KIRK C. McFARLAND, JR.
CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 6-28-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 1 OF
CHKD. BY DATE JOB NO. 6404 BLESSING

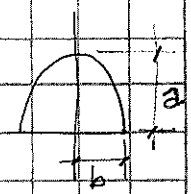
DESIGN FLOOR SYSTEM
USE 12" FORMS, 3" SLAB & 6" JOISTS
LOADS:

CONC. JOISTS SYSTEM	67 PSF	
PARTITIONS	20 PSF	
FUTURE CLG	10 PSF	
FLOOR FINISH	3 PSF	
LIVE LOAD		50 PSF
	100 PSF	50 PSF

CALCULATIONS TO ACCOMPANY CONJUGATE POINT MOMENT DIAGRAM. JOISTS

$M_{LL+DL} = \frac{wl^2}{8} = \frac{3\times150\times24^2}{8} = 32.4$ KIP·FT

$M_{DL} = \frac{wl^2}{8} = \frac{3\times100\times24^2}{8} = 21.6$ KIP·FT



$A_{DIL} = \frac{4}{3}ab = \frac{4}{3}\times 32.4\times 12 = 538$ KIP·FT²

$A_{D} = \frac{4}{3}ab = \frac{4}{3}\times 21.6\times 12 = 338$ KIP·FT²

$U_1 = \frac{A_1}{l} = \frac{538}{24} = 21.6$ Ft·KIP $\qquad U_B = \frac{A_2}{l} = \frac{338}{24} = 14.0$ ft·KIP

GIRDER @ LINE D

$M_{\substack{1-2\\4-5}}$ L+D $= \frac{wl^2}{8} = \frac{24\times150\times24^2}{8} = 259$ ft·kips

$M_{\substack{1-2\\4-5}}$ D ONLY $= \frac{wl^2}{8} = \frac{24\times100\times24^2}{8} = 173$ ft·kips

M_{2-3_a} L+D $= \frac{wl^2}{8} = \frac{24\times150\times32^2}{8} = 462$ ft·kips

M_{2-3_a} D ONLY $= \frac{24\times100\times32^2}{8} = 308$ ft·kips

M_{3_a-4} L+D $= \frac{24\times150\times16^2}{8} = 116$ ft·kips

M_{3_a-4} D ONLY $= \frac{24\times100\times16^2}{8} = 77$ ft·kips

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BY WK DATE 6-28-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 2 OF
CHKD. BY DATE JOB NO. 6404 BLESSING

$A_{1+4}^{D+L} = \frac{4}{3}ab = \frac{4}{3}\times 259\times 12 = 4150\ ft^2\cdot kip$ $\quad V = \frac{4150}{24} = 173\ ft\cdot kip$

$A_{1+4}^{D} = \frac{4}{3}ab = \frac{4}{3}\times 173\times 12 = 2760\ ft^2\cdot kip$ $\quad V = \frac{2760}{24} = 115\ ft\cdot kip$

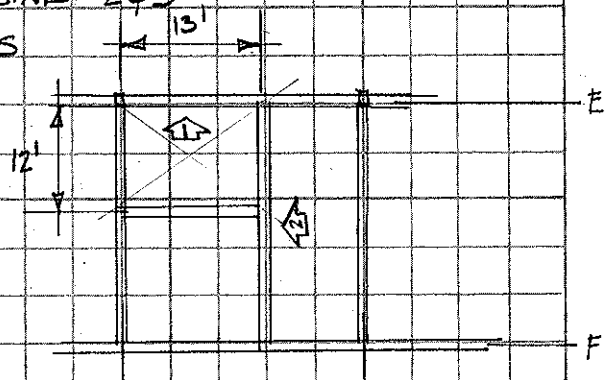
$A_{2}^{D+L} = \frac{4}{3}ab = \frac{4}{3}\times 462\times 16 = 9850\ ft^2\cdot kip$ $\quad V = \frac{9850}{32} = 308\ ft\cdot kip$

$A_{2}^{D} = \frac{4}{3}ab = \frac{4}{3}\times 308\times 16 = 6580\ ft^2\cdot kip$ $\quad V = \frac{6580}{32} = 205\ ft\cdot kip$

$A_{3}^{D+L} = \frac{4}{3}ab = \frac{4}{3}\times 116\times 8 = 1240\ ft^2\cdot kip$ $\quad V = \frac{1240}{16} = 77\ ft\cdot kip$

$A_{3}^{D} = \frac{4}{3}ab = \frac{4}{3}\times 77\times 8 = 820\ ft^2\cdot kip$ $\quad V = \frac{820}{16} = 51.2\ ft\cdot kips$

GIRDER "E"
VAULT LOAD BETWEEN COL. LINE 2 & 3
6" FLOOR & ROOF SLAB & 8" WALLS

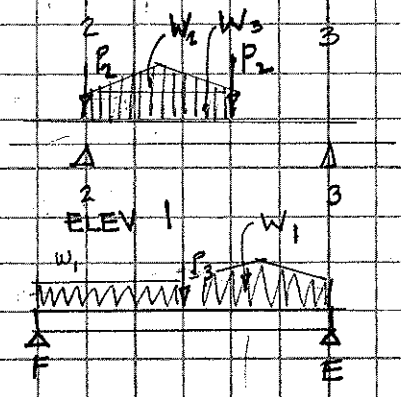


ASSUME 11' WALL HT.
W_1 = GIRDER WT. + WALL WT. + FL. & ROOF SLAB WT.

$W_1 = 175\ lb/ft \times 13' + 11' \times .67' \times 150\ lb/ft^3 \times 13' + 6' \times 13'/2 \times 150\ lb/ft$

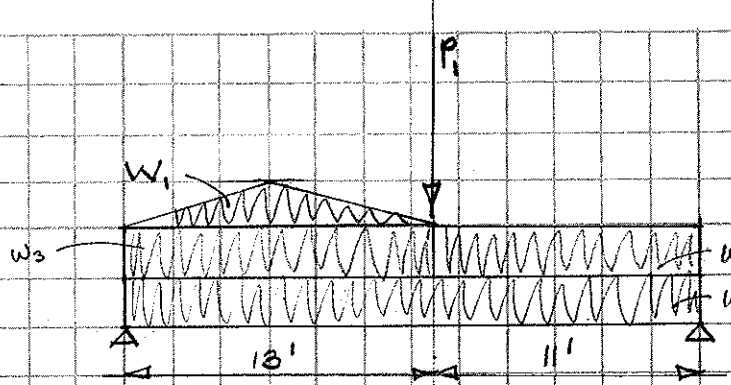
$W_1 = 2{,}27\ kip + 14{,}4\ kip + 5{,}85\ kip$
$= 22{,}52\ kips$
$P_3 = 11.26\ kips$
$P_2 = \frac{3}{4}\times 22.52 + \frac{1}{2}\times 11.26 + \frac{1}{4}\times 36$

$P_2 = 17.0 + 5.65 + .9 = 23.55\ kips$
$W_2 = 5.85\ kip$
$W_3 = 16.7\ kip$

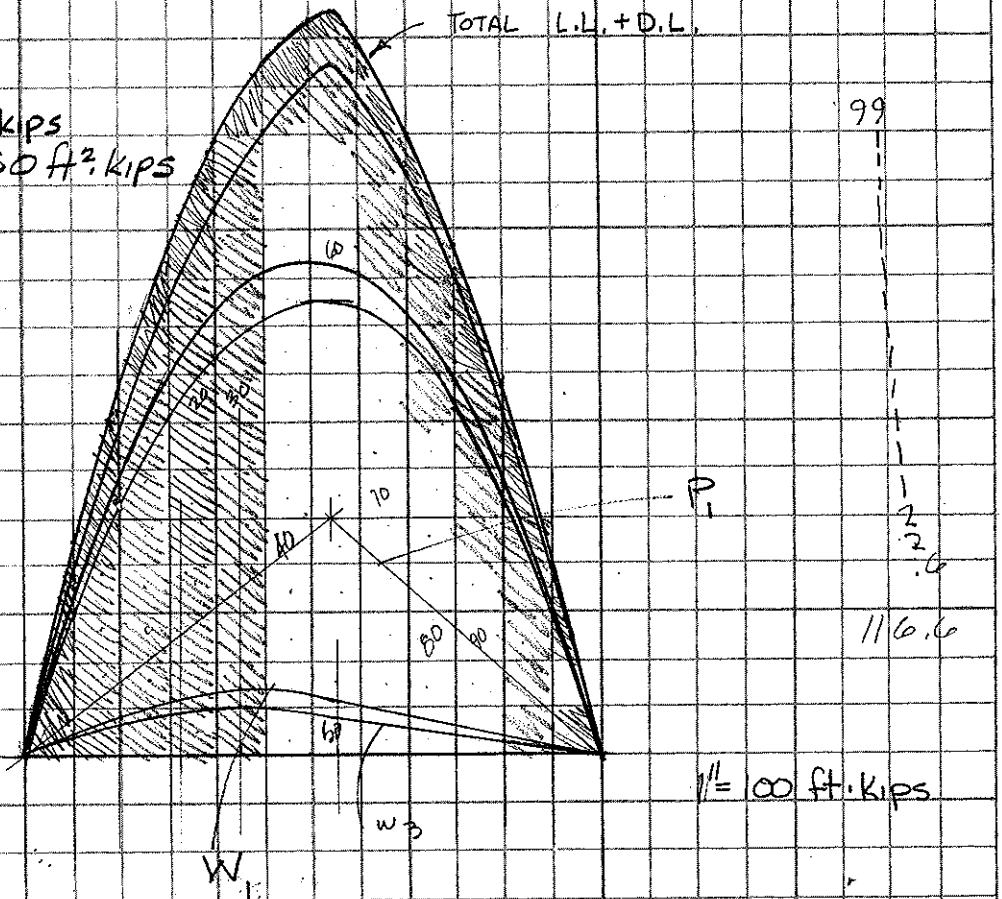


KIRK C. McFARLAND, JR.
CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 7-7-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 3 OF
CHKD. BY DATE JOB NO. 6404 BLESSING



	L.L.	D.L.
W_1 = TYP. FLOOR 12 ft. TRIBUTARY	600 lb/ft.	1200 lb/ft.
W_2 = " " " " "	600 lb/ft	1200 lb/ft.
W_3 = GIRDER WT. + WALL WT.		1200 lb/ft
W_1 = FLOOR & ROOF SLAB	3900 lb	5,850 lb.
P_1 = LOAD CAUSED BY CROSS GIRDER	3000 lb	18,000 lb



EACH SQ. = 50 ft². kips
116.6 SQ × 50 = 5850 ft². kips

1" = 100 ft. kips

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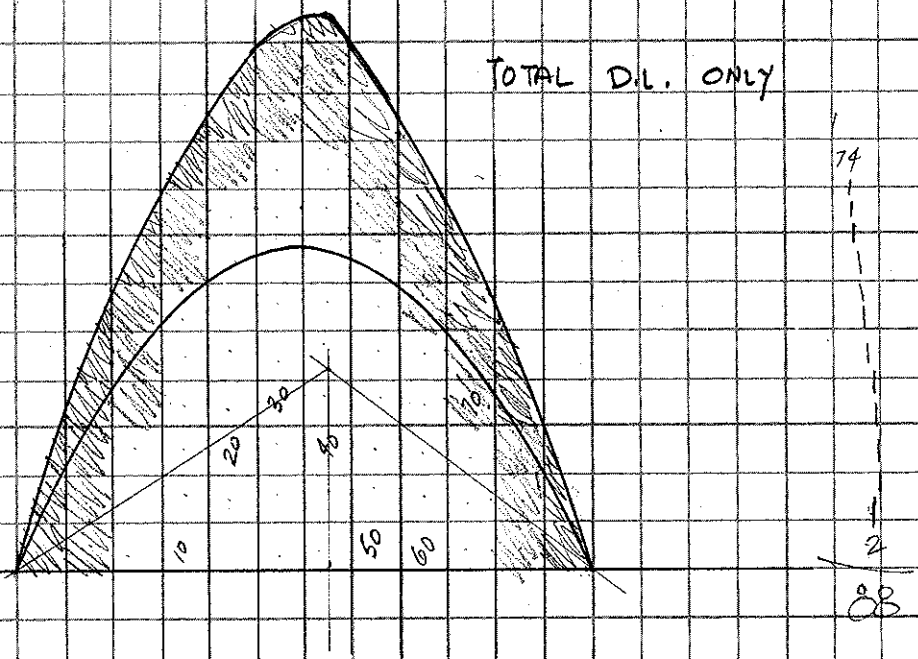
BY WK DATE 7-7-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 4 OF

CHKD. BY DATE JOB NO. 6404
BLESSING

EA. SQ. = 50 ft². KIPS
88 SQ × 50 = 4400 ft². KIPS



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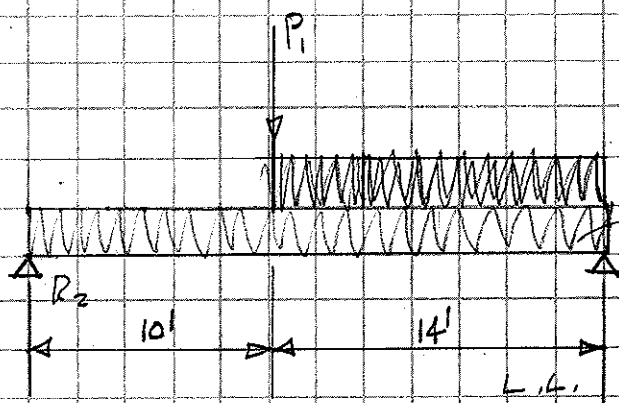
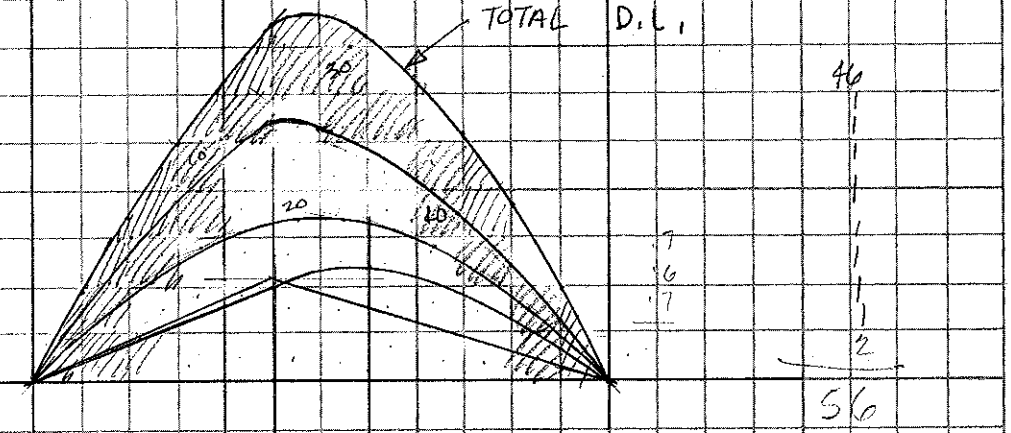
CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 7-7-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 5 OF
CHKD. BY DATE JOB NO. 6404
BLESSING



		L.L.	D.L.
w_1 =	TYP. FLOOR 12' TRIBUTARY	600 lb/ft	1200 lb/ft
w_2 =	" " " "	600 lb/ft	1200 lb/ft
P_1 =	CROSS GIRDER REACTION	49000 lb	89300 lb

99 00
128 30



EA. SQ. = 50 ft², kip

A = 56 × 50 = 2800 ft²-kips

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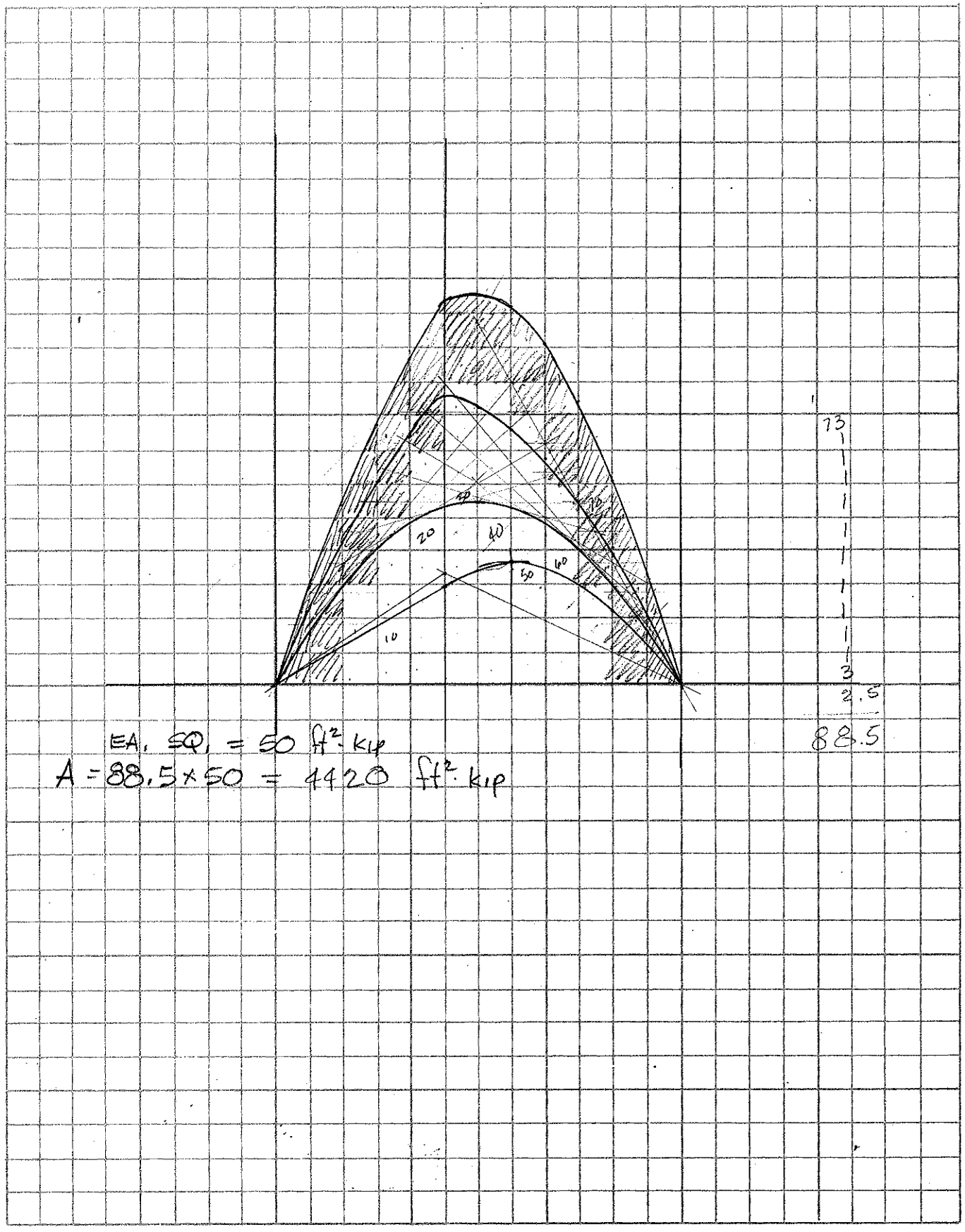
BY WK DATE 7-7-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 6 OF
CHKD. BY DATE JOB NO. 6404
BLESSING



EA. SQ. = 50 ft². kip

A = 88.5 × 50 = 4420 ft². kip

88.5

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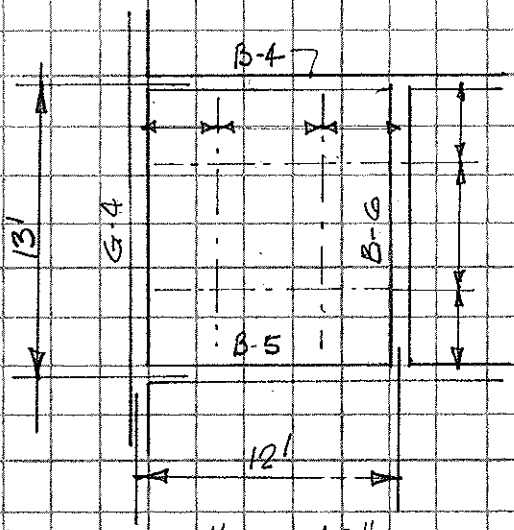
BY WK DATE 7-9-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 7 OF
CHKD. BY DATE JOB NO. 6404
BLESSING

DESIGN SLAB FLOOR OF VAULT @ COL. LINES "E" & "2"

LOADS:

D.L. = 85 PSF 6" SLAB + CLG. BELOW
L.L. = 100 PSF



NEGATIVE M

SHORT $M = CwS^2 = .04 \times 185 \times 144 = 1060$ ft.lb
LONG $M = CwS^2 = .033 \times 185 \times 144 = 880$ ft.lb

$d = 4\frac{1}{2}"$ $f_s = 20000$ $f_c = 3000$
$j = .866$

SHORT $A_s = \frac{M}{f_s j d} = \frac{1060 \times 12}{20 \times .866 \times 4.5} = .163$ in^2 NEG. USE #4 @ 12" O.C.

LONG $A_s = \frac{M}{f_s j d} = \frac{880 \times 12}{20 \times .866 \times 4.5} = .136$ in^2 NEG USE #4 @ 16" O.C.

SEE ACI FOR MOMENT COEFFICIENTS

POSSITIVE M.

SHORT $M = .057 \times 185 \times 144 = 1.52$ ft.kip
LONG $M = .050 \times 185 \times 144 = 1.33$ ft.kip

SHORT $A_s = \frac{M}{f_s j d} = \frac{1.53 \times 12}{20 \times .866 \times 4.5} = .236$ in^2 USE #4 @ 10" O.C.

LONG $A_s = \frac{M}{f_s j d} = \frac{1.33 \times 12}{20 \times .866 \times 4.5} = .205$ in^2 USE #4 @ 10" O.C.

SLAB FLOOR of VAULT @ COL. LINES "A" & "3"
SLAB IS 10'-0" SQ. $d = 4.5"$

NEG. $M = .033 \times 185 \times 100 = .610$ ft.kips
$A_s = \frac{M}{f_s j d} = \frac{.61 \times 12}{20 \times .866 \times 4.5} = .094$ in^2/ft. USE #4 @ 18" O.C.

Poss. $M = .05 \times 185 \times 100 = .93$ ft.kips
$A_s = \frac{M}{f_s j d} = \frac{.93 \times 12}{20 \times .866 \times 4.5} = .143$ in^2/ft USE #4 @ 16" O.C.

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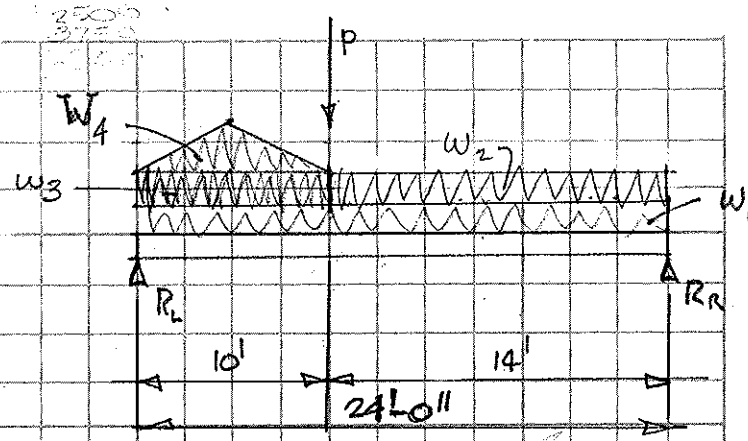
BY WK DATE 7-12-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 8 OF
CHKD. BY DATE JOB NO. 6401
BLESSING

DESIGN BEAM B-1 = B-2



w_1 = BM & JOIST FLOOR = 500 lb/ft
w_2 = SLAB WT = 5' × 85 = 425 lb/ft
w_3 = WALL WT = 675 lb/ft
W_4 = ROOF & FLOOR WT. = 6250 lb.
P = 10,000 lb

$$R_L = 12\text{ft} \times 500 + \frac{7}{24} \times 14\text{ft} \times 425\text{ft} + \frac{14}{24} \times 10000 + \frac{19}{24} \times 10\text{ft} \times 675 + \frac{19}{24} \times 6250$$

$$= 6000 + 1730 + 5840 + 5350 + 4950 = 23.87 \text{ kips}$$

$$\Sigma M_{@P} = 10 \times 23,870 - 50 \times 1175 - 5 \times 6250 = 148.6 \text{ ft.kips}$$

$$A_s = \frac{M}{f_s j d} = \frac{148.6 \times 12}{20 \times .875 \times 26} = 3.9 \text{ in}^2$$

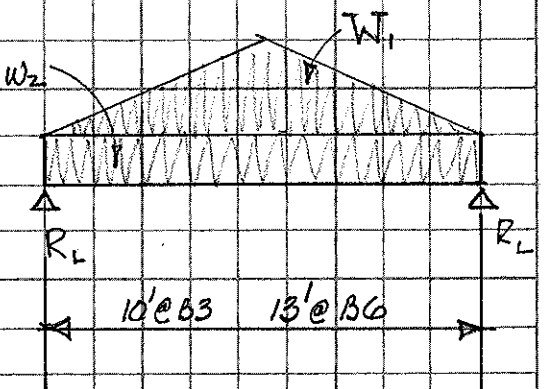
SHEAR $V = \frac{23870}{.875 \times 12 \times 26} = 87.5 < 90$ ∴ ok

CONSIDER END CONDITIONS 30% FIXED $A_s = .33 \times 3.9 = 1.3 \text{ in}^2$

USE 12" × 28" CONC. BEAM w/ 4 #9 @ POSSITIVE M
& 2-#8 @ NEG. M

DESIGN BEAM B-3 & B6

FOR B-3



W_1 = 6250 lb
w_2 = 2000 lb/ft

$$M = \frac{wl^2}{8} + \frac{Wl}{6}$$

$$M = \frac{2 \times 100}{8} + \frac{6.25 \times 10}{6} = 35.4 \text{ ft.kips}$$

$$A_s = \frac{M}{f_s j d} = \frac{35.4 \times 12}{20 \times .866 \times 16} = 1.54 \text{ in}^2$$

USE 7½" × 18" CONC. BEAM w/ 2-#8 @ +M & 1-#8 @ -M

CHECK SHEAR $V = \frac{32250}{.875 \times 18 \times 8 \times 2} = 128 > 90$ ∴ STIRRUPS REQ.

B-6

$W_1 = 9.75$ kip

$w_2 = 2.0$ kip/ft.

$$M = \frac{wl^2}{8} + \frac{Wl}{6} = \frac{2 \times 13^2}{8} + \frac{9.75 \times 13}{6} = 63.4 \text{ ft.kips}$$

$$A_s = \frac{M}{f_s j d} = \frac{63.4 \times 12}{20 \times .866 \times 18} = 2.45 \text{ in}^2$$

$$F = \frac{M}{K} = \frac{63.4}{236} = .268$$

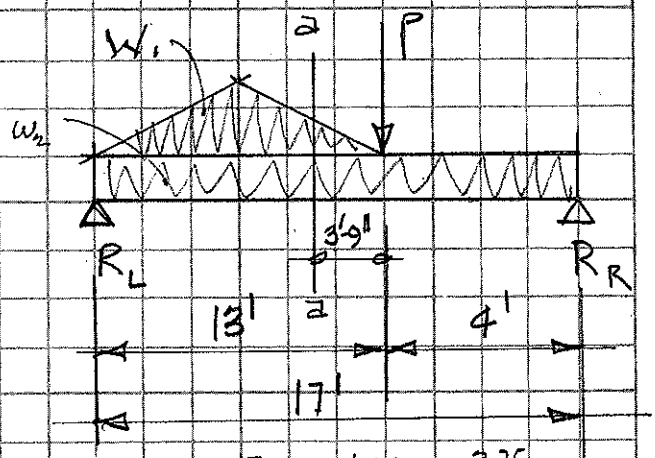
USE 10" x 20" CONC. BEAM w/ 2-#10 @ +M & 1-#10 @ -M

DESIGN B-4 & B-5

$W_1 = 9.75$ kip

$w_2 = 2.0$ kip

$P = 17.9$ kip



$$R_R = \frac{13}{17} \times 17.9 + 8.5 \times 2 + \frac{6.5}{17} \times 9.75$$

$$R_R = 13.7 + 17 + 3.73 = 34.4 \text{ kip}$$

13.7

$$M_{@a} = 7.75 \text{ ft} \times 34.4 - \frac{7.75^2}{2} \times 2 \text{ kip} - 3.75 \times 17.9 - 1.68 \text{ kip} \times \frac{3.75}{3}$$

$$= 131 \text{ ft.kips}$$

$$F = \frac{M}{K} = \frac{131}{236} = .555$$

12x28

$$A_s = \frac{M}{f_s j d} = \frac{131 \times 12}{20 \times .866 \times 24} = 3.8 \text{ in}^2$$

USE 12" x 26" CONC. BEAM w/ 2-#11 & 1-#8 @ +M & 2-#8 @ -M

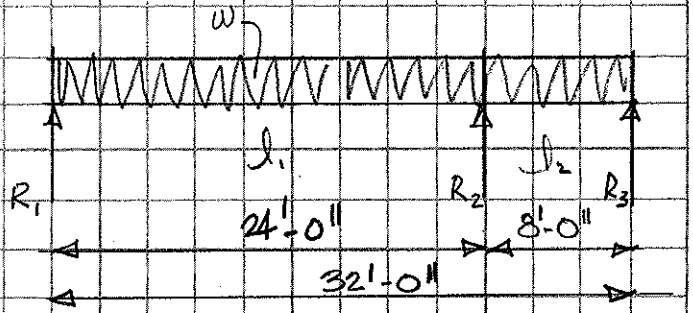
CHECK SHEAR $v = \frac{34400}{.875 \times 12 \times 24} = 137$ psi > 90 ∴ STIRRUPS REQ.

KIRK C. McFARLAND, JR.
CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 8-10-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 10 OF
CHKD. BY DATE JOB NO. 0404
BLESSING

GIRDER G-4

$w = 150\ lb/ft^2 \times 24\ ft = 3600\ lb/ft.$



ASSUME SIMPLE BEAM ACTION FOR l_1 & l_2

$$M_{l_1} = \frac{wl^2}{8} = \frac{3600 \times 24^2}{8} = 2600\ ft\cdot kips$$

USE 15" x 32"

$$A_s = \frac{M}{f_s j d} = \frac{260 \times 12}{20 \times .875 \times 29.5} = 6.04\ in^2$$ USE 4 - #11 BARS BOTT.
" 2 - #11 BARS TOP

CHECK SHEAR $v = \frac{V}{jbd} = \frac{3600 \times 12}{.875 \times 15 \times 29.5} = 112\ psi > 90$

∴ STIRRUPS ARE REQ.

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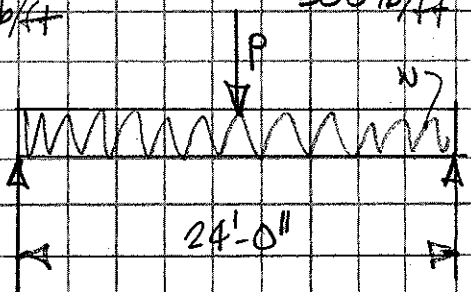
BY WK DATE 9-10-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 11 OF
CHKD. BY DATE JOB NO. C404 BLESSING

BEAM B-7 SPAN = 24'-0"

LOADS

	D.L.	L.L.
BM. WT = 300 lb/ft	= 300 lb/ft	
SLABS = 5x.5x150	= 1500 lb/ft	5x100 = 500 lb/ft
WALL ABOVE = 12x20	= 240 lb/ft.	
MECH. WT. =	= 1000 lb CONCENTRATED	
	2040 lb/ft	500 lb/ft



$M_+ = .07 \times wl^2 + Pl/4$

$M_+ = .07 \times 2.54 \times 24^2 + 24/4 = 102 + 6 = 108$ ft·kips

$M_- = .125 wl^2 + Pl/8$

$M_- = .125 \times 2.54 \times 24^2 + 24/8 = 183 + 3 = 186$ ft·kips

USE 13" x 29" CONC. BEAM

$-A_s = M/f_s jd = 186 \times 12 / 20 \times .875 \times 26 = 4.90 \text{ in}^2$ USE 4-#10

$+A_s = 108 \times 12 / 20 \times .875 \times 26 = 2.84 \text{ in}^2$ USE 1-#10 & 2-#8 BARS

CHECK SHEAR

$V = 12 \times 2.54 + .5 = 31000$ lb $\quad v = \frac{V}{jbd} = \frac{31000}{.863 \times 13 \times 27} = 102.1$ psi

∴ STIRRUPS REQ.

USE 2 #3 @ 18"

BEAM B-8 SPAN = 6' LOAD = 120 PSF x 7' TRIB.

$M = \frac{wl^2}{8} = \frac{120 \times 1 \times 36}{8} = 378$ ft. kips USE 6x12 w/ 2 #6 T & B

BEAM B-9 SPAN = 4' LOAD 120 PSF x 5' TRIB

USE 6x12 w/ 2-#6 T & B

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BY WG DATE 8-9-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 12 OF
CHKD. BY DATE JOB NO. 6404
STAIRS BLESSING

D.L = 130 PSF L.L. = 100PSF STAIR SPAN = 8'-10"

$t = 4\frac{1}{2}"$ $d = 3\frac{1}{2}"$ $M = \frac{wl^2}{8} = \frac{230 \times 16^2}{8} = 460$ ft. lb.

$A_s = \frac{M}{f_s j d} = \frac{460 \times 12}{20000 \times .875 \times 3.5} = .09 in^2/ft$ USE #3 @ 12"

STAIR LANDING SPAN = 8'-2" D.L. = 100 PSF L.L. = 100 PSF

$M = \frac{wl^2}{8} = \frac{200 \times 8.17^2}{8} = 1.67$ ft. kip $A_s = \frac{M}{f_s j d} = \frac{1.67 \times 12}{20 \times .875 \times 5} = .228 in^2/ft$

USE #4 @ 6"

CLG. SLAB @ ELEVATOR & STAIR WELLS SPAN = 8'-0"
LOAD = 50 PSF + 75 PSF = 125 PSF

$M = \frac{wl^2}{8} = \frac{125 \times 64}{8} = 1000$ ft. lb.

$A_s = \frac{12}{20 \times .875 \times 5} = .137$ USE #4 @ 16"

KIRK C. McFARLAND, JR.
CIVIL AND STRUCTURAL ENGINEER

BY K.C.M. DATE 3/26/65 SUBJECT Cupertino City Hall SHEET NO. 13 OF
CHKD. BY DATE JOB NO. 6404
Roof Framing Blessing

Roof DL
Roofing 21 #/ft²
Sheathing 4
Purlins 3
Clg 10
38 #/ft²

Roof LL 16 #/ft²
54 #/ft² ×12' = 645 #/ft
Assumed wt bm = 55
700 #/ft

Assumed wt parapet
6'@ 50#/ft² = 300
1,000 #/ft

} Interior Parapet Bm

M = 1.0 (24)²/8 = 720 K-ft
Use 16 B 31 - A36 steel

Spanish Tile &
2" T&G & ½" Plywood
6×16 @ 6' ctrs f_b = 1365 psi H = 78 psi

Roof DL
Roofing 21 #/ft²
Sheathing 4
Purlins 1
26 #/ft²

Roof LL 20 - Corridor bm
46 #/ft²

Spanish Tile
2" T&G & ½" Plywood
4×6 @ 6' ctrs f_b = 1390 psi H = 82 psi

16 #/ft² Wall bm
42 #/ft²

Wall bm - 24' Span
w = 4'(46 #/ft²) + 12'×54 #/ft² + 50 #/ft bm = 880 #/ft

M = 0.88 (24)²/8 = 63.5 K-ft
Use 16 B 31 - A 36 Steel

KIRK C. McFARLAND, JR.
CIVIL AND STRUCTURAL ENGINEER

BY K.C.M. DATE 4/8/65 SUBJECT Cupertino City Hall SHEET NO. 14 OF
CHKD. BY DATE JOB NO. 6404 Blessing

Wall Beam $w = 9 \times 46\ \#/ft^2 + 200\ \#/ft = 615\ \#/ft$

Use 3000 psi conc

$M = 0.615(24)^2/8 = 45$ K-ft

$F = M/K = 45/236 = 0.19$

$b = 10"$ $d_{min} = 15\frac{1}{2}"$ Use $d = 15\frac{1}{2}$ $D = 18"$

$A_s = 45/1.44(15.5) = 2.0$ Use 2 #9 $A_s = 2.0$

$V = 0.615(12) = 7.4$ K

$v = V/bjd = 7,400/10(\frac{7}{8})15.5 = 55$ psi No stirrups req'd

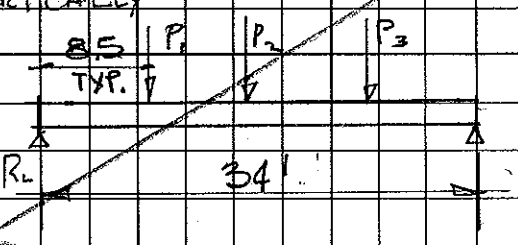
$\Delta = 5wl^4/384EI = .28\ w\#/ft(l.ft)^4/EI$

$= .28(6.15)\ 332\times10^3/750(10)^3(5.0\times10^3) = 1.5"$

Camber 1" in 24'

HIP BEAM

$l = 33$ ft HORIZONTAL 8 ft VERTICALLY



$P_1 = 18 \times$ =

$P_2 = 12 \times$ =

$P_3 = 6 \times$ =

BM. WT. = 30 lb/ft

$R_L = 3.96 \times \frac{25.5}{34} + 1.32 + 1.34 \times \frac{8.5}{34} + 30 \times 17 = 5.14$ KIPS

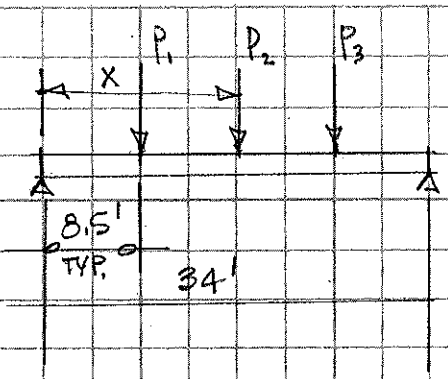
$M = 5.14 \times 17 - 3.96 \times 8.5 - 17^2/2 \times .03 = 49.5$ ft-kips

$S = \frac{M}{f} = \frac{49.5 \times 12}{2.4 \times 1.25} = 198\ in^3$

FROM PREVIOUS ELASTIC WT. MOMENT METHOD

$I_{REQ} = \frac{5160}{\Delta} =$

HIP BEAM



	D.L	L.L
P_1 =	$18 \times 228 = 4.1$	$18 \times 96 = 1.73$
P_2 =	$12 \times 228 = 2.74$	$12 \times 96 = 1.15$
P_3 =	$6 \times 228 = 1.37$	$6 \times 96 = .58$

BM. WT. = 30 lb/ft

D.L. $R_L = \frac{25.5 \times 4.1}{34} + \frac{2.74}{2} + \frac{8.5 \times 1.37}{34} + \frac{34 \times .03}{2} = 5.8$ kips

D.L+L.L. $R_L = \frac{25.5 \times 5.83}{34} + \frac{3.89}{2} + \frac{8.5 \times 1.43}{34} + .51 = 7.12$ kips

$M_{L+D} = 17 \times 7.2 - 8.5 \times 5.83 - \frac{8.5^2}{2} \times .03 = 172$ ft.kips

$S = \frac{M}{f} = \frac{72 \times 12}{2.4 \times 1.25} = 288$ in^3

CHECK DEFLECTION

$M_{@x} = R_x - \frac{P_x}{2} - \frac{wx^2}{2} = EI\frac{d^2y}{dx^2}$

$EI\frac{dy}{dx} = \frac{Rx^2}{2} - \frac{Px^2}{4} - \frac{wx^3}{6} + C$ $\quad C = EI\frac{dy}{dx} - \frac{Rx^2}{2} + \frac{Px^2}{4} - \frac{wx^3}{6}$

BUT $\frac{dy}{dx} = 0$ @ MAX Δ & $x = \frac{l}{2}$

$\therefore C = \frac{Rl^2}{8} + \frac{Pl^2}{16} - \frac{wl^3}{48}$

$EI\frac{dy}{dx} = \frac{Rx^2}{2} - \frac{Px^2}{4} - \frac{wx^3}{6} - 471000$

$C = \frac{5300 \times 34^2}{8} + \frac{4100 \times 34^2}{16} - \frac{30 \times 34^3}{48}$

$= -471{,}000$

$EIy = \frac{Rx^3}{6} - \frac{Px^3}{12} - \frac{wx^4}{24} - 471000x$

$EIy_{@x=\frac{l}{2}} = \frac{Rl^3}{48} - \frac{Pl^3}{96} - \frac{wl^4}{384} - \frac{471000l}{2}$

$EI_y = \frac{5300 \times 34^3}{48} - \frac{4100 \times 34^3}{96} - \frac{30 \times 34^4}{384} - \frac{471000 \times 34}{2}$

$EI_y = 4.33 \times 10^6 - 1.68 \times 10^6 - .105 \times 10^6 - 8.0 \times 10^6 = 5.45 \times 10^6$

$I = \frac{5.45 \times 1728}{1.8 \times 1.25} = 4180$ in^4 $\quad$ ACT. $\Delta = \frac{5.45 \times 1728}{1.8 \times 4325} = 1.21''$

USE 7 x 19½" GLU-LAM COMB. B

Roof over Council Chambers

Roof DL

Roofing	6 #/ft²	Tar & Gravel
Sheathing	1½	½" Plywood
Joists	2½	2×14 @ 16 f_b = 1400 @ 40# LL H = 44 psi
Clg	10	
	20 #/ft²	
Roof LL	40	Mech equip
	60 #/ft² × 24' =	1440 #/ft
Assumed wt bm		60
		1500 #/ft

M = 1.5 (32)²/8 = 192 K-ft

Use 21WF55 A36 steel

Low Roof

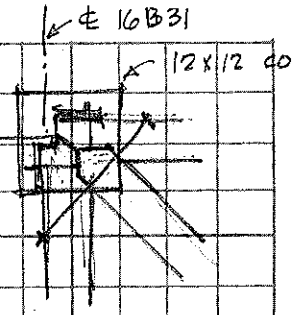
Roof DL	20 #/ft²	2×12 @ 16" f_b = 1700 psi @ 100# LL
Roof LL	100	
	120 #/ft² × 8' =	960 #/ft
	wt bm	40
	wt wall	100
		1,100 #/ft

M = 1.1 (24)²/8 = 79.2 K-ft

Use 16B31 A-36

KIRK C. McFARLAND, JR.
CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 8-6-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 17 OF
CHKD. BY DATE JOB NO. C0404
BLESSING



CORNER CONNECTION

LOAD

8x14 =	6.4
PLYWD =	1.0
2x DECK =	4.8
TILE =	21.0
L.L. =	20
	53.2 lb/ft²

REACTION OF 8x14 // TO BLDG = 5 (APPROX. TRIB. AREA) x 53.2 (LOAD) x 4 (½ SPAN) = 1070 lb.

REACTION OF 8x14 DIAG. = 4 x 53.2 x 5 = 1070 lb.

LOAD BOLTS SUPPORTING DIAGONAL = 1070 lb IN DOUBLE SHEAR
USE 2 - 5/8" ø ALLOW = 2x1300 = 2600 lb.

LOAD TO BOLTS SUPPORTING SIDE MEMBER = 1605 lb SINGLE SHEAR
USE 3 - 5/8" BOLTS ALLOW = 3 x 1210/2 = 1820 lb.
MIN. MEMBER THICKNESS = 3 5/8"

CONC. ARCADE BEAM
SPAN = 23'-0" LOAD = 9 x 30.5 = 275 lb/ft BM wt = 187 lb/ft
TOTAL LOAD = 462 lb/ft

$+M = .107 \times wl^2 = .107 \times 462 \times 24^2 = 285$ ft.kip
$+M = .077 \times wl^2 = .077 \times 462 \times 24^2 = 20.5$ ft.kip

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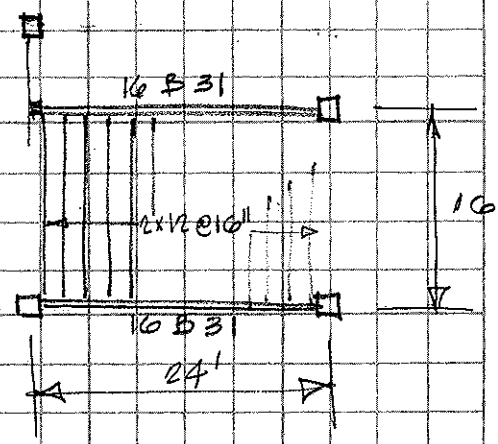
CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 8-13-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 18 OF
CHKD. BY DATE JOB NO. 6404
BLESSING

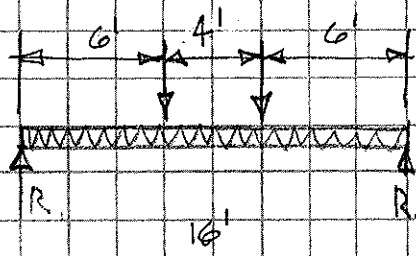
MECH. PIT @ ROOF

LOADS:

ROOFING	6 lb/ft²
1/2" PLYWD	1.5 lb/ft²
2x12 @ 16	4.7 lb/ft²
LIVE LOAD	20 lb/ft²
COOLING TOWER	2400 lb
GLG	10 PSF



DESIGN JOIST SUPPORTING COOLING TOWER 3 JOISTS



$w = 39 \times 1.33 = 52$ lb/ft

$P = 2400/6 = 400$ lb

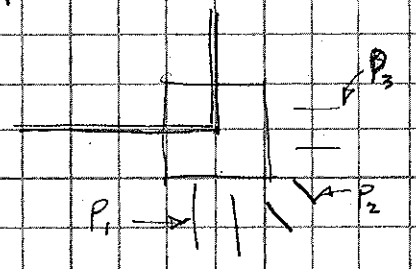
$R = 52 \times 8 + 400 = 815$ lb

$M = 8 \times 815 - \frac{8^2}{2} \times 52 - 400 \times 2 = 6.5 - 1.67 - .8 = 4.03$ ft·kips

$S = \frac{M}{f} = \frac{4.03 \times 12}{150} = 33.3$ in³ 2x12 ok $S_{ACT} = 35.82$ in³

REACTION OF 16 B 31 = 11,200 lb / 4 = 2,800 lb
USE 2-5/8" M.B.

DESIGN CONNECTION (C/S5)



$P_1 = 64 \times 6 \times 12 = 4.6$ KIP
$P_2 = 7.2$ KIPS
$P_3 = 64 \times 6 \times 12 = 4.6$ KIP

ALLOW. BRG PLAN = 300 PSI

DESIGN BEAM CONNECTION @ P_2 $P = 7.2$ KIPS $\frac{7.2}{.39} = 18.5$ in²

DESIGN BEAM CONNECTION @ $P_3 \neq P_1$ $P = 7.7$ KIPS $\frac{7.7}{.39} = 19.75$ in²

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BY WK DATE 8-19-65 SUBJECT CUPERTINO CITY HALL SHEET NO. 19 OF
CHKD. BY DATE JOB NO. 6404
BLESSING

DESIGN TOP OF AREA-WAY RETAINING WALL AS A BEAM

LOAD = $55 \times 6 + \frac{1}{3} \times \frac{1}{2} \times 600 \times 12^2 = 330 + 1800 = 2130$ lb/ft.

SPAN = 24' WITH 2 SPAN CONTINUITY

$+M = .07\,w l^2 = .07 \times 2.13 \times 24^2 = 86$ ft. kips   USE 12" x 30" BEAM

$-M = .125\,w l^2 = .125 \times 2.13 \times 24^2 = 154$ ft. kips

$+A_s = \frac{M}{f_s j d} = \frac{86 \times 12}{20 \times .875 \times 28} = 2.1\ in^2$ USE 2-#8 BARS

$-A_s = \frac{154 \times 12}{20 \times .875 \times 26} = 4.05\ in^2$ USE 2#10 & 1#8

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BY WK DATE 8-27-65 SUBJECT CUPERTINO CITY HALL SHEET NO. OF
CHKD. BY DATE JOB NO. 6404

DESIGN PLANTER SLAB OVER AREAWAY

SPAN = 36" LOAD = 140 lb/ft³ × 2.5 ft = 350 lb/ft² (SOIL)
" = 100 lb/ft² (SLAB)

$M = \frac{wl^2}{8} = \frac{450 \times 9}{8} = 506$ ft.lb. $A_s = \frac{M}{f_s jd} = \frac{.506 \times 12}{20 \times .875 \times 5} = .069$ in²/ft

USE #3 @ 12" EA. WAY

CHECK SHEAR V = 1.5 × 450 = 675 lb

$v = \frac{V}{jbd} = \frac{675}{.875 \times 12 \times 5} = 12.8$ PSI

DESIGN BEAM SUPPORTING SLAB

LOAD = 675 lb/ft SPAN = 7'-0" BM. WT. = 450 lb/ft

$M = \frac{wl^2}{8} = \frac{1.125 \times 49}{8} = 6.9$ ft.kips $A_s = \frac{M}{f_s jd} = \frac{6.9 \times 12}{20 \times .875 \times 38} = .21$ in²

USE 2-#5 ACT. $A_s = .62$ in²

CHECK CONC. $\frac{6.9}{235} = .029$ REQ. ACT. = .72 ∴ SAFE

CHECK SHEAR V = 3.5 × 1125 = 3940 lb

$v = \frac{V}{jbd} = \frac{3940}{.875 \times 9 \times 38} = 13.2$ PSI < 90 % SAFE

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BY YK DATE 8-11-65 SUBJECT CUPERTINO CITY HALL SHEET NO. L-1 OF
CHKD. BY DATE JOB NO. 6401
LATERAL BLESSING

SEE SHEET F-1 FOR UNIT LOADS

ROOF WT. (FLAT) 48'x 72'x 23PSF = 72.50 KIPS
4:12 (SLOPE) 44PSF x 336 x 24 = 355.0 KIPS
(PARAPET) 30PSF x 4' x 240' = 28.80 KIPS
2:12 (SLOPE) 30PSF x 484 FT² = 14.5 KIPS — NOT CONTRIBUTING TO DIAPHAM SHEAR
END WALLS = 20PSF x 6ft x 96 x 2 = 23.2 KIP
BEAM WT. = 31 x 770 = 24.0 KIPS
525.0 KIPS

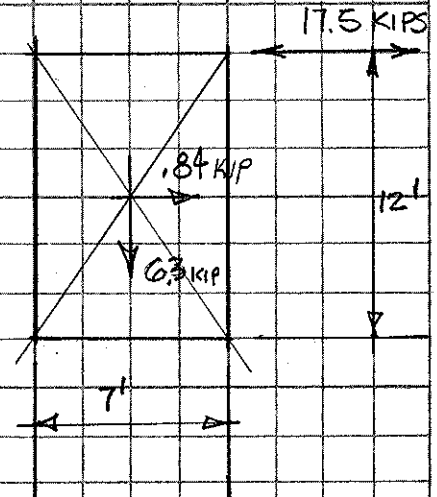
$F_{eq.}$ = .133 x 525 = 70 KIPS OR .133(525-14.5) = 68 KIPS

FORCE TO EXTERIOR WALLS = 68/2 = 34.0 KIPS
CRITICAL DIAPHAM SHEAR = 34.0/96 = 354 lb/ft

USE ½" PLYWD W/ 10d @ 6" O.C.

E.Q. IN EAST-WEST DIRECTION
EA. SHEAR WALL TO RESIST 70/4 = 17.5 KIPS

DESIGN TYP. SHEAR WALL



M = 12 x 17.5 + 6 x .84 = 215 ft.kips

$A_s = \frac{M}{f_s j d} = \frac{215 \times 12}{20 \times .875 \times 6.5 \times 12 \times 1.33} = 1.5\ in^2$

USE 2 - #8 EA. END FULL HEIGHT

CHECK CONC.

$K = M/bd^2 = \frac{215 \times 12 \times 10^3}{6 \times 6.5^2 \times 12^2} = 70.5 < 235$

∴ OK

DESIGN TYP STEEL IN WALL

WIND = 15 PSF E.Q. = .133 x 75 = 10 PSF ∴ WIND CRITICAL

$M = wl^2/8 = 15 \times 144/8 = 270$ ft.lb.

$A_s = \frac{M}{f_s j d} = \frac{.270 \times 12}{20 \times .875 \times 3} = .0616\ in^2/ft$

MIN. STEEL = .0015 x 12 x 6 = .108 in²

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BY WK DATE 8-10-65 SUBJECT CUPERTINO CITY HALL SHEET NO. L-2 OF
CHKD. BY LATERAL DATE JOB NO. 6404 BLESSING

MIN. HORIZ. STEEL = .0025×12×6 = .18 in²

USE #4 HORIZ @ 12" O.C.
USE #4 VERT. @ 12" O.C.

CHECK BASE SHEAR
17.5 + .84 = 18.4 18.4/505 = 36.4 PSI < 40 ∴ NO REINF. REQ.
USE #5 @ 6" DOWELS = 2.66 K/FT
DESIGN 16 B 31 CONNEC. TO SHEAR WALL

SHEAR = 17.5 KIPS ALLOW 7/8" A.B. = 2000×1.33 = 2660

17.5/2.66 = 7 BOLTS

E.Q. IN NORTH-SOUTH DIRECTION

WEST WALL $F_{eq.}$ = 35 KIPS TO 2 WALLS 8' & 10'
RELATIVE RIGIDITIES 12/8 = 1.5 8' WALL R = .3175
12/10 = 1.2 10' WALL R = .4692
.7867

FORCE TO 8' WALL = $\frac{3175}{7867} \times 35 = 14.15$ KIPS
" " 10' WALL = $\frac{4692}{7867} \times 35 = 20.85$ KIPS

DESIGN 8' WALL
M = 12×14.15 + 6×.96 = 175.75 ft. kips

$A_s = \frac{M}{f_s jd} = \frac{175.75 \times 12}{20 \times .875 \times 7.5 \times 18 \times 1.33} = 1.0$ in² USE 1-#9 @ EA. END FULL HEIGHT

USE #4 @ 12" VERT. & HORIZ.

DESIGN 10' WALL
M = 12×20.85 + 6×1.2 = 258.2 ft. kips

$A_s = \frac{M}{f_s jd} = \frac{258.2 \times 12}{20 \times .875 \times 9.5 \times 18 \times 1.33} = 1.17$ in² USE 1-#10 @ EA. END FULL HEIGHT

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BY K.C.M. DATE 11/23/05 SUBJECT Cupertino City Hall SHEET NO. L-2A OF
CHKD. BY DATE JOB NO. 6404 Blessing

Seismic Collector

20.85 K Axial Force

Use 20.85/2.86(1.33) = 6 - 3/4 ϕ bolts ea side ea splice

Use 12 - 3/4 ϕ Bolts in single shear

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BY WK DATE 8-11-65 SUBJECT CUPERTINO CITY HALL SHEET NO. L-3 OF
CHKD. BY DATE LATERAL JOB NO. 6404 BLESSING

EAST WALL F = 35 KIPS

TWO WALLS 12' & 7'

RELATIVE RIGIDITIES 12/7 = 1.72 7' WALL R = .2439
12/12 = 1.0 12'-WALL R = .6250
.8689

FORCE TO 7' WALL = $\frac{2439}{8689} \times 35 = 9.82$ KIPS

FORCE TO 12' WALL = $\frac{6250}{8689} \times 35 = 25.18$ KIPS 118.5 / 123

7' WALL $M = 12 \times 9.82 + 6 \times 84 = 123$ KIPS

$A_s = \frac{M}{f_s j d} = \frac{123 \times 12}{1.33 \times 20 \times .875 \times 6.5 \times 12} = .812 in^2$ USE #9 EA. END

12' WALL $M = 12 \times 25.18 + 6 \times 1.44 = 312.65$ KIP. ft. (324)

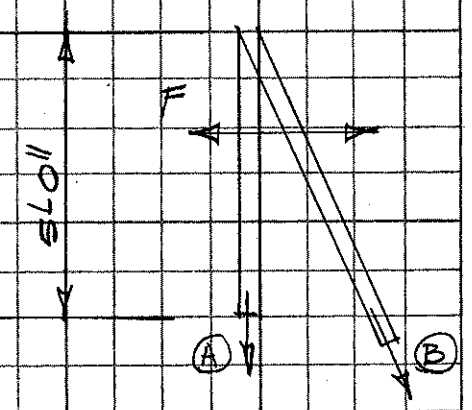
$A_s = \frac{M}{f_s j d} = \frac{312.65 \times 12}{20 \times .875 \times 11.5 \times 12 \times 1.33} = 1.4 in^2$ USE 2-#8 EA. END

16 B 31 TO SHEAR WALLS 7/8" ϕ A.B

14.15/2.66 = 6 BOLTS
20.85/2.66 = 8 BOLTS
9.82/2.66 = 4 BOLTS
25.18/2.66 = 10 BOLTS

DESIGN PARAPET

WT. = 30 PSF



$M_A = 30 \times 5 \times 2.5 = 375$ ft.lb

$B = 375/1.5 = 250$ lb/ft.

$M_B = 30 \times 5.75 \times \frac{5.75}{2} = 496$ ft.lb

$A = 496/1.75 = 285$ lb/ft

CHECK WOOD w 2½" SQ. WASHER NET AREA = 5.7 in²

ALLOW BRG = 390 PSI ALLOW. PER BOLT = 390 x 5.7 = 2220 lb

USE 5/8" ϕ M.B. @ 48" O.C.

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BY WK DATE 8-13-65 SUBJECT CUPERTINO CITY HALL SHEET NO. L-4 OF
CHKD. BY DATE JOB NO. 6404
LATERAL BLESSING

LATERAL ON MECH. PIT.

WT. ROOF 19 PSF x 16 x 24 = 7300 lb
WT. = 2400 lb
WT. C. TOWER B 31 = 31 x 48 = 1500
11200 lb

$F_{eq.}$ = 11.2 x .133 = 1500 lb

SHEAR PER FT. = $\frac{1500}{2 \times 16}$ = 47 lb/ft ½" PLYWD w/ 10d @ 6"

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CIVIL AND STRUCTURAL ENGINEER

BY WK DATE 8-3-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-1 OF
CHKD. BY DATE JOB NO. 6404
FOOTINGS BLESSING

LOADS:

	L.L.	D.L.
PARAPET =	15 lb/ft²	30 lb/ft²
ROOFING;	16 lb/ft²	
3x T&G DECKING		8 lb/ft²
5/16" PLYWOOD		1 lb/ft²
BEAMS 6x16 @ 6'-0" o.c.		4 lb/ft²
SPANISH TILE		21 lb/ft²
BUILT-UP ROOF		6 lb/ft²
2x14 JOISTS @ 16"		5.4 lb/ft²
1/2" PLYWD.		1.5 lb/ft²
2x T&G DECK		4.8 lb/ft²
4x14 BEAMS @ 6'-0" o.c.		3.2 lb/ft²
CEILING (1ST FL. & BASEMENT, EA.)		10 lb/ft²
WALLS;		
STUD		20 lb/ft² (VERT & HORIZ.)
CONC.		75 lb/ft² (VERT.)
MECH. EQUIP.		
12" SQ. CONC. COL.		150 lb/lin. ft.
3" CONC. SLAB & 12" CONC. JOISTS	50 lb/ft²	70 lb/ft²
BASEMENT WALLS		
12"		1800 lb/lin. ft.
8"		1220 lb/lin. ft.

LOAD ON COLUMN D-2 C-1

	D.L.	L.L.
CLG & ROOF (FLAT.)	16' x 24' x 23 #/ft² (D.L.) = 8830 lb	16x24x16 = 6150 lb
" (SLOPE)	13' x 24' x 44 #/ft² = 13700 lb	13x24x16 = 5000 lb
COLUMN WT.	= 32' x 150 lb/ft = 4800 lb	
FLOOR WT.	= 28 x 24 x 90 = 60500 lb	28x24x50 = 33600 lb
ROOF WF WT.	= 40 ft x 31 lb/ft = 1240 lb	
	89070	44750

TOTAL P = 89.0 + 45.0 = 133 KIPS
USE 11" SQ. COL. W/ 4-#11 & #3 TIES @ 12" o.c.
ALLOW. = 142 KIPS

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BY WK DATE 8-3-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-2 OF
CHKD. BY DATE JOB NO. 6404
FOOTINGS BLESSING

ALLOW. SOIL VALUES FOR DEAD + LIVE LOADS

CONTINUOUS FTGS. @ EXIST. GRADE	2900 PSF
ISOLATED FTGS. @ EXIST. GRADE	3560 PSF
CONTINUOUS FTGS. @ BASEMENT	3300 PSF
ISOLATED FTGS. @ BASEMENT	4100 PSF

DESIGN COL. FTG ASSUME 150 PSF FTG. WT.

REQ. AREA FOR COL. FTG. D-3 = $\frac{138}{41}$ = 33.7 ft²

USE 6'-0" SQ. FTG $A_{ACT.}$ = 36 ft² FTGS. WT = 5.4 KIPS

ACT. D.L. SOIL PRESSURE = $\frac{94.4 \text{ KIPS}}{36 \text{ ft}^2}$ = 2620 psf

% OF ACT. $\frac{D.L.}{L.L.}$ SOIL PRESS. = $\frac{26.2}{41}$ = .64%

TYPICAL EXTERIOR COLUMN C-5

LOAD.		D.L.	L.L.
4 in 12 ROOF	24' × 13' × 44 lb/ft² =	13700,	24 × 13 × 16 = 5000
2 in 12 ROOF	24' × 4' × 30 lb/ft² =	2880	24 × 4 × 16 = 1540
BM WT. (WF)	24 × 31 =	745	
COLUMN WT.	12' × 150 =	1800	
		19,125 lb	6,540 lb

TOTAL P = 25,665 lb ✓ USE 11" SQ. CONC. COL. W/ 4-#6 BARS & #2 TIES @ 10" O.C. ALLOW P = 82 KIPS

TYP. INTERIOR CORNER COL. eq. B-2 D.L. C-2 L.L.

CLG. & ROOF (FLAT)	12' × 12' × 23 =	3310	12 × 12 × 16 = 2300
" " (SLOPE)	13 × 36 × 44 =	20600	13 × 36 × 16 = 7500
COLUMN WT.	32 × 150 =	4800	
FLOOR WT.	24 × 24 × 100 =	57600	24 × 24 × 50 = 28800
ROOF WF WT.	24 × 31 =	750	
		87070	38600

TOTAL P = 87.1 + 38.6 = 125.7 KIPS

USE 11" SQ. COL. W/ 4-#10 BARS & #3 TIES @ 12" O.C. ✓

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BY WK DATE 8-3-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-3 OF
CHKD. BY DATE FOOTINGS JOB NO. 6404 BLESSING

COL. C-4 C-3

	D.L.	L.L.
ROOF (FLAT) 8×24×23 =	4420	8×24×16 = 3080
(SLOPE) 13×24×44 =	13700	13×24×16 = 5000
COL. WT. 32×150 =	4800	
FLOOR WT 21×24×100 =	50500	21×24×50 = 25200
ROOF WF WT. 32×31 =	1000	
	74420	33,280

TOTAL P = 74.4 + 33.3 = 107.7 KIPS

✓ USE 11" SQ CONC. COL W/ 4-#9 BARS & #2 TIES @ 12"

COL. C-3.4 C-3

	D.L.	L.L.
ROOF (FLAT)	24×24×23 = 13300	24×24×16 = 9200
COL. WT.	32×150 = 4800	
FLOOR WT.	24×24×100 = 57600	24×24×50 = 28800
ROOF WF WT.	24×55 = 1320	
	77020	38000

✓ TOTAL P = 77.0 + 38.0 = 115 KIPS

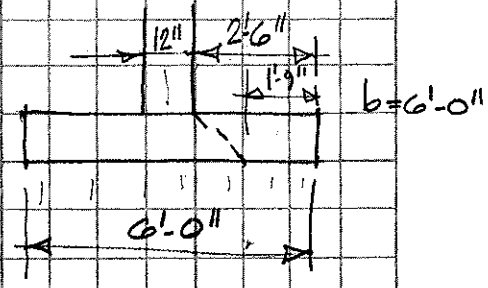
USE 11" SQ. CONC. COL. W/ 4-#9 BARS & #3 TIES @ 12"

FOOTING FOR COL. D-2 S_{PR} = SOIL PRESSURE

USING 6'-0" SQ. FTG. CRITICAL $S_{PR.}$ = 3840 PSF

ASSUME 12" DEPTH

M = 2.5 × 3840 × 6 × 1.25 = 72.0 ft. kips



CHECK CONC. K = 236 ASS'T d = 9"

$M = Kbd^2$ $d^2 = \frac{72}{6 \times 236} = 50.9$

REQ d = $\sqrt{50.9}$ = 7.1"

$A_s = \frac{M}{f_s j d} = \frac{72 \times 12 \times .85}{20 \times .875 \times 9} = 4.66\ in^2$ USE 7-#8 BARS EA. WAY

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BY VK DATE 8-4-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-4 OF
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CHECK SHEAR @ 45° LINE
AREA OF FTG PRODUCING SHEAR = 1.75 × 4.25 = 7.45 ft²
V = 7.45 × 3.84 = 28.6 KIPS
$v = \frac{V}{jbd} = \frac{28600\#}{.875 \times 2.5 \times 9 \times 12} = 122$ PSI > ALLOW = 75 PSI

CALCULATE REQ. d $d = \frac{122 \times 9}{75} = 14.6$ in.
ASSUME 18" DEPTH d = 14"
INCREASE DEAD LOAD BY 75 PSF OR 75 × 36 = 2.7 KIPS
ACTUAL $S_{PR.}$ (D.L.) = 97.1 / 36 = 2700 PSF

% OF $\frac{D.L.}{L.L.}$ $S_{PR.} = \frac{27}{41} = 66\%$ CRITICAL $S_{PR} = \frac{141.9}{36} = 3940$ PSF

FIND M = 2.5 × 3.94 × 6 × 1.25 = 73.8 ft·kips
$A_s = \frac{M}{f_s jd} = \frac{73.8 \times 12 \times .85}{20 \times .875 \times 14} = 2.97$ in² USE 10-#5 BARS E.W. (16)
$A_{s\,ACT.} = 3.10$ in² CHECK BOND $E = \frac{V}{\Sigma o jd} = \frac{3940 \times 6 \times 2.5}{240 \times .93 \times 14} = 18.9 < 19.6$

FOOTING FOR COL. B-2
D.L. = 87 + 8 (FTG.) = 95 KIPS $A_{REQ} = \frac{95}{2.7} = 35.2$ ft²

USE SAME FTG AS COL. D-2

FOOTING FOR COL. C-4
D.L. = 74.4 + 8 = 82.4 $A_{REQ} = \frac{82.4}{2.7} = 30.5$ ft²
USE 6'-6" SQ. FTG. × 18" DEEP
ACT. $S_{PR} = \frac{82.4 + 33.3}{30.3} = 3810$ PSF

$M = \frac{2.25^2}{2} \times 3.81 \times 5.5 = 53$ ft·kips

$A_s = \frac{M}{f_s jd} = \frac{53 \times 12 \times .85}{20 \times .875 \times 14} = 2.20$ in² USE 11-#4 BARS E.W.

CHECK SHEAR
V = 4.5 × 3810 = 17.2 KIPS
$v = \frac{V}{jbd} = \frac{17,200}{.935 \times 42 \times 14} = 31.2$ PSI < 75 PSI ∴ OK

$p = \frac{A_s}{bd} = \frac{2.2}{66 \times 14} = .00238$ J = .935

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4

CHECK BOND

$$E_o = \frac{V}{ujd} = \frac{2.25 \times 3810 \times 5.5}{240 \times .935 \times 14} = 15.0 \text{ PSI} < 17.3 \therefore \text{ OK}$$

FOOTING @ COL. C-3.4

D.L. = 77+8 = 85 KIPS $A_{REQ} = \frac{85}{2.7} = 31.5 \text{ ft}^2$

USE 5'-9" SQ FTG.

CRITICAL $S_{PR} = \frac{85+38}{33.2} = 3700 \text{ PSF}$

$M = \frac{2.38^2}{2} \times 5.75 \times 3.7 = 60 \text{ ft. kips}$

$A_s = \frac{M}{f_s jd} = \frac{60 \times 12 \times .85}{20 \times .9 \times 14} = 2.43 \text{ in}^2$ USE 8-#5 E.W.

4

CHECK BOND

$$E_o = \frac{V}{ujd} = \frac{5.75 \times 2.38 \times 3700 \times .85}{240 \times .9 \times 14} = 14.2 < 15.7 \text{ \% OK}$$

DESIGN FTG FOR EXTERIOR BASEMENT WALL

		D.L.	L.L.
FTG WT.	2' x 150	300	
12" WALL WT.		1800 lb/ft	
STUD WALL ABOVE	12 x 20 =	240 lb/ft	
COLUMN LOAD	19,139/24 =	796 lb/ft	6540/24 = 270 lb/ft
FLOOR LOAD	12 x 100	1200 lb/ft	12 x 50 = 600 lb/ft
		4336 lb/ft	870 lb/ft

ASSUME .66 x 3300 = 2180 PSF ALLOW. D.L. S_{PR}.

$A_{REQ} = 4336/2180 = 1.98'$ USE 24" WIDE FTG. W/ #5 T&B

ACT. $S_{PR.} = 5206/2 = 2600 \text{ PSF}$

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BY WSK DATE 8-4-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-6 OF
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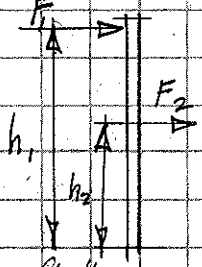
FOOTINGS BLESSING

DESIGN FOOTING UNDER STAIRWELL WALLS

	D.L.	L.L.
WALL $t = 6''$		
WALL WT. $= (12'+9')\ 75\ lb/ft^2$	$= 1580\ lb/ft$	
CONC. CLG. $= 4 \times 75$	$= 300\ lb/ft$	
STAIR LOAD $= 2 \times 135$	$= 270\ lb/ft$	$2 \times 100 = 200\ lb/ft$
	$2150\ lb/ft$	200

$A_{REQ} = 2150/2180 \approx 12''$ USE 12" WIDE FTG. w/ #4 T&B
TYP. ALL INTERIOR CONC. WALLS

DESIGN TYP. 6" WALL
$h_1 = 11'-0''$ $h_2 = 5'-6''$
D.L. COMPRESSION $= \frac{2150}{12 \times 6} = 30\ psi$



SEISMIC LOADING
$F_1 = 270 \times .133 = 36\ lb/ft$
$F_2 = 825 \times .133 = 110\ lb/ft$
$M = 36 \times 11 + 110 \times 5.5 = 396 + 605 \approx 1000\ ft.lb$

$A_s = \frac{M}{f_s j d} = \frac{12}{20 \times .875 \times 3 \times 1.33} = .172\ in^2/ft$ VERTICALLY PLACED

MIN. A_s BY U.B.C. $= .0025\ A_w$ HORIZ. $= .0025 \times 6 \times 12 = .18\ in^2$
" " " " $.0015\ A_w$ VERT $= .0015 \times 6 \times 12 = .108\ in^2$
USE #4 VERTICAL @ 12" O.C.
USE #4 HORIZ. @ 12" O.C.
CHECK CONC. $p = \frac{A_s}{bd} = \frac{.20}{12 \times 3} = .0050$ $j = .91$ $k = .27$
$f_c = \frac{2M}{jkbd^2} = \frac{2 \times 1200}{.91 \times .27 \times 12 \times 9} = 90.5\ psi < 1350$ OK

DESIGN TYP. BASEMENT (EXT.) WALL

12" WALL $12'-0'' = h$
EQUIV. FLUID WT. $= 55\ lb/ft^3$ ASSUME 1 ft SURCHARGE CAUSED BY SLAB

$\frac{wl^2}{8}$ +

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BY WK DATE 8-4-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-7 OF
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FOOTINGS BLESSING

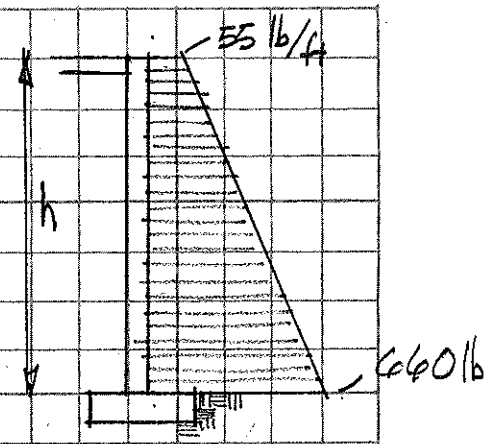
$W_1 = 605$ $W_2 = 55$

$$M_{MAX} = \frac{l^2}{16}(2W_2 + W_1) = \frac{144}{16}(110 + 605)$$

$$= \frac{144 \times 715}{16} = 6,450 \text{ ft·kips}$$

$$A_s = \frac{M}{f_s j d} = \frac{6.45 \times 12}{20 \times .875 \times 10} = .442 \text{ in}^2$$

USE #6 BARS VERT. @ 12" O.C.
HORIZ. STEEL = $.0025 \times 12 \times 12 = .36 \text{ in}^2$
USE #5 HORIZ. @ 10" O.C.
LOCATE REINF. 1½" CLEAR FROM INSIDE FACE OF WALL.



DESIGN TYP. EXTERIOR WALL FTG FOR PARTIAL BASEMENT

LOADS

	D.L.	L.L.
FTG WT. = 2 x 2 x 150	= 600 lb/ft	
STUD WALL = 12 x 20	= 240 lb/ft	
COLUMN LOAD = 19125/24	870 lb/ft	6540/24 = 2720 lb/ft
	1710	810

USE .66 x 2900 = 1915 PSF ALLOW S_{PR} FOR D.L.

$A_{REQ} = \frac{1.71}{1.92} = .89$ ft TOTAL LOAD = 1710 + 272 = 1982

ACT. $S_{PR} = \frac{1982}{1} = 1982$ PSF TRY 12" WIDE x 24" DEEP FTG.

SPAN OF FTGS = 24'-0"
MAX -M = $.107 wl^2 = .107 \times 1.142 \times 24^2 = 70.5$ ft·kips
$A_s = \frac{M}{f_s j d} = \frac{70.5 \times 12}{20 \times .875 \times 32} = 1.52 \text{ in}^2$ USE 2-#8 BARS
MAX. +M = $.077 wl^2 = 50.6$ ft·kips
$A_s = \frac{M}{f_s j d} = \frac{50.6 \times 12}{20 \times .875 \times 32} = 1.09 \text{ in}^2$ USE 2-#7 BARS

USE 12" x 36" FTG.
CHECK SHEAR $v = \frac{V}{jbd} = \frac{12 \times 1982}{.875 \times 12 \times 32} = 71$ PSI < 75 ok
NO STIRRUPS REQ.

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BY VK DATE 8-5-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-8 OF
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DESIGN COL & FTG D-2 (PARTIAL BASEMENT) C-7

LOADS	D.L.	L.L.
CLG & ROOF FLAT =	8330	6150
" " SLOPE =	13700	5000
COLUMN WT.	4800	
FLOOR WT. = 16×24×100 =	38400	16×24×50 = 19200
ROOF WF WT.	1240	
	66,470 lb	30,350 lb

TOTAL LOAD = 66.5 + 30.4 = 96.9 KIPS

✓ USE 11" SQ. COL. W/ 4-#8 & #3 TIES @ 12"

$A_{REQ\ FTG.} = \frac{72.1}{2.7} = 26.7\ ft^2$ USE 5'-3" SQ. FTG.

$ACT\ S_{PR} = \frac{102.5}{27.6} = 3720\ PSF\ (D+L)$

$M = 2.125 \times 5.25 \times 3.72 \times 1.06 = 43.90\ ft.kips$

$A_s = \frac{M}{f_s jd} = \frac{43.9 \times 12 \times .85}{20 \times .875 \times 14} = 1.82\ in^2$ USE 9 #4 BARS E.W.

CHECK CONC. ACT $K = \frac{M}{bd^2} = \frac{43.9 \times 12 \times .85}{63 \times 14^2} = 36.2$ ∴ CONC. SAFE

$P = \frac{A_s}{bd} = 1.68/63 \times 14 = .0018$ ACT. J = .94

CHECK BOND

$\Sigma_o = \frac{V}{ujd} = \frac{2 \times 5.25 \times 3720 \times .85}{240 \times .94 \times 14} = 10.5 < 14.1$ ∴ O.K.

DESIGN COL. & FTG. @ C-4 C-5

LOAD =	D.L.	L.L.
ROOF & CLG FLAT =	4420	3080
SLOPE =	13700	5000
COL. WT =	2400	
ROOF WF WT. =	1000	
	21,520	8080

✓ USE 11" SQ. COL. W/ 4-#6 BARS

ASSUME FTG. WT = 1400 lb

ALLOW D.L. S_{PR} = .66 × 3560 = 2350 PSF

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BY WK DATE 8-5-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-9 OF
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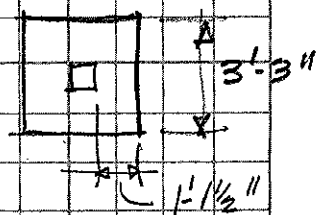
FOOTINGS BLESSING

REQ $A = \frac{22.9}{2.35} = 9.75\ ft^2$ USE 3'-3" SQ. FTG x 12" DEEP



Act S_{TR} (L+D) $= \frac{31}{10.6} = 2930$ PSF

$M = \frac{1.125^2}{2} \times 3.25 \times 2930 = 6.02$ ft.kips

$A_s = \frac{6.02 \times 12 \times .85}{20 \times .867 \times 8} = .438\ in^2$ USE 3-#4 BARS

CHECK BOND

$\mu_o = \frac{V}{\mu j d} = \frac{.41 \times 3.25 \times 2930}{240 \times .875 \times 8} = 2.32$

USE 3-#4 E.W.

DESIGN COL. & FTG. @ C-3A C-5

	D.L.	L.L.
LOAD ROOF =	13 300	9200
COL. WT. =	2400	
ROOF WF WT. =	1320	
	17020	9200

✓ USE 11" SQ. COL. W/ 4-#6

ASSUME FTG WT = 1400 lb

$A_{REQ.} = 18420/2350 = 7.85\ ft^2$ USE 2'-10" SQ. FTG. x 12" DEEP

USE 3-#4 E.W.

DESIGN COL. & FTG @ D-1 C-6

LOADS:	D.L.	L.L.
ROOF 4 in 12	13 700	5000
" 2 in 12	2880	1540
" WF WT.	1750	
COL. WT. 24 x 150 =	3600	
FLOOR WT. 17 x 24 x 100	41 000	17x24x50=20500
	61,930 lb	27,040 lb

✓ USE 11" SQ. COL. W/ 4-#7

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BY WK DATE 8-6-65 SUBJECT CUPERTINO CITY HALL SHEET NO. F-10 OF
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FTG. WT. = 5.6 KIPS TOTAL DL. = 5.6 + 61.9 = 67.5 KIPS

$A_{REQ} = \frac{67.5}{2.7} = 25\ ft^2$ USE 5'-0" SQ. FTG

$A_{CT.}\ S_{PR} = \frac{94.4}{25} = 3780$ PSF USE 9-#4 E.W.

DESIGN TYP. PERIMITER COL. (OUTSIDE WALKWAY) C-5

LOAD:

	D.L.	L.L.
ROOF = 24x9x30	= 6500	24x9x16 = 3460
CONC. BEAM = 24x164	= 3940	
COL. WT = 150x11	= 1650	
	12,090	3460

USE 12x12 COLUMN W/ 4-#6

DESIGN COL & FTG @ E-2

	D.L.	L.L.
LOAD FROM SHEET F-2	87.07 KIP	38.16 KIP
LOAD FROM B-5	7.0 KIP	
LOAD FROM B-4	3.5 KIP	
	97.57 KIP	38.16 KIP

TOTAL P = 97.57 + 38.6 = 136.4 KIP
USE 12½" SQ. CONC. COL. W/ 4-#11 BARS

FTG. REQ. = 97.57/2.620 = 37.2 ft^2 USE 6'-0" SQ. FT.
W/ 10-#5 EA. WAY

DESIGN FTG. ASSUME WT = 150016

$A = \frac{13590}{2350} = 5.78\ ft^2$ USE 2'-6" SQ. FTG.