LOCALLY BUILT FISH SCREEN PROJECT II

LOCATED ON

SUGAR CREEK,

A TRIBUTARY TO THE SCOTT RIVER

AGREEMENT # 14-48-0001-96

PROJECT IDENTIFICATION # 96-FP-23

Project completed by:
Siskiyou Resource Conservation District
Gary Black
PO Box 268
Etna, CA 96027
Telephone # (530) 467-3975
Fax # (530) 467-5617

Abstract: The purpose of the project was to install a fish screen in the Scott River watershed which would supplement the diversion screening efforts of the California Department of Fish and Game (CDFG). The Locally Built Fish Screen Program is a major portion of the Siskiyou RCD's mission to screen all active diversions within anadromous use. The purpose of the program is to provide better management of resource use and ensure fishery protection.

The funding was used to implement a self-cleaning fish screen in Sugar Creek, an important tributary to the Scott River. The fish screen met both CDFG and National Marine Fisheries Service (NMFS) specifications. The fish screen was constructed on the Fay Diversion Ditch, a 6.5 cfs diversion. The Fay Ditch is located in a critical portion of Sugar Creek approximately two miles above its confluence with the Scott River.

We are confident that the implementation of this screen will protect hundreds of salmonids each year. The structure will be a benefit to both the diversion users and the juvenile fishery populations. However, the designing of the fish screen has been a long, difficult process due to screen specifications which are not applicable. The screen specifications drawn up by NMFS do not apply to small surface diversions in steep gradient streams. Therefore, we need to achieve an excepted order of "variance" from NMFS every time we can't meet specifications due to natural topography. This makes screen design very difficult and frustrating as calculations and hierarchy have taken the place of biological concern and common sense.

Background: The Scott River, which runs through Scott Valley, is a major tributary to the Klamath River. The Scott supports wild stocks of chinook, coho, steelhead and rainbow trout. There are many tributaries to the Scott which contain prime spawning and rearing habitats for salmon and steelhead.

The citizens of Scott Valley are proactive in their efforts to sustain anadromous populations. The Siskiyou Resource Conservation District (RCD), Scott River Watershed Coordinated Resource Management Planning (CRMP) Council, and responsible agencies have developed consensus plans which site causes and possible solutions to declining fisheries populations. A major goal of the Siskiyou RCD and the Scott River CRMP is to install and maintain fish screens on all active diversions within the Scott River Drainage.

The Department of Water Resources has listed 152 diversions within the Scott River watershed. The RCD has identified approximately 120 active diversions, of which, only 38 are screened. Because of budget cuts and maintenance costs of existing screens, the California Department of Fish and Game is able to fabricate a maximum of two fish screens a year for the entire county. The Siskiyou RCD is currently implementing an aggressive fish screen fabrication program using technical assistance from the CDFG, NMFS and Natural Resource Conservation Service (NRCS)

Countless juveniles are lost by the nearly 120 unscreened diversions in the Scott River watershed. Few studies have been done on fishery densities and populations in the tributaries to the Scott River. Most diversion take out points are located in the mid and lower reaches of tributaries where anadromous fish spawn. Therefore, we can assume significant numbers of juvenile fish are lost to specific unscreened diversions.

Diversions are important to the agricultural community, which is the predominant economy in Scott Valley. Diversion users are aware of the adverse effects unscreened diversions can have on fisheries and are willing to have screens installed. The cost of fabricating and installing a self cleaning fish screen composed of stainless steel and aluminum is above what most landowners can personally afford. Therefore, many diversions remain unscreened even though most landowners are conscious and concerned about loss of fish.

Until recently, some members of the CRMP were concerned about the maintenance of the fish screens, which is a twice a week task. These members felt the diversion users would not want to maintain the screen and the misuse would shorten the life of the screen and possibly threaten the juvenile fish in the diversion ditch. This is now not a concern to the RCD. Due to the listing of the coho, diversion users now must have screens installed soon. Those who do not have screens may be forced to shut down the diversion until a screen is installed. Upon this realization, many diversion users were eager to receive screens and agree to screen maintenance for the duration of the screen. Improper maintenance causes the screen to plug up with debris. When this occurs, less water goes through the screen (and down the ditch) and more goes through the by-pass back to the stream. Therefore, the more the diversion user properly operates the screen, the more water he/she receives for irrigation. Now that fish screens are required, diversion users have agreed to maintain them. Our assurance that the screens will be operated correctly is that users receive more water when they are routinely maintained.

Project Implementation Delays: As previously mentioned, the project was very difficult to "get on the ground" due to the threatened listing of coho salmon. The listing brought NMFS inland as the lead agency. NMFS has developed screening specifications for other listed salmonid stocks which were significantly different from the CDFG specifications. The RCD did not know how to design the screen due to the differing specifications. The timing of attempted screen construction was during a period of turmoil and postulating by the two agencies.

With the help of NRCS, the Siskiyou RCD and Shasta Valley CRMP were instrumental in encouraging the CDFG and NMFS to meet on both on the state and regional level. We held a meeting with NMFS and CDFG screen engineers in Scott Valley during the spring of 1997. During the visit, state and regional engineers were able to visualize the hardships of installing small screens in steep, wild and often unattainable locations and refine design specifications. From this meeting, the CDFG and NMFS developed standardized fish screen specifications for the State of California. Unfortunately, the timing of the listing and the needed combination of screen specifications forced the RCD to wait until the end of the 1997 irrigation season to begin construction.

Screen Construction: The RCD worked with NRCS engineers and the CDFG to refine the design. The NRCS was paramount to the development of the screen design. The screen design was reviewed by local CDFG personnel. Upon local approval, the design was reviewed by NMFS for final acceptance. When NMFS approved the final design, we were ready to select a contractor.

The RCD wanted to focus on providing construction opportunities to local citizens who possessed the needed abilities. This was an effort to privatize the construction of fish screens in order to help the local economy and reduce screen costs. A bid package was developed for the Sugar Creek fish screen and the proposed project was publicized in two local newspapers. The bid packages were sent out to over 14 interested persons. The bid package contained the design drawings, the bid process, needed qualifications, and required insurance and bonding (attached). The RCD wanted to provide an employment option for all capable people. Research found that a contractors license was not required, when improving an agricultural water delivery system (State Contractor's License Board) and the most suitable bond package.

The Fay Ditch is a Vertical Plate Self-Cleaning screen which has moving brushes that clean the screen surface. The brushes are operated by a paddle wheel. The screen is placed in the diversion ditch rather then the active channel in order to better protect the structure from high flows. The structure has a by-pass pipe which returns the fish in the diversion ditch back to the stream. The by-pass pipe is sized so the diversion user can now return water back to the stream when not needed. The size of the structure is 9 feet wide by 20 feet long. The by-pass pipe is 56 feet long and includes a "drop tank" (a holding pool for juvenile fish to protect them from elevation drop). A design is attached in a copy of the bid packet.

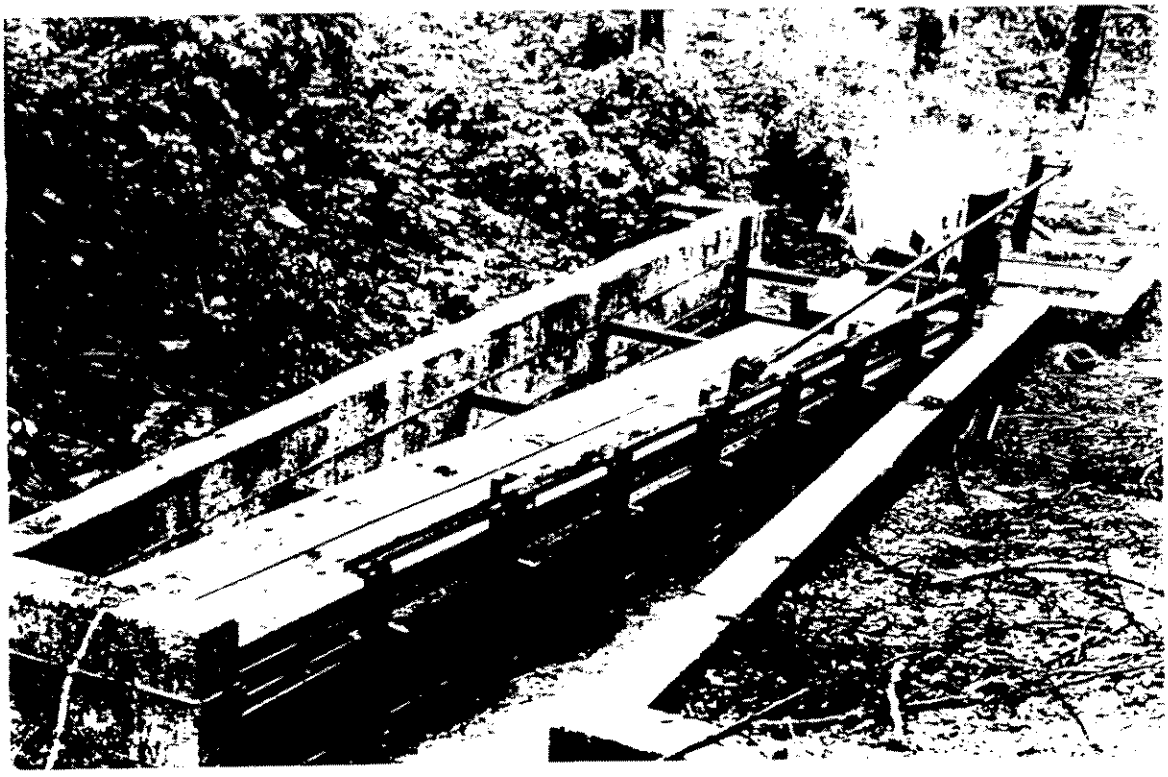
The screen works relatively well but does not operate as well as fish screens previously installed by the CDFG Yreka Screen Shop. The screen does not operate as well as the CDFG screens due the restrictions imposed by the new fish screen

specifications. Instead of using common sense combined with biological concerns to make decisions, we are now must abide by calculations and agency chain of command. Some of the new specifications are beneficial and answer previously unresolved questions. Still other new screen specifications are decisions which should be made by those in the field rather then the regional expert who has never seen the site. None the less, we at the RCD have "sharpened our teeth" on several fish screens and we now have the vision to design screens which are easy to construct and meet the current specifications. We are eager to continue designing and implementing screens and we will not relax until we have developed a successful program.

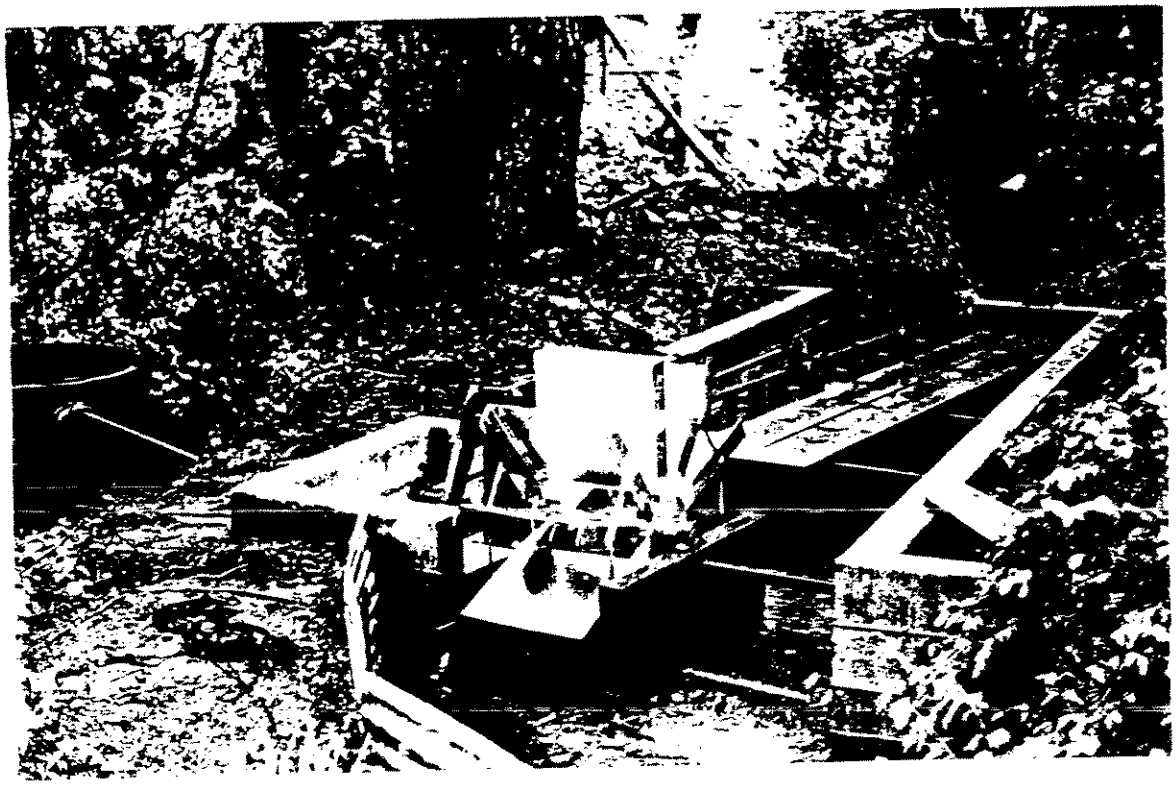
Financial Development: The Siskiyou RCD received $14,787.00 for the development of a fish screen in the Scott River Watershed from funding generated by the Klamath Restoration Act (Locally Built Screens). The funding was secured in 1996. The specifications for fish screen design changed during the spring of 1997. The new requirements significantly increased the cost of the fish screen. Therefore, the Siskiyou RCD utilized funding from a Jobs-In-the Woods Project (Fish Screen Fabrication and Maintenance Project: Agreement #14-48-0001-96672), which also was for screen development.

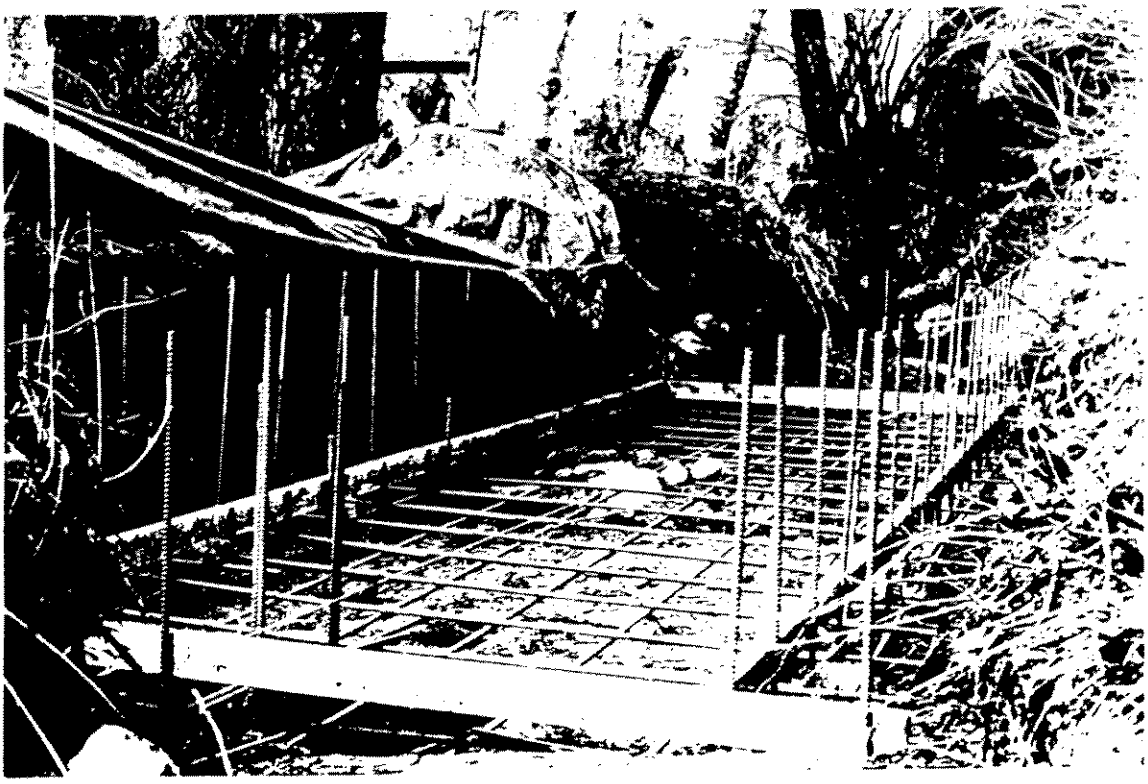
Funding from the Fish Screen Fabrication and Maintenance Project was transferred into the Locally Built Fish Screen II account (as shown on the Budget Page). The Fay Ditch fish screen ended up costing $24,038.84. The increased cost was largely due to complex screen specifications, and the staff time attempting to react and comply with the new specifications. The funding which was transferred into the account yet not used on the Fay Ditch fish screen was utilized on the Wright-Fletcher Fish Screen on Kidder Creek. The Wright-Fletcher Fish Screen Final Report is on file under "Fish Screen Fabrication and Maintenance Project", Agreement #14-48-0001-96672.

Conclusion: Even with its problems, the Siskiyou RCD is very pleased with the Locally Built Fish Screen II Project. We are confident that the screen installed on the Fay Ditch will extend past its estimated lifetime (20 years). We are pleased that diversion users are willing to accept the by-weekly responsibility of cleaning and maintaining the screens. This provides more funding for screen installation. The RCD has focused on constructing fish screens and selected screen installation as the highest priority project. Previously, the RCD focused on increasing the salmonid holding capacity of the watershed. Now the RCD has focused on protecting existing fisheries and habitat. We have found that the protection of resources usually is more cost efficient then restoring or creating new habitat.



Jay Ditch Fish Screen on Sugar Creek shown completed and operating in Spring of 1998





The Fay Ditch Fish Screen under construction during the winter of 1998

FINAL BUDGET
LOCALLY BUILT FISH SCREEN
PROJECT ID# 96-FP-23

Item:	**Original Budget:**	**Final Revised Budget:**
Salaries	1,000.00	7,961.68
Travel	100.00	1,254.86
Expendable	7,843.00	9,511.30
Operation & Maintenance	4,500.00	8,502.09
Subtotal	13,443.00	27,229.93
Administration	1,344.00	2,722.69
Total	**14,787.00**	**29,952.62**

Sugar Creek Ditch Fish Screen

To all interested bidders of the Sugar Creek Ditch Fish Screen construction project on Sugar Creek:

The Siskiyou Resource Conservation District would like to thank you for your interest in this program. Attached is general information about the screen as well as the approved plans. There is additional information available at the Siskiyou RCD office (440 Main St. in Etna) related to the screen design. The following are issues to be considered:

-All interested bidders must attend the pre-bid tour held on wednesday, December 3rd at 9:00 AM. Meeting location will be two miles up Sugar Creek Road at a cattle gaurd which croses the road.
-The successful bidder will be responsible for purchasing all materials, constructing and installing all portions of the project which are not defined below as the responsibility of the RCD.
- The responsibilities of the RCD include: Obtaining all permits, purchasing of the stainless steel screen, assisting in design questions and locating material vendors.
-The Siskiyou RCD Board will select the bidder who is qualified and has the lowest feasible bid. Any and all bids can be rejected by the RCD Board.
-The Attached bid sheets (last page) are to be returned to the Siskiyou RCD office no later then 4:00 PM on December 10th, 1997.

The mailing address is: Siskiyou RCD
PO Box 268
Etna, CA 96027

The physical address is: 440 Main St., Etna

Please feel free to contact Gary Black at 467-3402 if you have any questions. Thank you once again

Siskiyou Resource Conservation District

SUGAR CREEK DITCH FISH SCREEN PROJECT

BID NOTICE

SCOPE: Funding for the fish screen has been provided by the US Fish and Wildlife Service, Natural Resource Conservation Service and the users of the Fay Ditch (Sugar Creek Ditch). The Siskiyou Resource Conservation District (RCD) is administering the funds and insuring construction specifications are met. Final approval will also be required from a Natural Resource Conservation Service engineer. The selected bidder will be a sub-contractor to the Siskiyou Resource Conservation District (RCD). The RCD will pay the sub-contractor as invoices are received. Because the invoices must be processed through the federal procedure, actual payment can extend to 60 days beyond the day the invoice is submitted. The RCD acknowledges the delay may provide economic hardship or even exclude some bidders from participating in the process. Therefore, the RCD is attempting to set up an initial draw of **$3,000** which is available to the successful bidder 10 days after the excavation of the site is complete.

The work shall consist of three parts: 1.) Excavation and back filling of construction site and the by-pass culvert system which connects the construction site to Sugar Creek (access is minimal and hand excavation may be needed in some locations).
2.) Construction of concrete structure and installation of by-pass. 3.) Fabrication and installation of fish screen, screen supports and the paddle wheel. All phases have specifications which must be met and approved by the RCD staff.

QUALIFICATIONS: 1.) Demonstrated experience of individual(s) who will be conducting the welding and metal fabrication by providing two references upon request. 2.) Demonstrated experience forming concrete structures by providing two references upon request. 3.) Abide by the requirements developed by the property owners, Fruit Growers Supply.

Licensed bidders are to be considered to be more qualified by the RCD Board regardless of experience. The RCD has not determined if an unlicensed individual can carry general liability coverage. **If you do have General Liability Coverage, attach a copy of your statement to your bid sheet. If you are applying for liability, state your progress and attach it with your bid.**

BIDDER REQUIREMENTS: The following requirements must be met by the successful bidder. Proof of the requirements must be submitted to the RCD office by December 23rd or before starting the project.

Liability: Commercial General Liability is required. The minimum liability limits required are listed below:

General Liability Package	Limits
General Aggregate	300,000
Products completed-operations agg. limits	300,000
Personal and advertising	300,000
Each occurrence (any one)	300,000
Fire damage (any one)	50,000
Medical expense	5,000

The Siskiyou RCD must be listed on the liability coverage certificate.

Workman's Compensation: Workers Compensation is also required for all **employees** working on the screen. Documentation should be made available to the RCD concerning all persons working on the screen.

BACKGROUND: This project is part of an on-going Scott River Watershed Fish Screening Program, sponsored by the Siskiyou Resource Conservation District (RCD) and the Scott River Watershed Coordinated Management Planning (CRMP) Council. At present, 34 of approximately 120 active diversions have fish screens are in place. Fish screens keep juvenile salmon and steelhead from being lost to diversion ditches. The program also protects the diversion users from the Endangered Species Act and allows agriculture to maintain its economy. It is the goal of the Siskiyou RCD to develop beneficial projects which provide resource conservation, protect existing resource user economies (timber harvest, agriculture, mining) and enhance the general economy of the community by providing funding for construction of resource protection projects or changes in management. The RCD intends to seek funding to screen all diversion within the next 7 years. Currently, funding has been secured to construct 11 screens in the Scott River drainage over the next 8 months.

A large portion of the funding for the Sugar Creek Ditch is provided by the US Fish and Wildlife Service (USFWS) under the Klamath Restoration Act. The intention of the Klamath Restoration Act is to increase fishery habitat improvement in throughout the Klamath Basin. The Natural Resource Conservation Service has provided funding assistance and design. The diversion users are also providing funding as well as the maintenance for the life of the screen.

PROJECT AREA: The project site is located on property owned by Fruit Growers Supply Company. The users of the have an access to the property in order to maintain their water right. The screen site is located just off of Sugar Creek Road (40 feet). Access to the specific site is difficult due to the steepness of the bank and lack of an access road. The diversion crosses Sugar Creek in a flume. Immediately after the flume is the screen site. The material to be excavated is composed of creek washed material, soil and fractured bedrock. Fruit Growers Supply Company does have some restrictions which will be discussed with the successful bidder.

SCREEN DESIGN: The fish screen to be designed is called a Self Cleaning Vertical Plate screen. It is the design used by the California Department of Fish and Game (CDFG) because it can withstand diverse variations in flow levels which occur locally. All local CDFG screens are of the same design format with a few variations. The design of the Sugar Creek Ditch fish screen has been largely designed by the Natural Resource Conservation Service (NRCS). The NRCS design has been approved by the National Marine Fisheries Service(NMFS) and the CDFG. Both the NMFS and the CDFG have fish screening specifications related to biological factors, hydrological factors and specific site limitations. The RCD has been working with the various agencies to develop the design which satisfies all the factors.

The actual screen designs are attached as "Exhibit A" of this document.

PROJECT PERIOD: To begin as soon as possible after award of bid. Installation must be complete by March 25th (unless extended by Siskiyou RCD and the users of the ditch).

FUNDING SOURCE(S): US Fish and Wildlife Service (Klamath Restoration Act). Natural Resource Conservation Service through a cost share/cooperative agreement program with the users of the diversion.

CONTRACTOR TASKS:

Site excavation: Excavate a pad for the concrete structure and footings for the by-pass culvert and drop tank.

Concrete: Layout Rebar, form, and pour concrete per plans.

Fabrication: Fabricate screen frame, cleaning arm, and screen stand and paddle wheel (paddle wheel is made of aluminum).

By-pass: Install by-pass culvert, footings for culvert, and drop tank.

SPECIFICATIONS:

Screen Material: Stainless steel shall be used for the screening fabric to promote longevity and reduce long-term maintenance costs. Stainless steel shall have holes no larger then 3/32 on 5/32 staggered centers and made of 14 or 16 gauge material.

Note: The RCD has purchased the stainless screen and should not be part of your bid estimate.

Structure Design: Design shall be according to the volume specific dimensions based on CDFG and NMFS standard design which is incorporated into the plans. **Rebar grade is the common or lower grade (40) rather then bridge grade (60).**

Cement Structure Material: The quality, quantity and mixture of cement and sand for the concrete shall be: 5 sacks of Type I-II cement to 1 yard Conmix (1") minimum (also called "5 sack mix"). 6 sack is also acceptable as concrete will likely need be pumped to site.

STANDARDS:

A) Any excavated material at the screen installation site shall be deposited at a site or sites approved by the RCD Project Coordinator.
B) Landowner shall be contacted in advance about contractor's schedule on-site and his wishes shall be respected (i.e. closing of gates, etc.).
C) Updates on progress to the RCD Project Coordinator shall be made on a schedule as mutually agreed upon.

PERMITS: All permits have been secured by the RCD.

MATERIALS: Contractor will provide all materials **except for the following materials:**

-Stainless steel screen

It is important to note that the paddle wheel shall be made entirely of aluminum.

EQUIPMENT AND LABOR: All equipment, tools, transportation, and labor will be provided by the contractor and should be included in the bid price.

INSURANCE: Contractor should carry professional liability insurance as described in the requirements above.

PAYMENT: Payment will be made for tasks that are completed and meet specifications to the satisfaction of the RCD Project Coordinator. 10% of the bid will be withheld until final approval by the NRCS engineer within 7 working days after project completion.

Invoices should be submitted to the RCD at PO Box 268, Etna, CA 96027. They will be submitted to the RCD Board for approval at its monthly meeting. Upon approval by the RCD Board and the Contract Administrator of the Fish and Wildlife Service, a check will be made within 60 days of the invoice receipt date. Such payment will be considered full compensation for all labor, materials, equipment, and other items necessary and incidental to the job. **A starting draw of $3,000 will be made available to the successful bidder following completion of excavation of the screen pad and by-pass footings.**

CANCELLATION: The bid award may be canceled by the RCD Board 5 days after written notice if the Board is not satisfied with contractor's performance. The successful bidder also has the right to cancel 5 days after written notice.

PRE-BID INSPECTION TOUR: All bidders must attend a Pre-bid inspection on **Wednesday, December, 3 at 9:00 a.m.** to inspect the fish screen installation site and discuss construction issues. Meeting location will be two miles up Sugar Creek Road at a cattle guard which crosses the road.

FOR MORE INFORMATION: Contact Carolyn Pimentel, RCD District Manager, at 467-3975; or Gary Black, RCD Project Coordinator, at 467-3402.

SUGAR CREEK DITCH FISH SCREEN
BID SHEET

Name & Address _____.
Phone # _____ Contractors license #(if you posses one)_____.
Please fill in all blanks and total the cost estimates at the bottom. All bidders will be made aware of the decision within 5 working days.

Excavation: List your total estimated cost for excavating the screen site, excavating the footing and drop tank of the by-pass pipe and back the screen where needed.

Excavation Total $_____

Concrete work: List your total estimated cost for forming, installing rebar, purchasing equipment, pouring, and finish work of the screen structure, including the by-pass structures.

Concrete Total $_____

List names and telephone numbers of two references knowledgeable of your concrete background.

_____

_____

Fabrication work: List your total estimated cost for construction and installation of the screen frame, screen cleaning system, screen stand, gear box, connecting the by-pass pipe, and paddle wheel.

Fabrication Total: $_____

List names and telephone numbers of two references knowledgeable of your fabrication background.

_____

_____

List and describe other costs (if any) you feel are not listed

Other costs Total $_____

Total cost for completion of Sugar Creek Ditch Fish Screen $_____

concrete

VI. PLACEMENT

Concrete shall not be placed until the subgrade, forms, and reinforcing steel have been inspected by the Engineer.

Items to be embedded in the concrete shall be positioned accurately and firmly anchored to prevent displacement during placement of concrete.

All reinforcement at the time of placement shall be free from rust, oil, grease, paint or other deleterious matter.

The concrete shall be deposited as closely as possible to its final position and shall be worked into the corners and angles of the forms and around all reinforcement and embedded items in a manner to prevent segregation of aggregates or excessive laitance. The deposition of concrete shall be regulated so that the concrete may be consolidated with a minimum of lateral movement.

Concrete shall not be dropped more than five feet vertically unless suitable equipment is used to prevent segregation.

Consolidation of concrete may be accomplished by means of internal type mechanical vibrators, rodding, spading, or hand tamping.

VII. CONSTRUCTION JOINTS

Construction joints shall be provided as shown in the drawings or as approved by the Engineer. Joints shall be thoroughly cleaned and laitance removed before a new placement is made. Each joint shall be wetted immediately before the placing of new concrete.

VIII. FINISHING

After the concrete has been consolidated, the unformed surfaces shall be given a float finish.

Immediately after form removal, formed surfaces shall be cleaned of all defective concrete and effectively repaired.

IX. PROTECTION AND CURING

Concrete shall be prevented from drying for a curing period of at least seven days after it is placed. Exposed surfaces shall be kept continuously moist for the entire period. Moisture shall be maintained by sprinkling, flooding or fog spraying or by covering with continuously moistened canvas, burlap, cloth mats, straw earth or other approved material. For formed surfaces, the protection may be accomplished by leaving the forms in place and keeping them wet for the entire curing period. In lieu of water curing, the concrete shall be protected by spraying with an approved curing compound. The curing compounds shall be applied in an approved manner immediately after the concrete is finished. All surfaces shall be kept moist until the compound is applied.

The curing compound shall be applied at the rate of one gallon per 150 square feet.

X. CONCRETING IN COLD WEATHER

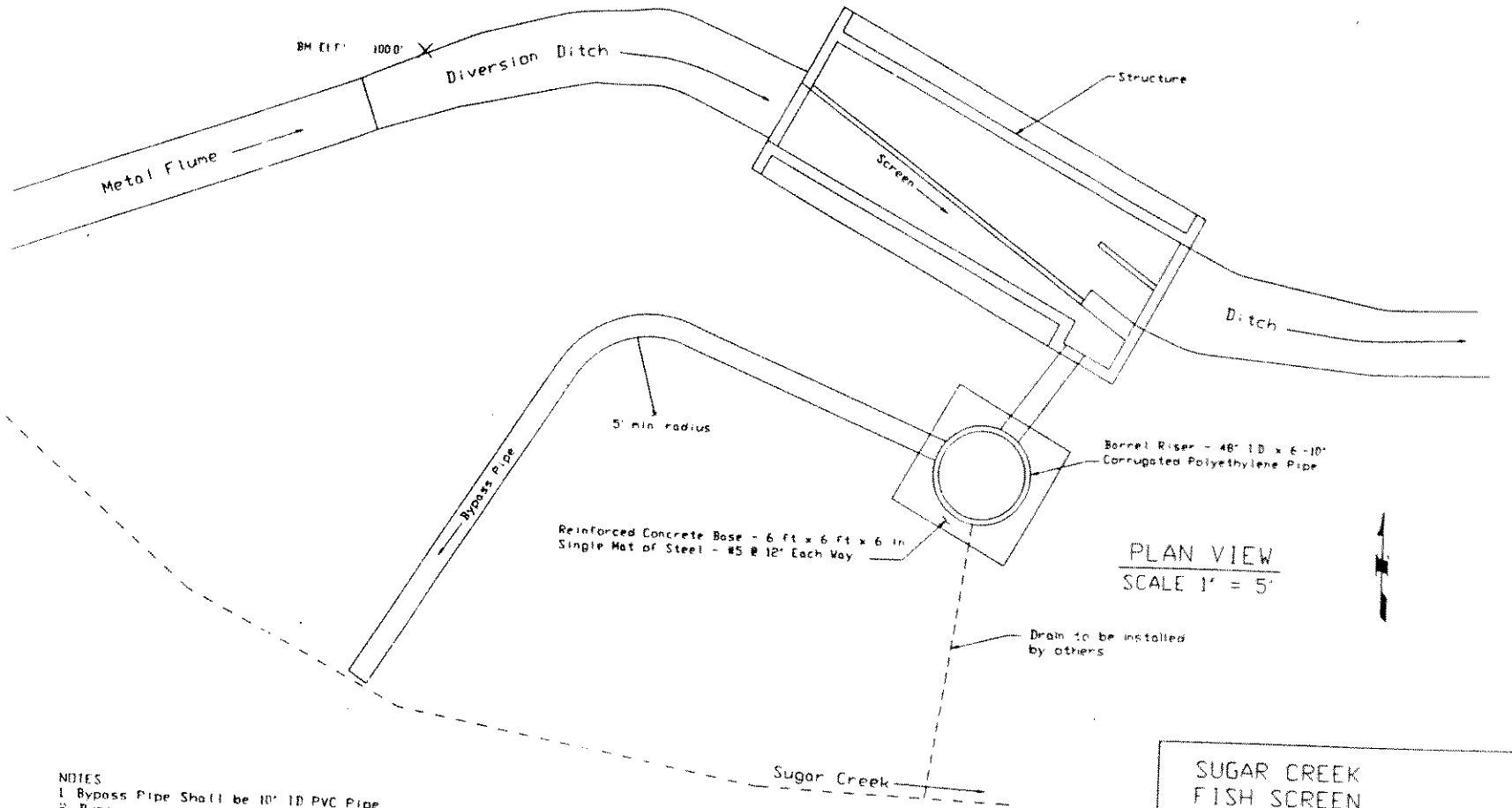
Before any concrete is placed, all ice, snow, and frost shall be completely removed from all surfaces to be in contact with the new concrete and the temperature of these surfaces shall be raised to as close as may be practical to the temperature of the new concrete that is to be placed thereon. No concrete shall be placed on a frozen subgrade or on one that contains frozen materials.

When the atmospheric temperature may be expected to drop below 40°F at the time concrete is placed, or at any time during the curing period, the following provisions also shall apply:

A. ~~The temperature of the concrete at the time of placing shall not be less than 50° F nor more than 90° F. The temperature of neither aggregates nor mixing water shall be more than 100° F just prior to mixing the cement.~~

B. When the daily minimum temperature is less than 40° F, mortar shall be insulated or housed [redacted] after placement. ~~The temperature of the concrete and air adjacent to the mortar shall be maintained~~

"Exhibit A"



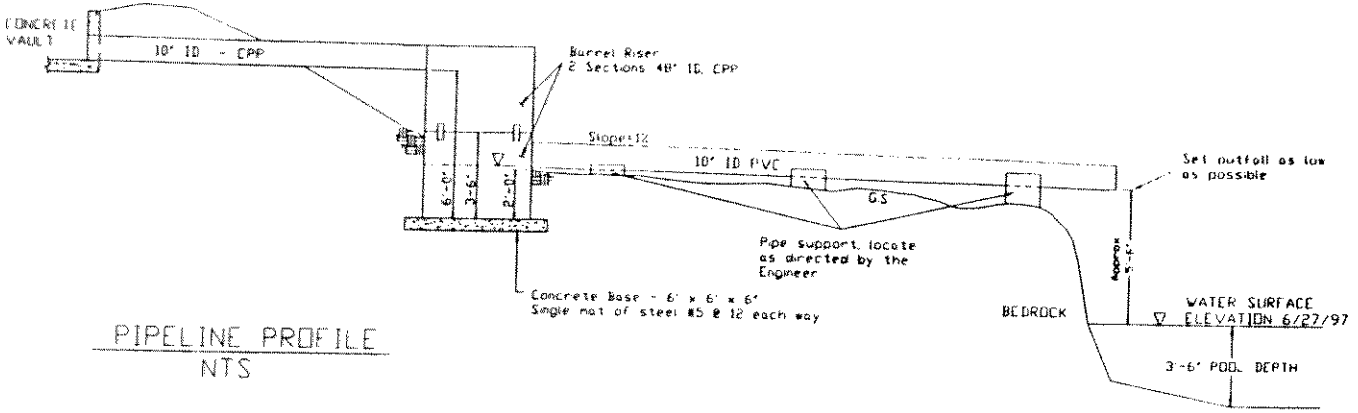
PLAN VIEW
SCALE 1" = 5'

NOTES
1. Bypass Pipe Shall be 10" ID PVC Pipe
2. Bypass pipe and riser shall be PVC
3. BM ELEV = 100.0'. Head of bolt on flume
4. An expanded metal screen shall be placed on top of riser to prevent predation

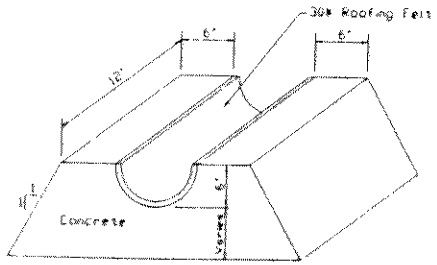
SUGAR CREEK
FISH SCREEN

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Approved by: Rebecca Challender for Chavis	Date: 11/3/97	Designed by: HH, RR	Date: 8/97	Drawn by: RR, TS	Date: 9/97
Title: State Conservation Engineer		Sheet No: 1	of: 13	Drawing No: CA-N-97-027	



PIPELINE PROFILE
NTS



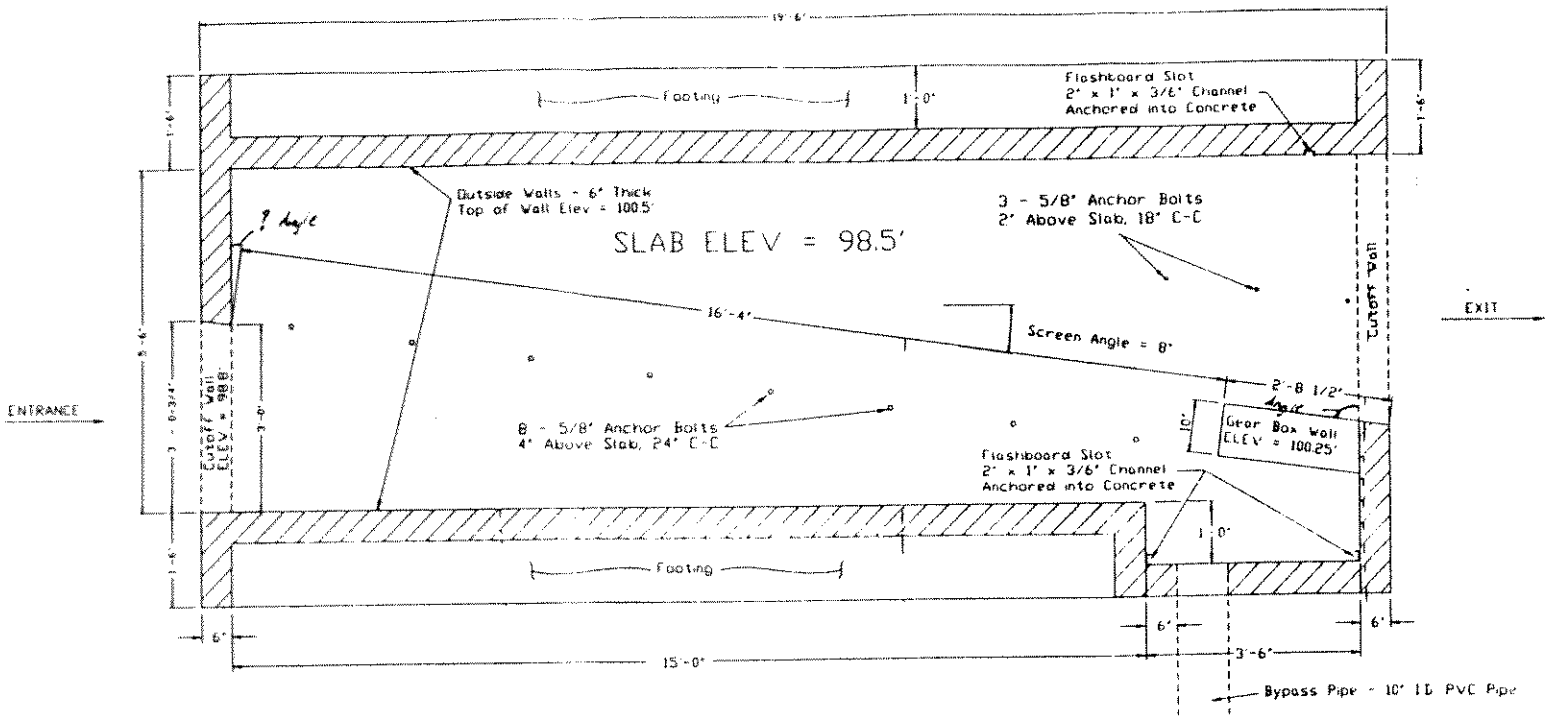
PIPE SUPPORT

NOTES
1 Bypass invert Elev = 985'
2 The Bypass Pipeline shall have a 10% uniform grade to the outlet
3 The riser shall be set in the concrete 3"
4 The top riser section will be held in place with 4 - 3" x 8" x 1/4" metal plates spaced @ 90° and bolted to the bottom section with 2 - 3/8" bolts
5 Riser and Anchor locations are approximate, the exact locations will be determined by the Engineer in the field

BYPASS PIPELINE

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Designed by:	Date:	Drawn by	Date
M.H., R.R	8/97	R.R, T.S	10/97
Sheet No: 2	of 13	Drawing No: CA-N-97-027	



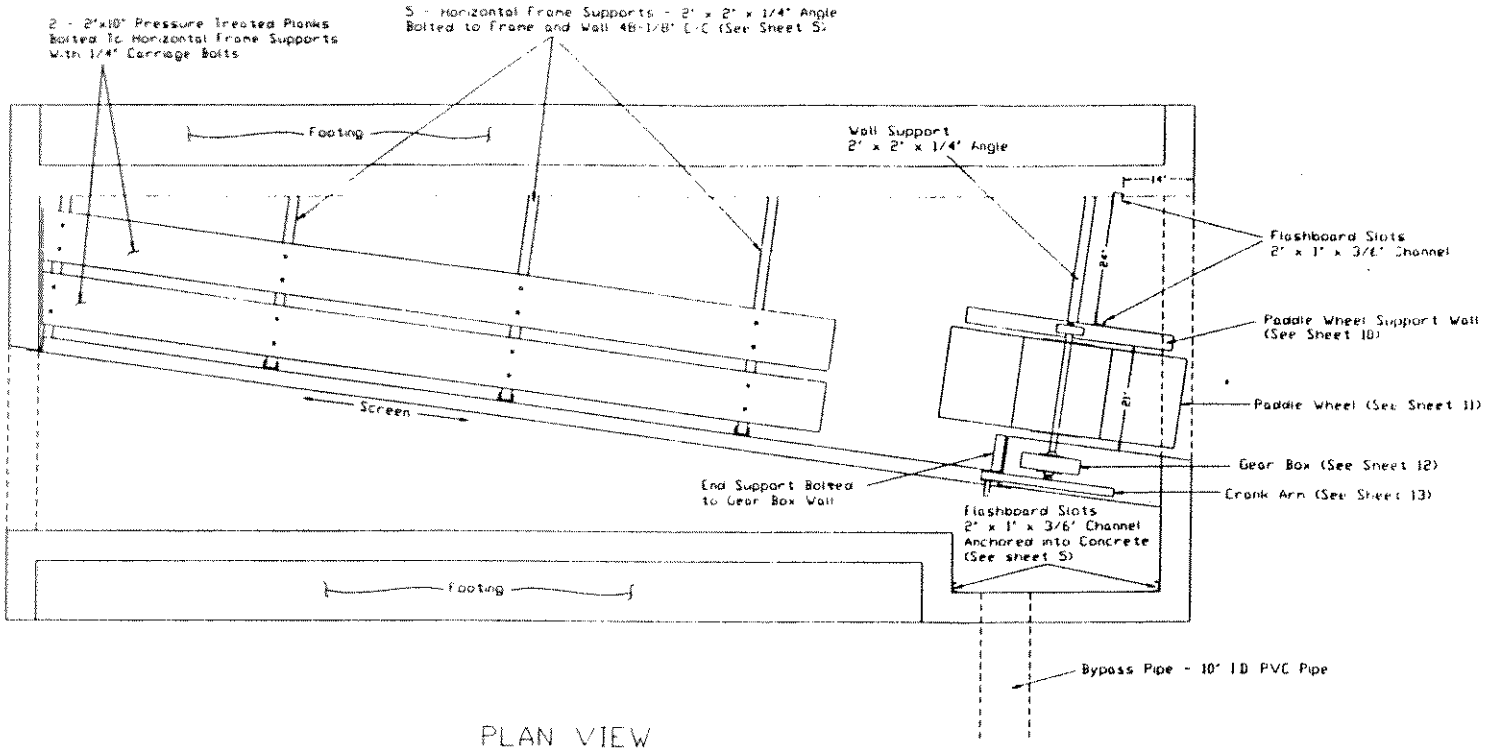
PLAN VIEW
SCALE 1" = 2'

NOTES
1. Walls are 6" thick with a single mat of steel - #5 @ 12" each way, slab and footings are 8" thick with a single mat of steel - #5 @ 12"
2. Upstream and downstream ends of structure will have a 6' wide cutoff wall extending to 97.0 Elev
3. Top of the Gear Box Wall will be 21" above the slab
4. See Sheet 5 for Anchor Details
5. Lap splices shall be a minimum of 19"

STRUCTURE

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Designed by	Date	Drawn by	Date
MH RR	8/97	RR, TS	9/97
Sheet No. 3	of 13	Drawing No CA-N-97-02	



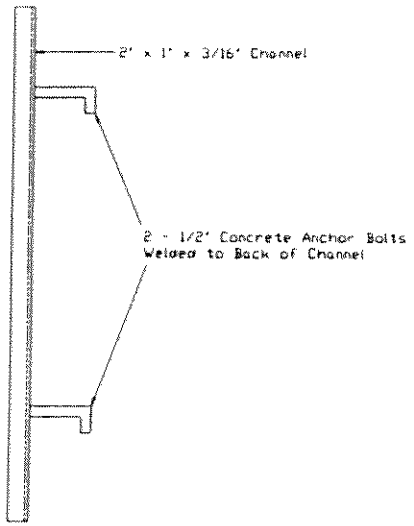
PLAN VIEW
SCALE 1" = 2'

NOTES
1 Wall Support shall be anchored in concrete or bolted to outside wall

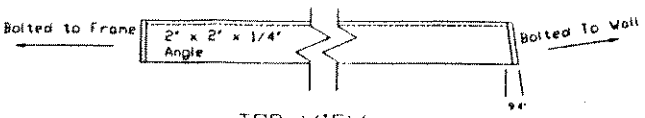
STRUCTURE
WITH ATTACHMENTS

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

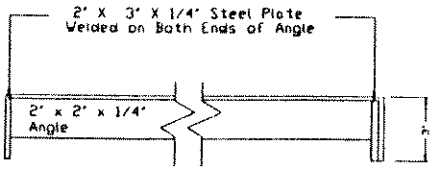
Designed by:	Date	Drawn by:	Date
MH, RR	8/97	RR, TS	9/97
Sheet No: 4	of: 13	Drawing No: CA-N-97-027	



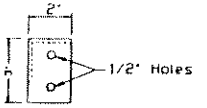
FLASHBOARD SLOT
SCALE: 1" = 1'



TOP VIEW



FRONT VIEW



END VIEW

HORIZONTAL FRAME SUPPORT
SCALE: 1" = 1/2"

ATTACHMENT DETAILS

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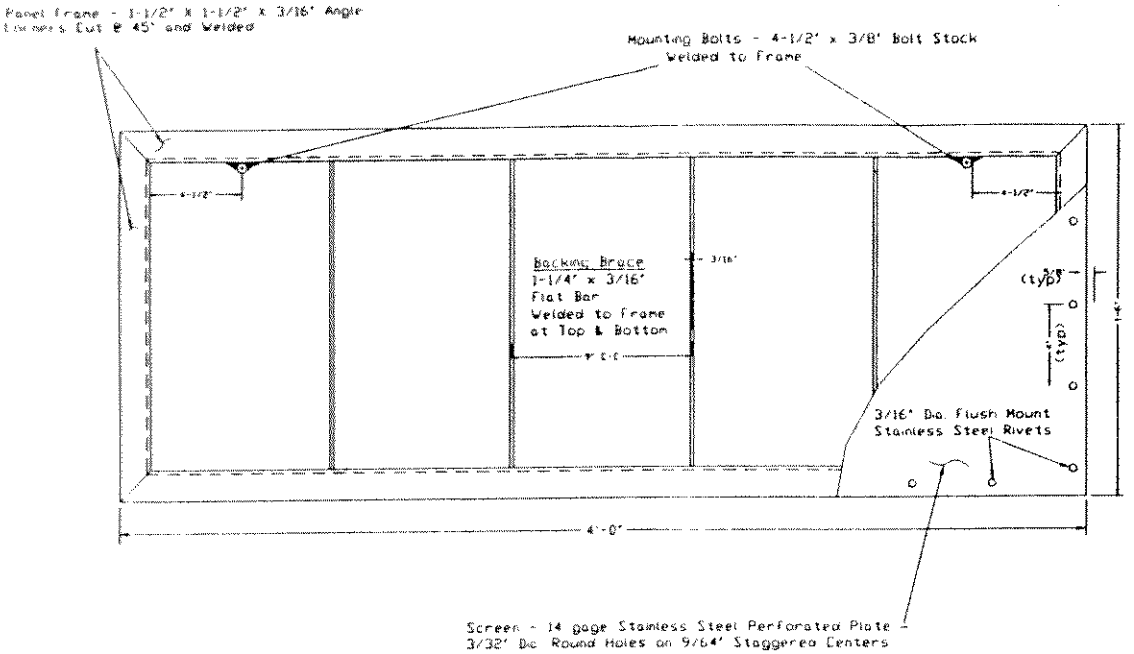
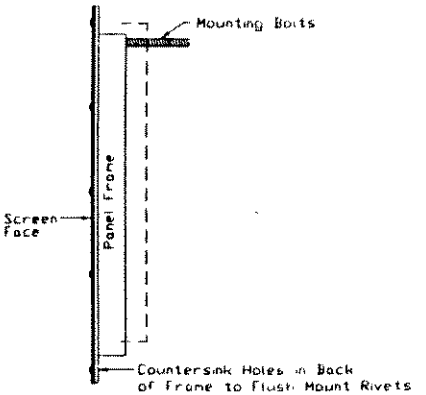


FRONT VIEW
SCALE: 1" = 1/2



SIDE VIEW
SCALE: 1" = 1/2"

NOTES
1 Panel frame and screen plate shall be table flat
2 All welds shall be full depth fillet welds or as directed by Engineer

SCREEN PANELS

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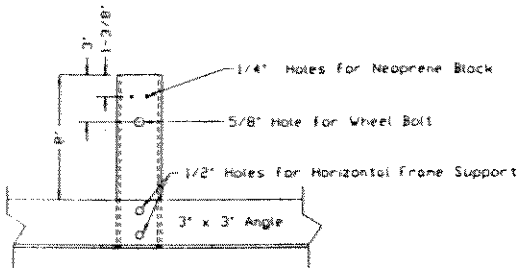
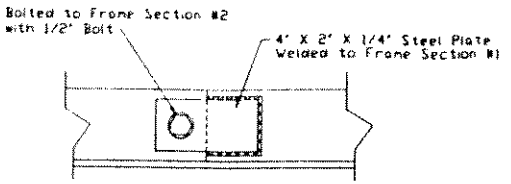
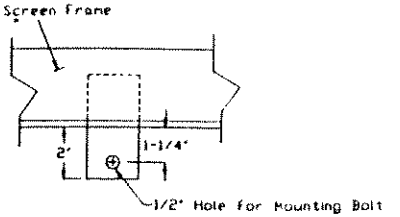


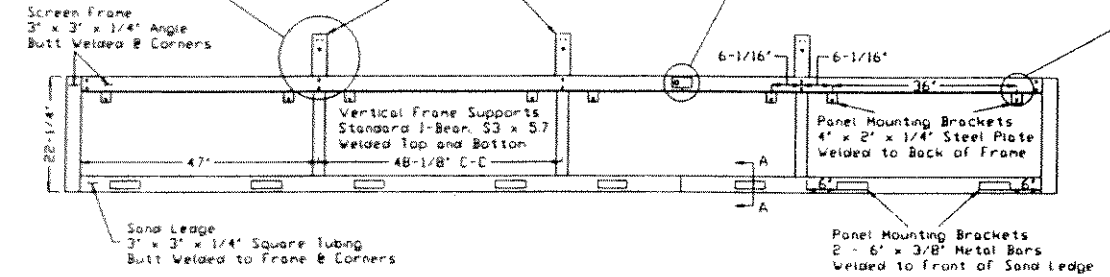
WHEEL SUPPORT DETAIL



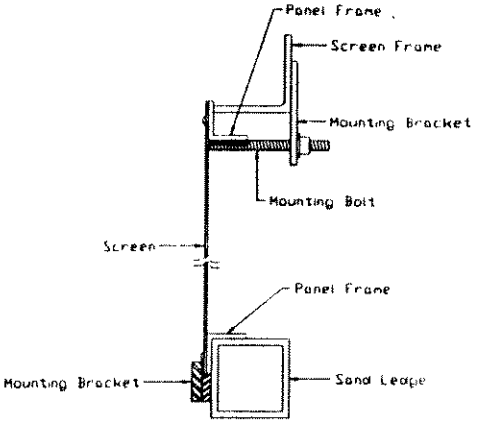
CONSTRUCTION JOINT DETAIL



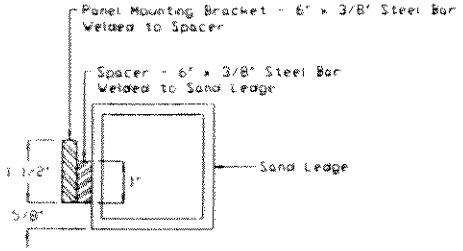
MOUNTING BRACKET DETAIL



FRONT VIEW
SCALE 1" = 2'



MOUNTING ASSEMBLY DETAIL
NTS



SECTION A-A
SCALE 1" = 3"

NOTES
1 Frame may be constructed in sections to be assembled on-site
2 All welds shall be full depth fillet welds or as directed by the Engineer
3 The Screen Frame shall be made table flat and symetrical about the center

SCREEN FRAME

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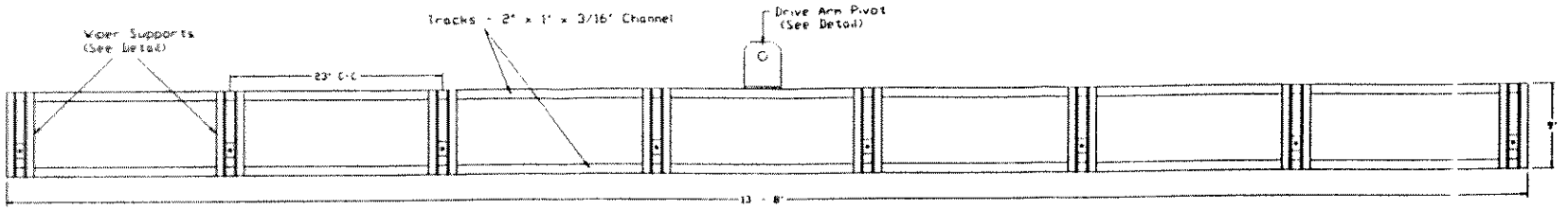
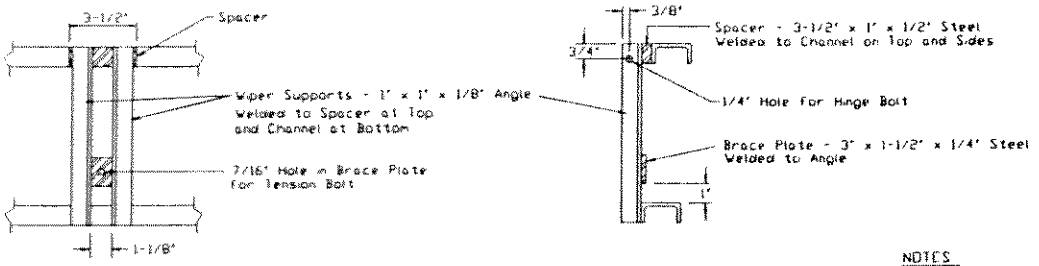


FRONT VIEW
SCALE: 1" = 1'

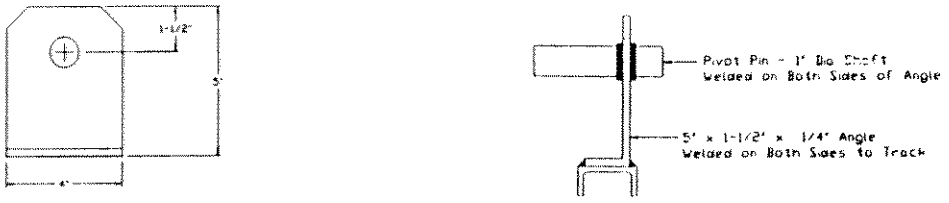


FRONT VIEW

SIDE VIEW

WIPER SUPPORT
SCALE: 1" = 6"

NOTES
1 Pivot Arm dimensions may vary depending on bearing assembly dimensions
2 The Track Assembly shall be made table flat and symetrical about the center
3 All welds shall be full depth fillet welds or as directed by the Engineer



FRONT VIEW

SIDE VIEW

DRIVE ARM PIVOT
1" = 4"

TRACK ASSEMBLY

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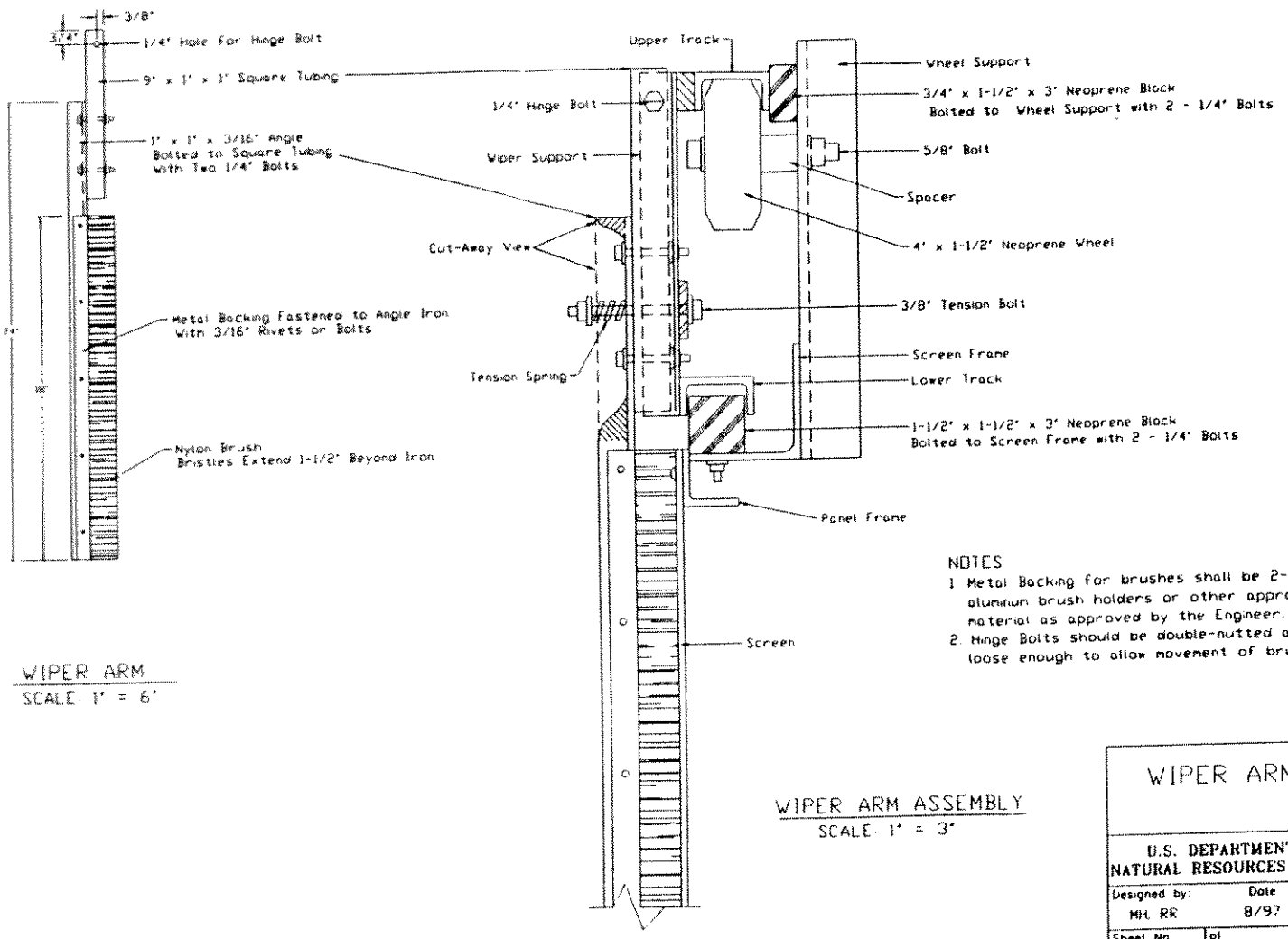

WIPER ARM
SCALE: 1" = 6"

WIPER ARM ASSEMBLY
SCALE: 1" = 3"

NOTES
1. Metal Backing for brushes shall be 2-piece aluminum brush holders or other appropriate material as approved by the Engineer.
2. Hinge Bolts should be double-nutted and remain loose enough to allow movement of brush arm

WIPER ARM ASSEMBLY

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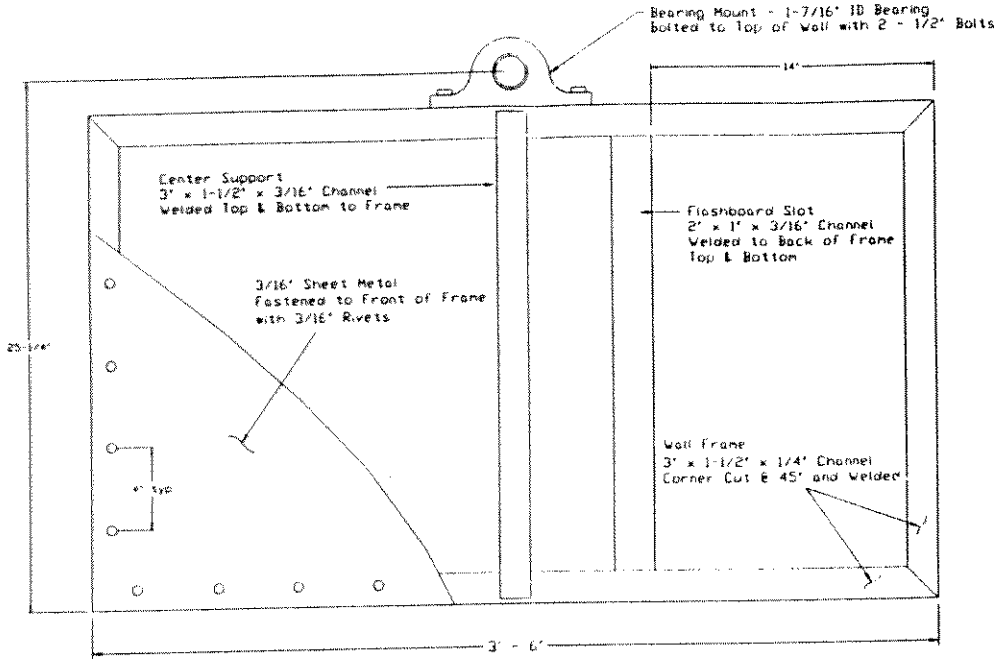
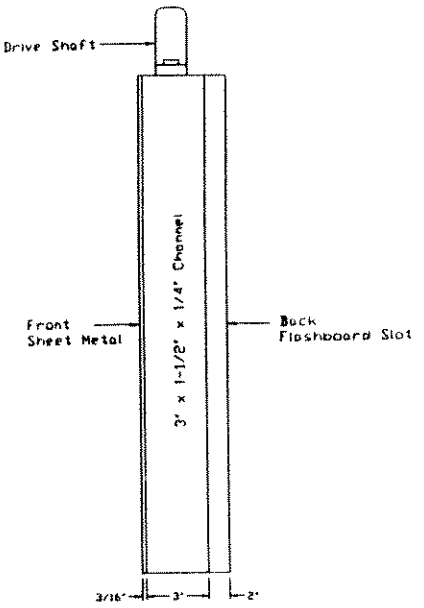


FRONT VIEW
SCALE 1" = 6"



SIDE VIEW
SCALE 1" = 6"

NOTES
1 The Wall shall be made table flat
2 All welds shall be full depth fillet welds or as directed by Engineer
3 The wall will be mounted to the floor of the Concrete Vault with 5/8" Anchor Bolts
4 The wall will be supported with a 2" x 2" x 1/4" angle bolted to the top of the frame and bolted or anchored into the concrete wall

PADDLE WHEEL SUPPORT WALL

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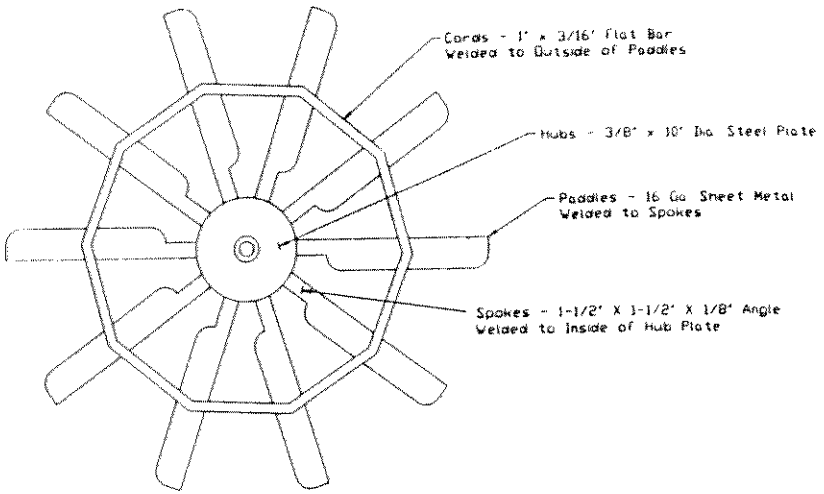
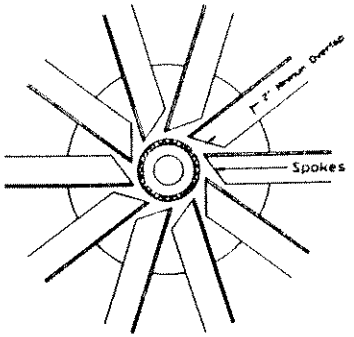
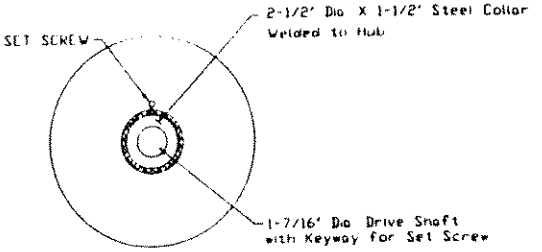


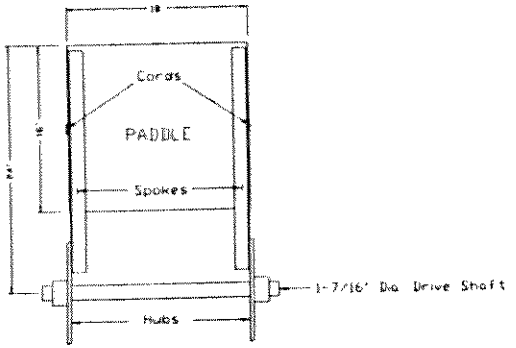
Side View
SCALE 1" = 1'



Spoke Detail
SCALE 1" = 6"



Hub Detail
SCALE 1" = 6"



Paddle Arm
SCALE 1" = 1'

PADDLE WHEEL ASSEMBLY

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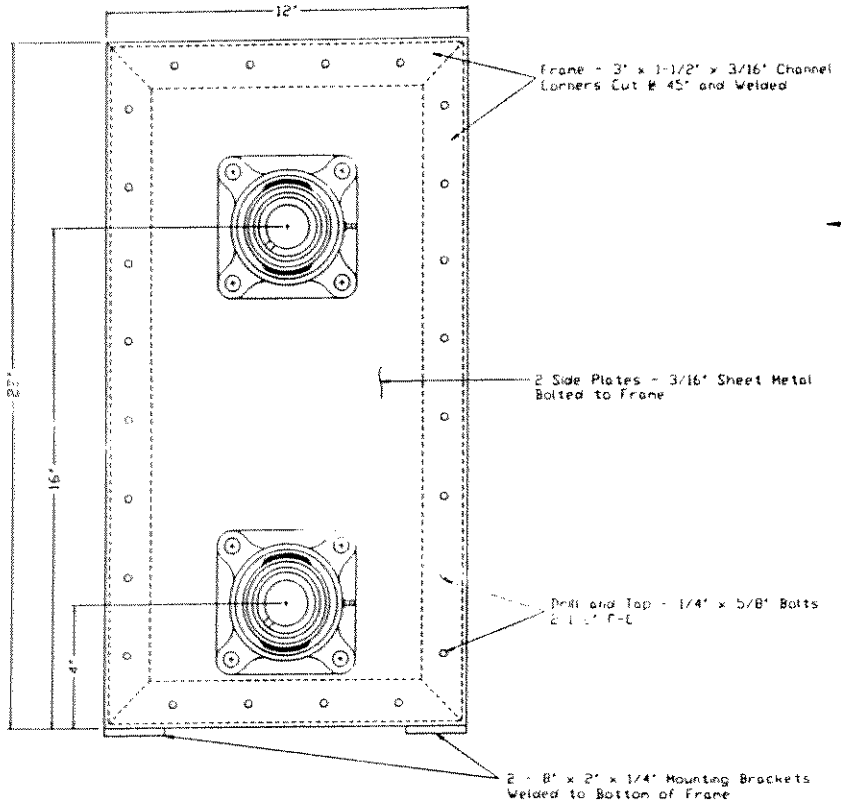
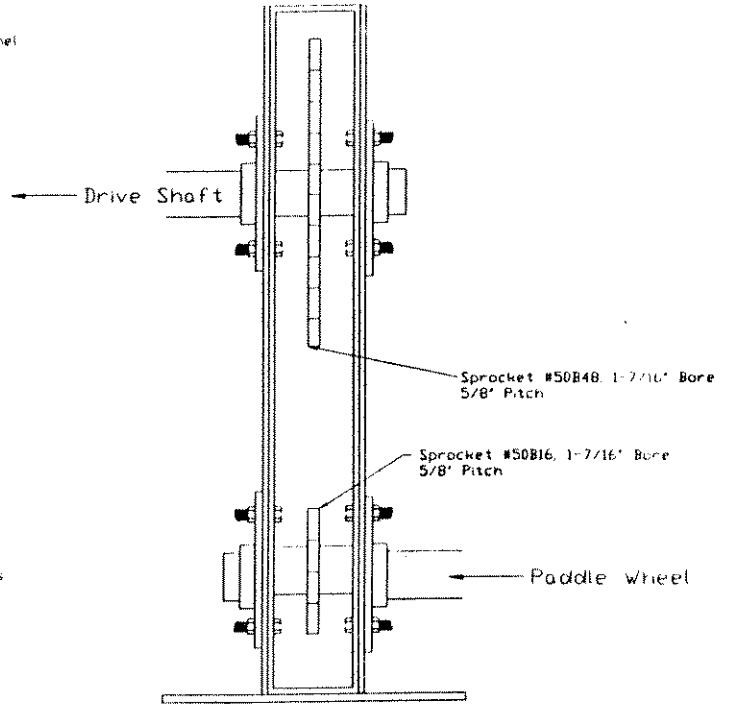


FRONT VIEW
SCALE 1" = 4"



SIDE VIEW
SCALE 1" = 4"

NOTES
1 Bearing Dodge #124208 - 1-7/16" ID
2 All welds shall be full depth fillet welds or as directed by Engineer
3 Gear ratio is 1:3

FISH AND GAME STANDARD GEAR BOX

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