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 50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylv 05000388
 AUTH. NAME AUTHOR AFFILIATION
 CURTIS, N. W. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION
 SCHWENCER, A. Licensing Branch 2

SUBJECT: Forwards response to NRC request on masonry walls. Submittal completes action on issue.

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Pennsylvania Power & Light Company

Two North Ninth Street • Allentown, PA 18101 • 215 / 770-5151

Norman W. Curtis
Vice President-Engineering & Construction-Nuclear
215 / 770-5381

July 1, 1982

Mr. A. Schwencer, Chief
Licensing Branch No., 2
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO NRC REQUEST ON MASONRY WALLS
ER 100450 FILE 841-2
PLA-1160

Docket Nos. 50-387
388

Dear Mr. Schwencer:

The attached calculation is submitted in response to a request from Mr. N. Romney. This submittal completes our action on the masonry wall issue.

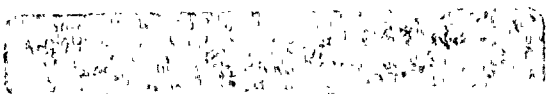
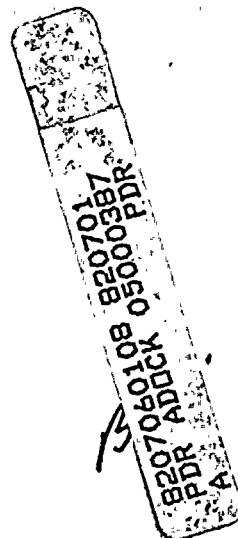
Very truly yours,

N.W. Curtis
Vice President - Engineering & Construction - Nuclear

DPM

Attachment

cc: R.L. Perch - NRC





CALCULATION SHEET

245-c 0

ORIGINATOR MT. G. LOUIE DATE 7-18-81
 PROJECT SSES REACTOR BLDG EL. 719'-1"
 SUBJECT CLASS I BLOCK WALL RE-EVALUATION

CALC. NO. 6.3 REV. NO. 0
 CHECKED 6.3 DATE Aug. 27, 1981
 JOB NO. 8856
 SHEET NO. C-20

PHASE III

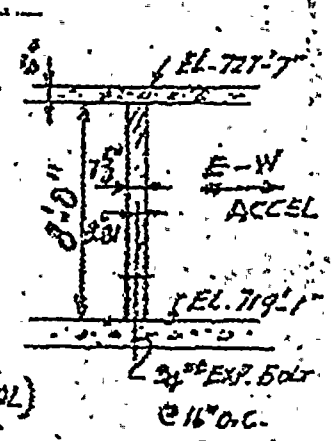
WALL : 8" NON SHIELDING FIREWALL (125#/FT³)

REF. DWG : SECT. G, DWG C-1202, C-179.

WALL DIMEN. : 8'-0" HT x 11'-2 1/2" LG.

REINF. STEEL : #4 @ 16" O.C. VERT., #4 @ 32" D.E. HORIZ.

ATTACHED LOAD : 155 # ACTUAL. (100# @ 1/2 SPAN MORE CRITICAL)



$$f'_{cm} = 1500 \text{ PSI.} \quad E_m = 1000 f'_{cm} = 1.5 \times 10^6 \text{ PSI.} \quad f_s = 24,000 \text{ PSI.} \quad E_s = 30 \times 10^6$$

$$f'_c = 2500 \text{ PSI.} \quad E_c = W \times 33 \sqrt{f'_c} = 125 \times 33 \sqrt{2500} = 2.31 \times 10^6 \text{ PSI.}$$

$$m_i = \frac{E_s}{E_c} = \frac{30 \times 10^6}{2.31 \times 10^6} = 12.99 \quad , \quad m_c = \frac{E_c}{E_m} = \frac{2.31 \times 10^6}{1.5 \times 10^6} = 1.54$$

DETERMINE THE M CAPACITY & MOMENT OF INERTIA, I_L , OF A TRANSFORMED SECT. SPANNING VERTICALLY.

$$\text{WT./FT OF WALL, } W = \frac{125 \times 7.625}{12} = 79.4 \text{ #/ft}$$



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

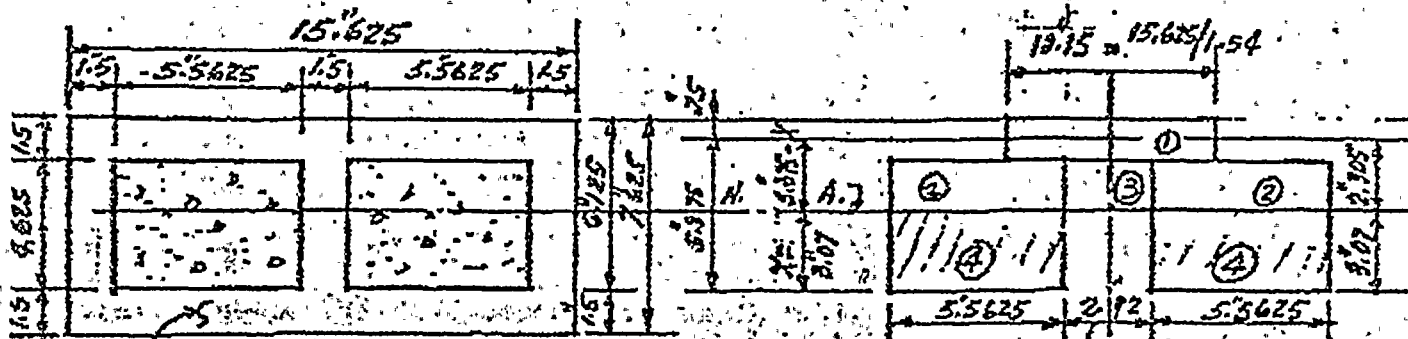


CALCULATION SHEET

24-5-C

ORIGINATOR M. G. LOUIE DATE 7-18-81
 PROJECT SSFS REACTOR BLDG EL. 719-1"
 SUBJECT CLASS I BLOCK WALL RE-EVALUATION

CALC. NO. 24-5-C REV. NO. 0
 CHECKED C.S. DATE Aug. 27, 1981
 JOB NO. 8856
 SHEET NO. C-2



NEGLECT MASONRY IN TENSION AREA.

LOCATE N. A.

8" B.W. - TRANSFORMED UNCRACKED SECT.

COMPRESSION

- (1) $10.15 \times 15 (5.375 - x) = 81.83 - 15.23x$
- (2) $2[5.5625(4.625 - x) \times \frac{1}{2}(4.625 - x)] = 5.5625(4.625 - x)^2 = 118.99 - 51.45x + 5.5625x^2$
- (3) $2.92(4.625 - x) \times \frac{1}{2}(4.625 - x) = 1.46(4.625 - x)^2 = 31.23 - 13.51x + 1.46x^2$
- (4) TENSION $2 \times 5.5625x^2 \times \frac{1}{2} = 5.5625x^2$

$\Sigma M = 0, (1) + (2) + (3) - (4) = 0, 1.46x^2 - 80.19x + 232.05 = 0$ OR

$x^2 - 54.92x + 158.94 = 0, x = 27.46 \pm \sqrt{(27.46)^2 - 158.94} = 27.46 \pm 24.39 = 3.07$

FIND I_x (TRANSFORMED UNCRACKED SECT.)

- (1) $\frac{1}{12} \times 10.15 \times 15^3 + 10.15 \times 15 \times 2.305^2 = 83.74$
- (2) $2 \times 5.5625(4.625 - 3.07)^2 \times \frac{1}{3} = 13.94$
- (3) $2.92(4.625 - 3.07)^2 \times \frac{1}{3} = 3.66$
- (4) $2 \times 5.5625 \times 3.07^2 \times \frac{1}{3} = 107.30$

TOTAL $I_x = 208.64 \text{ in}^4/\text{BLOCK WIDTH}$

$I_x = 208.64 \times \frac{12}{15.625} = 160.24 \text{ in}^4/\text{FT}$

{ SECT. 5-4.1 - SPEC.
 $f_r = 6\sqrt{f'_c} = 6\sqrt{2500}$
 $= 300 \text{ PSI}$
 FOR DETERMINING M
 CAPACITY.

$M_{CR} = \frac{f_r I}{C}$

$M \text{ CAPACITY} :- M_{CR} = \frac{300 \times 160.24}{3.07} = 15,658.6 \text{ OR } \frac{15,658.6}{12,000} = 1.31 \text{ K/FT}$



65 3 1



CALCULATION SHEET

145-C

0

ORIGINATOR: M.G. LOUIE DATE: 7-18-81 CALC. NO. 23 REV. NO. 0
 PROJECT: SSE5 REACTOR BLDG. EL. 719'-1" CHECKED: [Signature] DATE: Aug. 27, 1981
 SUBJECT: CLASS I BLOCK WALL RE-EVALUATION JOB NO. 8856 SHEET NO. C-22

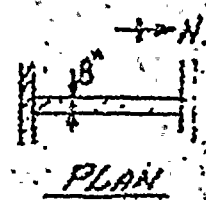
FREQUENCY & ACCELERATION

$$\Delta_{STATK} = \frac{5WL^4}{384E_c I_c} = \frac{5 \times 79.2 \times 8^4 \times \bar{w}^3}{384 \times 2.31 \times 10^6 \times 0.24} = .0198 \text{ IN.}$$

$$f_n = \frac{1}{2\pi} \sqrt{\frac{g}{\Delta_{STATK}}} = \frac{1}{2\pi} \sqrt{\frac{386.4}{.0198}} = 22.2 \text{ Hz.} \rightarrow \begin{matrix} 1.15 f_n = 25.5 \text{ CPS.} \\ .85 f_n = 18.9 \text{ CPS.} \end{matrix}$$

REACTOR BLDG. EL. 727'-7"

HORIZONTAL RESPONSE						PEAK VERTICAL RESPONSE	
TYPE	FREQUEN.	DAMPING	ACCEL.	FIG. NO.	DIRECTION	FIG. NO.	ACCEL.
OBE	19-25.5	2.0%	.20g	BN7-1	N-S	BY7-1	0.62g
SSE	19-25.5	↓	.25g	BN7-2		BY7-2	0.68g
SRV	19-25.5		.10g	BN7-3		BY7-3	0.56g
LOCA	19-25.5		.42g	BN7-4		BY7-4	1.18g
OBE			2.0%	.22g	BE8-1	E-W (ACTUAL)	
SSE		↓	.28g	BE8-2			
SRV			.10g	BE8-3			
LOCA			.36g	BE8-4			



EL. 719'-1"

OBE	19-25.5	2.0%	.25g	BN6-1	N-S	BY6-1	1.85g
SSE		↓	.33g	BN6-2		BY6-2	1.73g
SRV			.08g	BN6-3		BY6-3	0.24g
LOCA			.65g	BN6-4		BY6-4	0.64g
OBE			2.0%	.60g	BE7-1	E-W (ACTUAL)	
SSE		↓	.70g	BE7-2			
SRV			.11g	BE7-3			
LOCA			.83g	BE7-4			

2% DAMPING FOR UNCRACKED SECT.

LOWER FLOOR ACCELERATION CONTROLS - USE.





CALCULATION SHEET

24-c

ORIGINATOR M. G. LOUIE

DATE 7-18-81

CALC. NO. 24-c

REV. NO. 0

PROJECT SSES REACTOR BLDG EL. 719'-1"

CHECKED E.S.

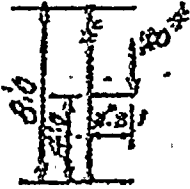
DATE Aug. 21, 1981

PROJECT CLASS I BLOCK WALL RE-EVALUATION

JOB NO. 8856

SHEET NO. C-23

1. LOCAL ANALYSIS LOAD COMBINATION = $D + L + T_o + H_o = D$



$$M_L = 100 \times 11.81 = 1181 \text{ in}^2, \quad \sigma = \frac{MC}{I}, \quad c = 3.81, \quad I = \frac{1}{12} \times 12 \times 7.625^3$$

ASSUME SOLID MASONRY.

$$\sigma = \frac{1181 \times 3.81}{(7.625)^3} = 10.2 \text{ PSI} < 25 \text{ PSI. O.K.}$$

VERT. RESPONSE LOAD COMB. = $D + L + T_o + H_o + E + SRV$

AMPLIFIED ACCEL. $1.5 a_v = 1.5(1.85 + .24)g = 3.14g$

$$M_L = (1 + 3.14) \times 100 \times 11.81 = 4889 \text{ in}^2 \text{ OR } 407 \text{ in}^2 < 1.31 (MCR) \text{ O.K.}$$

$$T = c = \frac{4889}{6} = 815 \text{ in}$$

$$N = \frac{VQ}{I_p t} = \frac{815 \times 10.15 \times 15 \times 2.305}{160.24 \times 12} = 14.9 \text{ PSI} < 25 \text{ PSI O.K.}$$

2. OBE GLOBAL ANALYSIS (NORMAL/SEVERE)

VERT. RESPONSE DUE TO ATTACHED LOADS.

$$M_L = 4889 \text{ in}^2 \text{ OR } 407 \text{ in}^2 \text{ SEE ABOVE.}$$

HORIZ. RESPONSE LOAD COMB. = $D + L + T_o + H_o + E + SRV + D_s$

$$a_h = (E + SRV) = (.60 + .11)g = .71g \rightarrow \begin{cases} W_c = .71 \times 794 = 56.4 \text{ #} \\ W_b = .71 \times 100 = 71 \text{ #} \end{cases}$$

STORY DRIFT

(SNT 9-1) Calc. 24-3-c.

$$\Delta = .0335 \text{ in}, \quad D_s = \frac{3EI_c \Delta}{L^3} = \frac{3 \times 231 \times 10^6 \times 160.24 \times 0.0335}{(66)^3} = 42.0 \text{ #}$$

$$\text{COMBINED } M = \frac{56.4 \times 80^2}{8} + 71 \times \frac{81}{4} + \frac{407}{2} + 42 \times \frac{81}{2} = 965.2 \text{ in}^2 < 1.31 \text{ in}^2 \text{ O.K.}$$

$$R = 56.4 \times 4 + 71 + 407/8 + 42 = 390 \text{ #}$$

$$N = \frac{VQ}{I_p t} = \frac{390 \times 10.15 \times 15 \times 2.305}{160.24 \times 12} = 7.1 \text{ PSI} < 25 \text{ PSI O.K.}$$



CALCULATION SHEET

24-C-0

ORIGINATOR M.G. LOUIE

DATE 7-18-81

CALC. NO.

REV. NO.

PROJECT SSE5 REACTOR BLDG

EL 719'-1"

CHECKED E.S.

DATE Aug 27, 1981

SUBJECT CLASS. BLOCK WALLS RE-EVALUATION

JOB NO. 8056

SHEET NO. C-24

2. OBE GLOBAL ANALYSIS CONT'D

HORIZ. RESPONSE

$$f_t = \frac{MC}{I_c} = \frac{965.2 \times 12 \times 3.07}{160.24} = 222 \text{ PSI} < 300 \text{ PSI O.K.}$$

TENSION IN CONCRETE.

DEFLECTION

$$\Delta_{10} = \frac{5Wl^4}{384EI_c} = \frac{5 \times 56.9 \times 12^4}{384 \times 2.31 \times 10^6 \times 160.24} = .014''$$

$$\Delta_7 = \frac{Fl^3}{48EI} = \frac{71 \times 96^3}{48 \times 2.31 \times 10^6 \times 160.24} = .004''$$

$$\Delta_{10} = .022 \times \frac{Ml^2}{EI} = \frac{.0602 \times 5000 \times 12^2}{2.31 \times 10^6 \times 160.24} = .008''$$

$$\Delta_{10} = \frac{Pl^3}{3EI} = \frac{42 \times 96^3}{3 \times 2.31 \times 10^6 \times 160.24} = .033''$$

$$\text{TOTAL } \Delta = .014 + .004 + .008 + .033 = .059 \text{ IN} < .50 \text{ IN O.K.}$$

3. SSE GLOBAL ANALYSIS (ABNORMAL / EXTREME)

VERT. RESPONSE LOAD COMB. = $D + L_0 + T_0 + H_0 + SEV + LOCA + D_s + E'$

$$\text{AMPLIFIED AXEL. } 1.5Q = 1.5(1.73 + .24 + .64)Q = 3.92Q$$

$$M_2 = (1 + 3.92) 100 \times 11.81 = 5822''\# \text{ OR } 485.2''\#$$

HORIZ. RESPONSE LOAD COMB. = $D + L + T_0 + H_0 + E' + SEV + LOCA + D_s$

$$Q_1 = (DSE + SEV + LOCA) (1.25 \times 70 + .11 + .83)Q = 192Q \rightarrow W_0 = 192 \times 74.6 = 152.0''\#$$

$$F_0 = 192 \times 100 = 192''\#$$

STORY DRIFT

$$\Delta = 0.0396''$$

$$D_s = \frac{3EI\Delta}{L^3} = \frac{3 \times 2.31 \times 10^6 \times 160.24 \times 0.0396}{(96)^3} = 49.7''\#$$

$$\text{COMB. } M' = \frac{152 \times 81}{8} + 192 \times \frac{81}{4} + 485.2 \times \frac{81}{2} + 49.7 \times \frac{81}{2} = 2042''\# \approx 1.31''\# \text{ N.G.}$$

$$R' = 152 \times \frac{81}{2} + 192 + 485.2 \times \frac{81}{8} + 49.7 = 910''\#$$

$$f_t = \frac{VQ}{I_c} = \frac{910 \times 10.15 \times 1.5 \times 2.305}{160.24 \times 12} = 16.6 \text{ PSI} < 25 \text{ PSI.}$$

$$f_t = \frac{MC}{I} = \frac{2042 \times 12 \times 3.07}{160.24} = 469 \text{ PSI} > 300 \text{ PSI N.G.}$$

WALL IS OVERSTRESSED AS UNCRACKED SECT. TRY CRACKED SECT. WITH REINFT. STEEL.



2 11 2 4

63



CALCULATION SHEET

245-C 0

ORIGINATOR M. G. LOUIE

DATE 7-20-81

CALC. NO.

REV. NO.

CHECKED E.S.

DATE

Aug. 27, 1981

PROJECT 5555 REACTOR BLDG

E.L. 719'-1"

JOB NO.

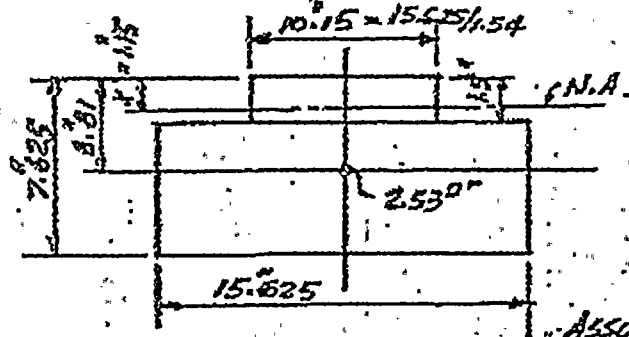
8856

SUBJECT CLASS I BLOCK WALLS RE-EVALUATION

SHEET NO.

C-25

DETERMINE M_{CAP} & I_{CR} OF TRANSFORMED & CRACKED SECT.



FROM SNT #1: $E_s = 30 \times 10^6$, $E_m = 15 \times 10^6$

$E_c = 2.91 \times 10^6$, $m_s = 12.99$

$m_m = 1.54$

$A_s = .20 \times \frac{15.625}{16} = .195 \text{ BLOCK WIDTH.}$

$N \cdot A_s = 12.99 \times .195 = 2.53 \text{ IN}^2$

ASSUME X AT $1/5$ SECT.

$$10.15 \left(\frac{X^2}{2} \right) = 2.53(3.81 - X) = 9.64 - 2.53X, \quad 5.08X + 2.53X - 9.64 = 0$$

$$X^2 - .5X - 1.9 = 0$$

$$X = \frac{.25 \pm \sqrt{(.25)^2 + 1.9}}{1} = \frac{.25 \pm 1.40}{1} = 1.15 \text{ IN.}$$

$$I_{CR} = 10.15 \times 1.15^3 \times \frac{1}{3} + 2.53(3.81 - 1.15)^2 = 5.15 + 17.70 = 23.05 \text{ IN}^4 / \text{BLK WIDTH.}$$

$$I_{CR} = 23.05 \times \frac{12}{15.625} = 17.70 \text{ IN}^4 / \text{FT.}$$

$M_{CAPACITY}$: ALLOW. $f_s = 1.67 \times 24.0 = 40.0 \text{ KSI}$, $f_c = .45 f_c' \times 1.67 = .45 \times 2500 \times 1.67 = 1.88 \text{ KSI}$

CONCRETE $M_{CAP} = \frac{1}{2} \times 1.88 \times 15.625 \times 1.15 \left(3.81 - \frac{1.15}{2} \right) = 57.88 \text{ IN-KIP} / \text{BLK WIDTH.}$

STEEL $M_{CAP} = 40 \times .195 \left(3.81 - \frac{1.15}{2} \right) = 26.73 \text{ IN-KIP} / \text{BLK WIDTH.}$

$$M_{CAP} = \frac{26.73}{12} \times \frac{12}{15.625} = 1.71 \text{ KIP-FT.}$$

$$c = X = 1.15$$

$$d = \frac{c}{2} = \frac{1.15}{2} = .575$$

$$j = 1 - \frac{d}{3} = 1 - \frac{.575}{3} = .809$$

STEP 2

$$I_c = \left(\frac{M_{CR}}{M_n} \right)^3 I_c + \left[1 - \left(\frac{M_{CR}}{M_n} \right)^3 \right] I_{CR}$$

$$= \left(\frac{1.31}{1.60} \right)^3 \cdot 160.24 + \left[1 - \left(\frac{1.31}{1.60} \right)^3 \right] \cdot 17.70$$

$$= 87.95 + 7.99 = 95.94 \text{ IN}^4 / \text{FT.}$$

FROM SNT #2 $I_c = 160.24 \text{ IN}^4 / \text{FT.}$, $M_{CR} = 1.31 \text{ KIP-FT.}$
 $I_{CR} = 17.70 \text{ IN}^4 / \text{FT.}$ - SEE ABOVE
 ASSUME $M_n = 1.6$



Small, illegible markings or text in the top right corner.





CALCULATION SHEET

145-C

CALC. NO. 6

REV. NO. 0

ORIGINATOR M.G. LOUIE

DATE 7-20-81

CHECKED C.S.

DATE

Aug. 27, 1981

PROJECT SSES REACTOR BLDG

EL. 719'-1"

JOB NO. 8856

SUBJECT CLASS I BLOCK WALL RE-EVALUATION

SHEET NO. C-26

STEP 2 CONT'D

FREQUENCY & DEFLECTION

$$\Delta_{STATIC} = 0.088 \times \frac{80.24}{95.94} = 0.034''$$

$$f_m = \frac{1}{2\pi} \sqrt{\frac{g}{\Delta_{static}}} = \frac{1}{2\pi} \sqrt{\frac{386.4}{0.034}} = 17.0 \text{ Hz} \rightarrow \begin{matrix} 1.5f_m = 19.6 \\ 0.5f_m = 14.5 \end{matrix}$$

HORIZONTAL RESPONSE						PEAK VERTICAL RESPONSE	
TYPE	FREQUEN.	DAMPING	ACCEL.	FIG. NO.	DIRECTION	FIG. NO.	ACCEL.
OBE	15-20	4%	.22g	BEB-1		BY7-1	.39g
SSE	15-20	7%	.28g	FEB-2	E-W	FV7-2	.38g
SRV	15-20	4%	.04g	BEB-3		BY7-3	.42g
LOCA	15-20	7%	.06g	FEB-4		FV7-4	.72g

EL. 719'-1"							
TYPE	FREQUEN.	DAMPING	ACCEL.	FIG. NO.	DIRECTION	FIG. NO.	ACCEL.
OBE	15-20	4%	.90g	BE7-1		BY6-1	1.35g
SSE	15-20	7%	.85g	FE7-2	E-W	FV6-2	.86g
SRV	15-20	4%	.15g	BE7-3		BY6-3	.18g
LOCA	15-20	7%	.26g	FE7-4		FV6-4	.30g

USE LOWER FLOOR ACCEL. WHICH IS HIGHER.

1. LOCAL ANALYSIS.

$$M_L = 100 \times 11.81 = 1181 \text{ #ft} \quad f_s = \frac{M}{A_s \cdot d} = \frac{1181}{15 \times 0.97 \times 3.81} = 2297 \text{ #ft}^2$$

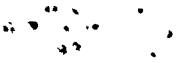
VERT. RESPONSE

$$\text{LOAD COMP.} = D + L + T_0 + H_0 + E + SRV$$

$$\text{AMPLIFIED ACCEL. } 1.5 a_v = 1.5 (1.35 + .18)g = 2.3g$$

$$M_L = (1 + 2.30) \times 100 \times 11.81 = 3897 \text{ #ft}^2 \text{ OR } 325 \text{ #ft}^2 < 1.71 \text{ #ft}^2 \text{ O.K.}$$

$$T = C = 3897/6 = 650 \text{ #}, \quad \sigma = \frac{V}{b \cdot d} = \frac{650}{12 \times 0.97 \times 3.81} = 15.8 \text{ PSI} < 25 \text{ PSI. O.K.}$$





CALCULATION SHEET

215-C

0

ORIGINATOR M.G. LOUIE

DATE 7-20-81

CALC. NO. E-3

REV. NO. 0

PROJECT SSES REACTOR BLDG EL. 719'-1"

JOB NO. 8856

DATE Aug 27, 1981

SUBJECT CLASS I BLOCK WALLS RE-EVALUATION

SHEET NO. C-27

STEP 2 CONT'D

2. OBE GLOBAL ANALYSIS.

VERT. RESPONSE

$$M_2 = 3897 \text{ #} \text{ OR } 325 \text{ #} \text{ SEE ABOVE.}$$

HORIZ. RESPONSE

$$\text{LOAD COMB.} = D + L + T_0 + H_0 + E + SRV + D_2$$

$$Q_h = E + SRV = \dots (.90 + .15)q = 1.05q$$

$$\begin{aligned} & \rightarrow \left\{ \begin{aligned} W_1 &= 1.05 \times 720 = 834 \text{ #/ft} \\ F_0 &= 1.05 \times 100 = 105 \text{ #} \end{aligned} \right. \end{aligned}$$

STORY DRIFT

$$\Delta = .0335 \text{ IN } \quad D_2 = \frac{3EI_0}{L^3} = \frac{3 \times 2.31 \times 10^6 \times 95.94 \times .0335}{(96)^3} = 25.2 \text{ #}$$

$$\text{COMB. } M = \frac{834 \times 80^2}{8} + 105 \times \frac{80}{4} + 325/2 + 25.2 \times 8/2 = 1141 \text{ #ft}$$

$$\begin{aligned} F &= \frac{6k^2}{12000} = .0145 \\ K &= \frac{M}{F} = \frac{1141}{.0145} = 787 \end{aligned}$$

$$R = 834 \times 4 + 105 + 325/8 + 25.2 = 504.4 \text{ #}$$

$$f_s = \frac{M}{A_s j d} = \frac{1141 \times 12}{15 \times 899 \times 3.81} = 26,650 \text{ #/in}^2 \quad \text{NO INCREASE FOR OBE. } 7,24,000 \text{ PSI. N.G.}$$

$$N = \frac{V}{b j d} = \frac{504.4}{12 \times 899 \times 3.81} = 12.3 \text{ PSI} < 25 \text{ PSI. O.K.}$$

$$f_c = 2K/jR = 2 \times 787 / 899 \times 3.02 = 580 \text{ PSI. MAX. COMP. } > 500 \text{ PSI.}$$

$$\text{DEFLECTION: } \Delta_w = \frac{5wL^4}{384EI} = \frac{5 \times 834 \times 8^4 \times 12^3}{384 \times 2.31 \times 10^6 \times 95.94} = .035, \quad \Delta_f = \frac{FL^3}{48EI} = \frac{105 \times 8^3}{48 \times 2.31 \times 10^6 \times 95.94} = .009$$

$$\Delta_{M_2} = .0642 \times \frac{M_2 L^2}{EI} = \frac{3.897 \times 96^2 \times .0642}{2.31 \times 10^6 \times 95.94} = .011, \quad \Delta_{D_2} = \frac{D_2 L^3}{3EI} = \frac{25.2 \times 96^3}{3 \times 2.31 \times 10^6 \times 95.94} = .034$$

$$\text{TOTAL } \Delta = .035 + .011 + .009 + .034 = 0.09 < .50 \text{ O.K.}$$

3. SSE GLOBAL ANALYSIS

VERT. RESPONSE

$$\text{LOAD COMB.} = D + L_0 + T_0 + H_0 + E + SRV + LDCR + D_2$$

$$1.5 Q_y = 1.5 (.86 + .18 + .30)q = 2.01q$$

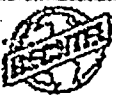
$$M_2 = (1 + 2.01) 100 \times 11.81 = 3555 \text{ #ft} \text{ OR } 296.2 \text{ #ft}$$



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CALCULATION SHEET

14.1.C

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ORIGINATOR M.G. LOUIE

DATE 70-20-81

CALC. NO.

REV. NO.

CHECKED C.S.

DATE

7/27/81

PROJECT 55E5 REACTOR BLDG EL. 719'-1"

JOB NO. 8856

SUBJECT CLASS 1 BLOCK WALLS RE-EVALUATION

SHEET NO. C-2B

STEP 2 CONT'D

3. SSE GLOBAL ANALYSIS. CONT.

HORIZ. RESPONSE LOAD COMB. = $D + L + T_0 + H_0 + E' + SRV + LOCA + D_s$

$$Q_1 = 1.25E' + SRV + LOCA = (1.25 \times .85 + .15 + .26)q = 1.87q \Rightarrow \begin{cases} Q_1 = 1.47 \times 77.4 = 117 \# \\ T_0 = 1.47 \times 100 = 147 \# \end{cases}$$

STORY DRIFT

$$\Delta = 103.3, D_s = \frac{3EI\Delta}{L^3} = \frac{3 \times 2.31 \times 10^6 \times 15.74 \times 0.396}{(96)^3} = 30.0 \#$$

(SEE ABOVE)

$$COMB. M = \frac{117 \times 8}{8} + 147 \times \frac{8}{4} + 296.2 \times \frac{8}{2} + 30.0 \times \frac{8}{2} = 1498 \# < 1.71 \# \text{ O.K.}$$

$$R' = 117 \times 4 + 147 + 296.2/8 + 30.0 = 682 \#$$

$$K = \frac{M}{F} = \frac{1498}{0.135} = 11096$$

$$f_3 = \frac{M}{A_{3jd}} = \frac{1498 \times 12}{15 \times .899 \times 3.81} = 34,988 \text{ PSI. } < 40,000 \text{ PSI. O.K.}$$

$$f_1 = \frac{V}{b_j d} = \frac{682}{12 \times .899 \times 3.81} = 16.6 \text{ PSI } < 25 \text{ PSI O.K.}$$

$$f_c = 2K/j_2 = 2 \times 103.3 / .899 \times 3.02 = 761 \text{ PSI MAX. COMP. } < 835 = 506 \times 1.67$$

DEFLECTION

$$\Delta_m = .043 \times \frac{117}{104} = .048, \Delta_f = .011 \times \frac{167}{131} = .0123$$

$$\Delta_{M_2} = .012 \times \frac{3555}{4429} = .010, \Delta_{D_s} = .034 \times \frac{30}{25.2} = .040$$

$$TOTAL \Delta = .048 + .0123 + .010 + .040 = 0.110 \text{ IN. } < .50 \text{ IN. O.K.}$$

CONCLUSION: THE WALL IS OVERSTRESSED FOR THE OBE CONDITION BY REGULAR STRESS COMBINATION. FOR STRESS COMBINATION BY SRSS SEE FOLLOWING PAGE. 34[#] EXP. BOLTS @ 16" O.C. O.K.



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CALCULATION SHEET

24-5-C

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ORIGINATOR M.G. LOUIE

DATE 8-7-81

CALC. NO. 2.5

REV. NO.

DATE Aug. 27, 1981

PROJECT 55E5 REACTOR BLDG EL. 719'-1"

JOB NO. 8856

SUBJECT CLASS I BLOCK WALLS RE-EVALUATION

SHEET NO. C-29

CHECK STRESSES BY SRSS

$$f_s = \frac{M \times 12}{A_s \times d} = \frac{M \times 12}{15 \times 899 \times 381} = 23.36 M$$

	f_s	$(f_s)^2$
f_s DUE TO $N_0 = 23.36 \times 6672 =$	15,586 PSI.	242,923,390
" $F_0 = 23.36 \times 210 =$	4,906	24,064,911
" $M_L = 23.36 \times 163 =$	3,808	14,498,426
" $D_3 = 23.36 \times 101 =$	2,359	5,566,580
	<u>26,659 PSI.</u>	<u>287,053,307</u>

$$f_s = (287,053,307)^{\frac{1}{2}} = 16,943 \text{ PSI. } < 24,000 \text{ PSI. O.K.}$$

$$f_c = \frac{2M}{s \times k \times F} = \frac{2M \times 12}{899 \times 302 \times 0.145} = 508.04 M \times 12$$

	f_c	$(f_c)^2$
f_c DUE TO $N_0 = 508.04 \times 6672 =$	339 PSI.	114,897
" $F_0 = 508.04 \times 210 =$	107	11,382
" $M_L = 508.04 \times 163 =$	83	6,858
" $D_3 = 508.04 \times 101 =$	51	2,633
	<u>580 PSI.</u>	<u>135,770</u>

$$f_c = (135,770)^{\frac{1}{2}} = 368.5 \text{ PSI. } < 500 \text{ PSI. O.K.}$$

