APPENDIX 1

Wind Pressure Calculations

Exposure Category: B | Importance Factor: 1

Occupancy Category: I | Basic Wind Speed: 80

P=(Ce)(Cq)(qs)(I)(w)

1 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 15 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 0.6

Design Wind Pressure 8.134

2 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 20 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 0.7

Design Wind Pressure 8.790

3 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 25 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 0.7

Design Wind Pressure 9.446

4 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 30 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 0.8

Design Wind Pressure 9.971

5 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 40 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 0.8

Design Wind Pressure 11.02

---

6 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 60 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 1

Design Wind Pressure 12.46

---

7 M1 Windward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 80 ft

Pressure Coefficient Cq =0.8

Exposure _Gust Factor Coefficient (Ce) 1.0

Design Wind Pressure 13.64

---

8 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 15 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 0.6

Design Wind Pressure -5.08

---

9 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 20 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 0.7

Design Wind Pressure -5.49

---

10 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 25 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 0.7

Design Wind Pressure -5.90

---

11 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 30 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 0.8

Design Wind Pressure -6.23

---

12 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 40 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 0.8

Design Wind Pressure -6.89

---

13 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 60 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 1

Design Wind Pressure -7.79

---

14 M1 Leeward Wall

Wind Stagnation Pressure (Ce) 16.4

Height 80 ft

Pressure Coefficient Cq =0.5

Exposure _Gust Factor Coefficient (Ce) 1.0

Design Wind Pressure -8.53

---

15 M1 Roof

Wind Stagnation Pressure (Ce) 16.4

Height 25 ft

Pressure Coefficient Cq =0.7

Exposure _Gust Factor Coefficient (Ce) 0.7

Design Wind Pressure -8.27

---

16 M1 Roof

Wind Stagnation Pressure (Ce) 16.4

Height 60 ft

Pressure Coefficient Cq =0.7

Exposure _Gust Factor Coefficient (Ce) 1

Design Wind Pressure -10.9

---

17 M1 Roof

Wind Stagnation Pressure (Ce) 16.4

Height 80 ft

Pressure Coefficient Cq =0.7

Exposure _Gust Factor Coefficient (Ce) 1.0

Design Wind Pressure -11.9

TABLE C3-1 MINIMUM DESIGN DEAD LOADS*

Component	Load (psf)	Component	Load (psf)
CEILINGS		Decking, 2-in. wood (Douglas fir)	5
Acoustical Fiber Board	1	Decking, 3-in. wood (Douglas fir)	8
Gypsum board (per 1/8–in. thickness)	0.55	Fiberboard, 1/2-in.	0.75
Mechanical duct allowance	4	Gypsum sheathing, 1/2-in.	2
Plaster on tile or concrete	5	Insulation, roof boards (per inch thickness)	
Plaster on wood lath	8	Cellular glass	0.7
Suspended steel channel system	2	Fibrous glass	1.1
Suspended metal lath and cement plaster	15	Fiberboard	1.5
Suspended metal lath and gypsum plaster	10	Perlite	0.8
Wood furring suspension system	2.5	Polystyrene foam	0.2
COVERINGS, ROOF, AND WALL		Urethane foam with skin	0.5
Asbestos-cement shingles	4	Plywood (per 1/8-in. thickness)	0.4
Asphalt shingles	2	Rigid insulation, 1/2-in.	0.75
Cement tile	16	Skylight, metal frame, 3/8-in. wire glass	8
Clay tile (for mortar add 10 psf)		Slate, 3/16-in.	7
Book tile, 2-in.	12	Slate, 1/4-in.	10
Book tile, 3-in.	20	Waterproofing membranes:	
Ludowici	10	Bituminous, gravel-covered	5.5
Roman	12	Bituminous, smooth surface	1.5
Spanish	19	Liquid applied	1
Composition:		Single-ply, sheet	0.7
Three-ply ready roofing	1	Wood sheathing (per inch thickness)	3
Four-ply felt and gravel	5.5	Wood shingles	3
Five-ply felt and gravel	6	FLOOR FILL	
Copper or tin	1	Cinder concrete, per inch	9
Corrugated asbestos-cement roofing	4	Lightweight concrete, per inch	8
Deck, metal, 20 gage	2.5	Sand, per inch	8
Deck, metal, 18 gage	3	Stone concrete, per inch	12

*Weights of masonry include mortar but not plaster. For plaster, add 5 lb/ft^2 for each face plastered. Values given represent averages. In some cases there is a considerable range of weight for the same construction.

(continued)

TABLE C3-1 continued
MINIMUM DESIGN DEAD LOADS*

Component				Load (psf)
FLOORS AND FLOOR FINISHES				
Asphalt block (2-in.), 1/2-in. mortar				30
Cement finish (1-in.) on stone-concrete fill				32
Ceramic or quarry tile (3/4-in.) on 1/2-in. mortar bed				16
Ceramic or quarry tile (3/4-in.) on 1-in. mortar bed				23
Concrete fill finish (per inch thickness)				12
Hardwood flooring, 7/7-in.				4
Linoleum or asphalt tile, 1/4-in.				1
Marble and mortar on stone-concrete fill				33
Slate (per mm thickness)				15
Solid flat tile on 1-in. mortar base				23
Subflooring, 3/4-in.				3
Terrazzo (1-1/2-in.) directly on slab				19
Terrazzo (1-in.) on stone-concrete fill				32
Terrazzo (1-in.), 2-in. stone concrete				32
Wood block (3-in.) on mastic, no fill				10
Wood block (3-in.) on 1/2-in. mortar base				16
FLOORS, WOOD-JOIST (NO PLASTER)				
DOUBLE WOOD FLOOR				
Joint sizes (in.)	12-in. spacing (1b/ft^2)	16-in. spacing (1b/ft^2)	24-in. spacing (1b/ft^2)	
2 × 6	6	5	5	
2 × 8	6	6	5	
2 × 10	7	6	6	
2 × 12	8	7	6	
FRAME PARTITIONS				
Movable steel partitions				4
Wood or steel studs, 1/2-in. gypsum board each side				8
Wood studs, 2 × 4, unplastered				4
Wood studs, 2 × 4, plastered one side				12
Wood studs, 2 × 4, plastered two sides				20
FRAME WALLS				
Exterior stud walls:				
2 × 4 @ 16-in., 5/8-in. gypsum, insulated, 3/8-in. siding				11
2 × 6 @ 16-in., 5/8-in. gypsum, insulated, 3/8-in. siding				12
Exterior stud walls with brick veneer				48

Component						Load (psf)
Windows, glass, frame, and sash						8
Clay brick wythes:						
4 in.						39
8 in.						79
12 in.						115
16 in.						155
Hollow concrete masonry unit wythes:						
Wythe thickness (in inches)		4	6	8	10	12
Density of unit (105 pcf)						
No grout		22	24	31	37	43
48 in. o.c.			29	38	47	55
40 in. o.c.	grout		30	40	49	57
32 in. o.c.	spacing		32	42	52	61
24 in. o.c.			34	46	57	67
16 in. o.c.			40	53	66	79
Full grout			55	75	95	115
Density of unit (125 pcf)						
No grout		26	28	36	44	50
48 in. o.c.			33	44	54	62
40 in. o.c.	grout		34	45	56	65
32 in. o.c.	spacing		36	47	58	68
24 in. o.c.			39	51	63	75
16 in. o.c.			44	59	73	87
Full grout			59	81	102	123
Density of unit (135 pcf)						
No grout		29	30	39	47	54
48 in. o.c.			36	47	57	66
40 in. o.c.	grout		37	48	59	69
32 in. o.c.	spacing		38	50	62	72
24 in. o.c.			41	54	67	78
16 in. o.c.			46	61	76	90
Full grout			62	83	105	127
Solid concrete masonry unit wythes (incl. concrete brick):						
Wythe thickness (in mm)		4	6	8	10	12
Density of unit (105 pcf)		32	51	69	87	105
Density of unit (125 pcf)		38	60	81	102	124
Density of unit (135 pcf)		41	64	87	110	133

*Weights of masonry include mortar but not plaster. For plaster, add 5 lb/ft^2 for each face plastered. Values given represent averages. In some cases there is a considerable range of weight for the same construction.

(continued)

Appendix 3

Area	Level	wi	Expr1	Expr2
80365	Level F	10045625	1808.2125	0
96309	Level E	12038625	2166.9525	8848.389375
75604	Level D	9450500	1701.09	13892.235
66059	Level 1	8257375	1486.3275	16845.045
62713	Level 2	7839125	1411.0425	21753.571875
63404	Level 3	7925500	1426.59	27818.505
63404	Level 4	7925500	1426.59	33643.7475
35193	Level 5	4399125	791.8425	21907.6425

Appendix 4

~~STAT~~

[Seismic Zone] (3)

Occupancy (3)

Static Lateral Force Procedure

$$V = \frac{C_v I}{R T} W$$

W = Total Seismic Dead Load

I = Importance Factor

C_v = Seismic Coefficient [Table 16-R]

T = Elastic Fundamental Period of Vibration. [Seconds]

R = Numerical Coefficient
Table 16N or 16-P

Building Frame System:
Shear Walls
Concrete
$R = 5.5$
$\Omega_o = 2.8$
$H_{max} = 240$

Dual
Sh. Walls
Concrete w/ SMRF
$R = 8.5$ $\Omega 2.8$ H – N.L.

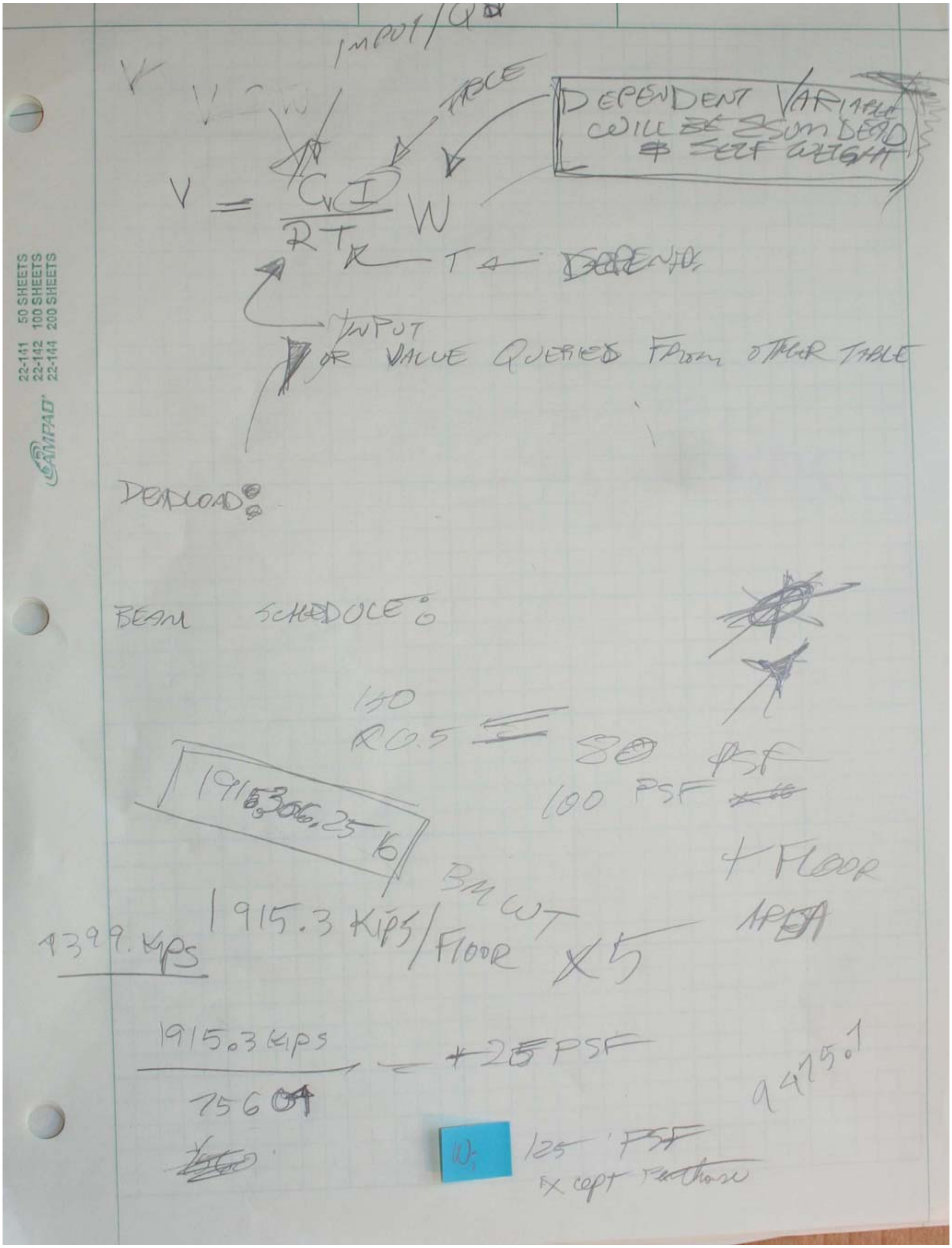
C_a = Seismic Coefficient
Tbl. 16-Q

∴ Soil = S_C

Table 16-I – Seismic
Z = 0.3

$C_a = 0.33$ ← Taken from Start Notes Page

Appendix 4


INPUT
TABLE
DEPENDENT VARIABLE WILL BE SUM DEAD & SELF WEIGHT
V = C_v I / R T_R W
INPUT
OR VALUE QUERIED FROM OTHER TABLE
DEADLOAD:
BEAM SCHEDULE:
100 PSF
+ FLOOR AREA
1915.3 KIPS / FLOOR
X 5
1915.3 KIPS
+ 25 PSF
125 PSF

Appendix 4

2597.5 Kips

$$V = \frac{0.45(1)}{5.5(0.97)}(W)$$

$$= 0.08435\,W$$

$$0.08435\,W = 5980$$

$$= 71688.6 \text{ Kips}$$

Appendix 4

FLOOR 5

LIMITS

$$V > V = 0.11 C_a I W$$

$$V < V = \frac{2.5 C_a I}{R} \cdot W$$

SOIL Profile:

S_C

12.3

70096

$I_p = 1.0$

$$V = \frac{(0.45)(1)}{(5.5)(0.97)}(30794.875)$$

$$T\ C_t (h_n)^{3/4} = C_x (61\ ft)^{3/4}$$

No Good

$$C_t = 0.020\ (0.0188)^{3/4}$$

$$= 0.00976\ (0.0488)$$

$A_e =$

24'

~~24~~ 2' – 48 ft²

16 x 2 = 32 ft²

18 x 2 = 36 ft²

8 x 2 = 16

3.75 x 2 = 7.5

21.827

12 (7.5) = 90

2 (16) = 32 16

~~2~~1 (32) = 32

2 (36) = 72

~~2 (48) = 96~~

A_e = 322 sf² (226)

C_t = ~~.05~~ 0.1075

$$\left[0.2 + \left(\frac{16}{61}\right)^2\right]$$

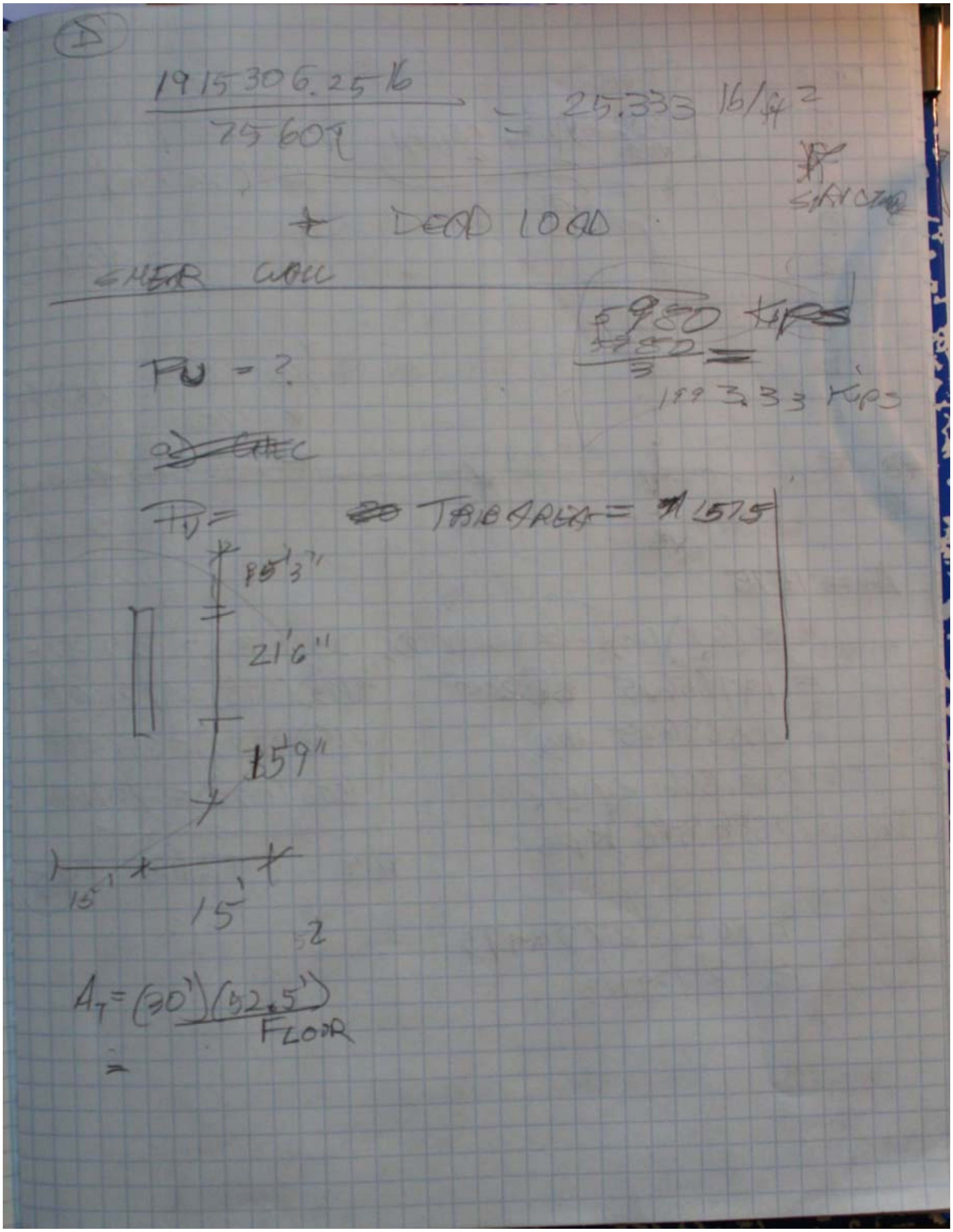
0.2688

23091

.034097

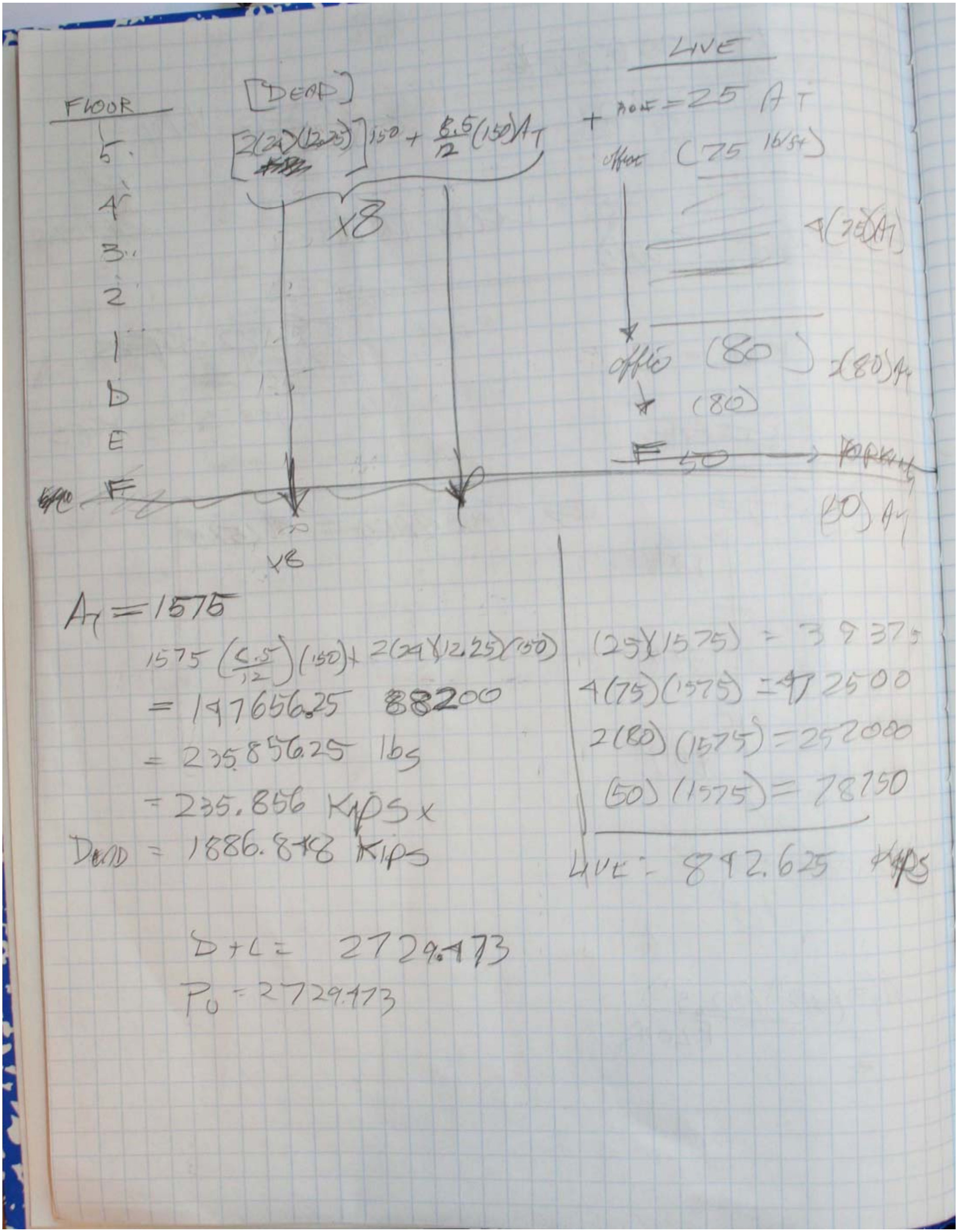
0.01159705)

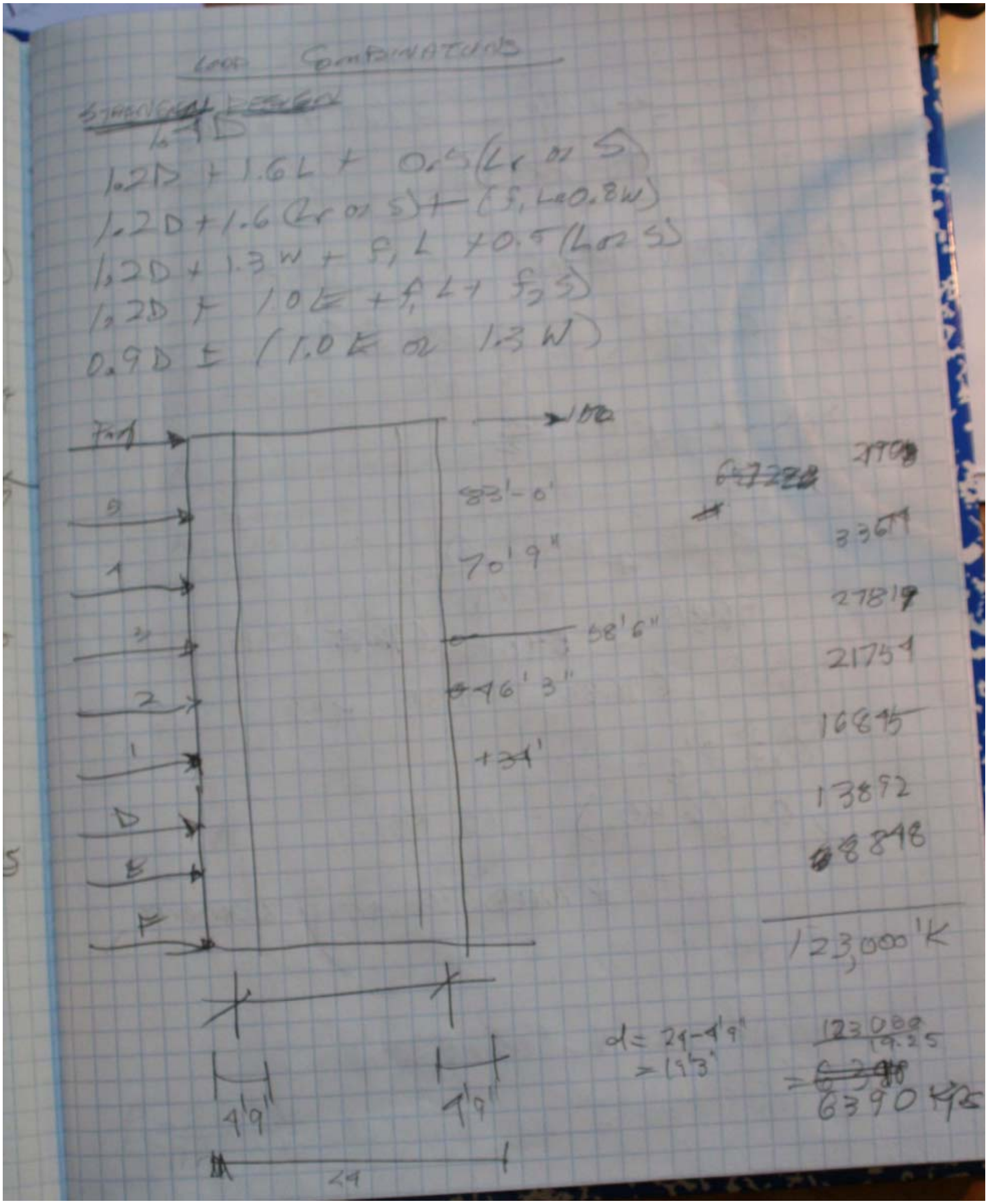
Appendix 4



1915306.25 lb
75 60 ft
= 25.333 lb/ft²
+ DEAD LOAD
SHEAR WALL
5980 KIPS
5980 / 3 =
1993.33 KIPS
PU = ?
PU =
TRIB AREA = 1575
21'6"
15'9"
15'
15'
A_T = (30')(52.5')
FLOOR

Appendix 4


LIVE
FLOOR
[DEAD]
5
4
3
2
1
D
E
F
[2(24)(12.25)] 150 + 8.5/12 (150) A_T
x8
+ ROOF = 25 A_T
office (75 lb/sf)
4(75)(A_T)
office (80) 2(80)A_T
(80)
F 50 → PARKING
(50) A_T
x8
A_T = 1575
1575 (8.5/12)(150) + 2(24)(12.25)(150)
= 167656.25 88200
= 235856.25 lbs
= 235.856 KIPS x
DEAD = 1886.848 Kips
(25)(1575) = 39375
4(75)(1575) = 472500
2(80)(1575) = 252000
(50)(1575) = 78750
LIVE = 842.625 Kips
D + L = 2729.473
P_0 = 2729.473


LOAD COMBINATIONS
1.4D
1.2D + 1.6L + 0.5(Lr or S)
1.2D + 1.6(Lr or S) + (f1L or 0.8W)
1.2D + 1.3W + f1L + 0.5(Lr or S)
1.2D + 1.0E + f1L + f2S
0.9D ± (1.0E or 1.3W)
83'-0"
70'9"
58'6"
46'3"
34'
33609
27819
21759
16845
13892
8848
123,000'K
d = 24-4'9"
= 19'3"
4'9"
4'9"
24
6390

Appendix 4

$$C_v = \frac{P_u}{2} + \frac{M_u}{d} = \frac{2729}{2} + 6390 =$$

$$= 7754.5$$

$$A_g = (2)(24) = 48\ ft^2$$

$$I_g = \frac{(2)(24)^3}{12} = 2304\ ft^4$$

$$f_c = \frac{P_u}{A_g} + \frac{M_u \frac{h_w}{2}}{I_g}$$

$$= \frac{2729}{48} + \frac{1230(24/2)}{2304} =$$

5685 + 640 = 696.85 KSF

696.85 = 4.84 KSI

$0.2\ f'_c$

$0.2(6\ ksi) = 1.2\ ksi$

* NEED BOUNDARY ELEMENT

Appendix 4

IF $V_u \geq 2 A_{cv} \sqrt{\ }$

NEED TWO Curtains Reinf

$$\frac{2(12)(24)(24')(\sqrt{6000})}{1000} = 10.70K < V_u$$

NEED 2 Curtains

$$\rho_l, \rho_t = \frac{A_{sl}}{A_{cv}} \geq 0.0025$$

~~$A_{s_{req}} = 0.0025\,((12)(24))^2 = 17.28\ in^2$~~

$$A_{s_{req}} = 0.0025\,(12)(24) = 0.72\ in^2/ft$$

2 # 6 BARS/ft

$$2(0.44) = 0.88\ in^2/ft$$

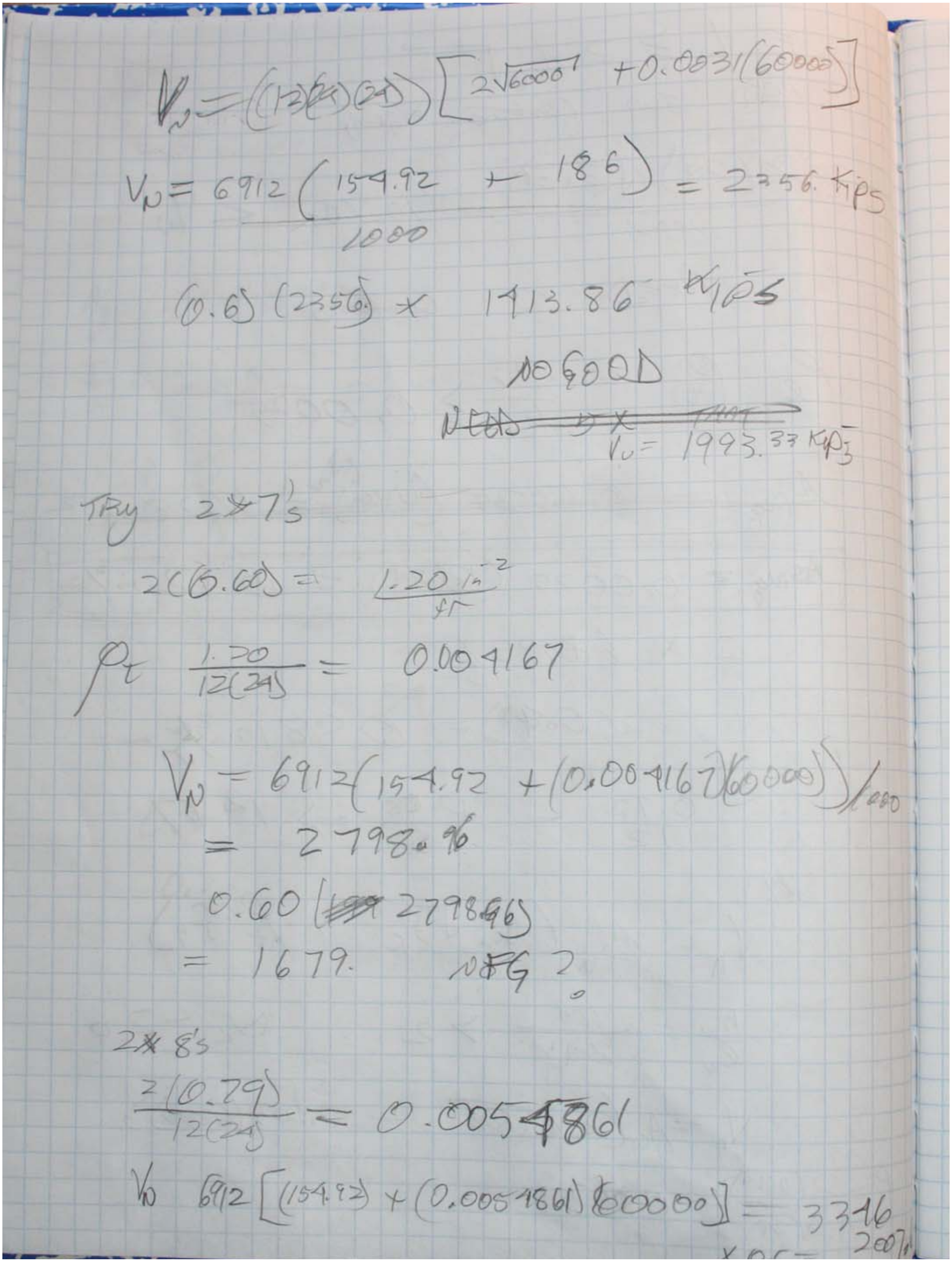
$$\frac{0.72}{12} - \frac{0.88}{S} \Rightarrow 14.67$$

$$V_n = A_{cv}\left(\alpha_c \sqrt{f'_c} + \rho_t f_y\right)$$

$$\frac{h_w}{l_w} = \frac{100}{24'} > 2 \therefore \alpha_c = 2.0$$

$$V_n = A_{cv}\left(2.0\sqrt{6000} + 0.0031(60000)\right)$$

$$\rho = \frac{2(0.44)}{(12)(24)} = 0.0031$$



$$V_n = ((12)(24)(24))\left[2\sqrt{6000} + 0.0031(60000)\right]$$

$$V_n = \frac{6912\,(154.92 + 186)}{1000} = 2356 \text{ kips}$$

$(0.6)(2356) = 1413.86$ kips

NO GOOD

~~NEED ... X THAT~~ $V_u = 1993.37$ kips

TRY 2 #7's

$2(0.60) = 1.20\ \text{in}^2/\text{ft}$

$$\rho_t\ \frac{1.20}{12(24)} = 0.004167$$

$$V_n = 6912(154.92 + (0.004167)(60000))/1000$$

$= 2798.96$

$0.60(2798.96)$

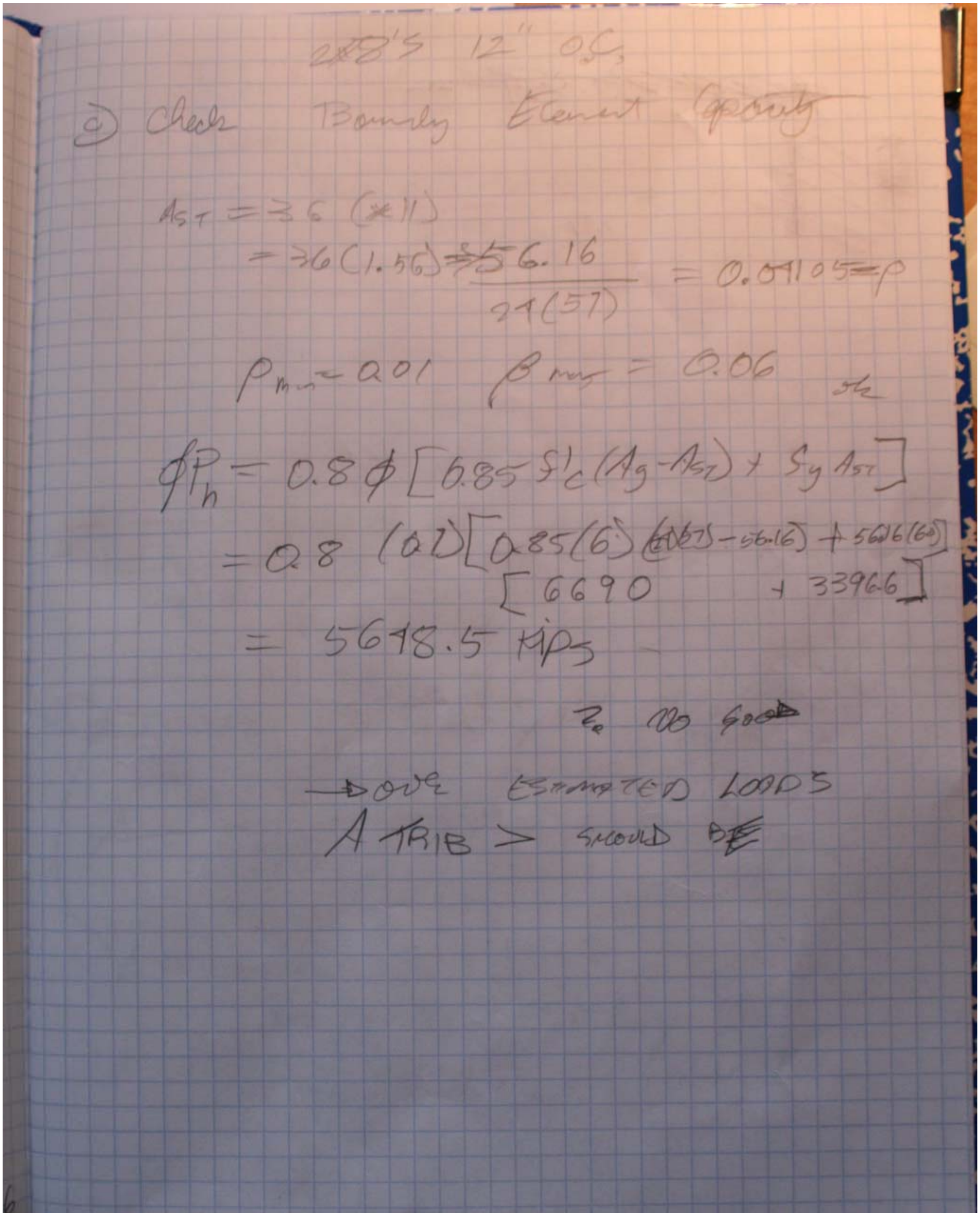
$= 1679.$ NFG ?

2 # 8's

$$\frac{2(0.79)}{12(24)} = 0.0054861$$

$V_n\ 6912[(154.92) + (0.0054861)(60000)] = 3346$

x 0.6 = 2007...


2 #8's 12" O.C.

a) Check Boundary Element Capacity

$A_{ST} = 36$ (#11)

$= 36(1.56) = 56.16 \quad \frac{56.16}{24(57)} = 0.04105 = \rho$

$\rho_{min} = 0.01 \quad \rho_{max} = 0.06$ ok

$\phi P_n = 0.8\phi[0.85 f'_c(A_g - A_{ST}) + f_y A_{ST}]$

$= 0.8(0.7)[0.85(6)(1368 - 56.16) + 56.16(60)]$

$[6690 + 33966]$

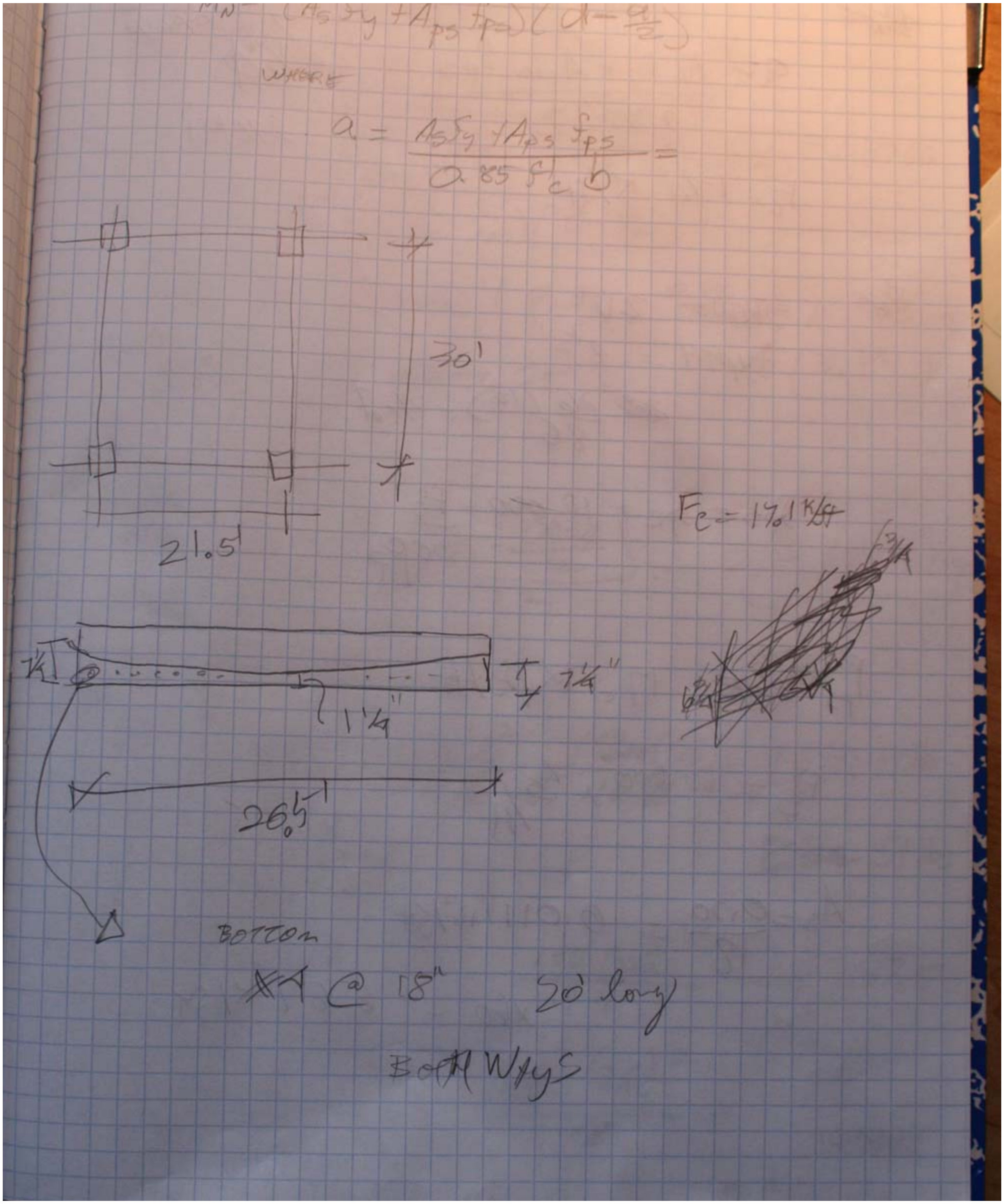
$= 5648.5$ kips

∴ no good

→ Over estimated loads

A trib > should be

Appendix 4



~~$M_N =$~~

$$a = \frac{A_s f_y + A_{ps} f_{ps}}{0.85 f'_c b}$$

7 wire STRAND
$\frac{1}{2}$" ϕ
270 ksi

$F_c = 17.1$ K/ft

SPAN = 26'
DEPTH = $8\frac{1}{2}$"

$$\frac{26}{8.5}(12) = 36.7$$

$$f_{ps} = f_{pe} + 10{,}000 + \frac{f'_c}{300 \rho_p}$$

$F_{ps} = 17.1$ Kips/ft

$F_s = 60\,000 \times A_s$/ft

$$A_s = \frac{0.20}{18} = 0.0111 \text{ in}^2/\text{ft}$$

$\times 60 = 6.67$ K/ft

Appendix 4

$$a = \frac{17.1 + 6.67}{0.85 f'_c b} = \frac{23.77}{0.85(6000)(12)} = 0.376 \text{ in}$$

$$M_n = (A_s S_y + A_{ps} S_{ps})(d - a/2)$$

$$M_n = (23.77 \text{ kips})\left(7.25 - \frac{0.376}{2}\right) = 167.86 \text{ in-kips}$$

$$= 13.99 \text{ ft-kips}$$

MIDSPAN $d = 7.25$

$d = 1.25$

SUPPORT

$$\frac{(23.77)\left(1.25 - \frac{0.376}{2}\right)}{12} = 2.1036 \text{ ft kips}$$

DESIGN MOMENT

$$M = \frac{w l^2}{16} = \frac{100(26)^2}{16} = \frac{16900 \text{ ft lbs}}{2}$$

$75 + 75$

$$\frac{100(26)^2}{16} = 6337.5$$

ok

$$\frac{150(26)^2}{16} \rightarrow$$