

Mr. Hutchinson

A000 7630

LMNNO (14 Jan 76)

SUBJECT: Lake Pontchartrain, La. and Vicinity, Florida Avenue Complex

TO C/Engineering Div

FROM A/E, New Orleans

DATE 23 Jan 76 CMT 2
Mr. Hutchinson/jl/255-7104

1. A review of the plans for the Florida Avenue Complex have been made and the following comments regarding constructability are offered:

a. Bypass Channel.

(1) Installation of deadmen and tieback cables in the vicinity of west Florida Avenue is not seen as a major construction problem. Traffic can be diverted on to east Florida Avenue during installation.

(2) Recommend a rough connection to the bridge side channel instead of a water tight connection. The sheet pile wall will keep the excavation dry and flooding outside the cofferdam will not affect construction.

(3) The bypass requires much less coordination between the Corps, contractor, and Sewerage and Water Board than canal damming.

(4) The major construction problem with the bypass is restriction of the working area. Natural access to the worksite is from west Florida Avenue. The bypass channel is too wide to allow a crane to reach the structure from the south side unless an extremely large crane is used. Therefore, a contractor will probably work from the cellular cofferdam on the north side of the excavation. Access to this area must come across the railroad tracks. The railroad embankment appears 6 or 7 feet above natural ground and will require an extensive embankment for an access road crossing.

b. Canal Damming.

(1) Construction of cellular cofferdam on south side of excavation is easier than bypass canal.

(2) Cellular cofferdam on south side provides better access to site and allows contractor to work from both sides.

(3) Flooding during work on bottom slab and first lift of walls would cause expensive damage. However, flooding after this would cause little or no damage as remainder of work can be done in the wet.

(4) The obvious problem is coordinated with the Sewerage & Water Board as to the circumstances under which the excavation will be flooded. At the present time the syphon is used only for overflows from other pumping stations. If this continues, the 60-inch pipe could be deleted as unnecessary. If this solution is used, the grade on the dams should be as high as possible without blocking the syphon for flood stages.

LMNNO

SUBJECT: Lake Pontchartrain, La. and Vicinity, Florida Avenue Complex

(5) This alternative should not be selected without firm commitments from the Sewerage and Water Board, and an expected frequency of flooding of not more than once a year based on rainfall predictions and pumping capacity.

c. A third alternative to be considered is a shallow bypass canal (bottom at -5 MSL or higher) on the north side of the cofferdam. This bypass would have the capacity to fill the syphon only when the water level in Florida Avenue Canal reached 0 MSL. Minimum cofferdam elevation would be 0 MSL also.

^{is}
~~is~~ d. A construction difficulty that will be encountered whichever method is used driving interlocking sheet piling. It will not be possible to drive a sheet pile cellular cofferdam in this area, without hitting obstructions much higher than the -70 MSL tip elevation. I recommend a cost analysis be run on drilled, cast in place, braced, concrete pile cofferdam as a substitute. There are economical systems available using betonite slurry and tremie concrete


DUCARPE

4 Incl
nc

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL

SUBJECT

LMNED-DD

Lake Pontchartrain, Louisiana and Vicinity
Florida Avenue Complex

~~AE/No Area Office~~

FROM C/Engr Div

DATE 14 Jan 76

CMT 1

Mr. Bigham/jh/445

1. We are currently preparing the Design Memorandum for the Florida Avenue Complex project. This project is located along the east and west banks of the IMNC at the IMNC intersection with Florida Avenue. See inclosure 1 for a general plan of the project.
2. Included in the project are vertical lift gate structures across the Florida Avenue drainage canal on each side of the IMNC. The vertical lift gates will normally remain in the stored position above the canal. They will be lowered when rising hurricane waters in the IMNC overtop the existing protection. See inclosure 2 for drawings of the gate and structure.
3. In constructing the vertical lift gate structures, it is required that the Florida Avenue drainage canal be diverted around the construction area so that the construction may be accomplished in the "dry."
4. Two means of canal diversion have been investigated.
 - a. Bypass Channel. Essentially the entire canal flow is diverted through a double wall sheet pile structure. The sheet pile walls are supported by a tieback and deadman system. See inclosure 3 for a plan of the IMNC west side bypass channel. (The IMNC east side bypass channel will be similar.)
 - b. Canal Damming. Low level dams are placed at each end of the construction area. Daily canal flow is diverted through a large diameter drainage pipe around the structure. See inclosure 4 for a plan of the IMNC west side construction with damming of the canal.
5. A comparison of the two diversion plans follows.
 - a. Advantage of Bypass Channel. Allows for a continuous diversion of canal flow during storm conditions producing a small possibility of flooding the construction site.
 - b. Disadvantages of Bypass Channel.
 - (1) Construction difficulties anticipated with the installation of deadmen in the area of Florida Avenue and tiein to the existing canal walls.
 - (2) Leakage through sheet pile interlocks.
 - (3) High cost.
 - c. Advantages of Canal Damming.
 - (1) Fewer construction difficulties anticipated.
 - (2) Damming of the canal does not require a positive tiein to the existing canal walls.

LMNED-DD

14 Jan 76

SUBJECT: Lake Pontchartrain, Louisiana and Vicinity
Florida Avenue Complex

(3) Lower cost anticipated.

d. Disadvantage of Canal Damming. Strong possibility exists for storm conditions producing canal stages which will cause overtopping of the dams and flooding of the construction area.

6. We request that you review the respective plans of canal diversion with respect to construction aspects and contract administration. Any comments or recommendations should be submitted to us by 30 Jan 76 in order for our design to proceed on schedule.

7. For additional information which may be required, call Mr. Bigham, Ext. 445.

4 Incl
as
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Des Memo Br


CHATRY

WRG
72/ERG

LEWIS (14 Jan 76)

SUBJECT: Lake Pontchartrain, La. and Vicinity, Florida Avenue Complex

TO C/Engineering Div

FROM A/E, New Orleans

DATE 23 Jan 76 CRT 2
Mr. Hutchinson/jl/255-7104

1. A review of the plans for the Florida Avenue Complex have been made and the following comments regarding constructability are offered:

a. Bypass Channel.

(1) Installation of deadmen and tieback cables in the vicinity of west Florida Avenue is not seen as a major construction problem. Traffic can be diverted on to east Florida Avenue during installation.

(2) Recommend a rough connection to the bridge side channel instead of a water tight connection. The sheet pile wall will keep the excavation dry and flooding outside the cofferdam will not affect construction.

(3) The bypass requires much less coordination between the Corps, contractor, and Sewerage and Water Board than canal dewatering.

(4) The major construction problem with the bypass is restriction of the working area. Natural access to the worksite is from west Florida Avenue. The bypass channel is too wide to allow a crane to reach the structure from the south side unless an extremely large crane is used. Therefore, a contractor will probably work from the cellular cofferdam on the north side of the excavation. Access to this area must come across the railroad tracks. The railroad embankment appears 6 or 7 feet above natural ground and will require an extensive embankment for an access road crossing.

b. Canal Dewatering.

(1) Construction of cellular cofferdam on south side of excavation is easier than bypass canal.

(2) Cellular cofferdam on south side provides better access to site and allows contractor to work from both sides.

(3) Flooding during work on bottom slab and first lift of walls would cause expensive damage. However, flooding after this would cause little or no damage as remainder of work can be done in the wet.

(4) The obvious problem is coordinated with the Sewerage & Water Board as to the circumstances under which the excavation will be flooded. At the present time the siphon is used only for overflow from other pumping stations. If this continues, the 60-inch pipe could be deleted as unnecessary. If this solution is used, the grade on the dam should be as high as possible without blocking the siphon for flood stages.

MEMO

SUBJECT: Lake Pontchartrain, La. and Vicinity, Florida Avenue Complex

(5) This alternative should not be selected without firm commitments from the Sewerage and Water Board, and an expected frequency of flooding of not more than once a year based on rainfall predictions and pumping capacity.

c. A third alternative to be considered is a shallow bypass canal (bottom at -5 MSL or higher) on the north side of the cofferdam. This bypass would have the capacity to fill the siphon only when the water level in Florida Avenue Canal reached 0 MSL. Minimum cofferdam elevation would be 0 MSL also.

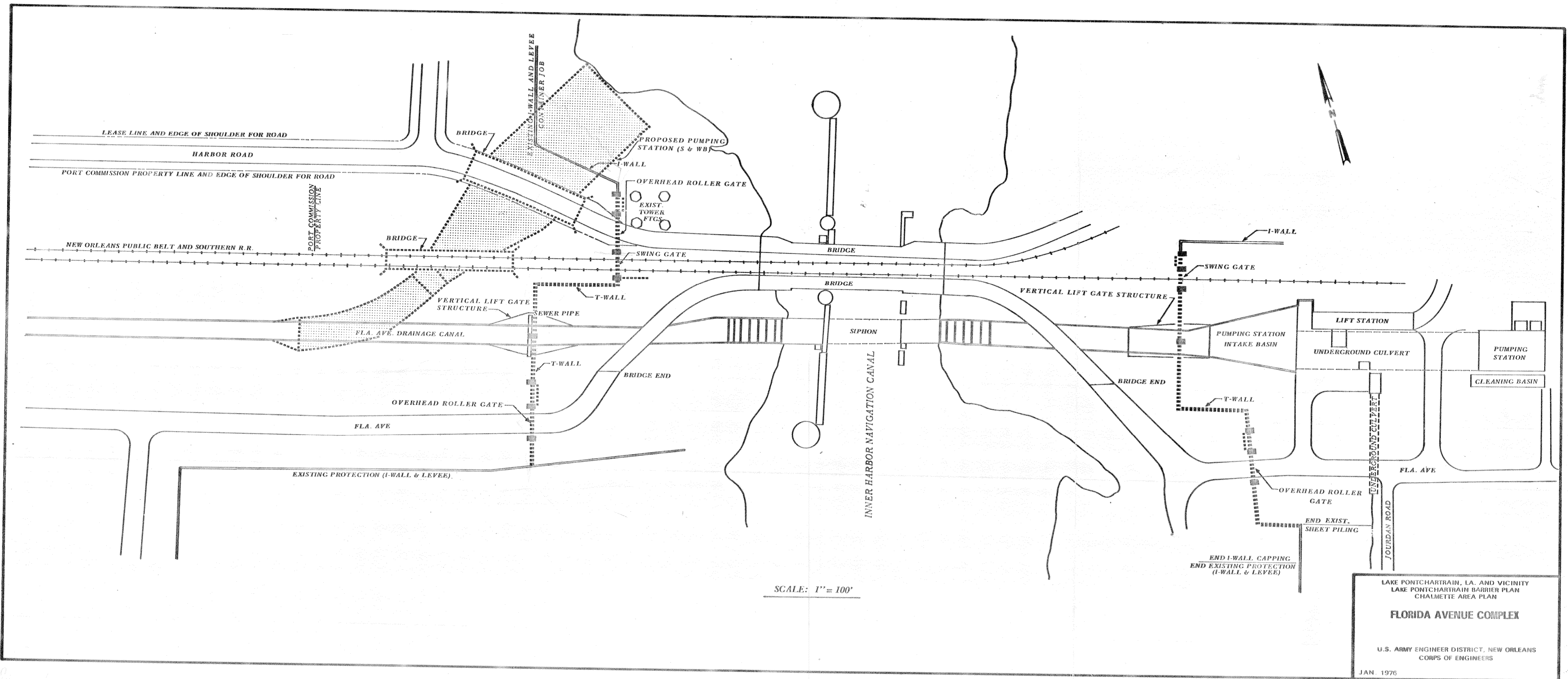
d. A construction difficulty that will be encountered whichever method is used on driving interlocking sheet piling. It will not be possible to drive a sheet pile cellular cofferdam in this area, without hitting obstructions much higher than the -70 MSL tip elevation. I recommend a cost analysis be run on drilled, cast in place, braced, concrete pile cofferdam as a substitute. There are economical systems available using bentonite slurry and tremie concrete

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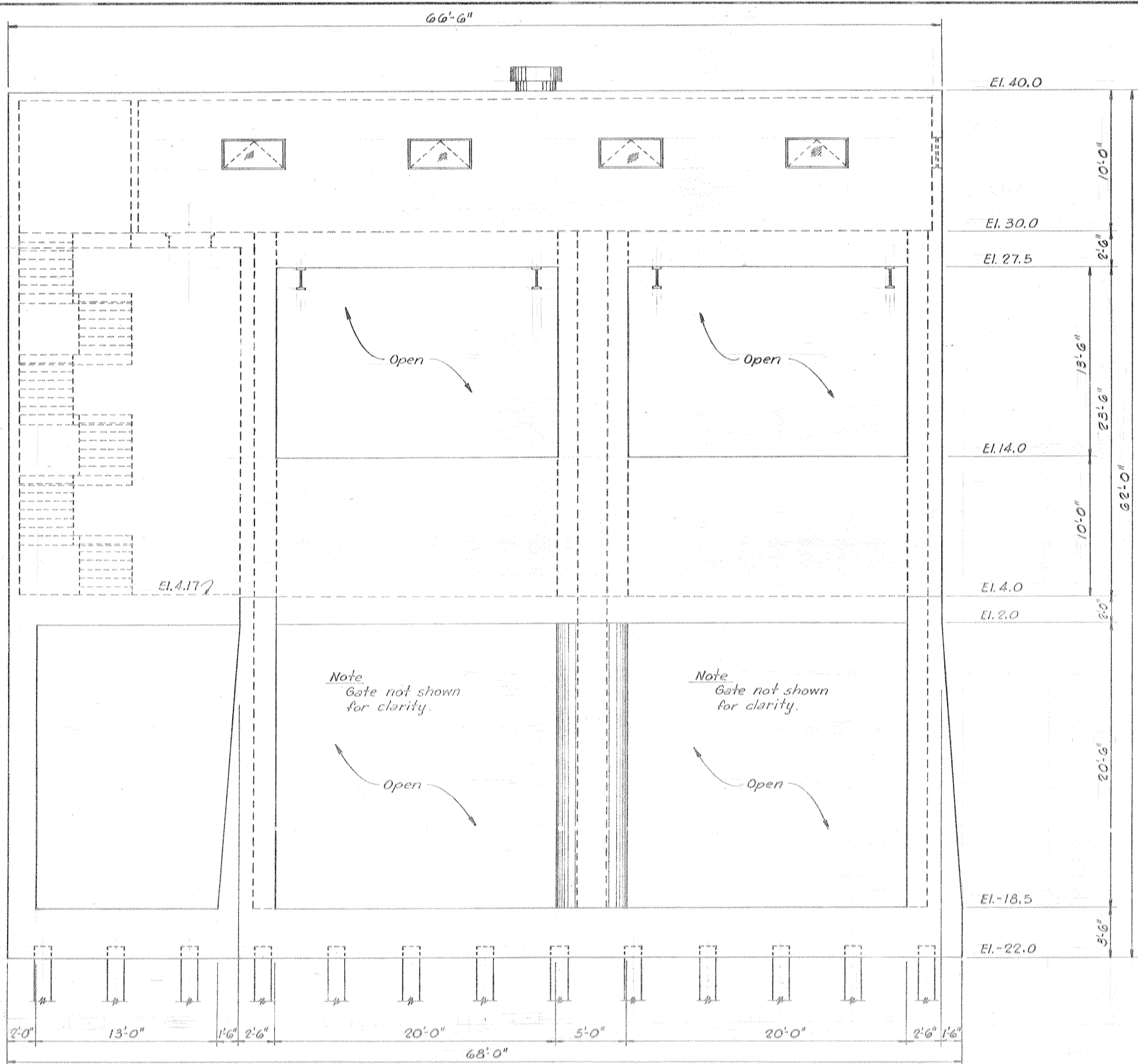
DUCARPE



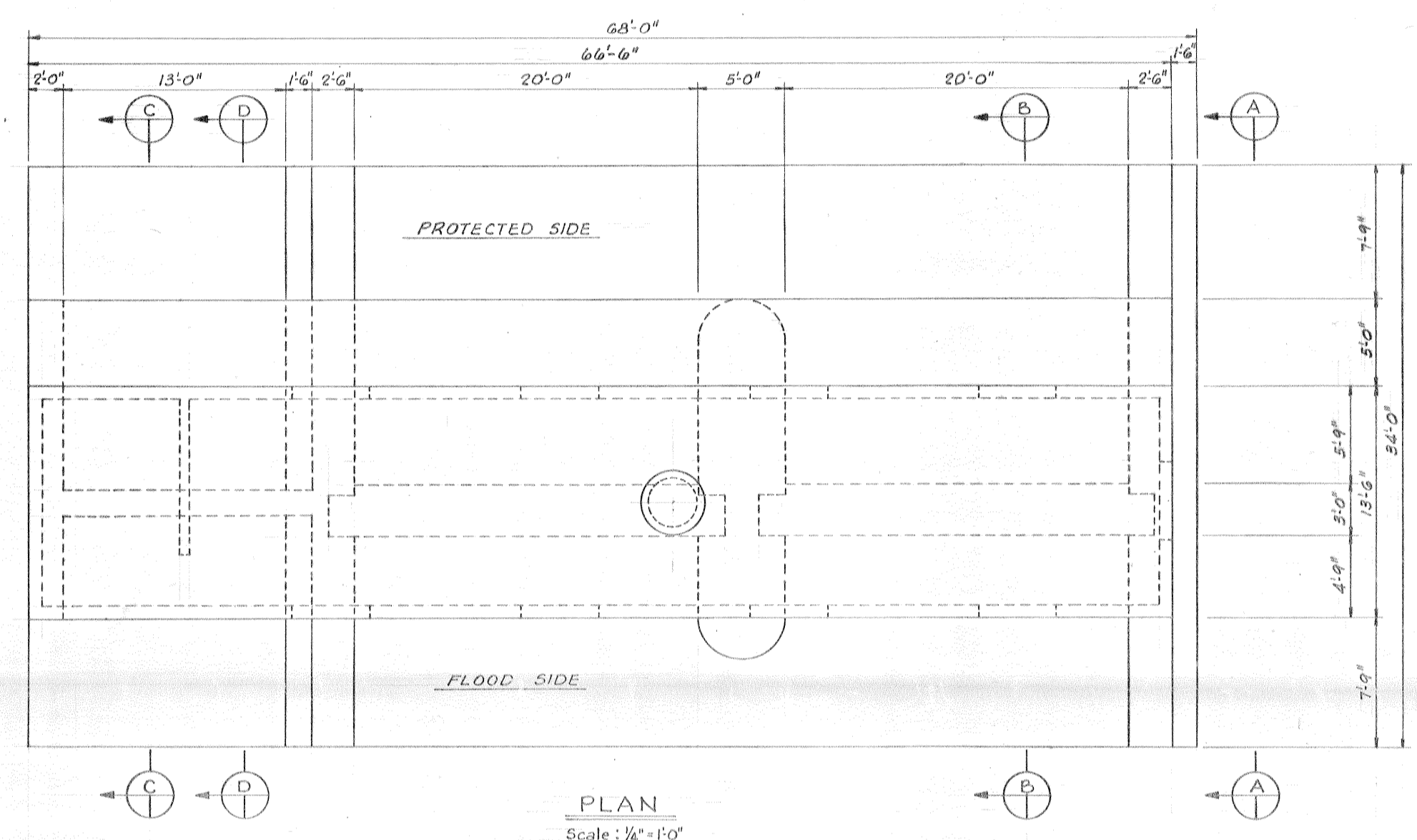
SCALE: 1" = 100'

LAKE PONTCHARTRAIN, LA. AND VICINITY
 LAKE PONTCHARTRAIN BARRIER PLAN
 CHALMETTE AREA PLAN
FLORIDA AVENUE COMPLEX
 U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
 CORPS OF ENGINEERS
 JAN. 1976

Incl 1



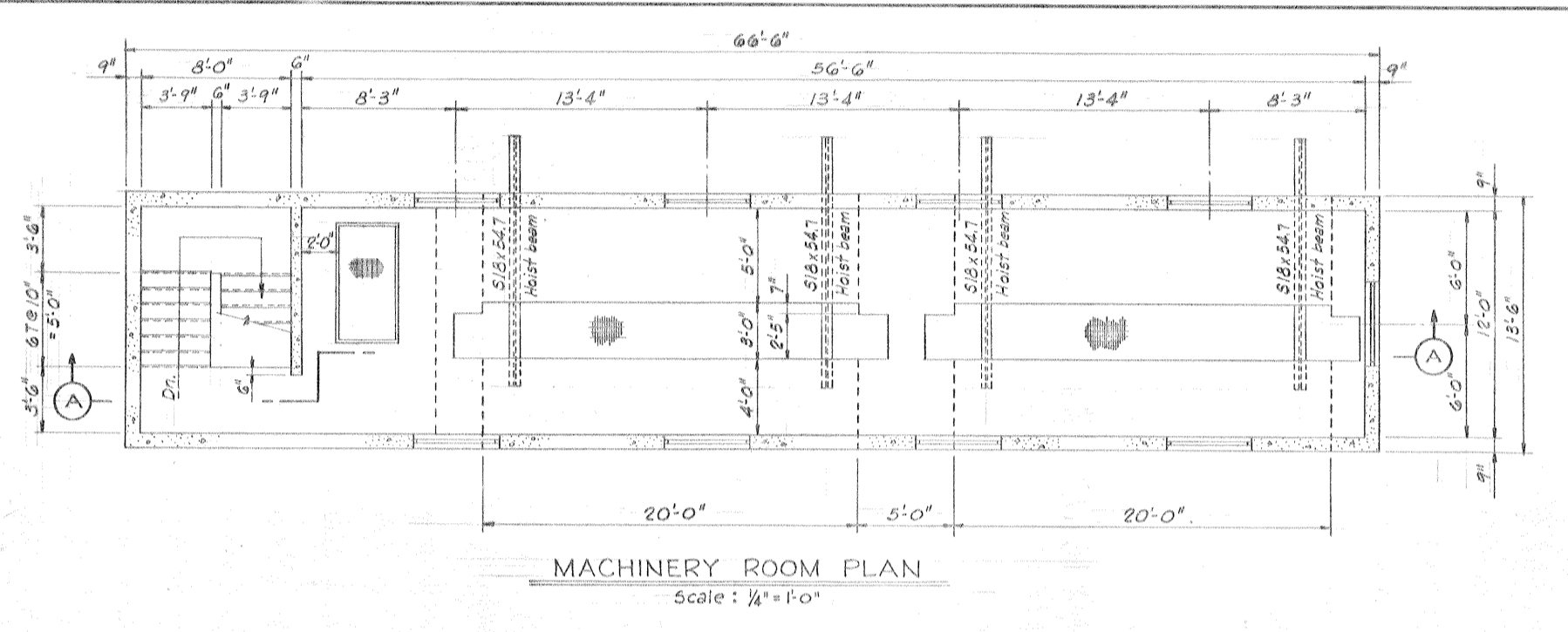
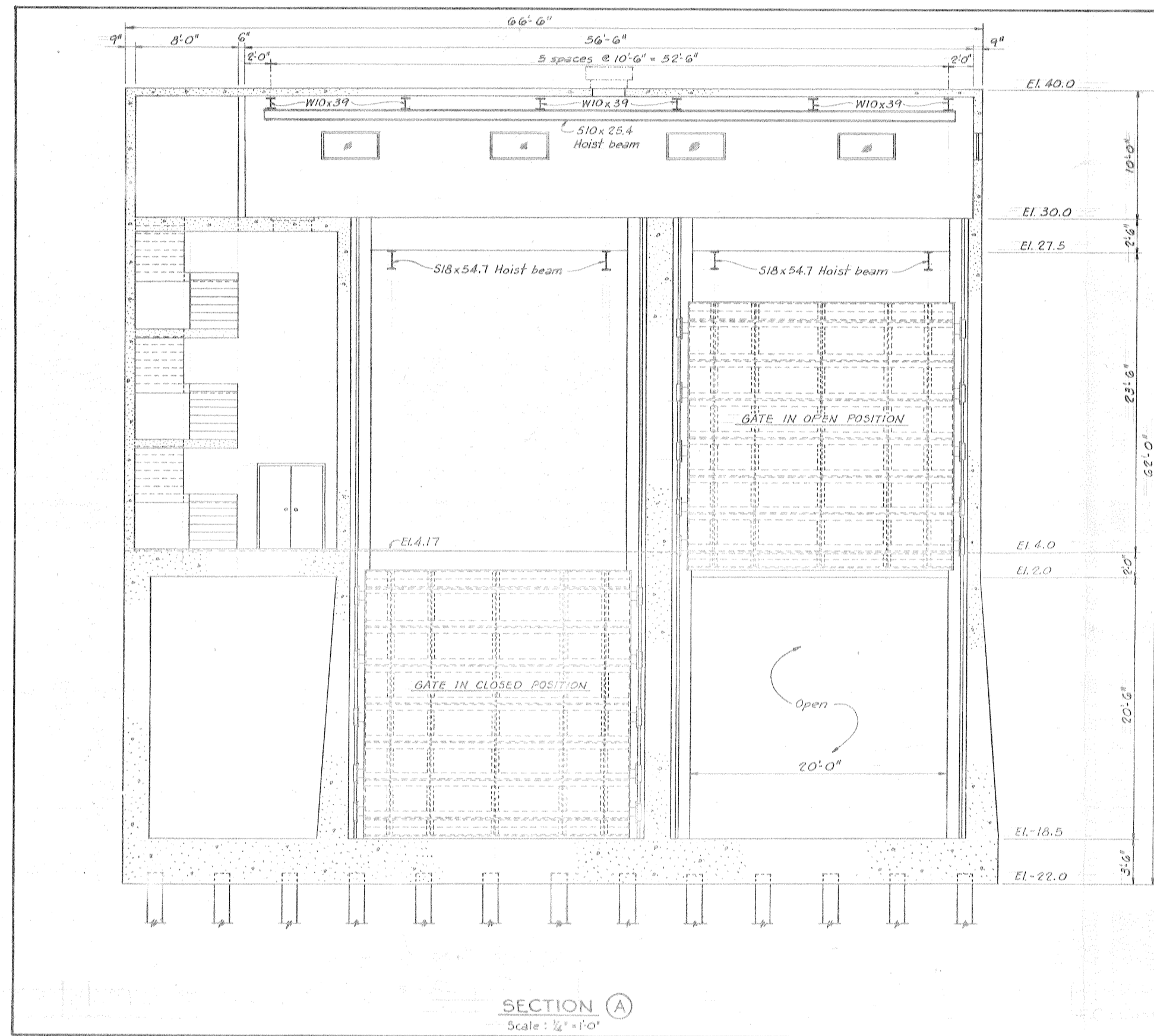
FLOOD SIDE ELEVATION
Scale: 1/4" = 1'-0"



FLORIDA AVE COMPLEX
WEST CONTROL STRUCT

HJH

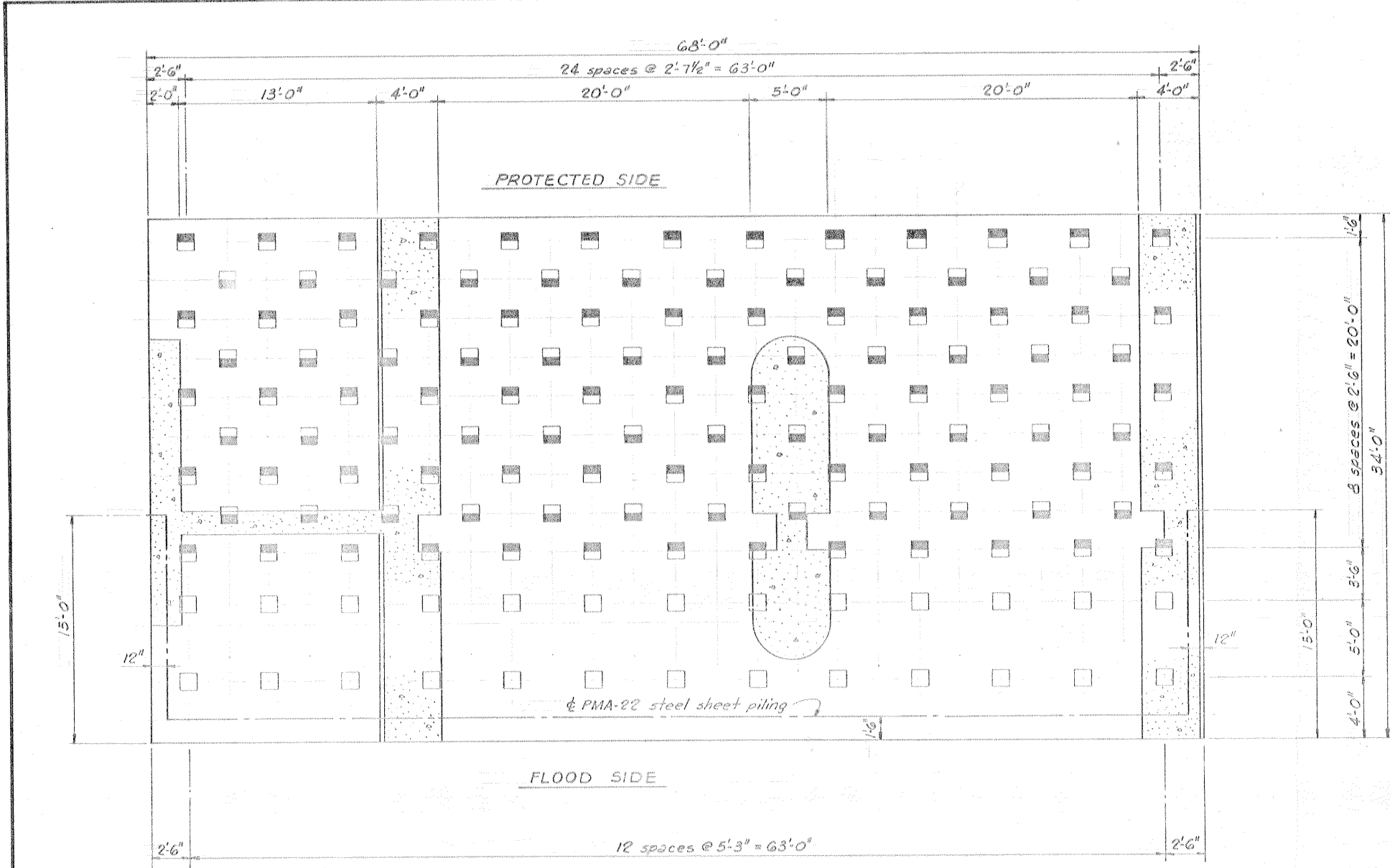
Sheet 2'





FLORIDA AVE. COMPLEX
WEST CONTROL STRUCT.
HJH

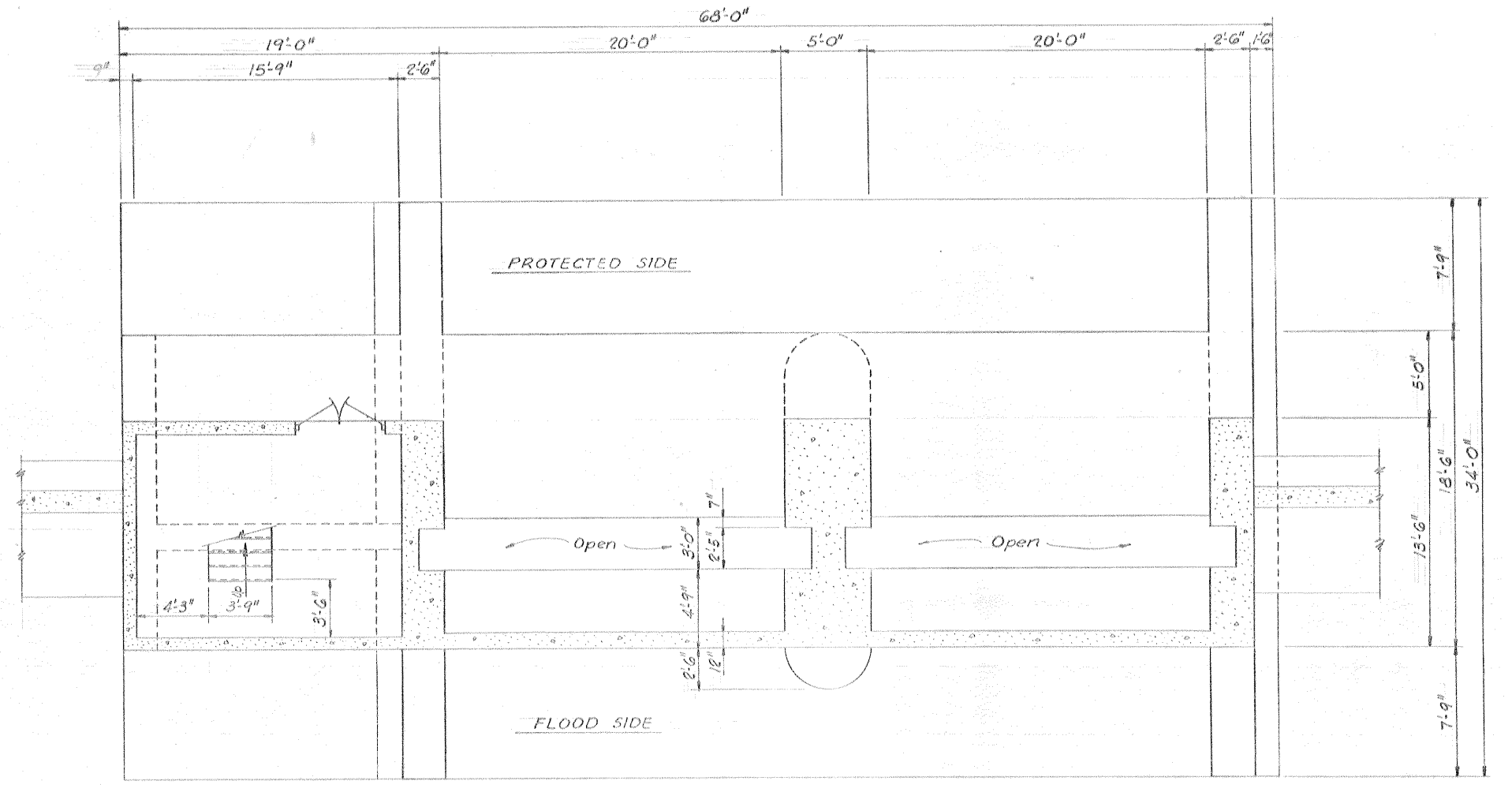
Incl 2²

Incl 2²



PLAN AT EL. -18.0
Scale: 1/4" = 1'-0"

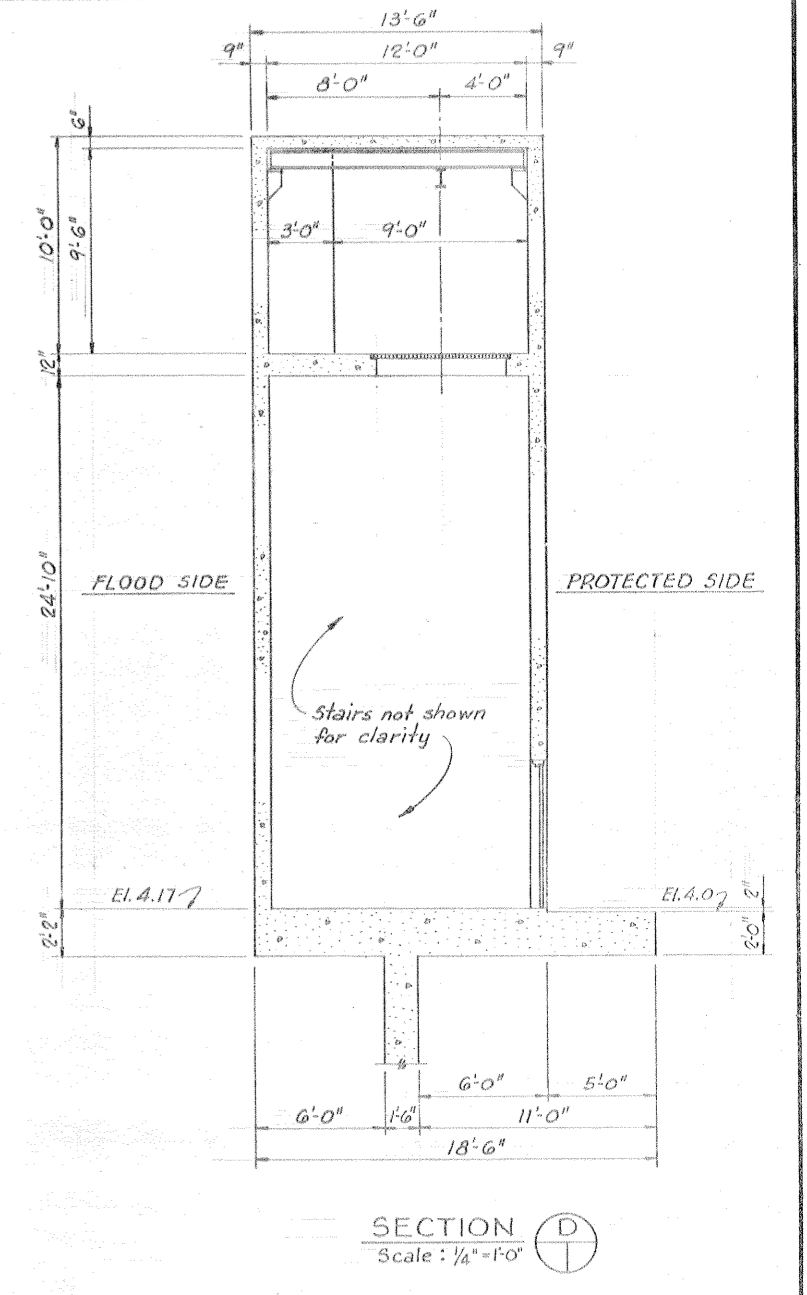
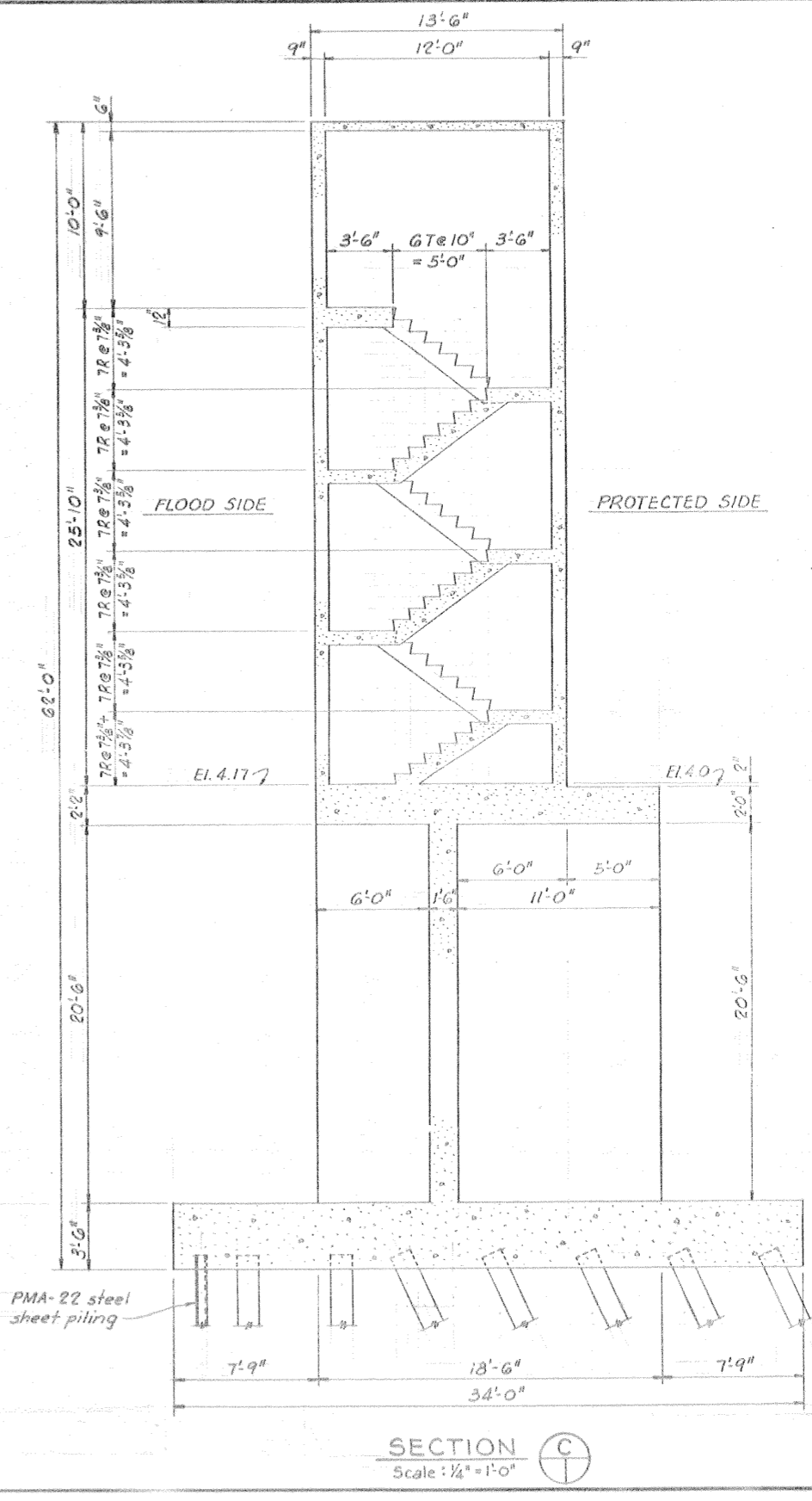
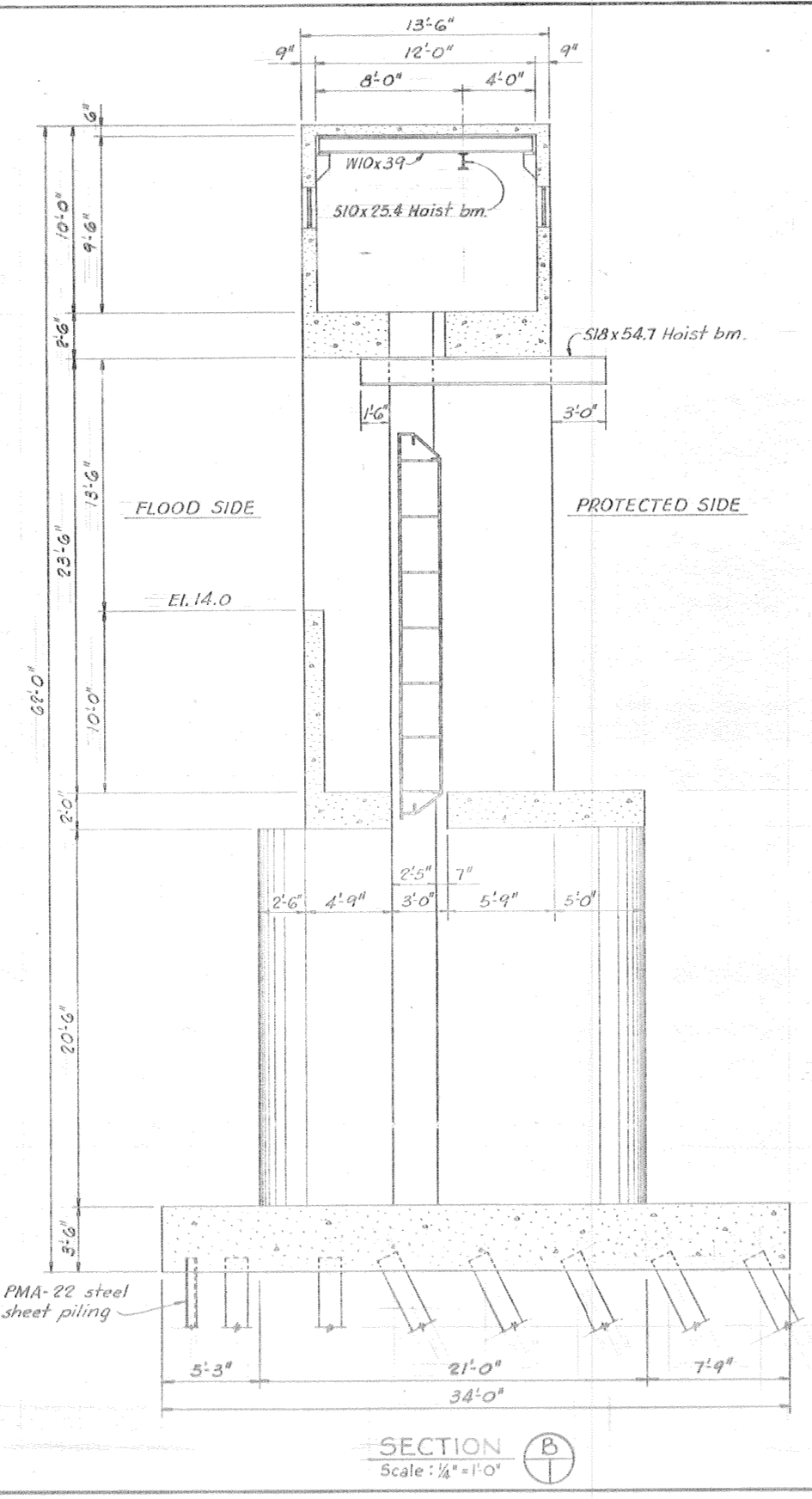
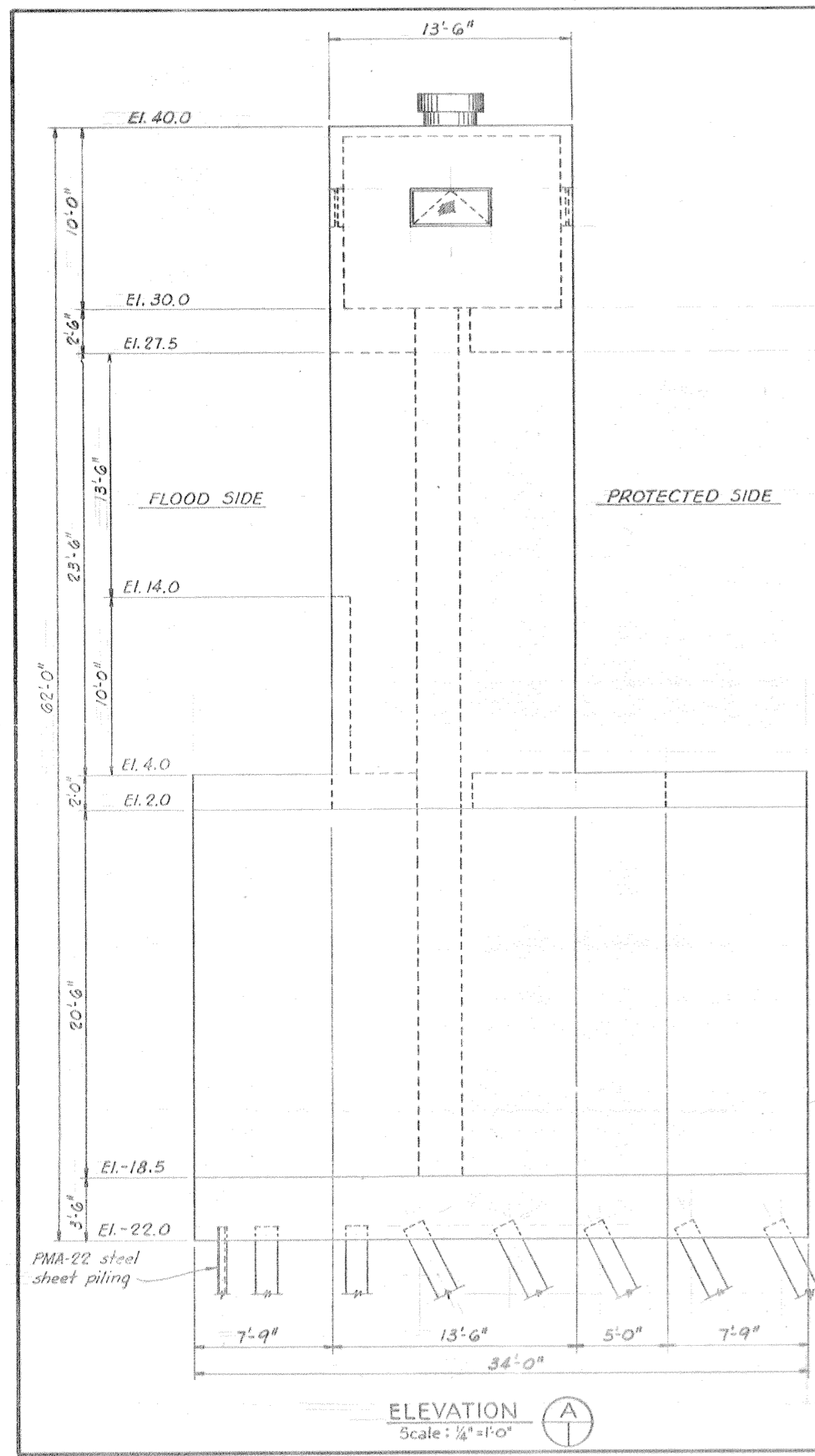
LEGEND
 Prestressed concrete vertical piles.
 Prestressed concrete battered piles.
 shaded side indicates direction of batter.
 All piles battered 2V on 1H.



PLAN AT EL. 5.0
Scale: 1/4" = 1'-0"

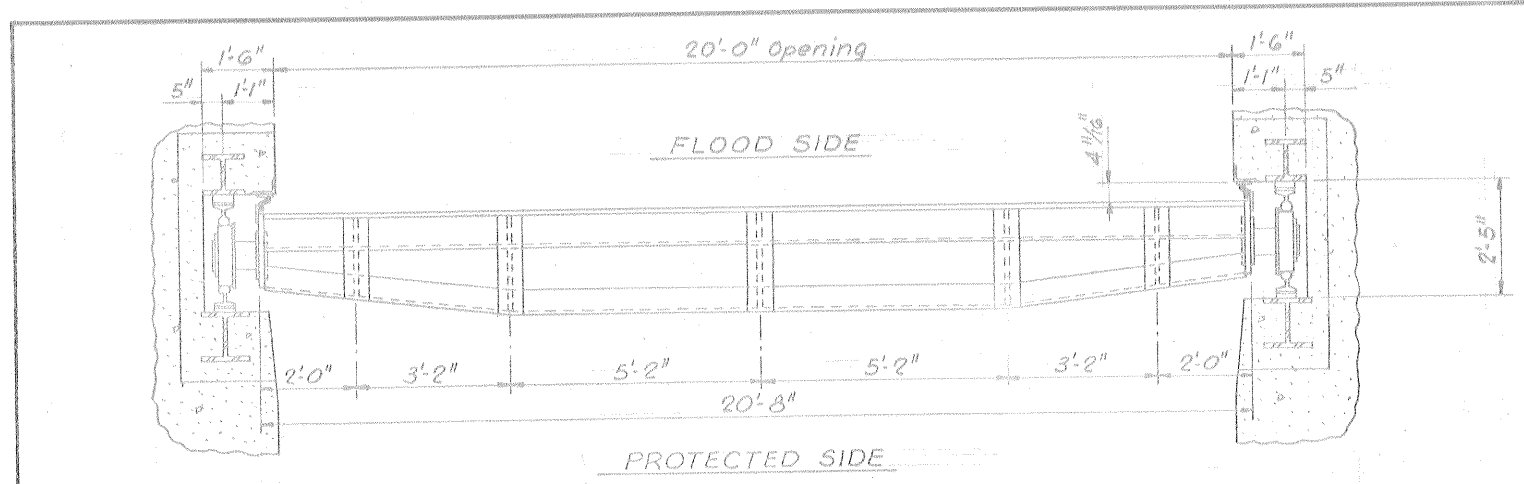
FLORIDA AVE. COMPLEX
 WEST CONTROL STRUCT.
 HJH

Incl 2³

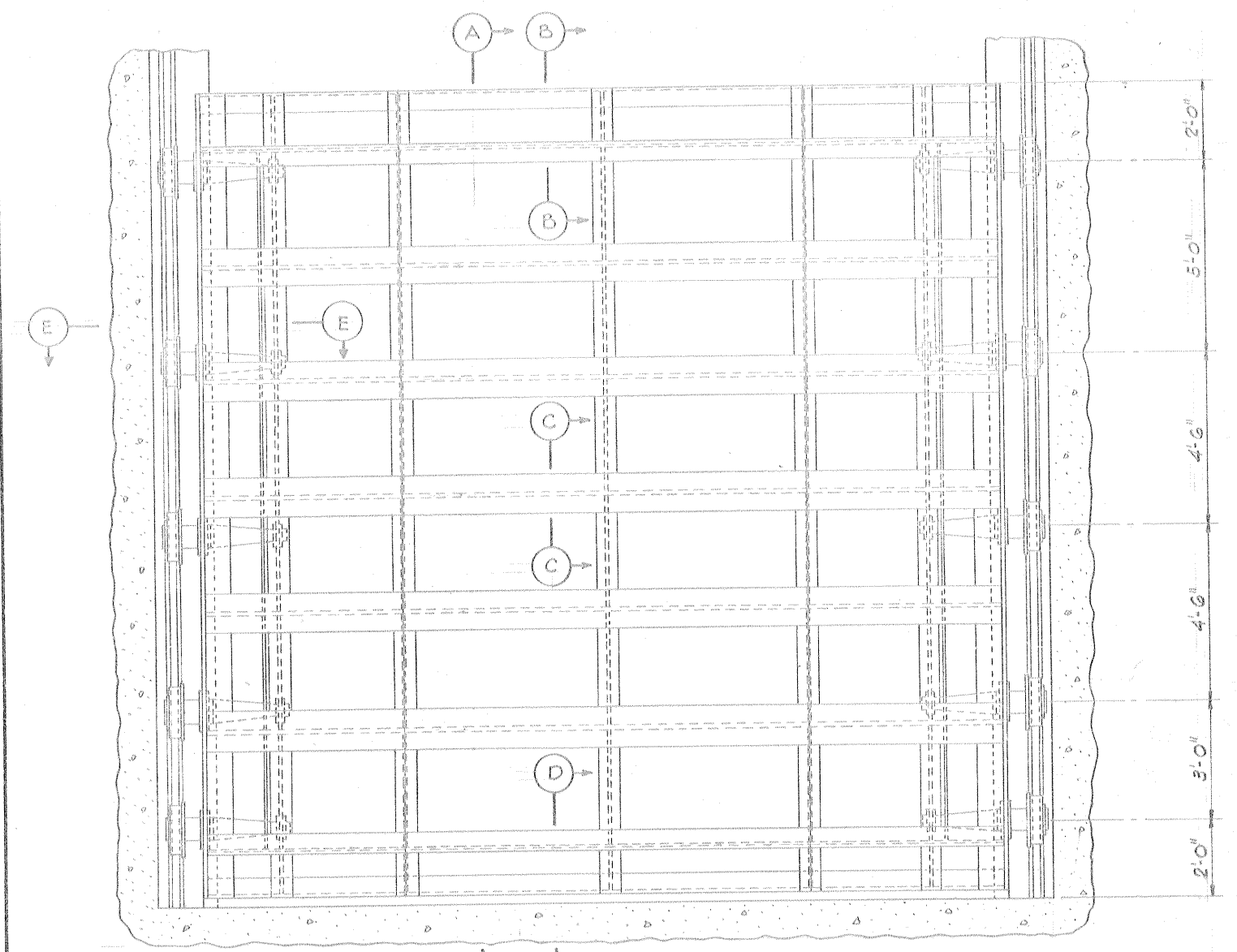


FLORIDA AVE. COMPLEX
WEST CONTROL STRUCT.
HJH

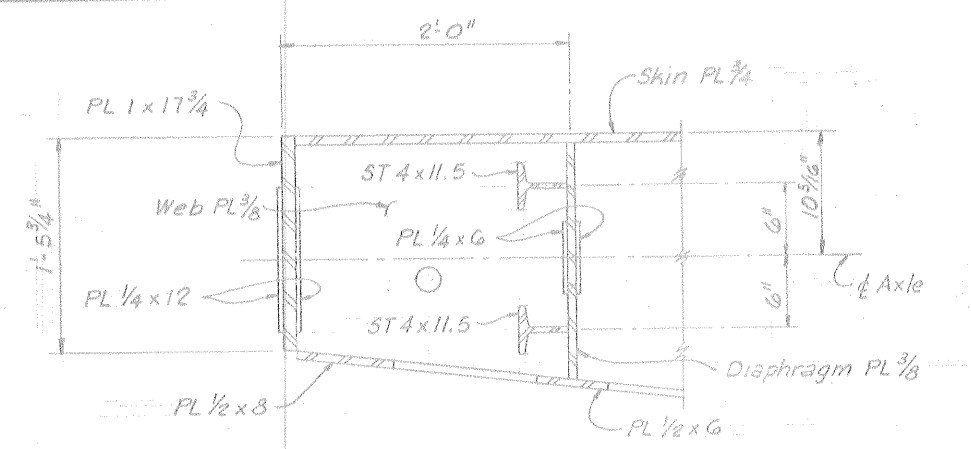
Jan 24



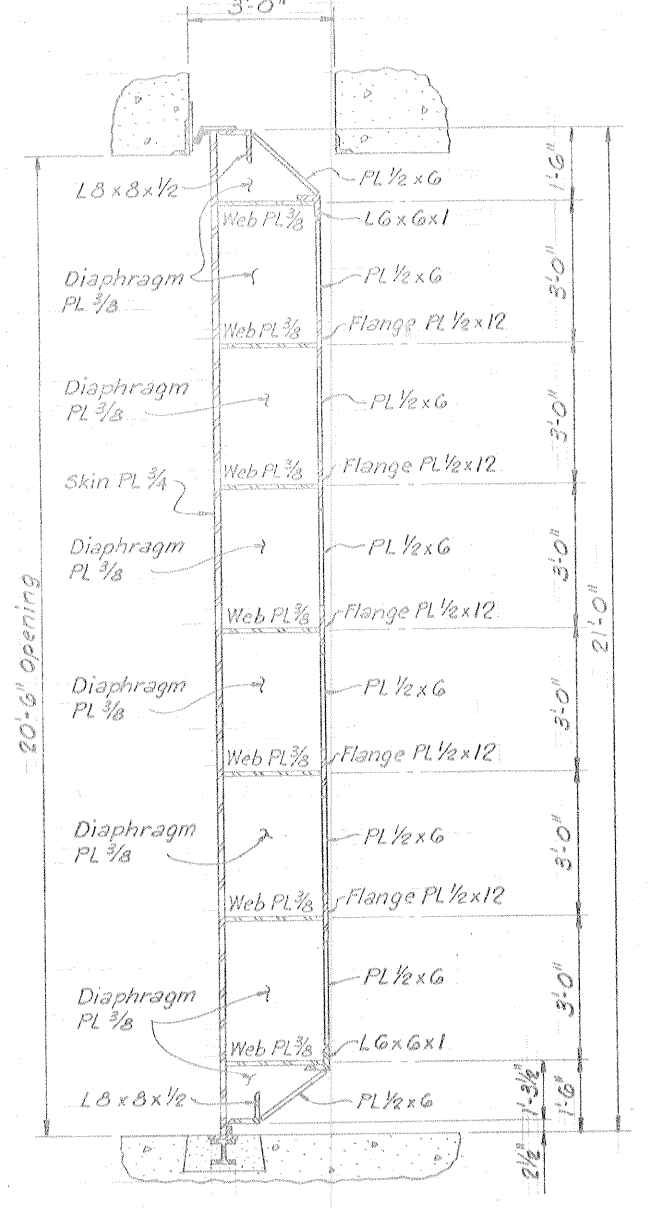
PLAN
Scale: 1/2" = 1'-0"



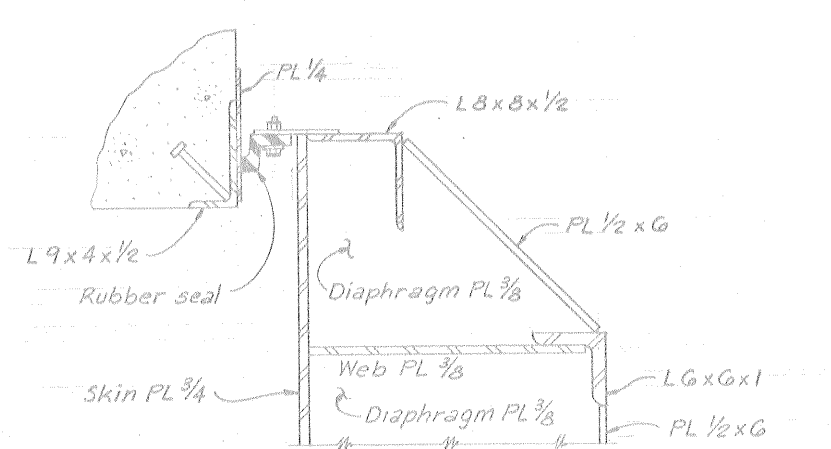
PROTECTED SIDE ELEVATION
Scale: 1/2" = 1'-0"



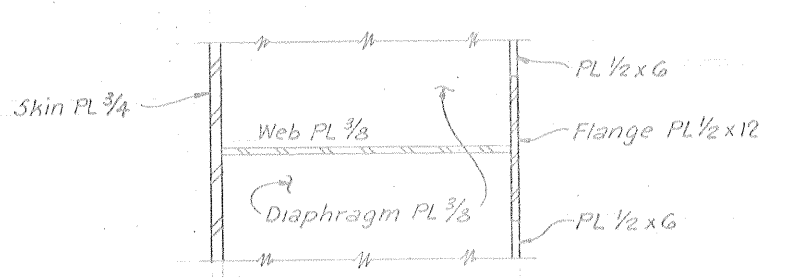
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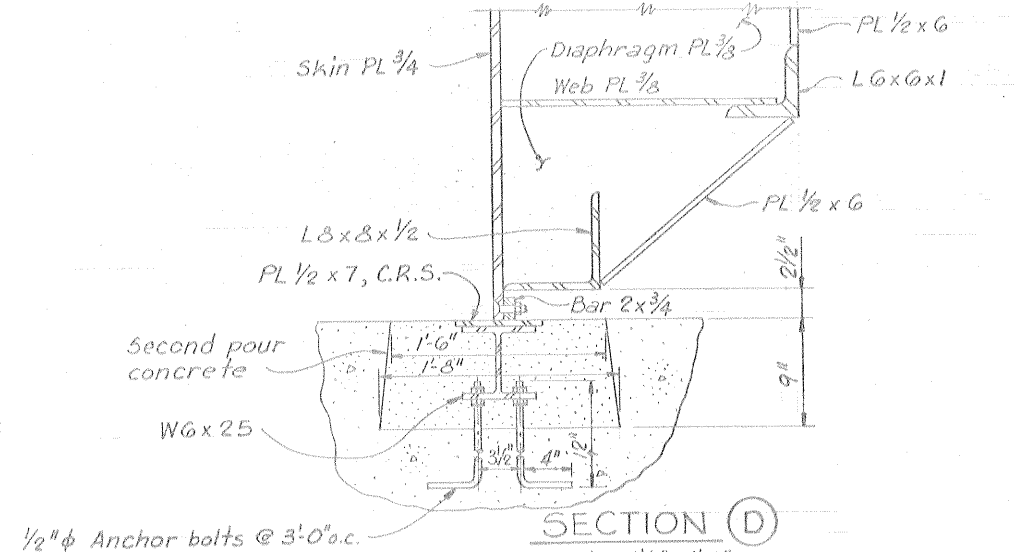
SECTION A
Scale: 1/2" = 1'-0"



SECTION B
Scale: 1/2" = 1'-0"



SECTION C
Scale: 1/2" = 1'-0"



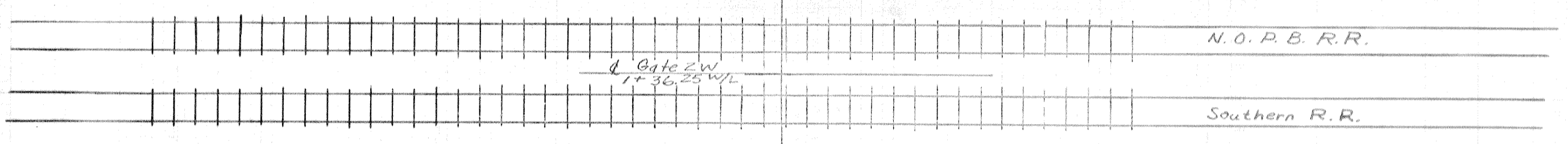
SECTION D
Scale: 1/2" = 1'-0"

FLORIDA AVE. COMPLEX
STRUCTURAL DETAILS
VERTICAL LIFT GATES

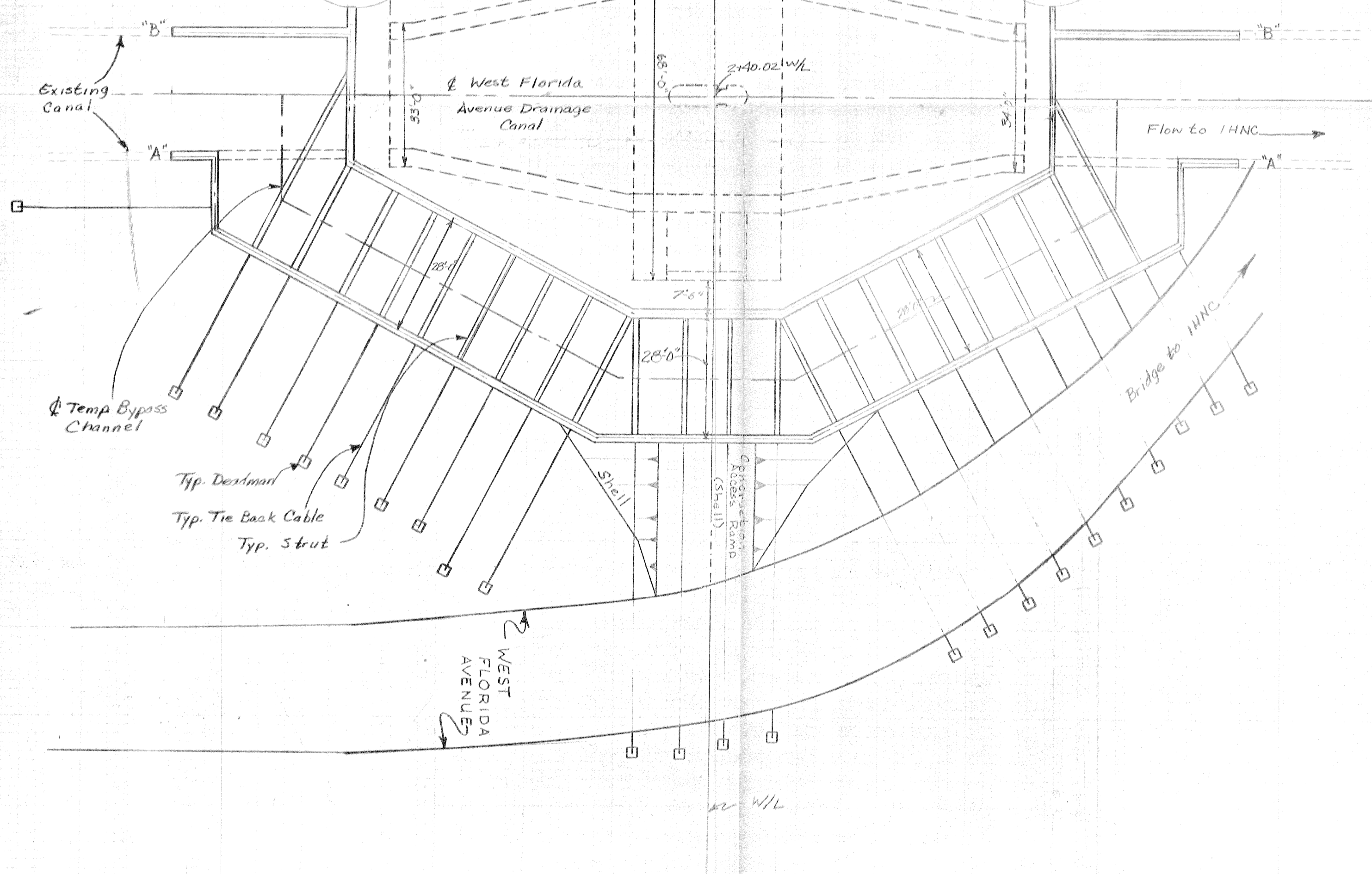
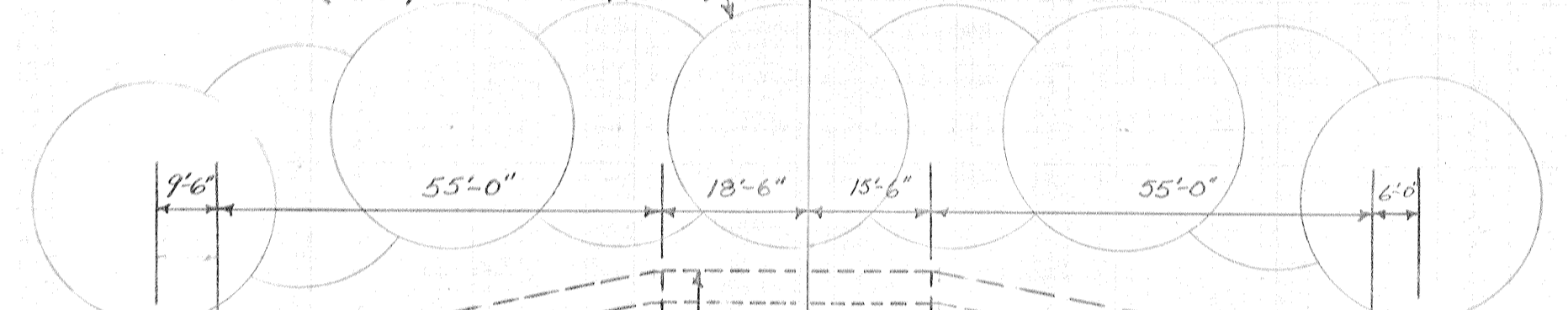
Jul 25



W/L



Temporary Cellular Cofferdam (Analysis not Complete)



Existing Canal

West Florida Avenue Drainage Canal

Flow to IHNC

Temp Bypass Channel

Typ. Deadman
Typ. Tie Back Cable
Typ. Strut

Shell
Approach Ramp (Shell)

Bridge to IHNC

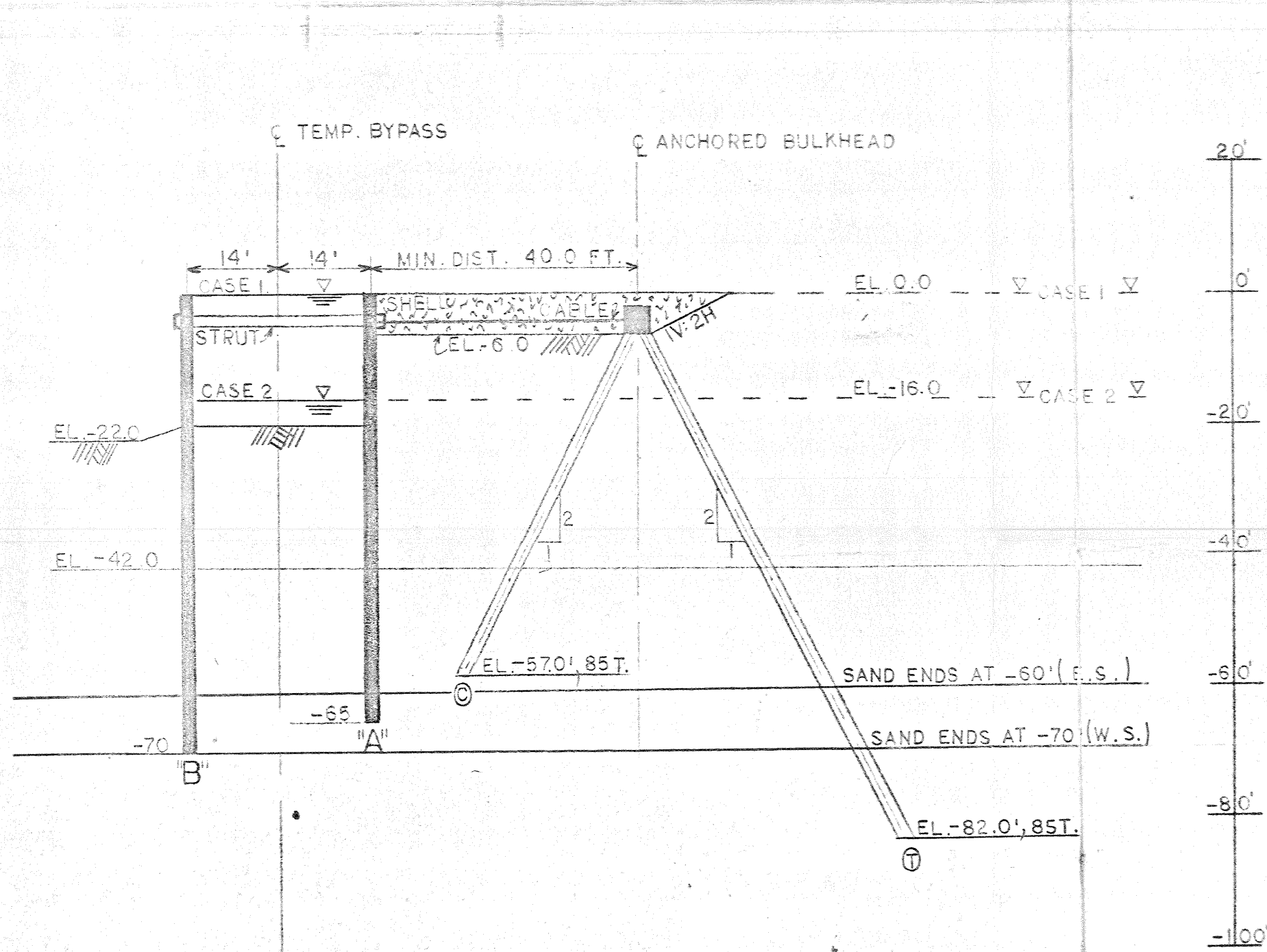
WEST FLORIDA AVENUE

W/L

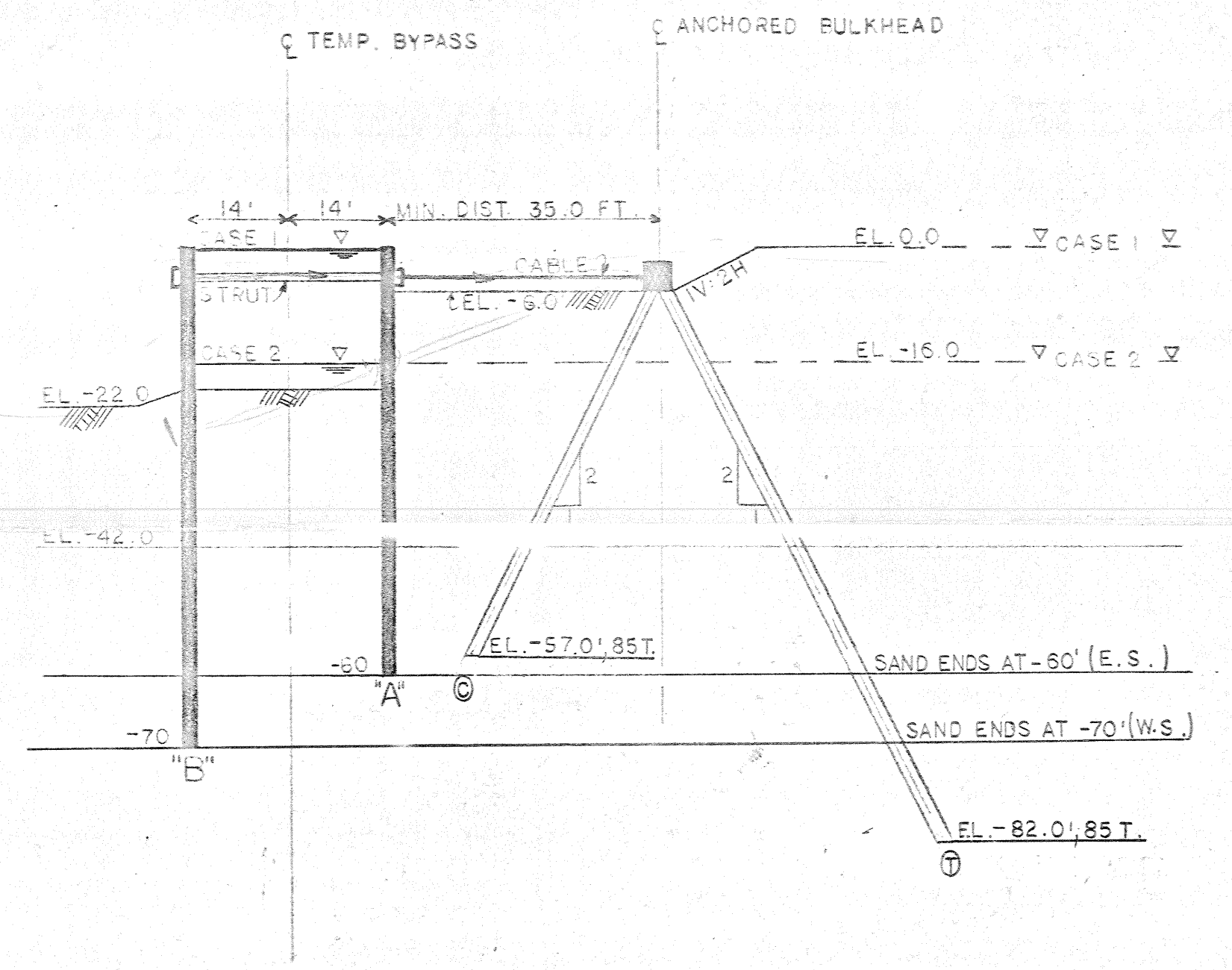
Sheet 3'

BYPASS CHANNEL WEST IHNC

CONSTRUCTION ACCESS RAMP ELEV VIEW
(WITH SHELL)



TYPICAL ELEVATION VIEW
(WITHOUT SHELL)



SCALE: 1" = 20'

NOTES

THE MAXIMUM FORCE ON THE DEADMAN OCCURS WHEN A=11,500 LBS. AND B=0, WITH THE WATER LEVEL AT -16.0 M.S.L. (CASE 2); ALSO, WHEN B=11,500 LBS. AND A=0, WITH THE WATER LEVEL AT 0.0 M.S.L. (CASE 1). THIS GIVES A MAXIMUM DESIGN FORCE OF 11,500 LBS.

THE DESIGN FORCES:

STRUTS: - ANCHOR TO "B" - 11,500 LBS.

CABLES: - ANCHOR TO "A" - 11,500 LBS.

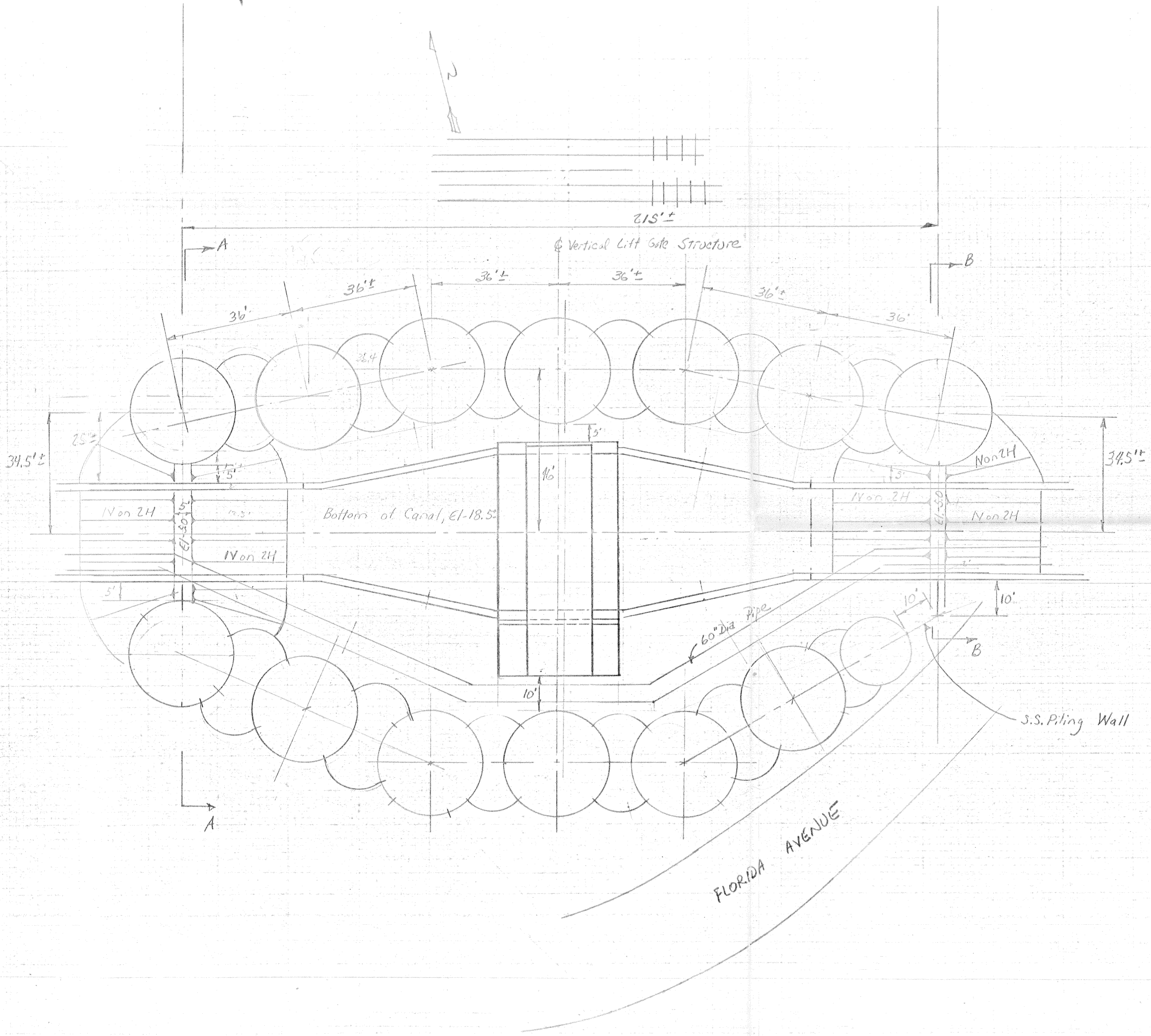
STRUTS AND CABLES JOIN AT "A", ELEV. -4.0' M.S.L.

THE F.O.S. = 1.25 FOR SHEET PILE BULKHEADS AND 1.25 FOR H PILE SUPPORTS.

THE VIEWS SHOWN ARE FROM THE WEST SIDE, BUT PERTAIN TO BOTH THE WEST SIDE AND THE EAST SIDE.

FLORIDA AVE. COMPLEX
TEMP. BYPASS CHANNEL
ELEVATION
VIEWS
EAST SIDE & WEST SIDE

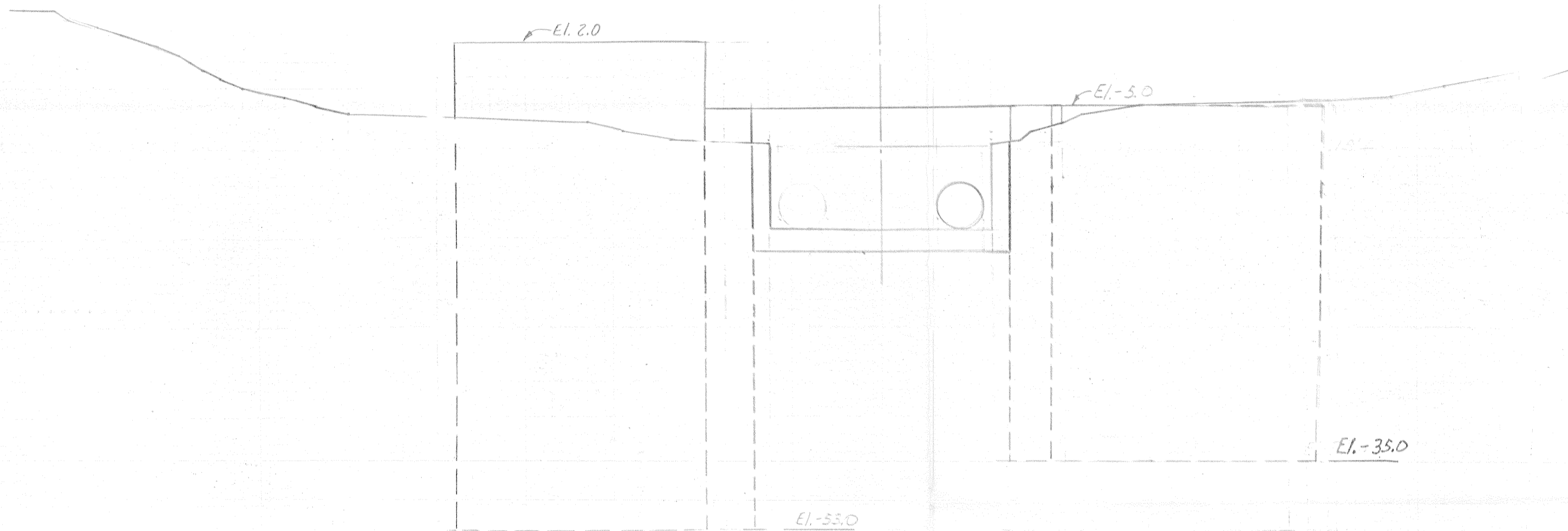
Jan 3 2



FLORIDA AVENUE

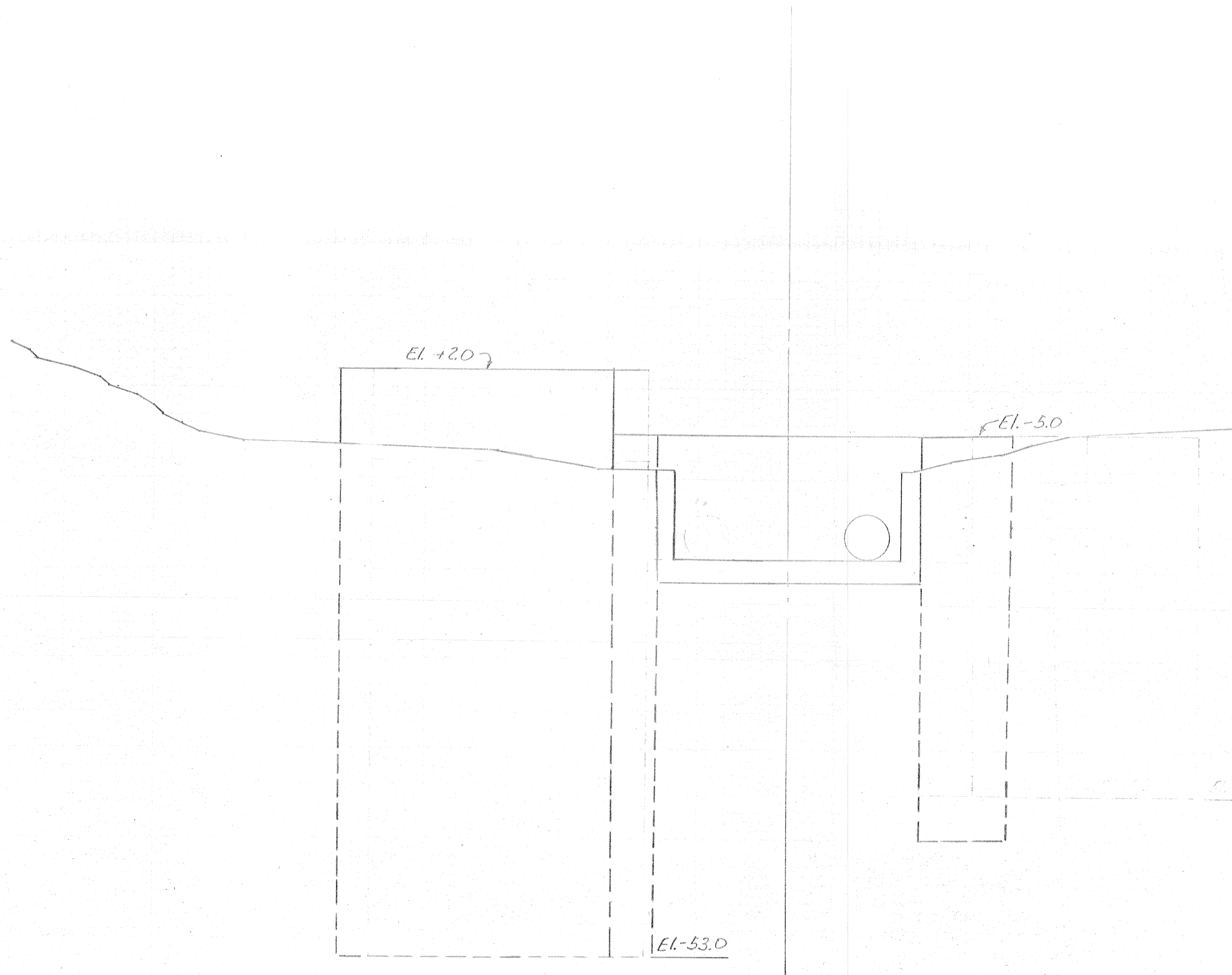
S.S. Piling Wall

Sheet 4'



SECTION A-A
Scale: 1" = 10'

Sheet 4



SECTION B-B
Scale: 1"=10'

Jul 4³

DISPOSITION FORM

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL

SUBJECT

LMNED-DD

Lake Pontchartrain, Louisiana and Vicinity
Florida Avenue Complex

TO C/Hydraulic & Hydrologic Br

FROM ~~TO~~ C/Design Branch

DATE 14 Jan 76

CMT 1

Mr. Bigham/jh/445 *JB*

1. The subject DM is currently being prepared.
2. During construction of the proposed vertical lift gate structures, it is required that the Florida Avenue drainage canal be diverted around the construction area so that the construction may be accomplished in the "dry."
3. We have investigated two means of canal diversion.
 - a. Bypass Channel. Essentially the entire canal flow is diverted through a double wall sheet pile structure. The sheet pile walls are supported by a tieback and deadman system. See inclosure 1 for a plan of the bypass channel on the west side of the IMNC. (The IMNC east side bypass channel will be similar.)
 - b. Canal Damming. Low level dams are placed at each end of the construction area. Daily canal flow (approximately 35 mgd) is diverted through a large diameter drainage pipe around the structure. See inclosure 2 for a plan of the IMNC west side construction with damming of the canal.
4. We request that you review the plan of canal diversion by damming. We need an estimate of how often storm conditions in a one year period would cause overtopping of the dams with resulting flooding of the construction area. The elevation we have suggested for the top of the dams is -5.0 m.s.l. This elevation can be adjusted if your review so suggests. The same applies to the drainage pipe diameter of 60 inches.
5. A reply is requested by COB 30 Jan 76. For additional information which may be required, call Mr. Bigham, Ext. 445.
6. Work should be charged to account number BEC 21304Z 10 AAWO.

2 Incl

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Des Memo Br

for BRUPBACHER *JB*

LMNED-HD

SUBJECT: Lake Pontchartrain, Louisiana and Vicinity, Florida Avenue Complex

TO: C/Design Br

FROM: C/Hyd & Hydro Br

DATE: 25 May 76 CMT 2

Mr. Falgoust/jmh/422

JBT

1. We have reviewed the plan of canal diversion by damming and reached the following conclusions. The daily canal flow of approximately 35 m.g.d. (55 c.f.s.) can be diverted around the vertical gate structure through 1-72" ϕ CMP with a head loss of 0.3 ft.
2. Inflows from the 4160 acres of drainage area (provided by the S&WB) were determined for the 1 yr - 24 hour storm and were floodrouted for different conditions. The stage in Florida Avenue would be 0.2 ft m.s.l. with 1-72" ϕ CMP and the top of the dam set at -5.0 ft m.s.l. It was determined that 8-72" ϕ CMP would be required to prevent the dam from being overtopped.
3. It was also determined that 0.8 inch or less per 24 hours of rainfall would not overtop the dam at -5.0 ft m.s.l. and with 1-72" ϕ CMP. The past 10 years of rainfall records at the London and Jourdan stations revealed that 0.8 inch or more of rainfall occurred 260 times during this period. Therefore, the dam will be overtopped approximately 26 times per year.
4. It is our understanding that the London Avenue pumping station could relieve the Florida Avenue drainage area from some of its inflow and thereby possibly could prevent the dam from being overtopped. This should be discussed or coordinated with the S&WB.
5. If additional information is required, contact Mr. Falgoust, ext. 422.

JFM

PAB
RECNEC

2 Incl
nc

10000-10

SUBJECT: Lake Pentchartrain, Louisiana and Vicinity, Florida Avenue Complex

TO: C/Design Br

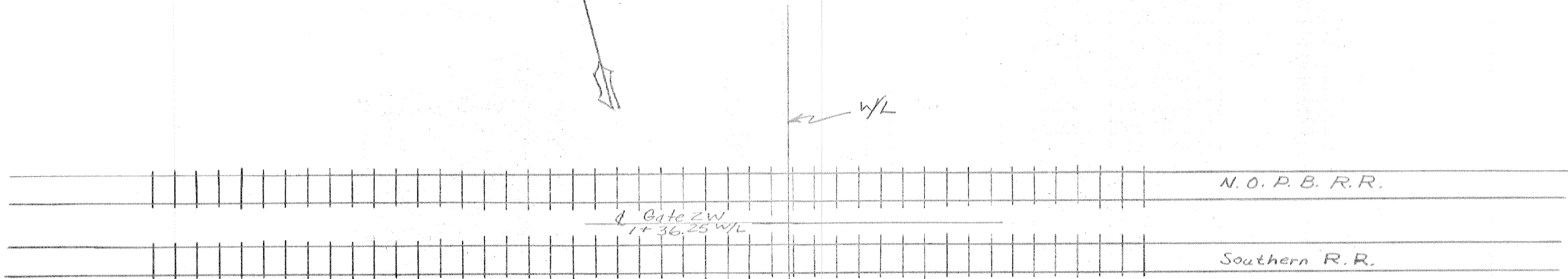
FROM: C/Hyd & Hydro Br

DATE: 25 May 76 CMT 2
Mr. Falgoust/jmh/422

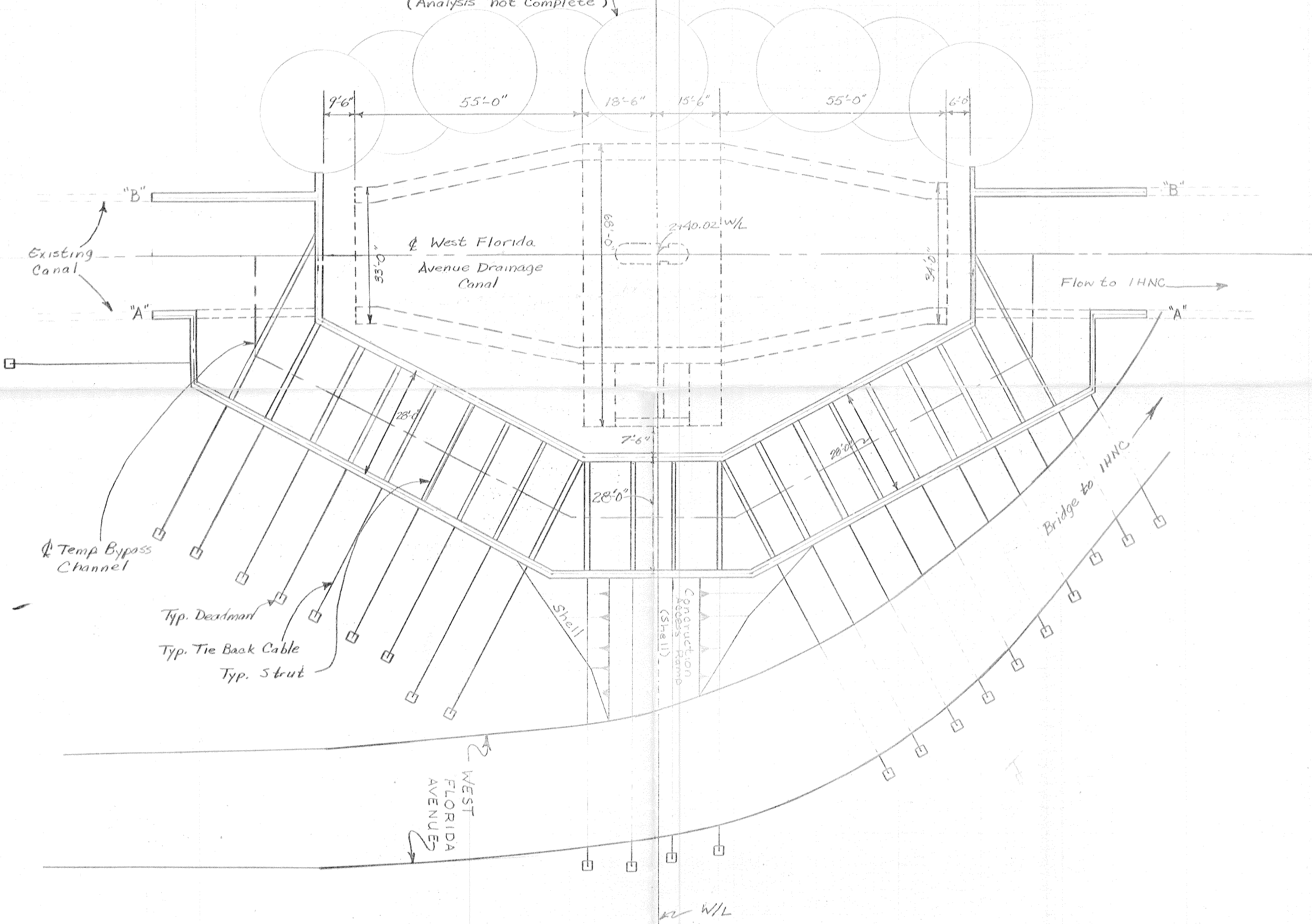
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4. It is our understanding that the London Avenue Pumping station could relieve the Florida Avenue drainage area from some of its inflow and hereby possibly could prevent the dam from being overtopped. This should be discussed or coordinated with the S&WB.
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2 Incl
nc

BECNEL



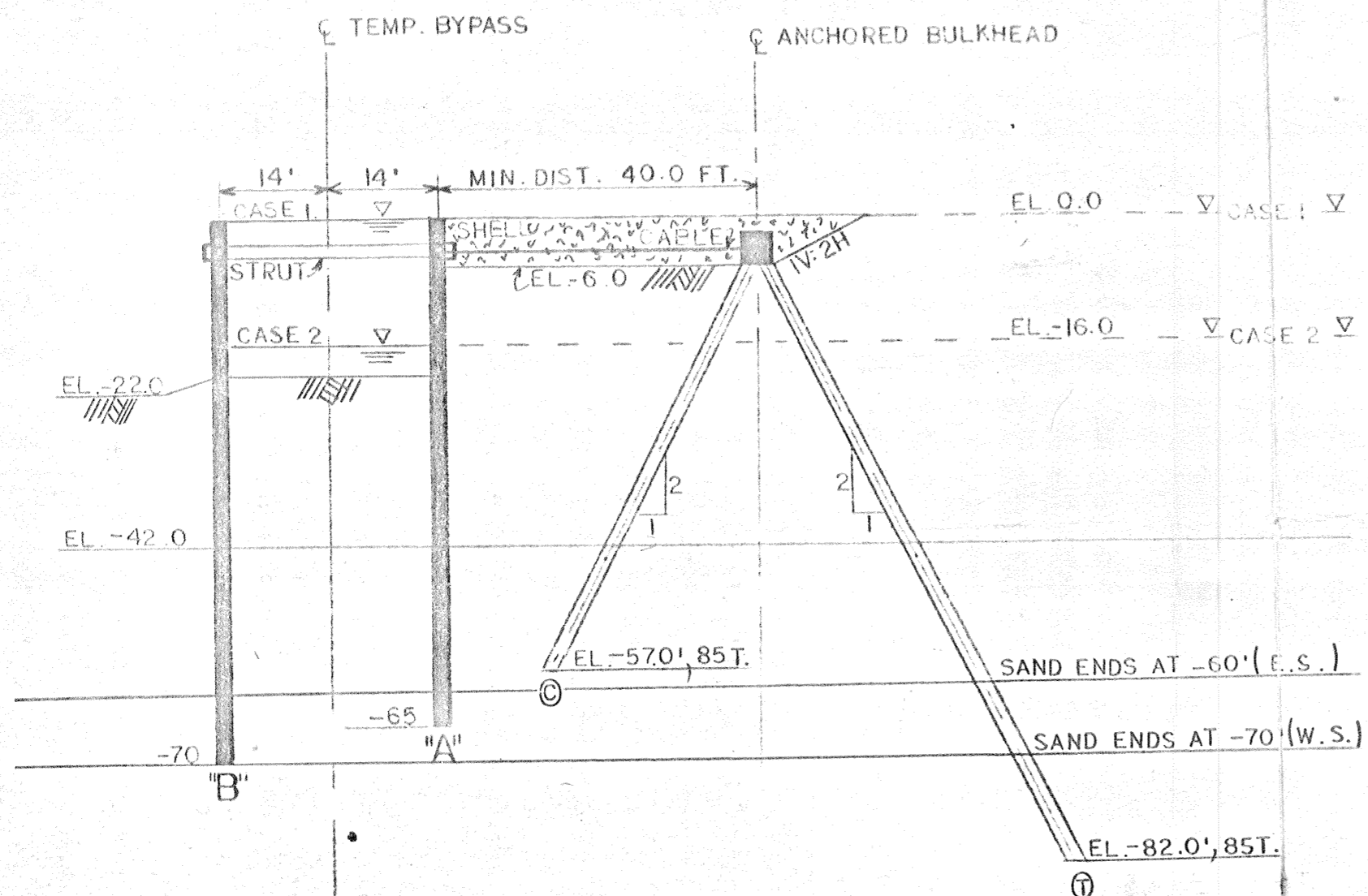
Temporary Cellular Cofferdam (Analysis not Complete)



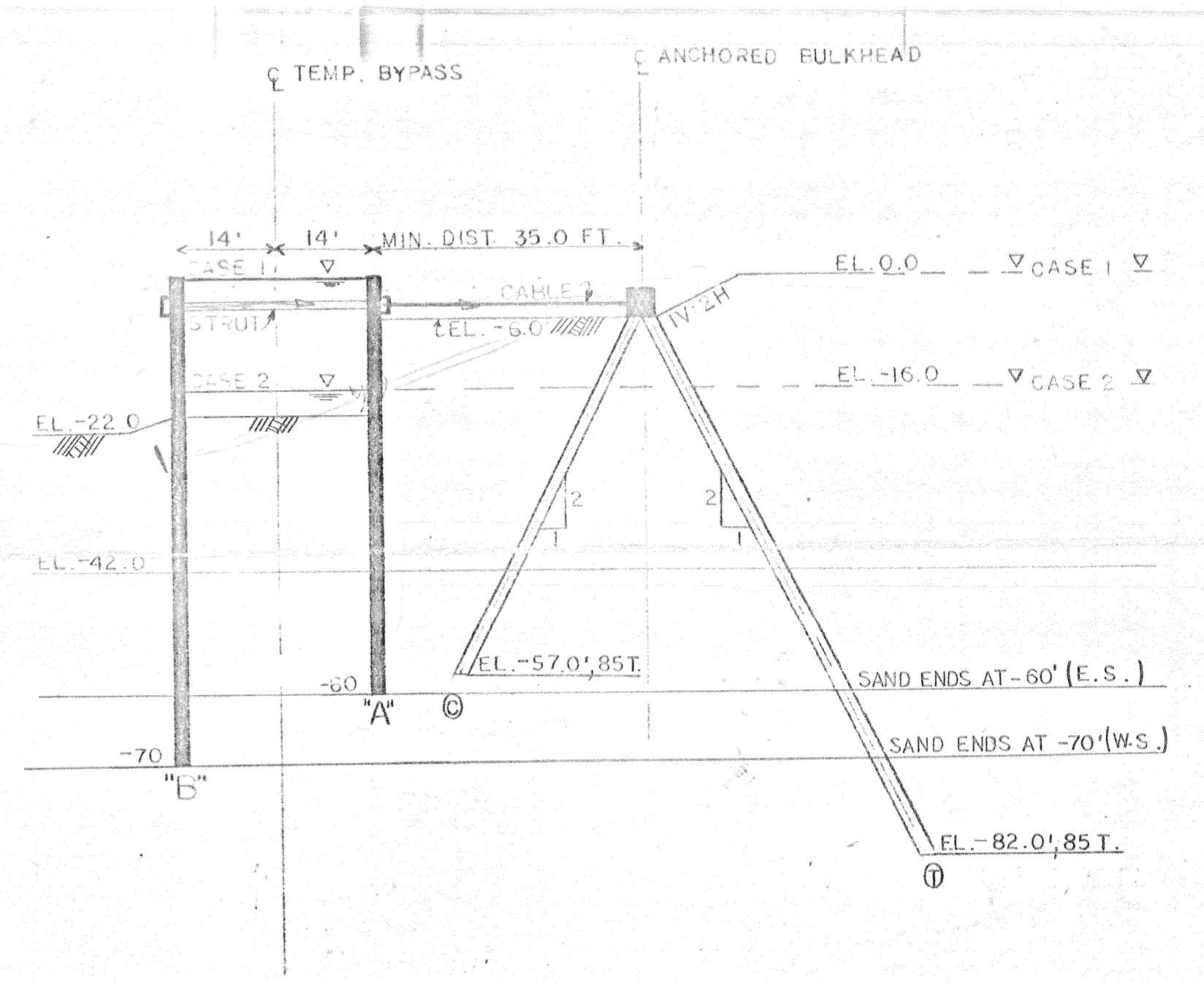
BYPASS CHANNEL WEST IHNC

Sheet 11

CONSTRUCTION ACCESS RAMP ELEV VIEW
(WITH SHELL)



TYPICAL ELEVATION VIEW
(WITHOUT SHELL)



SCALE: 1" = 20'

NOTES

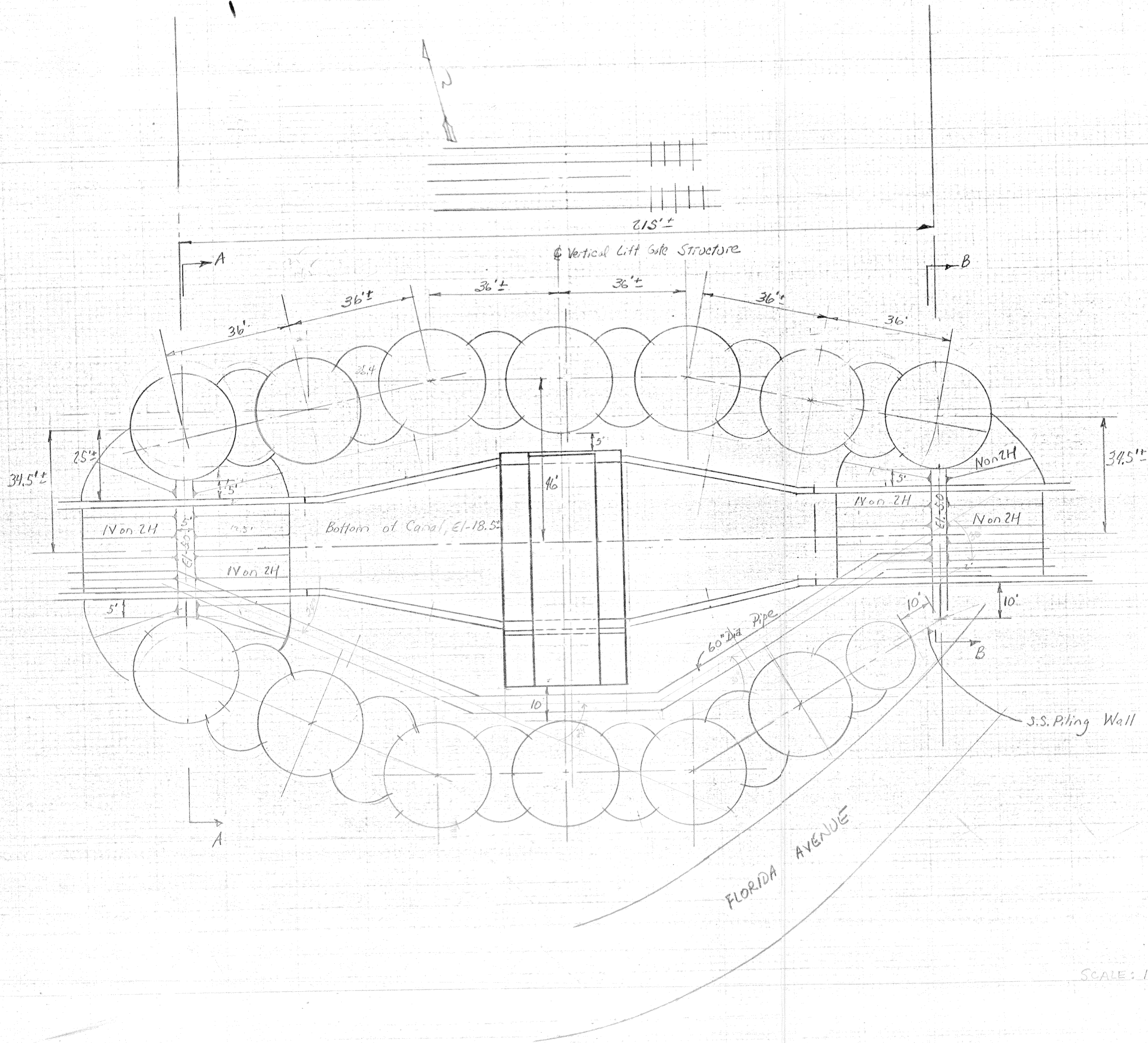
THE MAXIMUM FORCE ON THE DEADMAN OCCURS WHEN A=11,500 LBS. AND B=0, WITH THE WATER LEVEL AT -16.0 M.S.L. (CASE 2); ALSO, WHEN B=11,500 LBS. AND A=0, WITH THE WATER LEVEL AT 0.0 M.S.L. (CASE 1). THIS GIVES A MAXIMUM DESIGN FORCE OF 11,500 LBS.

THE DESIGN FORCES:

- STRUTS - ANCHOR TO "B" - 11,500 LBS.
- CABLES - ANCHOR TO "A" - 11,500 LBS.
- STRUTS AND CABLES JOIN AT "A", ELEV. -4.0' M.S.L.
- THE F.O.S. = 1.25 FOR SHEET PILE BULKHEADS AND 1.25 FOR H PILE SUPPORTS.
- THE VIEWS SHOWN ARE FROM THE WEST SIDE, BUT PERTAIN TO BOTH THE WEST SIDE AND THE EAST SIDE.

FLORIDA AVE. COMPLEX
TEMP. BYPASS CHANNEL
ELEVATION
VIEWS
EAST SIDE & WEST SIDE

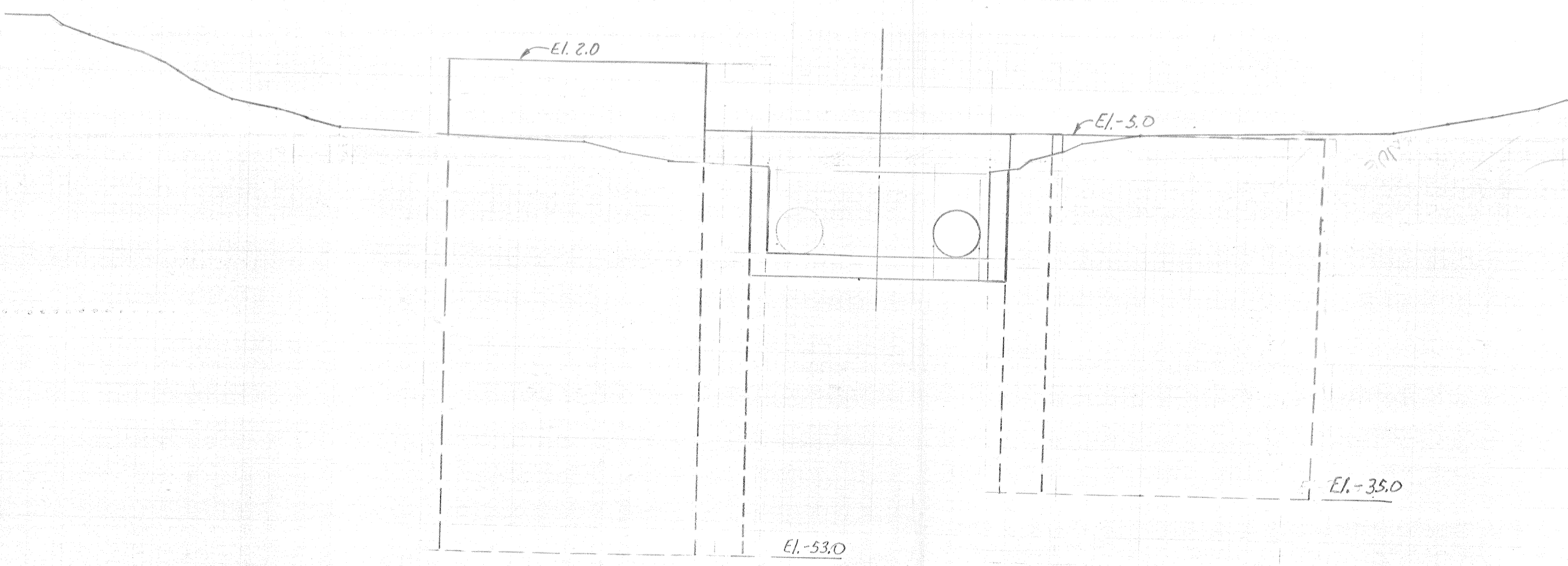
Jul 12



Est Str. 5 fps
 West Str. 3.5 fps

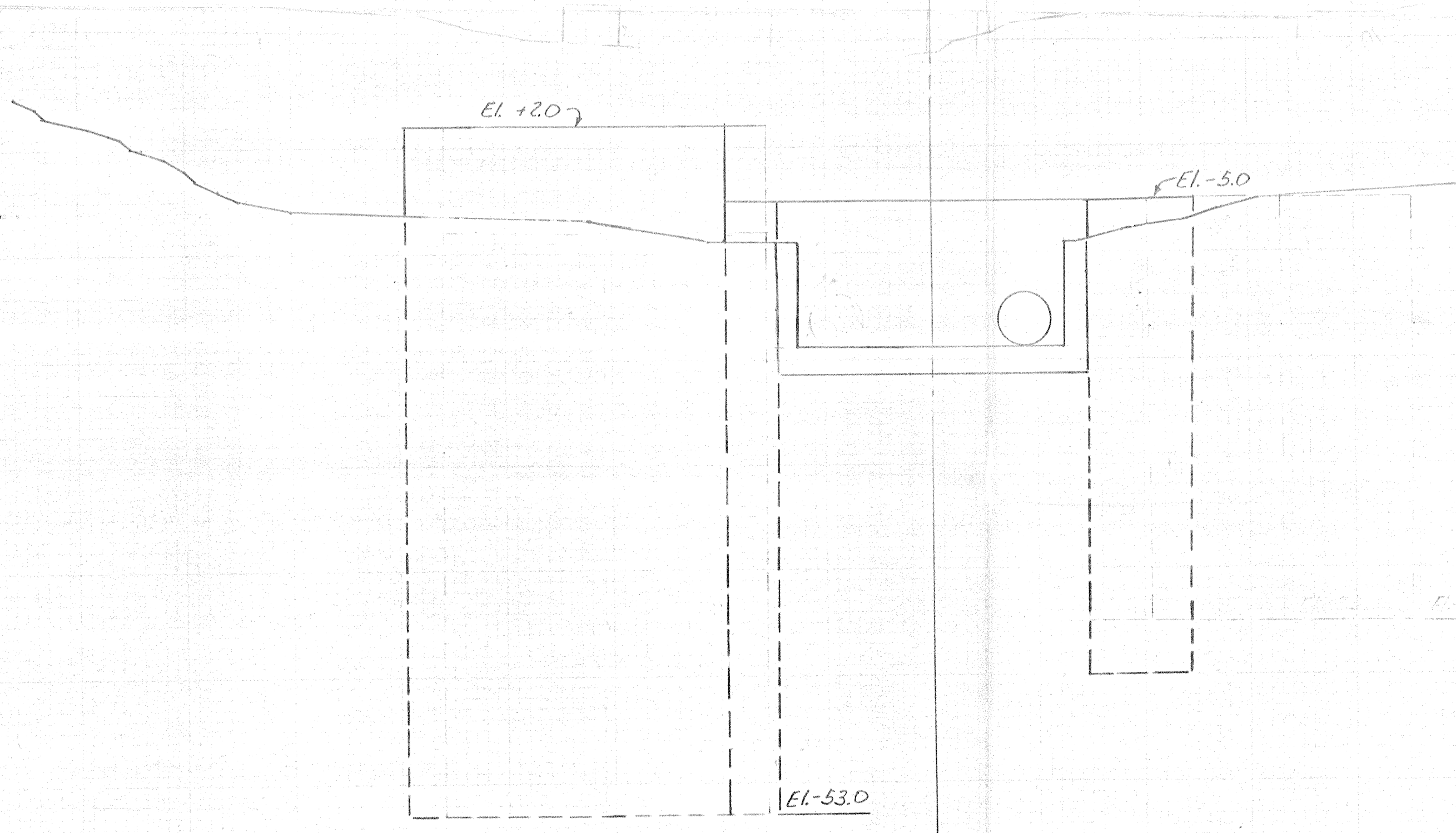
SCALE: 1" = 20'

Just 2'



SECTION A-A
Scale: 1"=10'

June 22



SECTION B-B
scale: 1"=10'

June 23

RODNEY HUNT COMPANY

ESTABLISHED 1840



ORANGE, MASSACHUSETTS, 01364, U.S.A.

October 24, 1979

N-Y Associates, Inc.
400 Main Street
Biloxi, MS 39530

RECEIVED OCT 29 1979

Attention: Mr. R. E. Bredberg

Subject: Assembly Drawing Request

Dear Mr. Bredberg:


Attached find our assembly drawing of a 150" x 156" sluice gate, Item #14, per your request of October 19, 1979.

We have not manufactured a gate of this particular size. However, we have manufactured larger gates and do not see any problem in doing so. We recommend that a wall thimble be used and should be of a minimum depth of at least 18".

I trust that this drawing will provide you with the dimensions you require. If you do need additional information, please do not hesitate to contact us.

Very truly yours,

RODNEY HUNT COMPANY



David F. Waskiewicz, Sales Manager
Water Control Equipment Division

DFW/bj

Encl.

cc - S. G. Davis, Inc.

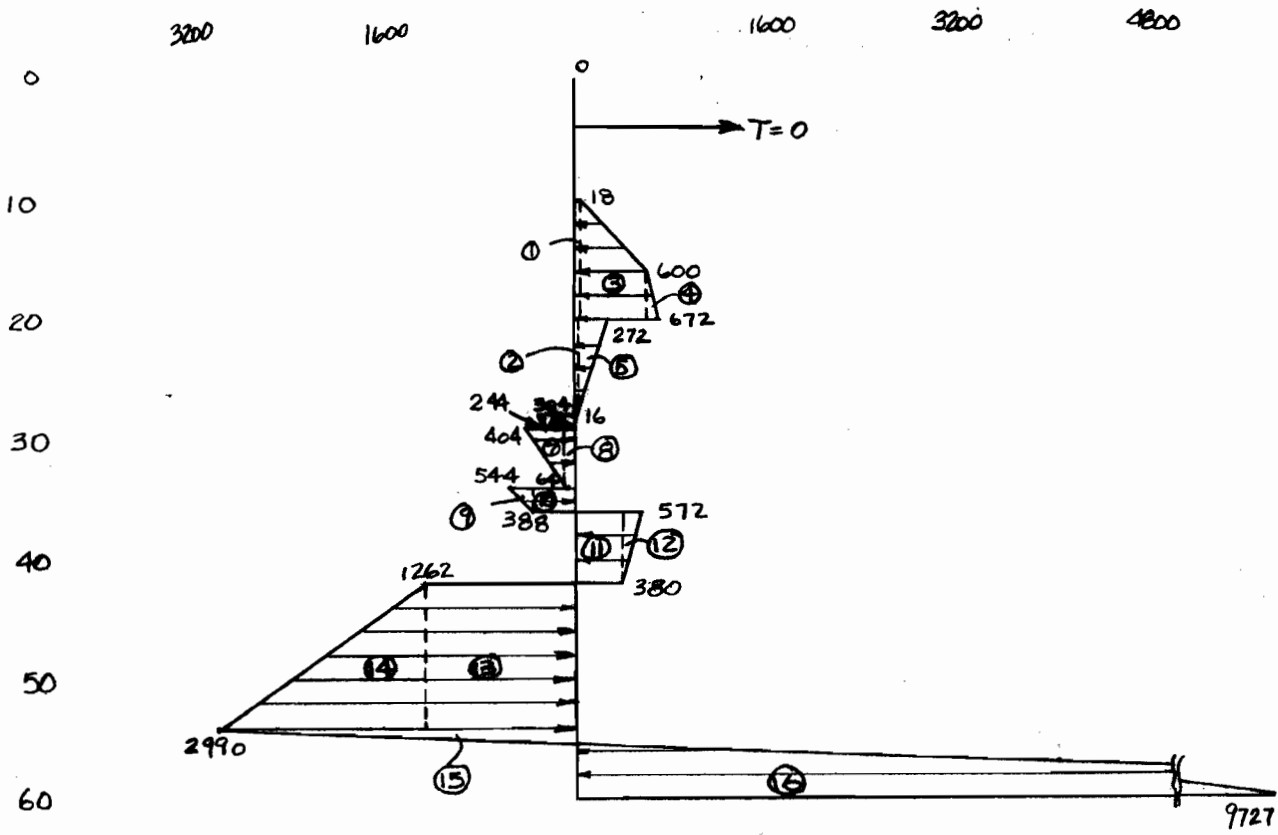
Attention: J. J. Casey - Baton Rouge

SUBJECT

DESIGNED BY DATE

DESIGN ANALYSIS

B A
 Bulkhead A - Cantilever Sheet Pile
 (For sections without shell - non-ramp areas)
 See P&M Branch DF dated 20 Aug 74
 Incl 5 - 1 of 3



Bulkhead A - Cantilever Sheet Pile
 (For sections without shell — non-ramp areas)

	Force (kips)
$P_1 - 10' \times 18\#11 =$	0.18
$P_2 - 8' \times 16\#11 =$	0.13
$P_3 - \left[\frac{1}{2} \times 6' + 4 \right] 582\#11 =$	4.07
$P_4 - \frac{1}{2} \times 4' \times 72\#11 =$	0.14
$P_5 - \frac{1}{2} \times 8' \times 256\#11 =$	1.02
$P_{1-5} =$	<u>5.54</u>

$P_{1-5} =$	<u>5.54</u>
$P_6 - \left(\frac{1}{2} \times 1.0 \times 60\#11 \right) +$	
$244\#11 \times 1.0 =$	- 0.27
$P_7 - \frac{1}{2} \times 5' \times 340\#11 =$	- 0.85
$P_8 - 5' \times 64\#11 =$	- 0.32
$P_9 - \frac{1}{2} \times 2' \times 156\#11 =$	- 0.16
$P_{10} - 2' \times 388\#11 =$	- 0.78
$P_{1-10} =$	<u>+ 3.17</u>

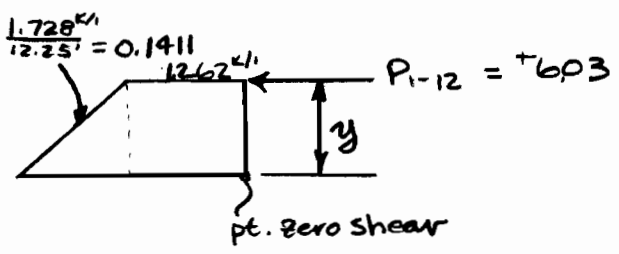
$P_{1-10} =$	+ 3.17
$P_{11} - 6' \times 380\#11 =$	+ 2.28
$P_{12} - \frac{1}{2} \times 6' \times 192\#11 =$	+ 0.58
$P_{1-12} =$	<u>+ 6.03</u>

$P_{1-12} =$	+ 6.03
$P_{13} - 12.25' \times 1262\#11 =$	- 15.46
$P_{14} - \frac{1}{2} \times 12.25' \times 1728\#11 =$	- 10.58
$P_{15} - \frac{1}{2} \times 1.25' \times 2990\#11 =$	- 1.87
$P_{1-15} =$	<u>- 21.88</u>

Bulkhead A - Cantilever Sheet Pile (For sections without shell — non-ramp areas)

Determine point of zero shear.

As $P_{13} > P_{1-12}$, point of zero shear must be between elev. -42.0 and -54.25.



$$\frac{0.1411}{2} y^2 + 1.262y = 6.03$$

$$y^2 + 17.89y = 85.47$$

$$\therefore y = -8.95 + \sqrt{\frac{320.05 + 341.88}{2}}$$

$$= 3.91' \text{ or Elev. } -45.91$$

M_{max} is at point of zero shear.

$$M_{max} = -\frac{1}{3} (8.34)^3 (0.1411 \text{ k/ft}) - 1.814 (8.34)^2 \frac{1}{2}$$

$$54.25 - 45.91 = 8.34$$

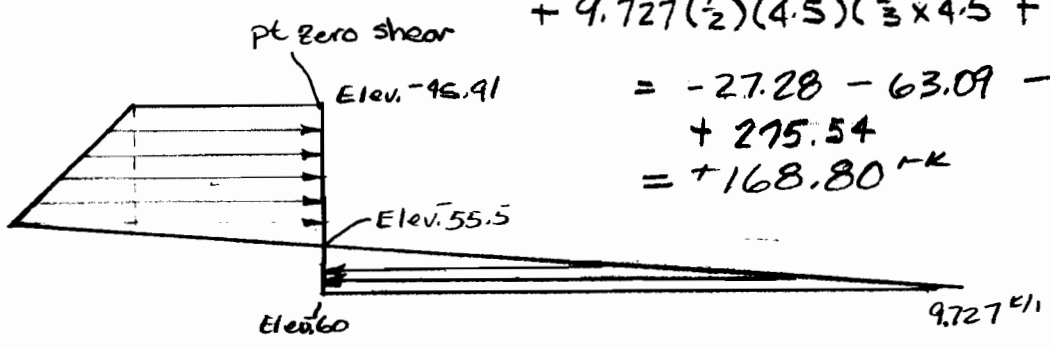
$$- 2.99 \left(\frac{1}{2}\right) (1.25) \left(\frac{1}{3} \times 1.25 + 8.34\right)$$

$$+ 9.727 \left(\frac{1}{2}\right) (4.5) \left(\frac{2}{3} \times 4.5 + 9.59\right)$$

$$= -27.28 - 63.09 - 16.37$$

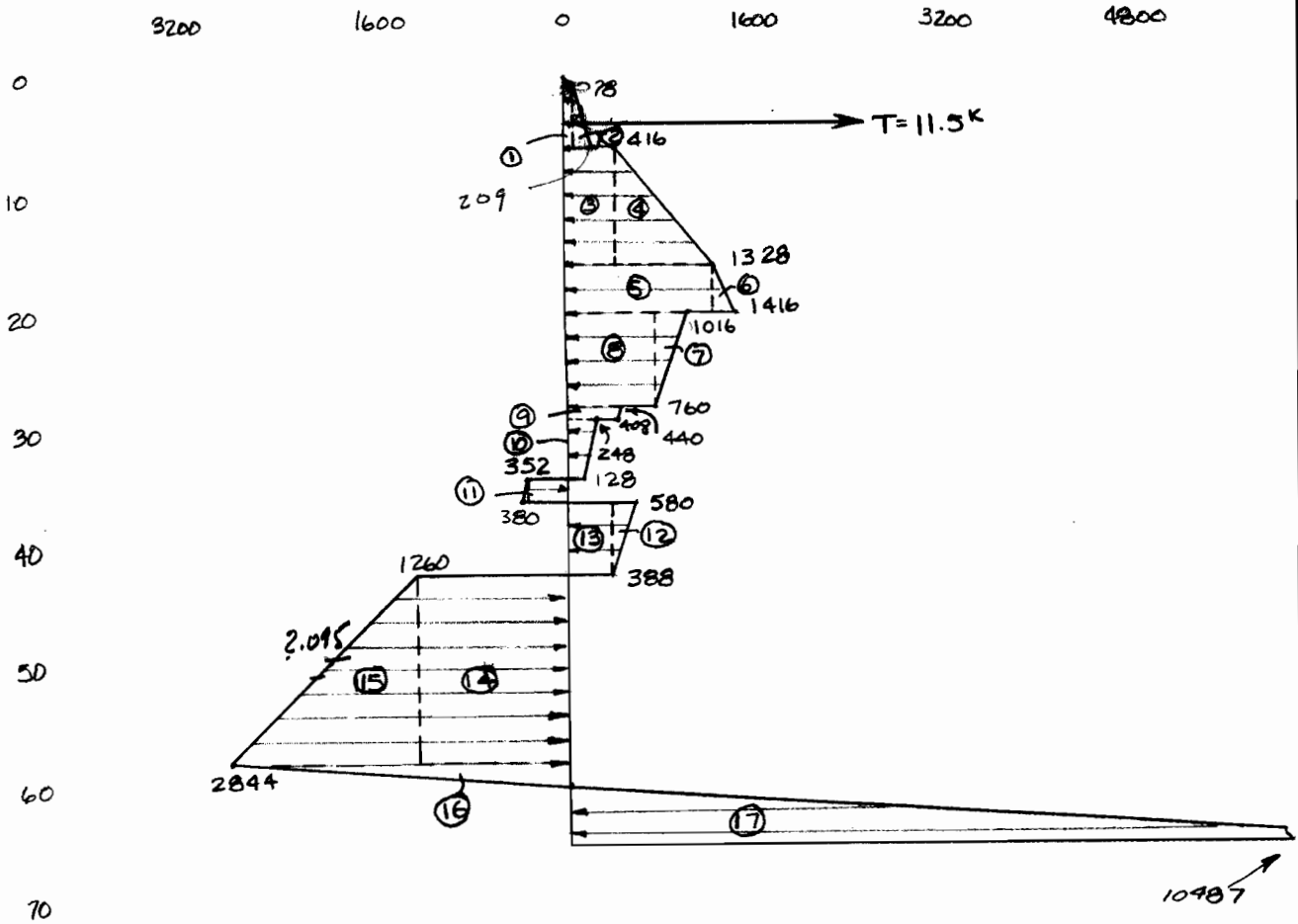
$$+ 275.54$$

$$= +168.80 \text{ k}$$



PROJECT	Florida Avenue Complex	Page 4 of —	COMPUTED BY	DATE
SUBJECT	Temp. Bypass Channel - Steel Sheet Piling		RJA	Sep 74
			CHECKED BY	DATE
			HMB	Nov. 76

Bulkhead A- Tie Back Sheet Pile
 (For sections with shell — ramp area)
 See F&M Branch DF dated 20 Aug 74
 Incl 5- 2 of 3

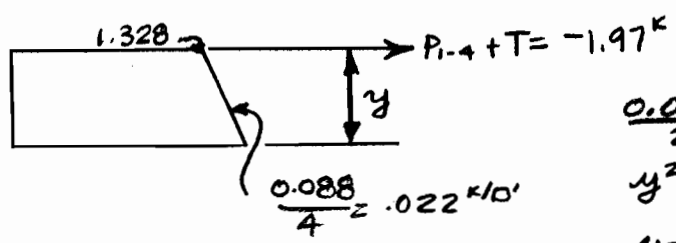


Bulkhead A - Tie Back Sheet Pile
(For sections with shell - ramp area)

Determine point of zero shear.:

	Force (kips)
$P_1 = \frac{1}{2} \times 0.5' \times 0.078 \text{ k/ft} + 0.078 \text{ k/ft} \times 5.5'$	= 0.45
$P_2 = \frac{1}{2} \times 5.5' \times 0.131 \text{ k/ft}$	= 0.36
$P_3 = 10' \times 0.416 \text{ k/ft}$	= 4.16
$P_4 = \frac{1}{2} \times 10' \times 0.912 \text{ k/ft}$	= 4.56
$P_5 = 4' \times 1.328 \text{ k/ft}$	= 5.31
$P_6 = \frac{1}{2} \times 4' \times 0.088$	= 0.18
$T =$	= -11.50
<hr/>	
$P_{1-6} + T$	= + 3.52

$P_{1-6} > T$ ∴ point of zero shear occurs between Elev. 0.0 and -20.0.



$$\frac{0.022}{2} y^2 + 1.328y = 1.97$$

$$y^2 + 120.73y = 179.09$$

$$y = -60.37 \pm 61.83$$

$$= 1.46' = \text{Elev. } -17.46'$$

$M_{max} = \text{Mom. at point of zero shear}$

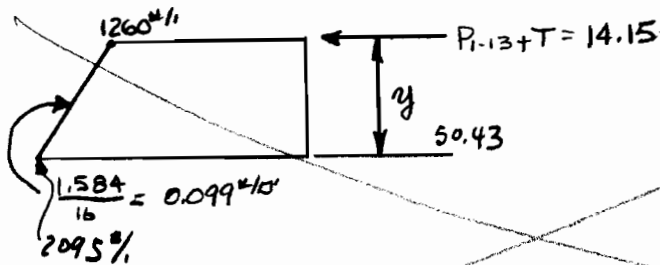
$$\begin{aligned} \therefore M_{max} &= + \frac{1}{2} \times 0.5 \times 0.078 \times \left(\frac{1}{3} \times 0.5 + 16.9 \right) + 5.5 \left(\frac{0.131}{2} \right) \left(\frac{5.5}{3} + 11.46 \right) \\ &+ 5.5' \times 0.078 \times \left(\frac{1}{2} \times 5.5 + 11.46 \right) \\ &+ 10' \times 0.416 \times \left(\frac{1}{2} \times 10.0 + 1.46 \right) \\ &+ \frac{1}{2} \times 10' \times 0.912 \left(\frac{1}{3} \times 10 + 1.46 \right) \\ &+ 1.46 \times 1.328 \times \frac{1}{2} \times 1.46 \\ &+ \frac{1}{2} \times 1.46^2 \times 0.022 \times \frac{1}{3} \times 1.46 \\ &- 11.5 \times 13.46 \\ &= 0.33 + 6.10 + 26.87 + 21.86 + 1.42 + 0.01 + 4.79 \\ &- 154.79 = -93.41 \text{ k} \end{aligned}$$

Bulkhead A - Tie Back Sheet Pile
 (For sections with shell — ramp area)
 Another point of zero shear occurs between elev. -40.0
 and -60.0.

Force (kips)

$$\begin{aligned}
 P_{1-6} + T &= 3.52 \\
 P_7 &= 8' \times 0.760 \text{ k/ft} = 6.08 \\
 P_8 &= \frac{1}{2} \times 8' \times 0.256 \text{ k/ft} = 1.02 \\
 P_9 &= \frac{1}{2} \times 1.0' \times 0.032 \text{ k/ft} + \\
 &\quad 1.0' \times 0.408 \text{ k/ft} = 0.41 \\
 P_{10} &= \frac{1}{2} \times 5.0' \times 0.120 \text{ k/ft} \\
 &\quad + 5.0' \times 0.128 \text{ k/ft} = 0.94 \\
 P_{11} &= \frac{1}{2} \times 2.0' \times 0.028 \text{ k/ft} \\
 &\quad + 2.0' \times 0.352 \text{ k/ft} = -0.73 \\
 P_{12} &= \frac{1}{2} \times 6.0' \times 0.192 \text{ k/ft} = 0.58 \\
 P_{13} &= 6.0' \times 0.388 \text{ k/ft} = 2.33 \\
 \hline
 P_{1-13} + T &= +14.15 \\
 P_{1-13} + T &= +14.15 \\
 P_{14} &= 16.0' \times 1.260 \text{ k/ft} = -20.16 \\
 P_{15} &= \frac{1}{2} \times 16.0' \times 1.584 = -12.67 \\
 P_{16} &= \frac{1}{2} \times 2.0 \times 2.844 = -2.84 \\
 \hline
 \end{aligned}$$

$$P_{1-16} + T = -21.52 > P_{1-13} + T \therefore \text{ok}$$



$$\begin{aligned}
 \frac{0.099}{2} y^2 + 1.26y &= 14.15 \\
 y^2 + 25.45y &= 285.86 \\
 \therefore y &= -12.73 + 21.16
 \end{aligned}$$

$$= 8.43' = \text{Elev } -50.43$$

$$\begin{aligned}
 M_{\text{max}} &= +\frac{1}{2} \times 5.0' \times 10.487 \times \left(\frac{2}{3} \times 5.0 + 9.57\right) \\
 &\quad - \frac{1}{2} \times 2.0 \times 2.844 \times \left(\frac{1}{3} \times 2.0 + 7.57\right) \\
 &\quad - \frac{1}{3} \times 0.099 \times 7.57^3 \\
 &\quad - 2095 \times (7.57)^2 \times \frac{1}{2} = -240.43
 \end{aligned}$$

Outhead A - Tie Back Sheet Pile
 (For sections with shell - ramp area)

Sum moments about E1. - 50.43 (at zero shear)

		<u>Force</u>	<u>Arm</u>	<u>Moment</u>
Δ	① $\frac{1}{2}(0.078)(0.5)$	= + 0.0195	50.10	+ 0.98
Δ	① (0.078)(5.5)	= + 0.429	47.18	+ 20.24
Δ	② $\frac{1}{2}(0.131)(5.5)$	= + 0.360	46.26	+ 16.67
Δ	③ (0.414)(10.0)	= + 4.16	39.43	+ 164.08
Δ	④ $\frac{1}{2}(0.912)(10.0)$	= + 4.56	37.76	+ 172.19
Δ	⑤ (1.328)(4.0)	= + 5.31	32.43	+ 172.20
Δ	⑥ $\frac{1}{2}(0.098)(4.0)$	= + 0.18	31.76	+ 5.72
Δ	⑦ $\frac{1}{2}(0.256)(8.0)$	= + 1.02	27.76	+ 28.32
Δ	⑧ (0.760)(8.0)	= + 6.08	26.43	+ 160.69
Δ	⑨ $\frac{1}{2}(1.0)(0.032)$	= + 0.02	22.10	+ 0.45
Δ	⑩ (0.408)(1.0)	= + 0.41	21.93	+ 8.99
Δ	⑪ $\frac{1}{2}(0.120)(3.0)$	= + 0.30	19.76	+ 5.93
Δ	⑫ (0.120)(5.0)	= + 0.64	18.93	+ 12.12
Δ	⑬ - (0.352)(2.0)	= + 0.70	15.43	+ 10.80
Δ	⑭ $\frac{1}{2}(0.028)(2.0)$	= - 0.03	15.10	- 0.45
Δ	⑮ $\frac{1}{2}(0.192)(6.0)$	= + 0.58	12.43	+ 7.21
Δ	⑯ (0.388)(6.0)	= + 2.33	11.43	+ 26.63
Δ	⑰ (1.260)(8.43)	= - 10.62	4.22	- 44.82
Δ	⑱ $\frac{1}{2}(0.835)(8.43)$	= - 3.52	2.81	- 9.89
T	11.5	= - 11.5	46.43	- 538.95

+0.03

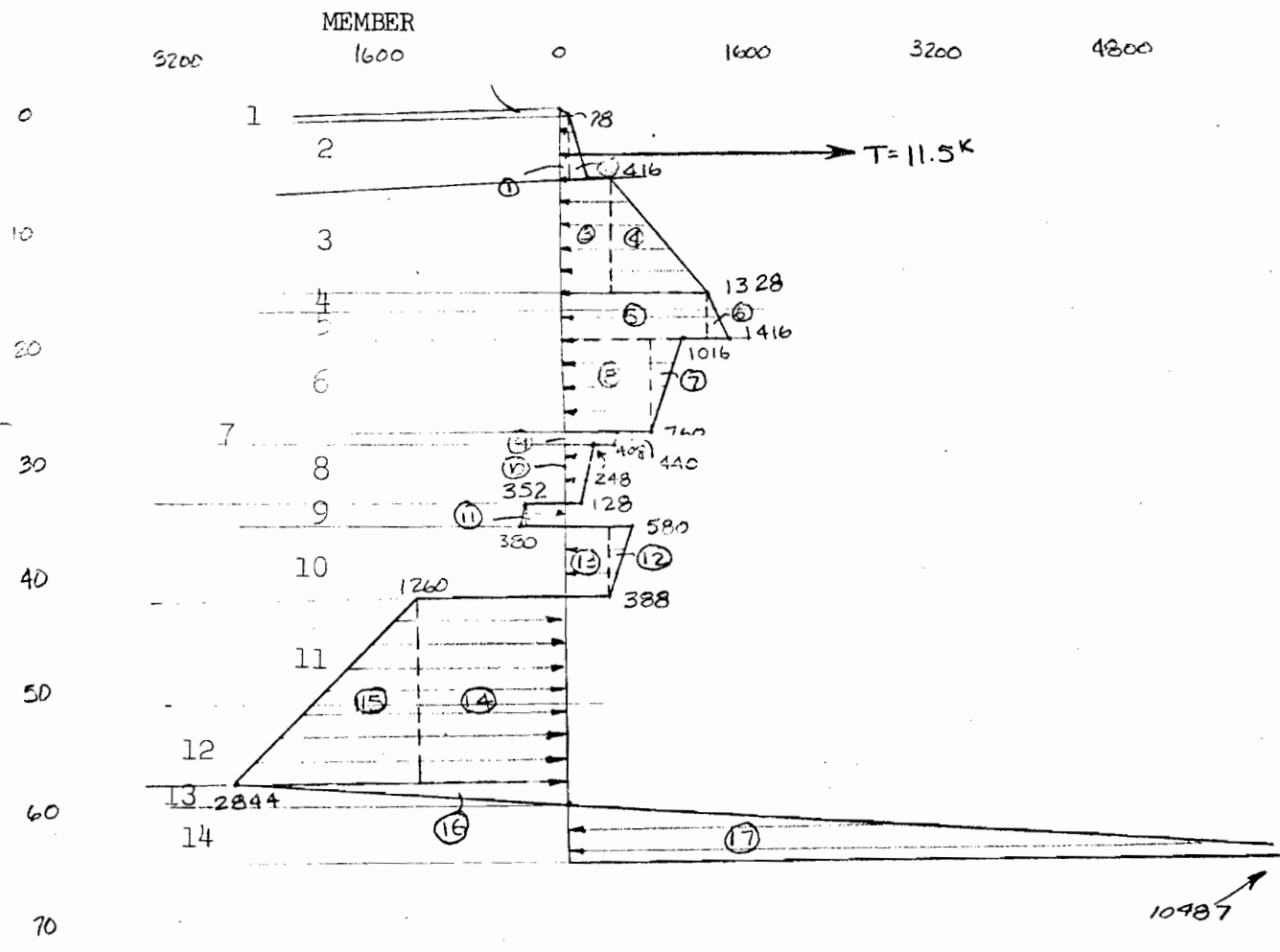
202.45

Note - Results from 6 Frame Program show a maximum moment of 205.40^{kt}. Maximum moment of 206^{kt} used in design.

Bulkhead A - Tie Back Sheet Pile
(For sections with shell - ramp area)

Model for G Frame Analysis

288
I = 4215
A = 16.77



10 FLORIDA AVE SHEET PILING BULKHEAD A TIE
(in ramp area)

20 15 14 1 29 0 0
30 1 0 0 0 0 0
40 2 0 0 0 .5 0
50 3 0 0 0 6 0
60 4 0 0 0 16 0
70 5 0 0 0 17.46 0
80 6 0 0 0 20 0
90 7 0 0 0 28 0
100 8 0 0 0 29 0
110 9 0 0 0 34 0
120 10 0 0 0 36 0
130 11 0 0 0 42 0
140 12 0 0 0 50.43 0
150 13 0 0 0 58 0
160 14 0 0 0 60 0
170 15 1 1 1 65 0
180 1 1 2 421.2 0 16.77
190 2 2 3 421.2 0 16.77
200 3 3 4 421.2 0 16.77
210 4 4 5 421.2 0 16.77
220 5 5 6 421.2 0 16.77
230 6 6 7 421.2 0 16.77
240 7 7 8 421.2 0 16.77
250 8 8 9 421.2 0 16.77
260 9 9 10 421.2 0 16.77
270 10 10 11 421.2 0 16.77
280 11 11 12 421.2 0 16.77
290 12 12 13 421.2 0 16.77
300 13 13 14 421.2 0 16.77
310 14 14 15 421.2 0 16.77
320 1 0 .078 0 0
330 2 .078 .209 0 -11.5 3.5 0 0
340 3 .416 1.328 0 0
350 4 1.328 1.360 0 0
355 5 1.360 1.416 0 0
360 6 1.016 .760 0 0
370 7 .440 .408 0 0
380 8 .248 .128 0 0
390 9 -.352 -.38 0 0
400 10 .580 .388 0 0
410 11 -1.260 -2.095 0 0
420 12 -2.095 -2.844 0 0
430 13 -2.844 0 0 0
440 14 0 10.487 0 0
450 0
460 0

READY

*LIB GFRAME

READY

*RUN

LOADER DIAGNOSTICS

<W> .FFBC UNDEFINED

=HMB
 ENTER A 1 TO BUILD NEW FILE OR A 2 TO EXECUTE OLD FILE
 =2
 DO YOU WANT INPUT CHECK -YES OR NO
 =YES

0 FLORIDA AVE SHEET PILING BULKHEAD A TIE

STRUCTURE INPUT DATA CHECK

15 JOINTS 14 MEMBERS 1 LOAD CASES
 MODULUS OF ELASTICITY = 29000. KSI

JOINT NUMBER	Y FIXITY	X FIXITY	ROT FIXITY	X (FEET)	Y (FEET)
1	0	0	0	0.	0.
2	0	0	0	0.50	0.
3	0	0	0	6.00	0.
4	0	0	0	16.00	0.
5	0	0	0	17.46	0.
6	0	0	0	20.00	0.
7	0	0	0	28.00	0.
8	0	0	0	29.00	0.
9	0	0	0	34.00	0.
10	0	0	0	36.00	0.
11	0	0	0	42.00	0.
12	0	0	0	50.43	0.
13	0	0	0	58.00	0.
14	0	0	0	60.00	0.
15	1	1	1	65.00	0.

MEMBER NUMBER	JOINT LEFT	JOINT RIGHT	WIDTH OR I IN OR IN ⁴	HEIGHT OR O INCHES	AREA OR O INCHES ²
1	1	2	421.20	0.	16.77
2	2	3	421.20	0.	16.77
3	3	4	421.20	0.	16.77
4	4	5	421.20	0.	16.77
5	5	6	421.20	0.	16.77
6	6	7	421.20	0.	16.77
7	7	8	421.20	0.	16.77
8	8	9	421.20	0.	16.77
9	9	10	421.20	0.	16.77
10	10	11	421.20	0.	16.77
11	11	12	421.20	0.	16.77
12	12	13	421.20	0.	16.77
13	13	14	421.20	0.	16.77
14	14	15	421.20	0.	16.77

0 FLORIDA AVE SHEET PILING BULKHEAD A TIE

LOADING CASE 1 OF 1

LOADING INPUT DATA CHECK

MEM NO	DIST LD		ANGLE (DEG)	PT LD NO	MAGNITUDE (K)	DIS FROM	
	LEFT (K/FT)	RIGHT (K/FT)				LEFT (FT)	ANGLE (DEG)
1	0.	0.078	0.				
2	0.078	0.209	0.	1	-11.50	3.50	0.
3	0.416	1.328	0.				
4	1.328	1.360	0.				
5	1.360	1.416	0.				
6	1.016	0.760	0.				
7	0.440	0.408	0.				
8	0.248	0.128	0.				
9	-0.352	-0.380	0.				
10	0.580	0.388	0.				
11	-1.260	-2.095	0.				
12	-2.095	-2.844	0.				
13	-2.844	0.	0.				
14	0.	10.487	0.				

JØINT NUM	APPLIED MØMENT (FT-K)	APPLIED VERT LD (K)	APPLIED HØRZ LD (K)

JØINT DISPLACEMENTS AND RØTATIONS

JØINT NUMBER	RØTATION (RADIAN)	X DISPLACEMENT (INCHES)	Y DISPLACEMENT (INCHES)
1	0.0312948	0.	-25.4741459
2	0.0312947	0.	-25.2863774
3	0.0315150	0.	-23.2196486
4	0.0389592	0.	-19.0758910
5	0.0405420	0.	-18.3794944
6	0.0432623	0.	-17.1019673
7	0.0492341	0.	-12.6178384
8	0.0495164	0.	-12.0252074
9	0.0489147	0.	-9.0551289
10	0.0477012	0.	-7.8946363
11	0.0406161	0.	-4.6824137
12	0.0224556	0.	-1.4367960
13	0.0060446	0.	-0.1868245
14	0.0032445	0.	-0.0772990
15	0.	0.	0.

MEMBER END MOMENTS AND FORCES

MEM NUM	JOINT LEFT	JOINT RIGHT	LENGTH (FT)	MOMENT LEFT (FT-K)	MOMENT RIGHT (FT-K)	SHEAR LEFT (K)	SHEAR RIGHT (K)	AXIAL LEFT (K)	AXIAL RIGHT (K)
1	1	2	0.50	-0.01	-0.01	-0.02	0.04	0.	0.
2	2	3	5.50	0.01	20.72	-0.08	-10.63	0.	0.
3	3	4	10.00	-20.72	91.04	10.63	-1.91	0.	0.
4	4	5	1.46	-91.04	92.40	1.91	0.05	0.	0.
5	5	6	2.54	-92.40	87.80	-0.06	3.58	0.	0.
6	6	7	8.00	-87.81	29.36	-3.58	10.69	0.	0.
7	7	8	1.00	-29.36	18.46	-10.68	11.11	0.	0.
8	8	9	5.00	-18.46	-39.66	-11.11	12.05	0.	0.
9	9	10	2.00	39.66	-63.03	-12.05	11.31	0.	0.
10	10	11	6.00	63.03	-140.20	-11.31	14.22	0.	0.
11	11	12	8.43	140.20	-205.40	-14.22	0.08	0.	0.
12	12	13	7.57	205.40	-138.80	-0.08	-18.62	0.	0.
13	13	14	2.00	138.80	-97.77	18.62	-21.46	0.	0.
14	14	15	5.00	97.77	-34.16	21.46	4.76	0.	0.

STRUCTURE REACTIONS

JNT NO	MOMENT (FT-K)	VERTICAL FORCE (K)	HORIZONTAL FORCE (K)
15	-34.16	4.76	0.

*STAT

CHANNEL 2640

USER STATUS ON SEP 13, 1974 AT 9:36:13 LOG-ON AT 8:21:57
 PROC TIME USED 48.76 SEC., 851 FILE I/O 20144 CHAR KEY I/O
 LIST OF OPEN FILES: HMB 39

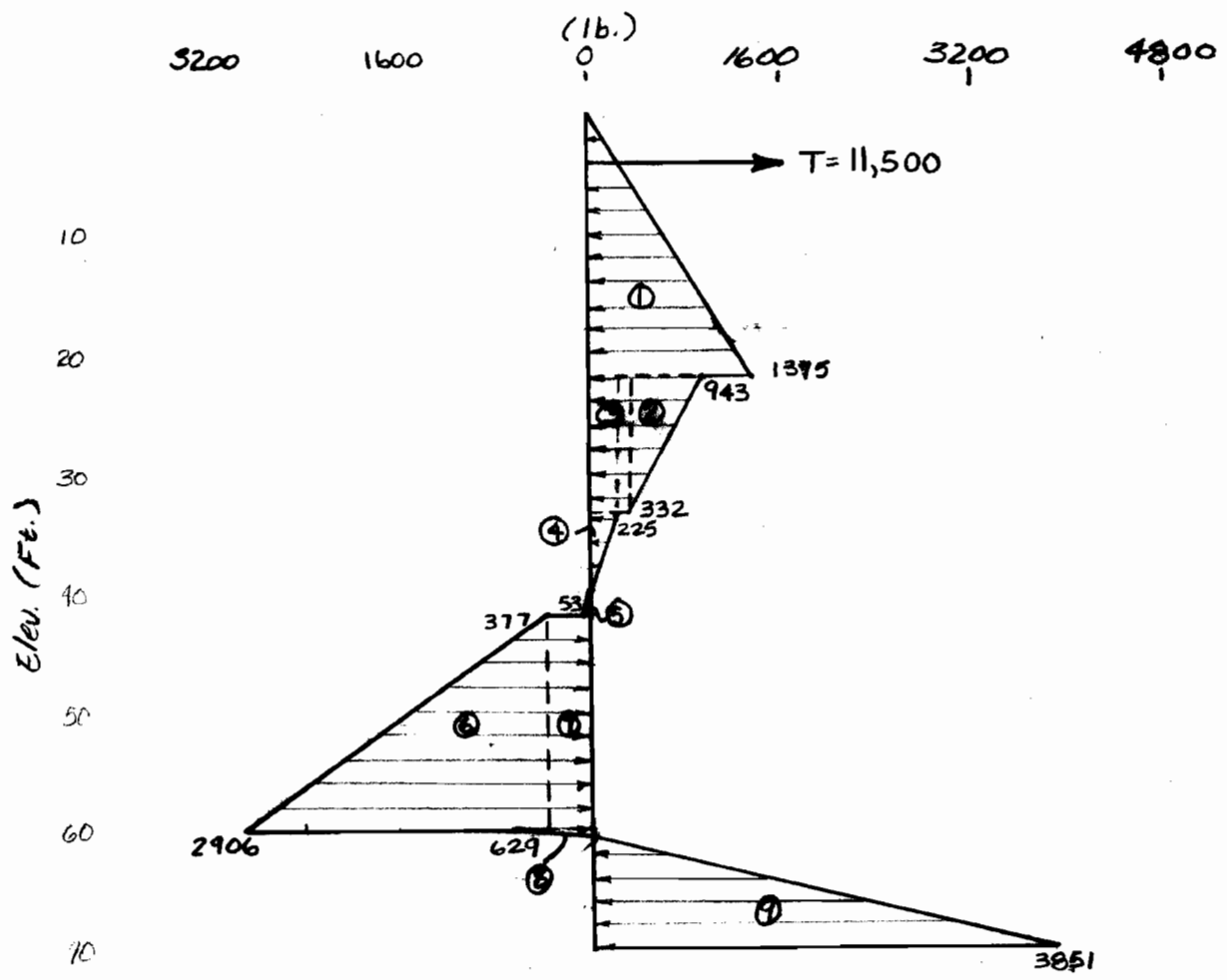
*BYE

1 TEMPORARY FILES CREATED.

39 ? NONE
 **RESOURCES USED \$ 31.33, USED TO DATE \$ 464.02= 9%
 **TIME SHARING OFF AT 9.636 ON 09/13/74

Bulkhead B - Tieback Sheet Pile

(B) (A) See R&M Branch DF dated 20 Aug 74
 Incl 5 - 3 of 3
 Net Force Diagram
 Floodwall B



Bulkhead B - Tieback Sheet Pile

Force (kips)

$$P_1 - \frac{1}{2} \times 22' \times 1375^{#1} = 15.13$$

$$P_2 - \frac{1}{2} \times 11.0 \times 611^{#1} = 3.36$$

$$P_3 - 11.0 \times 332^{#1} = 3.65$$

$$P_4 - \frac{1}{2} \times 7.0 \times 225^{#1} = 0.79$$

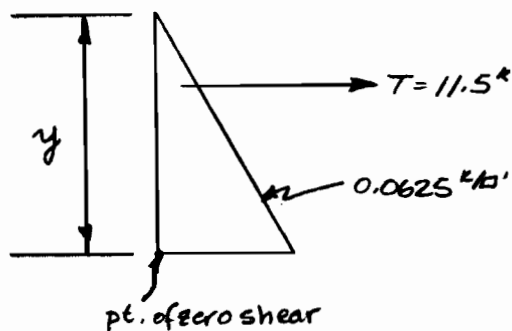
$$T = -11.50$$

$$\Sigma = +11.43$$

Determine point of zero shear.

As $P_1 > T$, point of zero shear must be between Elev. 0.0 and -22.0.

$$\frac{1375^{#1}}{22'} = 0.0625 \text{ k/ft}^2$$



$$\frac{0.0625}{2} y^2 = 11.5$$

$$y^2 = 368.0$$

$$y = 19.18' \text{ or Elev. } -19.18'$$

M_{max} is at point of zero shear. \therefore

$$M_{max} = 11.5(19.18) + \frac{0.0625}{6}(19.18)^3$$

$$= -174.57 + 73.50$$

$$= -101.07 \text{ k}$$

PROJECT	Florida Avenue Complex	Page 9 of -	COMPUTED BY	DATE
SUBJECT	Temp. Bypass Channel - Steel Sheet Piling		RJA	Sep 74
			CHECKED BY	DATE
			HMB	Nov. 76

Bulkhead B - Tieback Sheet Pile

Force (kips)

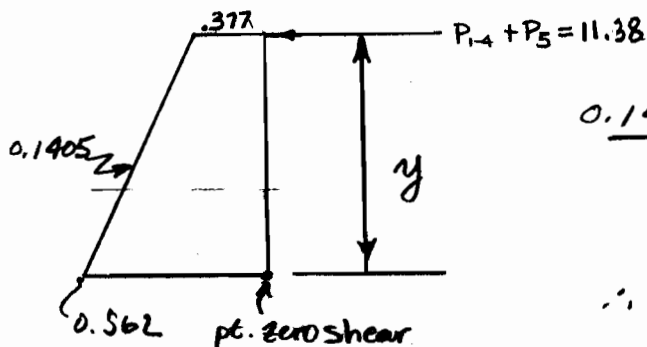
$$\begin{aligned}
 P_4 &= +11.43 \\
 P_5 &= \frac{1}{2} \times 2.0' \times 53'' = -0.05 \\
 P_6 &= \frac{1}{2} \times 18.0' \times 2529'' = -22.76 \\
 P_7 &= 18.0' \times 377'' = -6.79 \\
 P_8 &= \frac{1}{2} \times 1.25 \times 629'' = -0.39
 \end{aligned}$$

Determine point of zero shear.

As $P_6 > (P_4 + P_5)$, point of zero shear must be between elev. -42.0 and -60.0.

$$P_4 + P_5 = 11.43 - 0.05 = 11.38 \text{ k}$$

$$\frac{2.906 - 0.377}{18} = 0.1405 \text{ k/ft}$$



$$\frac{0.1405}{2} y^2 + 0.377y = 11.38$$

$$y^2 + 5.37y = 161.99$$

$$\therefore y = \frac{-5.37 + \sqrt{28.84 + 647.96}}{2}$$

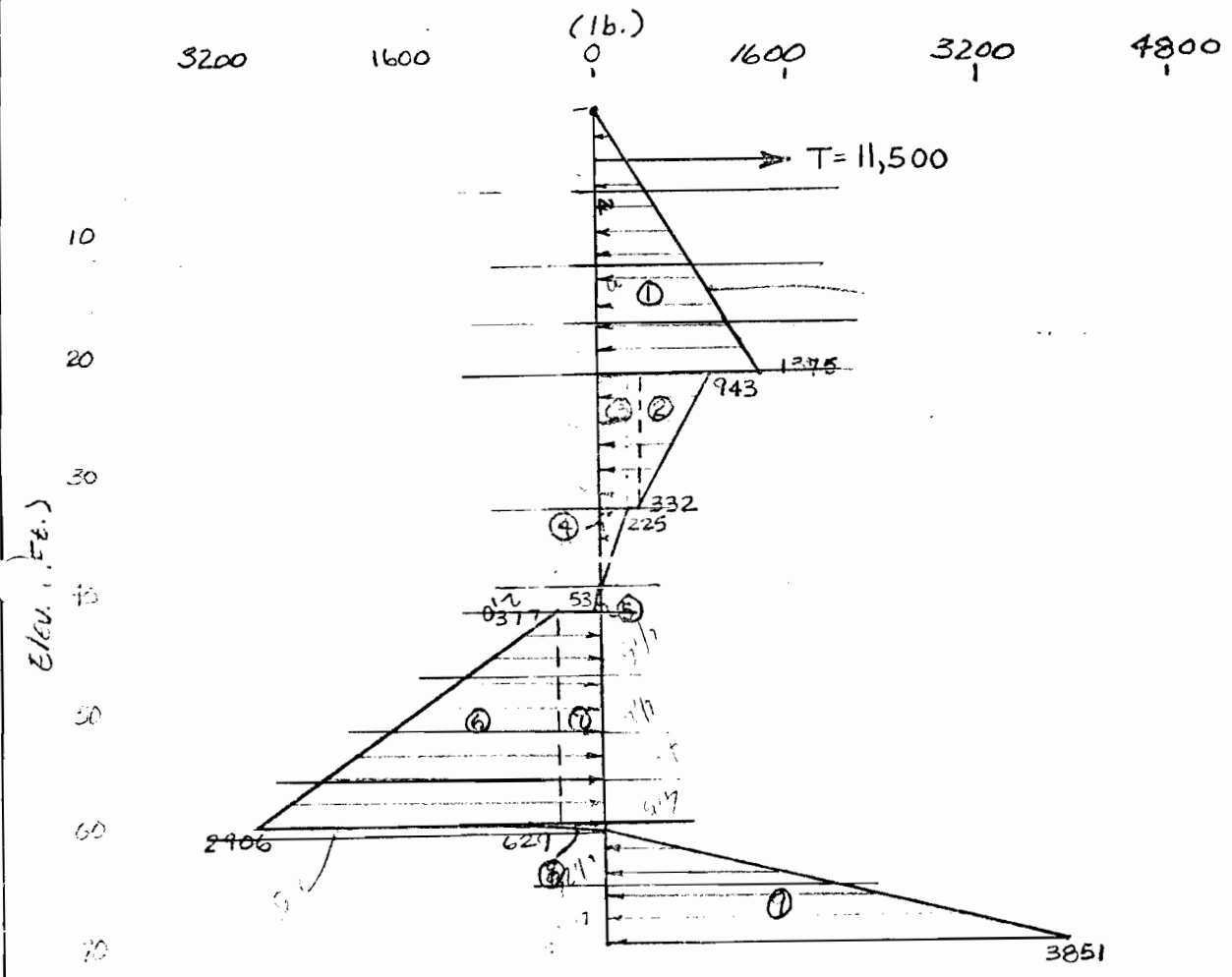
$$= 10.32' \text{ or Elev. } -52.32$$

M_{max} at point of zero shear.

$$\begin{aligned}
 M_{max} &= \frac{1}{2} (385)(8.75)(5.83 + 8.91) - \frac{1}{2} (0.63)(10.32 + 7.68)(1.25) \\
 &\quad - \frac{1}{2} (10.32 \times 0.1405 + 0.377) - \frac{0.1405}{3} (7.68)^3 \\
 &= 248.28 - 3.19 - 53.88 - 21.21 \\
 &= 170.00 \text{ k}
 \end{aligned}$$

Bulkhead B - Tie Back Sheet Pile
 Model for G Frame Analysis

Net Force Diagram
 Floodwall B



=YES

0 FLA AVE COM STR STEEL SHEET PILE ANALYSIS

STRUCTURE INPUT DATA CHECK

15 JOINTS 14 MEMBERS 1 LOAD CASES
MODULUS OF ELASTICITY = 29000. KSI

JOINT NUMBER	Y FIXITY	X FIXITY	ROT FIXITY	X (FEET)	Y (FEET)
1	0	0	0	0.	0.
2	0	0	0	5.50	0.
3	0	0	0	11.00	0.
4	0	0	0	19.13	0.
5	0	0	0	22.00	0.
6	0	0	0	33.50	0.
7	0	0	0	40.00	0.
8	0	0	0	42.00	0.
9	0	0	0	46.50	0.
10	0	0	0	52.47	0.
11	0	0	0	55.50	0.
12	0	0	0	60.00	0.
13	0	0	0	61.50	0.
14	0	0	0	65.75	0.
15	1	1	1	70.00	0.

MEMBER NUMBER	JOINT LEFT	JOINT RIGHT	WIDTH OR I IN OR IN^4	HEIGHT OR 0 INCHES	AREA OR 0 INCHES^2
1	1	2	421.20	0.	16.77
2	2	3	421.20	0.	16.77
3	3	4	421.20	0.	16.77
4	4	5	421.20	0.	16.77
5	5	6	421.20	0.	16.77
6	6	7	421.20	0.	16.77
7	7	8	421.20	0.	16.77
8	8	9	421.20	507.26	16.77
9	9	10	421.20	0.	16.77
10	10	11	421.20	0.	16.77
11	11	12	421.20	507.26	16.77
12	12	13	421.20	0.	16.77
13	13	14	421.20	0.	16.77
14	14	15	421.20	0.	16.77

0 FLA AVE COM STR STEEL SHEET PILE ANALYSIS

LOADING CASE 1 OF 1

LOADING INPUT DATA CHECK

DIST LD	DIST LD		DIS FROM
MEM LEFT	RIGHT	ANGLE	

NØ	(K/FT)	(K/FT)	(DEG)	NØ	(K)	(FT)	(DEG)
1	0.	0.343	0.	1	-11.50	4.00	0.
2	0.343	0.688	0.				
3	0.688	1.199	0.				
4	1.199	1.375	0.				
5	0.943	0.332	0.				
6	0.225	0.	0.				
7	0.	-0.053	0.				
8	-0.377	-1.009	0.				
9	-1.009	-1.848	0.				
10	-1.848	-2.274	0.				
11	-2.274	-2.906	0.				
12	-0.629	0.	0.				
13	0.	1.925	0.				
14	1.925	3.850	0.				

APPLIED APPLIED APPLIED
 JOINT MOMENT VERT LD HØRZ LD
 NUM (FT-K) (K) (K)

JOINT DISPLACEMENTS AND ROTATIONS

JOINT NUMBER	ROTATION (RADIANS)	X DISPLACEMENT (INCHES)	Y DISPLACEMENT (INCHES)
1	0.0145221	0.	-17.3290274
2	0.0146466	0.	-16.3700237
3	0.0173950	0.	-15.3309499
4	0.0259909	0.	-13.2291913
5	0.0292973	0.	-12.2932484
6	0.0371389	0.	-7.5658150
7	0.0347419	0.	-4.7253322
8	0.0328427	0.	-3.9132161
9	0.0266576	0.	-2.2955785
10	0.0156214	0.	-0.7692192
11	0.0097811	0.	-0.3083858
12	0.0026165	0.	0.0136744
13	0.0010176	0.	0.0456548
14	-0.0009403	0.	0.0320992
15	0.	0.	0.

MEMBER END MOMENTS AND FORCES

MEM NUM	JOINT LEFT	JOINT RIGHT	LENGTH (FT)	MOMENT LEFT (FT-K)	MOMENT RIGHT (FT-K)	SHEAR LEFT (K)	SHEAR RIGHT (K)	AXIAL LEFT (K)	AXIAL RIGHT (K)
1	1	2	5.50	0.00	15.52	-0.00	-10.56	0.	0.
2	2	3	5.50	-15.52	66.65	10.56	-7.72	0.	0.
3	3	4	8.18	-66.66	101.10	7.72	-0.00	0.	0.
4	4	5	2.82	-101.10	96.11	0.00	3.63	0.	0.
5	5	6	11.50	-96.11	5.52	-3.63	10.96	0.	0.
6	6	7	6.50	-5.52	-68.87	-10.96	11.69	0.	0.
7	7	8	2.00	68.87	-92.21	-11.69	11.64	0.	0.
8	8	9	4.50	92.21	-138.62	-11.64	8.52	0.	0.
9	9	10	5.97	138.62	-166.51	-8.52	-0.01	0.	0.
10	10	11	3.03	166.51	-157.34	0.01	-6.26	0.	0.
11	11	12	4.50	157.34	-104.03	6.26	-17.91	0.	0.
12	12	13	1.50	104.03	-76.69	17.91	-18.38	0.	0.
13	13	14	4.25	76.69	-4.36	18.38	-14.29	0.	0.
14	14	15	4.25	4.36	33.20	14.29	-2.02	0.	0.

STRUCTURE REACTIONS

JNT NØ	MOMENT (FT-K)	VERTICAL FORCE (K)	HORIZONTAL FORCE (K)
15	33.20	-2.02	0.

10 FLA AVE COM STR STEEL SHEET PILE ANALYSIS Bulkhead B Tie

20 15 14 1 29000.
 30 1 0 0 0 0
 40 2 0 0 0 5.5 0
 50 3 0 0 0 11.0 0
 60 4 0 0 0 19.18 0
 70 5 0 0 0 22.0 0
 80 6 0 0 0 33.5 0
 90 7 0 0 0 40.0 0
 100 8 0 0 0 42.0 0
 110 9 0 0 0 46.5 0
 120 10 0 0 0 52.47 0
 130 11 0 0 0 55.5 0
 140 12 0 0 0 60.0 0
 150 13 0 0 0 61.5 0
 160 14 0 0 0 65.75 0
 170 15 1 1 1 70.0 0
 180 1 1 2 421.2 0 16.77
 190 2 2 3 421.2 0 16.77
 200 3 3 4 421.2 0 16.77
 210 4 4 5 421.2 0 16.77
 220 5 5 6 421.2 0 16.77
 230 6 6 7 421.2 0 16.77
 240 7 7 8 421.2 0 16.77
 250 8 8 9 421.2 0 16.77
 260 9 9 10 421.2 0 16.77
 270 10 10 11 421.2 0 16.77
 280 11 11 12 421.2 0 16.77
 290 12 12 13 421.2 0 16.77
 300 13 13 14 421.2 0 16.77
 310 14 14 15 421.2 0 16.77
 320 1 0 0.343 0 -11.5 4.0 0 0
 330 2 .343 .688 0 0
 340 3 .688 1.199 0 0
 350 4 1.199 1.375 0 0
 360 5 .943 .332 0 0
 370 6 .225 0 0 0
 380 7 0 -.053 0 0
 390 8 -.377 -1.009 0 0
 400 9 -1.009 -1.848 0 0
 410 10 -1.848 -2.274 0 0
 420 11 -2.274 -2.906 0 0
 430 12 -0.629 0 0 0
 440 13 0 1.925 0 0
 450 14 1.925 3.850 0 0
 460 0
 470 0

READY

*LIB GFRAME

READY

*RUN

LOADER DIAGNOSTICS

<W> .FFBC UNDEFINED

MULTIPLE LOAD CASE PLANAR RIGID FRAME ANALYSIS

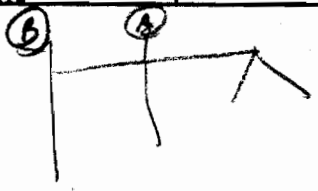
ENTER DATA FILE NAME

=RJG913

ENTER A 1 TO BUILD NEW FILE OR A 2 TO EXECUTE OLD FILE

=2

Bulkhead A - Tieback Sheet Pile



For Bulkhead A Design

Regular Steel Sheet Piling (A328)

MZ-38 with Cover Plates (5X2) S=117.1 in³ /ft. of wall.

M = 169 ft.-kips per ft. of cantilevered sheet (wall) (T=0). This type of wall is used in sections without shell for Bulkhead "A".

Max. M = 206 ft.-kips per ft. of sheet pile wall. (Computer run of Sheet Piling Bulkhead "A" Tie .) Governs

$$S_r = M / f_b = 206 \times 12 / 0.5 f_y = \dots \quad S_r = \text{Section Modulus required}$$

$$= 206 \times 12 / 0.5 (38.5) = 128.4$$

High Strength Steel Sheet Piling

USS EX-TEN 55

$$S_r = 206 \times 12 / 27.5 = 89.9$$

USS EX-TEN 50

$$S_r = 206 \times 12 / 25.0 = 98.9$$

USS EX-TEN 45

$$S_r = 206 \times 12 / 22.5 = 109.9$$

Sp = Section Modulus provided, Mp = Moment can resist.

	SHEET PILING MZ - 38			
STEEL	Regular (3)	H.S. (55)	H.S. (50)	H.S. (45)
COVER PLATES	(5 X 2)	(5X1 5/16)	(5X1 9/16)	(5X1 7/8)
Sp	117.1	91.5	100.0	112.3
Sr	128.4	89.9	98.9	109.9
Without COVER PLATE				
CMR		107.2	97.5	87.8
Length				
		top 36' of 65'	top 36' of 65'	(Bulkhead A)

Bulkhead B - Tie Back Sheet Pile
For Bulkhead B Design

Max. M = 167 ft.-kips per ft. of sheet pile wall. (Computer run of sheet piling Bulkhead "B" Tie.)

Regular Steel Sheet Piling

$$S_r = M/f = 167 \times 12 / 19.25 = 104.1 > S = 46.8 \text{ per ft. For PZ38 No Good}$$

High Strength Steel Sheet Piling

USS EX-TEN 55

$$S_r = 167 \times 12 / 27.5 = 72.9$$

USS EX-TEN 50

$$S_r = 167 \times 12 / 25.0 = 80.2$$

USS EX-TEN 45

$$S_r = 167 \times 12 / 22.5 = 89.1$$

		SHEET PILING PZ38		
STEEL	Regular	H.S. (55)	H.S. (50)	H.S. (45)
COVER PLATES	(5X)(5X1 3/4)	(5X)(7/8)	(5X1 1/8)	(5X1 3/8)
S_p	108.1	76.1	84.8	93.7
S_r	104.1	72.9	80.2	89.1

Cover Plate Length: top 42' of 70' (Bulkhead)B

PROJECT FLORIDA AVENUE COMPLEX	Page <u>12</u> of <u> </u>	COMPUTED BY HMB	DATE Sept. '74
SUBJECT TEMP. BYPASS CHANNEL - STEEL SHEET PILING DESIGN		CHECKED BY	DATE

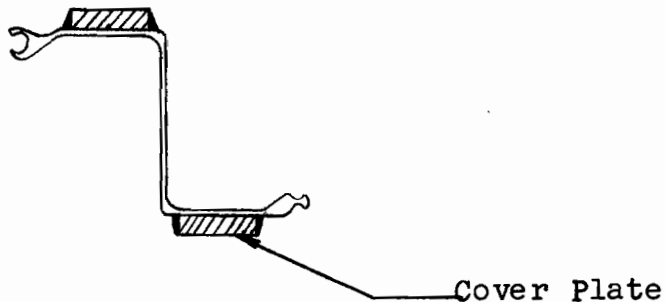
Bulkheads A & B - Wale Design
Steel Sheet pile Design

For Bulkhead A Use:

MZ-38 USS EX-TEN 55 65 ft. long
with cover plates (5X1 5/16) from 36' to 65'.

For Bulkhead B Use:

MZ-38 USS EX-TEN 55 70 ft. long with
cover plates (5X7/8) from 42' to 70'.



Design of the Wales (Use 36 ft. long wales with shear splices at tie rods.)

A uniform load of 11.50 kips/ft.

A tie rod at every 9 ft.

$$M = wL^2/9$$

$$M = 11.50(9)^2/9 = 103.5 \text{ k.}$$

$$S = M/F = 103.5 \times 12/18 = 69.0 \text{ req'd}$$

Use 2 - 15 C 40.0* (Cannels) S = 93 in³/2-C

Design Pile Connection to Wale (Use 1 Bolt/pile)

$$\text{Pull on Bolt} = 1.5T = 1.5 \times 11.5 = 17.25 \text{ kips/pile}$$

$$A = 17.25/10.5 = 1.64 \text{ in}^2$$

Use 1 3/4 ϕ bolts, root A = 1.74 in²

* Oversize wale + bolts are for stresses incurred by aligning piles.

PROJECT FLORIDA AVERNUE COMPLEX	Page <u>13</u> of <u> </u>	COMPUTED BY HMB	DATE SEPT. '74
SUBJECT TEMP. BYPAS CHANNEL STEEL SHEET PILING DESIGN		CHECKED BY	DATE

Bulkheads A & B - Tie Rod Design

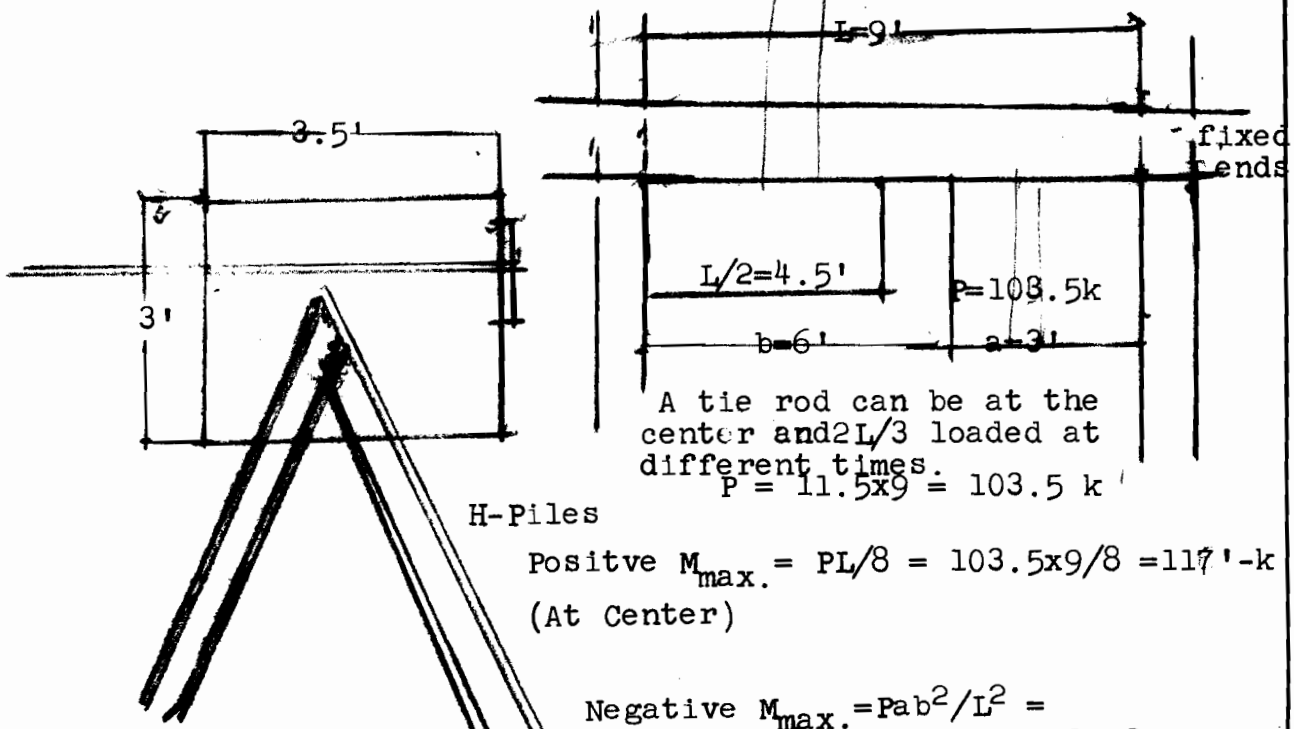
Design of the Tie Rods

A tie rod at every 9'.
 $T = P = 9(11.500) = 103.5 \text{ kips}$

$A = P/F = 103.5/18 = 5.75 \text{ in}^2$

Use 3 1/4" diam. rod

Design of the Tie rods Anchorage



A tie rod can be at the center and $2L/3$ loaded at different times.
 $P = 11.5 \times 9 = 103.5 \text{ k}$

Positive $M_{max.} = PL/8 = 103.5 \times 9/8 = 117 \text{ '-k}$
 (At Center)

Negative $M_{max.} = Pab^2/L^2 =$
 $= 103.5 \times 3 \times 6^2/9^2$
 $= 138 \text{ '-k (At One End)}$

Cross section
 Reinforced Concrete Cap
 Continuous

$V = Pb^2(3a+b)/L^3 = 103.5 \times 6^2(3 \times 3 + 6)/9^3 = 76.6 \text{ kips}$
 (At One End)

PROJECT FLORIDA AVENUE COMPLEX	Page <u>4</u> of —	COMPUTED BY HMB	DATE Sept. '74
SUBJECT TEMP. BYPASS CHANNEL - STEEL SHEET PILING DESIGN		CHECKED BY	DATE

Bulkheads A & B - Tie Rod Anchorage

Design of the Tie Rods Anchorage (Cont'd)
Long. Reinforcement

$$d_{req.} = \sqrt{VM/bk} = \sqrt{138/3 \times 152} = 17.4''$$

$$d_{prov'd} = 3.5(12) - 2 - 0.5 = 39.5''$$

$$A_s = 138/1.44 \times 39.5 = 2.43 \text{ in.}^2 \quad (\text{Positive Moment})$$

$$A_s = 117/1.44 \times 39.5 = 2.06 \text{ in.}^2 \quad (\text{Negative Moment})$$

$$\text{Bond: } U_c = 3.4\sqrt{f'_c}/D = 3.4\sqrt{3000}/0.875 = 212 \text{ psi}$$

$$\Sigma_o = V/U_c j d = 76,700/212 \times 0.875 \times 39.5 = 10.5''$$

Use 4 No. 7's on both sides

Transverse Reinforcement

$$M = pL/4 = 11.5 \times 3/4 = 8.63' \text{-k}$$

$$A_s = 8.63/1.44 \times 39 = 0.16 \text{ in.}^2$$

$$\text{Min. } A_s = 0.0025bd = 0.0025 \times 12 \times 39.5 = 1.19 \text{ in.}$$

$$\text{Bond: } \Sigma_o = 5075/212 \times 0.875 \times 39 = 0.70''/'$$

Use No. 7 at 12" all the way around (Both sides, top, and bottom)

$$\text{Shear: } V_{max} = 76.7 \text{ kips}$$

$$v = 76,700/36 \times 39.5 = 54 \times 60 \text{ psi}$$

PROJECT FLORIDA AVENUE COMPLEX	Page <u>15</u> of <u> </u>	COMPUTED BY HMB	DATE Sept. '74
SUBJECT TEMP. BYPASS CHANNEL - STEEL SHEET PILING DESIGN		CHECKED BY	DATE

Bulkheads A & B - Tie Rod Anchorage
 Longitudinal Reinforcement (Top and Bottom)

The vertical components of ± 103.5 kips for the 2 batter piles.
 Since these piles are welded together, most of this load
 does not go into the cap.

$$\text{Min. } A_s = 0.0025 \times 33.5 \times 42 = 3.52 \text{ in}^2$$

$$3.52/2 = 1.76 \text{ in}^2$$

Use 3 No. 7's both top + bottom

or ~~make~~ the top and bottom like the sides.

Use 4 No. 7's both top + bottom

Bearing Plates $F_p = 0.25f' = .750$ ksi (AISC 1.5.5)

$$A = 103.5/0.75 = 138 \text{ in}^2$$

$$12 \times 12 \text{ E} = 144 \text{ in}^2$$

$$4" \text{ } \emptyset \text{ hole} = \underline{-13}$$

131 in² slightly under

$$M = .750 \times 6^2 / 2 = 13.5 \text{ in.-k}$$

$$S \text{ M/F} = 13.5/18 = 0.75 \text{ in.}$$

Use 2" thick plate

COST ESTIMATE

- 20% -

11.6 - 9.8

PROJECT FLORIDA AVENUE COMPLEX	Page — of —	COMPUTED BY HMB 445	DATE Oct. '75
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL		CHECKED BY	DATE

Contract Estimate - Quantity Takeoff - Based on West Side

DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	COST
Channel Excavation	5,300	cu. yd.	5.00	26,500.00
Steel Sheet pile Walls USS EX-TEN 55 P 2 38	48,600	sq. ft.	8.00	388,800.00
Sheet pile Cover Plates	122,700 lb		0.75	92,025
5.1 5/16" Steel Plate, t= 1 5/16"	5,500	sq. ft.	16.00	88,000.00
5.7/8" " " t= 5/16"	90,440 lb		0.75	67,830
	6,070	sq. ft.	4.00	24,280
Wale Channels C 15X40	57360 lb		0.215	12,331.20
	1,434	ft.	11.00	15,774.00
3.25/4 Standard Pipe 4" 560	6,045	lb.	0.50	3,022.50
Tie rods 3 1/4" 935'	26,400	lb.	0.75	19,800.00
Tie Rod Anchorage	302,945	lb.	0.65	197,114.25
3.5/4 Steel H-Piles HP 14X73	3,234	ft.	13.00	42,042.00
Concrete	80	cu. yd.	100.00	8000.00
Steel Reinforcement	11,037	lb.	.40	4,414.80
				<u>620,633.3</u>
			10% Profit	62,063.3
			30% Cont.	186,199.0
			Total Cost	= 868,886.6
			One on Each Side	<u>2</u>
			Cost of Both Bypass Channel	= 1,737,773.2

178,515

(CBS 24 Oct. 75)

PROJECT FLORIDA AVENUE COMPLEX - WEST	Page <u>15</u> of <u>—</u>	COMPUTED BY HMB	DATE Oct. '75
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL		CHECKED BY	DATE

Estimate of Excavation for the Temporary Bypass Channel.

Assume the ground is at EL. 0 *

Channel: Long X Width X Depth
 216.5' X 30' X 22' / 27 = 5,300 yd³

Note - In DM estimate the excavation and back fill were computed from cross sections, not by assuming an average ground elevation.

PROJECT FLORIDA AVENUE COMPLEX - WEST	Page <u>25</u> of —	COMPUTED BY HMB	DATE Oct. '75
SUBJECT VER. LIFT GATE STR. TEMP. BYPASS CHANNEL		CHECKED BY	DATE

Steel Sheet Pile

Channel Bulkhead Wall A (depth=65 ft.)

Type: MZ-38 USS EX-TEN 55 21,200 ft²

Channel Bulkhead Wall B (depth=70 ft.)

Type: MZ-38 USS EX-TEN 55 (27,400

Total = 48,600 ft²

Cover Plates on Sheet Pile

Bulkhead A: Plates (5"X1 5/16")

2 per pile 30' Long for 220 piles = 5,500 ft²

Welds 30' long 4 per pile = 26,400 ft.

Bulkhead B: Plates (5"X5/16")

2 per pile 28' Long for 260 piles = 6,070 ft²

Welds 28' long 4 per pile = 26,120 ft.

PROJECT FLORIDA AVENUE COMPLEX - WEST	Page 45 of —	COMPUTED BY HMB	DATE Oct. 75
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL		CHECKED BY	DATE

Estimate of the material for the Tie Rods Anchorage.

For Each Tie Rod
Steel H-Piles HP 14X102 60 and 87 ft. long

$$L = 60 + 87 = 147 \text{ ft.}$$

$$\text{Weight} = 147 \times 102 = 14,994 \text{ lb. or } 15 \text{ kips}$$

For 22 Tie Rods

$$\text{Total Length of H-Piles} = 22 \times 147 = 3,234 \text{ ft.}$$

$$\text{Total Weight} = 3,234 \times 102 = 329,868 \text{ lb. or } 329.9 \text{ kips}$$

Concrete:

Continuous Anchorage

$$= 3 \times 3.5 \times 200 / 27 = 77.8 \text{ or } 80 \text{ yd}^3 \text{ of Concrete}$$

Steel Reinforcement:

Long. 4 no. 7's on each face

$$16 \times 200 = 3200 \text{ ft. of no. 7's}$$

$$\text{Weight} = 3200 \times 2.044 = 6540 \text{ lb. or } 6.540 \text{ kips}$$

Transverse No. 7 all around at 12"

$$200(2(2.5) + 2(3)) = 2200 \text{ ft. of no. 7's}$$

$$\text{Weight} = 2200 \times 2.044 = 4,497 \text{ lb. or } 5.5 \text{ kips}$$

Contract Estimate - Quantity Takeoff - Base On West Side

DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST*	COST
Channel Excavation	5,300	cu. yd.	5.00	26,500.00
Steel Sheet Pile Walls PZ 38 USS EX-TEN 55	48,600	Sq. ft.	8.00	388,800.00
Sheet Pile Cover Plates Steel Plate, t=1 5/16"	5,500	Sq. ft.	16.00	88,000.00
" " t= 5/16"	6,070	Sq. ft.	4.00	24,280.00
Wale Channels C 15X40	1,434	ft.	11.00	15,774.00
Standard Pipe 4" 560'	6,045	lb.	0.50	3,022.50
Tie Rod 3 1/4" 935'	26,400	lb.	0.75	19,800.00
Steel H-Piles HP 14X73	3,234	ft.	13.00	42,042.00
Concrete	80	cu. yd.	100.00	8,000.00
Steel Reinforcement	11,037	lb.	.40	4,414.80
Pulling Sheet Pile	48,600	sq. ft.	1.00	48,600.00
Pulling H Piles	3,234	ft.	2.00	6,468.00
Channel Backfill	5,300	cu. yd.	5.00	26,500.00
Salvage Steel	1,260	tons	40.00	50,400.00
				651,801.30
10% Profit				65,180.10
30% Contingencies				195,540.00
Total Cost =				912,521.40
One On Each Side				2
Cost Of Both Bypass Channel =				1,825,042.80

* Note: These unit costs were used for the preliminary estimate only. For the final DM estimate, the unit costs were based on the costs of the overall project. (Also 20% contingencies were used)

PROJECT FLORIDA AVENUE COMPLEX - EAST	Page <u>6E</u> of —	COMPUTED BY HMB	DATE Nov. 76
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL - ESTIMATE		CHECKED BY	DATE

Excavation for the Temporary Bypass Channel.

Assume the ground is at EL. 0

Channel: Length X Width X Depth

$$206 \times 30 \times 22' / 27 = 4,900 \text{ yd.}^3$$

Note - In the DM estimate, the excavation and backfill were computed from cross sections, not by assuming an average ground elevation.

PROJECT FLORIDA AVENUE COMPLEX - EAST	Page 7E of --	COMPUTED BY HMB	DATE Nov. 76
SUBJECT VER. LIFT GATE STR. TEMP. BYPASS CHANNEL		CHECKED BY	DATE

Steel Sheet Pile

Channel Bulkhead Wall A

Type: P~~X~~-38 USS EX-TEN 55
 340 x 65 = 22,100 ft²

Channel Bulkhead Wall B

Type: PZ -38 USS EX-TEN 55
 410 x 70 = 28,700

Total = 50,800 ft²

Cover Plates on Sheet Pile

Bulkhead A: Plates (5"X1 5/16")

2 per 29' long for 230 piles

2 x 29 x 230 x 5/12 = 5560 ft²

~~Bulkhead A: Welds 29' long 4 per pile~~

4x29x230 = 26,680 ft.

Bulkhead B: Plate (5"X 7/8")

2 x 28 x 275 x 5/12 = 6420

Welds 28' long 4 per pile

4x28x275 = 30,800

PROJECT FLORIDA AVENUE COMPLEX - EAST	Page 8E of —	COMPUTED BY HMB	DATE Nov. 76
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL - ESTIMATE		CHECKED BY	DATE

Material for the Tie Rods Anchorage

For Each Tie Rod

Steel H-Piles HP 14X73, Length 60 and 87 ft.

$$L = 60 + 87 = 147 \text{ ft.}$$

For 23 Tie Rods

$$\text{Total Length of H-Piles} = 23 \times 147 = 3,381 \text{ ft.}$$

$$\text{Concrete} = 3 \times 3.5 \times 225 / 27 = 87.5 \text{ or } 90 \text{ yd}^3$$

Steel Reinforcement

Long. 4 no. 7's on each face

$$16 \times 225 = 3600 \text{ ft. of no. 7's}$$

$$\text{Weight} = 3600 \times 2.044 = 7,360 \text{ lb.}$$

Transverse No. 7 all around at 12"

$$225(2(2.5) + 2(3)) = 2475 \text{ of No. 7's}$$

$$\text{Weight} = 2475 \times 2.044 = 5,060$$

$$\text{Total Steel Reinforcement} = 12,420 \text{ lb.}$$

PROJECT FLORIDA AVENUE COMPLEX - EAST	Page <u>9E</u> of —	COMPUTED BY HMB	DATE Nov. 76
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL - ESTIMATE		CHECKED BY	DATE

The wales for the Steel Sheet Pile Walls Bulkhead

Channel for Bulkhead Wall A:

Wale 2 Channels C 15X40

2X340 = 680 ft.

Channel for Bulkhead Wall B:

Wale 2 Channels C 15X40

2X410 = 820

Channel C 15X40 = 1,500 ft.

Tie Rods 3 1/4 dia., Length 1460 ft.

Weight = $0.7854(3.25)^2 1460 \times 490 / 144 = 41,200$ lb.

Struts Standard Pipe 4" dia., Length 640 ft.

640 x 10.79 = 6,905 lb.

Steel summary

5 x 1 3/16" R 5560 ft² (22.31) = 124,040 lb

5 x 7/8" R 6420 ft² (14.9) = 95,660 lb

Channels 1500 ft (40.0) = 60,000 lb

Tie Rods 41,200

Pipe struts 6,900

327,800

PROJECT FLORIDA AVENUE COMPLEX - EAST	Page <u>106</u> of <u> </u>	COMPUTED BY HMB	DATE Nov. 76
SUBJECT VER. LIFT GATE STR. - TEMP. BYPASS CHANNEL - ESTIMATE		CHECKED BY	DATE

CONTRACT ESTIMATE - QUANTITY TAKEOFF - BASE ON EAST SIDE

DESCRIPTION	ESTIMATED QUANTITY	UNIT
Channel Excavation	4,900	cu. yd.
Steel Sheet Pile Walls PZ-38 USS EX-TEN 55	50,800	sq. ft.
Sheet Pile Cover Plates Steel Plate, t=1 5/16"	5,560	sq. ft.
Steel Plate, t= 7/8"	6,420	sq. ft.
Wale, Channels C 15X40	1,500	ft.
Struts ,Standard Pipe 4" Length = 640'	6,905	lb.
Tie Rod 3 1/4" Length=1460'	41,200	lb.
Steel H-Piles HP 14X73	3,381	ft.
Concrete	90	cu. yd.
Steel Reinforcement	12,420	lb.
Pulling Sheet Piles	50,800	sq. ft.
Pulling H-Piles	3,381	ft.
Channel Backfill	4,900	cu. yd.
Salvage Steel	1,250	tons

_____ SOMMER *nd*
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~~_____ 3 DD~~
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_____ DG
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: _____ RELEASE
: _____ FILE
: _____ DESTROY

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

REFERENCE OR OFFICE SYMBOL

SUBJECT

LMNED-FS

Florida Avenue Complex - Temporary Bypass

TO Chief, Design Branch

FROM Chief, F&M Branch

DATE 20 Aug 74

CMT 1

Mr. Cali/mhg/885-7104

1. Forwarded for your information is the design criteria for the Florida Avenue Complex - Temporary Bypass, including the pile design for the deadman supports.
2. Inclosures 1 and 2 contain plan and elevation views of the Temporary Bypass Channel. The tieback cables and struts should be designed to carry 11,500 pounds per foot for bulkhead A and floodwall B, respectively. Pressure diagrams for critical cases of bulkhead A and floodwall B with sheetpile tips as stated in para. 3 are attached as inclosure 5. If it is desired to drive the sheetpile deeper, pressure diagrams and tieback forces will be furnished upon request. The factor of safety used in analyzing sheetpile walls is 1.25. The struts and cables, as tie back forces, are to be located every 10 ft.
3. There are two cases that yield the critical design load: Case 1, with the water level at 0.0M.S.L. in the bypass and outside bulkhead A and the canal excavation at -22.0 M.S.L.; and Case 2, with the water level at -16.0 M.S.L. in the bypass and outside bulkhead A and the canal excavation at -22.0 M.S.L. (see inclosure 3). Both cases yield the maximum design force of 11,500 pounds per foot. For these two cases, and the design force of 11,500 pounds per foot, the minimum sheetpile penetration should be as follows: bulkhead A (without shell, typical section), -60.0 M.S.L.; bulkhead A (with shell, construction access ramp section), -65.0 M.S.L.; and floodwall B, -70.0 M.S.L.
4. The critical case for bulkhead A occurs on the west side (A=11,500 pounds and B=0 for case 2), and the critical case for B occurs on the east side (A=0 and B=11,500 pounds for case 1). Therefore, the maximum force that can be exerted on the deadman is 11,500 pounds per foot. For a batter slope of 2 on 1, the pile force is 85 tons in compression and 85 tons in tension, which gives a pile penetration of el. -57.0 M.S.L. in compression and el. -82.0 M.S.L. in tension, using a factor of safety of 1.25. The pile design sketch and calculations are furnished as inclosure 4. These calculations are based on the field pile test, Florida Avenue to I.H.N.C. Lock, using 14"x14" steel H-piles.
5. The temporary bypass channel and deadman design pertain only to the south side of the permanent canal, as shown. The design is not symmetrical. The analysis of the north side of the canal will include a cellular cofferdam which is being studied at the present, and will be forwarded upon completion.
6. The above information applies to both the west side and east side of the Florida Avenue Complex. Since this is a temporary bypass channel, construction of the west side first will enable those materials to be utilized in the construction of the east side at a later date.

5 Incl.

1. Plan views (east & west side), 2 plates
2. Elev. views, typical & Const. Access Ramp
3. Sketch, water surface elevs., critical cases 1 & 2
4. Pile Design & sketch, 1 plate
5. Pressure diagrams, bulkhead A & floodwall B, 3 plates

CANNON

CF: Design Memo Branch

W/O INCL.

DA FORM 2496
1 FEB 62

REPLACES DD FORM 56, EXISTING SUPPLIES OF WHICH WILL BE
ISSUED AND USED UNTIL 1 FEB 63 UNLESS SOONER EXHAUSTED.

GPO : 1968 O - 322-600

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

REFERENCE OR OFFICE SYMBOL

LMNED-FS

SUBJECT

Floodwall Temporary Bypass

TO Chief, Design Branch

FROM Chief, F&M Branch

DATE 20 Aug 74

CMT 1

Mr. Cali/mhg/885-7104

1. Forwarded for your information is the design criteria for the Florida Avenue Complex - Temporary Bypass, including the pile design for the deadman supports.
2. Inclosures 1 and 2 contain plan and elevation views of the Temporary Bypass Channel. The tieback cables and struts should be designed to carry 11,500 pounds per foot for bulkhead A and floodwall B, respectively. Pressure diagrams for critical cases of bulkhead A and floodwall B with sheetpile tips as stated in para. 3 are attached as inclosure 5. If it is desired to drive the sheetpile deeper, pressure diagrams and tieback forces will be furnished upon request. The factor of safety used in analyzing sheetpile walls is 1.25. The struts and cables, as tie back forces, are to be located every 10 ft.
3. There are two cases that yield the critical design load: Case 1, with the water level at 0.0 M.S.L. in the bypass and outside bulkhead A and the canal excavation at -22.0 M.S.L.; and Case 2, with the water level at -16.0 M.S.L. in the bypass and outside bulkhead A and the canal excavation at -22.0 M.S.L. (see inclosure 3). Both cases yield the maximum design force of 11,500 pounds per foot. For these two cases, and the design force of 11,500 pounds per foot, the minimum sheetpile penetration should be as follows: bulkhead A (without shell, typical section), -60.0 M.S.L.; bulkhead A (with shell, construction access ramp section), -65.0 M.S.L.; and floodwall B, -70.0 M.S.L.
4. The critical case for bulkhead A occurs on the west side (A=11,500 pounds and B=0 for case 2), and the critical case for B occurs on the east side (A=0 and B=11,500 pounds for case 1). Therefore, the maximum force that can be exerted on the deadman is 11,500 pounds per foot. For a batter slope of 2 on 1, the pile force is 85 tons in compression and 85 tons in tension, which gives a pile penetration of el. -57.0 M.S.L. in compression and el. -82.0 M.S.L. in tension, using a factor of safety of 1.25. The pile design sketch and calculations are furnished as inclosure 4. These calculations are based on the field pile test, Florida Avenue to I.H.N.C. Lock, using 14'x14' steel H-piles.
5. The temporary bypass channel and deadman design pertain only to the south side of the permanent canal, as shown. The design is not symmetrical. The analysis of the north side of the canal will include a cellular cofferdam which is being studied at the present, and will be forwarded upon completion.
6. The above information applies to both the west side and east side of the Florida Avenue Complex. Since this is a temporary bypass channel, construction of the west side first will enable those materials to be utilized in the construction of the east side at a later date.

5 Incl.

1. Plan views (east & west side), 2 plates
2. Elev. views, typical & Const. Access Ramp
3. Sketch, water surface elevs., critical cases 1 & 2
4. Pile Design & sketch, 1 plate
5. Pressure diagrams, bulkhead A & floodwall B, 3 plates

E. Cannon
CANNON

CF: Design Memo Branch

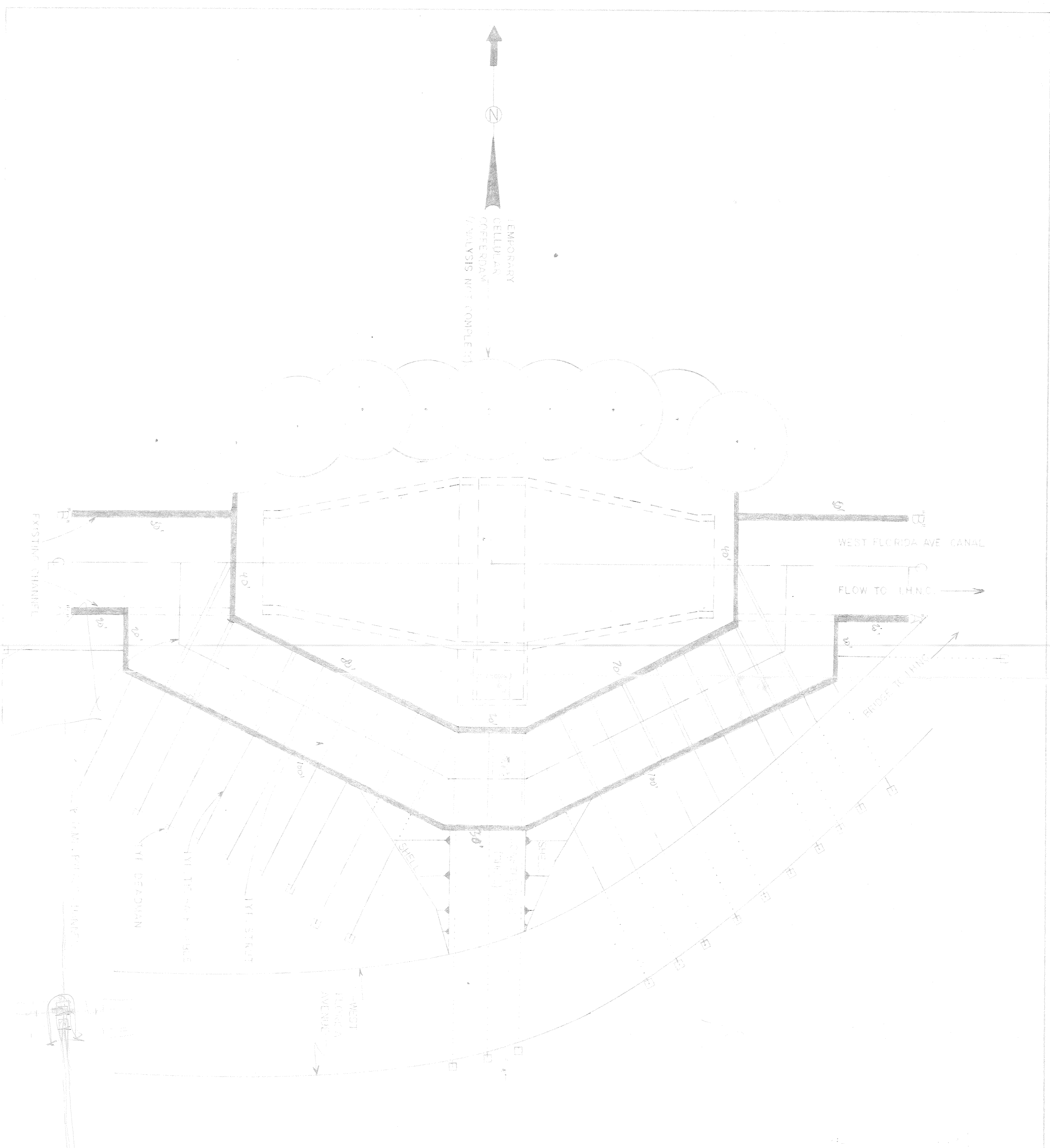
w/o Incl.

DA FORM 2496
1 FEB 62

REPLACES DD FORM 96, EXISTING SUPPLIES OF WHICH WILL BE
ISSUED AND USED UNTIL 1 FEB 63 UNLESS SOONER EXHAUSTED.

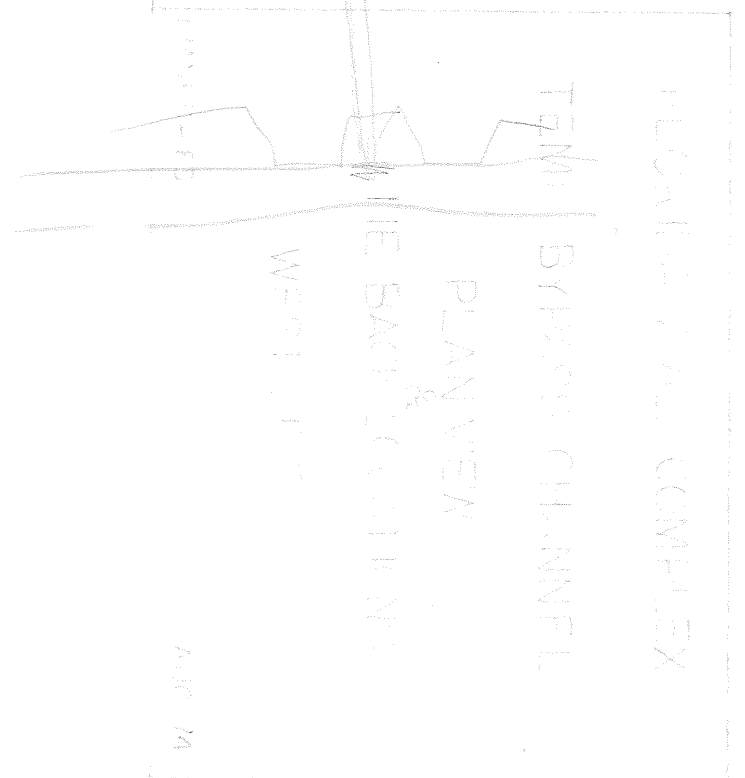
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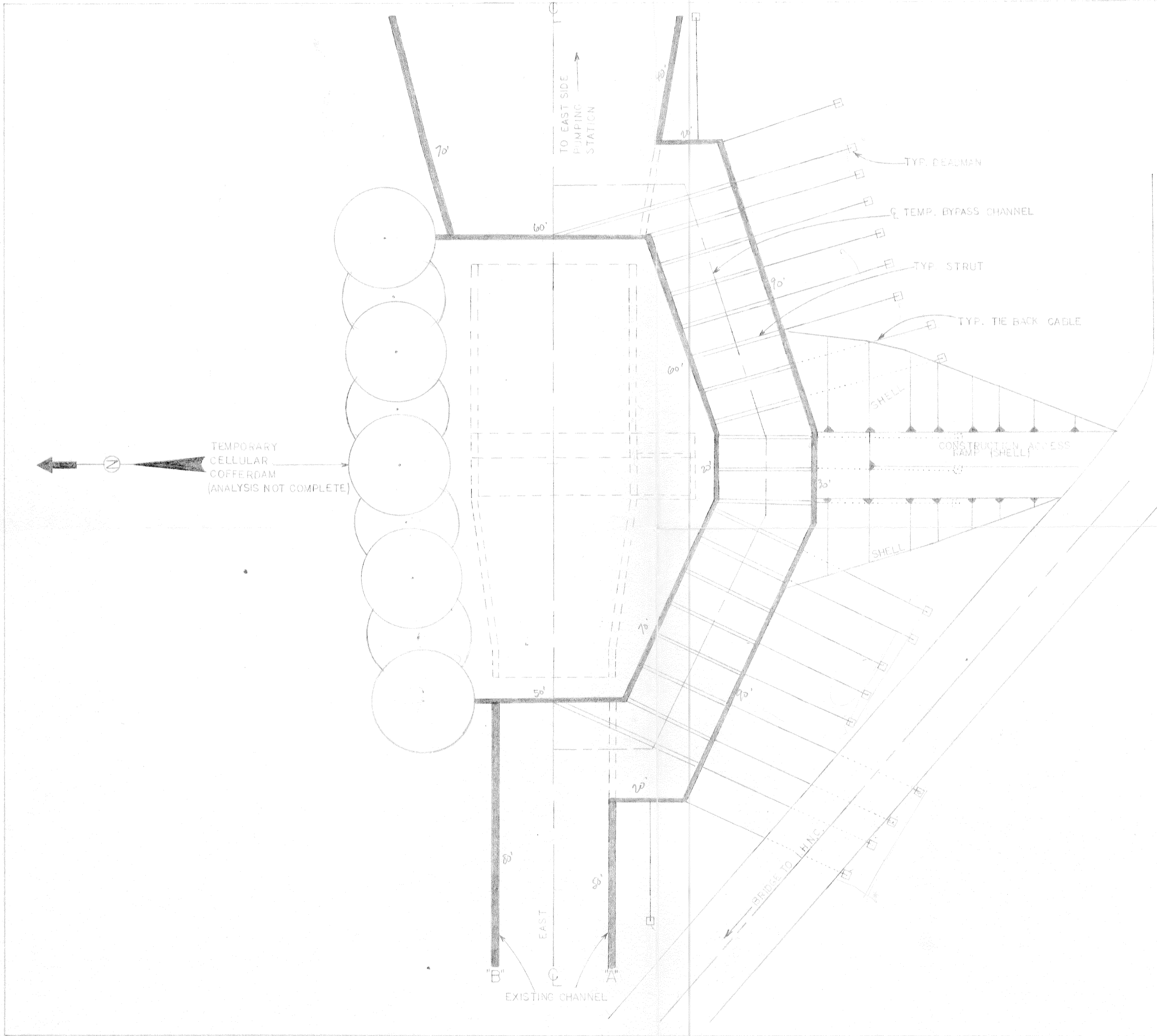
TEMPORARY
CELLULAR
COFFERDAM
(ANALYSIS NOT COMPLETE)



NOTE
 THE WALLS ARE TO BE ENCASED IN STEEL
 AND SHIELD THROUGH A 12" GAP AND SHIELD
 ALONG AVENUE DUE TO LIMITED SPACE, WHERE
 NECESSARY, THEY ARE COATED EVERY 10'
 THEREBY, THE VARI. MINIMUM DIST. IS 25 FT.
 STEEL SHEET PILING FOR W. IS TO BE AT ELEV.
 -65.0 MTL WHERE THE SHELL PARALLEL IS
 A TARGET FOR THE INVESTIGATION RAMP,
 THE REST IS TO BE AT ELEV. -66.0 MTL. THE
 SHEET PILING FOR "B" IS AT ELEV. -70.0 MTL.

SCALE: 1"=20'





NOTES

TIE BACK CABLES ARE TO BE ENCASED IN STEEL AND DRIVEN THROUGH ACCESS RAMPS AND UNDER FLORIDA AVENUE DUE TO LIMITED SPACE, WHERE NECESSARY. THEY ARE LOCATED EVERY 10'.

TIEBACK LENGTHS VARY, MINIMUM DIST. IS 35 FT.

STEEL SHEET PILING FOR "A" IS TO BE AT ELEV. -65.0 M.S.L. WHERE THE SHELL BACKFILL IS AGAINST IT FOR THE CONSTRUCTION RAMP, THE REST IS TO BE AT ELEV. -60.0 M.S.L. THE SHEET PILING FOR "B" IS AT ELEV. -70.0 M.S.L.

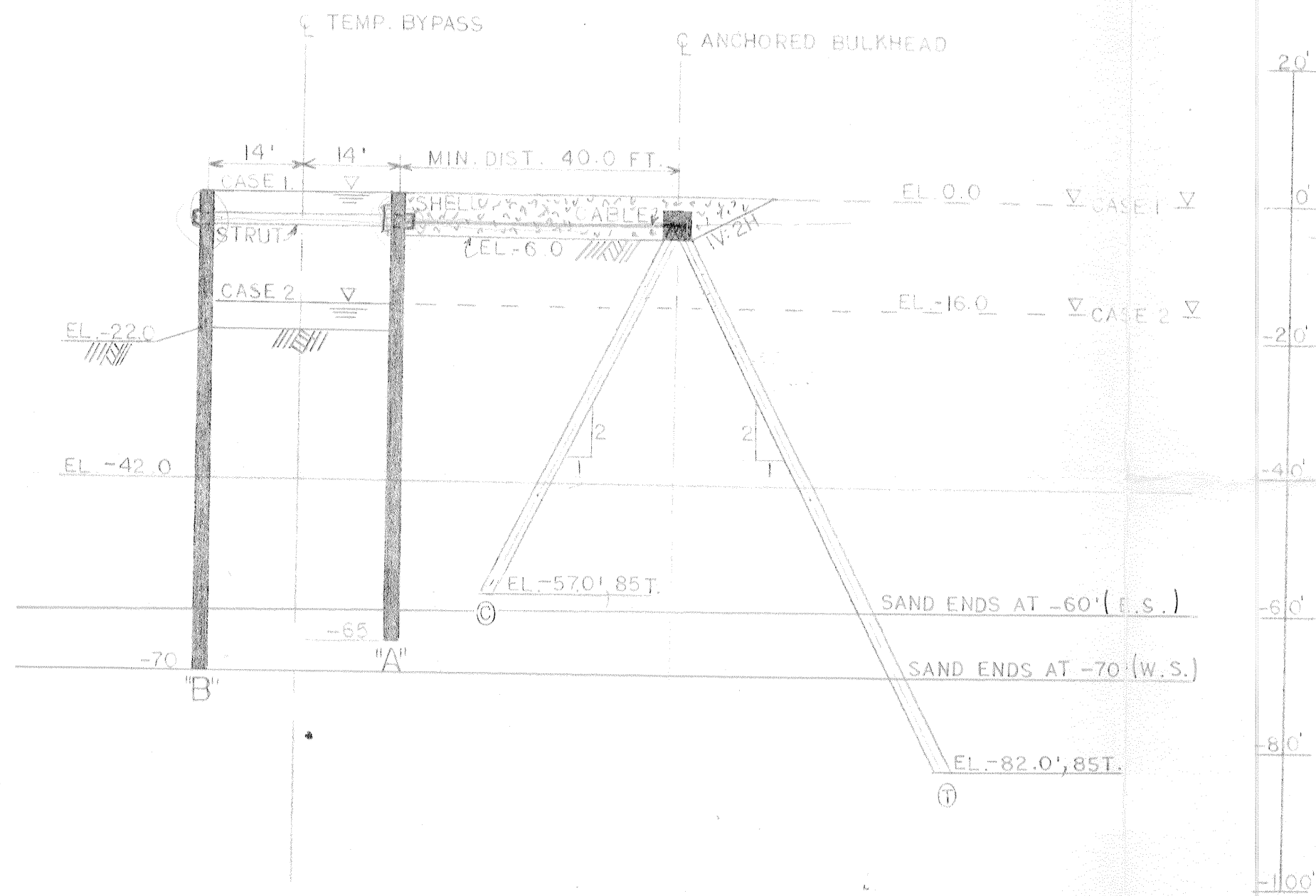
SCALE: 1"=20'

FLORIDA AVE. COMPLEX
 TEMP. BYPASS CHANNEL
 PLAN VIEW
 &
 TIE BACK LOCATIONS
 EAST SIDE

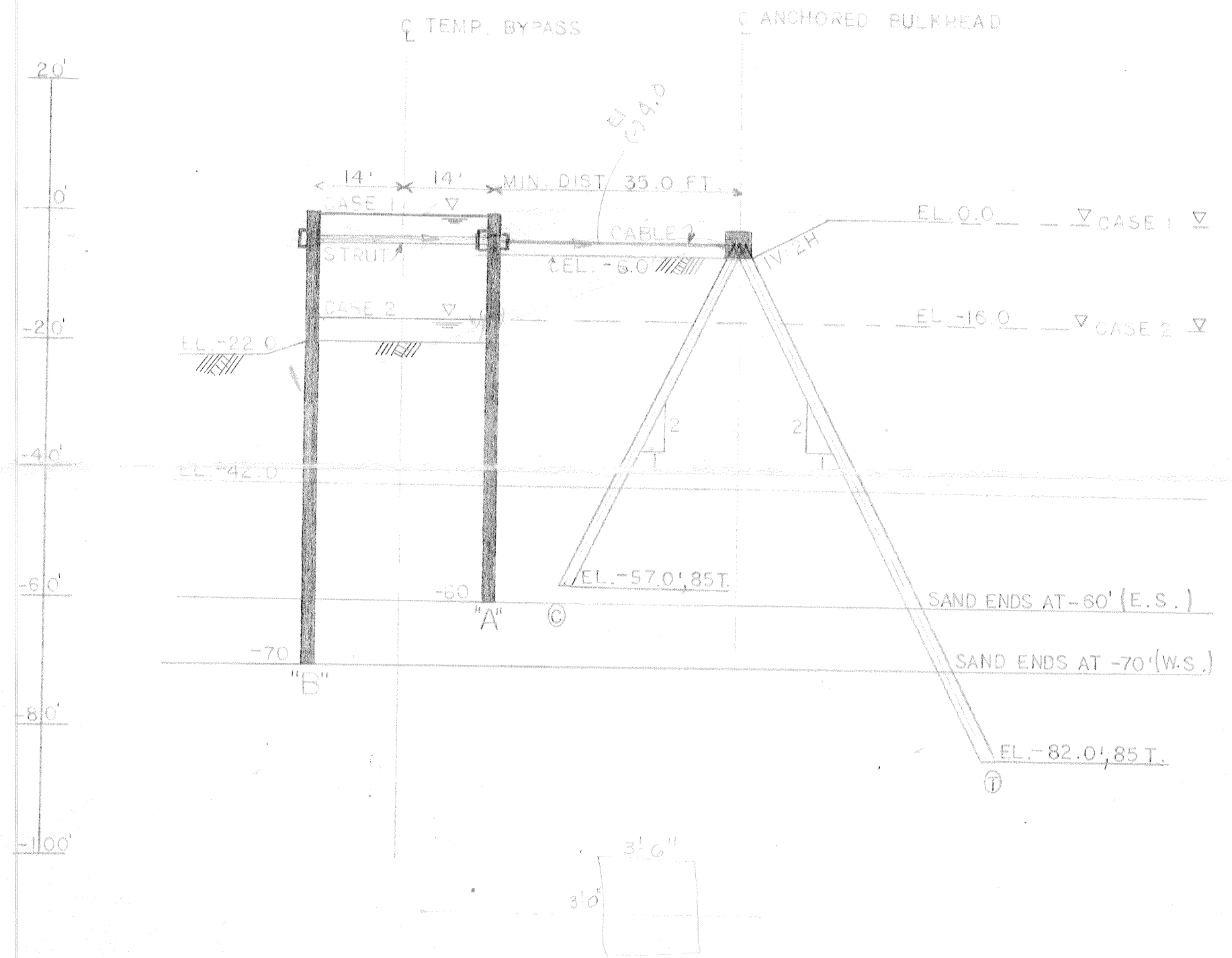
LMNED-FS AUG. 74

1/26/74 / 2012

CONSTRUCTION ACCESS RAMP ELEV VIEW
(WITH SHELL)



TYPICAL ELEVATION VIEW
(WITHOUT SHELL)



SCALE: 1" = 20'

NOTES

THE MAXIMUM FORCE ON THE DEADMAN OCCURS WHEN A=11,500 LBS. AND B=0, WITH THE WATER LEVEL AT -16.0 M.S.L. (CASE 2); ALSO, WHEN B=11,500 LBS. AND A=0, WITH THE WATER LEVEL AT 0.0 M.S.L. (CASE 1). THIS GIVES A MAXIMUM DESIGN FORCE OF 11,500 LBS.

THE DESIGN FORCES:

STRUTS: - ANCHOR TO "B" - 11,500 LBS.

CABLES: - ANCHOR TO "A" - 11,500 LBS.

STRUTS AND CABLES JOIN AT "A", ELEV. -4.0' M.S.L.

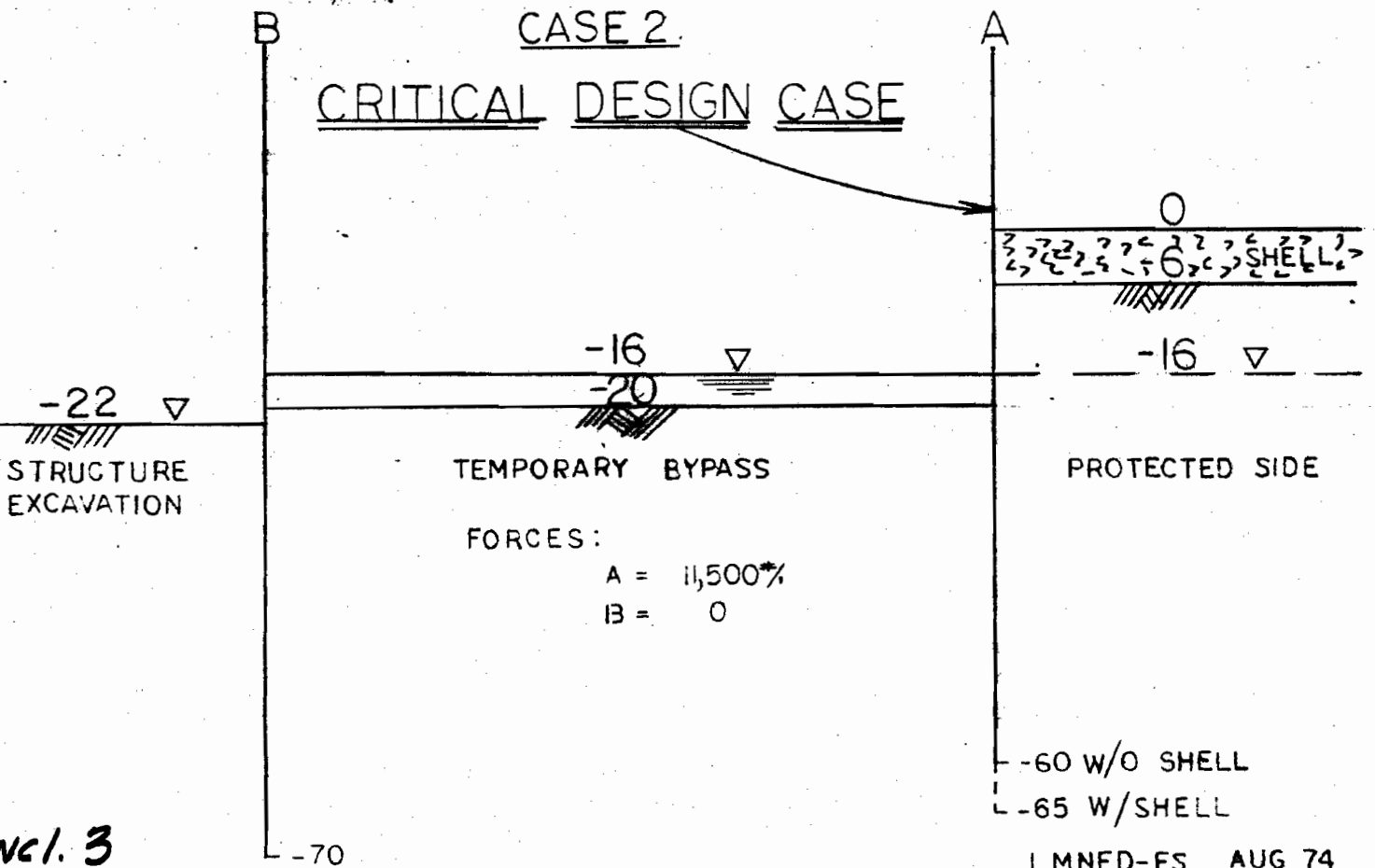
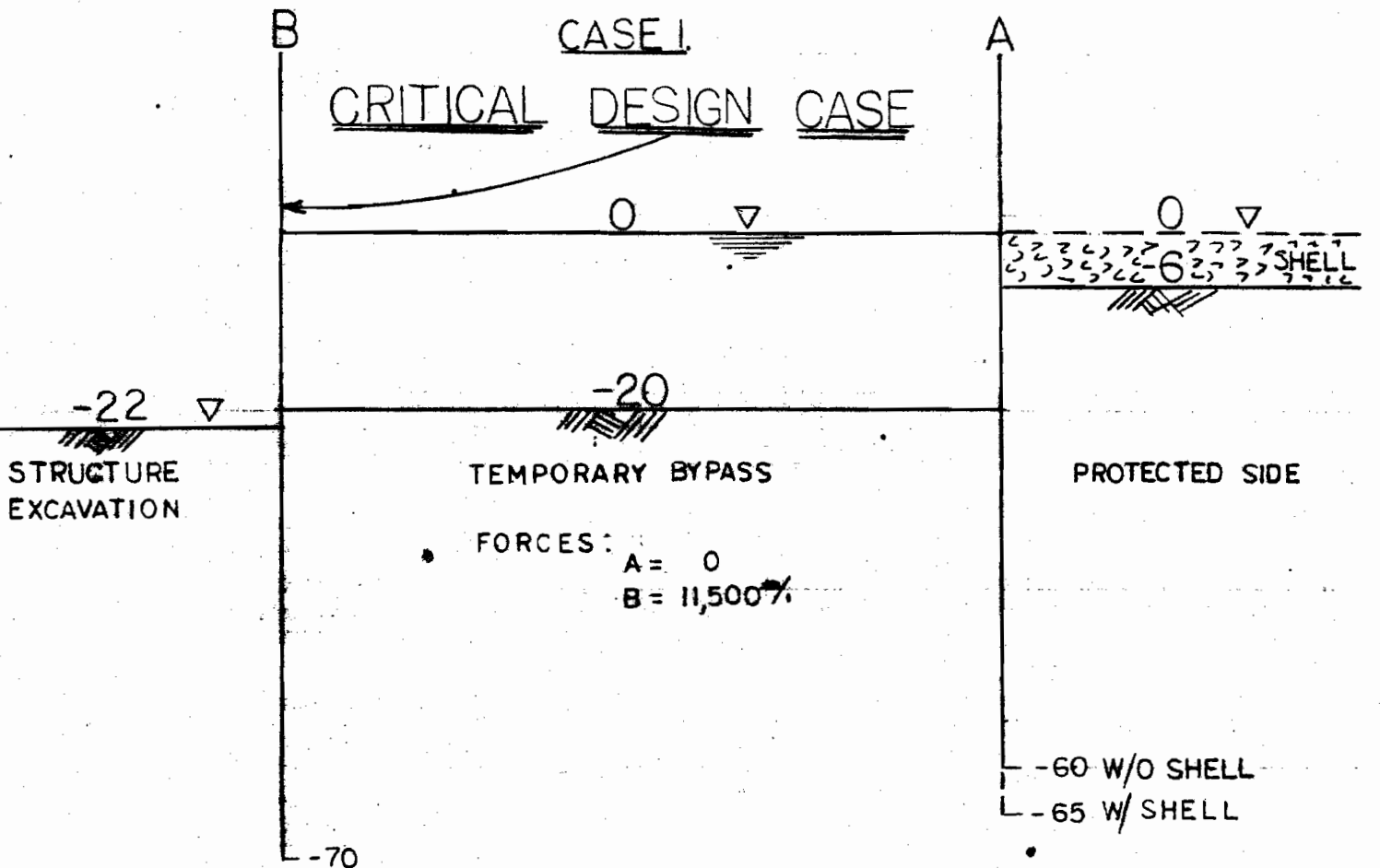
THE F.O.S. = 1.25 FOR SHEET PILE BULKHEADS AND 1.25 FOR H-PILE SUPPORTS.

THE VIEWS SHOWN ARE FROM THE WEST SIDE, BUT PERTAIN TO BOTH THE WEST SIDE AND THE EAST SIDE.

FLORIDA AVE. COMPLEX
TEMP. BYPASS CHANNEL
ELEVATION
VIEWS
EAST SIDE & WEST SIDE

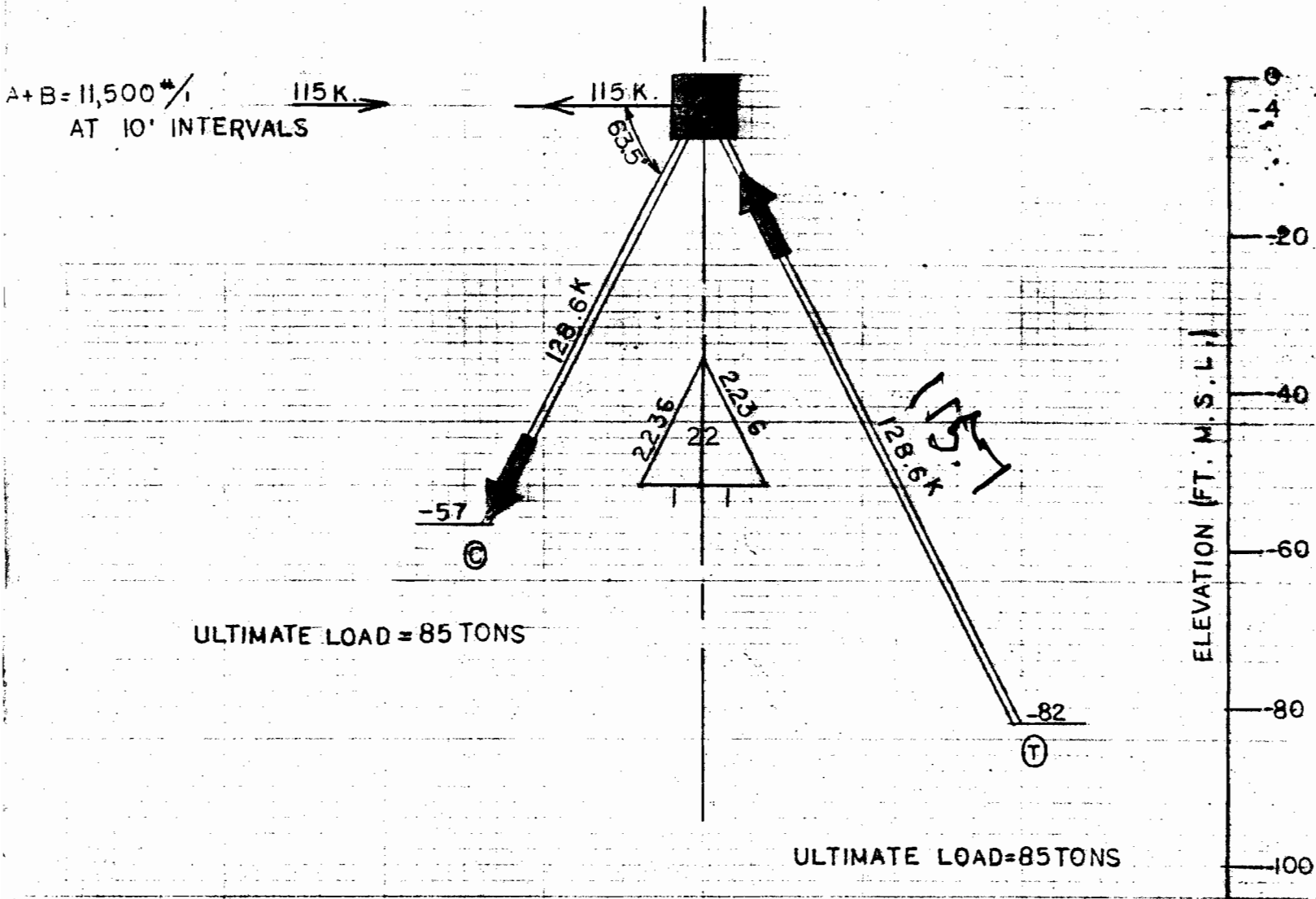
WATER CONDITIONS

SCALE: 1" = 20'



Incl. 3

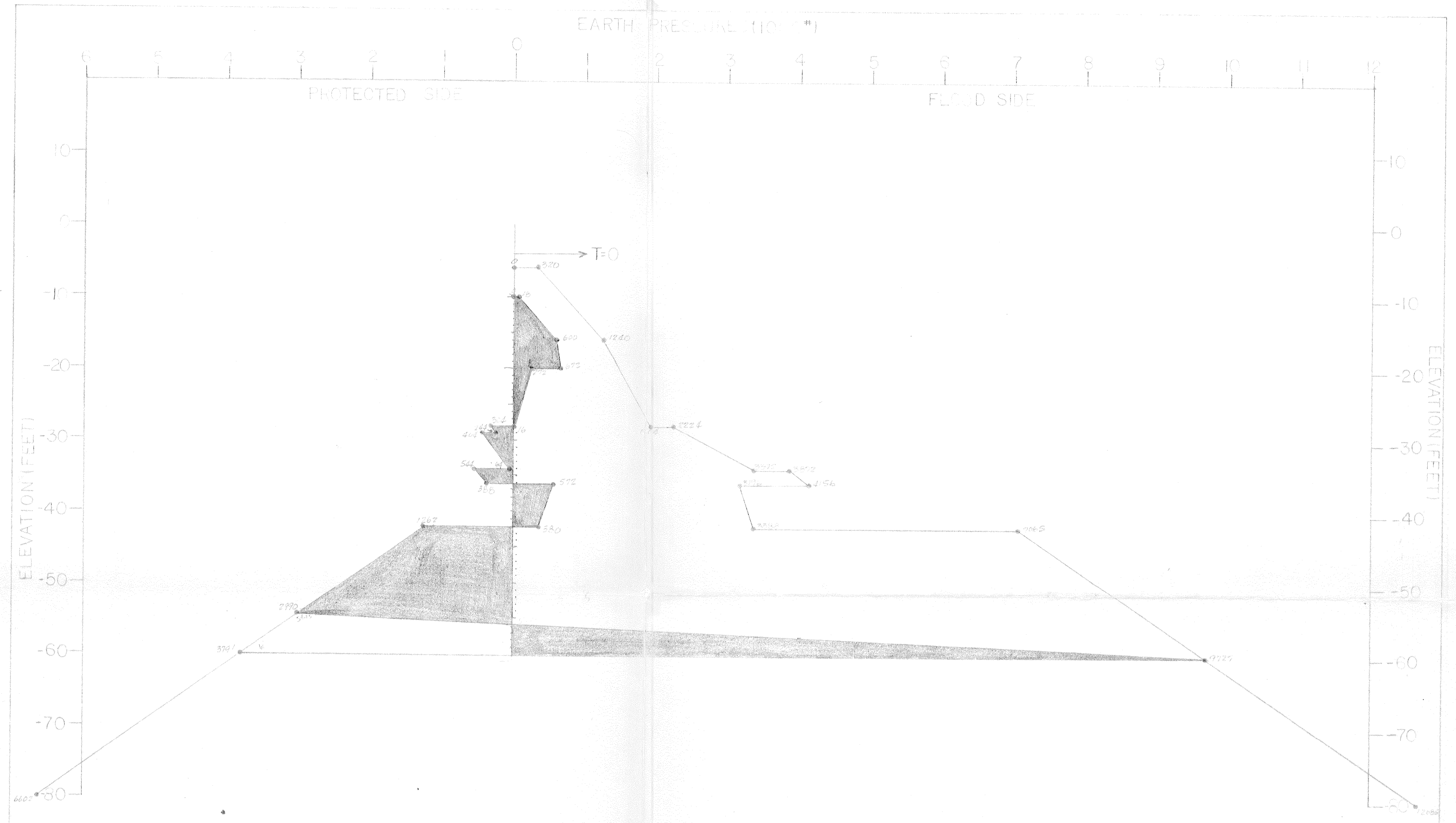
FLORIDA AVE. COMPLEX PILE DESIGN SKETCH



PILE DESIGN BASED ON FIELD PILE TEST —
 FLORIDA AVE. TO I.H.N.C. LOCK
 USE 14"X14" STEEL H PILES,
 2 ON BATTER SLOPE,
 2 PILE CLUSTER.
 PILE LOAD VALUES SHOWN INCLUDE A
 F.O.S. = 1.25

SCALE: 1" = 20'
 LMNED-FS AUG 74

INCL. 4



TENSION CRACK
 FLOOD SIDE: -33.32' MSL
 PROTECTED SIDE: -9.41' MSL
 FORCE OF WATER = 0

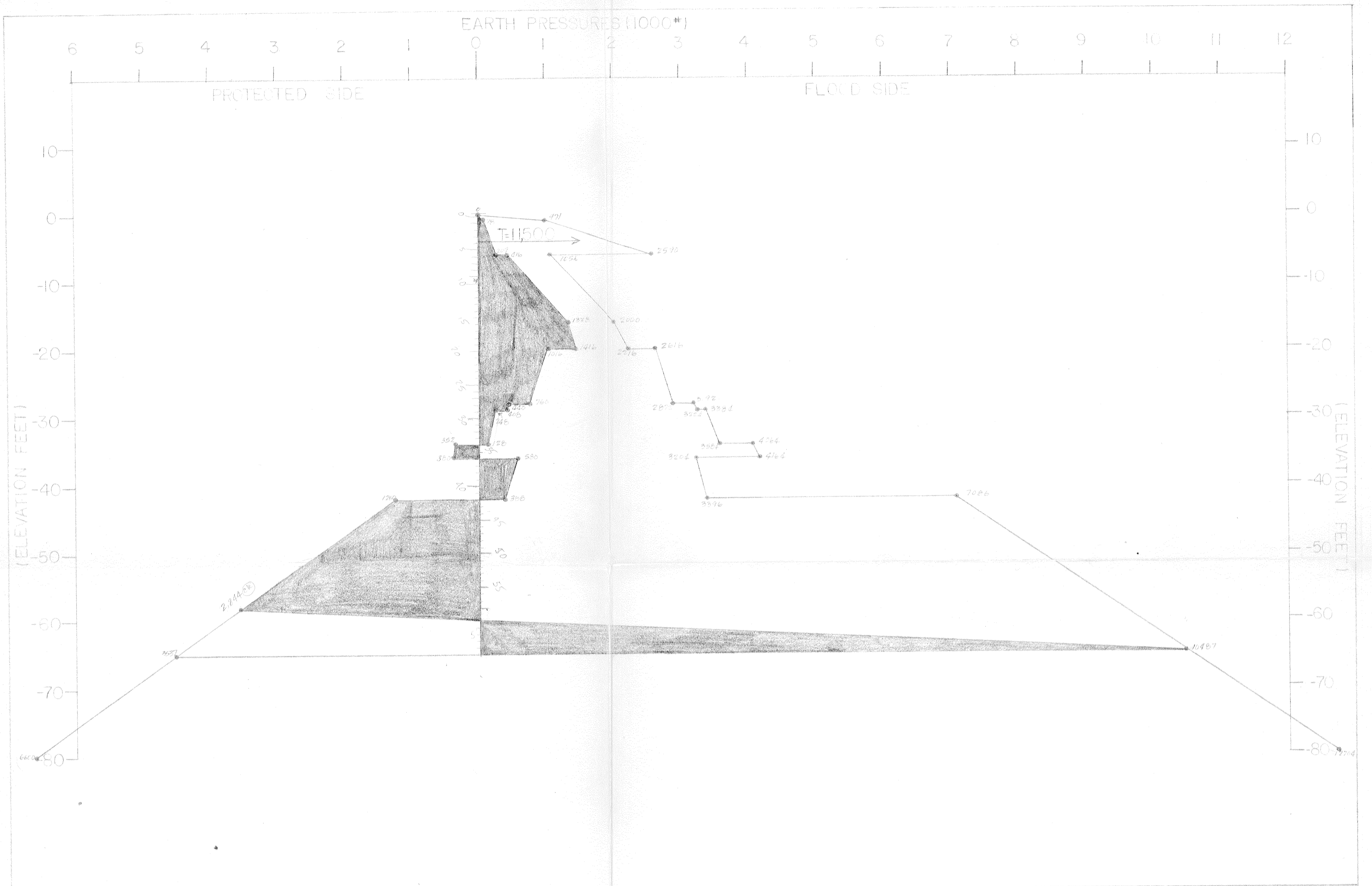
TIE BACK FORCE T=0
 F.O.S. = 1.25
 CASE 2 (WATER LEVEL AT -16 IN THE BYPASS
 AND -22 IN THE EXCAVATION)

FLORIDA AVE. COMPLEX
 EARTH PRESSURES
 AND
 NET FORCE DIAGRAM —
 BULKHEAD "A"
 (FOR SECTIONS WITHOUT SHELL)
 (TIP PENETRATION = -60.0MSL)

LMNED-FS
 AUG 74

Inc. 5 / of 3

21
31.5



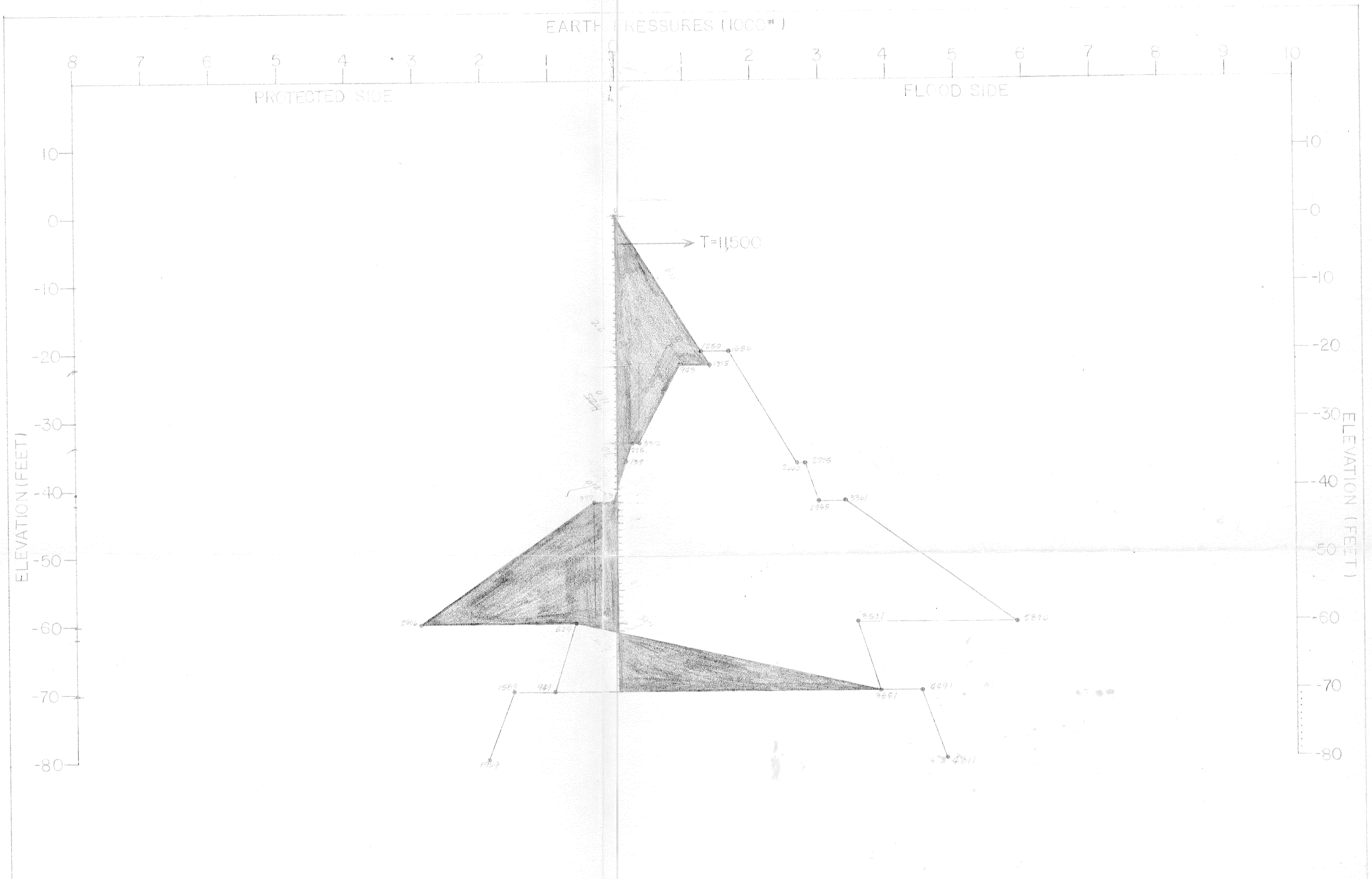
NO TENSION CRACK
FORCE OF WATER = 0

TIE BACK FORCE T=11,500#/FT. AT -4.0' MSL.
F.O.S. = 1.25
CASE 2 (WATER LEVEL AT -16 IN THE BYPASS
AND -22 IN THE EXCAVATION)

FLORIDA AVE. COMPLEX
EARTH PRESSURES
AND
NET FORCE DIAGRAM
BULKHEAD "A"
(FOR SECTIONS WITH SHELL FOR A
CONSTRUCTION ACCESS RAMP.)
(TIP PENETRATION = -65.0 MSL.)

LMNED-FS
AUG 74

Incl. 5 2 of 3



TENSION CRACK
 FLOOD SIDE: -33.32' M.S.L.
 PROTECTED SIDE: -36.38 M.S.L.
 FORCE OF WATER = 0 AT 0.0 M.S.L. TO 13.75'
 AT -22.0 M.S.L.

TIE BACK FORCE T=11,500#/FT. AT -4.0' M.S.L.
 F.O.S. = .25
 CASE 1 (WATER LEVEL AT 0 IN THE BYPASS
 AND -22 IN THE EXCAVATION)

FLORIDA AVE. COMPLEX
 EARTH PRESSURES
 AND
 NET FORCE DIAGRAM
 FLOODWALL "B"
 (TIP PENETRATION=-70.0 M.S.L.)

LMNED-FS AUG 74

INCL. 5 of 3