U.S. ARMY CORPS
OF ENGINEERS

Office of the Chief of Engineers
Value Engineering Study Team

VALUE ENGINEERING STUDY

SOUTHEAST LOUISIANA FLOOD CONTROL, ORLEANS PARISH, LA

(DWYER PUMP STATION AND CANAL)

DRAFT REPORT

Sponsored By:
U.S. Army Engineering District, New Orleans

August 1997

VALUE ENGINEERING TEAM STUDY

DOD SERVICE: USACE
CONTROL NO: CELMN-VE-97-10
VALUE ENGINEERING OFFICER: Frank Vicidomina

Value Engineering Study on the

SOUTHEAST LOUISIANA FLOOD CONTROL ORLEANS PARISH, LA (DWYER PUMP STATION AND CANAL)

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U.S. Army Engineer District, New Orleans

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VALUE ENGINEERING STUDY TEAM MEMBERS

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VALUE ENGINEERING TEAM STUDY
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VALUE ENGINEERING TEAM STUDY

PROJECT DESCRIPTION AND BACKGROUND

PROJECT TITLE:	Southeast Louisiana Flood Control, Dwyer Pump Station and Canal
PROJECT LOCATION:	Orleans Parish

Subbasin OE5, often referred to as "Dwyer", is located in New Orleans East and is bounded by the New Orleans lakefront levee on the north, Old Gentilly Road on the south, Crowder Boulevard on the east, and the hurricane protection levee along the Inner Harbor Navigational Canal (IHNC) on the west.

The subbasin drainage area is about 2,900 acres with a drainage system consisting of a grid of canals and large concrete box culverts.

The Dwyer Road Drainage Pump Station (DPS) has a capacity of 120 CFS and pumps into the IHNC. The Dwyer Road DPS is an automated station with a trash rack and an exposed reinforced concrete platform that holds a two 60 CFS pumps and appurtenances. The Dwyer Station has a concrete box culvert inflow channel and a 50" diameter outflow pipe that discharges through the existing hurricane protection into the IHNC.

The current plan consists of increasing the capacity of the Dwyer Road DPS to 1,000 CFS from 120 CFS and providing adequate outlet capacity to the IHNC. The resulting 10-year stage lowering for this plan is 0.5 feet.

The project estimate in the Technical Report is $8,300,000.

VALUE ENGINEERING TEAM STUDY
EXECUTIVE SUMMARY

The Value Engineering Study was conducted in the New Orleans District during the week of 28 July - 1 August 1997

The project was studied using the standard VE methodology, consisting of six phases: Information, Speculation, Analysis, Development, Presentation, and Implementation.

During the Information Phase, the Team studied the drawings, figures, descriptions of project work, and cost estimates to fully understand the work to be performed and the functions to be achieved. Cost Models were prepared to determine areas of relative high cost to ensure that the Team focused on those parts of the project which offered the most potential for cost savings. (See Appendix C.)

The Team performed the Speculation Phase by conducting a brainstorming session to generate ideas for alternative designs (see Appendix B). All Team Members were encouraged to contribute ideas.

Following the Speculation Phase, the Team analyzed these ideas and ranked them by priority for development. Ideas which did not survive critical analysis were deleted.

The surviving ideas were developed by the VE Study Team. In addition to proposals, VE Team Comments are included.

The summary of the VE recommendations is given on the following page.

OVEST will be available, if requested, to assist during the Implementation Phase of this Study.

VALUE ENGINEERING TEAM STUDY
SUMMARY OF RECOMMENDATIONS

Thirty-four ideas for ways to improve the project or reduce costs were generated during the Speculation Phase of this study. The Analysis Phase of the study reduced the number of ideas to the following 12 proposals, plus one comment.

PROPOSAL NO.	DESCRIPTION	POTENTIAL SAVINGS
C-1 PAC	Add Future 12 X 14 Box to this Project	($10,490,860)
C-2	Use Alternative Road and Road Service/Access To Support Open-Cut Construction	$383,031
X C-3	Construct Above-Grade Channel Using Sheet Pile Wall Parallel to Existing Floodwall	$1,176,473
C-4	Use Arch Pipe [Contractor option]	$149,336
X C-5A	Use 84" Concrete Pressure Pipe and Existing 50" Discharge Lines	$700,000
C-5B	Use 108" Concrete Pressure Pipe and Existing 50" Discharge Lines	$699,000
C-5C	144" concrete pressure pipe	
X C-6	Install a Siphon for Backflow Prevention	$62,580
X C-7	~~Keep Existing 120~~ CFS Dwyer Pump Station And Construct New 880 CFS Pump Station Re-site to south	$913,502
X C-8	Relocate Pump Station to Entergy Site and Use Entergy Culverts	$2,673,699
X C-9	Use Ascension Parish-Type Pump Station	$5,000,000

PROPOSAL NO.	DESCRIPTION	POTENTIAL SAVINGS
E-1A	Improve Power Availability by Extending a Feeder From S&WB	($1,000,000)
E-1B	Improve Power Availability by Initiating a Feasibility Study for S&WB Project	Quality Improvement
	***TOTAL POTENTIAL SAVINGS**	$7,673,699

*Proposals C-8 and C-9

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-1 PAGE NO: 1 OF 3

DESCRIPTION: Add Future 12 X 14 Box to this Project

ORIGINAL DESIGN:

The current design objective is to upgrade the pump station from 120 CFS to 1,000 CFS. However, a future 12 X 14 box culvert to allow this 1,000 CFS capacity is being initiated by the Sewage and Water Board of New Orleans. Without this additional box culvert, the current project will limit the capacity to about 650 CFS. (See Drawing No. 1.)

PROPOSED DESIGN:

This proposal suggests that the addition of the new 12 X 14 box culvert be added to this project in order to allow the full 1,000 CFS capacity.

ADVANTAGES:

1. Allows the full scope of 1,000 CFS to be achieved in this project.
2. Cost avoidance of future project.

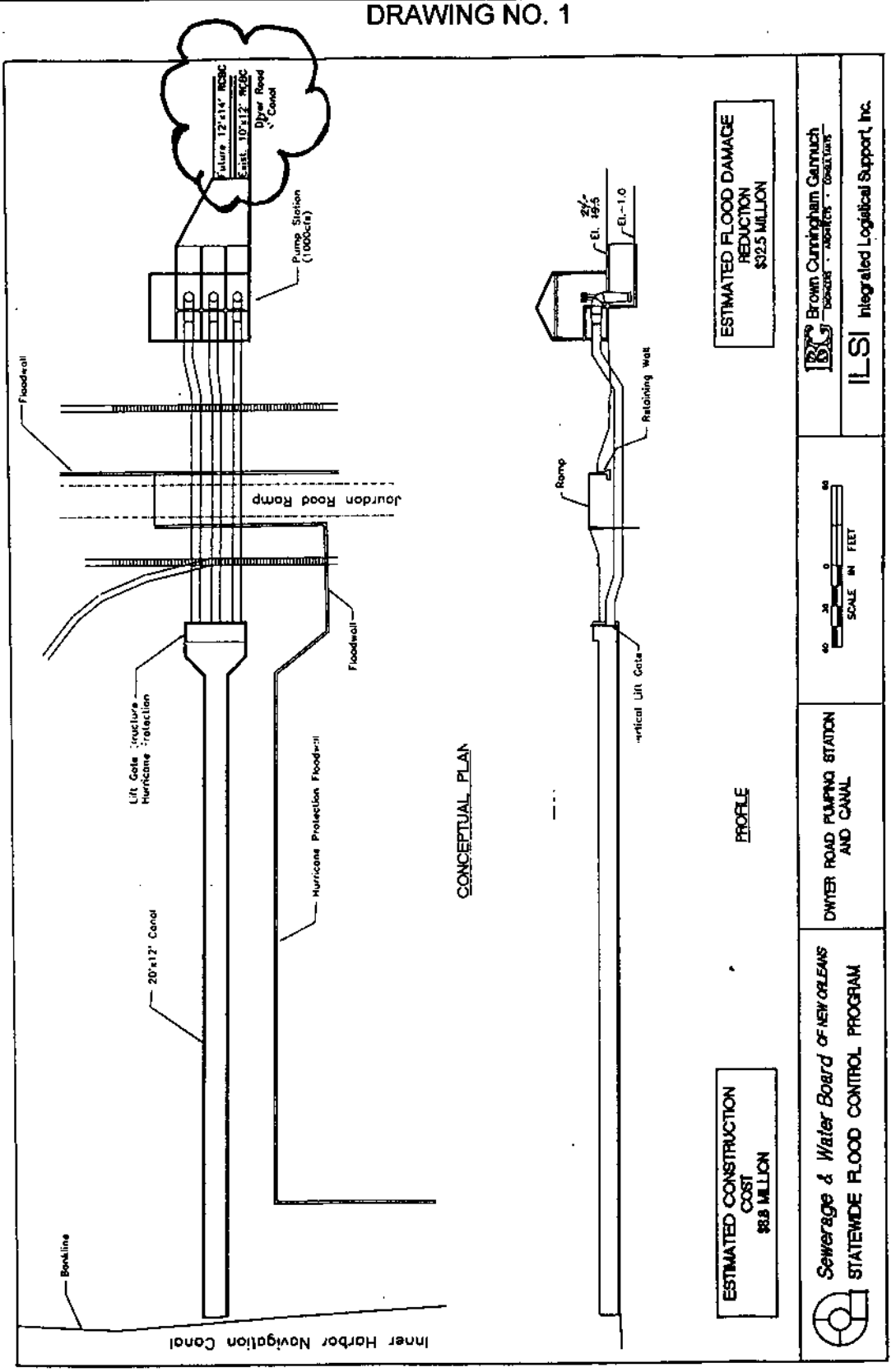
DISADVANTAGES:

Project cost increase.

JUSTIFICATION:

Placing the second culvert in this project will allow the full 1,000 CFS project capacity to be realized rather than deferred to a future date.

DRAWING NO. 1


Sewerage & Water Board OF NEW ORLEANS
STATEWIDE FLOOD CONTROL PROGRAM
DWYER ROAD PUMPING STATION AND CANAL
Brown Cunningham Gannuch
ILSI Integrated Logistical Support, Inc.
SCALE IN FEET
ESTIMATED CONSTRUCTION COST $9.8 MILLION
ESTIMATED FLOOD DAMAGE REDUCTION $32.5 MILLION
CONCEPTUAL PLAN
PROFILE
Inner Harbor Navigation Canal
Bankline
20'x12' Canal
Lift Gate Structure
Hurricane Protection
Hurricane Protection Floodwall
Floodwall
Jourdan Road Ramp
Floodwall
Pump Station (10000cfs)
Future 12'x14' RCBC
Exist. 10'x12' RCBC
Dwyer Road Canal
Ramp
Retaining Wall
Vertical Lift Gate
El. 14.5
El. -1.0

COST ESTIMATE WORKSHEET

PROPOSAL NO: C-1 PAGE NO: 3 OF 3

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
TOTAL DELETIONS				$0

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
12 X 14 Culvert	LF	4,224	$2,000.00	$8,448,000
TOTAL ADDITIONS				$8,448,000

Net Increase (Deletes - Adds)	$8,448,000
Markups 24.3%	2,052,860
TOTAL INCREASE	$10,490,860

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

Pump Sta to Lamb Canal

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-2 PAGE NO: 1 OF 4

DESCRIPTION: Use Alternate Rail and Road Service/Access to Support Open-Cut Construction

ORIGINAL DESIGN:

The current plan provided a new 1,000 CFS pump station near the end of Dwyer Road and extends 3 (50" or 72") pressure pipes approximately 225 LF discharging into a culvert (510 LF) which discharges into the Inner Harbor Navigation Canal. The pressure pipes will be excavated and placed under two rail lines using temporary bridges to maintain rail service. The road crossing is also a temporary bridge for the cut through the Jourdan Road ramp, related retaining wall, and floodwall (see Drawing No. 1).

PROPOSED DESIGN:

It is recommended that existing north-south alternative service access loops for both rail and road be used and that the three pipes be placed by open-cut method. Roadway access will allow one access point from the north (Hayne Boulevard) and one access point from the south (Old Gentilly Road). Current rail service has two parallel service spur lines which are connected. Rail service will use one N.O.P.B.R.R. service spur while open-cut excavation is underway on the other rail line. Service access will travel north and reverse or back into the interrupted rail line to service existing customers (see Drawing No. 2).

ADVANTAGES:

1. Faster construction by open-cut excavation and pipe placement each can be completed in approximately 1 week with rail access alternating with one spur line remaining in service.
2. No temporary road or rail bridges are needed (eliminating one construction site).
3. Open-cut construction can be used on alternative VE proposals where re-siting is being considered.
4. Casing pipe will be used in lieu of temporary bridge piles and timber crib.

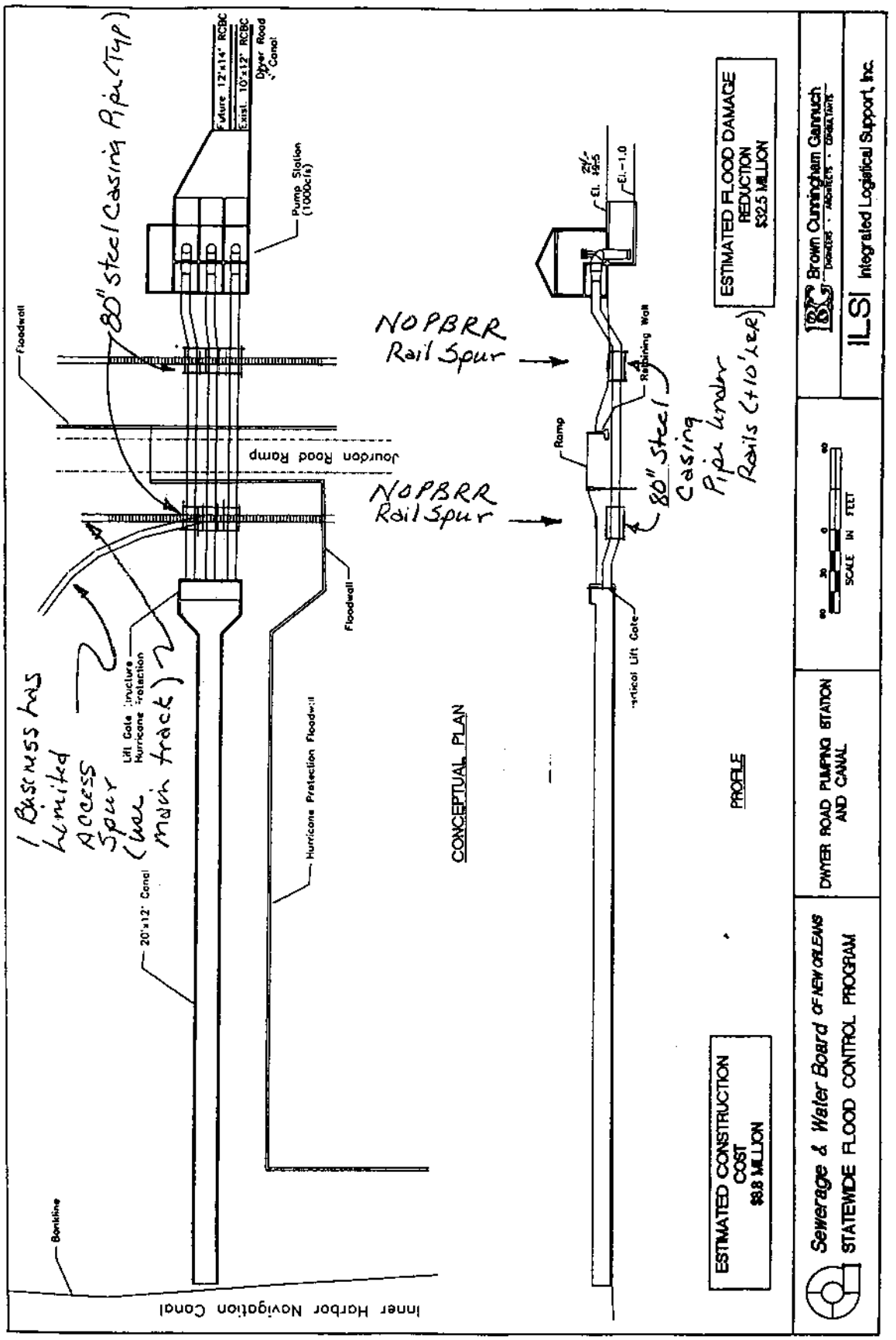
DISADVANTAGES:

One business will access rails cars on the interrupted main spur line because its private spur switch point cannot be accessed while the west service spur is cut.

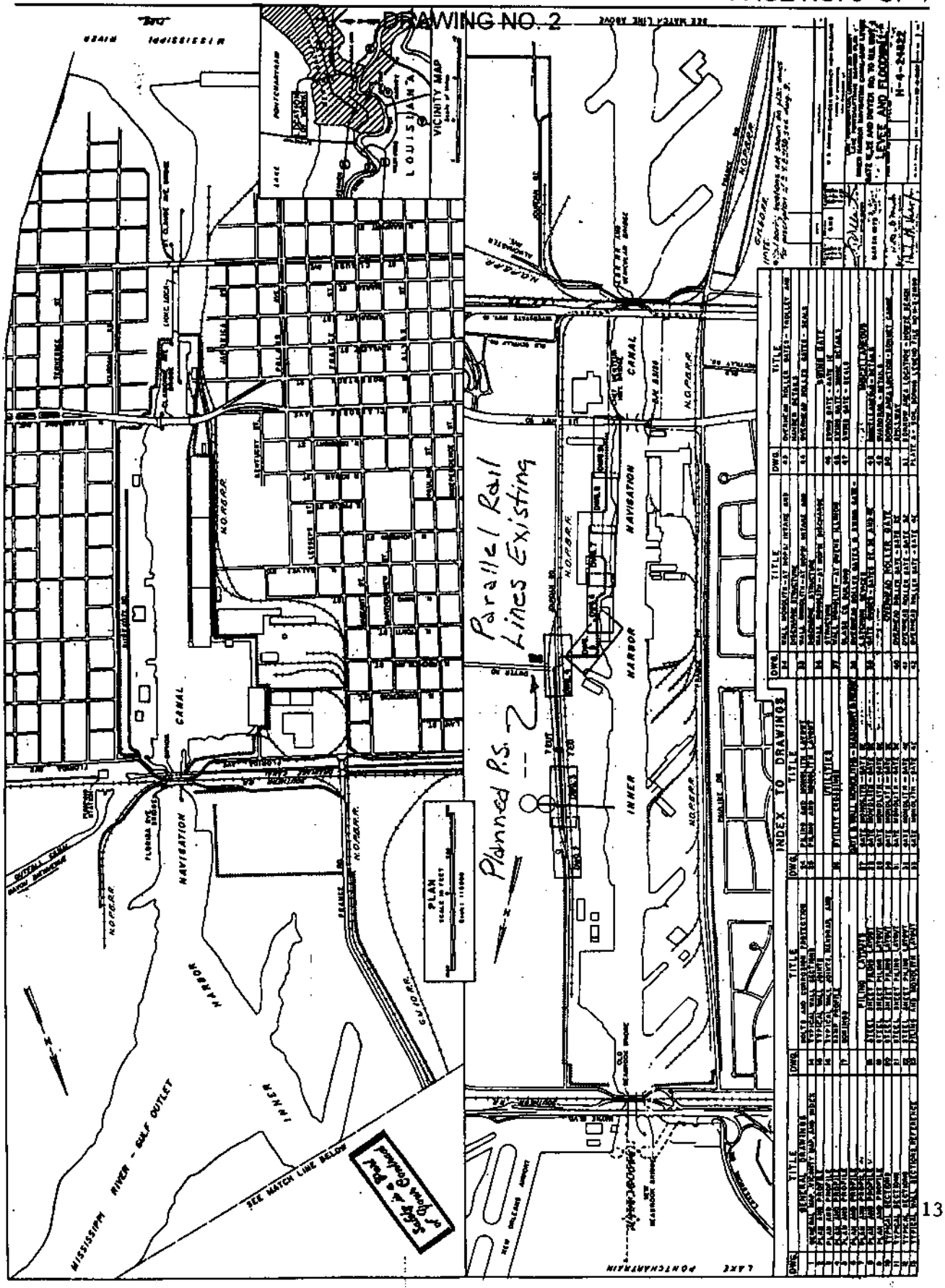
JUSTIFICATION:

Roadway access is maintained from the north and south. One rail spur line is kept in service while the other is cut for construction. Service by rail is back fed to the interrupted spur line. Coordination with one affected business must be handled in conjunction with N.O.P.B.R.R. Rail access to one business must rely on cars parked on the interrupted spur. Open-cut trenching is clearly more advantageous.

DRAWING NO. 1


80" steel casing Pipe (Typ)
NOPBRR Rail Spur
NOPBRR Rail Spur
80" steel casing Pipe under Rails (+10' ±)
1 Business has limited Access Spur (use main track)
Future 12'x14' RCBC
Exist. 10'x12' RCBC
Dwyer Road Canal
Pump Station (1000cfs)
Floodwall
Jourdon Road Ramp
Lift Gate (structure Hurricane Protection
Hurricane Protection Floodwall
20'x12' Canal
Bankline
Inner Harbor Navigation Canal
CONCEPTUAL PLAN
PROFILE
Ramp
Retaining Wall
Vertical Lift Gate
EL. -1.0
ESTIMATED FLOOD DAMAGE REDUCTION $325 MILLION
ESTIMATED CONSTRUCTION COST $8.8 MILLION
SCALE IN FEET
Brown Cunningham Gannuch
ILSI Integrated Logistical Support, Inc.
Sewerage & Water Board of NEW ORLEANS
STATEWIDE FLOOD CONTROL PROGRAM
DWYER ROAD PUMPING STATION AND CANAL

DRAWING NO. 2


Parallel Rail Lines Existing
Planned P.S. 2
INDEX TO DRAWINGS
PLAN
VICINITY MAP
INNER HARBOR NAVIGATION CANAL
MISSISSIPPI RIVER - GULF OUTLET
SEE MATCH LINE BELOW
LAKE PONTCHARTRAIN

COST ESTIMATE WORKSHEET

PROPOSAL NO: C-2 PAGE NO: 4 OF 4

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
35' Double Track Temp Bridge	LS	1	$215,866.00	$215,866
35' Double Track Temp Bridge	LS	1	167,896.00	167,896
Excavation 2 Temp Bridges	CY	300	8.99	2,698
Remove/Replace Track	LF	105	360.00	37,776
Jourdan Road (25') Temp Bridge	LS	1	48,119.00	48,119
TOTAL DELETIONS				$472,355

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Remove/Replace Track	LF	105	$360.00	$37,776
Excavate Pipe Trench	CY	150	8.99	1,349
80" Casing Pipe	LF	264	250.00	66,000
_____	___	____	____	_____
_____	___	____	____	_____
TOTAL ADDITIONS				$105,125

Net Savings (Deletes - Adds)	$367,230
Markups 4.3%	15,791
TOTAL SAVINGS	$383,021

Markups included in unit cost are contractor's markup for OH & Profit, Contingencies, and 4.3% is added.

(CHANNEL side)

Rail on PS side can be taken out of service but other side ↓ can't
Dock board says no. LBCG has talked to RR, Dock board)

VALUE ENGINEERING PROPOSAL

PROPOSAL NO:	C-3	PAGE NO: 1 OF 5
DESCRIPTION:	Construct Above-Grade Channel Using Sheet Pile Wall Parallel to Existing Floodwall	

ORIGINAL DESIGN:

A 20' x 20' underground discharge culvert conveys flow from west side of Jourdan Road to IHNC. (See Drawing No. 1.)

PROPOSED DESIGN:

Install sheet pile founded I-wall north of and parallel to existing hurricane protection floodwall to create an open channel from Jourdan Road to IHNC. (See Drawing No. 2.)

ADVANTAGES:

1. Allows existing 50" pipe to remain in place.
2. Utilizes existing floodwall as one wall of channel.
3. Eliminates excavation for underground culvert.
4. Better outfall conditions when IHNC is high.
5. Possibly eliminates need to relocate existing 50" waterline.

DISADVANTAGES:

None known.

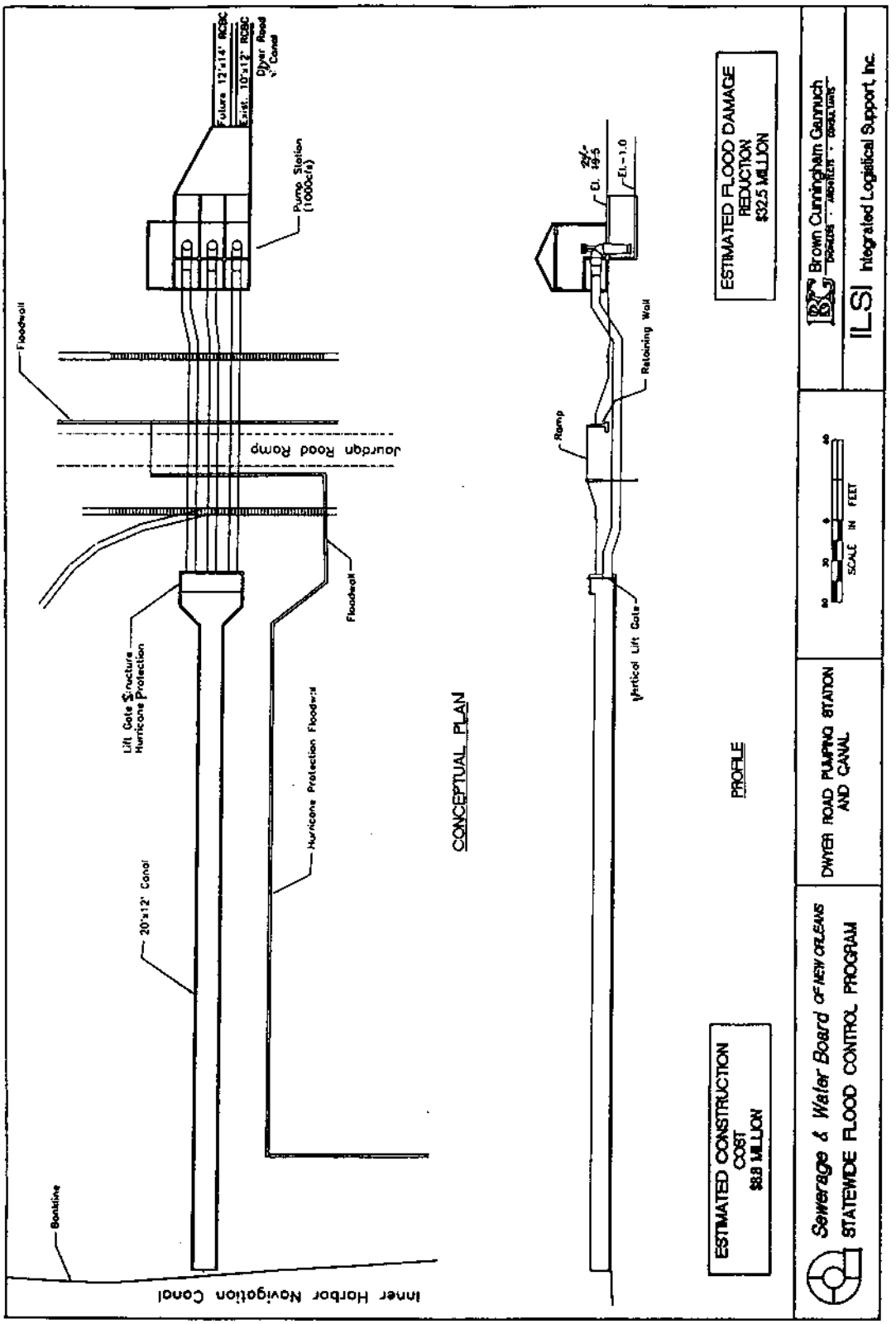
JUSTIFICATION:

A hurricane protection floodwall is already in place along the channel right-of-way. A sheet pile founded I-wall north and parallel to this wall will create an enclosed above-ground channel up to 60' wide ending at the IHNC. The existing floodwall is a sheet pile founded I-wall and is backed by an earthen berm on the south side. An 8' high I-wall will yield a 6' high by 60' wide channel, allowing an additional 2' above the maximum channel flow line for design uncertainty increment. For a 60 X 6' channel, velocities will be less than 3' per second, and a grass-lined bottom will protect from erosion. A rock-lined trapezoidal channel section can be constructed in the center of this grass bottom to contain normal flows (see Drawing No. 3). This section can be lined if necessary. Maintenance and cleaning should be reduced because the pump station will have screens. There will be considerable reduction in construction disturbance to this area.

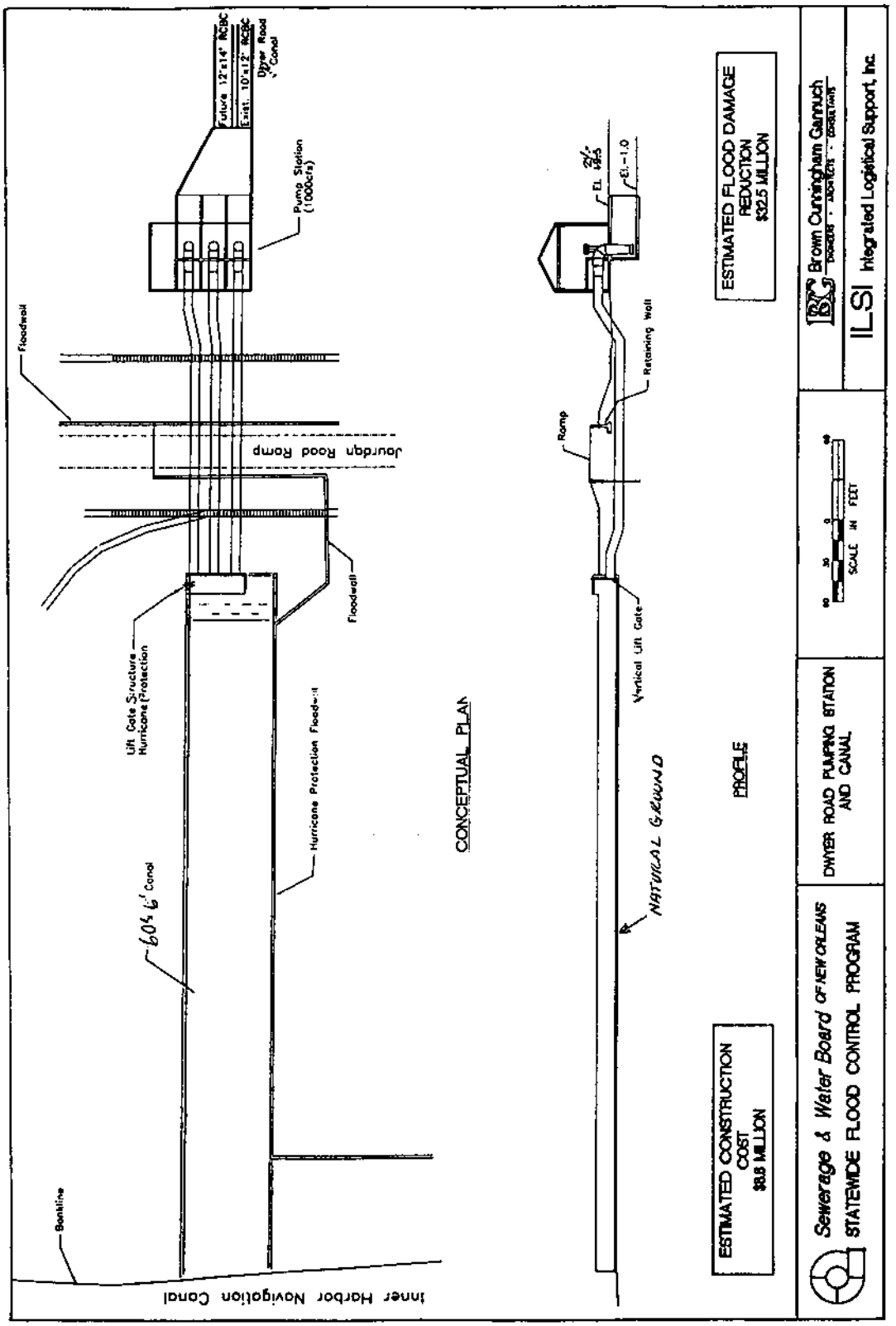
VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-3 PAGE NO: 2 OF 5

DRAWING NO. 1



DRAWING NO. 2


Inner Harbor Navigation Canal
Bankline
Lift Gate Structure
Hurricane Protection
Floodwall
Hurricane Protection Floodwall
605' Canal
Pump Station
(1000cfs)
Future 12'x14' RCBC
Exist. 10'x12' RCBC
Upper Road
Canal
Floodwall
Jourdan Road Ramp
CONCEPTUAL PLAN
Ramp
Retaining Wall
Vertical Lift Gate
NATURAL GROUND
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REDUCTION
$32.5 MILLION
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$8.8 MILLION
SCALE IN FEET
Brown Cunningham Gannuch
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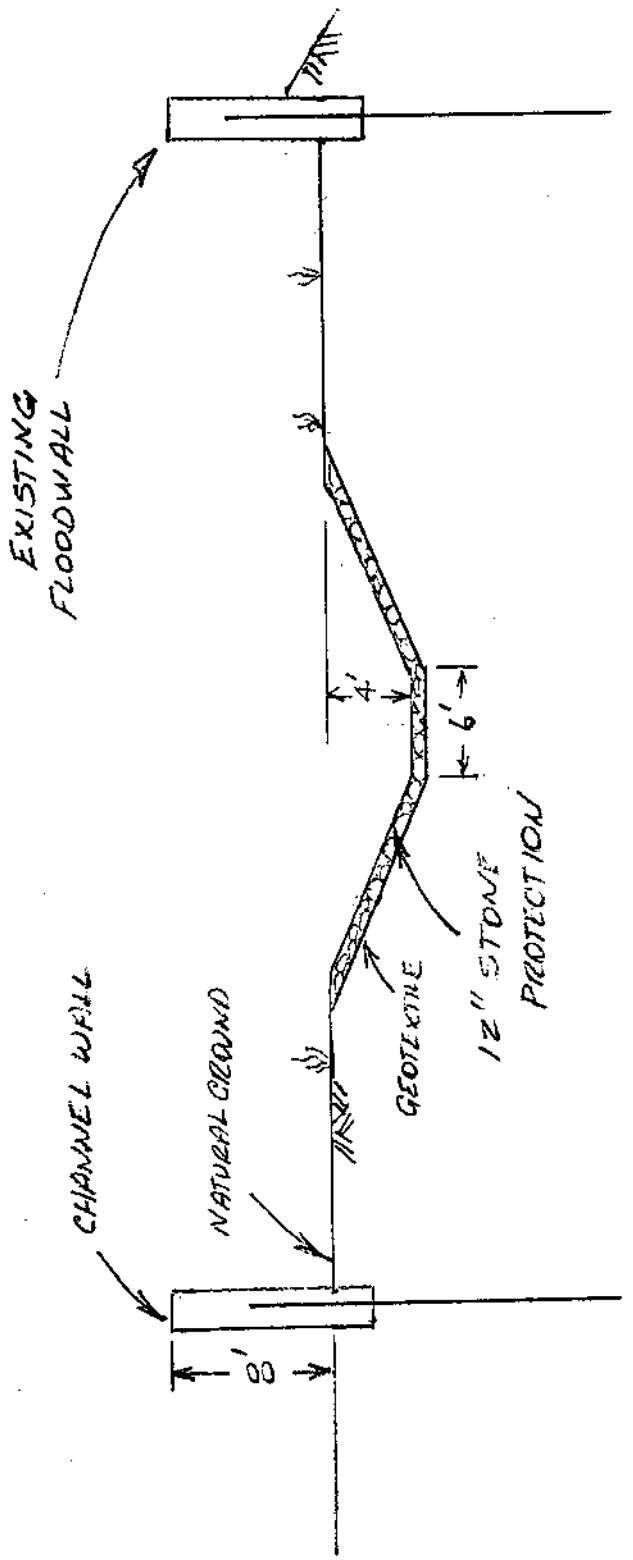
Sewerage & Water Board OF NEW ORLEANS
STATEWIDE FLOOD CONTROL PROGRAM
DWYER ROAD PUMPING STATION
AND CANAL

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-3 PAGE NO: 3 OF 5

DRAWING NO. 3



COST ESTIMATE WORKSHEET

PROPOSAL NO: C-3 PAGE NO: 5 OF 5

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
PZ-27	SF	19,200	$10.34	$200,256
Drive/Pull	SF	38,400	6.01	230,784
Demo 50" Pipe	LS	1	29,756.00	29,756
Excavation	CY	15,797	3.61	57,027
Backfill	CY	8,803	7.21	63,470
Reinforced Concrete				
Discharge Culvert Base	CY	941	240.00	228,840
Walls & Top	CY	1,207	397.00	479,179
40' Piling	LF	26,630	9.62	256,125
3' O.C. Piling	LF	4,878	9.62	46,045
TOTAL DELETIONS				$1,591,482

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
20' Sheet Pile X 710	SF	14,200	$13.50	$191,700
10' Concrete I-Wall	CY	526	400.00	210,370
Excavate Low Flow	CY	3,200	3.61	11,552
12" Stone Protection	TN	1,450	30.00	43,500
Geotextile	CY	2,130	3.00	6,390
TOTAL ADDITIONS				$463,512

Net Savings (Deletes - Adds)	$1,127,970
Markups 4.3%	48,503
TOTAL SAVINGS	$1,176,473

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

Note 1: Quantities adjusted to reflect 480' discharge culvert, 20' wide, which is a current design change from the Recon Report Design 680' long and 16' wide.

Note 2: This proposal does not delete the discharge basin, since a discharge/stilling basin will be needed.

Exit problem at ITNC (Pres Pall) head cutting.
Easements from Dock Board.
Dock Board has existing land under lease — want to keep it under lease.
water table problem
[redacted] head change for P.S. discharge

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-4 PAGE NO: 1 OF 4
DESCRIPTION: Use Arch Pipe

ORIGINAL DESIGN:

Cast-in-Place 20' X 12' underground discharge culvert conveys flow from west side of Jourdan Road to IHNC. (See Drawing No. 1.)

PROPOSED DESIGN:

Install pre-fabricated arch pipe for the discharge culvert. (See Drawing No. 2.)

ADVANTAGES:

Reduces construction time.

DISADVANTAGES:

Joints every 8' may increase chance of leakage.

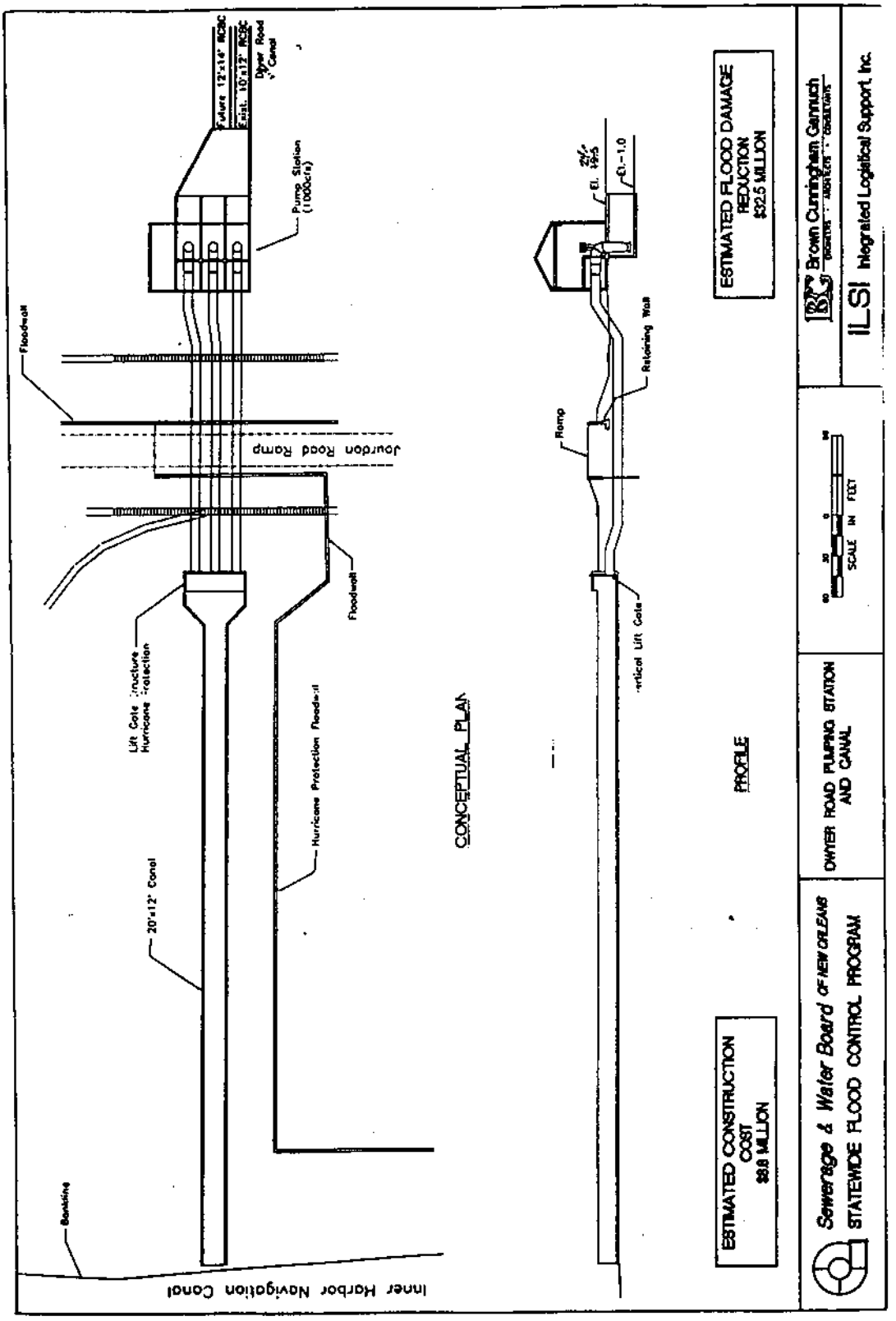
JUSTIFICATION:

Pre-fabricated arch sections reduce construction time. Pre-fabricated sections can also be barged in or brought in by rail at this location which may further reduce costs. Installation of prefab sections is not as weather affected as cast-in-place construction.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-4 PAGE NO: 2 OF 4

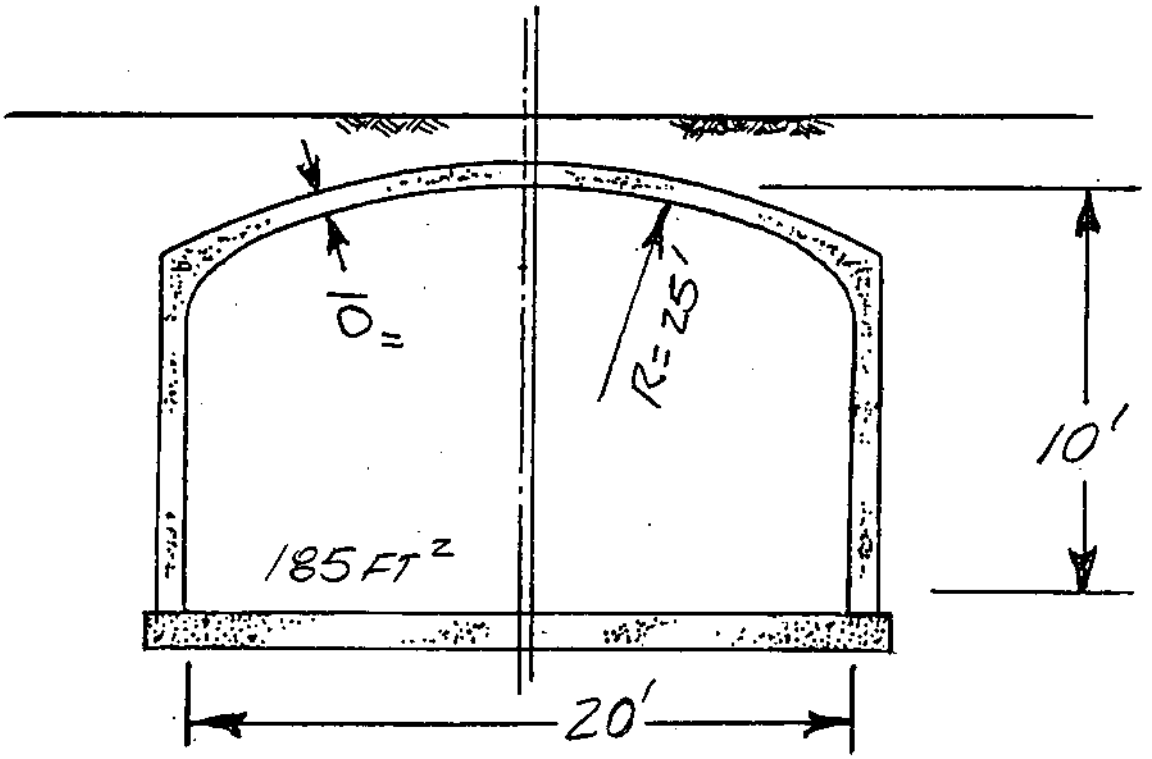
DRAWING NO. 1



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-4 PAGE NO: 3 OF 4

DRAWING NO. 2



COST ESTIMATE WORKSHEET

PROPOSAL NO: C-4 PAGE NO: 4 OF 4

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Reinforced Concrete Walls/Top	CY	1,207	$397.00	$479,179
TOTAL DELETIONS				$479,179

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
*Pre-fabricated Arch 20' Wide	LF	480	$700.00*	$336,000
TOTAL ADDITIONS				$336,000

Net Savings (Deletes - Adds)	$143,179
Markups 4.3%	6,157
TOTAL SAVINGS	$149,336

Markups included.

Note 1: *Based on estimate quoted from CONSPAN for arch delivered, including tax. This also includes $50.00/LF for crane rental and installation plus contingency based on installation rate of 15 seconds per day.

Note 2: **Savings for reduced construction time not quantified.

S'G WB sent letter in on Napoleon Ave saying they will use arch pipe as contractor option provided that joint leakage can be addressed.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-5A PAGE NO: 1 OF 4
DESCRIPTION: Use 84" Concrete Pressure Pipe and Existing 50" Discharge Lines

ORIGINAL DESIGN:

Construct a 20' X 12' CBC discharge culvert. (See Drawing No. 1.)

PROPOSED DESIGN:

Install a new 84" concrete pressure pipe next to the existing 50" discharge line. (See Drawing No. 2.)

ADVANTAGES:

1. Significantly reduces cost and construction time of discharge culvert.
2. Allows existing station to stay in service for a longer time during construction.
3. Utilizes existing discharge line.

DISADVANTAGES:

1. Requires about a 25% increase of pump horsepower.
2. Requires about 7' added height to gate/basin structure.
3. Somewhat limits future station capacity increase.

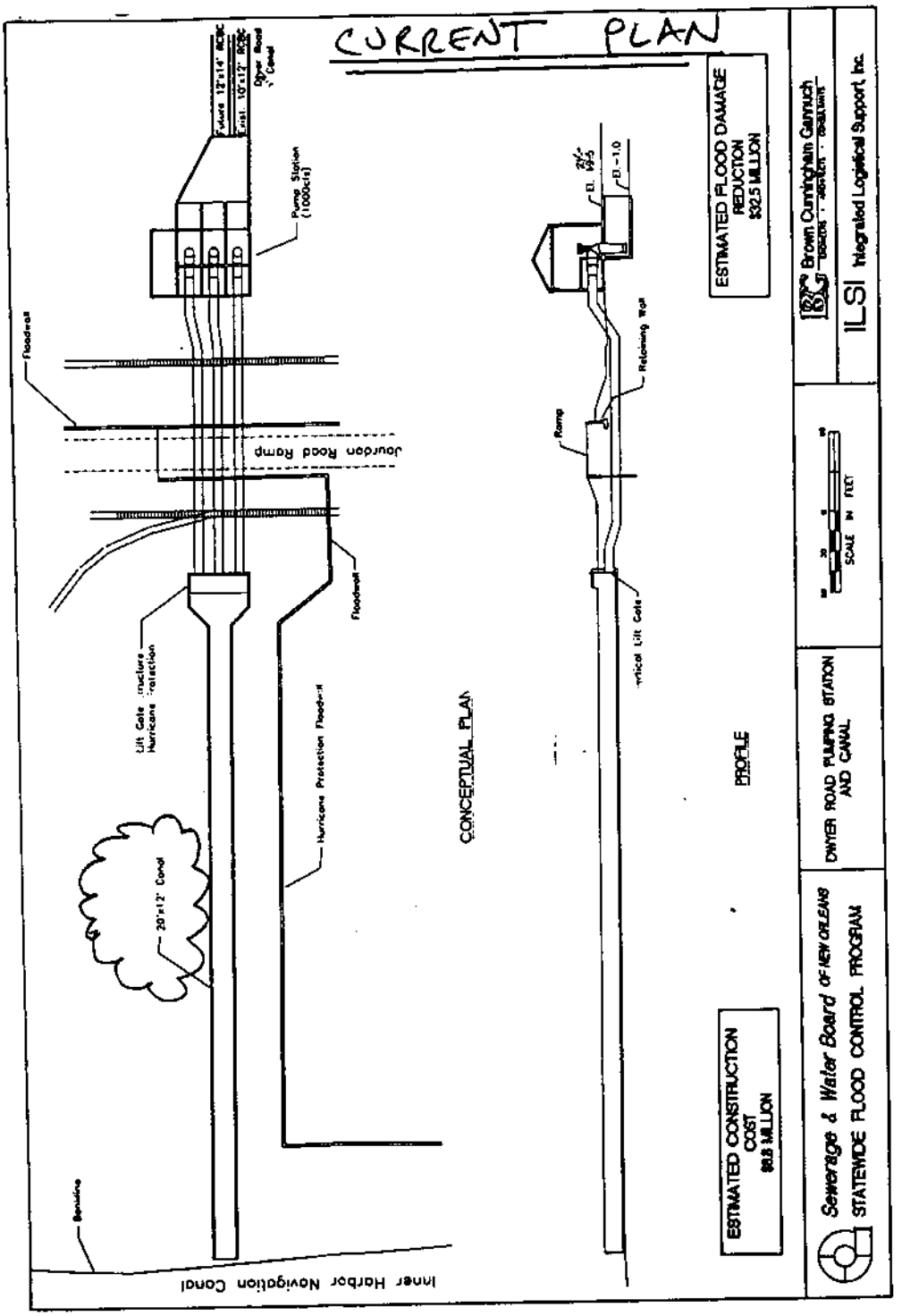
JUSTIFICATION:

While minimizing friction headloss maximizes pump output, the pump station design should still be optimized in conjunction with discharge structure and/or piping costs. The project calls for approximately 500' of free-flowing conveyance from the proposed floodgate structure to the IHNC. The current design calls for a 20 X 12 cast-in-place concrete box culvert. While this design minimizes system headloss and provides some excess capacity for future use, it is an expensive project component. The proposed design change significantly reduces this cost with the continued use of the existing 50" diameter discharge line and adding an 84" diameter concrete pressure pipeline. This change would add a calculated 7', or about 25% system headloss. This would require increasing the power of each pump driving system. This 25% required power increase would not affect pump type/model selection but only require a change in motor and/or gearbox size (see Appendix E, Supporting Documents). The cost of this change, including increased electrical use, would be far less than the cost savings realized in this proposed discharge piping plan.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-5A PAGE NO: 2 OF 4

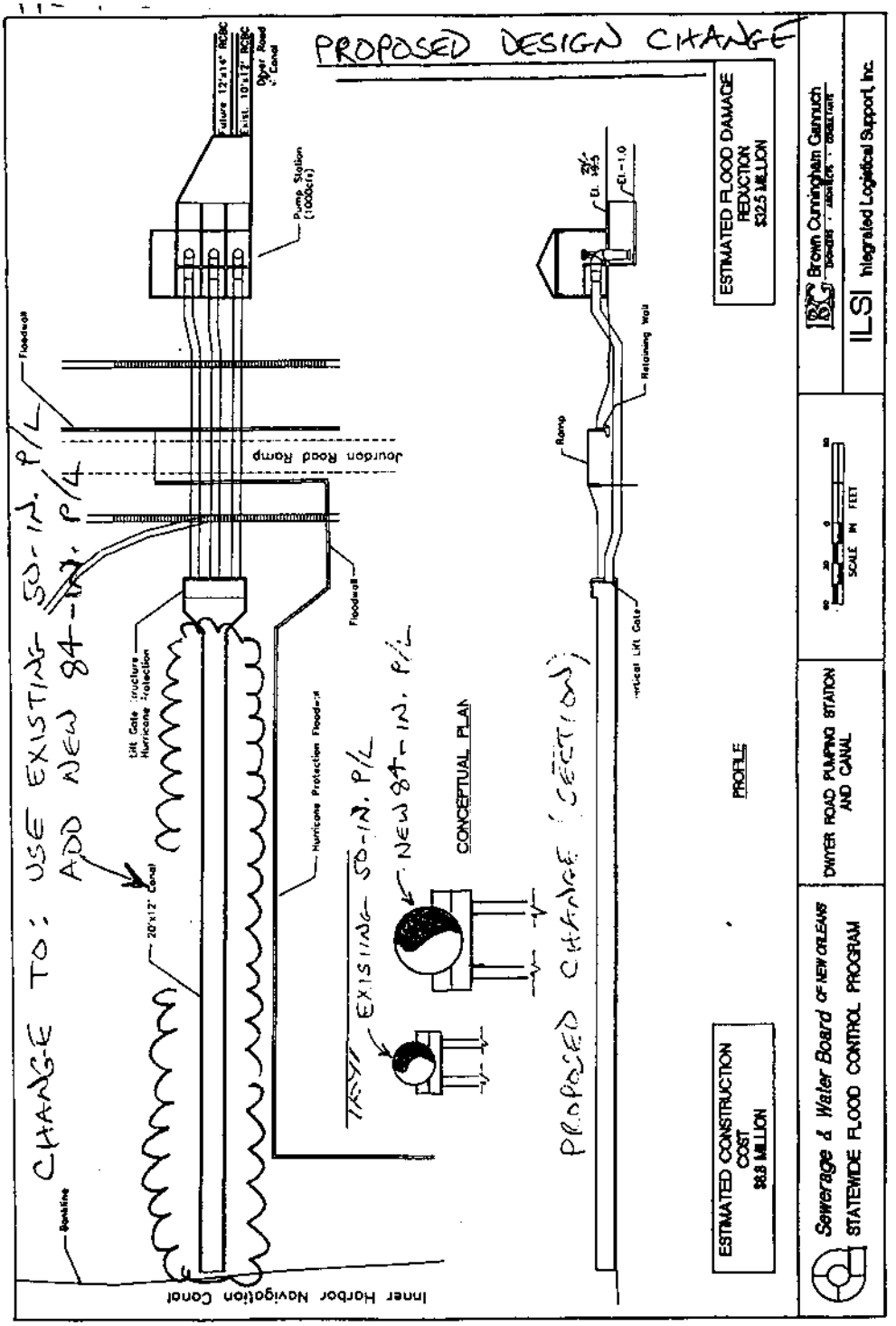
DRAWING NO. 1



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-5A PAGE NO: 3 OF 4

DRAWING NO. 2



COST ESTIMATE WORKSHEET

PROPOSAL NO: C-5A

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Base Slab Concrete	CY	950	$200.00	$190,000
Walls & Roof Concrete	CY	1,220	330.00	403,000
Timber Piling	LF	26,940	8.00	216,000
Cofferdam & Temp Sheet Piling (10%)	--	--	--	--
50" P/L Removal	LF	500	30.00	15,000
TOTAL DELETIONS				$889,000

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
84" Concrete Pressure Pipe	LF	500	$375.00	$188,000
Timber Piling & Saddles	LF	5,120	10.00	51,000
800 to 1,000 HP Increase	EA	3	20,000.00	60,000
Added Wall Concrete for Gate Structure	CY	9	330.00	3,000
**PW of Added Power Cost	LS	1	24,000.00	24,000
TOTAL ADDITIONS				$326,000

Net Savings (Deletes - Adds)	$563,000
Markups 24.3%	137,000
TOTAL SAVINGS	$700,000

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

**Annual Cost X 13.5% present worth factor = PW.
(Annual Cost = 22,500 KWH/HR X $0.08/KWH = $1,800)

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-5B PAGE NO: 1 OF 4

DESCRIPTION: Use 108" Concrete Pressure Pipe and Existing 50" Discharge Lines

ORIGINAL DESIGN:

Construct a 20' X 12' CBC discharge culvert. (See Drawing No. 1.)

PROPOSED DESIGN:

Install a new 108" concrete pressure pipe next to the existing 50" discharge line. (See Drawing No. 2.)

ADVANTAGES:

1. Significantly reduces cost and construction time of discharge culvert.
2. Allows existing station to stay in service for a longer time during construction.
3. Utilizes existing discharge line.

DISADVANTAGES:

1. Requires about a 25% increase of pump horsepower.
2. Requires about 7' added height to gate/basin structure.
3. Somewhat limits future station capacity increase.
4. Provides some excess conveyance capacity.

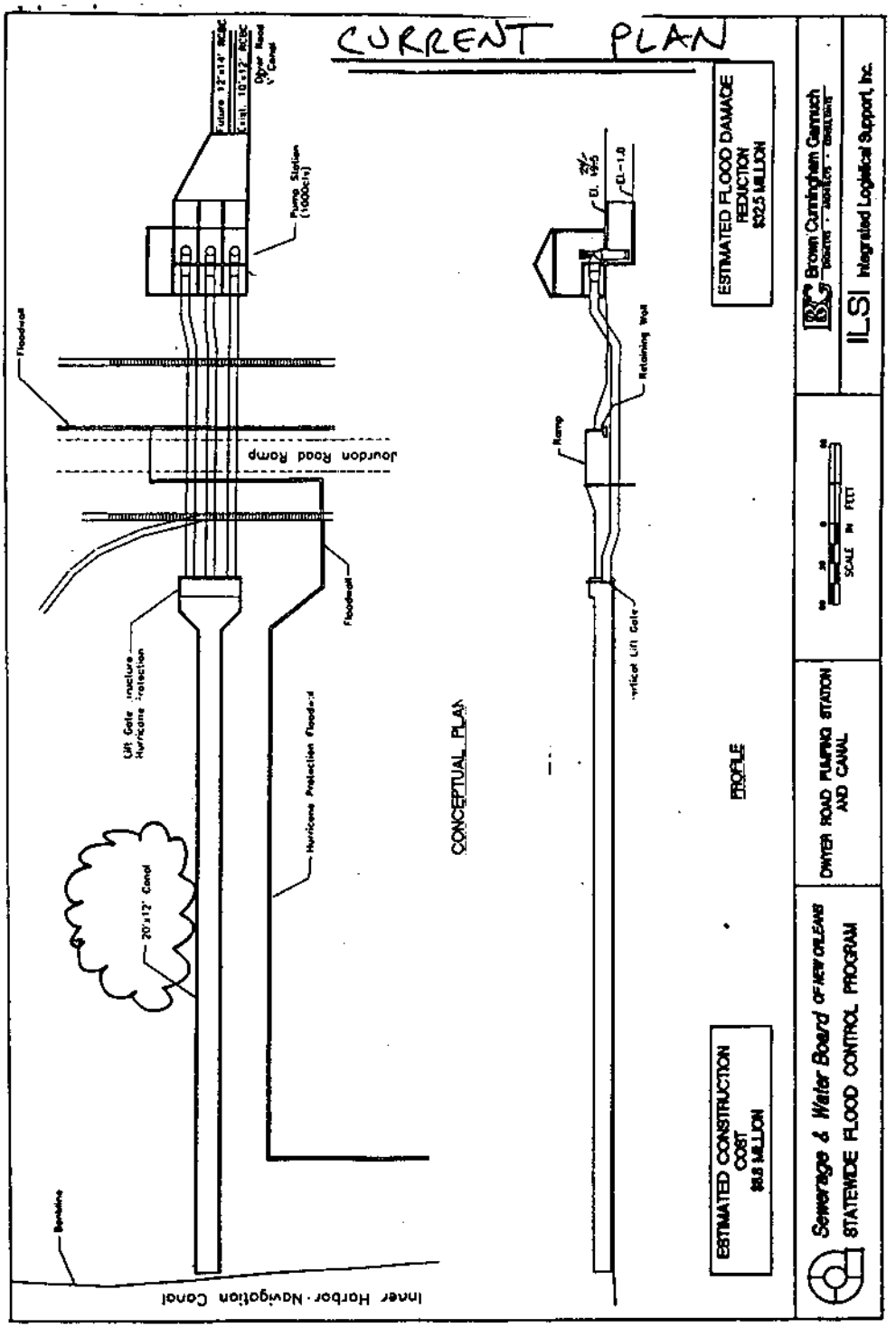
JUSTIFICATION:

While minimizing friction headloss maximizes pump output, the pump station design should still be optimized in conjunction with discharge structure and/or piping costs. The project calls for approximately 500' of free-flowing conveyance from the proposed floodgate structure to the IHNC. The current design calls for a 20 X 12 cast-in-place concrete box culvert. While this design minimizes system headloss and provides some excess capacity for future use, it is an expensive project component. The proposed design change significantly reduces this cost with the continued use of the existing 50" diameter discharge line and adding an 84" diameter concrete pressure pipeline. This change would add a calculated 7', or about 10% system headloss. This would require increasing the power of each pump driving system. This 10% required power increase would not affect pump type/model selection but only require a change in motor and/or gearbox size (see Appendix E, Supporting Documents). The cost of this change, including increased electrical use, would be far less than the cost savings realized in this proposed discharge piping plan.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-5B

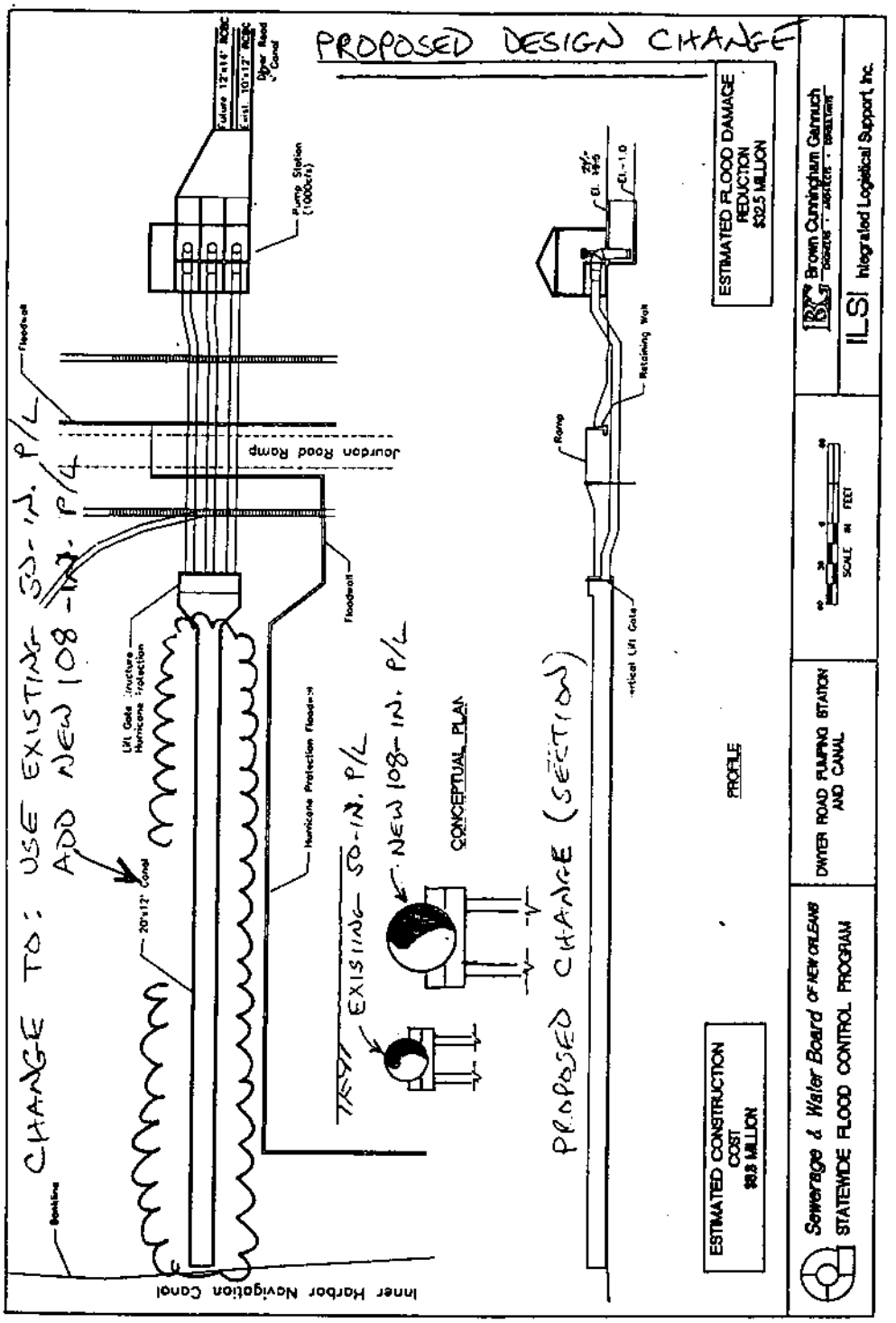
DRAWING NO. 1



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-5B

DRAWING NO. 2



COST ESTIMATE WORKSHEET

PROPOSAL NO: C-5B

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Base Slab Concrete	CY	950	$200.00	$190,000
Walls & Roof Concrete	CY	1,220	330.00	403,000
Timber Piling	LF	26,940	8.00	216,000
Cofferdam & Temp Sheet Piling (10%)	--	--	--	--
50" P/L Removal	LF	500	30.00	15,000
TOTAL DELETIONS				$889,000

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
108" Concrete Pressure Pipe	LF	500	$450.00	$255,000
Timber Piling & Saddles	LF	5,120	10.00	51,000
800 to 900 HP Increase	EA	3	8,000.00	24,000
Added Wall Concrete for Gate Structure	CY	9	330.00	3,000
**PW of Added Power Cost	LS	1	24,000.00	24,000
TOTAL ADDITIONS				$327,000

Net Savings (Deletes - Adds)	$562,000
Markups 24.3%	137,000
TOTAL SAVINGS	$699,000

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

**Annual Cost X 13.5% present worth factor = PW.
(Annual Cost = $22,500 KWH/YR X $0.08/KWH = $1,8 00)

better than 5A
SLWB has not checked these plans only will give comments

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-6 PAGE NO: 1 OF 4
DESCRIPTION: Install a Siphon for Backflow Prevention

ORIGINAL DESIGN:

The outlet structure has a discharge basin which incorporates a gated structure that provides positive cutoff from backflow. (See Drawing No. 1.)

PROPOSED DESIGN:

Create a siphon by raising the pipe over the wall, and install a siphon break to prevent backflow. (See Drawing No. 2.)

ADVANTAGES:

1. Simpler backflow prevention.
2. Eliminates gated structure and maintenance.
3. Manual closing of gate is not required.

DISADVANTAGES:

Additional initial head to overcome at the beginning of pumping.

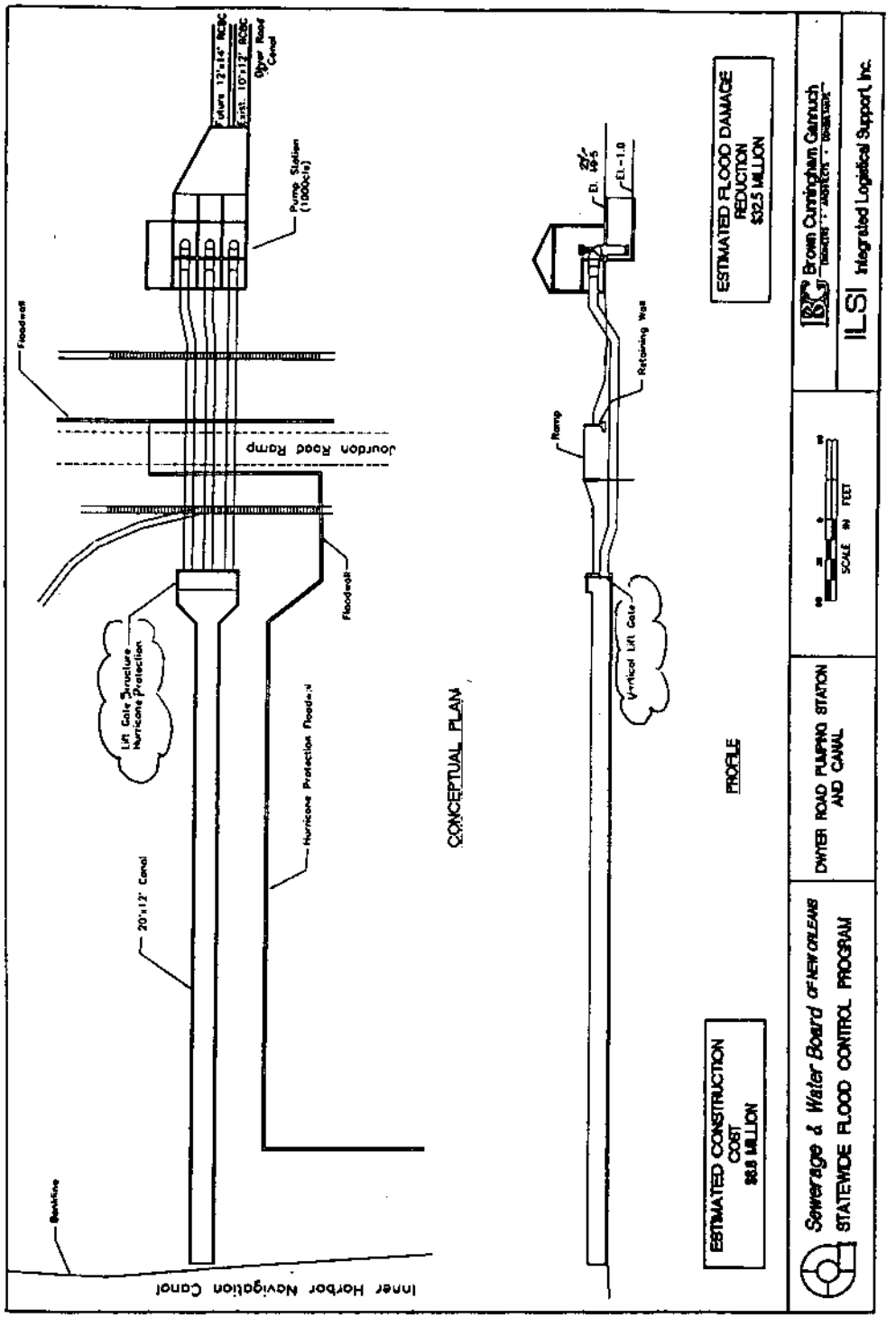
JUSTIFICATION:

A siphon pipe installed at elevation higher than surrounding floodwall system will insure that backflow cannot occur.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-6

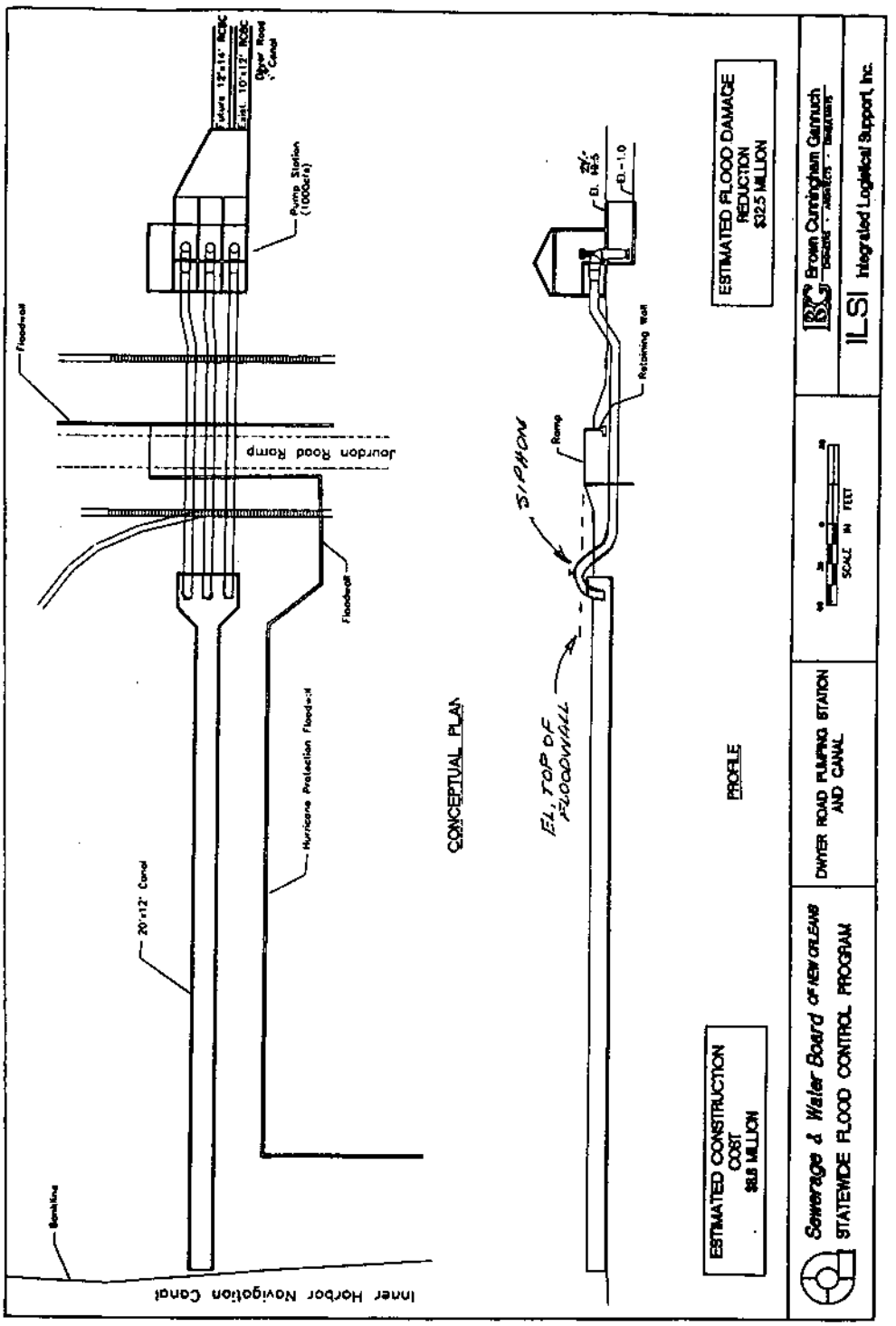
DRAWING NO. 1



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-6 PAGE NO: 3 OF 4

DRAWING NO. 2



COST ESTIMATE WORKSHEET

PROPOSAL NO: C-6 PAGE NO: 4 OF 4

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Slide Gate Structure	LS	1	$75,000.00	$75,000
TOTAL DELETIONS				$75,000

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Siphon	LS	3	$5,000.00*	$15,000
TOTAL ADDITIONS				$15,000

Net Savings (Deletes - Adds)	$60,000
Markups 4.3%	2,580
TOTAL SAVINGS	$62,580

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

*Represents the increase in cost over straight pipe section.

Citrona PS has siphon/gate combination

VALUE ENGINEERING PROPOSAL

PROPOSAL NO:	C-7	PAGE NO: 1 OF 7
DESCRIPTION:	Keep Existing 120 CFS Dwyer Pump Station and Construct New 880 CFS Pump Station	

ORIGINAL DESIGN:

The Dwyer Road Pump Station has a capacity of 120 CFS. The pump station is an un-manned automated station with open concrete platform with a trash rack system and appurtenances (see Drawing No. 3). It has a concrete box culvert inflow channel and a 50" diameter outflow pipe that discharges through existing levee floodwall into the IHNC. The selected SELA plan consists of increasing Dwyer Road DPS to 1,000 CFS by demolition of the existing station and constructing the new pump station on the site and discharging via pipes and conduit into IHNC. (See Drawing Nos. 1 and 2.)

PROPOSED DESIGN:

It is recommended that the existing Dwyer Road Pump Station be kept in service and that the new pump station be modified to 880 CFS. The new pump station may be shifted to the south by purchase of required property from LP&L (Entergy), possibly 1 acre (see Drawing Nos. 4 and 5).

ADVANTAGES:

1. Existing pump station and 120 CFS pump capacity is retained during construction and after for lower pumping requirements.
2. Avoids temporary pumping of existing Dwyer Canal storm water and ground water during construction.
3. New pump station design requirement is reduced to 880 CFS (12% less new construction).
4. Cost savings can fund both O&M and some specific system repair or parts replacement if needed.

DISADVANTAGES:

1. Two pump stations and plant systems require maintenance and repair.
2. Additional site and canal connection is required for the new pump station.

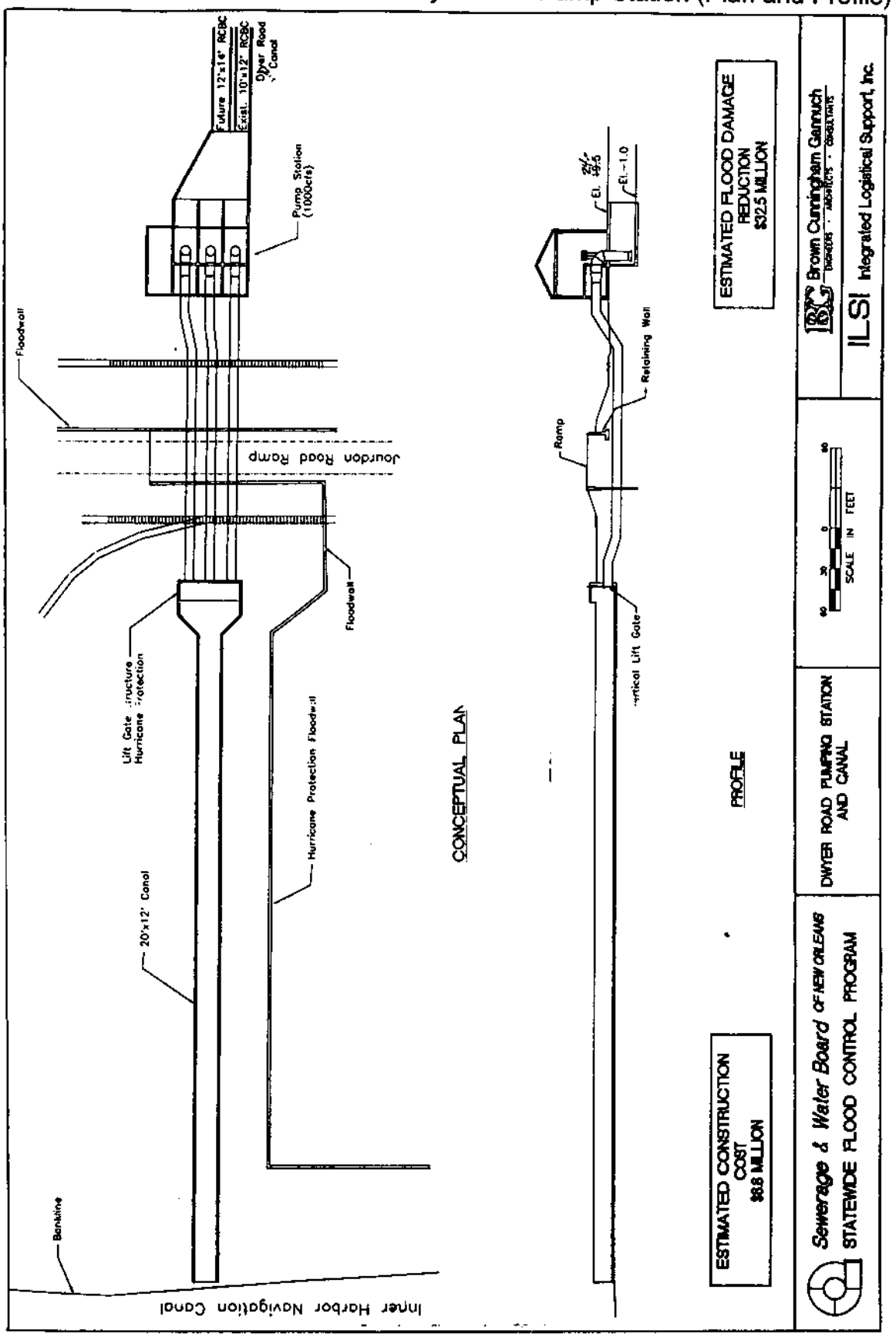
JUSTIFICATION:

The existing pump station capacity is retained both during construction and after to meet lower pumping requirements. Temporary pumping of storm water drainage and ground water during construction is served by the existing pump station. Reduction in capacity for the new pump station can be realized.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-7

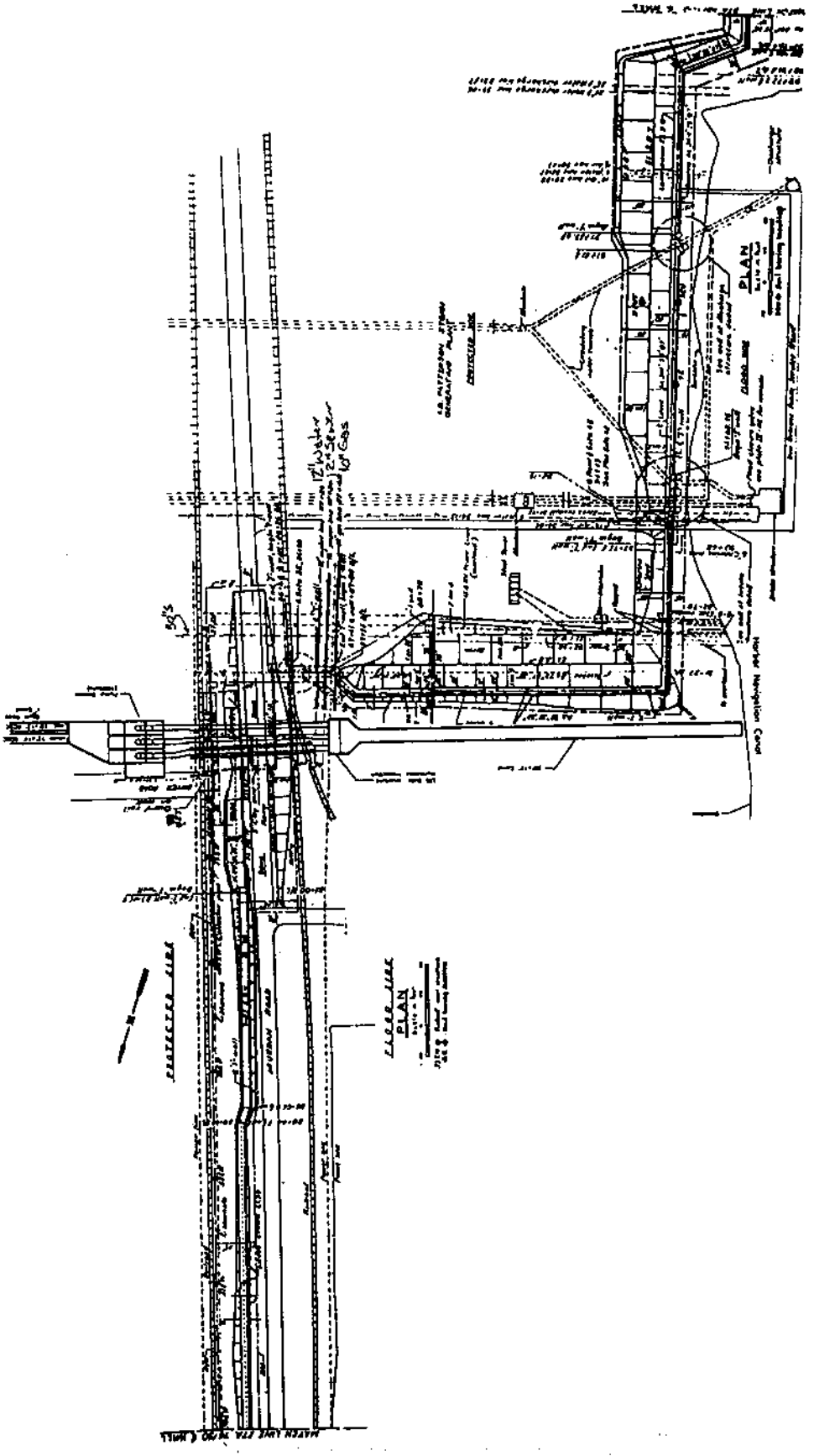
DRAWING NO. 1 -- New 1,000 CFS Dwyer Road Pump Station (Plan and Profile)



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-7

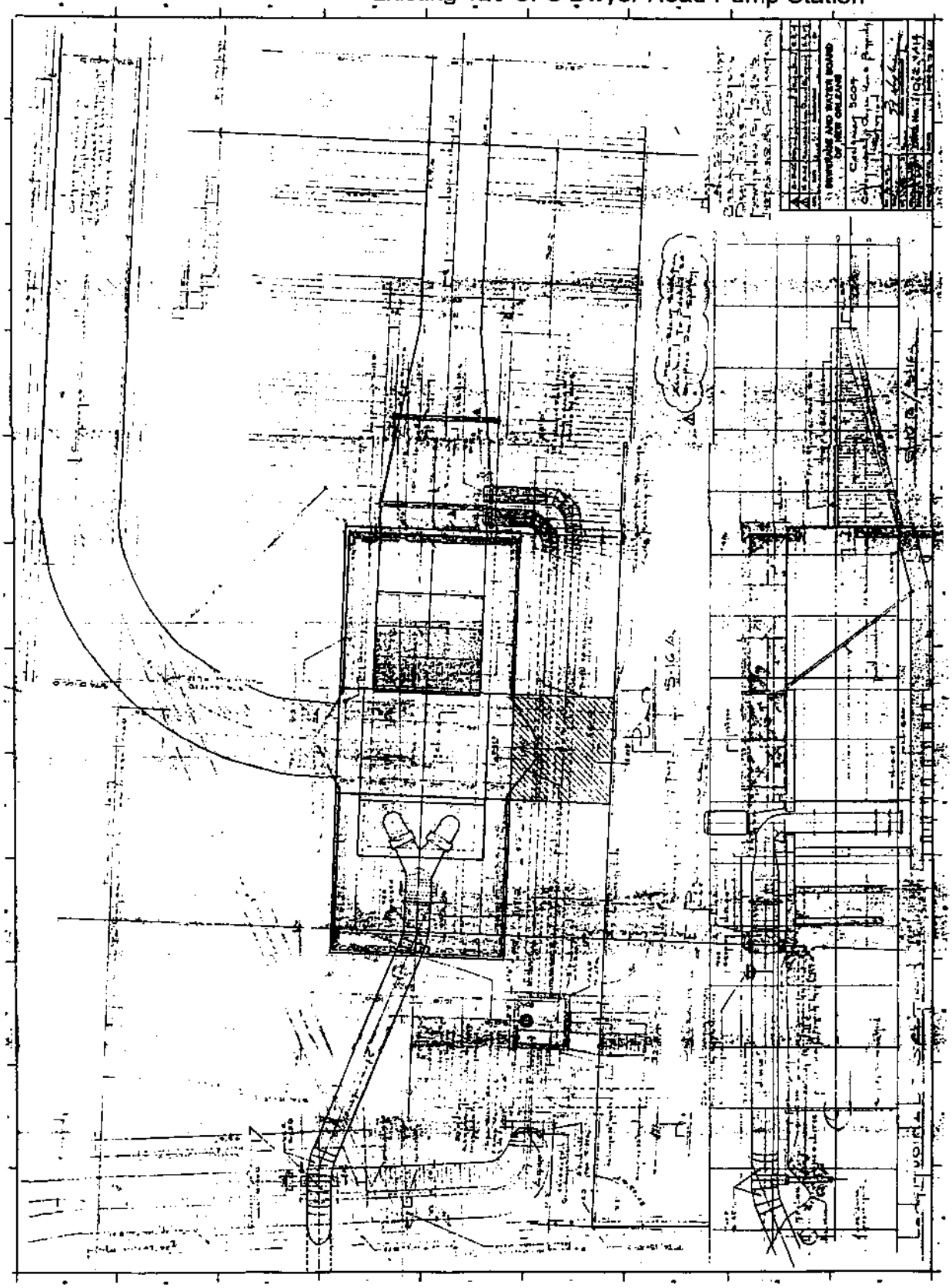
DRAWING NO. 2 -- New 1,000 CFS Dwyer Road Pump Station (Overall Site Plan)



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-7 PAGE NO: 4 OF 7

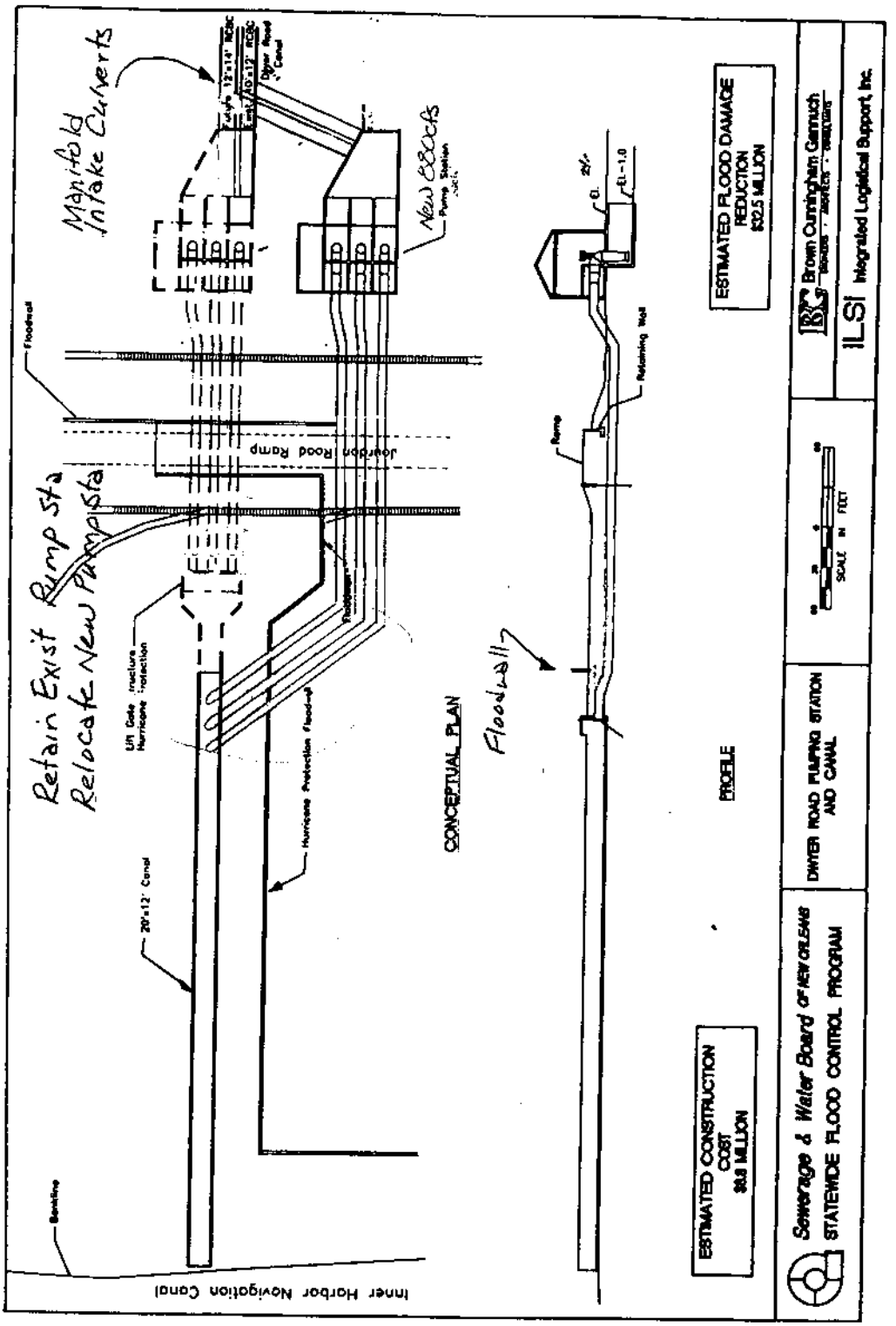
DRAWING NO. 3 -- Existing 120 CFS Dwyer Road Pump Station



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-7 PAGE NO: 5 of 7

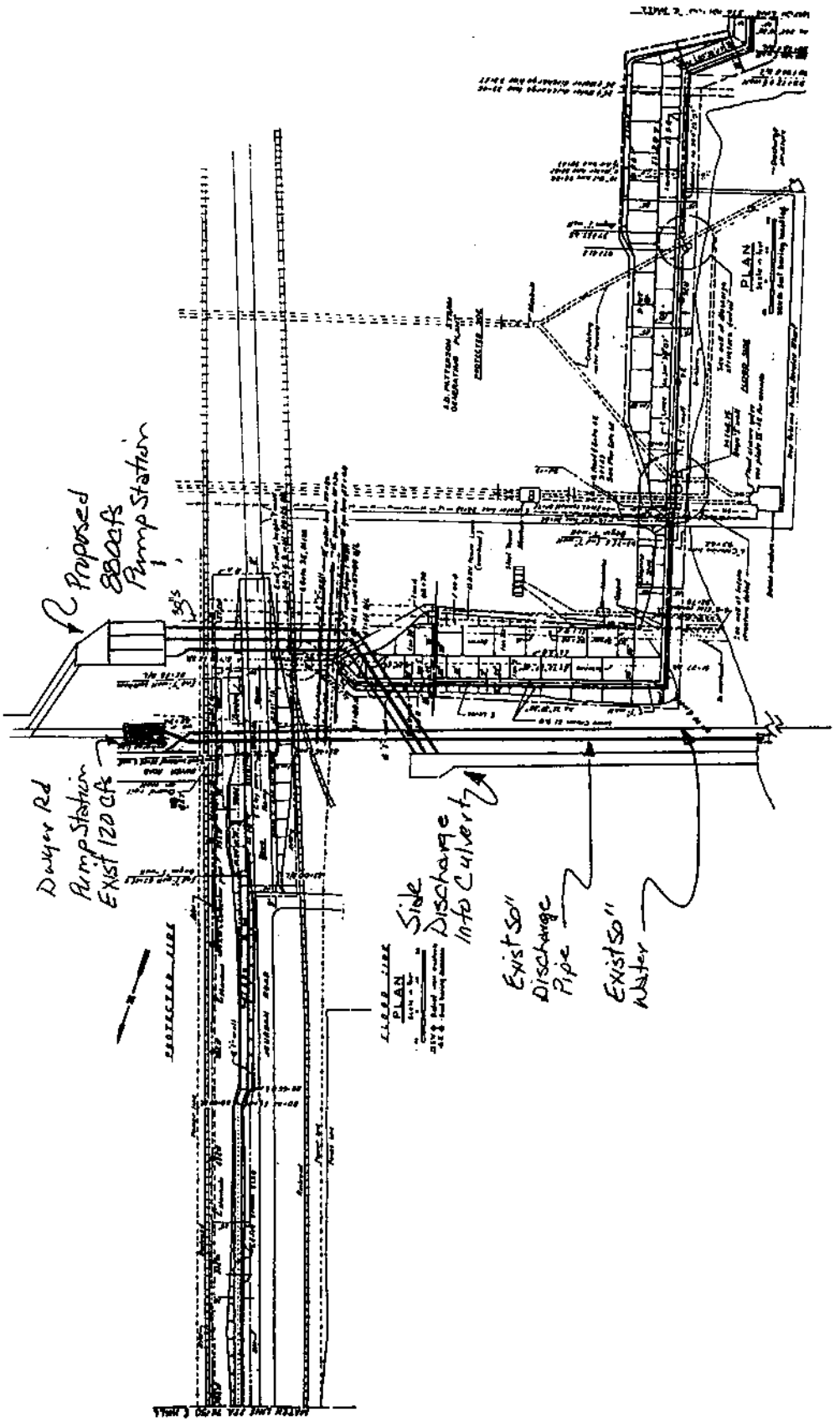
DRAWING NO. 4 -- Recommended 880 CFS Pump Station



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-7 PAGE NO: 6 of 7

DRAWING NO. 5 -- Recommended New 880 CFS Pump Station (Overall Site Plan)



COST ESTIMATE WORKSHEET

PROPOSAL NO: C-7 PAGE NO: 7 OF 7

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
New 1,000 CFS PS	LS	1	$3,850,000.00	$3,850,000
Demo Existing PS	LS	1	28,226.00	28,226
Demo Existing 50" Pipe	LS	1	29,756.00	29,756
Temp Pumping Dwyer Canal	LS	1	(unknown)	(unknown)
Utilities Relocations	LS	1	189,000.00	189,000
Road Relocations	LS	1	250,000.00	250,000
Discharge Culvert	LF	100	3,755.00	375,500
O&M New 1,000 CFS PS	LS	1	1,350,000.00	1,350,000
TOTAL DELETIONS				$6,072,482

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Real Estate -- New Site PS	AC	1.5	$100,000.00	$100,000
*O&M (Exist PS)	LS	1	162,000.00	162,000
New 880 CFS PS	LS	1	3,388,000.00	3,388,000
O&M (New 880 CFS PS)	LS	1	1,188,000.00	1,188,000
Utilities Relocations (Power & Sewer)	LS	1	134,741.00	134,741
Road Relocations (50% orig)	LF	300	163.00	48,900
TOTAL ADDITIONS				$5,196,641

Net Savings (Deletes - Adds)	$875,841
Markups 4.3%	37,661
TOTAL SAVINGS	$913,502

*O&M = Present Worth

120 CFS X $100/CFS/YR X 13.5 (50 yrs) = $ 162,000
880 CFS X $100/CFS/YR X 13.5 (50 yrs) = $1,188,000
1,000 CFS X $100/CFS/YR X 13.5 (50 yrs) = $1,350,000

450

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-8 PAGE NO: 1 OF 6
DESCRIPTION: Relocate Pump Station to Entergy Site and Use Entergy Culverts

ORIGINAL DESIGN:

The current configuration incorporates a new pump station at the site of the existing Dwyer Canal pump station. This new pump station will include three 150,000 GPM (333 CFS) vertical pumps. The discharge from these pumps will be piped below Jourdan Road and two railroad spurs and connect to a 20' X 12' concrete culvert which discharges into the Inner Harbor Navigation Canal (see Drawing No. 1) .

PROPOSED DESIGN:

This proposal recommends locating the new pump station at the site of Entergy's abandoned pump station (see Drawing No. 2) . In addition, this proposal recommends pumping the discharge through the two existing 5' X 5' concrete culverts from the Entergy pump station site to the Inner Harbor Navigation Canal (see Drawing No. 3). This proposal recommends keeping the existing Dwyer Canal pump station and 50" discharge pipe. This existing pump station is capable of pumping 120 CFS. The remaining 880 CFS will be handled by four vertical pumps in the new pump station at the Entergy site. These four pumps will deliver 220 CFS each. The Dwyer Canal will be extended to the intake sump of the new pump station on the Entergy site. Implementation of this proposal requires that the Sewage and Water Board acquire a portion of the abandoned generation plant site and the discharge culverts to the Inner Harbor Navigational Canal (IHNC). It should be noted that this proposal intends to use Entergy's existing intake structure for discharge to the IHNC. The existing pump structure on the Entergy site will have to be demolished. Dwyer canal will be extended and a new pump station constructed. Any maintenance needed on the existing Dwyer Canal pumps should also be incorporated into this project (i.e., motor replacement). The new four-pump station will be housed in a pre-engineered building with a 20-ton bridge crane. This proposal also adds new gate structures to the existing 5' X 5' culverts and the existing 50" discharge line to assure positive cut-off during emergency conditions.

ADVANTAGES:

1. First cost savings.
2. Smaller pumps add operational flexibility.
3. This approach avoid numerous conflicts with road crossings, railroad crossings, and utility crossings.

DISADVANTAGES:

1. The Entergy real estate must be acquired.
2. Demolition on the Entergy site may involve some hazardous waste cleanup.

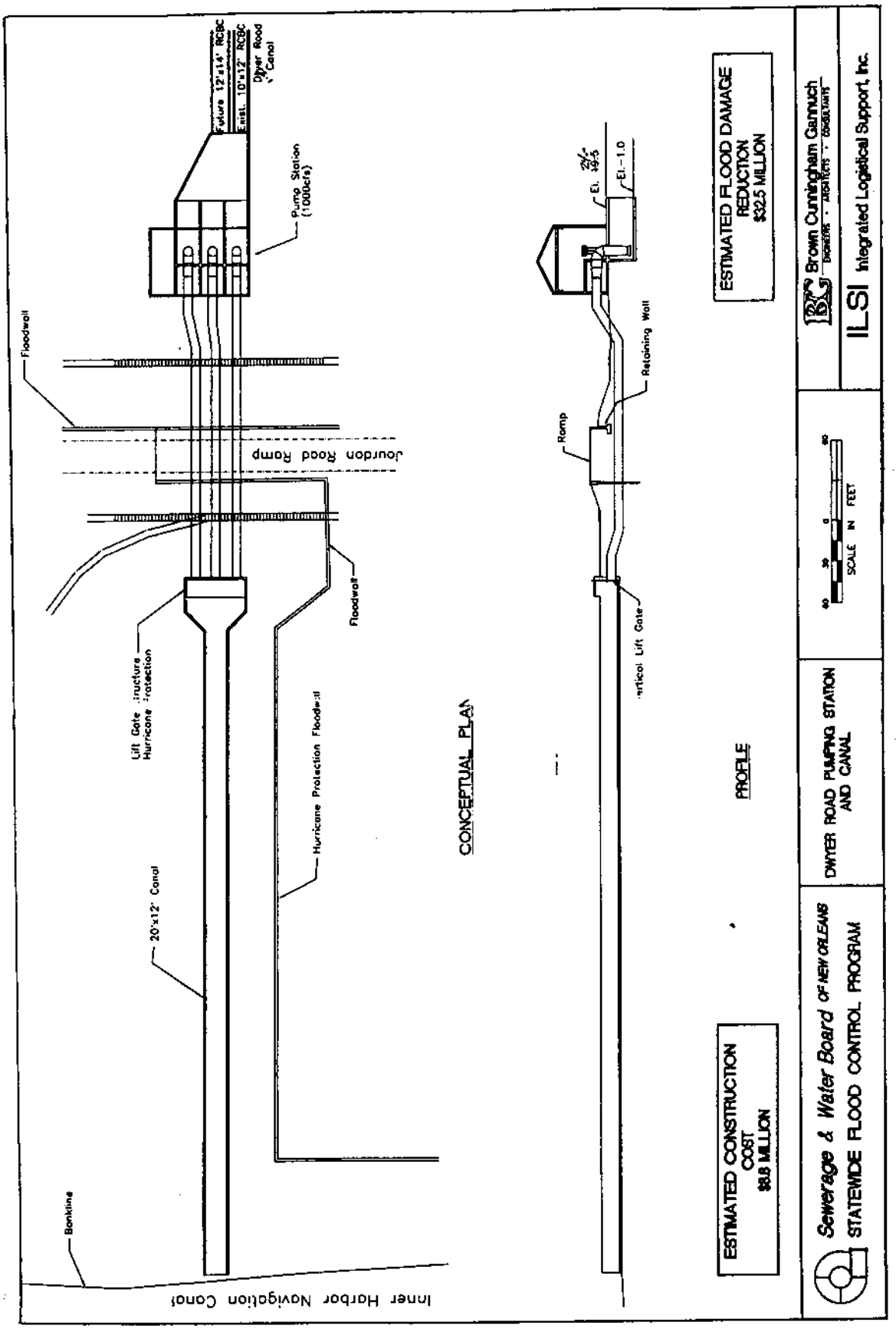
JUSTIFICATION:

This proposal meets the functional requirements of the project at a reduced cost and avoids cutting the existing railroad tracks and road.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-8 PAGE NO: 3 OF 6

DRAWING NO. 1

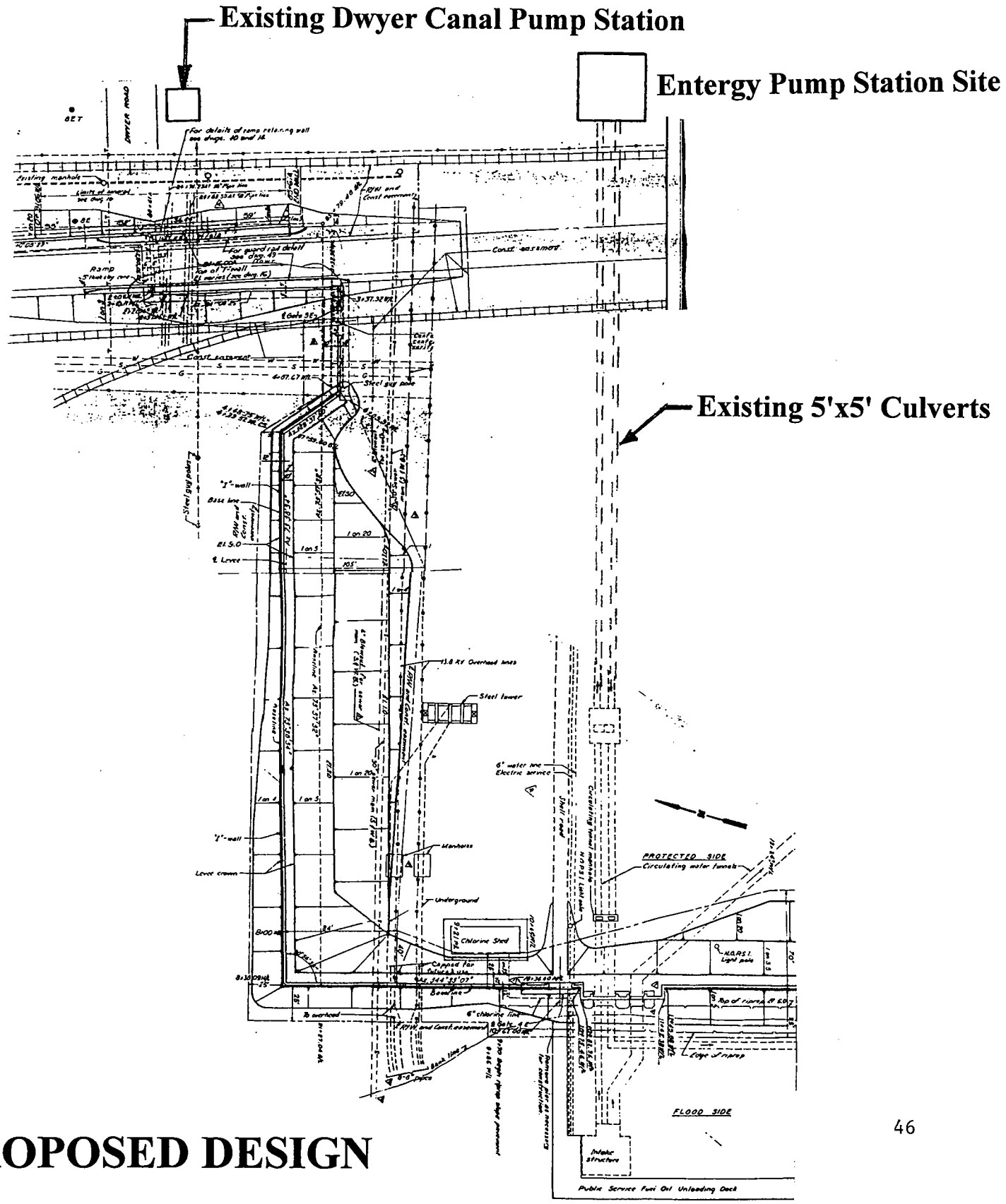


EXISTING DESIGN

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-8 PAGE NO: 4 OF 6

DRAWING NO. 2

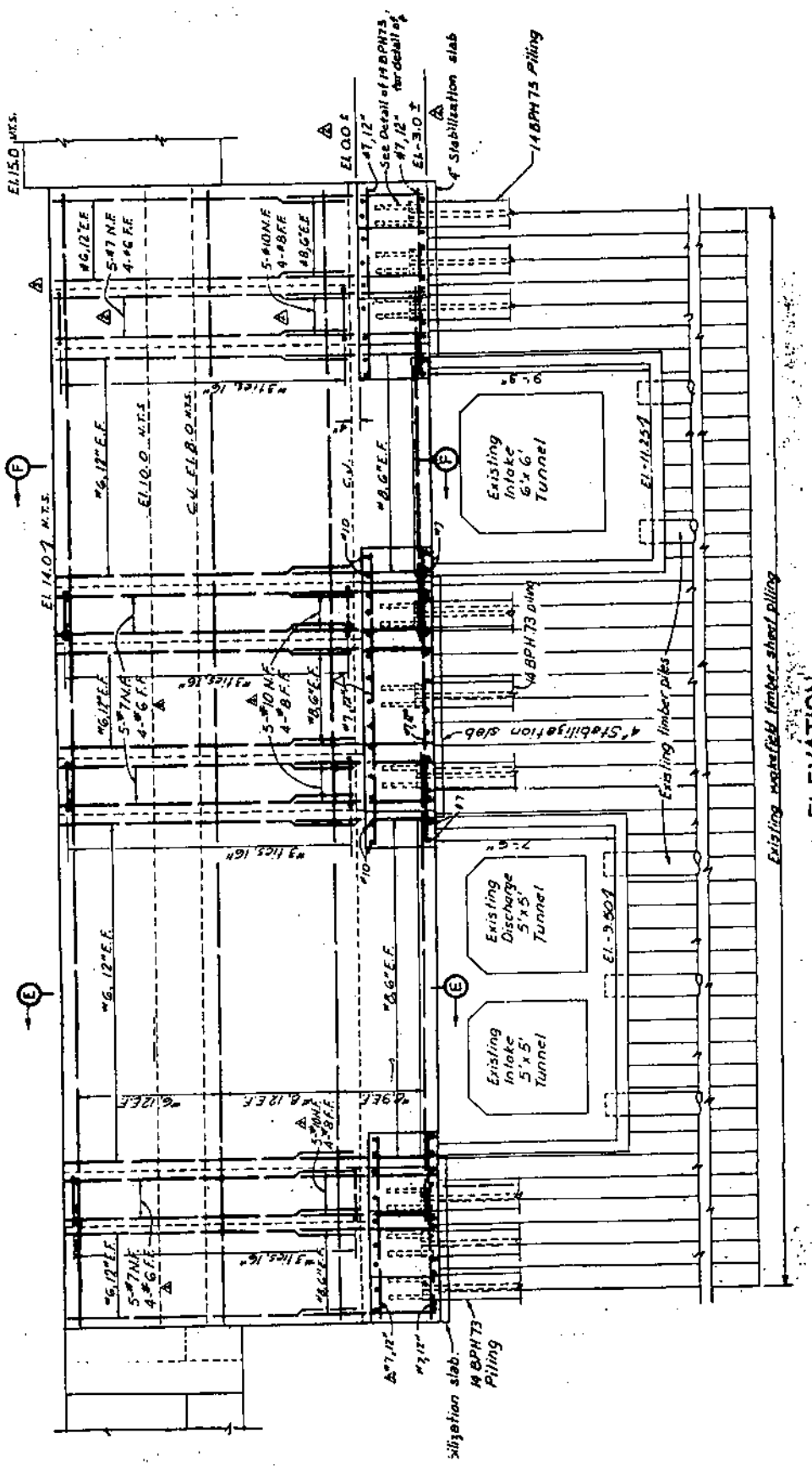


PROPOSED DESIGN

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-8 PAGE NO: 5 OF 6

DRAWING NO. 3



Section of Entergy's Existing Culverts

COST ESTIMATE WORKSHEET

PROPOSAL NO: C-8 PAGE NO: 6 OF 6

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
333 CFS Vertical Pumps	EA	3	$355,511.00	$1,066,533
25-Ton Bridge Crane	LS	1	90,083.00	$90,083
Gear Reducers	EA	3	82,876.00	248,628
800 HP Elec. Motors	EA	3	96,088.00	288,264
Foundation/Site Work/ Care H_2O	LS	1	778,861.00	778,861
Pre-Engineered Building	SF	2,000	54.00	108,000
Railroad Work	LS	1	891,000.00	891,000
Utilities Avoided	LS	1	189,000.00	189,000
Road Work	LS	1	250,000.00	250,000
Discharge Culverts	LS	1	2,760,000.00	2,760,000
Existing Pump Station Demo	LS	1	28,226.00	28,226
TOTAL DELETIONS				$6,698,595

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Real Estate Acquisition	AC	3	100,000.00	$300,000
Demo on Entergy Site	LS	1	50,000.00	50,000
Dwyer Canal Extension	FT	275	2,900.00	797,500
Intake Sump/Found/ Care of H_2O	LS	1	1,038,481.00	1,038,481
Discharge Connection to Culverts	LS	1	25,000.00	25,000
Pre-Engineered Building	SF	2,700	54.00	145,800
20-Ton Bridge Crane	EA	1	73,000.00	73,000
4-220 CFS Vertical Pumps	EA	4	234,872.00	939,488
4-90° Gear Reducers	EA	4	82,876.00	331,504
4-800 HP Elec. Motors	EA	4	96,088.00	384,352
Maint on Existing Pump Sta	LS	1	20,000.00	20,000
2-Gate Structures	EA	2	15,000.00	30,000
TOTAL ADDITIONS				$4,135,125
Net Savings (Deletes - Adds)				$2,563,470
Markups 4.3%				110,229
TOTAL SAVINGS				$2,673,699

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

Entergy will probably not want to give up their facilities

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: C-9 PAGE NO: 1 OF 2
DESCRIPTION: Use Ascension Parish-Type Pump Station

ORIGINAL DESIGN:

The current design calls for a concrete and CMU building (with internal 25-ton crane) to house the Dwyer Pump Station. The Dwyer Pump Station will move 1,000 CFS.

PROPOSED DESIGN:

(See Drawing No. 1 and Appendix E.) This proposal suggests the use of a weatherproof steel housing for the pumps in lieu of a concrete/CMU building. Note that the Ascension Parish-type pump station produces 5,000 CFS at a total cost of $11,000,000.

ADVANTAGES:

1. Reduced first cost.
2. Ease of construction.

DISADVANTAGES:

None known.

JUSTIFICATION:

A potential savings of $5,000,000 makes the Ascension Parish- type of facility extremely competitive and warrants serious consideration.

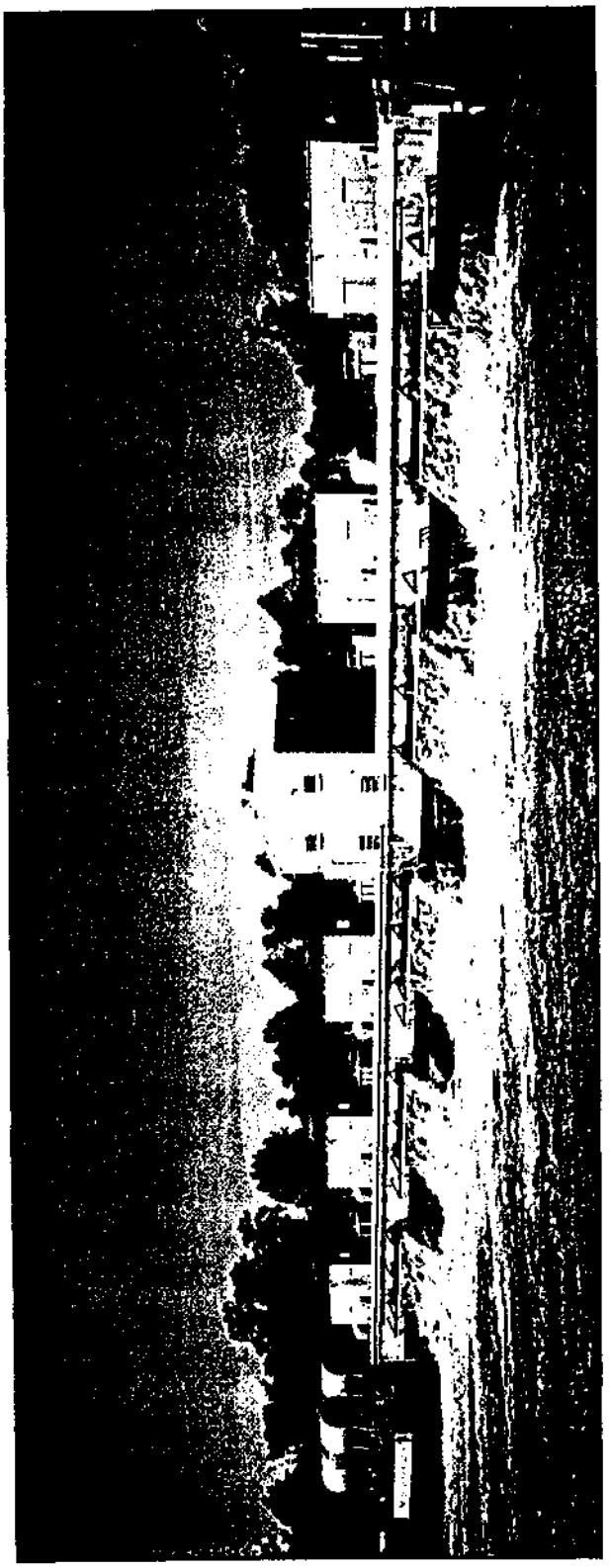
POTENTIAL SAVINGS: $5,000,000

Ascension Types = $11,000,000 for 5,000 CFS or $2,500/CFS
Dwyer = $6,500/CFS or $6,500,000
Dwyer @ 2,500 CFS = $2,500,000

Difference = $4,000,000 w/o markups = $5.3M with markups, say $5M

Low head vertical Lift PS.
S&WB will not go with metal building (Ascension)
Perm section savings - ? hard for this station is lower

DRAWING NO. 1



VALUE ENGINEERING PROPOSAL

PROPOSAL NO: E-1A PAGE NO: 1 OF 2

DESCRIPTION: Improve Power Availability by Extending a Feeder from S&WB

ORIGINAL DESIGN:

The existing Dwyer Pump Station is currently being fed by a single Entergy feeder. Since the pumps are electrically driven, this situation places the plant at a relatively low availability (a 1-hour outage in a period of 1 year yields .9998 availability). More so, a 1-hour outage over a storm period would reduce the availability to about .97 -- very poor.

PROPOSED DESIGN:

This proposal emphasizes that an electrically-driven pump motor requires some sort of backup, especially if the pump station is to become more relied upon for flood control. Several solutions are possible:

1. Provide a backup generator on site.
2. Have arrangements for the deployment of a portable generator.
3. Extend an alternate feed from S&WB.
4. Use diesel-driven pumps.

This proposal suggests extending an S&WB feeder to the Dwyer Plant such that failure of the Entergy feeder will switch over to the S&WB feeder. The reason to extend an S&WB feeder vice a new Entergy feeder is that the S&WB system is dedicated exclusively to flood control. Consequently, its reliability is expected to be much higher. The combination of the Entergy feeder and the S&WB feeder should raise the availability above 4-9's. The estimate assumes the extension of an aerial line. An underground line would improve the reliability but at a much higher cost.

ADVANTAGES:

Increased pump availability.

DISADVANTAGES:

Increased first cost.

JUSTIFICATION:

The current power source is not adequate to assure a high degree of availability should a major storm flood occur. Some other source of power is needed – unless the discharge contribution of this plant is more with respect to the system availability or discharge capacity.

COST ESTIMATE WORKSHEET

PROPOSAL NO: E-1A

DELETIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
TOTAL DELETIONS				$0

ADDITIONS

ITEM	U/M	QTY	UNIT COST	TOTAL
Duct Bank & Feeder	LS	1	$1,000,000.00	$1,000,000
TOTAL ADDITIONS				$1,000,000

TOTAL INCREASE $1,000,000

Markups include Contractor's markup for OH & Profit, Contingencies and S&A where applicable.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO:	E-1B	PAGE NO: 1 OF 1
DESCRIPTION:	Improve Power Reliability by Initiating a Feasibility Study for a New S&WB Project	

ORIGINAL DESIGN:

The Sewage and Water Board (S&WB) currently has a 25 cycle electrical system whose task is to exclusively serve the New Orleans pump stations. As a result, the system is maintained in a very reliable posture. Feeders to the plants are underground.

PROPOSED DESIGN:

There are five pump station at Lake Forrest that are being served by the New Orleans public Service, whose lines are overhead (subject to outages, particularly during storms). This proposal suggests that a Feasibility Study be initiated to determine if a point project could establish a new 60 Hz generation plan at Lake Forrest to handle the five existing electrical pumps. The plant would be owned and operated by the S&WB. A life cycle study is required to substantiate this proposal.

ADVANTAGES:

1. Higher plant availability (about 100 fold).
2. Possible reduced life-cycle costs (plant operation costs versus New Orleans Public Service charges). These electrical pumps generally carry a high demand charges.

DISADVANTAGES:

A large capital outlay in first costs.

JUSTIFICATION:

A Feasibility Study will reveal an increase in plant availability for flood control. Life-cycle savings, however, must be determined.

POTENTIAL SAVINGS:

To be determined as a result of Feasibility Study.

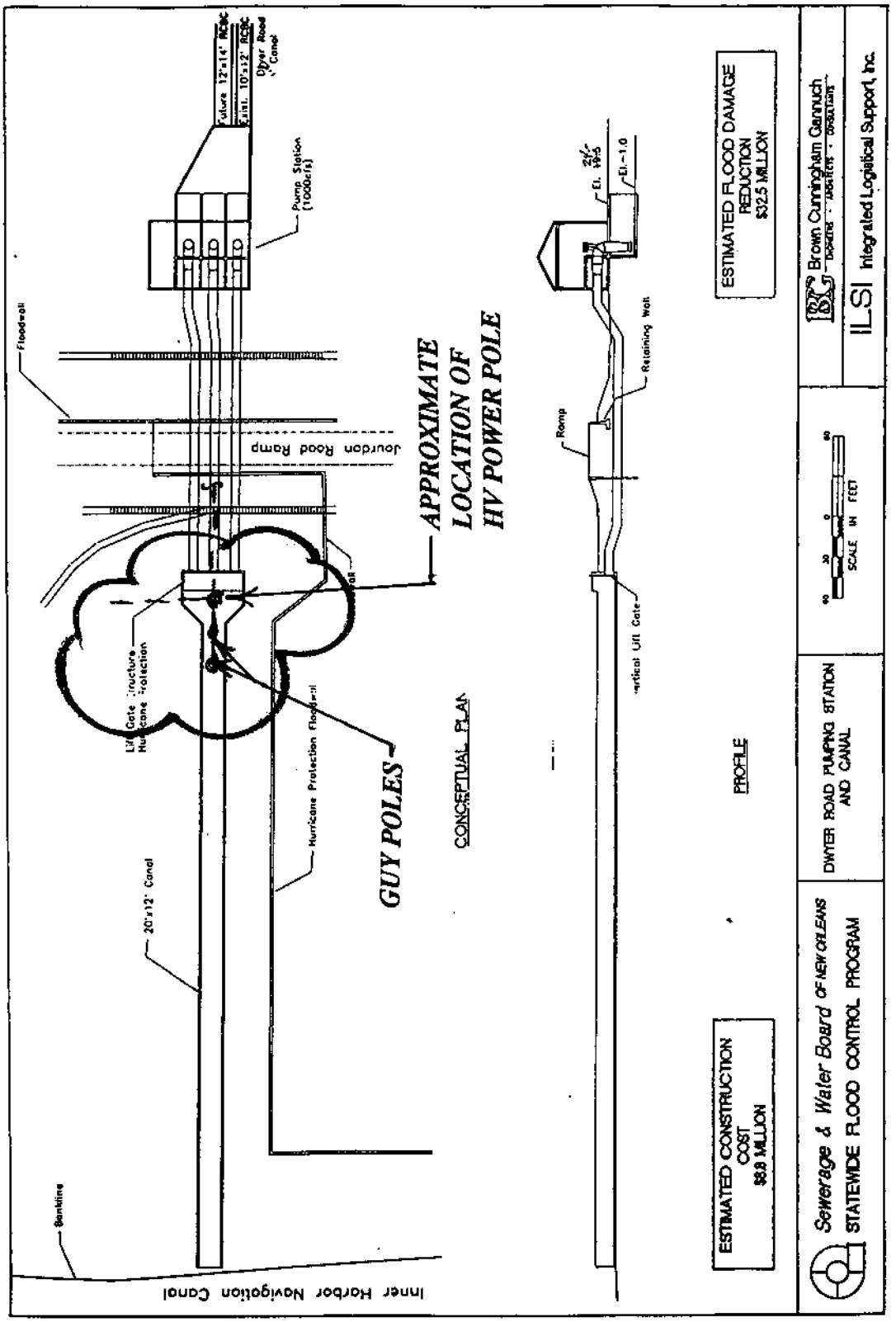
VALUE ENGINEERING COMMENTS

1. **Move Existing Lift-Gate Structure to Avoid Power Pole** -- (See Drawing No. 1.) The current design places the discharge basin where there is a 100KV+ power pole which serves as a corner of the high voltage circuit. This comment recommends relocating the basin, say 50 feet westward. This would then require only relocating the guy pole.

VALUE ENGINEERING COMMENTS

COMMENT NO: 1

DRAWING NO. 1



CONTACT DIRECTORY

VALUE ENGINEERING TEAM STUDY

APPENDIX A: CONTACT DIRECTORY

NAME	ORGANIZATION	TEL/FAX NUMBERS
Frank Vicidomina	CELMN-VE	504-862-1251/1785
Angel Mislan	CELMN	504-862-2473/2471
Pam DeLoach	CELMN	504-862-2621
Jim Richardson	CELMN	504-862-1031
Rodney Greenup	CELMN	504-862-2613/2572
Jorge Romero	CELMN	504-862-2645
Ann Springston	BCG	504-454-3866/6397
Dan Marsalone	BCG	504-454-3866/6397
G.J. Sullivan	S&WB	504-585-2365
Jim Parker	S&WB	504-865-0660/0663
Carl Canicatti	OVEST	912-652-5172/5956
Charlie Fore	OVEST	912-652-5174/5956
Fred McAuley	OVEST	912-652-5715/5956
Eara Merritt	OVEST	912-652-5171/5956

SPECULATION LIST

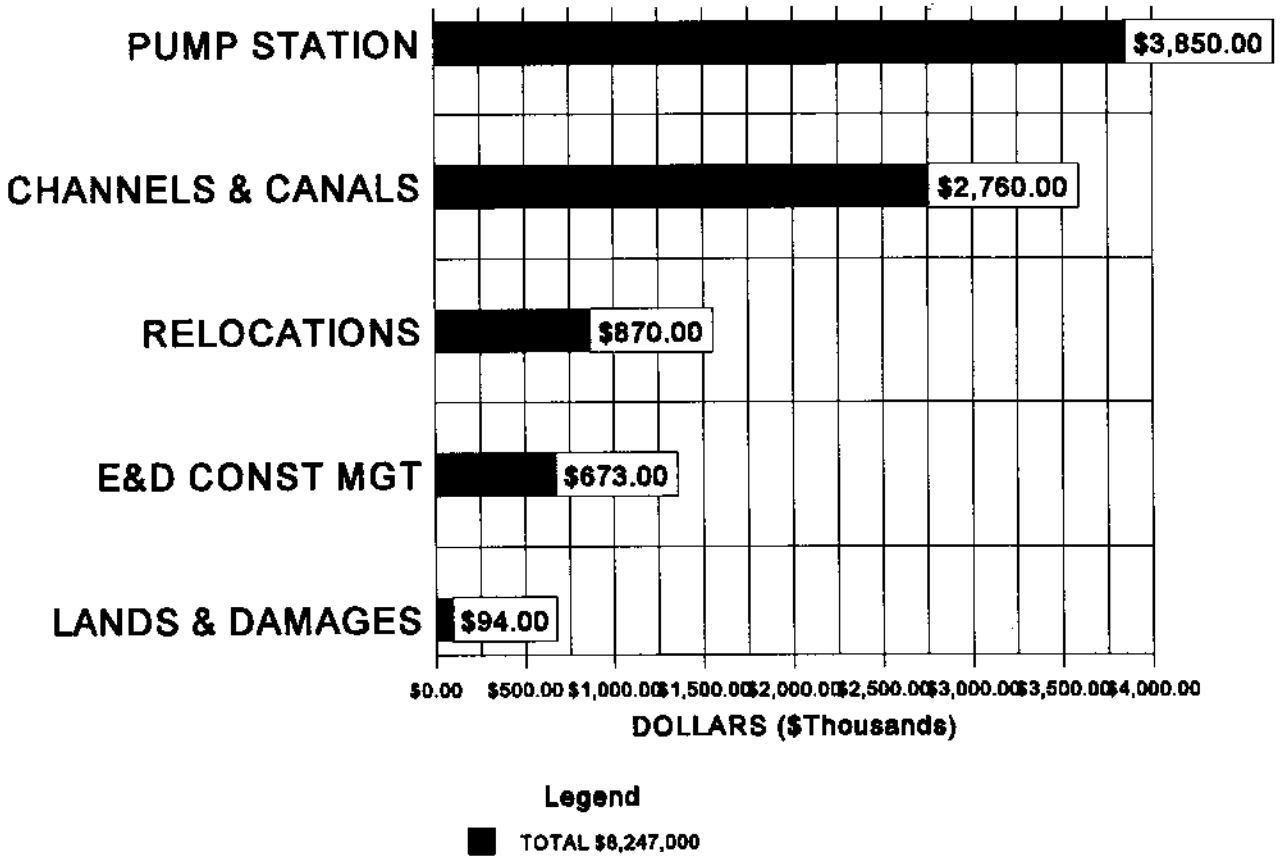
✓=Develop Idea ?=Investigation X=Deleted CMT=Comment

✓	1.	Open cut (Railroad access and vehicular access) vice temporary bridge.
✓	2.	Daylight and go to open channel ASAP.
✓	3A.	Keep 50" discharge, add 84" pipe.
✓	3B.	Keep 50" discharge, add 108" pipe.
✓	4.	Put pump station across road.
✓	5.	Lower crane size.
✓	6A.	Above-grade channel with parallel sheet pile wall.
X	6B.	Earth levee wall.
X	7.	Fit flood protection to pump station.
✓	8.	Manifold 3 to 1 line.
✓	9.	Revisit motor HP
X	10.	Provide an Ascension-style station.
✓	11.	Add future 12' X 14' box to project.
CMT	12.	Move existing lift gate structure toward lake to avoid powerline.
✓	13.	Add an auto screen cleaning system.
X	14.	Defer purchase and installation of two pumps.
X	15.	Give package to Parish to bid.
✓	16.	Improve station power availability by initiating a new power plant project.
X	17.	Jack and bore discharge lines past second track.
✓	18.	Run new SW&B feeder from P.S. 19.
✓	19.	Avoid utility conflict.
X	20.	Go Overhead
X	21.	Long deep tunnel.
X	22.	Add suction priming pump.
✓	23A.	Keep existing pumping service during construction.
✓	23B.	Keep existing pumping station.
X	24.	Upgrade existing to 250 CFS, add 750 CFS and shore a new discharge.
✓	25.	Add two 550's, plus existing.
✓	26.	Same as Speculation Item No. 25, but upgrade existing and lower 550's.
✓	27.	(See Speculation Item No. 4), but locate pump station at IHNC floodwall.
✓	28.	Investigate abandoned LP &L.
X	29.	Need a gate culvert on flood side of floodwall.
✓	30.	Discharge under floodwall.
✓	31.	Demolish LP&L and use existing pipes.
✓	32.	Use arch pipe.
✓	33.	Add inverted trap.
✓	34.	Add four pumps.

COST MODELS

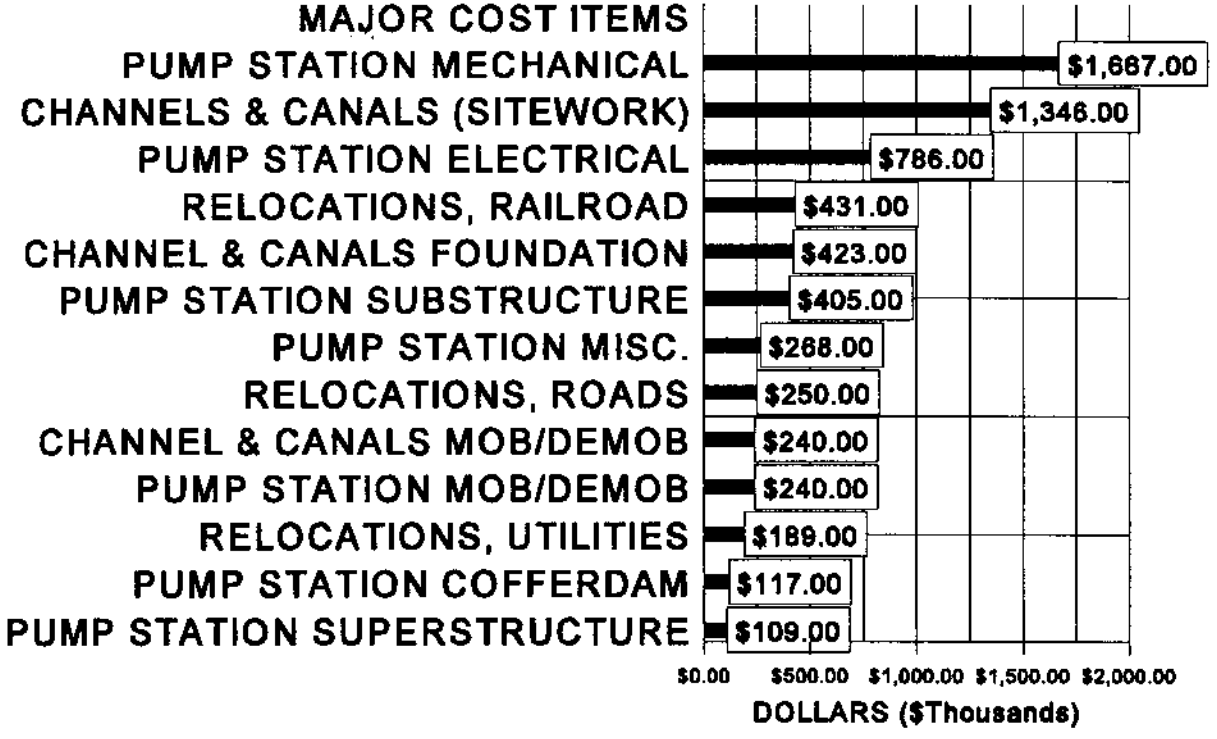
COST MODEL

DWYER PUMP STATION AND CANAL



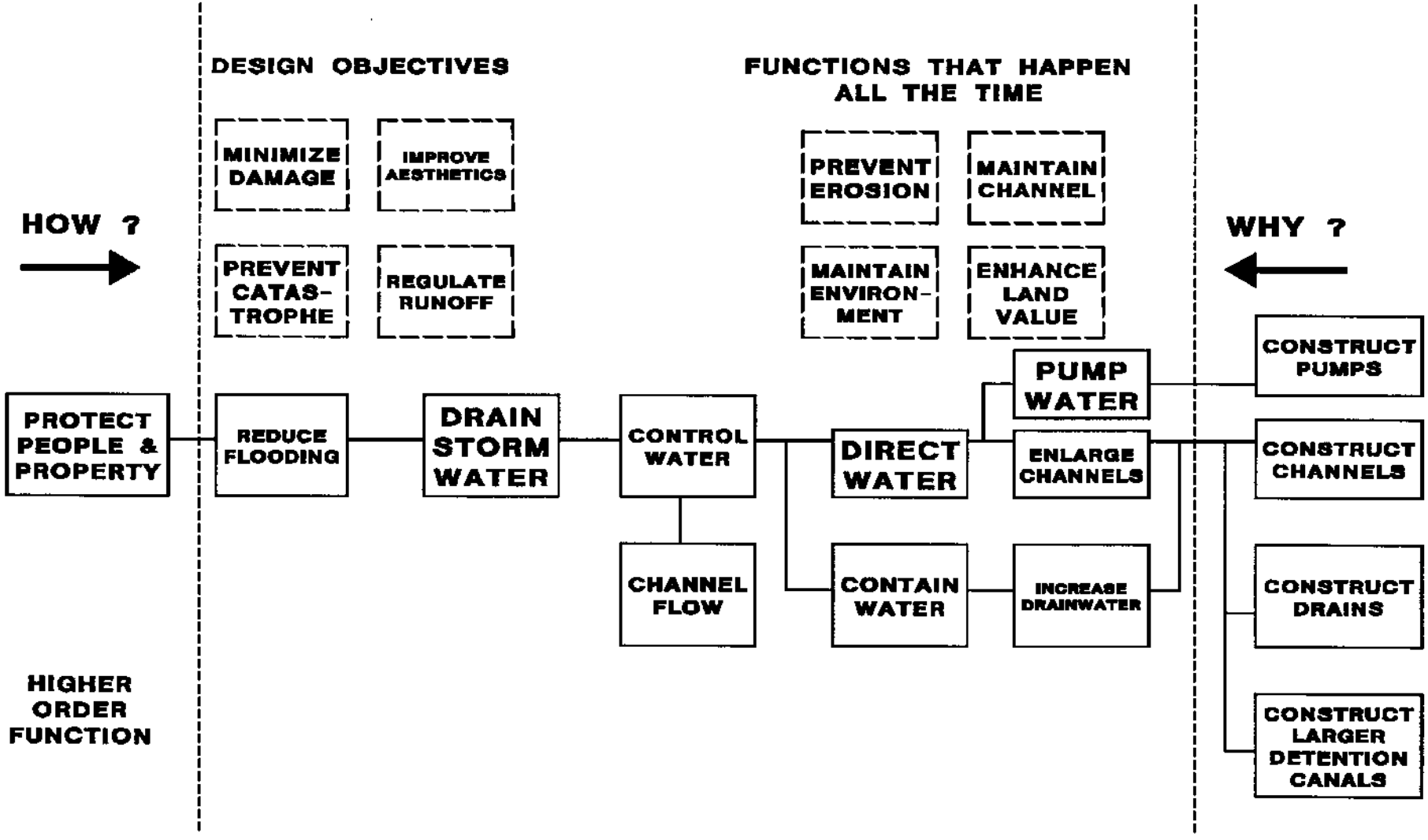
COST MODEL

DWYER PUMP STATION AND CANAL



FAST DIAGRAM

DWYER PUMP STATION AND CANAL



FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

SUPPORTING DOCUMENTS

SUPPORTING DOCUMENTS FOR PROPOSALS NO. C-5A & C-5B

7/30/97

ESTIMATE OF OUTLET PLAN TDH / HP

- VERTICAL LIFT

= 25.4 C.D. (5.0 FT FLOOD STAGE) − 3.0 C.D (CANAL @ 4' DEEP) = 22.4 FT

- FRICTION LOSS

(3) PIPES (72-in) $L_e \cong 550'$

@ 333 CFS $S = .007$

$h_{fg} \cong 3.9$ FT

- LOSS THROUGH 20 x 12 FLUME ≅

- INLET, OUTLET AND LOSSES THROUGH PUMP

(SAY 3 x VELOCITY HEAD)

$3 \times (12.5)^2 / 64.4 = 7.3$ FT

- ASSUME NO LOSSES THROUGH FLUME; ≤ .5'

@ 5.0 FLOOD STAGE CANAL REACHES FLOODPACK, =

TDH = 22.4 + 3.9 + 7.3 = 33.6 FT

HP = (62.4)(333)(33.6) / 550 × .8

= 1,587

WITH SUMP @ ELEV. + 13.0 C.D.

TDH = 23.6 FT

HP = 1,115

7/30/97

PROP. 3A - ESTIMATE OF FRICTION HEADLOSS

84-IN AND 50-IN

SPLIT FLOW TRIAL + ERROR

TRY 200 (50-IN) 800 (84-IN)

$S_{(50\text{-IN})} = .013$ $S_{(84\text{-IN})} = .013$

✓ OK

$h_{f} = .013 \times 510 \text{ FT} = 6.6 \text{ FT}$

NEW TOH EITHER $\frac{33.6 + 6.6 = 40.2}{33.6}$ $+20\%$

OR

$\frac{23.6 + 6.6 = 30.2}{23.6}$ $+28\%$

- EST. HEADLOSS THROUGH (2) 5x5 BOX CULVERTS

@ 880 CFS (440 CFS ea.)

$h_{lf} = .016 \times 750 \text{ FT} = \underline{12 \text{ FT}}$

$\text{TOH} = \dfrac{33.6 + 12 = 45.6}{33.6}$ $\pm 36\%$

OR

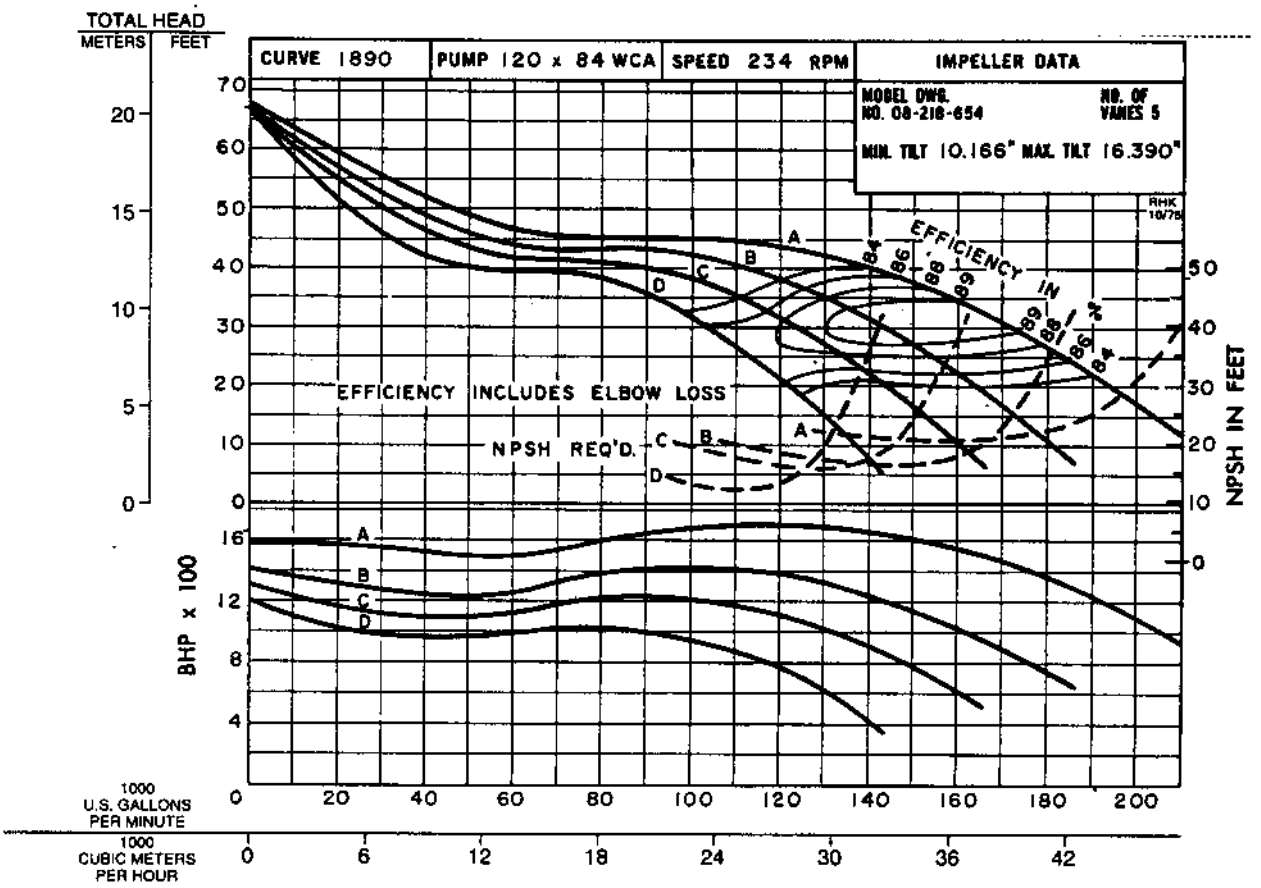
$23.6 + 12 = \dfrac{35.6}{23.6}$ $\pm 51\%$

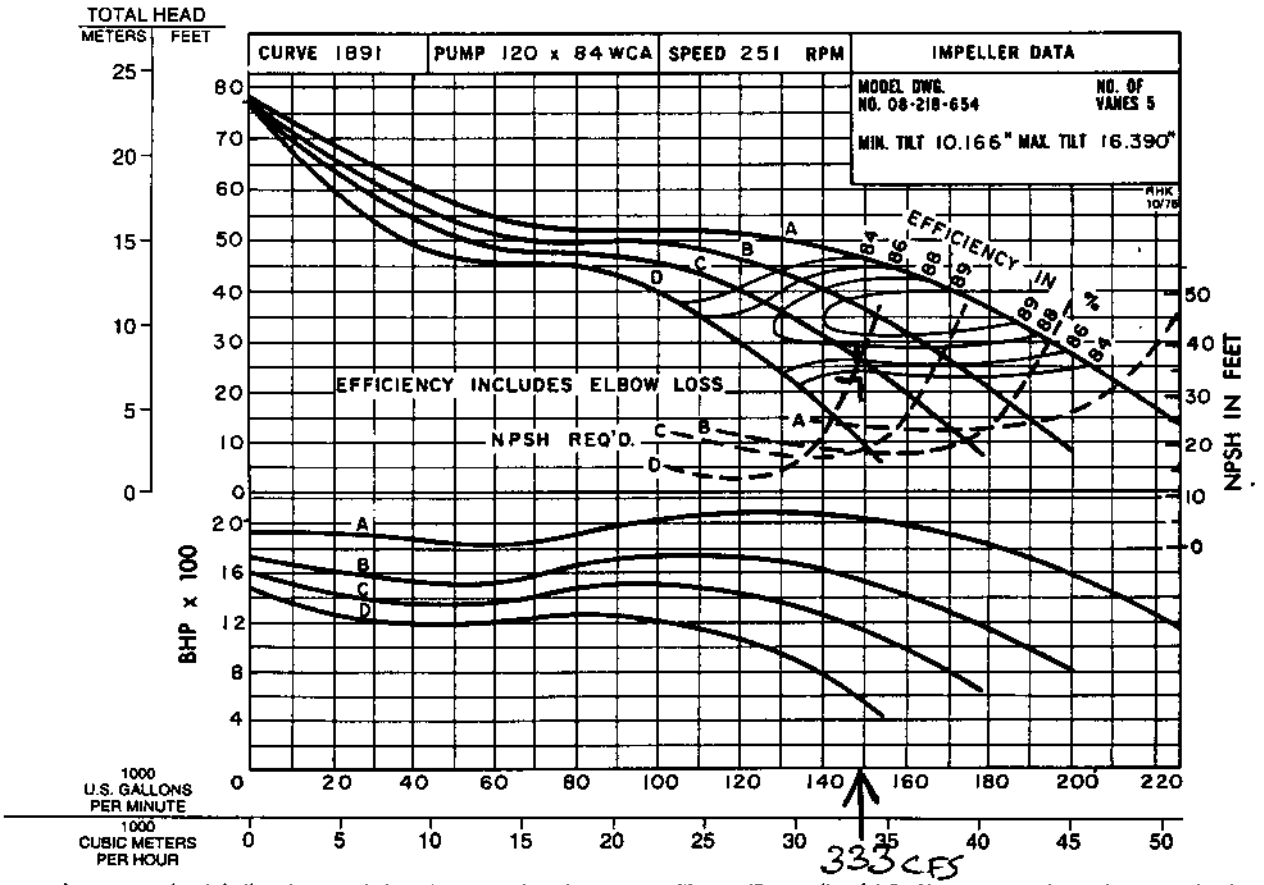
VERTICAL MIXED FLOW COLUMN PUMPS

Type WCA
Performance Curves

ITT A-C Pump
A unit of ITT Corporation

September, 1993
Supersedes 5/77 issue





Curves show approximately the characteristics when pumping clear water with specific gravity of 1.0. No guarantee is made except for the rated point.

3B

- CALCULATE ADDITIONAL HEADLOSS THROUGH 108-IN. DISCHARGE LINE W. 50 IN. STILL IN USE:

(FINAL – LRAM)

FLOW SPLIT (CFS)	84-IN	50-IN
900/100	.0055	.00375
~~875~~ 850/~~125~~ 150	.00425	.00875
880/120	.0045	.0050
888/125	.0048	.0048

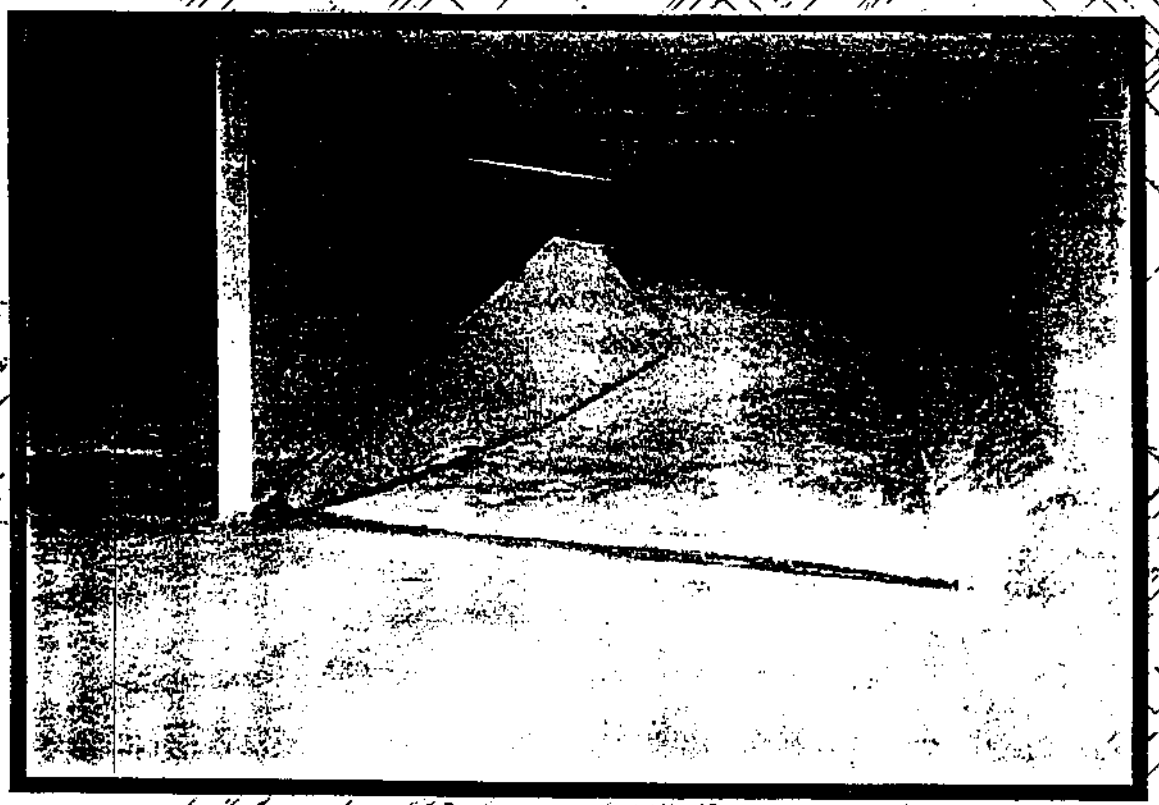
$h_l = .0048\,(500) = \underline{2.5}$ ft.

Δ TOTAL POWER ~ 10%

SUPPORTING DOCUMENTS FOR PROPOSAL NO. C-9

A New Concept

McElroy Drainage Pump Station



PRESCOTT FOLLETT & ASSOCIATES, INC.
CONSULTING ENGINEERS

Associated Builders and Contractors

1992 Excellence in Construction Awards Competition

AWARD OF MERIT

presented to

Prescott Follett & Associates, Inc.

In Recognition of the Outstanding Achievement

reflected by the Quality, Innovation and

Teamwork with

Boh Bros. Construction Co. Inc.

for

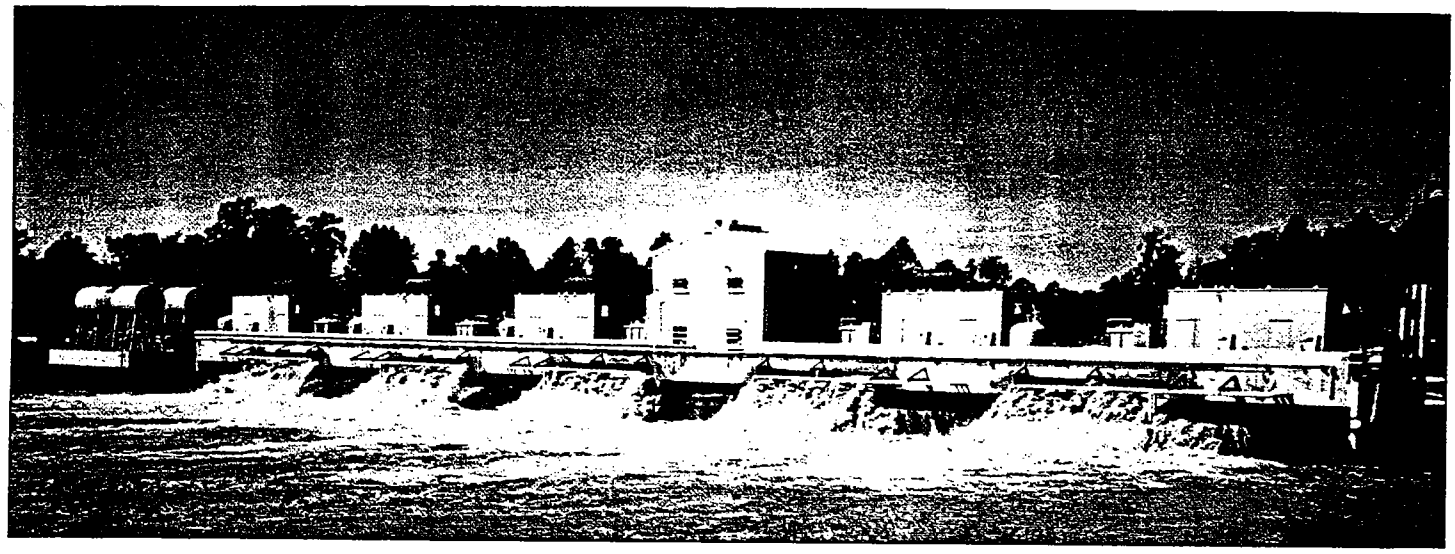
McElroy Pumping Station and Flood Gates

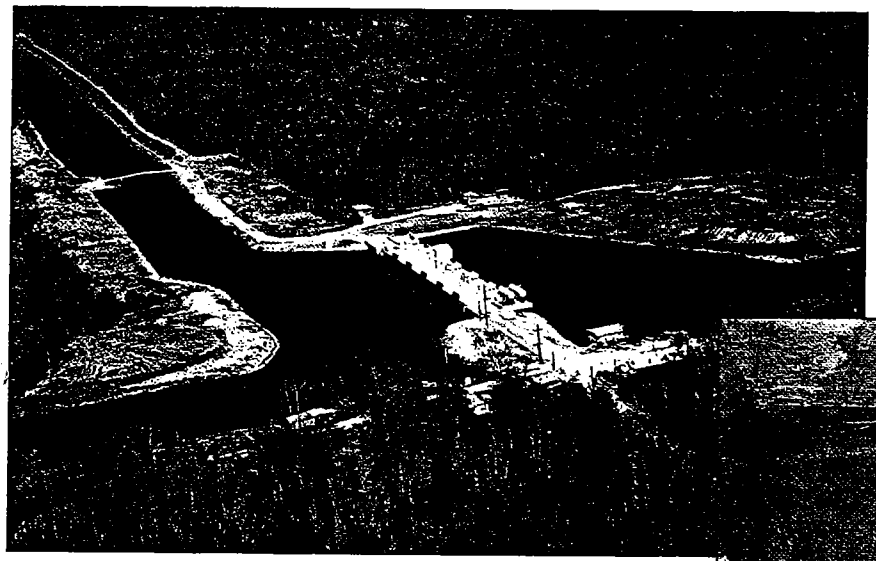
presented March 14, 1992

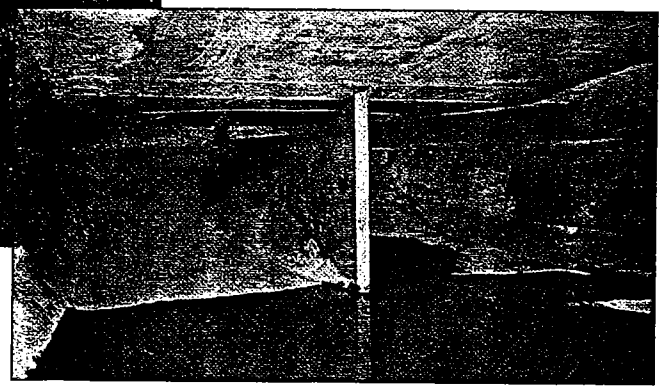
National President

National Business Development
Committee Chairman

Prescott Follett & Associates, Inc. received this Award of Merit from the Associated Builders and Contractors in 1992.







Top: Discharge side pumps running, note boat gate at extreme right.

Middle: Aerial view showing the pump station in foreground with discharge basin to right of pump station. Shown left are the intake canals with a projecting bank or nose (left foreground) that guides canal flows into the pumping suction basin. Protection levee is shown upper left.

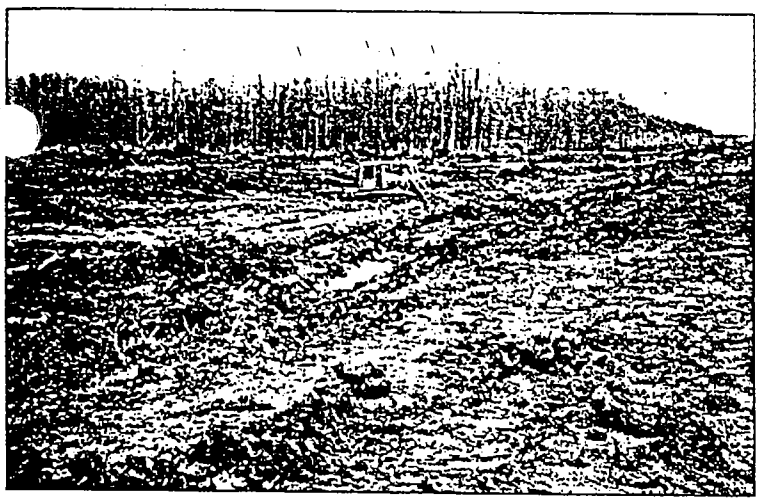
Bottom: Completed pump intake tunnel.

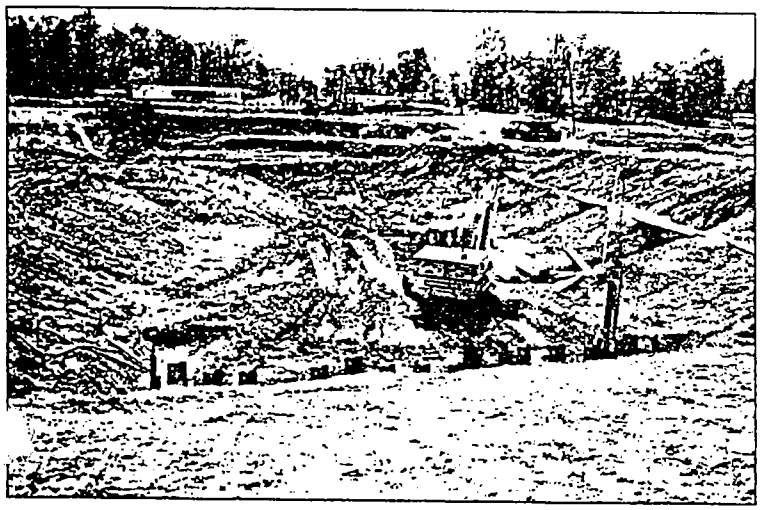
McElroy Drainage Pump Station

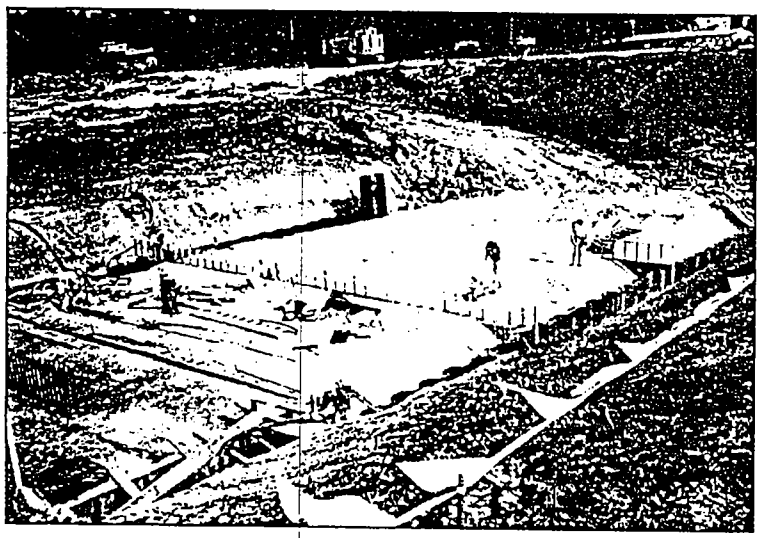
A New Concept in Flood Control Design and Wetlands Protection

The award winning McElroy Drainage Pump Station, in Ascension Parish, Louisiana, which was designed by Prescott Follett & Associates, Inc. Consulting Engineers, is significant for two reasons. *One*, it incorporates wetlands protection and function in the project's concept and design. *Two*, it is the largest facility of its type in the United States. Indeed, the pump itself may be the largest drainage pump of its type in the world—utilizing a shaped-concrete intake design, with the pump, gear and engine designed and sized to match.

The benefits of this pump design are superior pumping capabilities for drainage and power plant facilities at remarkably low cost. Ordinarily, drainage







Top: Site clearing.

Middle: Pump station open excavation.

Bottom: View of foundation slab and sheet pile perimeter wall.

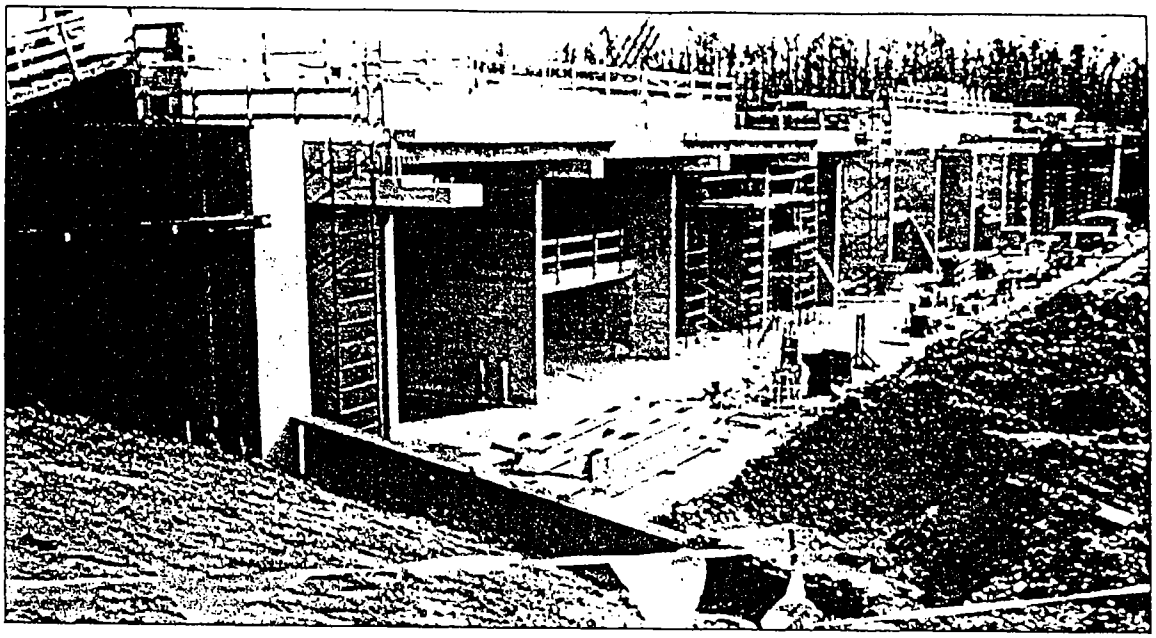
pump stations without floodgates can cost $5,000-$6,000 per CFS of pumping capacity. This pumping station, however, delivers the water and includes floodgates and a boat lock for $2,146 per CFS—a cost-savings of more than 50%. The major savings derived from the method of construction, which allowed for open excavation rather than the usual sheetpile cofferdam enclosure, the use of high-strength soils in place of piling supports, the elimination of the discharge recovery section, and the greatly reduced equipment housing. (In a conventional drainage pump station the entire facility is enclosed, constituting a considerable cost item.) The design of the contoured inlet saved nearly another million dollars.

Money was also saved by securing numerous competitive bids for all significant job items, minimizing changes to the job once contracts were let, and having virtually no job extras.

As noted, this job is also important for its inclusion of the wetlands in the project concept and design. Allowing the 13 square miles of levee-enclosed wetlands to serve as natural drainage ponds preserves their form and function, while also protecting human property from flood damage.

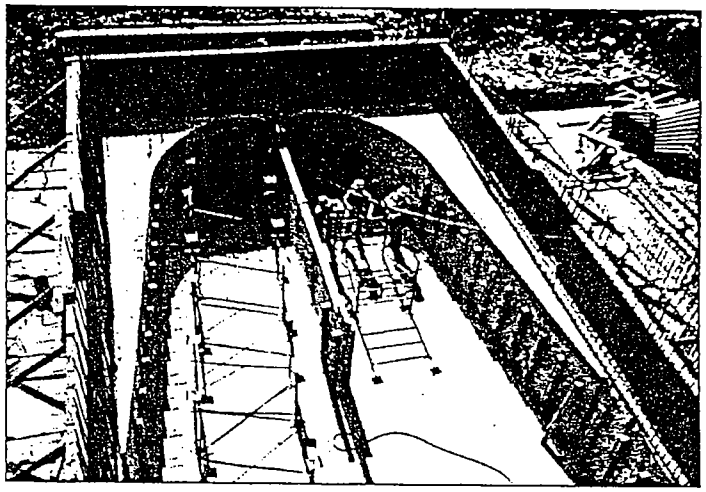
Project history

The east bank of Ascension Parish, approximately 60 miles northwest of New Orleans, Louisiana extends from the Mississippi River in an easterly direction, sloping gradually to lower elevations in the wetlands surrounding Lake Maurepas. The ground elevations range from a height of +12 to +15 along the Mississippi River, to +8 to +10 in the Gonzales area, to +5 in the St. Amant and Sorrento areas, to the wetlands themselves, which generally are at sea level or below. Several ridges run through the area, which were no doubt formed by river overflows in previous times. The river overflow is also evident in



Top: Foundation walls with upper deck under construction. Approach causeway sheet pile wall, left foreground.

Bottom: Typical intake tunnel wall construction.



the remaining waterways such as New River, Bayou Francois, and Black Bayou—all of which were no doubt one-time distributaries of the Mississippi.

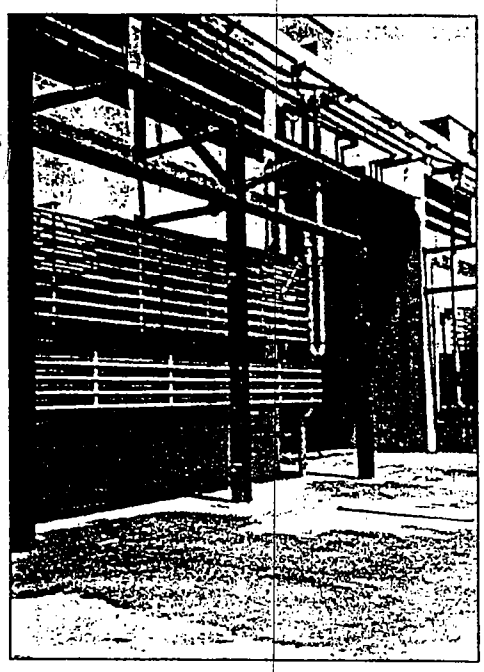
The area around Gonzales has experienced extensive urban and industrial development, and this development is accelerating each year. Originally, Gonzales and the surrounding communities were drained through natural waterways, some of which have been mentioned. However, in the course of time, many of these waterways became clogged with dense vegetation so that they no longer could carry rainfall overflows and provide adequate drainage. Throughout the last 30 years, heavy rainfalls every two-to-three years caused flooding in the Gonzales and Sorrento areas. Homeowners affected by the severe flooding were the moving force behind the major drainage program that is in operation today.

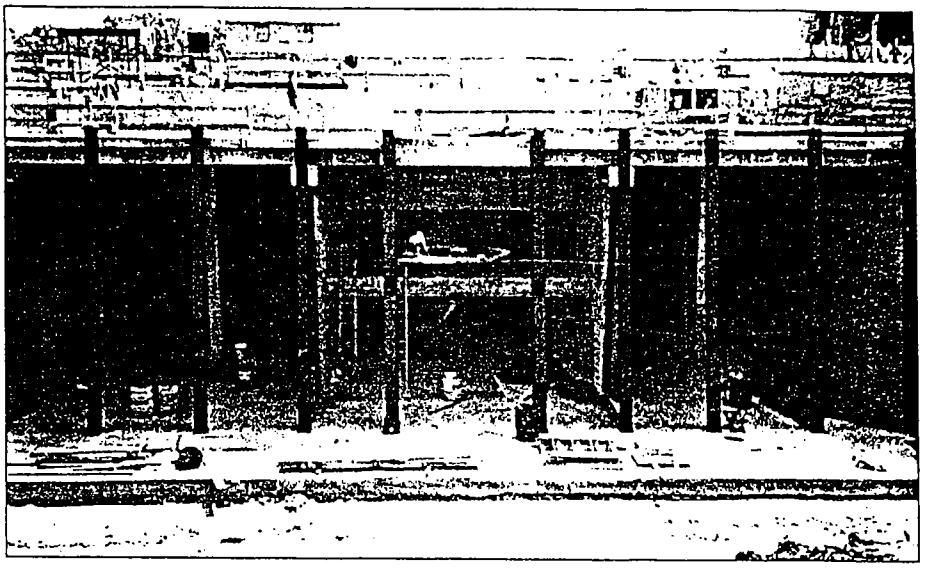
In early 1980, the City of Gonzales, acting through Mayor Nelson Roe, contacted our office and requested the preparation of a major drainage plan—not only for the city of Gonzales, but also for the other flood-prone areas on the east bank of Ascension Parish. In June 1980 we submitted a drainage plan that proposed the improvement of the existing canals and waterways, construction of a back levee flood protection system, and the installation of floodgates and pumping stations to provide combined gravity and pumped drainage. This major drainage plan called for facilities to accommodate 5-year rainfalls of 7.5" occurring in a 24-hour period, combined with a high tide condition, caused either by hurricanes or lunar tides.

In September 1984, parish voters approved a 1/2¢ sales tax to fund the proposed drainage project and we were authorized to prepare permit drawings for submission to the various governmental agencies involved. Upon receipt of the necessary permits, we then proceeded with the final drainage system design for the central pumping station, which was to be located at McElroy Ridge, at the intersection of Bayou Francois—New River Canal and Saverio Canal.

Shaped-concrete intake design

An important feature of this pumping station is the unique design of the pump intake. A contoured intake





Left: Stainless steel cooling coils on discharge side of station.

Above: Suction side, showing screen guides in front of pump intake tunnels.

tunnel allows the water to be pumped down to the impeller without causing cavitation. (Ordinarily, a vertical pump of this size would require 10' to 15' of submergence beneath the low water level to which it is pumping. This would have required a tremendous amount of additional excavation and concrete work.) This tunnel concept was originated in the United States in 1917, but was never used domestically for a project such as this. In Europe, however, the concept has been used extensively for power plant water intakes, as well as for drainage pump station intakes. Prescott Follett & Associate's chief engineer, Mr. James Tocho, who is undoubtedly the most knowledgeable drainage pump design engineer in Louisiana, learned about this method of handling intake flows and worked out a conceptual design based on smaller, existing units in Europe. The pump's design was then integrated into a shaped-concrete intake design.

Wetlands an important design component

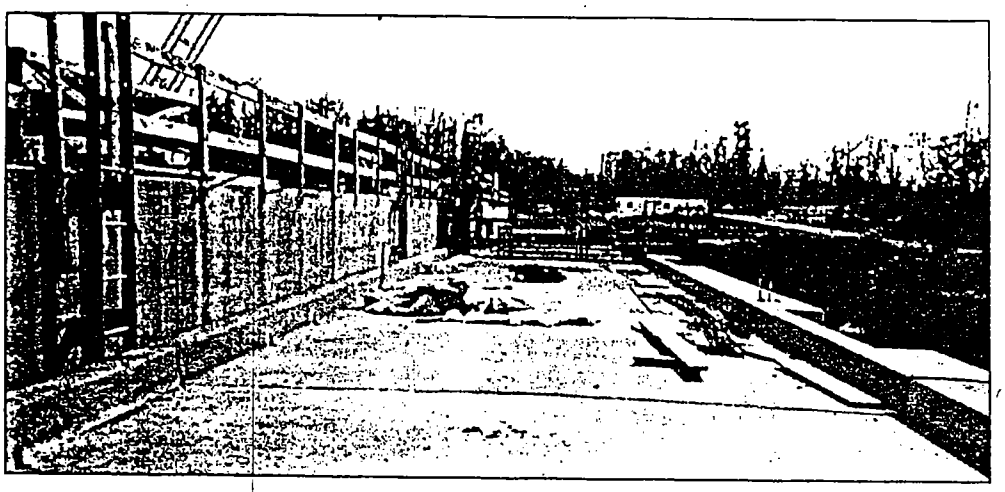
Implicit in the design of this project is the use of the existing wetlands that are enclosed by the levee system. The total area under drainage amounts to 70 square miles, of which some 13 square miles are wetlands. These wetlands will be left in place and utilized for drainage purposes, as they form a large sump area suitable for ponding of rainfall waters in excess of the capacity of the pumping station during peak rainfalls.

The combination of wetland storage and gravity-pump drainage capabilities allowed us to design a pumping station of 5,000 CFS capacity, paired with a series of large, top-hinged, vertical-lift gates, all integrated into one structure. In order to accommodate sports fishermen and recreational boaters, a 14'-wide lock with a controlling depth of 6' at low tide was also included.

Other design features

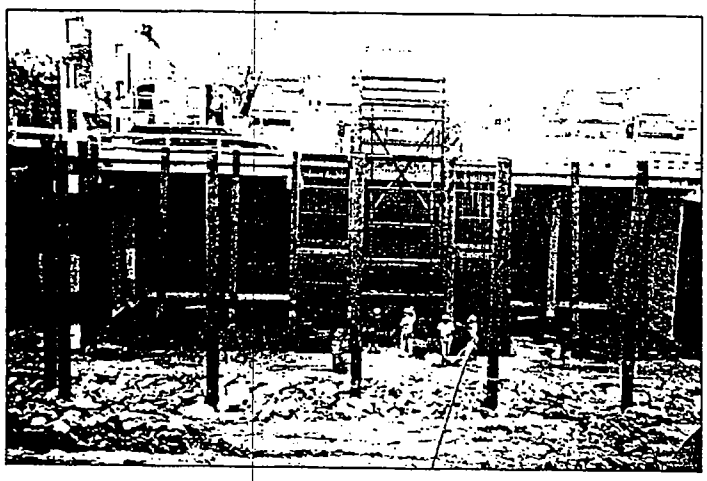
The pumping station was designed on a mat foundation with no piling, since the bottom of the station is founded upon a very strong Pliocene strata of great depth, which provides ultimate bearing loads of 10,000 pounds per square foot, or a design loading of 5,000 pounds per square foot. This foundation was designed with a short steel sheetpile cutoff wall surrounding its entire perimeter and was poured integral with the foundation mat. The walls were built to form individual and alternating floodgate bays and pump bays.

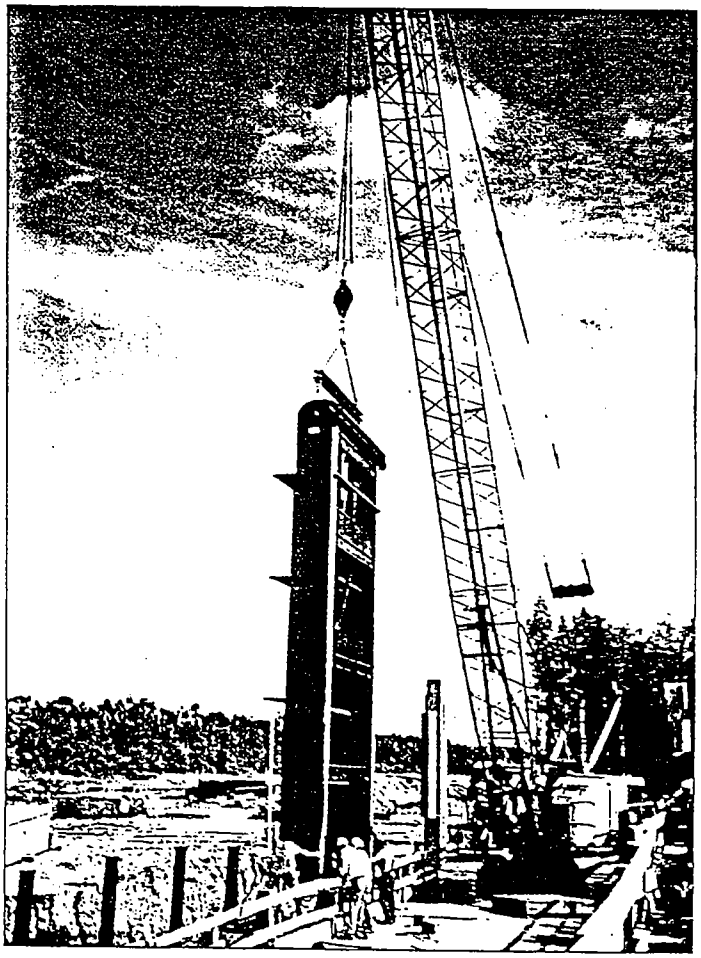
Across the front of the pump station is a wide concrete roadway, which gives access to the pumping equipment as well as to the bar screens that protect the pumps. The pump station includes two types of screens: electro-mechanical screens of European design, which bring debris and floating vegetation up to the roadway area,



Top: Heavy duty bridge across station, shown on left is elevated engine deck, on right are the notches for trash screen.

Other photos on this page show the electro-mechanical self cleaning travelling screen.

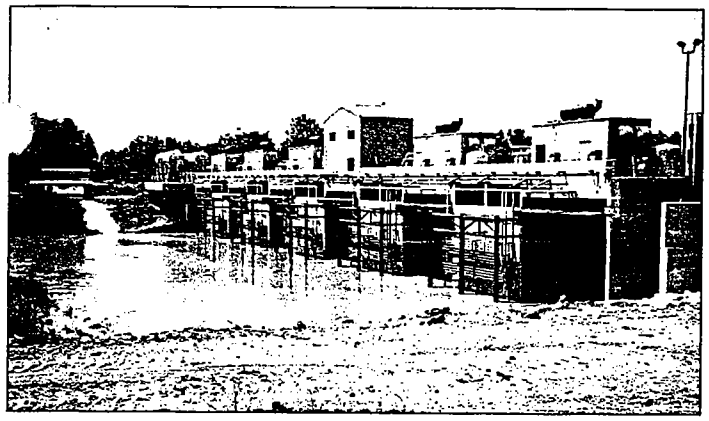




from which it can be removed by truck or bulldozer; and fixed-bar screens on either side of the electro-mechanical screens, which can be removed for maintenance, but which are ordinarily fixed in place inside of steel guide beams. In front of the intake screens is a floating boom made of lightweight steel pipe, which is foamed for flotation. These pipe sections are chained together to make a continuous floating boom protection device. The boom is attached to vertical steel pipe piles by means of a chain collar at each pile, which allows the boom to float up and down with variations in water level.

All significant items put out to bid

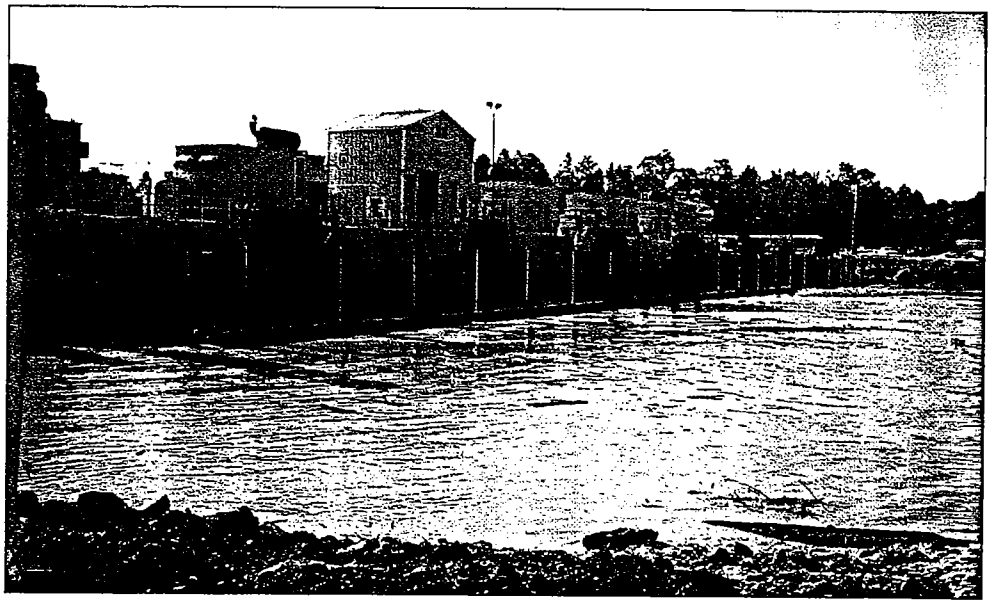
As noted, all significant job items for this project were put out to bid. The pump-driving engines were sized to match the pumps and were bid out as a separate package. The pumps and reduction gears were bid in a separate package, and the third bid item was the foundation and installation of the pumps, engines, and gears. The



Top right: Station completed, note water entering site ready for pumping.

Top left: Steel floating trash boom.

Right: Suction side with debris approaching floating trash booms and mechanical screens.



pump manufacturer was required to submit its own detailed design of the pump intake, based on our concept and specifications, combined with its pump and gear design. The sum total of the three bids ($10.7 million) was within our engineering cost estimate and well within the bonding capacity of the dedicated sales tax revenues.

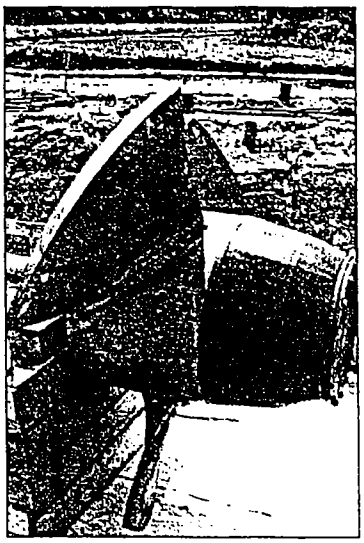
Boh Bros. Construction Company, Inc., which won the foundation bid, began construction in December 1988. Due to excellent weather and job organization, Boh Bros. was able to complete the entire project, including installation of the pumps, engines, and gears, six months ahead of schedule, or by year-end 1990. Delivery of the pumps and engines were also prompt, aided partly by the fact that Caterpillar, Inc., which won the engine bid, had developed a large engine for another client that fit our design perfectly.

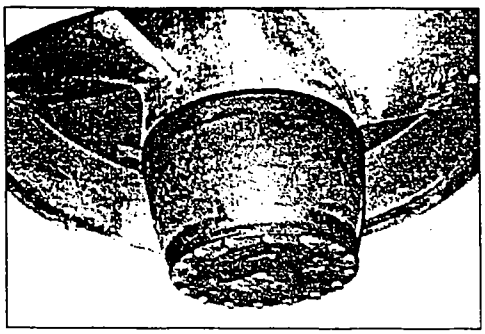
Summary of project equipment

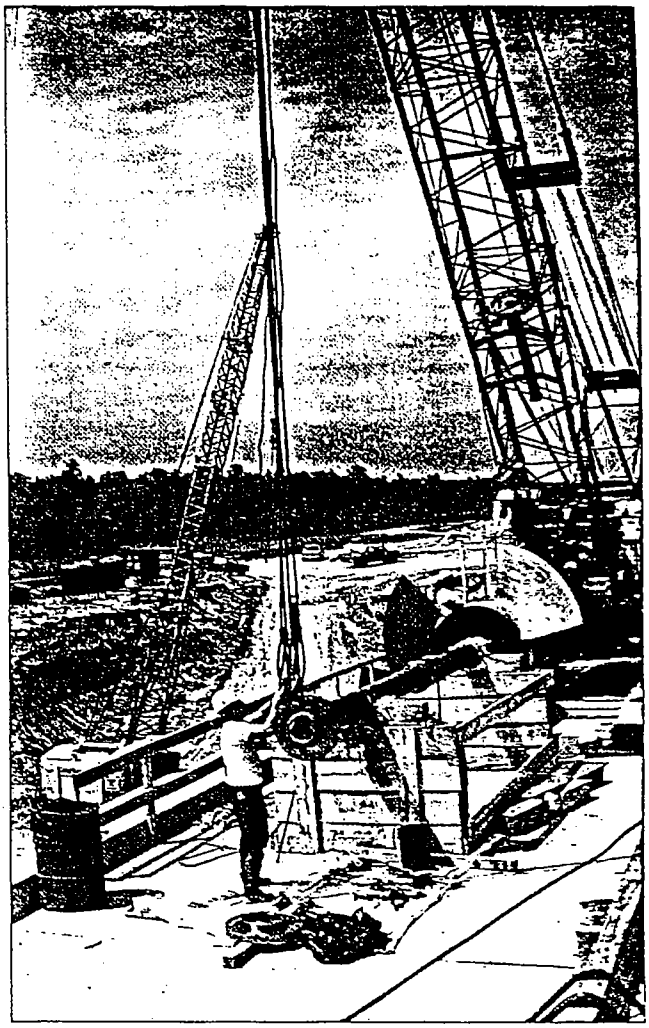
The equipment for this project included:

- Caterpillar engines Mod. No. 3606, which are 6-cylinder, 2,250-HP, turbo-charged and after-cooled, with an operational speed of 970 RPM. The engines are enclosed in weather- and hurricane-proof steel, which is bolted to the concrete, in lieu of a continuous steel building. The enclosures can be removed if necessary for major maintenance. The engines are started within the enclosure and have their own controls. The engines and pumps, however, also have remote controls housed in the control building.

- An Ingersoll-Dresser Pump Co. axial flow pump with a three-bladed propeller 9' in diameter. The pump weights 125,000 pounds, rotates at 162







Top left: Pump diffuser casting.

Top middle: pump impeller.

Top right: pump impeller & shaft.

Right: pump impeller mounted into tunnel roof.

RPM, and can pump 1,000 CFS, or 450,000 gallons per minute, at a 12.3' head.

- Pumps are driven through a Brad-Foote Gear Works, Inc. double-reduction, water-cooled, oil-lubricated gear assembly.

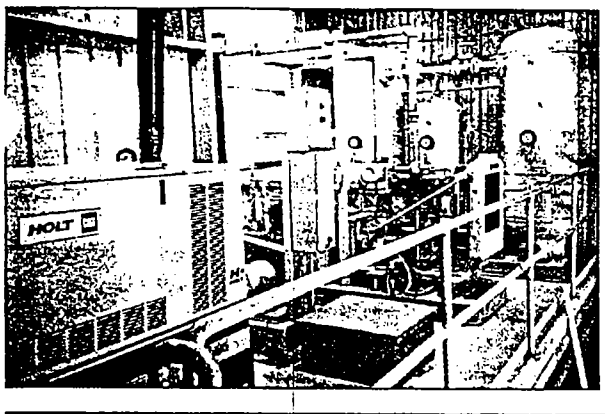
The cooling for the engines and the gears are submerged, stainless steel heat-exchangers, placed underwater on the outfall side of the pump bay. All fuel, air, and instrument piping, as well as electrical conduit, are either encased in the upper deck slab or are racked along the outfall side of the pump station or, in some cases, underneath the floor slab for the upper deck. The cooling-water exchangers are a feature our company has developed over 30 years of drainage pump station engineering. They have been remarkably durable and have provided excellent heat exchange properties for many types of pump stations.

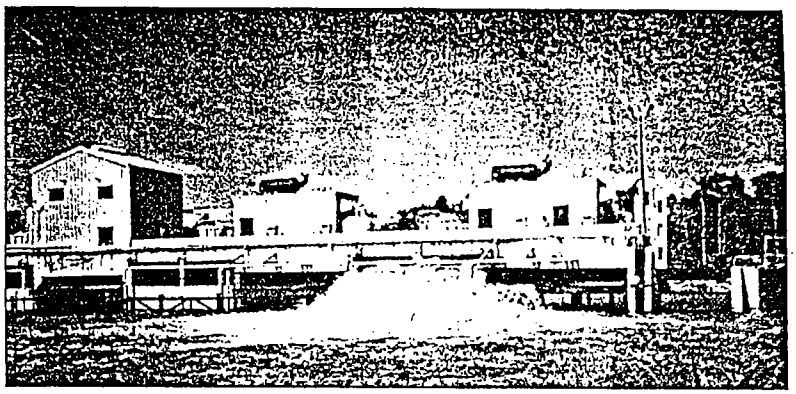
Additional project description

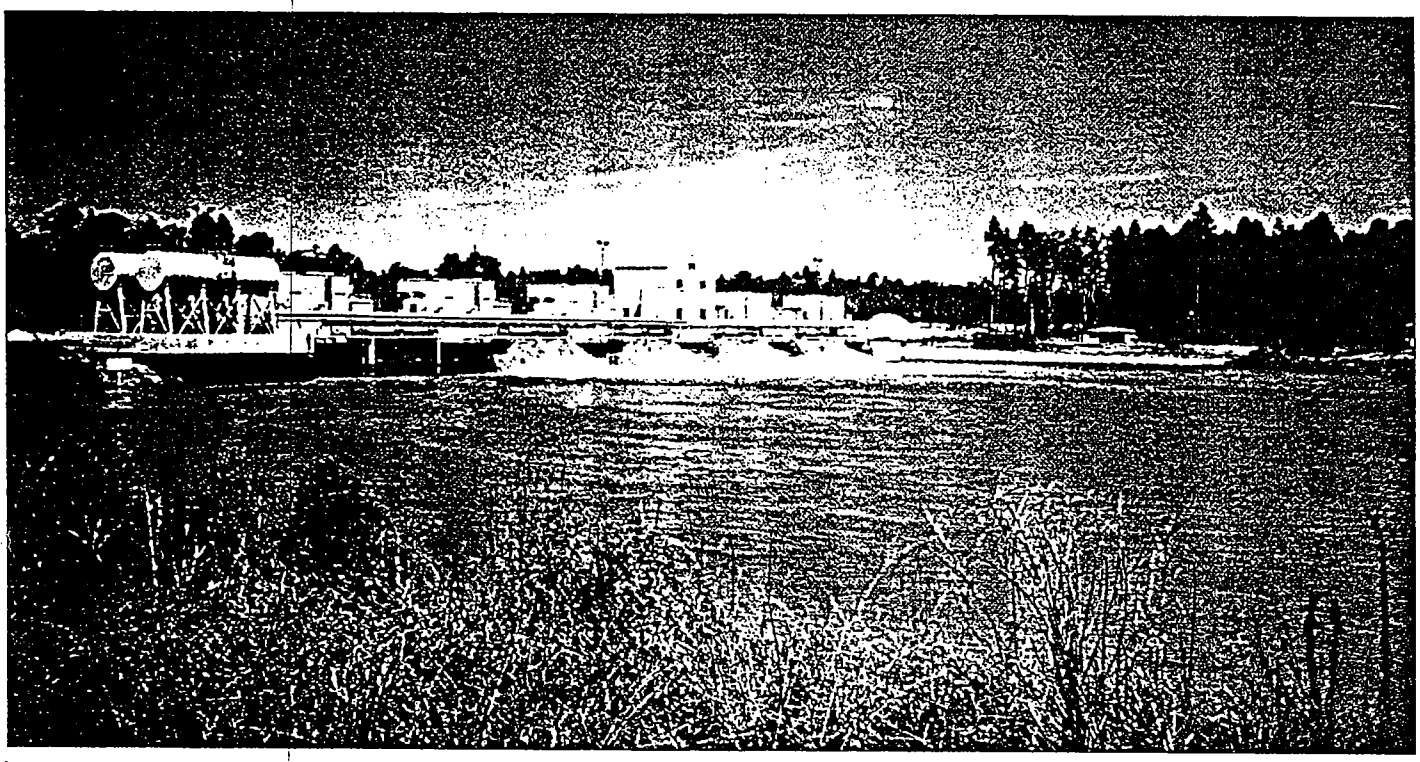
The pump discharge flows into a discharge chamber, from which it runs out over an outfall weir, with no recovery section. (Due to the infrequent use of the pumps, it was not deemed economic to build discharge recovery sections.) The main fuel tanks for the pump station are on elevated steel supports, surrounded by a concrete slab and firewall, which is supported by steel piling.

The pump station controls are housed in a control building that also serves as a shop and office area. Located in the building are the auxiliaries, including a 30-KW diesel-electric emergency generator and a diesel compressor, along with the controls for the electro-mechanical screens and the main engine drive.

The roadway across the front of the pumping station connects to a drawbridge on the station's north side at the navigation lock. The elevation of the drawbridge







Top left: Control house emergency generator and air compressor on second floor.

Top right: Discharging pump with control building on left and boat gate and roadway draw bridge right.

Center: Completed pump station pumps operating.

allows small craft to pass beneath it during normal tides. To accommodate larger boats, the drawbridge can be raised to allow their entry into the drainage canal system. The converging canals on the suction side (see aerial photo on page one) have been shaped so as to facilitate flows into the suction side of the station. The outfall basin is quite large and was designed to reduce velocity and turbulence within the discharge basin. The outfall canal utilizes the existing New River canal to accommodate the outfall flows.

In 1992, Boh Bros. Construction Company, Inc. entered the McElroy Pumping Station project in the annual national contest sponsored by the Associated Builders and Contractors organization. The project received the Award of Merit, which was presented to our firm in Orlando, Florida, on March 14, 1992.

Police Jury
Parish of Ascension

P.O. Box 1659
GONZALES, LOUISIANA 70707-1659
(504) 621-5700

October 1, 1993

To Whom it May Concern:

This letter will confirm that the firm of Prescott Follett & Associates, Inc. have been and still are consultants to the East Ascension Police Jury and to the East Ascension Consolidated Gravity Drainage District that has been set up to administer a Major Drainage Project in the eastern part of Ascension Parish, Louisiana. The Major Drainage Program is funded by 1/2 cent sales tax and includes a large drainage pumping station with a pumping capacity of 5,000 c.f.s. as well as major canals and protection levees that encompass over 100 square miles of area. The project also includes the design of a 300 c.f.s. pumping station for the Town of Sorrento which adjoins the Major Drainage Program. This drainage program will be completed within the next 5 to 8 years, with total expenditures of approximately $40 million. The centerpiece of the drainage facilities is the McElroy Pumping Station with five pumps each with 1,000 c.f.s pumping capacity. This pumping station also has large swing gates for gravity drainage during normal rainfalls and tide conditions. Under high tide conditions on the outfall side and heavy rainfall the gates are closed, the pumps go into action and provide the necessary drainage within the drainage district. Also included in the design is a 15' wide, 6' draft navigation gate for small craft to come in and out during good weather. During a hurricane tide situation the gate is closed along with the aforementioned floodgates.

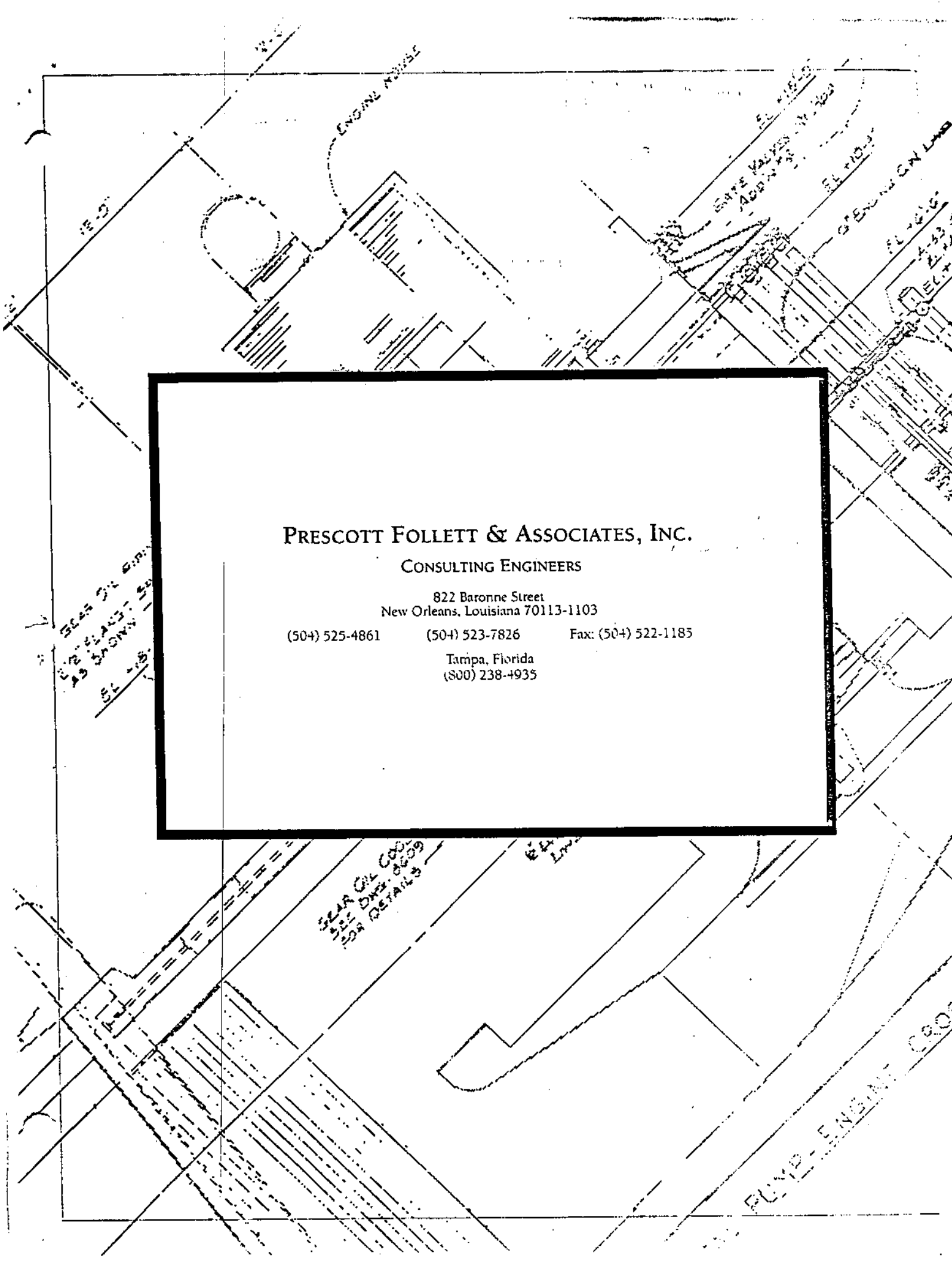
Prescott Follett & Associates, Inc. has done an excellent job in designing the McElroy Station in which a new concept was developed employing a shaped intake tunnel in conjunction with 10' diameter vertical pumps that were driven through reduction gears with diesel engine power. This project in total amounted to $11 million and was very economical considering the size of the project. Many economies were realized due to the unique design and construction procedure whereby the total project was built in the dry and then connected to the intake canal and discharge canal. The use of the remote control to the engines which have their own weatherproof housings resulted in a considerable savings on the project. Immediately upon completion of the construction Ascension Parish underwent three months of exceptionally heavy rainfall and high tide conditions which called upon the pump station to be in action for almost three continuous months and the floodgates combined with the pumps saved the drainage area from being flooded from backwater flooding from high tides as well as the heavy rainfall intensity.

We feel that the construction of this station has definitely been a help to our community and to the surrounding areas in which it serves and we would not hesitate to recommend Prescott Follett & Associates, Inc. for any drainage work that you may be planning now or in the future.

Very truly yours,

Marvin Braud

Marvin Braud, Drainage Chairman
East Ascension Consolidated Gravity Drainage Board



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