9969828

S C

9969828

Trade

B

Street Number

2445

Street Dir

Document Date

Suite

10/8/99

Street Name

FONTAINE

Street Type

RD

Tract Number

Address Key

203502

Doc Type

PL

Sub Doc Type

BL

Permit Key

784435

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Initials				
Date				

BIGGS CARDOSA
ASSOCIATES INC
STRUCTURAL ENGINEERS

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SUPPLEMENTAL STRUCTURAL CALCULATIONS

FOR

CHUCK E. CHEESE'S

2445 FONTAINE ROAD
SAN JOSE, CALIFORNIA

Received
AUG 26 1999
Kutzmann & Assoc.
9969828

AUGUST 1999

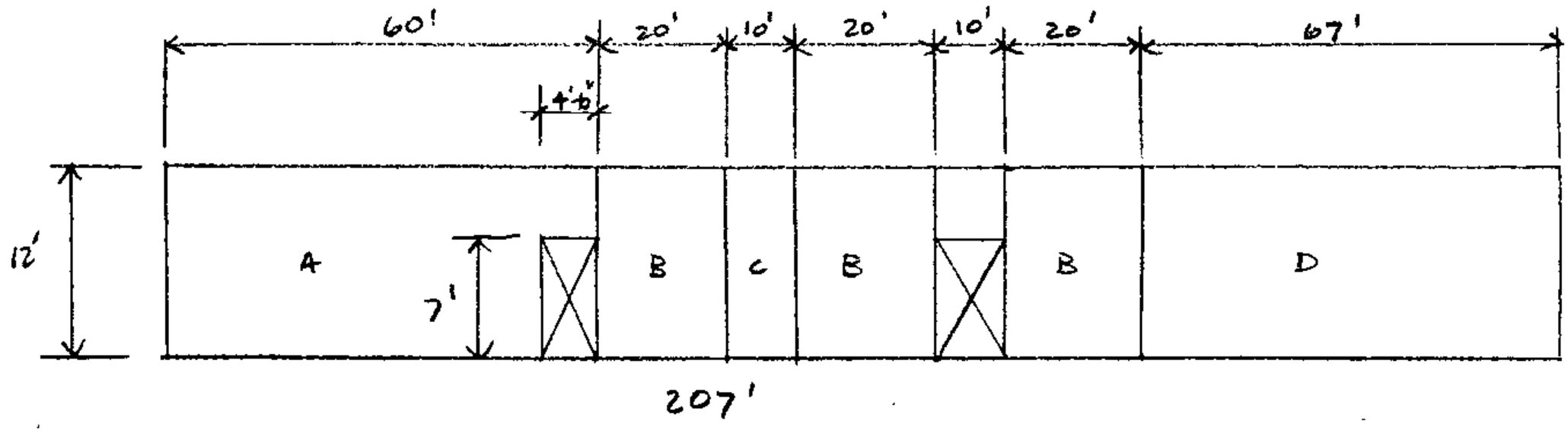
BCR

BY ELM DATE 8/23/99 SUBJECT CHUCK E. CHEESE SHEET NO. 1 OF 8
CHKD. BY _____ DATE _____ JOB NO. 99147

SUPPLEMENTAL CALCULATION #1

EVALUATE CMU WALL PIERS -

(E) WEST ELEVATION



FROM REINFORCED MASONRY ENGINEERING HANDBOOK 5th EDITION TABLE T-1

PIER A

TOTAL $\frac{h}{d} = \frac{12}{60} = 0.2$ $R_c = 15.823$ $\Delta = 0.063$

− BOTTOM $\frac{h}{d} = \frac{7}{60} = 0.117$ $-\Delta = 0.035$

+ BOTTPIER $\frac{h}{d} = \frac{7}{55.5} = 0.126$ $+\Delta = 0.038$

$\Sigma\Delta = 0.066$

$R = \frac{1}{\Sigma\Delta} = 15.15$

PIER B

TOTAL $\frac{h}{d} = \frac{12}{20} = 0.6$ $R = 3.754$

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PIER C

TOTAL $\frac{h}{d} = \frac{12}{10} = 1.2$ $R = 0.951$

PIER D

TOTAL $\frac{h}{d} = \frac{12}{67} = 0.18$ $R = 17.75$

(E) WALL LINE $\Sigma R = \underline{45.1}$

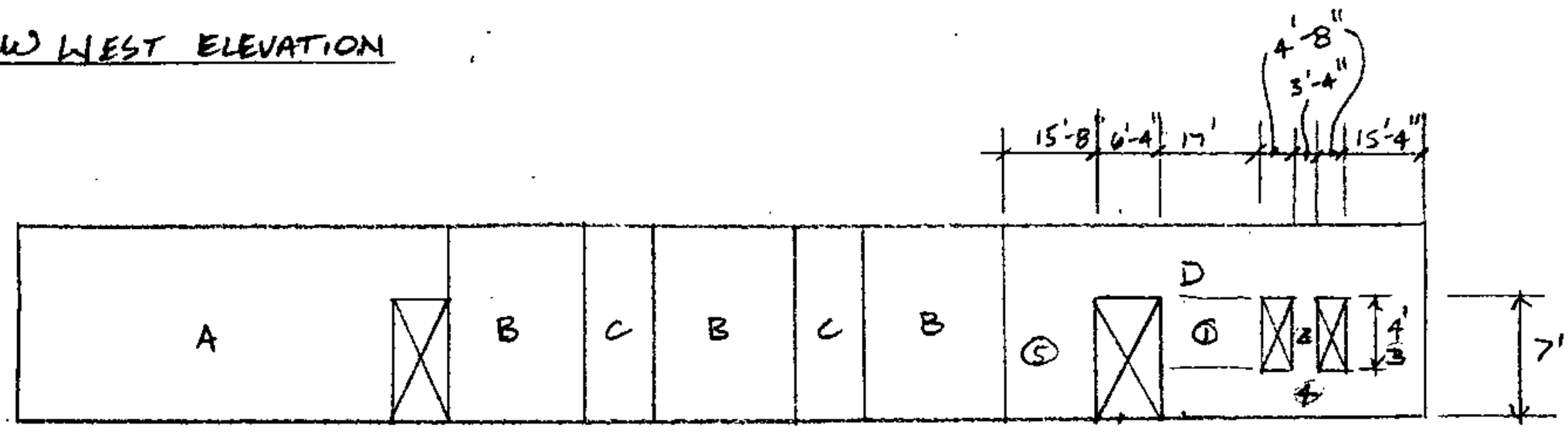
REGISTERED PROFESSIONAL ENGINEER KATHLEEN A. DILLON No. S 3668 Exp. 12-31-00 STRUCTURAL STATE OF CALIFORNIA

BIGGS CARDOSA ASSOCIATES INC.

BY ELM DATE 8/23/99 SUBJECT CHUCK E. CHEESE'S SHEET NO. 2 OF 8

CHKD. BY _____ DATE _____ JOB NO. 99147

NEW WEST ELEVATION



PIER A R = 15.15

PIER B R = 3.754

PIER C R = 0.915

PIER D

TOTAL $\frac{h}{d} = 0.18$ R = 17.752 $\Delta = 0.056$

− BOTTOM $\frac{h}{d} = \frac{7}{67} = 0.104$ $-\Delta = 0.031$

0.025

+① $\frac{h}{d} = \frac{4}{17} = 0.235$ R = 13.93

+② $\frac{h}{d} = \frac{4}{3.33} = 1.20$ R = 1.877

+③ $\frac{h}{d} = \frac{4}{15.33} = 0.261$ R = 12.49

ΣR = 28.3 $+\Delta = 0.035$

+④ $\frac{h}{d} = \frac{3}{45} = 0.067$ $+\Delta = 0.020$

0.055 R = 18.18

⑤ $\frac{h}{d} = \frac{7}{15.67} = 0.447$ R = 6.99

ΣR = 25.17

$\Delta = 0.025 + 0.0397 = 0.0647$ $\Delta_{BOT} = 0.0397$

R = 15.46

WALL LINE ΣR = 43.7

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WEST ELEVATION

ASSUME 10K UNIT LOAD TO WALL

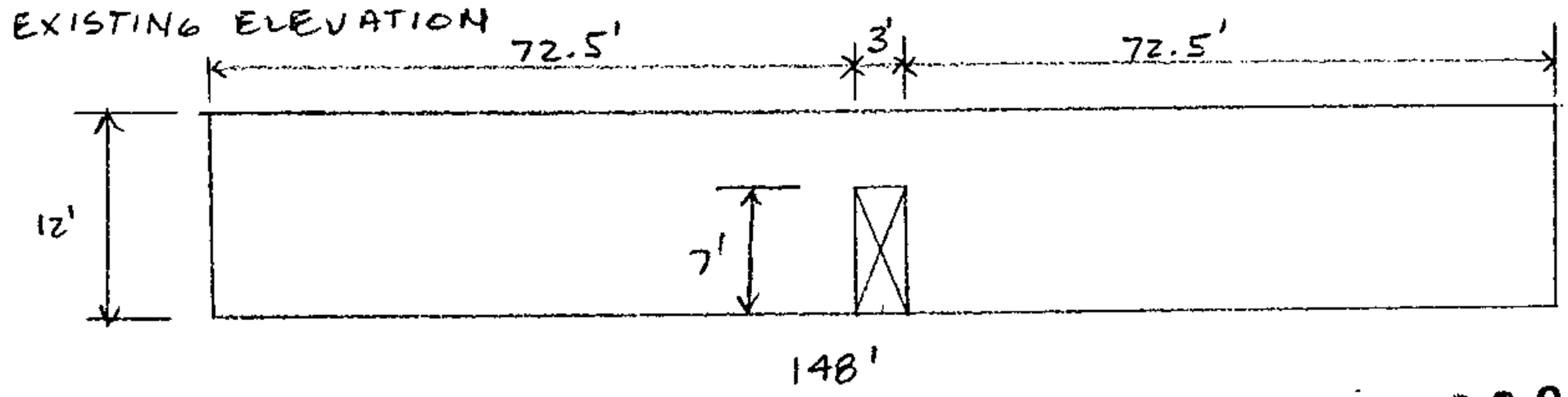
LOAD TO PIERS

	(E) WALL PIERS	NEW	% INCREASE
PIER A	$10k\left(\frac{15.823}{45.1}\right) = 3.51k$	$10k\left(\frac{15.823}{43.7}\right) = 3.62k$	3.2%
PIER B	$10k\left(\frac{3.754}{45.1}\right) = 0.83k$	$10k\left(\frac{3.754}{43.7}\right) = 0.86$	3.2%
PIER C	$10k\left(\frac{0.951}{45.1}\right) = 0.211k$	$10k\left(\frac{0.951}{43.7}\right) = 0.217$	3.2%
PIER D	$10k\left(\frac{17.75}{45.1}\right) = 3.94k$	$10k\left(\frac{15.46}{43.7}\right) = 3.54k$	-10.1% REDUCTION

INCREASE LOAD TO PIERS = 3.2%
(E) WALL OK BY INSPECTION

EAST ELEVATION

EXISTING ELEVATION



TOTAL

$\frac{h}{d} = \frac{12'}{148'} = 0.081$ $R = 40.75$ $\Delta = 0.0245$

-BOT $\frac{h}{d} = \frac{7}{148} = 0.0473$ $-\Delta = 0.0142$

+PIERS $\frac{h}{d} = \frac{7}{72.5} = 0.0966$ $R = 2(34.4) = 68.8$ $+\Delta = 0.0145$

$\Delta = 0.0248$

$R = 40.32$

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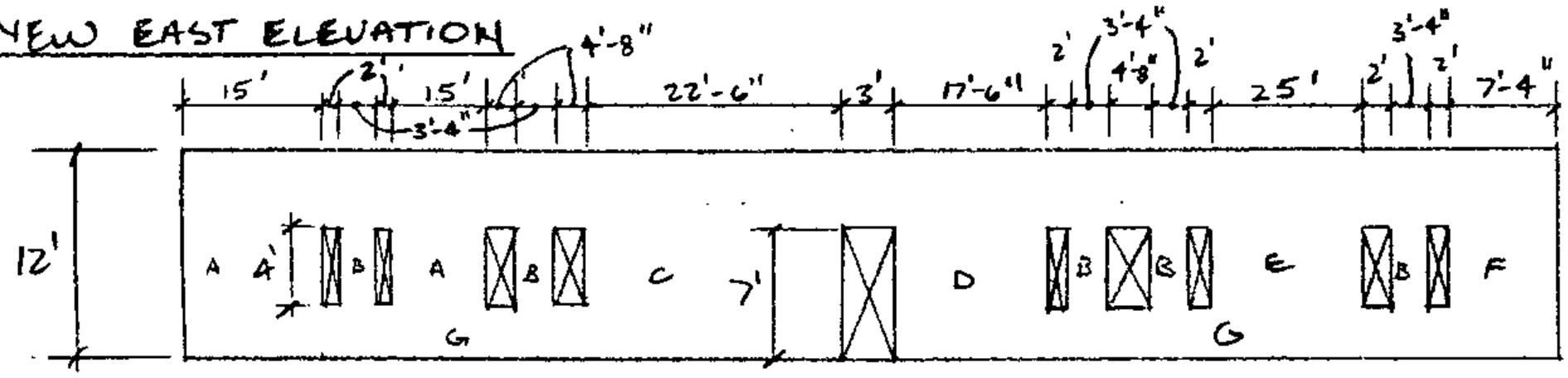
BY ELM DATE 8/23/99 SUBJECT CHUCK E. CHEESE SHEET NO. 4 OF 8

CHKD. BY _____ DATE _____ JOB NO. 99147

NEW EAST ELEVATION



TOTAL $\Delta = 0.0245$

- BOT $-\Delta = 0.0142$

0.0103

A $h/d = 0.267$ $R = 12.20$

B $h/d = 1.20$ $R = 1.877$

C $h/d = 0.178$ $R = 18.54$

D $h/d = 0.229$ $R = 14.31$

E $h/d = 0.16$ $R = 20.657$

F $h/d = 0.545$ $R = 5.57$

G $h/d = 0.041$ $R = 81.26$

$2R_A + 2R_B + R_C = 46.69$ $\Delta = 0.0214$

$\Delta_G = 0.0123$

0.0337 $R = 29.65$

$R_D + 3R_B + R_E + R_F = 46.17$ $\Delta = 0.02166$

$\Delta_G = 0.0123$

0.0340 $R = 29.44$

$$\Delta_{BOT} = \frac{1}{29.65 + 29.44} = 0.0169$$

$$\Sigma \Delta = 0.0103 + 0.0169 = 0.0272$$

$$R = \underline{\underline{36.74}}$$

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EAST ELEVATION

ASSUME 10 K LOAD TO WALL

(E) WALL $\frac{10K}{2 \text{ piers}} \times \frac{1}{72.5} = 69$ plf

LOAD TO LEFT SIDE $= 10K\left(\frac{46.69}{92.86}\right) = 5.028K$

" RIGHT SIDE $= 10K\left(\frac{46.17}{92.86}\right) = 4.972K$

PIER	LOAD TO PIER	PLF	% INCREASE
A	$5.028\left(\frac{12.20}{46.69}\right) = 1.314k$	87.6	21%
B	$5.028\left(\frac{1.877}{46.69}\right) = 0.202k$	60.6	✓OK
C	$5.028\left(\frac{18.54}{46.69}\right) = 2.00k$	88.7	22%
D	$4.972\left(\frac{14.31}{46.17}\right) = 1.54$	88.1	22%
E	$4.972\left(\frac{20.657}{46.17}\right) = 2.22$	89.0	22.5%
F	$4.972\left(\frac{5.57}{46.17}\right) = 0.66$	81.8	15.6%

22% N.G. EVALUATE STRESSES

BUILDING WEIGHTS

ROOF DL = 13.5 PSF
FLOOR DL = 18.0 PSF

FLOOR AREAS PER ORIGINAL DRAWINGS

ROOF 15690 SF
3RD & 2ND 4370 SF
Length WALL 650 ft

DL ROOF 15690 (13.5 PSF) = 211.8 k
3RD 4370 (15.0 PSF) = 65.6
2ND 4370 (15.0 PSF) = 65.6
WALL 650 (32.67'-6')(50) = 866.8
1210 K

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SEISMIC FACTOR

SOIL TYPE S_D (ASSUME - CONSERVATIVE)
SOURCE TYPE B HAYWARD FAULT SE EXTENSION
DIST. ≈ 6 km

$N_A = 1.0$ $R = 4.5$ MASONRY SHEARWALLS
$N_V = 1.2$ $T = 0.02(h_n)^{3/4} = 0.273$
$C_a = 0.44 N_a = 0.44$
$C_v = 0.64 N_v = 0.768$ $I = 1.0$ $Z = 0.4$

$V = \frac{C_v I}{R T} W = 0.625 W$ (30-4)

$V_{MAX} = \frac{2.5 C_a I}{R} W = 0.244 W$ (30-5) ← CONTROLS DESIGN VALUE

$V_{MIN} = 0.11 C_a I W = 0.048 W$ (30-6)

$V_{MIN} = \frac{0.8 Z N_v I}{R} W = 0.085$ (30-7)

$V_{BASE} = 0.244 (1210 k) = 295.2 k$

ASSUME EAST WALL TAKES ½ V_{BASE} = 147.6 k

CHECK PIER E (WORST CASE)

LOAD TO PIER E = $147.6 \left(\frac{20.657}{92.86}\right) = 32.83$ k

LOAD PER 32" = 3.50 k

SHEAR AREA = 7.25 (7.63) + [(32 - 7.25) 1.25 × 2]
= 117.2 [illegible]

$f_v = \frac{3.50}{117.2} = 29.9$ PSI

$\lambda = 25' - (4") = 24.67'$

$M = 32.83 (2') = 65.7$ K-FT

$M/Vd = 0.081 < 1$

$F_{V_M} = \frac{1}{2}\left(\frac{1}{3}\right)\left(4 - \frac{M}{Vd}\right)\sqrt{1350} = 23.5$ PSI MASONRY ONLY

$F_{V_M} = \frac{1}{2}\left(\frac{1}{2}\right)\left(4 - \frac{M}{Vd}\right)\sqrt{1350} = 35.3$ PSI > 29.9 PSI STEEL TO TAKE ALL SHEAR ✓OK

NOW INSPECTED

$A_{V\,REQ'D} = \frac{s V}{F_s d} = \frac{32" (32.83 k)}{32 ksi (296 in)} = 0.11 in^2 < 0.31 in^2$ ✓OK

PIER B BENDING

LOAD TO PIER B $\quad d = 3'-0" = 36"$

$147.6\left(\frac{1.877}{92.86}\right) = 2.98^k$

$M = 2.98^k(2') = 5.97^{k\text{-}ft}$

$f_b = \frac{M}{b'd^2}\left(\frac{2}{jk}\right) = 105.5^{psi}$

$F_{bm} = 225(1\tfrac{1}{3})^{psi}$ ✓OK

$n = 28.6$

$\rho = \frac{0.31}{117.2} = 2.645E-3$

$k = 0.3206$

$j = 0.893$

$b' = 7.63"\left(\frac{117.2}{32(7.63)}\right) = 3.66"$

partially grouted

$f_s = \frac{M}{A_s jd} = 7.19^{ksi} < 24(1\tfrac{1}{3})^{ksi} = F_s$ ✓OK

1-#5 EA END

(E) CMU WALLS ✓OK
W/ NEW OPENINGS

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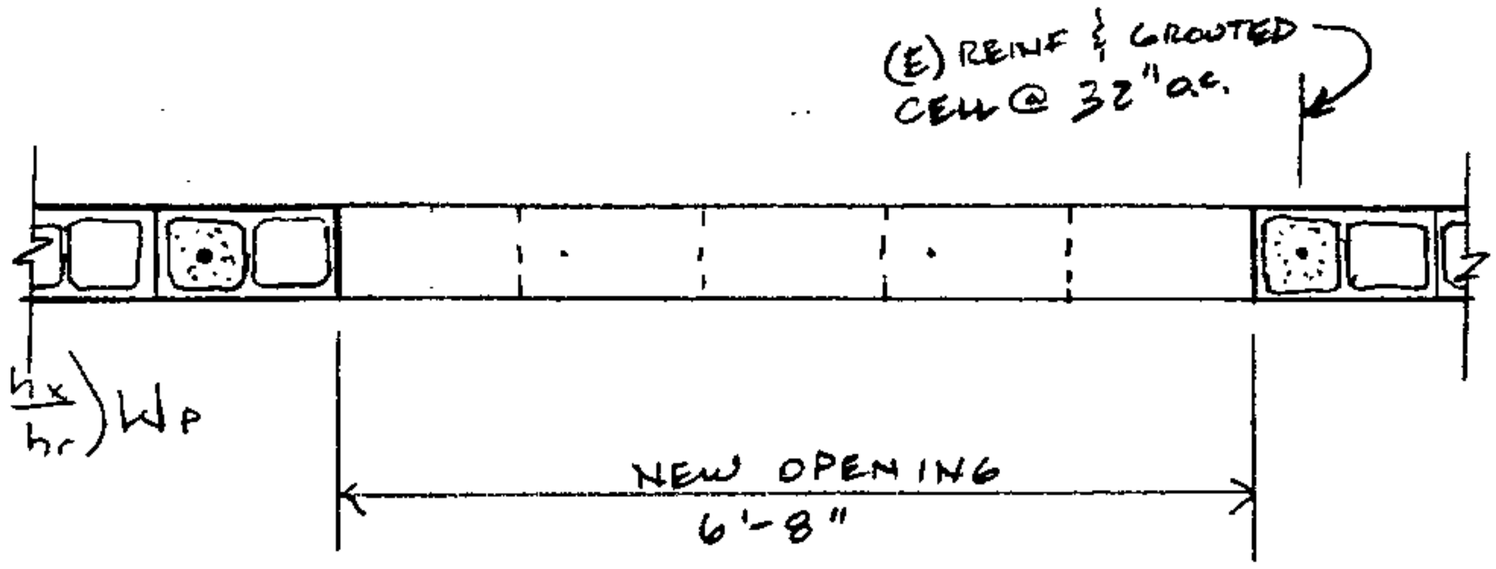
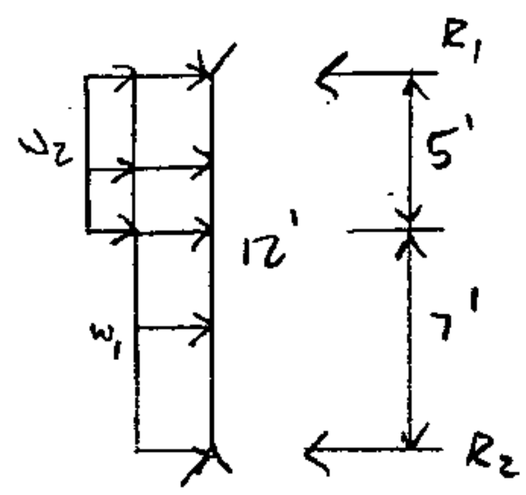
BY ELM DATE 8/23/99 SUBJECT CHUCK E. CHEESE SHEET NO. 8 OF 8
CHKD. BY _____ DATE _____ JOB NO. 99147

CHECK OUT OF PLANE @ NEW DOOR OPENING

SEISMIC FACTOR
$a_p = 1.0$
$R_p = 3.0$
$C_a = 0.44$
$F_p = \frac{a_p C_a I_p}{R_p}\left(1+3\frac{h_x}{h_r}\right)W_p$
$F_p = 0.308\,W_p$



WALL WT. = 50 PSF GROUTED @ 32" OC PER ORIGINAL DWGS



$w_1 = 50\left(\frac{20''}{12''}\right)(.308) = 26$ plf

$w_2 = 50\left(\frac{40''}{12''}\right)(.308) = 51$ plf

$R_1 = \frac{w_2 a}{2l}(2l-a) + \frac{w_1 l}{2} = 358^{\#}$

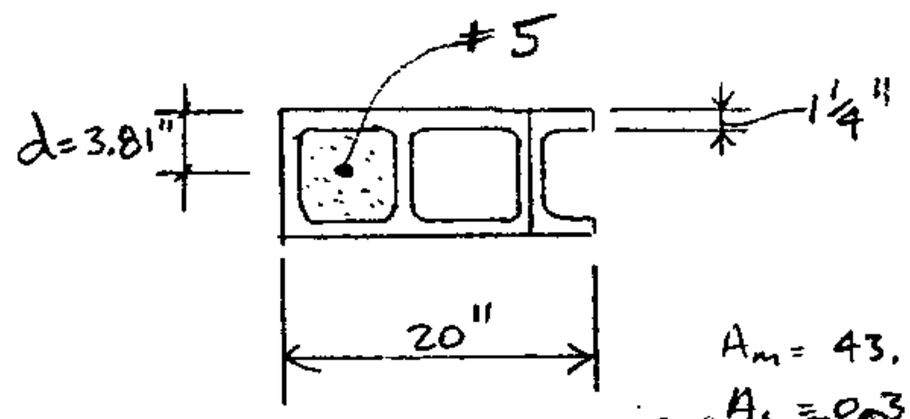
$R_2 = \frac{w_2 a^2}{2l} + \frac{w_1 l}{2} = 209^{\#}$

$\frac{358}{51+26} = 4.65'$ use 5'

$M_{MAX} = R_1(5') - (26+51)\frac{(5')^2}{2}$

$= 828$ ft-lb

CAPACITY –



$f'_m = 1350$ psi

$E_m = 750 f'_m = 1.0125 \times 10^6$

$E_s = 29 \times 10^6$

$n = E_s/E_m = 28.6$

$A_m = 43.4\ in^2$

$A_s = 0.31\ in^2$

$\rho = \frac{A_s}{A_m} = \frac{0.31}{43.4} = 0.00715$

$t_f = 1.25''$

$k = \frac{n\rho + \frac{1}{2}\left(\frac{t_f}{d}\right)^2}{n\rho + \left(\frac{t_f}{d}\right)} = 0.485$ $kd = 1.85'' > t_f = 1.25''$ ∴ T section

$F_m = 225(1\frac{1}{3}) = 300$ psi $F_s = 24$ ksi $(1\frac{1}{3}) = 32$ ksi

$f_{bm} = \frac{2M(12)}{\left[1+\frac{kd-t_f}{kd}\right]\left(d-\frac{t_f}{2}\right)b\,t_f} = 188$ psi ✓OK $f_s = \frac{M(12)}{A_s\left(d-\frac{t_f}{2}\right)} = 10.1$ ksi ✓OK

NO STRENGTHENING REQ'D @ OPENING

BIGGS CARDOSA ASSOCIATES INC.

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BY ELM DATE 9/7/99 SUBJECT CHUCK E. CHEESE SHEET NO. 1 OF 1
CHKD. BY _____ DATE _____ JOB NO. 99147

SUPPLEMENTAL CALCULATION #1

CALCULATION OF REDUNDANCY FACTOR
FOR LOAD TO EAST WALL – REFER TO PGS 4-6 OF PREVIOUS SUBMITTAL

PIER	V TO PIER (relative RIGIDITY)	ℓ_{PIER}	r
A (SHEAR TO WALL LINE)	$147.6\left(\frac{12.20}{92.86}\right) = 19.39^k$ (92.86 = SUM OF RIGIDITIES)	15'	.0438
B	$R_B = 1.877 \rightarrow 2.98^k$	3.33'	.0303
C	$R_C = 18.54 \rightarrow 29.47^k$	22.5'	.0444
D	$R_D = 14.31 \rightarrow 22.75^k$	17.5'	.0440
E	$R_E = 20.66 \rightarrow 32.83^k$	25'	.0445 ← r_{MAX}
F	$R_F = 5.57 \rightarrow 8.85^k$	7.33'	.0409

$$r = \frac{V_{wi}}{V_i}\left(\frac{10}{\ell_{PIER}}\right) \qquad V_i = 295.2^k$$

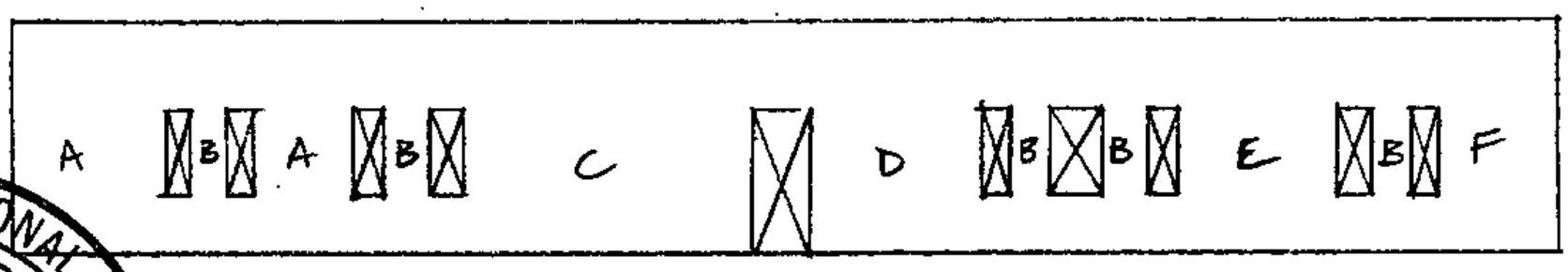
(V_{wi} = shear to pier; V_i = story shear)

$A_B = 15690^{\Phi}$

$$\rho = 2 - \frac{20}{r_{MAX}\sqrt{A_B}} = -1.588 < 1.0 \qquad \boxed{\therefore \rho = 1.0}$$

PREVIOUS WALL CALCULATIONS REMAIN UNCHANGED

EAST ELEVATION



PLAN CHECK APPROVAL
SEP 23 1999
KUTZMANN & ASSOC., INC.
99699828
REGISTERED PROFESSIONAL ENGINEER
KATHLEEN A. DILLON
No. S 3688
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