio Comms - Extended System (Repeater)**	7301.33	3	$21,904		$21,904
Server Hardware	$30,270	1	$30,270		$30,270
Software Licences	$1,750	6	$10,500		$10,500
Concrete	$90/yard	20	$1,800		$1,800
Rebar - grade 40	$0.25 / foot	500	$125		$125
Concrete Forms			$1,500		$1,500
Contractual / Construction					
Gate installation (Rubicon Water)	$500/gate	13	$6,500		$6,500
Site Commissioning (Rubicon Water)	$350/gate	13	$4,550		$4,550
TCC Implementation(Rubicon Water)	6000/gate	12	$72,000		$72,000
Host Engineering (Rubicon Water)	$950	5	$4,750		$4,750
Project Coordinator (1 Employee)	$80 /hr	40	$3,200		$3,200
Environmental And Regulatory Compliance			$0	$0	$0
Total Direct Costs			**$332,301**	**$299,715**	**$632,016**

Budget Narrative:

Frenchman Cambridge Irrigation District

Cambridge Canal Automation Project

(a) Salaries and Wages ***$2,657.00***

Heavy Equipment operator's Salary and wages; Frenchman Cambridge Irrigation District will provide 1 full time employee with the job classification of "Heavy Equipment Operator" It's estimated that 16 man hours at $19.00 per hour is required. They will handle the duties of loading and unloading Rubicon Water FlumeGates and setting them in modified check structures. The Equipment will include one Caterpillar 450E Backhoe.

FCID Match $304; Federal request $0

General Construction Labor; Frenchman Cambridge Irrigation District will provide 4 fulltime employees with the job title as "Ditch Rider/Canal Maintenance" they will work on all aspects of the project, including site preparation, cleanup and restoration. It is estimated that a total of 128 man hours are required at $17.33 per hr.

FCID Match $2,218; Federal request $0

Office and Clerical staff; One Clerical position is required, it is estimated that 10 hours is required for this project at $13.50per hour. This position will be responsible for all receipts and bills associated with the accounting and reporting.

FCID Match $135; Federal request $0

(b) Fringe Benefits ***$2,378.00***

Heavy Equipment operator's Fringe Benefits; Frenchman Cambridge Irrigation District will provide 1 full time employee with the job classification of "Heavy Equipment Operator" It's estimated that 16 man hours at $15.63 per hour is required. They will handle the duties of loading and unloading Rubicon Water FlumeGates and setting them in modified check structures. The Equipment will include a Caterpillar 450E Backhoe.

FCID Match $250; Federal request $0

General Construction Labor Fringe Benefits; Frenchman Cambridge Irrigation District will provide 4 fulltime employees with the job title as "Ditch Rider/Canal Maintenance" they will work on all aspects of the project, including site preparation, cleanup and restoration. It is estimated that a total of 128 man hours are required at $15.63 per hr.

FCID Match $2001; Federal request $0

Office and Clerical staff Fringe Benefits; One Clerical position is required, it is estimated that 10 hours is required for this project at $12.75per hour. This position will be responsible for all receipts and bills associated with the accounting and reporting.

FCID Match $128; Federal request $0

All Frenchman Cambridge Irrigation District's employees have the same "Fringe Benefits package" . All contracted and sub-contracted positions receive no Fringe Benefits.

FCID Match $2,378.00; Federal request $0

(c) Travel ***$630.00***

Travel costs include (1.) Pickup Utility Truck with generator and welding equipment is needed to weld and cut metal, electrical power and for service of heavy equipment; $1.50 per mile, estimated 32 miles. (2.) Pickup Trucks for employees are needed to move workers to and from project site; $0.50 per mile, estimated 500 miles.

FCID Match $630.00; Federal request $0

(d) Equipment ***$2,400.00***

Only one type of heavy equipment is required for this project; A 450E Caterpillar backhoe will be used to lift and load new gates on trailers and into the check structure. The estimated hours required are estimated at 16 hours at $150 per hour.

FCID Match $2,400; Federal request $0

(e) Materials and Supplies ***$532,951.00***

Most of the material supplies will come from Rubicon Water and will consist of FlumeGates and electrical control with solar panels, Radio communication hardware, 13 gates are required for this project, Two actuator motors for two existing gates that will be motorized. Rubicon Water will also supply all computer software, Radio control equipment and repeater stations. Approximately $1500 is estimated on lumber for concrete forms and $500 for rebar.

FCID Match $233,236; Federal request $299,715

(f) Contractual:

Rubicon Water will provide engineers and technical support and will install all of the controls and software. Frenchman Cambridge Irrigation District's consulting engineer will be the project coordinator.

FCID Match $91,000; Federal request $0

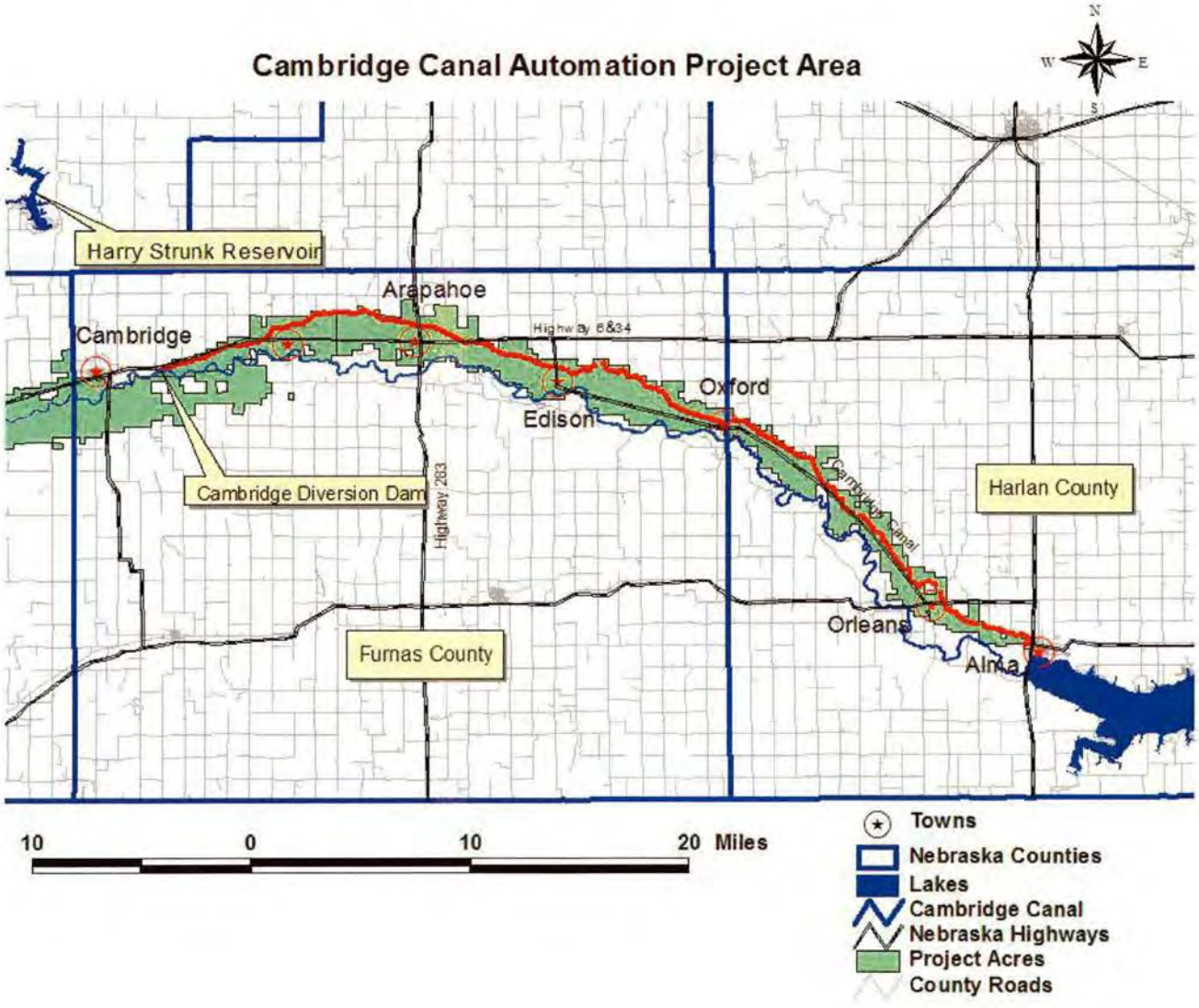
- *Reporting*

Reporting will be handled by existing in-house Clerical and is estimated under Salaries and Wage.

TOTAL PROJECT COSTS **$ 632,016**

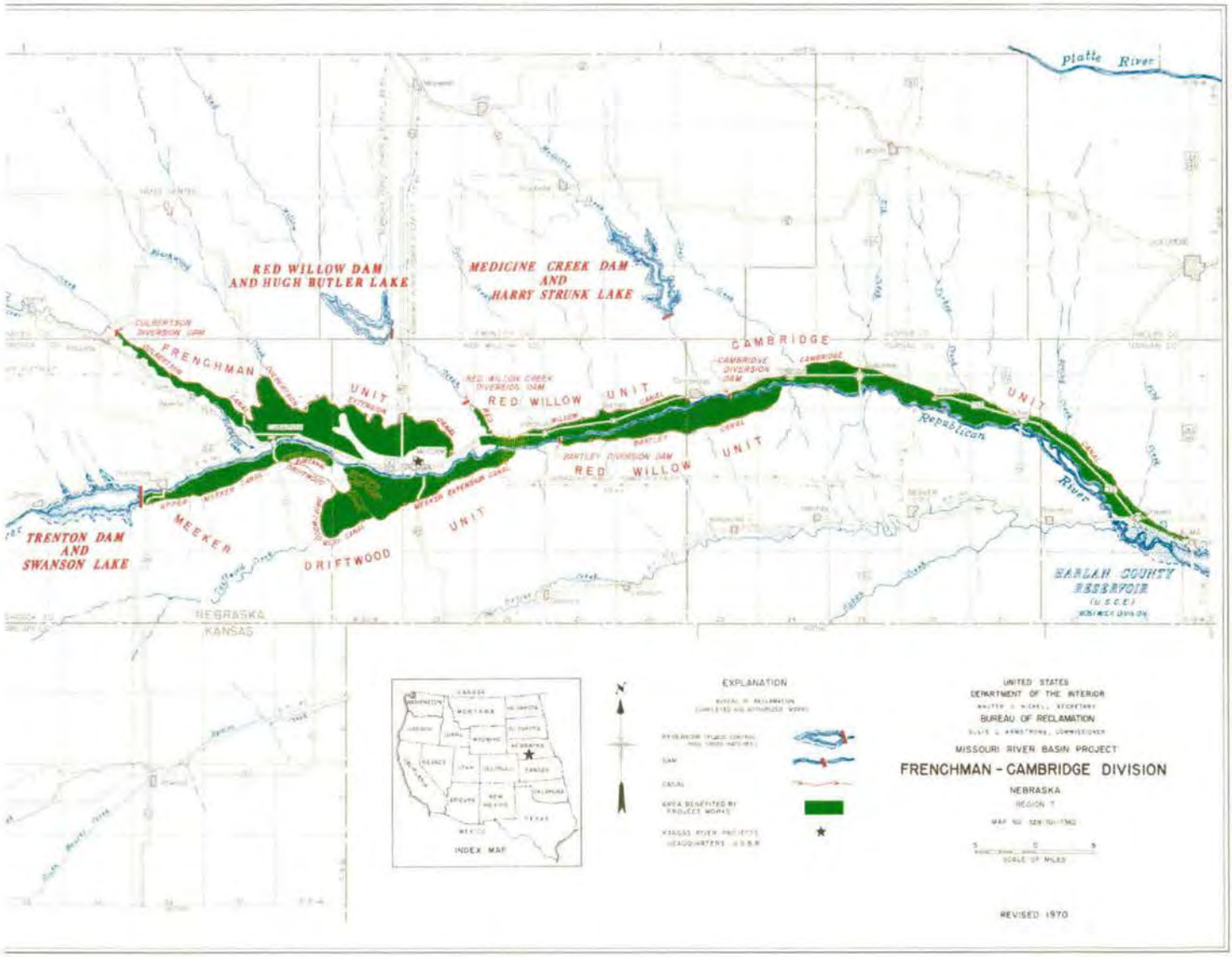
Total FCID match: 52.6% at $332,301; Total Federal request: 47.4% at $299,715

Appendix A (Map of Project Area)



Appendix A (continued)

Map of the Frenchman-Cambridge Division



Appendix B

Water Rights Associated with the Frenchman Cambridge Irrigation District Project.

Natural Flow Permits (Owner = Frenchman Cambridge Irrigation District)

Canal	use	Grant	Priority Date	App. No.		
Cambridge Canal	IR	140.91	04/03/1946	A 3869E	M-4	D
Cambridge Canal	IR	4.47	04/16/1954	A 6218	M-4	DK
Cambridge Canal	IR	3.11	04/30/1957	A 9479	M-4	DK
Cambridge Canal	IR	1.70	09/17/1959	A 9763	M-4	D
Cambridge Canal	IR	5.89	03/30/1965	A 10591	M-4	DK
Cambridge Canal	IR	3.43	02/09/1967	A 11041	M-4	DK
Cambridge Canal	IR	11.60	08/31/1970	A 12067	M-4	DK
Cambridge Canal	IR	3.70	04/01/1971	A 12200	M-4	DK
Cambridge Canal	IR	1.39	10/15/1974	A 13228	M-4	DK
Cambridge Canal	IR	2.30	04/15/1976	A 14181	M-4	DK
Cambridge Canal	IR	1.10	10/20/1977	A 15131	M-4	D
Cambridge Canal	IR	4.29	03/25/1981	A 15804	M-4	DK
	Total Grant	**183.89 cfs**				

Storage Use Permits (Owner = Reclamation)

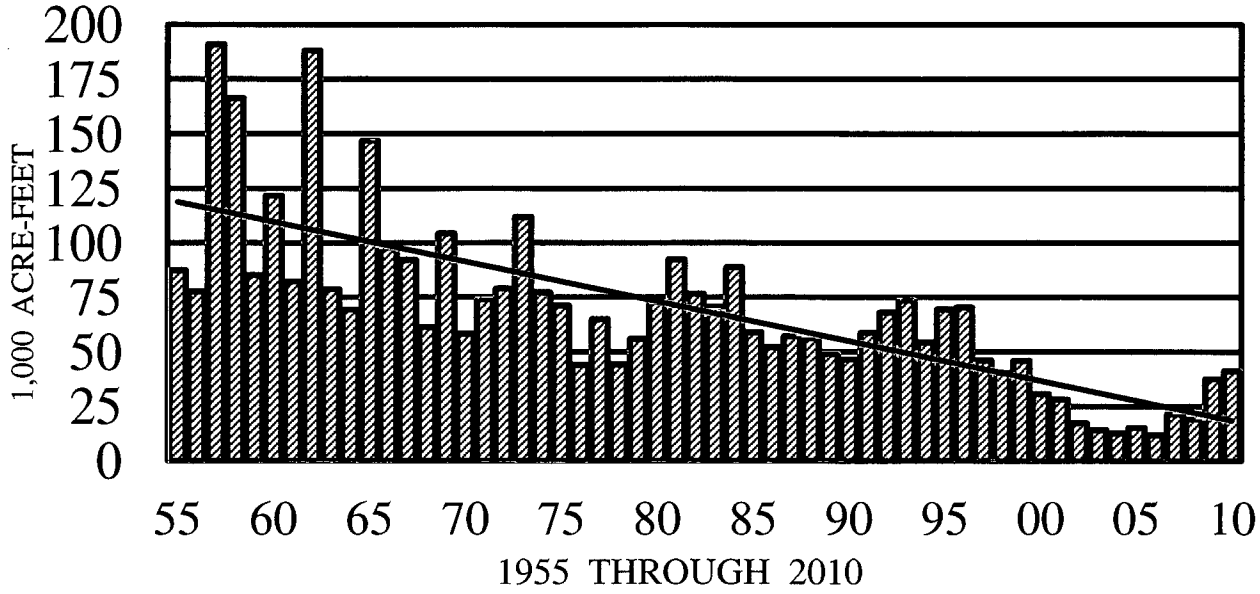
Canal	use	Grant	Priority Date	App. No.		
Cambridge Canal	SI	AF	04/16/1954	A 6225L	M-4	K
Cambridge Canal	SI	AF	04/06/1976	A 14159	M-4	
Cambridge Canal	SI	AF	11/07/1977	A 15137	A-15131	M-4
Cambridge Canal	SI	AF	03/27/1981	A 15814	M-4	

Storage Permits (Owner = Reclamation

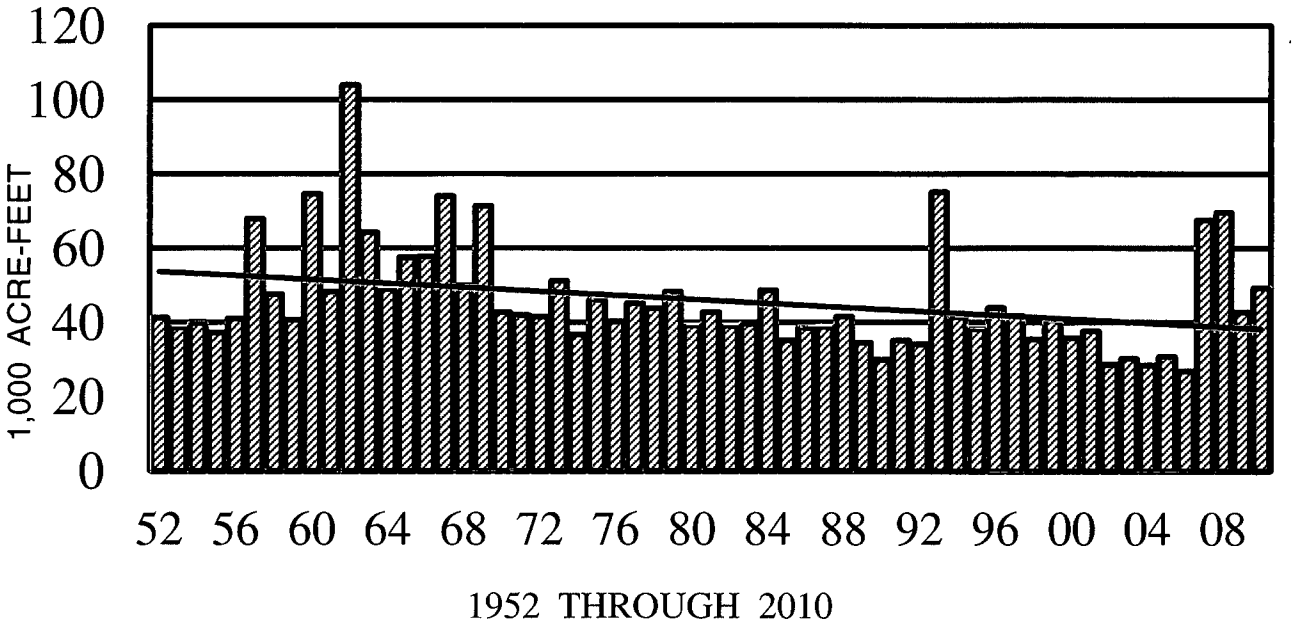
Republican River					
S: 5 T: 2 R: 33W Hitchcock					
Bureau of Reclamation	Swanson Lake	ST	122800AF	07/11/1951	A 4884
Medicine Creek					
S: 25 T: 5 R: 26W Frontier					
Bureau of Reclamation	Harry Strunk Lake	ST	40000AF	05/01/1946	A 3900
Red Willow Creek					
S: 36 T: 5 R: 30W Frontier					
Bureau of Reclamation	Hugh Butler Lake	ST	26400AF	07/11/1951	A 4885
Bureau of Reclamation	Hugh Butler Lake	SS	12000AF	08/29/1960	A 9858 A-4885

Appendix C

SWANSON RESERVOIR
YEARLY HISTORICAL INFLOW

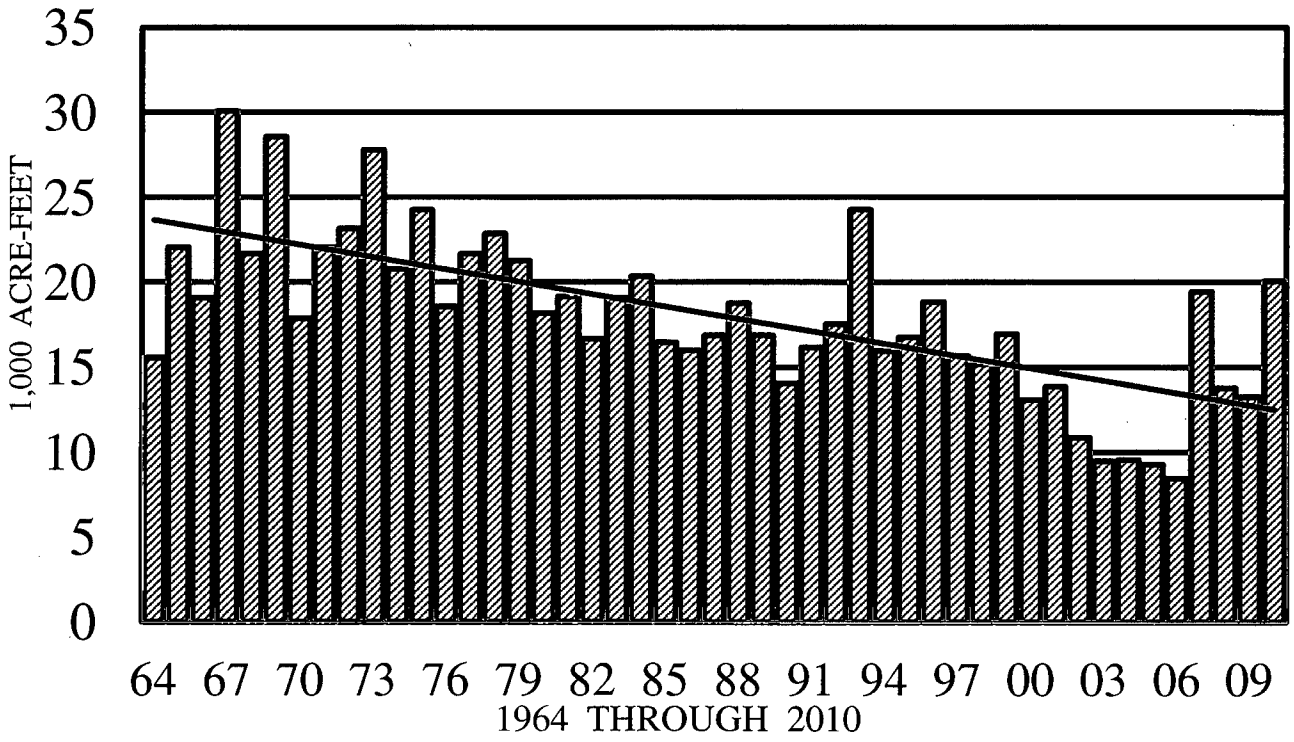


HARRY STRUNK LAKE
YEARLY HISTORICAL INFLOW



Appendix C (continued)

HUGH BUTLER LAKE
YEARLY HISTORICAL INFLOW



Appendix D

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Frenchman-Cambridge Irrigation District
Meeker-Driftwood, Red Willow and Cambridge Units
Pick-Sloan Missouri Basin Program, Nebraska

"DISTRICT OPERATING PLAN"

This "District Operating Plan" hereinafter referred to as "Plan" is made for the purpose of providing a means to implement the contractual commitment made by the District to the United States concerning the operation of the District and the performance of certain water conservation and environmental activities which are part of the consideration for a 40 year repayment term. The District hereby agrees to honor the commitments in this Plan. The parties shall annually, or as otherwise agreed, review the Plan and may, by mutual agreement of the parties, modify and amend the operating criteria of the initial Plan necessary to achieve the District's commitments, Provided, That the District's commitments shall not be diminished or eliminated.

BACKGROUND:

The Frenchman-Cambridge Division is located in southwestern Nebraska along the Republican River and includes the tributaries of Red Willow and Medicine Creeks. The Frenchman-Cambridge Division includes the Meeker-Driftwood, Red Willow, and Cambridge Units. The Meeker-Driftwood Unit consists of Trenton Dam and Swanson Lake and a system of canals, laterals, and drains that currently serves 16,562 acres of project lands. The Red Willow Unit consists of Red Willow Dam and Hugh Butler Lake, Red Willow and Bartley Diversion Dams, and a system of canals, laterals, and drains that currently serves 11,312 acres of project lands. The Cambridge Unit consists of Medicine Creek Dam and Harry Strunk Lake, Cambridge Diversion Dam, and a system of canals, laterals, and drains that currently serve 17,297 acres of project lands. In addition to storing water for irrigation the three units protect the downstream areas from floods, and offer opportunities for recreation and for conservation and development of fish and wildlife resources.

Due to a depleting water supply, the District is willing to limit its irrigation deliveries in order to maintain higher reservoir levels and undertake water conservation measures to improve the efficiency of the project delivery system and encourage on-farm efficiency improvement.

IRRIGATION DELIVERIES:

It is understood that from time to time the United States shall accomplish sediment re-surveys of the reservoirs which shall change the area-capacity data and the elevation-capacity relationship. It is further understood that when the data is officially revised and placed into use it shall be used in determining the contents for the shutoff elevations. In the event the re-survey necessitates changes in reservoir elevations for flood control and irrigation this Plan shall be revised to incorporate those changes.

The available water supply to the District shall be flows of the Republican River, Red Willow Creek, and Medicine Creek, and the storage waters available for release above the established reservoir shutoff elevations.

1. By January 15 of each year, the United States shall provide the District an estimate of the releases available for the irrigation season. The amount of storage water released during any one irrigation season shall be restricted to no more than the waters available above the established reservoir shutoff elevations, based on the following:

    A. Swanson Lake

        1. The space available for irrigation use in Swanson Lake is established as the space available between elevations 2752.0 and 2725.0. The current contents are 112,214 acre-feet (El. 2752.0) and 20,855 acre-feet (El. 2725.0) which establishes the current irrigation space as 91,359 acre-feet.

        2. The annual shutoff elevation is established as El. 2725.0.

    B. Hugh Butler Lake

1. The space available for irrigation use in Hugh Butler Lake is established as the space available between elevations 2581.8 and 2561.0. The current contents are 36,224 acre-feet (El. 2581.8) and 11,212 acre-feet (El. 2561.0) which establishes the current irrigation space as 25,012 acre-feet.

2. The annual shutoff elevation is established as El. 2561.0.

C. Harry Strunk Lake

1. The space available for irrigation use in Harry Strunk Lake is established as the space available between elevations 2366.1 and 2343.0. The current contents are 35,705 acre-feet (El. 2366.1) and 8,859 acre-feet (El. 2343.0) which establishes the current irrigation space as 26,846 acre-feet.

2. The annual shutoff elevation is established as El. 2343.0.

2. The United States reserves the right to make any releases necessary to protect the project facilities and the public in accordance with appropriate safety procedures.

WATER CONSERVATION MEASURES:

The District agrees to:

1. Establish a revolving water conservation fund to be utilized for annual costs associated with the water conservation program activities. The funding shall be provided by an annual assessment on all project lands collected by the District as part of their annual operation and maintenance charge. It is provided that these funds may be fully utilized on an annual basis or accumulated to allow the District to perform water conservation projects that would not otherwise be within the District's financial capability should such projects have to be funded through collections or charges during any one year period. It is specifically provided that these funds may be utilized for Reclamation or other cost-share assistance that may be available to the District for water conservation activities.

2. Continue, when permitted, the practice of seasoning canals with stream flows or flood waters to reduce canal losses and control the growth of vegetation. Diversion of natural flows or flood waters to season canals

shall not be initiated without concurrence of the Contracting Officer, and may not be permitted during those times that the resulting flow reduction would negatively impact the storage of water in downstream reservoirs.

3. Continue the established practice of providing assistance to irrigators who upgrade on-farm irrigation facilities by improving turnout locations, installing meters, assisting with buried pipe projects to allow the use of gated pipe or center pivots, and implementation of other new technology.

4. Continue to work with Reclamation on evaluating computer software and other new technology that shall improve water scheduling and accounting.

The District also agrees to: continue and/or improve its existing policies and practices that further the goals of water conservation; provide educational opportunities for District employees, such as canal operations training, water scheduling, water use seminars, etc.; and work with irrigators through educational type demonstrations or projects that measure on-farm efficiencies and crop water requirements in terms of the type of irrigation methods employed by individual irrigators.

The District further agrees to provide for proper accounting for all water deliveries and operational waste within five years of the date of this Plan. Water delivery and operational waste accounting records shall be provided to the United States on or before November 1 of each year. Prior to March 1 of each year, the District and the Contracting Officer's representative shall meet to assess the past year's water supply and delivery records and accounting, and to evaluate the upcoming irrigation season. Through the use of these records and other available data, the Contracting Officer shall assess the delivery efficiency and on-farm efficiency improvements resulting from the District's implementation of water conservation commitments. The improvements shall be measured against pre-Plan water use data. On that basis, it is the general goal of the District to increase the delivery efficiency of the District by a total of 4 percent and on-farm efficiencies by a total of 5 percent. If the "improvements" are not expected to result in the individual or cumulative increase in efficiencies during the first ten year period of this Plan as determined by the Contracting Officer, additional water conservation measures shall be identified, by mutual agreement of the parties, to be undertaken to ensure the increased efficiencies are realized during the succeeding five year period.

Prior to July 1 of each year, the District shall provide the Contracting Officer an annual

report of water conservation activities/accomplishments for the prior year, and a statement of water conservation funds collected, expended, and water conservation fund balance as of the end of the prior calendar year.

ENVIRONMENTAL MEASURES:

The District agrees to:

1. Install or create better screening devices to prevent the passage of fish, crayfish, etc., into turnouts and lateral systems.
2. Establish policies to preserve lake levels.

In addition to accepting the changes in operation the District is willing to cooperate with Reclamation and others in improving fish and wildlife habitat and recreational access at Swanson Lake, Hugh Butler Lake, and Harry Strunk Lake. If requested, the District shall annually furnish 30 man-days of labor at the above referenced lakes provided the work is coordinated through Reclamation and scheduled during the non-irrigation season at least one month in advance. In lieu of the man-days of labor, the district shall furnish a district-owned machine and operator for 8 days. It is further provided that the District, if requested, may agree to perform more man-days and/or more machine and operator days during one calendar year than the annual commitment, and that any man-days and/or machine and operator days furnished in excess of the annual commitment shall apply as a credit to the succeeding years' commitment(s).

Reclamation is committed to determine the significance of selenium concentration levels for fish and wildlife resources in the Republican River Basin. This commitment by Reclamation shall be implemented through an adaptive management process as outlined in the Record of Decision for the Final Environmental Impact Statement, Long-Term Water Supply Contract Renewals, Republican River Basin, Kansas and Nebraska dated July 22, 2000. The adaptive management process includes, but is not limited to: identification and selection of objectives, implementation and monitoring of response, and assessment of accomplishment that can conclude or refine management actions. The District agrees to cooperate with the United States in implementation of the adaptive management plan which could include, but is not limited to, maintenance of the outfall drains to allow free flow/discharge of drainage water to the stream so as to prevent ponding of drainage effluent, and monitoring the water quality of the project drains.

Prior to July 1 of each year, the District shall provide the United States an annual report

of environmental activities/accomplishments for the prior year.

THE UNITED STATES OF AMERICA

By Rod R. Oie
Area Manager

Date July 25 - 2000

FRENCHMAN-CAMBRIDGE IRRIGATION DISTRICT

By Ralph Best
President

Date July 25 - 2000

ATTEST:

Robert C Andrews
Secretary