F1-316

EXECUTIVE SUMMARY

Bishop Cut Fish Screen Demonstration Project

Applicant
Murray, Burns and Kienlen

Project Description & Primary Biological/Ecological Objectives:

The hundred of miles of the Sacramento-San Joaquin Delta waterways is home to many resident and anadromous fish species. Fish species commonly found are **delta smelt, winter-run chinook salmon, Sacramento splittail, longfin smelt, striped bass** and many others. The populations of fish species have declined significantly in the past decade; those in particular, delta smelt and winter-run chinook salmon. The decline has been attributed partially to reductions in Delta outflow due to SWP/CVP pumping and unscreened water diversions.

Of the 1800 identified agricultural diversions in the Delta, the majority of these diversions are gravity flow siphons that irrigate crops grown on nutrient rich peat soil. Gravity flow siphons typically range in size from 8 to 16 inches in diameter and are located in remote locations where electrical lines are do not exist.

Screening of smaller agricultural diversions in the Delta has been nonexistent due to the high cost of installing and maintaining the screens. Many of today's fish screens require expensive civil works and sophisticated backwash systems for successful installation. Often, the cost of civil works and running electrical lines to remote siphons cost more than the fish screens. A method of screening agricultural diversions that requires minimal civil works and no electricity is needed to encourage the screening of agricultural siphons.

Within the past year, several diversions in the Suisun Marsh have been screened with a conical fish screen cleaned by a brush system, with additional screens scheduled to be installed within the next year. To date, these screens have performed exceptionally well, meeting or exceeding the 0.2 fps approach velocity criteria, reducing entrainment and preventing heavy debris buildup on the screens. The brush system is powered by batteries recharged by solar panels. Solar panels are ideal in certain remote locations within the Suisun Marsh and Delta. However, many diversion locations within the Delta are heavily traveled by recreation users and are close to major population centers. Solar panels may not be feasible in these areas due to vandalism.

Murray, Burns and Kienlen and Intake Screens Inc. propose to install a cone screen powered by a turbine powered brush system on a 16-inch diameter siphon. The project would test a turbine powered brush system while reducing the entrainment of fish. By consolidating two existing siphons, the project could potentially lead to reduction of total diversion points in the Delta.

Approach/Tasks/Schedule:

The proposed project is expected to be constructed before the 1998 irrigation season and post-project monitoring completed by the year 2000. The tasks for project completion are as follows:

Engineering & Design	—	Sept. 1997 to March 1998
Biological Consultation	—	Oct. 1997 to March 1998
Regulatory Permits & Consultation	—	Sept. 1997 to March 1998
Construction	—	April 1998
Post-project Monitoring & Financial Reporting	—	April 1998 to November 2000
Maintenance	—	April 1998 to April 2000

Justification:

Studies conducted by the Department of Water Resources have shown that screening agricultural diversion could save approximately one-quarter million larval and small juvenile striped bass, as well as one million other larval and juvenile fish in the Delta each year. The project is also expected to benefit CALFED's priority species such as fall-run chinook salmon, delta smelt and many others.

Should the project be a success, it could provide an economic means of screening remote agricultural siphons in the Delta and reducing entrainment. The screening of agricultural siphons would be consistent with CALFED's objective to restore the ecological health of the Sacramento/San Joaquin Delta.

Budget Costs:

The estimated budget cost for completing the project is as follows:

Engineering & Design	—	$ 8,500
Biological Consultation	—	$ 15,000
Regulatory Permits & Consultation	—	$ 3,000
Construction	—	$ 100,000
Post-project Monitoring & Financial Reporting	—	$ 47,500
Maintenance	—	$ 7,000
Total Project Cost		$ 181,000

Third Party Impacts:

There are no anticipated third party impacts associated with the project. Approval has been obtained from the local landowner for installation and operation & maintenance of the fish screen and siphon.

Applicant Qualifications:

MBK is a consulting civil engineering firm whose main emphasis is water resources. Its three main areas of specialization include water supply planning, flood control and water rights. MBK represents many water diverters located in the Sacramento/San Joaquin Delta watershed. This association has resulted in MBK personnel involvement in many existing and planned fish screening facilities. The services provided include feasibility design and environmental/regulatory. The list of projects includes Pelger Mutual Water Company, Deseret Farms Wilson Ranch, Maxwell Irrigation District, Lower Joice Island, Thousand Acre Ranch, Browns Valley Irrigation District and Grizzly Island.

Monitoring & Data Evaluation:

The project will be monitored for biological effectiveness and mechanical performance of the fish screen. A technical report would be prepared after each irrigation season to document mechanical performance of the fish screen and cleaning system. Biological monitoring would focus on both hydraulic and biological criteria.

Local Support/Coordination With Other Programs/Compatibility with CALFED:

The final design and specifications of the fish screen will incorporate advice from Department of Water Resources, Department of Fish & Game (DFG), United States Fish & Wildlife Service and National Marine Fisheries Service for expedient permit approval. Permits or approvals will be obtained from the Corps of Engineers, DFG Streambed Alteration Agreement, and the Central Valley Regional Water Quality Control Board. Cost share in the project has been by means of in-kind services by MBK and a long-term operation and maintenance agreement with Marchetti Brothers Farming.

BISHOP CUT FISH SCREEN DEMONSTRATION PROJECT

Prepared for:

CALFED BAY-DELTA PROGRAM
1416 Ninth Street, Suite 1155
Sacramento, California 95814

Applicant:

Gilbert Cosio Jr.
Murray, Burns and Kienlen
Consulting Civil Engineers
1616 29th Street, Suite 300
Sacramento, California 95816
Telephone: **(916) 456-4400** FAX: (916) 456-0253

Applicant Type: Taxable Corporation
Tax I.D. #94-2282149

Participants:
Murray, Burns and Kienlen
Intake Screens Inc.
Marchetti Brothers Farming

RFP Project Group Type: Construction

I. *PROJECT DESCRIPTION:*

Murray, Burns and Kienlen (MBK) of Sacramento, California and Intake Screens Inc. (ISI) of Clovis, California, are proposing to install a brushed cone screen with a turbine powered brush system on an agriculture siphon diverting water from Bishop Cut in the Sacramento-San Joaquin Delta (Sheets 1 & 2). The purpose of the project is to reduce entrainment of fish using a fish screen with an alternative cleaning system.

The proposed fish screen will consist of mounting one brushed cone screen at the entrance of a new 16-inch diameter steel siphon (Sheet 3). The new 16-inch siphon will irrigate an adjacent field that currently is irrigated by two 12-inch unscreened siphons. Should the fish screen and cleaning system meet performance expectations, the two 12-inch unscreened siphons would be abandoned.

Fish screen criteria as described in "*Fish Screen Criteria for Anadromous Salmonids,*" National Marine Fisheries Service, Southwest Region (January 1997) will be used to develop the screen specifications. The 16-inch siphon has a maximum diversion rate of approximately 18 cfs. It is proposed to use a 12-foot diameter cone screen manufactured by Intake Screens, Inc., to satisfy the approach velocity criteria of both 0.2 fps and 0.33 fps for delta smelt and winter-run chinook salmon, respectively. Screen material will consist of perforated stainless steel with 5/32-inch round openings on 1/4-inch staggered centers with 35% open area. This specification meets or exceeds the screen material criteria for fingerling salmonids. Similar cone screens with solar power brush systems have been installed on five equal or larger diversions in the Suisun Marsh and have been effective to date. The final design and specifications will be developed in consultation with staff from Department of Water Resources (DWR), Department of Fish & Game (DFG), National Marine Fisheries Service (NMFS) and United States Fish & Wildlife Service (USFWS).

It is proposed to use a turbine powered brush system requiring no electricity or batteries to operate. A turbine propeller in the 16-inch pipe would be geared to rotate the brush assembly on the cone screen. The screen would be cleaned continuously during times of water diversion. For maintenance and inspection purposes, the screen would be mounted on four piles and lifted in and out of water for inspection and maintenance.

A turbine powered brush system was selected over a solar powered system for the following reasons:

1. The siphon is located in a high visible and heavily traveled location of the Delta. A solar panel at the diversion site would be highly suspectable to vandalism.

2. To test the feasibility of using turbine powered brush system on Delta agriculture siphons.

EXPECTED BENEFITS:

The proposed fish screen is expected to benefit the priority species identified in the CALFED RFP. Fish species include San Joaquin River fall-run chinook salmon, delta smelt, longfin smelt, Sacramento splittail, steelhead trout and striped bass. Depending on flow conditions, benefits will be provided for winter-run and spring-run chinook salmon as well. Entrainment stress to populations of these species will be reduced by implementation of this project. Benefits will be long-term since arrangements have been made for future operations and maintenance.

Fish sampling at the site has not been conducted but local landowners state that striped bass and American shad are two anadromous fish regularly caught in the area by recreational fisherman. During 1993 through 1995, the DWR Delta Agricultural Diversion Evaluation studies included sampling of fish entrainment at an agricultural diversion at nearby Bacon Island. Study results at Bacon Island for 1994 identified the entrainment of at least 13 identified species and other unidentified species of egg, larvae, juvenile, or adult fishes. The greatest entrainment during the study period was for chameleon goby, striped bass, and threadfin shad. These findings were similar to results of the Agricultural Diversion Evaluation 1992 pilot study at the same Bacon Island diversion.

The Delta Agricultural Diversion Evaluation generally concluded that fish entrainment losses at each water diversion are unique and different, and depend on diversion operations and the life stage, seasonal occurrence, abundance, and distribution of fish in the channel of the diversion intake. However, the Bacon Island fish entrainment estimates could be considered representative of possible annual fish losses from Bishop Cut at the proposed fish screen project described above. Based on this assumption, the fishery benefit could translate into increased survival of some fraction of approximately one-quarter million larval and small juvenile striped bass, as well as a portion of almost one million other larval and juvenile fish estimated to be lost in the Delta each year. In addition, benefits would accrue to the other priority species mentioned above.

BACKGROUND:

In 1996, MBK on behalf of Marchetti Brothers Farming, proposed a similar fish screen demonstration project at the same diversion location. That proposal consisted of installing four Lakos Self-Cleaning Intake Screens with a backwash system powered by a ram pump. The ram pump backwash system would have required no electricity to operate. Approval for 50% cost share was obtained from Delta Pumping Plants Fish Protection Agreement and the

remaining 50% was being sought from CVPIA Unscreened Diversion Program and Category III. MBK prepared preliminary designs for the proposal and proceeded to obtain regulatory approval when funding for the project did not materialize. Thus, much of the preliminary design work is complete for the proposed project.

TECHNICAL JUSTIFICATION:

Of the more than 1800 agricultural diversions identified within the Delta, most of these diversions are gravity flow siphons with intake pipes between 8 and 16-inches diameter. Many of these diversions are in remote areas where no electric power exists. Running electric lines to remote siphons to power backwash systems is beyond the financial capability of most farmers thus discouraging installation of fish screens on agricultural diversions. Should the proposed fish screen operate successfully, it could significantly encourage increased screening of smaller agricultural diversions in Delta because it would demonstrate a more economical screening system that can be used at remote diversions without available electric power. It could also reduce the number of diversion points since two or more smaller siphons could be consolidated at a larger, single diversion.

This fish screen proposal is consistent with CALFED's long-term restoration objective, benefits multiple species, and has no third-party or redirected impacts. It is also compatible with CALFED's objective for water supply reliability, water quality, and levee system integrity.

SCOPE OF WORK:

To complete the proposed project, the following tasks have been identified:

1. **Engineering Design** -- final design of fish screen, backwash system & civil works, plans and specifications for construction, contract administration and project inspection/monitoring.

2. **Biological Consultation** -- biological evaluation of fish screen design, consultation with resource agencies, site assessment, refinement of technical and biological monitoring.

3. **Regulatory Permits and Consultation** -- prepare regulatory permit applications, oversee permit process.

4. **Construction** -- construct and install new siphon, discharge structure, fish screen and cleaning system.

5. **Post-project Technical and Biological Monitoring (2 years)** -- evaluate and report on performance and effectiveness of fish screen.

6. **Maintenance** (2 years) -- install/remove screens, repair fish screen as needed.

It is proposed to provide financial and progress reports of the project quarterly prior to construction. After construction provide technical and biological monitoring reports once a year after the irrigation season for two years. Financial reports would include an itemization of all incurred cost per task as described above. Reports would be submitted to CALFED and all interested parties.

MONITORING:

Should the fish screen be constructed, a two-year technical and biological monitoring plan is proposed to evaluate the performance and effectiveness of the fish screen.

Technical monitoring of the fish screen would focus on the mechanical performance of the screen and cleaning system. Daily or weekly inspection logs would be prepared during the operation of the screen. Inspection during operation would document channel conditions, debris load, diversion rate, and cleaning cycle timing. After each irrigation season, a technical report would be prepared to report the performance of the screen during the irrigation season.

The monitoring program for the fish screen at Bishop Cut will be focused on evaluating both hydraulic and biological criteria. These criteria include the following: 1. Does the hydraulic performance of the screen match design/regulatory requirements? ; and 2. is the screen successfully excluding/diverting the species of concern from the water diversions?

Hydraulic performance will be assessed by evaluating approach velocities and sweeping velocities under a range of flow/tidal conditions. Acceptable approach velocities at the screen are expected to be ≤ 0.20 feet per second, since the screen will be located in a tidal area where delta smelt may be present. Maintaining a suitably low approach velocity is important to avoid impingement of fish on the screen. Approach velocity will be measured by an electromagnetic (Marsh-McBirney) meter or acoustic meter along a grid pattern, perpendicular to the screen face and approximately three inches in front of the screen surface.

Sweeping velocities across the face of the screen are important to move fish away from the diversion as quickly as possible, thereby providing little opportunity for entrainment or

impingement. Sweeping velocities should be twice the approach velocity, and will be measured with the same current meter used for approach velocities. Measurements will be conducted parallel and adjacent to the screen face. A range of measurement locations will be used in order to depict velocity isopleths in the vicinity of the screen.

Biological sampling will be conducted behind the fish screen during the spring and summer diversion period for two years, and any captured species identified, counted, and measured. Sampling during the first spring and summer of screen operation will occur on a monthly basis. Biological sampling will utilize a fyke net and live box that can be attached directly to the downstream end of the diversion. The net will be continuously operated during water diversions over 2-3 days for each sampling period.

IMPLEMENTABILITY:

Regulatory permits for the proposed project have not been obtained yet but no foreseeable problems are anticipated. A DFG streambed alteration agreement was obtained as part of the earlier demonstration project. It is anticipated extension of the agreement will be granted. Other regulatory permits would be, U.S. Army Corps General Permit #34 (GP34). Some key conditions of GP34 require the siphon to be located in the Sacramento/San Joaquin River drainage basin, siphon capacity less than 40 cfs and fish screens installed which comply with criteria established by DFG and NMFS. The proposed project meets all the conditions imposed by GP34. To expedite permit approval, the fish screen final design and specifications will be developed in coordination with DWR, DFG, NMFS, and USFWS. Installation of the siphon and fish screen will have no significant impact upon the vegetative and aquatic resources within the project area or water quality of Bishop Cut therefore no mitigation is planned.

Other approvals needed for installation include local landowner approval and an encroachment permit from Reclamation District No. 2044. Marchetti Brothers Farming, the landowner, has approved the installation of the siphon and has agreed to provide long-term operation and maintenance. The proposed project should have no problems meeting conditions set by Reclamation District No. 2044, which include, minimum pipe elevations, pipe discharge location and pipe material.

Technically sound and proven methods for screening diversions have been adopted for this project, as demonstrated on diversions in the Suisun Marsh. Development and design of the turbine cleaning system is underway and testing of the system should occur shortly. If construction funding is approved, construction could begin as early as April 1998 and by April 1999. Since the installation will not impact the existing siphons, construction will not be impacted by farming operations.

II. COST AND SCHEDULE

Table 1 shows the estimated cost of the tasks described above in "Scope of Work." Funds are requested from CALFED for 100% of the project total cost. MBK plans to cost share in the proposed project by means of in-kind services performed for the earlier demonstration project. To date, MBK has expended $4,000 on preliminary design and permit approval for the project. Local involvement and support are being provided by Marchetti Brothers Farming through their agreement to provide long-term maintenance of the fish screen and siphon.

Table 1

Cost Breakdown							
Project Phase and Task	**Direct Labor Hours**	**Direct Salary & Benefits**	**Overhead Labor**	**Service Contracts**	**Material & Acquisition Contracts**	**Miscellaneous & other District Costs**	**Total Cost**
Engineering Design	110	$ 7,500	—	—	—	$1,000	$ 8,500
Biological Consultation	—	—	—	$ 15,000	—	—	15,000
Regulatory Permits & Consultation	24	1,800	—		—	1,200	3,000
Construction	—	—	—	100,000	—	—	100,000
Technical Monitoring & Reporting (2 years)	60	4,500	—	—	—	500	5,000
Biological Monitoring & Reporting (2 years)	—	—	—	40,000	—	—	40,000
Financial Reporting (2 years)	40	2,200	—	—	—	300	2,500
Maintenance	—	—	—	7,000	—	—	7,000
TOTAL	234	$16,000	$0	$162,000	$0	$3,000	$181,000

The project is expected to be constructed before the 1998 irrigation season by adopting the following schedule:

Engineering & Design	—	Sept. 1997 to March 1998
Biological Consultation	—	Oct. 1997 to March 1998
Regulatory Permits & Consultation	—	Sept. 1997 to March 1998
Construction	—	April 1998
Post-project Monitoring	—	April 1998 to November 2000
Maintenance	—	April 1998 to April 2000

III. APPLICANT QUALIFICATIONS:

MBK is a consulting civil engineering firm whose main emphasis is water resources. Its three main areas of specialization include water supply planning, flood control and water rights. MBK represents many water diverters located in the Sacramento/San Joaquin Delta watershed. This association has resulted in MBK personnel involvement in many existing and planned fish screening facilities. The services provided include feasibility, design and environmental/regulatory. The list of projects includes Pelger Mutual Water Company, Deseret Farms Wilson Ranch, Maxwell Irrigation District, Lower Joice Island, Thousand Acre Ranch, Browns Valley Irrigation District and Grizzly Island.

In addition, MBK has consulted for Reclamation District No. 2044 (King Island) and its landowners for nearly 20 years in regard to flood control, irrigation and drainage. MBK also consults for 20 other Delta reclamation districts in the same capacity.

Intake Screens, Inc., and its president, Russell Berry, have been involved in screening diversions in the Delta and along the Sacramento River for five years. Most recently, the screen chosen for this project was installed in the Suisun Marsh. The screen was invented by Mr. Berry. Mr. Berry has been designing screens for over twenty years. His screens are currently being used on agricultural diversions all over the world.

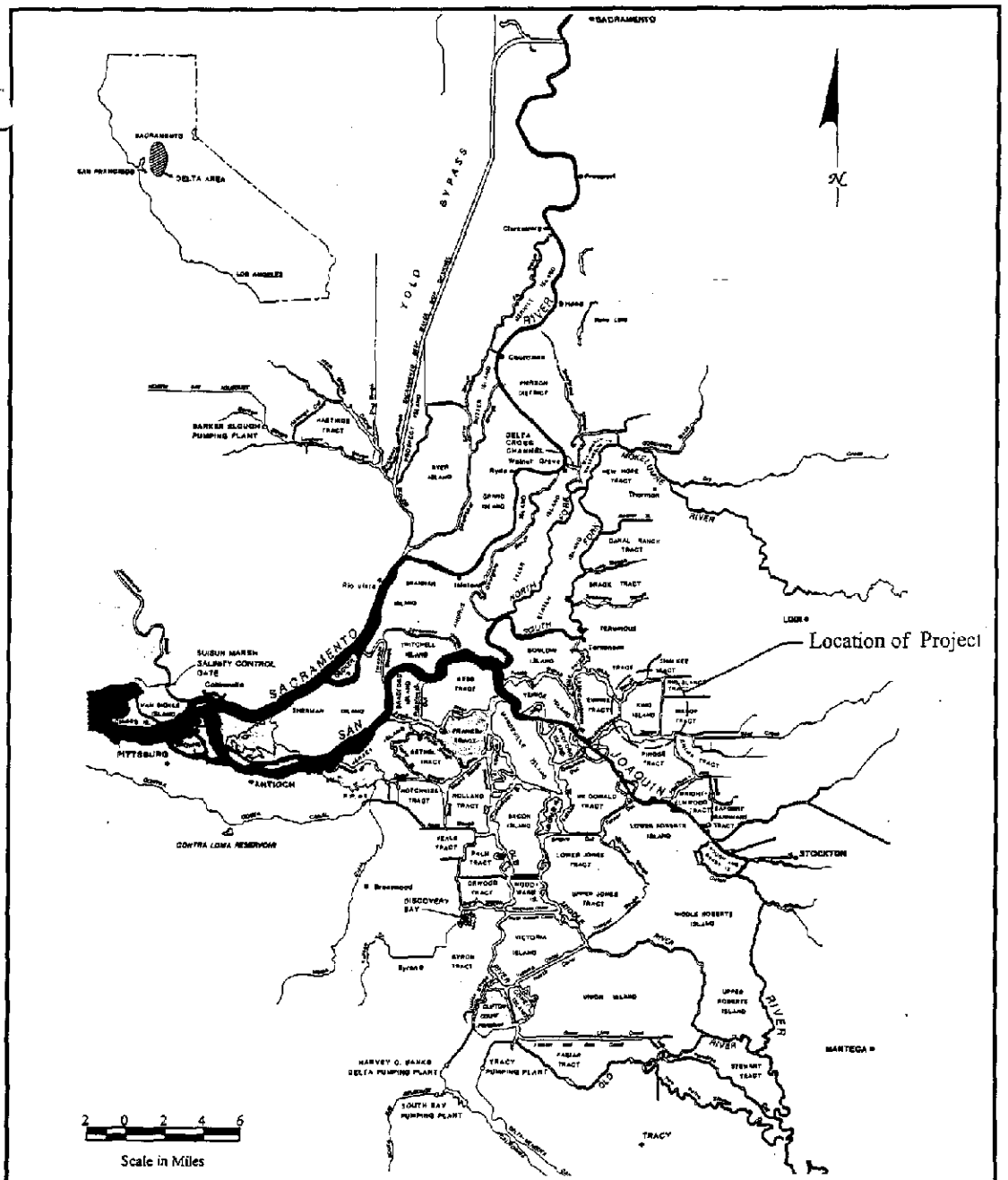
Consistent with Government Code §4525, EA Engineering, Science, and Technology, Inc. was selected by Murray, Burns and Kienlen to provide environmental services in connection with biological monitoring, project development and permit processing. The selection was made on the basis of qualifications and demonstrated competence for the requested services, including documentation of fair and reasonable prices.

Pursuant to California Government Code §1090, EA Engineering, Science, and Technology, Inc., is disclosing a remote interest in proposals submitted for funding under CALFED's 1997 Category III program. EA staff, as third tier subcontractors to the Bureau of Reclamation, have provided technical and administrative support to CALFED agency staff in the Restoration Coordination Program. In this capacity, EA staff have assisted with documentation of public meetings of the Ecosystem Roundtable, and compiled technical team meeting information for distribution to Roundtable members and the public. EA's legal counsel has determined that EA's participation as a subconsultant in contracts that may be awarded under the Category III program does not constitute a violation of California Government Code §1090.

EA is a multidisciplinary environmental consulting firm with a staff of Northern California scientists who specialize in environmental analyses related to water resources.

EA's staff have been conducting aquatic studies in the Delta and its tributary watersheds for over 20 years, and have completed entrainment studies on dozens of facilities during that time.

Scott Wilcox of EA Engineering, Science, and Technology is a senior fisheries biologist whose role will involve technical oversight and management of tasks related to biological monitoring and environmental compliance. His areas of technical expertise include aquatic and terrestrial resource impact assessment, fish screen evaluation, and fisheries analyses in riverine and estuarine systems. His 17 years of experience includes biological investigations for approximately 30 projects within or tributary to the Central Valley and the Delta. Many of these projects involved planning of aquatic habitat restoration actions and characterization of fish populations and habitat conditions. Relevant project experience includes biological consultation, design, and monitoring plan development for fish screens on hydro projects; fish population sampling in riverine and estuarine systems; CEQA compliance for habitat restoration and mitigation projects; and TES species surveys. Professional references for similar projects include John Kessler (916-644-1960) of El Dorado Irrigation District and Steve Onken (916-534-1221) of Oroville-Wyandotte Irrigation District.

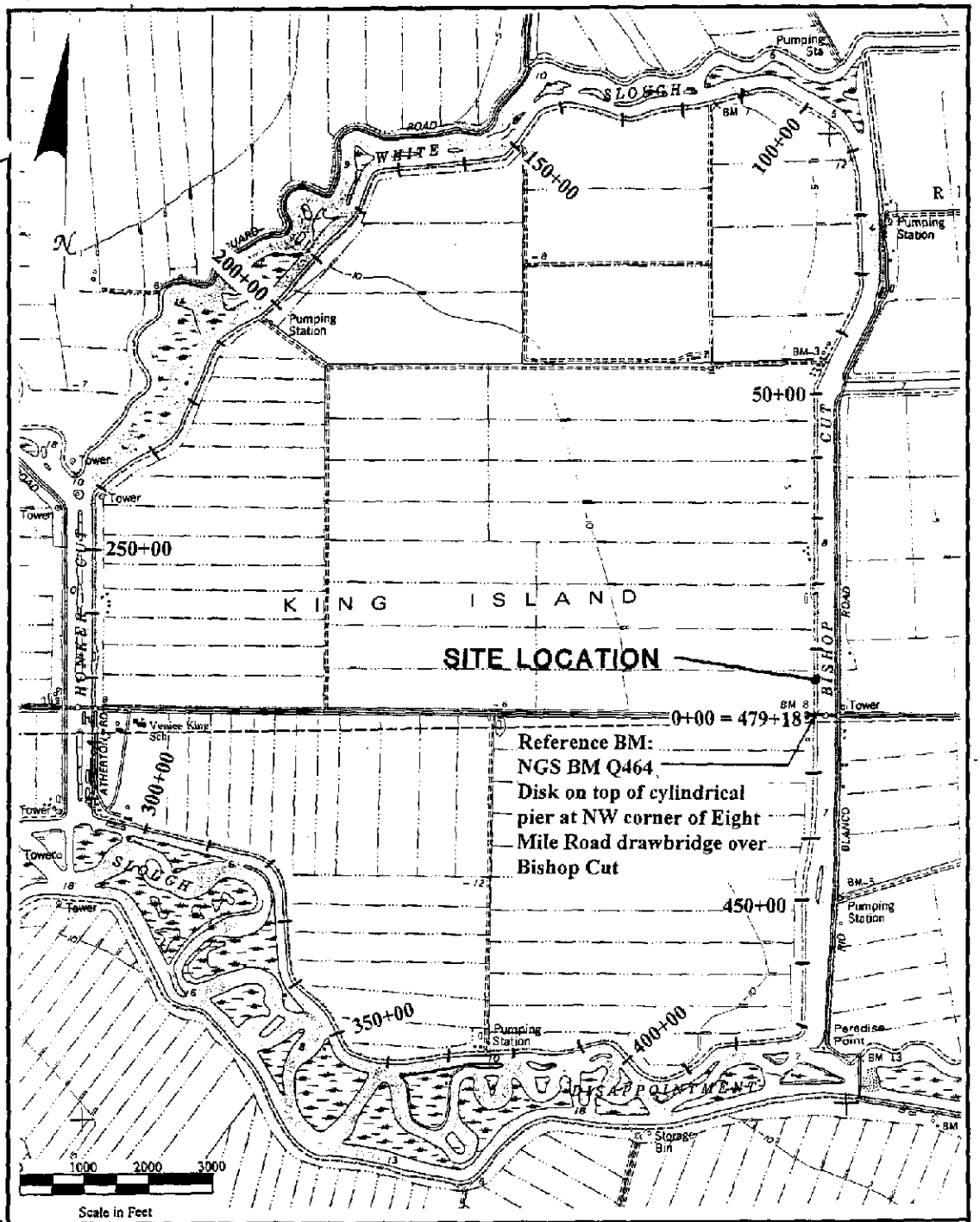


Location Map

MURRAY, BURNS & KIENLEN - Consulting Civil Engineers
1616 29th Street Ste 300, Sacramento CA 95816 - (916) 456-4400

Bishop Cut Fish Screen Demonstration Project

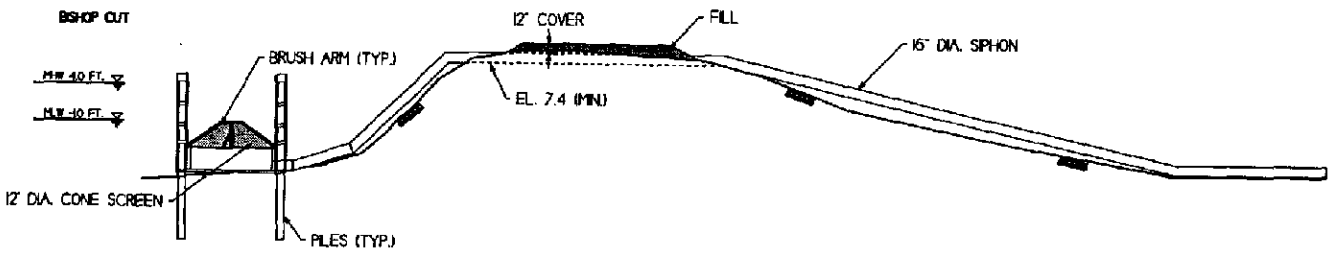
SHEET 1 OF 3



Bishop Cut Fish Screen Demonstration Project

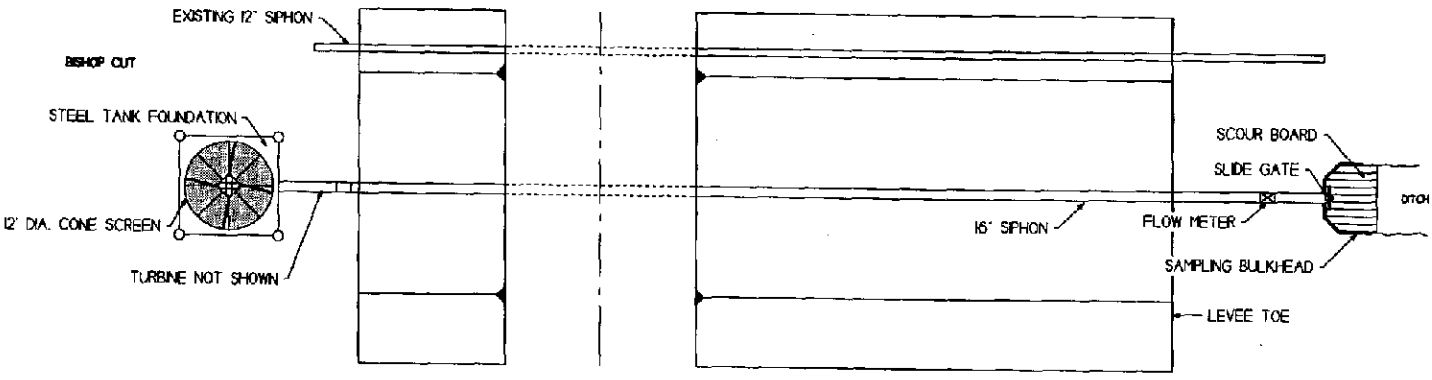
MURRAY, BURNS & KIENLEN - Consulting Civil Engineers
1616 29th Street Ste 300, Sacramento CA 95816 - (916) 456-4400

SHEET 2 OF 3



CROSS SECTION

SCALE 1" = 20'



PLAN

SCALE 1" = 20'

MURRAY, BURNS & KIENLEN - Consulting Civil Engineers 1616 29th Street Ste 300, Sacramento CA 95816 - (916) 456-4400	**Bishop Cut Fish Screen Demonstration Project**	Date July 1997	Sheet 3 of 3

I-006829

Item 8

NDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME
Murray, Burns & Kienlen, A Corporation

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

FFICIAL'S NAME
Gilbert Cosio, Jr.

ATE EXECUTED
July 28, 1997

EXECUTED IN THE COUNTY OF
Sacramento

OSPECTIVE CONTRACTOR'S SIGNATURE

OSPECTIVE CONTRACTOR'S TITLE
Vice President

OSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME
Murray, Burns & Kienlen, A Corporation

Item 11

Agreement No. _____

Exhibit _____

NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS

STATE OF CALIFORNIA)
)ss
COUNTY OF Sacramento)

Gilbert Cosio, Jr., being first duly sworn, deposes and
(name)

says that he or she is Vice President of
(position title)

Murray, Burns & Kienlen, A Corporation
(the bidder)

the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

DATED: July 28, 1997 By _____
(person signing for bidder)

PARHAM SHEKARLAB
COMM. # 1060700
Notary Public — California
SACRAMENTO COUNTY
My Comm. Expires MAY 31, 1999

Subscribed and sworn to before me on
7/28/97

(Notary Public)

(Notarial Seal)