WaterSMART Water and Energy Efficiency Grant:

Island Canal System Modernization

Henry Miller RD #2131
Dos Palos, California
(West side of the San Joaquin Valley)

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TABLE OF CONTENTS –

TECHNICAL PROPOSAL AND EVALUATION CRITERIA

(1) – EXECUTIVE SUMMARY –

- Date: January 10, 2013
  Applicant Name: Henry Miller Reclamation District #2131
  11704 W. Henry Miller Ave.
  City: Dos Palos
  Counties of Merced and Fresno
  State: California

- Proposal Name: Island Canal System Modernization Project

- Project Summary:

This project intends to modernize the delivery system by retrofitting fourteen existing check structures into four modern automatic flow control structures , nine Long Crested Weirs (LCWs), two automatic spillways, a regulating reservoir and a flow and water quality monitoring station to reduce unnecessary canal spill and to be more efficient in the water management process by having a more precise water level control in the Island Canal system of the Henry Miller Reclamation District No. 2131.

Water Conservation will be achieved through Improved Water Management by installing 9 (nine) Long Crested Weirs to control very well the water level in the canal system in combination of canal spill reduction by the installation of a regulating reservoir monitored and operated through the existing SCADA system.
4 (four) automatic flow control structures with acoustic flow meters will constantly regulate the flow downstream of the structures to minimize spill out of the district and a drainage monitoring station will be collecting flow and water quality information.
This project also will reduce energy consumption by reducing the hours of operation of several deep wells and low lift pumps along the mentioned canal system because of the water conserved through the improved water management.
This reduction in deep well pumping will also result in a water quality improvement since the water developed by these deep wells is of higher salinity levels. This will be contributing to future solutions for regional water quality and drainage issues in the San Joaquin River.
Potential water marketing opportunities. HMRD through SLCC is a member of the San Joaquin River Exchange Contractors. The Exchange Contractors are already involved in water marketing, and are well aware of the need to shift conserved water to areas that need it.
Specifically, water that is conserved in HMRD can reduce diversion needs from the Delta-Mendota Canal. There are currently pumping restrictions from the Delta, and many users south of the Delta need more water. Water conservation in HMRD will not only benefit the water quality in the San Joaquin River, but it will provide water for potential transfers south of the Delta.

- The Project is estimated to be completed in 3(three) years. Starting at the end of July of 2013 and finished in July 2016.

(2) – BACKGROUND DATA –

Geographic location

Counties: Merced and Fresno. See Figure 1.

Direction from nearest town:
From the intersection of Hwy 165 and Hwy 152 in the town of Los Banos, go east 2.3 miles on Hwy 152. Turn north on Turner Island Road. Go north 3 miles, to Henry Miller Avenue. The headquarters of HMRD is located on the NE corner of Turner Island Road and Henry Miller Avenue.

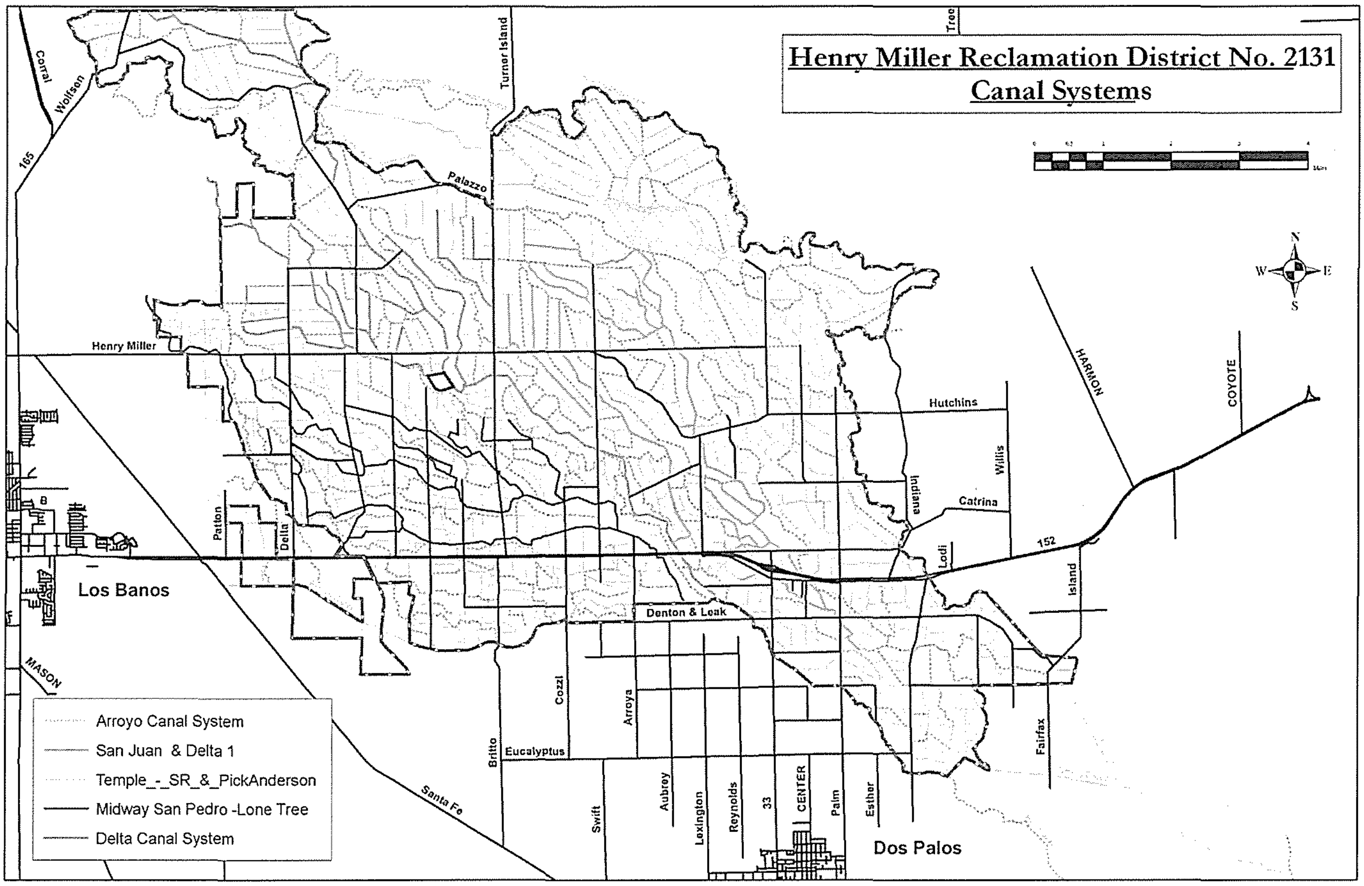


Figure 1. HMRD 2131 Location and Canals/Drains

District and Water Delivery System Description

HMRD is an agricultural district. The district encompasses 47,285 gross acres. The following Table 1 shows HMRD's cropping history for the last 5 years.

The system is completely gravity canals, with a few recirculation pumps. It is comprised of an old network of unlined canals and drains that were laid out on the contour over 100 years ago. The first figure shows how complex the layout of the system is.

The district has the following physical characteristics:

- Miles of main canals: 59
- Miles of lateral canals: 98
- Miles of surface drain ditches: 113
- Number of water users served: 89
- Number of delivery points: 1089
- Estimated surface outflows to San Joaquin River: 47,900 AF annually (2006-2008)

Most of the check structures are flashboards, although the district has recently installed 32 long-crested weirs a regulating reservoir and 4 flow control structures (Figure 2) and 9 ITRC flap gates. The district recently installed a SCADA system to control a central regulating reservoir and several flow control structures. Flow measurement to individual turnouts is measured with canal meter gates. All surface drainage flows that exit the district go to the San Joaquin River. HMRD does make some deliveries to wildlife refuges.

Table 1: Cropping Pattern

	2012		2011		2010		2009		2008	
Total net acres in SLCC	40434	100%	40423	100%	40397	100%	40397	100%	40429	100%
Submitted crop report	40429	100%	40406	100%	39986	99%	40354	100%	40412	100%
Double Crops	2144	5%	2491	6%	1944	5%	2461	6%	2701	7%
	42573		42897		41930		42815		43113	
COTTON	16776	39.4%	17034	39.7%	12077	28.8%	7621	17.8%	11908	28%
ALFALFA	9757	22.9%	11007	25.7%	12791	30.5%	15033	35.1%	15308	36%
TOMATOES	4929	11.6%	5708	13.3%	7421	17.7%	7585	17.7%	4316	10%
CORN	4313	10.1%	3176	7.4%	2385	5.7%	3986	9.3%	4043	9%
WINTER CROPS	3337	7.8%	1864	4.3%	2516	6.0%	4175	9.8%	3276	8%
WETLAND VEGETATION	1775	4.2%	2011	4.7%	2011	4.8%	1984	4.6%	2140	5%
PASTURE	782	1.8%	745	1.7%	742	1.8%	718	1.7%	796	2%
SAFFLOWER	79	0.2%	0	0.0%	0	0.0%	10	0.0%	154	0.4%
SUGAR BEETS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	155	0.4%
		98%		97%		95%		96%		98%

The district received a very rapid SOR in 2005, conducted by Cal Poly ITRC, with financial help from the Fresno office of USBR. Based on that SOR (known locally as a "RAP" or Rapid Appraisal Process), the district installed a single central buffer reservoir with a limited SCADA system to monitor the pumps and gates.

The district conducted a second SOR prepared by the Cal Poly ITRC which studied in depth Salt and Water Balances and showed the importance of reducing the amount of deep well water pumping and seepage reduction.

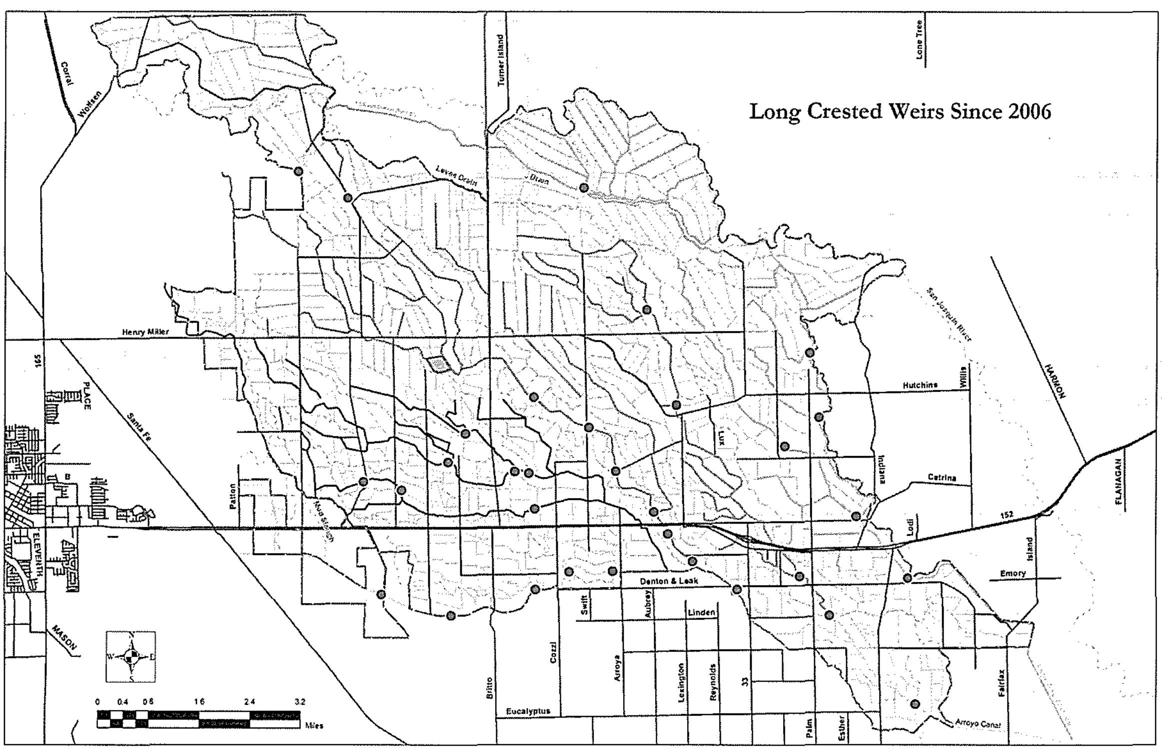


Figure 2. Central regulating reservoir and Long Crested Weirs installed since 2006.

In addition the district has a Water Conservation Program to help the landowners and farmers to apply for grants and low interest loans to improve the on-farm irrigation efficiencies. Due to the program since 2006 8,253 acres were converted form surface irrigation to drip. Several of these farmers received funds through the NRCS EQIP program to convert to drip irrigation, therefore the importance to provide a flexible and reliable delivery of irrigation water to all the farmers throughout the district.

San Luis Canal Company (SLCC) obtains its water supply through an Exchange Contract with the USBR. The Exchange Contract allows the Company to receive its water through the Delta-Mendota Canal. Henry Miller Reclamation District 2131 was formed in FY2000. It works in conjunction with SLCC to deliver the irrigation water and provide drainage to the company costumers. The vast majority of the delivery facilities i now either owned by HMRD or have a permanent easement. Henry Miller Reclamation District No. 2131 is in charge of operating and maintaining the canals and drains. As a member of the San Joaquin River Exchange Contractors, SLCC has an annual right of 163,600 AF in a "normal" year, and 123,000 during critical years. The actual deliveries to farmers average 130,000 AF per year. HMRD also "wheels" 28,000 AF of water to US Fish and Wildlife, California Fish & Game 8,200 AF, and to Grasslands RCD 8,800 AF.
HMRD supplements its irrigation demands through deep well pumping and water recirculation with 33 "low-lift" pumping plants throughout the district. On average 40,000 AF are pumped from deep wells and 93,000 AF from "low-lift" per year. By improving the delivery system efficiency and the on-farm efficiencies big losses will be reduced and less water will be needed.
SLCC has submitted a Water Conservation plan to the USBR through the Exchange Contractors.

Past working relationships with the Bureau of Reclamation.

Include previous grants and agreements:

Grant No. 05FGG210011
Upgrade Telemetry System with Acoustic Doppler flow meters in Drains.
Finished December 31, 2006.

Grant No. 07FG200023
Flow Rate and Water Quality Monitoring Sites Upgrade.
Finished December 2009.

Grant No. 08FG200107
System Optimization Review
Finished June 2010.

Grant No. 08FG200049
Retrofitting existing check structures into Long Crested Weirs
Finished March 2010.

Agreement No. R10AP20120
Water SMART: Temple Santa Rita Canal System Modernization Project
Finished October 2011.

Agreement No. R11AP20111
Water SMART: Arroyo Canal System Modernization Project
In Progress. 98 % Completed. Estimated to be finished: March 2013 when final report is due.

Agreement No. R12AP20034
Water SMART: Lower Arroyo Canal System Modernization Project
In Progress. 75 % Completed. Estimated to be finished: March 2013.

(3) – TECHNICAL PROJECT DESCRIPTION –

Island Canal Modernization Project.

The Island Canal System is the northern end of HRMD's irrigation system. It serves farmland along the north edge of the district and delivers water to the San Luis National Wildlife Refuge and the California Department of Fish and Game, Los Banos Wildlife Area and North Grasslands Wildlife Area. (Figure 4).

The Island canal system is the continuation of the Delta Canal which conveys the water from the Arroyo Canal from the San Joaquin River. All these canals are operated under upstream control with regular board check structures with high potential of water level fluctuation unless very close supervision by canal men is available. The proposed package of modifications to the selected cross regulator structures in the lower part of this system will simplify operations and reduce unwanted operational spill, while improving service to water users.

HMRD is modernizing the canal control infrastructure in the district, including the creation of an *expressway* between the headworks of the Arroyo Canal and the Central Regulating Reservoir which is in the delivery path of this proposal which intends to extend the improvements to the lower part of the distribution system.

Modifications to the Island Canals ("A", "B", "C", "D"- Figure 3) will allow the system to respond to unexpected variation in inflows from the upstream Delta Canal system, while maintaining constant flows to local turnouts. A new reservoir will automatically balance incoming (from the Delta Canal) flows and outgoing flows, which will greatly enhance flexibility and enable operators to reduce spill.

Level Pool Canal Concept:

The basic concept of the "level pool canal" can be seen in the following detailed figure 3. Water level measurements at two points (the far north end of the level pool) and (next to the reservoir) will be continually fed into a PLC, which will control the intake and release of water from the proposed reservoir. The flow control points for the laterals will be moved downstream from their present locations.

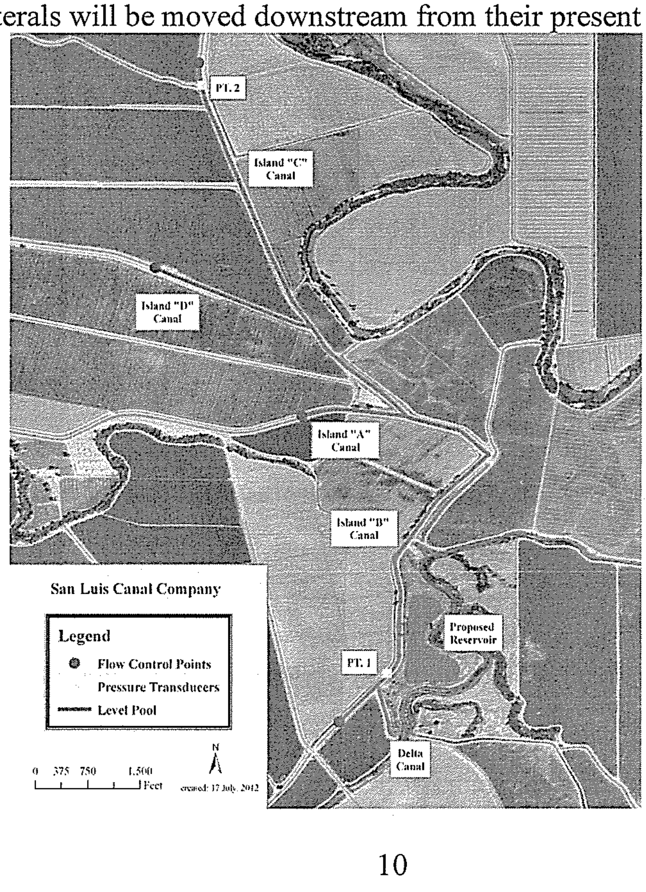


Figure 3.

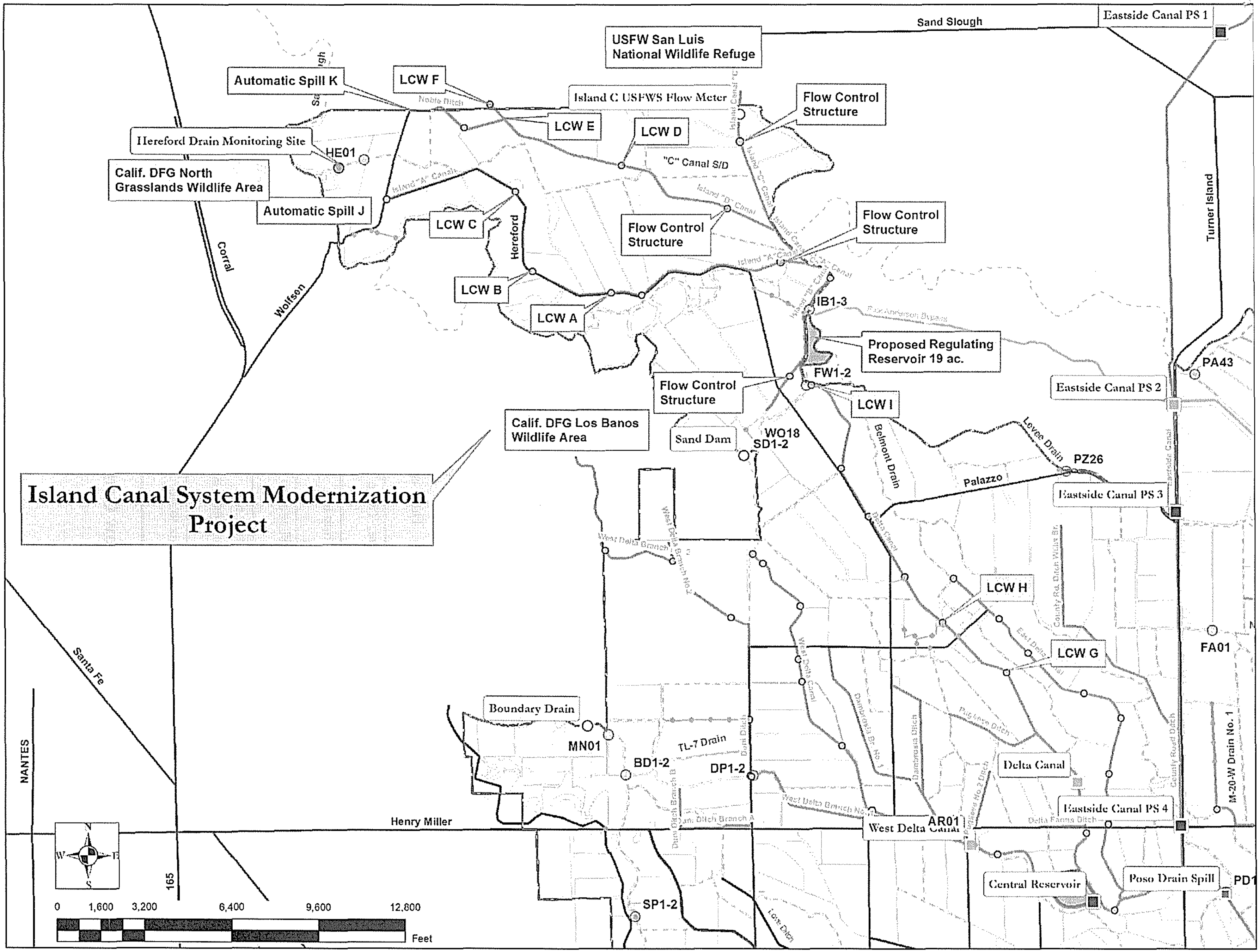
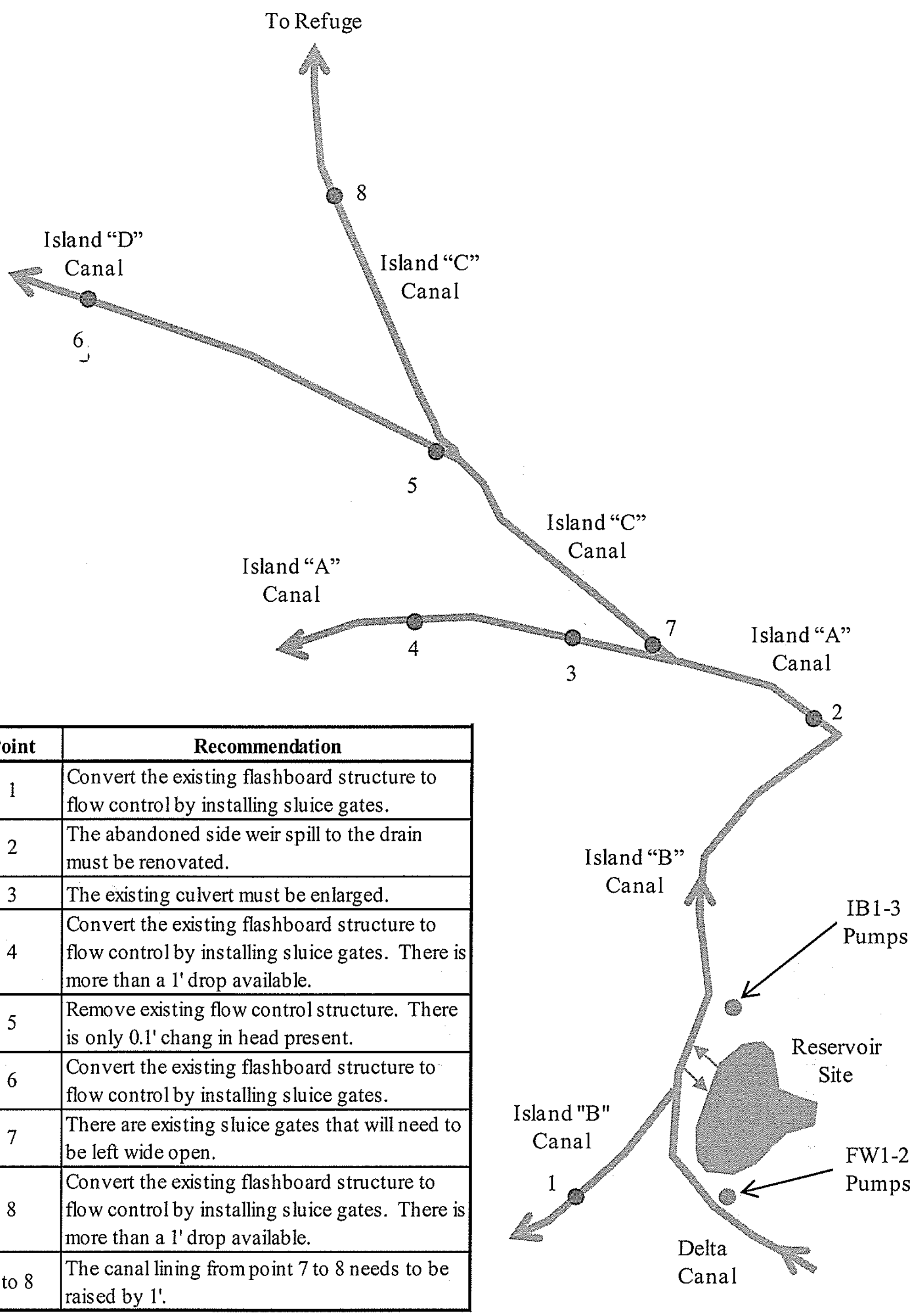


Figure 4. Project Area and Site Locations

Island Canal System Improvements:

The following Figure 5 displays the locations of feature improvements for the Island Canal System.



Point	Recommendation
1	Convert the existing flashboard structure to flow control by installing sluice gates.
2	The abandoned side weir spill to the drain must be renovated.
3	The existing culvert must be enlarged.
4	Convert the existing flashboard structure to flow control by installing sluice gates. There is more than a 1' drop available.
5	Remove existing flow control structure. There is only 0.1' chang in head present.
6	Convert the existing flashboard structure to flow control by installing sluice gates.
7	There are existing sluice gates that will need to be left wide open.
8	Convert the existing flashboard structure to flow control by installing sluice gates. There is more than a 1' drop available.
7 to 8	The canal lining from point 7 to 8 needs to be raised by 1'.

Figure 5. Reservoir and Flow Control structure locations

Site by Site Improvements:

Improvement Point: 1
Location: Island "B" lateral. Photo looks to the southwest.
Recommendation: The existing flashboard structure needs to be converted to flow control by installing a sluice gate.

Figure 6. Improvement point 1

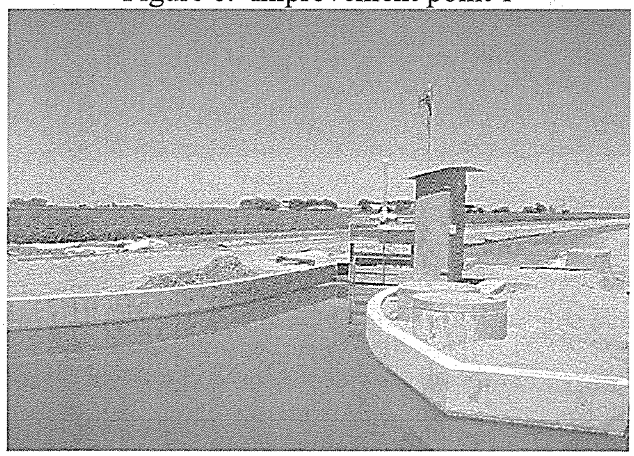


Figure 7. Example of a flow control strucutre built on theTemple Santa Rita Canal

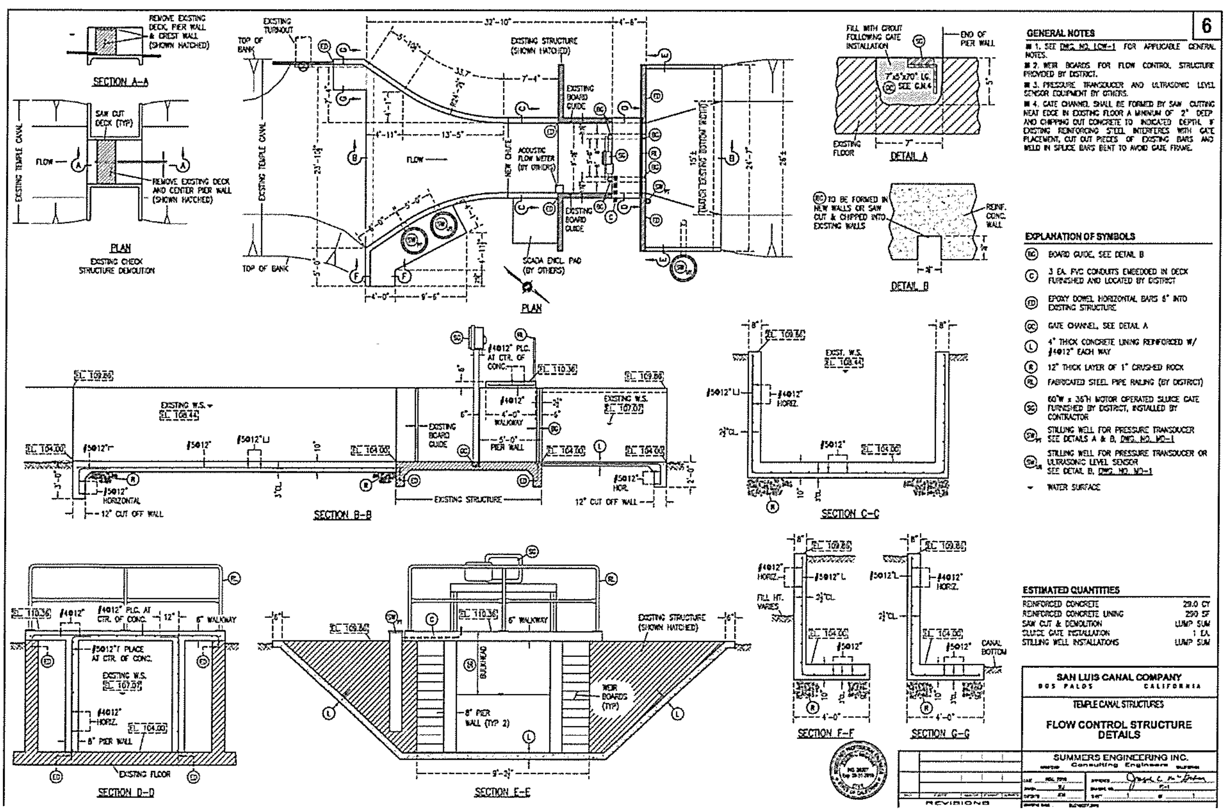
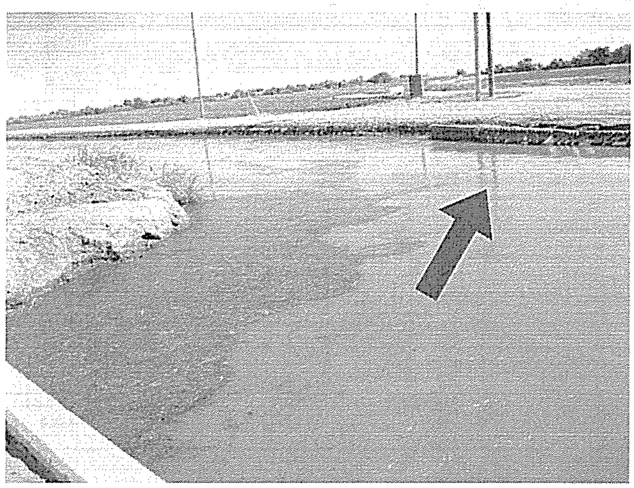


Figure 8. Flow Control Structure design to be use at all the proposed sites.

Improvement Point: Reservoir Site
Location: Near intersections of Delta Canal and Island "B" lateral. The photo shows the proposed site for the reservoir.

Improvement Point: 2
Location: Start of Island "A", just downstream of bridge from Island "B" canal. View in photo is to the north, looking downstream.
Recommendation: The abandoned side weir spill to the drain needs to be renovated.



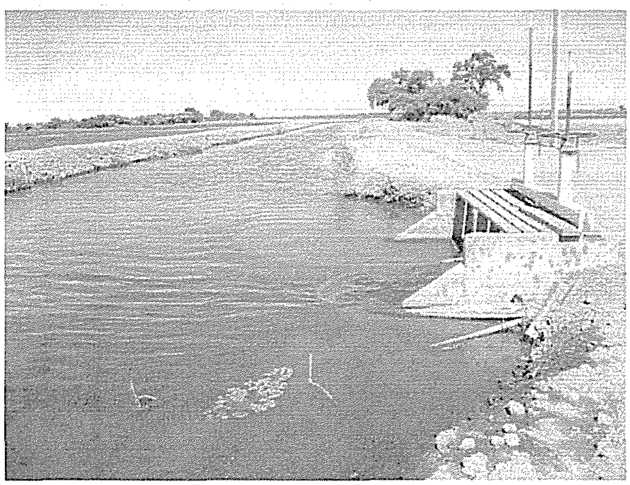
Improvement Point: 3
Location: Island "A" lateral. The photo is to the west looking downstream.
Recommendation: The existing culvert must be enlarged.

Improvement Point: 4
Location: Island "A" lateral. Photo looks to the southwest.
Recommendation: First check structure on Island "A" Canal that needs to be converted to flow control like the structure depicted on Figures 7 and 8. There is more than a 1' drop available.

Improvement Point: 5
Location: Head of Island D lateral with Island C lateral in the background. Photo looks to the north.
Recommendation: The existing flow control structure at the head of Island "D" Canal needs to be removed. There is only 0.1' change in head.

Improvement Point: 6
Location: Island "D" lateral. Photo looks to the north.
Recommendation: First check structure on Island "D" Canal that needs to be changed to flow control like the one on figures 7 and 8.

Improvement Point: 7
Location: Intersection of Island "A" lateral and Island "C" lateral. Photo is to the west looking downstream of Island "A" lateral.
Recommendation: The existing sluice gates on the right hand side of the figure supply water to the north and will need to be left wide open. No modifications to the structure are necessary.



Improvement Point: 8
Location: Island "C" lateral. Photo looks to the north.
Recommendation: First check structure on Island "C" Canal that needs to be changed to flow control. There is more than a 1' drop available. The canal lining from the sluice gates at the head of the Island "C" Canal (Point 7) to this point need to be raised 1'.

Simulation of Control

The Island Canal System was simulated by the ITRC in CanalCAD to determine if the "level canal pool" will work well.

The controls for in/out of the reservoir must be based on maintaining a target water level at some point. The simulations examined two different "control points:

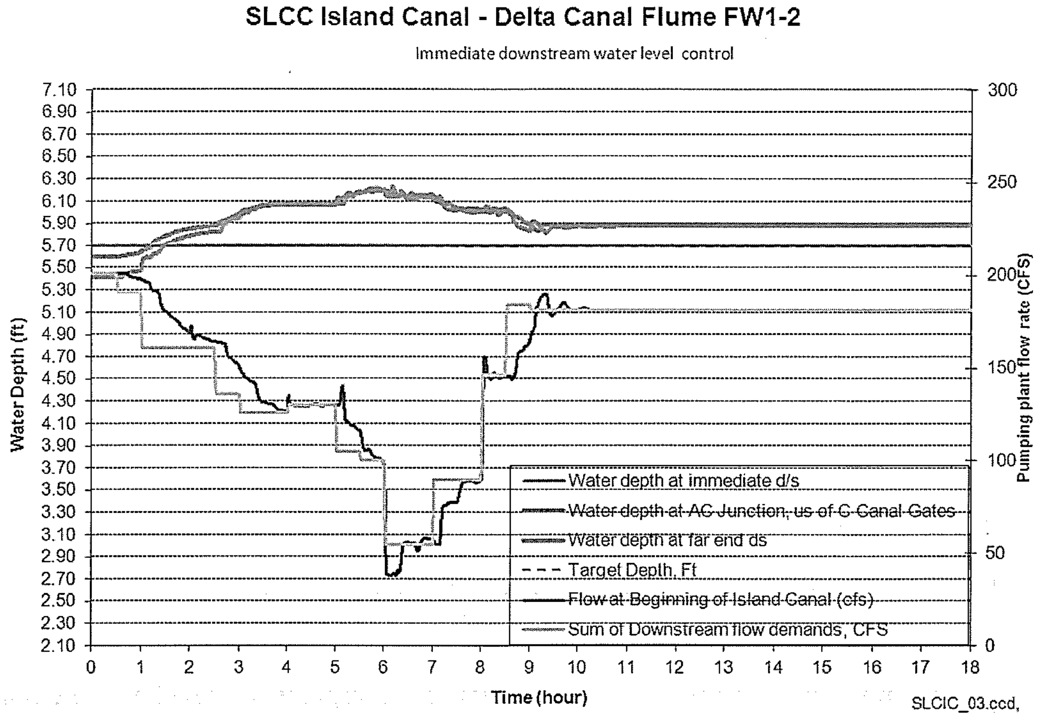
1. Maintaining a constant water level in the canal, right next to the reservoir (also known as "immediate downstream control").

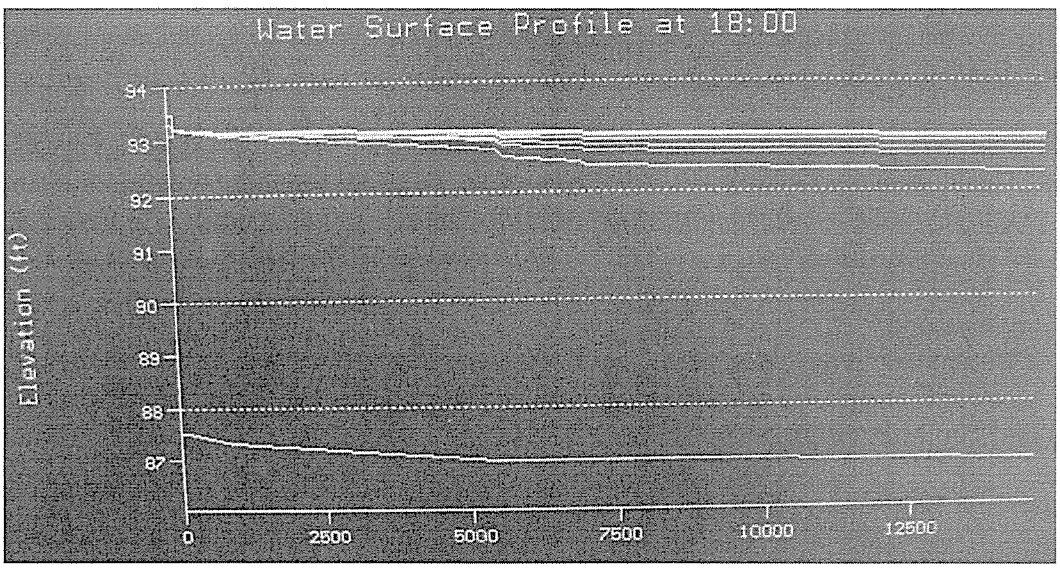
2. Maintaining a constant water level about midway down the canal pool (toward the refuge flow control point). This is done by looking at water levels at two points at the same time. In the simulation, these two levels were averaged with equal weight. This is referred to as the "50% Bival downstream control" method. The locations of the two water level measurements are:
   a. The water level at the far north end of the level pool, just upstream of the new flow control to the refuge, and
   b. The water level in the canal, right next to the reservoir.

Control Graphs and Canal Profiles:

Immediate Downstream Water Level Control:

Result: With perfect, idealized control at the reservoir, there is as much as 0.8' water level variation at the far northern end of the level pool. This drop occurs at high flows, and is caused by the necessary friction in the canal as water flows from the reservoir, and through the canal.



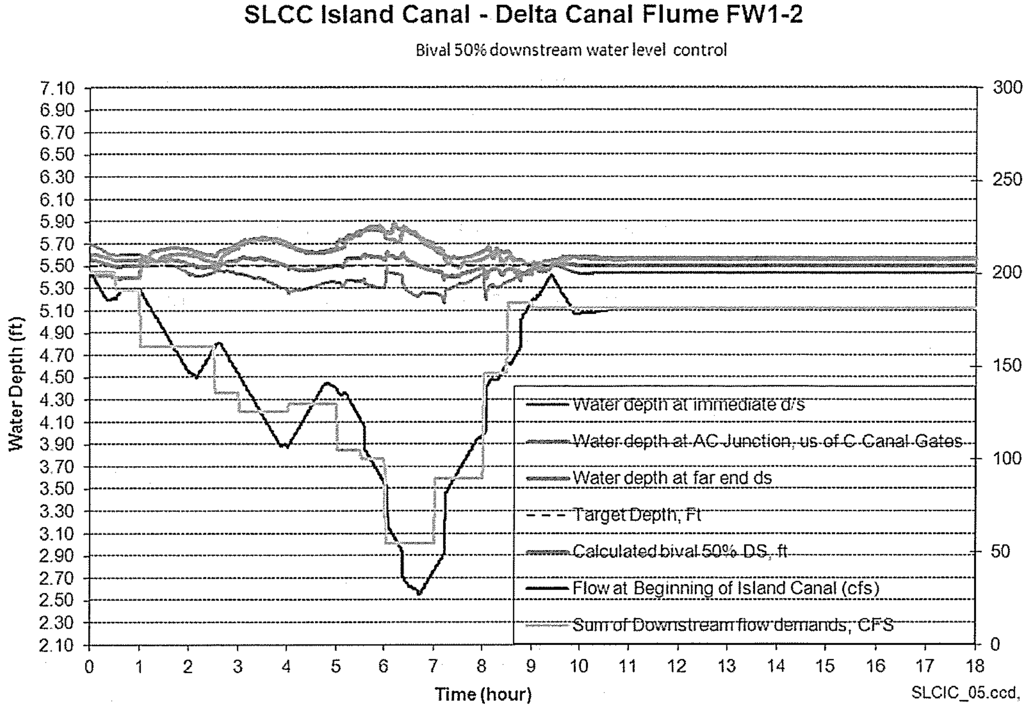


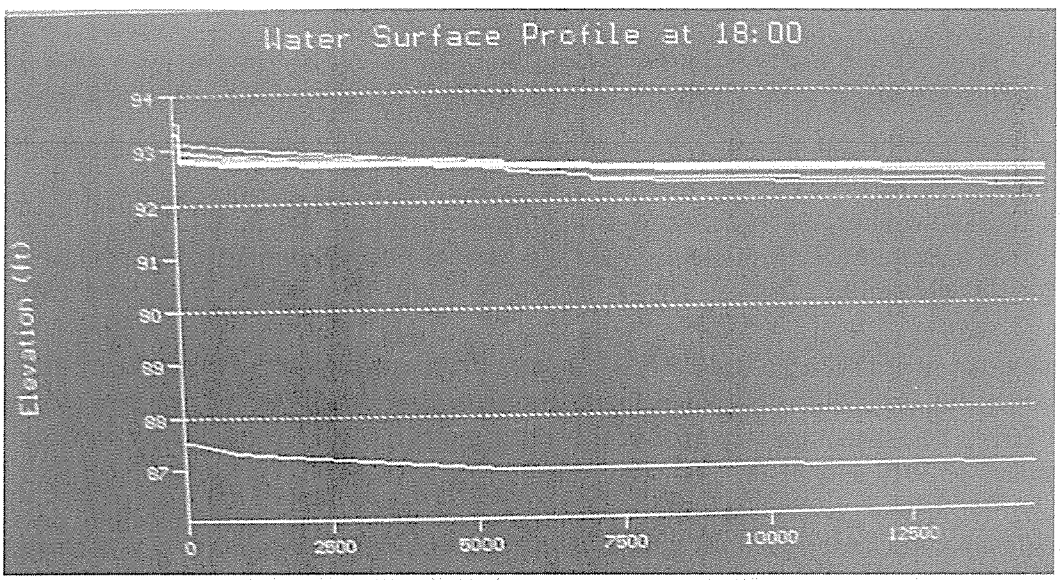
50% Bival downstream water level.

Result: The results for this type of control are:

a. The maximum water level variation at the far northern end of the level pool is 0.4'

b. The maximum water level variation next to the reservoir is 0.3'.





Conclusions regarding control:

1. The "Bival" method should be used.
2. Stable control can be achieved.
3. At high flows, there is a substantial (0.8') change in water level from the reservoir to the far north end. It is not anticipated that this will be a problem, because during any one or two days, there will not be such a large change in flow rate unless operators are involved. If the district knows that there will be a time of high or low flows, the "target" water depth can be adjusted up or down from the office.

Retrofitting existing check structures into modern Long Crested Weirs

With more flexible canal operations, the variation in canal flow rates will increase. Therefore, it is necessary to upgrade the existing check structures so that changes in flow rate in the canals do not negatively impact water deliveries to growers' turnouts or to the headworks of other canal systems.

The retrofitting of the existing flashboard structures will bring immediate results and benefits by improving the reliability and the flexibility of the deliveries directly for 2,900 acres in the district and indirectly to approximately 4,600 acres of farmland considering the acres farmed upstream of the new proposed regulating Island Reservoir and downstream of the new proposed flow control structures.

The Long Crested Weir has been used for decades as an "automated upstream control" device. Weir designs are hydraulically superior to orifice designs for check structures in manually operated canals. Long crested weirs have a special configuration which provides considerably more weir length than flashboards installed perpendicular to the canal.

By using long crested weirs rather than a normal flashboard weir as a control structure, the water level variation over the crest will be reduced by about 75%.
The long crested weir is not an automated structure, technically speaking. However, when properly designed and operated, the water level control can be equivalent to that achieved with some sophisticated automation techniques.

Some of the benefits of the implementation of this program will be:

a. Installing these Long Crested Weirs (LCW) will reduce the fluctuations of the water level in the canals providing more constant water deliveries through the canal turnouts located upstream of the structures.
b. Good water level control and management practices will improve the reliability and the flexibility of the water deliveries.
c. Good water level control promotes accurate measuring and accounting of water.
e. Good water measurement will facilitate accurate and equitable distribution of water resulting in fewer problems and easier operation.

The surveying task is supposed to begin in July 2013 and construction will start in December 2013 when the irrigation comes to its end, and will continue weather permitting until the start of the pre-irrigation period in early February of 2014. The construction period of the following years will have a similar schedule from December to February of 2015 and 2016.

Retrofitting these flashboard check structures with long-crested weirs would enable flow rate changes to travel down the canal faster with much less chance of exceeding freeboard and overtopping the canal. In addition, in the upper section of the canal, long-crested weirs would help alleviate the operational problems created by wind causing substantial and rapid flow rate changes in the canal. The canal would respond more quickly to changes at the flow control structures.

A standard design long-crested weir design has been developed for widespread use in the district (figure 9) illustrates the basic concept that would be applicable at other check structures in these canals and other key locations in the district.

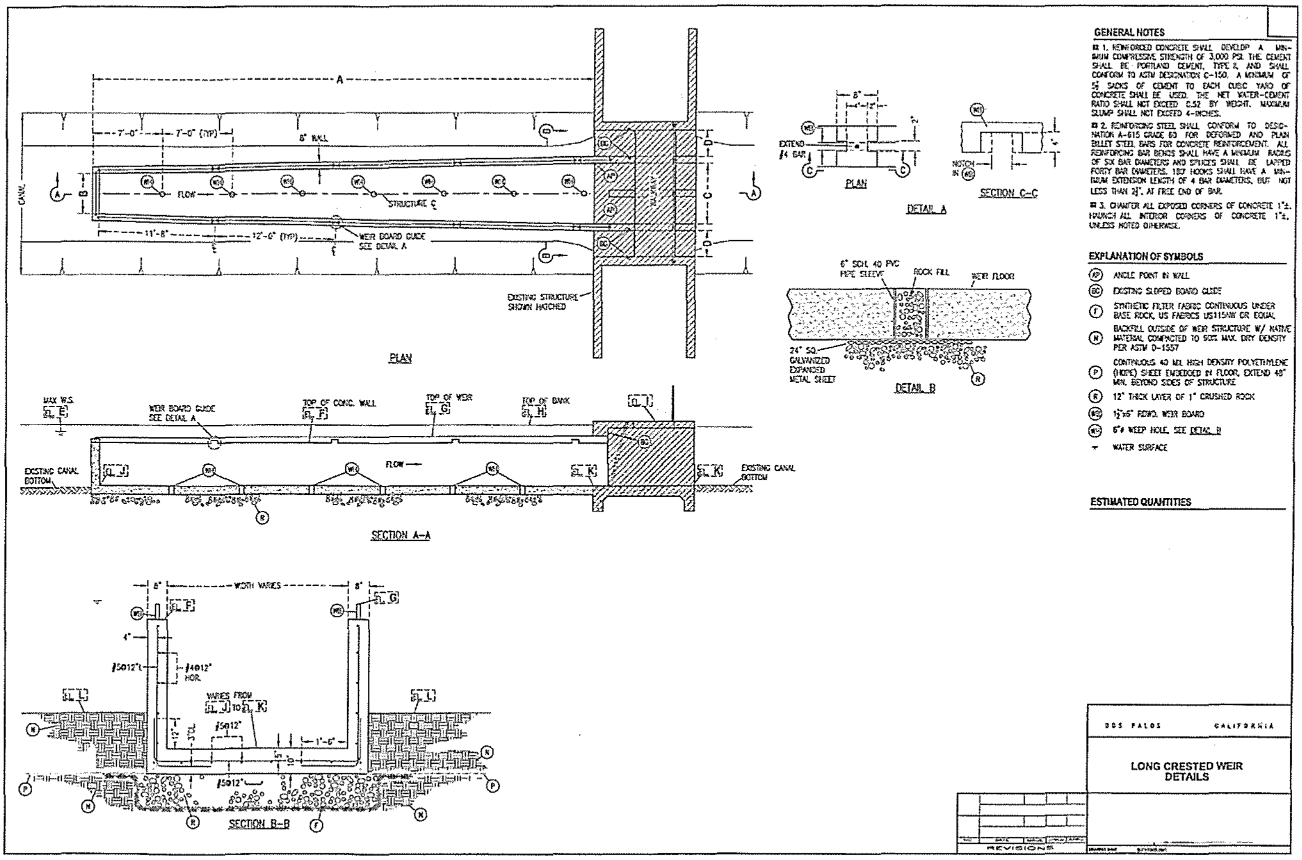


Figure 9. Design layout of a long-crested weir for a standard HMRD flashboard check

The design would be to pour a 12-inch concrete slab floor for the structure to which the steel frame would be attached and 8 inch concrete walls of different height depending upon location with a fixed top wooden board. It is necessary to have sufficient weepholes in the concrete floor to avoid floating the structure. From a construction point of view, this means the canal must be completely drained to do construction.

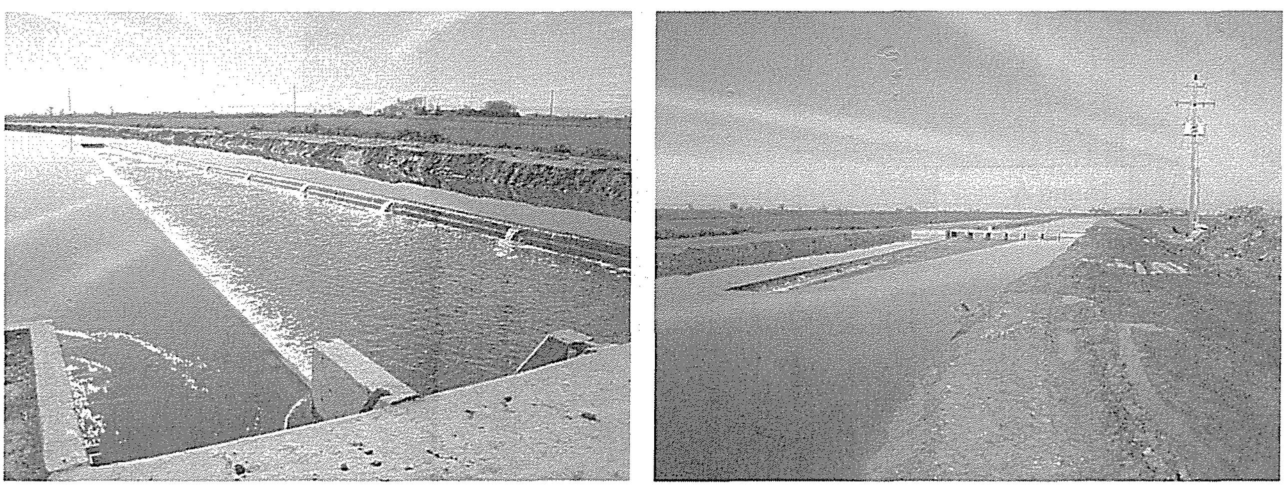


Figure 10. Long-crested weir installed on the Delta Canal d.s. of HWY 152.

There are a number of locations in the canal distribution system that the district has identified for the design and construction of more long-crested weirs, including check structures and spill structures.

The following section summarizes the hydraulic design conditions and recommended configuration for the Island Canal System.

Island A, Island D Canals and Noble Ditch

The relevant details about the existing check structures are summarized in **Tables 2 & 3**. Each of the first four existing check structures downstream of the flow control structures are basically the same design, consisting of two (2) flashboard bays with widths ranging from 104 inches to 107 inches. The last two structures on the Noble Ditch canal have only 1 flashboard bay. The estimated change in water level across the structure was measured according to the observed high water marks. Some design estimates had to be made for things such as the turnout head, which reflect the general conditions for the most sensitive turnouts upstream of the structure.

Table 2. Details of Island A Canal check structures

ID.	Design Flow Rate (cfs)	# of bays	Change in Canal WL across Check at High Flow (Ft)	Estimated Turnout Head (Ft)
A	50	2	0.8	0.1
B	35	2	0.5	0.2
C	25	2	1.7	0.1

The layout and configuration of the existing check structures in the Island Canal system are shown in **Figures 11** to **16**. Once these check structures are upgraded, all the check structures between the flow control structures and the spillways will be enhanced and will allow the water level control capabilities for handling more flexible operations.

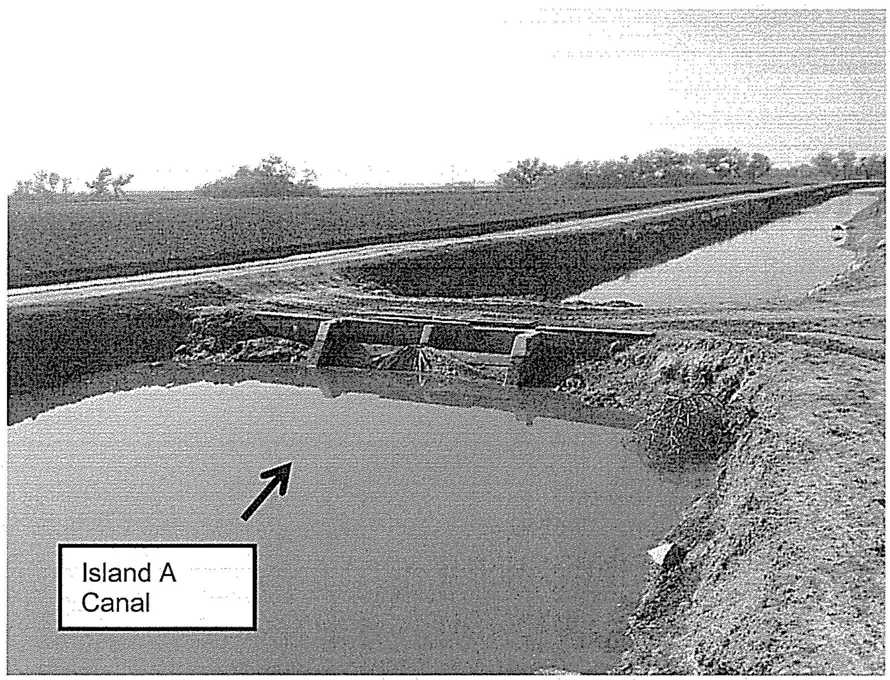


Figure 11 Check #A – Island A

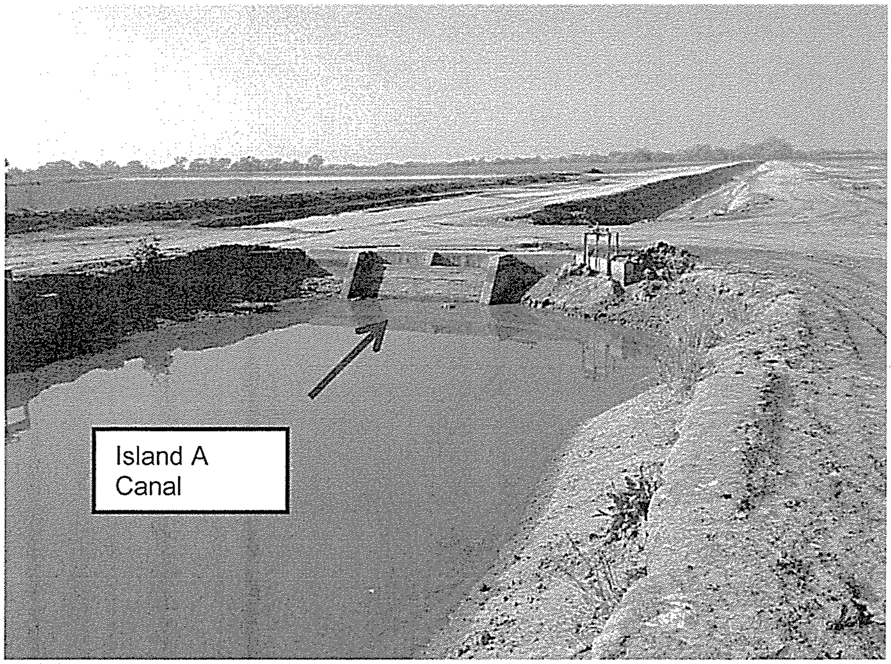


Figure 12. Check #B – Island A.

Figure 13. Check #C - Island A Canal.

Table 3. Details of Island D and Noble Ditch check structures

ID.	Design Flow Rate (cfs)	# of bays	Change in Canal WL across Check at High Flow (Ft)	Estimated Turnout Head (Ft)
D	45	2	0.5	0.5
E	20	1	0.8	1.0
F	20	1	0.8	0.2

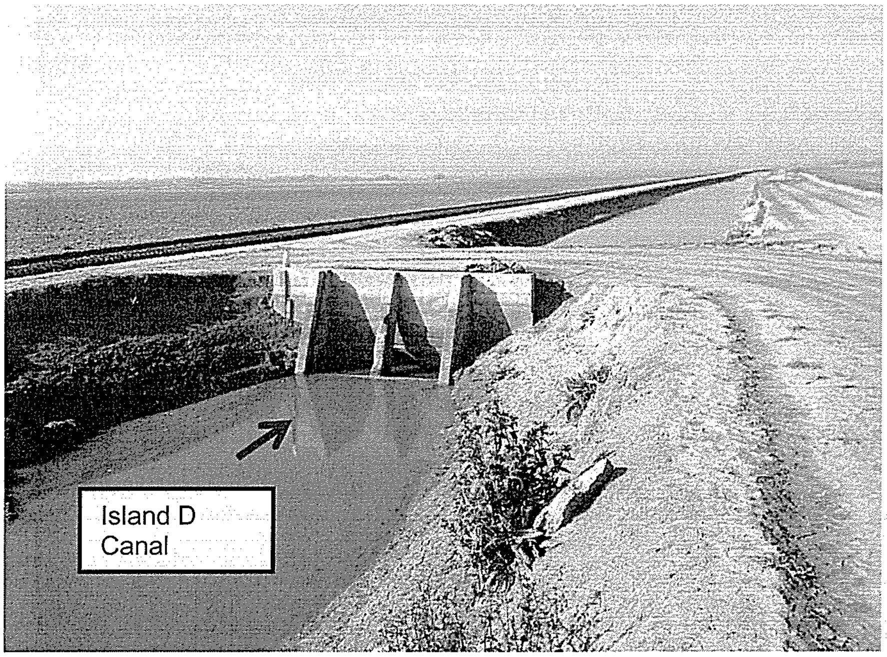


Figure 14. Check #D – Island D Canal.

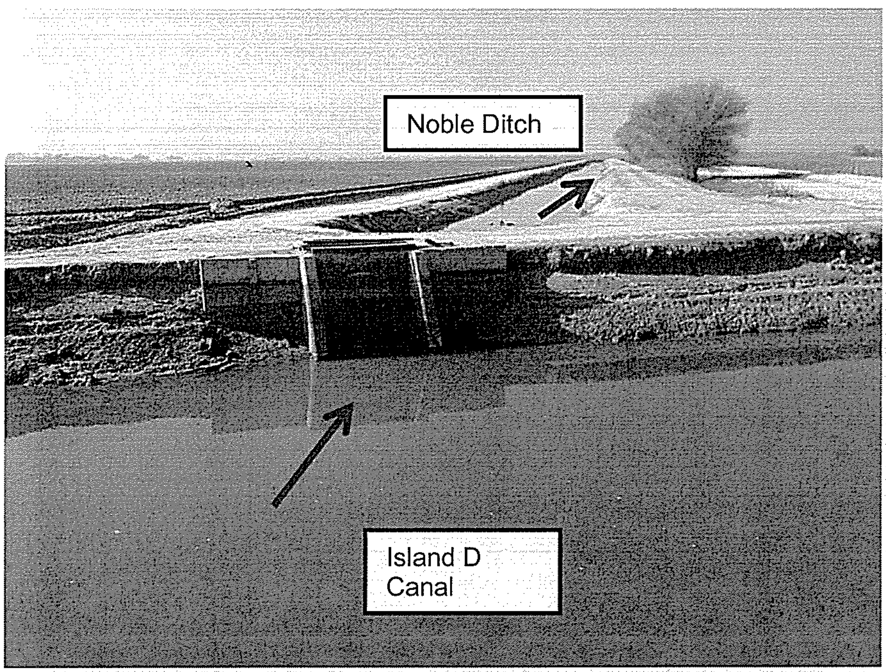


Figure 15. Check #E – Noble Ditch Head weir.

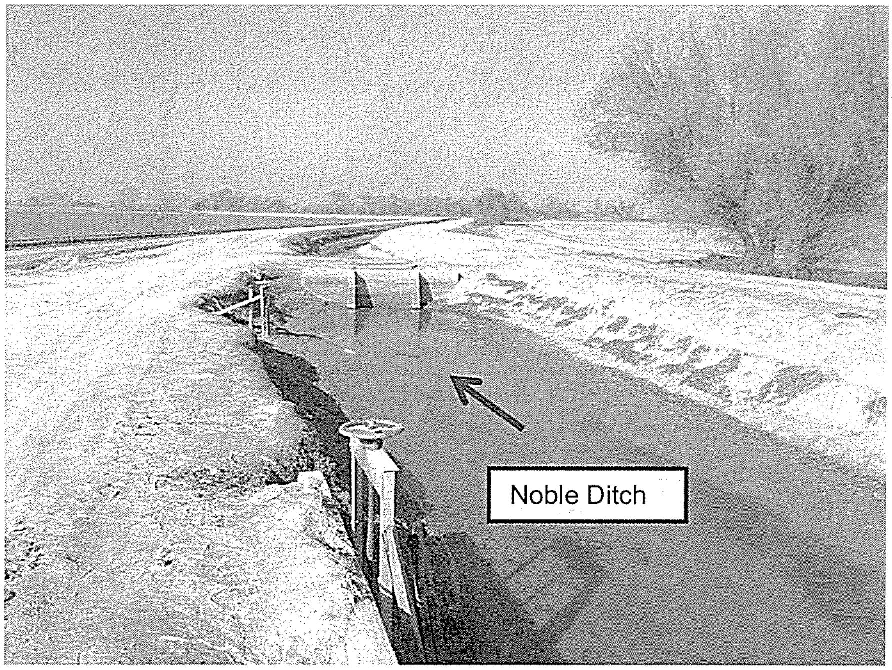


Figure 16. Check #F – Noble Ditch.

Delta Canal

The relevant details about the existing check structures on the proposed retrofitted structures on the Delta Canal are summarized in Table 4

Table 4. Details of Delta Canal check structures

ID.	Design Flow Rate (cfs)	# of bays	Change in Canal WL across Check at High Flow (Ft)	Estimated Turnout Head (Ft)
G	90	2	0.9	0.5
H	90	1	0.8	1.0
I	90	1	0.8	0.2

The layout and configuration of the existing check structures in the Delta Canal are shown in Figures 17 to 19.

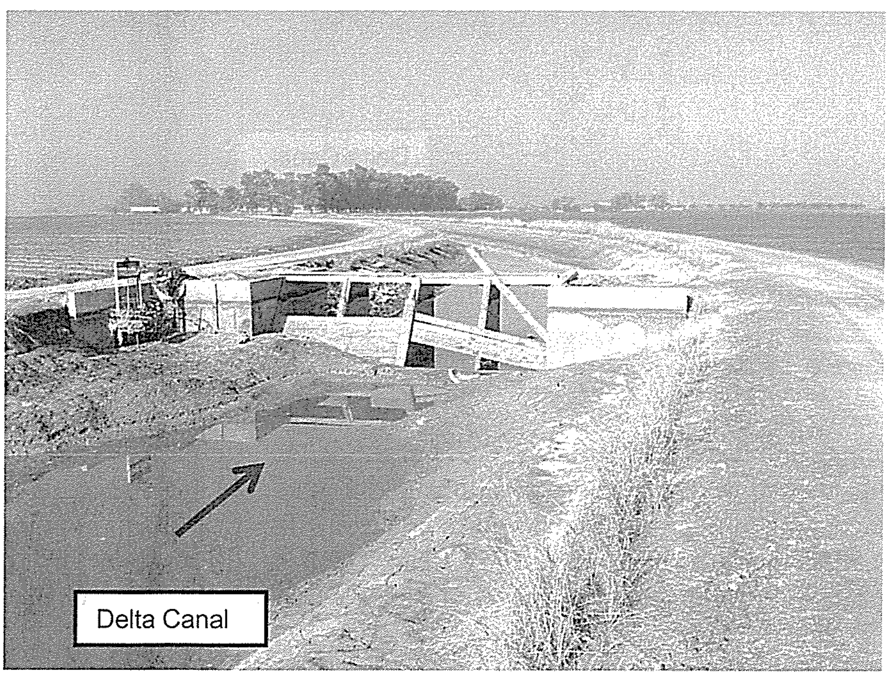


Figure 17. Check #G – Delta Canal.

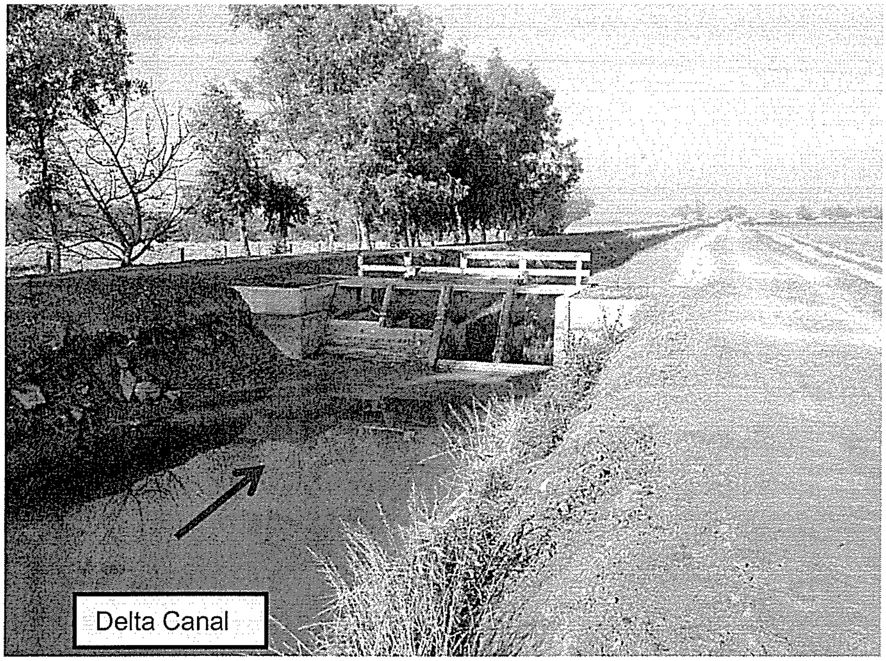


Figure 18. Check #H – Delta Canal.

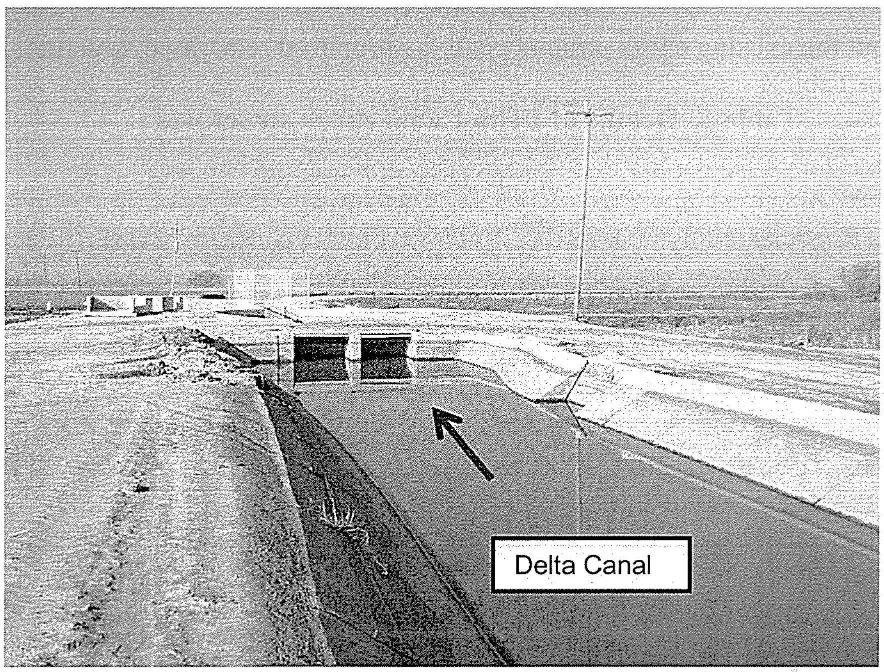


Figure 17. Check #I – Delta Canal.

Design Procedures

Cal Poly's Irrigation Training and Research Center (ITRC) helped on the original design process so HMRD has successfully built long-crested weirs at various locations in the canal system. A general design rule that has been used to size the existing long-crested weirs was to determine the weir length required to keep turnout flows within ±10% even when the canal flow changed by 50%. This is a fairly conservative estimation procedure and it is appropriate for small and medium-sized canals where the flow may change rapidly by a large amount.

For this analysis of the check structures in the Island Canal, a systematic procedure was applied that is appropriate for determining the correct weir length based on performance criteria for the expected flow conditions. The design procedure used here takes into account several factors, including:

1. All the canal flow, which will be run over the long-crested weir (or the remaining flashboard bays that are left in place next to the long-crested weir, and at the same elevation as the weir crest).
2. An estimate of the possible change in canal flow rate that may occur at a particular location before an operator comes to adjust the turnout gates, or to adjust the control gates to the outlets for the laterals.
3. Performance criteria for the allowable fluctuation in the turnout flow (or the flow to the laterals). This is what determines the allowable fluctuation in the water level in the Arroyo Canal.

Design

The design and performance criteria used in this analysis are summarized in **Table 5**. The values and designs in the table are explained below.

Table 5. Long Crested Weir design assumptions – Island A & D and Delta Canals

No.	Design Flow Rate (cfs)	Est. Change in Flow between Adjustments of Turnout (%)	Est. Turnout Head (Ft)	Allowable Change in Turnout Flow (%)
A	50	15-20%	0.1	5%
B	35	15-20%	0.2	5%
C	25	15-20%	0.1	5%
D	45	15-20%	0.5	5%
E	20	15-20%	1.0	5%
F	20	15-20%	0.2	5%
	Delta Canal			
G	90	15-20%	0.1	5%
H	90	15-20%	0.2	5%
I	90	15-20%	1.0	5%

The design flow rate at the different locations in the Island canals varies from 50 cfs to 20 cfs. One has to consider the maximum flow rate that may occur in order to ensure that the design weir size is going to be adequate under conditions where high flows are being put into the expressway as part of integrating reservoir operations (i.e., when the operator wants to fill the reservoir while still making deliveries).

The estimated change in flow between adjustments of the turnout is considered as a percentage of the total flow rate in the Island B canal. For example, a major change in flow rate at the one of the flow control structures is about 12 cfs, out of a maximum flow rate of approximately 50 cfs. This is equivalent to about 24%. For canals that are run with a high degree of flexibility for good water level service, the estimated value for the amount of canal flow variability is typically 15-20%.

Any outlet from a canal with about 1 foot or less of available head is considered somewhat 'sensitive' to changes in water elevations Based on staff gauge readings at the site, it appears that at high flow conditions the change in water level across these gates is only about 0.5 ft. This is a conservative estimate, and so it will result in a design that has good service during all conditions. It was estimated that sensitive turnouts in each of the other canal pools may have about 0.75 ft of available head for making deliveries.

The allowable change in turnout flow is a performance criteria that is typically assigned as 5-10%. This means that the amount of water being delivered will not vary by more than that percentage during times when no adjustments are made to the turnout gate. So for example, with a criteria of 10% if the turnout is supposed to deliver a water order of 10 cfs, it means that the turnout flow stays within 9-11 cfs (±1 cfs), even when the supply canal is operating at different flows. The lower the percentage change in turnout flow that is allowed, the longer the weir crest has to be in order to have the required degree of water level control.

A criteria value of 10% is typically used for design purposes; however, when considering the situation where a main canal is delivering to a medium-sized lateral canal this value of 10% can still be large. For example, if the lateral canal is diverting 100 cfs from the main canal, the resulting "error" from this 10% criteria would be ±10 cfs, which could contribute significantly to the amount of mismatch in the system, and eventually the operational outflow from the system. Therefore, a value of 5% was used to set the allowable turnout flow variation. (Note: when the 5% criteria is applied to the estimated design turnout conditions, the allowable change in head across the turnouts work out to approximately ±0.1 foot with a head on the weir at the base flow of about 0.50-0.60 ft.)

Using the design information from the previous sections, the standard weir formula was employed to calculate the (minimum) equivalent length (L_e) of weir required to pass the base flow with an acceptable performance level. The calculated effective weir lengths were converted to the required actual length of the long-crested weir at each site by considering the hydraulic effects of contraction based on the estimated approach width of the canal (est. ≈ 30 ft) and assumed weir crest height of 4.5 ft.

It was assumed that the new long-crested weirs would be built by taking up the middle flashboard bays in each check structure, leaving one bay in place (refer to the sketch in **Figure 18**). These existing bays could then be used in the future for flushing silt or to drain the upstream canal pools. Taking into account the weir lengths of these existing bays reduces the required length of the new LCW by about 5 to9 ft depending on the site.

The recommended design lengths of the new long-crested weirs are summarized in **Table 5**. The recommended lengths of the new long-crested weirs vary from approximately **<u>90 ft to 30 ft</u>**.

Table 6. Lengths for the long-crested weirs in the Island & Delta Canals

No.	Minimum Effective Length, Le (Ft)	Actual Required Weir Length, L (Ft)	Est. Weir Length of Remaining Bays (Ft)	Length of Long-Crested Weir (Ft)
A	42	55	5.0	55
B	37	49	5.0	45
C	38	50	4.5	45
D	37	49	4.5	45
E	24	32	4.0	30
F	28	34	4.0	30
G	80	97	9	90
H	80	97	9	90
I	70	80	9	90

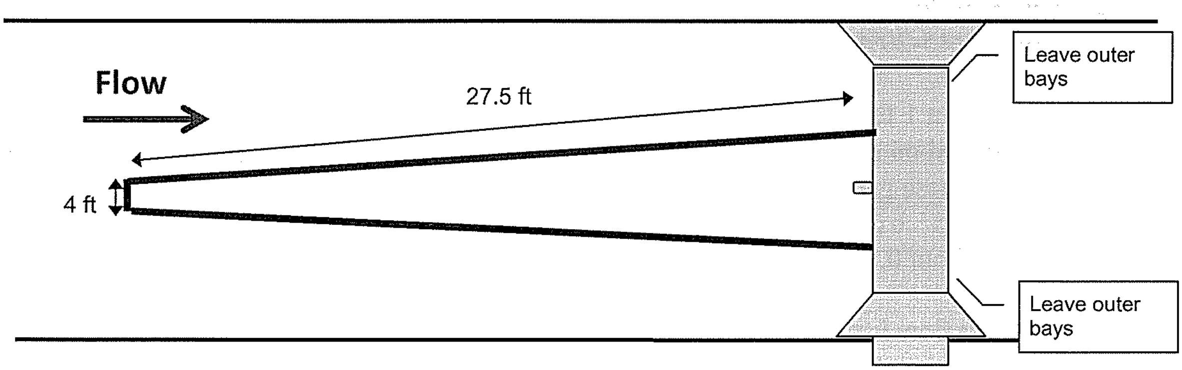


Figure 18. Schematic of long-crested weir pointed upstream of existing flashboard bay check structure at Site #3 ("Check A Weir", design Q = 50 cfs)

Retrofitting existing check structures into Automatic Spillways with ITRC Flap Gates

The proposed operation consists of using the ITRC Flap Gate to maintain a constant water level at the end of these 2 canals sections and also be used as automatic spillways. The ITRC Flap Gate works automatically to maintain constant water levels without an operator having to make frequent adjustments, as is the case now. Figure 19 shows the proposed design to be implemented at end of the Island A canal and also at the end of the Noble Ditch. This design has been used successfully at two existing locations on the Temple Santa Rita canal system (figure 20).

An inclinometer installed on the ITRC flap gate will be used to determine the angle of the steel plate on the flap gate which is related to the flow rate passing through the gate. This information is recorded and sent via radio through the solar powered SCADA system so the ditchtender and the watermaster can monitor and make decisions for better water management.

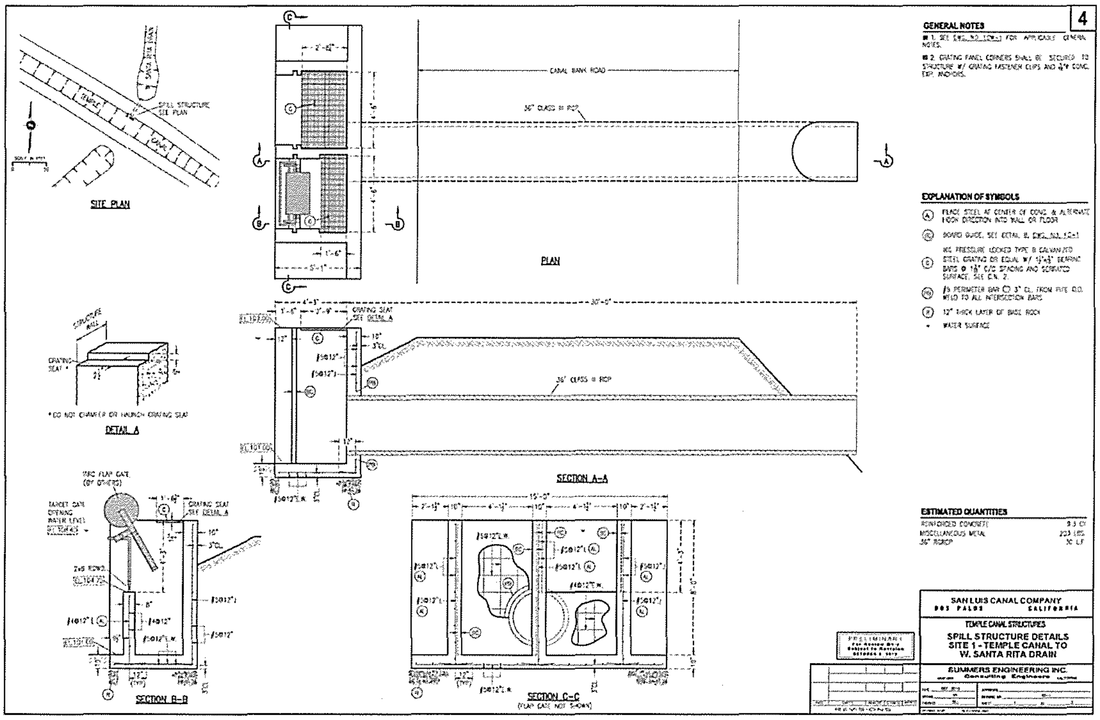


Figure 19. Schematic of an automatic spill structure

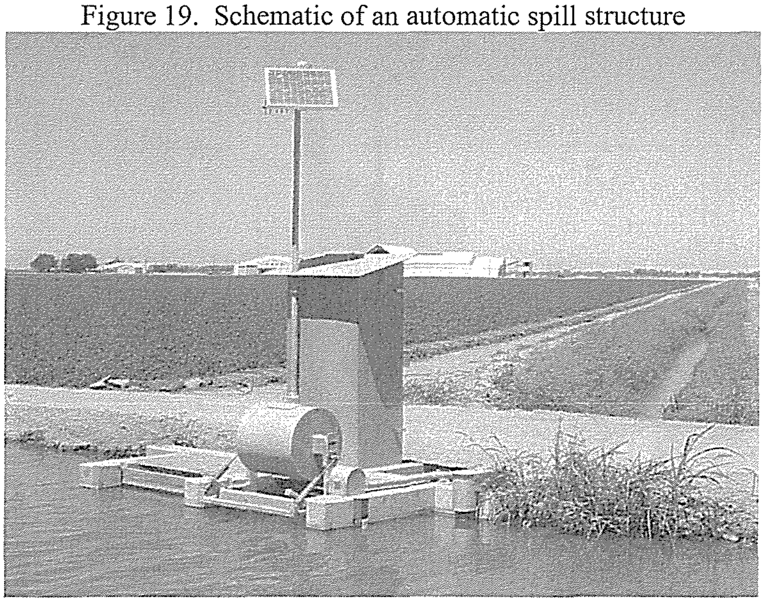


Figure 20. Automatic Spillway using an ITRC Flap gate connected to SCADA to monitor spill flow.

Hereford Drain Monitoring Site

In its process of modernizing its canal and drainage systems, HMRD plans to build a brand new monitoring site at the Hereford Drain outlet. (Figure 22).

The purpose is to install a Doppler flow meter integrated with data loggers and a communication system connected to the existing SCADA system to measure water velocity and depth with a high level of precision at this outlet point of the Henry Miller Reclamation District. The main reason to monitor the exiting flows and water quality at the mentioned site resides in improving water management and reduce operational spills out of the district's service area by re-circulating drainage water that otherwise would leave the system.
HMRD already successfully installed 5 monitoring sites like the proposed. Two of these sites include an air blasting system to prevent silt buildup on the Doppler sensor for maintenance effort reduction. Figures 21 and 22 show a similar installation done during 2008 at the West Delta Drain at Sand Dam.

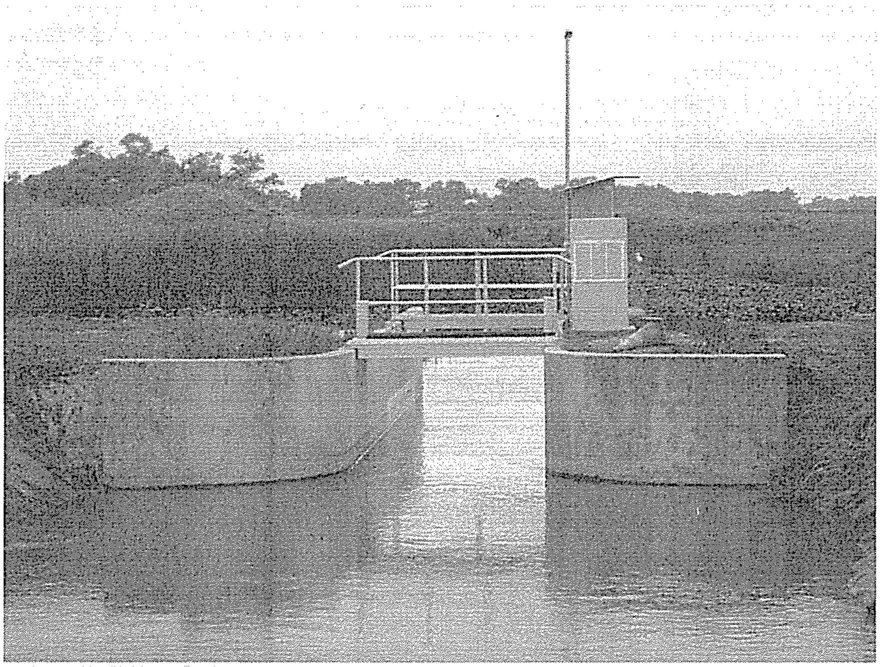


Figure 22. West Delta Drain Monitoring Site at Sand Dam. Similar site proposed at the Hereford Drain outlet.

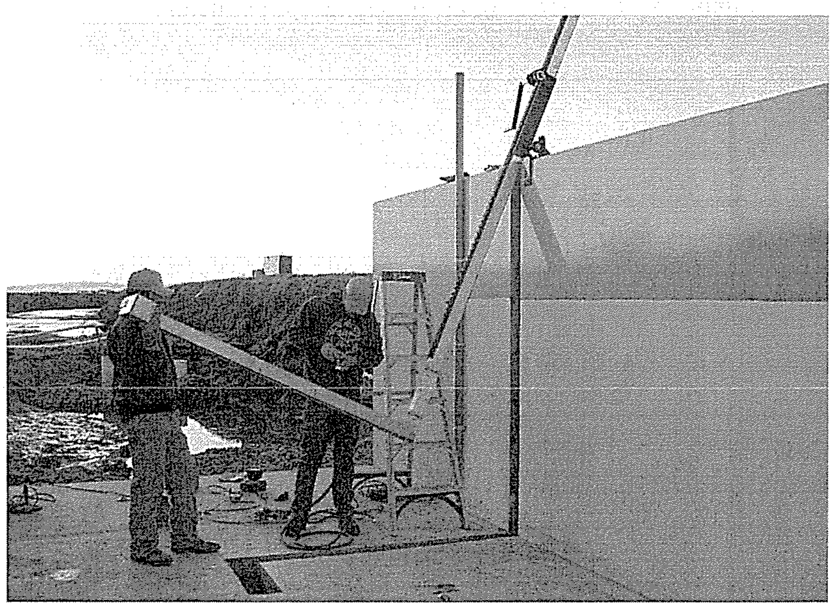


Figure 23. Bracket holding Doppler meter and air blasting system for automatic maintenance operation.

– (4) EVALUATION CRITERIA

Subcriterion No. A.1) Water Conservation

Quantifiable Water Savings:
During previous year unnecessary canal spill was measured and totalized approximately 1,700 AF.
We estimate that this spill can be reduced by 95% with the modernization proposal bringing the operational spill down to less than 200 AF conserving about 1,500 AF per year.
Also we anticipate reducing the deep well pumping (1000 AF in this canal) by 75% providing 800 AF in savings. All these savings totalize 2,500 AF.
The use of the regulating reservoir to buffer the daily operational spill collecting water from the shut off from drip system will save an estimated 1,900 AF that other ways would be spilled at the end of the canals. Making a total of 4,400 AF of water conserved.

- **Average Water Supply**:

In average HMRD diverts 130,000 AF annually.
This water savings will represent a 2% of water conserved directly as a result of the project.
Looking at this particular portion of the district, on the Island Canal system, approximately 35,000 AF are diverted through the flume. The mentioned 2,300 AF will represent a 7% of water conserved.

- **Destination of water leaving the irrigation system:**

The water is being spilled at the end of the Island A Canal and the Noble Ditch and is not recoverable by the district.

- **Destination of conserved water:**

HMRD through SLCC is a member of the San Joaquin River Exchange Contractors. The Exchange Contractors are already involved in water marketing, and are well aware of the need to shift conserved water to areas that need it. Specifically, water that is conserved in HMRD can reduce diversion needs from the Delta-Mendota Canal. There are currently pumping restrictions from the Delta, and many users south of the Delta need more water. Water conservation in HMRD will not only benefit the water quality in the San Joaquin River, but it will provide water for potential transfers south of the Delta.

3. Improved Water Management:
Through better measurement and SCADA automation the project will indirectly benefit 4,600 acres of farm land. By using the LCWs as water level control structures the water level variation (0.5 FT) over the crest will be reduced by about 75% which could potentially improve the water management of approximately another 2,300 AF per year.
There is also an indirect benefit which is the drastic improvement in flexibility to order and to shut off the water into the farmer's fields. This will result in less water lost to deep percolation and runoff and improving the on-farm Irrigation Efficiency.
Due to better flexibility and reliability of the proposed project, the farmers will be more encouraged to improve their irrigation systems through the On-Farm Conservation Program for which HMRD grants up to 50% of the cost and loans the balance up to $500 per acre on a 3% for 5 years.

$$\frac{\text{Estimated amount of water better managed}}{\text{Average Annual Water Supply}} = \frac{2{,}300\text{ AF}}{35{,}000\text{ AF}} = 6.5\%$$

Subcriterion No A.2. Percentage of Total Supply

$$\frac{\text{Estimated amount of Water Conserved}}{\text{Average Annual Water Supply}} = \frac{4{,}400\text{ AF}}{130{,}000\text{ AF}} = 3\%$$

Subcriterion No A.3 Reasonableness of Cost

$$\frac{\text{Total Project Cost}}{\text{AF Conserved + Better Managed * Improvement Life}} = \frac{\$2,719,400}{6,700 \text{ AF * 20 years}} = 20.2$$

Subcriterion No B.2 Increasing Energy Efficiency in Water Management

1. Energy:

This project involves water management which will evolve in less deep water pumping which will reduce the energy consumption accordingly. It has been estimate a 75% reduction in pumping costs. According to pump tests done during June 2012 the average pumping cost of the 3 deep wells involved on the proposed improvement area is $28/AF which multiplied by the estimated 796 AF estimated volume reduction makes savings for about $22,250 per year.

2. Reduced Carbon Emissions:

Because all these canals are operated under upstream control with regular board check structures with high potential of water level fluctuation unless very close supervision by canal men is available, the ability to remote control pump and canal flows and the construction of these long crested weirs will reduce the constant driving on the canal banks and therefore will improve the air quality by reducing the dust in the air as well as reducing carbon emissions.

V.A.3. Evaluation Criterion C: Benefits to Endangered or threatened species:

HMRD is situated in a "hot spot" in the San Joaquin Valley that is impacted by many issues such as:

- Restoring flows in the San Joaquin River for salmon runs.
- Maintaining salinity standards in the San Joaquin River.
- Disposal of selenium-laden water.
- Disposal of silt into the San Joaquin River
- Reduced pumping from the Delta
- Climate change and the anticipated water shortages throughout the state.

It is highly unlikely that conflict will ever be eliminated. However, HMRD is very interested in being able to control its water (quality and quantity) in a manner that will protect the economics of farming while simultaneously improving the environment and transferring water to others who need it. HMRD believes that one of the requirements for accomplishing this is to remove the "art" from water control and to replace it with infrastructure and information management that allows the water to be managed in a manner more resembling a modern control process.

V.A.4. Evaluation Criterion D: Water Marketing:

SLCC is a member of the San Joaquin River Exchange Contractors. The Exchange Contractors are already involved in water marketing, and are well aware of the need to shift conserved water to areas that need it. Current conserved water transfers from SLCC are 29,000 AF per year.

Specifically, water that is conserved in HMRD can reduce diversion needs from the Delta-Mendota Canal. There are currently pumping restrictions from the Delta, and many users south of the Delta need more water. Water conservation in HMRD will not only benefit the water quality in the San Joaquin River, but it will provide water for potential transfers south of the Delta.

San Luis Canal Company (SLCC) obtains its water supply through an Exchange Contract with the USBR. The Exchange Contract allows the Company to receive its water through the Delta-Mendota Canal. Henry Miller Reclamation District 2131 was formed in FY2000. It works in conjunction with SLCC to deliver the irrigation water and provide drainage to the company costumers. The vast majority of the delivery facilities i now either owned by HMRD or have a permanent easement. Henry Miller Reclamation District No. 2131 is in charge of operating and maintaining the canals and drains. As a member of the San Joaquin River Exchange Contractors, SLCC has an annual right of 163,600 AF in a "normal" year, and 123,000 during critical years. The actual deliveries to farmers average 130,000 AF per year. HMRD also "wheels" 28,000 AF of water to US Fish and Wildlife, California Fish & Game 8,200 AF, and to Grasslands RCD 8,800 AF.
HMRD supplements its irrigation demands through deep well pumping and water recirculation with 33 "low-lift" pumping plants throughout the district. On average 40,000 AF are pumped from deep wells and 93,000 AF from "low-lift" per year. By improving the delivery system efficiency and the on-farm efficiencies big losses will be reduced and less water will be needed.

V.A.5. Evaluation Criterion E: Other Contributions to Water Supply Sustainability

Category (2): Expedite On-Farm Irrigation Improvements

Whit the implementation of the proposed plan the current on-farm irrigation practices can be drastically improved as a result of higher flexibility for the farmers to start their irrigation and to shut-off the water without having to contact the ditchtenders and asking for permission to do it.

The 24 hour in-advance call to order and shut-off will be practically discarded so the farmers can manage their water better without having to let it run-off their fields until the next morning when the ditchtenders are ready to receive the water as it is right now without the automation with the LCWs.

Irrigation practices will respond more to irrigation demand instead than water availability. This will be the case on all the fields served directly by the Delta Canal, the Island Canal system, and the upper portion of the Arroyo canal roughly 10,700 acres.

In addition Gilardi Farms, Andrews Farms, Bowles Farming Company, Gamboni Farms, Palazzo Ranches, Nickel Family LLC, Santa Rita Farms, Pentagon Company, 4W Ranch, Parrlon Farming, Den k Holstein, Robert McDonald, O'Banion Ranches, Bertao Bros.and other smaller farmers have applied and received funds from HMRD and some also from NRCS to convert to drip irrigation or implement other types of on-farm water conservation practices.

Both the Canal system operations and the on-farm operations are greatly improved by better water level control. The installed drip systems showed a water application reduction in average of 3.5 AF/ acre compared to surface irrigation on Tomatoes. Furthermore the required flexibility to turn these systems on and off for good on-farm water management is provided by the combination of "automatic" water level control in the canals and a regulating reservoir connected to a SCADA system.
Due to the improvements in the canal systems since 2006 a total of 8,250 acres were converted to drip irrigation producing a substantial amount of water savings.

Category (3) Other Benefits

Beyond a substantial reduction in diversions and deep well saltier water pumping, this project will bring beneficial consequences for regional water quality issues in the San Joaquin River.

HMRD supplements its irrigation demands through deep well pumping and water recirculation with 33 "low-lift" pumping plants throughout the district. On average 40,000 AF are pumped from deep wells and 93,000 AF from "low-lift" per year. By improving the delivery system efficiency and the on-farm efficiencies big losses will be reduced and less water will be needed.

The project also promoted the collaboration among the entities to whom the district delivers water: the US Fish and Wildlife Service through the San Luis National Wildlife Refuge and the California Department of Fish and Game through the Los Banos Wildlife Area and the North Grasslands Wildlife Area, as well as collaboration with NRCS with help of HRMD staff , several farmers applied and were awarded grants from the NRCS EQIP & AWEP and The **Coalition For Urban/Rrral Environmental Stewardship (CURES)** programs mainly to convert from flood irrigation to install drip system. HMRD has a complementary program that grants and loans up to $500 per acres for on-farm improvements. Both funding sources combined with more flexible and reliable water deliveries make probable the opportunity for economic success by investing on changing irrigation techniques and methods and provide water savings.

V.A.6. Evaluation Criterion F: Implementation and Results

Subcriterion No. F.1. – Project Planning

(1) The district has a Water Conservation Plan submitted to the USBR through the San Joaquin River Exchange Contractors in November 2012. The Water Management Plan includes the proposed project.

(2)The district received a very rapid SOR in 2005, conducted by Cal Poly ITRC, with financial help from the Fresno office of USBR. Based on that SOR (known locally as a "RAP" or Rapid Appraisal Process), the district installed a single central buffer reservoir with a limited SCADA system to monitor the pumps and gates and a strategy was developed to modernize the district.

The district is also finished a second SOR conducted by the Cal Poly ITRC which involved a Salt and Water Analysis that showed the importance of reducing the amount of deep well water pumping and seepage reduction and recommended the installation of the LCW on the Arroyo Canal.
SLCC is a member of the San Joaquin river Exchange Contractors water Authority, whose members receive their water from the USBR via the Delta – Mendota Canal. The four members Exchange Contractor Authority have also submitted a Water Conservation Plan to the USBR.
Copies of the Rapid Appraisal conducted in 2005 and of the last S.O.R. and the BMPs can be submitted if requested.

(3) See Project Description Section above for details. Summer Engineering designed model structures based on Cal Poly ITRC recommendations. More engineering efforts will be necessary during the project to finalize details on the design of ancillary facilities for the regulating reservoir, SCADA connection and programming of the controls for the pumping stations and flow control structures.

Subcriterion No. F.2. – Readiness to Proceed

The project has a three year schedule.

First year 2013-2014:
During the first year additional surveying along the Island canal will be performed as well as engineering to finalize the design of the proposed flow control structures and ancillary facilities for the regulating reservoir. The survey and the final design phase of the reservoir will determine how much the canal liner between points 7 and 8 on the Island C canal (Figure 5) needs to be raised. The survey will be conducted in July 2013. The final design should be ready by October 2013. It is expected that the environmental and cultural resources compliances will be completed by the month of December. It is estimated that 50% of the ancillary facilities for the reservoir including the pump bays construction, platforms and walkways will be built during the first winter season. Also during 2013 winter season the 3 LCW's on the Delta Canal upstream of the flume will be completed (sites G, H and I of Figure 4).

Second year 2014-2015:
During the second year the new spillway at site 2 (Figure 5) will be installed along with the four flow control structures and the remaining six long crested weirs. The reservoir control building will be started and the pump bay structures should be finished. The process to bring power to halve of the proposed sites will be started and the construction of the Hereford Drain Monitoring site will be started.

Third year 2015 -2016:
This year will be the last phase of the construction for the finalization of the reservoir ancillary facilities. More specifically the control building and the installation of the pumps, discharge pipes, flow meters and all the components of the SCADA system as well the electrical terminations. After the construction is finalized, all the SCADA programming for the alarming, control algorithms, testing and field verification will take place.

Subcriterion No. F.3. – Performance Measures

The SCADA system will keep track of the flows through the flow control structures and automatic spills. These daily values will show the reduction in water diverted into the system after the project is completed.

All district owned and private deep wells and the low lift pumps have flow meters. The district keeps monthly records of the amount of AF pumped. The expected reduction in pumping will be reflected in the monthly record once the project is finished.

As part of the project the district plans on installing a flow and water quality monitoring site at the Hereford Drain to record and evaluate water management performances and potential savings. These sites are expected to show significant flow reductions after the project is completed.

Canal water level variations were measured with pressure transducers and data loggers. These same instruments will be used after the project is complete to prove the water level stabilization achieved with the installation of the LCWs.

V.A.7. Evaluation Criterion G: Additional Non-Federal Funding.

$$\frac{\text{Non-Federal Funding}}{\text{Total Project Cost}} = \frac{\$1,386,894}{\$2,719,400} = 51\%$$

V.A.8. Evaluation Criterion H: Connection to Reclamation Project Activities.

HMRD is situated in a "hot spot" in the San Joaquin Valley that is impacted by many issues where Reclamation is actively involved such as:

- Restoring flows in the San Joaquin River for salmon runs.
- Maintaining salinity standards in the San Joaquin River.
- Disposal of selenium-laden water.
- Disposal of silt into the San Joaquin River
- Reduced pumping from the Delta
- Climate change and the anticipated water shortages throughout the state.

San Luis Canal Company (SLCC) obtains its water supply through an Exchange Contract with the USBR. The Exchange Contract allows the Company to receive its water through the Delta-Mendota Canal

Performance Measures

Please see **V.A.6. Evaluation Criterion F: Implementation and Results; Subcriterion No. F.3. – Performance Measures** for the proposed methods of quantifying the actual multiple benefits of the proposed project.

Environmental and Cultural Resources Compliance.

1. Impact.
This project will not negatively impact surrounding environment. First the project will start only after de-watering process of the canals system and only minimal excavation will take effect only on the LWC sites to pour a 12" floor. All the dirt excavated will return to the same site.
2. Endangered or Threatened Species.
The giant garter snake is an endangered species that could be seen out of the northwest border of HMRD's service area. This project will take effect on the south side of HMRD's service area so the associated activities are not expected to affect the giant garter snake. The proposed work will not impact the surrounding environment; therefore no steps should be taken to minimize the impact. Actually because all these canals are operated under upstream control with regular board check structures with high potential of water level fluctuation unless very close supervision by canal men is available, the construction of these long crested weirs will reduce the constant driving on the canal banks and therefore will improve the air quality by reducing the dust in the air.
Also, between 2004 and 2012 NEPA analyses were favorably completed for the District at the opportunity of applying for similar grants to install Long Crested weirs, Flow Control Structures and Monitoring Sites. The grants were approved without modification after it was determined that no environmental impacts to biological or cultural resources will be done.
3. There are no wetlands inside the project boundaries.
4. Date of Construction. The existing water level control structures are concrete structures built about 15 or 20 years ago.
5. Will the project result in any modifications?
The intent is to retrofit this old fashion check structures and modify them to perform a better water level control and flow control. The modifications basically consist in extending the weir length of the existing structures.
6. National Register of Historic Places. There are no National Registered Historic Places in the District.
7. Archeological Sites. There are no archeological sites in the district.
8. The project will not impact low income or minority populations.
9. The project will not limit access to any Indian sacred sites or tribal lands
10. This project will not contribute to the introduction, continued existence or spread of noxious weeds on invasive species in the area

g. Required Permits:
A construction permit will be obtained from the Merced County for the construction of the reservoir control building. The other tasks for retrofitting weirs do not require permits since the proposed work lays inside the canal facilities.

Official Resolution:
See next page

HENRY MILLER RECLAMATION DISTRICT #2131

December 20, 2012

RESOLUTION # 2012-058

A RESOLUTION OF THE HENRY MILLER RECLAMATION DISTRICT #2131 BOARD OF DIRECTORS APPROVING THE GRANT APPLICATION RELATING TO THE U.S. DEPARTMENT OF THE INTERIOR, UNITED STATES BUREAU OF RECLAMATION (USBR), WATER SMART: WATER AND ENERGY EFFICIENCY GRANT FOR FY 2013 FUNDING OPPORTUNITY ANNOUNCEMENT NO. R13SF80003

Whereas; HENRY MILLER RECLAMATION DISTRICT #2131, (the "District"), is a special district duly organized and existing under and by virtue of the laws of the State of California,

Whereas; the District desires to continue to make improvements to facilities within its boundaries in order to increase the goal of improving efficiencies in both Water and Energy resources,

Whereas, said Grant Program would meet such a goal and would be for the benefit of all lands served by the facilities of the District,

Therefore; the District is capable of, and will meet, its funding obligations as set forth in the application as well as working with the USBR in meeting all established deadlines for entering into a cooperative agreement or other necessary instruments to meet the guidelines of the grant program.

Therefore; The District Board of Directors do hereby authorize signature of said resolution by its board secretary.

Duly approved this 20th day of December 2012, by unanimous vote of the Directors of Henry Miller Reclamation District #2131

AYES: Carlucci, Pearl, Pruitt, Sansoni, Michael, Neves, Nickel

NOES: None

ABSENT: None

ABSTAINED: None

David Carlucci, President

Project Budget

Funding Plan and Letters of Commitment:

Henry Miller Reclamation District will provide the $1,386,894- required contribution to the cost share through actual cash during a period of three years as proposed in Table 8 Funding Group II. Funding Request.
The funds for the second and third year are secured on HMRD's reserved fund of 2$2,500,000.
The HMRD approved an operations budget to cover this type of projects. A copy of the 2013 budget is attached.

Table 7. Summary of non-Federal and federal funding sources

Funding Sources	Funding Amount
Non- Federal Entities	
1. HMRD 2131	$ 1,386,894
Non-Federal Subtotal:	$ 1,386,894
Other Federal Entities	
1. None	$ -
Other federal Subtotal:	$ -
Requested Reclamation Funding:	$ 1,332,506
Total Project Funding:	$ 2,719,400

Table 8. Funding Group II Funding Request.

	Year 1 (FY 2013)	Year 2 (FY 2014)	Year 3 (FY 2015)
Funding Request	$ 319,627.00	$ 504,602.00	$ 508,277.00

Budget Proposal

Table 9. Funding Sources

Funding Sources	Percentage of Total Project Cost	Total Cost by Source
Recipient Funding	51%	$ 1,386,894
Reclamation Fundng	49%	$ 1,332,506
Other Federal Funding		$ -
Totals	100%	$ 2,719,400

BUDGET ITEM DESCRIPTION	$/Unit	Quantity	TOTAL COST
SALARIES AND WAGES			
General Manager, Chase Hurley	$ 60.14	156	$ 9,382
Conservation Specialist, Alejandro Paolini	$ 40.97	502	$ 20,565
Maintenance Superintendent, J. P. Petroni	$ 40.97	312	$ 12,783
SCADA Techincian, Victor Barron	$ 21.48	310	$ 6,659
Fabricator - Welder	$ 21.94	310	$ 6,801
Fabricator - Welder	$ 21.94	310	$ 6,801
Pump Operator, Richard Weaver	$ 21.94	484	$ 10,619
Crew Member, Steven Hastings	$ 18.31	484	$ 8,862
Crain Operator, Ricky Ray	$ 19.92	174	$ 3,466
FRINGE BENEFITS			
Full time employees		%	
General Manager, Chase Hurley		43.55	$ 4,086
Conservation Specialist, Alejandro Paolini		46.33	$ 9,528
Maintenance Superintendent, J. P. Petroni		46.33	$ 5,922
SCADA Techincian, Victor Barron		53.98	$ 3,595
Fabricator - Welder		53.64	$ 3,648
Fabricator - Welder		53.64	$ 3,648
Pump Operator, Richard Weaver		53.64	$ 5,696
Crew Member, Steven Hastings		56.77	$ 5,031
Crain Operator, Ricky Ray		55.06	$ 1,908
SUPPLIES / MATERIALS			
Concrete (cu- Yd)	$ 110.0	12	$ 1,320
Sand (ton)	$ 9.0	51	$ 459
Rebar (lb)	$ 8.0	1050	$ 8,400
Plywood for enclosures (sh)	$ 47.0	12	$ 564
Steel for flap gates and enclosures (lb)	$ 1.3	22000	$ 27,500
Valvanizing (lb)	$ 0.6	22000	$ 12,100
Rubber for gates	$ 5.0	62	$ 310
Sluice Gates and Actuators	$ 14,000.0	6	$ 84,000
Staff Gauges	$ 35.0	10	$ 350
SCADA Integration - Equipment & Installation	$ 314,000	1	$ 314,000
Miscellaneus Electric materials sites not reservoir	$ 10,000	7	$ 70,000
Building Permit	$ 120.0	1	$ 120
Pump Electric materials reservoir site	$ 60,000.0	4	$ 240,000
Pump Flow meters	$ 5,000.0	4	$ 20,000
Pump Discharge Pipes	$ 13,000.0	4	$ 52,000
Pump Bay Construction, platforms, walkways, fencing	$200,000.0	2	$ 400,000
Sensors Stilling Wells Reservoir site	$ 20,000.0	4	$ 80,000
PG&E Contracts for all sites	$ 15,000.0	8	$ 120,000
CONSTRUCTION			
Contracted Outside			
Furnish and Install (F&I) Reinforced concrete (cu-Yd)	$ 970.0	358.7	$ 347,929
F&I Weep holes, filterblanket & HDPE sheets - Site A	$ 2,850.0	1	$ 2,850
F&I Weep holes, filterblanket & HDPE sheets - Site B	$ 2,850.0	1	$ 2,850
F&I Weep holes, filterblanket & HDPE sheets - Site C	$ 2,850.0	1	$ 2,850
F&I Weep holes, filterblanket & HDPE sheets - Site D	$ 2,850.0	1	$ 2,850
F&I Weep holes, filterblanket & HDPE sheets - Site E	$ 2,850.0	1	$ 2,850
F&I Weep holes, filterblanket & HDPE sheets - Site F	$ 2,850.0	1	$ 2,850
F&I Weep holes, filterblanket & HDPE sheets - Site G	$ 3,600.0	1	$ 3,600
F&I Weep holes, filterblanket & HDPE sheets - Site H	$ 3,600.0	1	$ 3,600
F&I Weep holes, filterblanket & HDPE sheets - Site I	$ 3,600.0	1	$ 3,600
Control Building	$ 40,000.0	1	$ 40,000
F&I Miscellaneous galvanized Metal (lb)	$ 8.0	750	$ 6,000
Flow control Strucutres -			
Furnish and Install (F&I) Reinforced concrete (cu-Yd)	$ 928.0	120	$ 111,360
Furnish and Install (F&I) Reinforced concrete Lining (sf)	$ 13.0	1160	$ 15,080
Saw cut demolition	$ 2,250.0	4	$ 9,000
Installation of Sluicegate	$ 900.0	4	$ 3,600
Concrete Stilling Well Installation Flow control structures	$ 2,400.0	16	$ 38,400
PVC Stilling Well Installation for Flow Control structures	$ 800.0	6	$ 4,800
Raising canal Bank and additional concrete liner	$125,000.0	1	$ 125,000
Crain Usage (hr)	$ 200.0	27	$ 5,400
ENVIRONMENTAL AND REGULATORY CONPLIANCE	$ 40,000.0	1	$ 40,000
OTHER Reporting	$ 2,500.0	1	$ 2,500
Surveying and soil testing	$ 50,000.0	1	$ 50,000
Eng. SCADA Programming - Code Writing	$ 19,500.0	6	$ 117,000
Engineering & Design	$110,000.0	1	$ 110,000
TOTAL DIRECT COSTS			$ 2,614,092
INDIRECT COSTS - %		5%	$ 105,308
TOTAL PROJECT COSTS			$ 2,719,400

BUDGET NARRATIVE

The cost estimates used for the budget proposal is based on engineering estimates, actual quotes and bid processes performed in 2012 and experience gained during the past recent years on several similar projects constructed since 2010 throughout the district.
In order to build the long crested weirs the District decided to use a combination of concrete walls and floor and finished up with wood boards all around the length of the weir for final adjustment.
The designs take in account the maximum and minimum flows needed to pass over the weirs and the sensitivity of the upstream turnouts in the corresponding canal ponds.
The design recommended by the ITRC Cal Poly San Luis Obispo for a widespread use throughout the district are long crested weirs pointing upstream, about 30 to 90 feet long crests.

Salaries and Wages
Based on the previous structures constructed in the district during the last 3 years the total cost of labor including benefits is estimated as $129,000.- for the 3 year project, including all sites. Mainly the work to be done consists of:

Cleaning and preparing each construction site.
Site survey and dimension verification.
Labor for the flap gate and vandalism enclosure welding
Installation of gates, enclosures and protection boxes
Construction supervision
Project management

Supplies / Materials
All vandalism enclosures and ITRC flap gates will be made in –house at HMRD's shop out of steel that is later sent to be galvanized and then installed at every site. It is estimated that 22,000 lb of steel will be required for the 8 vandalism enclosures and 3 flap gates and metal grating for walkways.
Each of the flow control structures is equipped with a sluice gate which also needs an actuator for remote operation. Two sluice gates are planned to be installed on the reservoir for gravity operation making a total of 6 sluice gates provided by Fresno Valves and Castings.
Staff gauges are used for visual reference and installed at every facility so the SCADA water level equipment can be compared to the actual water level elevations in the field. Staff gauges are needed upstream and downstream of the flow control structures but only upstream of the Long Crested Weirs.
SCADA integration refers to all the miscellaneous equipment; including sensors, brackets, PLCs, RTUs, radio antennae, radio devises, software involved for the remote control and data acquisitions. The $314,000- estimated for this task is based on similar projects installed during the last three years and includes all the elements for the water level monitoring and flow rate control for the pumps and gates at the regulating reservoir, 4 flow control structures, 2 automatic spillways, 2 existing pumping stations and a drain flow rate and water quality monitoring site. Sierra Control Systems is the districts integrator since 2008 for our installations. They installed and integrated the equipment for the central reservoir, all the flow control structures on the Delta Canal, West Delta Canal and Temple Santa Rita Canal and the monitoring sites on all the inlet and outlet drains along with the Arroyo canal headworks and the Langemann gates at the Temple Backup weir.

Miscellaneous electric materials are needed at all the SCADA sites which have been estimated at $10,000 per site based on past experience.

The regulating reservoir will have two each inlet and outlet pumps with their respective discharge pipes and flow meters integrated to the SCADA system. The pumps will be mounted on bays with platforms and walkways for debris removal and pump regular maintenance.

The water level sensors need stilling wells mounted upstream and downstream of the structures for accurate flow rate calculations and good water management. The reservoir, the four flow control structures, the 2 existing pumping stations (F-W1-2 & IB1-3 on Figure 4) and the Hereford drain monitoring site will need power drops from PG&E. Based on recently projects done last year, we estimated $15,000- per site making a total of $120,000- for this line item.

Construction

The long crested weirs consist mainly of reinforced concrete walls and floors, with #4 rebar grid inside. 6 in. redwood boards are used at the top of the concrete wall for possible necessary adjustments. Only staff gauges are installed in the upstream side to verify correct water running level.

Contracted outside

The District may contract the services of an outside contractor for the construction of the 9 long crested weirs and flow control structures.
Final construction drawings will be prepared by Summers Engineering -
The final drawings will show the calculated volumes of reinforced concrete and pipes for weep holes and filter blanket & HDPE sheets per structure. The volume of reinforced concrete is estimated as 358.7 cu yards and the cost per Cu-yard is $970.- making a total amount of $347,929- for the long crested weirs
The cost figures used are the same that the district is paying now on similar construction projects in progress at the time of this application and are the result of a bidding process performed during the month of November of 2012.

For the four flow control structures it is estimated a total of 120 Cu- yards of concrete with an estimated cost of $928 per yard making $113,360 plus $15,080 for reinforced concrete liner to be poured downstream of the structures for erosion control.
These flow control structures need mayor modifications therefore some concrete saw-cut and demolition costs are also added.
The contractor will also install the sluice gates furnished by the district at every flow control structure.
On the four flow control structures 36 in. concrete stilling wells will be installed upstream and downstream of the structure to house redundant water level sensors (4 total per structure) of different kind.
PVC stilling wells will be also used to house the water quality sensors at the different structures.
According to the plan, the liner of the existing concrete lined ditch between points 7 and 8 (Figure 5) needs to be raised to improve the flow control capabilities. According to a cost estimate provided by a contractor company, it will cost $125,000-
It has been estimated 200 hours of crane operation for the installation of all the vandalism enclosures, walkways, flap gates, etc. with an estimated cost of $5,400.
Environmental and Regulatory Compliance
We are including a line item for environmental compliance of $40,000.-

Other
For reporting we estimated a total of $2,500-
The final surveying and soil testing task were estimated to be around $50,000 at all the different proposed sites
The SCADA Programming and Code writing will be performed by the Irrigation Training and Research Center (ITRC) at Cal Poly San Luis Obispo. The cost has been estimated using a previous SCADA project and multiplied by the total number of sites making $117,000-
The final engineering and design for the whole length of the project is estimated as $110,000.
Indirect Costs
We calculated a 5% indirect cost based on 2010audited financials using HMRD's communications, Computer support & office equipment, Administration's Gasoline, Administration's Materials & supplies, Postage and Administration's Payroll expenses making a total of $105,308
The Total Project Cost has been calculated as $2,614,092.-

OMB Approval No. 0348-0041

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$ .00	$ .00	$ .00
2. Land, structures, rights-of-way, appraisals, etc.	$ .00	$ .00	$ .00
3. Relocation expenses and payments	$ .00	$ .00	$ .00
4. Architectural and engineering fees	$ .00	$ .00	$ .00
5. Other architectural and engineering fees	$ .00	$ .00	$ .00
6. Project inspection fees	$ .00	$ .00	$ .00
7. Site work	$ .00	$ .00	$ .00
8. Demolition and removal	$ .00	$ .00	$ .00
9. Construction	$ .00	$ .00	$ .00
10. Equipment	$ 2,614,092.00	$ .00	$ 2,614,092.00
11. Miscellaneous Indirect Costs	$ 105,308.00	$ .00	$ 105,308.00
12. SUBTOTAL (sum of lines 1-11)	$ .00	$ .00	$ .00
13. Contingencies	$ .00	$ .00	$ .00
14. SUBTOTAL	$ 2,719,400.00	$ .00	$ 2,719,400.00
15. Project (program) income	$ .00	$ .00	$ .00
16. TOTAL PROJECT COSTS (subtract #15 from #14)	$ 2,719,400.00	$ .00	$ 2,719,400.00
FEDERAL FUNDING			
17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 49 %		$ 1,332,506.00

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BUDGET FORM –

Attachments

HENRY MILLER RECLAMATION DISTRICT #2131
BUDGET SUMMARY

	FY 2013 Budget
Revenue	**7,185,800**
Expenses:	
Administration	**1,823,179**
Operations	**1,311,600**
Maintenance	**2,359,565**
Total Expenses	**5,494,344**
Net Balance	**1,691,456**
Capital Budget:	**2,126,000**
ES Canal Loan: Principal pmts.	**578,380**
Total Budget	**(1,012,924)**