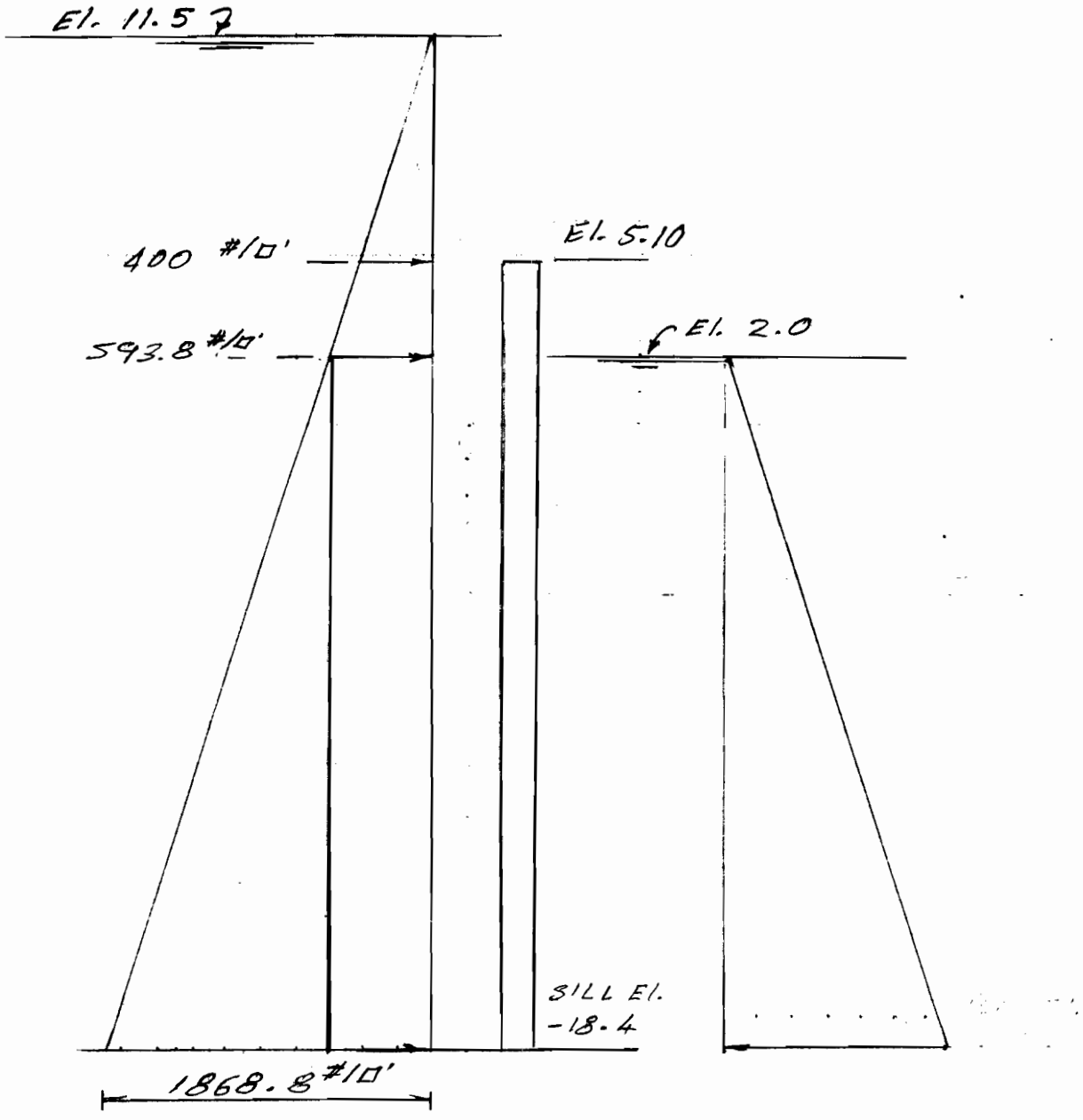
COMPUTATION SHEET

PROJECT 17th Street Canal GDM	PAGE 1 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

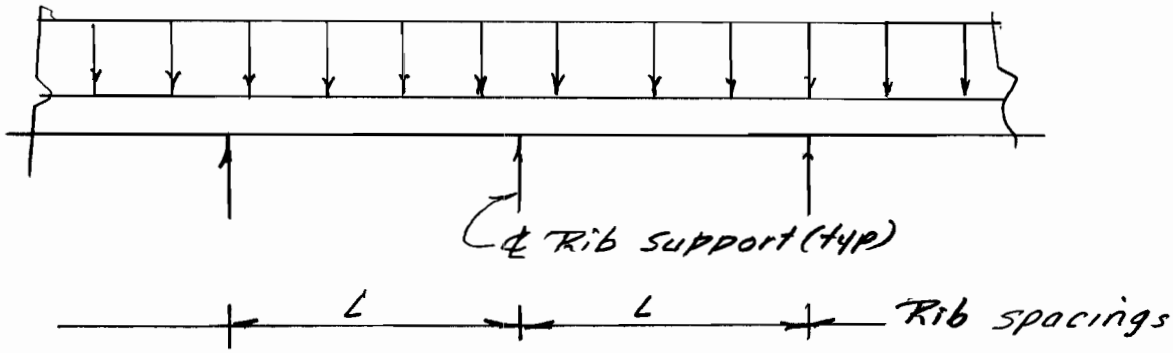


PROJECT 17th Street Canal GDM	PAGE 2 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

SKIN PLATE

Per Ft. ht of skin plate, @ El. -18.4

$p = 1869$ #/ft. (From lakeside)



$M = \frac{pL^2}{12}$ (EM 1110-2-2702)

$= 1869L^2 \times \frac{12}{12}$

$= 1869L^2$ in-lbs

$F_a = 0.625\ F_y$ $F_y = 36$ ksi

$= 0.625 \times 36000$

$= 22{,}500$ psi

$S = \frac{1}{6} b t^2$ - Use ½" thick skin plate.

$= \frac{1}{6} \times 12 \times 0.5^2$

$= 0.5$

$M = F_a \cdot S$

$1869L^2 = 22500 \times 0.5$

$L = 2.45$ Use $L = 2'\text{-}4''$ Max.

PROJECT 17th Street Canal GDM	PAGE 3 OF 19	COMPUTED BY MSD	DATE
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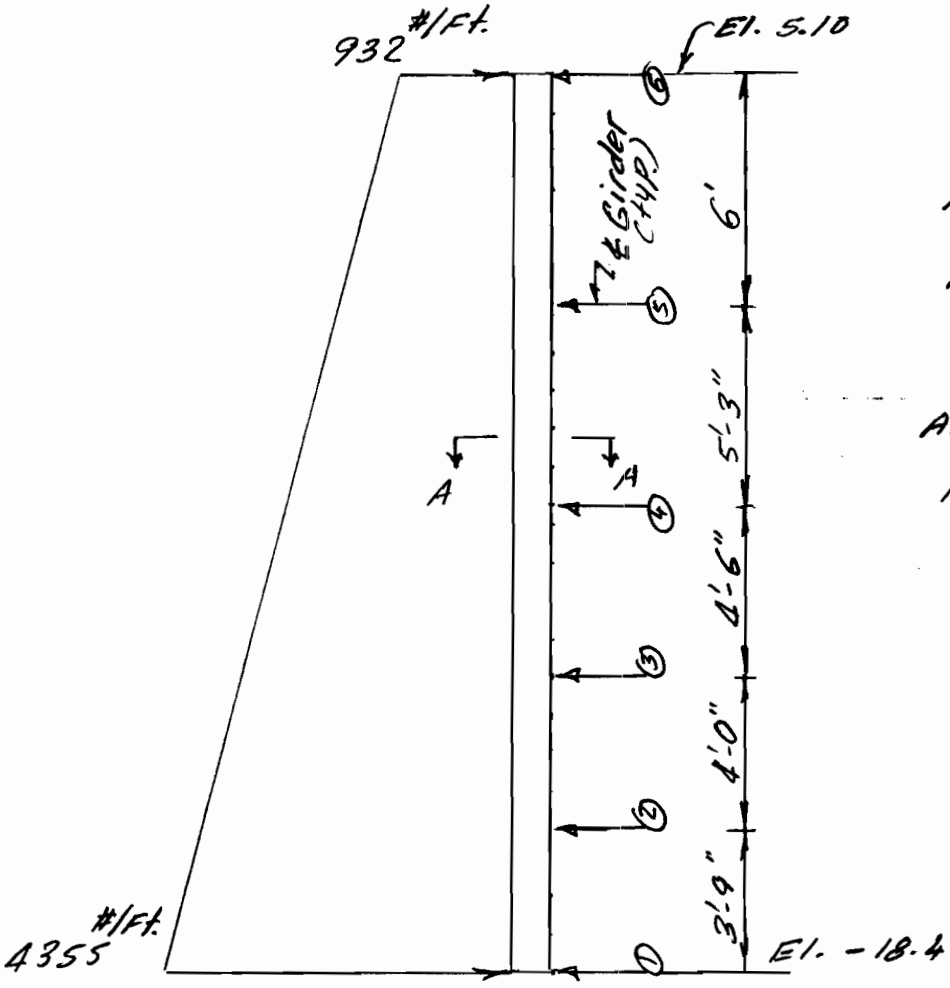
Rib Design



At El. 5.10

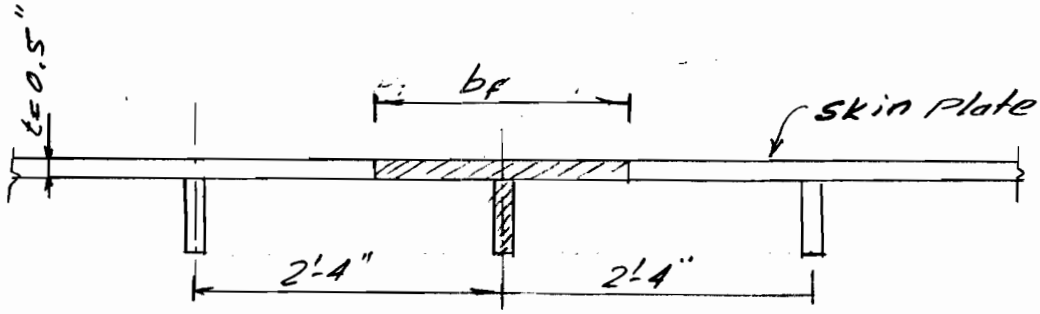
P_1 = 400 x Rib spac.

= 932 #/Ft. ht.

At El. -18.4

P_2 = 1869 x Rib spac.

= 4355 #/Ft. ht.



SECTION A-A

PROJECT 17th Street Canal GDOOR	PAGE 4 OF 19	COMPUTED BY	DATE
SUBJECT Butterfly Gate structure		CHECKED BY	DATE

RIB DESIGN (CONT.)

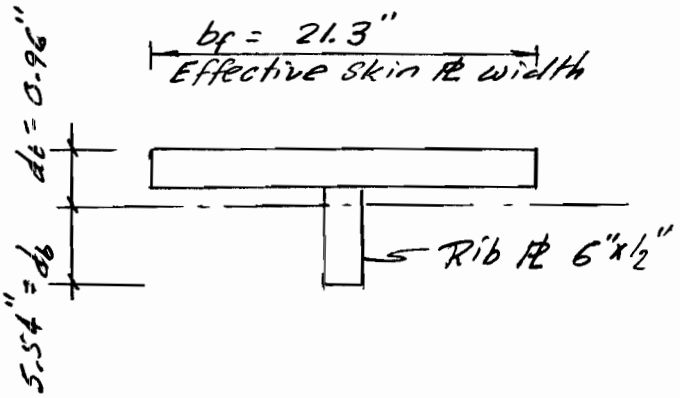
For skin plate,

Effective skin plate width-

$$b_f = 1.5\, t \left(\frac{E}{F_y}\right)^{1/2}$$

$$= 1.5 \times 0.5 \left(\frac{29000}{36}\right)^{1/2}$$

$$= 21.3"$$



For rib plate

$$\frac{b}{t} \leq 95/\sqrt{F_y}$$

$$b \leq 0.5 \times 95/(36)^{1/2}$$

$$\leq 7.92 \qquad \text{use } \tfrac{1}{2} \times 6"$$

section Property.

A_f = 13.65 □", $A_{rib} = 6 \times 0.5 = 3$ □"

$I = 33.94$ in^4

$S_T = 35.36$ in^3

$S_B = 6.12$ in^4

From CFRAME analysis,

Max Moment @ Support 2

$M = 69330$ in-lb

Max. Shear @ support 2

$V = 9019$ lbs

$F_a = 0.5 F_y = 18{,}000$ psi, $F_v = 0.833 \times 0.40 \times F_y = 12000$

$f_a = 69330 \div 6.12 = 11{,}328 < 18000$ o.k

$f_v = 9019 \div 3 = 3006 < 12000$ o.k

```
100 17TH ST CANAL HLP ALTERNATE 1*
110 BUTTERFLY STRUCTURE RIB
120 KSI FT IN IN LB
130 6 5 1 29000 .3
140 1 0 0 2 3.75 0 3 7.75 0
150 4 12.25 0 5 17.5 0 6 23.5 0
160 FIX X 1 TO 6 FIX Y 1 TO 6
170 GM 1 1 2 5 1 1
180 33.94 13.65 3 1 TO 5
190 LOAD CASE 1 0 5 0 0 0 WATER LOAD
200 0 -4355 3.75 -3805 0 1
210 0 -3805 4 -3223 0 2
220 0 -3223 4.5 -2567 0 3
230 0 -2567 5.25 -1806 0 4
240 0 -1806 6 -932 0 5
!*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
 PROGRAM CFRAME V02.05 24JUL84
 *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
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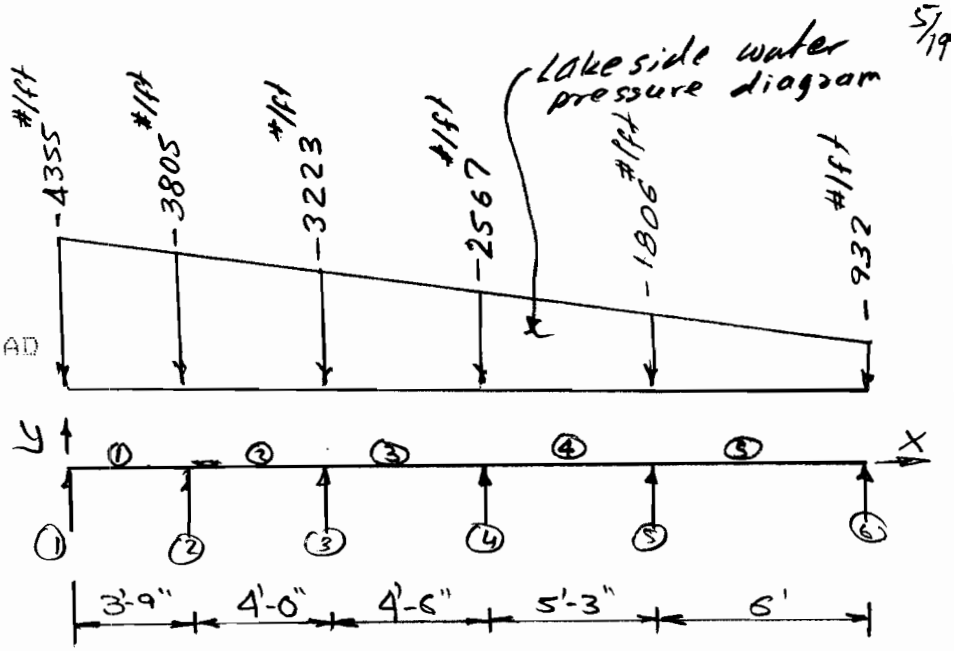



```
 RUN DATE = 87/11/27
 RUN TIME =  9.35.53


 17TH ST CANAL HLP ALTERNATE 1
 BUTTERFLY STRUCTURE RIB


1 *** JOINT DATA ***
```

JOINT	X	Y	FIXITY X	FIXITY Y	FIXITY R	KX	KY	KR
	--- FT ---					---LB / IN---		IN-LB /RAD
1	.00	.00	*	*				
2	3.75	.00	*	*				
3	7.75	.00	*	*				
4	12.25	.00	*	*				
5	17.50	.00	*	*				
6	23.50	.00	*	*				

```
1 *** MEMBER DATA ***
```

MEMBER	END A	END B	LENGTH FT	I IN**4	A IN**2	AS IN**2	E KSI	G KSI
1	1	2	3.75	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05
2	2	3	4.00	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05
3	3	4	4.50	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05
4	4	5	5.25	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05
5	5	6	6.00	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05

```
1 *** LOAD CASE      1  WATER LOAD
```

MEMBER	LA FT	PA LB / FT	LB FT	PB LB / FT	ANGLE DEG

1	.00	-.4355E+04	3.75	-.3805E+04	.00
2	.00	-.3805E+04	4.00	-.3223E+04	.00
3	.00	-.3223E+04	4.50	-.2567E+04	.00
4	.00	-.2567E+04	5.25	-.1806E+04	.00
5	.00	-.1806E+04	6.00	-.9320E+03	.00

LOAD CASE 1 WATER LOAD

JOINT DISPLACEMENTS

JOINT	DX IN	DY IN	DR RAD
1	.0000E+00	.0000E+00	.8363E-03
2	.0000E+00	.0000E+00	-.2021E-03
3	.0000E+00	.0000E+00	.8382E-04
4	.0000E+00	.0000E+00	-.1671E-04
5	.0000E+00	.0000E+00	.1680E-03
6	.0000E+00	.0000E+00	-.9659E-03

MEMBER END FORCES

MEMBER	JOINT	AXIAL LB	SHEAR LB	MOMENT IN-LB	MOMENT EXTREMA IN-LB	LOCATION IN
1	1	.0000E+00	-.6281E+04	.0000E+00	.6933E+05	45.00
	2	.0000E+00	-.9019E+04	.6933E+05	-.5526E+05	18.00
2	2	.0000E+00	-.7524E+04	.6933E+05	.6933E+05	.00
	3	.0000E+00	-.6532E+04	.5485E+05	-.2231E+05	24.96
3	3	.0000E+00	-.6688E+04	.5485E+05	.5874E+05	54.00
	4	.0000E+00	-.6340E+04	.5874E+05	-.3121E+05	25.92
4	4	.0000E+00	-.5932E+04	.5874E+05	.6757E+05	63.00
	5	.0000E+00	-.5547E+04	.6757E+05	-.2749E+05	30.24
5	5	.0000E+00	-.5482E+04	.6757E+05	.6757E+05	.00
	6	.0000E+00	-.2732E+04	.0000E+00	-.4243E+05	43.20

STRUCTURE REACTIONS

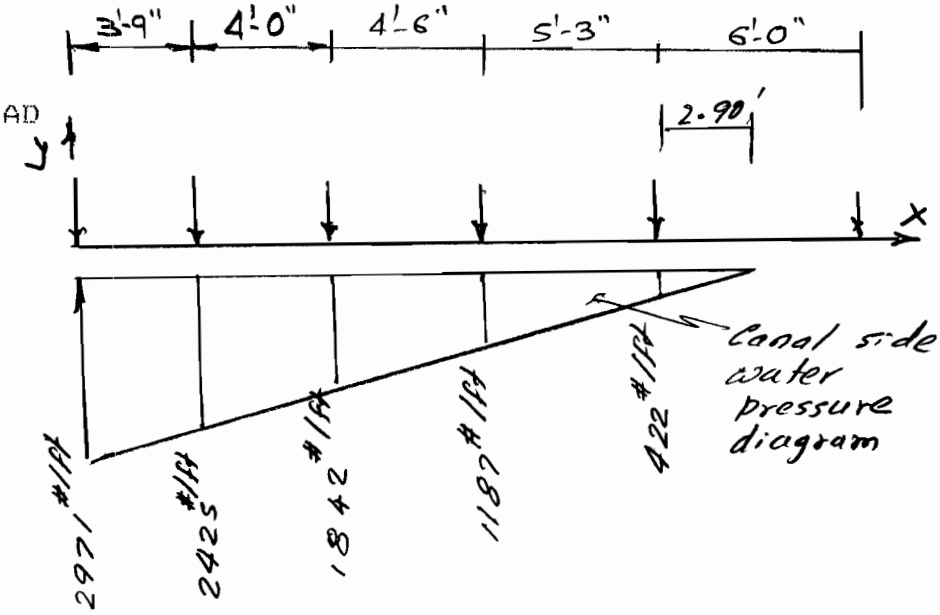
JOINT	FORCE X LB	FORCE Y LB	MOMENT IN-LB
1	.0000E+00	-.6281E+04	.0000E+00
2	.0000E+00	-.1654E+05	.0000E+00
3	.0000E+00	-.1322E+05	.0000E+00
4	.0000E+00	-.1227E+05	.0000E+00
5	.0000E+00	-.1103E+05	.0000E+00
6	.0000E+00	-.2732E+04	.0000E+00
TOTAL	.0000E+00	-.6208E+05	

1 MEMBER END FORCES

MEMBER	LOAD CASE	JOINT	AXIAL LB	SHEAR LB	MOMENT IN-LB	MOMENT EXTREMA IN-LB	LOCATION IN

1	1	1	.0000E+00	-.6281E+04	.0000E+00	.6933E+05	45.00
		2	.0000E+00	-.9019E+04	.6933E+05	-.5526E+05	18.00
2	1	2	.0000E+00	-.7524E+04	.6933E+05	.6933E+05	.00
		3	.0000E+00	-.6532E+04	.5485E+05	-.2231E+05	24.96
3	1	3	.0000E+00	-.6688E+04	.5485E+05	.5874E+05	54.00
		4	.0000E+00	-.6340E+04	.5874E+05	-.3121E+05	25.92
4	1	4	.0000E+00	-.5932E+04	.5874E+05	.6757E+05	63.00
		5	.0000E+00	-.5547E+04	.6757E+05	-.2749E+05	30.24
5	1	5	.0000E+00	-.5482E+04	.6757E+05	.6757E+05	.00
		6	.0000E+00	-.2732E+04	.0000E+00	-.4243E+05	43.20

```
A:\>LIST BTRFLYC
100 17TH ST CANAL HLP ALTERNATE 1*
110 BUTTERFLY STRUCTURE RIB
120 KSI FT IN IN LB
130 6 5 1 29000 .3
140 1 0 0 2 3.75 0 3 7.75 0
150 4 12.25 0 5 17.5 0 6 23.5 0
160 FIX X 1 TO 6 FIX Y 1 TO 6
170 GM 1 1 2 5 1 1
180 33.94 13.65 3 1 TO 5
190 LOAD CASE 1 0 5 0 0 0 WATER LOAD
200 0 2971 3.75 2425 0 1
210 0 2425 4 1842 0 2
220 0 1842 4.5 1187 0 3
230 0 1187 5.25 422 0 4
240 0 422 2.9 0 0 5
```




```
A:\>LIST BTRFLYCO
1*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
 PROGRAM CFRAME V02.05 24JUL84
 *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*

 RUN DATE = 87/11/27
 RUN TIME =  9.48.25


 17TH ST CANAL HLP ALTERNATE 1
 BUTTERFLY STRUCTURE RIB


1 *** JOINT DATA ***

                                                  ----------FIXITY----------
 JOINT      X          Y        X   Y   R        KX          KY          KR
            --- FT ---                           ---LB / IN---      IN-LB /RAD

    1        .00        .00     *   *
    2       3.75        .00     *   *
    3       7.75        .00     *   *
    4      12.25        .00     *   *
    5      17.50        .00     *   *
    6      23.50        .00     *   *


1 *** MEMBER DATA ***

          END END
 MEMBER    A   B     LENGTH        I           A          AS          E          G
                       FT        IN**4       IN**2      IN**2       KSI        KSI

      1    1   2       3.75   .3394E+02   .1365E+02   .3000E+01   .2900E+05   .1115E+05
      2    2   3       4.00   .3394E+02   .1365E+02   .3000E+01   .2900E+05   .1115E+05
```

4	4	5	5.25	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05
5	5	6	6.00	.3394E+02	.1365E+02	.3000E+01	.2900E+05	.1115E+05

9/19

1 *** LOAD CASE 1 WATER LOAD

MEMBER	LA FT	PA LB / FT	LB FT	PB LB / FT	ANGLE DEG
1	.00	.2971E+04	3.75	.2425E+04	.00
2	.00	.2425E+04	4.00	.1842E+04	.00
3	.00	.1842E+04	4.50	.1187E+04	.00
4	.00	.1187E+04	5.25	.4220E+03	.00
5	.00	.4220E+03	2.90	.0000E+00	.00

1 LOAD CASE 1 WATER LOAD

JOINT DISPLACEMENTS

JOINT	DX IN	DY IN	DR RAD
1	.0000E+00	.0000E+00	-.5617E-03
2	.0000E+00	.0000E+00	.1461E-03
3	.0000E+00	.0000E+00	-.2858E-04
4	.0000E+00	.0000E+00	.1430E-04
5	.0000E+00	.0000E+00	.1508E-03
6	.0000E+00	.0000E+00	-.4824E-04

MEMBER END FORCES

MEMBER	JOINT	AXIAL LB	SHEAR LB	MOMENT IN-LB	MOMENT EXTREMA IN-LB	LOCATION IN
1	1	.0000E+00	.4231E+04	.0000E+00	.3704E+05	18.00
	2	.0000E+00	.5886E+04	-.4492E+05	-.4492E+05	45.00
2	2	.0000E+00	.4761E+04	-.4492E+05	.1360E+05	24.96
	3	.0000E+00	.3773E+04	-.3052E+05	-.4492E+05	.00
3	3	.0000E+00	.3677E+04	-.3052E+05	.1615E+05	25.92
	4	.0000E+00	.3139E+04	-.2926E+05	-.3052E+05	.00
4	4	.0000E+00	.2739E+04	-.2926E+05	.1333E+05	34.02
	5	.0000E+00	.1485E+04	-.1083E+05	-.2926E+05	.00
5	5	.0000E+00	.6637E+03	-.1083E+05	.0000E+00	72.00
	6	.0000E+00	-.5177E+02	.0000E+00	-.1083E+05	.00

STRUCTURE REACTIONS

JOINT	FORCE X LB	FORCE Y LB	MOMENT IN-LB
1	.0000E+00	.4231E+04	.0000E+00
2	.0000E+00	.1065E+05	.0000E+00
3	.0000E+00	.7449E+04	.0000E+00
4	.0000E+00	.5878E+04	.0000E+00
5	.0000E+00	.2148E+04	.0000E+00

TOTAL	.0000E+00	.3030E+05

MEMBER END FORCES

MEMBER	LOAD CASE	JOINT	AXIAL LB	SHEAR LB	MOMENT IN-LB	MOMENT EXTREMA IN-LB	LOCATION IN
1	1	1	.0000E+00	.4231E+04	.0000E+00	.3704E+05	18.00
		2	.0000E+00	.5886E+04	-.4492E+05	-.4492E+05	45.00
2	1	2	.0000E+00	.4761E+04	-.4492E+05	.1360E+05	24.96
		3	.0000E+00	.3773E+04	-.3052E+05	-.4492E+05	.00
3	1	3	.0000E+00	.3677E+04	-.3052E+05	.1615E+05	25.92
		4	.0000E+00	.3139E+04	-.2926E+05	-.3052E+05	.00
4	1	4	.0000E+00	.2739E+04	-.2926E+05	.1333E+05	34.02
		5	.0000E+00	.1485E+04	-.1083E+05	-.2926E+05	.00
5	1	5	.0000E+00	.6637E+03	-.1083E+05	.0000E+00	72.00
		6	.0000E+00	-.5177E+02	.0000E+00	-.1083E+05	.00

A:\>C:

C:\>DESKTOP

PROJECT 17th Street Canal GDM	PAGE 11 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

Horizontal Girder Design (TAPERED) (18'-6" leaf)

Net reactions @ rib locations on Girders
(See FRAME ANALYSIS OUTPUT)

18'-6" Leaf:

G_1, $R = 6281 - 4231 = 2050^{\#}$

G_2 $R = 16540 - 10650 = 5890^{\#}$

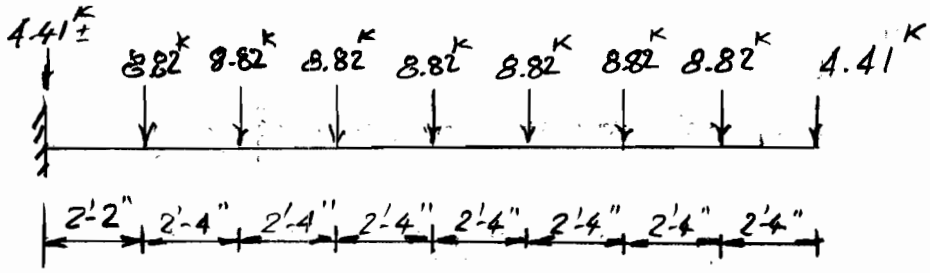
G_3 $R = 13220 - 7449 = 5771^{\#}$

G_4 $R = 12270 - 5878 = 6392^{\#}$

G_5 $R = 11030 - 2148 = 8820^{\#}$ ← controls.

G_6 $R = 2732 + 51.77 = 2784^{\#}$

Gate stalled in closing position. (18'-6" leaf)



$$\text{Max } M = 4.41 \times 18.5 + 8.82\,[2.33(6+5+4+3+2+1) + 2.17 \times 7]$$

$$= 647^{1\text{-K}}$$

$$\text{Max } V = 7 \times 8.82 + 4.41 \times 2$$

$$= 70.56^{K}$$

PROJECT 17th Street Canal GDM	PAGE 12 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

Net Reactions @ rib-location on Girder (12'-0" leaf)

Rib spaced @ 2'-0"

At G_1, $R = 2050 \times \frac{2}{2.33} = 1757$ lbs

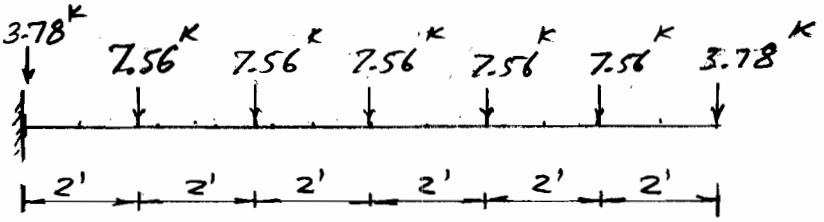
At G_2, $R = 5890 \times \frac{2}{2.33} = 5049$ lbs

At G_3, $R = 5771 \times \frac{2}{2.33} = 4947$ lbs

At G_4, $R = 6392 \times \frac{2}{2.33} = 5479$ lbs

At G_5, $R = 8820 \times \frac{2}{2.33} = 7560$ lbs — controls

At G_6, $R = 2784 \times \frac{2}{2.33} = 2386$ lbs



Max $M = 3.78 \times 12 + 7.56 [2(5+4+3+2+1)]$

$= 272.2^{1-K}$

Max $V = 2 \times 3.78 + 5 \times 7.56 = 45.36$

PROJECT 17th Street Canal GDM	PAGE 13 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

Gate stalled in closing position.

At $\frac{3}{4}L = 13'-10\frac{1}{2}"$ point,

$$M_{\frac{3}{4}L} = 4.41 \times 13.875 + 8.82[2.33(4+3+2+1) + 2.21 \times 5]$$
$$= 364.10^{1-K}$$

$$V_{\frac{3}{4}L} = 4.41 + 5 \times 8.82$$
$$= 48.51^{K}$$

At $\frac{1}{2}L = 9.25'$ pt,

$$M_{\frac{1}{2}L} = 4.41 \times 9.25 + 8.82[2.33(2+1) + 2.25 \times 3]$$
$$= 161.98^{1-K}$$

$$V_{\frac{1}{2}L} = 4.41 + 8.82 \times 3$$
$$= 30.87^{K}$$

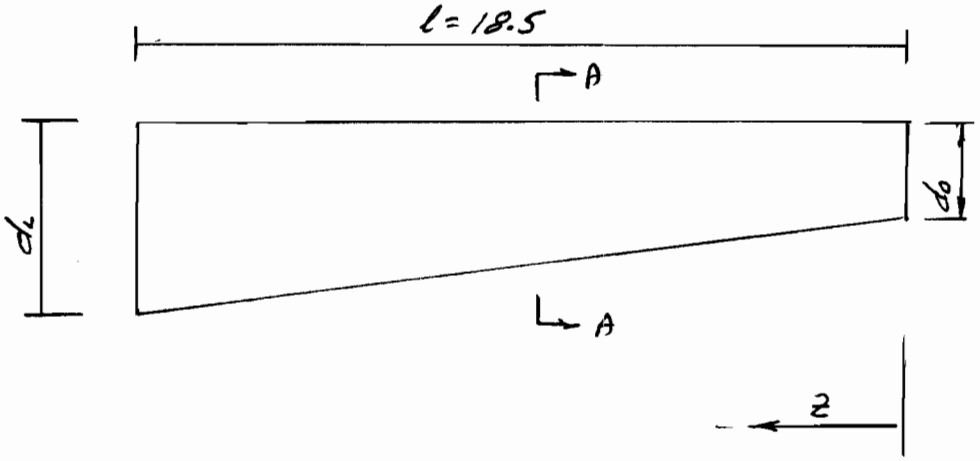
At $\frac{1}{4}L = 4.625'$ pt.

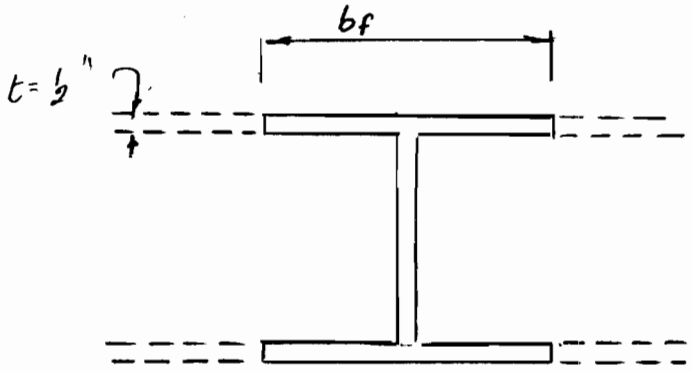
$$M_{\frac{1}{4}L} = 4.41 \times 4.625 + 8.82 \times 2.29$$
$$= 40.59^{1-K}$$

$$V_{\frac{1}{4}L} = 4.41 + 8.82$$
$$= 13.23^{K}$$

PROJECT 17th Street Canal GDM	PAGE 14 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

Web - Tapered Girder.





SECTION A-A

$$b_f = 1.5(t)\sqrt{\frac{E}{F_y}}$$

$$= 1.5(0.5)\left(\frac{29000}{36}\right)^{\frac{1}{2}}$$

$$= 21.3"$$

$$A_f = 0.5 \times 21.3$$

Tapering ratio

$$\gamma = (d_1 - d_0)/d \leq 0.268\ell/d_0 \text{ or } 6$$

for $d_1 = 3.0$,
$d_0 = 1.25$

$$\gamma = \frac{3 - 1.25}{1.25} = 1.40 < 0.268 \times 18.5/1.25 = 3.97$$

ℓ controls.

PROJECT 17th Street Canal GDM	PAGE 15 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

Allowable stresses

$$F_{br} = 0.83 \times \frac{2}{3}\left[1 - \frac{F_y}{6B\sqrt{F_{sr}^2 + F_{wr}^2}}\right] F_y \leq 0.50 F_y$$

where

$$F_{sr} = \frac{12 \times 10^3}{(h_s \, l \, d_o)/A_f}$$

$$= 24.45$$

$h_s = 1 + 0.0230\,\gamma\sqrt{l d_o / A_f}$

$= 1.5694$

$l = 18.5 \times 12 = 222$

$d_o = 15$

$A_f = 21.3 \times 0.5 = 10.65$ □"

$\gamma = 1.40$

$$F_{wr} = \frac{170 \times 10^3}{(h_w \, l/k_{T_o})^2}$$

$$= 103.78$$

$h_w = 1 + 0.00385\,\gamma\sqrt{l/k_{T_o}}$

$= 1.0337$

$k_{T_o} = 5.67$

$B = 1$

$$F_{br} = \frac{2}{3}\left[1 - \frac{36}{6 \times 1\sqrt{24.45^2 + 103.78^2}}\right] 36 \times 0.83$$

$= 22.65 \times 0.83 = 18.80 > 0.50 F_y = 18$

Use $F_{br} = 0.50 F_y = 18$ ksi

$F_v = 12000$ psi

To be revised.

PROJECT 17th Street Canal GDM	PAGE 16 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

Girder - section property.

At $z = 18.5$

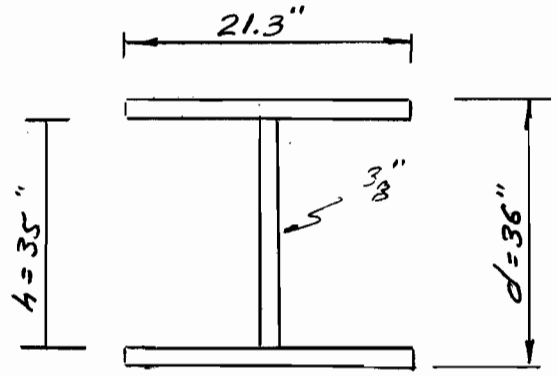
$d = 36"$

Web thickness t

$$\frac{h}{t} \leq \frac{14000}{\sqrt{F_y(F_y+16.5)}}$$

$$\frac{35}{t} \leq \frac{14,000}{\sqrt{36(36+16.5)}}$$

$t \geq 0.11$ Use $t = \frac{3}{8}"$ min.



Moment of Inertia. @ $z = 18.5$

Flanges	21.3	±17.75	–	6710.8	0.44	6711.3
Web	13.13	–	–	–	1339.8	1339.8
						8051 in^4

$S_T = S_B = \frac{8051}{18} = 447\ in^3$, $A_{web} = 13.13\ in^2$

At $z = 0.75\ell = 13.875'$, $d = 30.75"$

$I = 5696.0$ $S_T = S_B = 370.5\ in^3$, $A_w = 11.16\ in^2$

At $z = 0.50\ell$, $d = 25.50"$

$I = 3788.1$ $S_T = S_B = 297.1\ in^3$, $A_w = 9.19\ in^2$

At $z = 0.25\ell$ $d = 20.25"$

$I = 2300.4$ $S_T = S_B = 227.2\ in^3$ $A_w = 7.22\ in^2$

At $z = 7'$ $d = 22.95"$

$I = 3013.7$ $S_T = S_B = 262.6\ in^3$ $A_w = 8.23\ in^2$

PROJECT 17th Street Canal GDM	PAGE 17 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate structure		CHECKED BY	DATE

At $z = 18.5$,

$M = 647^{1-K}$, $V = 66.15^{K}$

$S_T = S_B = 447$, $A_w = 13.13\ in^2$

$f_a = \frac{647 \times 12}{447} = 17{,}369 < 18.000$

$f_v = \frac{66.15}{13.13} = 5.04\ ksi < 12\ ksi$

At $z = 0.75\ell$

$M = 364.10^{1-K}$ $V = 48.51^{K}$

$S = 370.50$, $A_w = 11.6\ in^2$

$f_a = \frac{364.1 \times 12}{370.50} = 11.79^{ksi} < 18^{ksi}$

$f_v = \frac{48.51}{11.6} = 4.18^{ksi} < 12^{ksi}$

At $z = 0.50\ell$,

$M = 161.98^{1-K}$ $V = 30.87^{K}$

$S = 297.1$ $A_w = 9.19\ in^2$

$f_a = \frac{161.98 \times 12}{297.1} = 6.54^{ksi} < 18^{ksi}$

$f_v = \frac{30.87}{9.19} = 3.36^{ksi} < 12^{ksi}$

At $z = 0.25\ell$,

$M = 40.59^{1-K}$ $V = 13.23^{K}$

$S = 227$ $A_w = 7.2$

$f_a = 2.15$ $f_v = 1.84$

At $z = 7'$

$M = 154.77^{1-K}$ (Gate closed position)

$S = 262.6$

$f_a = \frac{154.77 \times 12}{262.6} = 7.07^{ksi} < 18.0^{ksi}$

PROJECT 17th Street Canal GDM	PAGE 18 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate Structure		CHECKED BY	DATE

SHAFT DESIGN (GATE IN CLOSING POSITION)

Girder reations on shaft.

From G_1, $R = 70.56 \times \frac{2.05}{8.82} + 45.36 \times \frac{1.757}{7.560} = 26.94^{K}$

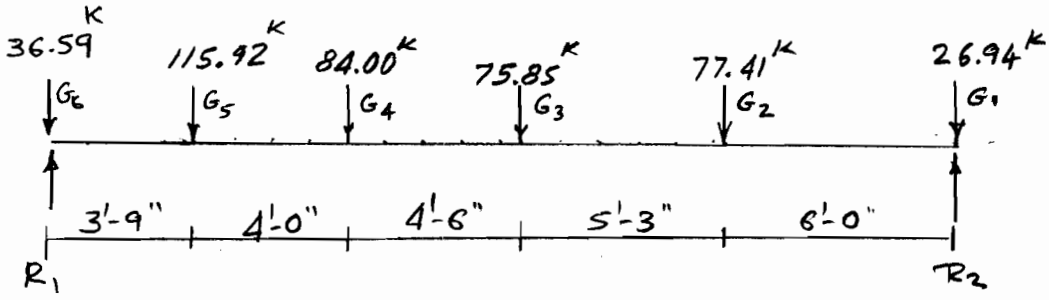
From G_2, $R = 70.56 \times \frac{5.89}{8.82} + 45.36 \times \frac{5.049}{7.56} = 77.41^{K}$

From G_3 $R = 70.56 \times \frac{5.771}{8.82} + 45.36 \times \frac{4.947}{7.56} = 75.85^{K}$

From G_4 $R = 70.56 \times \frac{6.392}{8.82} + 45.36 \times \frac{5.479}{7.56} = 84.00^{K}$

From G_5 $R = 70.56 * 41.58 = 115.92^{K}$

From G_6, $R = 70.56 * \frac{2.784}{8.82} + 45.36 \times \frac{2.386}{7.56} = 36.59^{K}$



$R_1 = 246.39^{K}$, $R_2 = 170.32^{K}$

$M = (246.39 - 36.59)12.25 - 115.92 \times 8.50 - 84 \times 4.5$

$= 1207^{1-K}$

COMPUTATION SHEET

PROJECT 17th Street Canal GDM	PAGE 19 OF 19	COMPUTED BY MSD	DATE
SUBJECT Butterfly Gate structure		CHECKED BY	DATE

Pipe property

O.D = 20" ϕ

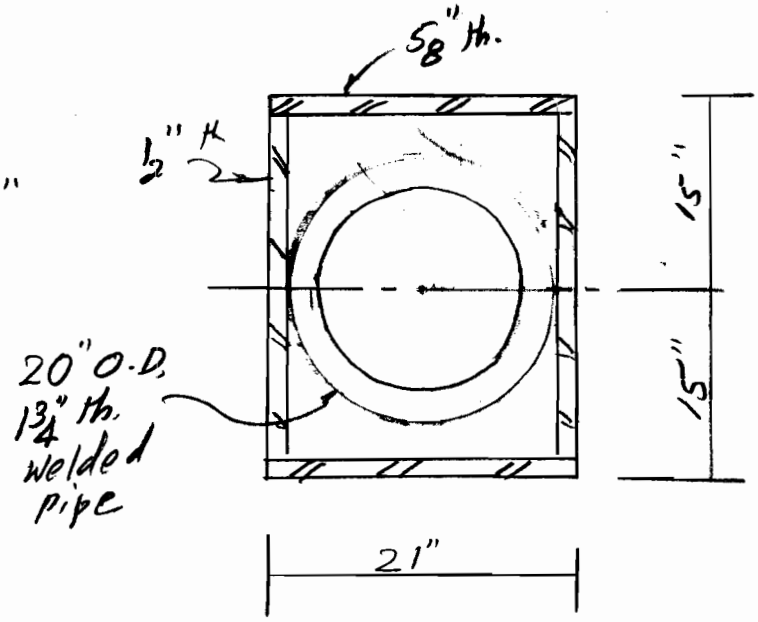
ID = 16.5" ϕ

Wall thickness = 1.75"

ASTM A-53, type S, Grade B

F_y = 35 ksi

F_u = 60 ksi



Moment of Inertia

	A	d	Ad	Ad^2	I_o	$I_o + Ad^2$
2-21 x 5/8" Flange	- 26.25	± 14.69	-	5663	-	5663
2-30" x 1/2" plates	30.0	—	-	—	2550	2550
Pipe	100.33	—	-	-	4216	4216
	156.580"					12429 in⁴

$$S_{T \text{ or } B} = \frac{12429}{15} = 828.6$$

$$S_{@ \text{ pipe}} = \frac{12429}{10} = 1243$$

At Flange plate

$$f_a = \frac{1207 \times 12}{828.6} = 17.48 < 18 \text{ ksi allow}$$

At. pipe,

$$f_a = \frac{1207 \times 12}{1243} = 11.65 < 0.83 \times 0.6 \times 35 = 17.43$$

COMPUTATION SHEET

PROJECT 17th St. Canal GDM	PAGE 1 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

East Bound.

℄ Bridge, East end El. 8.9
℄ Bridge, West end El. 8.3
Average El. 8.60

West Bound

℄ Bridge, East end El. 8.9
℄ Bridge, West end El. 8.2
Ave. El. 8.55

From contract plan,

From ℄ bridge to curb, average grade drop = 0.55'

then grade at gutter line = 8.00 (@ abut)
grade at gutter line = 8.56 (@ ℄ Canal)

Average gutter line El = 8.28 @ L.W. end

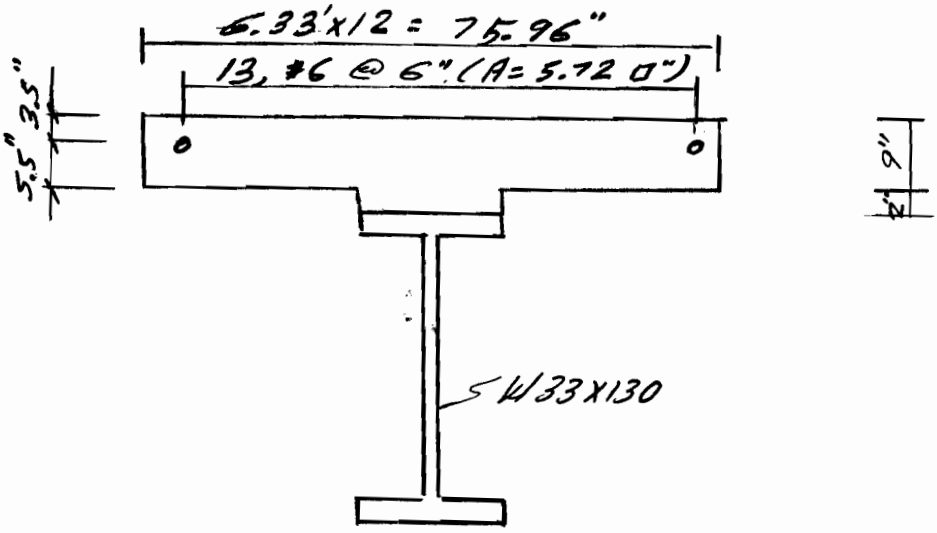
Similarly Average gutterline El. = 8.94

Ave. Deck El = 8.59

Ht' of Parapet = 14.5 - 8.59 - $\frac{10}{12}$ = 5.07
say 5'-1" O.K.

PROJECT 17th Street Canal COM	PAGE 2 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

SECTION PROPERTY



A. composit section
for +M, n = 30

	A	d	Ad	Ad^2	I_o	Ad^2+I_o
W33X130	38.30	–	–	–	6710	6710
Conc. $75.96 \times \frac{9}{30}$	22.80	23.05	525.50	12113	154	12,267
	61.10	(8.60)	525.50			18,977 in⁴
					Loss: 525.50x8.60	-4,520
					I	= 14,457 in⁴

$S_{TS} = \frac{14,457}{7.945} = 1820\ in^3$

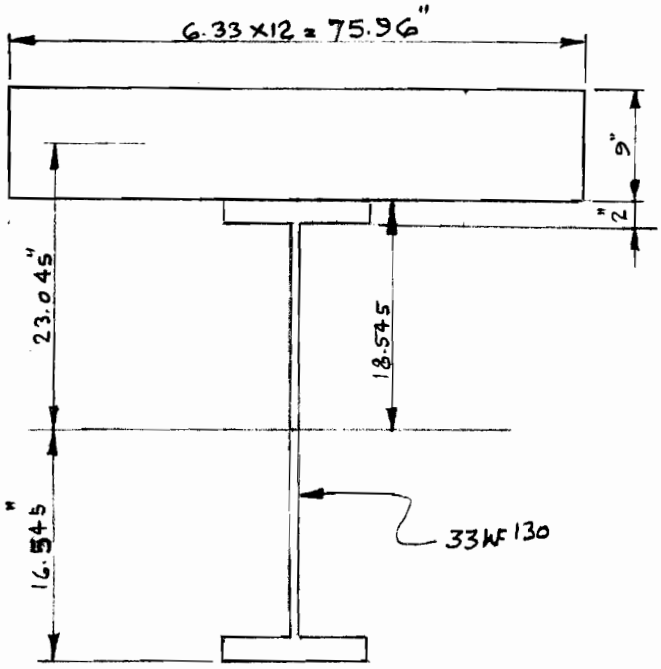
$S_{BS} = \frac{14,457}{25.15} = 575\ in^3$

$S_{TC} = \frac{14,457}{18.95} = 763\ in^3$

COMPUTATION SHEET

PROJECT 17TH street CANAL G.D M	PAGE OF	COMPUTED BY S.A.	DATE 11/6
SUBJECT Veterns Bridge		CHECKED BY	DATE

SECTION PROPERTY



11.529 ℄

Imp. = 29.5%

For n = 30

$S_{TS} = 1820\ In^3$

$S_{BS} = 575\ In^3$

$S_{TC} = 763\ In^3$

L = 44.5'

$M_{D.L.} = 224.3^{k'}$

$V_{D.L.} = 20.2^{K}$

$-M = 668.3^{k'}$

$-V = 60.9^{K}$

For n = 10

$S_{TS} = 11,392\ In^3$

$S_{BS} = 646\ In^3$

$S_{TC} = 1582\ In^3$

$M_{S.D.L} = 111.9^{k'}$

$V_{S.D.L} = 10.06^{K}$

For Composite Section

$S_{TS} = 714\ In^3$

$S_{BS} = 488\ in^3$

$S_{Rein.bar} = 458\ In^3$

$M_{LL+I} = 395.2^{k'}$

$V_{LL+I} = 43.1^{K}$

COMPUTATION SHEET

PROJECT 17th Street CANAL	PAGE 2 OF	COMPUTED BY S.A.	DATE 11/6
SUBJECT Veterns Bridge		CHECKED BY	DATE

W 130 Sx = 406

Stresses in W-section

AT TOP OF SECTION	AT BOTTOM SECTION

CASE-I

D.L. : 224.3 x 12 ÷ 406 = 6.63	224.3 x 12 ÷ 406 =	6.63
S.D.L. : 111.9 x 12 ÷ 1820 = .74	111.9 x 12 ÷ 575 =	2.34
LL+I : 395.2 x 12 ÷ 11392 = .42	395.2 x 12 ÷ 646 =	7.34
7.79 Comp.		16.31 Tens.

CASE II

D.L =	= 6.63 k'	= 6.63
S.D.L =	= .74	= 2.34
Hyd = −668.3 x 12 ÷ 714	= 11.23	−668.3 x 12 ÷ 488 = −16.93
	−3.86 Tens	−7.46 Comp.

STRESSES IN CONC.

CASE I

S.D.L. = 111.9 x 12 ÷ (763 x 30) = .059
LL+I = 395.2 x 12 ÷ (1582 x 10) = .229
> TOTAL = .288 < 1.2 o.k.

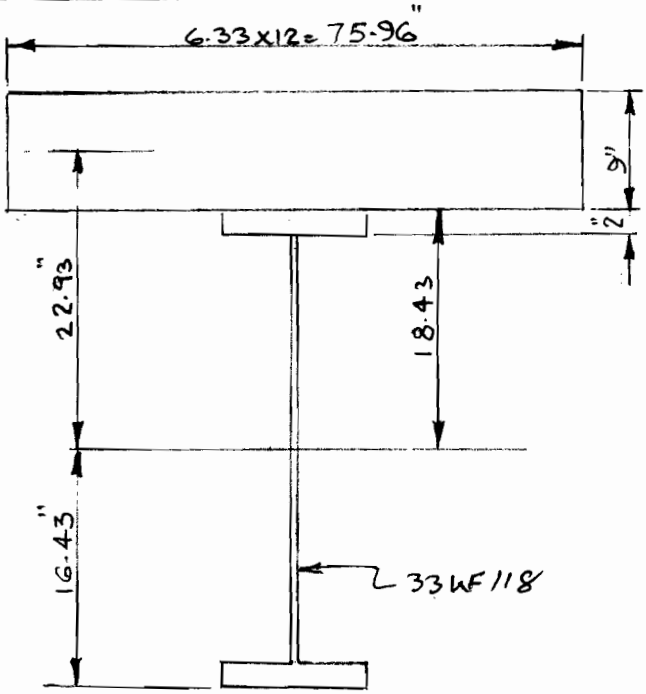
CASE II

(111.9 − 668.3) x 12 ÷ 458 = 14.58 k.s.i < 18 k.s.i o.k.

COMPUTATION SHEET

PROJECT	17th street CANAL G.D.M.	PAGE 3 OF	COMPUTED BY SA	DATE 11/6
SUBJECT	Veterans Bridge		CHECKED BY	DATE

SECTION PROPERTY



	A	d	Ad	Ad^2	I_o	$Ad^2 + I_o$
WF	= 34.70				5900	5900
Conc. $75 \times \frac{9}{30}$	= 22.80	22.93	522.80	11988	154	12142
	57.50	9.088	522.80			18042 in⁴

Less = 522.80 x 9.088 = 4751

13291 in⁴

$$S_{T_S} = \frac{13291}{7.342} = 1810 \text{ in}^3$$

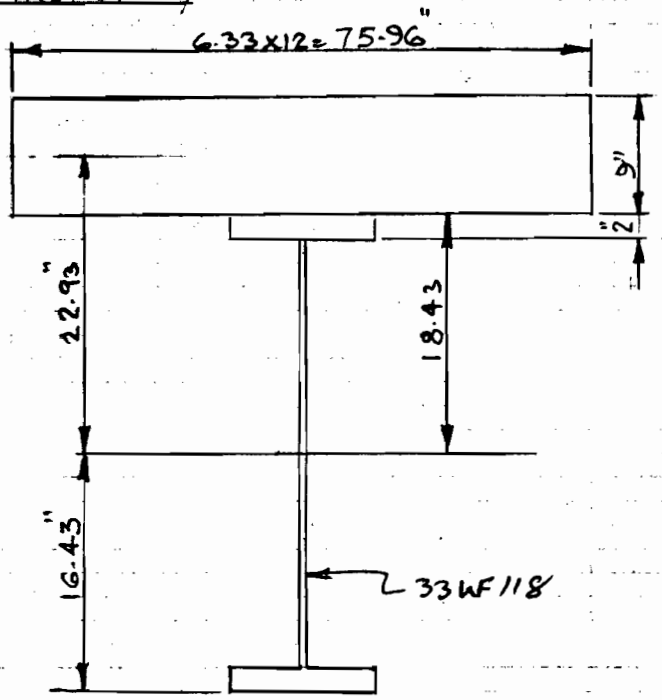
$$S_{33} = \frac{13291}{25.518} = 521 \text{ in}^3$$

$$S_{T_c} = \frac{13291}{18.342} = 725 \text{ in}^3$$

COMPUTATION SHEET

PROJECT	17th street CANAL G.D.M.	PAGE 3 OF	COMPUTED BY SA	DATE 11/6
SUBJECT	Veterans Bridge		CHECKED BY	DATE

SECTION PROPERTY



	A	d	Ad	Ad^2	I_D	$I_D + Ad^2$
WF	34.70				5900	5900
Conc. $75.96 \times \frac{9}{1a}$	68.36	22.93	1568	35943	461	36404
	103.06	15.214	1568			42304

Less $15.214(1568) = -23856$

$18448\ in^4$

$$S_{T_S} = \frac{18448}{1.216} = 15,171\ in^3$$

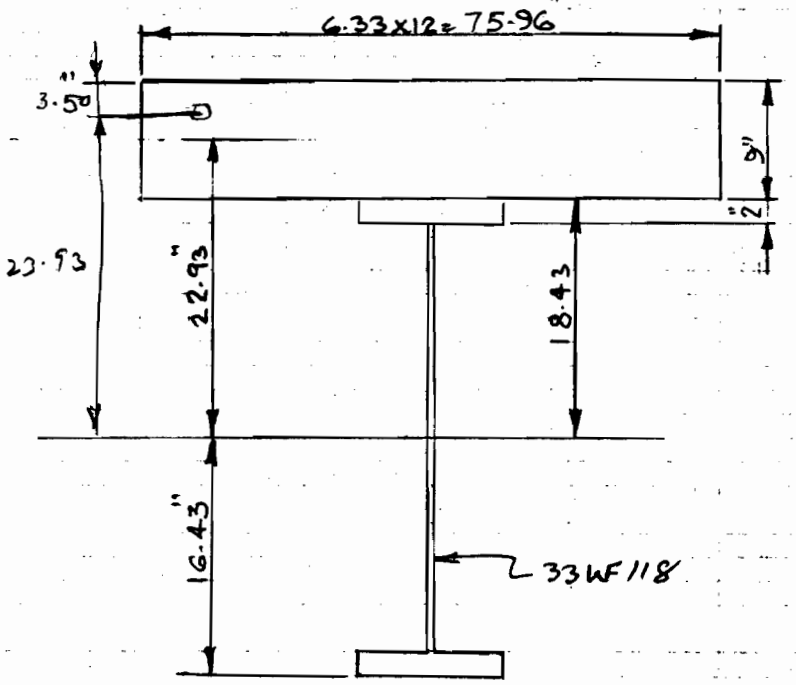
$$S_{B_S} = \frac{18448}{31.644} = 583\ in^3$$

$$S_{T_C} = \frac{18448}{12.216} = 1510\ in^3$$

COMPUTATION SHEET

PROJECT	17th street CANAL G.D.M.	PAGE 3 OF	COMPUTED BY SA	DATE 11/6
SUBJECT	Veterans Bridge		CHECKED BY	DATE

SECTION PROPERTY



Concrete Neglected Use #6 @ 6" c/c

	A	d	Ad	Ad^2	I_o	$I_o + Ad^2$
W 33X118	34.70				5900	5900
13 — #6 bars	5.72	23.93	136.88	3276	—	3276
	40.42	3.39	136.88			9176

$(136.88)(3.39) = 464$

$9176 - 464 = 8712$

$$S_{Ts} = \frac{8712}{13.04} = 668.10$$

$$S_{Bs} = \frac{8712}{19.82} = 440$$

$$S_{Rebar} = \frac{8712}{20.54} = 424.$$

COMPUTATION SHEET

PROJECT 17th Street Canal	PAGE OF	COMPUTED BY	DATE
SUBJECT Veterans Bridge		CHECKED BY	DATE

FOR $n=30$ | For $n=10$ | For Composite section

$S_{T_S} = 1810\ in^3$ | $S_{T_S} = 15171\ in^3$ | $S_{T_S} = 668\ in^3$

$S_{B_S} = 521\ in^3$ | $S_{B_S} = 583\ in^3$ | $S_{B_S} = 440\ in^3$

$S_{T_C} = 725\ in^3$ | $S_{T_C} = 1510\ in^3$ | $S_{T_{Conc}} = 424\ in^3$

$M_{DL} = 224.3$ | $M_{S_{DL}} = 111.9$ | $M_{LL+I} = 395.2^{k'}$

$V_{DL} = 20.2$ | $V_{SDL} = 10.06$ | $V_{LL+I} = 43.1^{k'}$

$-M = 668.2^{k'}$

$-V = 60.1^{k'}$

STRESSES (TOP)

D.L. $= 224.3 \times 12 \div 359$	$= 7.50$	
SDL $= 111.9 \times 12 \div 1810$	$= .74$	
LL+I $= 395.2 \times 12 \div 15171$	$= .31$	
TOTAL	8.55 Comp.	

STRESSES (BOTTOM)

$224.3 \times 12 \div 359$	$= 7.50$	
$111.9 \times 12 \div 521$	$= 2.58$	
$395.2 \times 12 \div 583$	$= 8.13$	
	18.21	

< 20 O.K.

CASE II

According to AASHTO

D.L.	$= 7.50$		$= 7.50$
SDL	$= .74$		$= 2.58$
Hyd. $= -668.2 \times 12 \div 668.0$	$= 12.00$	$6618.2 \times 12 \div 440$	$= -18.22$
	-3.76		-8.14 Comp.

STRESSES IN Concrete

CASE I

SDL $= 111.9 \times 12 \left(\frac{725}{30}\right) = .062$

LL+I $= 395.2 \times 12 \div (1510 \times 10) = .314$ $>$ $.376 < 1.2$ O.K.

Case II

$(111.9 - 668.3) \times 12 \div 424 = 15.74 < 18$ O.K.

COMPUTATION SHEET

PROJECT	17th Street Canal	PAGE OF	COMPUTED BY	DATE
SUBJECT	Veterans bridge.		CHECKED BY	DATE

Bridge Reactions.

CASE I

V.D.L = 20.20

$V_{S.D.L.}$ = 10.06

V_{LL+I} = 43.10

73.36

CASE II

V.D.L = 20.20

V_{SOL} = 10.06

$V_{Hyd.}$ = −60.10

29.84

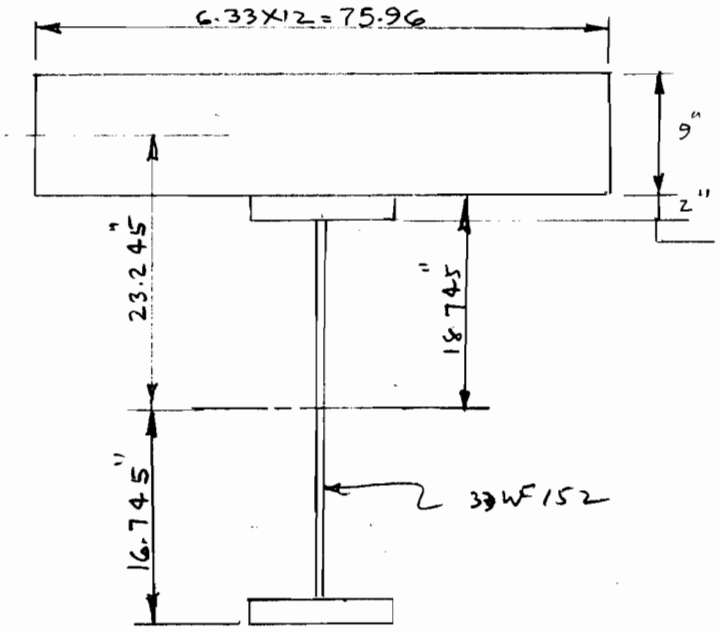
Reqd. A = 29.84/18 = 1.658 ☐'

f_c = 73.36/32.86 × .550 = 4.06 < Allowable.

COMPUTATION SHEET

PROJECT	17th St. CANAL G.O.M.	PAGE OF	COMPUTED BY SA	DATE 11/9
SUBJECT	Veterans Bridge		CHECKED BY	DATE

Center span = 57'-0" From bearing to bearing = 56'-0"



	A	d	Ad	Ad^2	I_o	$I_o + Ad^2$
33WF152	44.70				8160	8160
Conc. 75.96×9/12	68.36	23.245	1589	36936	461	37397
	113.06	14.05	1589			45557

Less 1589(14.05) = -22325

23,232

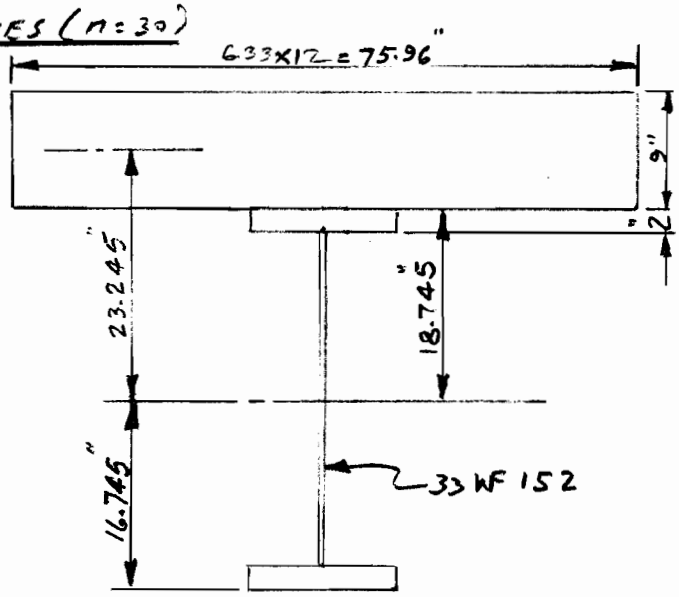
$$S_{Ts} = \frac{23232}{2.695} = 8620 \text{ in}^3$$

$$S_{Bs} = \frac{23,232}{30.795} = 754 \text{ in}^3$$

$$S_{Tc} = \frac{23,232}{13.695} = 1696 \text{ in}^3$$

PROJECT 17th street canal G.D.M.	PAGE OF	COMPUTED BY S.A.	DATE 11/13
SUBJECT Veterans Memorial Bridge		CHECKED BY	DATE

SECTION PROPERTIES (n = 30)



	A	d	Ad	Ad^2	I_o	$I_o + Ad^2$
33WF152	44.70				8160	8160
Conc. $\frac{75.96 \times 9}{30}$	22.79	23.245	530	12320	154	12474
	67.49	7.853	530		8314	20,634
					Less (530 × 7.853)	−4,162
					I =	16,472

$$S_{Ts} = \frac{16,472}{8.892} = 1852\ In^3$$

$$S_{Bs} = \frac{16,472}{24.598} = 670\ In^3$$

$$S_{Tc} = \frac{16472}{19.892} = 828\ In^3$$

PROJECT 17th Street CANAL G.D.M.	PAGE OF	COMPUTED BY S.A.	DATE 11/13
SUBJECT Veterns Memorial Bridge		CHECKED BY	DATE

SECTION PROPERTIES (Concrete Neglected)

Use #6 @ 6" C. to C.

	A	d	Ad	Ad^2	I_o	$Ad^2 + I_o$
WF 33 x 152	44.70	—	—	—	8160	8160
13 — #6 bars (bars — 3½" from Top)	5.72	24.245	139	3370	—	3370
	50.42	2.76	139			11,530
					Less (139 x 2.76)	− 384
						11146 in^4

$$S_{T_s} = \frac{11146}{13.985} = 797\ in^3$$

$$S_{B_s} = \frac{11146}{19.505} = 571\ in^3$$

$$S_{Tc} = \frac{11,146}{(24.245 - 2.76) = 21.485} = 519\ in^3$$

DESIGN LOADS (L = 57'-0")

DEAD - LOAD

slab = $\frac{9}{12} \times 6.33 \times 0.150$ = 0.712 K/FT.

WF = 0.152×1.20 = 0.182 "

HAUNCH = $\frac{3}{12} \times 1.50 \times 0.150$ = 0.038 "

0.938 K/FT.

$$M_{DL} = wl^2/8 = 0.938(56)^2/8 = 367.70\ K\text{-}FT.$$

$$V_{DL} = wl/2 = 0.938 \times 56/2 = 26.26\ kips$$

Super Imposed D.L. (Distribute over 7 beams)

Parapet = $\frac{1}{7} \times 5.08 \times 1 \times 2 \times 0.150$ = 0.218 K/FT.

Sidewalk = $\frac{1}{7} \times 3.17 \times \frac{10}{12} \times 0.150) 2$ = 0.113

W.S. = 0.127

0.458

PROJECT 17th Street CANAL G.D.M.	PAGE OF	COMPUTED BY S.A.	DATE 4/13
SUBJECT Veterns Memo. Bridge		CHECKED BY	DATE

$M_{S.D.L.} = wl^2/8 = 0.458\,(56)^2/8 = 179.5$ K FT.

$V_{D.L} = wl/2 = 0.458 \times 56/2 = 12.82$ K-FT.

Live Load D.L. Moment (HS20-44)

(a) Moment = 735.10 K'

End shear = 60.00 Kips

$\text{Impact} = \frac{50}{125+56} = .2762$ or 27.62 %

$D.F. = S/5.50 = 6.33/5.50 = 1.15$ wheels or 0.575 Axles.

$M_{LL+I} = 735.1\,(.575) \times 1.2762 = 539.42$ Ft Kips.

$V_{LL+I} = 60.00\,(.575) \times 1.2762 = 44.02$ Ft Kips.

Lane Loading reduction factor = 3 lanes — 90 %

$M_{LL+I} = 0.90\,(539.42) = 485.5$ K' 487

$V_{DL+I} = 0.90\,(44.02) = 39.6$ Kips.

(b) Water ± Elev. = 14.5'

Uplift head = 4.08 + 0.83 + .75 = 5.66 feet

Uplift Load = 5.66 × .064 × 6.33 = 2.29 K/Ft.

Moment = $wl^2/8 = 2.29\,(56)^2/8 = 897.7$ K/Ft. 899

$V = wl/2 = 2.29 \times 56/2 = 64.12$ Kips

For stresses — see next Page.

COMPUTATION SHEET

PROJECT 17th Street Canal G.D.M.	PAGE OF	COMPUTED BY S.A.	DATE 11/13
SUBJECT Veterans Memorial Bridge		CHECKED BY	DATE

stresses in WF Section

AT TOP of SECTION

CASE - I

D.L. = 367.70 x12/487 = 9.06

S.D.L. = 179.50x12/1852 = 1.16

LL+I = 485.5 x12/8620 = 0.67

Total 11.58

Compression

AT BOTTOM OF SECTION

3 67.7 x12/487 = 9.06

179.5 x12/670 = 3.21

485.5 x12/754 = 7.73

Total 20.00

Tension

O.K.

Allowable 20K.S.I.

As per AASHTO para 1.7.1A

CASE - II

D.L. = = 9.06 = 9.06

SDL = = 1.16 = 3.21

Hyd = -897.7 x12/797 = -13.52 -897.7 X12/571 = -18.87

Total -3.30 -6.6

TENSION Comp.

Stresses in Concrete

CASE I

S.D.L. = 179.5 x12/628 x30 = .087

LL+I = 485.5 x12/1696 x10 = .344

> TOTAL f_c = .431 < 1.2

CASE II

= (179.50 - 897.7) x12/519 = 16.61 < 18 K.S.I O.K.

COMPUTATION SHEET

PROJECT 17th street CANAL Bridge	PAGE OF	COMPUTED BY S.A.	DATE 11/14
SUBJECT Veterans Bridge		CHECKED BY	DATE

Pile Bent A and D.

D.L. Reactions

(a) superstructure:

Deck = $42.25 \times \frac{9}{12} \times 40 \times .150 = 190.125^{K}$

HAUNCH = $7 \times 0.038 \times 42.25 = 11.239^{K}$

Girder = $7 \times .130 \times 42.25 = 38.448^{K}$

SDL = $.458 \times 7 \times 42.25 = 135.454^{K}$

TOTAL 375.266^{K}

(b) substructure:

Pier Cap = $1 \times 44 \times 2.5 \times 3.50 \times .150 = 57.75^{K}$

Beam Seats = $7 \times 4.85/12 \times 2.00 \times 1.50 \times .150 = 1.27^{K}$

TOTAL 59.02^{K}

Live Load (Hyd. load)

(a) uplift on superstructure:

uplift head = $4.58 + .83 + .75 = 6.16^{K}$

" Load = $6.16 \times .064 \times 42.25 \times 47.33 = -788.36$

(b) uplift on substructure; H.W.L. = 14.5' (12.5+2)

uplift head = $\overset{\text{P/AT}}{4.58} + \overset{\text{S.W.}}{.83} + \overset{\text{CAP}}{2.50} + \overset{\text{SEAT}}{\frac{4.85}{12}} = 8.31'$

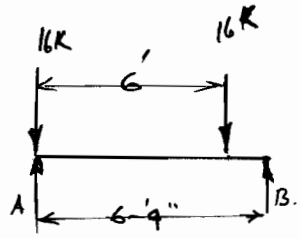
" Load = $8.31 \times .064 \times \underbrace{44 \times 3.50}_{\text{CAP}} = -81.90^{K}$

Net $1.75\,(375.266 + 59.02 - 788.36 - 81.90) = -326.98^{K}$

Pile Cap capacity $7 \times 47.8 = 334.6$ > 326.98 No Piles needed

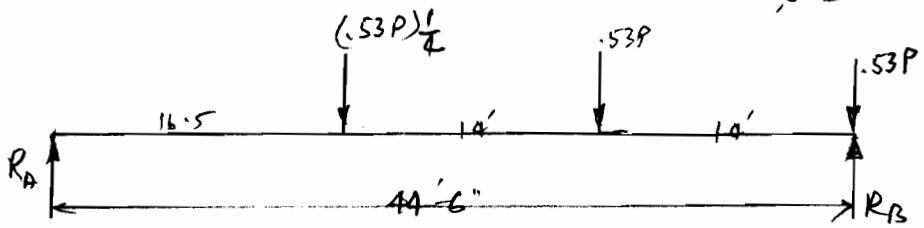
PROJECT 17th Street Canal Bridge	PAGE OF	COMPUTED BY S. A	DATE 11/12
SUBJECT Veterans Bridge.		CHECKED BY	DATE

Find the distribution Factor



$\therefore R_B = \frac{16 \times 6}{6.33} = 15.16$

$R_A = 32 - 15.16 = 16.84$ Factor $\cdot \frac{16.84}{32} = 0.53$



$\Sigma R_A = 0$

$16.5(.53)P/4 + 30.5(.53P) + .53P(44.5) = 44.5 R_B$

$2.186P + 16.165P + 23.585P = 44.5 R_B$

1.06

$R_B = \frac{41.936P}{44.5} = .9423P$

$= .9423(32) = \underline{30.154}$ Kips

$R_A = 1.1925P - .9423P = .2502P = .2502(32) = \underline{8}$ K

Live Load Reaction = $\underline{30.154}$ K

COMPUTATION SHEET

PROJECT	17th Street CANAL G.D.M	PAGE OF	COMPUTED BY S. A.	DATE 11/85
SUBJECT	Veterans Bridge		CHECKED BY	DATE

NORMAL Conditions.

a) superstructure Load = 375.266

b) substructure Load = 59.020

c) Live Load Reaction = 30.154

Total 464.440

Pile Cap uplift $\frac{-81.90}{383.54}$

$.75\left(383.54^{\circ}\right) = 287.655$

no Piles needed.

PROJECT	17th Street CANAL G.D.M.	PAGE OF	COMPUTED BY S.A.	DATE 1/12
SUBJECT	Veteran's Bridge		CHECKED BY	DATE

Pile Bent B & C.

D.L. Reactions.

(a) superstructures.

Deck = $50.75 \times \frac{9}{12} \times 40 \times .150 = 228.375$

Haunch = $7 \times .038 \times 50.75 = 13.500$

Girder $\begin{cases} 7 \times .152 \times 28.50 = 30.324 \\ 7 \times .130 \times 22.25 = 20.248 \end{cases}$

S.D.L = $7 \times .458 \times 50.75 = 162.705$

Total 455.152

b) uplift on superstructure

uplift head = 5.66 ft.

∴ Load = $5.66 \times .064 \times 47.33 \times 50.75 = -870.2$

(c) uplift on substructure =

head = $4.08 + .83 + 2.50 + 4.85/12 = 7.814'$

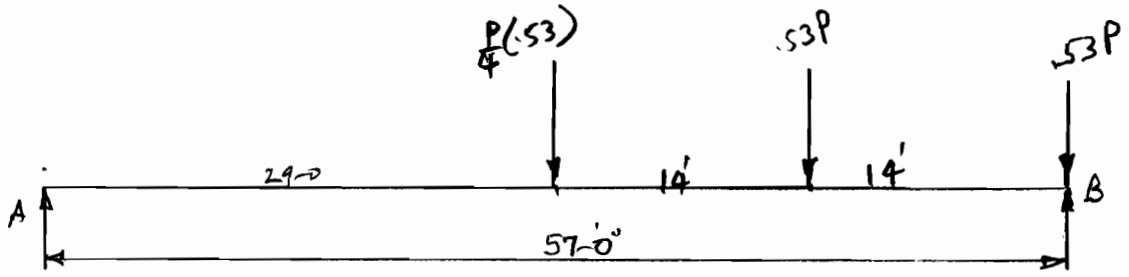
Load = $7.814 \times .064 \times 44 \times 3.50 = -77.014^{k}$

d) substructure ; Same As before = 59.02

Net = $0.75\left[455.152 + 59.02 - 870.2 - 77.014\right] = 324.78$

7 Pile Cap. = 334.6 > 324.78 NO Piles needed

PROJECT 17th Street CANAL GDM.	PAGE OF	COMPUTED BY S.A.	DATE 11/14
SUBJECT Veteran's Bridge		CHECKED BY	DATE



$\Sigma R_A = 0$

$$29 \times .53(P/4) + 43(.53P) + 57(.53)P = 57 R_B.$$

(3.8425 · 22.79 · 30.21)

or

$$R_B = \frac{56.8425P}{57.00} = .9972P$$

$$R_A = 1.1925P - .9972P$$

$$= .1953P = .1953(32) = 6.2496 \text{ Kips}.$$

$$R_B = 32(.9972) = 31.91 \text{ Kips}$$

Normal Conditions

superstructure = 455.152
Substr = 59.020
Live Load = 31.910
546.082

Pier Cap uplift = $\frac{-77.014}{469.068} \times 0.75 = 351.801^{K} \div 7 = 50.257^{Kips}$

With F.S. of 3.0 = $50.257 \times 3 = 150.771^{K}$ or 75.3855 Tons > 9.7

Replace All Piles. = 75.4 Tons

12/28/87

EXISTING PILE CAPACITY VETS Blvd

Bridge Pile Abutment AND BENT A & PILE BENT D.

20" Square Concrete Piles 39' length
Tip EL -35.0

	Compression	Tension
Q-CASE	132 TONS/pile	59.4 TONS/pile
S-CASE	125 TONS/pile	47.8 TONS/pile

Bridge Piers Pile Berts C and E

20" Square Concrete Piles 37' Length
Tip ELevation -33.0

	COMPRESSION	TENSION
S-CASE = Q-CASE	44.0 TONS	9.7 TONS

Sheetpile Cutoff

The existing sheetpile cutoff for the Veterans Bridge EL -17.4 is adequate.

F.S. = 2.0 with Pile Test
F.S. = 3.0 without Pile Test
For Tension pile capacity of existing bridge piles ~~piers~~ a F.S. = 2.0 is OK FJV 10/89
↳FOR OFFICIAL RESPONSE SEND DF

12/28/87

EXISTING PILE CAPACITY VETS Blvd

Bridge Pile Abutment & Pile Bent A-1

20" Square Concrete Piles 39' length
Tip EL -35.0

	Compression	Tension
Q-CASE	132 TONS/pile	59.4 TONS/pile
S-CASE	125 TONS/pile	47.8 TONS/pile

Bridge Piers Pile Bent B-1

20" Square Concrete Piles 37' Length
Tip ELevation -33.0

	COMPRESSION	TENSION
S-CASE = Q-CASE	44.0 TONS	9.7 TONS

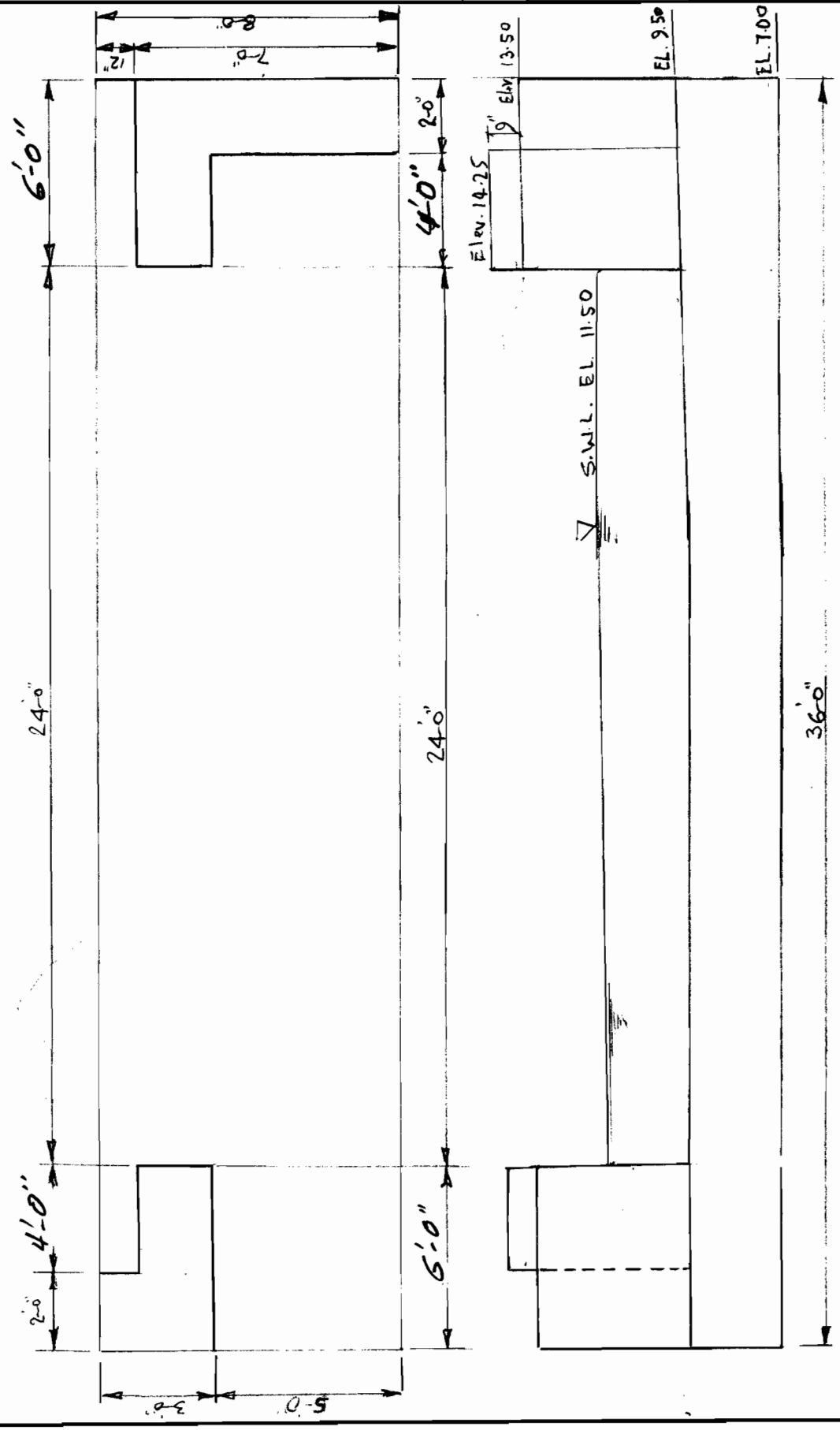
Sheetpile Cutoff

The existing sheetpile cutoff for the Veterans Bridge EL -17.4 is adequate.

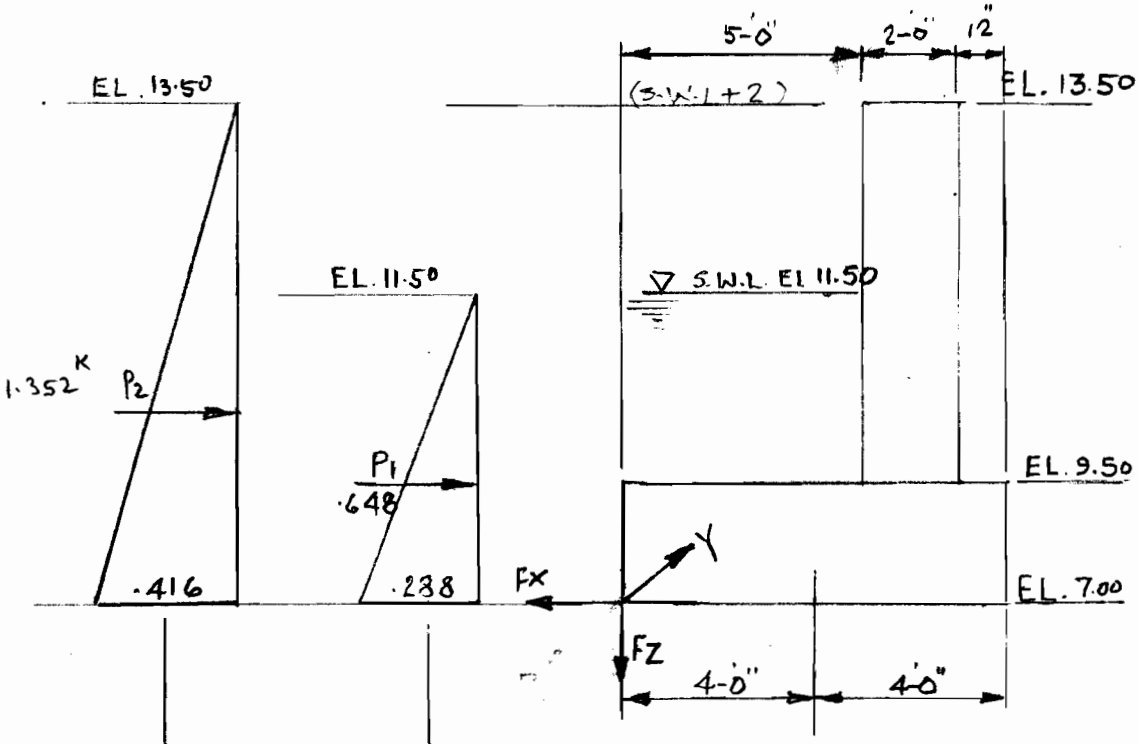
F.S. = 2.0 With Pile Test
F.S. = 3.0 Without Pile Test
For Tension pile capacity of existing bridge ~~piers~~ piles a F.S. = 2.0 is OK FJV 10/89
Without Pile Test

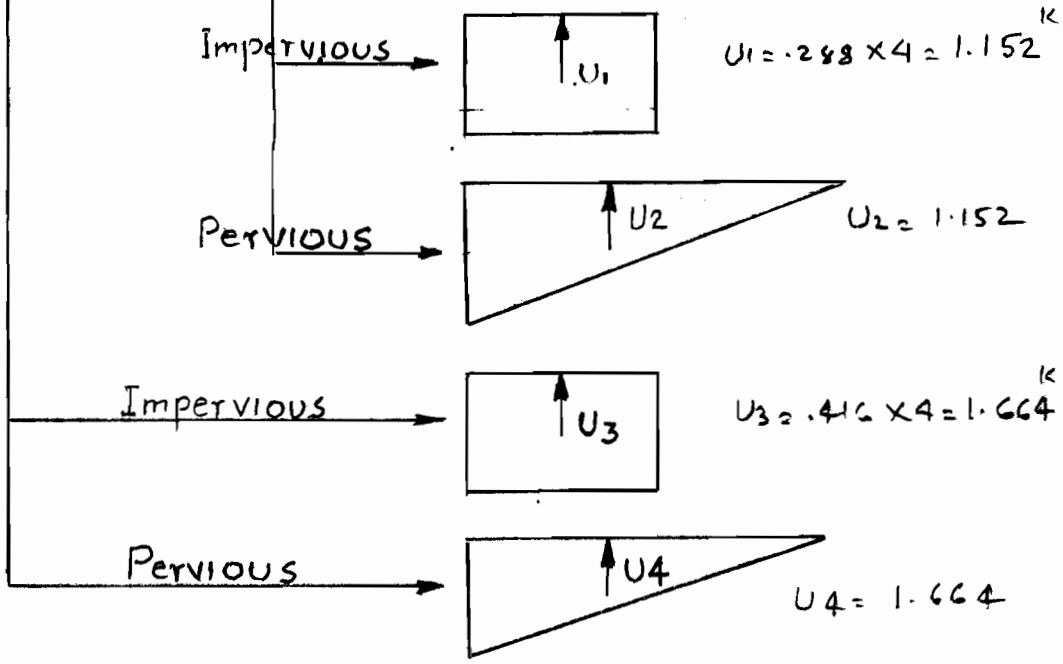
COMPUTATION SHEET

PROJECT 17th Street CANAL GDM	PAGE 1 OF 17	COMPUTED BY S. A.	DATE 12/20
SUBJECT SWING GATE AT HAMMOND HIGHWAY		CHECKED BY	DATE



PROJECT 17th Street CANAL	PAGE 2 OF 17	COMPUTED BY J.A.	DATE 10/25
SUBJECT Swing Gate Monolith @ HAMMOND Highway		CHECKED BY	DATE





PROJECT 17th street CANAL	PAGE 3 OF 17	COMPUTED BY S.A.	DATE 10/25
SUBJECT SWING GATE MONOLITH AT HAMMOND HWY.		CHECKED BY	DATE

DEAD-LOAD	Fx	Fz	L.A.	My-y
BASE slab = 36×8×2.50×.150		108.0	4.00	432.0
Colums = 2×4×2×4.75×.150		11.4	6.00	68.4
= 1×7.0×2×4.00×.150		8.4	3.50	29.4
= 1×3.0×2×4.00×.150		3.6	6.50	23.4
GATE CLOSED POSITION		4.5	4.50	20.3
Σ D.L./W GATE		135.9		573.5
Σ D.L, W/O GATE		131.4		553.2
HYDRAULIC LOAD				
(a) WATE To Elev. 11.50 (S.W.L)				
DOWN-WATER = 5×2.50×36×.064		28.8	2.50	72.0
uplift Imp. = (4.50×.064)×4×36		−41.5	2.00	−83.0
" Perv. = (4.50×.064)×$\frac{8}{2}$×36		−41.5	2.67	−110.8
Submerged wt. of Gate = 4.5 − $\left(2\times\frac{.064}{.490}\right)$		4.24	4.50	19.1
Hor. Water = (.064×4.50)×$\frac{4.5^{0}}{2}$×36	−23.33		1.5°	35.0
(b) WATER To (S.W.L.+2.0) Elev. 13.50				
DOWN WATER = 5×4×36×.064		46.1	2.50	115.3
uplift. Imperv. = (6.50×.064)×4×36		−59.9	2.00	−119.8
uplift. (Perv.) = (6.50×.064)×$\frac{8}{2}$×36		−59.9	2.67	−159.9
Submerged wt. of Gate = 4.50 − $\left(4\times\frac{.064}{.490}\right)$		3.98	4.50	17.9
Hor. WATER = (.064×6.50) $\frac{6.5^{0}}{2}$×36	−48.67		2.17	105.6
(c) WIND LOADS				
From Flood side = 4×.050×36		−7.2	3.25	23.4
From Protect. side = 4×.050×36		7.2	3.25	−23.4

PROJECT 17TH Street CANAL	PAGE 4 OF 17	COMPUTED BY S.A.	DATE 10/25
SUBJECT SWING-GATE MONOLITH AT HAMMOND HWY.		CHECKED BY	DATE

TRUCK LOADING HS 20-44

	FZ	$\bar{x}$	$\bar{Y}$	M_{x-x}	M_{y-y}
(1) TWO TRUCK ON F.S. Edge	64		1.0		± 64.0
(2) TWO TRUCKS ON P.S. Edge	64	-8.0	1.0	±64	512

	Fx	Fy	Fz	Mx-x	My-y	M. z-z
LOAD CASE 8:						
D.L.	0	0	135.9	0	573.5	0
TRUCK LOAD F.S.	0	0	64.0	±64	0	0
	0	0	199.9	±64	573.5	0
LOAD CASE 9:						
D.L.	0	0	135.9	0	573.5	0
TRUCK LOAD P.S.	0	0	64.0	±64	512.0	0
	0	0	199.9	±64	1085.5	0

PROJECT 17th Street CANAL	PAGE 5 OF 17	COMPUTED BY SA	DATE 10/25
SUBJECT SINING-GATE MONOLITH AT HAMMOND HWY.		CHECKED BY	DATE

LOAD SUMMARY

CASE 1: WATER TO S.W.L., NO WIND, IMPERVIOUS SHEET PILE CUT OFF, NO DYNAMIC WAVE FORCE (100 % FORCES USED)

DESCRIPTION	Fx	Fy	Fz	Mx-x	My-y	Mz-z
D.L.	—	—	135.9	—	573.5	—
WATER DOWN	—	—	28.8	—	72.0	—
UPLIFT (IMP.)	—	—	-41.5	—	-83.0	—
HORIZ.	-23.33	—	—	—	35.0	—
TOTAL	-23.33	—	123.2	—	597.5	—

CASE 2: WATER TO SWL, NO WIND, PERVIOUS SHEET PILE CUT OFF NO DYNAMIC WAVE FORCE (100 % Forces used)

DESCRIPTIONS	Fx	Fy	Fz	Mx-x	My-y	Mz-z
D.L.	—	—	135.9	—	573.5	—
WATER DOWN	—	—	28.8	—	72.0	—
UPLIFT (PER)	—	—	-41.5	—	-110.8	—
HORIZ.	-23.33	—	—	—	35.0	—
TOTAL	-23.33	—	123.2	—	569.7	—

CASE 3: WATER TO (S.W.L +2'), NO WIND, IMPERVIOUS sheet Pile cut off, NO DYNAMIC WAVE FORCE (75% Forces Used)

DESCRIPTIONS	Fx	Fy	Fz	Mxx	My-y	Mz-z
D.L.	—	—	135.9	—	573.5	—
WATER DOWN	—	—	46.1	—	115.3	—
UPLIFT	—	—	-59.9	—	-119.8	—
HORIZ	-48.67	—	—	—	105.6	—
100 %	-48.67	—	122.1	—	674.6	—
75%	-36.50	—	92.0	—	506.0	—

PROJECT	17th Street CANAL	PAGE 6 OF 17	COMPUTED BY SA	DATE 10/25
SUBJECT	SWING-GATE MONO. AT HAMMOND HWY.		CHECKED BY	DATE

CASE 4: WATER TO Elev. 13.50 NO WIND, Pervious seepage And no Dynamic WIND FORCE (75%)

DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
CONC. D.L.	—	—	135.9	—	573.5	—
WATER DOWN	—	—	46.1	—	115.3	—
UPLIF (PERV.)	—	—	-59.9	—	-159.9	—
HORIZ.	-48.67	—	—	—	105.6	—
100% TOTAL	-48.67	—	122.1	—	634.5	—
75% TOTAL	-36.50	—	92.0	—	476.0	—

CASE NO. 5: NO WATER, NO WIND (100 %)

DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
D.L. CONC.	—	—	135.9	—	573.5	—
100% TOTAL	—	—	135.9	—	573.5	—

CASE No. 6: NO WATER, WIND FROM PROT. SIDE (75%)

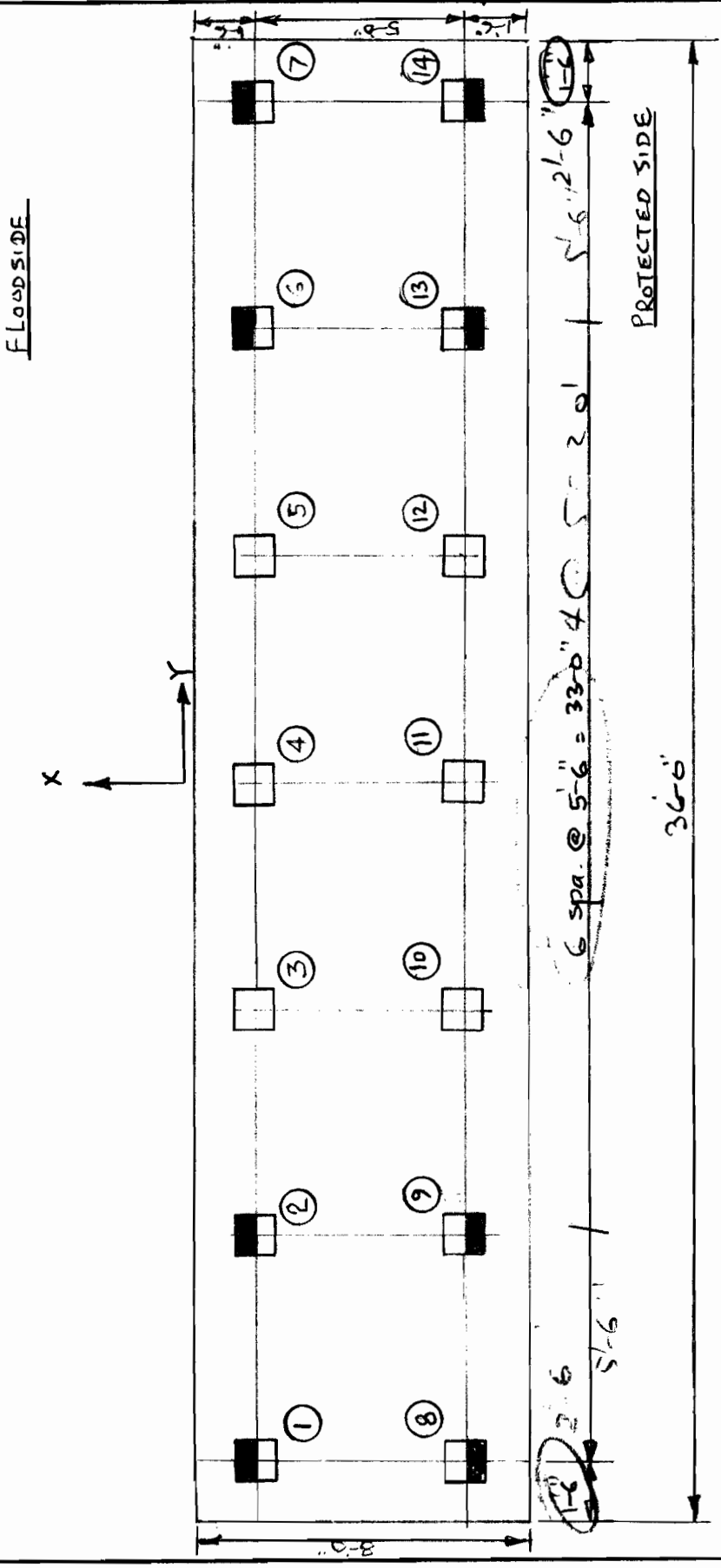
DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
D.L. CONC.	—	—	135.9	—	573.5	—
P.S. wind Force	—	—	7.2	—	-23.4	—
100% TOTAL	—	—	143.1	—	550.1	—
75% TOTAL	—	—	107.3	—	412.6	—

CASE No. 7: NO WATER, WIND FROM FLOOD-SIDE (75%)

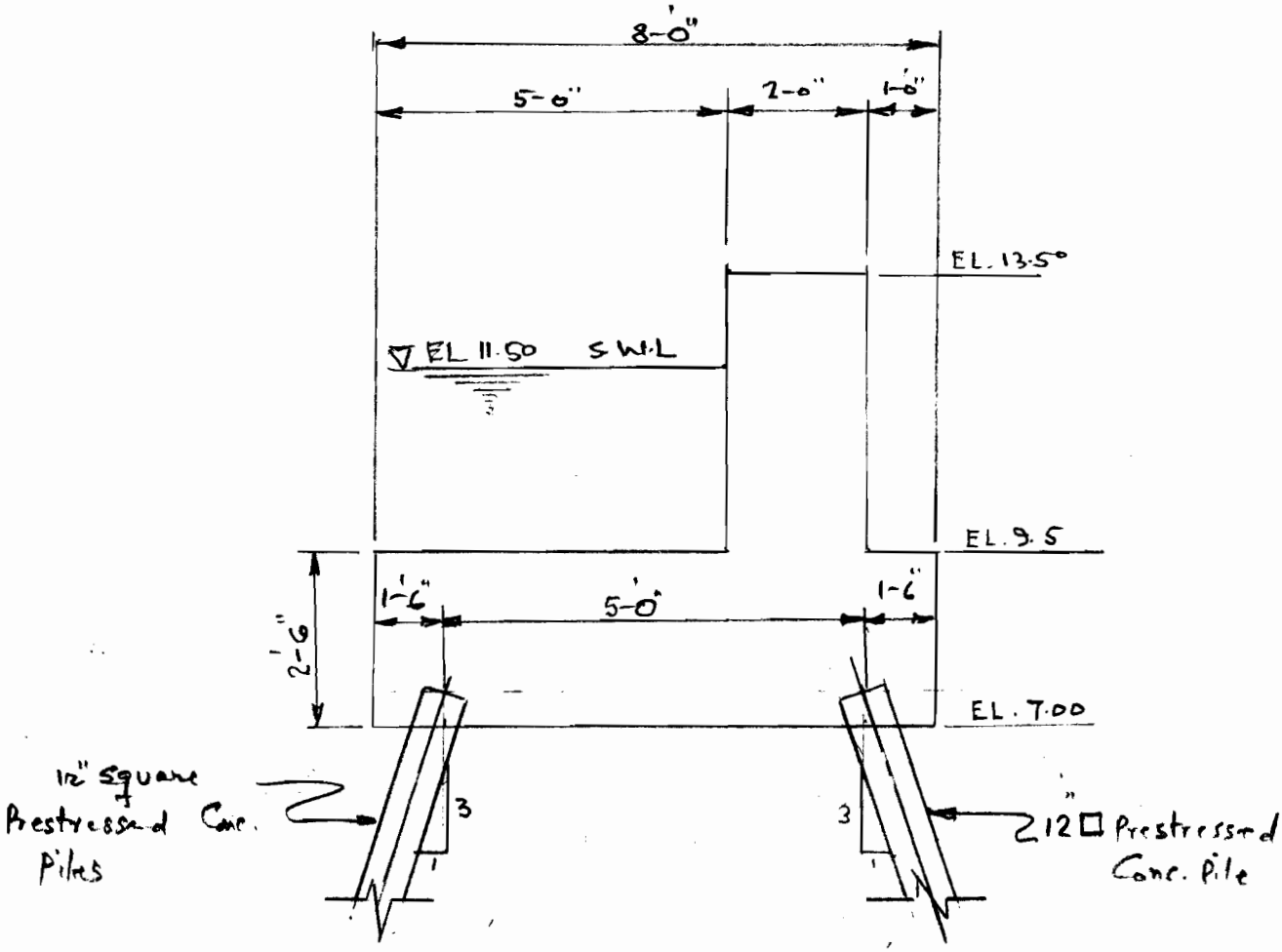
DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
DL. CONC.	—	—	135.9	—	573.5	—
F.S. WIND FORCE	—	—	-7.2	—	23.4	—
100% TOTAL	—	—	127.7	—	596.9	—
75% TOTAL	—	—	95.8	—	447.7	—

COMPUTATION SHEET

PROJECT	17th Street CANAL	PAGE 7 OF 17	COMPUTED BY S.A	DATE 10/25
SUBJECT	SWING-GATE AT HAMMOND HWY.		CHECKED BY	DATE



PROJECT 17th street CANAL	PAGE 8 OF 17	COMPUTED BY S.A	DATE 10/26
SUBJECT SWING GATE AT HAMMOND HWY.		CHECKED BY	DATE



WESTWEGO - HARVEY CANAL GDM
SWING GATE MONOLITH ,HAMMOND HWY.F.G

10/25/89
CAL

STIFFNESS MATRIX FOR CPGA (3D PILE)

* KhB = .15 ksi Ec = 4074 ksi

I1 = 1728 cu in I2 = 1728 cu in

A = 144 sq in L = 50 ft

R1 = 82.8 in R2 = 82.8 in

STIFFNESS COEFFICIENT	FIXITY CONSTANT Co	RESULT
B11 =	1	8.782
B22 =	1	8.782

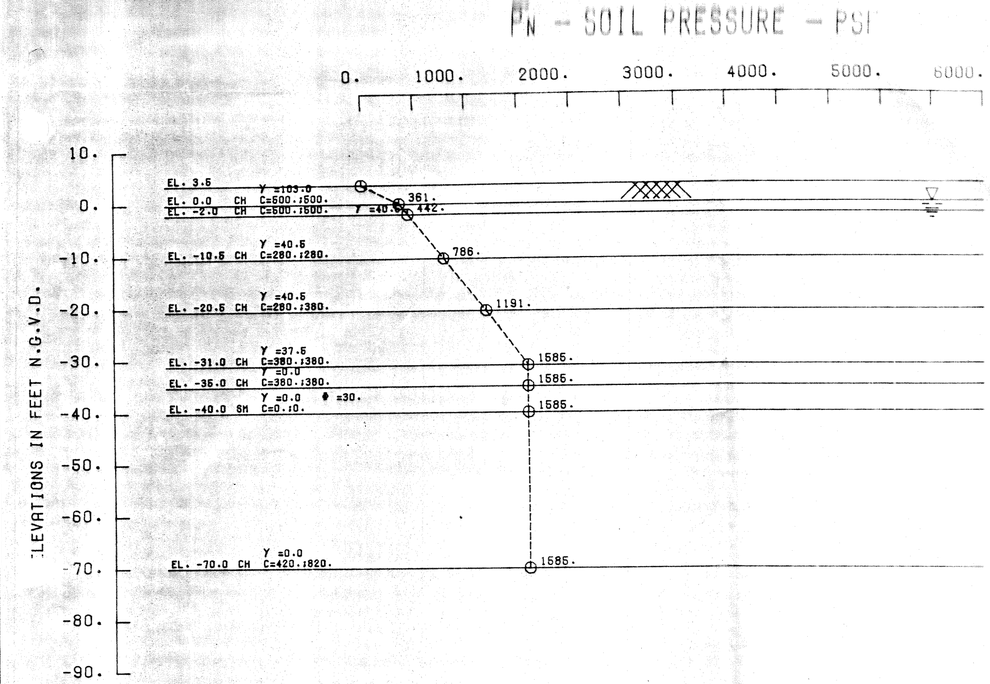
B33 = 1955.5

KMP1 = 37.7
KMP2 = 37.7

* -- LOW Kh VALUE TO ACCOUNT FOR GROUP AFFECTS OF TIMBER PILES 1,2,4,5.

NOTE : ABOVE COMPUTATIONS ARE FOR FLOODWALLS WITH CONSTANT SUBGRADE MODULUS, FULLY EMBEDDED PILES AND FOLLOW THE CALCULATIONS PRESENTED ON PAGE B35 OF THE CPGA MANUAL.

9.5
7.'
5°
/43



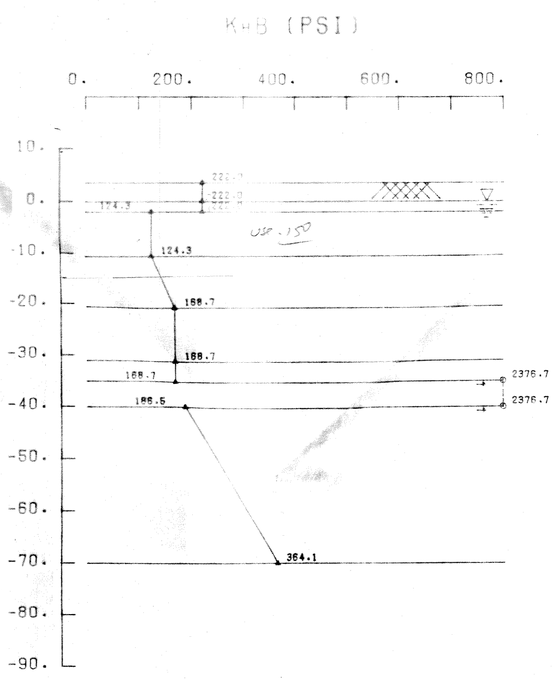
S-CASE
CH,CL- Φ=23°
ML- Φ=30°
SM,SP- Φ=30°,33°

TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE

SHEAR STRENGTH AND WET DENSITIES SEE PLATE

D	PILE SPACING IN DIRECTION OF LOADING
1.00	8B
0.85	7B
0.70	6B
0.55	5B
0.40	4B
0.25	3B
C	LOADING CONDITION
1.00	INITIAL LOADING
0.30	CYCLIC LOADING



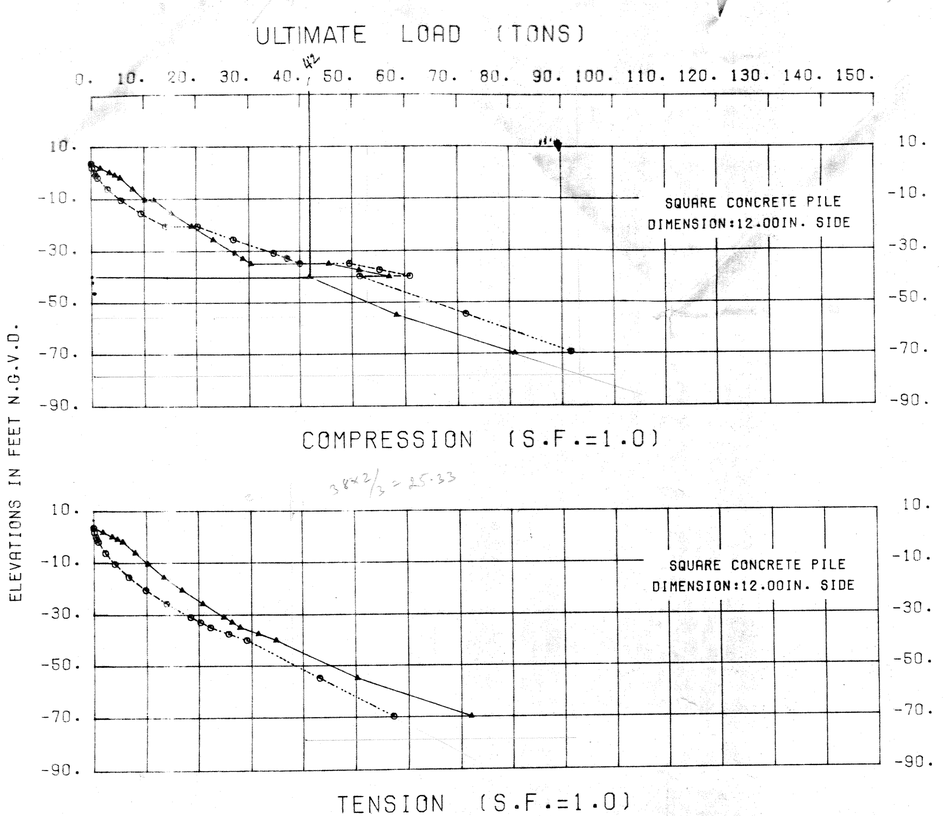
NOTES: $K_H = \alpha K_1/B = (0.2222\,q_u/B)(C)(D)$ COHESIVE

- α = 0.4 = Factor of material properties of soil and pile
- k_1 = Modulus of subgrade reaction for test plate (pci)
- B_1 = Width or diameter of test plate (in)
- $K_1 = k_1 B_1 = 80\,q_u$ (psf) = $0.5556\,q_u$ (psi)
- $q_u = 2 \cdot c$ = Unconfined compressive strength (psf)
- C = Reduction for cyclic loading-not applicable
- D = Group effect reduction factor
- B = Width of pile measured at right angles to the direction of displacement (in)

K_H = Initial/Average coefficient

n_h = Coefficient of horizontal subgrade reaction (pci)

Z = Depth below equivalent ground surface (in)



THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE K_H, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C).

(C) Ex: $K_H = 0.2222$ (C)(D) (B)

- - - - S-CASE
——— Q-CASE

NOTE: ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING FS=2.0 WITH PILE TEST OR FS.=3.0 WITHOUT PILE TEST.

17TH ST OUTFALL CANAL GDM
HAMMOND HIGHWAY FLOODGATE
12" SQUARE PRESTRESSED CONCRETE PILES

PILE CAPACITY CURVES

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
NEW ORLEANS
JUNE 1981

```
10 17TH STREET OUTFALL CANAL S.D.M.-
20 SWING GATE MONG. HAMMOND HWY. F.GATE (A:HAM)  )
30 BIJ 8.782 9.782 1935.5 0 0 0 0 0 ALL
40 TENSION 0.8 ALL
   DLS S 35.33 25.33 539.4 182 73.7 939 775 H 12 ALL
60 ASC S 144 288 .84 .9975 1.75 0 ALL
70 PMAXMOM 37.7 37.7 ALL
80 BATTER 3 1 2 6 TO 9 13 14
90 ANGLE 00 1 TO 7
100 ANGLE 180 8 TO 14
110 PILE 1 -1.5 -16.5 0 2 -1.5 -11 0 3 -1.5 -5.5 0
120 PILE 4 -1.5 0 0 5 -1.5 5.5 0 6 -1.5 11 0 7 -1.5 16.5 0
130 PILE 8 -6.5 -16.5 0 9 -6.5 -11 0 10 -6.5 -5.5 0
140 PILE 11 -6.5 0 0 12 -6.5 5.5 0 13 -6.5 11 0 14 -6.5 16.5 0
150 LOAD 1 -23.3 0 123.2 0 597.5 0
160 LOAD 2 -23.3 0 123.2 0 569.7 0
170 LOAD 3 -36.5 0 92.0 0 506.0 0
180 LOAD 4 -36.5 0 92.0 0 476.0 0
190 LOAD 5 0 0 135.9 0 573.5 0
200 LOAD 6 0 0 107.3 0 412.6 0
210 LOAD 7 0 0 95.8 0 447.7 0
220 LOAD 8 0 0 199.9 -64 573.5 0
230 LOAD 9 0 0 199.9 64 1085.5 0
240 FOUT 1 2 3 4 5  A:HAMOUT
250 PSC 1
260 PFD ALL
```

```
*********************************
* COPPS PROGRAM  #  X0080     *  CPGA - CASE PILE GROUP ANALYSIS PROGRAM
* VERSION NUMBER # 86/09/02-A *  RUN DATE 10-26-87     RUN TIME 06:50:35
*********************************
```

17TH STREET OUTFALL CANAL G.D.M.
SWING GATE MONO, HAMMOND HWY. F.GATE (A:17THST.)

THERE ARE 14 PILES AND
            9 LOAD CASES IN THIS RUN.

ALL PILE COORDINATES ARE CONTAINED WITHIN A BOX

	X	Y	Z
WITH DIAGONAL COORDINATES = (	-6.50 ,	-16.50 ,	.00)
(	-1.50 ,	16.50 ,	.00)

****

PILE STIFFNESSES AS INPUT

.87820E+01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.87820E+01	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.19555E+04	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

THIS MATRIX APPLIES TO THE FOLLOWING PILES -

ALL

****

PILE GEOMETRY AS INPUT AND/OR GENERATED

NUM	X FT	Y FT	Z FT	BATTER	ANGLE	LENGTH FT	FIXITY
1	-1.50	-16.50	.00	3.00	.00		P
2	-1.50	-11.00	.00	3.00	.00		P
3	-1.50	-5.50	.00	V	.00		P
4	-1.50	.00	.00	V	.00		P
5	-1.50	5.50	.00	V	.00		P
6	-1.50	11.00	.00	3.00	.00		P
7	-1.50	16.50	.00	3.00	.00		P
8	-6.50	-16.50	.00	3.00	180.00		P
9	-6.50	-11.00	.00	3.00	180.00		P
10	-6.50	-5.50	.00	V	180.00		P
11	-6.50	.00	.00	V	180.00		P
12	-6.50	5.50	.00	V	180.00		P
13	-6.50	11.00	.00	3.00	180.00		P
14	-6.50	16.50	.00	3.00	180.00		P

****

APPLIED LOADS

LOAD CASE	FX K	FY K	PZ K	MX FT-K	MY FT-K	MZ FT-K
1	-23.3	.0	123.2	.0	597.5	.0
2	-23.3	.0	123.2	.0	569.7	.0
3	-36.5	.0	92.0	.0	506.0	.0
4	-36.5	.0	92.0	.0	476.0	.0
5	.0	.0	135.9	.0	573.5	.0
6	.0	.0	107.3	.0	412.6	.0
7	.0	.0	95.6	.0	447.7	.0
8	.0	.0	199.9	-64.2	573.5	.0
9	.0	.0	199.9	64.0	1005.3	.0

****

ORIGINAL PILE GROUP STIFFNESS MATRIX

.16803E+04	.68075E-04	.00000E+00	.00000E+00	-.14016E+06	-.39063E-02
.68075E-04	.12295E+03	-.20422E-03	.00000E+00	-.15933E-01	-.59015E+04
.12207E-03	-.20422E-03	.25820E+05	.00000E+00	.12373E+07	.31250E-01
-.78125E-02	.00000E+00	.00000E+00	.43292E+09	.00000E+00	.20000E+01
-.14016E+06	-.15930E-01	.12393E+07	.00000E+00	.82726E+08	.30000E+01
-.11719E-01	-.59015E+04	.31250E-01	.00000E+00	.30000E+01	.46632E+09

LOAD CASE 1. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 2. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 3. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 7.

LOAD CASE 4. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 7.

LOAD CASE 5. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 6. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 7. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 8. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 9. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 3.

****

PILE CAP DISPLACEMENTS

LOAD CASE	DX IN	DY IN	DZ IN	RX RAD	RY RAD	RZ RAD
1	-.1883E-01	.1519E-07	.7628E-02	-.3398E-12	-.5952E-04	-.4093E-11
2	-.2124E-01	.1510E-07	.9015E-02	-.3833E-12	-.9841E-04	-.3701E-11
3	-.3175E-01	.1730E-07	.9336E-02	-.5730E-12	-.1203E-03	-.4310E-11
4	-.3436E-01	.1720E-07	.1083E-01	-.6200E-12	-.1515E-03	-.3973E-11
5	.2592E-02	.8723E-08	.3772E-02	.4678E-13	.3103E-04	-.2771E-11
6	-.1439E-02	.6757E-08	.4934E-02	-.2597E-13	-.1725E-04	-.1737E-11
7	.5592E-02	.6290E-08	.4926E-03	.1009E-12	.6704E-04	-.2442E-11
8	-.1960E-01	.1195E-07	.1902E-01	-.1774E-05	-.2350E-03	-.1043E-11
9	.2479E-01	.1362E-07	-.6521E-02	.1774E-03	.2971E-03	-.6794E-11

PILE FORCES IN LOCAL GEOMETRY

M1 & M2 NOT AT PILE HEAD FOR PINNED PILES
* INDICATES PILE FAILURE
# INDICATES CBF BASED ON MOMENTS DUE TO
(F3*EMIN) FOR CONCRETE PILES
B INDICATES BUCKLING CONTROLS

LOAD CASE - 1

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.2	.0	.5	.0	6.6	.0	.01	.19	1.02	.82	
2	-.2	.0	.5	.0	6.6	.0	.01	.19	1.02	.82	
3	-.2	.0	12.8	.0	6.2	.0	.36	.14	1.11	.91	#
4	-.2	.0	12.8	.0	6.2	.0	.36	.14	1.11	.91	#
5	-.2	.0	12.8	.0	6.2	.0	.36	.14	1.11	.91	#
6	-.2	.0	.5	.0	6.6	.0	.01	.19	1.02	.82	
7	-.2	.0	.5	.0	6.6	.0	.01	.19	1.02	.82	
8	.1	.0	17.2	.0	-5.6	.0	.49	.12	1.14	.94	#
9	.1	.0	17.2	.0	-5.6	.0	.49	.12	1.14	.94	#
10	.2	.0	5.8	.0	-6.2	.0	.17	.16	1.06	.86	#
11	.2	.0	5.8	.0	-6.2	.0	.17	.16	1.06	.86	#
12	.2	.0	5.8	.0	-6.2	.0	.17	.16	1.06	.86	#
13	.1	.0	17.2	.0	-5.6	.0	.49	.12	1.14	.94	#
14	.1	.0	17.2	.0	-5.6	.0	.49	.12	1.14	.94	#

LOAD CASE - 2

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.2	.0	.6	.0	7.4	.0	.02	.19	1.03	.82	
2	-.2	.0	.6	.0	7.4	.0	.02	.19	1.03	.82	
3	-.2	.0	14.5	.0	7.0	.0	.41	.13	1.12	.92	#
4	-.2	.0	14.5	.0	7.0	.0	.41	.13	1.12	.92	#
5	-.2	.0	14.5	.0	7.0	.0	.41	.13	1.12	.92	#
6	-.2	.0	.6	.0	7.4	.0	.02	.19	1.03	.82	
7	-.2	.0	.6	.0	7.4	.0	.02	.19	1.03	.82	
8	.2	.0	17.1	.0	-6.4	.0	.48	.12	1.14	.94	#
9	.2	.0	17.1	.0	-6.4	.0	.48	.12	1.14	.94	#
10	.2	.0	4.1	.0	-7.0	.0	.12	.17	1.05	.84	
11	.2	.0	4.1	.0	-7.0	.0	.12	.17	1.05	.84	
12	.2	.0	4.1	.0	-7.0	.0	.12	.17	1.05	.84	
13	.2	.0	17.1	.0	-6.4	.0	.48	.12	1.14	.94	#
14	.2	.0	17.1	.0	-6.4	.0	.48	.12	1.14	.94	#

LOAD CASE - 3

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.3	.0	-6.3	.0	10.7	.0	.25	.13	.99	.76	
2	-.3	.0	-6.3	.0	10.7	.0	.25	.13	.99	.76	
3	-.3	.0	14.0	.0	10.5	.0	.40	.13	1.13	.90	#
4	-.3	.0	14.0	.0	10.5	.0	.40	.13	1.13	.90	#
5	-.3	.0	14.0	.0	10.5	.0	.40	.13	1.13	.90	#
6	-.3	.0	-6.3	.0	10.7	.0	.25	.13	.99	.76	

7	-.3	.0	-6.3	.0	10.7	.0	.20	.13	.99	.76
8	.3	.0	19.6	.0	-10.0	.0	.55	.12	1.17	.94 #
9	.3	.0	19.6	.0	-10.0	.0	.55	.12	1.17	.94 #
10	.3	.0	-.1	.0	-10.5	.0	.00	.04	1.03	.80
11	.3	.0	-.1	.0	-10.5	.0	.00	.04	1.03	.80
12	.3	.0	-.1	.0	-10.5	.0	.00	.04	1.03	.80
13	.3	.0	19.6	.0	-10.0	.0	.55	.12	1.17	.94 #
14	.3	.0	19.6	.0	-10.0	.0	.55	.12	1.17	.94 #

Sheet 15 of 17

LOAD CASE - 4

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.3	.0	-6.2	.0	11.6	.0	.24	.13	.99	.76	
2	-.3	.0	-6.2	.0	11.6	.0	.24	.13	.99	.76	
3	-.3	.0	15.9	.0	11.4	.0	.45	.13	1.15	.91	#
4	-.3	.0	15.9	.0	11.4	.0	.45	.13	1.15	.91	#
5	-.3	.0	15.9	.0	11.4	.0	.45	.13	1.15	.91	#
6	-.3	.0	-6.2	.0	11.6	.0	.24	.13	.99	.76	
7	-.3	.0	-6.2	.0	11.6	.0	.24	.13	.99	.76	
8	.3	.0	19.4	.0	-10.9	.0	.55	.12	1.17	.94	#
9	.3	.0	19.4	.0	-10.9	.0	.55	.12	1.17	.94	#
10	.3	.0	-1.9	.0	-11.4	.0	.08	.07	1.02	.79	
11	.3	.0	-1.9	.0	-11.4	.0	.08	.07	1.02	.79	
12	.3	.0	-1.9	.0	-11.4	.0	.08	.07	1.02	.79	
13	.3	.0	19.4	.0	-10.9	.0	.55	.12	1.17	.94	#
14	.3	.0	19.4	.0	-10.9	.0	.55	.12	1.17	.94	#

LOAD CASE - 5

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	.0	.0	9.6	.0	-.4	.0	.27	.15	1.07	.91	#
2	.0	.0	9.6	.0	-.4	.0	.27	.15	1.07	.91	#
3	.0	.0	8.5	.0	-.9	.0	.24	.15	1.06	.90	#
4	.0	.0	8.5	.0	-.9	.0	.24	.15	1.06	.90	#
5	.0	.0	8.5	.0	-.9	.0	.24	.15	1.06	.90	#
6	.0	.0	9.6	.0	-.4	.0	.27	.15	1.07	.91	#
7	.0	.0	9.6	.0	-.4	.0	.27	.15	1.07	.91	#
8	.0	.0	9.9	.0	1.5	.0	.28	.15	1.07	.90	#
9	.0	.0	9.9	.0	1.5	.0	.28	.15	1.07	.90	#
10	.0	.0	12.1	.0	.9	.0	.34	.14	1.08	.92	#
11	.0	.0	12.1	.0	.9	.0	.34	.14	1.08	.92	#
12	.0	.0	12.1	.0	.9	.0	.34	.14	1.08	.92	#
13	.0	.0	9.9	.0	1.5	.0	.28	.15	1.07	.90	#
14	.0	.0	9.9	.0	1.5	.0	.28	.15	1.07	.90	#

LOAD CASE - 6

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	.0	.0	7.8	.0	.9	.0	.22	.15	1.05	.89	#
2	.0	.0	7.8	.0	.9	.0	.22	.15	1.05	.89	#
3	.0	.0	9.1	.0	.5	.0	.26	.15	1.06	.90	#
4	.0	.0	9.1	.0	.5	.0	.26	.15	1.06	.90	#
5	.0	.0	9.1	.0	.5	.0	.26	.15	1.06	.90	#
6	.0	.0	7.8	.0	.9	.0	.22	.15	1.05	.89	#
7	.0	.0	7.8	.0	.9	.0	.22	.15	1.05	.89	#
8	.0	.0	7.6	.0	-.1	.0	.22	.15	1.05	.89	#
9	.0	.0	7.6	.0	-.1	.0	.22	.15	1.05	.89	#

10	.0	.0	7.1	.0	-.5	.0	.20	.15	1.05	.89 #
11	.0	.0	7.1	.0	-.5	.0	.20	.15	1.05	.89 #
12	.0	.0	7.1	.0	-.5	.0	.20	.15	1.05	.89 #
13	.0	.0	7.6	.0	-.1	.0	.22	.13	1.03	.87 #
14	.0	.0	7.6	.0	-.1	.0	.22	.15	1.05	.89 #

Sheet 16 of 17

LOAD CASE - 7

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI
1	.0	.0	6.6	.0	-1.6	.0	.19	.16	1.05	.88 #
2	.0	.0	6.6	.0	-1.6	.0	.19	.16	1.05	.88 #
3	.0	.0	3.3	.0	-1.9	.0	.09	.16	1.03	.86 #
4	.0	.0	3.3	.0	-1.9	.0	.09	.16	1.03	.86 #
5	.0	.0	3.3	.0	-1.9	.0	.09	.16	1.03	.86 #
6	.0	.0	6.6	.0	-1.6	.0	.19	.16	1.05	.90 #
7	.0	.0	6.6	.0	-1.6	.0	.19	.16	1.05	.90 #
8	-.1	.0	7.2	.0	2.4	.0	.20	.15	1.06	.88 #
9	-.1	.0	7.2	.0	2.4	.0	.20	.15	1.06	.90 #
10	.0	.0	11.2	.0	1.9	.0	.32	.14	1.08	.91 #
11	.0	.0	11.2	.0	1.9	.0	.32	.14	1.08	.91 #
12	.0	.0	11.2	.0	1.9	.0	.32	.14	1.08	.91 #
13	-.1	.0	7.2	.0	2.4	.0	.20	.15	1.06	.93 #
14	-.1	.0	7.2	.0	2.4	.0	.20	.15	1.06	.86 #

LOAD CASE - 8

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI
1	-.2	.0	16.0	.0	7.7	.0	.45	.13	1.14	.92 #
2	-.2	.0	15.8	.0	7.7	.0	.45	.13	1.13	.92 #
3	-.2	.0	29.2	.0	6.5	.0	.83	.11	1.22	1.02 #
4	-.2	.0	28.9	.0	6.5	.0	.82	.11	1.22	1.02 #
5	-.2	.0	28.7	.0	6.5	.0	.81	.11	1.22	1.02 #
6	-.2	.0	14.9	.0	7.7	.0	.42	.13	1.13	.92 #
7	-.2	.0	14.7	.0	7.7	.0	.42	.13	1.13	.92 #
8	.2	.0	14.1	.0	-6.0	.0	.40	.13	1.12	.92 #
9	.2	.0	13.8	.0	-6.1	.0	.39	.13	1.11	.92 #
10	.2	.0	1.6	.0	-6.5	.0	.04	.18	1.02	.83
11	.2	.0	1.4	.0	-6.5	.0	.04	.18	1.03	.83
12	.2	.0	1.1	.0	-6.5	.0	.03	.19	1.03	.83
13	.2	.0	13.0	.0	-6.1	.0	.37	.14	1.11	.91 #
14	.2	.0	12.8	.0	-6.1	.0	.36	.14	1.11	.91 #

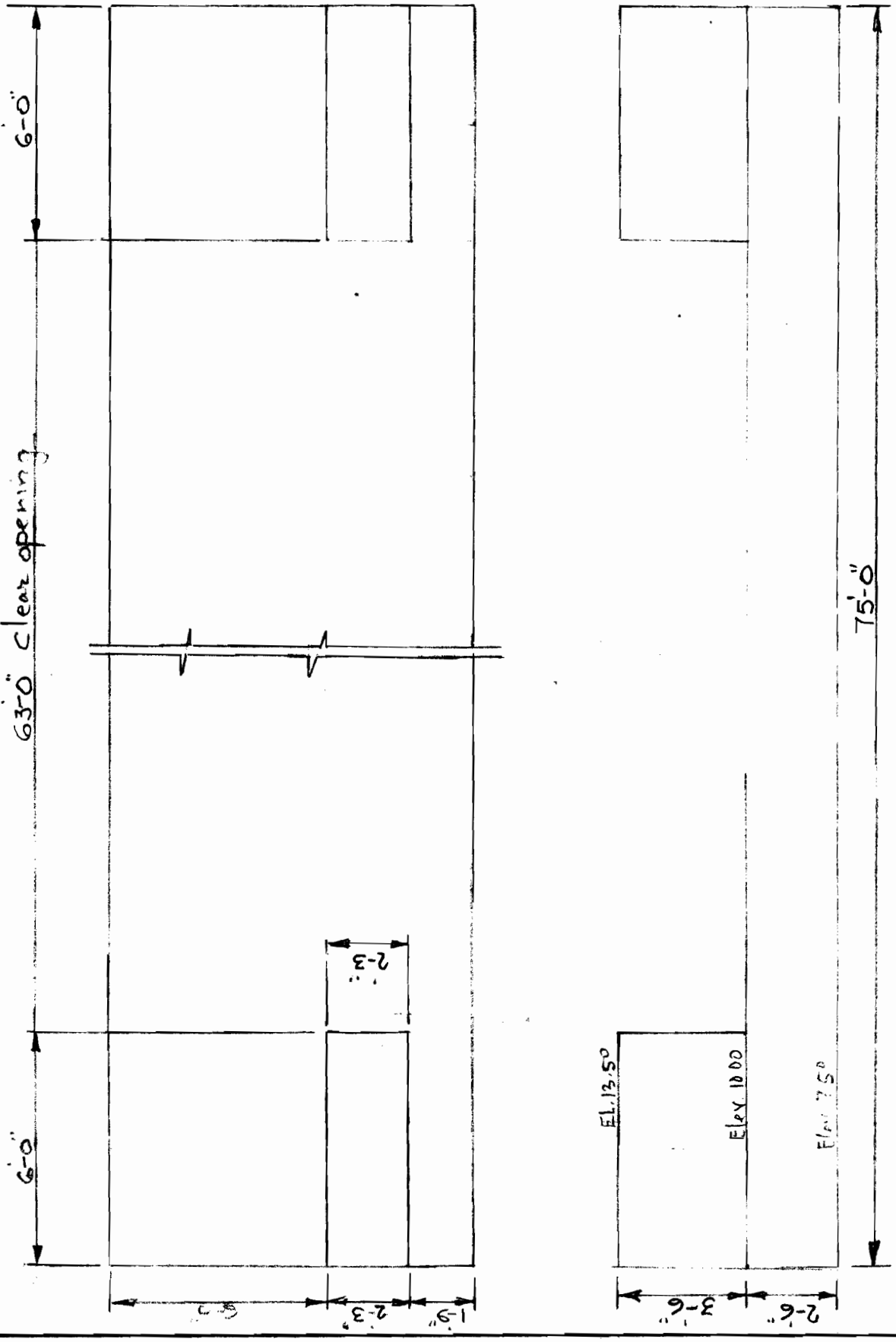
LOAD CASE - 9

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI
1	.2	.0	12.5	.0	-7.9	.0	.35	.14	1.11	.93 #
2	.2	.0	12.7	.0	-7.9	.0	.35	.14	1.11	.90 #
3	.2	.0	-2.5	.0	-8.2	.0	.10	.07	1.01	.79
4	.2	.0	-2.3	.0	-8.2	.0	.09	.06	1.01	.80
5	.2	.0	-2.1	.0	-8.2	.0	.08	.06	1.01	.80
6	.2	.0	13.6	.0	-7.9	.0	.38	.13	1.12	.91 #
7	.2	.0	13.8	.0	-7.9	.0	.39	.13	1.12	.91 #
8	-.3	.0	14.9	.0	9.5	.0	.42	.13	1.13	.91 #
9	-.3	.0	15.1	.0	9.5	.0	.43	.13	1.14	.91 #
10	-.2	.0	32.3	.0	8.2	.0	.92	.14	1.25	1.04 #
11	-.2	.0	32.6	.0	8.2	.0	.92	.14	1.25	1.04 #
12	-.2	.0	32.8	.0	8.2	.0	.93	.15	1.25	1.04 #

15	-.3	.0	16.0	.0	9.6	.0	.45	.13	1.14	.92 #
16	-.3	.0	16.2	.0	9.6	.0	.46	.13	1.14	.92 #

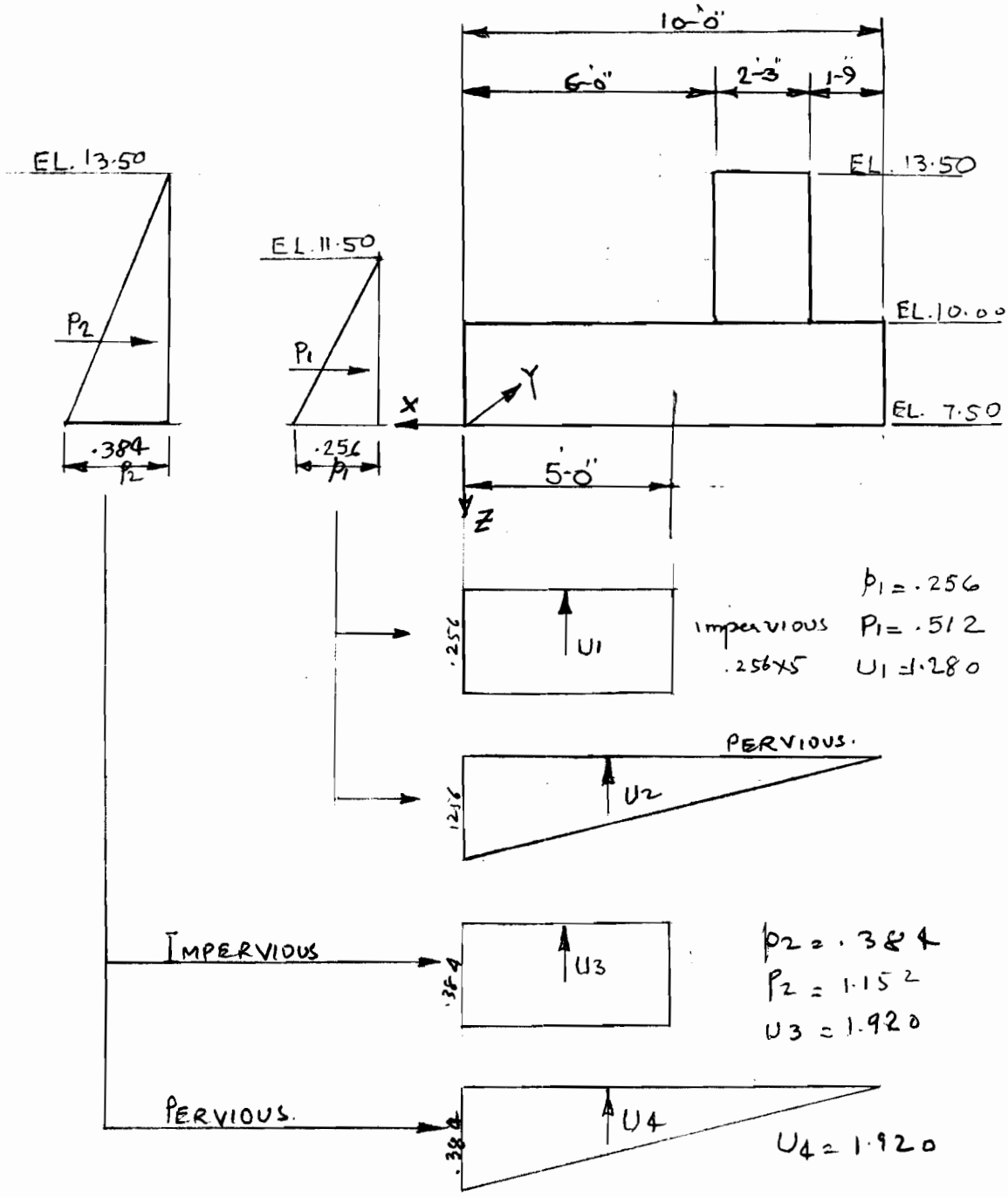
COMPUTATION SHEET

PROJECT 17th Street CANAL G.D.M.	PAGE 1 OF 18	COMPUTED BY S A.	DATE 10/31/89
SUBJECT Roller Gate Monolith		CHECKED BY MSD	DATE 3/90



COMPUTATION SHEET

PROJECT 17th Street CANAL G.D.M.	PAGE 2 OF 14	COMPUTED BY S.A.	DATE 10/27
SUBJECT Roller gate Monolith		CHECKED BY MSD	DATE 3/90



PROJECT 17th Street CANAL G.D.M.	PAGE 3 OF 18	COMPUTED BY J.A.	DATE 4/25
SUBJECT Roller GATE MONOLITH		CHECKED BY MSD	DATE 3/90

DEAD LOADS

	Fx	FZ	L.A.	My-Y
Base slab = 1x75x10x2.50x.150	—	281.25	5.00	1406.25
Columns = 2x6.50x2.25x3.50x.150	—	15.36	7.125	109.44
GATE CLOSED Position	—	12.50	7.125	89.06
Σ D.L.		309.11		1604.75

HYDRAULIC LOADS

a. Water to (S.W.L.) Elev. 11.50

Down water = 6x1.50x75x.064		43.20	3.00	129.60
uplift Imp. = 4x.064x5x75.0		−96.00	2.50	−240.00
Pervious = 4x.064x$\frac{10}{2}$x75.0		−96.00	3.33	−320.00
HORIZ. = (4x.064)x$\frac{4}{2}$x75.0	−38.40		1.33	51.10

b. Water to (SWL+2) Elev. 13.50

Down Water = 6x3.50x75x.064		100.80	3.00	302.40
uplift Imp. = 6x.064x5x75.0		−144.00	2.50	−360.00
uplift Perv. = 6x.064x$\frac{10}{2}$x75.0		−144.00	3.33	−480.00
HORIZ. = (6x.064)x$\frac{6}{2}$x75.0	−86.4		2.00	172.80

WIND LOADS

From Flood-side = 3.50x.05x75	−13.13		4.25	55.80
From Prot. side = 3.50x.05x75	13.13		4.25	−55.80

TRUCK-LOADING-HS 20-44

	FZ	$\bar{x}$	$\bar{Y}$	Mx-x	My-Y
4 trucks on F.S. Edge	128	10	1.2	160	1280.00

PROJECT 17th Street CANAL G.D.M	PAGE 4 OF 18	COMPUTED BY S.A.	DATE 10/27
SUBJECT Roller Gate Monolith		CHECKED BY MSD	DATE 3/90

SUMMARY OF LOAD CASES

CASE No. 1. WATER TO EL. 11.50, IMPERVIOUS seepage AND NO Dynamic Wave Force (100 %)

DESCRIPTION	Fx	Fy	Fz	Mx-x	My-y	Mz-z
D.L. Conc.	—	—	309.11	—	1604.75	—
WATER DOWN	—	—	43.20	—	129.60	—
UPLIFT (Imp.)	—	—	-96.00	—	-240.00	—
HORIZ.	-38.40	—	—	—	51.10	—
TOTAL	-38.40	—	256.31	—	1545.55	

CASE-No. 2 WATER TO Elev. 11.50, Pervious seepage and no dynamic WAVE FORCE (100 %)

Description	Fx	Fy	Fz	Mx-x	My-y	Mz-z
D.L. Conc.	—	—	309.11	—	1604.75	—
WATER DOWN	—	—	43.20	—	129.60	—
UPLIFT (Perv.)	—	—	-96.00	—	-320.00	—
HORIZ.	-38.40	—	—	—	51.10	—
TOTAL	-38.40	—	256.31	—	1465.45	—

CASE-NO.3 : WATER TO Elev. 13.50, NO WIND, Impervious seepage & No DYNAMIC WAVE FORCE (75%)

Description	Fx	Fy	Fz	Mx-x	My-y	Mz-z
D.L. Conc.	—	—	309.11	—	1604.75	—
WATER DOWN	—	—	100.80	—	302.40	—
Imp. uplift	—	—	-144.00	—	-360.00	—
HORIZ.	-86.4	—	—	—	172.80	—
100 %	-86.4	—	265.91	—	1719.95	—
75 %	-65.0		200.00		1290.00	

PROJECT 17TH Street CANAL G-D-M	PAGE 5 OF 18	COMPUTED BY S.A.	DATE 10/27
SUBJECT Roller GATE MONOLITH		CHECKED BY MSD	DATE 3/90

CASE 4: WATER TO Elev. 13.50, NO WIND, Pervious seepage And no Dynamic WIND FORCE (75%)

DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
CONC. D.L.	—	—	309.11	—	1604.75	—
WATER DOWN	—	—	100.80	—	302.40	—
UPLIF (PERV.)	—	—	-144.00	—	-480.00	—
HORIZ.	-86.4	—	—	—	172.80	—
100% TOTAL	-86.4	—	265.91	—	1599.95	—
75% TOTAL	-65.0	—	200.00	—	1200.00	—

CASE NO. 5: NO WATER, NO WIND (100 %)

DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
D.L. CONC.	—	—	309.11	—	1604.75	—
100 % TOTAL	—	—	309.11	—	1604.75	—

CASE No. 6: NO WATER, WIND FROM PROT. SIDE (75%)

DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
D.L. CONC.	—	—	309.11	—	1604.75	—
P.S. wind Force	—	—	13.13	—	-55.80	—
100 % TOTAL	—	—	322.24	—	1548.95	—
75 % TOTAL	—	—	241.68	—	1161.71	—

CASE No. 7: NO WATER, WIND FROM FLOOD-SIDE (75%)

DESCRIPTIONS	Fx	FY	FZ	Mx-x	My-y	Mz-z
DL. CONC.	—	—	309.11	—	1604.75	—
F.S. WIND FORCE	—	—	-13.13	—	55.80	—
100% TOTAL	—	—	295.98	—	1660.55	—
75% TOTAL	—	—	221.99	—	1245.41	—

17TH STREET CANAL S.D.M. | 10/31/07
ROLLER GATE MONOLITH DESIGN | CAL

STIFFNESS MATRIX FOR CPGA (3D PILE)

* Kh0 = .15 ksi Ec = 4074 ksi

I1 = 1728 cu in I2 = 1728 cu in

A = 144 sq in L = 50 ft

R1 = 82.8 in R2 = 82.8 in

STIFFNESS COEFFICIENT	FIXITY CONSTANT Cc	RESULT
B11 =	1	8.782
B22 =	1	8.782

B33 = 1955.5

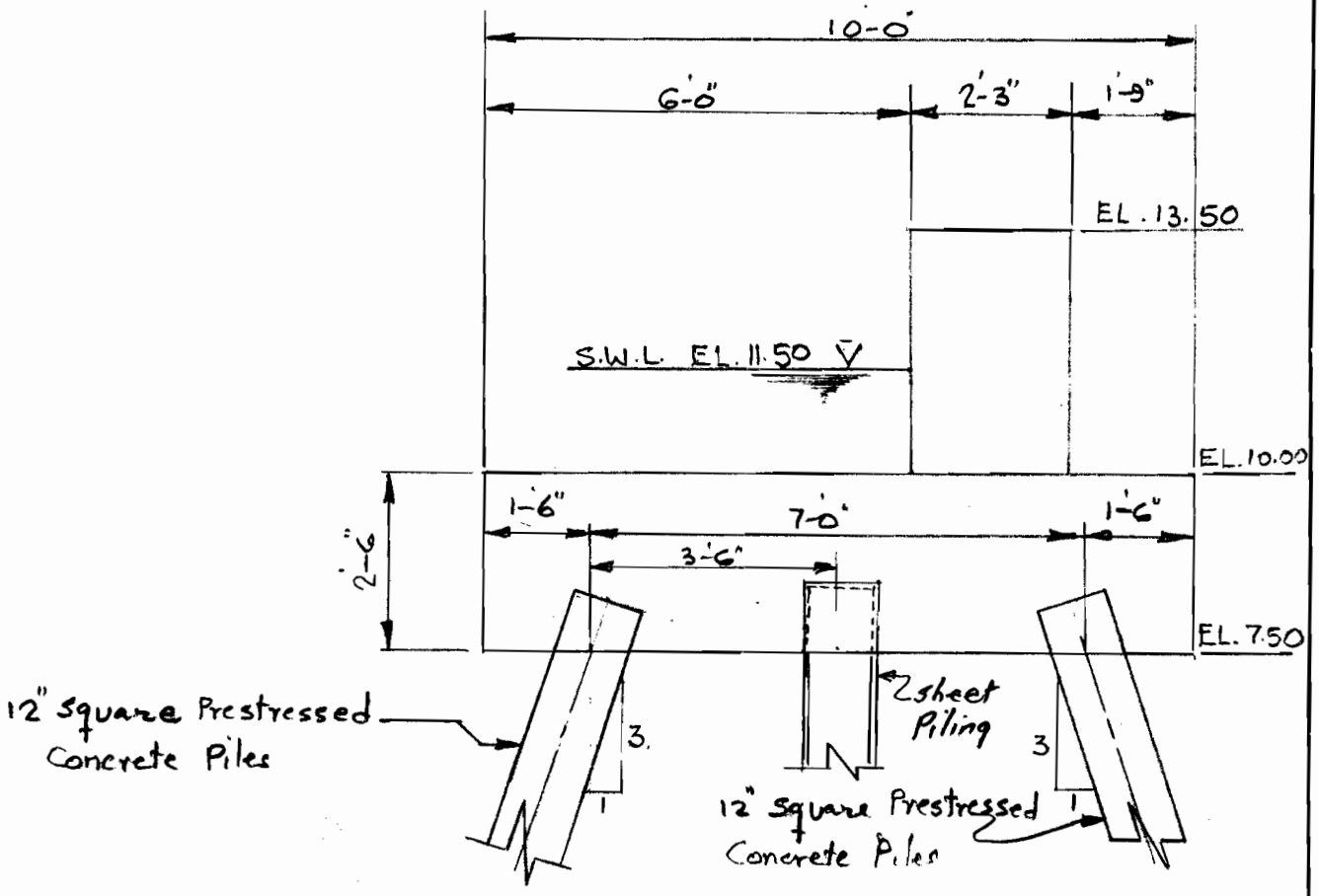
KMP1 = 37.7
KMP2 = 37.7

* --- LOW Kh VALUE TO ACCOUNT FOR GROUP AFFECTS OF TIMBER PILES 1,2,4,5.

NOTE : ABOVE COMPUTATIONS ARE FOR FLOODWALLS WITH CONSTANT SUBGRADE MODULUS, FULLY EMBEDDED PILES AND FOLLOW THE CALCULATIONS PRESENTED ON PAGE B35 OF THE CPGA MANUAL.

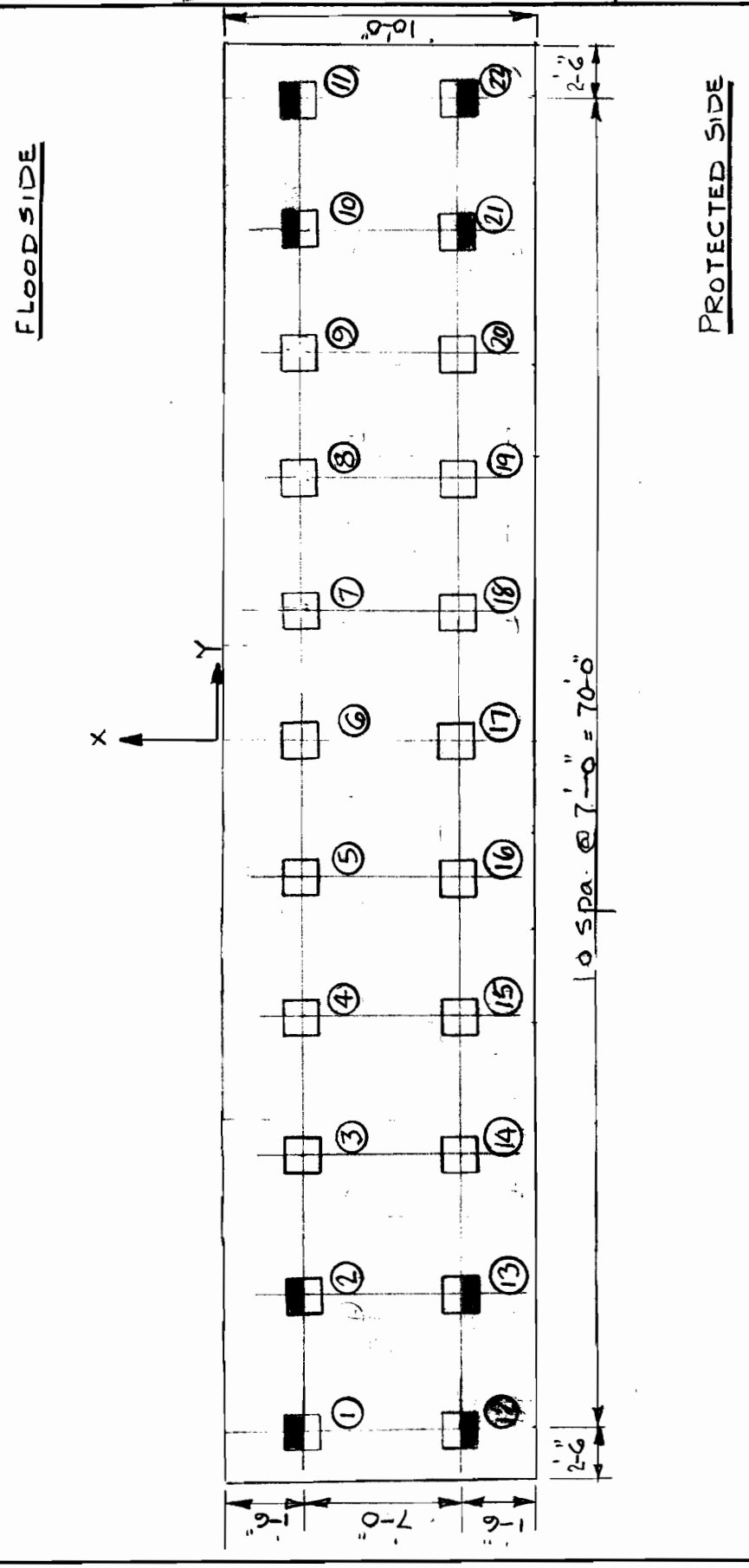
COMPUTATION SHEET

PROJECT 17TH Street CANAL G.D.M	PAGE 8 OF 18	COMPUTED BY S.A.	DATE 11/1/89
SUBJECT Roller GATE MONOLITH		CHECKED BY MSD	DATE 3/90



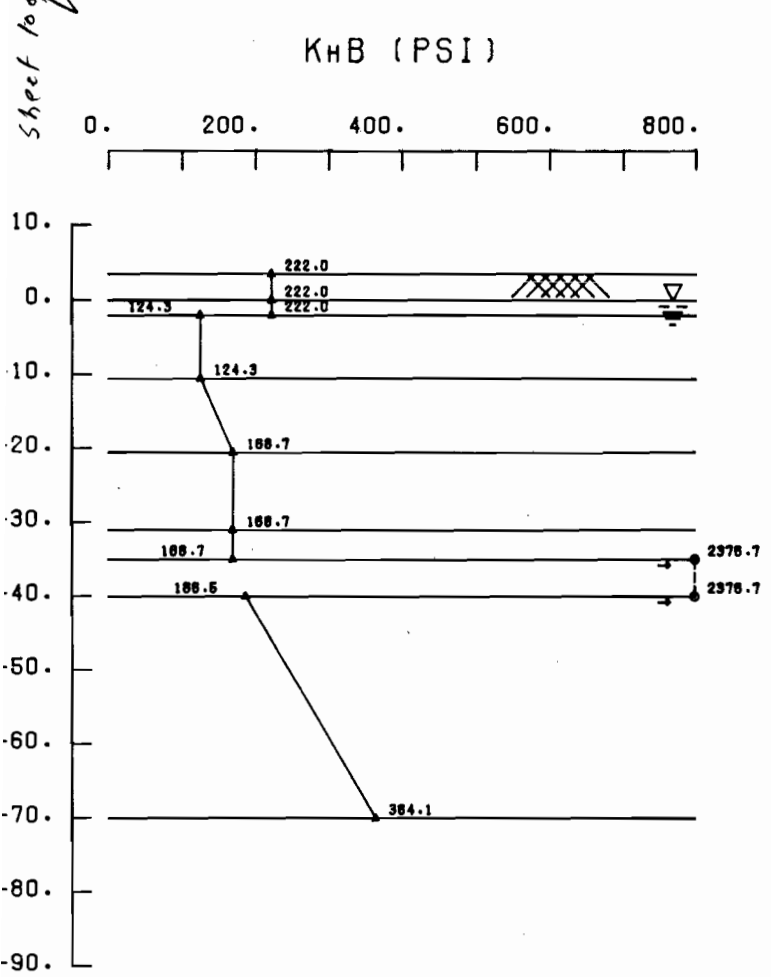
COMPUTATION SHEET

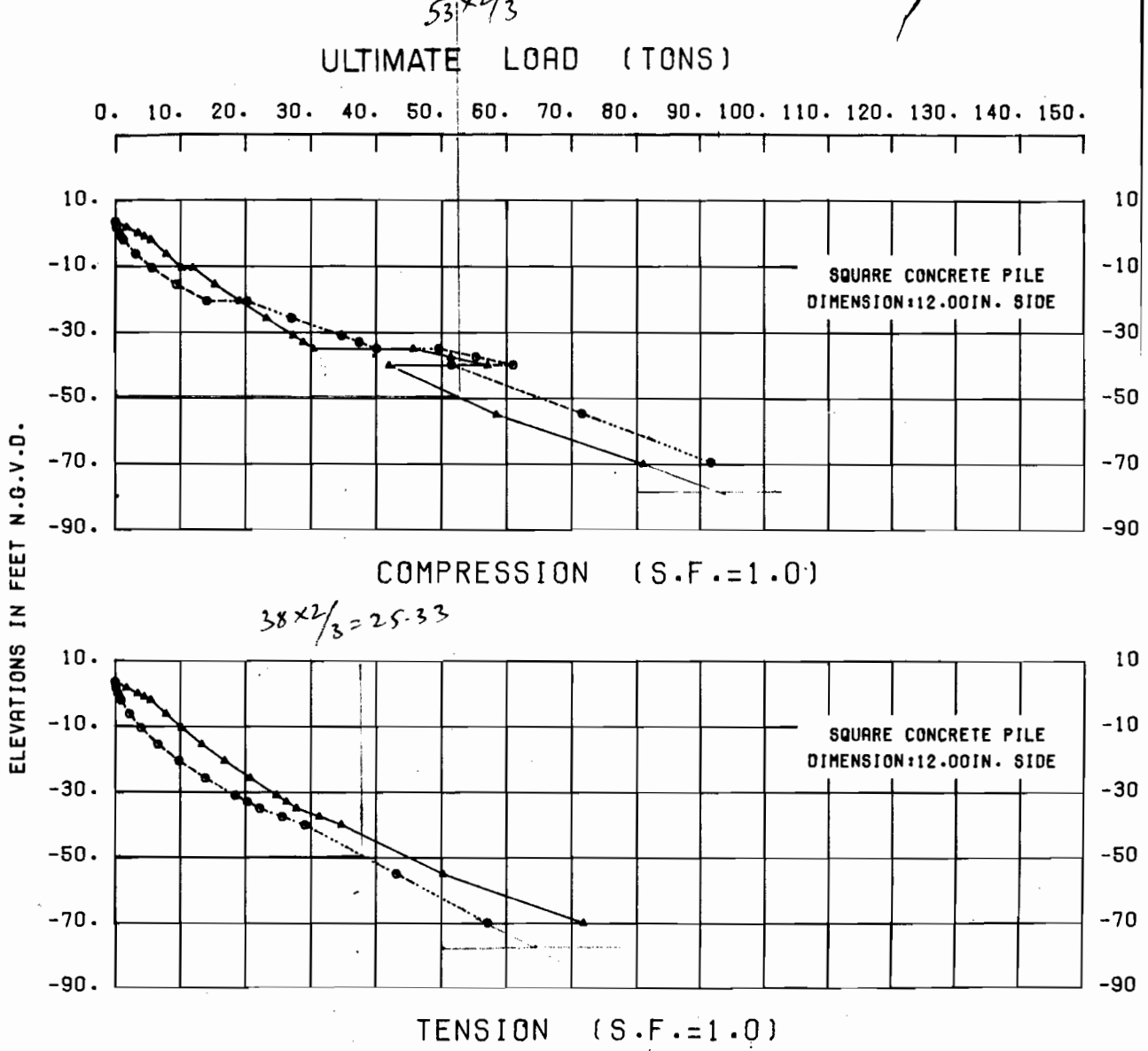
PROJECT 17TH STREET CANAL G.D.M	PAGE 9 OF 18	COMPUTED BY S.A.	DATE 11/1/89
SUBJECT DESIGN OF GATE MONOLITH		CHECKED BY MJD	DATE 3/90



Sheet 16 of 18

1 53 X 2/3 = 35.33 K





NOTES: $K_H = \alpha K_1/B = (0.2222\,q_u/B)(C)(D)$ COHESIVE

α = 0.4 = Factor of material properties of soil and pile

k_1 = Modulus of subgrade reaction for test plate (pci)

B_1 = Width or diameter of test plate (in)

$K_1 = k_1 B_1 = 80\,q_u$ (psf) $= 0.5556\,q_u$ (psi)

$q_u = 2 \cdot c$ = Unconfined compressive strength (psf)

C = Reduction for cyclic loading-not applicable

D = Group effect reduction factor

B = Width of pile measured at right angles to the direction of displacement (in)

$K_H = (n_h)(Z/B)(C)(D)$ COHESIONLESS

n_h = Coefficient of horizontal subgrade reaction (pci)

Z = Depth below equivalent ground surface (in)

THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE K_H, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX: $K_h = \frac{0.2222\,q_u\,(C)(D)}{(B)}$

----- S-CASE

——— Q-CASE

NOTE: ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING F.S.=2.0 WITH PILE TEST OR F.S.=3.0 WITHOUT PILE TEST.

17TH ST OUTFALL CANAL ODM
HAMMOND HIGHWAY FLOODGATE
12" SQUARE PRESTRESSED CONCRETE PIL
PILE CAPACITY CURV

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS

NEW ORLEA
JUNE 1987

```
3$ 10 17TH STREET CANAL G.D.M.-
 20 ROLLER GATE MONOLITH DESIGN (A:ROLLER)
 30 BIJ 8.782 8.782 1955.5 0 0 0 0 0 ALL
 40 TENSION 0.8 ALL
 50 DLS S 35.33 25.33 539.4 182.0 73.7 939.0 775.0 H 12 ALL
 60 ASC S 144 288 0.84 .9975 1.75 0 ALL
 70 PMAXMOM 37.7 37.7 ALL
 80 BATTER 3 1 2 9 TO 13 21 22
 90 ANGLE 00 1 TO 11
100 ANGLE 180 12 TO 22
110 PILE 1 -1.5 -35 0 2 -1.5 -28 0 3 -1.5 -21 0 4 -1.5 -14 0
120 PILE 5 -1.5 -7 0 6 -1.5 0 0 7 -1.5 7 0 8 -1.5 14 0
130 PILE 9 -1.5 21 0 10 -1.5 28 0 11 -1.5 35 0 12 -8.5 -35 0
140 PILE 13 -8.5 -28 0 14 -8.5 -21 0 15 -8.5 -14 0 16 -8.5 -7 0
150 PILE 17 -8.5 0 0 18 -8.5 7 0 19 -8.5 14 0 20 -8.5 21 0
160 PILE 21 -8.5 28 0 22 -8.5 35 0
170 LOAD 1 -38 0 256 0 1546 0
180 LOAD 2 -38 0 256 0 1465 0
190 LOAD 3 -65 0 200 0 1290 0
200 LOAD 4 -65 0 200 0 1200 0
210 LOAD 5 0 0 309 0 1605 0
220 LOAD 6 0 0 242 0 1162 0
230 LOAD 7 0 0 222 0 1245 0
240 LOAD 8 0 0 437 160 1605 0
250 LOAD 9 0 0 437 160 2885 0
260 FOUT 1 2 3 4 5  A:ROLOUT
270 PSO 1
280 PFO ALL
```

```
**********************************
* CORPS PROGRAM  #  X0080      *  CPGA - CASE PILE GROUP ANALYSIS PROGRAM
* VERSION NUMBER # 88/11/02    *  RUN DATE 90/04/26  RUN TIME  8.06.00
**********************************
```

17TH STREET CANAL G.D.M.
ROLLER GATE MONOLITH DESIGN (A:ROLLER)

THERE ARE 22 PILES AND
            9 LOAD CASES IN THIS RUN.

ALL PILE COORDINATES ARE CONTAINED WITHIN A BOX

	X	Y	Z
WITH DIAGONAL COORDINATES = (	-8.50 ,	-35.00 ,	.00)
(	-1.50 ,	35.00 ,	.00)

****

PILE STIFFNESSES AS INPUT

.87820E+01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.87820E+01	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.19555E+04	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

THIS MATRIX APPLIES TO THE FOLLOWING PILES -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
ALL

****

PILE GEOMETRY AS INPUT AND/OR GENERATED

NUM	X FT	Y FT	Z FT	BATTER	ANGLE	LENGTH FT	FIXITY
1	-1.50	-35.00	.00	3.00	.00		P
2	-1.50	-28.00	.00	3.00	.00		P
3	-1.50	-21.00	.00	V	.00		P
4	-1.50	-14.00	.00	V	.00		P
5	-1.50	-7.00	.00	V	.00		P
6	-1.50	.00	.00	V	.00		P
7	-1.50	7.00	.00	V	.00		P
8	-1.50	14.00	.00	V	.00		P
9	-1.50	21.00	.00	3.00	.00		P
10	-1.50	28.00	.00	3.00	.00		P
11	-1.50	35.00	.00	3.00	.00		P
12	-8.50	-35.00	.00	3.00	180.00		P
13	-8.50	-28.00	.00	3.00	180.00		P
14	-8.50	-21.00	.00	V	180.00		P
15	-8.50	-14.00	.00	V	180.00		P
16	-8.50	-7.00	.00	V	180.00		P
17	-8.50	.00	.00	V	180.00		P

18	-8.50	7.00	.00	V	180.00	P
19	-8.50	14.00	.00	V	180.00	P
20	-8.50	21.00	.00	V	180.00	P
21	-8.50	28.00	.00	3.00	180.00	P
22	-8.50	35.00	.00	3.00	180.00	P

****

APPLIED LOADS

LOAD CASE	PX K	PY K	PZ K	MX FT-K	MY FT-K	MZ FT-K
1	-38.0	.0	256.0	.0	1546.0	.0
2	-38.0	.0	256.0	.0	1465.0	.0
3	-65.0	.0	200.0	.0	1290.0	.0
4	-65.0	.0	200.0	.0	1200.0	.0
5	.0	.0	309.0	.0	1605.0	.0
6	.0	.0	242.0	.0	1162.0	.0
7	.0	.0	222.0	.0	1245.0	.0
8	.0	.0	437.0	160.0	1605.0	.0
9	.0	.0	437.0	160.0	2885.0	.0

****

ORIGINAL PILE GROUP STIFFNESS MATRIX

.19453E+04	.68075E-04	.58402E+03	.14717E+06	-.18572E+06	-.49057E+05
.68075E-04	.19320E+03	-.20422E-03	.00000E+00	-.20831E-01	-.11592E+05
.58402E+03	-.20422E-03	.41269E+05	-.49057E+05	.24843E+07	-.14717E+06
.14717E+06	.00000E+00	-.49057E+05	.27979E+10	-.88303E+06	-.37087E+08
-.18572E+06	-.20831E-01	.24843E+07	-.88303E+06	.22235E+09	-.26491E+07
-.49057E+05	-.11592E+05	-.14717E+06	-.37087E+08	-.26491E+07	.25230E+09

LOAD CASE 1. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 3.

LOAD CASE 2. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 2.

LOAD CASE 3. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 5.

LOAD CASE 4. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 5.

LOAD CASE 5. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 6. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 7. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 8. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

LOAD CASE 9. NUMBER OF FAILURES = 0. NUMBER OF PILES IN TENSION = 0.

****

PILE CAP DISPLACEMENTS

LOAD CASE	DX IN	DY IN	DZ IN	RX RAD	RY RAD	RZ RAD
1	-.2551E-01	-.4136E-05	.8630E-02	.1482E-05	-.3430E-04	-.6918E-07
2	-.2786E-01	.1193E-05	.9897E-02	.1422E-05	-.5477E-04	.1945E-07

3	-.4568E-01	-.1846E-03	.1097E-01	.2526E-05	-.9114E-04	-.3672E-06
4	-.4828E-01	-.1786E-03	.1238E-01	.2681E-05	-.1139E-03	-.2977E-05
5	-.1819E-02	.2407E-03	.7336E-02	.2785E-06	.3181E-05	.4011E-05
6	-.4172E-02	.1947E-03	.7230E-02	.3825E-06	-.2152E-04	.3246E-05
7	.1351E-02	.1669E-03	.3834E-02	.4106E-07	.2551E-04	.2781E-05
8	-.2189E-01	.3898E-03	.2079E-01	.2236E-05	-.1639E-03	.6496E-05
9	.1514E-01	.3056E-03	.7793E-03	.2143E-07	.1597E-03	.5092E-05

sheet 147 18

****

PILE FORCES IN LOCAL GEOMETRY

M1 & M2 NOT AT PILE HEAD FOR PINNED PILES
* INDICATES PILE FAILURE
# INDICATES CBF BASED ON MOMENTS DUE TO (F3*EMIN) FOR CONCRETE PILES
B INDICATES BUCKLING CONTROLS

LOAD CASE - 1

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.2	.0	-2.1	.0	8.8	.0	.08	.06	1.01	.79	
2	-.2	.0	-1.8	.0	8.8	.0	.07	.06	1.02	.80	
3	-.2	.0	14.9	.0	8.5	.0	.42	.13	1.13	.91	#
4	-.2	.0	15.2	.0	8.5	.0	.43	.13	1.13	.92	#
5	-.2	.0	15.4	.0	8.4	.0	.44	.13	1.13	.92	#
6	-.2	.0	15.7	.0	8.4	.0	.44	.13	1.14	.92	#
7	-.2	.0	15.9	.0	8.4	.0	.45	.13	1.14	.92	#
	-.2	.0	16.2	.0	8.4	.0	.46	.13	1.14	.92	#
	-.2	.0	-.2	.0	8.9	.0	.01	.03	1.03	.81	
10	-.2	.0	.0	.0	8.9	.0	.00	.20	1.03	.81	
11	-.2	.0	.3	.0	8.9	.0	.01	.20	1.03	.81	
12	.2	.0	24.2	.0	-7.6	.0	.68	.10	1.19	.98	#
13	.2	.0	24.4	.0	-7.5	.0	.69	.10	1.19	.98	#
14	.2	.0	9.3	.0	-8.5	.0	.26	.15	1.09	.88	#
15	.2	.0	9.5	.0	-8.5	.0	.27	.15	1.09	.88	#
16	.2	.0	9.8	.0	-8.4	.0	.28	.15	1.09	.88	#
17	.2	.0	10.0	.0	-8.4	.0	.28	.15	1.10	.88	#
18	.2	.0	10.3	.0	-8.4	.0	.29	.14	1.10	.88	#
19	.2	.0	10.5	.0	-8.4	.0	.30	.14	1.10	.88	#
20	.2	.0	10.8	.0	-8.4	.0	.30	.14	1.10	.89	#
21	.2	.0	26.2	.0	-7.4	.0	.74	.10	1.21	1.00	#
22	.2	.0	26.4	.0	-7.4	.0	.75	.10	1.21	1.00	#

LOAD CASE - 2

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.3	.0	-2.0	.0	9.6	.0	.08	.06	1.02	.79	
2	-.3	.0	-1.7	.0	9.6	.0	.07	.06	1.02	.79	
3	-.2	.0	16.6	.0	9.2	.0	.47	.13	1.14	.92	#
4	-.2	.0	16.9	.0	9.2	.0	.48	.12	1.15	.93	#
	-.2	.0	17.2	.0	9.2	.0	.49	.12	1.15	.93	#
6	-.2	.0	17.4	.0	9.2	.0	.49	.12	1.15	.93	#
7	-.2	.0	17.7	.0	9.2	.0	.50	.12	1.15	.93	#
8	-.2	.0	18.0	.0	9.2	.0	.51	.12	1.15	.93	#
9	-.3	.0	.1	.0	9.7	.0	.00	.20	1.03	.81	
10	-.3	.0	.3	.0	9.7	.0	.01	.20	1.03	.81	
11	-.3	.0	.6	.0	9.8	.0	.02	.20	1.04	.81	

12	.2	.0	24.0	.0	-8.4	.0	.68	.10	1.17	.98 #
13	.2	.0	24.2	.0	-8.4	.0	.69	.10	1.19	.98 #
14	.2	.0	7.6	.0	-9.2	.0	.22	.15	1.08	.86
15	.2	.0	7.9	.0	-9.2	.0	.22	.15	1.08	.86 #
16	.2	.0	8.2	.0	-9.2	.0	.23	.15	1.09	.86 #
17	.2	.0	8.4	.0	-9.2	.0	.24	.15	1.09	.87 #
18	.2	.0	8.7	.0	-9.2	.0	.25	.15	1.09	.87 #
19	.2	.0	9.0	.0	-9.2	.0	.25	.15	1.09	.87 #
	.2	.0	9.2	.0	-9.2	.0	.26	.15	1.09	.87 #
21	.2	.0	26.2	.0	-8.2	.0	.74	.10	1.21	.99 #
22	.2	.0	26.5	.0	-8.2	.0	.75	.10	1.21	1.00 #

LOAD CASE - 3

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.4	.0	-13.7	-.0	15.6	.0	.54	.26	.96	.69	
2	-.4	.0	-13.2	-.0	15.6	.0	.52	.25	.96	.69	
3	-.4	.0	17.0	-.0	15.4	.0	.48	.12	1.17	.90	#
4	-.4	.0	17.4	-.0	15.3	.0	.49	.12	1.17	.91	#
5	-.4	.0	17.8	-.0	15.2	.0	.50	.12	1.17	.91	#
6	-.4	.0	18.2	-.0	15.1	.0	.52	.12	1.18	.91	#
7	-.4	.0	18.7	-.0	15.0	.0	.53	.12	1.18	.92	#
8	-.4	.0	19.1	-.0	15.0	.0	.54	.12	1.18	.92	#
9	-.4	.0	-9.3	-.0	15.1	.0	.37	.19	.99	.72	
10	-.4	.0	-8.7	-.0	15.1	.0	.34	.18	.99	.73	
11	-.4	.0	-8.2	-.0	15.0	.0	.32	.17	.99	.73	
12	.4	.0	30.2	-.0	-14.7	.0	.85	.12	1.26	1.00	#
13	.4	.0	30.4	-.0	-14.6	.0	.86	.12	1.26	1.00	#
14	.4	.0	2.0	-.0	-15.4	.0	.06	.21	1.07	.80	
15	.4	.0	2.4	-.0	-15.3	.0	.07	.20	1.07	.80	
16	.4	.0	2.9	-.0	-15.2	.0	.08	.20	1.07	.81	
17	.4	.0	3.3	-.0	-15.1	.0	.09	.20	1.07	.81	
18	.4	.0	3.7	-.0	-15.0	.0	.10	.19	1.08	.81	
19	.4	.0	4.1	-.0	-15.0	.0	.12	.19	1.08	.82	
20	.4	.0	4.5	-.0	-14.9	.0	.13	.19	1.08	.82	
21	.4	.0	32.3	-.0	-13.8	.0	.91	.14	1.27	1.02	#
22	.4	.0	32.5	-.0	-13.7	.0	.92	.14	1.27	1.02	#

LOAD CASE - 4

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI	
1	-.4	.0	-13.6	-.0	16.5	.0	.54	.26	.96	.69	
2	-.4	.0	-13.0	-.0	16.5	.0	.51	.25	.96	.69	
3	-.4	.0	18.9	-.0	16.2	.0	.53	.12	1.19	.91	#
4	-.4	.0	19.3	-.0	16.2	.0	.55	.12	1.19	.92	#
5	-.4	.0	19.8	-.0	16.1	.0	.56	.12	1.19	.92	#
6	-.4	.0	20.2	-.0	16.0	.0	.57	.12	1.19	.92	#
7	-.4	.0	20.6	-.0	15.9	.0	.58	.11	1.20	.93	#
8	-.4	.0	21.1	-.0	15.8	.0	.60	.11	1.20	.93	#
9	-.4	.0	-9.0	-.0	16.1	.0	.35	.19	.99	.72	
10	-.4	.0	-8.4	-.0	16.0	.0	.33	.18	.99	.73	
11	-.4	.0	-7.8	-.0	16.0	.0	.31	.17	1.00	.73	
12	.4	.0	30.0	-.0	-15.6	.0	.85	.12	1.26	.99	#
1	.4	.0	30.2	-.0	-15.5	.0	.86	.12	1.26	1.00	#
14	.4	.0	.2	-.0	-16.2	.0	.00	.22	1.06	.78	
15	.4	.0	.6	-.0	-16.2	.0	.02	.22	1.06	.79	
16	.4	.0	1.0	-.0	-16.1	.0	.03	.21	1.06	.79	
17	.4	.0	1.5	-.0	-16.0	.0	.04	.21	1.06	.79	
18	.4	.0	1.9	-.0	-15.9	.0	.05	.21	1.07	.80	
19	.4	.0	2.4	-.0	-15.8	.0	.07	.21	1.07	.80	

20	.4	.0	2.8	-.0	-15.7	.0	.08	.20	1.07	.80
21	.4	.0	32.3	-.0	-14.7	.0	.91	.14	1.27	1.01 #
22	.4	.0	32.6	-.0	-14.6	.0	.92	.14	1.27	1.02 #

LOAD CASE - 5

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI
1	-.0	.0	13.4	.1	.8	.0	.38	.14	1.09	.93 #
2	-.0	.0	13.3	.1	.9	.0	.38	.14	1.09	.93 #
3	.0	.0	14.3	.1	.3	.0	.41	.13	1.10	.94 #
4	-.0	.0	14.4	.1	.4	.0	.41	.13	1.10	.94 #
5	-.0	.0	14.4	.1	.5	.0	.41	.13	1.10	.94 #
6	-.0	.0	14.5	.1	.6	.0	.41	.13	1.10	.94 #
7	-.0	.0	14.5	.1	.7	.0	.41	.13	1.10	.94 #
8	-.0	.0	14.5	.1	.8	.0	.41	.13	1.10	.94 #
9	-.0	.0	12.1	.1	1.7	.0	.34	.14	1.09	.92 #
10	-.0	.0	11.9	.1	1.8	.0	.34	.14	1.09	.92 #
11	-.1	.0	11.8	.1	1.9	.0	.33	.14	1.09	.91 #
12	-.0	.0	14.1	.1	.7	.0	.40	.13	1.10	.93 #
13	-.0	.0	14.3	.1	.6	.0	.41	.13	1.10	.94 #
14	.0	.0	14.8	.1	-.3	.0	.42	.13	1.10	.94 #
15	.0	.0	14.9	.1	-.4	.0	.42	.13	1.10	.94 #
16	.0	.0	14.9	.1	-.5	.0	.42	.13	1.10	.94 #
17	.0	.0	15.0	.1	-.6	.0	.42	.13	1.10	.94 #
18	.0	.0	15.0	.1	-.7	.0	.43	.13	1.10	.94 #
19	.0	.0	15.1	.1	-.8	.0	.43	.13	1.11	.94 #
20	.0	.0	15.1	.1	-.9	.0	.43	.13	1.11	.94 #
21	.0	.0	16.3	.1	-.2	.0	.46	.13	1.11	.95 #
22	.0	.0	16.6	.1	-.3	.0	.47	.13	1.11	.95 #

LOAD CASE - 6

PILE	F1 K	F2 K	F3 K	M1 IN-K	M2 IN-K	M3 IN-K	ALF	CBF	ASC KSI	AST KSI
1	-.0	.0	10.7	.0	1.6	.0	.30	.14	1.08	.91 #
2	-.0	.0	10.6	.0	1.7	.0	.30	.14	1.08	.91 #
3	-.0	.0	13.2	.0	1.1	.0	.37	.14	1.09	.93 #
4	-.0	.0	13.3	.0	1.2	.0	.38	.14	1.09	.93 #
5	-.0	.0	13.3	.0	1.3	.0	.38	.14	1.09	.93 #
6	-.0	.0	13.4	.0	1.4	.0	.38	.14	1.10	.93 #
7	-.0	.0	13.4	.0	1.5	.0	.38	.14	1.10	.93 #
8	-.0	.0	13.5	.0	1.6	.0	.38	.14	1.10	.93 #
9	-.1	.0	9.8	.0	2.3	.0	.28	.15	1.07	.90 #
10	-.1	.0	9.7	.0	2.4	.0	.27	.15	1.07	.90 #
11	-.1	.0	9.6	.0	2.5	.0	.27	.15	1.07	.90 #
12	.0	.0	10.8	.0	-.4	.0	.31	.14	1.07	.91 #
13	.0	.0	11.0	.0	-.5	.0	.31	.14	1.08	.91 #
14	.0	.0	9.7	.0	-1.1	.0	.27	.15	1.07	.90 #
15	.0	.0	9.7	.0	-1.2	.0	.28	.15	1.07	.90 #
16	.0	.0	9.8	.0	-1.3	.0	.28	.15	1.07	.90 #
17	.0	.0	9.8	.0	-1.4	.0	.28	.15	1.07	.90 #
18	.0	.0	9.9	.0	-1.5	.0	.28	.15	1.07	.90 #
19	.0	.0	10.0	.0	-1.6	.0	.28	.15	1.07	.90 #
20	.0	.0	10.0	.0	-1.7	.0	.28	.15	1.07	.90 #
21	.0	.0	12.8	.0	-1.1	.0	.36	.14	1.09	.93 #
22	.0	.0	13.1	.0	-1.2	.0	.37	.14	1.09	.93 #

LOAD CASE - 7

PILE	F1	F2	F3	M1	M2	M3	ALF	CBF	ASC	AST

	K	K	K	IN-K	IN-K	IN-K			KSI	KSI	
1	.0	.0	9.5	.0	-.3	.0	.27	.15	1.06	.90	#
2	.0	.0	9.4	.0	-.3	.0	.26	.15	1.06	.90	#
3	.0	.0	8.4	.0	-.7	.0	.24	.15	1.06	.90	#
4	.0	.0	8.4	.0	-.6	.0	.24	.15	1.06	.90	#
5	.0	.0	8.4	.0	-.5	.0	.24	.15	1.06	.90	#
6	.0	.0	8.4	.0	-.4	.0	.24	.15	1.06	.90	#
7	.0	.0	8.4	.0	-.4	.0	.24	.15	1.06	.90	#
8	.0	.0	8.4	.0	-.3	.0	.24	.15	1.06	.90	#
9	.0	.0	8.4	.0	.2	.0	.24	.15	1.06	.90	#
10	.0	.0	8.2	.0	.3	.0	.23	.15	1.06	.90	#
11	-.0	.0	8.1	.0	.4	.0	.23	.15	1.06	.89	#
12	-.0	.0	10.4	.0	1.5	.0	.29	.14	1.07	.91	#
13	-.0	.0	10.5	.0	1.4	.0	.30	.14	1.08	.91	#
14	-.0	.0	12.6	.0	.7	.0	.36	.14	1.09	.92	#
15	-.0	.0	12.6	.0	.6	.0	.36	.14	1.09	.93	#
16	-.0	.0	12.6	.0	.5	.0	.36	.14	1.09	.93	#
17	-.0	.0	12.6	.0	.4	.0	.36	.14	1.09	.93	#
18	.0	.0	12.6	.0	.4	.0	.36	.14	1.09	.93	#
19	.0	.0	12.6	.0	.3	.0	.36	.14	1.09	.93	#
20	.0	.0	12.6	.0	.2	.0	.36	.14	1.09	.93	#
21	-.0	.0	11.7	.0	.8	.0	.33	.14	1.08	.92	#
22	-.0	.0	11.9	.0	.7	.0	.34	.14	1.08	.92	#

LOAD CASE - 8

PILE	F1	F2	F3	M1	M2	M3	ALF	CBF	ASC	AST	
	K	K	K	IN-K	IN-K	IN-K			KSI	KSI	
1	-.2	.0	19.5	.1	7.8	.0	.55	.12	1.16	.95	#
2	-.2	.0	19.5	.1	8.0	.0	.55	.12	1.16	.95	#
3	-.2	.0	33.8	.1	6.7	.0	.96	.15	1.26	1.05	#
4	-.2	.0	34.1	.1	6.9	.0	.97	.16	1.26	1.05	#
5	-.2	.0	34.5	.1	7.1	.0	.98	.16	1.26	1.05	#
6	-.2	.0	34.9	.1	7.2	.0	.99	.16	1.27	1.06	#
7	-.2	.0	35.2	.1	7.4	.0	1.00	.17	1.27	1.06	#
8	-.2	.0	35.6	.1	7.6	.0	1.01	.17	1.27	1.06	#
9	-.2	.0	19.6	.1	9.3	.0	.55	.12	1.17	.94	#
10	-.3	.0	19.6	.1	9.5	.0	.55	.12	1.17	.94	#
11	-.3	.0	19.6	.1	9.7	.0	.56	.12	1.17	.94	#
12	.2	.0	17.7	.1	-5.7	.0	.50	.12	1.14	.94	#
13	.2	.0	18.4	.1	-5.8	.0	.52	.12	1.15	.95	#
14	.2	.0	6.9	.1	-6.7	.0	.19	.15	1.07	.86	#
15	.2	.0	7.2	.1	-6.9	.0	.20	.15	1.07	.87	#
16	.2	.0	7.6	.1	-7.1	.0	.22	.15	1.08	.87	#
17	.2	.0	8.0	.1	-7.2	.0	.23	.15	1.08	.87	#
18	.2	.0	8.3	.1	-7.4	.0	.24	.15	1.08	.87	#
19	.2	.0	8.7	.1	-7.6	.0	.25	.15	1.08	.87	#
20	.2	.0	9.1	.1	-7.8	.0	.26	.15	1.09	.88	#
21	.2	.0	23.8	.1	-7.1	.0	.67	.10	1.19	.98	#
22	.2	.0	24.5	.1	-7.2	.0	.69	.10	1.19	.98	#

LOAD CASE - 9

PILE	F1	F2	F3	M1	M2	M3	ALF	CBF	ASC	AST	
	K	K	K	IN-K	IN-K	IN-K			KSI	KSI	
1	.1	.0	17.4	.1	-5.0	.0	.49	.12	1.14	.94	#
2	.1	.0	17.2	.1	-4.9	.0	.49	.12	1.13	.94	#
3	.1	.0	7.1	.1	-5.4	.0	.20	.15	1.07	.87	#
4	.1	.0	7.1	.1	-5.3	.0	.20	.15	1.07	.87	#
5	.1	.0	7.1	.1	-5.2	.0	.20	.15	1.07	.87	#
6	.1	.0	7.1	.1	-5.0	.0	.20	.15	1.06	.87	#

7	.1	.0	7.1	.1	-4.9	.0	.20	.15	1.06	.87 #
8	.1	.0	7.2	.1	-4.7	.0	.20	.15	1.06	.87 #
9	.1	.0	15.4	.1	-4.0	.0	.43	.13	1.12	.93 #
10	.1	.0	15.1	.1	-3.8	.0	.43	.13	1.12	.93 #
11	.1	.0	14.8	.1	-3.7	.0	.42	.13	1.11	.93 #
12	-.2	.0	21.0	.1	7.2	.0	.59	.11	1.17	.96 #
13	-.2	.0	21.2	.1	7.1	.0	.60	.11	1.17	.96 #
14	-.1	.0	33.4	.1	5.4	.0	.94	.15	1.25	1.05 #
	-.1	.0	33.4	.1	5.3	.0	.94	.15	1.25	1.05 #
16	-.1	.0	33.4	.1	5.2	.0	.94	.15	1.25	1.05 #
17	-.1	.0	33.4	.1	5.0	.0	.94	.15	1.25	1.05 #
18	-.1	.0	33.4	.1	4.9	.0	.94	.15	1.25	1.05 #
19	-.1	.0	33.4	.1	4.7	.0	.94	.15	1.25	1.06 #
20	-.1	.0	33.4	.1	4.6	.0	.95	.15	1.25	1.06 #
21	-.2	.0	23.4	.1	6.0	.0	.66	.11	1.18	.98 #
22	-.2	.0	23.6	.1	5.9	.0	.67	.11	1.18	.98 #

Sheet 18 of 18

CELMN-ED-FS 27 Feb 89

MEMORANDUM FOR C/Des Br

SUBJECT: GDM Design, 17th Street, Outfall Canal Lake Pontchartrain, LA & Vicinity Hurricane Protection Project
HLP

1. We have compared the wall alinement for the Jefferson Parish side of the 17th St Canal which was furnished by Mr. Desai of Design Br with the existing 17th St Canal cross sections, and with the latest N.O.S.&W.B. alinement.

2. We recommend the wall alinement be changed between B/L Sta. 627+28 to Sta. 669+00 Jefferson Parish side. The change is necessary to maintain the wall line in the crown of the levee. The B/L and W/L offsets are shown in Encl. 1.

3. At B/L Sta 568+00 (end of reach) Orleans Parish side the W/L offset should be changed from 205.6' to 206.3'. From B/L Sta. 614+00 to B/L Sta. 627+28 Orleans Parish side the wall alinement must be changed as shown in Encl. 2. The changes are necessary because of a change in channel alinement by the N.O.S.&W.B. from their original plans.

4. Enclosure 3 is a table of minor changes made on the levee sections furnished to your office by CELMN-ED-FS's DF dated 10 May 88 subject as above.

5. Encl. 4 is a landside enlargement for Sta. 663+00 to 670+00 Orleans Parish side. The new section has been furnished to you because Modjeski & Masters, consulting engineers for the OLB, have requested that the highest possible levee crown elevation be maintained. P.O.C. is Frank Vojkovich ext. 1034.

RPP

4 Encls
as

RODNEY P. PICCIOLA
Chief, Foundations and Materials Branch

CELMN-ED-FS 27 Feb 89

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4 Encls
as

RODNEY P. PICCIOLA
Chief, Foundations and Materials Branch

JEFFERSON PARISH SIDE
STA 627+28 TO STA 669+00

B/L STATION	F.S. Levee Toe (Channel Bottom)	GDM WALL ℄ (B/L OFFSET)	W/L (• B/L offset)
627+28	86'	4.5	5.5
628+00	86	4.5	5.5
630+00	86	4.5	5.5
632+00	88	4.5	5.5
634+00	88	4.5	5.5
636+00	90	-0.5	+0.5
638+31	90	-0.5	+0.5
642+08	90	2.5	3.5
643+00	90	2.5	3.5
644+00	90	2.5	3.5
645+00	90	2.5	3.5
646+00	90	2.5	3.5
647+00	90	2.5	3.5
648+00	90	2.5	3.5
649+00	91	2.5	3.5
650+00	92	2.5	3.5
651+00	93	2.5	3.5
652+00	94	2.5	3.5
653+00	94	2.5	3.5
654+00	94	2.5	3.5
655+00	94	2.5	3.5
656+00	94	2.5	3.5
657+00	94	2.5	3.5
658+00	94	2.5	3.5
659+00	93	2.5	3.5
660+00	92	2.5	3.5

ENCL 1

JEFFERSON PARISH SIDE

STA 627+28 TO STA 669+00

B/L STA	F.S. Levee Toe (Channel Bottom)	(B/L OFFSET) GDM WALL ℄	W/L (B/L OFFSET)
661+00	91	2.5	3.5
662+00	90	2.5	3.5
663+00	90	-4.5	-3.5
664+00	90	-4.5	-3.5
665+00	90	-4.5	-3.5
666+00	90	-4.5	-3.5
667+00	90	-4.5	-3.5
668+00	90	-4.5	-3.5
669+00	90	-4.5	-3.5

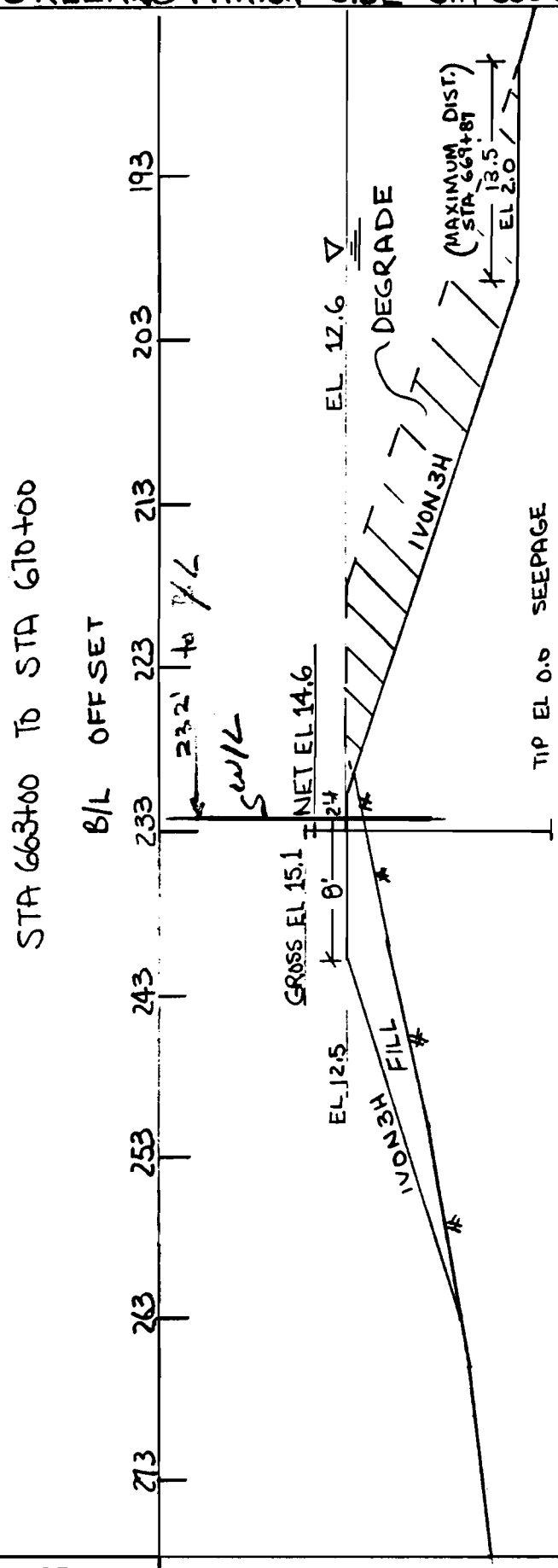
ORLEANS PARISH SIDE

B/L STATION	F.S. Levee Toe (Channel Bottom)	(B/L OFFSET) GDM Wall ℄	W/L (B/L OFFSET)
616+00	145.8	227.1	226.1
618+00	145.3	226.6	225.6
620+00	144.9	226.2	225.2
622+00	144.4	225.7	224.7
624+00	144.0	225.3	224.3
624+27	143.9	225.2	224.2
627+28	143.3	223.8	222.8

Encl 2

COMPUTATION SHEET

PROJECT 17th St Outfall Canal		PAGE OF	COMPUTED BY FJV	DATE 2/89
SUBJECT ORLEANS PARISH SIDE STA 663+00 TO STA 670+00			CHECKED BY	DATE



LMV Form 107e
OCT 86

PREVIOUS EDITIONS MAY BE USED

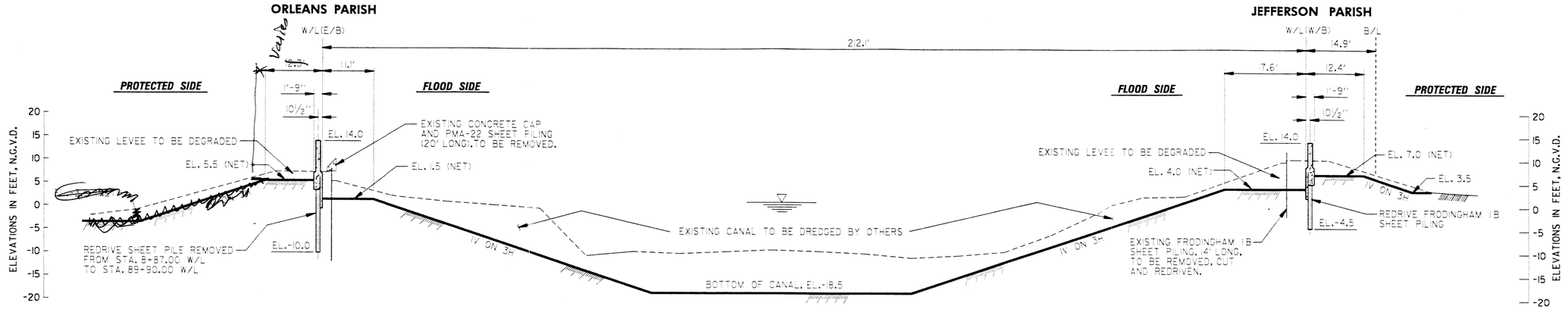
(FOR USE WITH 10 x 10 GRID)

ENCL 4

ORLEANS PARISH SIDE

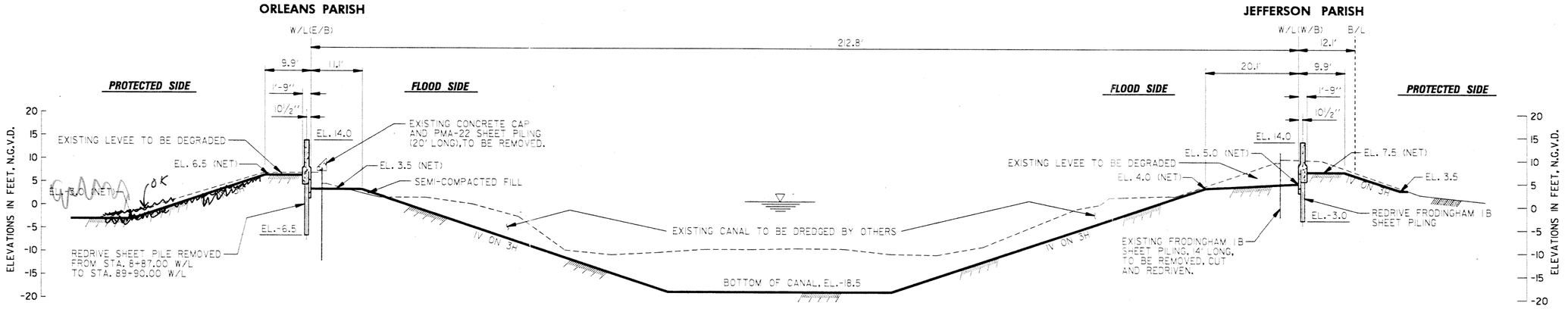
STATION	CHANGES
STA 545+80 TO STA 552+70	NONE
554+00 TO 568+00	Change Tip EL -13.2 to EL -12.8
568+00 TO 589+00	Change 11' F.S. bench to 8.5' F.S. bench
589+00 TO 614+00	Change 15.5' F.S. bench at EL 3.5 to 19.7' F.S. bench sloping from EL 2.1 to EL 3.0. Change tip EL-7.5 to EL -7.8.
614+00 TO 625+00	Change 16.5' F.S. bench at EL 4.5 to 15' F.S. bench at EL 3.6. Change 11' P.S. crown width to 8' P.S. crown width. Change tip from EL-5.3 to EL -6.8.
625+25 TO 635+00	Change 9.5' P.S. crown width to 8' P.S. crown width. Change tip EL -4.6 to EL -4.9
635+00 TO 642+00	Change 8.5' P.S crown width to 8' P.S. crown width
642+00 TO 663+00	Change crown EL 12.0 to EL 12.1
663+00 TO 670+63	Change Crown EL to 12.5 (Landside Levee Enlargement
	JEFFERSON PARISH SIDE
549+22 TO 552+76	Change gross levee from EL 10.0 to EL 13.5. Change gross sheetpile EL 14.0 to EL 14.7. These changes apply from Sta 551+00 to Sta 552+25 (Wall alinement changes)
554+00 TO 589+00	change 18' F.S. bench to 17'. & Change 10.5 P.S. crown width to 11.5'. Change tip EL-10.1 to EL-10.0
589+00 TO 614+00	change 19' F.S. bench to 18'. change 11' P.S. crown width to 11.5'
614+00 TO 625+25	Change EL 5.5' at F.S. sheetpile to EL 5.0. Change slope from IVON14H to IVON21H on F.S. bench. Change 8' P.S. crown width to 9' P.S. crown width. Change tip EL-1.3 to EL-3.3.
625+25 TO 635+00	Change EL 5.5 F.S. bench to EL 5.0 F.S. bench change 12' F.S. bench width to 14'. Change tip EL-2.9 to EL-2.6
635+00 TO 641+50	NONE
641+50 TO 663+00	"
663+00 TO 670+00	"

ENCL



TYPICAL SECTION

VICINITY STA. 67+10.00 W/L (E/B) AND STA. 62+85.00 W/L (W/B)



TYPICAL SECTION

VICINITY STA. 73+35.00 W/L (E/B) AND STA. 68+85.00 W/L (W/B)

ORLEANS SIDE REVISED BY Frank on March 15, 90

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

COMPUTER AIDED DESIGN DRAFTING

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

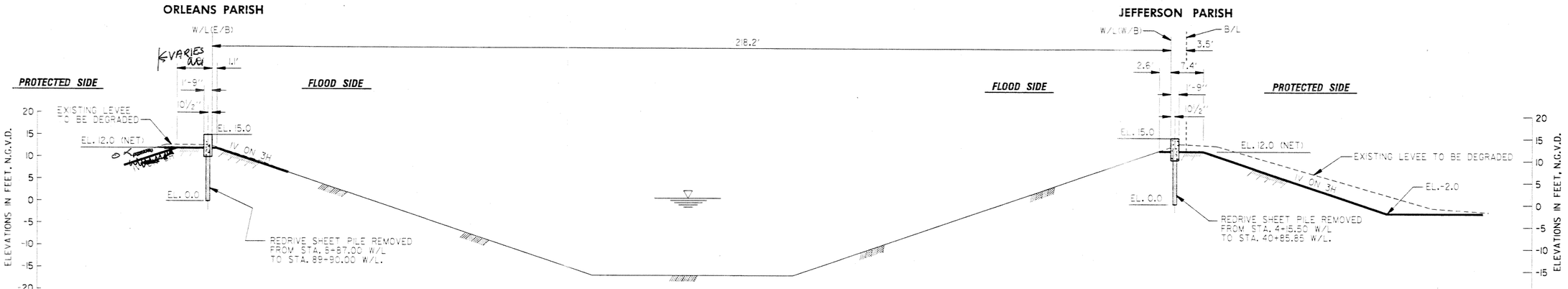
TYPICAL SECTIONS

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: X FILE NO. H-2-30300

30300SR06.DGN
FORM SIZE I20

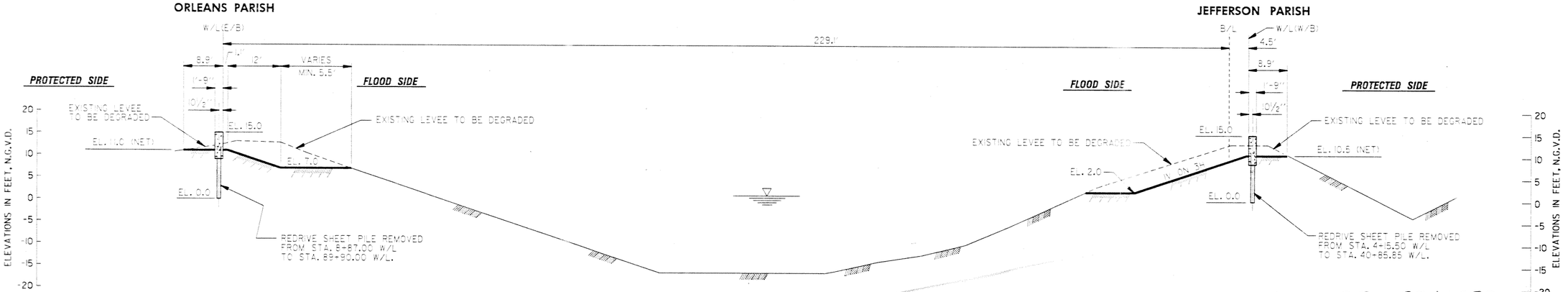
JAN 31, 1990

PLATE 12



TYPICAL SECTION

VICINITY STA. 103+30.00 W/L (E/B) AND STA. 98+90.00 W/L (W/B)



TYPICAL SECTION

VICINITY STA. 123+20.00 W/L (E/B) AND STA. 118+80.00 W/L (W/B)

ORLEANS SIDE REVISED
By Frank, March 15, 90

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

COMPUTER AIDED DESIGN DRAFTING

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH – JEFFERSON PARISH
17TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

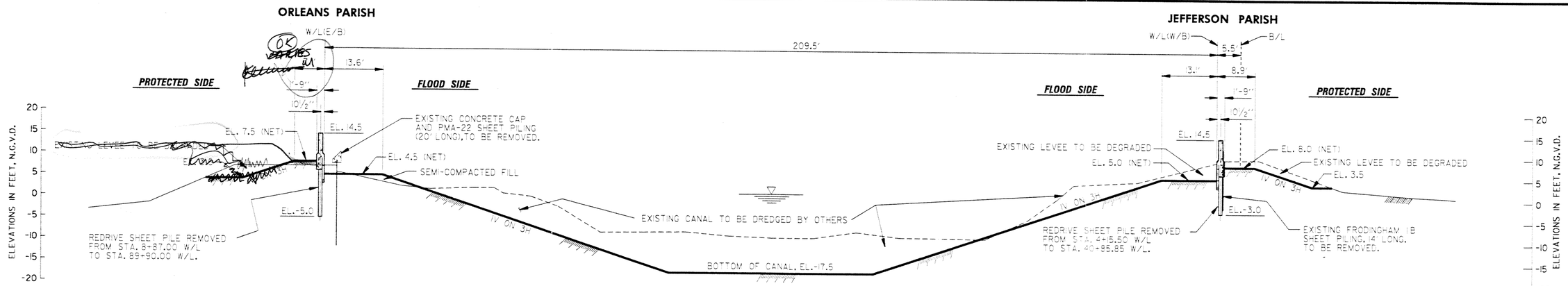
TYPICAL SECTIONS

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE. X FILE NO. H-2-30300

303005808.DGN
FORM SIZE 120

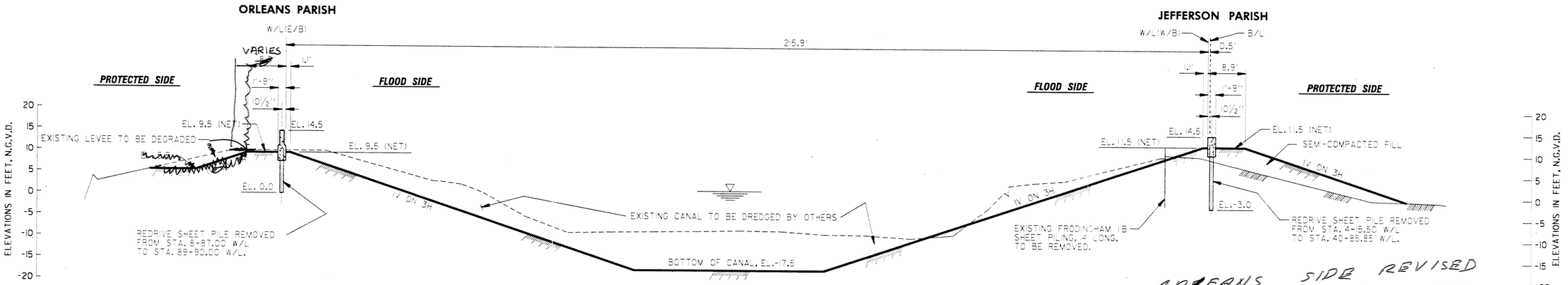
FEB 13, 1990

PLATE 14



TYPICAL SECTION

VICINITY STA. 85+33.00 W/L (E/B) AND STA. 81+00.00 W/L (W/B)



ORLEANS SIDE REVISED
By Frank, march 15, 1990

TYPICAL SECTION

VICINITY STA. 93+90.00 W/L (E/B) AND STA. 88+96.00 W/L (W/B)

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

COMPUTER AIDED DESIGN DRAFTING

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

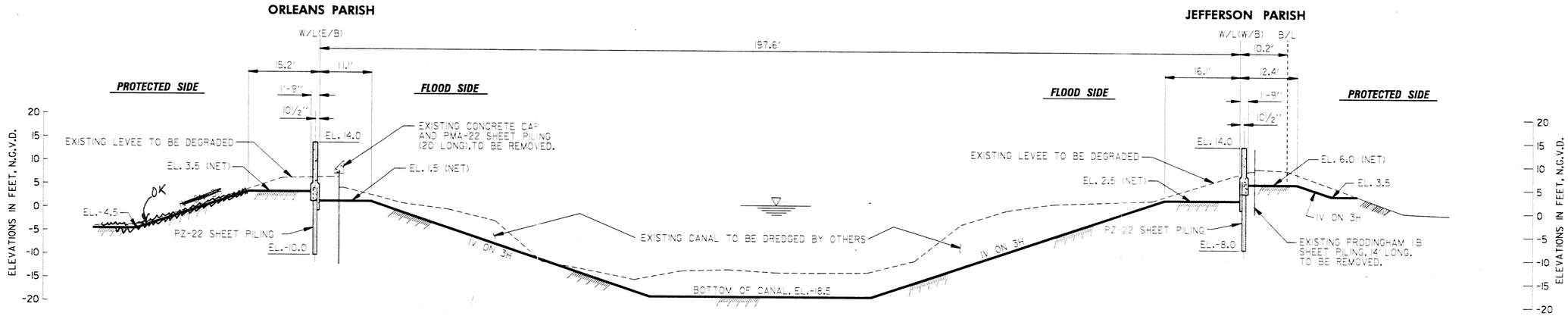
TYPICAL SECTIONS

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: X
FILE NO H-2-30300

30300SR07.DGN
FORM SIZE 120

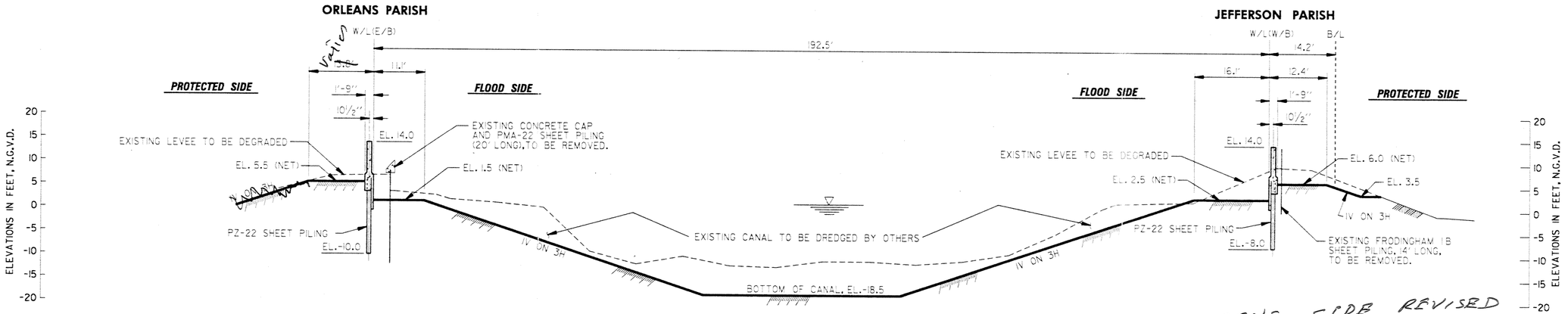
JAN 31, 1990

PLATE 13



TYPICAL SECTION

VICINITY STA. 15+40.00 W/L (E/B) AND STA. 10+85.00 W/L (W/B)



TYPICAL SECTION

VICINITY STA. 25+40.00 W/L (E/B) AND STA. 20+85.00 W/L (W/B)

ORLEANS SIDE REVISED
By Frank. March 15, 1990

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

COMPUTER AIDED DESIGN DRAFTING

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH – JEFFERSON PARISH
17TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

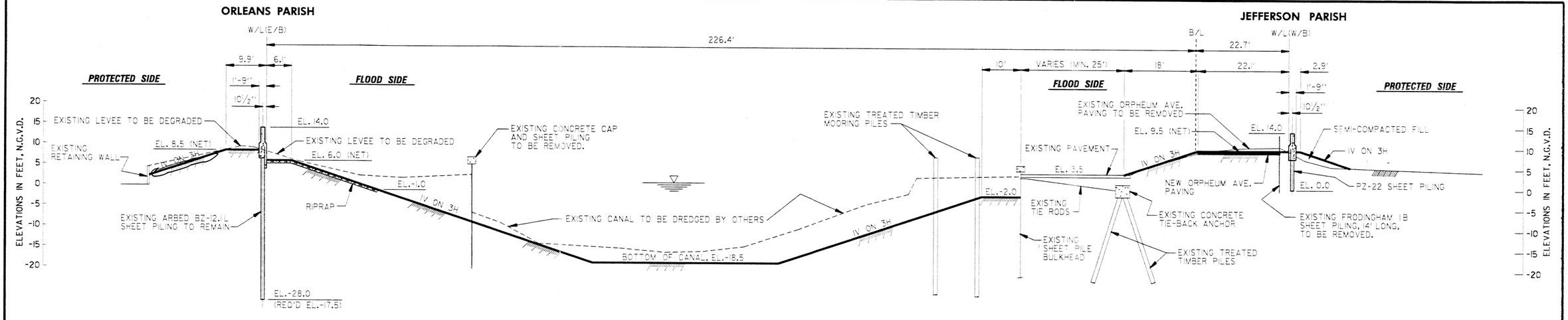
TYPICAL SECTIONS

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: X
FILE NO. H-2-30300

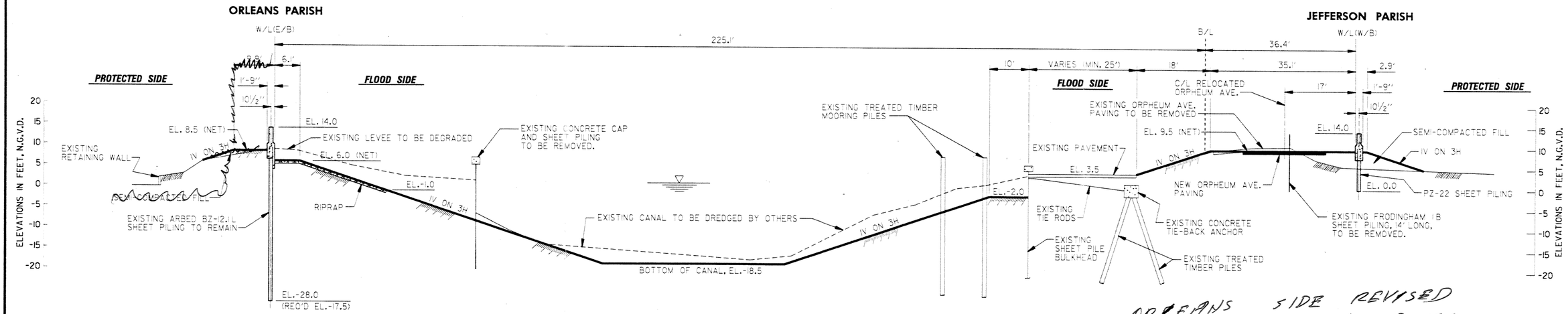
JAN. 31, 1990

PLATE 11

30300SB05.DGN
FORM SIZE 120



TYPICAL SECTION
VICINITY STA. 4+92.00 W/L (E/B) AND STA. 0+50.00 W/L (W/B)



TYPICAL SECTION
VICINITY STA. 6+92.00 W/L (E/B) AND STA. 2+55.00 W/L (W/B)

ORLEANS SIDE REVISED
By Frank. March 15, 1990

SCALE: 1" = 10'

10' 0 10' 20' 30' 40'

COMPUTER AIDED DESIGN DRAFTING

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

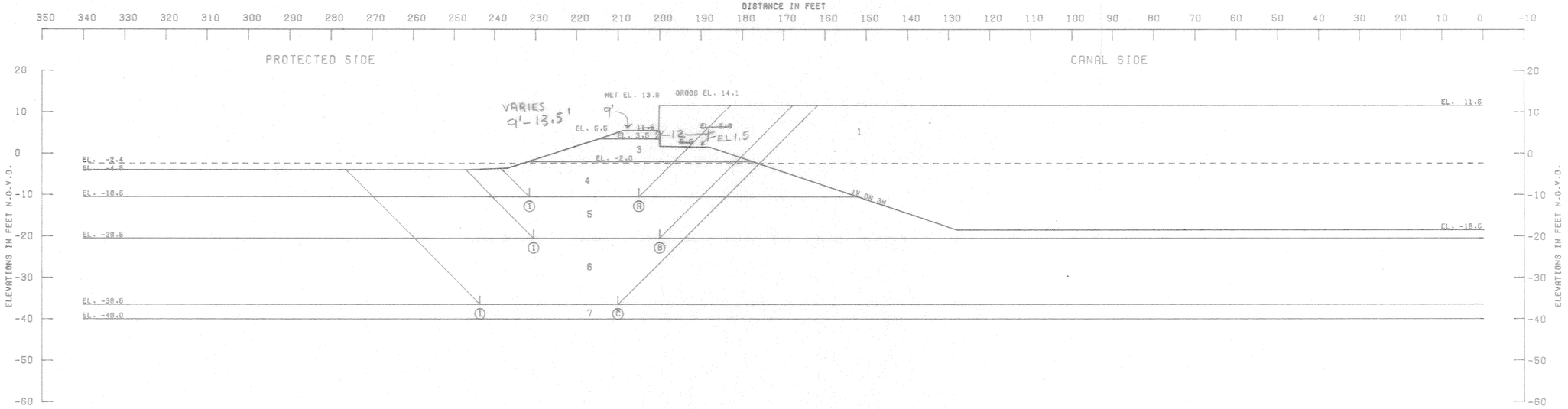
TYPICAL SECTIONS

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: X FILE NO. H-2-30300

JAN 31, 1990 PLATE 10

30300SB09.DGN
FORM SIZE 120



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(A) (1)	-10.5	8334	7420	3834	17322	2928	19588	14394	1.36
(B) (1)	-20.5	12362	11690	10240	41538	15189	34192	26369	1.30
(C) (1)	-36.5	23241	12806	22400	98314	54290	58447	44024	1.33

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
(1)	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
(2)	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
(3)	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
(4)	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
(5)	(CH)	103.0	103.0	330.0	330.0	380.0	380.0	0.0
(6)	(CH)	102.0	102.0	380.0	380.0	380.0	380.0	0.0
(7)	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

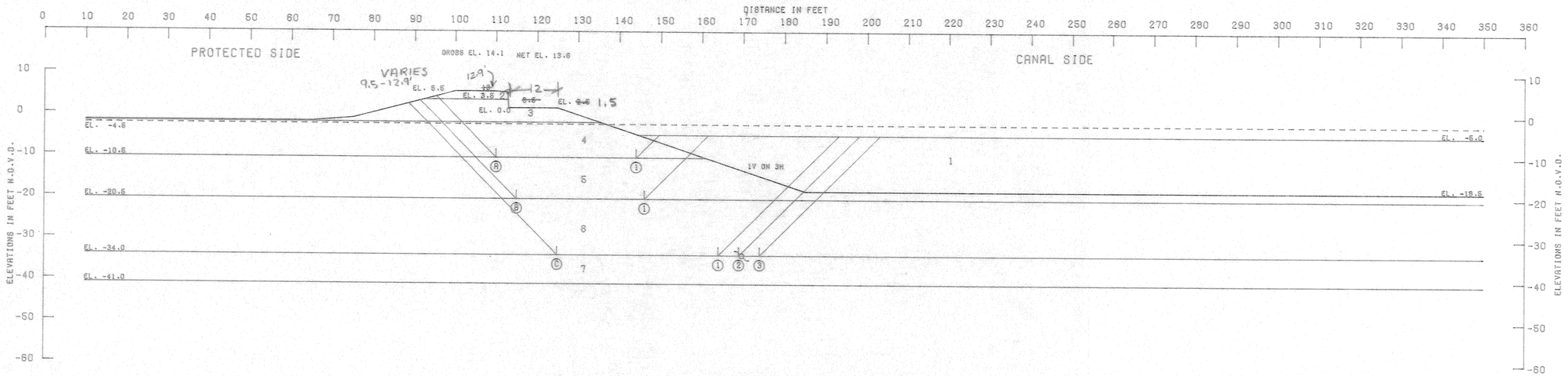
NOTES

ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

ORLEANS
553+70 TO 568+00

M28



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	R_B	R_P	DRIVING FORCES D_B	$D_A - D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(A) (1)	-10.5	11024	9520	2379	13249	1435	22923	11814	1.94
(B) (1)	-20.5	18594	11780	7299	33198	10923	35873	22276	1.60
(C) (1)	-34.0	26131	14820	12487	73677	33877	53438	39700	1.35
(C) (2)	-34.0	26131	16720	11663	73677	32780	54514	40797	1.34
(C) (3)	-34.0	26131	18548	11580	73677	31871	56259	41706	1.35

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	CENTER OF STRATUM VERT. 2	BOTTOM OF STRATUM VERT. 1	BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
(1)	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
(2)	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
(3)	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
(4)	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
(5)	(CH)	103.0	103.0	330.0	330.0	380.0	380.0	0.0
(6)	(CH)	102.0	102.0	380.0	380.0	380.0	380.0	0.0
(7)	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

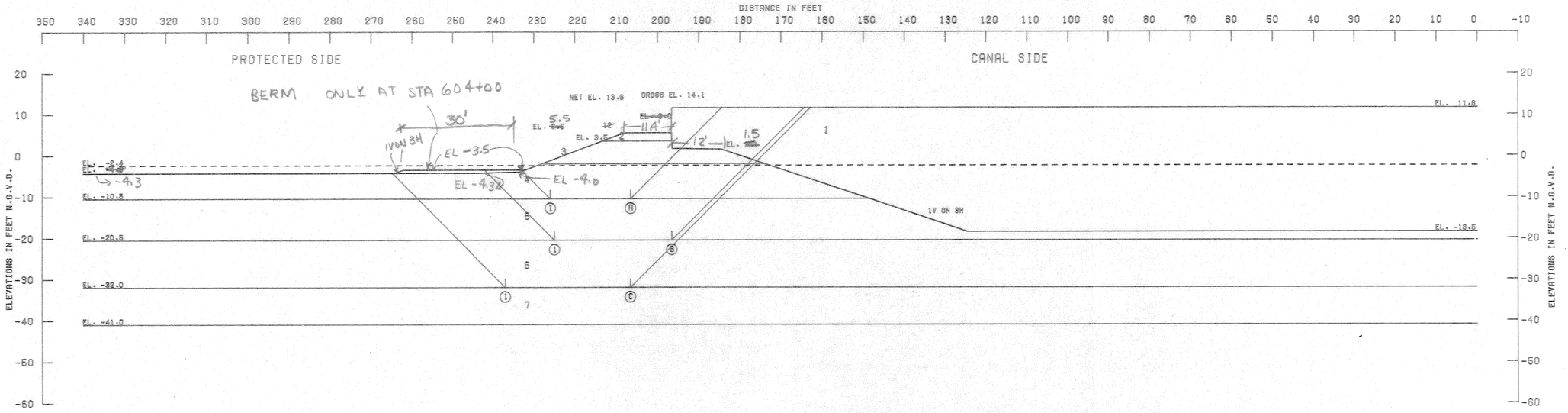
NOTES

Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

STA 568 +00 TO
STA 589+00
ORLEANS

M31



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
(B) (1)	-10.5	8409	5480	3877	16353	3241	17846	13112	1.36
(B) (1)	-20.5	12362	10830	10696	41541	15891	33888	25650	1.32
(C) (1)	-32.0	20727	11590	18812	79486	41823	51129	37843	1.35

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	DEGREES
(1)	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
(2)	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
(3)	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
(4)	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
(5)	(CH)	103.0	103.0	330.0	330.0	380.0	380.0	0.0
(6)	(CH)	100.0	100.0	380.0	380.0	380.0	380.0	0.0
(7)	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

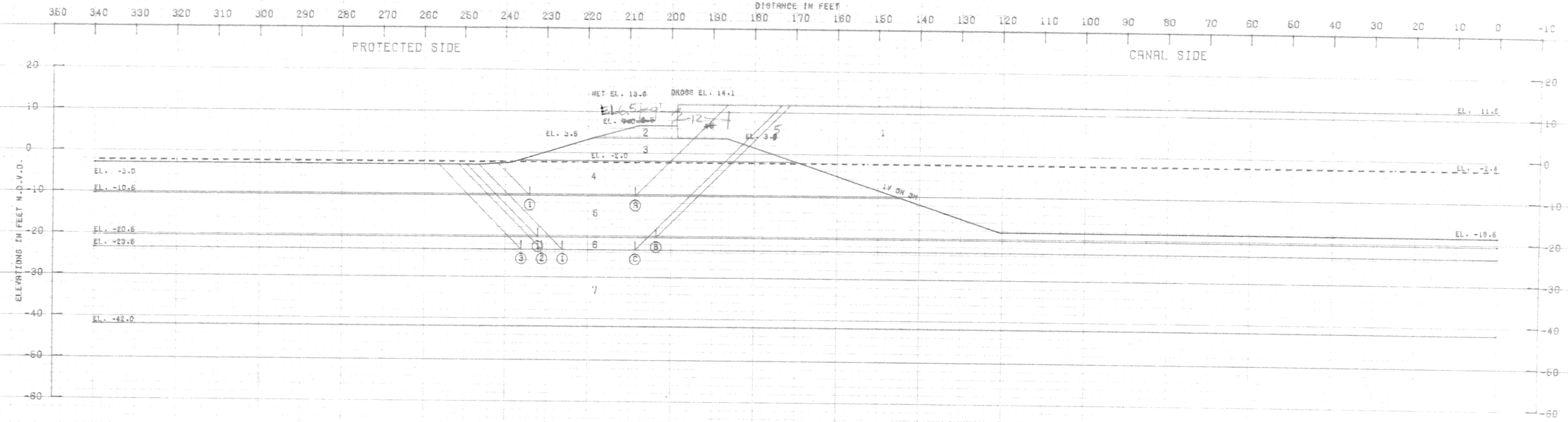
NOTES

ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

ORLEANS
STA 589 - 614+00

Nov. 6, 1989



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
(S) (1)	-10.6	10280	7140	4308	17756	3607	21728	14249	1.52
(B) (1)	-20.6	15111	10650	10744	42886	15802	36886	26084	1.41
(C) (1)	-23.6	17891	8650	13024	51646	24742	37686	26904	1.40
(C) (2)	-23.6	17891	9550	13024	51646	22902	38466	28744	1.37
(C) (3)	-23.6	17891	10450	13024	51646	21849	41366	29797	1.39

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
3	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
4	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
5	(CH)	103.0	103.0	930.0	930.0	980.0	980.0	0.0
6	(CH)	100.0	100.0	380.0	380.0	380.0	380.0	0.0
7	(SW)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, ST
STRENGTH, AND UNIT WEIGHT OF THE
WERE BASED ON THE RESULTS OF UNDIS
BORINGS. SEE BORING DATA PLATES.

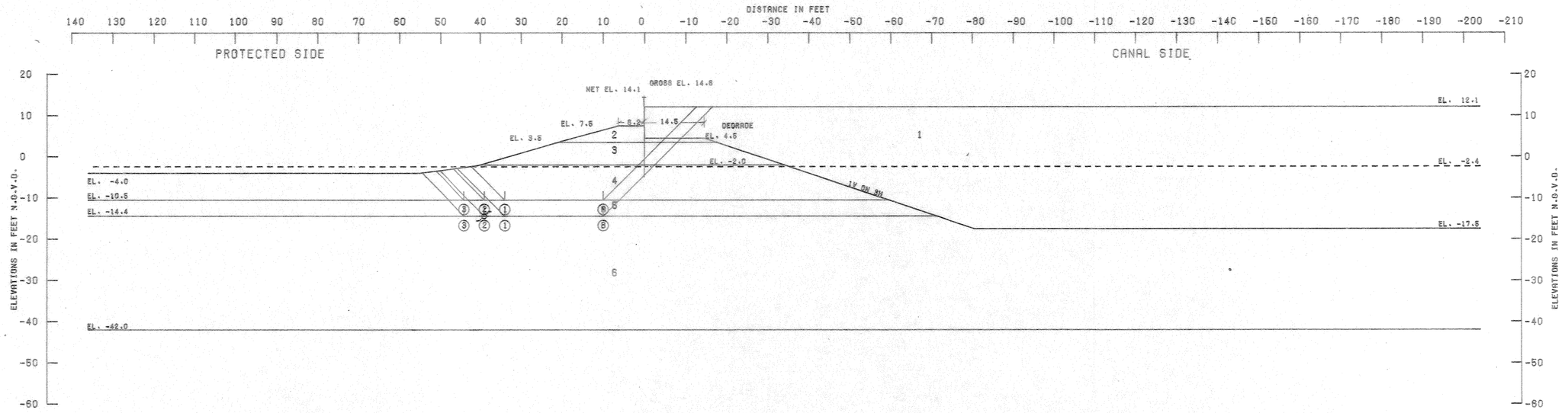
NOTES

Φ -- ANGLE OF INTERNAL FRICTION
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN
R -- HORIZONTAL RESISTING FORCE
A -- AS A SUBSCRIPT, REFERS TO
B -- AS A SUBSCRIPT, REFERS TO
P -- AS A SUBSCRIPT, REFERS TO

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

ORLEANS

STA 614-6



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(B) (1)	-10.5	11260	6720	4553	18388	4202	22533	15186	1.48
(B) (2)	-10.5	11260	8120	4238	18388	3346	23618	16042	1.47
(B) (3)	-10.5	11260	9520	3923	18388	2848	24703	16540	1.49
(B) (1)	-14.4	13600	7680	6647	28115	8163	27927	19952	1.40
(B) (2)	-14.4	13600	9280	6333	28115	7081	29213	21034	1.38
(B) (3)	-14.4	13600	10729	6018	28115	6367	30347	21768	1.39

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
(1)	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
(2)	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
(3)	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
(4)	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
(5)	(CH)	103.0	103.0	300.0	300.0	320.0	320.0	0.0
(6)	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

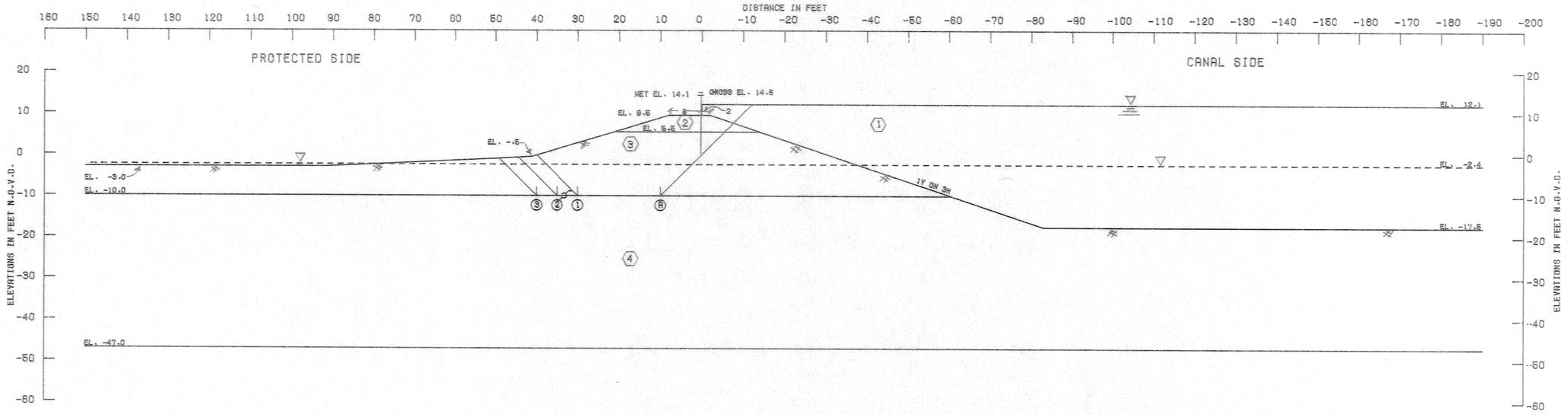
CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_B + R_B + R_P}{D_B - D_P}$$

ORLEANS
STA 625+25 TO
STA 635+00



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_R	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
R 1	-10.0	14238	9100	7424	22346	6741	30762	16805	1.97
R 2	-10.0	14238	11949	7016	22346	6969	32603	16977	1.92
R 3	-10.0	14238	13236	6807	22346	4629	34281	17717	1.93

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	117.0	117.0	800.0	800.0	800.0	800.0	0.0
3	(CH)	107.0	107.0	377.0	377.0	456.0	456.0	0.0
4	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

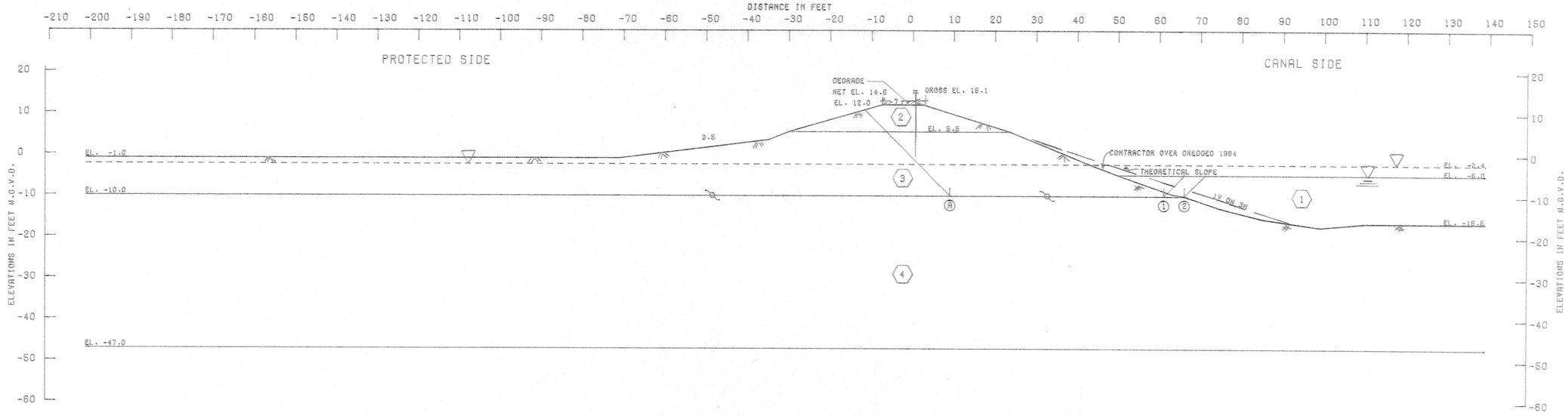
NOTES

ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_R - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 635 + 00 TO
B/L STA. 642 + 00 ORLEANS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: FILE NO. H-2-30300

PLATE M 38



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_B	$-D_P$	RESISTING	DRIVING	
(A) (1)	-10.0	18008	15147	667	25948	805	33822	25143	1.35
(A) (2)	-10.0	18008	15152	-2	25948	781	33158	25167	1.32

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
(1)	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
(2)	(CH)	117.0	117.0	800.0	800.0	800.0	800.0	0.0
(3)	(CH)	107.0	107.0	377.0	377.0	455.0	455.0	0.0
(4)	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

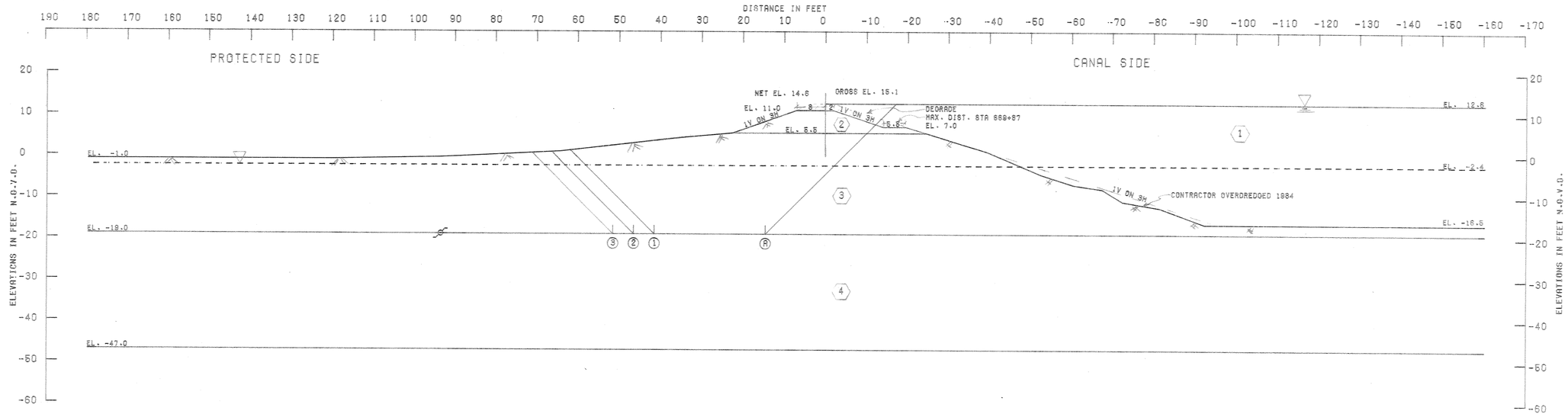
Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

ORLEANS

B/L STA 642+00 TO
B/L STA 663+00

M41



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_B	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
R 1	-18.0	23231	14715	17102	48868	24528	55048	24340	2.26
R 2	-18.0	23231	17440	16779	48868	23297	57450	25571	2.25
R 3	-18.0	23231	20165	16578	48868	22232	59974	26636	2.25

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	117.0	117.0	600.0	600.0	600.0	600.0	0.0
3	(CH)	107.0	107.0	422.0	422.0	546.0	546.0	0.0
4	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

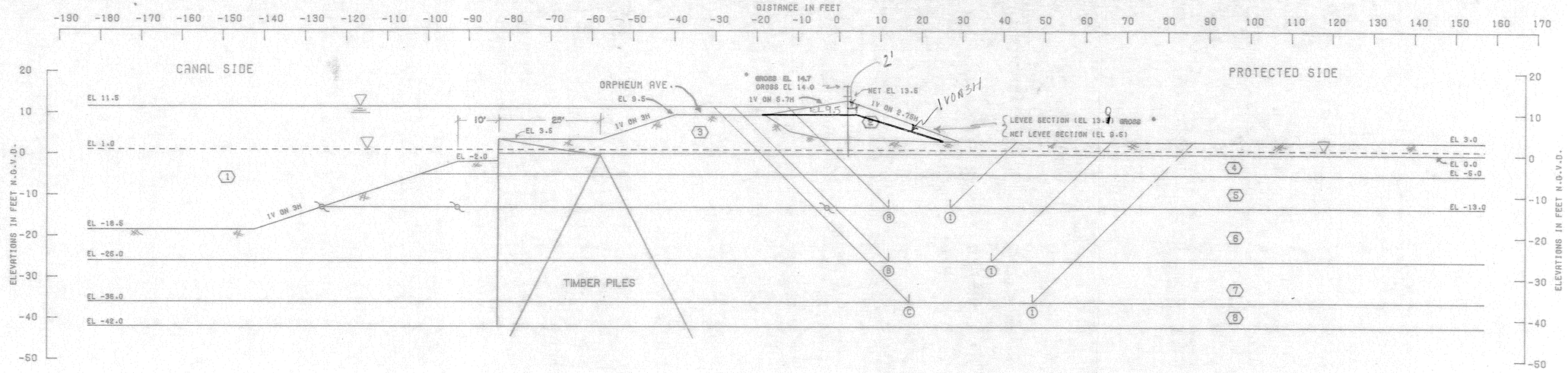
NOTES

ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_B - D_P}$

ORLEANS
STA 663+00
TO
STA 670+63

M42



* STA 551 + 00 TO STA 552 + 25

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	CENTER OF STRATUM VERT. 2	BOTTOM OF STRATUM VERT. 1	BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	110.0	110.0	400.0	400.0	400.0	400.0	0.0
3	(CH)	110.0	110.0	500.0	500.0	500.0	500.0	0.0
4	(CH)	100.0	100.0	500.0	500.0	500.0	500.0	0.0
5	(CH)	95.0	100.0	280.0	400.0	280.0	400.0	0.0
6	(CH)	100.0	100.0	280.0	500.0	280.0	600.0	0.0
7	(CH)	100.0	100.0	340.0	670.0	400.0	745.0	0.0
8	(SH)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(B) (1)	-13.0	18760	4200	12480	32231	13200	35440	19031	1.86
(B) (1)	-26.0	26380	7000	19760	72480	42194	53140	30286	1.75
(C) (1)	-36.0	33480	12000	26560	113603	76092	72040	37511	1.92

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

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C -- UNIT COHESION, P.S.F.
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B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

0+00 w/L TO 3+60 w/L

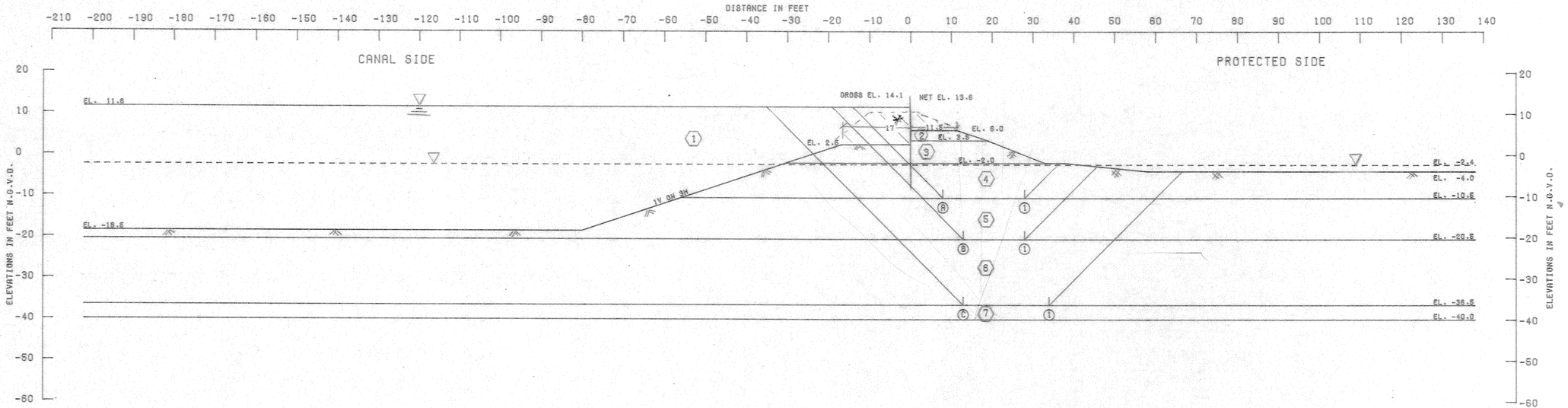
LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)

PROTECTED SIDE LEVEE STABILITY ANALYSIS B/L STA. 549 + 22 TO B/L STA. 552 + 70 JEFFERSON

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

DATE: FILE NO. H-2-30300

PLATE



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
(A) (1)	-10.5	9324	5600	4760	17378	4226	19684	13152	1.50
(B) (1)	-20.5	15897	5700	10927	40740	17792	32524	22948	1.42
(C) (1)	-36.5	25771	7980	22400	100138	56894	56151	43244	1.30

* Maximum

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE DEGREES
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
3	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
4	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
5	(CH)	103.0	103.0	330.0	330.0	380.0	380.0	0.0
6	(CH)	100.0	100.0	380.0	380.0	380.0	380.0	0.0
7	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

3+60.0 o/L
To 39+86 o/L

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

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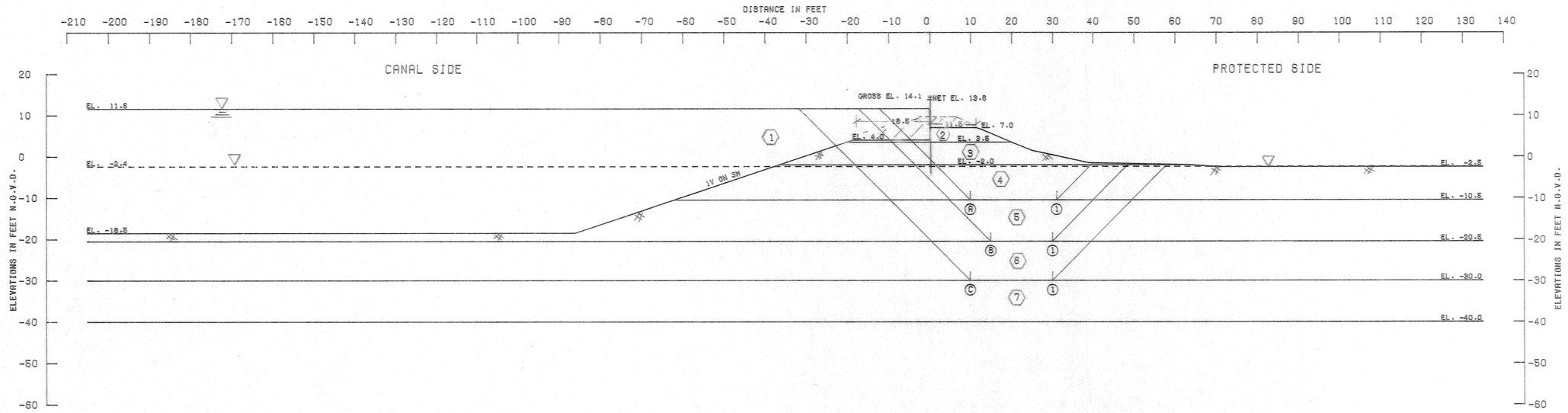
FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH – JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 554 + 00 TO
B/L STA. 589 + 00 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: FILE NO. H-2-30300

PLATE



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_R	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(A) (1)	-10.5	10760	5880	5239	18489	4876	21879	13613	1.61
(B) (1)	-20.5	17360	5700	11656	42563	19378	34716	23184	1.50
(C) (1)	-30.0	23208	7600	18682	76295	42187	49490	34108	1.45

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	CENTER OF STRATUM VERT. 2	BOTTOM OF STRATUM VERT. 1	BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
3	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
4	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
5	(CH)	103.0	103.0	330.0	330.0	380.0	380.0	0.0
6	(CH)	100.0	100.0	380.0	380.0	380.0	380.0	0.0
7	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

39+86.0 w/L
To
64+86 w/L

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

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C -- UNIT COHESION, P.S.F.
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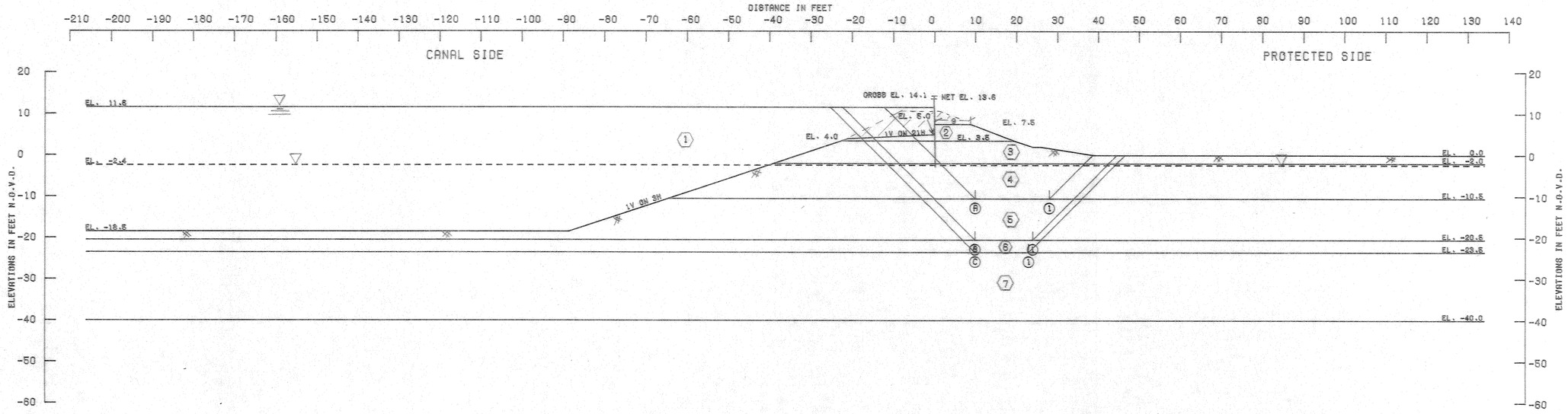
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_R - D_P}$$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 589 + 00 TO
B/L STA. 614 + 00 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE:
FILE NO. H-2-30300

PLATE
M42



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_B	$-D_P$	RESISTING	DRIVING	
(A) (1)	-10.5	11510	5040	6827	19313	6634	23377	12679	1.84
(B) (1)	-20.5	17856	5320	13360	44532	23392	36536	21140	1.72
(C) (1)	-23.5	19800	4940	15640	54042	30400	40380	23642	1.71

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F.		C - UNIT COHESION - P.S.F.				FRICTION ANGLE
				CENTER OF STRATUM		BOTTOM OF STRATUM		
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	DEGREES
(1)	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
(2)	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
(3)	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
(4)	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
(5)	(CH)	103.0	103.0	330.0	330.0	380.0	380.0	0.0
(6)	(CH)	100.0	100.0	380.0	380.0	380.0	380.0	0.0
(7)	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

64+86 w/L
to
76+10 w/L

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

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C -- UNIT COHESION, P.S.F.
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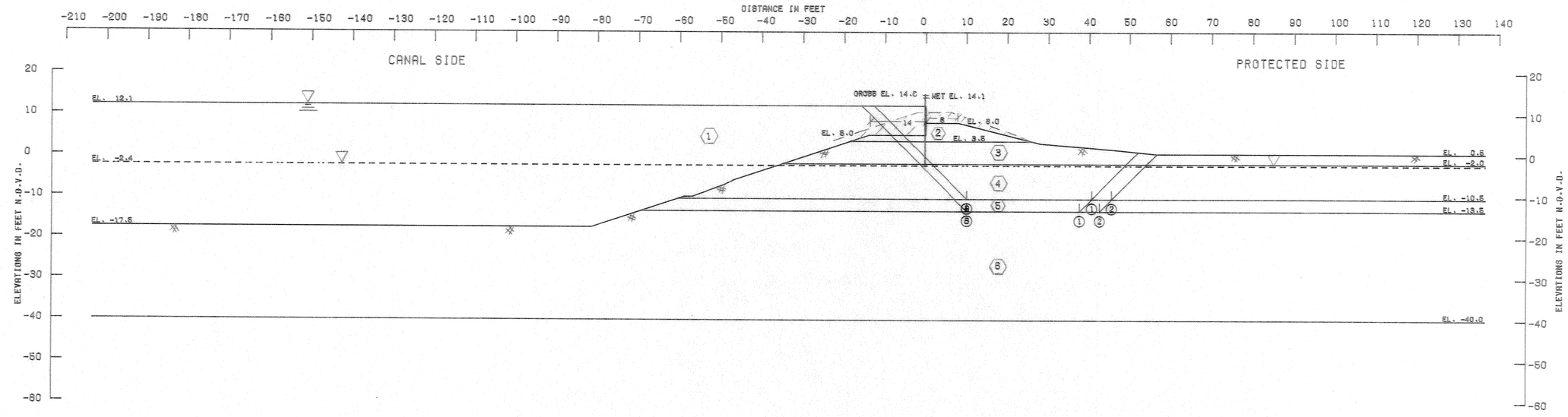
FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_B - D_P}$

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 614+00 TO
B/L STA. 625+25 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: FILE NO. H-2-30300

PLATE



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(A) (1)	-10.5	11780	8540	7714	20302	7397	28014	12905	2.17
(A) (2)	-10.5	11780	9940	7260	20302	6863	28960	13449	2.15
(B) (1)	-13.5	13530	8525	9484	28962	11756	31539	15206	2.07
(B) (2)	-13.5	13530	10075	9030	28962	11087	32635	15875	2.06

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	120.0	120.0	500.0	500.0	500.0	500.0	0.0
3	(CH)	103.0	103.0	500.0	500.0	500.0	500.0	0.0
4	(CH)	103.0	103.0	280.0	280.0	280.0	280.0	0.0
5	(CH)	103.0	103.0	295.0	295.0	310.0	310.0	0.0
6	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

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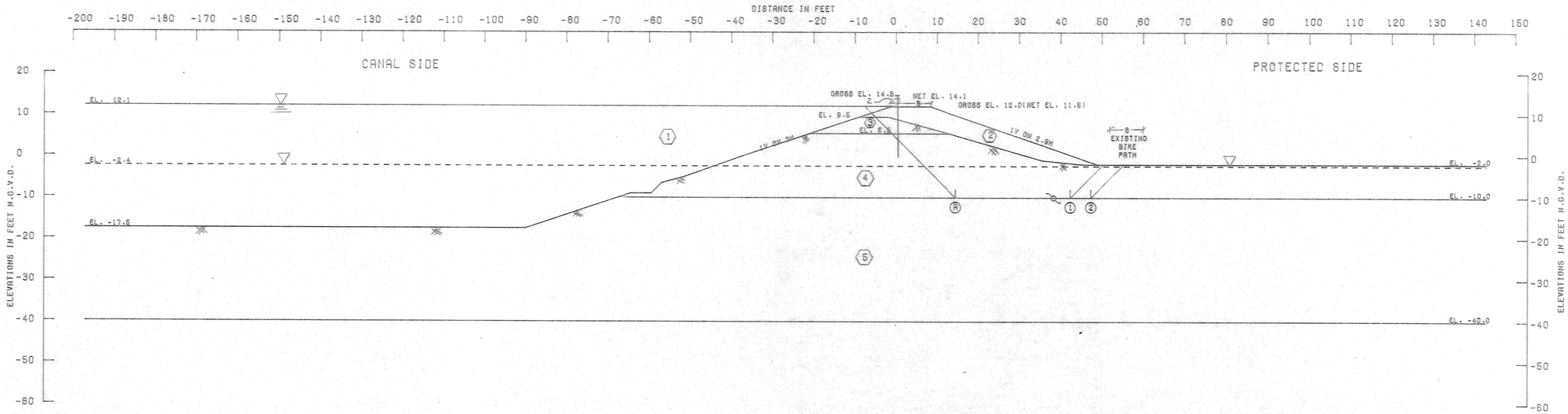
FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

76+10 w/L
to
85+86 w/L

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH — JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 625 + 25 TO
B/L STA. 635 + 00 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE:
FILE NO. H-2-30300

PLATE



ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_B	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
R 1	-10.0	17319	11974	6048	25647	4636	35341	21011	1.68
R 2	-10.0	17319	13675	6048	25647	3695	37042	22052	1.68

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(FILL)	110.0	110.0	400.0	400.0	400.0	400.0	0.0
3	(CH)	117.0	117.0	600.0	600.0	600.0	600.0	0.0
4	(CH)	107.0	107.0	378.0	378.0	455.0	455.0	0.0
5	(BH)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

85+86 w/L
to
92+38 w/L

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

NOTES

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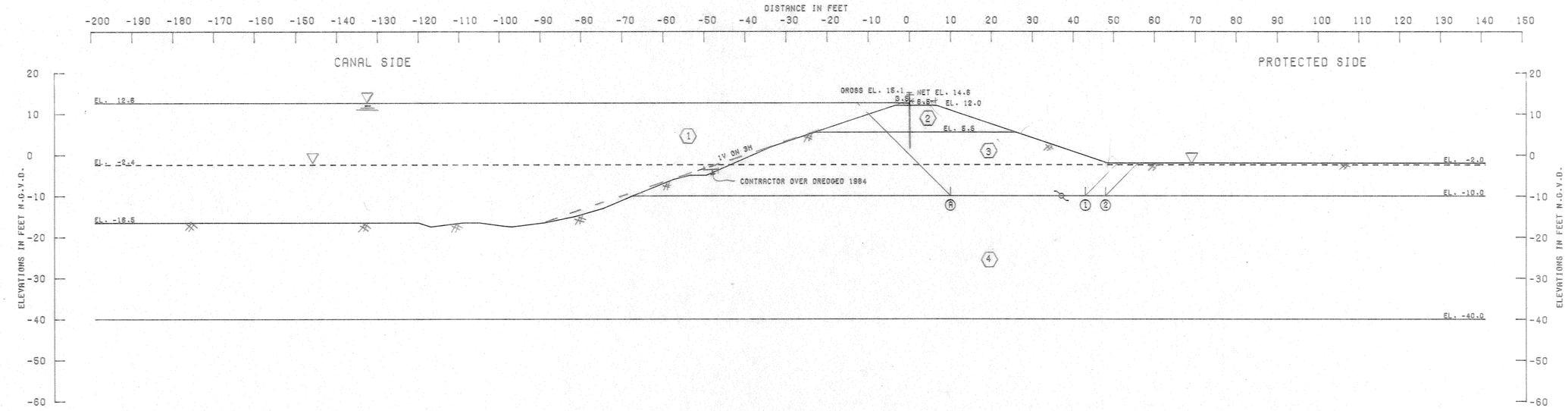
C -- UNIT COHESION, P.S.F.
∇ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT, REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT, REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_B - D_P}$

LAKE PONTCHARTRAIN, LA AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH – JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 635 + 00 TO
B/L STA. 641 + 50 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE:
FILE NO. H-2-30300

PLATE



ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
R 1	-10.0	16969	14656	6048	26836	3963	37672	22873	1.65
R 2	-10.0	16969	16063	6048	26836	3428	39080	23408	1.67

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F.		C - UNIT COHESION - P.S.F. CENTER OF STRATUM		C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM		FRICTION ANGLE
		VERT. 1	VERT. 2	VERT. 1	VERT. 2	VERT. 1	VERT. 2	DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	117.0	117.0	600.0	600.0	600.0	600.0	0.0
3	(CH)	107.0	107.0	378.0	378.0	455.0	455.0	0.0
4	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

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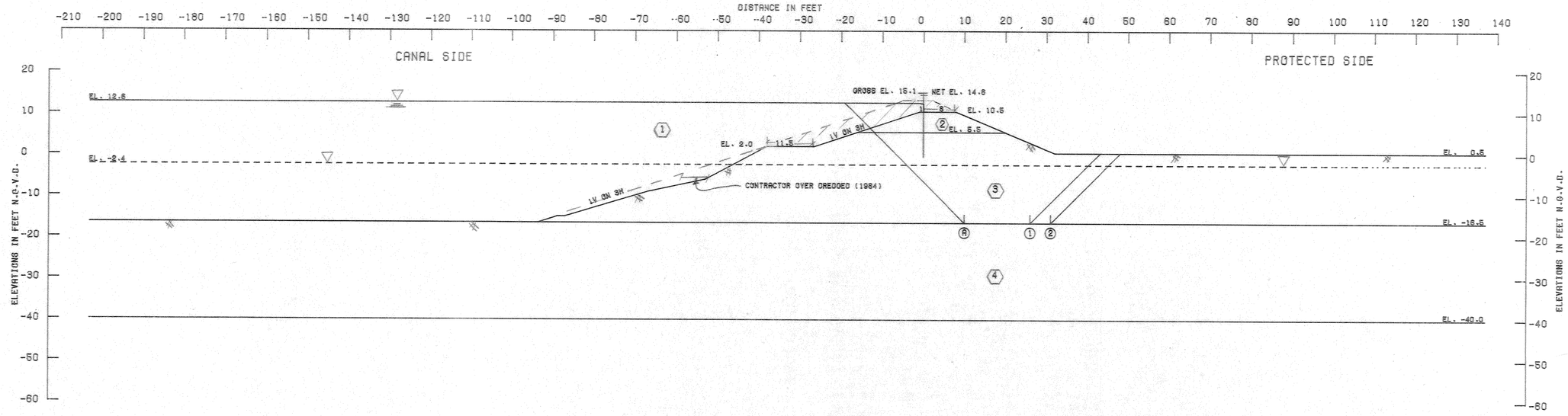
$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

92+38 ℄L
to
113+77 ℄L

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 641+50 TO
B/L STA. 663+00 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: FILE NO. H-2-30300

PLATE



REBUMED FAILURE SURFACE NO.	REBUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_R	DRIVING FORCES D_P	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
R 1	-16.5	19242	8320	13940	40751	16283	41502	24468	1.69
R 2	-16.5	19242	10920	13940	40751	15483	44102	26268	1.75

STRATUM NO.	SOIL TYPE	EFFECTIVE UNIT WT. P.C.F. VERT. 1	EFFECTIVE UNIT WT. P.C.F. VERT. 2	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 2	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 2	FRICTION ANGLE DEGREES
1	(WATER)	62.5	62.5	0.0	0.0	0.0	0.0	0.0
2	(CH)	117.0	117.0	600.0	600.0	600.0	600.0	0.0
3	(CH)	107.0	107.0	410.0	410.0	520.0	520.0	0.0
4	(SM)	122.0	122.0	0.0	0.0	0.0	0.0	30.0

GENERAL NOTES:

CLASSIFICATION, STRATIFICATION, SHEAR STRENGTH, AND UNIT WEIGHT OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS. SEE BORING DATA PLATES.

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$$\text{FACTOR OF SAFETY} = \frac{R_A + R_B + R_P}{D_A - D_P}$$

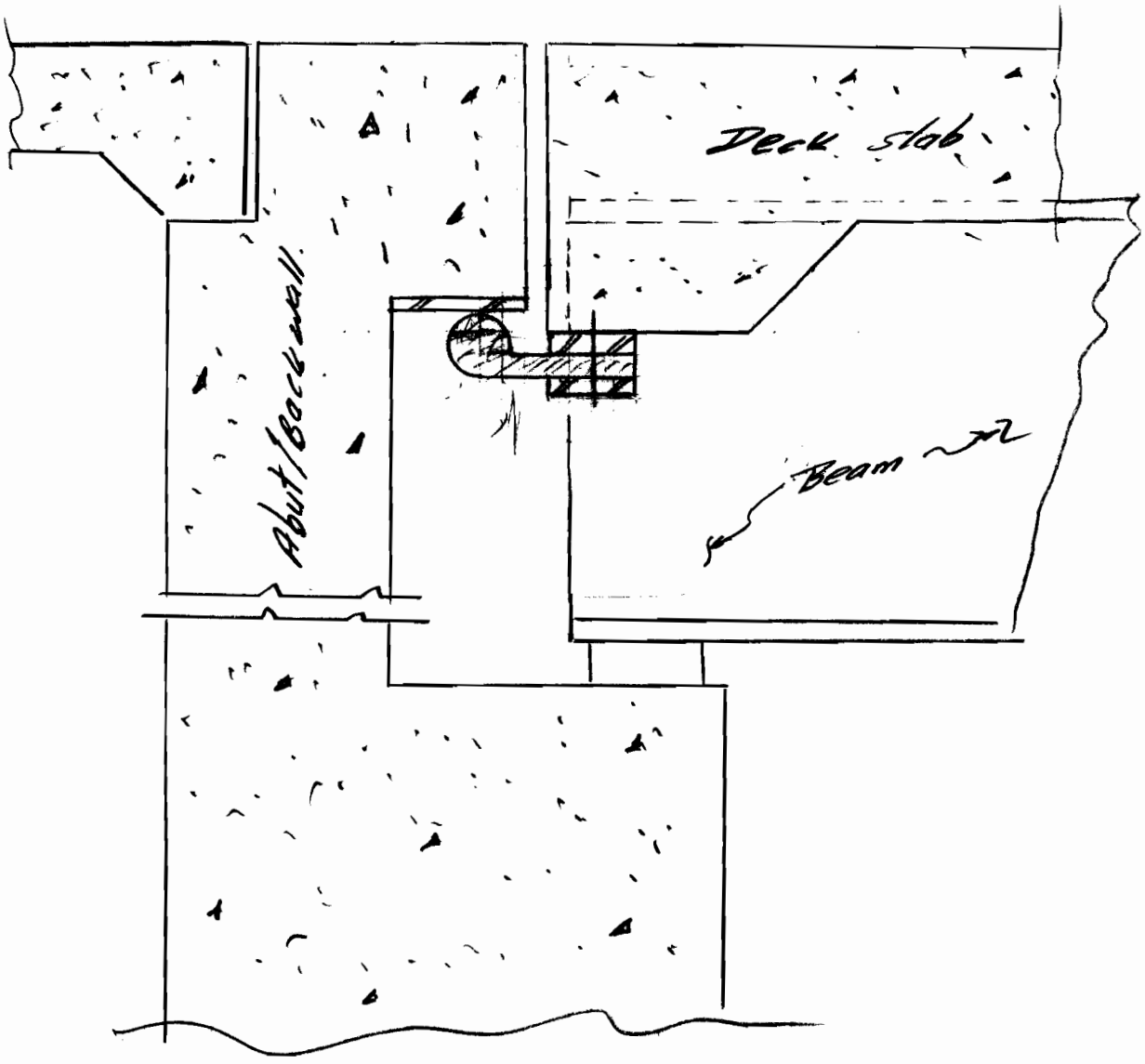
113+77 w/L
to
119+95.49 w/L

LAKE PONTCHARTRAIN, LA. AND VICINITY
HURR. LEVEL PLAN
DESIGN MEMORANDUM NO 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
PROTECTED SIDE LEVEE
STABILITY ANALYSIS
B/L STA. 663+00 TO
B/L STA. 670+00 JEFFERSON
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE:
FILE NO. H-2-30300

PLATE

COMPUTATION SHEET

PROJECT	PAGE OF	COMPUTED BY MSD	DATE
SUBJECT		CHECKED BY	DATE



NTS

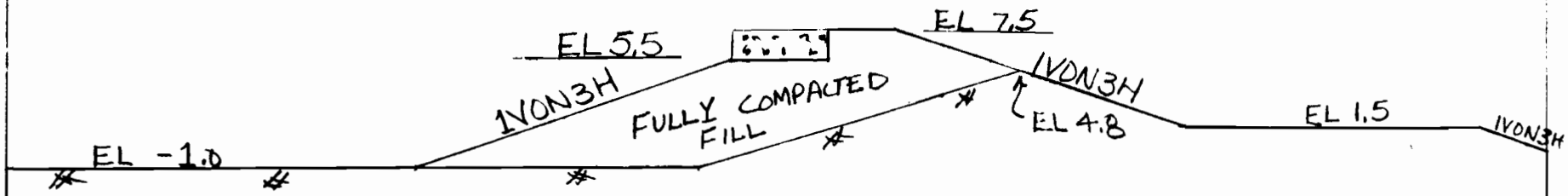
			Flood side	Protected side
sta. 553+70	to	613+00: 68+00 ω/L	1.50	5.50
sta. 615+00 ~~70+00~~	to	624+27 79+56.61	3.50	6.50
sta. 627+28 ~~[illegible]~~ 82+53.43	to	634.00 89+25.53	4.50	7.50
sta. 634+00 89+25.53	to	638+31 93+56.63	9.50	9.50
sta. 643+00 98+21.92	to	661+00 116+19.76	12.0	12.0
sta. 663+00 118+19.76	to	669+87 end	11	11.0

11

ORLEANS PARISH

HAMMOND HIGHWAY FLOODGATE

GATE STORAGE MONOLITH



17th St Outfall Canal

FJV

11/89

PROJECT 17th Street Canal GDM	PAGE 3 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

SECTION PROPERTY (CONT.)

B. Composite section
for +M, n = 10

	A	d	Ad	Ad^2	I_o	I_o+Ad^2
W 33x130	38.3				6710	6710
Conc. $75.96 \times \frac{9}{10}$	68.36	23.05	1576	36327	461	36,788
	106.66	(14.77)	1576			43,498
						−23,278
					I	= 20,220

$S_{TS} = \frac{20,220}{1.775} = 11,392$

$S_{BS} = \frac{20,220}{31,312} = 646$

$S_{TC} = \frac{20,220}{12.78} = 1582$

C. Composite section
for −M. conc. neglected. use #6 @ 6"

	A	d	Ad	Ad^2	I_o	I_o+Ad^2
W 33x130	38.3	—	—	—	6710	6710
13, #6 bars	5.72	24.05	137.5	3308	−	3308
	44.02	(3.12)	137.5			10018
					−	429
					I	= 9588

$S_{TS} = \frac{9588}{13.43} = 714 \text{ in}^3$

$S_{BS} = \frac{9588}{19.67} = 488 \text{ in}^3$

$S_{reinf\text{-}Bar} = \frac{9588}{20.93} = 458 \text{ in}^3$

PROJECT 17th Street canal GDM	PAGE 4 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

DEAD LOAD (DL)

End span $L = 40'$

Slab	$\frac{9}{12} \times 6.33 \times 0.15$	$= 0.712^{k/ft}$
Haunch	$\frac{2}{12} \times 1.50 \times 0.15$	$= 0.038^{k/ft}$
W. section		$= 0.130^{k/ft}$
Miss. ~ 20% W. Sect		$= 0.026$
		$0.906^{k/ft}$ ↓

$$M_{DL} = 181.2^{ft\text{-}k}$$
$$V_{DL} = 18.12^{k}$$

Super Imposed Dead Load (SDL)

Parapet: $(\frac{1}{7}) \times 5.08 \times 1.0 \times 2 \times 0.15 = 0.218^{k/ft}$

Sidewalk $= \frac{1}{7} \times 3 \times \frac{10}{12} \times 2 \times 0.15 = 0.107^{k/ft}$

Wearing Surface: $0.02 \times 6.33 = 0.127^{k/ft}$

$0.452^{k/ft}$

$$M_{SDL} = 90.40^{ft\text{-}k}$$
$$V_{SDL} = 9.04^{k}$$

Live Load

2. HS-20 44 Truck

$$M_{LL} = 449.8^{ft\text{-}k}$$
$$V_{LL} = 55.2^{k}$$

LL D.F. $= \frac{6.33}{11} = 0.576$

$I = 50 \div (40 + 125) = 0.303$ Use 30% max.

$$M_{LL+I} = 337$$
$$V_{LL+I} = 41.3$$

PROJECT 17th Street Canal Bom	PAGE 5 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

Live Load (Cont.)

b. Water to El. 14.50

Uplift head : $H = 5.08 + 0.83 + 0.75 = 6.66'$ Max.

Uplift load = $6.66 \times 0.064 \times 6.33 = 2.70^{K/ft}$

$-M = 540^{1.K}$

$-V = 54^{K}$

STRESS in W-section

	At Top of Section	At Bottom-section
Case-I		
D.L:	$181.2 \times 12 \div 406 = 5.36$	$181.2 \times 12 \div 406 = 5.36$
SDL	$90.40 \times 12 \div 1820 = 0.60$	$90.40 \times 12 \div 575 = 1.89$
LL+I(TRUCK)	$337 \times 12 \div 11392 = 0.36$	$337 \times 12 \div 646 = 6.26$
	6.32 Comp.	13.51 Tens.
Case II		
DL	5.36	5.36
SDL	0.60	1.89
Hyd.	$-540 \times 12 \div 714 = +9.08$	$-540 \times 12 \div 488 = -13.28$
	3.12 Ten.	6.03 Comp

STRESS in Conc.

Case I:

SDL: $90 \times 12 \div (763 \times 30) = 0.047$

LL+I(TRUCK): $337 \times 12 \div (1582 \times 10) = 0.256$

Tot $f_c = 0.303 < 1.2$

Case II

$(90 - 540) \times 12 \div 458 = 11.79^{ksi} < 18^{ksi}$

PROJECT 17th Street Canal GDM	PAGE 6 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

Bridge Reaction

Load Case I, (Check Web shear)

$V_{DL} = 18.12$
$V_{SDL} = 9.04$
$V_{LL+I} = \underline{41.30}$
68.46^{K}

$v = \frac{68.46}{33.09 \times 0.58} = 3.55^{KSI} < \text{Allow.}$

Load Case II (Check Girder Anchor)

$V_{DL} = 18.12$
$V_{SDL} = 9.04$
$V_{Hyd} = \underline{-54.00}$
-26.84^{K} uplift

Req'd $A = \frac{26.84}{18} = 1.49\ \square''$

Provide 2-1"ϕ Anchors @ each girder.

PROJECT 17th Street CANAL GDOT	PAGE 7 OF 21	COMPUTED BY SA	DATE 10/19
SUBJECT Veterans Memorial Bridge		CHECKED BY	DATE

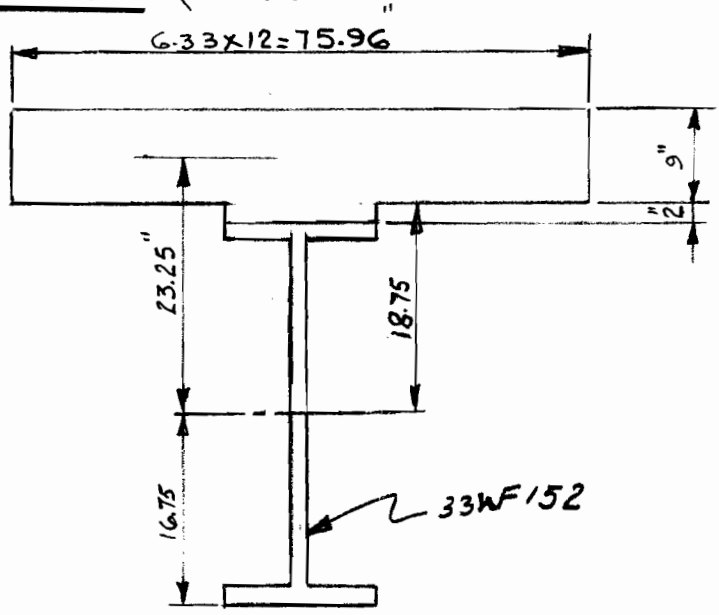
Total span (c. to C pile bents) = 57.0'

Removable span = 48'-1"

Low steel Elev. = 6.72

Girder Size = 33WF152

SECTION PROPERTIES (n = 30)



	A	d	Ad	Ad^2	I_o	Ad^2+I_o
WF 33X152	44.70	–	–	–	8160	8160
Conc. $\frac{75.96 \times 9}{30}$	22.80	23.25	530.10	12325	154	12479
	66.50	(7.97)	530.10			20,639
					Less (530.10)(7.97)	−4,225
					I =	16,414

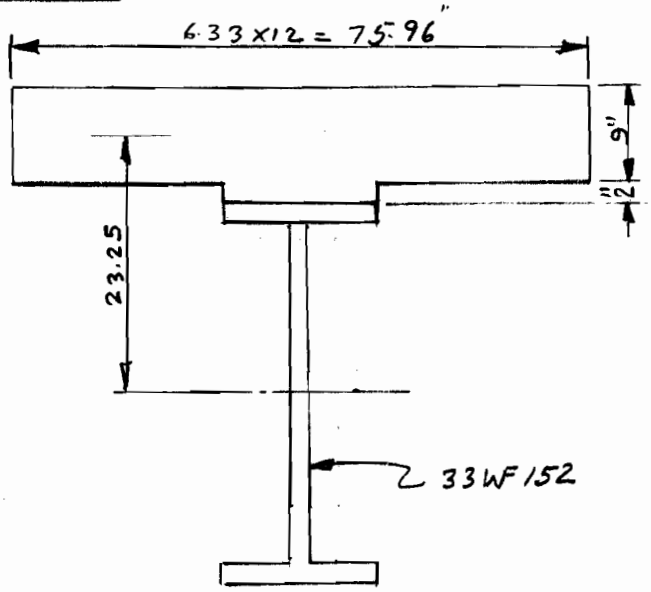
$$S_{Ts} = \frac{16414}{(16.75-7.97)=8.78} = 1870\ in^3$$

$$S_{Bs} = \frac{16414}{(16.75+7.97)=24.72} = 664\ in^3$$

$$S_{Tc} = \frac{16414}{(23.25+4.50)=19.78} = 830\ in^3$$

PROJECT	PAGE	COMPUTED BY	DATE
17th Street Canal GDM	8 OF 21	S.A.	10/23
SUBJECT Veterans Memorial Bridge.		CHECKED BY	DATE

SECTION PROPERTIES (n = 10)



SECTION	A	d	Ad	Ad^2	I_o	$Ad^2 + I_o$
WF 33 x 152	44.70				8160	8160
Conc. $75.96 \times \frac{9}{10}$	68.36	23.25	1589	36953	461	37414
TOTAL	113.06	14.05	1589	36953	8621	45574

Less $1589(14.05) = -22314$

$I = 23,260$

$$S_{TS} = \frac{23,260}{(16.75 - 14.05) = 2.7} = 8615 \text{ in}^3$$

$$S_{BS} = \frac{23,260}{(16.75 + 14.05) = 30.80} = 755 \text{ In}^3$$

$$S_{TC} = \frac{23,260}{(23.25 - 14.05 + 4.50) = 13.70} = 1698 \text{ in}^3$$

PROJECT 17th Street CANAL GDM	PAGE 9 OF 21	COMPUTED BY S.A	DATE 10/23
SUBJECT Veterans Memorial Bridge		CHECKED BY	DATE

SECTION PROPERTIES (Concrete Neglected)

Use #6 @ 6"

	A	d	Ad	Ad^2	I_O	$I_O + Ad^2$
W 33×152	44.70	—	—	—	8160	8160
13 - #6 bars (bars – 3½" from Top)	5.72	24.25	139	3364	–	3364
	50.42	2.76	139			11,524

$139\,(2.76) = 384$

$11,140\ in^4$

$$S_{TS} = \frac{11,140}{(16.75 - 2.76)} = 796\ in^3$$

$$S_{BS} = \frac{11,140}{19.51} = 571\ in^3$$

$$S_{Reinf\ bars} = \frac{11,140}{21.49} = 518\ in^3$$

DESIGN-LOADS

DEAD-LOADS ($L = 48'-1"$)

$$Slab = \tfrac{9}{12} \times 6.33 \times 0.150 = 0.712\ K/FT$$

$$WF = 0.152 \times 1.20 = 0.182\ K/FT$$

$$HAUNCH = \tfrac{2}{12} \times 1.50 \times 0.150 = .038\ K/FT$$

$$TOTAL \quad 0.932\ K/FT$$

$$M_{DL} = w\ell^2/8 = 0.932\,(48.0833)^2/8 = 269.35\ K\text{-}FT$$

$$V_{DL} = w\ell/2 = 0.932\,(48.0833)/2 = 22.41\ K/2S$$

PROJECT 17th Street Canal GDM	PAGE 10 OF 21	COMPUTED BY S.A.	DATE 10/23
SUBJECT Veterans Memorial Bridge		CHECKED BY	DATE

Super-Imposed D.L (Distributed over 7 beams).

Parapet = $\frac{1}{7} \times 5.08 \times 1 \times 2 \times 0.150 = 0.218$

Sidewalk = $\left(\frac{1}{7} \times 3.17 \times 10/12 \times 0.150\right) 2 = 0.113$

Wearing Surface $= 0.127$

TOTAL 0.458

$M_{SDL} = wl^2/8 = 0.458 (48.0833)^2/8 = 132.36$ K FT

$V_{DL} = wl/2 = 0.458 (48.0833)/2 = 11.01$ Kips

Live Load-Moment (H-20-44)

(a) Moment = 592 + 1.50 = 593.50 K-FT.

End Shear = 58 + 02 = 58.02 Kips.

Impact = $\frac{50}{125 + 48.0833} = 50/173.0833 = .2828$ or 28.28%

D.F = $\frac{S}{5.50} = 6.33/5.50 = 1.15$ wheels or .575 Axles

Lane reduction factor = 0.90

$M_{LL+I} = \left[593.50 (.575)\right] \times .90 \times 1.2828 = 394$ K FT.

$V_{LL+I} = 58.02 (.575) \times 0.90 \times 1.2828 = 38.52$ Kips.

(b) Water to Elev. = 14.50 feet.

uplift Head = 5.08 + 0.83 + 0.75 = 6.66 feet

uplift Load = 6.66 × .064 × 6.33 = 2.70 K/Ft.

Moment = $wl^2/8 = 2.70 (48.0833)^2/8 = 780$ K'

$V = wl/2 = 2.70 \times 48.0833/2 = 65$ Kips.

PROJECT 17th Street CANAL GOM	PAGE 11 OF 21	COMPUTED BY SA.	DATE 10/23
SUBJECT Veterans Memorial Bridge		CHECKED BY	DATE

Stresses in W-SECTION

AT TOP OF SECTION

CASE: I

D.L. = 269.35 × 12 / 487 = 6.63

SDL = 132.36 × 12 / 1870 = .85

LL+I = 394 × 12 / 8615 = .55

TOTAL 8.03 compression

AT Bottom Section

269.35 × 12 / ~~406~~ 487 = 6.63

132.36 × 12 / 664 = 2.39

394 × 12 / 755 = 6.26

TOTAL 15.28 TENSION

CASE II

D.L.	= 6.63	= 6.63
SDL	= .85	= 2.39
Hyd. = −780 × 12 / 796	= −11.75	−780 × 12 / 571 = −16.39
	−4.27 Ten.	7.37 Comp

STRESS in Conc.

CASE I

S.D.L.: 132.36 × 12 / 830 × 30 = .064

LL+I : 394 × 12 / 1698 × 10 = .278

> TOTAL f_c = .342 < 1.2

CASE II

(132.36 − 780) × 12 ÷ 518 = 15.00 KSI < 18 K.S.I.

Bridge Reactions

LOAD CASE I

$V_{D.L.}$ = 22.41

$V_{S.DL.}$ = 11.01

V_{LL+I} = 38.52 / 71.94

R = 71.94 / 33.49 × .635 = 3.38 K.S.I. < Allow.

LOAD CASE II

V_{DL} = 22.41

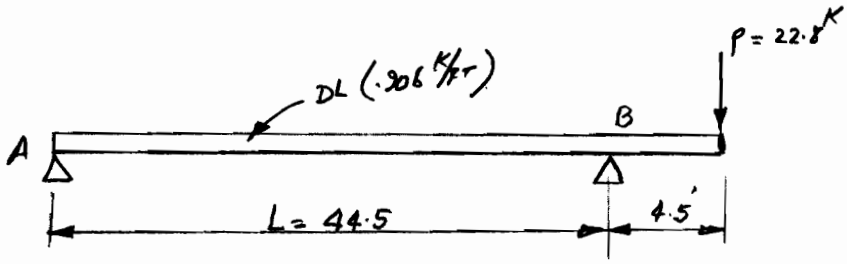
V_{SDL} = 11.01

V_{Hyd} = −65.00 / 31.58

Reqd A = 31.58 / 18 = 1.75 in²

Provide − 2 − #9 Anchors each Girder

PROJECT 17th Street CANAL GDM	PAGE 12 OF 21	COMPUTED BY S.A.	DATE 10/23
SUBJECT Veterns Memorial Bridge		CHECKED BY	DATE



AT 0.4L

M_{DL} = 211.623 K-FT

$M_{P(D.L.)}$ = −41.040 "

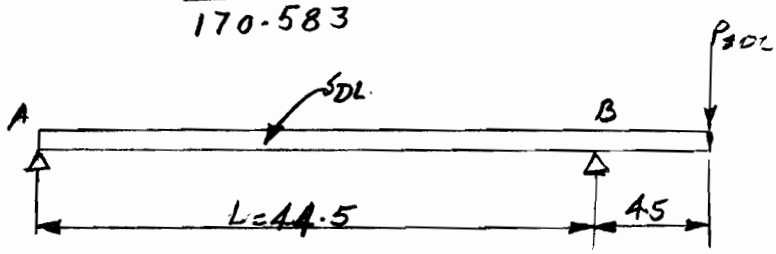
170.583

AT SUPPORT "B"

M_{DL} = 9.17 K-FT.

$M_{P(DL)}$ = −102.60 "

−93.43 K/FT.



AT 0.4L

M_{SDL} = 105.55 K-FT.

$M_{P(SD.L.)}$ = −20.47 "

85.08 K/FT

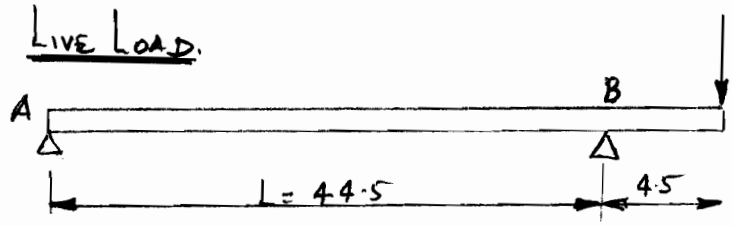
AT SUPPORT B

M_{SDL} = 4.57 K-FT.

$M_{P(SDL)}$ = −51.18 "

−46.61 K/FT

LIVE LOAD.



Dist. FACTOR = S/5.5 = 1.1509/2 = .575

Impact = 50/125+44.5 = .295

TRUCKS @ midspan

M = 538.7 (.575) (1.295) = 401.13 K'

M(VC) =

261 (.575) (1.295)

= −194.35 K'

PROJECT 17th Street CANAL GDM	PAGE 13 OF 21	COMPUTED BY S.A	DATE 10/24
SUBJECT Veterns Memorial Blvd.		CHECKED BY	DATE

STRESSES ON W-SECTION

CASE I

	AT TOP OF SECTION	AT BOTTOM SECTION
D.L.	$170.583 \times 12/406 = 5.04$ K/FT	$170.583 \times 12/406 = 5.04$ K/FT.
S.D.L.	$85.08 \times 12/1820 = .56$ "	$85.08 \times 12/575 = 1.78$ "
LL+I	$401.13 \times 12/11392 = .42$ "	$401.13 \times 12/406 = 7.45$ "
	6.02 K/FT.	14.27 "

CASE II

D.L. $= -93.43 \times 12/406 = 2.76$

SDL $= -46.61 \times 12/714 = 0.78$

LL+I $= -194.35 \times 12/714 = 3.26$

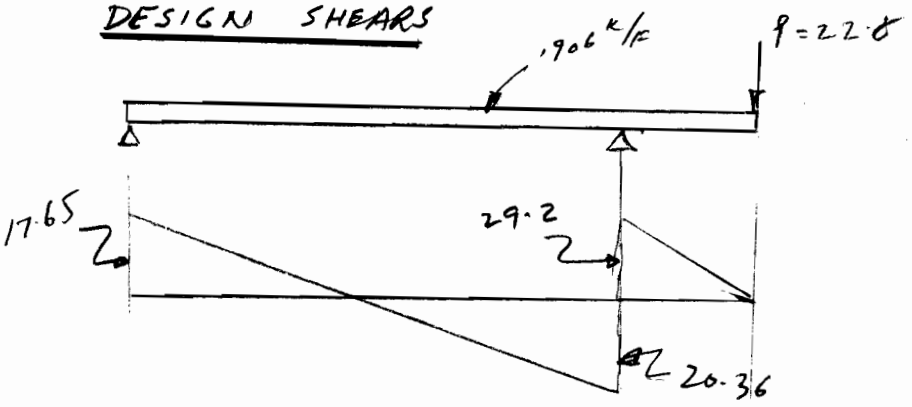
$6.80 < 18$ K.S.I O.K.

STRESS IN CONC.

S.DL $= 55.08 \times 12/763 \times 30 = .045 > .399 < 1.2$ O.K.

LL+I $= 401.13 \times 12/1582 \times 10 = -3.04$

DESIGN SHEARS



$V_{DL} = 17.65$

$V_{PDL} = 29.20$

$= -20.36$

$+26.49$

L.L. Shear

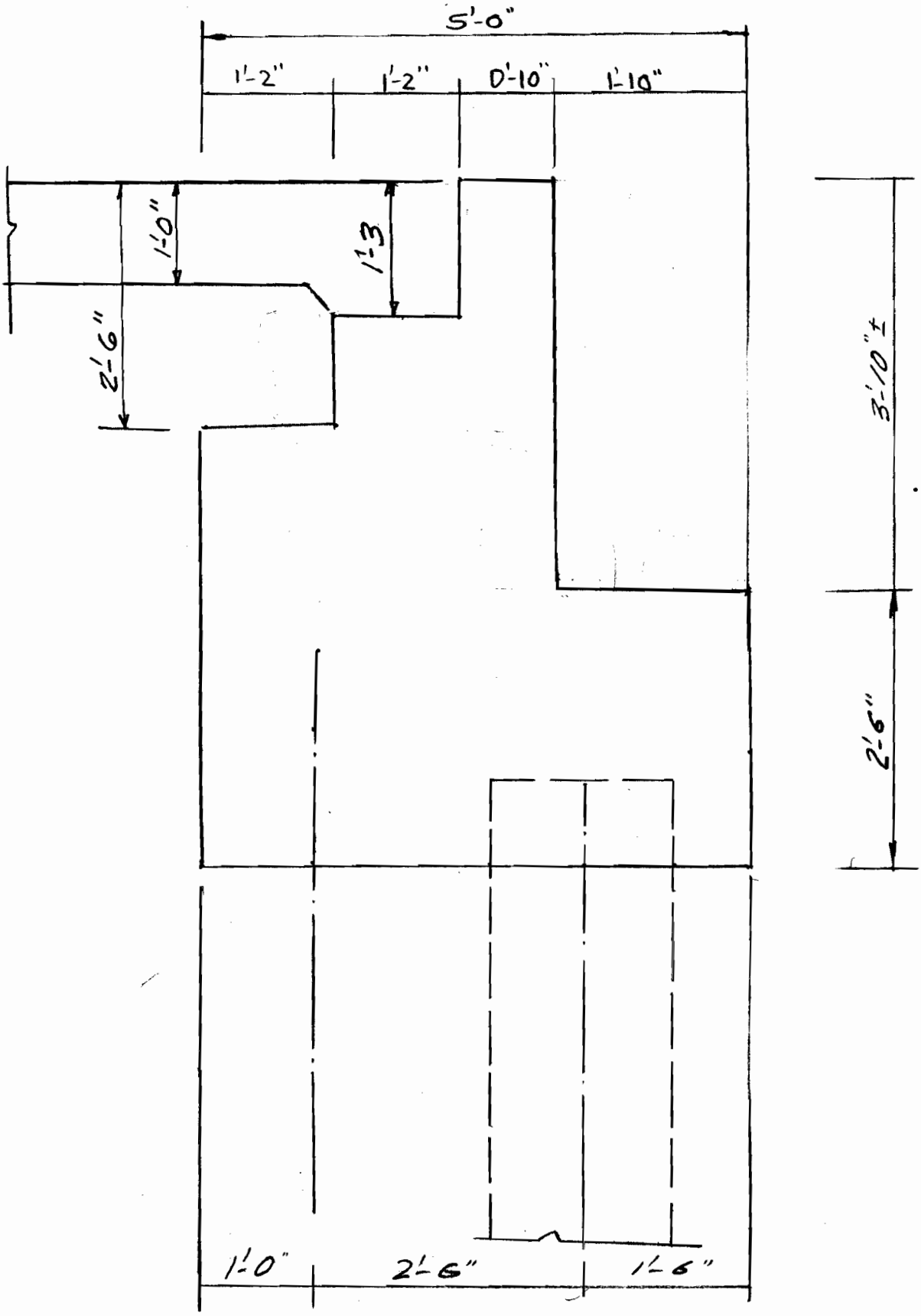
$56.85 \times .575 \times 1.295 = 42.33$ Kips

$V_{DL} = 17.65$
$V_{PDL} = 29.20$
LL+I $= 42.33$

$89.18/33.07 \times .58 = 4.65 <$ Allow. OK

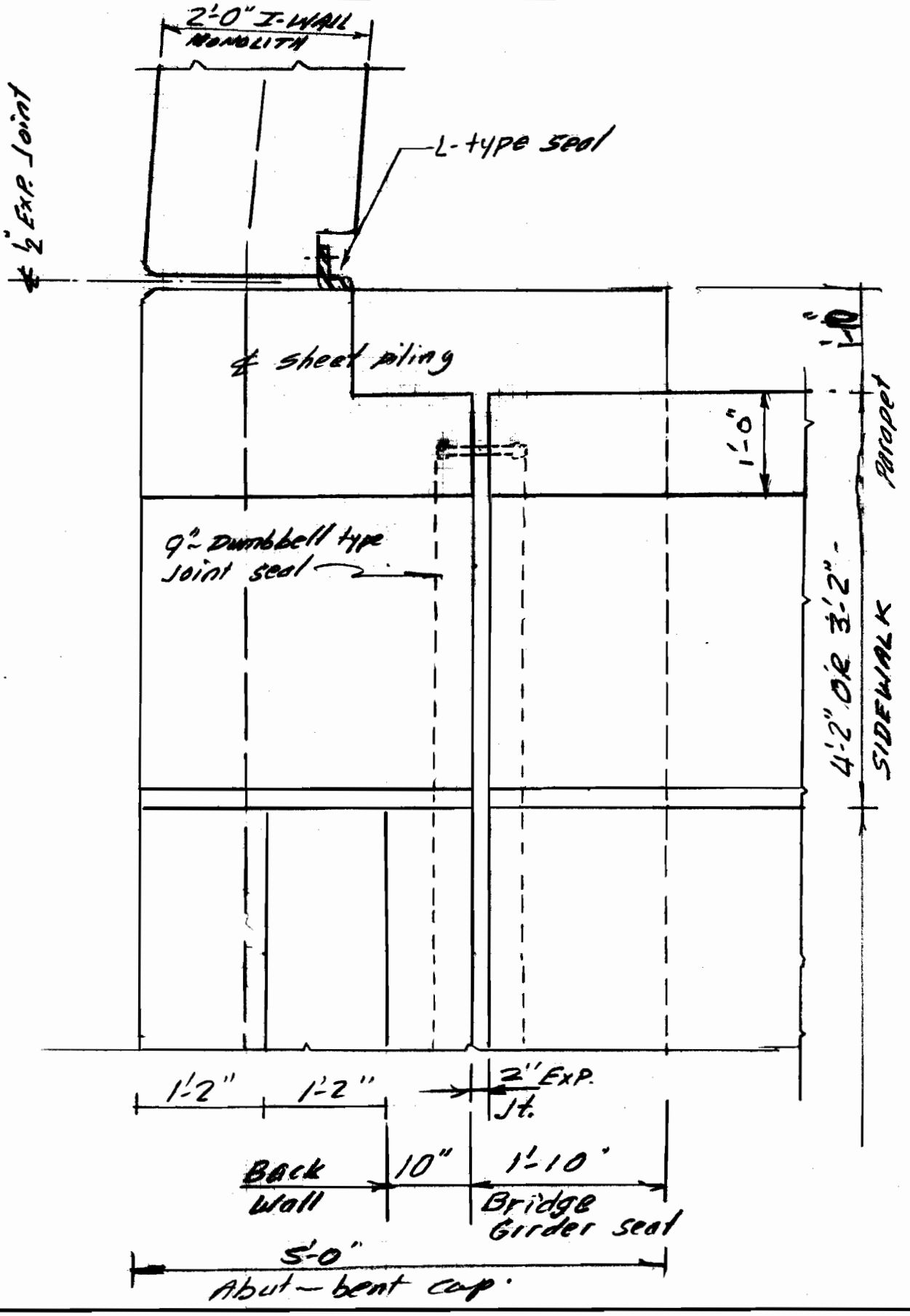
COMPUTATION SHEET

PROJECT 17th Street Canal GDM	PAGE 14 OF 21	COMPUTED BY MSD	DATE
SUBJECT Vets Bridge		CHECKED BY	DATE



COMPUTATION SHEET

PROJECT 17th Street Canal GDM	PAGE 15 OF 21	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE



PROJECT 17th Street canal Bridge	PAGE 16 OF	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

PILE SUPPORT AT ABUTMENT.

DL REACTIONS,

a. Super Structure:

Deck: $42.14 \times \frac{8}{12} \times 40 \times \frac{1}{2} \times 0.15$	=	94.82
Haunch: $7 \times 0.038 \times 40 \times \frac{1}{2}$	=	5.32
Girder: $7 \times 0.130 \times 40 \times \frac{1}{2}$	=	18.20
SDL : $0.452 \times 7 \times 40 \times \frac{1}{2}$	=	63.28
Σ DL, super Str:	=	181.62 K.

b: Abutment:

$2.5 \times 5 \times 49.33 \times 0.15$	= 92.49
$3.83 \times 0.83 \times 40 \times 0.15$	= 19.07
$1.17 \times 2.83 \times 40 \times 0.15$	= 19.87
$1.17 \times 1.83 \times 40 \times 0.15$	= 12.85
$5.17 \times 4.67 \times 3.17 \times 0.15$	= 11.48
$4.17 \times 4.67 \times 3.17 \times 0.15$	= 9.26
Σ DL, sub str.	= 165.02 K

Live Load (Hyd. load)

a. uplift on Super Structure: HWL = 12.5

uplift Head = ~~5.08~~ 3.08 + 0.83 + 0.75 = ~~6.66~~ 4.66

uplift load = ~~6.66~~ 4.66 × 0.064 × 40 × 47.33 × ½ = ~~-403.5~~ -282.3 K

b. Uplift on sub structure:

uplift head: ~~5.08~~ 3.08 + 0.83 + 3.83 + 2.5 = ~~12.24~~ 10.24 -161.6 K

uplift load = ~~12.24~~ 10.24 × 0.064 × 49.33 × 5 = ~~-193.2~~ K

Net Uplift = 181.62 + 165.02 − ~~403.5~~ 282.3 − ~~193.2~~ 161.6 = ~~-250.0~~ -97.29 K

Capacity of exist. pile: $5 \times 47.8 + 2 \times 47.8 \times \frac{1}{4} = 262 > ~~250~~ 92.29$

No additional piles req'd.

PROJECT 17th street canal Bridge	PAGE 17 OF	COMPUTED BY MSD	DATE
SUBJECT Veterans Bridge		CHECKED BY	DATE

PILE SUPPORT AT ABUTMENT.

DL REACTIONS,

a. Super structure:

Deck: $42.14 \times \frac{9}{12} \times 40 \times \frac{1}{2} \times 0.15$	=	94.82
Haunch: $7 \times 0.038 \times 40 \times \frac{1}{2}$	=	5.32
Girder: $7 \times 0.130 \times 40 \times \frac{1}{2}$	=	18.20
SDL : $0.452 \times 7 \times 40 \times \frac{1}{2}$	=	63.28
Σ DL, super Str	=	181.62 K.

b: Abutment:

$2.5 \times 5 \times 49.33 \times 0.15$	= 92.49
$3.83 \times 0.83 \times 40 \times 0.15$	= 19.07
$1.17 \times 2.83 \times 40 \times 0.15$	= 19.87
$1.17 \times 1.83 \times 40 \times 0.15$	= 12.85
$5.17 \times 4.67 \times 3.17 \times 0.15$	= 11.48
$4.17 \times 4.67 \times 3.17 \times 0.15$	= 9.26
Σ DL, sub str.	= 165.02 K

Live Load (Hyd. load)

a. uplift on super structure:

uplift Head: $5.08 + 0.83 + 0.75 = 6.66'$

uplift load $= 6.66 \times 0.064 \times 40 \times 47.33 \times \frac{1}{2} = -403.5$ K

b. Uplift on sub structure:, HWL = 12-5+2 = 14-5

uplift head: $5.08 + 0.83 + 3.83 + 2.5 = 12.24'$

uplift load: $12.24 \times 0.064 \times 49.33 \times 5 = -193.2$ K

Net Uplift: $.75(181.62 + 165.02 - 403.5 - 193.2) = -187.5$ K ← Controls

Capacity of exist. pile: $5 \times 47.8 + 2 \times 47.8 \times \frac{1}{4} = 262 > 187.5$

No additional piles req'd.

PROJECT 17th Street Canal GDM	PAGE 18 OF	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

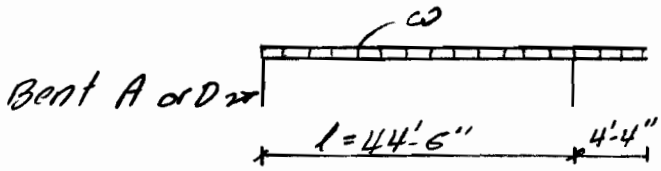
PILE BENT A & D

DL REACTIONS:

a. Superstructure

From end span , 181.62 K

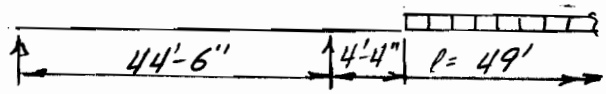
From cant. span.



$R_1 = 0.4953\,\omega l$

Deck: $0.4953(42.14 \times \frac{9}{12} \times 44.5 \times 0.15)$	104.49
Haunch: $7 \times 0.038 \times 44.5 \times 0.4953$	5.86
Girder: $7 \times 0.130 \times 44.5 \times 0.4953$	20.06
SDL: $0.452 \times 7 \times 44.5 \times 0.4953$	69.74

From suspended span



$R_1 = -0.05\,l\omega$

Deck: $42.14 \times \frac{9}{12} \times 0.15 \times 0.05 \times 49$	- 11.61
Haunch: $0.038 \times 7 \times 0.05 \times 49$	- 0.65
Girder: $0.152 \times 7 \times 0.05 \times 49$	- 2.61
SDL: $0.452 \times 7 \times 0.05 \times 49$	- 7.75
Σ DL	= 359.15 K

Add pile cap:

$47.33 \times 3.5 \times 2.5 \times 0.15$	62.12
	421.27 K

PROJECT 17th Street Canal GDM	PAGE 19 OF	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

PILE BENT A&D (Cont.)

LIVE LOAD REACTION.

a uplift load on super structure. (Hyd.)

From Cant. span, (Hyd.)

4.66
6.66 X 0.064 X 47.33 X 44.5 X 0.4953 = -444.65 k -311.12 k

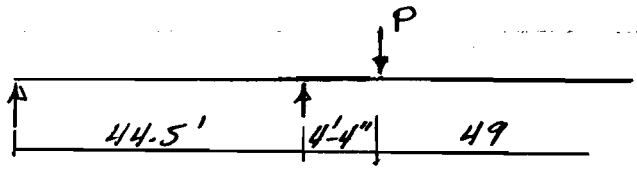
From Susp-span (Hyd.)

4.66
6.66 X 0.064 X 47.33 X 49 X 0.05 = + 49.43 34.59 k

From end span (Hyd.) = - 403.5 -282.3 k

b. Uplift load, truck load.

From suspended span.



R = 0.10 P

Std. truck reaction in suspended span = 58.25 k/truck

For 4 lanes

P = 4 X 58.25 X 0.75 = 174.75 k

uplift, impact = 100%

uplift load = 2 X 174.75 X 0.10 = -34.95 k

-593.78 k

Total uplift = -833.67 k

Pile cap, uplift

47.33 X 3.5 X 2.5 X 0.064 = - 26.50

Net uplift = -860.17 k -620.28 k

PROJECT 17th Street canal GDM	PAGE 20 OF	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

PILE BENT A&D (Cont.)

LIVE LOAD REACTION.

a uplift load on super structure. (Hyd.)

From cant. span, (Hyd.)

$6.66 \times 0.064 \times 47.33 \times 44.5 \times 0.4953 = -444.65^{k}$

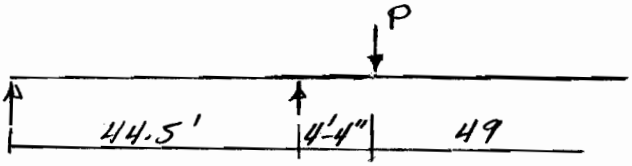
From susp. span (Hyd.)

$6.66 \times 0.064 \times 47.33 \times 49 \times 0.05 = +49.43$

From end span (Hyd.) $= -403.5$

b. uplift load, truck load.

From suspended span.



$R = -0.10P$

Std. truck reaction in suspended span $= 58.25^{k/truck}$

For 4 lanes

$P = 4 \times 58.25 \times 0.75 = 174.75^{k}$

uplift, impact = 100%

uplift load $= 2 \times 174.75 \times 0.10 = -34.95^{k}$

Total uplift $= -833.67^{k}$

Pile cap, uplift

$47.33 \times 3.5 \times 2.5 \times 0.064 = -26.50$

Net uplift $= -860.17^{k}$

COMPUTATION SHEET

PROJECT 17th Street canal GDM	PAGE 21 OF	COMPUTED BY MSD	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

PILE BENT A & D (cont.)

Net Reaction

a. HWL = 12.50 (100 % Case)

$R = 421.27 - 620.28 = -199.01$

b: HWL = 12.50 + 2 = 14.50 (133 % case)

$R = 0.75(421.27 - 860.17) = -329.18^{K}$

↑ controls

Pile capacity = $7 \times 47.8 = 334.6^{K} > 329.18$

No additional piles req'd.

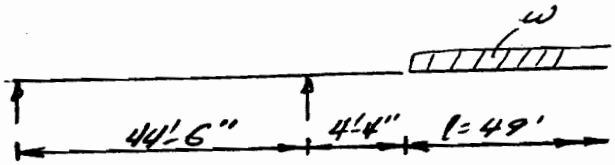
PILE BENT B & C

DL Reactions :

From cant. span

$(104.49+5.86+20.06+69.74)\frac{0.5047}{0.4953}$ = 203.95 K

From Suspended span



$R = 0.5487\,wl$

$-(11.61+0.65+2.61+7.75)\left(\frac{0.5487}{-0.05}\right)$ = 248.21

Pier Cap = 62.12

ΣDL = 514.28

Live Load Reactions

Uplift on super structure (Hyd.), HL/L = 12.5

From cant. span

$\frac{-311.12}{\cancel{444.65}}\left(\frac{0.5047}{0.4953}\right)$ = $\frac{-317.02\ K}{\cancel{-453.09}}$

From suspended span

$\frac{34.59}{\cancel{49.43}}\left(\frac{0.5487}{-0.05}\right)$ = $\frac{-379.59}{\cancel{-542.44}}$

Uplift on Cap = -26.50

Net Reaction = $\frac{\cancel{-507.75}}{-208.83}$

PROJECT 17th Street Canal Bridge	PAGE 23 OF	COMPUTED BY MSD	DATE
SUBJECT Veterans Bridge		CHECKED BY	DATE

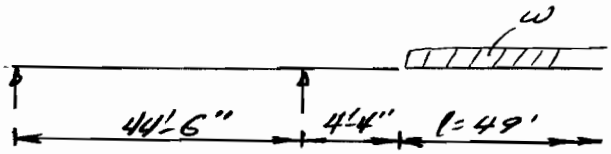
PILE BENT B & C (Cont.)

DL Reactions :

From cant. span

$(104.49+5.86+20.06+69.74)\frac{0.5047}{0.4953}$ = 203.95 K

From Suspended span



$R = 0.5487\,wl$

$-(11.61+0.65+2.61+7.75)\left(\frac{0.5487}{-0.05}\right)$ = 248.21

Pier cap = 62.12

ΣDL = 514.28

Live Load Reactions

Uplift on super structure (Hyd.), HWL = 12-5+2 = 14-5

From Cant. span

$444.65\left(\frac{0.5047}{0.4953}\right)$ = −453.09

From suspended span

$49.43\left(\frac{0.5487}{-0.05}\right)$ = −542.44

Uplift on cap = −26.50

Net Reaction = −507.75

at 100%, Net reaction = 0.75 x (−507.75)

= −380.81 K ← controls

PROJECT 17th St. Canal GDM	PAGE 24 OF	COMPUTED BY	DATE
SUBJECT Veterns Bridge		CHECKED BY	DATE

PILE BENT B & C (CONT.)

Required pile capacity

$$= \frac{380.81}{7}$$

$$= 54.40$$

Exist. pile capacity = $9.7^{K} < 54.40^{K}$

Remove existing piles. Redrive new 20" □ conc., 99' piles,

pile capacity = $\frac{85 \times 2}{3}$

$= 56.67^{K} > 54.4^{K}$ req'd.

17th street Canal
Veterns Highway Bridge

The suspended span of the Vet. highway bridge will be required to anchor ~~against~~ against uplift force due to hyd. load.

If hangers are used then hanger plate will be required to stiffen against buckling ~~condi~~ under uplift load.

If bearings are used then ~~S~~suspended span will be required to anchor ~~agai~~ against uplift of suspended span.

Total uplift load per girder at each end is approx $30^{K} \times 0.75 = 22.5^{K}$ under full ~~uplift~~ Hyd. load to El. 14.50

12/28/87

EXISTING PILE CAPACITY VETS Blvd

Bridge Pile Abutment AND BENT A & PILE BENT D.

20" Square Concrete Piles 39' length
Tip EL -35.0

	Compression	Tension
Q-CASE	132 TONS/pile	59.4 TONS/pile
S-CASE	125 TONS/pile	47.8 TONS/pile

Bridge Piers Pile Berits C and D

20" Square Concrete Piles 37' Length
Tip ELevation -33.0

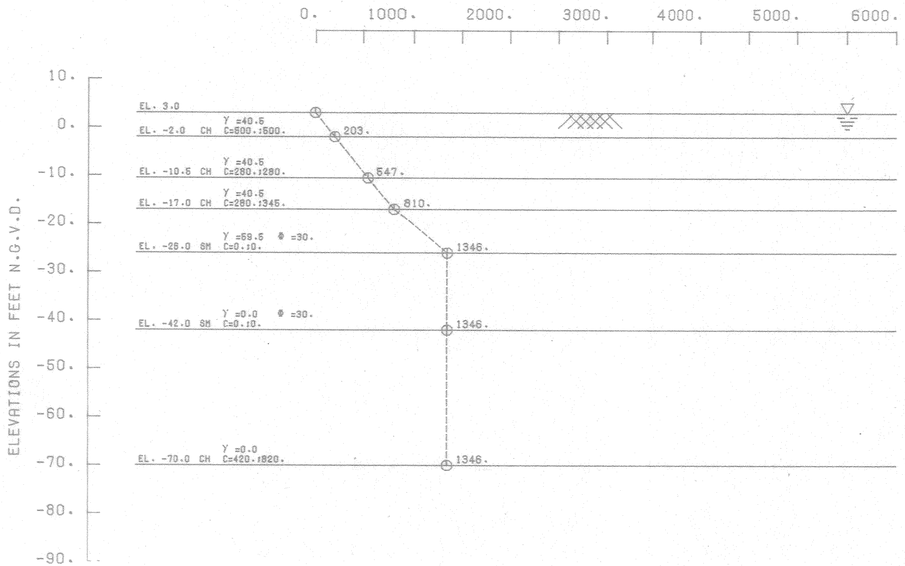
	COMPRESSION	TENSION
S-CASE = Q-CASE	44.0 TONS	9.7 TONS

Sheetpile Cutoff

The existing sheetpile cutoff for the Veterans Bridge EL -17.4 is adequate.

F.S. = 2.0 with Pile Test
F.S. = 3.0 without Pile Test
For Tension pile capacity of existing bridge piles ~~piers~~ a F.S. = 2.0 is OK FJV 10/89
↳ FOR OFFICIAL RESPONSE SEND DF

$\bar{P}_N$ — SOIL PRESSURE — PSF



S-CASE
CH,CL- Φ=23°
ML- Φ=30°
SM,SP- Φ=30°

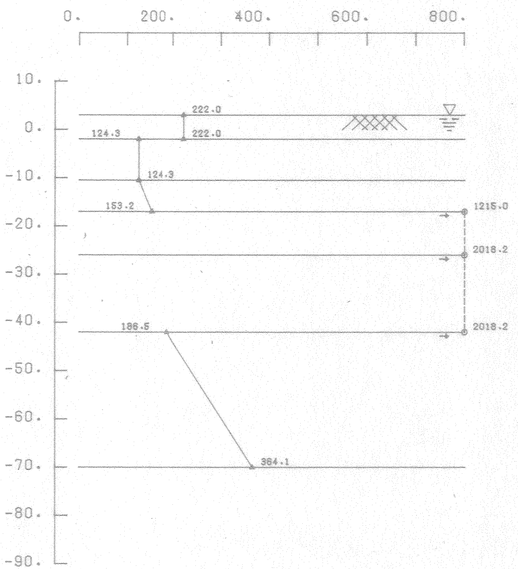
TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE

SHEAR STRENGTH AND WET DENSITIES SEE PLATE

D	PILE SPACING IN DIRECTION OF LOADING
1.00	8B
0.85	7B
0.70	6B
0.55	5B
0.40	4B
0.25	3B
C	LOADING CONDITION
1.00	INITIAL LOADING
0.30	CYCLIC LOADING

K_HB (PSI)



NOTES: $K_H = \alpha K_1/B = (0.2222\ q_u/B)(C)(D)$ COHESIVE

α = 0.4 = Factor of material properties of soil and pile

k_1 = Modulus of subgrade reaction for test plate (pci)

B_1 = Width or diameter of test plate (in)

$K_1 = k_1 B_1 = 80\ q_u$ (psf) = $0.5556\ q_u$ (psi)

$q_u = 2 \cdot c$ = Unconfined compressive strength (psf)

C = Reduction for cyclic loading-not applicable

D = Group effect reduction factor

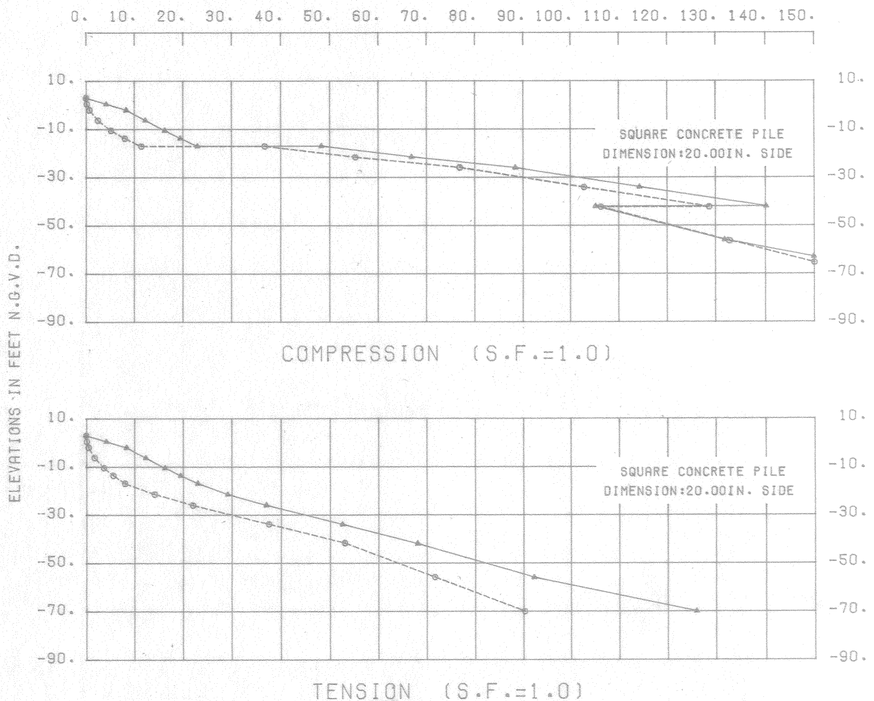
B = Width of pile measured at right angles to the direction of displacement (in)

$K_H = (nh)(Z/B)(C)(D)$ COHESIONLESS

nh = Coefficient of horizontal subgrade reaction (pci)

Z = Depth below equivalent ground surface (in)

ULTIMATE LOAD (TONS)



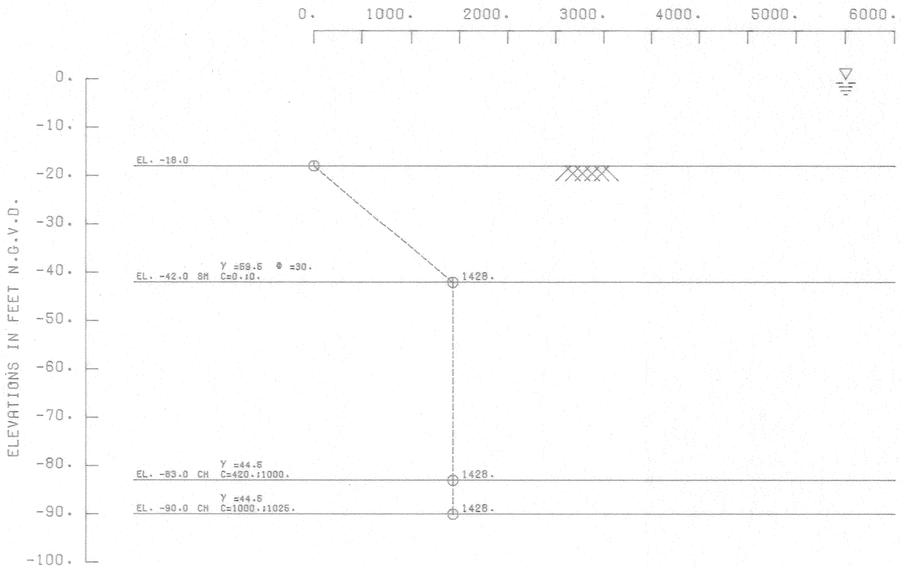
THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE K_h, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX: $K_h = \frac{0.2222\ q_u\ (C)(D)}{(B)}$

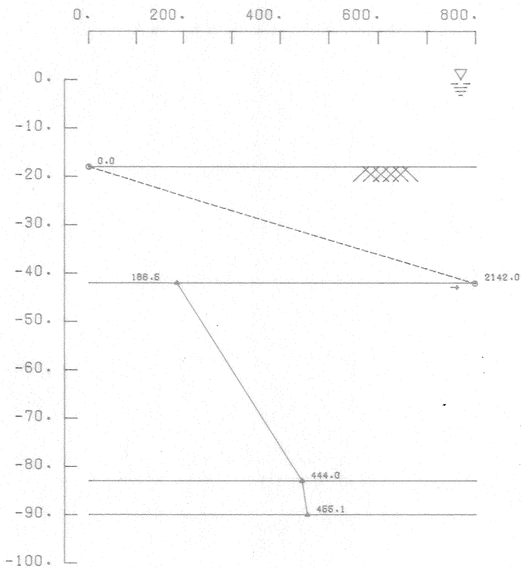
NOTE: ALLOWABLE CAPACITIES SHOULD BE DETERMINED INCORPORATING F.S. = 2.0 WITH PILE TEST OR F.S. = 3.0 WITHOUT PILE TEST.

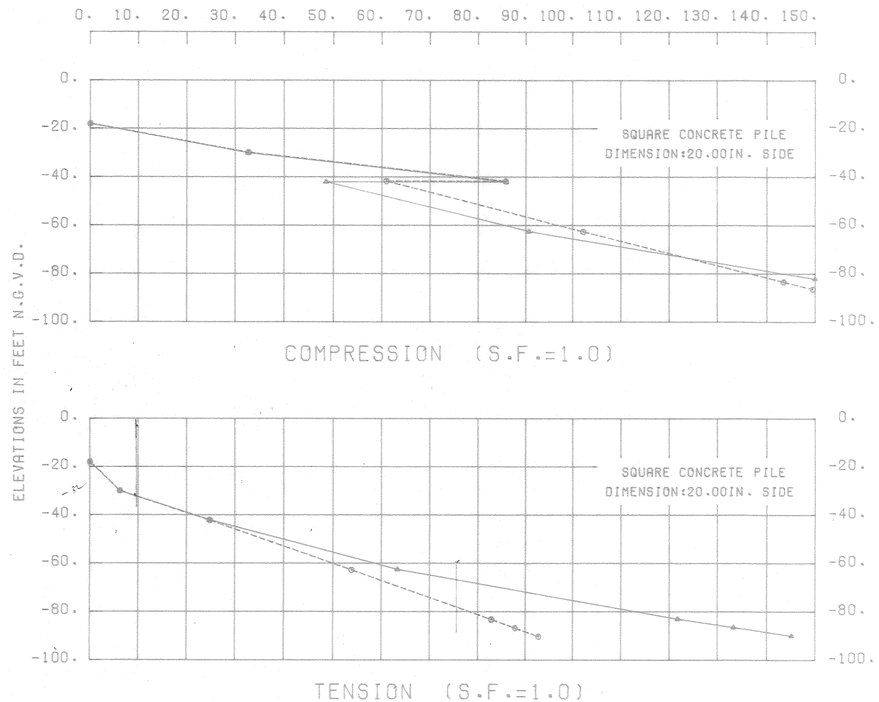
----- S-CASE
——— Q-CASE

LAKE PONTCHARTRAIN, LA. AND VICINITY
HIGH LEVEL PLAN
DESIGN MEMORANDUM NO. 20 GENERAL DESIGN
ORLEANS PARISH - JEFFERSON PARISH
17 TH. STREET OUTFALL CANAL
(METAIRIE RELIEF)
VETERANS BLVD. BRIDGE ABUTMENTS AND INTERIOR BENTS
20" SQ. PRESTRESSED CONCRETE PILES
PILE CAPACITY CURVES
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
DATE: FILE NO. H-2-30300

PLATE 25







S-CASE
CH,CL- Φ=23°
ML- Φ=~~28°~~ 30°
SM,SP- Φ=30°

TYPICAL SOIL PROFILE

SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE

SHEAR STRENGTH AND WET DENSITIES SEE PLATE

D	PILE SPACING IN DIRECTION OF LOADING
1.00	8B
0.85	7B
0.70	6B
0.55	5B
0.40	4B
0.25	3B

C	LOADING CONDITION
1.00	INITIAL LOADING
0.30	CYCLIC LOADING

NOTES: $K_H = \alpha K_1/B = (0.2222\,q_u/B)(C)(D)$ COHESIVE

α = 0.4 = Factor of material properties of soil and pile

k_1 = Modulus of subgrade reaction for test plate (pci)

B_1 = Width or diameter of test plate (in)

$K_1 = k_1 B_1 = 80\,q_u$ (psf) = 0.5556 q_u (psi)

$q_u = 2 \cdot c$ = Unconfined compressive strength (psf)

C = Reduction for cyclic loading-not applicable

D = Group effect reduction factor

B = Width of pile measured at right angles to the direction of displacement (in)

$K_H = (nh)(Z/B)(C)(D)$ COHESIONLESS

nh = Coefficient of horizontal subgrade reaction (pci)

Z = Depth below equivalent ground surface (in)

THE FACTOR SHOWN, (MODULUS OF HORIZONTAL SUBGRADE K_h, TIMES THE PILE WIDTH IN INCHES (B), MEASURED AT RIGHT ANGLES TO THE DIRECTION OF DISPLACEMENT) MUST BE MODIFIED BY A REDUCTION FACTOR FOR THE EFFECT OF GROUP ACTION (D) AND A REDUCTION FACTOR FOR CYCLIC LOADING (C) EX: $K_h = \frac{0.2222\,q_u\,(C)(D)}{(B)}$

– – – – – S-CASE
——— Q-CASE

VETERANS BLVD BRIDGE
PILE BENTS IN CANAL CHANNEL
20" SQUARE CONCRETE
17th St Canal

U.S. ARMY ENGINEER DISTRICT NEW ORLEANS
CORPS OF ENGINEERS OCT 89