Search S

Natomas Mutual Water Company

Home About Projects Documents & Links Contact Us

About

Search S

Home » About

History of Natomas Mutual Water Company

Natomas Mutual Water Company is one of four mutual water companies formed around 1920 by the Natomas Company of California (NCC) to deliver appropriated water from the Sacramento River to the lands in area known as the American Basin. These lands were deeded to the NCC as a result of their "reclamation" efforts, i.e., construction of levees and the maintenance of drainage facilities to prevent annual flooding of the lands from the Sacramento River overtopping its banks. NCC's plan for the American Basin was simple: 1) use their dredging equipment to construct a series of levees around an area prone to annual flooding, 2) construct drainage canals and pumping facilities to prevent future flooding 3) subdivide the properties into saleable parcels 4) market the parcels for a quick sale and 5) produce a return on the investment. NCC was successful with the first three steps of their process, but sale of the parcels was limited by the stock market crash of 1929 and the subsequent depression of the 1930's. In an effort to enhance the salability of the properties, NCC invested additional capital in infrastructure such and roads and irrigation facilities, e.g., the creation of the four mutual water companies.

The four original mutual water companies were named after the area served on the 1921 NCC subdivision map. Each water company constructed their distinct diversion facility and obtained individual water permits from the State of California. The Natomas Elkhorn Mutual Water Company (Elkhorn) was formed first, around 1918. The Natomas Riverside (Riverside), The Natomas Central (Central) and The Natomas Northern Mutual Water Company (Northern), were formed later, around 1921. Operating independent and distinct water companies was expensive and the Boards of Directors and management, in an effort to benefit from "economies of scale," decided to combine all of the water rights and facilities through a series of mergers. The final merger in 1963 set the stage for the American Basin to be represented by one governing body during very important negotiations with the United States Bureau of Reclamation (USBR) concerning its Central Valley Project (CVP).

In 1964 the re-formed Natomas Central Mutual Water Company (Natomas), along with hundreds of other Sacramento River water rights holders (diverters), signed a Sacramento River Settlement Contract with USBR to purchase water from the CVP. In exchange for the right to purchase water, the diverters agreed to limit their diversions from the Sacramento River to a monthly allocation which represented a good faith estimate of their historical use. This marked the first time Natomas was forced to pay for the right to use water in the Sacramento River.

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Funding Opportunity Announcement R16-FOA-DO-004

WaterSMART: Water and Energy Efficiency Grants for Fiscal Year (FY) 2016

Northern Drainage Canal Lift Pump Station Project

Sutter County, CA

Natomas Central Mutual Water Company
2601 West Elkhorn Blvd.
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January 20, 2016

TABLE OF CONTENTS

APPENDICES

TECHNICAL PROPOSAL AND EVALUATION CRITERIA

I. EXECUTIVE SUMMARY

Project: Northern Drainage Canal

Date: January 20, 2016

Applicant: Natomas Central Mutual Water Company
Rio Linda, Sacramento and Sutter County, CA

Project Funding

FUNDING SOURCE	FUNDING AMOUNT
Non-Federal Entities:	
Natomas Central Mutual Water Company	
In-Kind Contribution	$141,000
Cash Contribution	$711,000
Non-Federal Subtotal:	$852,000
Reclamation Funding:	$852,000
TOTAL PROJECT FUNDING:	$1,704,000

Project Summary

The proposed project will construct a new tailwater recovery pump station with 120 cubic feet per second (cfs) capacity near the head of NMWC's largest point of diversion, the Sankey Diversion, with 434 cfs capacity. The location of the new pump station will supplement drain water to reduce the demand for Sacramento River water by approximately 4,000 AF annually. The proposed project will also improve management and effective use of the drain water system within the basin and reduce the quantity of drain water pumped out to the river system. Therefore, the project will result in a higher quantity and quality of water in the Sacramento River.

Proposed Start Date: 10/1/2016

Estimated Completion: 9/30/2019

II. BACKGROUND DATA

A map of the project area is presented in Appendix A. The project is located near Nicolaus in Sutter County, at the projected intersection of Howsely & Powerline Road.

Water Supply and Water Rights

The Company receives its irrigation supply from the Sacramento River, the Natomas Cross Canal (a tributary of the Sacramento River) and through an extensive tailwater recovery system.

The Company has a U.S. Bureau of Reclamation Settlement Contract for an annual water supply of 120,200 acre-feet made up of 98,200 acre-feet of base supply and 22,000 acre-feet of "Project" supply allocated by the Bureau of Reclamation. The actual amount of Sacramento River water used varies annually depending on farming practices and weather conditions.

Current Water Uses: Major Crops and Total Acreage Served:

The primary use of water is for irrigation deliveries to farming operations. Rice is the primary crop grown within the Natomas Basin. The two additional main crops grown are alfalfa and wheat. Other row crops and low water demand crops are grown within the vicinity of the Sacramento International Airport. The Company's service area is approximately 50,000 acres within the 200 square-mile basin. Currently there are approximately 24,000 irrigatable acres. The majority of the fields use flood irrigation methods, either wide border checks or furrows.

Water is also supplied to mitigated marshes and other environmental mitigation properties owned and maintained by the Natomas Basin Conservancy as a result of development within the Natomas Basin. A map of Natomas Basin Conservancy property is provided in Appendix A.

The average annual diversion over the past 5 years is 53,000 acre-feet. The Company captures approximately 37,700 acre-ft of tailwater annually and blends with the river diversions to meet the total demand. The actual amount served varies by year depending on hydrologic conditions and farming practices.

Description of Water Delivery System

The water supply facilities are made up of four diversions from the Sacramento River. There are a total of approximately 100 miles of canals and laterals. Water is applied directly to fields through gated turnouts in the irrigation canals.

The Company completed construction of the Sankey Diversion, a 434 cfs flat plate fish screen facility, in 2012 to remove two diversions on the Natomas Cross Canal to improve fisheries habitat. The new diversion is connected to the heads of the two existing systems with a new supply canal. The Company is currently reconstructing the Pritchard Lake Diversion to accommodate new drum fish screens.

The four river pump stations and approximately one-half of the drainage canal lift pumps are equipped with variable speed drives to maintain a consistent discharge water level. The Company has been reconstructing check structures in the Northern System to provide automation and remote SCADA stations to improve water management. The remaining pumps, gates and check structures are operated manually by field personnel. Canal seepage losses are minimal and drainage ditches have been constructed that direct seepage into drains, which is then recirculated back into the irrigation canals.

The Company operates a tail water recovery system within the basin during the irrigation season through a joint use agreement with Reclamation District 1000 (RD1000). This joint use agreement allows the Company to operate and maintain the drainage canal system during the irrigation season (April 1 to October 30) at higher levels than during flood season to capture and recirculate tailwater from fields. Utilizing check structures and lift pumps in the drainage canal system, the Company convey the tailwater within the existing drainage canal system and recirculate tailwater back into the irrigation canals by pumping facilities located at strategic points in the system. This operation annually captures approximately 37,700 acre-feet, a majority of the run-off that would otherwise be pumped back into the Sacramento River by RD1000, thereby reducing the amount of water diverted from the Sacramento River.

Past Working Relationship with Reclamation:

The project is connected to Reclamation's Central Valley Project activities as the Company is a Reclamation Settlement Contractor.

In coordination with the Anadromous Fish Screen Program, the Company constructed a new Sacramento River Diversion to consolidate and remove their two diversions on the Natomas Cross Canal. Reclamation cost shared on this project with Central Valley Project Improvement Act (CVPIA) funds through Grant Agreement R09AP20008. The Company is currently reconstructing their second largest Sacramento River Diversion and equipping the diversion with rotating drum screens. Reclamation is also cost sharing on this project with CVPIA funds through Grant Agreement R12AC20042. This project is schedule to be completed in April 2016.

The Company began a phased SCADA (supervisory control and data acquisition) implementation in 2008. The first phase was to establish water level monitoring at key locations throughout the service area. This work was cost shared by Reclamation through CALFED Water Use Efficiency Grant 07SF200084 and two Water Conservation Field Services Program Grants 08FG200097 and R09AP20041. This work was completed in December 2010.

The second phase of the SCADA program is to install flow meters at key SCADA sites. The Company received a funding award from Reclamation's CALFED Water use Efficiency Grant Program in 2011 to install flow meters at the 30's Pump Station, and a second funding award from Reclamation's Water Conservation Field Services Program to install flow meters at the Pullman Pumping Plant. These projects were successfully completed in 2012.

The Company received two additional funding awards in 2011 to provide automation improvements for two projects. The first award from Reclamation's WaterSMART: Water and Energy Efficiency Program provided assistance with the replacement of two diesel pump drivers with electric motors and installation of flow meters at the Bennett Drain Pump and the County Line Check and Lift Pump. The second award Reclamation's CALFED Water Use Efficiency Program provided assistance with automation improvements to Barnes Crossing Control Structure. These projects were both constructed by 2013 with final reporting in 2014.

In 2012, the Company received an award from Reclamation's WaterSMART Grant program for the Dodge Crossing Automation Project through Grant Agreement R12AP20028. The project was constructed in 2013, providing automation improvements to the Dodge Crossing control structure, flow measurement at the Chappell West Pump Station and SCADA integration. The automation improvements will provide water savings from reduced spills, improved water management, and reduce energy usage from pumping.

In 2013, the Company received an award from Reclamation's CALFED Water Use Efficiency Grant program for the Sankey Road Check Automation Project through Grant Agreement R13AP20046; and in 2014, the Company received an award from Reclamation's WaterSMART program through Grant Agreement R14AP00145. Both projects are anticipated to be constructed and in service prior to April 2016.

III. TECHNICAL PROJECT DESCRIPTION

Existing Conditions

During the irrigation season, flow in the river is primarily controlled by reservoir releases from Trinity, Shasta, and Oroville. During normal to wet years, sufficient water is available in these reservoirs to meet water demand while providing an ecologically beneficial volume and quality of flow. In drier years, although water demand is marginally met, the timing of releases impacts the ecological benefits putting a strain on the quantity and quality of water available in the Sacramento River within the project reach.

The NDC Lift pump station will be located in the upper tailwater pool that is maintained by the Countyline Check and Lift Pumps (see project site map in **Appendix A**). The water balance for the upper tailwater pool, ignoring minor losses and minor pumping is as follows:

Inflow:

Countyline Check and Lift Pumps:	26,500 acre-feet
Pritchard Supply:	11,000 acre-feet
Tailwater runoff from fields:	30,000 acre-feet
	67,500 acre-feet

Outflow:

Bennett Lift Pumps:	16,500 acre-feet
30's Lift Pumps:	24,000 acre-feet
Pullman Pumps:	11,000 acre-feet
Plant 2 Lift Pump:	6,000 acre-feet
T-Drain Lift Pump:	10,000 acre-feet
	67,500 acre-feet

The ability to recirculate tailwater to the head of the Northern Main Canal is limited by the capacity of the T-Drain lift pump (approximately 30 to 50 cfs). The pump is located at the high point of the T-Drain with minimal submergence which limits the potential for increasing the capacity at this location. This project will relift tailwater directly from the Northern Drainage Canal and eliminate the need for pumping at the T-Drain.

The 30's Lift delivers half of its water to the Northern Main Canal to supplement water diverted from the Sacramento River at the lower end of the system.

Proposed Improvements

The objective of the proposed project is to enhance streamflow in the Sacramento River below Verona by reducing the quantity of fresh water diverted from the river and by reducing the quantity of drain water pumped out of the Natomas Basin by RD 1000 into the river. This project will achieve this objective by improving tailwater recovery within the basin by increasing the capacity to recover tailwater and by reinjecting additional tailwater at the head of the Bennett and Northern Systems.

The post-project water balance is expected to be as follows:

Inflow:

Countyline Check and Lift Pumps:	30,500 acre-feet
Pritchard Supply	11,000 acre-feet
Tailwater runoff from fields:	30,000 acre-feet
	71,500 acre-feet

Outflow:

Bennett Lift Pumps:	16,500 acre-feet
30's Lift Pumps:	18,000 acre-feet
Pullman Pumps:	11,000 acre-feet
Plant 2 Lift Pump:	6,000 acre-feet
T-Drain Lift Pump:	0 acre-feet
NDC Lift Pumps:	20,000 acre-feet
	71,500 acre-feet

The targeted operational improvements of this project are:

- The additional recirculation capacity at the NDC Lift will allow the Countyline lift pumps to move more tailwater into the upper pool without raising the water level required to adequately drain the adjacent fields. The increase in volume is 4,000 acre-feet or approximately a 15% increase.
- By recirculating more tailwater to the head of the Northern Main Canal, the need to supplement water supply at the lower end of the system will be reduced. This will reduce the demand at the 30's Lift Pumps by approximately 6,000 acre-feet.
- The T-Drain lift pump will no longer be required and will be replaced by more efficient pumping at the NDC Lift.

The combined impacts will result in water savings that will reduce the quantity of water diverted from the Sacramento River at the Sankey Diversion. A conservative estimate of the quantity of water savings is 4,000 acre-feet, which is the increased volume of water moved through the upper tailwater pool. It is expected that once the NDC Lift is operational, additional savings will result from efforts to fine tune the operations of the tailwater recovery system.

The proposed tailwater recovery pump station will be used to maintain the drain levels below the maximum allowable elevation that triggers the RD1000 pumps at Pumping Plant 4 to turn on and discharge excess drain water into the Natomas Cross Canal, a tributary to the

Sacramento River near Verona. The volume of drain water pumping back into the irrigation system will directly reduce the quantity and rate of pumping from the Sacramento River at the Sankey Diversion.

The proposed project will be most effective in the fall. As rice fields are drained for harvest, excess drain water typically accumulates and overwhelms the drainage canal system. RD1000 is forced to turn on pumps to maintain the system at a desired level that allows the fields to freely drain. The proposed project provides sufficient capacity to maintain the upper tailwater pool while significantly limiting the need to pump excess drain water out of the system.

Execution of Work

The following scope of work has been defined for the development of the project schedule and budget.

Task 1 – Program Management & Grant Administration:

NCMWC shall provide all technical and administrative services associated with performing and completing the work for this project. This task allows for efforts allotted to managing the completion of tasks, consultant and agency coordination, compliance with reporting requirements, processing of funding requirements, and any associated direct costs.

The work performed in this task also includes the preparation and submission of Quarterly Progress Reports; the planning and holding of periodic status meetings with the project team to review progress and issues from the previous quarter; the preparation and submission of the Project Closure Summary Report; and the preparation and submission of deliverable products as required.

Deliverables will include reimbursement requests, quarterly reports, and all other requested status and compliance reporting.

Task 2 – Final Design and Permitting:

This task includes the effort required to complete the final design and obtain permits from the resource agencies that are necessary for constructing the project. The work for this task includes:

- *Final Design.* Development of additional construction details sufficient for construction of the pump station, and procurement of specialized equipment & services. This work will be performed by Larsen Wurzel & Associates (LWA) in close coordination with NCMWC staff.
- *CEQA Review and Compliance.* The environmental review is anticipated to require preparation of an Initial Study/Mitigated Negative Declaration. This work will be completed by CH2M.
- *Permitting.* Completion of informal consultations with the regulatory agencies, preparing permit applications, and obtaining all permits and approvals required for construction of the project. This work will also be performed by CH2M.

Task 3 – Construction:

This task includes the effort to construct the project, install equipment, and complete the controls and SCADA programming. NCMWC will complete the majority of the work with existing staff. Materials and specialty equipment (e.g.: pumps, electrical controls, trash rake, etc.) will be procured by NCMWC. LWA will provide engineering assistance as required. CH2M will perform environmental monitoring during construction as required by the permits.

The work will generally include:

- Site preparation and installation of temporary piping in the Sankey Canal;
- Installation of pre-cast concrete pipe and manholes, including excavation and backfill;
- Construction of cast-in-place concrete intake structure and installation of trash rake;
- Construction of pump platform;
- Installation of pumps and discharge piping;
- Installation of electrical and controls equipment, and associated programming; and
- Intake channel excavation and finish grading.

IV. EVALUATION CRITERIA

Criterion A – Water Conservation

Subcriterion A.1. – Water Conservation

Subcriterion A.1(a) – Quantifiable Water Savings

The Company's average annual water supply (river diversions and tailwater recovery) over the past 5 years is 90,700 acre-ft.

This project will result in water savings that reduces the quantity of water pumped from the Sacramento River as a result of improved tailwater use efficiency. A conservative estimate of the quantity of water savings is 4000 acre-feet annually. It is expected that once the new structure is operational, additional savings will result from efforts to fine tune the operations of the tailwater recovery system.

The conserved water will in turn be used for irrigation, reducing the demand on river water diversions.

Quantifying the Water Savings

The estimated water savings per year is 4000 acre-feet. This is equal to the increased volume of tailwater recovered in the upper tailwater recovery pool. The calculation for determining the volume of tailwater recovered is provided in above in the technical project description.

- Pre-project Tailwater Recovery Capacity of the Upper Pool: 67,500 acre-feet
- Post-project Tailwater Recovery Capacity of the Upper Pool: 71,500 acre-feet

- Water Savings based on increased Tailwater Recovery: 4,000 acre-feet

To verify the actual water savings, the Company will compare the pre- and post-project water balance to confirm the quantity of increased tailwater recovery, the reduction of Sacramento River diversions, and reduction of pumping at RD 1000 Pumping Plant 4.

Subcriterion A.2. – Percentage of Total Supply

The percentage of the Company's total water supply (river diversions and tailwater recovery) conserved is:

$$\frac{\text{Estimated Amount of Water Conserved}}{\text{Average Total Annual Water Supply}} = \frac{4{,}000}{90{,}700} = 4.4\%$$

The percentage of the Company's water supply from river diversions that is better managed is:

$$\frac{\text{Estimated Amount of Water Conserved}}{\text{Average Annual River Diversion}} = \frac{4{,}000}{37{,}700} = 10.6\%$$

Criterion B – Energy-Water Nexus

Subcriterion B.1. – Implementing Renewable Energy Projects Related to Water Management and Delivery

This project does not have a renewable energy component.

Subcriterion B.2. – Increasing Energy Efficiency in Water Management

The increase in tailwater recovery will result in reduced pumping and associated energy savings by reducing the quantity of water pumped from the Sacramento River at a higher head and increasing the quantity of water pump from the upper tailwater water pool at a lower head.

- The average head for pumping out of the Sacramento River is 25 feet.
- The average head for pumping out of the upper tailwater pool is 15 feet.
- Reduction in average pumping head is 10 feet.

Based on this data, the estimated energy savings can be approximated using the fundament pump equation:

Fundamental Pump Equation:

$$HP = \frac{Q \times \gamma_{water} \times TDH}{550 \times e_{pump} \times e_{motor}}$$

Energy Consumption per acre-foot:

$$\frac{\text{kW-hr}}{\text{acre-ft}} = \frac{HP}{Q(cfs)} \times \frac{0.746\,(kW/hp) \times 43{,}560\,(cu-ft/acre-ft)}{3{,}600\,(seconds/hour)}$$

Energy Savings per acre-foot:

$$\frac{\Delta \text{kW - hr}}{\text{acre - ft}} = \frac{0.746 \times 43560}{3600} \times \frac{\gamma_{water} \times \Delta TDH}{550 \times e}$$
$$= \frac{0.746 \times 43560}{3600} \times \frac{62.4 \times 10}{550 \times 0.77} = 13.3 \text{ kWh per acre} - \text{ft}$$

Annual Energy Consumption Savings:

$$= 13.3 \frac{\Delta \text{kW - hr}}{\text{acre - ft}} \times 4{,}000 \text{ acre} - \text{ft} = 53{,}200 kWh$$

Criterion C – Benefits To Endangered Species

Increasing the quantity and quality of flows in the lower Sacramento River will improve streamflow conditions for anadromous fish species (salmon, steelhead, green sturgeon and Delta Smelt), migrating upstream to spawning habitat in the Sacramento River, Feather River, and tributary streams.

Fish passage is the primary limiting factor within the primary river reach. This project will improve passage by reducing the pumping rate of the Sankey Diversion during operation of the NDC Lift Pump Station. Other diversions on the Sacramento River within the primary reach have been screened or are planned to be screened within the next five years.

By meeting the project objectives, approximately 4,000 acre-feet of water will be made available in the Sacramento River below Verona each year. The timing of the availability will vary depending on the water year. Based on historical system demand and availability of drain water, the project will have the most impact in the early spring (March & April) when the juvenile spring-run Chinook are migrating and in the fall (late September, October, & November) when juvenile fall-run Chinook are migrating.

After a few years of operations, NCMWC will be able to better optimize the operations of the NDC Lift pump station to gain further system efficiency and potentially reduce diversion rates at the Sankey Diversion during critical summer months.

Within the Natomas Basin, the Company delivers water to approximately 4,500 acres of habitat preserve managed by the Natomas Basin Conservancy. These preserves provide critical foraging habitat for Swainson's Hawk and Giant Garter Snake, as well as critical habitat for several other species such as burrowing owl, tricolored blackbird and white-faced-ibis. More than half of the preserve land is located in the north end of the basin. The improvements to water management and conservation resulting from this project will also increase the reliability of water deliveries to the preserve sites, which is essential to their long-term sustainability.

Criterion D – Water Marketing

This project does not propose to directly market the water saved through conservation and better water management. However, the water savings and contribution to water supply sustainability will allow flexibility in Sacramento River diversions that would allow for water transfers to other Settlement Contractors to meet short term supply deficiencies on a year-by-year basis.

Criterion E – Other Contributions to Water Supply Sustainability

Subcriterion E.1 – Addressing Adaption Strategies in the WaterSMART Basin Study

The Sacramento-San Joaquin Valley Basin Study is currently being developed. It is currently unknown when the draft will be released for public review.

Subcriterion E.2 – Expediting Future On-Farm Irrigation Improvements

This project does not expedite future on-farm irrigation improvements.

Subcriterion E.3 – Other Water Supply Sustainability Benefits – Drought Resiliency

California is entering its fifth year of drought. As a settlement contractor, the Company was provided 75% its allocation for Sacramento River water in 2014 and 2015. This is the first time in its history that the Company did not receive 100% of its allocation. The conditions for 2016 are improving, but the Company is planning for the same expectation of limited allocation, and in particular a more restrictive availability due to cold water pool management in Shasta Reservoir.

This project is will increase the ability to rely on tailwater recovery by up to 4,000 acre-ft per irrigation season, reducing the demand for river water. In a critically dry year with 75% allocation, this water would allow for up to 1,200 acres to remain in production that would otherwise face fallowing due to limited water supply.

Subcriterion E.3 – Other Water Supply Sustainability Benefits – CA Bay-Delta

The Company also has a relationship to the California Bay-Delta in that the Company's service area diverts water from the Sacramento River north of the confluence with the American River. These rivers provide a significant source of fresh water to the California Bay-Delta. Excess drain water from the services area is pumped back into the Sacramento River by RD1000. Water conservation and improvements in water management will result in less fresh water being diverted from the Sacramento River as well as a reduction in the amount of drain water being pumped back into the river. The combination of these two effects would result in a higher quantity and quality of water being delivered to the California Bay-Delta.

This project contributes towards achieving the goals for the following CALFED Quantifiable Objectives and Targeted Benefits for Sub-Region 7, Lower Sacramento River below Verona:

TB-57: Provide flow to improve aquatic ecosystem conditions, Sac River
Quantifiable Objective: 44 to 180 TAF per year.

One possible action toward achieving the quantifiable objective is identified as a "Reduction in operational spill through improved management, canal automation or regulatory storage." This project will improve tailwater recovery by increasing recirculation by utilizing variable frequency drive controllers and by increasing water management by installing flow meters and integration in to the Company's SCADA system. Improved tailwater recovery will reduce the amount of fresh water diversions and the amount of excess drain water being pumped into the Sacramento River.

TB-60: Reduce salinity to enhance and maintain aquatic species populations, NEMDC
Quantifiable Objective: TBD.

TB-60 is targeting a reduction in electrical conductivity to allow municipal treatment facilities the flexibility to meet the potential long-term regulatory scenario. While it is unclear what that scenario is and what the quantifiable objective will be, it may involve the reduction of salt levels. Agricultural drain water tends to have a higher level of salts that are picked up from the irrigated fields. This project will improve the efficient use of drain water, thereby reducing fresh water diversions and reducing the amount of drain water being pumped back into the Sacramento River. The combined affect will improve water quality and reduce salinity.

TB-64: Provide long-term diversion flexibility to increase the water supply for beneficial uses.
Quantifiable Objective TBD

TB-64 is aimed at providing diversion flexibility to enhance conjunctive use projects by reducing flows to groundwater in dry years and increasing flows to groundwater in wet years. The improvement to tailwater recovery gained by this project will improve the Company's ability to manage water in dry years, providing additional water supply in the Sacramento River for conjunctive use projects downstream.

TB-65: Provide long-term diversion flexibility to increase the water supply for beneficial uses, Wetlands
Quantifiable Objective: 1 TAF per year

TB-65 is targeting improved water management to provide addition water for wetlands. Possible actions to achieve TB-65 are the same as TB-57. This project will improve tailwater recovery and reduce excess drain water pumping, as discussed above. In addition, the Company provides water to approximately 4,500 acres of Natomas Basin Conservancy mitigation property for sustained rice farming, upland habitat preservation and managed marsh lands. The operational efficiencies and

water management improvements resulting from this project will improve long-term reliability of water supply to these mitigation lands.

Criterion F – Implementation and Results

Subcriterion F.1. – Project Planning

Planning, Engineering and Design Work:

In 2011, the Company completed a System Optimization Review (SOR) of the tailwater recovery system that identified improvements to managing the recirculation of drain water. This Project was included in the study, but with a lower priority over check structure automation in the main irrigation canals. With the automation projects completed, this Project is the final improvement to complete the objectives of the SOR.

A preliminary design and cost estimate have been prepared for the project and are included in Appendix C.

Conformance to Regional Water Plans:

The proposed project is consistent with the Sacramento Valley Integrated Regional Water Management Plan (SVIRWMP). This project contributes to the "System Improvement/Water Conservation" water management strategy contained in Section 4.1.2 and subsection 4.1.2.2 of the document. These sections have been included with this proposal in Appendix B. The improvements of this project meet the key objectives of improved measurement and management outlined in subsection 4.1.2.2

Subcriterion F.2. – Readiness to Proceed

The Company is ready to implement the project as follows:

Design and Permitting Phase:

The objective of this phase is to be ready to begin construction during the 2018 Irrigation Season. Following award of the grant, the Company will complete the design of the improvements and initiate the environmental compliance work. This includes designing the site layout and structure and finalizing equipment selection. The Company and their consultant will work with local Reclamation staff to prepare a joint NEPA/CEQA document and complete the environmental compliance work and obtain all regulatory permits.

Construction Phase:

The construction phase will begin in winter of 2017/18 with the installation of by-pass piping in the Sankey Canal to allow for construction of the pump station through the summer/fall of 2018. The objective is to complete construction in time for the project to be operations for rice re-flood in November 2018.

Performance Monitoring Phase:

The Project is planned to be operational for rice reflood in the fall of 2018. A full year of performance monitoring in 2019 will provide for a full irrigation season of pre- and post-project comparison. The comparison of the pre- and post-project water balance will be made to confirm quantity of water conserved by the project.

Estimated Project Schedule:

Grant Execution	By September 30, 2016
Administration/Management	October 2016 – December 2018
Final Design	October 2016 – March 2017
Environmental Compliance	January 2017 – September 2017
Construction:	
Install By-pass	October 2017 – December 2017
Site Construction	April 2018 – October 2018
Start-up and Testing	October 2018
Project Performance Monitoring*	October 2018 – September 2019
Project Closeout	By September 2019

Subcriterion F.3. – Performance Measures

The following performance measures will be made to quantify the benefits upon completion of the project:

Pre-project monitoring will consist of summarizing prior year's water balance to determine an average or typical base for comparison to the post-project condition. Once the post-project irrigation season has passed, conditions will be evaluated to determine whether a specific year is most applicable, or an average of past year is most comparable.

Post-project monitoring during the 2019 irrigation season will be accomplished by creating a water balance data based on data collected through the company's SCADA records and manual recordings in the upper tailwater pool.

The project performance will be determined by comparing the quantity of pre- and post-project tailwater recovered from the upper tailwater recovery pool. A description of any acute observations will be included with the comparison.

Subcriterion F.4. – Reasonableness of Costs

Initial Project Cost:	$1,674,000
Life-Span:	Electrical equipment is expected to last approximately 20 years before replacement is required. Therefore, the electrical controls and SCADA equipment will require replacement four times over the life of the project. Aside from the electrical, this project should have a lifespan of 100 years before any significant rehabilitation is required. The current value of the electrical equipment is approximately $200,000. The present value to replace four times over the lifespan (assuming 2% discount rate) is approximately $350,000
Life-Span Replacement:	$350,000
Total Project Cost:	$2,024,000

Annual Acre-feet Conserved: 4,000 acre-feet

Reasonableness of Cost:

$$= \frac{\text{Total Project Cost}}{\text{Acre} - \text{feet} \times \text{Improvement Life}}$$

$$= \frac{\$2{,}024{,}000}{(4{,}000) \times (100 \text{ years})} \approx \$5.06 \text{ per ac - ft conserved per year}$$

Criterion G – Additional Non-Federal Funding

The Company is requesting 50% cost share from the USBR and is seeking addition points for this evaluation criterion.

Criterion H – Connection To Reclamation Project Activities

How is the proposed project connected to Reclamation project activities?

The project is connected to Reclamation's California Central Valley Project activities as the Company is a Reclamation Settlement Contractor. Any savings in water by the Company can be made available to other Settlement Contractors during dry water years.

Does the applicant receive Reclamation project water?

As a Settlement Contractor, the Company has water rights for 98,200 acre-feet of base supply and 22,000 acre-feet of contract water.

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

No.

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

Yes, the Project is located in the Sacramento River Basin and within the CALFED Solution Area.

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

Yes, expected water savings will result in a higher quantity and quality of water being delivered to the California Bay-Delta, the source of water for the Central Valley Project.

Will the project help Reclamation meet trust responsibilities to Tribes?

No.

V. PERFORMANCE MEASURES

NCMWC will be responsible for, and fund, the operational management and monitoring of the project. The long term management and monitoring plan will evaluate the effectiveness of the project to reduce river diversions and to reduce excess drain water pumping.

Day-to-day operational management will be guided by irrigation demand and availability of drain water. Generally, the NDC Lift pump station will be operated to supply approximately 50% of the irrigation demand. Operations staff will evaluate the interaction of the project with other facilities to develop operational guidelines and improve the effectiveness of the tailwater recovery program.

An annual water balance analysis will be prepared to evaluate project operations. Prior year's water balance analyses will be utilized to develop the pre-project baseline conditions for comparison. While a direct year-to-year comparison is not appropriate, comparison of average monthly data will indicate whether a trend is occurring – either positive or negative with respect to total river diversions or quantity of recycled tailwater.

With respect to excess drain water, prior year's pump records from RD1000 will establish a pre-project baseline, which may also indicate a trend in the quantity of excess drain water pumped out of the basin during irrigation season. Post-project pump records will be compared to assess the benefits of the project on drain water pumping. The data will be evaluated on a monthly basis to identify the aggregate amount of reduced pumping, and to determine how the project helped reduce pumping during peak periods, such as at the end of the season when rice fields are quickly drained for harvest.

ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

The Company believes that the proposed project does not negatively impact the surrounding environment. However, based on experience prior projects and current on-going efforts with the Sankey Road Check Automation, the Company recognizes that the project will not be considered for a categorical exemption even though it is truly a replacement project. Therefore, we have included budget for Reclamation to complete an Environmental Assessment (EA) to identify any impacts in order to obtain clearance to begin construction. Recognizing the need for an EA prior to award should provide sufficient time to complete the EA prior to January 2016. The following answers are provided in response to the questions in the Funding Opportunity Announcement.

1. Construction of the check structure will have no permanent impacts and insignificant temporary impacts on the surrounding environment. Removal of the existing structure and excavation required for the new structure is required. However, existing conditions will be restored and the project will not require additional fill below the ordinary water level in the canal. Minor trenching will be required for electrical conduit along the top of canal banks used for vehicular access.

2. Endangered and threatened species found in parts of the Company's service area include:

   According to the EIR/EIS prepared for the Sankey Diversion Project in 2008, threatened/endangered fish species of concern in the Lower Sacramento River include Winter-run Chinook salmon, Central Valley Spring-run Chinook salmon, Central Valley Fall-run/Late fall-run Chinook salmon, Central Valley steelhead, Delta smelt, Longfin smelt, Green sturgeon, Sacramento split tail, River lamprey, Pacific lamprey, Hardhead, and California roach. Other native and introduced fish species, both anadromous and resident, are present in the Sacramento River and would similarly benefit from improved water quantity and quality.

3. Wetlands are not present within the vicinity of the site. There are wetlands in the Company's service area that are managed by the Natomas Basin Conservancy that will not be impacted by this project.

4. The irrigation water distribution system construction began in 1921 and continued throughout the 1920's.

5. The Sankey Canal was constructed in the 2012 as part of the Sankey Diversion project. No alterations have been made since construction.

6. Buildings, structures, or features in the Company's district that might be eligible for listing on the National Register of Historic Places include two pump station buildings that are historically significant. However, neither of these structures are currently eligible for listing on the National Register of Historic Places. Furthermore, this project does not involve any activities at these pump stations.

7. There are known archeological sites that exist along the Sacramento River in the Company's service area. However, this project is not located near any of these sites.

8. The project will not have any disproportionately high and adverse effects on low income or minority populations.

9. The project does not limit access to any ceremonial use of Indian sacred sites or result in other impacts on tribal lands.

10. The project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

REQUIRED PERMITS AND APPROVALS

The Project will require the preparation of an environmental compliance document to confirm, but it is expected that the project will require a mitigated negative declaration. Therefore, the project will require the normal suite of regulatory approvals including a USACE Section 404 permit, CA Section 401 Water Quality Certifications, CA Section 1602 Streambed Alteration Agreement, plus others as required by the regulatory agencies. The permit applications will be processed and obtained during 2017 prior to any ground disturbing activities.

The budget includes $30,000 for USBR to coordinate and review the joint CEQA/NEPA document prepared by the Company's consultant and coordinate with the regulatory agencies as required.

OFFICIAL RESOLUTION

This project has been presented to the Company's Board for consideration and has been included in discussions of the 2016 budget. However, due to the timing of the January Board meeting, an official resolution to support this funding request is not included in this application package. In accordance with the solicitation, an official resolution in support of the Project by the Board will be provided to Reclamation following the February board meeting on February 9, 2016.

APPENDIX A

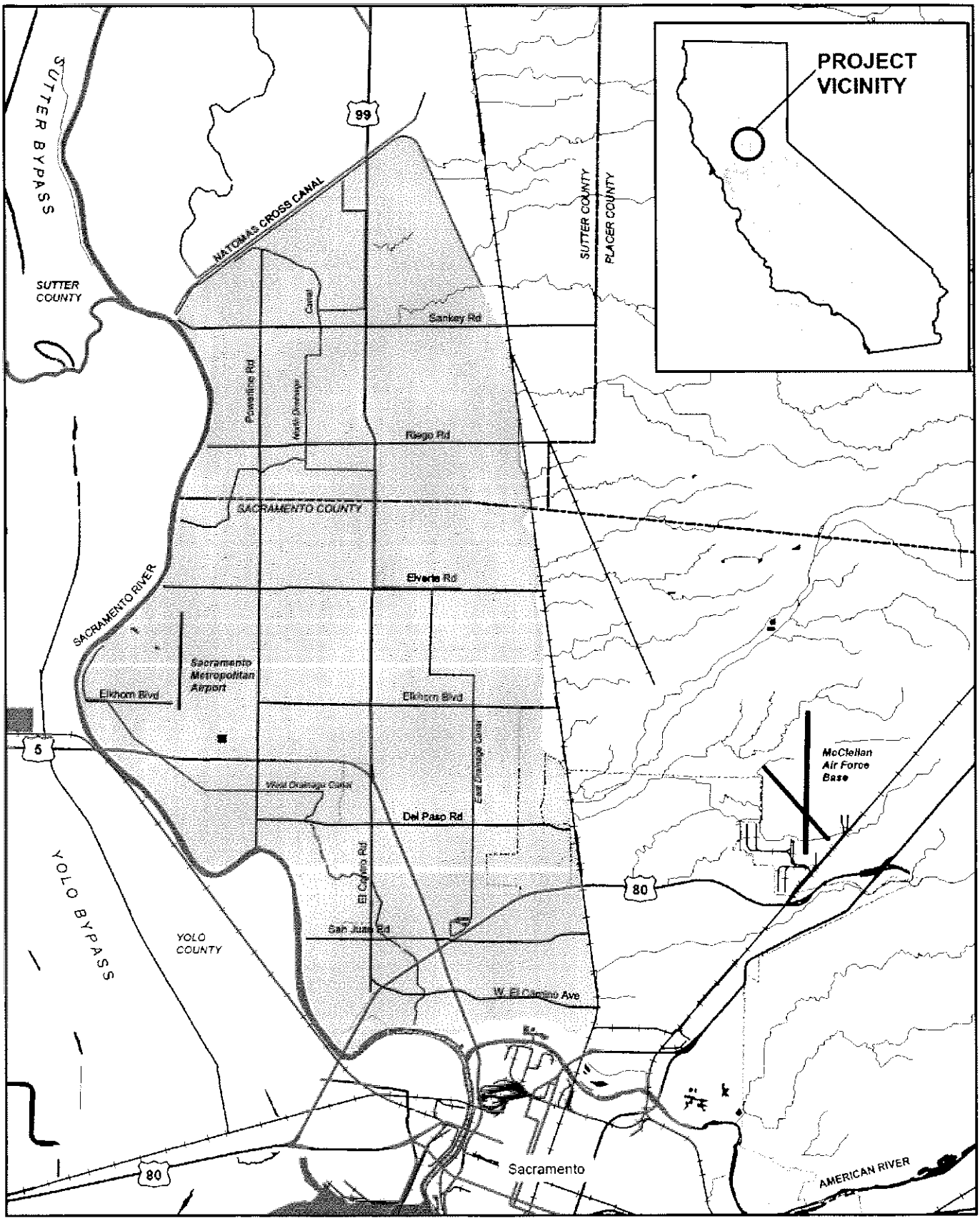
PROJECT AREA MAP / PROJECT PHOTOS

AND

NATOMAS BASIN CONSERVANCY MAP

Natomas Central Mutual Water Company **Location Map**

NDC Lift Pump Station

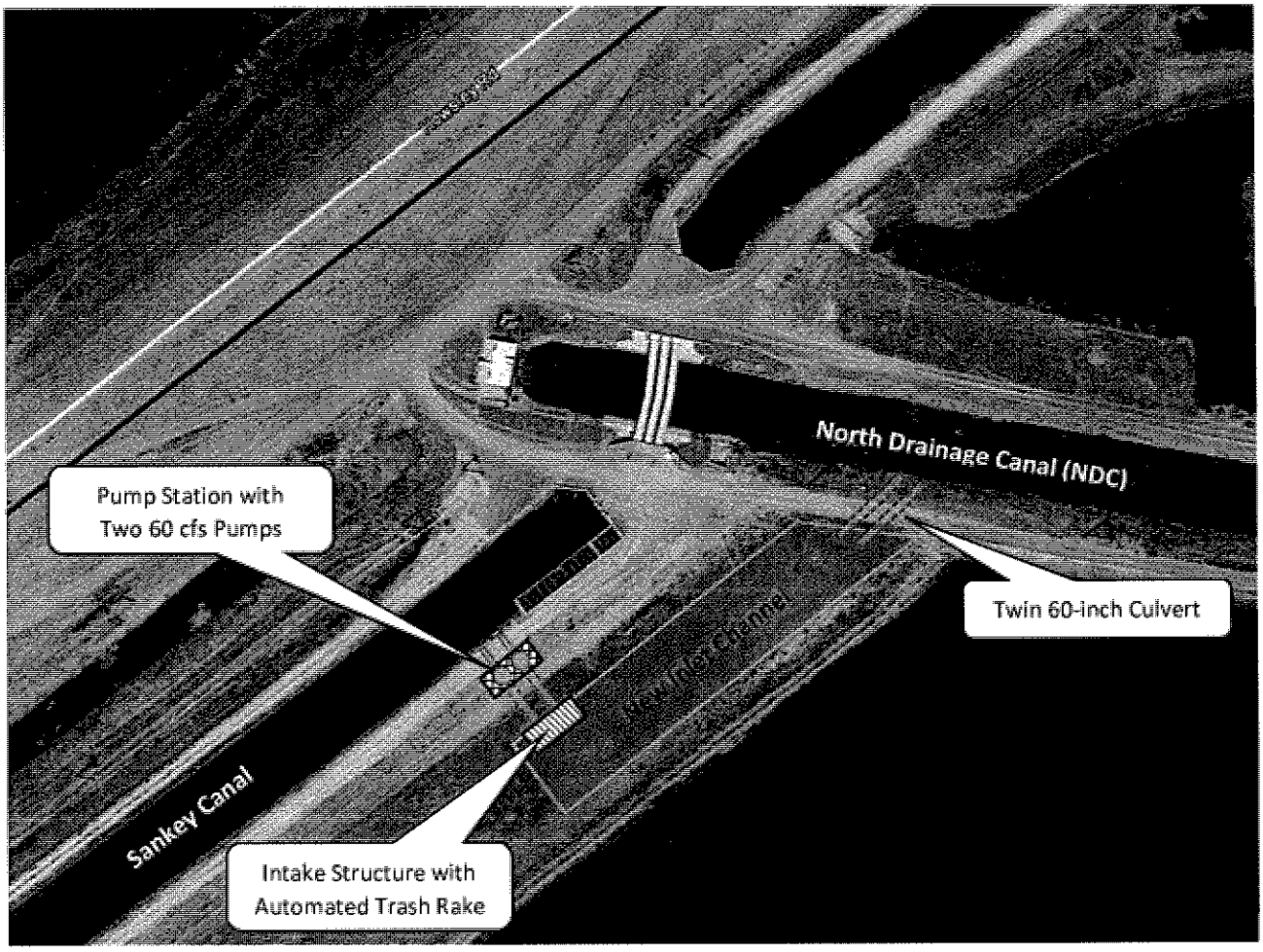


Natomas Mutual Water Company
NDC Lift Pump Station

Project Site Map

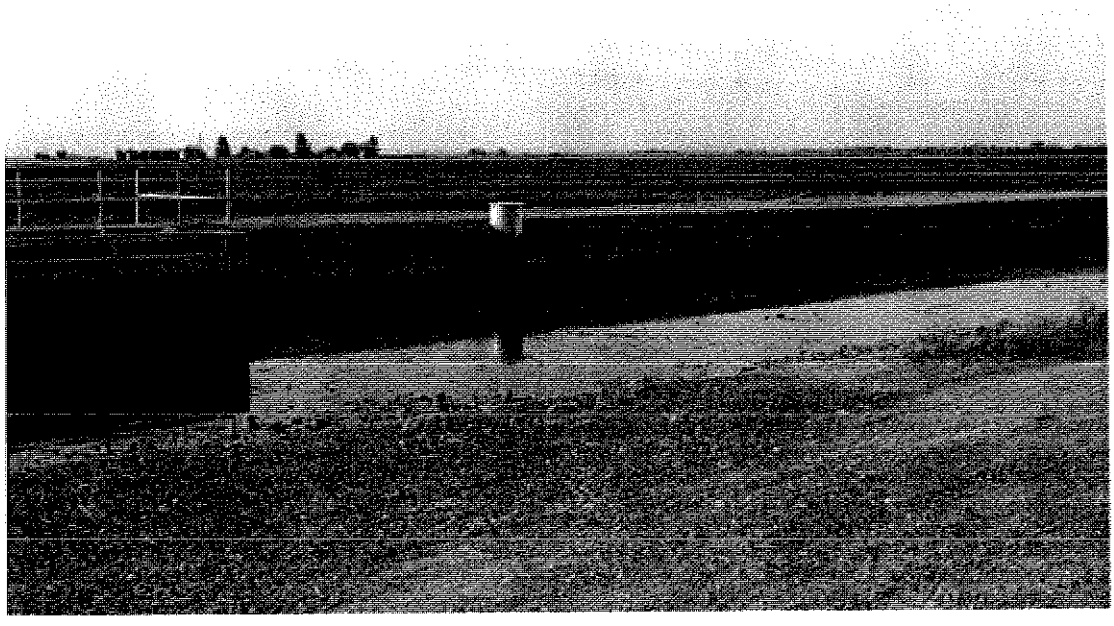
Natomas Central Mutual Water Company
NDC Lift Pump Station

Project Photos

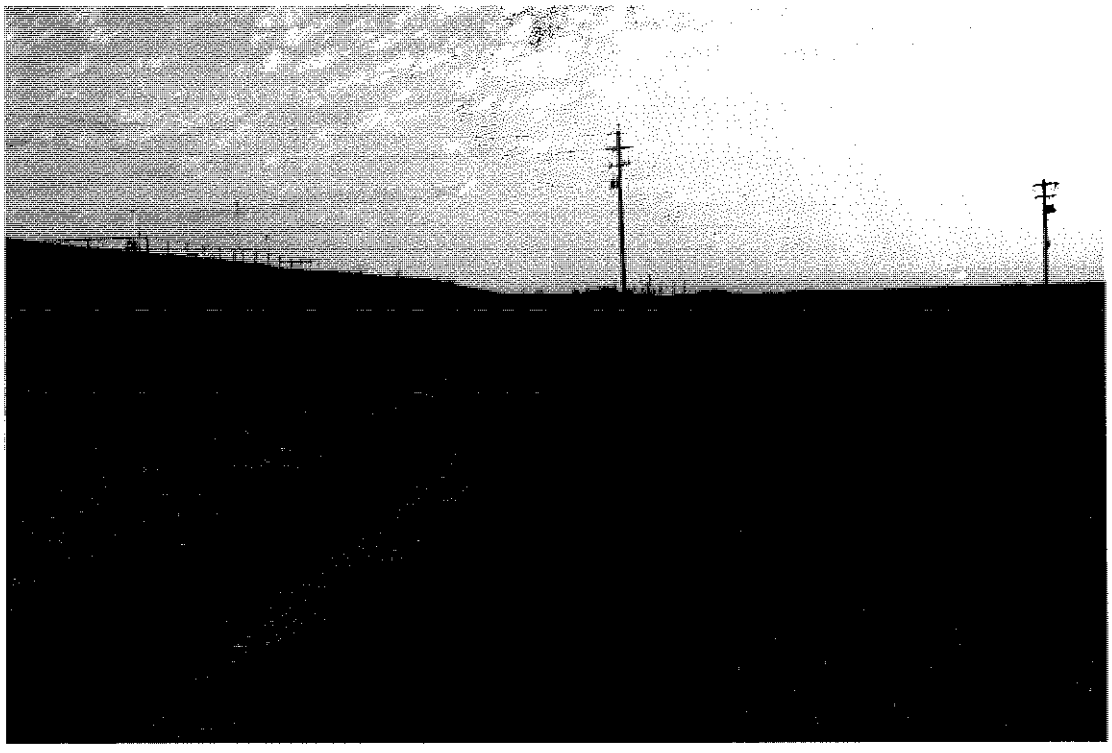


Aerial Photograph of NDC Lift Pump Station Site

Site Photo 1 – NDC Lift Pump Station Location



Site Photo 2 – Pump Discharge Location into the Sankey Canal

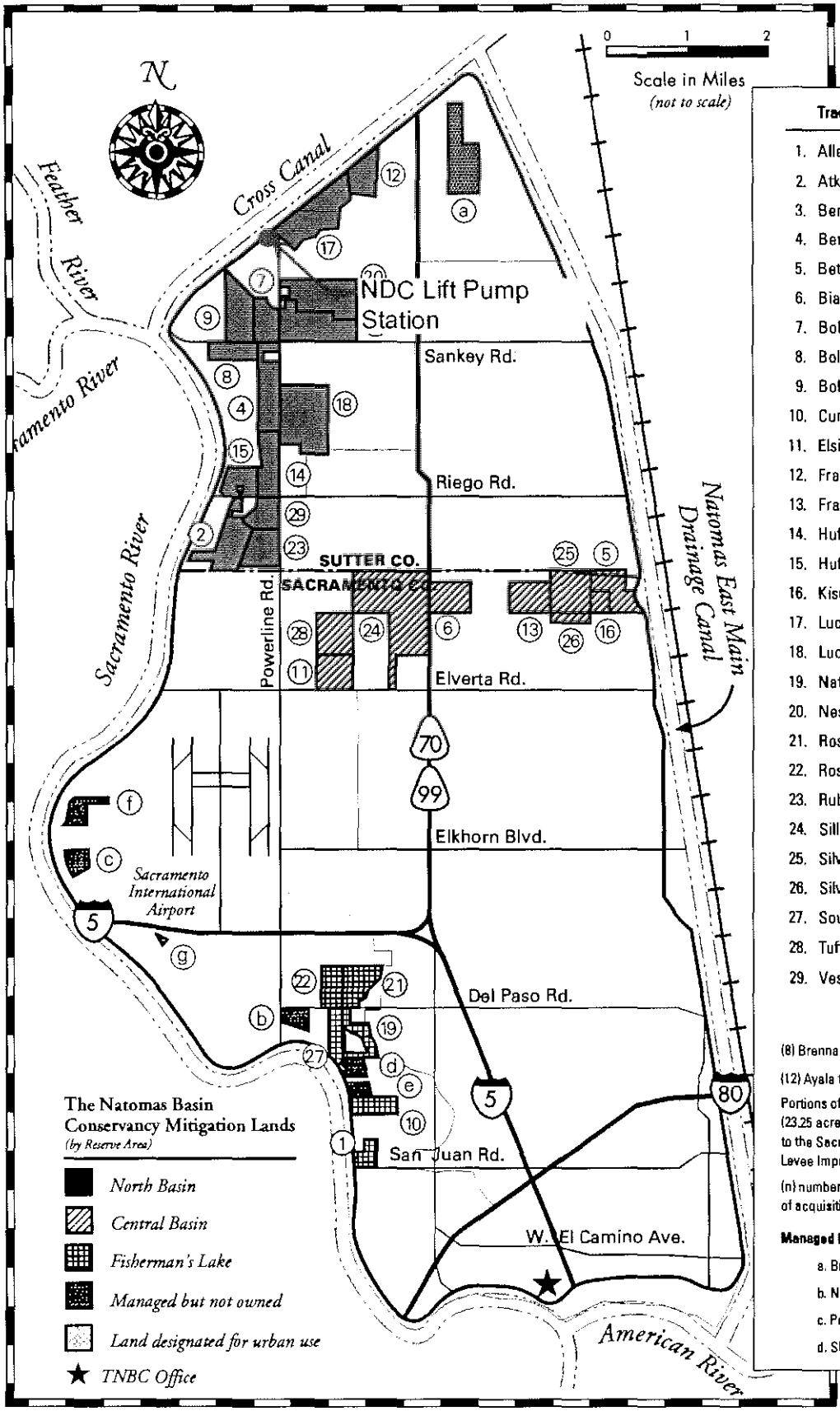


Site Photo 3 – NDC Lift Pump Station Intake Location

Site Photo 4 – NDC Lift Pump Station

2015 BASE MAP

THE NATOMAS BASIN CONSERVANCY



	Tract	Acq. Date	Acres
1.	Alleghany (14)	11.07.02	50.26
2.	Atkinson (16)	06.12.03	199.40
3.	Bennett North (4)	05.17.99	226.68
4.	Bennett South (5)	05.17.99	132.49
5.	Betts (2)	04.05.99	138.99
6.	Bianchi West (28)	11.07.06	110.16
7.	Bolen North (23)	04.29.05	113.62
8.	Bolen South (24)	04.29.05	102.38
9.	Bolen West (26)	09.01.06	155.14
10.	Cummings (15)	11.07.02	66.83
11.	Elsie (29)	11.07.06	158.03
12.	Frazer North (9)	07.31.00	92.60
13.	Frazer South (30)	11.07.06	110.37
14.	Huffman East (19)	09.30.03	135.75
15.	Huffman West (18)	09.30.03	157.85
16.	Kismat (3)	04.16.99	40.46
17.	Lucich North (6)	05.18.99	267.99
18.	Lucich South (7)	05.18.99	351.89
19.	Natomas Farms (11)	07.09.01	55.19
20.	Nestor (27)	09.01.06	233.16
21.	Rosa East (21)	03.23.05	106.28
22.	Rosa Central (22)	03.23.05	100.02
23.	Ruby Ranch (17)	06.23.03	91.08
24.	Sills (13)	07.15.02	436.41
25.	Silva (1)	01.07.99	159.20
26.	Silva South 1 (31)	09.28.12	29.12
27.	Souza (10)	07.02.01	40.00
28.	Tufts (20)	09.29.04	147.95
29.	Vestal (25)	09.12.05	94.95
			4,104.25

(8) Brennan tract, acquired 6.15.00, exchanged 9.1.06. (242.38 acres)

(12) Ayala tract, acquired 2.20.02, exchanged 11.3.06. (317.37 acres)

Portions of the Atkinson tract (6.76 acres), the Huffman West tract (23.25 acres), and the Natomas Farms tract (41.27 acres) were sold to the Sacramento Area Flood Control Agency for the Natomas Levee Improvement Program (NLIP).

(n) number in parentheses represents chronological order of acquisition

Managed but not owned (SAFCA)

a. Brookfield 180.00 acres
b. Novak 52.753 acres
c. Pappe Rosa 35.77 acres
d. Sherma 20.81 acres
e. AKT 16.01 acres
f. South Sutter 75.08 acres
g. Willey 4.69 acres

Revision Date: 1.6.2015

APPENDIX B

EXCERPTS FROM THE SACRAMENTO VALLEY INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Final

Sacramento Valley Integrated Regional Water Management Plan

December 5, 2006

- Formulate and conduct data gathering and investigations to build a credible body of knowledge about the groundwater resources.
- Prepare and distribute factual information to ensure that the public has an opportunity to become better informed about this important groundwater resource.
- Identify policy issues that need to be considered by or recommended to the respective entities in the region.

Additionally, the Coordinating Group will help facilitate and clarify the respective roles of the Department, special districts, and counties. This discussion may form the basis for an MOU or similar arrangement that will articulate the respective roles necessary for a cogent and coordinated integrated plan for groundwater management in Northern California.

4.1.2 System Improvement/Water Conservation Strategies

For this IRWMP, the system improvement strategy refers to potential projects or operational changes that will improve water management at the district or farm level, and actions that can be taken related to urban use. System improvement projects include canal lining, installation of facilities to reduce operational spills, or changes in management that can result in decreased river diversions or additional reuse of water.

The system improvement/water conservation strategies are designed to provide multiple benefits and serve multiple objectives. They provide for agricultural water recycling, water conservation, drainwater management, system automation, and associated water quality improvements. These types of projects help meet local and regional water supply needs, improve water quality, and enhance water system flexibility. Common elements among these strategies follow:

- They are locally formulated.
- They provide local/districtwide water supply reliability.
- They improve water system operation at the district level.
- They generally provide water quality benefits.
- They enhance district water system flexibility and system operations.

Numerous water use efficiency projects have been implemented recently, with additional projects seeking funding either underway or awaiting final approvals to proceed. A list of proposed projects formulated under system improvement strategies is provided in Appendix A.

In October 2002, NCWA, working with various agencies throughout Northern California, developed a regional agricultural water use efficiency program to encourage water use efficiency in the region and to help implement cost-effective local and regional programs to use water more efficiently. The regional program was based on meeting Quantifiable Objectives and/or Targeted Benefits established by CALFED and the Department. The

IRWMP provides an opportunity to further this regional water use efficiency program by a more detailed review of the potential opportunities and limitations for water use efficiency in the Sacramento Valley and then providing a framework for additional system improvements or other water use efficiency measures.

4.1.2.1 Urban Water Management

The Urban Water Management Planning Act of 1983 requires that every urban water supplier (public or private) who provides water for municipal purposes either directly or indirectly to more than 3,000 customers or supplies more than 3,000 ac-ft of water annually must prepare and submit to the Department an urban water management plan. The plan is to be updated at least every 5 years. Urban water management plans include the area served, quantity and sources of water, groundwater management plans, and future supply and demand projections. The Department reviews all submitted urban water management plans. All cities across the region have prepared these plans, and many urban purveyors have also completed and are implementing water master plans that guide their provision of water services.

4.1.2.2 Agricultural Drainwater Recycling and Management

Drainwater management, in the form of controlling releases of drainwater from fields, reusing drainwater for onfield irrigation, and monitoring inflows to and outflows from drains, is a common practice in much of the Sacramento Valley. On a subbasin or larger scale, the management actions of the farmers within the individual districts can result in major cumulative influences on regional hydrology. These influences could include changes in river diversions (reduced or increased diversions as drainwater supplies change relative to irrigation demand); changes in flow rates in many natural sloughs, streams, and drains; the creation of habitat along the watercourses; and water quality and temperature effects at points of discharge to receiving waters. In addition to these influences on regional hydrology and habitat, drainwater management provides critical, regional-scale benefits by increasing the overall subbasin efficiency through repeated use of field tailwater runoff.

All of these impacts and benefits result from the largely independent actions of many irrigators who respond daily to changes in their local water supply and demand conditions. With some level of regional coordination, drainwater management could be expanded in conjunction with actions to address the water quality of return flows and other regulatory issues. The most logical and effective geographic unit for regional drainwater management appears to be the hydrologic subbasin. The following are the key objectives and related benefits of a regional drainwater management program:

- Improved measurement of drainage flows.
- Improved water quality sampling and real-time monitoring.
- Coordinated management of drainwater flow rates.
- Increased water management flexibility and potential for benefits.

APPENDIX C

SCOPE OF WORK

AND

COST ESTIMATE

Natomas Central Mutual Water Company
NDC Lift Pump Station

Scope of Work

The following scope of work has been defined for the development of the project schedule and budget.

Task 1 – Program Management & Grant Administration

NCMWC shall provide all technical and administrative services associated with performing and completing the work for this project. This task allows for efforts allotted to managing the completion of tasks, consultant and agency coordination, compliance with reporting requirements, processing of funding requirements, and any associated direct costs.

The work performed in this task also includes the preparation and submission of Quarterly Progress Reports; the planning and holding of periodic status meetings with the project team to review progress and issues from the previous quarter; the preparation and submission of the Project Closure Summary Report; and the preparation and submission of deliverable products as required.

Deliverables will include reimbursement requests, quarterly reports, and all other requested status and compliance reporting with the WCB.

Task 2 – Final Design and Permitting

This task includes the effort required to complete the final design and obtain permits from the resource agencies that are necessary for constructing the project. The work for this task includes:

- *Final Design.* Development of additional construction details sufficient for construction of the pump station, and procurement of specialized equipment & services. This work will be performed by Larsen Wurzel & Associates (LWA) in close coordination with NCMWC staff.
- *CEQA Review and Compliance.* The environmental review is anticipated to require preparation of an Initial Study/Mitigated Negative Declaration. This work will be completed by CH2M.
- *Permitting.* Completion of informal consultations with the regulatory agencies, preparing permit applications, and obtaining all permits and approvals required for construction of the project. This work will also be performed by CH2M.

Task 3 – Construction

This task includes the effort to construct the project, install equipment, and complete the controls and SCADA programming. NCMWC will complete the majority of the work with existing staff. Materials and specialty equipment (e.g.: pumps, electrical controls, trash rake, etc.) will be procured by NCMWC. LWA will provide engineering assistance as required. CH2M will perform environmental monitoring during construction as required by the permits.

The work will generally include:

- Site preparation and installation of temporary piping in the Sankey Canal;
- Installation of pre-cast concrete pipe and manholes, including excavation and backfill;
- Construction of cast-in-place concrete intake structure and installation of trash rake;
- Construction of pump platform;
- Installation of pumps and discharge piping;
- Installation of electrical and controls equipment, and associated programming; and
- Intake channel excavation and finish grading.

LWA LARSEN WURZEL & Associates, Inc.
DEREK LARSEN, Principal • SETH WURZEL, Principal
Sacramento, California • www.larsenwurzel.com
Ph: (530) 665-8222 • Fx: (530) 406-1335

subject: NDC LEFT PUMP STATION

page: 1 of 4
made by: SCB
date: 9/22/15
checked by:
date:

INTAKE SIZE

INTAKE PIPE DIAMETER:

$Q = 60 cfs$

@ 48"ϕ $\Rightarrow v = \frac{60 cfs}{\left(\frac{3.14 \cdot (4)^2}{4}\right)} = 4.7$ fps

@ 60"ϕ $\Rightarrow v = \frac{60}{\left(\frac{3.14 (5)^2}{4}\right)} = 3.1$ fps $\Leftarrow$ USE HEADLOSS @ 60cfs $\approx 1.5 \frac{v^2}{2g} \approx 0.25$ FT

@ 72"ϕ $\Rightarrow v$ $= 2.1$ fps

SUMP SIZE : TOH CALC

FOR 60"ϕ INTAKE PIPES USE 72"ϕ SUMP

VERTICAL OPEN DEPTH:

INVERT $\approx$ 6 FT
TOP $\approx$ 21.5 FT
DESIGN WSEL = 16 FT

SANKEY CANAL

TOP OF BANK @ 31.5
INVERT $\approx$ 23.8
DESIGN WSEL $\approx$ 31.0

TOP OF SUMP: 29 FT
INVERT SUMP: 6.5 FT
WATER DEPTH @ 60cfs = 16FT - 0.25FT - 6.5FT = 9.25 FT

PUMP TOH = $(31.0 - 16 - 0.25) + 5\pm = 19.75$ FT SAY 20 FT @ 60cfs

LWA | LARSEN WURZEL & Associates, Inc.
DEREK LARSEN, Principal • SETH WURZEL, Principal
Sacramento, California • www.larsenwurzel.com
Ph: (530) 665-8222 • Fx: (530) 406-1335

subject: NDC GIFT PUMP STATION

page: 2 of 4
made by: SLB
date: 9/22/15
checked by:
date:

1) STRIP CANAL & EXCAVATION AREA
2 DAYS, FULL CREW; EXCAVATOR ($148/hr), SKID STEER ($26/hr), DUMP TRUCK ($72/hr)

2) EXCAVATE SUMP & PLACE/COMPACT TEMP FILL IN SANKEY CANAL
3 DAYS, FULL CREW, EXCAVATOR, SKID STEER, DUMP TRUCK, CRANE ($80/hr), COMPACTOR ($22
200 LF 60-inch HDPE PIPE,

3) FINISH GRADE EXCAVATION & SET CONCRETE SUMPS & PIPE, BACKFILL
10 DAYS FULL CREW, EXCAVATOR, SKID STEER, CRANE
60 LF 60-in RCP
2 - 96" PRECAST MANHOLES
BASE ROCK (16 CY)

4) CAST-IN-PLACE INTAKE STRUCTURE
15 days, FULL CREW, SKID STEER, EXCAVATOR, COMPACTOR
BASEROCK: $24 \times 30 \times 2/27 \cong 55$ CY
CONCRETE: $[(20 \times 24 \times 1.5) + (60 \times 15 \times 1) + 2 \times (\frac{1}{2} \times 24 \times 15 \times 1) + (24 \times 15 \times 2)]/27 \times 1.1 = 85$ CY
REBAR: 45 CY $\times \frac{27 \text{ CF}}{\text{CY}} \times 490$ PCF $\times$ 0.005 STEEL RATIO $\cong$ 3,000 LBS

WOOD FORMS:
PLYWOOD: $\left[\frac{20}{4} \times \frac{15}{8}\right] + \left[\frac{24}{4} \times \frac{15}{8}\right] = 20.6$ SAY 22 SHEETS

2X8 BOARDS: $2 \times [2 \times 24 + 2 \times 20] = 176$ LF

2X6 BOARDS: $\frac{(24 + 20)}{1.33} \times 16' = 530$ LF

SNAP TIES: $\frac{24 \times 16}{4} + \frac{20 \times 24}{4} \cong 220 \rightarrow 3$ BOXES

REBAR TIE WIRE, STAKES, NAILS & MISC MATERIALS

CONCRETE APRON FOR TRASH HANDLING (REUSE FORMWORK)
- $20 \times 30 \times 1.25/27 = 50$ CY
- STEEL: $30 \times 27 \times .004 \times 490 \cong 1600$#
- BASEROCK $\cong 30$ CY

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subject: NDC LIFT PUMP STATION

page: 3 of 4
made by: SLB
date: 9/22/15
checked by:
date:

5) TRASH RACK & TRASH RAKE:

INTEGRATED RACK & RAKE SYSTEM, INCLUDING CONTROLS PACKAGE
QUOTE FROM JBI

INSTALLATION 2 DAYS FULL CREW, CRANE

6) PUMP PLATFORM

- DRILLED, CAST-IN-PLACE CAISSONS:
  15 DAYS FULL CREW, EXCAVATOR, BACKHOE, CRANE
  CONCRETE PUMPER – 5 DAYS
  DRILLER – 5 DAYS → (6) 24-in ϕ x 30 FT
  CONCRETE: $6 \times \frac{3.14(2)^2}{4} \times 30\text{FT} \times 1.1 = 23\text{ CY}$

  STEEL: 12 VERTICAL #6 BARS, 40FT EACH = 480FT @ 1.51 lbs/FT = 720 lbs
  #3 SPIRAL w/ 3" PITCH: $\left[\frac{(24" - 6"\text{CVR})}{12} \times 3.14\right] \times 40\text{FT} \times \frac{12}{3}\text{ PITCH} \cong 758\text{FT} @ 0.376\text{ lb/FT} \cong 280\text{ lbs}$

  WEIGHT PER PILE = 1,000 lbs x 6 = 6,000 lbs @ $3/LB

- STRUCTURAL STEEL:
  10 DAYS, FULL CREW, EXCAVATOR, CRANE, WELDER
  COLUMNS: (1,) HP12, 8FT @ 53 lbs/FT ⇒ 6 x 8 x 53 = 2550 lbs
  BEAM: (7) W12, 10FT @ 50 lbs/FT ⇒ 7 x 10 x 50 = 3500 lbs
  PUMP SUPPORT BEAMS: (4) W8, 10FT @ 24 lbs/FT ⇒ 4 x 10 x 24 = 960 lbs
  DIAGONAL BRACES (6) 6" ϕ STANDPIPE, 12.5FT @ 19 lbs/FT = 6 x 12.5 x 19 = 1425 lbs

  SUBTOTAL: 8,435
  MISC PLATES, CONNECTIONS, etc: 15% 1,265
  9,700 lbs

- PLATFORM
  5 DAYS, FULL CREW, CRANE, WELDER
  GRATING: ≈ 10 x 20 = 200 SF
  HANDRAIL ≈ 2 x (10 + 20) = 60 LF

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subject: NOC LEFT PUMP STATION

page: 4 of 4
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7) PUMPS:
2 DAYS FULL CREW, CRANE, EXCAVATOR TO SET PUMPS

(2) 60 CFS @ 25FT TDH, VFD RATED MOTORS
QUOTE FROM CASCADE

8) DISCHARGE PIPING
10 DAY FULL CREW, EXCAVATOR, SKID STEER, CRANE, WELDER, COMPACTOR

- EXCAVATE CANAL EMBANKMENT
- 48" WSP; LENGTH ≈ 40 FT PER PUMP ⇒ 80 FT
- FLAP GATES → 4@ (48") ALUMINUM FLAP GATES. ASSUME $8,000 EA
- MISC FERNCO'S, FITTINGS, ANCHORS, etc USE 10% ALLOWANCE
- AIR/VACUUM RELEASE VALVES: (2) @ $ 8,000 EACH
- BACKFILL SECTION

9) ELECTRICAL & CONTROLS
15 DAY, FOREMAN, SCADA TECH, LABOR 1/2 TIME

- PAD MOUNTED TRANSFORMER $50,000 FROM PG&E
- INSTRUMENTATION & CONTROLS FROM TESCO
  ASSUME 3/4 COST OF PRITCHARD ⇒ $150,000
- WIRE & CONDUIT: ASSUME ADDITIONAL $50,000

10) FINISH GRADING
5 DAY, FULL CREW, EXCAVATOR, BOBCAT STEER

11) INTAKE CANAL EXCAVATION & CULVERT
10 DAY, FULL CREW, EXCAVATOR, BOBCAT STEER, DUMP TRUCK, TRANSITIONAL PUMPS (30/h
CULVERTS – (2) 60" HPDE, FROM TEMP PIPING OF SANKEY CANAL RE-USED
RIP RAP – ASSUME 80 TONS IN SANKEY CANAL
80 TONS IN NOC

CASCADE PUMP COMPANY
MANUFACTURERS OF AXIAL AND MIXED FLOW PUMPING EQUIPMENT
10107 SOUTH NORWALK BOULEVARD, P.O. BOX 2767 • SANTA FE SPRINGS, CALIFORNIA 90670-0767
E-MAIL: PUMPINFO@CASCADEPUMP.COM • WWW.CASCADEPUMP.COM
TEL:562.946.1414 • FAX:562.941.3730

VIA EMAIL
scott@larsenwurzel.com.com

September 25, 2014

LWA
Sacramento

ATTENTION: SCOTT BROWN

SUBJECT: REQUEST FOR QUOTE
CASCADE QUOTATION NO. 15-314

We are pleased to submit the following price information for the 1 pump per our phone call on September 21, 2014.

SCOPE OF SUPPLY

Rated Condition: 27,000 GPM at 20 feet total dynamic head.

Pump: 36AP axial flow, 1 stage, 36" diameter below baseplate flanged discharge, oil lubrication, 700 RPM, bowl efficiency 77%, brake horsepower 177, 30'– 0" from baseplate to bottom of suction bell, weight lbs., catalog curve AP3610.

Motor: 200 Horsepower, 720 RPM, vertical hollow shaft, TEFC enclosure, 460 volts, 3 phase, 60 Hertz, 1.15 service factor, 40° C ambient, class F insulation with class B rise, non reverse ratchet coupling, premium efficiency, inverter duty, steady bushing, weight 4710lbs.

PRICES

QTY	DESCRIPTION	UNIT
1	36AP Pump & Motor	$130,000.00

Delivery terms are F.O.B. Shipping Point. Freight charges are not included.

COMMENTS

1. Submittals 2 to 4 weeks after receipt of acceptable purchase order.
   Shipment 24 to 26 weeks after drawing approval and release to production. Manufacture lead-time is estimated and is subject to availability of materials.
3. Pump price includes engineering drawings, O&M manual, head shaft assembly for VHS driver, a one gallon oil reservoir with 460 volt solenoid valve, discharge flange with 125lb drilling only, coupling guards, motor stand, aluminum bronze propeller and allowance for special paint.
4. Anchor bolts, installation, start-up services, field testing, controls, lubricants, etc. not included.
5. Prices for motors, gear drives and other equipment purchased for resale included in this quotation are subject to price in effect at time of shipment.

Terms of Payment: Normal payment terms are Net 30 Days after date of invoice. Invoices are dated as of the date of shipment or notice of completion of manufacture if shipment is delayed at Purchaser's request. Purchaser's request shall be any cause whatsoever not reasonably within control of the Seller. If completion of manufacture is delayed at Purchaser's request, Seller may invoice according to percentage of completion. Storage of equipment shall be at Purchaser's risk and expense. We reserve the right to make partial shipments of equipment and pro rata invoice for that equipment as shipments are made. Retention of a percentage of the contract sale amount is prohibited unless agreed to in writing prior to our acceptance of contract. Credit worthiness of the purchaser will be determined upon receipt of contract. Credit terms, if authorized, are subject to change during the life of the contract if the financial condition of the Purchaser changes.

Sales and Similar Taxes: Unless otherwise stated in this quotation, prices do not include any Federal, State, or Local sales, use or other taxes that may be applicable to the sales of offered products or services. The amount of any such applicable taxes will be added to the invoice at the rate in effect at the time of shipment.

Terms and Conditions: This quotation is based solely upon the terms and conditions set forth herein including attachments. They supersede and reject any conflicting terms and conditions of yours. Any other terms and conditions that you may propose are subject to requotation.

Please feel free to contact us if you have any questions relative to this proposal.

Sincerely,
CASCADE PUMP COMPANY

John Temple
Attachment: Additional Terms and Conditions
Drawing 15-314
Curve AP3610

Duperon® ADAPTIVE TECHNOLOGY
Your Path to the Future

DATE: September 25, 2015

Mechanically Cleaned Bar Screen
Budgetary Proposal Number P8347
Natomas Mutual Water PS CA

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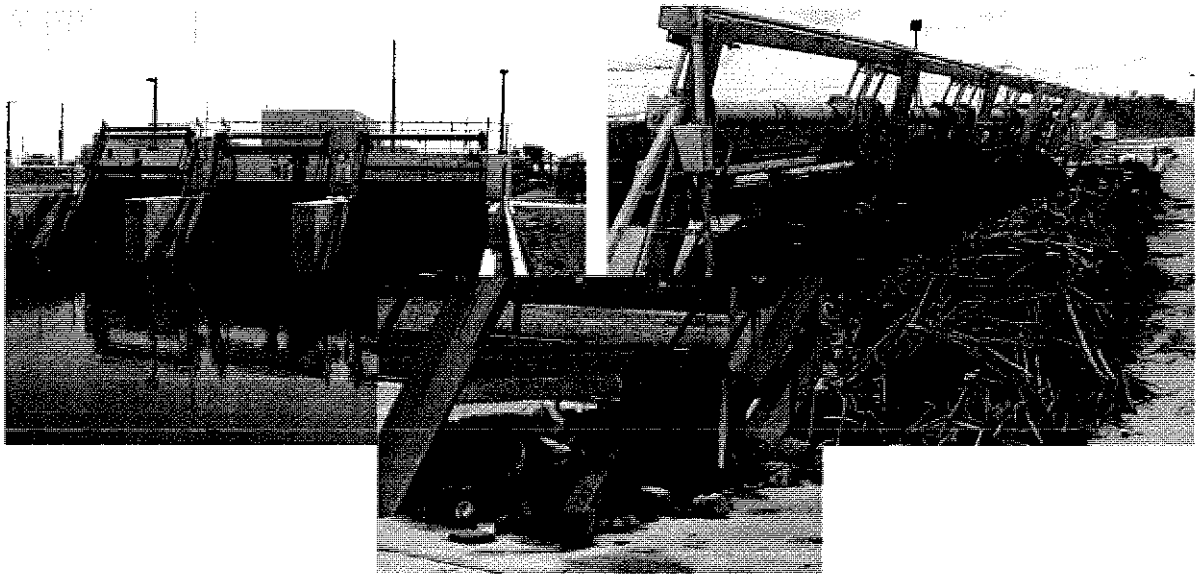

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Scope of Supply: Based on Information received 9.23.2015

(2) **Mechanical Bar Screen - Stainless Steel Link Driven, Front Cleaning, Front Return**

- **Model FlexRake® outdoor installation**
  - **FRHD, Heavy Duty**
- Head Sprocket Only Design – no critical components under water
- Standard painted bar screen with 304 SSTL Links & pins, 304 SSTL rings
- 1,000 lb lifting capacity, utilizing a ¼ HP motor
- Continuous Cleaning, top to bottom, the entire width of scraper
- Continuous Cleaning without an operator
- Drive sprockets and end castings shall be steel painted
- Drive shaft shall be steel
- Standard painted bar screen A36
- SSTL304 FlexLinks
- Scrapers of UV Stabilized UHMW
- Motor shall be standard coating

Dimensions and design criteria (site modifications required for fit of the screen)

- 1.75 inch clear opening (to be verified)
- Bars shall be 0.375 inch x 2 inches
- 25 degree angle (to be verified)
- 30.00 ft nominal length of FlexLink and scraper system
- 16.00 ft channel height (to be verified)
- Discharge height 4 ft (to be determined)
- Average water level (to be determined)
- Maximum water level (to be determined)
- 60 cfs each screen
- Installation outdoors
- 9 ft screen width (2 ft wide diver between screens)
- Channel modifications and closeouts might be required to be provided by others.

Clarifications/Exceptions/By Others:

- Spreader bar required for unloading, seismic zone impacts not included
- Please see the template DWG for critical dimensions needed for fit and function of the screen
- Crane may be required for unloading
- Final assembly at site required
- Anchor Bolts

(1) Controls (assumed control package 2 screen for 1 panel)

- Wall mount NEMA 4X stainless steel enclosure for 1 FRHD
- Main Breaker for 3 phase incoming power (460/3/60)
- 2 Full voltage reversing motor starters, 1/4HP
- Relay logic control with adjustable cycle timer and off-delay
- 2 Emotron power shaft monitors for overload protection
- Pilot lights, push buttons and selector switches on dead front door
- Terminal blocks, ETM's, breakers, timers and relays where required

Field mounted devices

- (2) Three Button NEMA 4X Enclosure for E-Stop, Jog-Reverse and Forward

Clarifications/Exemptions

- Customer to verify upstream and downstream equipment
- Customer to verify incoming power supply - Voltage, Phase & Hz
- Customer to verify equipment installation location is/is not hazardous
- Customer to verify main control panel location is indoors/outdoors
- Customer to verify distance between main control panel and each piece of equipment
- Customer to verify automatic functions to be provided: start/stop input, cycle timer, single upstream float for on/off, single upstream float for high speed & alarm, dual upstream floats for on/off & high speed, differential level sensing and differential level sensing plus upstream float for high speed & alarm.
- Customer to verify instrumentation: ultrasonic transducers or submersible pressure transducers

FlexRake Spare Parts

- (1) Drive Clevis Pin
- (10) Snap/Retaining Rings
- (4) Link Clevis Pins
- (4) Scraper Bolts
- (4) Scraper Nuts
- (1) Snap Ring Tool
- (1) Never Seez 3 oz. tube

On Site Technical Assistance

- (1) Trip(s)
- (1) Technician
- (1) 8 hour man-days
- *If additional Technical Service days are required, please add per the rates included in the Clarifications section of this scope of supply.*

Operation and Maintenance Manuals

- 6 Hard Copies

Warranty

- One Year Standard material and workmanship

Freight to Jobsite

Price: $324,000

Adder for differential level controls including pressure transducers and PLC:

(1) Controls (assumed control package 2 screen for 1 panel)

- Wall mount NEMA 4X stainless steel enclosure for 1 FRHD
- Main Breaker for 3 phase incoming power (460/3/60)
- 2 Full voltage reversing motor starters, 1/4HP
- PLC based control with adjustable cycle timer, level and off-delay
- (2) Unitronics V130 PLCs with built in HMI and shade protection
- 2 Emotron power shaft monitors for overload protection
- Pilot lights, push buttons and selector switches on dead front door
- Terminal blocks, ETM's, breakers, timers and relays where required

Field mounted devices

- (2) Three Button NEMA 4X Enclosure for E-Stop, Jog-Reverse and Forward
- (4) KPSI submersible transducers for differential level

Adder $ 5,500

Price is valid for 30 days.

Submittals: 4-6 weeks after approved purchase order

Equipment Delivery: 8-12 weeks after approval based on work load

Clarifications:

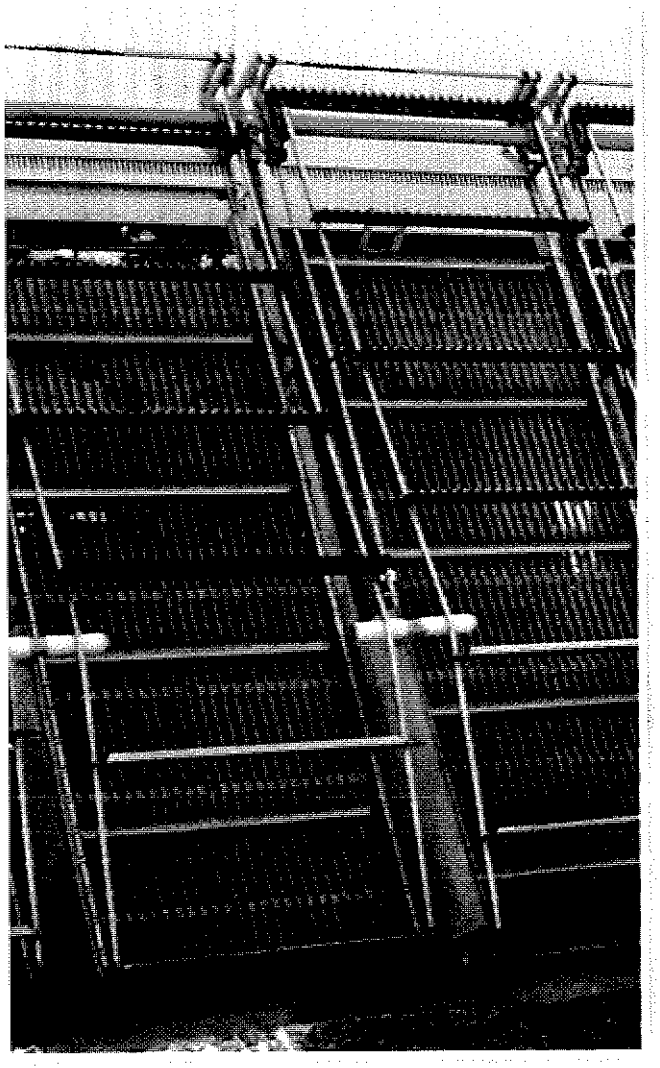
- Scope of supply and pricing above does not include additional structure for seismic, additional head differential or wind conditions
- See Duperon Contractor Installation Guides for guidance in estimating these costs.
- Duperon requires 2 week's advanced notice in writing to schedule field service technician on site.
- Field Services will be provided as outlined in this proposal. Duperon field service rate is $750 per day plus travel and per diem expenses. If field service personnel arrive on site as scheduled and the project is not ready for intended services to be performed, Duperon will invoice for additional days, if required. If the time required is greater than the time listed in this proposal, Duperon will invoice at the above rates.
- The specifications listed are the only specifications which shall apply to this proposal either directly or by reference. Any additional specifications, with equipment or requirements specified therein, that are not specifically included as part of this offer are excluded from this proposal.

Not Included:

- Anything not specifically stated in this Proposal.
- Bonding, tariffs, permits, taxes, liquidated damages.
- Construction and /or installation work of any kind at the jobsite.
- On-site conditions affecting the work described or which affects the installation.
- Conduit, stands, control mounting wiring, junction boxes, or other accessories.
- Any site work or installation tasks (ie, unloading, placement, dewatering, diving, clearing the forebay, wiring, provision of concrete structure, etc.), equipment (such as cranes, hammer drills, etc.), or anchor bolts.
- Pre-installation tasks such as touch-up painting, checking bolts for tightness, removal of shipping containment devices, etc.
- Engineering: Does not include drawings other than those for the FlexRake.
- Additional structure for seismic or wind conditions.
- Offloading or handling of delivered equipment.
- Union labor for all field support services.
- Controls not specifically listed above.
- Videotaping of the training sessions
- Release of proprietary information.
- Insulation or weather proofing.
- Site/field painting or touch up.
- Vibration and noise testing.

LOWEST COST OF OWNERSHIP
COARSE SCREENING

Reliable, Even in the Worst of Storms and Toughest of Conditions



FlexRake® FRHD

Mechanically Cleaned Bar Screens

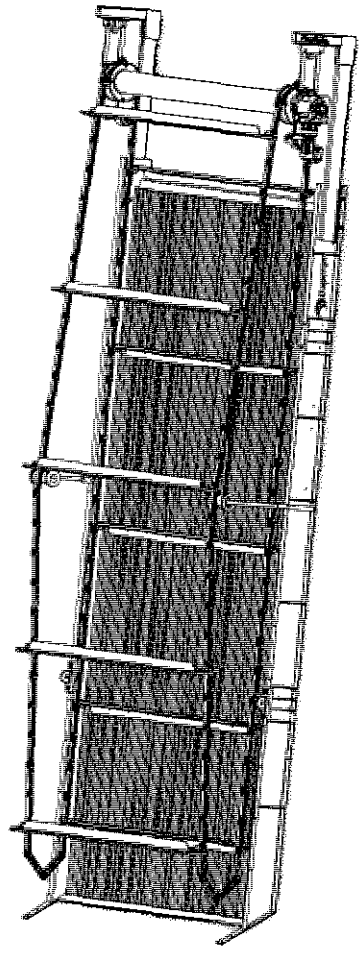
Robustly simple front return Duperon® FlexRake® technology. Utilizes A36 steel with Duperon® standard coating or hot-dipped galvanized. Available with 2 inch to 4 inch openings.

- Industry-Exclusive FlexLink™ Design Incorporates a Robust 5 lb Stainless Steel Cast Link System—60,000 lb Ultimate Strength, 1,000 lb Debris Lifting Capacity
- Ideal for Open Channel Applications Where Debris Size and Velocity may be Unpredictable
- Assures Continued Flow—Even Through Heavy Storms—Without Interruption or Shutdown
- No Lower Sprockets, Bearings, Tracks or Guides That Require Underwater Lubrication or Dewatering For In-Channel Maintenance

Duperon ADAPTIVE TECHNOLOGY
Your Path to the Future™

The Duperon® FlexRake® FRHD

- Effortlessly Removes Debris of All Sizes Without Interruption—No Alarms, No Operators, No Fuss
- Continually Cleans Across Entire Intake With Multiple Scrapers (No Cycle Times, No Clogging)
- No Carryover, Most Resilient Design In The Industry—Perfect for Stormwater, and Flood Control Applications
- Easy to Install and Easy to Operate



TYPICAL APPLICATIONS
Open channels, water intakes, coarse screens, irrigation canals, stormwater pump stations, flood control, hydroelectric.

UNIT WIDTH
2 feet to 12 feet

UNIT LENGTH
10 feet to 100 feet

ANGLE OF INSTALLATION
Range from vertical to 45 degrees, dependent upon site conditions. Optimum: 30 degrees from vertical.

STANDARD MATERIALS OF CONSTRUCTION
A36 steel, with Duperon® standard coating or hot-dipped galvanized. Available in 304 or 316 Stainless Steel

BAR OPENING
2 inches to 4 inches

STANDARD SCRAPER SPACING
Every 6th link

SCRAPER CONFIGURATION
Serrated scraper

TYPICAL MOTOR
1/4 HP 3 PH, 230/460 VAC, weatherproof motor
1/8 HP 1 PH, 115/230 VAC, with weather shield

STANDARD OPERATING SPEED
0.5 RPM
Scrapers move 28 inches/minute

SHIPPING DATA
Ships fully assembled.
For retrofit only, rake is partially assembled.

STANDARD CONTROLS OPTIONS
Packages range from simple start/stop to sophisticated automation. Motor overload protection provided. Contact Duperon® for further details and assistance in selecting the perfect package for your site.

OPERATION OPTIONS
Continuous/Manual.
Automatic with timer, float, SCADA, differential/high-level sensing options with I/O as needed.

Duperon ADAPTIVE TECHNOLOGY
Your Path to the Future℠

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2201/12/13/1M

- Anchor Bolts by others.
- Discharge system.
- Stilling wells.

Proposal Terms:

- Subject to acceptance by our credit department.
- Provision for retainage is not included in this proposal.
- Pricing is subject to changes based upon time of order and current stainless steel prices.
- Terms may be negotiated upon request

Right to Refuse:

This proposal is based upon the information available at this time and may be impacted by future specifications, scope, and other requirements. This information may be relied upon and used for project estimating purposes only. Note In the event of cancellation of a purchase order or contract, Duperon Corporation will be compensated for all costs that it or its subcontractors have incurred for performance of work in good faith. Due to the current volatility of the steel market, prices may be impacted at time of order. Please be advised that Duperon Corporation retains the right to revise, withdraw, or negotiate this offer at any time prior to signing a material contract.

the initial submittal package is generated. Hanson will not be liable for product manufactured but not utilized which was produced in accordance with approved submittals or detail drawings.

- Standard products sold on a "first come, first served" basis. Standard products include the following; Drycast Reinforced Concrete Pipe (RCP) with profile gasketed joint in sizes ranging from 12"-72", blank base sections for 48" and 60" manholes, riser sections for 48", 60" and 72" manholes without cored openings or steps, manhole cone or slab tops for 48", 60" and 72" manholes with standard access opening and 2x2, 2x3, 3x3, 4x3, and 4x4 catch basin base sections with standard knock-out panels and corresponding top sections.

- Non-Standard products will not be scheduled for production without an approved submittal package; including approved drawings, and are not eligible for return or credit of any kind. Non-Standard products include the following; Drycast RCP in excess of 72" inside diameter, all Wetcast and Centrifugally Spun RCP, all Reinforced Concrete Box Culvert (RCBC), round or square precast structures altered in any way; including cored openings for pipe connections, inverts, step addition, custom reinforcing placement etc., and any custom or specialty precast items including but not limited to panel vaults, precast headwalls, lagging panels and precast concrete slabs.

- Drycast Reinforced Concrete Pipe (RCP) to be produced and billed in straight standard lengths with standard reinforcing unless specifically noted otherwise. RCP meets or exceeds ASTM C76/C433, AASHTO M170/M198 and Caltrans specifications. Drycast RCP in excess of 48" inside diameter is to be unloaded by contractor. Contractor shall cut all short RCP sections in the field unless specifically noted otherwise. Drycast RCP includes (1) polyisoprene profile style rubber gasket per piece and joint lubrication as required. Alternate rubber compounds area available but are not included in the above quote unless specifically noted otherwise. Lost or damaged gaskets will be replaced at the contractors expense.
- Wetcast and Centrifugally Spun Reinforced Concrete Pipe (RCP) to be produced and billed in straight standard lengths with standard reinforcing unless specifically noted otherwise. RCP meets or exceeds ASTM C76/C433 or ASTM C361, AASHTO M170/M198 and Caltrans specifications. All Wetcast and Spun RCP is to be unloaded by contractor. Contractor shall cut all short RCP sections in the field unless specifically noted otherwise. Wetcast or Spun RCP includes either (1) or (2) polyisoprene o-ring style rubber gaskets per piece (dependent upon joint configuration) and joint lubrication as required. Alternate rubber compounds area available but are not included in the above quote unless specifically noted otherwise. Lost or damaged gaskets will be replaced at the contractors expense.

- Reinforced Concrete Box Culvert (RCBC) to be produced and billed in standard lengths with standard reinforcing unless specifically noted otherwise. RCBC meets or exceeds ASTM C1577, AASHTO M279/M253 and Caltrans precast box culvert specifications. All RCBC is to be unloaded by contractor. Contractor shall cut all short RCBC sections in field unless specifically noted otherwise. Box culvert to include mastic joint sealant. External Joint Wrap is available upon request, but is not included in the above quote unless specifically noted otherwise.

- If Precast Structures or Custom Precast items are priced to include freight, delivery does not include unloading or placement. All Precast Structures and custom precast to be unloaded and set by contractor.

- All linings, coatings and hardware are excluded unless specifically noted as included.

- Any lead time provided by Hanson staff is based upon the receipt of either a purchase order, or signed copy of our quote, receipt of preliminary (pre-lien) information and receipt of an approved submittal package when applicable. Lead times quoted without these items are considered estimated and are subject to change.

- Preliminary information (pre-lien) must be provided prior to first shipment.

- If quote includes delivery, delivery is based upon full loads. Any short loads requested by the contractor may be subject to additional delivery charges. Delivery is quoted based upon safe access to the site by standard length (45' trailer) fully loaded tractor/trailer carrying approximately 46,000 pounds; under their own power. Difficult deliveries including mountainous terrain, narrow roadways, low

clearance etcetera are not included unless specifically noted otherwise. Contractor is responsible for any delivery costs incurred for difficult deliveries not disclosed prior to receiving Hanson's bid including those costs for freight returned to Hanson due to lack of safe access and post-delivery trips to jobsite to evaluate shipping route. With adequate notice, Hanson will gladly pre-evaluate site access and include freight for difficult deliveries at time of quote.

- Contractor to provide all rigging and/or handling apparatus required for offloading and handling material on site.

- Hanson will not warranty and product which is damaged due to improper handling or installation practices by the contractor. Please contact your Hanson sales representative or field representative with questions or to request installation instructions.

Subject to State, County & Local Taxes, add as applicable
F.O.B.: Jobsite.
Above prices based on truckload quantities.
Terms: 30 Days, net 10 with approved account

Luis Santana
Sales Manager of California
Office: (916) 313-5518
Cell: (916) 704-5237
luis.santana@lehighhanson.com

TERMS AND CONDITIONS OF SALE

Any sale of goods is subject to the Limited Warranty and Remedies set forth below and Hanson's other General terms and Conditions of Sale. Any contrary provision in any purchase order or other document of customer is rejected.

Unless otherwise agreed upon, custom items will be billed in full 60 days after manufacture; these items will be discarded after 90 days at an additional 20% disposal fee.

LIMITED WARRANTY AND REMEDIES

Hanson warrants that, at the time of delivery, the goods sold will conform to the applicable specifications set forth in the Quotation, Acknowledgement of Order, or other sales document signed by Hanson. **HANSON MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL OTHER WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MECHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED.** If the goods fail to conform, at time of delivery, to this limited warranty, Buyer's sole and exclusive remedy and Hanson's entire liability will be, at Hanson's election, (i) the repair or replacement by Hanson within a reasonable time of the non-conforming goods, f.o.b. Hanson's plant, or (ii) the refund of the price paid for the non-conforming goods, and in either case only if Hanson receives written notice of the defect or non-conformance within 30 days of the date of delivery of the non-conforming goods. **HANSON WILL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.** Hanson's liability, whether under contract, in tort or otherwise shall not in any event exceed the price of the goods or portion of such goods on which such liability is based, and Buyer waives any claim for amounts in excess of that amount.