

Wilmington Harbor GRR
Lock and Dam Study
Intake Evaluation

Prepared for:

Army Corps of Engineers
Wilmington District
Wilmington, North Carolina

Prepared by:

Army Corps of Engineers
Mobile District
Mobile, Alabama

MARCH 2007
FINAL

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NARRATIVE

**Wilmington Harbor GRR
Lock and Dam Study
Intake Evaluation**

1. General

This chapter covers the water supply to five existing pump stations on the Cape Fear River from Fayetteville, North Carolina to Wilmington, North Carolina. This study consists of evaluating the impacts to the existing pump stations for three alternatives. Alternative 1 is for the water surface elevation with the locks and dams removed. Alternative 2 is for the water surface elevation with the locks and dams lowered to an elevation of no impact to the intakes. Alternative 3 is for the water surface elevation with the locks and dams lowered so that no rock ramps are required for fish passage. Changes to pump stations and intake structures recommended in this report are offered only if one of the above alternatives is selected through the General Reevaluation Report (GRR) process. A summary of elevations which also contains the maximum daily flow and average daily flow for each of the existing pump stations is on page 8. A spreadsheet provided by the Wilmington District with the existing low water levels and the calculated low water levels for each of the three alternatives for each pump station is on page 9.

2. Pump Stations

A. Glenville Pump Station, City of Fayetteville: The profile of the Glenville Pump Station is shown on Sheet C-201. The Glenville pump station is a square concrete structure. The inside bottom elevation is 15.00 feet. Motors for the vertical turbine pumps and the traveling screen are mounted on the top slab of the pump station and are exposed to the weather. The intake structure is located about 120 feet from the pump station. The intake structure has a screen to stop debris and a sluice gate to control flow of water to the pump station. The carrier pipe from the intake structure to the pump station is a 48" ductile iron pipe inside a 72" casing pipe and is set at a 0% slope with an invert elevation of 22.00. Glenville normally operates a pump station on a lake near Glenville. The Glenville pump station on the Cape Fear River only operates a few months a year based on the water surface elevation at their lake intake. The average daily flow through the Glenville pump station is 3 million gallons per day (mgd). The peak daily flow for the Glenville pump station is 7 mgd.

The minimum water surface elevation for Alternative 2 is 28.0 feet, which will not require any revisions to the intake structure.

The low water levels established for Alternatives 1 and 3 are set at elevation 23.00 and 24.10 respectively. These elevations are well below the top of the intake pipe. Changes to the intake structure will be required for both of these alternatives.

The recommended changes to meet the daily flow requirements for Alternatives 1 and 3 are shown on Sheet C-202 and are as follow:

- Remove the existing intake structure and intake pipe.
- Repair and seal opening into the pump station from the removed pipe.
- Install new 48" intake pipe at invert elevation 18.00.
- Install 2 new 3.5 mgd intake screens with an air cleaning system.

The Glenville pump Station will have to be taken out of operation for incorporation of these modifications.

The repair and seal operation noted above would involve removal of the section of the sump wall from a point some distance above the top of the existing pipe connection to the sump floor, and for a distance either side of the edges of the pipe. A required clearance of 18" around the

top and sides of the pipe connector is recommended. This will result in a section measuring approximately 9' wide by 12.5 feet high being removed to facilitate removal of the existing pipe and installation of the new 48" pipe connector. The perimeter of the wall section would be saw cut and the concrete removed taking care to protect and preserve the existing wall reinforcement to provide for splicing with new reinforcement as the concrete wall is renewed. Once the wall section is removed the new wall section would be formed with the new pipe connector supported in place, and the wall reinforcement restored. With these features in place concrete would be placed to restore the section of wall.

The removal and re-placement of the intake pipe will require an extensive amount of excavation. The excavation shall be properly designed in order to protect workmen during placement of the intake pipe.

Previous expansions of the intake structures and pump stations in the area sequenced the construction by installing the pump station first followed by intake piping and intake structures. The pipe installation utilized underwater placement methods. After a substantial pipe trench was excavated the trench was allowed to be flooded from the river. This eliminated the need for a cofferdam in the river and a substantial dewatering effort along the pipe trench. Dewatering will still be required for the pump station installation. This construction method is expected to be used for the new pump facilities. Excavated materials shall be stockpiled and re-used, as much as practical, as trench backfill. All scarred areas will be seeded and mulched.

See quantity and cost summary sheets in the cost estimate for listing of items included in the pump station.

Note: There is an existing sediment problem at this site and it will also impact this recommended solution. There is not an adequate depth available for any type of intake structure. Dredging and/or diversion of flow to the right bank needs to be investigated.

B. Hoffer Pump Station, City of Fayetteville: The profile of the Hoffer Pump Station is shown on Sheet C-203. The Hoffer Pump Station is a concrete structure containing a wet well, loading bay, and operating floor. Pumps, motors and controls are located inside the structure. The inside bottom elevation of the wet well is at elevation 15.00 feet. There are two intake structures each consisting of two screens set at a centerline elevation of 25.00 feet. The intake pipes from the screens to the wet well are 60" in diameter. The centerline of both intake pipes into the wet well are set at elevation 19.00 feet. The average daily flow through the Hoffer Pump Station is 17 million gallons per day (mgd). The peak daily flow for the Hoffer pump stations is 30 mgd.

The minimum water surface elevation for Alternative 2 is 28.0 feet, which will not require any revisions to the intake structure.

The low water levels established for Alternatives 1 and 3 are set at elevation 23.00 and 24.10 respectively. The existing intake screens will not be fully submerged at either of these elevations.

The recommended changes to meet the flow requirements for Alternatives 1 and 3 are shown on Sheet C-204 and are as follow:

- Remove the existing intake pipes to the point of connection with the new intake pipes.
- Replace the existing intake screens with 6 new 5 mgd screens set at a new centerline elevation of 21.00 feet. The existing screens are 36" in diameter and will not function as designed in 3 to 4 feet of water. The existing air cleaning system will be connected to the new screens.
- Install new 60" intake pipes from both sets of screens level at a centerline elevation of 21.00 and connect to the existing intake pipes at that same elevation.

The Hoffer Pump station will have to be taken off line for incorporation of these modifications.

The recommended changes to the pump station will require the removal

and replacement of existing slope protection systems. A riprap section will be used for the replacement of the concrete fabriform slope protection. The replacement of the intake pipes will require an extensive excavation. Excavated materials shall be stockpiled and re-used, as much as practical, as trench backfill. The excavation shall be properly designed in order to protect workmen during placement of the intake pipes and screens. The underwater construction method described for the Glenville Pump Station will also be used at this site. All scarred areas will be seeded and mulched. The existing piling used to support the existing intake pipe and screens will be modified to support the new intake pipes and screens.

See quantity and cost summary sheets in the cost estimate for listing of items included in the pumping station.

Note: There is an existing sediment problem at this site and it will also impact this recommended solution. There is not an adequate depth available for the screens. Dredging and /or diversion of flow to the right bank needs to be investigated. If possible, lowering the centerline elevation of the new screens and intake pipe to an elevation of 20.00 feet is preferred.

C. DuPont Pump Station. The profile of the DuPont Pump Station is shown on Sheet C-205. The DuPont pump station is concrete caisson with the top slab set at an elevation of 75.00 feet. The inside bottom elevation is set at an elevation of 3.00 feet. Motors for the vertical turbine pumps and the traveling screen are mounted on the top slab of the pump station and are exposed to the weather. The intake structure is located about 130 feet from the pump station. The intake structure has a screen to stop debris. The intake pipe from the intake structure to the pump station is a 72" pipe set at a 0% slope with an invert elevation of 8.00. The average daily flow through the DuPont Pump Station is 15 mgd. The peak daily flow is 16 mgd. This pump station will remain operational for all alternatives with no changes.

D. Lower Cape Fear Water and Sewer Authority (LCFWASA) Pump Station. The profile of the LCFWASA Station is shown on Sheet C-206. The LCFWASA pump station is a concrete structure containing the wet well and an operations floor. Pumps, motors and controls are located inside the structure. The inside bottom of the wet well is set an elevation of -2.00 feet. The intake structure is a set of intake screens located 1100 feet from the pump station in the river channel. The centerline of the intake pipe entering the wet well is set at an elevation of 3.75 feet. The average daily flow through the LCFWASA Pump Station is 16.8 million gallons per day mgd. The peak daily flow for the LCFWASA pump stations is 45.0 mgd. When the existing pump station is operating at peak capacity there is a head loss of over 4 feet from the river to the wet well. This loss varies dependant on how clean the intake screens are.

The low water levels established for Alternatives 1 and 3 are set at elevation 0.00 and 2.50 respectively. Both of these alternatives will require relocation of the intake screens and a complete replacement of the pump station.

The minimum water surface elevation for Alternative 2 is 10.0 feet, which will not require any revisions to the intake structure or pump station.

The recommended changes to meet the flow requirements for Alternatives 1 and 3 are shown on Sheet C-207 and are as follow:

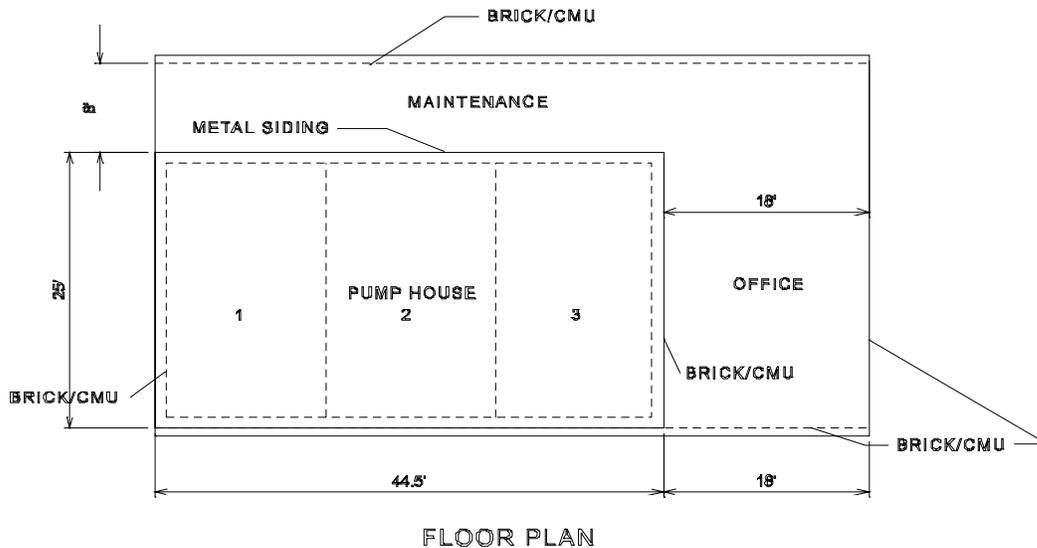
- Install 5 new 9 mgd intake screens with an air cleaning system.
- Construct a new pump station similar to the existing pump station but with the floor of the wet well set at elevation -12.00.
- Install 2 new 1400 HP electric motor driven pumps that can deliver 18,000 gpm at 235 feet TDH at 880 rpm with variable frequency drives. These pumps were selected based on sizes and capacities of the existing

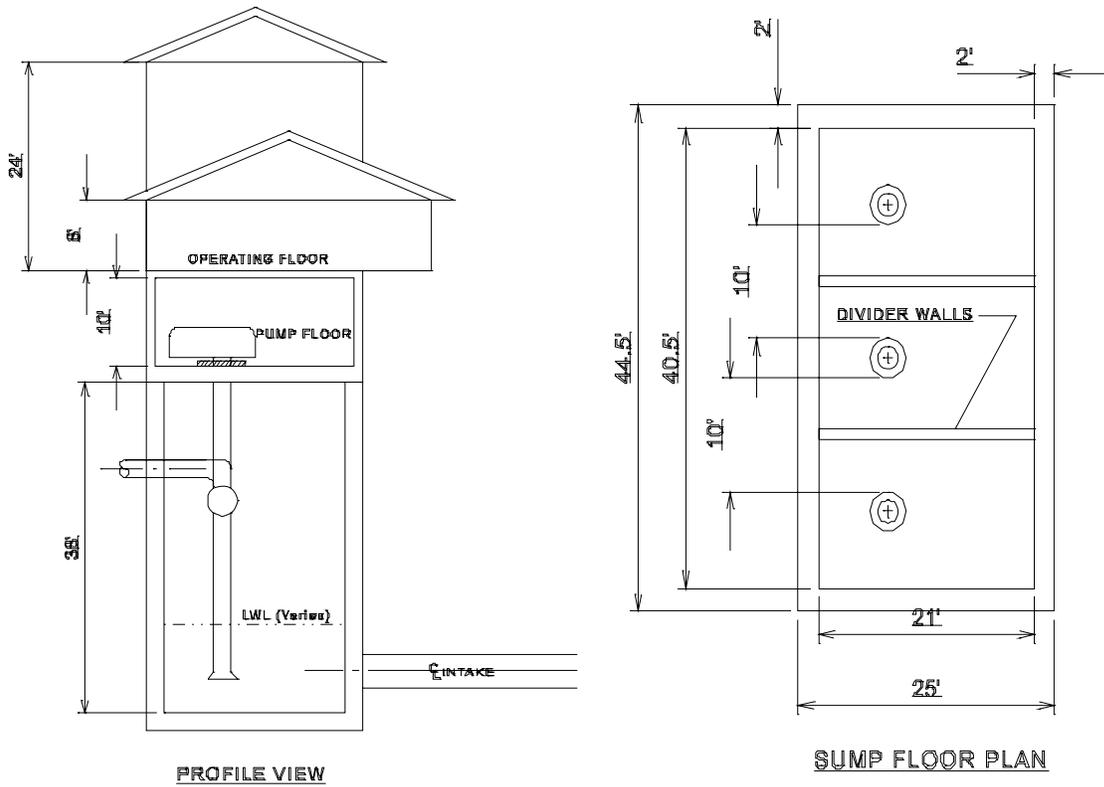
electric pumps.

- Install 1 new 1400 HP diesel motor driven pump that can deliver 18,000 gpm at 235 feet TDH at 880 rpm with a right angle drive. This pump was selected based on size and capacity of the existing diesel pump.
- Install a new 60" intake pipe from the relocated screens to the new pump station set at a centerline elevation of -8.00.

The old pump station will remain in operation while the new pump station is being constructed. There may be a minimal downtime required for connections to be made to the existing pressure main from the existing pump station.

The new pumping facility would have the same operating and administrative floor elevations, and would be configured for an equivalent number of pumps and with the same ancillary facilities as are included in the existing plant. As noted above, all pumps, motors and controls would be located inside the structure. In addition it was assumed that a nominally sized overhead crane would be included in the high bay area to facilitate maintenance of the pumping equipment. For estimating purposes the footprint of the replacement facility was derived using a pump spacing of 10 feet and a wall clearance of 5 feet for all pumps. The operating, administrative, and storage spaces were estimated for square footage and required vertical clearances based on pictures and other data gathered from the existing plant. It was assumed that these areas would be constructed in much the same configuration and with much the same architectural treatment as was used for the existing plant.





The modifications to this pump station will require significant excavations due to the distance between the pump station and intake structure in the river along with the invert elevation of the intake pipe. The underwater construction method described for the Glenville Pump Station will also be used at this site. Excavated materials shall be stockpiled and re-used, as much as practical, as trench backfill. The excavation shall be properly designed in order to protect workmen during placement of the intake pipe. All scarred areas will be seeded and mulched.

See quantity and cost summary sheets in the cost estimate for listing of items included in the pumping station.

E. City of Wilmington Pump Station. The profile of the City of Wilmington Pump Station is shown on Sheet C-208. The pump station is a concrete and brick structure containing the wet well, pump room, and loading dock. Pumps, motors and controls are located inside the structure. The inside bottom of the wet well is set an elevation of 4.00 feet. The intake structure is a canal from the river to a screened inlet into the wet well. There is a sluice gate on the inlet wall of the wet well to control the flow of water. The average daily flow through the City of Wilmington Pump Station is 9.5 million gallons per day (mgd). The peak daily flow for the pump station is 25.0 mgd.

The low water levels established for Alternatives 1 and 3 are set at elevation 0.00 and 2.50 respectively. No water will enter the wet well at either of these elevations. Alternatives 1 and 3 will require replacement of the existing pump station. New intake screens with an air cleaning system will new intake screens and a complete replacement of the pump station.

The minimum water surface elevation for Alternative 2 is 10.0 feet, which will not require any revisions to the intake structure or pump station.

The recommended changes to meet the flow requirements for alternatives

1 and 3 are shown on Sheet C-209 and are as follow:

- Install 3 new 8.33 mgd intake screens with an air cleaning system.
- Construct a new pump station similar to the LCFWASA pump station but with the floor of the wet well set at elevation -12.00.
- Install a new 48" intake pipe from the relocated screens to the new pump station set at an invert elevation of -10.00.
- Install 2 new 600 HP electric motor driven pumps that can deliver 8400 gpm at 230 feet TDH at 880 rpm with variable frequency drives. These pumps were selected based on sizes and capacities of the existing electric pumps.
- Install 1 new 1200 HP diesel motor driven pump that can deliver 10,500 gpm at 335 feet TDH at 880 rpm with a right angle drive. This pump was selected based on size and capacity of the existing diesel pump.

The old pump station will remain in operation while the new pump station is being constructed. There may be a minimal downtime required for connections to be made to the existing pressure main from the existing pump station.

The new pumping facility would have the same operating and administrative floor elevations, and would be configured for an equivalent number of pumps as are included in the existing plant. As noted above pumps, motors and controls would be located inside the structure. A nominally sized overhead crane would be included in the high bay area to facilitate maintenance of the pumping equipment. For estimating purposes the ancillary facilities for this plant were assumed to be the same as for the LCFWASA Pump Station, noted above. The footprint of the replacement facility was derived using a pump spacing of 10 feet and a wall clearance of 5 feet for all pumps. The operating, administrative, and storage spaces were estimated for square footage and required vertical clearances based on pictures and other data gathered from the existing LCFWASA Station. It was assumed that these areas would be constructed in much the same configuration and with much the same architectural treatment as was used for that plant. See quantity and cost summary sheets for listing of items included in the pump station.

The modifications to this pump station will require significant excavations due to the distance between the pump station and intake structure in the river along with the invert elevation of the intake pipe. Excavated materials shall be stockpiled and re-used, as much as practical, as trench backfill. The underwater construction method described for the Glenville Pump Station will also be used at this site. Excavated materials shall be stockpiled and re-used, as much as practical, as trench backfill. The excavation shall be properly designed in order to protect workmen during placement of the intake pipe. All scarred areas will be seeded and mulched.

See quantity and cost summary sheets in the cost estimate for listing of items included in the pumping station.

3. Summary

This study evaluated the impacts to the existing pump stations on the Cape Fear River for three alternatives. Alternative 1 is for the water surface elevation with the locks and dams removed. Alternative 2 is for the water surface elevation with the locks and dams lowered to an elevation of no impact to the existing intakes. Alternative 3 is for the water surface elevation with the locks and dams lowered so that no rock ramps are required. Results are as follow:

A. Glenville Pump Station: For Alternatives 1 and 3 the existing intake structure will have to be replaced with new screens and intake pipe.

B. Hoffer Pump Station: Existing screens will have to be replaced with smaller diameter screens set at a centerline elevation of 21.00 feet with the intake pipes lowered as indicated on the drawing for both

Alternatives 1 and 3.

C. DuPont Pump Station: This station will remain functional with no changes for alternatives 1 and 3.

D. LCFWASA Pump Station: Alternatives 1 and 3 will require a complete replacement of the pump station, intake pipe, and screens.

E. City of Wilmington Pump Station: Alternatives 1 and 3 will require a complete replacement of the pump station with new intake pipe and new screens.

SUMMARY OF ELEVATIONS ON CAPE FEAR RIVER

7 Dec, 2006

All elevations are NGVD 1929 feet

Lock and Dam #1

(@ river station 353000)

Dam Crest 11.1

City of Wilmington Intake

(@ river station 353440)

4ft X 4ft Intake Sill 9.14

4ft X 4ft Intake Invert 5.14

Wetwell invert 4.06

Max Capacity 25 MGD

Avg Capacity (1997) 9.47 MGD

Lower Cape Fear Water & Sewer Authority (LCFWASA)

(@ river station 353760)

Centerline of intake screen 4.5

Centerline of 48" intake Pipe in river -8.0

Wetwell invert -2.0

Centerline intake pipe @ wetwell 3.75

Max Capacity 45.0 MGD

Avg Capacity (1997) 16.81 MGD

Lock & Dam #2

(@ river station 523670)

Dam Crest 20.1

Lock & Dam #3

(@ river station 645300)

Dam Crest 29.1

DuPont Intake

(@ river station 650700)

Centerline of 61" ID intake pipe 11.0

Finish floor of pump area 75.0

Wet well invert 3.0

Bottom of pump intake 5.5

Max Capacity 16.0 MGD

Avg Capacity (2005) 15.0 MGD

Fayetteville Intakes

(@ river station 764605)

Glenville Pumping Station

Top of Intake Screen 34.5

Invert of intake screen 20.5

Invert of 48" intake pipe 22.00

Invert of intake structure 19.5

Invert of wet well 15.0

Max Capacity 7 MGD

Avg Capacity (1997) 3 MGD

Hoffer Pumping Station

Centerline of 36" intake screen 25.0

Centerline of 60" pipe 19.0

Invert of wet well 15.0

Avg Capacity 17 MGD

Max Capacity 30 MGD

Minimum water level for pumps 21.0

Normal minimum water level
For pumps 23.0

WILMINGTON HARBOR GRR - LOCKS AND DAMS STUDY

Water Surface Elevations @ 300 CFS

December 8, 2006

LOCATION DESCRIPTION	River Station Feet from Mouth	Alternative 1								Alternative 2		Alternative 3	
		Existing conditions		Locks and Dams Removed		L&D's lowered to elevation of minimum impact on intakes		Locks and Dams lowered so that no rock ramps are required					
		FEET NGVD		FEET NGVD		FEET NGVD		FEET NGVD		FEET NGVD		FEET NGVD	
		Dam Elevation	Water Surface Elevation	Dam Elevation	Water Surface Elevation	Dam Elevation	Water Surface Elevation	Dam Elevation	Water Surface Elevation	Dam Elevation	Water Surface Elevation	Dam Elevation	Water Surface Elevation
Lock & Dam 1	353000	10.70	11.20	-5.5*	0.00	9.50	10.00	2.00	2.50				
City of Wilmington Intake	353440	10.70	11.20	-5.5*	0.00	9.50	10.00	2.00	2.50				
LCFWASA Intake	353760	10.70	11.20	-5.5*	0.00	9.50	10.00	2.00	2.50				
Lock & Dam 2	523670	20.10	20.50	2 ⁺	3.20	2 ⁺	8.60	14.00	14.60				
<u>Proposed</u> Smithfield Foods Intake	619290	20.10	20.70	2 ⁺	13.20	2 ⁺	12.90	14.00	14.90				
Lock & Dam 3	645300	29.10	29.40	9.9*	13.30	27.20	27.60	23.00	23.60				
Dupont Intake	650700	29.10	29.60	9.9*	14.00	27.20	27.80	23.00	23.60				
Fayetteville Glenville Intake	764605	29.10	29.70	9.9*	23.00	27.20	28.00	23.00	24.10				
Fayetteville Hoffer Intake	764605	29.10	29.70	9.9*	23.00	27.20	28.00	23.00	24.10				

NOTE: * indicates that the dam has been removed and that is natural bottom at the site

COST ESTIMATE

PRELIMINARY PROGRAMMING & PLANNING COST ESTIMATE

PROJECT: Cape Fear River Intake Projects

LOCATION: North Carolina

WORK ITEM: PROJECT SUMMARY

ITEM NO. SUMMARY

SHEET NO. 1

PREPARED: Addison DeBoi

BASIS OF ESTIMATE: info furnished per Project Delivery Team

FILE NAME: cfripa

DATE: 26-Mar-07

OF 6

CHECKED: George Brown

DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
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SUMMARY

<u>GLENVILLE</u>	1	Job	xxx	500,000
<u>HOFFER</u>	1	Job	xxx	\$1,100,000
<u>DUPONT</u>	1	Job	xxx	\$0
<u>LCFWASA</u>	1	Job	xxx	8,500,000
<u>CITY OF WILMINGTON</u>	1	Job	xxx	\$6,059,900

Total Project Cost Summary (FY-08) \$16,159,900

Notes:

Price Level Apr 07

Unit Cost Based on Historical Data, Recent Pricing, & Estimator's Judgment

Estimate Excludes:

- Real Estate
- Environmental
- Recreation
- Mitigation
- Removal or Relocations
- HTRW
- All dredging

PRELIMINARY PROGRAMMING & PLANNING COST ESTIMATE

PROJECT: Cape Fear River Intake Projects

LOCATION: North Carolina

WORK ITEM: Glenville Intake - City of Fayetteville

ITEM NO. 1

SHEET NO. 2

PREPARED: Addison DeBoi

BASIS OF ESTIMATE: info furnished per Project Delivery Team

FILE NAME: cfripa

DATE: 26-Mar-07

OF 6

CHECKED: George Brown

DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
<u>GLENVILLE</u>				
Mobilization, Preparatory Work, Demobilization	1	ls	allow	\$15,000
Strip 6 inches off top of area to be excavated	2420	sy	2	4,840
Common Excavation	10880	cy	9	100,096
Dewatering (manned 24hr/day)	1	ls	1000	1,000
Removal of existing 42" inside 72" casing pipe	125	lf	77	9,625
Dispose of pipe debris	210	cy	35	7,350
Saw cut wall around and below existing penetration	39	lf	50	1,950
Break up and remove concrete inside cut area	189	cf	29	5,481
Remove old pipe thimble	1	ea	400	400
Install new pipe thimble	1	ea	1200	1,200
Install reinforcement	450	lb	3	1,125
Install forms around cut wall area	150	sf	17	2,550
Cast in place structural concrete	4	cy	133	530
Install new ductile iron, class 150 48" pipe	140	lf	244	34,160
Install new pylon/concrete support for pipe/screens	3	ea	7700	23,100
Install new 3.5 mgd intake screens w/existing air burst system	2	ea	7800	15,600
Hand compacted backfill	1000	cy	19	18,840
Equipment compacted backfill	9870	cy	5	48,758
Silt Fencing	1270	lf	3	3,810
Seeding & Mulching	3630	sy	1	3,194
Misc. Site Items & Restoration/silt fencing	1	job	allow	8,000
				306,609
		Contingency	35.0%	107,313
				413,922
		Acct 30 Planning and design	6.0%	24,835
				438,758
		Acct 31 Construction. Management	8.0%	35,101
				473,858
		Escalation, FY-08	4.0%	18,954
				\$492,813
Total Project Cost Summary (FY-08)				\$500,000

PRELIMINARY PROGRAMMING & PLANNING COST ESTIMATE

PROJECT: Cape Fear River Intake Projects
 LOCATION: North Carolina
 WORK ITEM: Hoffer Intake - City of Fayetteville

ITEM NO. 2 DATE: 26-Mar-07
 SHEET NO. 3 OF 6
 PREPARED: Addison DeBoi CHECKED: George Brown
 BASIS OF ESTIMATE: info furnished per Project Delivery Team
 FILE NAME: cfripa

DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
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HOFFER

Mobilization, Preparatory Work, Demobilization	1	ls	allow	\$15,000
Stripping (6 inch)	1452	sy	2	2,904
Common Excavation	7333	cy	9	67,464
Dewatering (Sump Pumping at Pump Station)	1	ls	1000	1,000
Riprap Removal (for reuse)	500	cy	39	19,250
Removal of existing PCCP 60" pipe	280	lf	69	19,320
Dispose of pipe/concretedebris (bobby, took this qty off your input..seems	35	cy	27	945
Concrete Slope Protection Removal	1620	cy	27	42,930
Riprap (reuse of existing)	500	cy	90	45,000
Riprap (new)	350	cy	120	42,000
Bedding Material	420	sy	90	37,800
Bedding Filter Cloth	1400	sy	2	2,800
Modify Steel Pile Support Structure for pipe and 4 screens	48	ea	3800	182,400
Install 2 new Screen Supports for 2 additional screens	2	ea	5200	10,400
Install new 5 mgd intake screens w/existing air burst system	6	ea	8000	48,000
Install new 60" ductile iron class c pipe	280	lf	408	114,240
Hand compacted backfill	1150	cy	19	21,666
Equipment compacted backfill	6000	cy	5	29,640
Silt Fenching	1270	lf	3	3,493
Seeding & Mulching	2178	sy	1	1,917
Misc. Site Items & Restoration/silt fencing	1	job	allow	8,000

716,168

Contingency 35.0% 250,659

966,826

Acct 30 Planning and design 6.0% 58,010

1,024,836

Acct 31 Construction. Management 8.0% 81,987

1,106,823

Escalation, FY-08 4.0% 38,673

\$1,145,496

Total Project Cost Summary (FY-08) \$1,100,000

PRELIMINARY PROGRAMMING & PLANNING COST ESTIMATE

PROJECT: Cape Fear River Intake Projects
LOCATION: North Carolina
WORK ITEM: Dupont Intake

ITEM NO. 3 DATE: 26-Mar-07
SHEET NO. 4 OF 6
PREPARED: Addison DeBoi CHECKED: George Brown
BASIS OF ESTIMATE: info furnished per Project Delivery Team
FILE NAME: cfripa

DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
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DUPONT

NO WORK ON THIS PROJECT

Total Project Cost Summary (FY-08) \$0

DRAWINGS



Symbol	Description	Date	Approved

Date	File No.	I.S.O. Sheet File Name	Solicitation Number
		C-201.dgn	

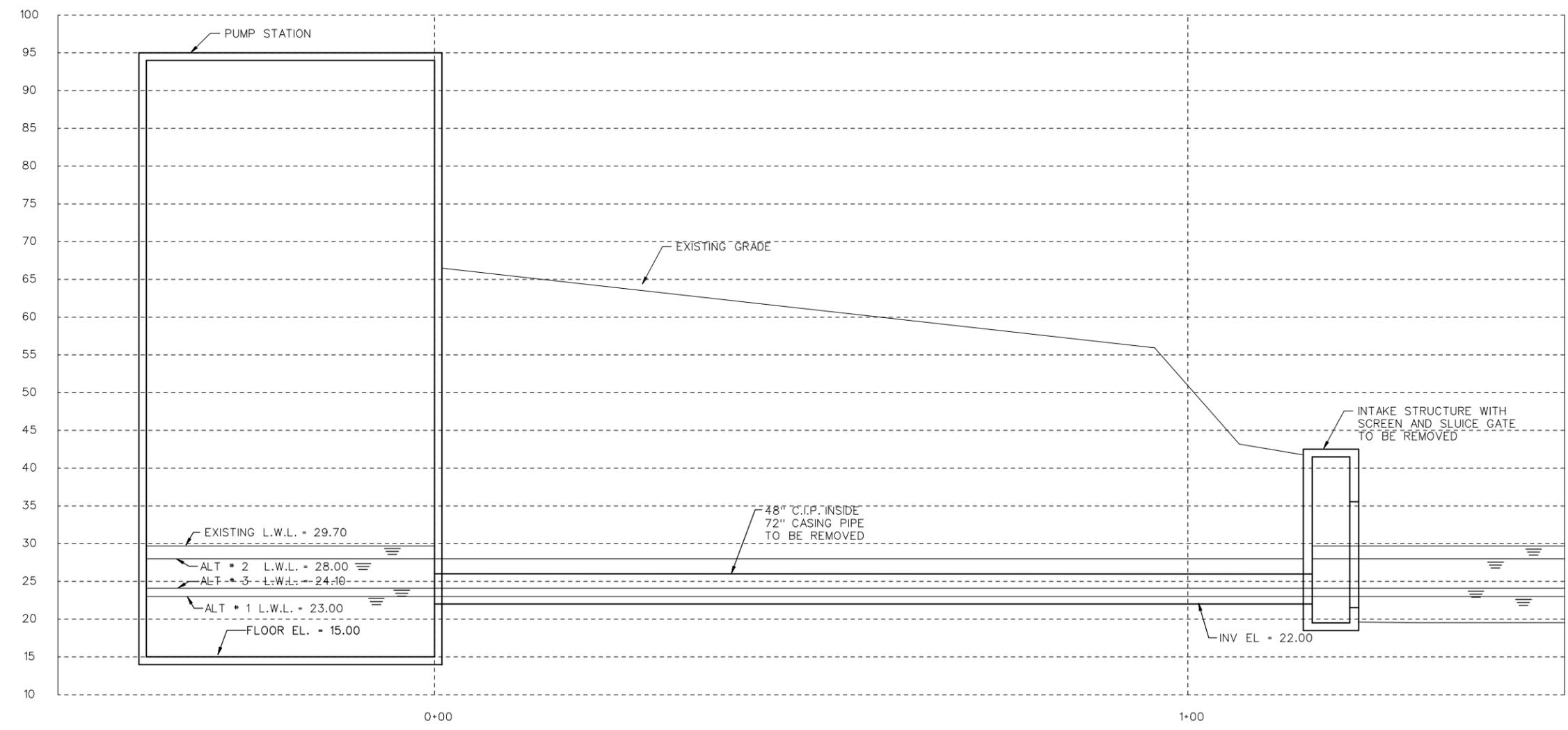
Designed By	Drawn By	Checked By	Reviewed By

WILMINGTON HARBOR ORR
LOCK AND DAM STUDY

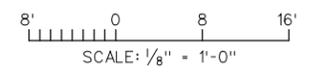
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

GLENVILLE PUMP STATION
EXISTING CONDITIONS

Sheet Reference Number:
C-201



ELEVATION
SCALE: 1/8" = 1'-0"





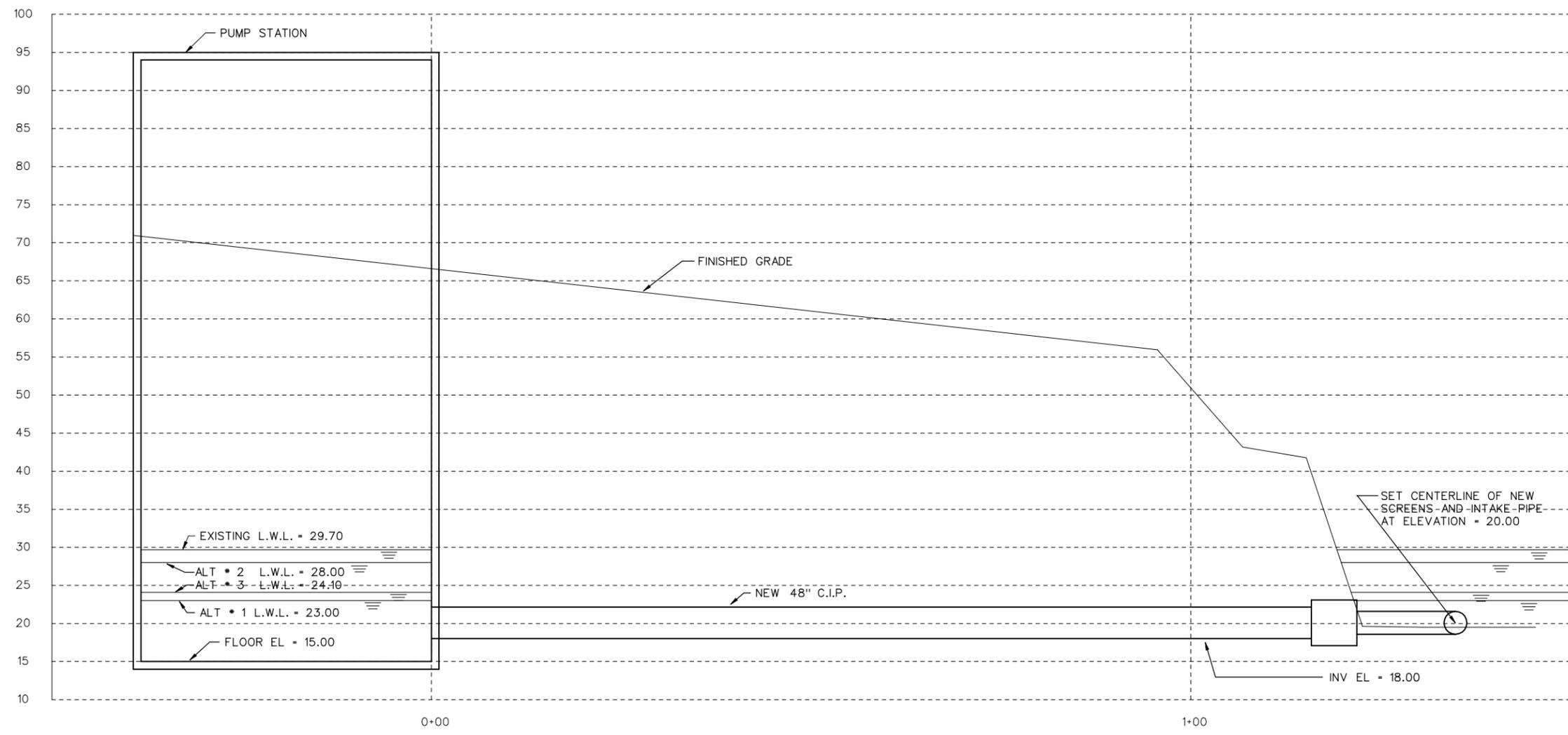
US Army Corps
of Engineers
Mobile District

Symbol	Description	Date	Approved

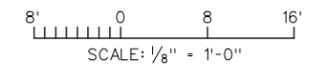
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U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	-	-	C-202.dgn
Drawn By:	Checked By:	Reviewed By:	Solicitation Number:
-	-	-	-

WILMINGTON HARBOR, GRR
LOCK AND DAM STUDY
**GLENVILLE PUMP STATION
REVISIONS**

Sheet
Reference
Number:
C-202



ELEVATION
SCALE: 1/8" = 1'-0"





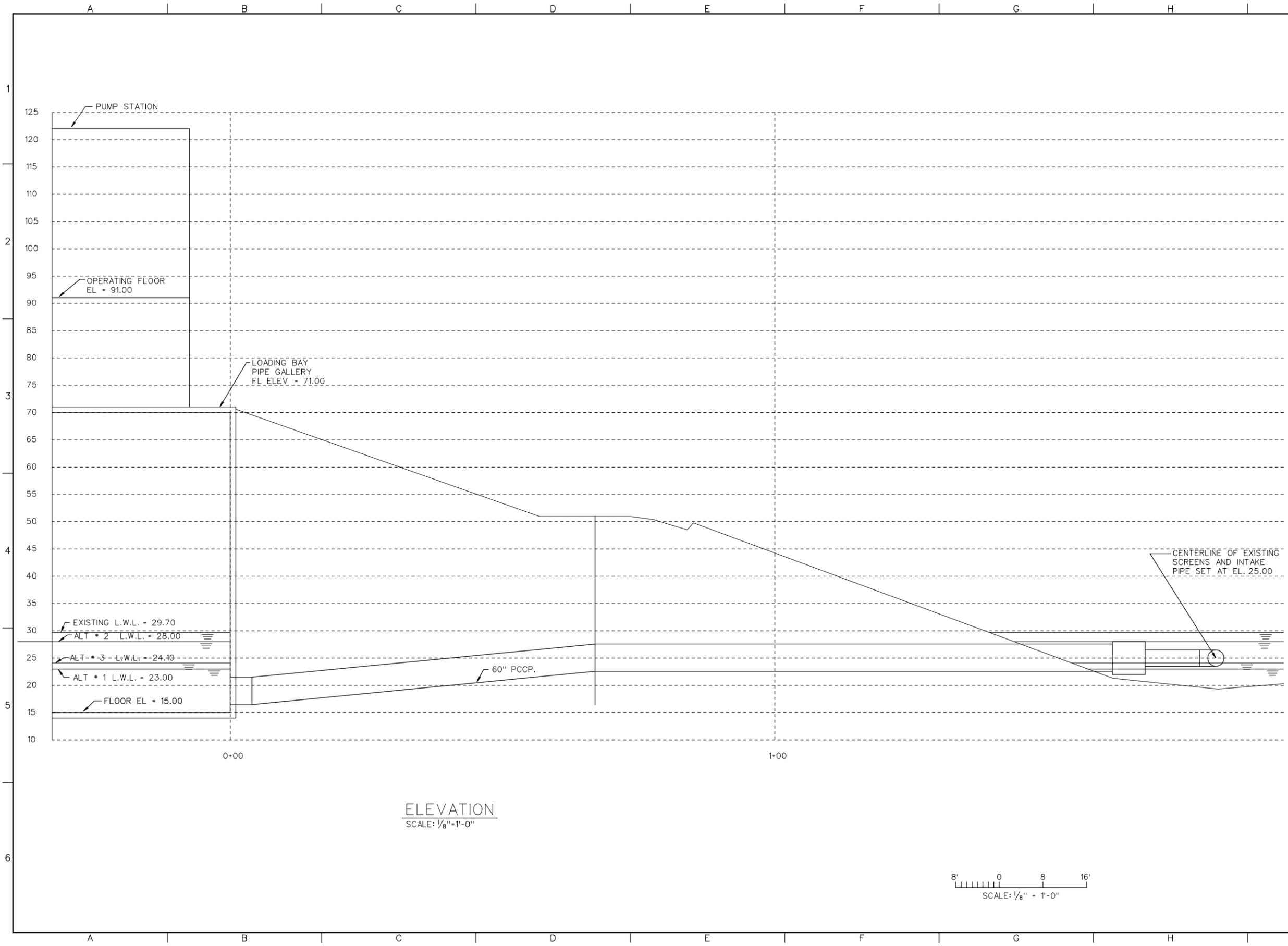
US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

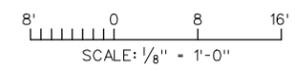
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Reviewed By:	Solicitation Number:

WILMINGTON HARBOR GRR
LOCK AND DAM STUDY
HOFFER PUMP STATION
EXISTING CONDITIONS

Sheet Reference Number:
C-203



ELEVATION
SCALE: 1/8" = 1'-0"





US Army Corps of Engineers
Mobile District

Date	Description	Symbol	Approved

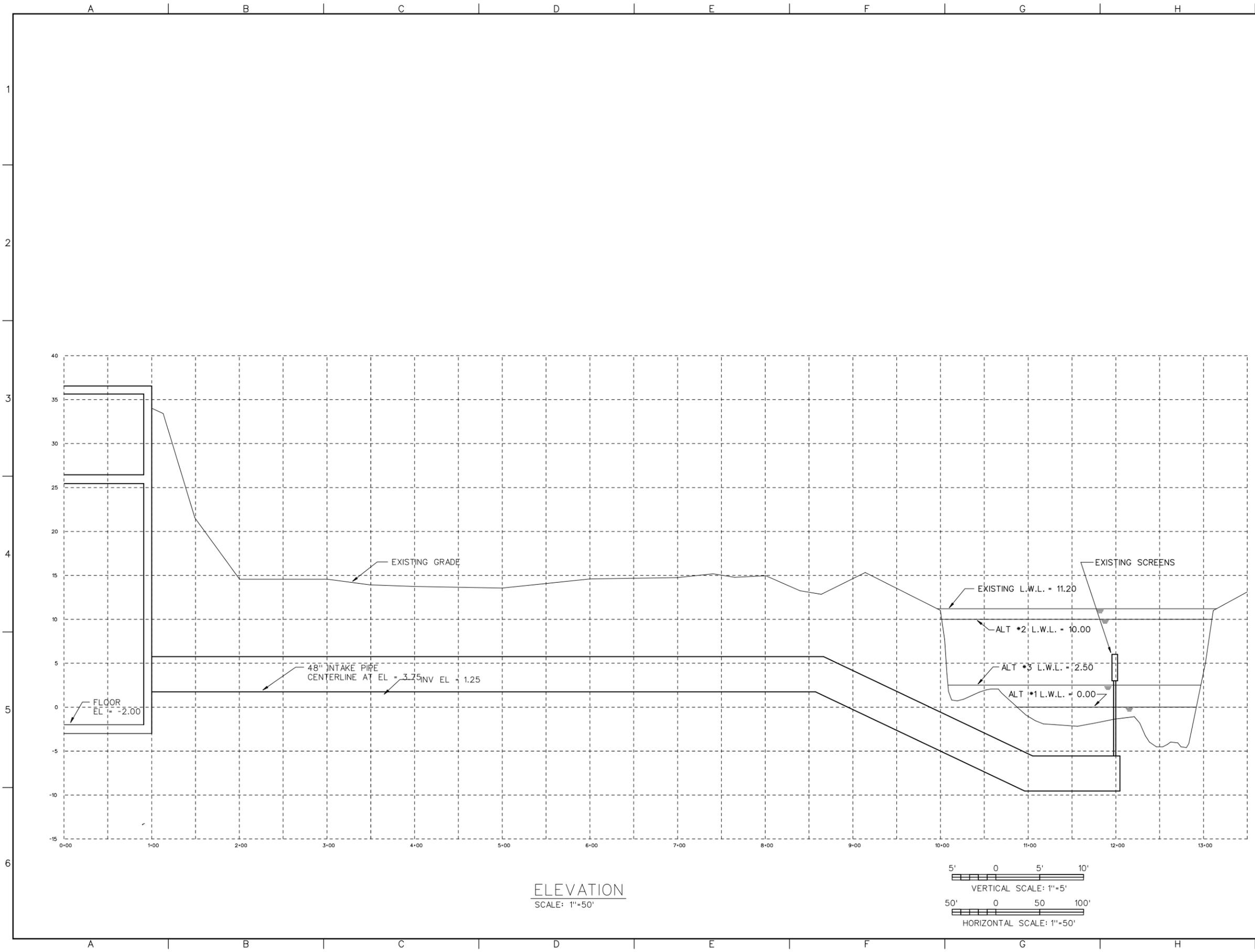
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Reviewed By:	Solicitation Number:

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

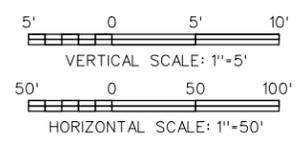
WILMINGTON HARBOR GRR
LOCK AND DAM STUDY

**LCFWASA PUMP STATION
EXISTING CONDITIONS**

Sheet Reference Number:
C-206



ELEVATION
SCALE: 1"=50'

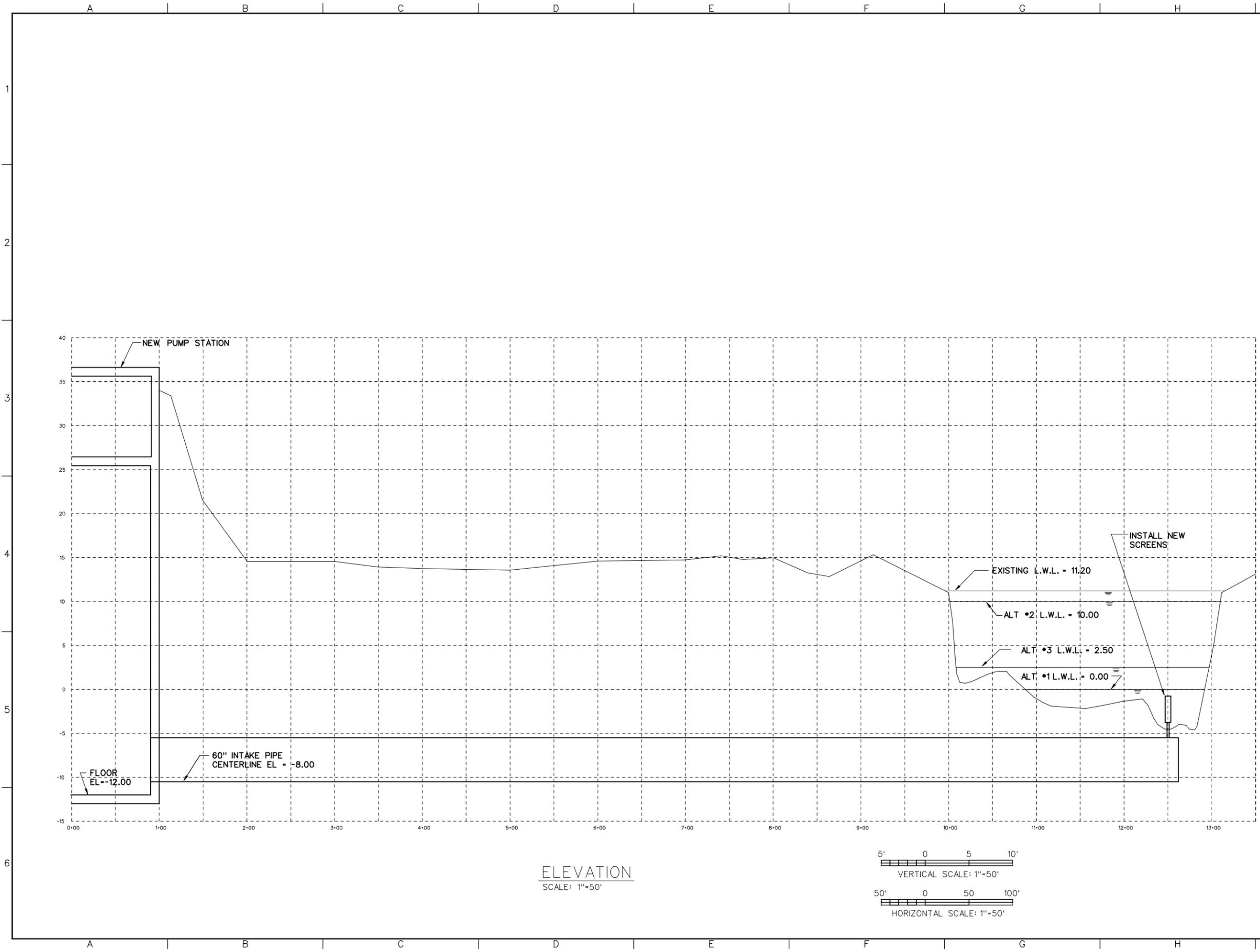


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Drawn By:	U.S.O. Sheet File Name:	C-207.dgn
Checked By:	Revision Number:	
Reviewed By:		

WILMINGTON HARBOR GRR
LOCK AND DAM STUDY
**LCFWASA PUMP STATION
REVISIONS**

Sheet Reference Number:
C-207



ELEVATION
SCALE: 1"=50'





US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

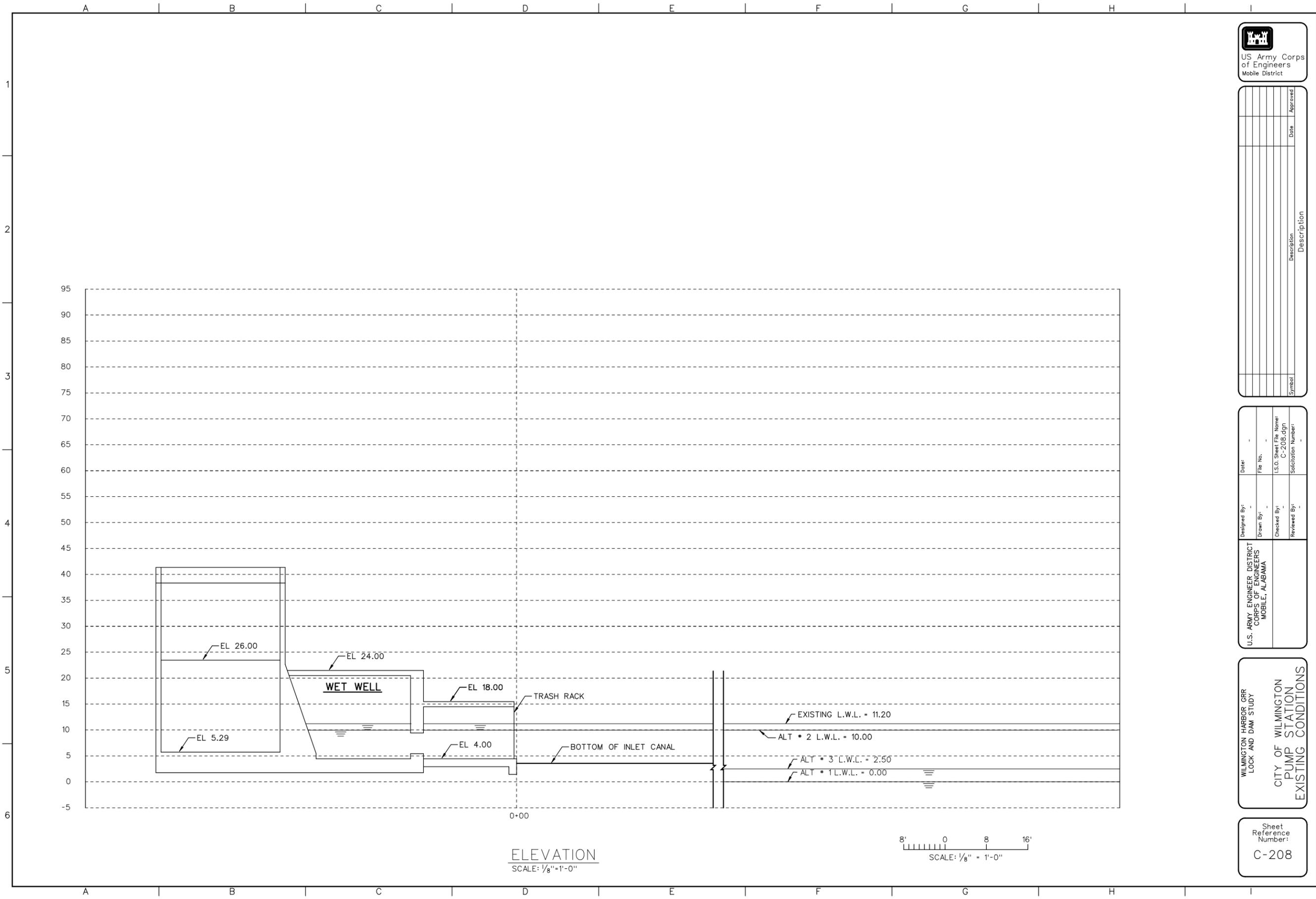
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Reviewed By:	-	Solicitation Number:	-

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

WILMINGTON HARBOR GRR
LOCK AND DAM STUDY

CITY OF WILMINGTON
PUMP STATION
EXISTING CONDITIONS

Sheet Reference Number:
C-208





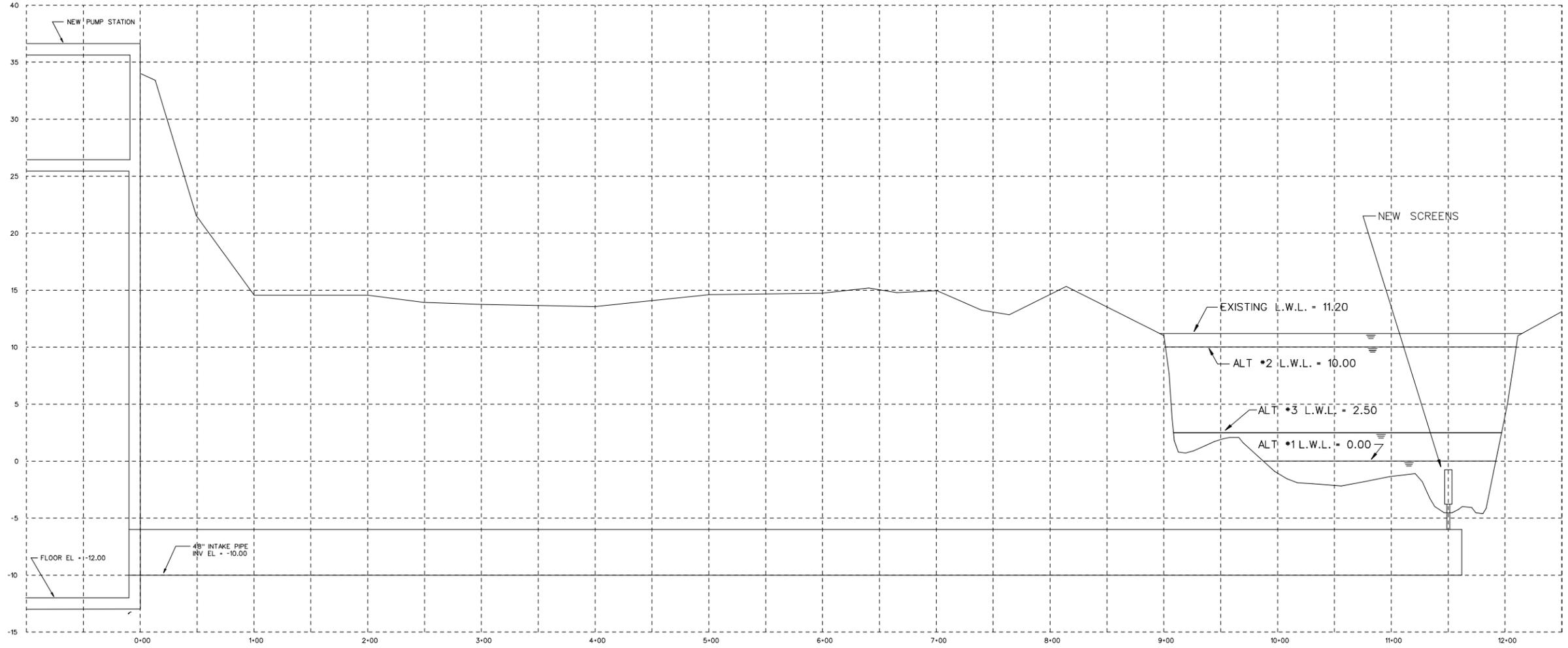
US Army Corps
of Engineers
Mobile District

Symbol	Description	Date	Approved

Designed By:	Date:
Drawn By:	File No.:
Checked By:	U.S.O. Sheet File Name:
Reviewed By:	Solicitation Number:
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	
C-209.dgn	

WILMINGTON HARBOR GRR
LOCK AND DAM STUDY
CITY OF WILMINGTON
PUMP STATION
REVISIONS

Sheet
Reference
Number:
C-209



ELEVATION
SCALE: 1"=50'



1
2
3
4
5
6

A | B | C | D | E | F | G | H