(A0507121)

VIII. ITEMS REQUIRED FOR PERMANENT FLOOD PROTECTION

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As stated earlier, the work proposed in this report is meant to provide interim high level flood protection. At some future time, the U.S. Army Corps of Engineers will take certain actions to bring the system of flood protection to a permanent status. There are two items of flood protection needed to make the interim protection permanent, and these are discussed below.

The first of these items is the concrete encasement of the steel sheet pile wall of recommended Levee Alternative 2, from Hammond Highway to Pump Station No. 6. As stated in Section IV of this report it is the intention of the Orleans Levee Board to provide only a sheet pile wall for interim high level protection. The Army Corps of Engineers will encase this sheet pile wall at some point in the future. The second of these items is a means of providing permanent flood protection and seepage protection at Pump Station No. 6. To accomplish this, two alternatives were evaluated, both calling for sliding gates, butterfly valves, sheet pile cut-off walls and floodwalls.

A. Concrete I - Wall

The proposed concrete I - wall to encase the steel sheet pile of Levee Alternative 2, from Hammond Highway to Pump Station No. 6, is shown in Figure 32. The proposed wall is 2'-0" thick and extends from 6" above the top of sheet pile, to 2'-0" below the top of levee on both the levee side of the sheet pile and the canal side of the sheet pile. Reinforcing is designed to resist the overturning movement resulting from hydrostatic pressure over the full height of the wall, neglecting any resistance provided by the steel sheet pile. Joints, with flexible jumpers, are located every 25'-0".

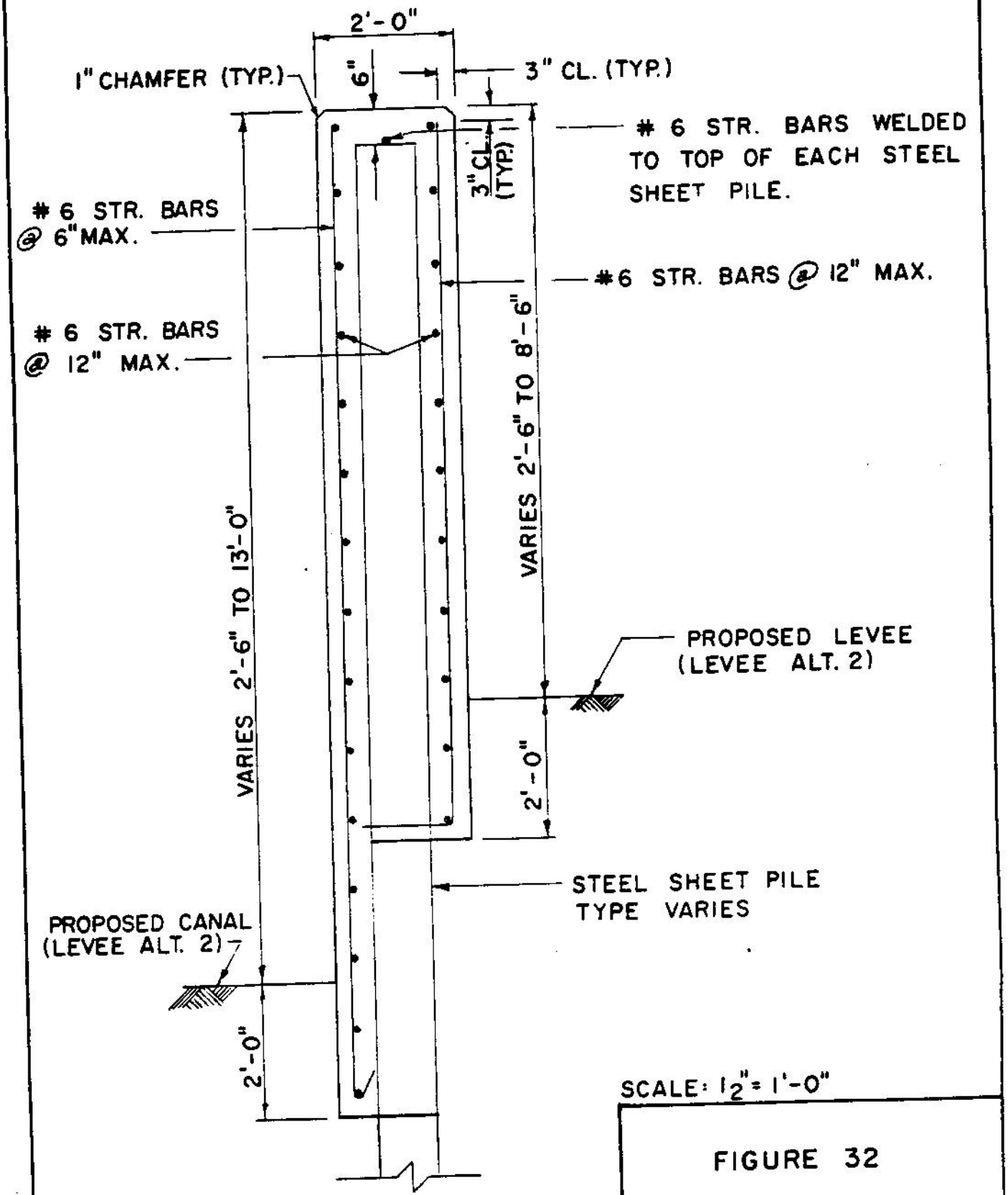
It is estimated that the cost of the concrete encasement, as shown in Figure 32, is $3,792,700. For a breakdown of costs, see Appendix A, Table A-12.

B. Pump Station No. 6

Under the conditions of the U.S. Army Corps of Engineers' design storm scenario, the possibility exists for a surge of water from Lake Pontchartrain to raise the level of water in the outfall canal significantly. If, for some reason, a pump in Station 6 should cease to operate, or conditions were such that the pumps could not be started, a back flow of water thorough the pumps as well as beneath the pump station could occur. In turn, this would result in a flooding of the intake canal. Measures must be taken to provide a means of sealing off the pumps and to provide a positive cutoff across the canal.

At present, there are thirteen pumps at Station No. 6, with two new pumps scheduled for installation in the near future. The sizes and types of these pumps vary and therefore require two methods of sealing.

The six smallest pumps, two of which share a common discharge tube, will be fitted with butterfly or gate valves at the section of their discharge tubes with the highest invert elevation. The remaining nine pumps, which are considerably larger, will be fitted with sliding gates.



SCALE: $1\frac{1}{2}$" = 1'-0"

FIGURE 32

CONCRETE I-WALL

Two alternatives for the location of these gates were evaluated. Alternative 1 calls for placing the gates at the section of the pump discharge tubes with the highest invert elevation, and Alternative 2 calls for placing the gates at the end of the discharge tubes. The advantages and disadvantages of each of these alternatives are discussed later in this section.

In addition to preventing reversed flow through the pumps, measures must be taken to prevent reversed flow beneath the pump station. It is proposed that steel sheet piling be driven across the canal, beneath the proposed sliding gates, to provide the necessary positive cutoff. To provide protection from over-topping, floodwalls will be provided at the sliding gates, tying into the existing flood protection presently being constructed on the western half of the station.

In the area between the existing sheet pile cutoff wall on the western half of the station and the east protection levee, it is proposed that PZ 22 steel sheet pile be driven to a tip elevation of -23.5'. Cutoff elevation will be 34.0', except directly beneath the sliding gates where the sheet pile cutoff will coincide with the bottom of the discharge tubes. All exposed sheet pile connecting to the eastern levee will be encased in a 2'-0" thick concrete wall. This wall will extend from 2'-0" below the ground surface to a top of wall elevation of 35.0'. Flood protection directly over the pumps will be provided by the sliding gate structures.

Figures 33 and 34 show the general orientation of the items of permanent flood protection at Pump Station No. 6 for Alternatives 1 and 2 respectively.

Sliding Gates

Alternative 1: Gates at High Point of Discharge Tubes

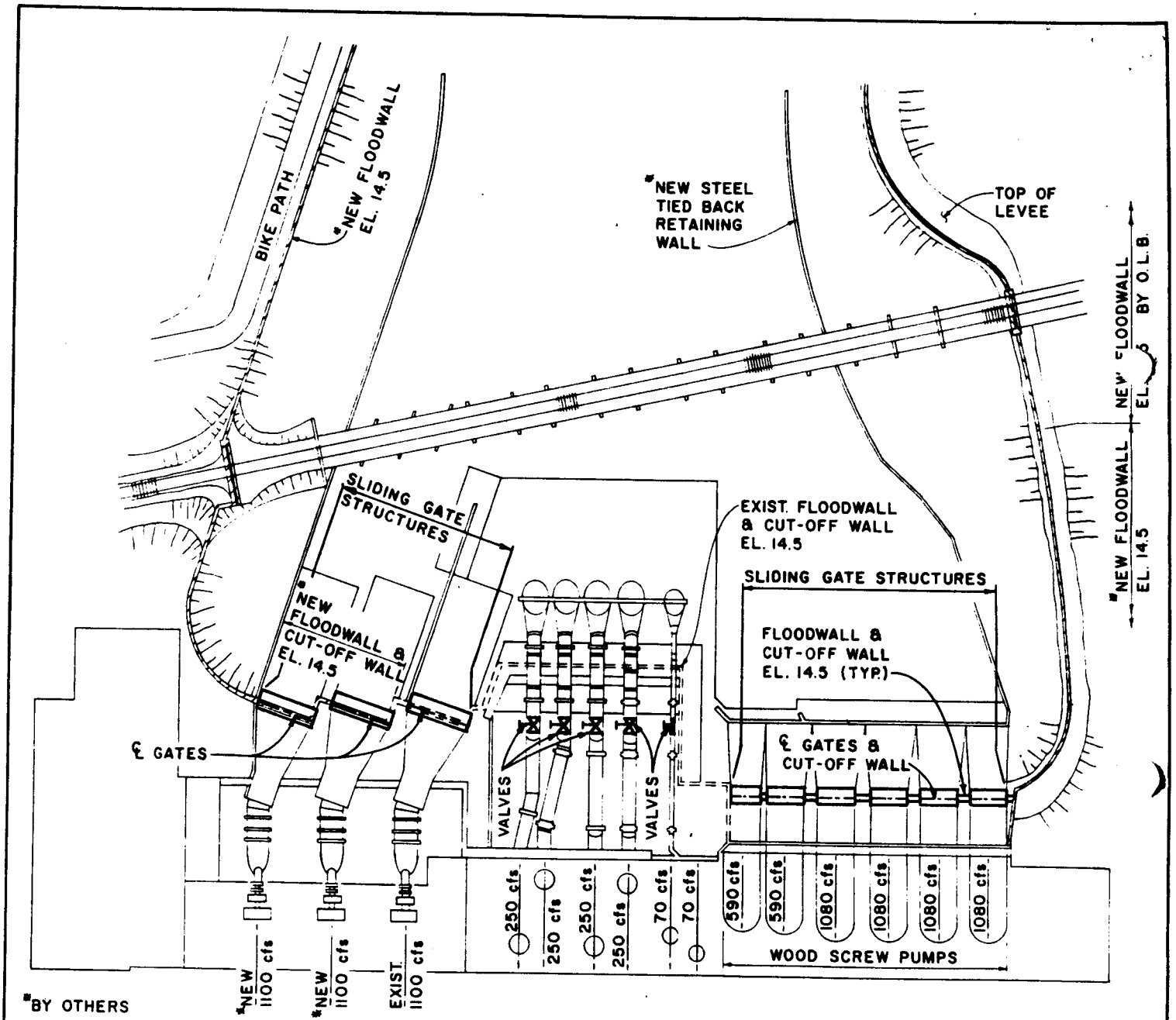
The basic configuration of the sliding gates in Alternative 1 is shown in Figure 35. The main advantage of this alternative is that construction can be performed "in the dry", requiring only a work platform rather than a sealed cofferdam as is required for Alternative 2. In addition, Alternative 1 requires smaller sliding gates and gate structures, does not require rip-rap or additional piles, and has a shorter construction time. All of these advantages add up to considerable cost savings.

Alternative 1 does, however, have a disadvantage. Because the location of the gates is at the high point of the tube, precautions must be taken to insure that a vacuum can be achieved, since a leak in any of the various seals required in this configuration could prevent the starting of the pumps. It is, however, felt that sufficient seals can be provided to prevent this problem.

The estimated cost for Alternative 1, including sliding gates, butterfly valves, cut-off walls and floodwall, is $3,923,900. For a breakdown of costs, see Appendix A, Table A-13.

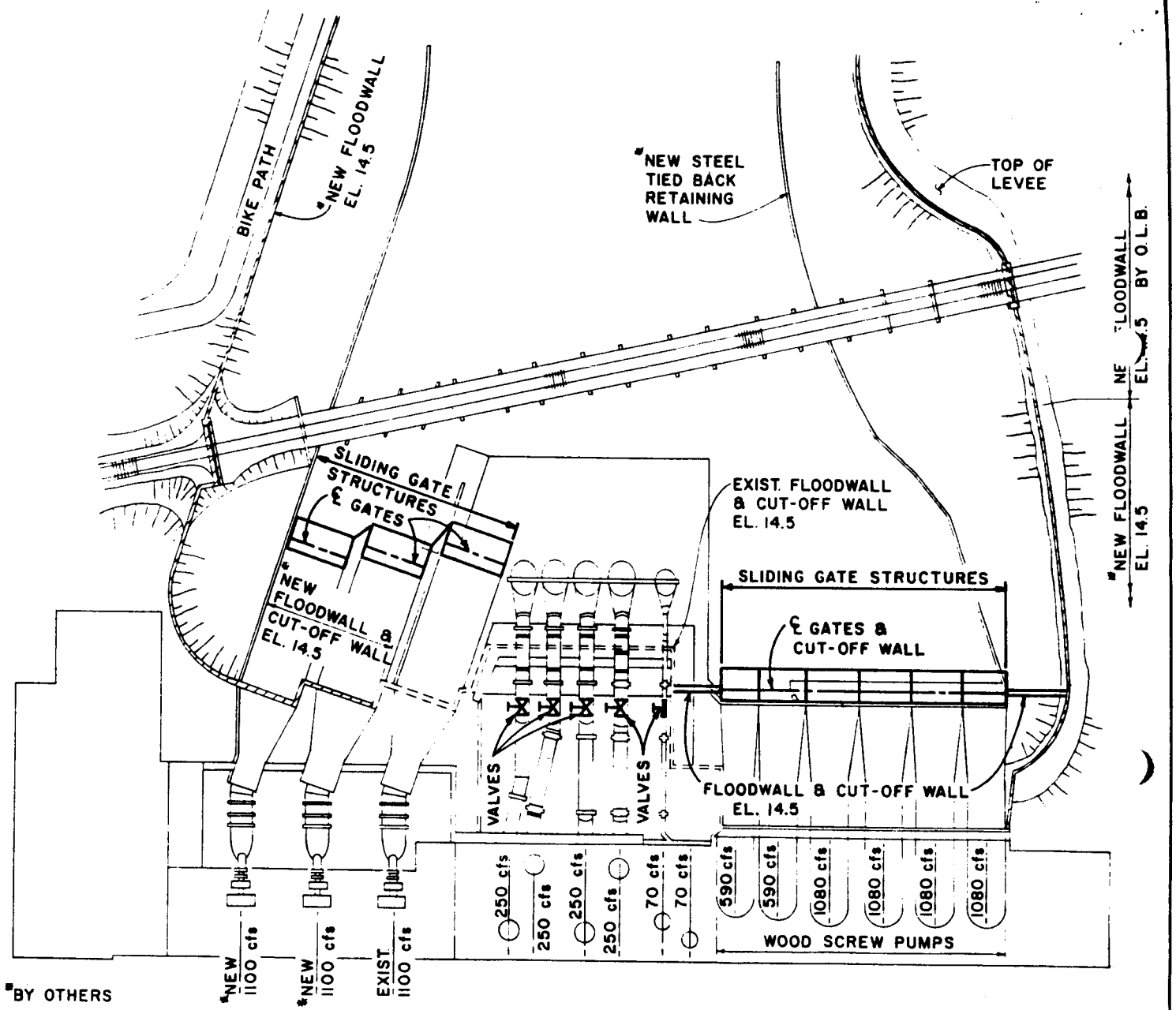
Alternative 2: Gates at End of Discharge Tubes

The basic configuration of the sliding gates in Alternative 2 is shown in Figure 36. There is only one advantage to placing the sliding gates at the end of the discharge tubes and that is there will be no effect on the vacuum required to prime the pumps. All construction joints and seals will be under water when it is time to start the pumps.



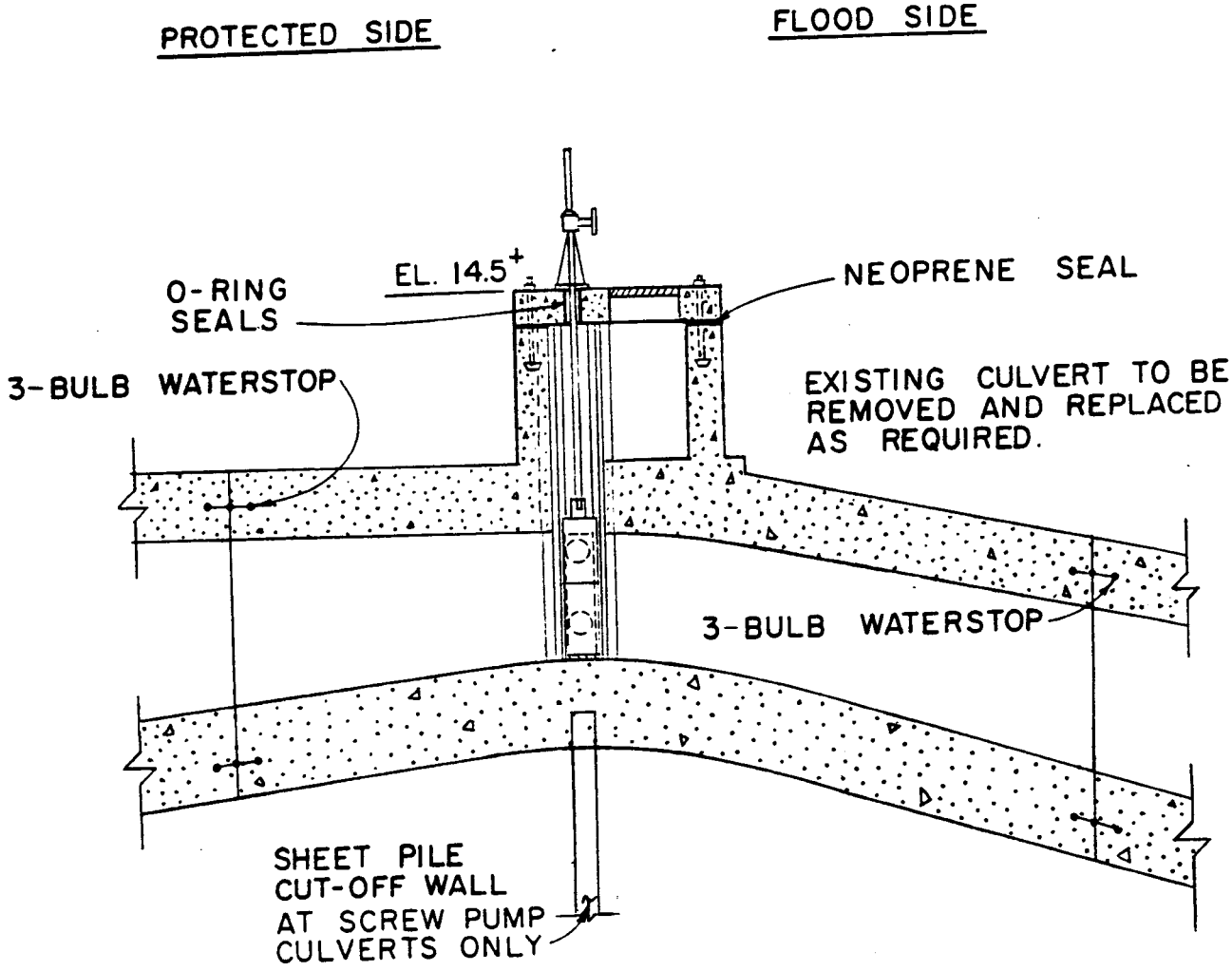
PLAN

FIGURE 33
PUMP STATION NO. 6
FLOOD PROTECTION
ALTERNATIVE I



PLAN

FIGURE 34
PUMP STATION NO. 6
FLOOD PROTECTION
ALTERNATIVE 2



NOTE:

EXISTING TIMBER PILES NOT SHOWN FOR CLARITY

FIGURE 35

SLIDING GATE

ALTERNATIVE I

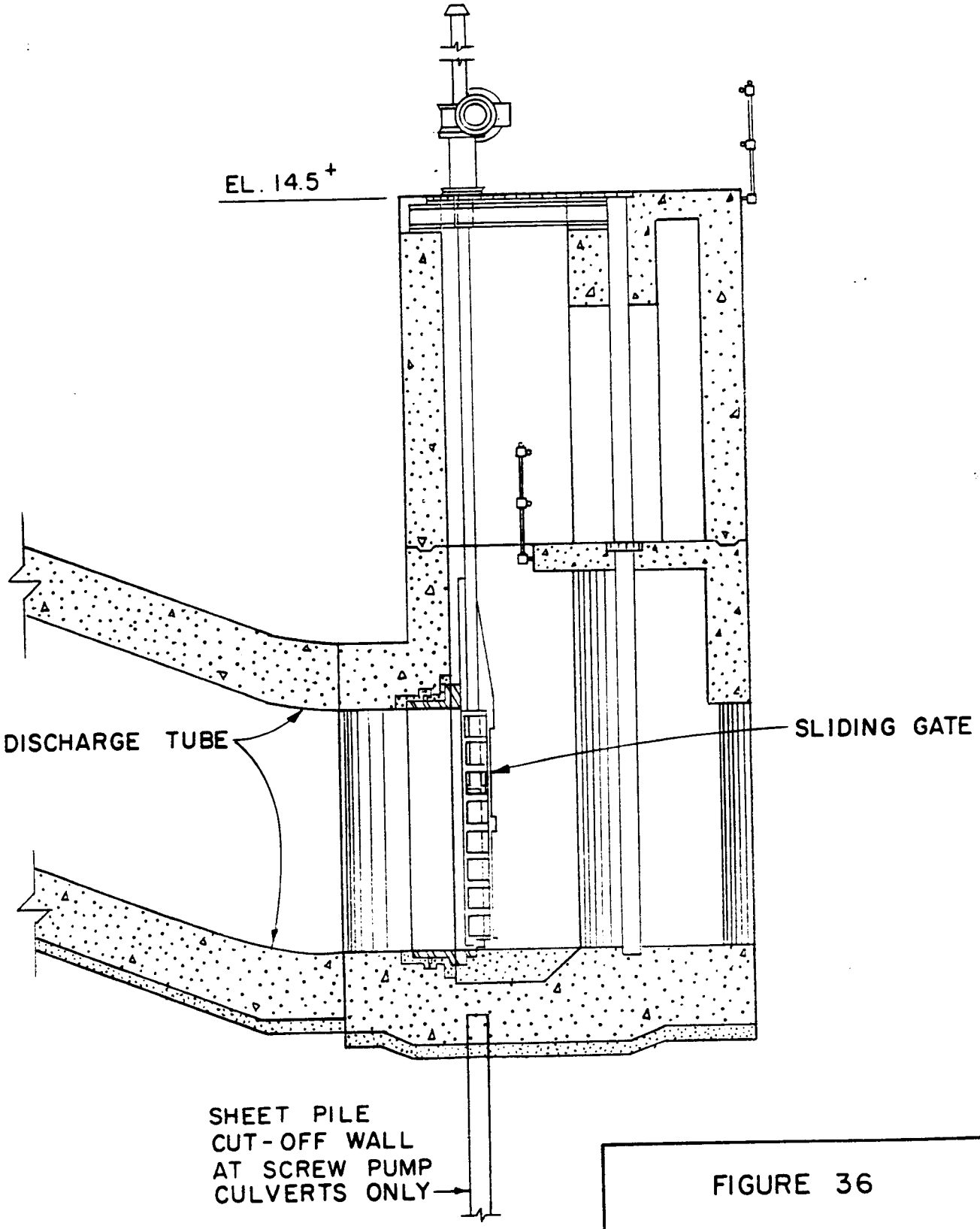


FIGURE 36

SLIDING GATE

ALTERNATIVE 2

The disadvantages of this alternative, however, are numerous; the location of the gates requires cofferdams for construction, the sliding gates and gate structures are larger; more gates are required; rip-rap is required at the end of the gate structures; and additional piles are required. All of the disadvantages add up to substantial costs.

It is estimated that Alternative 2 will cost $6,417,300 for sliding gates, butterfly valves, cut-off piling and floodwall. A breakdown of this estimate can be found in Appendix A, Table A-14.

C. Conclusions

From the above discussion it is evident that Alternative 1 is the least costly of the two alternatives considered for flood protection at Pump Station No. 6. Implementation of this alternative is, however, dependent upon the approval of the Sewerage and Water Board. Because of the possible problem this alternative presents with regard to obtaining a vacuum in the pump discharge tubes, the Sewerage and Water Board will be insistent that precautions are taken to insure the maintenance of the vacuum. This vacuum is necessary in order to prime the pumps, and is therefore of the utmost importance in the operation of the pump station. The total cost to the U.S. Army Corps of Engineers for Alternative 1 flood protection at Pump Station No. 6 and the concrete I - wall from Hammond Highway to Pump Station No. 6 is $7,716,600.

Alternative 2, while more costly, does not present any operational problems to the pumping station. The total cost to the U.S. Army Corps of Engineers for Alternative 2 flood protection at Pump Station No. 6 and the concrete I - wall is $10,210,000.

TABLE A-12

CONCRETE I-WALL - COST ESTIMATE

NOTE: Quantities and Costs are for Encasing the Sheet Pile Wall of Levee Alternative 2.

ITEM	UNIT	QUANTITY	UNIT COST	COST
Concrete	CY	8,800	$350.00	$ 3,080,000
Reinforcing	LB	970,000	0.40	388,000
Contingencies - 15%				520,200
TOTAL				$ 3,988,200

TABLE A-13

PUMP STATION NO. 6 FLOOD PROTECTION: ALTERNATIVE 1 - COST ESTIMATE

SLIDING GATES AT HIGH POINT OF DISCHARGE TUBES

ITEM	UNIT	QUANTITY	UNIT COST	COST
Sliding Gates	EA	9	$300,000.00*	$ 2,700,000
Butterfly Valves	EA	5	75,000.00	375,000
Electrical Service	LS	-	-	90,000
Work Platform	LS	-	-	100,000
Concrete	CY	81.5	350.00	28,550
Reinforcing	LB	7,450	0.40	3,000
Sheet Pile	T	105	1,100.00**	115,500
Contingencies - 15%				511,850
TOTAL.....				$ 3,923,900

* Preliminary estimate by the U.S. Army Corps of Engineers for sliding gate and gate structure.

** PZ 22

TABLE A-14

PUMP STATION NO. 6 FLOOD PROTECTION: ALTERNATIVE 2 - COST ESTIMATE

SLIDING GATES AT END OF DISCHARGE TUBES

ITEM	UNIT	QUANTITY	UNIT COST	COST
Sliding Gates	EA	21	$100,000.00	$ 2,100,000
Butterfly Valves	EA	5	75,000.00	375,000
Electrical Service	LS	-	-	90,000
Cofferdams and Tremie Seals	LS	-	-	1,350,000
Concrete	CY	1,700	350.00	595,000
Reinforcing	LB	535,000	0.40	214,000
Sheet Pile	T	90.5	1,100.00	99,550
Piles 12" Sq. PPC	LF	11,500	20.00	230,000
Misc. Steel	LB	89,500	3.00	268,500
Steel Grating	LB	45,000	3.00	135,000
Aluminum Handrail	LF	830	40.00	33,200
Rip-Rap	LS	-	-	90,000
Contingencies - 15%				837,050
TOTAL.....				$ 6,417,300