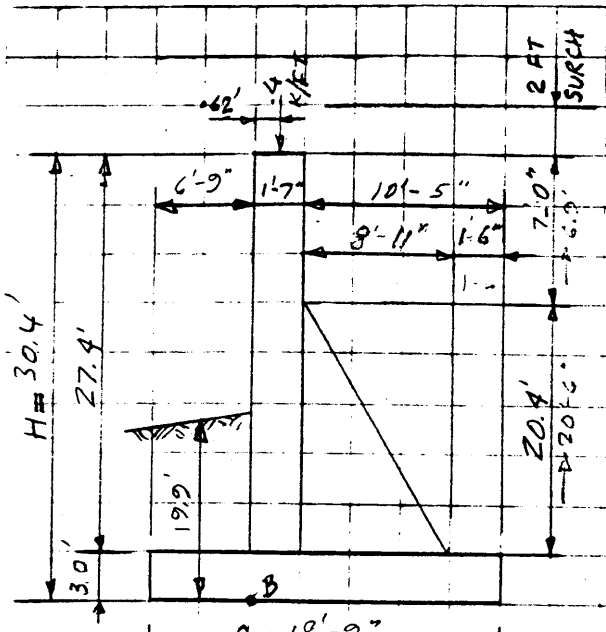
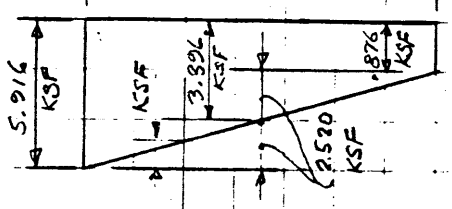
PROJECT BRIDGE MADE BY RJ DATE 10/5/83 198

SUBJECT WING W. WITH COUNTERFORTS. H = 30.4' CHECKED BY ALA DATE

LOCATION: SE WING W — SECM. 2



F(HOR) = .035 H(½H+2')	UNIT WT	FORCE	ARM	MOM (B)
M HOR = .035 H²(⅙H+1')	K/FT³	K/FT	TO 'B'	FTK/FT
HORIZ EARTH PRESS		18.30		-196.2
REQ WT = (1.5/.55) F HOR		49.91		
GRAVITY LOADS - DURING CONSTRUCTION				
FTG 18'-9" × 3'-0	.15	8.44	2.62	22.1
STEM 19" × 27.4'	.15	6.51	9½" = .79'	5.2
NJ BARRIER		.40	.62'	0.2
BACKFILL 10'-5" × 27.4	.12	34.25	6.79	232.6
COUNTERFORTS:				
2 × ½ × 19" × 8'-11" × 20.4'/22'	.03	0.39	4.56	1.8
TOTAL		49.99		261.9
ADD FILL OVER TOE				
6'-9" × 16.9'	.12	13.69	-3.37	-46.2
TOTAL INCL. EARTH PRESS MOM		63.68		19.5



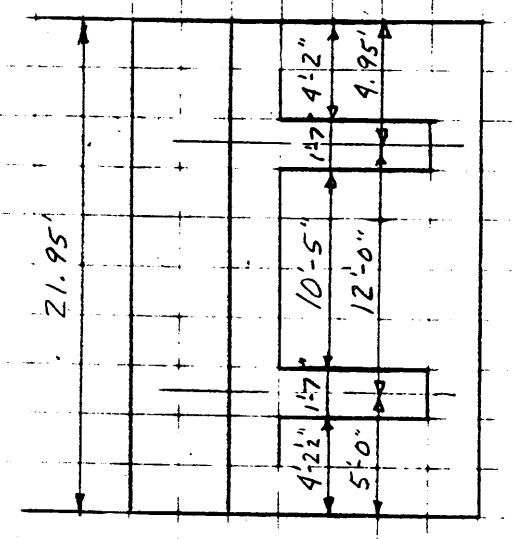
FOUNDATION PRESSURE

$E = (1/2)(18'-9") - (6'-9") - 19.5/63.68 = 2.319$

AV PRESS $p = 63.68/18'-9" = 3.396$

$\Delta p = p \times 6E/B = 2.520$

$p_{MAX} = 5.916$ $p_{MIN} = 0.876$



SHEAR IN HEEL (BUREC FIG. 1)

a = b =

a/b = COEF =

p = LB/FT

V = COEF × p × b =

[AASHTO (5-13)] $V_c = 125\% \times (.8 + 2 \times \quad) \sqrt{3000} =$

T(REQ) = V/(12 V_c) + 3.7" =

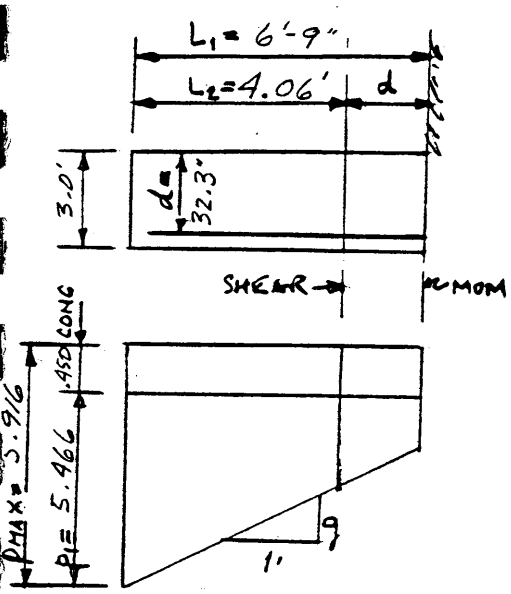
BRIDGE

RET. WALLS WITH COUNTERFORTS H = 30.4

LOCATION: S.E. WINGWALL SEG. 2

Rz NOV. 3, 198

JBM 11/30/83



TOE OF FOOTING

$d = T - 3.7 = 36 - 3.7 = 32.3''$

q = GRADIENT OF FTG PRESS = $2.520^{KSF} / 18.75/2 = 0.269$

SHEAR = V

$V = (p_1 - \frac{1}{2} q L_2) * L_2 = 19.97^{K/FT}$

$v = V/(12'' * d) = .0515 = 51.5^{PSI} <$ 52 PSI

MOMENT M

$M = L_1^2 (\frac{1}{2} p_1 - \frac{1}{6} q L_1) = 110.73$

TAKE $jd = (0.97)(32.3'') = 2.61'$

$A_{EST} = (M/jd)/24.KSI = 1.77 in^2$

$\rho = \frac{A_s}{bd} = 1.77/(12")(32.3") = .0046$

$\therefore j = 0.92$

$A_{REQ'D} = \frac{110.73}{(.92)(32.3'')(1/12'')} / 24^{KSI} = 1.86 in^2$

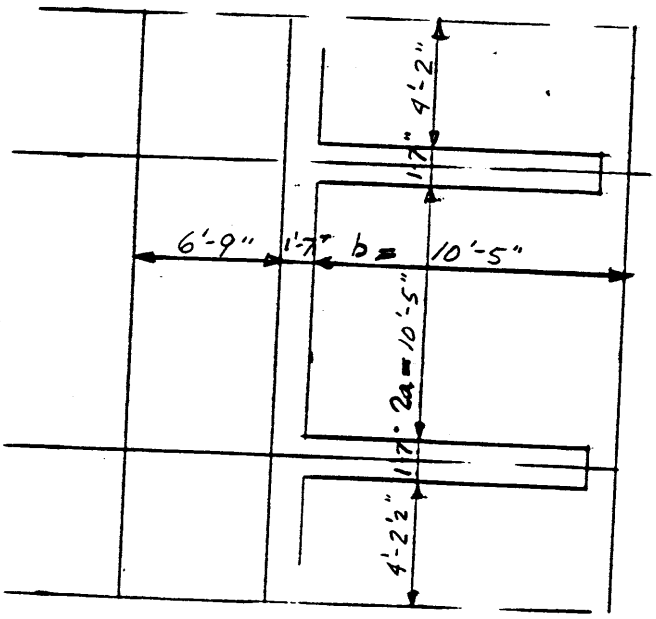
BRIDGE

Rz OCT. 27, 198

WITH COUNTERFORTS H = 30.4' JBM 11/30/83

LOCATION S.E. WING WALL SEGMENT 2

HEEL



$p = 27.4' \times .12^{K/FT^3} + 3.0^{FT} \times .15^{K/FT^3} = 3.74^{K/FT^2}$

$pb = (3.29 + 0.45)\,10.42' = 38.97^{K/FT}$

2 FREE EDGES (BUREC FIG. 27)

$a =$

$b =$

$a/b = 1/\beta =$

$pb =$

pb^2

	LONGIT. (X)	TRANSV (Y)
SHEAR		
COEF		
$V = COEF \times pb$		
$v = V/(12'' \times \quad)$		
jd		
MOM COEF		
$M = COEF \times pb^2$		
$A = (M/jd)/30\ KSI$		

1 FREE EDGE (BUREC FIG. 1)

$2a = 10.42'$ $b = 10.42$

$a/b = 1/\beta = 0.5$

$pb = 38.97^{K/FT}$ $pb^2 = 406.07^{K}$

	LONGITUDINAL (X)		TRANSVERSE (Y)	
	TOP BARS	BOT. BARS	TOP BARS	BOT. BARS
jd	2.48	2.48	2.48	2.48
MOM COEF	.0852	.0432	.0534	.0135
$M = COEF \times pb^2$	34.60	17.54	21.68	5.48
$A = (M/jd)/30\ KSI$	0.47	0.24	0.29	0.074

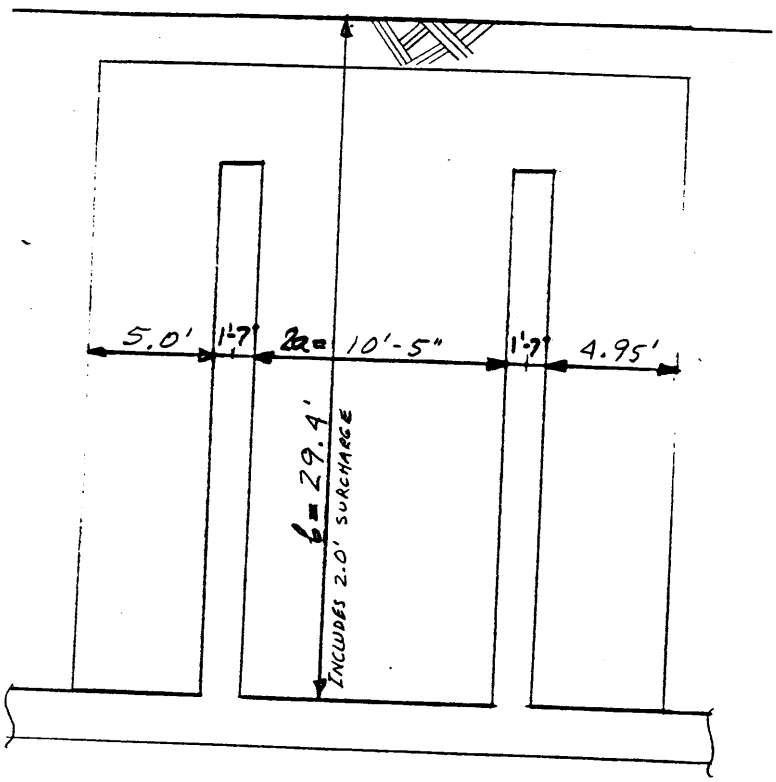
BRIDGE

WITH COUNTERFORTS ~~H~~ = 30.4'

Ky OCT. 27, 1983

JBM 11/30/83

LOCATION: SOUTH EAST WING WALL SEG. 2



WALLS 19" THK

$p = .035^{K/FT^3} \times 29.4' = 1.029^{K/FT^2}$

$b = 29.4'$

$pb = 30.25^{K/FT}$

$pb^2 = 889.35^{K}$

2 FREE EDGES (BUREC FIG. 30)

$a =$ $a/b = 1/\beta =$

	HORIZ (X)	VERT (Y)
jd		
MOM COEF		
$M = COEF \times pb^2$		
$A = (M/jd)/24KSI$		

EDGES (BUREC FIG. 4)

$a = 5.21$

$b = 29.40$

$a/b = 1/\beta = 0.177$

	HORIZONTAL (X)		VERTICAL (Y)	
	I.F	O.F	I.F	O.F
jd	(0.94)(16") = 1.25'	(0.94)(15") = 1.17'	(0.94)(16.6") = 1.30'	(0.94)(15.6") = 1.22'
MOM COEF	.0070	.0035	.0062	.0016
$M = COEF \times pb^2$	6.22	3.11	5.51	1.42
$A = (M/jd)/24KSI$	0.21	0.11	0.18	0.05

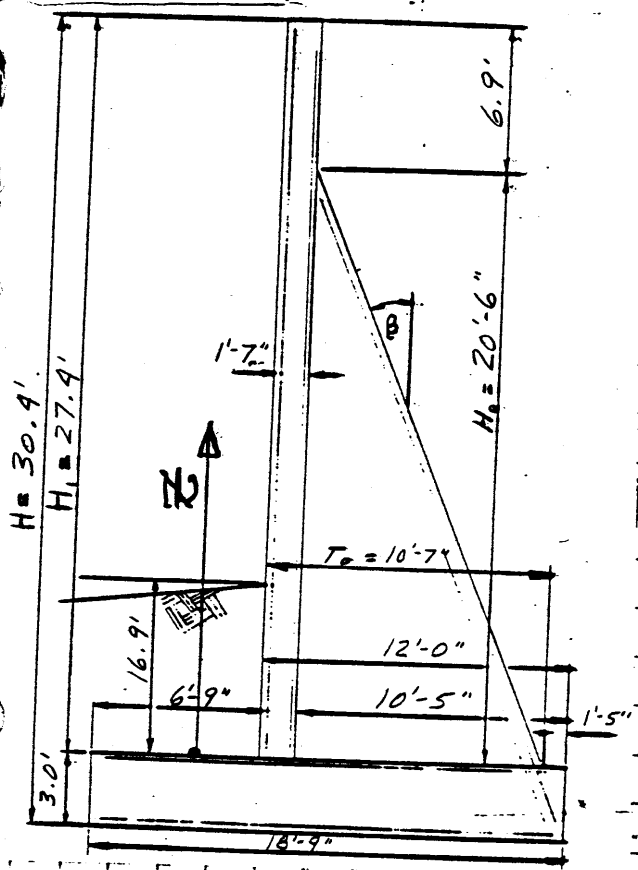
PROJECT

MADE BY RJ DATE NOV. 3, 1983

SUBJECT WING WALL W/COUNTERFORTS H = 30.4

CHECKED BY JBM DATE 11/30/83

LOCATION SOUTH EAST WINGWALL SEG. 2



COUNTERFORT $T_o \times H_o$ = 10'-7" x 20'-6"

TRIB. WIDTH: B = 12'-0"

DEPTH OF CTRF. T = 10.58 − .439 Z

COS β = .916

MOM = .035 B × $(H_1 - Z)^2$ [$(H_1 - Z)/6$ + 1'] =

d = T − 8"

d ≈ .96

SHEAR

NOM. TENSION (Z = 0) = M_o/d_o = $\frac{1755.3}{10.05}$ = 174.6

DITTO (Z = 1'-0") = M_1/d_1 = $\frac{1580.7}{9.63}$ = 164.1

v = ΔT/(12 × 19) = 0.046

MOMENT

Z	T	d	jd	A_{min}	M	A = (M/jd)/24 ksi		LAP	LAP × COS β
11.0'	5.75	5.08	4.88		422	3.60	USE 6 #7 (3.61)		
6.0'	7.95'	7.28'	6.99		879	5.24	USE 4 #9 & 2 #7 (5.20)	45"	42"
0'-0"	10.58'	10.05	9.65		1755.3	7.58	USE 6 #10 (7.59)	74	67"