LEO A DALY

SUBJECT Structural Calculations

PROJECT Telex/Hygain To

COMPUTED NFB CHECKED

DATE 4-28-82 PAGE O

STRUCTURAL CALCULATIONS

FOR

52-FOOT TELESCOPING ANTENNAE TOWER

PER

LOS ANGELES BUILDING CODE

FOR

TELEX COMMUNICATIONS INC.
8601 NORTHEAST HIGHWAY 6
LINCOLN, NEBRASKA 68505

BY

LEO A. DALY COMPANY
8600 INDIAN HILLS DRIVE
OMAHA NEBRASKA 68114
(402) 391 - 8111

REGISTERED PROFESSIONAL ENGINEER
MICHAEL FRANCIS BA[illegible]ERT
No. C31194
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CIVIL
STATE OF CALIFORNIA

Michael F Bau

LEO A DALY

SUBJECT CODE CHECK

PROJECT TELEX TOWER
030382

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DATE 4/22/82 PAGE 1 OF

DESIGN CRITERIA

LOS ANGELES BUILDING CODE, 1980 EDITION

	LABC SECTION
WIND TO ACT ON NORMAL PROJECTED AREA OF ALL ELEMENTS OF ONE FACE	2305, n,
- BASIC WIND PRESSURE = 15 PSF	TABLE 2
- WIND AREA = 2.00 x EXPOSED AREA OF ONE FACE	TABLE 2

ANTENNA AREA = 1.0 FT^2

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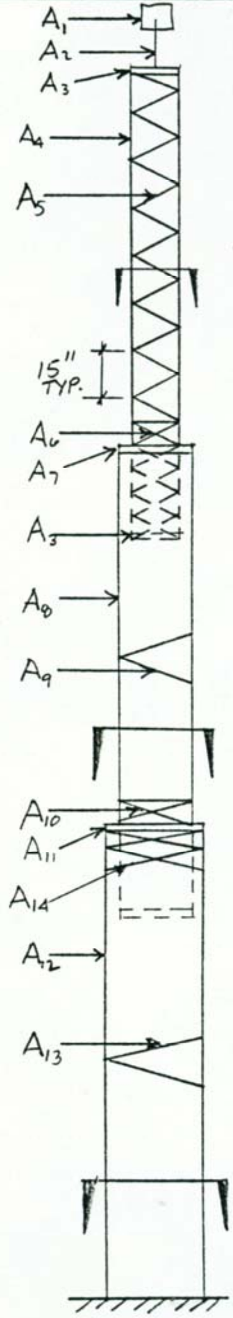
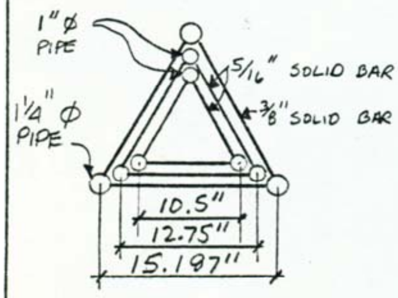
WIND AREAS





	SHAPE FACTOR	AREA
A_1 = ANTENNA AREA = 1.0 FT^2	1.30	1.30 F
A_2 = 2" ø × 24" LONG TUBE $= 2 \times 24/144 = 0.33$ FT^2	1.00	0.33 F
A_3 = 3" × 9.5" GIRT $= 3" \times 9.5"/144 = 0.198$ FT^2	2.00	0.40 FT
A_4 = 1" ø TUBE × 2 SIDES $= 1" \times 12" \times 2/144 = 0.167$ FT^2/FT	$2.00 \times 2/3$	0.22 FT/
A_5 = 5/16" BAR DIAGONAL (2 PER 15") $= 2 \times \frac{5}{16} \times \frac{12"}{15"} \times \sqrt{9.5^2+7.5^2}/144 = 0.042$ FT^2/FT	$2.00 \times 2/3$	0.05 FT/
A_6 = 5/16" BAR X-BRACE $= 2 \times A_5 = 0.084$ FT^2/FT	$2.00 \times 2/3$	0.11 FT/
A_7 = 3" × 11.75" GIRT $= 3" \times 11.75"/144 = 0.245$ FT^2	2.00	0.49 FT
A_8 = 1" ø TUBE × 2 SIDES $= A_4 = 0.167$ FT^2/FT	$2.00 \times 2/3$	0.22 FT/
A_9 = 5/16" BAR DIAGONAL (2 PER 15") $= 2 \times \frac{5}{16}" \times \frac{12"}{15"} \times \sqrt{11.75^2+7.5^2}/144 = 0.048$ FT^2/FT	$2.00 \times 2/3$	0.06 FT/
A_{10} = 5/16" BAR X-BRACE $= 2 \times A_9 = 0.096$ FT^2/FT	$2.00 \times 2/3$	0.13 FT/
A_{11} = 3" × 13.94" GIRT $= 3" \times 13.94/144 = 0.29$ FT^2	2.00	0.58 FT^2
A_{12} = 1¼" ø TUBE × 2 SIDES $= 1\frac{1}{4}" \times 12" \times 2/144 = 0.208$ FT^2/FT	$2.00 \times 2/3$	0.28 FT
A_{13} = 3/8" BAR DIAGONAL (2 PER 15") $= 2 \times \frac{3}{8}" \times \frac{12"}{15"} \times \sqrt{13.94^2+7.5^2}/144 = 0.066$	$2.00 \times 2/3$	0.09 FT^2/
A_{14} = 3/8" BAR X-BRACING $= 2 \times A_{13} = 0.132$ FT^2/FT	$2.00 \times 2/3$	0.18 FT^2/

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SUBJECT: WIND LOADS

PROJECT: TELEX TOWER

COMPUTED: MJS CHECKED: MFB

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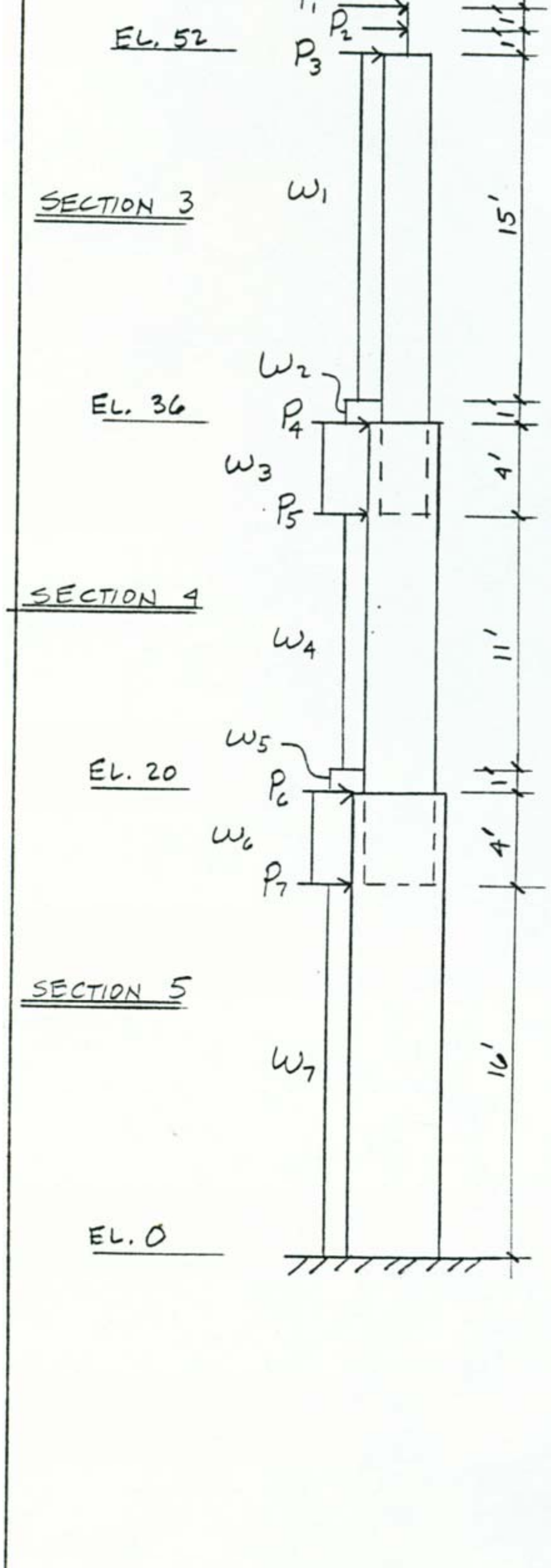
WIND LOADS



P_1 = ANTENNA = 15 PSF × 1.30 FT^2 = 19.5#

P_2 = MAST = 15 PSF × 0.33 FT^2 = 5.0#

P_3 = GIRT = 15 PSF × 0.40 FT^2 = 6.0#

ω_1 = LEGS + DIAGONALS (SECTION 3)
= 15 PSF × (0.22 + 0.05) = 4.2#/

ω_2 = LEGS + X-BRACE (SECTION 3)
= 15 PSF × (0.22 + 0.12) = 5.1#/F

P_4 = GIRT = 15 PSF × 0.49 FT^2 = 7.4#

ω_3 = LEGS + X-BRACE (SECTION 3)
+ LEGS + DIAGONALS (SECTION 4)
= 15 PSF × (0.22 + 0.11 + 0.22 + 0.06) = 9.5#/

P_5 = GIRT = 15 PSF × 0.40 FT^2 = 6.0#

ω_4 = LEGS + DIAGONALS (SECTION 4)
= 15 PSF × (0.22 + 0.06) = 4.4#/F

ω_5 = LEGS + X-BRACE (SECTION 4)
= 15 PSF × (0.22 + 0.13) = 5.4#/F

P_6 = GIRT = 15 PSF × 0.58 = 8.7#

ω_6 = LEGS + X-BRACE (SECTION 4)
+ LEGS + X-BRACES (SECTION 5)
= 15 PSF × (0.22 + 0.13 + 0.28 + 0.18) = 12.2#/F

P_7 = GIRT = 15 PSF × 0.49 FT^2 = 7.4#

ω_7 = LEGS + DIAGONALS (SECTION 5)
= 15 PSF × (0.28 + 0.09) = 5.7#/F

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LEO A. DALY FORM NO. 6

WIND SHEARS & MOMENTS (SEE DIAGRAM, "WIND LOADS")

SHEAR

@ EL. 36'

$$V = 19.5^{\#} + 5.0^{\#} + 6.0^{\#} + (4.2)(15') + (5.1)(1') = \underline{\underline{98.6^{\#}}}$$

@ EL. 20'

$$V = 98.6^{\#} + 7.4^{\#} + (9.5)(4') + 6.0^{\#} + (4.4)(11') + (5.4)(1') = \underline{\underline{203.8}}$$

@ EL. 0

$$V = 203.8^{\#} + 8.7^{\#} + (12.2)(4') + 7.4^{\#} + (5.7)(16) = \underline{\underline{360.0^{\#}}}$$

MOMENT

@ EL. 36'

$$M = (19.5)(18') + (5.0)(17') + (6.0)(16') + (4.2)(15')\left(\tfrac{15'}{2} + 1'\right) + (5.1)(1')^2/2 = \underline{\underline{1070\ '^{-}}}$$

@ EL 20'

$$M = 1070 + (98.6)(16') + (7.4)(16') + (9.5)(4')\left(\tfrac{4'}{2} + 12'\right) + (6.0)(12') + (4.4)(11')(11'/2 + 1') + (5.4)(1')^2/2 = \underline{\underline{3687'}}$$

@ EL 0

$$M = 3687 + (203.8)(20') + (8.7)(20') + (12.2)(4')(4'/2 + 16') + (7.4)(16') + (5.7)(16')^2/2 = \underline{\underline{9663'^{-}}}$$

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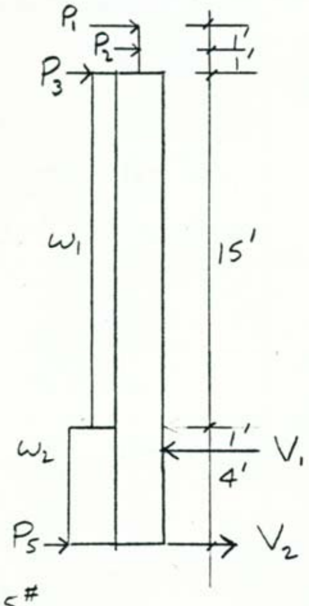
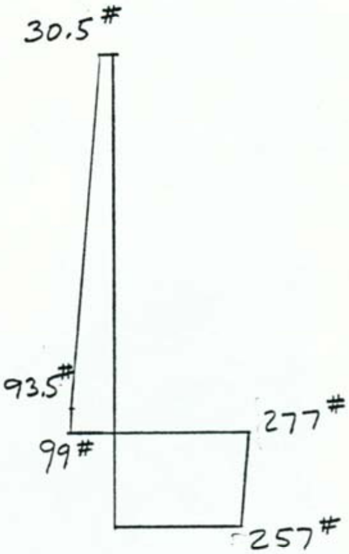
FREE BODY DIAGRAMS

SECTION 3



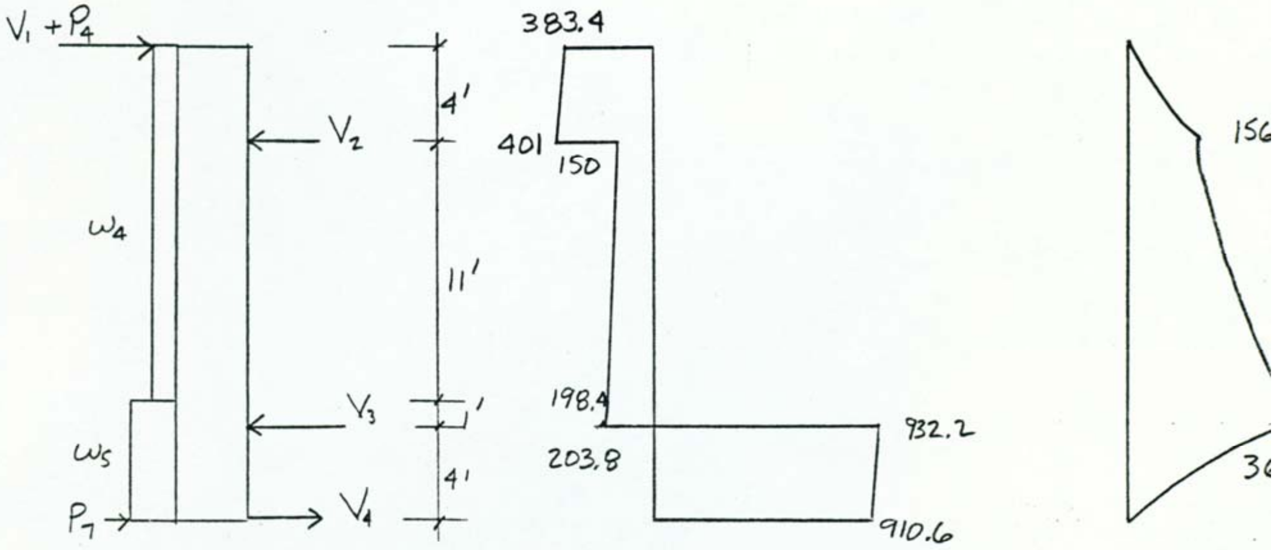


$P_1 = 19.5^{\#}$
$P_2 = 5^{\#}$
$P_3 = 6^{\#}$
$P_5 = 6^{\#}$
$\omega_1 = 4.2^{\#}/FT$
$\omega_2 = 5.1^{\#}/FT$

$$\Sigma F_{V_2} = 19.5 \times 22' + 5 \times 21' + 6 \times 20' + \cdot$$
$$+ 5.1 \times 5^2/2 - 4 \times V_1$$
$$\therefore V_1 = 376^{\#}$$
$$V_2 = 251^{\#}$$

FREE BODY DIAGRAMS (CONTD)

SECTION 4



$V_1 + P_4 = 376 + 7.4 = 383.4^{\#}$

$P_7 = 7.4^{\#}$

$\omega_4 = 4.4^{\#}/FT$

$\omega_5 = 5.4^{\#}/FT$

$V_2 = 251^{\#}$

$\Sigma F_{V_4} = 383.4 \times 20 + 4.4 \times 15 \times (15/2 + 5) + 5.4 \times 5^2/2 - 251 \times 16 - 4 \times V_3$

$\therefore V_3 = 1136^{\#}$

$V_4 = 903.2^{\#}$

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SUBJECT FREE BODY DIAGRAMS
PROJECT TELEX TOWER
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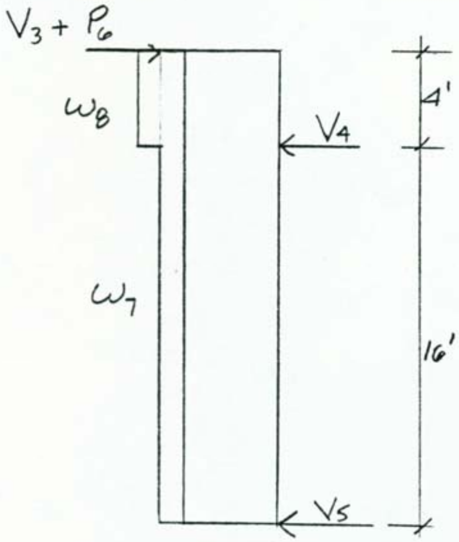
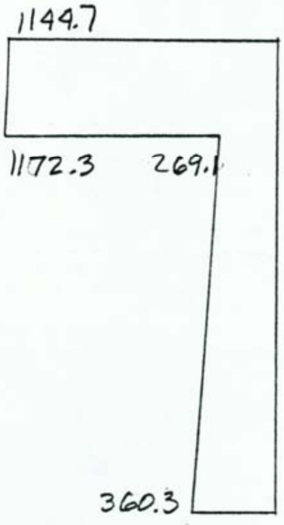
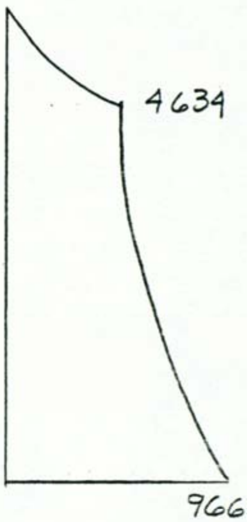
FREE BODY DIAGRAMS (CONT'D)

SECTION 5







$V_3 + P_6 = 1136^{\#} + 8.7^{\#} = 1144.7^{\#}$

$V_4 = 903.2^{\#}$

$w_7 = 5.7\ ^{\#}/FT$

$w_8 = (0.28 + 0.18) \times 15\ PSF = 6.9\ ^{\#}/FT$

$$\Sigma M_{V_5} = 1144.7 \times 20' - 903.2 \times 16' + 6.9 \times 4' \times (4/2 + 16) + 5.7 \times 16^2/2 = 9669\ ^{1\text{-}\#}$$

$$V_5 = 1144.7 - 903.2 + 6.9 \times 4 + 5.7 \times 16 = 360.3^{\#}$$

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SUBJECT DEAD LOADS

PROJECT TELEX TOWER

COMPUTED MJS CHECKED MFB

DATE 4/23/82 PAGE 8 OF

DEAD LOADS

	MEMBER	QUANTITY	LENGTH (FT)	SIZE	LB/FT	WT. (L
	ANTENNA	1				50
SECTION 3						
	MAST	1	2'	1½"ϕ	2.72	5.4
	GIRT	6	1.0'	⅛" × 3"	1.27	7.6
	LEG	3	20'	1"ϕ × 0.065"	0.7	42.0
	DIAGONAL	72	1.0'	5/16"ϕ	0.26	18.7
	X-BRACE	48	1.0'	5/16"ϕ	0.26	12.5
						86.2
SECTION 4						
	GIRT	6	1.2'	⅛" × 3"	1.27	9.1
	LEG	3	20'	1"ϕ × 0.095"	0.92	55.2
	DIAGONAL	72	1.16'	5/16"ϕ	0.26	21.7
	X-BRACE	48	1.16'	5/16"ϕ	0.26	14.5
						100.5
SECTION 5						
	GIRT	6	1.4'	⅛" × 3"	1.27	10.6
	LEG	3	20'	1¼"ϕ × .120"	1.45	87.0
	DIAGONAL	78	1.32'	⅜"ϕ	0.37	38.0
	X-BRACE	36	1.32'	⅜"ϕ	0.37	17.6
	PULLEY					10.0
						163.2

TOTAL = 400

SEISMIC CHECK USING WORST POSSIBLE FACTORS

V = IKCSW

I = 1.0   K = 2.0   CS = .14 MAX   W = 400#

V = 1.0 (2.0)(.14)(400) = 112#

WIND SHEAR = 360#   i.e. WIND CONTROLS

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SUBJECT CABLE CHECK

PROJECT TELEX TOWER

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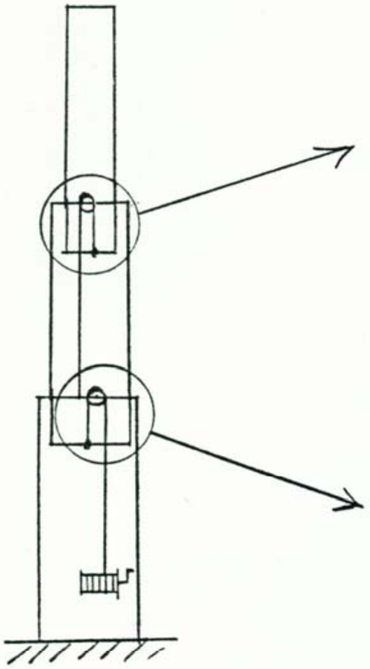
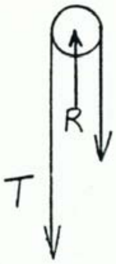
CABLE LOADS

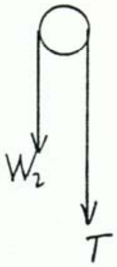




W_1 = WT. OF SECTION 3 = 136.2#

T = 136.2#

R = 136.2 + 136.2 = 272.4#



W_2 = WT. OF SECTION 4 + R

= 100.5# + 272.4

= 372.9#

$\therefore$ T_{MAX} = 373#

R = 373 + 373 = 746#

RATED WINCH CAPACITY = 1500#

CABLE BRKG STRENGTH = 4200#

} O.K.

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ALLOWABLE COMPRESSIVE LOADS

MEMBER	SIZE	AREA	(ℓ)	r	K	$K\ell/r$	F_Y	f_a** (KSI)	P_{ALLO}
SECTION 3									
LEG	$1''\phi \times 0.065$	0.19 IN^2	15"	0.33"	1.0	45	45	21.6	4100#
DIAGONAL	$5/16''\phi$	0.076	12.1"	0.078"	1.0	155	36	6.22	472#
X-BRACE	$5/16''\phi$	0.076	12.1"	0.078"	0.8*	124	36	9.70	737#
SECTION 4									
LEG	$1''\phi \times 0.095$	0.27 IN^2	15"	0.32"	1.0	47	45	21.4	5778#
DIAGONAL	$5/16''\phi$	0.076	13.9"	0.078"	1.0	178	36	4.71	358#
X-BRACE	$5/16''\phi$	0.076	13.9"	0.078"	0.8*	143	36	7.30	555#
SECTION 5									
LEG	$1\frac{1}{4}''\phi \times 0.12$	0.42 IN^2	15"	0.40"	1.0	38	45	22.1	9282#
DIAGONAL	$3/8''\phi$	0.11	15.8"	0.093"	1.0	170	36	5.17	481#
X-BRACE	$3/8''\phi$	0.11	15.8"	0.093"	0.8*	136	36	8.07	887#

* ASSUME X-BRACING RECEIVES SOME LATERAL SUPPORT FROM OTHER BARS.

** DIAGONALS & X-BRACES BASED ON AISC, 1.5.1.3
LEGS BASED ON AISI SPEC, 3.6.1.1 (Q = 1.0)

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SUBJECT Member Checks

PROJECT Telex Tower

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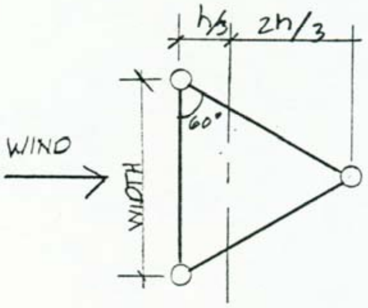
MAX. COMPRESSION IN CHORDS



$h = \text{WIDTH} \times \sin(60°)$

$M_R = F \times 2h/3 + 2 \times F/2 \times h/3 = F \times h$

$\therefore F = M/h$

ELEV	WIDTH	h	M	① M/h	② DL/3	③ CABLE LOAD	TOTAL ① + ② + ③	PALLOW	
36'	10.5"	9.1"	1070'-#	1411#	46#	136#/3	1503#	4100#	OK
20'	12.75"	11.0"	3687'-#	4022#	79#	373#/3	4225#	5778#	OK
0'	15.18"	13.1"	9669'-#	8857#	133#	746#/3	9239#	9282#	OK

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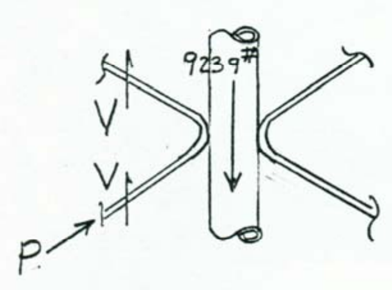
MAX. COMPRESSION IN DIAGONALS DUE TO SHEAR TRANSFER

SECTION ⑤

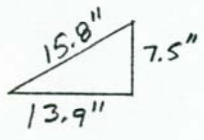


TOTAL # OF DIAGONALS ATTACHED TO ONE CHORD = 64 IN THE BOTTOM SECTION (SECTION 5)

$$\therefore V = \frac{9239}{64} = 144^{\#}$$

$$P_{MAX} = \frac{15.8}{7.5} \times 143 = 302^{\#}$$

$$P_{ALLOW} = 481^{\#} \quad \text{OK}$$



SECTION ④ (& SECTION ③)

- ASSUME, IN THIS SECTION, THAT THE ENTIRE LOAD IS TRANSFERRED BY THE DIAGONALS. I.E., THE X-BRACES ARE NOT USED AT ALL FOR THIS LOAD TRANSFER.

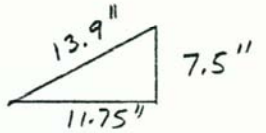
TOTAL VERT. FORCE = 4225#

\# OF DIAGONALS = 48

$$\therefore V = \frac{4225}{48} = 88^{\#}$$

$$P_{MAX} = 88^{\#} \times \frac{13.9}{7.5} = 163^{\#}$$

$$P_{ALLOW} = 358^{\#} \quad \text{OK}$$



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SUBJECT MEMBER CHECKS | PROJECT TELEX TOWER

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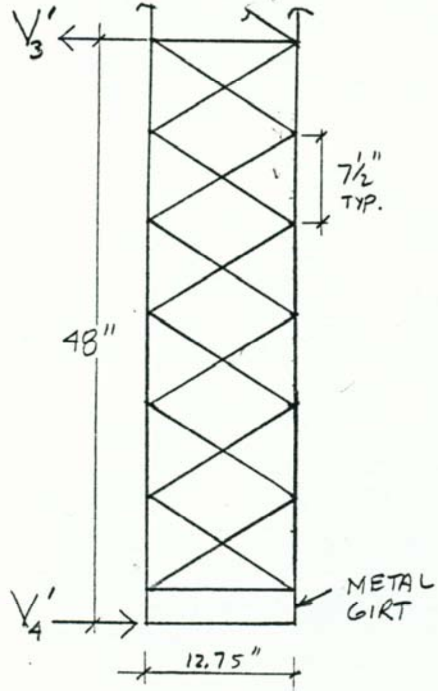
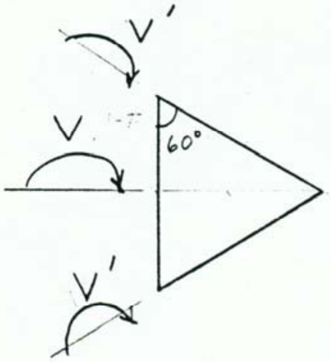
MAX. COMPRESSION IN X-BRACING

SECTION 4





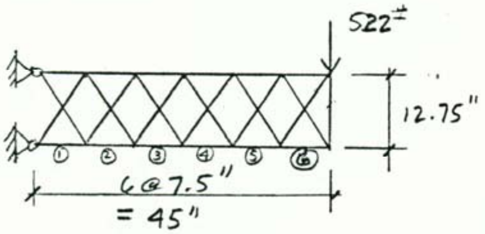
$$V' = \frac{V}{2} \times \frac{1}{\sin 60^\circ}$$

$$\left.\begin{array}{l} V_3 = 1136^{\#} \\ V_4 = 903.2^{\#} \end{array}\right\} P.6$$

$$\therefore\ V_3' = \frac{1136}{2} \times \frac{1}{\sin 60} = 655^{\#}$$

$$V_4' = \frac{903.2}{2} \times \frac{1}{\sin 60} = 522^{\#}$$

- STRUDL INPUT



CHORDS : $A_x = 0.27\ IN^2$

$I_z = 0.049\,(1.0^4 - 0.81^4) = 0.028$ IN

DIAGONALS : $A_x = 0.076\ IN^2$

$I_z = 0.785\,(5/32'')^4 = 0.000468$ I

- OUTPUT :

MAX. FORCE IN DIAGONAL $= 319^{\#}$

$P_{ALLOW} = 555^{\#}$

OK

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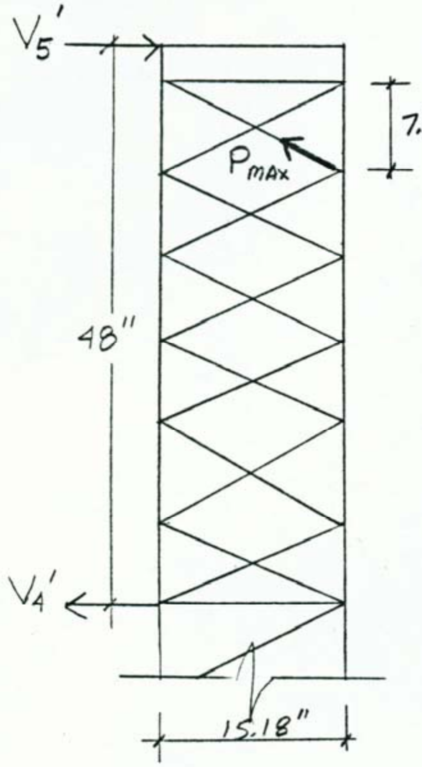
MAX. COMPRESSION IN X-BRACING (CONTD)

SECTION 5



$$V_5' = \overbrace{(V_3 + P_6)}^{P.7} \times \frac{1}{2 \times \sin 60°} \qquad \text{(SEE P. 13)}$$

$$= 1144.7/2 \times \sin 60°$$

$$= 661 \#$$

$$V_4' = 522 \# \qquad (P. 13)$$

FROM STRUOL ANALYSIS ON SECTION 5,

$$P_{MAX} = 391 \#$$

$$P_{ALLOW} = 887 \# \qquad (P. 10)$$

OK

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SUBJECT: MEMBER CHECKS

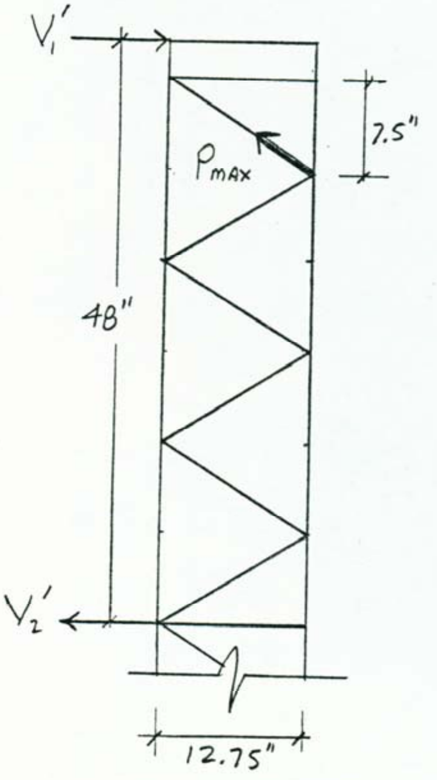
PROJECT: TELEX TOWER

COMPUTED: MJS CHECKED: MFB

DATE: 4/27/82 PAGE: 15 OF: 18 PAGES

MAX. COMPRESSION IN DIAGONAL DUE TO INTERNAL COUPLE

@ SECTION 4 ONLY



$$V_1' = \frac{V_1 + P_4}{2} \times \frac{1}{\sin 60} = \frac{383.4}{2} \times \frac{1}{\sin 60} = 222^{\#}$$

$$V_2' = \frac{V_2}{2} \times \frac{1}{\sin 60} = \frac{251}{2} \times \frac{1}{\sin 60} = 145^{\#}$$

$$\therefore P_{MAX} = 222^{\#} \times \frac{\sqrt{7.5^2 + 12.75^2}}{12.75^2}$$

$$= 258^{\#}$$

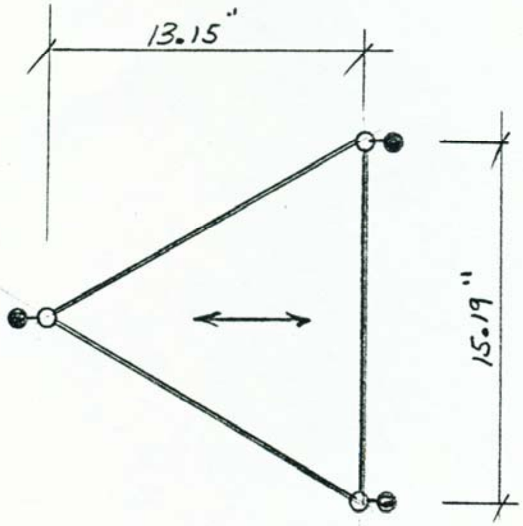
$$P_{ALLOW} = 358^{\#} \quad (P.\ 10)$$

OK

Michael F Baumert

REGISTERED PROFESSIONAL ENGINEER
MICHAEL FRANCIS BAUMERT
No. C31194
4-28-82
CIVIL
STATE OF CALIFORNIA

LEO A DALY	SUBJECT BASE CONNECTION	PROJECT TELEX / HYGAIN TOWER
	COMPUTED NFB CHECKED NFB	DATE 4-27-82 PAGE 16 OF 18 PAGES



REF: PAGE 4, 8

TOWER WEIGHT = 400#

WIND OVERTURNING MOMENT = 9663'"

WIND SHEAR = 360#

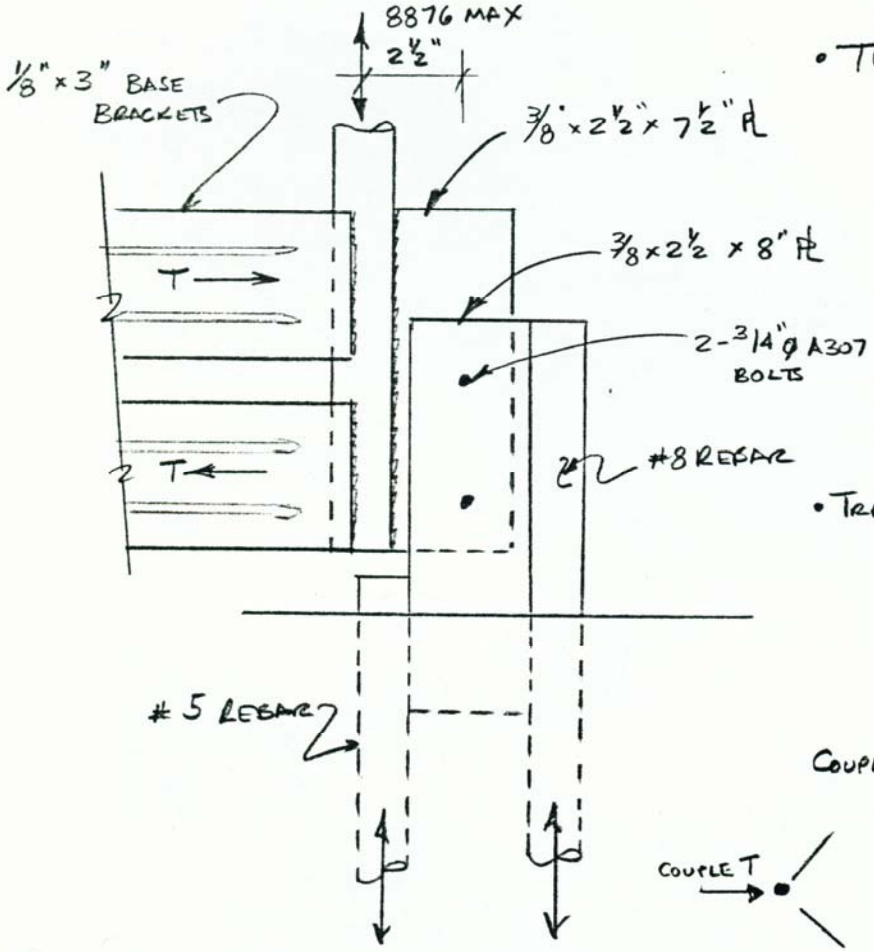
REACTION @ BASE

$$\text{VERT} = \frac{9663\,(12)}{13.15} \pm \frac{400}{3} = \uparrow 8684^{\#},\ \downarrow 8951^{\#}$$

$$\text{HORIZ} = 360/3 = 120^{\#}$$

• CHECK BOLT SHEAR P_{ALL} 3/4"ø A307 = 4.4^k

$$\#\text{REQ'D} = 8951/4400 = 2.03 \quad \text{USE } \underline{\underline{2}}$$



• TOP PL w/ ECCENTRIC LOAD (3/16" WELD)

REF AISC pg 4-76 TABLE XIX

$l = 7.5"$ D: 3 $al = 2.5"$

$a = .33$ $C_1 = 1.0$ $K = 0$

FROM CHART C = 1.14

$$P_{ALL} = 1.14\,(1)(3)(7.5) = 25.6^k \gg 8.9 \text{ O.K}$$

• TRANSFERRING ECCENTRICITY INTO BASE BRACKETS

FORCE COUPLE MUST RESIST Pe

$$Pe = 8951 \cdot (2.5) = 22{,}400$$

$$\text{COUPLE T} = \frac{22{,}400}{4.5} = 4980^{\#}$$

COUPLE T

RESOLVING INTO 2 BRACKETS @ 60°

$$\text{COUPLE T} = \frac{4980}{2 \times \cos 30} = 2880^{\#}$$

Michael F Baumert

No. C31194

4-28-82

BASE BRACKET WELD CAPACITY =

$$.707(2)(925)(3) = 3923^{\#} \quad \text{O.K}$$

(1/8" WELD)

NOTE: PER <u>LABC 91.2305.n.10</u>.
NO 1/3 - STRESS INCREASE
ALLOWED OR TAKEN

LEO A DALY

SUBJECT BASE CONNECTION

PROJECT TELEX / HYGAIN TOWER

COMPUTED NFB CHECKED NFB

DATE 4-27-82 PAGE 17 OF 18 PAGES

BASE CONNECTION - CONT'D

CHECK BEARING ON 3/4"ϕ A307 BOLT ON 3/8" BASE EAR'S

REF AISC pg 4-6 TABLE 1-E

P_{ALL} ON 3/8" MAT'L W/ SPACING ≈ 2.5" = 22^K >> 4.4 BOLT CAPACITY

REBAR TENSIONS

P PER REBAR = $8951/2 = 4476$

USING 20,000 psi ALLOW STRESS

$A_{REQ'D} = 4476/20{,}000 = .22\,\text{in}^2$

USE #5 REBAR INSIDE, #8 FOR CAGE (FABRICATION PURPOSES)

WELD REQ'D $\dfrac{4476}{2\,(925)(2)} = 1.2$

USE 2 - 1/8" × 2½" WELDS

l_d #8 A615-40 REBAR ACI 12.2.2

$l_d = .04(.79)(40{,}000)/\sqrt{2000} = 28.6"$

$= .0004\,(1)(40{,}000) = 16"$

USED 54" O.K

l_d #5 A615-40 REBAR ACI 12.2.2

$l_d = .04\,(.31)(40{,}000)/\sqrt{2000} = 11"$

$> .0004\,(.625)(40{,}000) = 10"$

USE 16" LONG REBAR

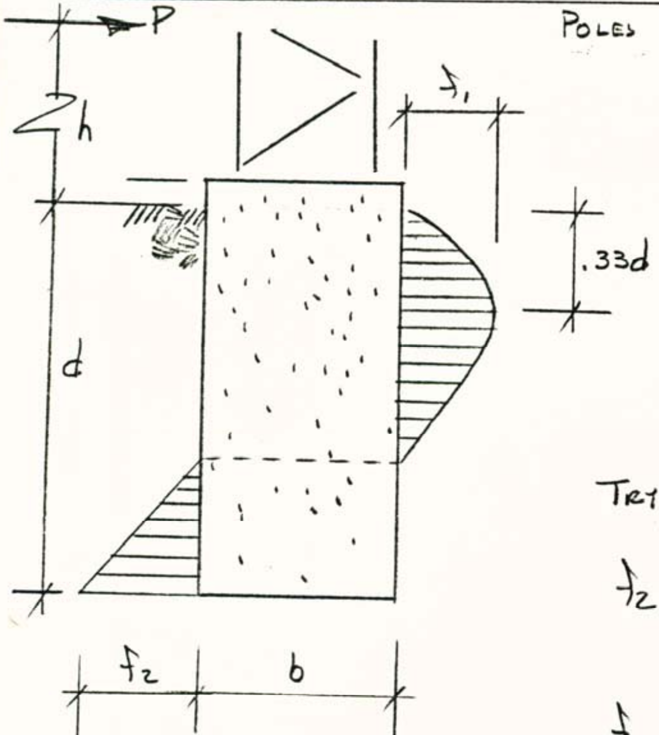
Michael F Baumert

No. C31194

4-28-82

LEO A DALY

SUBJECT FOUNDATION BEARING PRESSURES
PROJECT TELEX/HYGAIN
COMPUTED NFB CHECKED NFB
DATE 4-23-82 PAGE 18 OF 18 PAGES



POLES W/O LATERAL RESTRAINT @ SURFACE

$$f_1 = \frac{2.85\,P}{bd} + \frac{f_2}{4}$$

$$f_2 = \frac{7.62\,P(2h+d)}{bd^2}$$

$$M_{OT} = 9663^{\#\text{-}'} \quad P = 360^{\#}$$

$$h = \frac{9663}{360} + .5 = 27.3'$$

TRY $b = 3.5'$ $d = 5.5'$

$$f_2 = \frac{7.62\,(360)(2\cdot 27.3 + 5.5)}{1.27\,(3.5)(5.5)^2} = 1226 \text{ PSF}$$

$$f_1 = \frac{2.85\,(360)}{1.27\,(3.5)(5.5)} + \frac{1226}{4} = 348 \text{ PSF}$$

LABC 91.2311 CASE II

LABC 91.2803(d) ALLOW BRG PRESSURE TABLE No 28-B

USING: GRAVEL, SILTY OR GRAVEL CLAYEY, OR SAND, SILTY $f = 333$ PSF/FT

1/3 INCREASE FOR WIND PRESSURE ALLOWED

100% INCREASE FOR ISOLATED POLES OR SIGNS ALLOWED BUT NOT TAKEN

$$f_{1\,ALLOW} = 333\,(.33)(5.5)\,4/3 = 805 \text{ psf}$$

$$F.S. = 805/348 = 2.31$$

$$f_{2\,ALLOW} = 333\,(5.5)\,4/3 = 2442 \text{ PSF}$$

$$F.S. = 2442/1226 = 1.99$$

Michael F Baumert
No. C31194
4-28-82

LABC 91.2305 MOMENT OF STABILITY REQ'D = 1.5 O.K

LABC 91.2803 FOUNDATION BEARING PRESSURE (VERTICAL)

TOWER WEIGHT = 400# + FOOTING = $3.5^2(5.5)(150) = 10106 \cong 10,500$

$f = 10,500/3.5^2 \cong 860$ psf O.K ANY SOIL TYPE

USE 3'-6" × 3'-6" × 5'-6" BASE

LOAD AND STRESS ANALYSIS

TELEX/HYGAIN PRODUCT 125
STEEL CRANK UP TOWER

BY
MORRIS STOVER

NOVEMBER 16, 1982

PADMASTER® / Made in U.S.A.

M.S.S. 11-16-82 1/1

THIS REPORT PROVIDES AN ANALYSIS OF LOADS AND RESULTING STRESSES FOR TELEX/HYGAIN PRODUCT 125 CRANK UP TOWER.

PADMASTER® / Made in U.S.A.

DESIGN CRITERIA

1. STRUCTURAL DESIGN: UBC
2. WIND LOADS: UBC 20
3. DESIGN STRESS: AISC
4. FOOTINGS: UBC/ACI

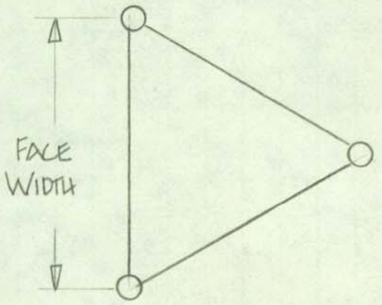
REFERENCES:

1. STRUCT. ENGR. HNDBK.
2. ASTM STANDARDS
3. AISC STEEL CONSTRUCTION MANUAL
4. ACI 318-77
5. TELEX/HYGAIN TOWER DESIGN & INSTALLATION DRAWING NO. 125-1

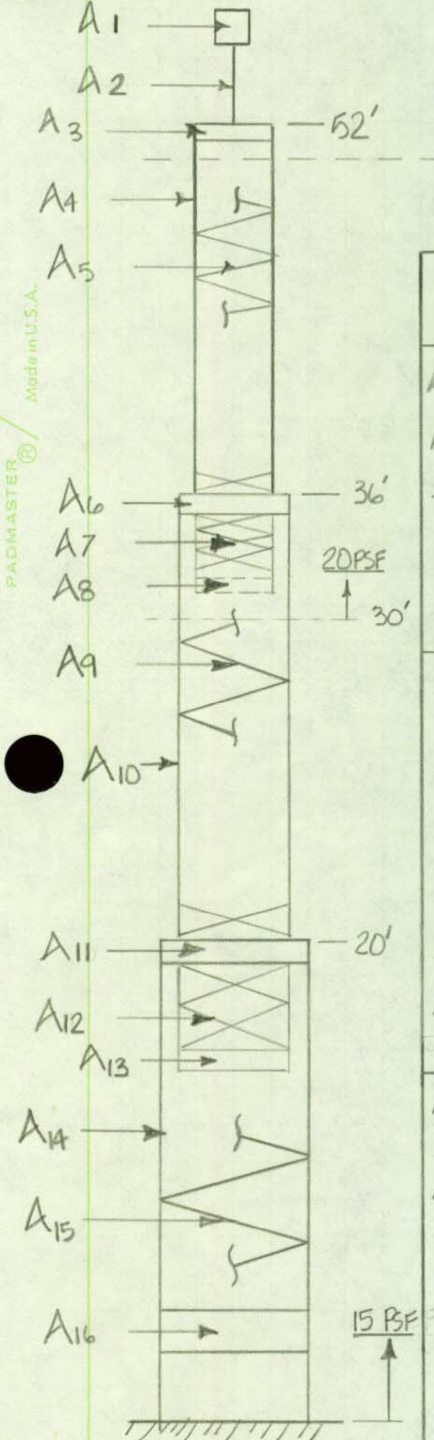
PRODUCT 125
CRANK-UP TOWER

MSS 10-21-82

WIND LOADS - UBC



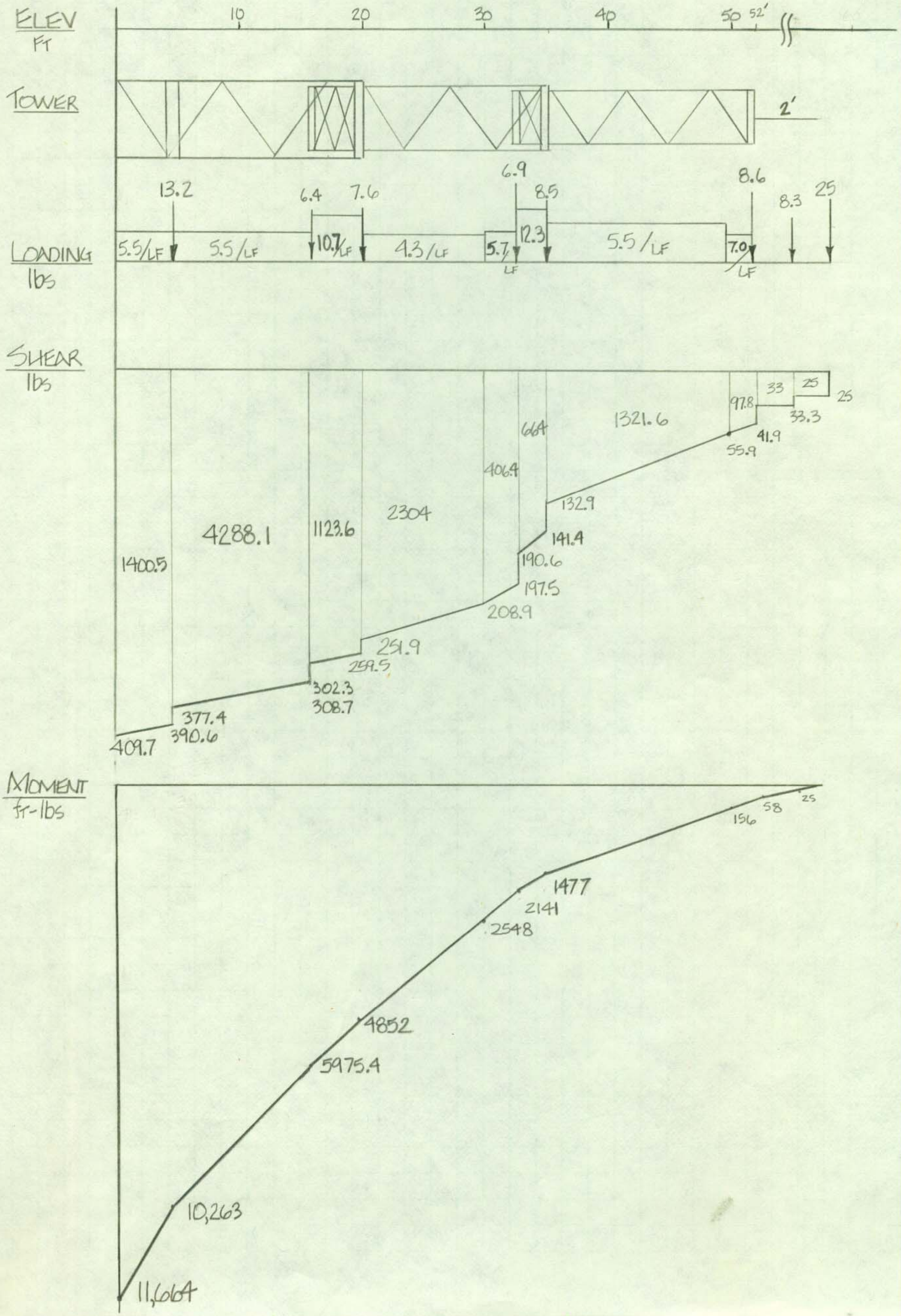
SECTION	FACE WIDTH
3	10.5"
4	12.75"
5	15.187"

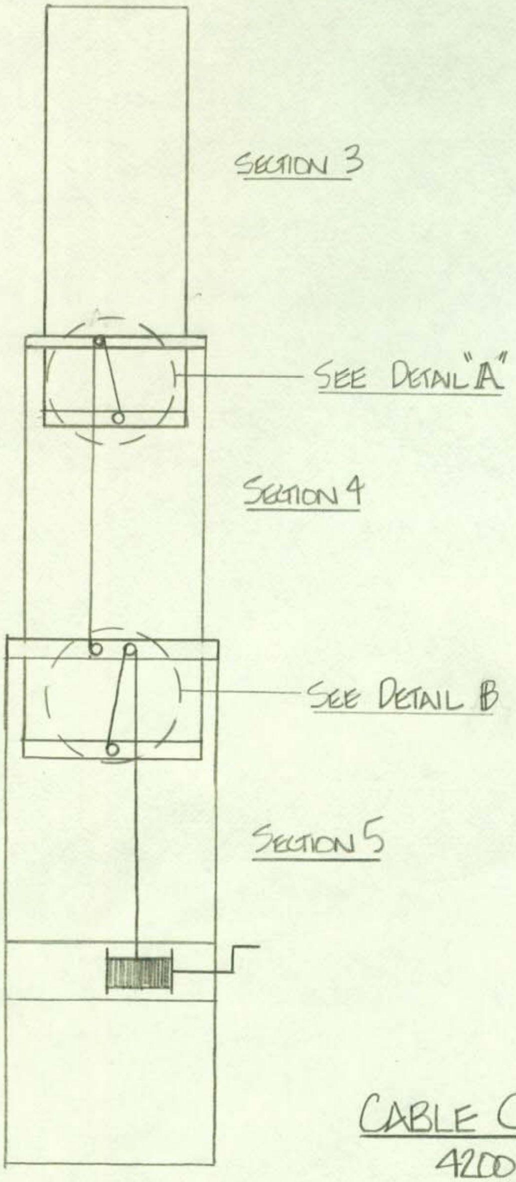


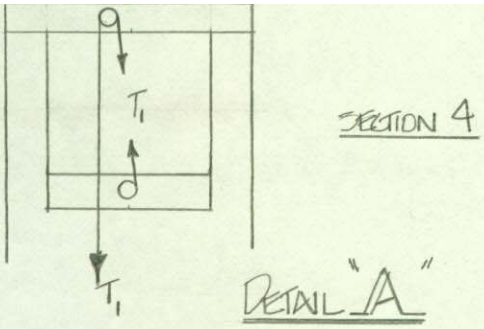
TOWER ELEMENT	ELEMENT SIZE-IN	PROJECTED AREA - ft^2	FACTORS	WIND AREA-ft^2	PSF	WIND LOAD
A1-ANTENNA	—	—	—	1.0 ft^2	25	25 lb
A2-MAST	2Φ x 24"	.33	1.0	.33	↓	8.3 lb
A3-MTG PL	3" x 9.5"	.198	1.3 x 1.34	.34		8.6 lb
A4-LEG	1" Φ	.167/ft	1.34	.22/ft		5.6 lb/ft
A5-SNGL BRACE	5/16" Φ	.042/ft	1.34	.056/ft		1.4 lb/ft
A4-LEG	1" Φ	.167/ft	1.34	.22/ft	20	4.4 lb/ft
A5-SNGL BRACE	5/16" Φ	.042/ft	1.34	.056/ft	↓	1.1 lb/ft
A6 CABLE BRKT	3" x 11.75"	.245	1.3 x 1.34	.43		8.5 lb
A7-DBL BRACE	5/16" Φ	.084/ft	1.34	.112/ft		2.2 lb/ft
A8-CABLE BRKT	3" x 9.5	.198	1.3 x 1.34	.34		6.9 lb
A9-SNGL BRACE	5/16" Φ	.048/ft	1.34	.064/ft		1.3 lb/ft
A10-LEG	1" Φ	.167/ft	1.34	.22/ft		4.4 lb/ft
A9-SNGL BRACE	5/16" Φ	.048/ft	1.34	.064/ft	15	1.0 lb/ft
A10-LEG	1" Φ	.167	1.34	.22/ft	↓	3.3 lb/ft
A11-SHEAVE BRKT	3" x 13.9"	.290	1.3 x 1.34	.51		7.6 lb
A12-DBL BRACE	5/16" Φ	.096/ft	1.34	.13/ft		1.9 lb/ft
A13-CABLE BRKT	3" x 11.75	.245	1.3 x 1.34	.43		6.4 lb
A14-LEG	1¼" Φ	.208/ft	1.34	.278/ft		4.2 lb/ft
A15-SNGL BRACE	3/8" Φ	.066/ft	1.34	.088/ft		1.3 lb/ft
A16-WINCH PL	7" x 13.9"	.676	1.3	.879		13.2 lb

PRODUCT 125
CRANK-UP TOWER

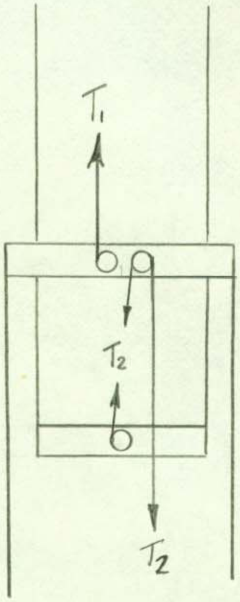
MSS 10-21-82







DETAIL "A"

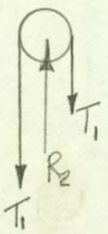


CABLE CAPACITY

4200 lb BREAK STR MAX LOAD 373 lbs OKAY

WINCH CAPACITY

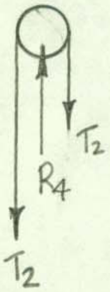
1500 lb CAPACITY MAX LOAD 373 lbs OKAY



T_1 = WT OF SECTION 3

= 136.2#

R_2 = (2) T_1 = 272.4#



T_2 = WT OF SECTION 4 + R_1

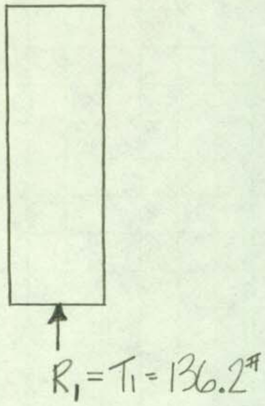
= 100.5 + 272.4

= 372.9#

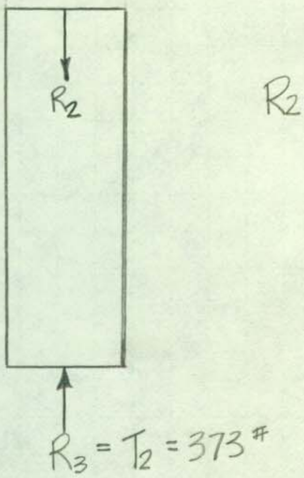
R_4 = 2 (T_2) = 746 lbs

FREE BODY DIAGRAMS OF TOWER SECTIONS FOR THE VERTICAL LOADS

SECTION 3



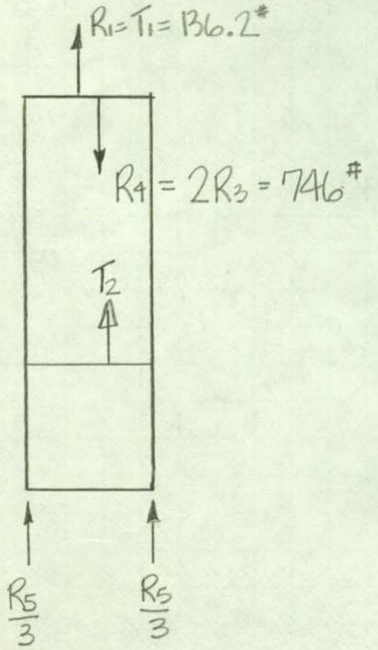
SECTION 4



R_2 = FORCE ON PL

= 272.4#

SECTION 5



$R_5 = R_4 +$ DEAD LOAD OF SECTION 5 $- R_1 - T_2$

$= 746\# + 163.2\# - 136.2\# - 373\#$

$= 400$ lbs

AISC & UBC

MEMBER	SIZE	AREA	ℓ	r	k	$k\ell/r$	F_Y (KSI)	F_a (KSI)	F_a' (KSI)
SECTION 3									
LEG	1"ϕ x .065	.191	15"	.33"	1.0	45.0	45	22.90	30.46
DIAGONAL SINGLE	5/16 ϕ	.077	12.1	.078	.8	127.4	36	9.20	12.24
DIAGONAL DOUBLE	5/16 ϕ	.077	12.1	.078	.8	127.4	36	9.20	12.24
SECTION 4									
LEG	1"ϕ x .095	.270	15"	.322	1.0	46.6	45	22.70	30.27
DIAGONAL SINGLE	5/16" ϕ	.077	13.9"	.078	.8	143.0	36	7.30	9.71
DIAGONAL DOUBLE	5/16" ϕ	.077	13.9	.078	.8	143.0	36	7.30	9.71
SECTION 5									
LEG	1¼"ϕ x .120	.426	15"	.402	1.0	37.3	45	23.82	31.68
DIAGONAL SINGLE	3/8" ϕ	.110	15.8"	.094	.8	134.5	36	8.25	10.97
DIAGONAL DOUBLE	3/8" ϕ	.110	15.8"	.094	.8	134.5	36	8.25	10.97

NOTES:

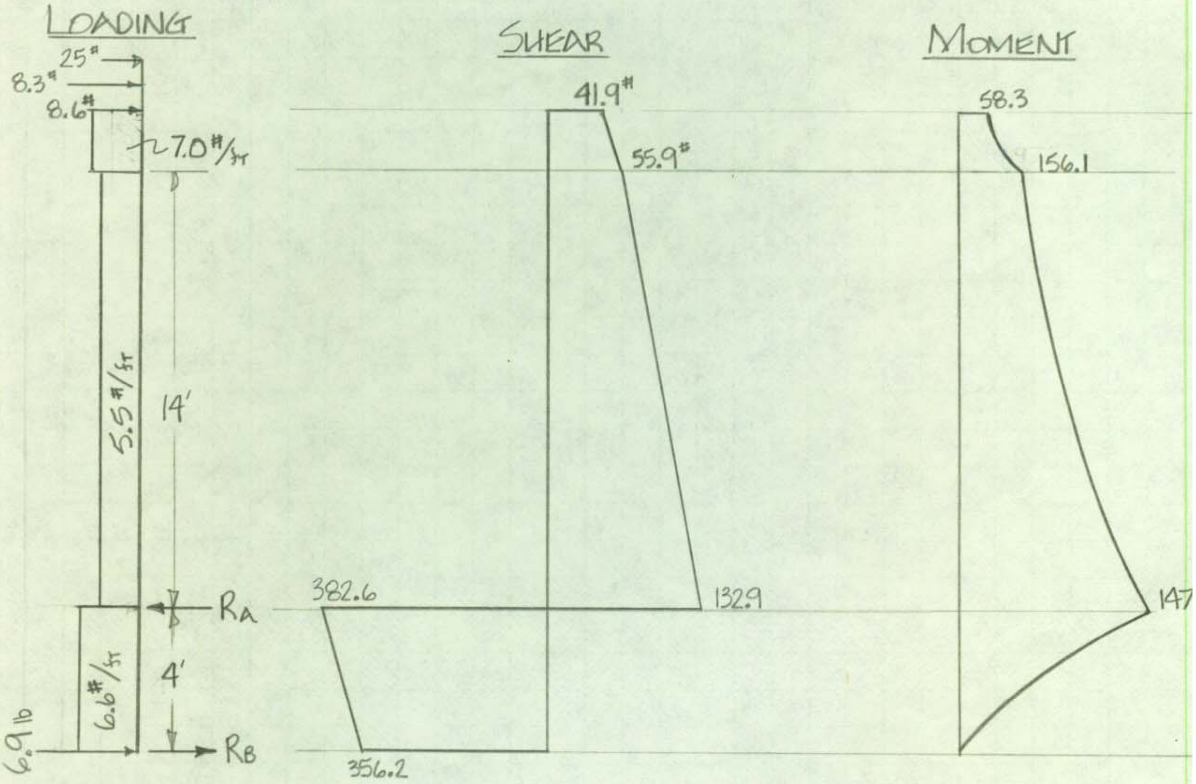
① K FACTOR

K=1.0 LEGS
K=0.8 SINGLE DIAGONALS
K=0.8 DOUBLE DIAGONALS

② F_a - ALLOWABLE STRESS FOR COMPRESSIVE MEMBERS - AISC 1.5.1.3.1 OR 1.5.1.3.2

③ F_a' - ALLOWABLE STRESS INCREASED BY 1.33 - UBC

FREE BODY DIAGRAMS
SECTION 3



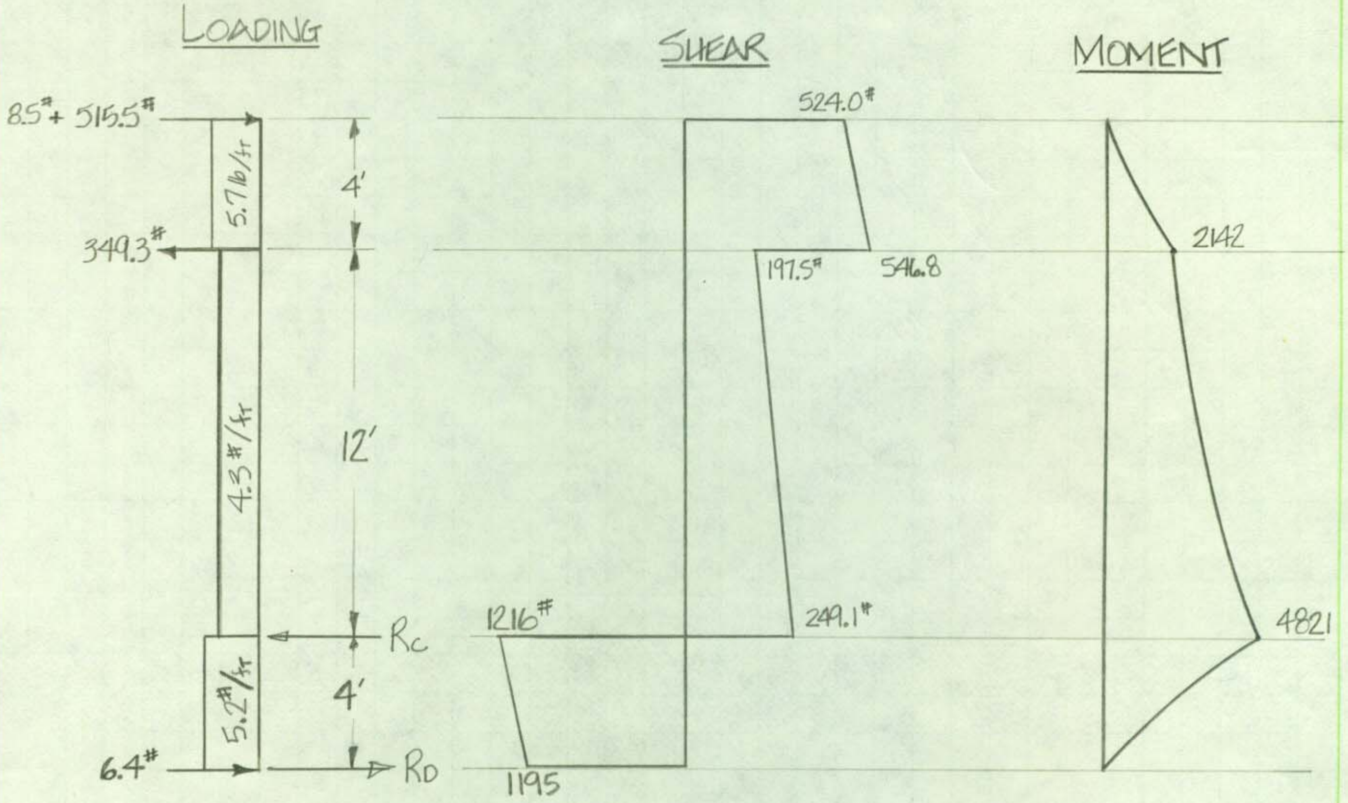
$$4R_A = 25^{\#}(22) + 8.3(21) + 8.6(20) + 7.0(19)2 + 14(5.5)11 + 4(6.6)2$$

$R_A = 515.5$ lbs

$R_B = 349.3$ lbs

SECTION 4

PADMASTER® / Made in U.S.A.



$$4R_C = 524(20) + 5.7(4)18 - 349.3(16) + 4.3(12)10 + 5.2(4)(2)$$

$R_C = 1465$ lbs

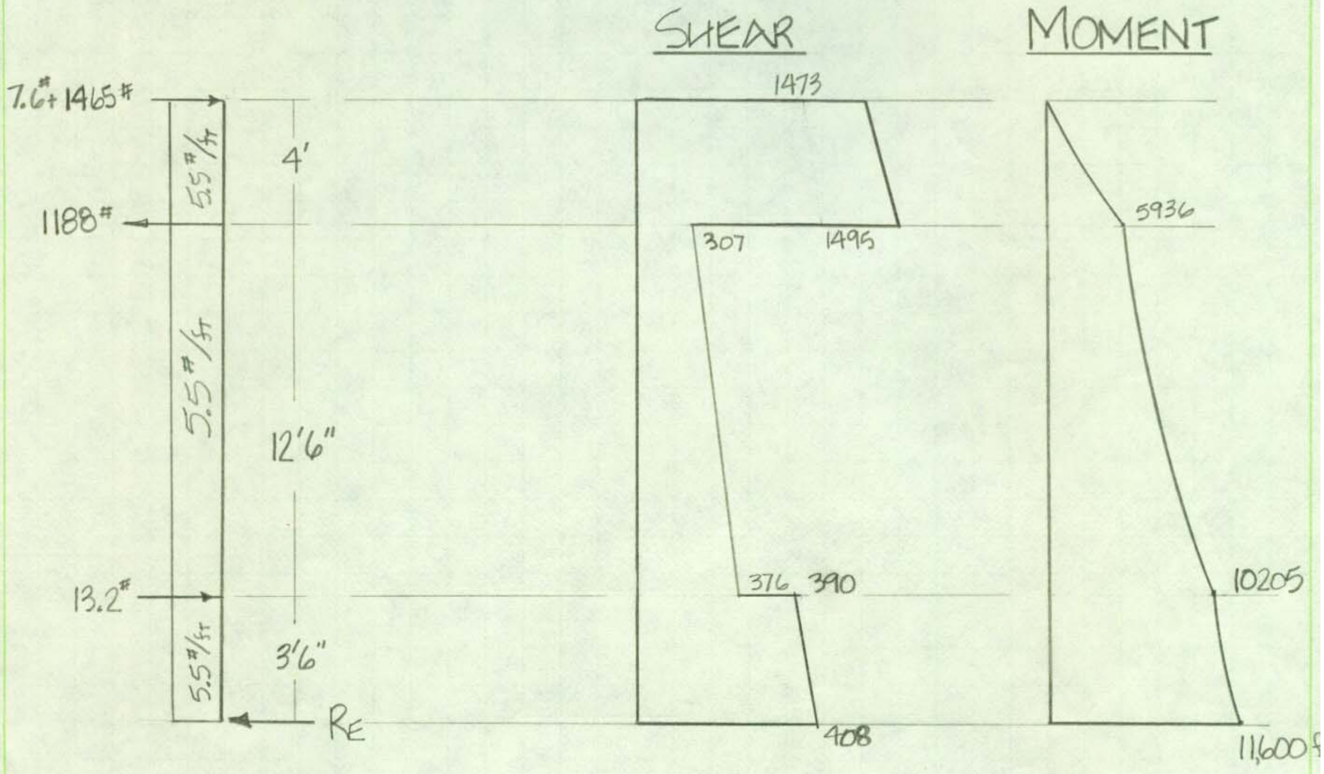
$R_D = 1188$ lbs

PRODUCT 125
CRANK UP

MSS 11-2-82

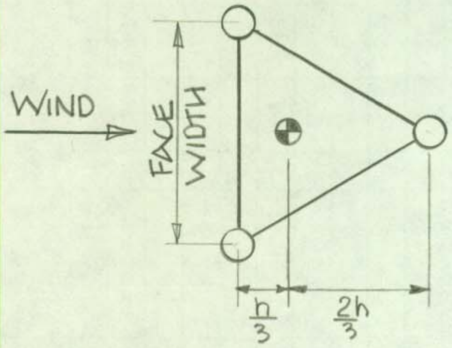
FREE BODY DIAGRAMS

SECTION 5



RE = 408 lbs

ACTUAL STRESSES & COMPRESSIVE LOADS- LEGS



h = FACE WIDTH x SIN 60°

M = MOMENT DUE TO WIND

$$= F \times \tfrac{2}{3}h + 2 \times \frac{F}{2} \times \frac{h}{3}$$

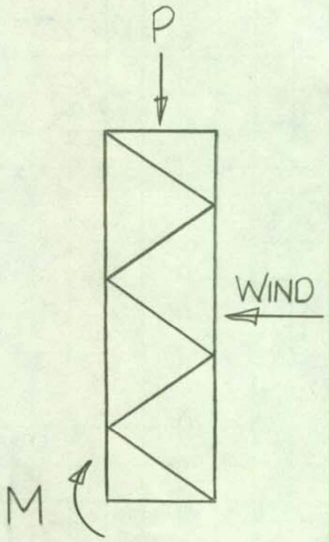
$$= F \times h$$

HENCE:

$$F = M/h$$

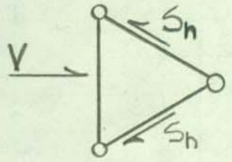
$$P = \frac{P_{DL}}{3} + \frac{M \times 12}{h}$$

$$f_a = \frac{P}{A}$$



MEMBER	MOMENT FT-lbs	LOAD-$\frac{P_{DL}}{3}$ lbs	h IN	AREA IN^2	P lbs	f_a PSI	F'_a PSI	F'_a/f_a
SECTION 3 ELEV 36'	1478	45	9.1	.191	1994	10,440	30,460	2.92
SECTION 4 ELEV 20'	4821	124	11.0	.270	5,383	19,940	30,270	1.52
SECTION 5 ELEV 0'	11,600	133	13.2	.426	10,680	25,070	31,680	1.26

ACTUAL STRESSES & COMPRESSIVE LOADS – DIAGONAL BRACES

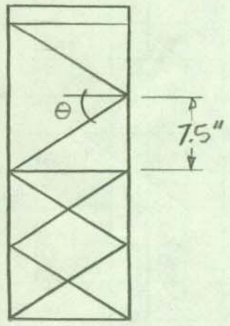


V = MAX SHEAR ON TOWER SECTION

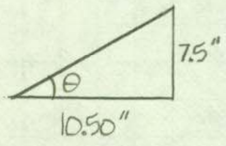
$S_n = V/2\cos 30° = .577V$ = SHEAR ON ONE FACE

$S = S_n/\cos\theta$ = SHEAR INTO THE DIAGONALS

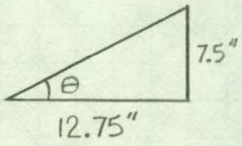
$f_a = S/A$



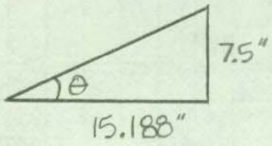
SECTION 3



SECTION 4



SECTION 5



$\theta_3 = 35.5°$ $\theta_4 = 31.0°$ $\theta_5 = 26.3°$

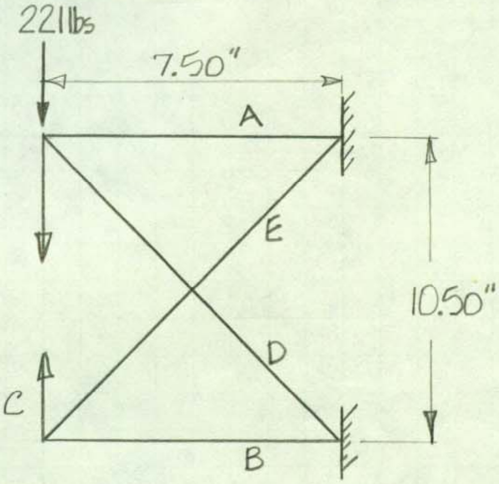
MEMBER	V lbs	S lbs	AREA IN^2	f_a PSI	F'_a PSI	F'_a/f_a
SECTION 3						
SINGLE BRACE	133	94.3	.077	1225	12,240	10.0
DOUBLE BRACE	383	143	.077	1857	12,240	6.60
SECTION 4						
SINGLE BRACE	547	368	.077	4779	9,710	2.03
DOUBLE BRACE	1216	432	.077	5610	9,710	1.73
SECTION 5						
SINGLE BRACE	408	263	.110	2391	10,970	4.59
DOUBLE BRACE	1495	524	.110	4764	10,970	2.30

ANALYSIS OF THE DOUBLE BRACING

SECTION 3

APPLYING THE METHOD OF LEAST WORK

$V_{MAX} = 383 \text{lbs}$
$S_h = 221 \text{lbs}$



MEMBER	A IN²	l IN	S' lb	S' l/A	u	uS' l/A	U² l/A	Ru	S'+ Ru ①
A	.191	7.5	+158	+6204	+.71	+4405	19.79	-74.76	+83.2
B	.191	7.5	0	0	+.71	0	19.79	-74.76	-74.8
C	.38	10.5	0	0	+ 1.0	0	27.63	-105.3	-105.3
D	.077	12.9	-272	-45,570	- 1.23	+56,050	253.5	+129.5	-142.5
E	.077	12.9	0	0	-1.23		253.5	+129.5	+129.5
						60,455	574.1		

$$R = -\frac{60455}{574.1} = -105.3$$

NOTES:

(+)— TENSION
(–)— COMPRESSION

① S'+RU = S = SHEAR INTO MEMBER (REFER TO PAGE 11/19)

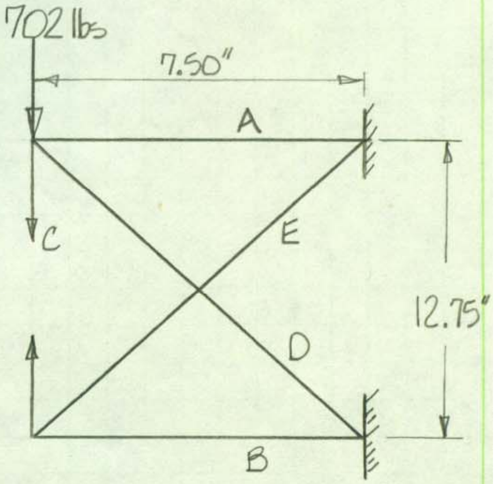
PRODUCT 125
CRANK UP TOWER

MSS 11-4-82

ANALYSIS OF THE DOUBLE BRACING
SECTION 4

METHOD OF LEAST WORK

$V_{MAX} = 1216$ lbs
$S_h = 702$ lbs



MEMBER	A IN^2	ℓ IN	S' lbs	$S'\,\ell/A$	u	$uS'\,\ell/A$	$u^2\,\ell/A$	Ru	S' + Ru ①
A	.27	7.5	+413	+11,470	+.59	+6770	9.67	-195.1	+217.9
B	.27	7.5	0	0	+.59	0	9.67	-195.1	-195.1
C	.38	12.75	0	0	+1.0	0	33.55	-330.6	-330.6
D	.077	14.8	-815	-156,650	-1.16	+181,710	258.6	+383.5	-431.5
E	.077	14.8	0	0	-1.16	0	258.6	+383.5	+383.5
						188,480	570.2		

$$R = -\frac{188{,}480}{570.2} = -330.6$$

NOTES:

(+) - TENSION
(−) - COMPRESSION

① S' + Ru = S = SHEAR INTO MEMBER (REFER TO PAGE 11/19)

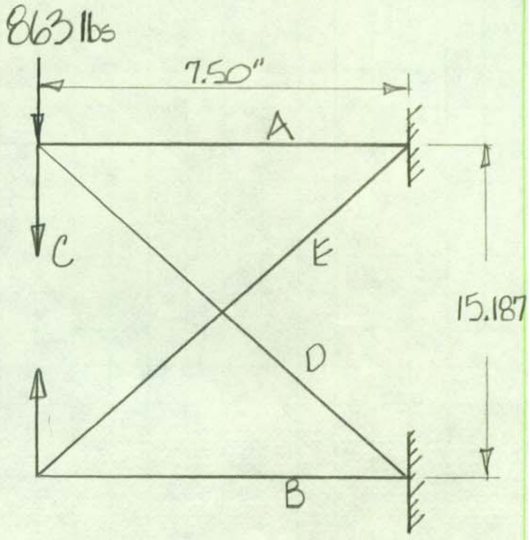
ANALYSIS OF THE DOUBLE BRACING

SECTION 5

METHOD OF LEAST WORK

$V_{MAX} = 1495$ lbs

$S_h = 863$ lbs



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MEMBER	A IN^2	l IN	S' lbs	$S'\,l/A$	u	$u S'\,l/A$	$u^2\,l/A$	Ru	$S' + Ru$ ①
A	.426	7.5"	+425	7480	+.494	+3695	4.30	-192.2	+232.8
B	.426	7.5"	0	0	+.494	0	4.30	-192.2	-192.2
C	.38	15.19"	0	0	1.0	0	40.0	-389.1	-389.1
D	.110	16.9"	-960	-147,490	-1.12	+165,190	192.7	+437.8	-524.2
E	.110	16.9"	0	0	-1.12	0	192.7	+437.8	+437.8
						168885	434.0		

$$R = -\frac{168,885}{434.0} = -389.1$$

NOTES:

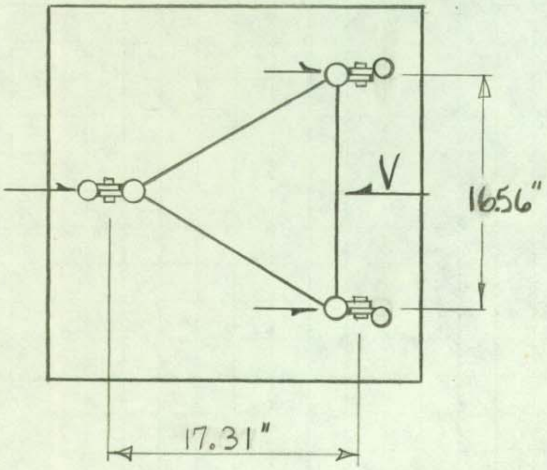
(+) — TENSION

(−) — COMPRESSION

① $S' + Ru = S =$ SHEAR INTO MEMBER (REFER TO PAGE 11/19)

FOUNDATION – BOLTS IN FRICTION CONNECTION

USING A307 BOLTS



VERTICAL LOADS

$P_{DL} = 133 \text{ lbs}/_{LEG}$

$M = 11{,}600 \text{ ft-lbs}$

$P = \dfrac{11{,}600 \times 12}{17.31} \pm 133$

$= 8173 \text{ lbs} \quad (8040 \text{ TENSION})$

HORIZONTAL FORCE

$V = 408 \text{ lbs}$

RESULTANT FORCE

$= (408^2 + 8173^2)^{1/2}$

$= 8184 \text{ lbs}$

CHECK THE CAPACITY 2- 3/4" A307 BOLTS

$$\text{FORCE}/_{\text{BOLT}} = F_v \frac{\pi d^2}{4}$$

$$= 10 \text{ KSI } \frac{\pi(.75)^2}{4}$$

$$= 4418 \text{ lbs}/_{\text{BOLT}} \times 2 \text{ BOLTS} = 8836 \text{ lbs} \times 1.33 \ (\overset{\text{UBC}}{\text{WIND}} \text{ FACTOR})$$

$$= 11750 \text{ lbs}$$

$$\text{MARGIN} = \frac{\text{ALLOWABLE FORCE}}{\text{ACTUAL FORCE}} = \frac{11{,}750}{8184} = 1.44 \quad \underline{\text{OKAY}}$$

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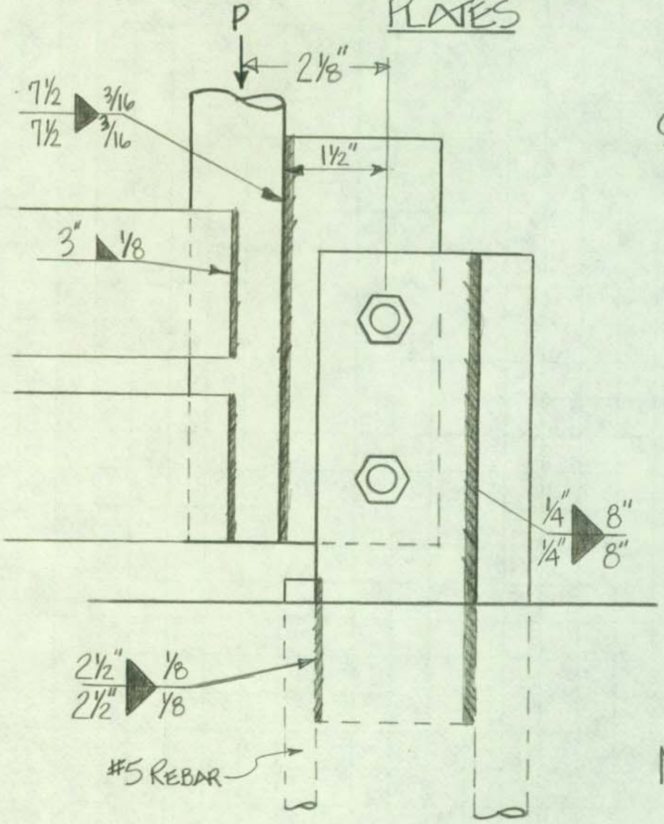
FOUNDATION – WELDS ON BASE CONNECTION PLATES



CHECK CAPACITY OF TOWER

ECCENTRIC LOAD – P_e CONDITION

FROM AISC PG 4-76 TABLE X

$P = 8184$ lbs $l = 7.5"$ $D = 3$
$al = 1.5"$ $a = .20$ $C_1 = 1.$
$k = 0.0$

FROM CHART $C = 1.39$

$P_{ALLOWABLE} = C C_1 D l \times 1.33$ (W F

$= 1.0(1.39)3(7.5) \times ($

$= 41.6$ KIPS

$MARGIN = \frac{41.6\,K}{8.2\,K} = 5.1$ O

CHECK CAPACITY OF FOUNDATION EARS

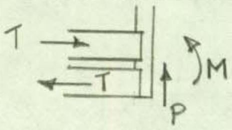
TOTAL WELD CAPACITY – E 70

$P_{ALLOWABE} = .707(.3)70(.125(2\tfrac{1}{2}")2 + .25(8")2)$

$= 68.7$ KIPS $\times 1.33$
$= 91.3$ KIPS

$MARGIN = \frac{91.3\,K}{8.2\,K} = 11.1$ OKAY

CHECK THE CAPACITY OF THE BASE BRACKETS

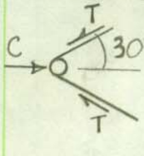


M = MOMENT CAUSED BY ECCENTRIC LOAD $= P \times 2\tfrac{1}{8}"$

$M = 17{,}391$ IN-lbs

COUPLE T RESISTS M

$COUPLE = \frac{17391 \text{ IN-lbs}}{3.5"} = 4969$ lbs



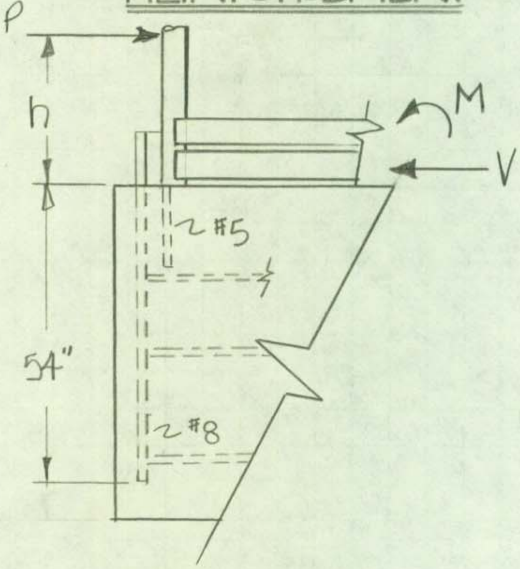
$T = \frac{4969}{2 \times \cos 30} = 2869$ lbs

$P_{ALLOW} = .707(70).3(3")$

$= 5568 \times 1.3$

$MARGIN = \frac{7405}{2869} = 2.6$ OK

FOUNDATION & FOUNDATION REINFORCEMENT



CHECK IMBEDMENT LENGTHS - ld

#8 BARS REF. ACI

$ld = .04 A_b \, f_y / \sqrt{f_c'}$

$ld = .04(.79)\,40{,}000 / \sqrt{2000}$

$ld = 28.33''$

ACTUAL ld = 54" OKAY

#5 BARS

$ld = 10.7''$

ACTUAL ld = 16" OKAY

CHECK BAR TENSION

$\frac{P}{2\text{ BARS}} = T = \frac{8040}{2} = 4020 \text{ lbs/PER BAR}$

$\text{MARGIN} = \frac{12{,}400}{4020} = 3.1$ OKAY

$P_{ALLOW} = \text{AREA}_{\#5} \times 40{,}000 \text{ PSI}$

$= .31 \times 40{,}000 \text{ PSI}$

$= 12{,}400 \text{ lbs}$

CHECK FOUNDATION DEPTH

$M = 11{,}600 \text{ ft-lbs} \quad V = 408 \text{ lbs} \quad V = P$

$h = \frac{M}{V} + .5 = \frac{11600}{408} + .5 = 28.93'$

$d = \frac{A}{2}\left(1 + \sqrt{1 + \frac{4.36h}{A}}\right)$ REF. UBC

$d_{ALLOW} = \frac{.339}{2}\left(1 + \sqrt{1 + \frac{4.36(28.93)}{.339}}\right)$

$= 3.44 \text{ ft}$

FOR CLASS 3 SOILS
ISOLATED FOOTING

$S_1 = 200(2)\,1.42 = 568$

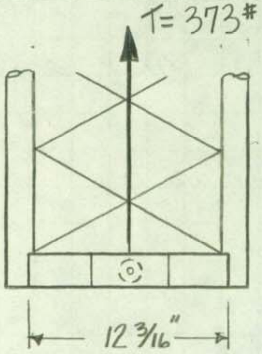
$B = \frac{42\,(1.414)}{12} = 4.950$

$A = \frac{2.34P}{S B} = \frac{2.34(408)}{568(4.950)}$

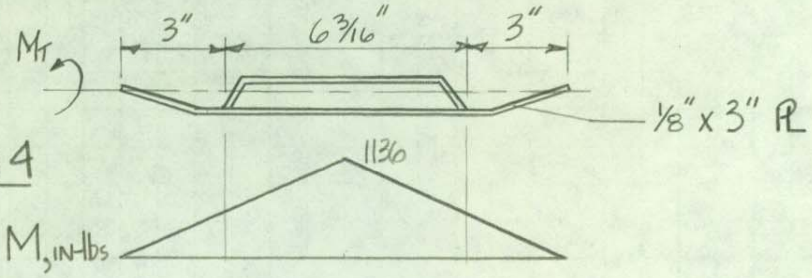
$A = .339$

SPECIFIED DEPTH = 5.50 ft OKAY

CABLE BRACKETS



SECTION 4



$M_{MAX} = \frac{PL}{4} = 1136$ IN lbs

$M_{3"} = \left(\frac{3"}{6\,3/32"}\right) 1136 = 560$ IN lbs

$S_{x\,\text{DOUBLE PLATE}} = \frac{(1/8)\,3^2}{6} \times 2 = .375\,\text{IN}^3$ $f_{bx} = \frac{1136\,\text{IN lbs}}{.375} = 3.03$ KSI

$S_{x\,\text{SINGLE PLATE}} = \frac{(1/8)\,3^2}{6} = .1875\,\text{IN}^3$ $f_{bx} = \frac{560\,\text{IN-lbs}}{.1875\,\text{IN}^3} = 2.99$ KSI

M_T = MOMENT DUE TO ECCENTRICITY = Pe

$e = 0"$ $\therefore M_T = 0$

MARGIN

$\frac{F_b}{f_b} = \frac{24\,\text{KSI}}{3.03\,\text{KSI}} = 7.9$ OKAY

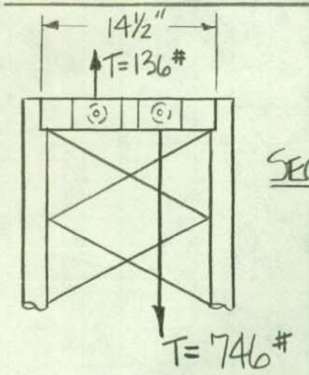
WELD CAPACITY

$P_{ALLOW} = .707(1/8).3(70) \times 6"$
$= 11.1$ KIPS

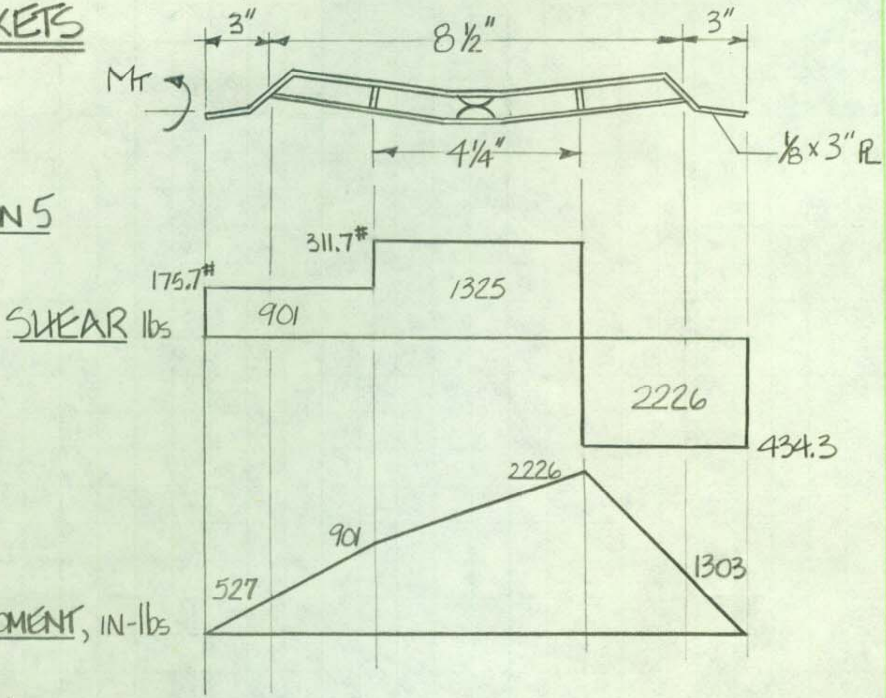
MARGIN (WELDS)

$\frac{P_{ALLOW}}{P_{ACTUAL}} = \frac{11.1\,\text{KIPS}}{.373} = 29.9$ OKAY

SHEAVE BRACKETS



SECTION 5



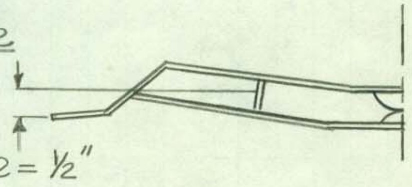
$$f_{bx_{\text{SINGLE PLATE}}} = \frac{1303 \text{ IN lbs}}{.1875 \text{ IN}^3} = 6.95 \text{ KSI}$$

$$f_{bx \text{ DOUBLE PLATE}} = \frac{2226 \text{ IN lbs}}{.375 \text{ IN}^3} = 5.94 \text{ KSI}$$

MT = MOMENT DUE TO TORSION = Pe

$M_T = 434.3\# \times \frac{1}{2}"$

$= 217.2 \text{ IN lbs}$



① $f_T = \text{SHEAR STRESS} = \frac{M_T}{.333\, b^2 d}$

$= \frac{217.2}{.333 (1/8)^2 3} = 13.9 \text{ KSI}$

② $f_b = \frac{f_{bx}}{2} + \sqrt{\left(\frac{f_{bx}}{2}\right)^2 + f_T^{\,2}} = \frac{6.95}{2} + \sqrt{\left(\frac{6.95}{2}\right)^2 + 13.9^2}$

$f_b = 17.8 \text{ KSI}$

WELD CAPACITY = $.707(1/8).3(70)\ 3$
$= 5.57 \text{ KIPS}$

MARGIN

$\frac{F_b}{f_b} = \frac{24 \text{ KSI}}{17.8 \text{ KSI}} = 1.35$ OKAY

MARGIN - WELDS

$\frac{P_{ALLOW}}{P_{ACTUAL}} = \frac{5.57 \text{ KIPS}}{.434} = 12.8$ OKAY

NOTES:

① - FROM - STD HANDBOOK FOR MECH. ENGINEERS by BAUMEISTER & MARKS
② - FROM - ELEMENTS OF STRENGTH OF MATERIALS by TIMOSHENKO & YOUNG

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ELEX/4GAIN
7/6/83

SUPPLEMENT TO PRODUCT 125 LOADS & STRESS ANALYSIS DATED 11/16/82

- CONSIDER LOADS ASSOCIATED WITH INCREASED WIND AREA DUE TO RADIAL ICE ON TOWER AND ANTENNA, WITH TOWER IN RETRACTED POSITION.

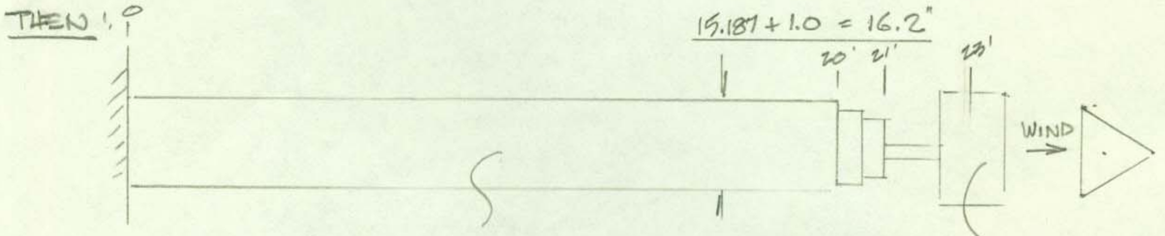
- ASSUME:

1. TOWER FACE IS COATED SOLID WITH ICE (> ½" RADIAL)
- CONSERVATIVE

2. ANTENNA WIND AREA DOUBLES WITH ½" RADIAL ICE

THEN:

15.187 + 1.0 = 16.2"



PROJECTED AREA OF SOLID TOWER FACE

$= \frac{16.2}{12} \times 1.3 = 1.16$ FT²/FT LIN.

FLAT SURFACE

PROJECTED AREA OF NOMINAL ANTENNA

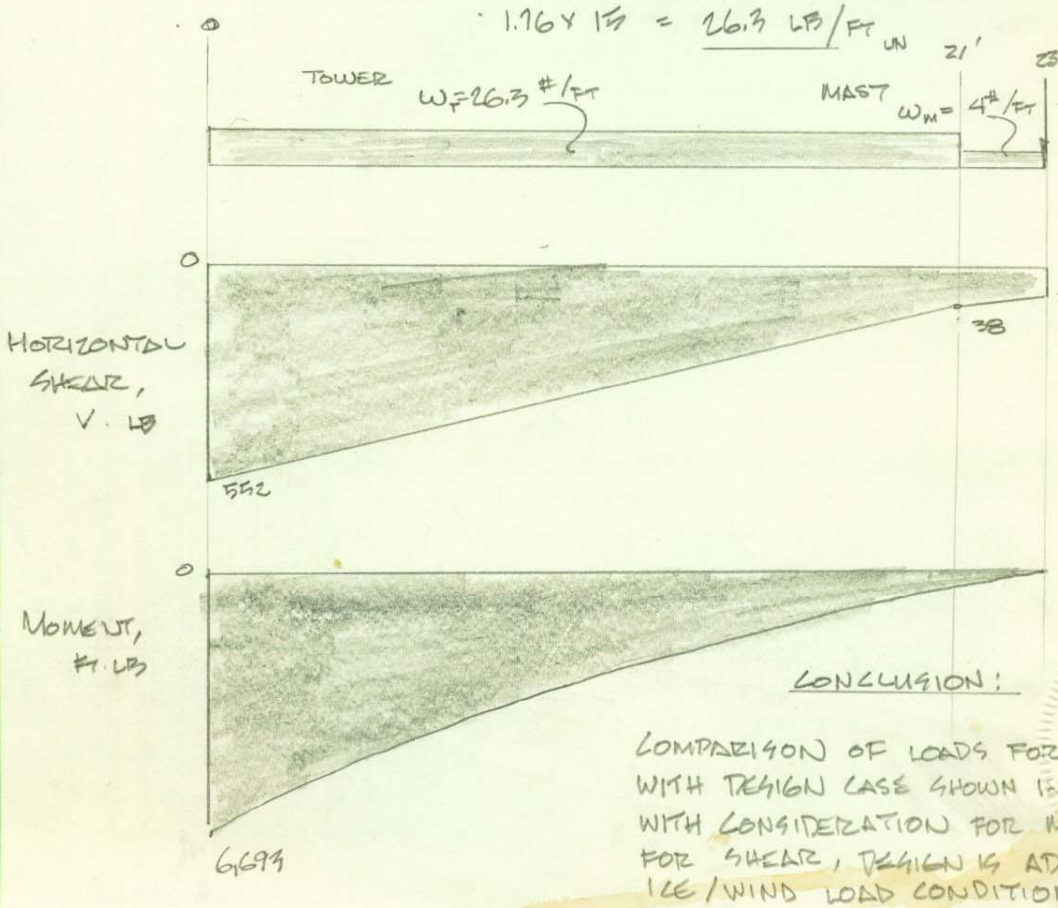
= 1 FT² × 2 = 2 FT²

WIND LOAD ON TOWER · UBC 20

· 1.16 × 15 = 26.3 LB/FT LIN

WIND LOAD ON ANTENNA

2 × 15 = 30 LB



CONCLUSION:

COMPARISON OF LOADS FOR THIS CASE WITH DESIGN CASE SHOWN IN 11-16-82 REPORT, WITH CONSIDERATION FOR MARGINS IN BASE FOR SHEAR, DESIGN IS ADEQUATE FOR THE ICE / WIND LOAD CONDITION. Robert A. Christian

7/6/

ROBERT A. CHRISTIANSEN

TELEX®

TELEX COMMUNICATIONS, INC.
Divisions: HY-GAIN • MAGNECORD • TURNER®

8601 Northeast Highway 6 • Lincoln, Nebraska 68505 U.S.A. • Telephone: (402) 467-5321 • telex: Hygain Lcn a 48-4324

March 18, 1983

Los Angeles County Engineer
Building and Safety Department
5908 N. Kauffman Avenue
Temple City, California 91780

Attention: Mr. Paul Dennison

Dear Mr. Dennison,

This letter relates to our telephone discussion yesterday regarding a building permit submittal by Mr. Mike Ferraro of LaCresenta, for the installation of one of our small antenna towers.

As discussed, the materials submitted were for L.A. City standard plan, based on L.A. City building code. We have also performed analysis for this structure based on the Uniform Building Code, which differs from the L.A. City code, but is the same as the Los Angeles County code for wind loading and allowable stress criteria.

A copy of the UBC analysis is enclosed. I believe you will find that this shows that Los Angeles County code requirements have been satisfactorily met.

Sincerely,
TELEX COMMUNICATIONS, INC.
Hy-Gain Division

Robert A. Christiansen

Robert A. Christiansen, P.E.
Special Projects Engineer

Enclosures:

As the attached copies of my building permit successful. I now have the first such permit for a Ham Radio Antenna issued by the City of Chicago. And you are now the first recognized and approved Ham tower (H6 70 HD) for use in Chicago.

I want to say a special thanks to you, Al Caplan, Kit Kitterer and Bob Christiansen. Your patience in filling my requests was greatly appreciated.

I have a few notes here that may be of interest and/or value if you are contacted by another Chicago resident:

1. The revised drawing PROD 131-1 with the base to tower attachment section detail is needed for any of the tower specs;

2. The "typical Chicago soil" caused the building department to ask for the base to be increased to 48" x 48" x 96" for the H6 70 HD;

3. Mr. Christiansen is licensed in Nebraska and, by receprosity, is recognized in Illinois but our building department asked for an Illinois RPE seal anyway - so I used Sam Polonetzky WB9RDE to review the prints and stress tables;

4. The City used a 50 year average for wind loading as Zone B and they would have liked to have seen the stress analysis based on 30#/FT^2 loading. This type of tower was a new experience for the structural examiners. All they are used to is self-supporting, fixed towers as we use for Police, Fire and other services. An explanation of why a crank-up and how it's used in the Amateur Radio Service was necessary;

Include the wind vs. height and antenna area vs. wind derating curves with the stress calculations. This was helpful in explaining how this tower is to be used, and why the crank-up feature.

Finally, when the permit was issued, it was a noteworthy occasion and the City of Chicago Publicity Department took pictures Jim O'Connel W9WU who authored the Amateur Radio ammendment to the new City ordinance and my engineer, Sam Polonetzky received the permit for me. We are going to send a news release to QST and Ham Radio. I'll be sure to mention which tower was approve (And hopefully they won't edit it out of this article.)

Again, thanks for the help and cooperation. You got the busine because the other guys in Visalia gave me the old "Catch 22" line, "buy the tower and we'll send you the drawings and specs" To this I replied "no, send the drawings so I can see if I'll get the building permit". But their rep said, "no, buy the tower first". So that didn't work and you sent the drawings for me to start the ball rolling. It's nice to deal with reasonabl people. And I haven't hesitated to say so when the subject of towers comes up at meetings or on our 2 meter or 220 repeaters.

73,

John D Mitchell

John D. Mitchell

cc: Al Caplan
Bob Christiansen
Kit Kitterer

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LOAD AND STRESS ANALYSIS

TELEX/HYGAIN PRODUCT 125
STEEL CRANK UP TOWER

BY
MORRIS STOVER

NOVEMBER 16, 1982

REVIEWED & APPROVED
Robt A. Christiansen
10/16/82

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. CHRISTIANSEN
E-4826
STATE OF NEBRASKA

THIS REPORT PROVIDES AN ANALYSIS OF LOADS AND RESULTING STRESSES FOR TELEX/HYGAIN PRODUCT 125 CRANK UP TOWER.

DESIGN CRITERIA

1. STRUCTURAL DESIGN: UBC
2. WIND LOADS: UBC 20
3. DESIGN STRESS: AISC
4. FOOTINGS: UBC/ACI

REFERENCES:

1. STRUCT. ENGR. HNDBK.
2. ASTM STANDARDS
3. AISC STEEL CONSTRUCTION MANUAL
4. ACI 318-77
5. TELEX/HYGAIN TOWER DESIGN & INSTALLATION DRAWING NO. 125-1

REVIEWED & APPROVED
PAGES 1-19, 11-16-82

11/16-82

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. CHRISTIANSEN
E-4623
STATE OF NEBRASKA

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