DESIGN OF SECTION

BEAM

	MOE	MC	ME	Q
L	0.3	0.9	0.9	1.6
E	2.2	0.4	1.4	1.3
S	2.6 1.9	1.3	2.3 0.5	4.2

b×D = 28×50 j = 39.3

a = 2.50 / 39.3 × 3.0 = 2.12 2-D13

	MOE	MC	ME	Q
L	0.4	1.5	2.2	3.5
E	3.6	0.4	2.3	2.8
S	4.0 3.2	2.7	5.0	3.1

b×D = 28×50

40A = 28 · 39.3 · .9 = 990

a_{DE} = 400 / 39.3 × 3.0 = 3.4 2-D19

a_{ME} = 500 / = 4.2 2-D19

	MOE	MC	ME	Q
L	0.5	0.7	1.2	2.0
E	7.2	1.5	4.3	4.1
S	7.7 6.7	2.2	5.5 3.1	11.2

ΔQ = 11.2 − 9.9 = 1.3

ΔQ/bj = 1.18

Pw = 0.27

D10 x = 1.43 / 28 × 0.27
 = 18.9 → 15 @

b×D = 28×50

a_{OE} = 770 / 39.3 × 3.0 = 6.5 2-D19 / 2-D13

a_{ME} = 550 / = 4.7 2-D19

L				
E				
S				

L				
E				
S				

L								
E								

L	11.4							
E	10.4							
G	22.4							
L	14.4							
E	10.4							
G	24.3							

L	14.5	12.3	11.2	10.6
E	4.6	3.1	2.4	1.2
S	23.1			

b×D = 20 × 7.5

a	12.6	10.6	9.2	
m	2-D22 2-D19	2-D22 2-D16	2-D22 2-D13	

L	6.1	8.7	8.6	7.4
E	6.2	2.5	1.2	0.9
S	13.7			

b×D = 20 × 7.5

a	6.7	7.9	7.0	
m	2-D19 2-D13	2-D19 2-D16	2-D19 2-D13	

L	2	1.2	0.2	1.6
E	4.4	1.5	1.5	1.2
S	4.5	2.8	1.7	0.7

b×D = 20 × 5.5

a	3.8	2.5	1.9
m	2-D16	2-D16	2-D16

Δd = 10.6 − 10.33 = 0.3

Δd/d = 0.145

Pw = 0.22

Pb = 14.3 / 20 × 0.22

= 23 ⇒ 15 (A)

COLUMN

3CA1	P x	P y	M x	M y	Q x	Q y
L	4.1		3.3 / 3.3	0.5 / 0.3	0.2	0.2
E	1.3	1.3	3.3 / 1.8	3.3 / 1.8	1.1	1.4
S	5.4 / 2.8	5.4 / 7.8	7.5	7.8	2.4	3.2

b×D = 28×75 b/H = 28/350 = 1/12.4 λ=1.00

α_H = 0.8 × 28 / 18 = 1.24

	P/bD x	P/bD y	M/bD² x	M/bD² y	Pt x	Pt y	at x	at y
L	2.0		0.5	0.5	–	–		
S	2.6 / 1.3	2.6 / 1.3	5.3	2.4	0.28	0.12	4.2	2.5

2-D19 2-D19

0.3% = 16.0 In = 6-D19

$_sQ_{ax}$ = 75 × 21.1 × 6.0 = 9.0

$_sQ_{ay}$ = 28 × 01.7 × 6.0 = 10.3

1CA1	P x	P y	M x	M y	Q x	Q y
L	13.0		0.2 / 0.1	0.5 / 0.3	0.1	0.2
E	5.4	4.4	5.5 / 6.2	6.0 / 11.2	2.8	4.3
S	18.4 / 7.6	17.4 / 9.5	6.3	11.5	5.17	8.8

b×D = 28×75

	P/bD x	P/bD y	M/bD² x	M/bD² y	Pt x	Pt y	at x	at y
L	6.2		0.6	0.3	–	–		
E	8.8 / 3.6	8.3 / 4.1	13.6	7.1	0.50	0.22	10.5	4.6

4-D19 2-D19

b/H = 28/400 = 1/14.3 λ = 1.00

HOOP D10 x = 143 / 75 × 0.2 = 9.5

	P		H		Q	
	X	Y	X	Y	X	Y
L	11.7	0	9.2	2	4.7	
E	0.4	0.5	2.4	4.1	1.4	1.9
S	12.0	12.7				
	11.4	11.2	2.4	12.4	2.6	0.6

	P/bD		P/bD²		Pt	a1	
	X	Y	X	Y			
L	5.6	0	4.9	−	0.26	5.2	2-DIA
S	5.7	5.4	6.0	9.4	0.25	3.2	2-DIA
	9.6	5.2					

	P		H		Q	
	X	Y	X	Y	X	Y
L	27.9	0	4.1	0	1.5	
E	1.4	1.9	6.2	7.1	4.6	
S	29.3	29.8	6.2	13.0	6.2	10.7
	26.5	26.0		11.6		

	P/bD		H/bD²		Pt	a1		
	X	Y	X	Y				
L	12.7	0	7.6	−	−			
S	14.2	14.2	12.2	0.5	0.2	7.4	3-DIA	2-DIA
	12.6	12.4						

	P		H		Q	
	X	Y	X	Y	X	Y
L	12.5	0	4.9	11.2	0	5.9
E	0	0.5	2.6	4.1	1.4	1.6
S	12.5	13.0	7.9	13.1	2.6	0.1
		13.0				

	P/bD		H/bD²		Pt	a1		
	X	Y	X	Y				
L	6.0	0	11.1	−	0.4	7.6	2-DIA	
S	6.0	6.2	6.0	9.9	0.15	3.2	2-DIA	
		5.7						

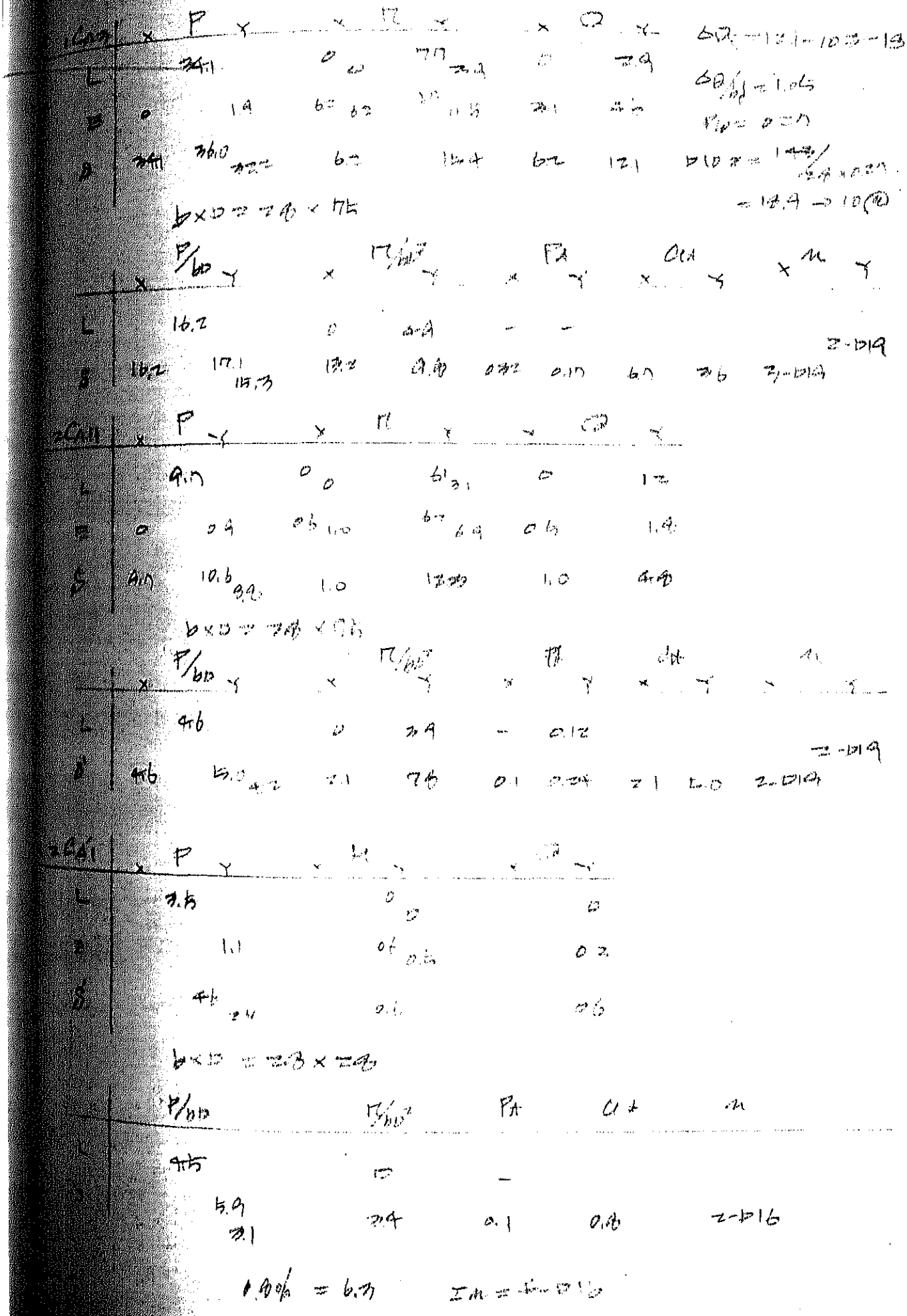
$\Delta Q_y = 10.7 - 10.2 = 0.4$

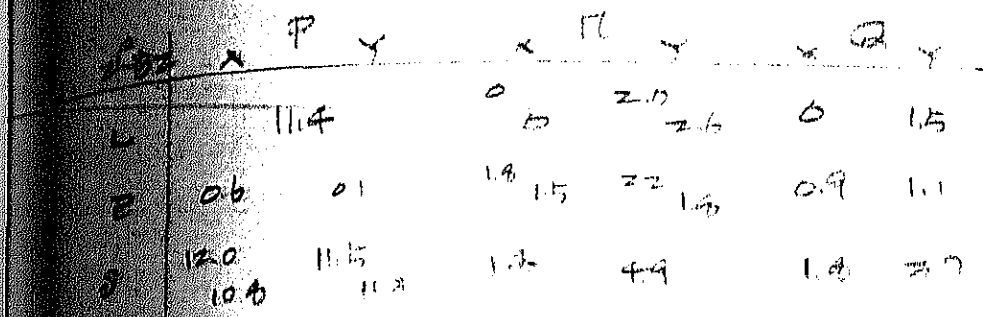
$\Delta H/bD^2 = 0.23$

$P_{10} = 0.22$

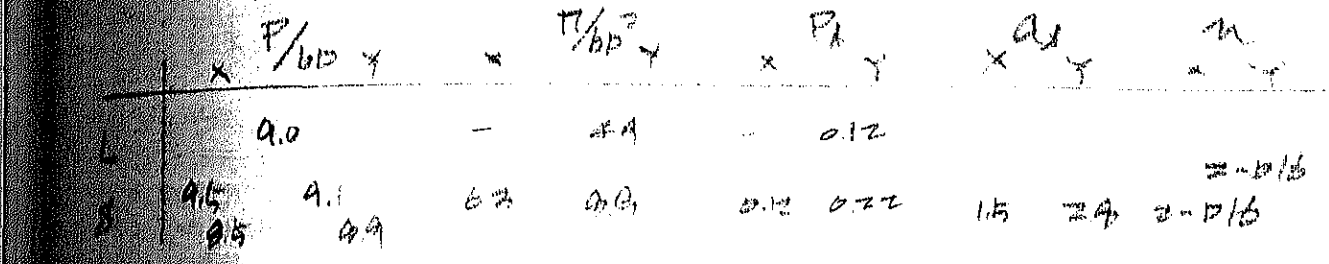
$P10 = 10\%/6 \times 0.22$

$= 2\%$





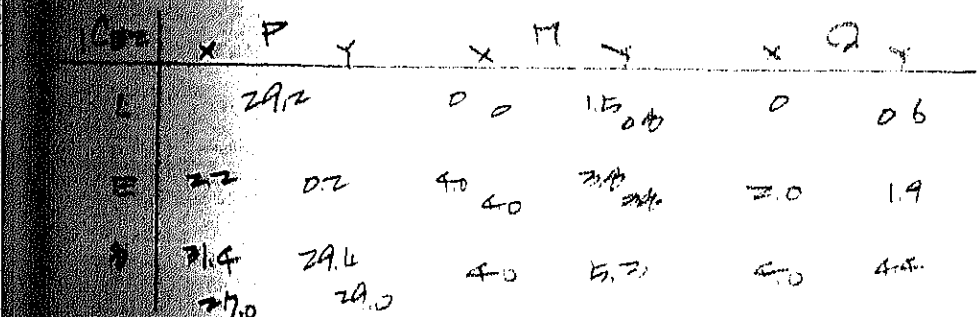
b×D = 2.9×4.5



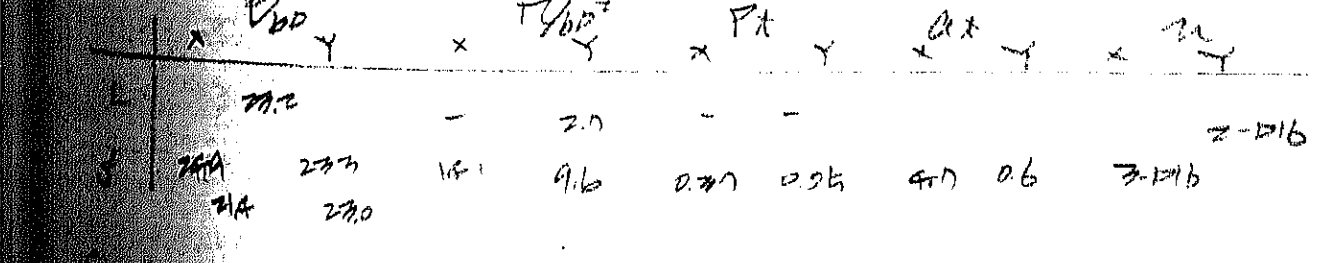
ΣBM = 10.1 ΣM = 6-D16

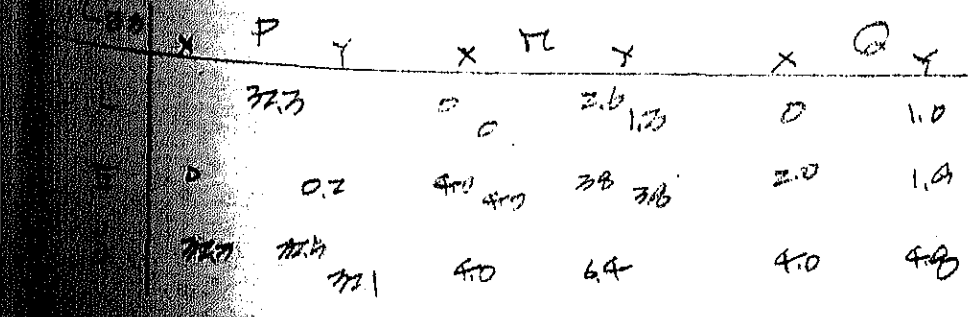
sQtx = 4.5 × 10.1 × 9 = 8.1

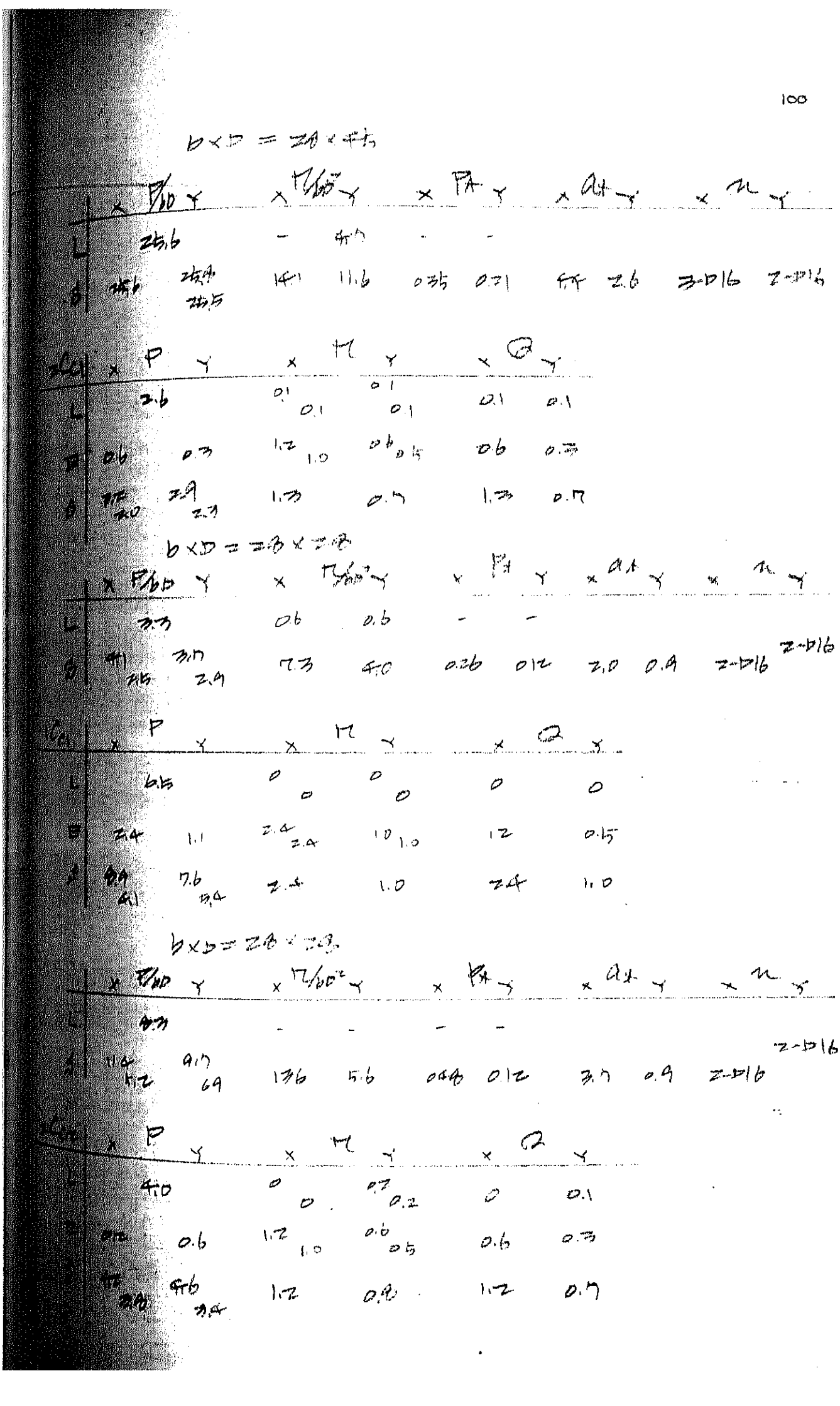
sQty = 2.9 × 3.5 × 9 = 8.8



b×D = 2.9× 4.5







b×D = 23 × 23

	x	P/bD y	M/bD² x	M/bD² y	Pt x	Pt y	Qt x	Qt y	n x	n y
L	5.1		0	1.1	-					
S	5.4 / 4.4	5.9 / 4.3	0.6	4.5	0.20	0.11	1.6	0.9	2-016	2-016

Cz	x	P y	M x	M y	Q x	Q y
L	9.1		0 / 0	0 / 0	0	0
D	0	2.1	2.6 / 2.6	1.0 / 1.0	1.3	0.5
6	4.1	11.2 / 12.0	2.6	1.0	2.6	1.0

b×D = 28 × 28

	x	P/bD y	M/bD² x	M/bD² y	Pt x	Pt y	Qt x	Qt y	n x	n y
L	11.7		-	-	-	-				
S	11.7	14.4 / 4.0	14.7	5.6	0.44	0.08	3.4	0.6	2-016	2-016

SLAB

$l_x = 2.83$ $l_y = 4.17$ $\lambda = 1.47$ $W_1 = 0.56$ $W_2 = 0.66$ $W_L = 0.86$

$M_{x1} = 0.082 \times w \times 2.83^2$	$= 0.656w$	0.37	0.43	0.57
$M_{x2} = 0.055 \times$ "	$= 0.440w$	0.25	0.29	0.38
$M_{y1} = 0.042 \times$ "	$= 0.336w$	0.19	0.22	0.29
$M_{y2} = 0.028 \times$ "	$= 0.224w$	0.13	0.15	0.19

$D = 10$ $d_x = 6.1$ $d_y = 5.2$

	1		2		3	
$a_{x1} =$	3.0	D10 20@	3.5	D10 20@	4.6	D10 15@
$a_{x2} =$	2.0	"	2.4	"	3.1	"
$a_{y1} =$	1.8	D10 30@	2.1	D10 30@	2.8	D10 25@
$a_{y2} =$	1.2	"	1.4	"	1.8	"

TIE BEAM   35×90 $j = 72.6$

Fx

$M_{OE} = 62 + 01 = 63$

$M_{IE} = 31 + 0 = 31$

$w' = 0.76 + 0.54 = 1.30 \qquad l = 2.83$

$C = 1.30 \times 2.83^2/12 = 0.87$

$M_0 = \quad " \quad /8 = 1.30$

$\Sigma M_{IE} = 31 + 1.2 \times 0.87 = 41$

$a_{OE} = 63 / 0.726 \times 3.0 = 2.9 \qquad$ 2-D19

$a_{IE} = 41 / \quad " \quad = 1.9 \qquad$ 2-D19

Fy

$M_{OE} = 11.4 + 3.9 = 15.3$

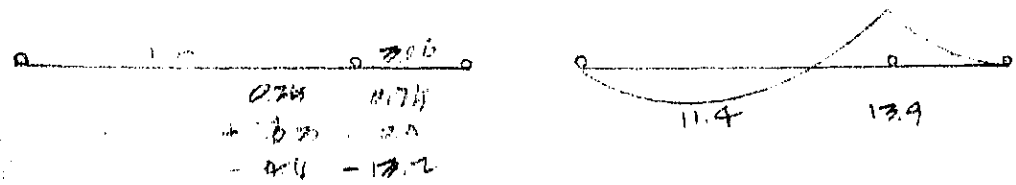
$M_{IE} = 2.7 + 1.0 = 3.7$

$M_{[illegible]} = 1.0 + 0 = 1.0$

$w' = 0.76 + 1.31 = 2.07 \quad l = 8.42 \qquad w' = 0.76 \quad l = 2.75$

$C = 2.07 \times 8.42^2/12 = 12.2 \qquad 0.76 \times 2.75^2/12 = 0.48$

$M_0 = \quad " \quad /8 = 18.3 \qquad " \quad /8 = 0.72$



$\Sigma_L M_{IE} = 1.0 + 13.9 = 14.9$

$M_C = 11.4$

$a_{OE} = 15.3 / 0.726 \times 3.0 = 7.0 \qquad$ 3-D19

$a_C = 11.4 / 0.726 \times 2.0 = 7.9 \qquad$ 3-D19

$a_{IE} = 14.9 / \quad " \quad = 10.3 \qquad$ 4-D19

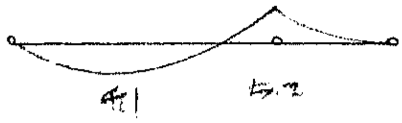
$a_{[illegible]} = 1.0 / 0.726 \times 3.0 = 0.5 \qquad$ 2-D19

NON WALL W = 0.76

$C = 0.76 \times 8.4^2 / 12 = 4.5$

$T0 = \text{"} / 8 = 6.7$

0.24 0.76
+6.7 −0.7
−1.5 −4.5



$\Sigma M_{cE} = 0.6 + 5.2 = 5.8$

$a_c = 4.1 / 0.726 \times 2.0 = 2.8$ 2-#19

$a_{IE} = 5.8 / \text{"} = 4.0$ 2-#19

FOOTING

f_P 35φ = 30T

W = 1.05² × 0.75 × 2.4 = 2.0

} f_P = 30 − 2.0 = 28.0

P	WALL	TIE BEAM	ΣP	φ × n	l × l'
13.0	0.54 × 1.17 0.63 1.67 × 1.17 1.95	2.15	17.8	35φ × 1	105 × 105
29.9	0.54 × 2.55 1.38	5.35	34.6	35φ × 2	105 × 210
36.1	0.54 × 2.55 1.38 1.31 × 4.07 5.33	5.35	46.2	35φ × 3	105 × 315
34.0	0.54 × 1.17 0.63 1.31 × 4.07 5.33	5.35	41.1	"	"
16.3		5.35	21.7	35φ × 2	105 × 210
30.6	0.54 × 2.55 1.38	5.35	37.3	"	"
12.0	1.68 × 2.53 4.25	2.15	18.4	35φ × 1	105 × 105
11.3	1.64 × 1.27 2.13	3.19	16.6	"	"
29.2	1.68 × 2.55 4.28	6.60	39.9	35φ × 2	105 × 210
33.3	1.68 × 1.0 1.68 1.31 × 4.15 5.44	6.60	47.1	35φ × 3	105 × 315
29.2	1.31 × 5.15 6.75	6.60	42.3	"	"
16.8		6.60	23.2	35φ × 2	105 × 210
6.4	0.17 × 1.26 0.22 0.47 × 1.24 0.58	2.16	9.4	35φ × 1	105 × 105
9.1	0.17 × 2.55 0.43	3.21	12.7	"	"
10.3	0.17 × 2.55 0.43 0.47 × 2.55 1.20	3.21	15.1	"	"

P1 35φ×1 105×105 D = 75 j = 59.5

n = 5-D16

P2 35φ×2 105×210

σp = 40.0 / 2 = 20.0 = …

τ = 20.0×10³ / 105×59.5 = 3.2 < 5

q = 20.0×10³ / 59.5×15 = 22.4 ⎫
a = 20.0×52.5 / 59.5×20.0 = 8.8 ⎭ 5-D16

P3 35φ×3 105×315

σp = 47.1 / 3 = 15.7

q = 15.7×10³ / 59.5×15 = 17.6 ⎫
a = 15.7×105 / 59.5×20.0 = 13.9 ⎭ 5-D19