THE GOVERNMENT OF MAURITIUS MINISTRY OF ENERGY, WATER RESOURCES AND POSTAL SERVICES CENTRAL WATER AUTHORITY

THE DETAILED DESIGN ON THE PORT LOUIS WATER SUPPLY PROJECT IN MAURITIUS

FINAL REPORT (2)

DATA BOOK

FOR

LOT III: RAW WATER TRANSMISSION PIPELINE AND TREATMENT FACILITIES

MARCH 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

S S S C R (3) 92 - 037

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27716

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国際協力事業団

23716

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PART III BORING LOG DATA

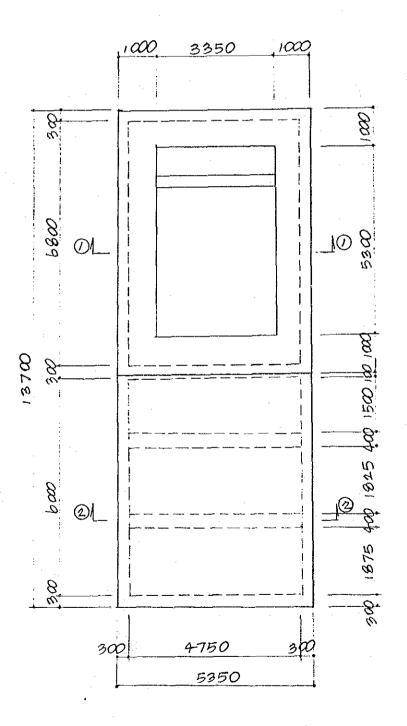
PART I STRUCTURAL CALCULATION

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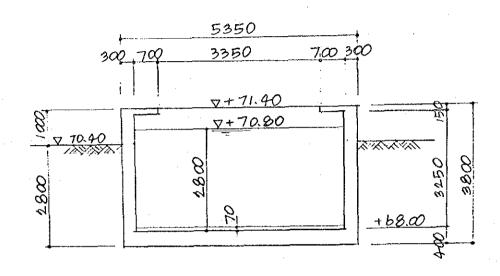
1. RECEIVING TANK

ITEM	PLGE
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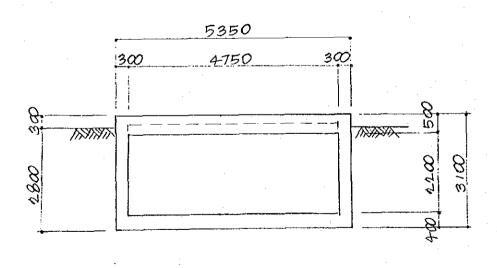
1. PLAN AND SECTION



PLAN

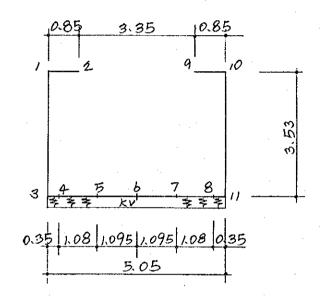


SECTION D-D



SECTION Q-Q

2. FRAME OF SECTION ①-①
2-1 DIMENSION OF FRAME



$$XV = KVO \left(\frac{BV}{30}\right)^{-3/4}$$

$$XVO = \frac{1}{30} \times 1 \times 28 \times 25 = 23.33 \times \frac{89}{cm^3}$$

$$BV = \sqrt{1370 \times 535} = 85b^{cm}$$

$$XV = 23.33 \times \left(\frac{85b}{30}\right)^{-3/4} = 1.89 \times \frac{89}{cm^3} = 1.890 \times \frac{100}{cm^3}$$

$$KV = 1890 \times 1.00 = 1890 \times \frac{100}{cm^2}$$

2-2 INERTIA AND AREA

$$I = \frac{1}{12} \times 1.00 \times 0.15^{3} = 0.0003^{m4}$$

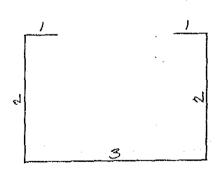
$$A = 1.00 \times 0.15 = 0.15^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.30^{3} = 0.0023^{m4}$$

$$A = 1.00 \times 0.30 = 0.30^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.40^{3} = 0.0053^{m4}$$

$$A = 1.00 \times 0.40 = 0.40^{m2}$$



$$L_1 = 0.003^{m2}$$
 $A_1 = 0.15^{m2}$

$$I_2 = 0.0023$$
 $A_2 = 0.30$

$$I_3 = 0.0053$$
 $A_3 = 0.50$

2-3 CALCULATION OF LOAD
2-3-| VERTICAL LOAD

(1) SLAB

DEAD LOAD
$$0.15 \times 2.5 = 0.38^{t/m^{2}}$$

LIVE LOAD $= 0.30^{\circ}$
 $W_{1} = 0.68^{t/m^{2}}$

P1 = ab8 x a15 = a10t

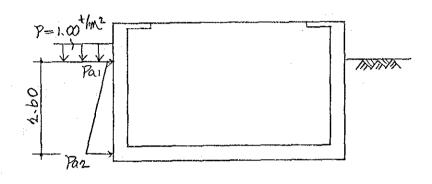
- (2) WALL $t = 30^{\circ m} \quad Pwi = 0.30 \times 2.5 = 0.75^{\dagger m^2}$
- (3) BASE SLAB

 DEAD LOAD $0.40 \times 2.5 = 1.00 \text{ m}^2$ RL CONCRETE $0.07 \times 2.3 = 0.16$ $W2 = 1.16 \text{ m}^2$

WATER LOAD W3 = 2.73 × 1.0 = 2.73 7 m2

6

2-3-2 EARTH PRESSURE

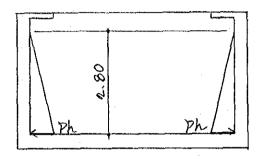


$$Pa1 = 1.00 \times 0.5$$
 = 0.50 /m²

$$Pa2 = (1.00 + 1.8 \times 2.60) \times 0.5 = 2.84$$
"

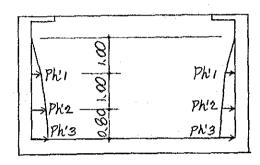
7

2-3-3 WATER PRESSURE



Ph = 2.80 x 1.0 = 2.80 4/m2

2-3-4 DYNAMIL WATER PRESSURE



$$\tanh \left(\sqrt{3} \times \frac{2.375}{2.80}\right) = 0.90 \rightarrow 1.0$$

$$Ph'_{1} = \sqrt{3} \times 0.05 \times 1.0 \times 2.80 \times \left\{ \frac{1.00}{2.80} - \frac{1}{2} \times \left(\frac{1.00}{2.80} \right)^{2} \right\} = 0.07 \frac{1}{10^{2}}$$

$$Ph'_{2} = \sqrt{3} \times 0.05 \times 1.0 \times 2.80 \times \left\{ \frac{2.00}{2.80} - \frac{1}{2} \times \left(\frac{2.00}{2.80} \right)^{2} \right\} = 0.11$$

$$Ph'_{3} = \sqrt{3} \times 0.05 \times 1.0 \times 2.80 \times \left\{ \frac{2.80}{2.80} - \frac{1}{2} \times \left(\frac{2.80}{2.80} \right)^{2} \right\} = 0.12$$

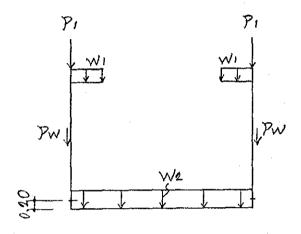
2-3-5 EARTHQUAKE LOAD

PE = ab8 4m2 x 1,00 x 0.05 = 0.03+

WALL

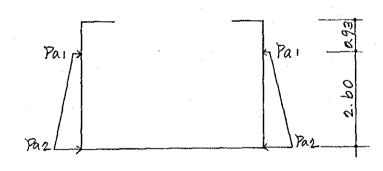
 $W_E = 0.30 \times 2.5 \times 0.05 = 0.04 + m^2$

2-4 LOADING CHART CASEI VERTICAL LOAD



WI = 0.68 */m2 W2 = 1.16 */m2 P1 = 0.10 * PW = 0.75 */m2

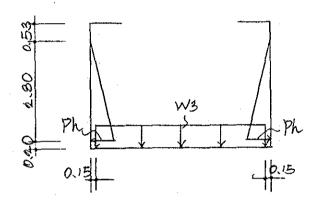
CASE & EARTH PRESSURE



 $Pa_1 = 0.50^{t/m^2}$ $Pa_2 = 2.84^{t/m^2}$

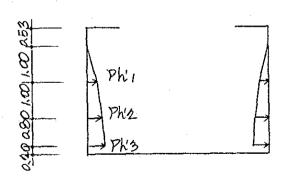
11

CASES WATER PRESSURE



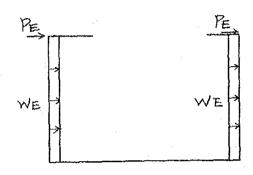
 $W3 = 2.73 \, \text{Im}^2$ Ph = $2.80 \, \text{Im}^2$

CASE 4 DYNAMIC WATER PRESSURE



Phi = 0.07 t/m2 Phi2 = 0.11/m2 Phi3 = 0.12 t/m2

CASES EARTHQUAKE LOAD



PEMANENT LOAD

CASE
$$b = (1) + (2)$$

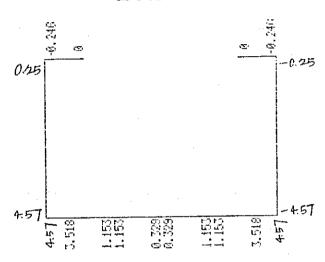
 $7 = (1) + (2) + (3)$

TEMPORARY LOAD (X = 0.667)

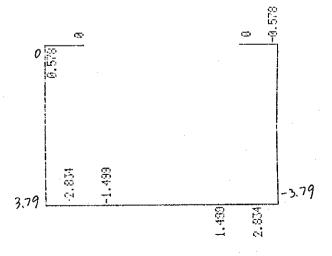
$$10 = 1 + 2 + 3 + 4 + 5$$

CASE & PERMANENT LOAD

MOMENT

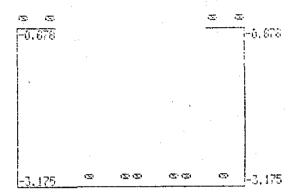


SHEAR



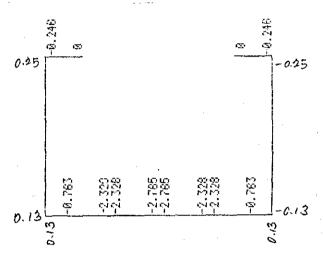
CASE & PERMANENT LOAD

AXIAL

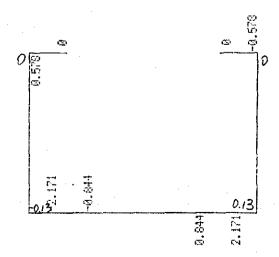


CASE 7 PERMANENT LOAD

MOMENT

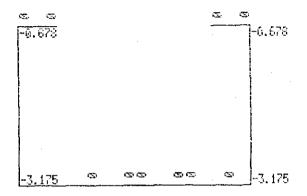


SHEAR



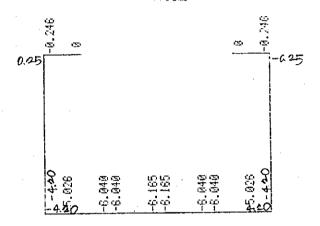
CASE 7 PERMANENT LOAD

AXIAL

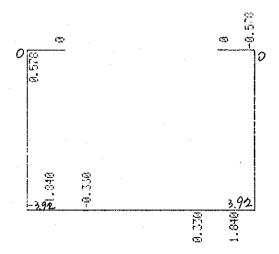


CASE & PERMANENT LOAD

MOMENT

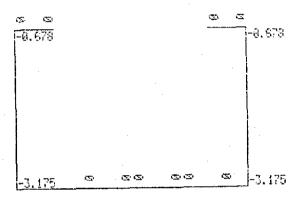


SHEAR



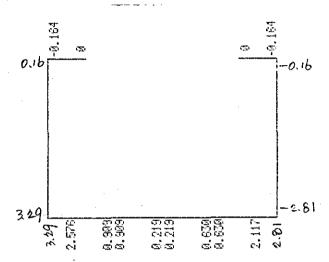
CASE & PERMANENT LOAD

AXIAL

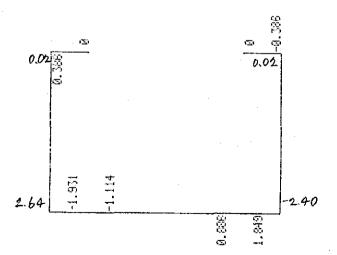


CASE 9 TEMPORARY LOAD

MOMENT

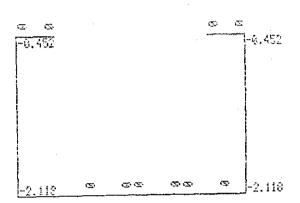


SHEAR



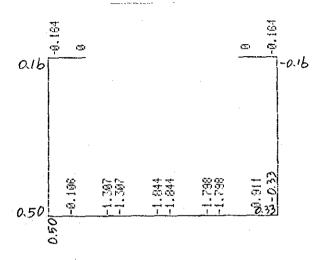
CASE 9 TEMPORARY LOAD

AXIAL

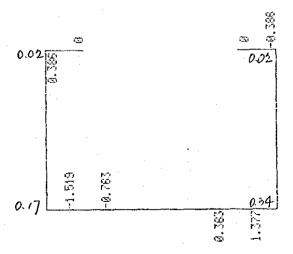


CASE 10 TEMPORARY LOAD

MOMENT

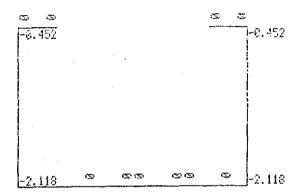


SHEAR



CASE 10 TEMPORARY LOAD

AXIAL



2-5 DESIGN OF SECTION

SLAE	}					
1.10	MOMENT	M	(t·m)	=	0. 250	Case b
••	AXIAL FORCE	N	(t) m)	==	0.000	
	SHEAR FORCE	S	(t)	=	0.580	
	WIDTH	b	(cm)	=	100.000	•
	DEPTH	h	(n)	==	15.000	
	EFFECTIVE DEPTH	d	(n)	-	10.000	
	CONCRETE COVER	ď	(n)	=	0.000	
	CONCRETE COVER	ď″	(n)	==	5.000	-
			Es / Ec	=	15	
	AREA OF REINFORCEMENT		(cm2)	==		D13@200 上
	AREA OF REINFORCEMENT	As '	(n)	==	0.000	
			/r (0)			•
	COMPRESSIVE STRESS	d c	(Kg/cm2)		16,13 447,28	
	TENSILE STRESS	σs τ	(n)	=	0.65	

24

```
WALL
```

```
3.11 NOMENT
                                                        Case b
                                              4.570
                              (t \cdot m)
                        M
                            (t)
(t)
     AXIAL FORCE
                                              0.000
                        N
     SHEAR FORCE
                                              3.790
                        S
                            (cm)
     HIDIN
                                          100,000
                        b
     DEPTH
                                             30,000
                        h
                              (n)
     EFFECTIVE DEPTH
                                             23.000
                        d
                              (n)
     CONCRETE COVER
                        ď,
                                              7.000
                              (n)
     CONCRETE COVER
                         ď"
                                             7,000
                             _{i}\left( n\right) _{i}
     MODULAR RATIO
                         n = Es / Ec = 15
                                             15.270 D16@200+D13@200 外
     AREA OF REINFORCEMENT As (cm2) =
     AREA OF REINFORCEMENT As '(")
                                             12.670D13@100 内
```

```
COMPRESSIVE STRESS \sigma_c (Kg/cm2) = 52.07 TENSILE STRESS \sigma_s ( " ) = 1405.29 SHEARING STRESS \tau ( " ) = 1.89
```

```
Case 8
                                = \% 3.410
HOMENT
                        (t \cdot m)
                  M
AXIAL FORCE
                                       0.000
                  N
                        (t)
                                ==
SHEAR FORCE
                                       3.920
                  S
                        (t)
                                =
HIDIH
                                     100.000
                  b
                       (cm)
                       -(n)
DEPTH
                  h
                                      30.000
                        (n)
EFFECTIVE DEPTH
                                      23.000
                  d
                       (n) = (n) =
CONCRETE COVER
                                       7.000
                  ď'
                                      7.000
CONCRETE COVER
                  d"
                  n = E_s / E_c =
                                      15
MODULAR RATIO
AREA OF REINFORCEMENT As (cm2) = 12.670 D13@100 内
                                      16. 270 D16@200+D13@200 4
AREA OF REINFORCEMENT As '(")
```

```
COMPRESSIVE STRESS \sigma_c (Kg/cm2) = 42.83
TENSILE STRESS \sigma_s (") = 1325.36
SHEARING STRESS \tau (") = 1.93
```

```
MOMENT M (t·m) = 4.200 Case 8 •

AXIAL FORCE N (t) = 0.000

SHEAR FORCE S (t) = 1.840

WIDTH b (cm) = 100.000

DEPTH h (") = 40.000

EFFECTIVE DEPTH d (") = 33.000

CONCRETE COVER d'(") = 10.000

CONCRETE COVER d'(") = 7.000

MODULAR RATIO n = Es / Ec = 15

AREA OF REINFORCEMENT As (cm2) = 9.930 D16@200 +

AREA OF REINFORCEMENT As '(") = 16.270 D16@200 + D13@200 F
```

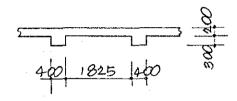
```
COMPRESSIVE STRESS \sigma_c (Kg/cm2) = 33.58
TENSILE STRESS \sigma_s (") = 1381.11
SHEARING STRESS \tau (") = 0.60
```

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```
BASE
  Ь
                                                     5.170 Case 8
      HOHENT
                            M
                                   (t · m)
                                                    0.000
      AXIAL FORCE
                            N
                                   (t)
                                                    0.000
                            S
      SHEAR FORCE
                                   (t)
                                                  100,000
      WIDTH
                            b
                                   (cm)
                                                   40.000
      DEPTH
                            h
                                   (n)
                                                   30.000
      EFFECTIVE DEPTH
                            d
                                   (n)
                                                    7.000
                            ď
      CONCRETE COVER
                                   (n)
      CONCRETE COVER d'"
MODULAR RATIO n
AREA OF REINFORCEMENT As
                                                   10.000
                                   (n)
                               n = Es / Ec =
                                                   15
                                                   16.270 D16@200+D13@200 ==
                                  (cm2)
      AREA OF REINFORCEMENT As '
                                                    9,930 D16@200 下
```

	P 460		
COMPRESSIVE STRESS	σc	(Kg/cm2) =	44.79
TENSILE STRESS		(n) =	
SHEARING STRESS	τ	(: ") =	0.00

3. DESIGN OF SLAB
3-| DIMENSION OF SLAB



3-2 MOMENT AND SHEAR

$$W = 0.20 \times 2.5 + 0.30^{1/m^{2}} = 0.80^{1/m^{2}}$$

$$-M = -\frac{1}{12} \times 0.80 \times 2.23^{2} = -0.33^{1/m}$$

$$M = \frac{1}{24} \times 0.80 \times 2.23^{2} = 0.17^{1/m}$$

$$S = 0.80 \times 1.83 \times \frac{1}{2} = 0.73^{1/m}$$

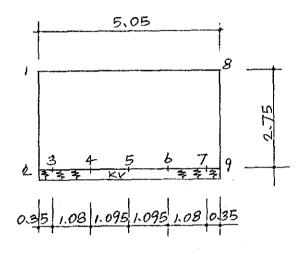
3-3 DESIGN OF SECTION

$$As = \frac{0.33 \times 10^5}{1600 \times 0.875 \times 15} = 1.57 \, \text{cm}^2 < D13 @ 200$$

$$T = \frac{0.73 \times 10^3}{1.00 \times 0.875 \times 15} = 0.6^{\frac{\text{Kg}}{\text{cm}^2}} < 4.25^{\frac{\text{Kg}}{\text{cm}^2}} \text{ OK}$$

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4. FRAME OF SECTION @-@
4-1 DIMENSION OF FRAME



KV = 1890 7m2

4-2 INERTIA AND AREA

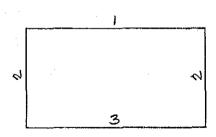
$$I = 0.0083 \, \text{m}^4$$

$$I = \frac{1}{12} \times 2.25 \times 0.30^3 = 0.0051^{\text{m}^4}$$

$$A = 2.25 \times 0.30 = 0.68 \text{ m}^2$$

$$I = \frac{1}{12} \times 2.25 \times 0.40^3 = 0.0120^{914}$$

$$A = 2.25 \times 0.40 = 0.90^{m^2}$$



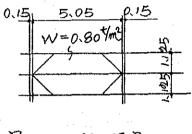
$$I_1 = 0.0083^{m4}$$
 $A_1 = 0.57^{m^2}$

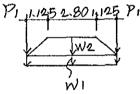
$$I2 = 0.0051$$
 $A2 = 0.68$

1-31

4-3 CALCULATION OF LOAD 4-3-1 VERTICAL LOAD

(1) BEAM





$$W_{1} = 0.40 \times 0.30 \times 2.5 = 0.30^{t/m}$$

$$W_{2} = 0.80 \times 2.25 = 1.80''$$

$$P_{1} = 0.80 \times (0.15 \times 2.25 + 1.125 \times 1.125 \times \frac{1}{2} \times 2) = 1.28^{t}$$

(2) WALL
$$t = 30^{cm}$$

$$PW = 0.30 \times 2.25 \times 2.5 = 1.69^{4/m}$$

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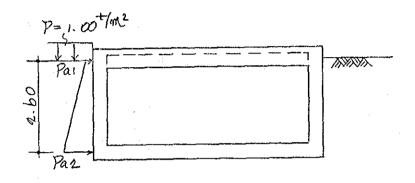
DEAD LOAD
$$0.40 \times 2.25 \times 2.5 = 2.25 \text{ m}$$

DEAD LOAD $0.50 \text{ m}^2 \times 2.25 = 1.13$

LIVE LOAD $0.30 \text{ m}^2 \times 2.25 = 0.68$

W3 = 4.06 */m

4-3-2 EARTH PRESSURE



$$Pa_1 = 1.00 \times 0.5 \times 2.25 = 1.13 \text{ m}$$

$$Pa2 = (1.00 + 1.8 \times 2.60) \times 0.5 \times 2.25 = 6.39$$
"

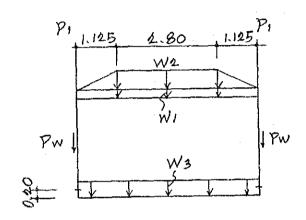
4-3-3 EARTHQUAKE LOAD

 $P_{E} = (0.80^{4} \text{m}^{2} \times 2.675 \times 2.25 + 0.30^{4} \text{m} \times 2.375) \times 0.05 = 0.28^{4}$

WALL

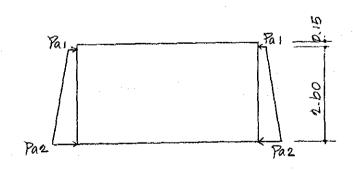
WF = 0.30 × 2.25 × 2.5 × 0.05 = 0.08 */m

4-4 LOADING CHART CASE I VERTICAL LOAD

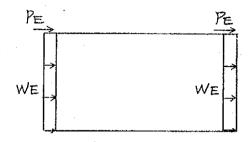


$$W_1 = 0.30^{t/m}$$
 $W_2 = 1.80^{t/m}$ $W_3 = 4.06^{t/m}$
 $P_1 = 1.28^{t}$ $P_W = 1.69^{t/m}$

CASE 2 EARTH PRESSURE



CASE 3 EARTHQUAKE LOAD



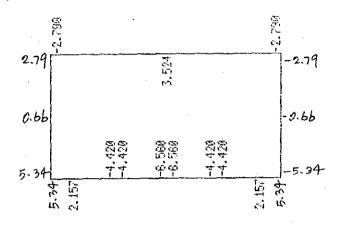
PE = 0.28 + WE = 0.08 +/m

PERMANENT LOAD

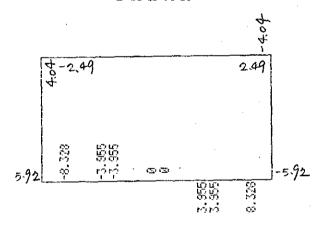
TEMPORARY LOAD (X = 0.667)

CASE 4 PERMANENT LOAD

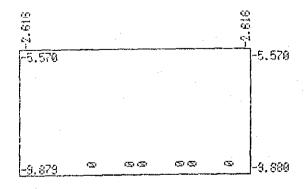
MOMENT



SHEAR



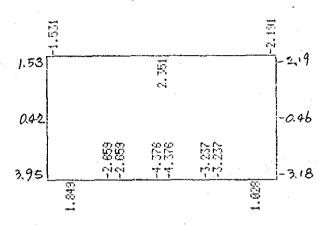
AXIAL



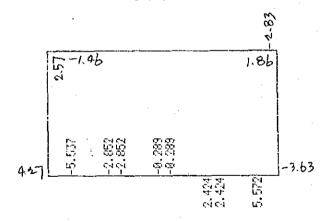
1 - 38

CASE 5 TEMPORARY LOAD

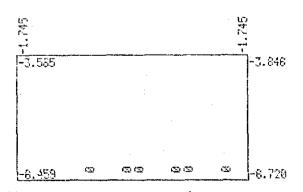
MOMENT



SHEAR



AXIAL



1 - 39

4-5 DESIGN OF SECTION

```
BEAM
                                              2.790 Case 4
1.8 HOMENT
                         M
                               (t·m)
     AXIAL FORCE
                                              0.000
                         N
                              (t)
                                              4.040
     SHEAR FORCE
                         S
                               (t)
                                             40.000
     WIDTH
                         b
                               (cm)
                                        =.'
                              (#)
                                        =
                                             50,000
     DEPTH
                         h
                                             43.000
     EFFECTIVE DEPTH
                               (n)
                                        =
                                              7,000
      CONCRETE COVER
                               (n)
                                        =
                                              7,000
     CONCRETE COVER
                               (#)
                                             15
                           n = Es / Ec =
     MODULAR RATIO
                                               5.950 D16-3 上
                               (cm2)
      AREA OF REINFORCEMENT As
     AREA OF REINFORCEMENT As '(")
                                              5.950
                                             28.08
                               (Kg/cm2) =
      COMPRESSIVE STRESS
                         σc
                                 n = 1206.51
      TENSILE STRESS
                         σs
      SHEARING STRESS
```

BEAM	1	•	~~ ~		
1-8	MOMENT	M	$(t \cdot m)$	===	$_{3.520}$ Case δ
	AXIAL FORCE	N	(t)	-	0.000
	SHEAR FORCE	S	(t)	==	0.000
	WIDTH	b	(cm)	·==	40,000
	DEPTH	h	·(n)	=	50.000
	EFFECTIVE DEPTH	d	(11)	= .	43.000
	CONCRETE COVER	ď	(n)	==	7.000
	CONCRETE COVER	ď″	(n)	=	7,000
	MODULAR RATIO	n =	Es /Ec	===	15
	AREA OF REINFORCEMENT	As	(cm2)	E11	5.950 D16-3 F
	AREA OF REINFORCEMENT	As′	(·n -)	=772	5.950 , 上

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			_		_	•
COMPRESSIVE STRESS	OC	(Kg	/cm	2)	· <del></del> -	35.42
TENSILE STRESS	σs	(	"	)	=	1522.19
SHEARING STRESS	τ	(	"	)	=	0.00

```
BEAM
 1-8 HOMENT
                                                 3.520 Case 5
                                (t·m)
                          M
                                                 0.000
                          N
S
                                (t)
      AXIAL FORCE
                                                 0.000
                                (t)
      SHEAR FORCE
                                                40.000
                          b
                                (cm)
      HIDIH
                                                30,000
                          h
                                (n)
      DEPTH
                                                23,000
      EFFECTIVE DEPTH
                                (n)
                           d
                                                 7,000
                          ď′
      CONCRETE COVER
                                (n)
                          \hat{d}''
                                                 7.000
      CONCRETE COVER
                                (n)
                            n = Es / Ec
                                                15
      MODULAR RATIO
                                (cm2)
                                                11.920 DIb-b下
      AREA OF REINFORCEMENT As
      AREA OF REINFORCEMENT As
                                                 9.930 DIb-5上
                                (n)
```

COMPRESSIVE STRESS TENSILE STRESS SHEARING STRESS	σς σs τ	(Kg/cm2) = ( " ) = ( " ) =	1549.63
Suchaing Siness	U	( " )	• • • • • • • • • • • • • • • • • • • •

```
WALL
1.8 MOMENT
                                                  2.790 Case 4
                                 (t · m)
      AXIAL FORCE
                                                  2,620
                           Ν
                                 (t)
      SHEAR FORCE
                                                  4.040
                           S
                                 (t)
                                                225,000
      HIDIH
                           b
                                 (cm)
      DEPTH
                                                 30,000
                                 (#)
                           h
      EFFECTIVE DEPTH
                                                 23,000
                           d
                                 ( H )
      CONCRETE COVER
                                 (n)
                                                  7.000
                           ď′
                           ď"
      CONCRETE COVER
                                 (n)
                                                  7,000
                                           ==
      MODULAR RATIO
                                                 15
                             n = Es / Ec =
      AREA OF REINFORCEMENT As
AREA OF REINFORCEMENT As
                                                 22.340 D16@200 /
                                 (cm2)
                                                 14.250 D13@200 内
                                 (n)
                                                 17.23
                                 (Kg/cm2) =
      COMPRESSIVE STRESS
                           σc
                                               539.38
                                 ( ") =
      TENSILE STRESS
                           σs
      SHEARING STRESS
                                     n
                                                  0.89
```

WALL	_	<u></u>	<b></b>	
2.9 HOHENT	M	(t·m)	=	5. 340 Case 4
AXIAL FORCE	N	(t)	=	9. <b>88</b> 0
SHEAR FORCE	S	(t)	==	5.920
WIDTH	b	(cm)	==	225.000
DEPTH	h	·(#)	=-	30.0 <b>00</b>
EFFECTIVE DEPTH	d	(n)	=	23.000
CONCRETE COVER	ď	(")	===	7.000
CONCRETE COVER	ď″	$\cdot (n)$	=	7.000
MODULAR RATIO		=Es/Ec	===	15
AREA OF REINFORCEMENT		(cm2)	=	22.340 <b>D16@200</b> 9
AREA OF REINFORCEMENT	As '	(")	==	14.250 013@200内

COMPRESSIVE STRESS	σc	(K	g / Cn	2) =	32.67
TENSILE STRESS	Ø S	(	H	)	916.09
SHEARING STRESS	₹ .	(	"	) ===	-1.30
the state of the s					

```
BASE
2.9 HOMENT
                                                  5.340
                                 (t · m)
      AXIAL FORCE
                                 (t)
                                                  0.000
      SHEAR FORCE
                           S
                                                  8.330
                                 (t)
      HIDIH
                                               225,000
                           b
                                 (cn)
      DEPTH
                                 (n)
                           h
                                                40,000
      EFFECTIVE DEPTH
                           d
                                 ( " )
                                                30,000
      CONCRETE COVER
                           ď í
                                 (n)
                                                  7.000
                           ď"
      CONCRETE COVER
                                                10,000
                                 (n)
      MODULAR RATIO
                                                15
                             n = Es / Ec =
                                                22.340 D16@200 F
      AREA OF REINFORCEMENT As
                                (cm2)
      AREA OF REINFORCEMENT As '
                                                22.340
                                                                  1
                                (n)
                                                21.08
      COMPRESSIVE STRESS
                           σc
                                 (Kg/cm2) =
     TENSILE STRESS
SHEARING STRESS
                                               879.73
                           o s
                                    "
                                    "
                                                  1.36
```

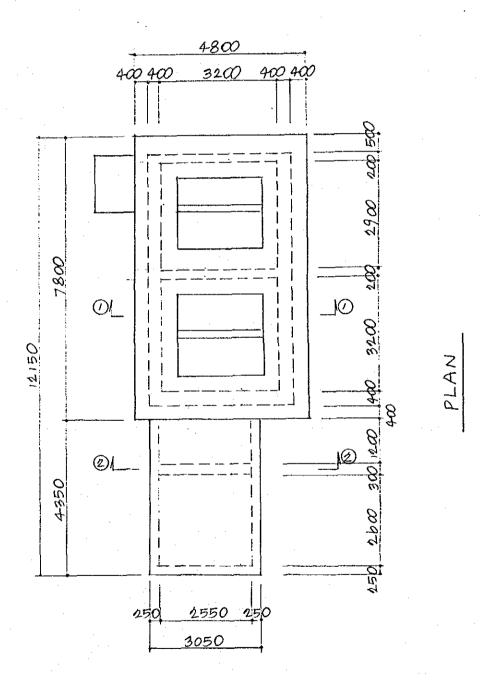
BASE		_				
5 HOM	ent	M	(t·m)	=	6.560	Case 4
AXI	AL FORCE	N	(t)	==	0,000	
	AR FORCE	S	(t)	171	0.000	
WID	TH .	. b	(cm)	=	225.000	
DEP:	TH	h	(n)	==	40,000.	
-	ECTIVE DEPTH	d	(n)	==	33,000	
	CRETE COVER	ď	(n)	TZ.	10.000	
	CRETE COVER	ď"	( " )	72	7.000	
HODI	JLAR RATIO		=Es/E	c = .	15	
ARE	of reinforcement		(cm2)	=		D16@200 上
ARE	a of reinforcement	'As '	(n)	=	22, 340	"

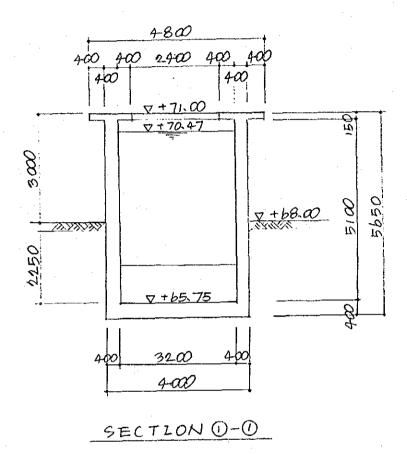
			<del></del>	
COMPRESSIVE STRESS	σс	(Kg∕c	cm2) =	23.09
TENSILE STRESS	σs	( "	) ===	963.88
SHEARING STRESS	τ	( "	) =	0.00

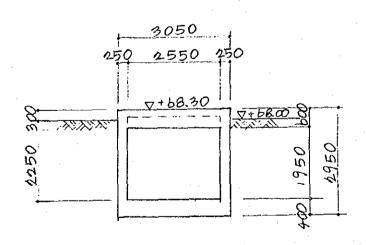
SHEET	M.	
OI1L., L., I	110	

2. RAPID MIXING TANK

ITEM	PAGE
1. PLAN AND SECTION	- 1
2. DESIGN OF WALL (1)	
2-1 MOMENT AND SHEAR	· - 3
2-2 DESIGN OF SECTION	- 5
3. DESIGN OF WALL(2)	
3-1 MOMENT AND SHEAR	Ь
3-2 DESIGN OF SECTION	- 7
4. DESIGN OF BASE	
4-1 CALCULATION OF LOAD	8
4-2 MOMENT AND SHEAR	19
4-3 DESIGN OF SECTION	- //
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b. FRAME OF SECTION 2-2	
6-1 DIMENSION OF FRAME	- 13
6-2 INERTIA AND AREA	. ,4
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6-4 LOADING CHART	,9
6-5 DESIGN OF SECTION	23

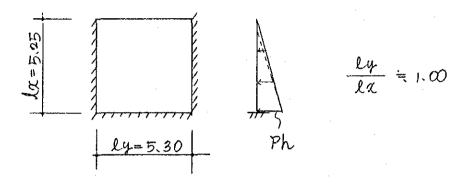






SECTION 2-2

2. DESIGN OF WALL (1)
2-1 MOMENT AND SHEAR
2-1-1 WATER PRESSURE



Ph = 4.72 × 1.0 = 4.72 7 mc

$$-M21 = -4.72 \times 5.25^{2} \times 0.03b = -4.68^{+m}$$

$$-My3 = -4.72 \times 5.25^{2} \times 0.03 = -3.90^{"}$$

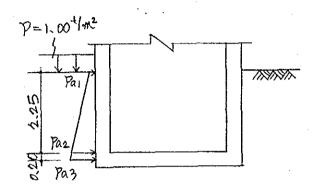
$$My1 = 4.72 \times 5.25^{2} \times 0.015 = 1.95^{"}$$

$$My2 = 4.72 \times 5.25^{2} \times 0.01 = 1.30^{"}$$

$$Mx2 = 4.72 \times 5.25^{2} \times 0.009 = 1.17^{"}$$

$$0x1 = 4.72 \times 5.25 \times 0.325 = 8.05^{+}$$

$$Qy1 = 4.72 \times 5.25 \times 0.24 = 5.95^{"}$$



$$Pa_{1} = 1.00 \times 0.5$$

$$Pa_{2} = (1.00 + 1.8 \times 2.25) \times 0.5 = 2.53$$

$$Pa_{3} = (1.00 + 1.8 \times 2.45) \times 0.5 = 2.71$$

$$M = \frac{1}{2} \times 0.50 \times 2.25^{2} + \frac{1}{6} \times 2.03 \times 2.25^{2} = 2.98^{+m}$$

$$Q = (0.50 + 2.53) \times 2.25 \times \frac{1}{2} = 3.41^{+}$$

#### 2-2 DESIGN OF SECTION

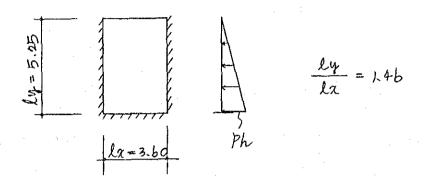
$$AS = \frac{4.68 \times 10^{5}}{1600 \times 0.875 \times 33} = 10.13^{\text{cm}^{2}} < P160200 + D130200 - 1NSIDE$$

$$AS = \frac{2.98 \times 10^5}{1600 \times 0.875 \times 33} = 6.45^{\text{cm}^2} < D.16.200...OUT SIDE$$

$$A_5 = \frac{3.90 \times 10^5}{1600 \times 0.875 \times 31} = 8.99^{\text{cm}^2} < D.16 @ 200 \dots IN SIDE$$

$$D.16 @ 200 \dots OUT SIDE$$

3. DESIGN OF WALL (2)
3-1 MOMENT AND SHEAR
3-1-1 WATER PRESSURE



Ph = 4.72 4m2

$$-My_{1} = -M\chi_{3} = -4.72 \times 3.60^{2} \times 0.042 = -2.57^{tm}$$

$$-M\chi_{1} = -4.72 \times 3.60^{2} \times 0.01 = -0.62^{"}$$

$$My_{2} = 4.72 \times 3.60^{2} \times 0.01 = 0.61^{"}$$

$$M\chi_{2} = 4.72 \times 3.60^{2} \times 0.006 = 0.37^{"}$$

$$Qy_{1} = 4.72 \times 3.60 \times 0.36 = 6.12^{t}$$

$$Q\chi_{1} = 4.72 \times 3.60 \times 0.31 = 5.27^{"}$$

3-2 DESIGN OF SECTION

$$AS = \frac{2.57 \times 10^{5}}{1b00 \times 0.875 \times 31} = 5.92^{\text{cm}^{2}} < D1b @ 200 \cdots IN SIDE$$

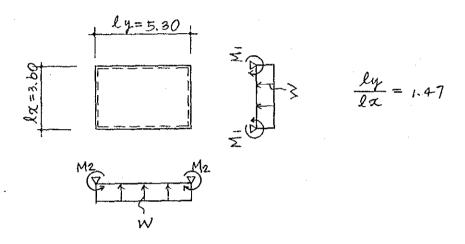
$$D1b@ 200 \cdots OUT SIDE$$

4. DESI	GN OF BASE		
4-1 CA	LCULATION OF LOAD		•
4-1-1 V	ERTICAL LOAD		
SLAB	0.68 tm2 x (7.80 x 4.80 - 2.30 x 2.40 - 1.90 x 2	2.40)=	18.60t
11	0.80 4m2 x 1.60 x 1.49	- -	1.91"
,	0.50 m² x (1.20 x 3.20 +1.60 x 1.49)	=	3、11
WATER	0.79 4m2 x 1.20 x 5.09	=	4.83"
WALL	0.20 × 3.50 × 3.20 × 2.5	=	5.60"
<i>u</i>	0.20 × 4.10 × 3.20 × 2.5	=	b.5b"
	0.20 × 1.52 × 3.20 × 2.5	; <del>=</del>	2-43"
4	0.20 x 3.05 x 4.00 x 2.5	=	b.10"
4	0.20 × 1.15 × 1.49 × 2 × 2.5	=	1.71
4	0.40 x 5.10 x (3.20+5.70+5.50) x 2.5	=	73.44"
4	0.40 × 3.00 × 3.20 × 2.5	<b>=</b>	9.60"
′,	0.40 × 3.05 × 1.00 × 2.5	=	3.05
4	0.40×(305×1,20-1,15×1,20)×25	=	2.28"
4	0.20 × 2.05 × 0.40 × 2.5	=	0.41
		ZW =	139.63×

$$W = \frac{139.63}{4.00 \times 5.70} = 6.12 \text{ M/m}^3$$

## 4-2 MOMENT AND SHEAR

### CASE 1 VERTICAL LOAD + WATER PRESSURE



$$M_{1} = 4.68 + 8.05 \times 0.20 = 6.29^{tm}$$

$$M_{2} = 2.57 + 6.12 \times 0.20 = 3.79^{"}$$

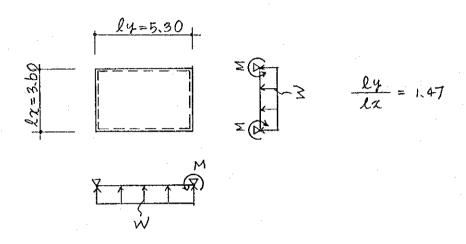
$$M_{2} = 6.12 \times 3.60^{2} \times 0.079 + 6.29 = 12.56^{tm}$$

$$M_{3} = 6.12 \times 3.60^{2} \times 0.027 + 3.79 = 5.93^{"}$$

$$M_{3} = 6.12 \times 3.60 \times 0.54 = 11.90^{t}$$

$$Q_{3} = 6.12 \times 3.60 \times 0.52 = 11.46^{"}$$

#### CASEL VERTICAL LOAD+ EARTH PRESSURE



 $W = b.12 + m^2$ 

$$M = \frac{1}{2} \times 0.50 \times 2.45^{2} + \frac{1}{b} \times 2.21 \times 2.45^{2} = 3.71^{+m}$$

$$M\chi 2 = b.21 \times 3.60^{2} \times 0.079 = b.3b^{+m}$$

$$My 2 = b.21 \times 3.60^{2} \times 0.027 = 2.17^{"}$$

4-3 DESIGN OF SECTION

Maz= 12.56 +m WATER PRESSURE

CENTER AS =  $\frac{12.5b \times 10^5}{1600 \times 0.875 \times 33} = 27.19^{(ort^2)} < D19@100 UPPER$ 

MI = 6.29 + M WATER PRESSURE

END  $AS = \frac{b.29 \times 10^5}{1b00 \times 0.875 \times 33} = 13.61^{cm/2} < D19@200 UPPER$ 

My2 = 5.93 TM WATER PRESSURE

CENTER  $As = \frac{5.93 \times 10^5}{1600 \times 0.875 \times 31} = 13.66 \text{ cm}^2 < D19 @ 200 UPPER$ 

Ma = 3.79 * WATER PRESSURE

END  $As = \frac{3.79 \times 10^5}{1600 \times 0.875 \times 31} = 8.73^{(m)^2} < D19@200 UPPER$ 

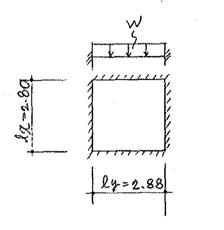
MX1 = 6.36 tm EARTH PRESSURE

CENTER AS =  $\frac{b.3b \times 10^5}{1b00 \times 0.875 \times 30} = 15.15^{cm^2} < D1b@100$ 

M = 3.71 * EARTH PRESSURE

END AS =  $\frac{3.71 \times 10^5}{1600 \times 0.875 \times 30} = 8.83^{\text{cm}^2} < D160200$ 

## 5. DESING OF SLAB 5-1 MOMENT AND SHEAR



$$-M\chi_{1} = -M\psi_{1} = -0.80 \times 2.80^{2} \times 0.052 = -0.33^{+m}$$

$$M\chi_{2} = M\psi_{2} = 0.80 \times 2.80^{2} \times 0.0175 = 0.11^{"}$$

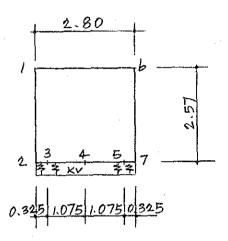
$$Q\chi_{1} = Q\psi_{1} = 0.80 \times 2.80 \times 0.44 = 0.99^{+}$$

## 5-2 DESING OF SECTION

$$AS = \frac{0.33 \times 10^5}{1600 \times 0.875 \times 15} = 1.57^{\text{cm}^2} < D13 @ 200$$

$$T = \frac{0.99 \times 10^3}{100 \times 0.875 \times 15} = 0.8^{\frac{100}{100}} < 4.25^{\frac{100}{100}} \text{ OK}$$

b. FRAME OF SECTION @-@ 6-1 DIMENSION OF FRAME



$$XV = KVO\left(\frac{BV}{30}\right)^{-3/4}$$

$$KVO = \frac{1}{30} \times 1 \times 28 \times 50 = 4b.67^{kg/cm^3}$$

$$BV = \sqrt{475 \times 305 + 570 \times 400} = 611^{cm}$$

$$XV = 4b.67 \times \left(\frac{611}{30}\right)^{-3/4} = 4.87^{kg/cm^3} = 4870^{t/m^3}$$

$$KV = 4870 \times 2.40^{m} = 11688^{t/m^2}$$

$$A = 0.44^{m^2}$$

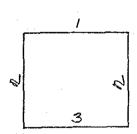
$$I = \frac{1}{12} \times 2.40 \times 0.25^{3} = 0.0031^{m4}$$

$$A = 2.40 \times 0.25 = 0.60^{m2}$$

$$A = 2.40 \times 0.25 = 0.60$$
 = 0.60

$$I = \frac{1}{12} \times 2.40 \times 0.40^3 = 0.0128^{\text{m}^2}$$

$$A = 2.40 \times 0.40 = 0.96^{m^2}$$

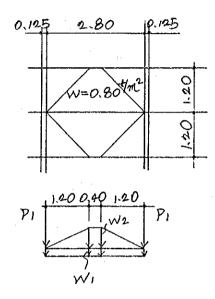


$$I_1 = 0.0105^{m4}$$
  $A_1 = 0.44^{m2}$ 

$$I_3 = 0.0128$$
  $A_3 = 0.96$ 

6-3 CALCULATION OF LOAD 6-3-1 VERTICAL LOAD

#### (1) BEAM .



$$W1 = 0.30 \times 0.40 \times 2.5 = 0.30 \text{ m}$$

$$W2 = 0.80 \times 2.40 = 1.92 \text{ ''}$$

$$P1 = 0.80 \times (0.125 \times 2.40 + 1.20 \times 1.20 \times \frac{1}{2} \times 2) = 1.39 \text{ '}$$

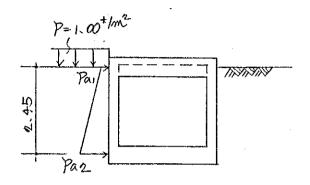
(2) WALL
$$t = 25^{cm}$$

$$PW = 0.25 \times 2.40 \times 2.5 = 1.50 \text{ Vm}$$

### (3) BASE SLAB

DEAD LOAD  $0.40 \times 2.40 \times 2.5 = 2.40 \text{ m}$ DEAD LOAD  $0.50 \text{ m}^2 \times 2.40 = 1.20$ LIVE LOAD  $0.30 \text{ m}^2 \times 2.40 = 0.72$ W3 = 4.32 m

### b-3-2 EARTH PRESSURE



$$Pa_1 = 1.00 \times 0.5 \times 2.40 = 1.20 \text{ m}$$

$$Pa2 = (1.00 + 1.8 \times 2.45) \times 0.5 \times 2.40 = 6.49$$
"

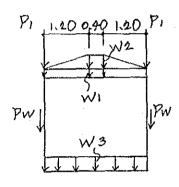
6-3-3 EARTHQUAKE LOAD

PE = (0.80 / m × 1.525 × 2.40 + 0.30 / m × 1.275) × 0.05 = 0.17 t

WALL

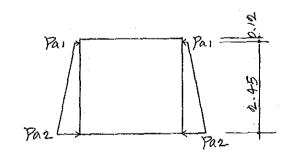
WE = 0.25 × 2.40 × 2.5 × 0.05 = 0.08 4m

# 6-4 LOADING CHART CASE / VERTICAL LOAD

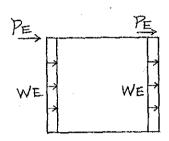


$$W_1 = 0.30 \text{ Vm}$$
  $W_2 = 1.92 \text{ Vm}$   $W_3 = 4.32 \text{ Vm}$   $P_1 = 1.39 \text{ Vm}$   $P_2 = 1.50 \text{ Vm}$ 

### CASEL EARTH FRESSURE



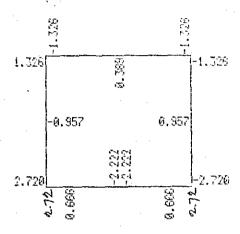
### CASE 3 EARTHQUAKE LOAD



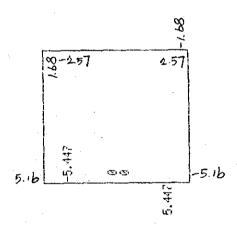
PERMANENT LOAD

### CASE 4 PERMANENT LOAD

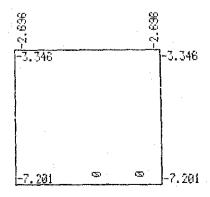
#### MOMENT



#### SHEAR



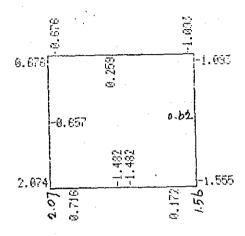
#### AXIAL



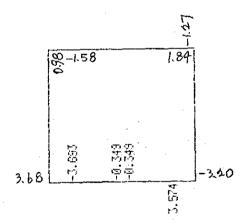
I - 66

# CASE 5 TEMPORARY LOAD

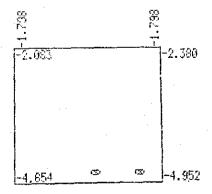
### MOMENT



### SHEAR



### AXIAL



1 - 67

#### b-5 DESIGN OF SECTION

```
BEAM
                                           1.330 Case 4
    MOMENT
                       M:
                            (t·m)
     AXIAL FORCE
                            (t)
                                           0.000
     SHEAR FORCE
                                    =
                                          1.680
                           (t)
    WIDTH
                       b
                                          30,000
                            (cm)
                            (n)
                                          40.000
     EFFECTIVE DEPTH
                       \mathbf{d}
                            (n)
                                          33.000
                      ď
                            ( # )
     CONCRETE COVER
                                           7,000
     CONCRETE COVER
                            (n)
                                          7.000
    MODULAR RATIO
                       n = Es / Ec =
     AREA OF REINFORCEMENT As (cm2) =
                                           5.950 D16-3
     AREA OF REINFORCEMENT As '(")
                                          5.950 //
                            (Kg/cm2) =
    COMPRESSIVE STRESS
                                        24.33
                      σç
     TENSILE STRESS
                      σs
                            ( n ) =
                                         773.01
    SHEARING STRESS
```

```
WALL
1,2, HOMENT
                                   2.720.Case 4
                   M
                         (t·m)
                   N (t)
     AXIAL FORCE
                                ==
                                      7.210
                   S
                       (t)
(cm)
     SHEAR FORCE
                                =
                                      5.160
                    b
     HIDIH
                                 = 240.000
                    h (")
     DEPTH
                                = 25.000
     EFFECTIVE DEPTH
                     đ
                          (n)
                                     18.000
                    ď,
     CONCRETE COVER
                         (n)
                                      7,000
                         (")
     CONCRETE COVER
                    ď"
                                      7.000
     MODULAR RATIO
                    n = Es / Ec =
                                     15
     AREA OF REINFORCEMENT As (cm2) =
                                     15.200 D13@200
     AREA OF REINFORCEMENT As (")
                                 = 15.200 \nu
```

```
COMPRESSIVE STRESS \sigma c (Kg/cm2) = 27.34
TENSILE STRESS \sigma s ( " ) = 792.89
SHEARING STRESS \tau ( " ) = 1.36
```

```
BASE
                                                 2.720 Case 4
2,3,7 HOMENT
5,7 AXIAL FORCE
                                (t·m)
                          ·M
                                                 0.000
                                (t)
                                          ===
                          N
                                              5,450
      SHEAR FORCE
                          S
                                (t)
                                             240,000
                                (cm)
                                          ==
                          b
      WIDTH
                                         ==
                                                40,000
                                (n)
      DEPTH
                                         ==
                                                30..000
                                (11)
      EFFECTIVE DEPTH
                          d
                                        · 峷
                          ď′
                                (n) = (n) =
                                                7,000
      CONCRETE COVER
                          ď"
                                                10,000
      CONCRETE COVER
                                                1.5
                           n = Es / Ec =
      MODULAR RATIO
                                                15.200 D13@200
      AREA OF REINFORCEMENT As (cm2)

AREA OF REINFORCEMENT As (")
                                                15.200 /
                                (Kg/cm2) =
      COMPRESSIVE STRESS
                          σc
                                 ( n ) = 54
( n ) =
                                               643.01
      TENSILE STRESS
                           Ø S
```

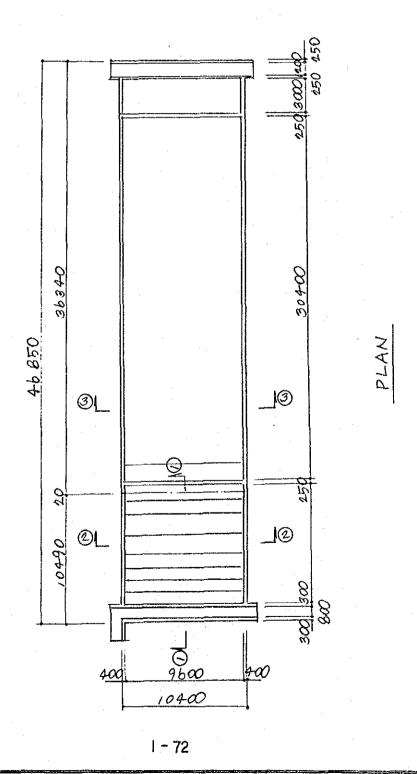
```
BASE.
                                             2. 220 Case 4
 4
                            (t m)
                        M
     MOMENT
                                            0.000
                           (t)
                                      ---
                        N
      AXIAL FORCE
                                            0.000
                                      ==
                        S
      SHEAR FORCE
                              (t)
                                           240,000
                        b
                              (cm)
                                      ===
     WIDTH
                                           40,000
                       · h
                                      =
                             (n)
      DEPTH
                    d
                                            33.000
      EFFECTIVE DEPTH
                              (n)
                              (")
                      ď
                                            10.000
      CONCRETE COVER
                                            7.000
                        ď″
     CONCRETE COVER
                        n = Es / Ec = 15
     HODULAR RATIO
     AREA OF REINFORCEMENT As (cm2) = 15.200 D13@200
AREA OF REINFORCEMENT As (") = 15.200 "
```

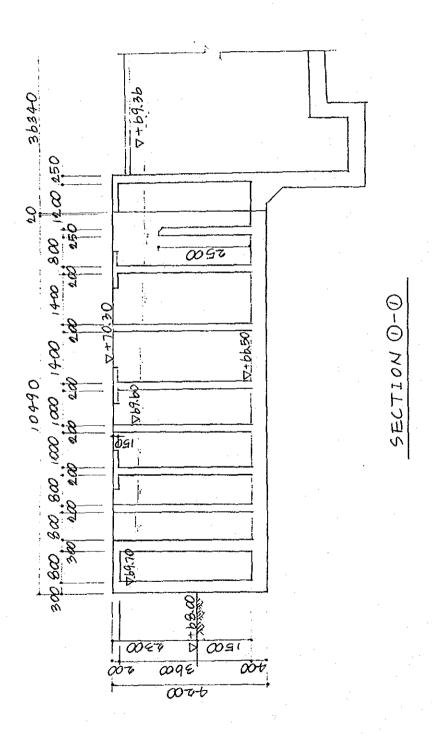
```
COMPRESSIVE STRESS \sigma_c (Kg/cm<sup>2</sup>) = 8.88
TENSILE STRESS \sigma_s (") = 456.04
SHEARING STRESS \tau (") = 0.00
```

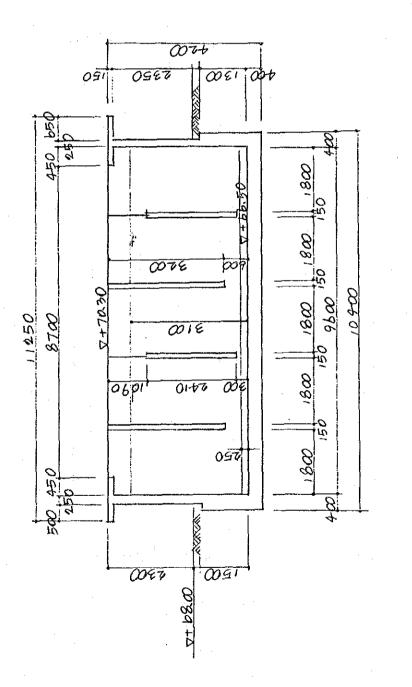
SHEET No: 🔑
-------------

3. FLOCCULATION & SEDIMENTATION TANK

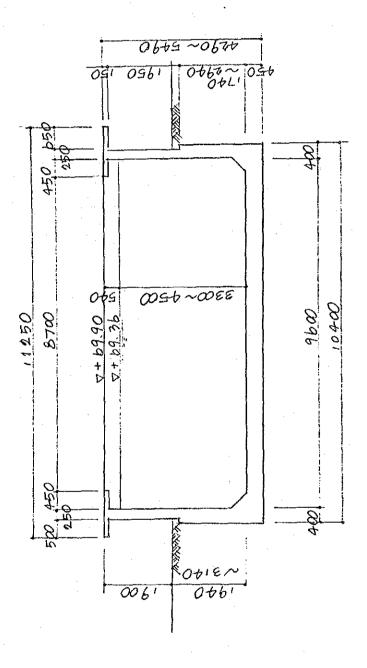
ITEM	PAGE
1. PLAN AND SECTION	I
2. FRAME OF SECTION ()-()	
2-1 DIMENTION OF FRAME	5
2-2 INERTIA AND AREA	Ь
2-3 CALCULATION OF LOAD	7
2-4 LOADING CHART	12
2-5 DESIGN OF SECTION	33
3. FRAME OF SECTION@-@	
3-1 DIMENTION OF FRAME	37
3-2 INERTIA AND AREA	38
3-3 CALCULATION OF LOAD	39
3-4 LOADING CHART	44
3-5 DESIGN OF SECTION	57
4. FRAME OF SECTION 3-3	·
4-1 DIMENTION OF FRAME	61
4-2 INERTIA AND AREA	b2
4-3 CALCULATION OF LOAD	63
4-4 LOADING CHART	68
4-5 DESIGN OF SECTION	81





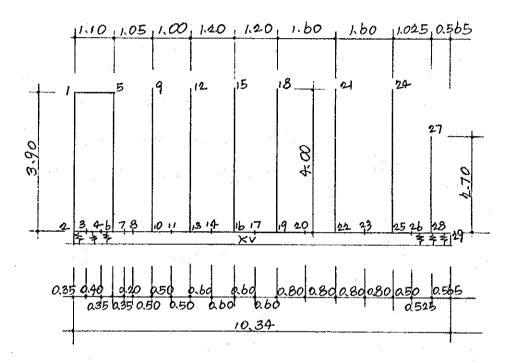


SECTION @-@



SECTION 3-3

2. FRAME OF SECTION D-D 2-1 DIMENTION OF FRAME



$$Kv = Kv0 \left(\frac{BV}{30}\right)^{-3/4}$$

$$Kv0 = \frac{1}{30} \times 1 \times 28 \times 20 = 18.67^{29} \text{ cm}^{3}$$

$$Bv = \sqrt{1049} \times 1040 = 1044^{\text{cm}}$$

$$Kv = 18.67 \times \left(\frac{1044}{30}\right)^{-3/4} = 1.30^{29} \text{ cm}^{3} = 1300^{27} \text{ m}^{3}$$

$$Kv = 1300 \times 1.00 = 1300^{27} \text{ m}^{2}$$

2-2 INERTIA AND AREA

$$I = \frac{1}{12} \times 1.00 \times 0.20^{3} = 0.0007.$$

$$A = 1.00 \times 0.20 = 0.20 \text{ m}^{2}$$

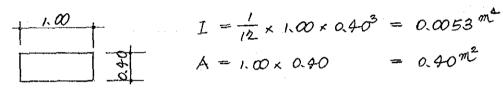
$$I = \frac{1}{12} \times 1.00 \times 0.25^3 = 0.0013 \text{ m}^4$$

$$A = 1.00 \times 0.25 = 0.25 \text{ m}^2$$

$$I = \frac{1}{12} \times 1.00 \times 0.30^{3} = 0.0023^{m^{4}}$$

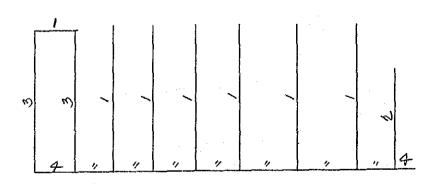
$$A = 1.00 \times 0.30 = 0.30^{m^{2}}$$

$$A = 1.00 \times 0.30 = 0.30^{m^2}$$



$$I = \frac{1}{12} \times 1.00 \times 0.40^3 = 0.0053^{m2}$$

$$A = 1.00 \times 0.40 = 0.40 \text{ m}^2$$



$$I_1 = 0.0007^{mt}$$
  $A_1 = 0.20^{m^2}$   $I_2 = 0.0013$   $A_2 = 0.25$ 

$$I_2 = 0.0013$$

# 2-3 CALCULATION OF LOAD 2-3-1 VERTICAL LOAD

(1) SLAB

DEAD LOAD 
$$0.20 \times 2.5 = 0.50 \text{ m}^2$$

$$LIVE LOAD = 0.30 \text{ w}$$

$$WI = 0.30 \text{ M}^2$$

(2) WALL

$$t = 20^{cm} \qquad PW1 = 0.20 \times 2.5 = 0.50^{t/m^2}$$

$$t = 25^{"} \qquad PW2 = 0.25 \times 2.5 = 0.53^{"}$$

$$t = 30^{"} \qquad PW3 = 0.30 \times 2.5 = 0.75^{"}$$

$$P_1 = 0.15 \times 0.40 \times 2 \times 2.5 + 0.30^{t/m^2} \times 1.00 = 0.50^{t}$$

(3) BASE SLAB

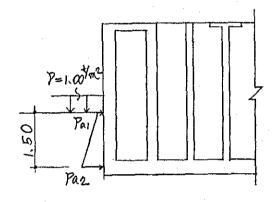
DEAD LOAD 
$$0.40 \times 2.5 = 1.00 \text{ ym}^2$$

P.L CONCRETE  $0.25 \times 2.3 = 0.58$  "

 $0.40 \times 2.5 = 1.58 \text{ ym}^2$ 

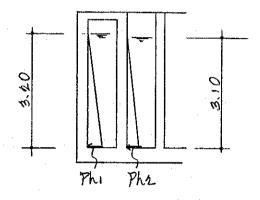
WATER LOAD 
$$W3 = 2.95 \times 1.0 = 2.95 \text{ m}^2$$
  
 $W4 = 2.85 \times 1.0 = 2.85$ 

### 2-3-2 EARTH PRESSURE

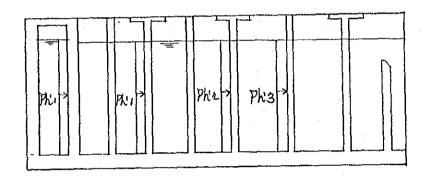


$$Pa_1 = 1.00 \times 0.5 = 0.50 \text{ /m}^2$$

### 2-3-3 WATER PRESSURE



# 2-3-4 DYNAMIC WATER PRESSURE



$$Pk2 = 1.00 \times \frac{1}{2} \times 1.0 \times 0.05 = 0.03$$
"

$$Pk3 = 1.40 \times \frac{1}{2} \times 1.0 \times 0.05 = 0.04$$
"

### 2-3-5 EARTHQUAKE LOAD

 $P_{E1} = 0.80^{t/m^2} \times 0.70 \times 0.05 = 0.03^{t}$  $P_{E2} = 0.60 \times 0.05 = 0.03^{"}$ 

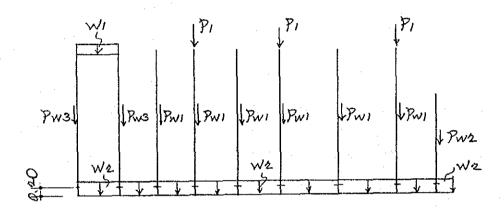
WALL

 $WE1 = 0.30 \times 2.5 \times 0.05 = 0.04 \text{ m}^2$   $WE2 = 0.20 \times 2.5 \times 0.05 = 0.03$ 

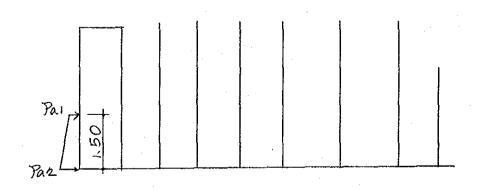
WE3 = 0.25 x 2.5 x 0.05 = 0.03

## 2-4 LOADING CHART

# CASE 1 VERTICAL LOAD

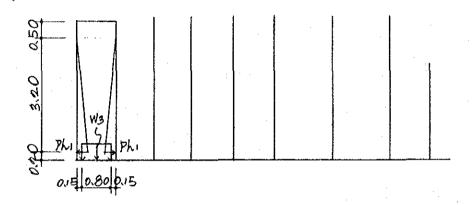


### CASE 2 EARTH PRESSURE



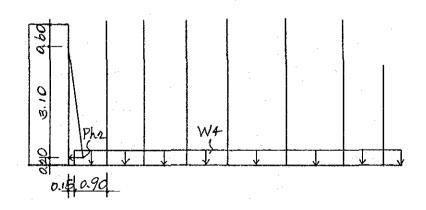
$$Pa_1 = 0.50 \text{ Vm}^2$$
  $Pa_2 = 1.85 \text{ Vm}^2$ 

### CASE 3 WATER PRESSURE (1)



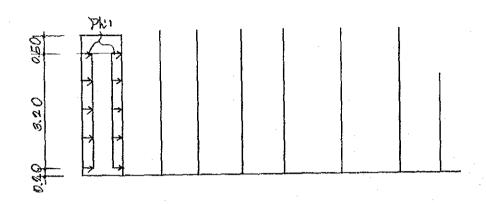
W3= 2.95 7m2 Ph, = 3.207m2

# CASE 4 WATER PRESSURE (4)



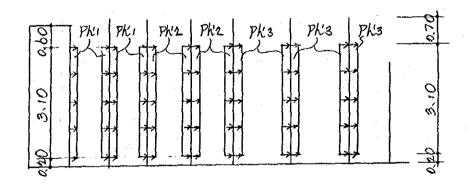
W4= 2.85 7 mc Ph2= 3.10 /m2

# CASE 5 DYNAMIC WATER PRESSURE (1)



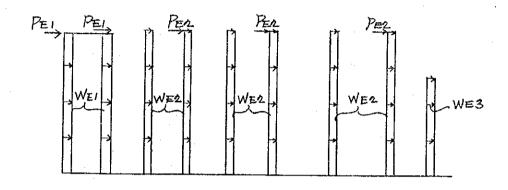
Phi= 0.02 */m2

# CASEL DYNAMIC WATER PRESSURE (2)



Phi=0.024m2 Phi2=0.034m2 Phi3=0.044m2

## CASET EARTHQUAKE LOAD



### PERMANENT LOAD

CASE 8 = 
$$0 + 2$$
  
 $9 = 0 + 2 + 3$   
 $10 = 0 + 2 + 3 + 4$   
 $11 = 0 + 3 + 4$ 

CASE 
$$1/2 = 1 + 2 + 7$$

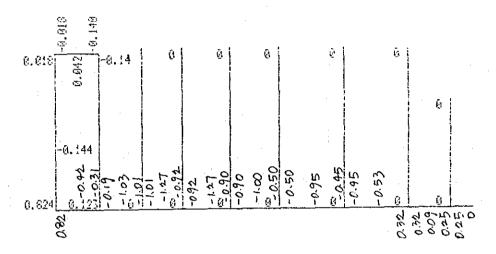
$$13 = 1 + 2 + 3 + 5 + 7$$

$$14 = 1 + 2 + 3 + 4 + 5 + 6 + 7$$

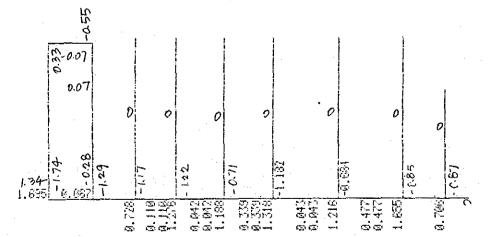
$$15 = 1 + 2 + 3 + 4 - 5 - 6 - 7$$

### CASE & PERMANENT LOAD

### MOMENT

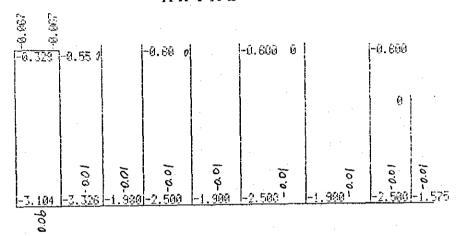


### SHEAR



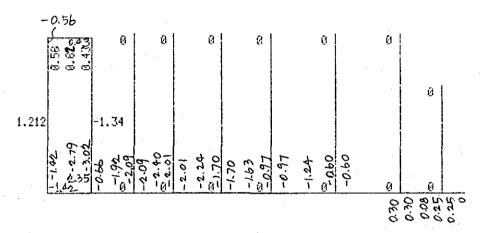
# CASE 8 PERMANENT LOAD

### AXIAL

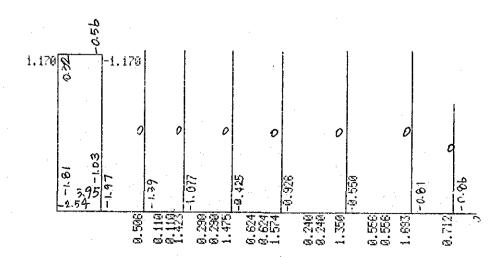


### CASE 9 PERMANENT LOAD

#### MOMENT



### SHEAR

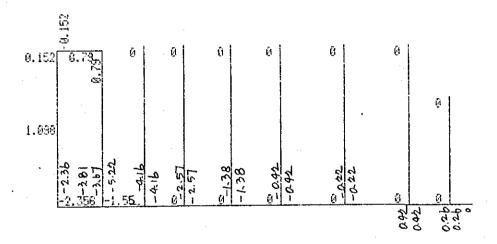


# CASE 9 PERMANENT LOAD

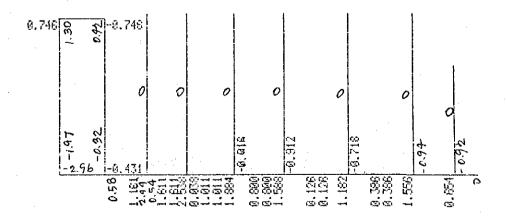
# AXTAL

150 32 A	0.56		-0.60 O		-6.606 8		-0.680
				!			0
	-0.42	-0.42	2007	20-0-64	2.0.7	-0.42	20.02
-3.097 l-	<u>3.333  -</u>	1.300	-2.50 <u>0 1</u>	<u>-1.300</u>	-2.500	<u> -1.900°</u>	<u> -2,500 -1,5</u> 7

#### MOMENT

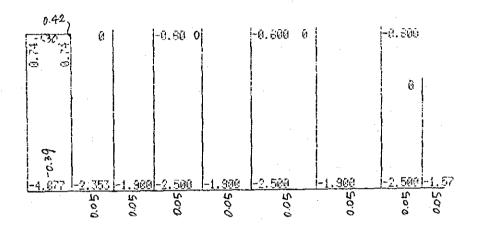


### SHEAR



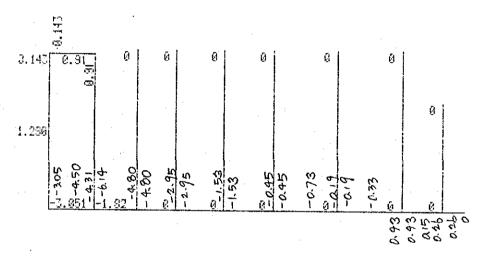
### CASE/O PERMANENT LOAD

### AXIAL

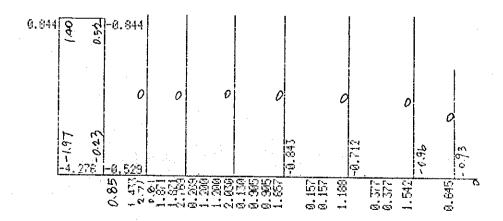


### CASE// PERMANENT LOAD

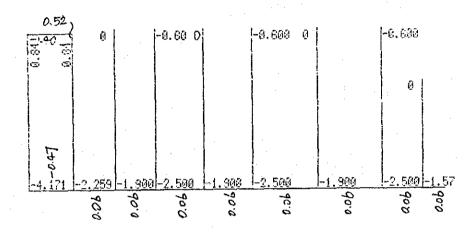
#### MOMENT



### SHEAR

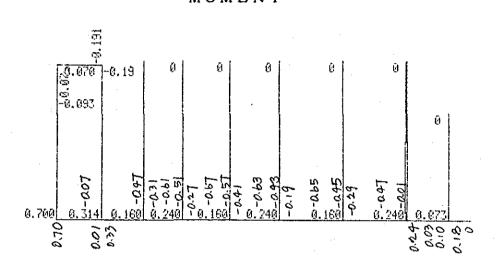


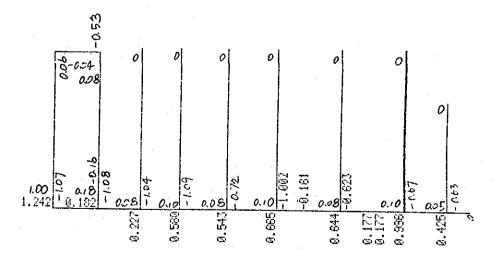
### CASE// PERMANENT LOAD



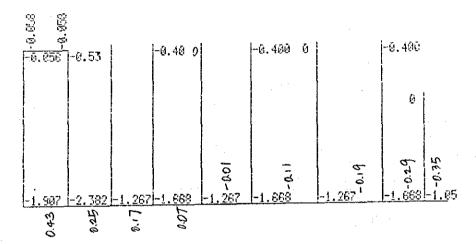
### CASE/2 TEMPORARY LOAD

#### MOMENT



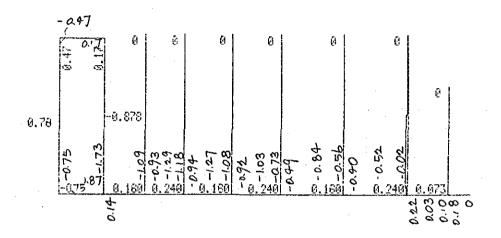


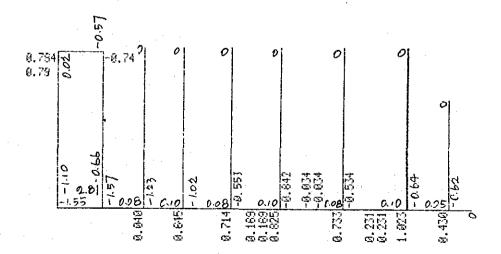
### CASE/2 TEMPORARY LOAD



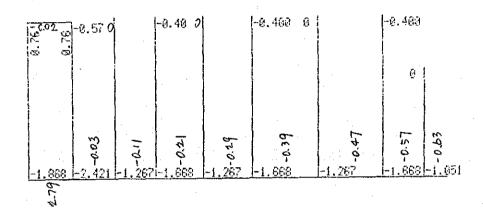
### CASE/3 TEMPORARY LOAD

### MOMENT



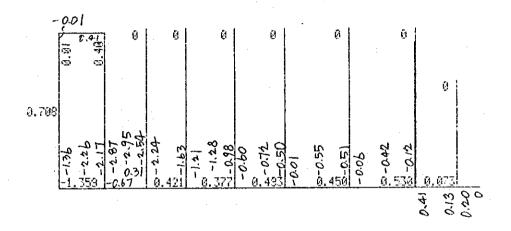


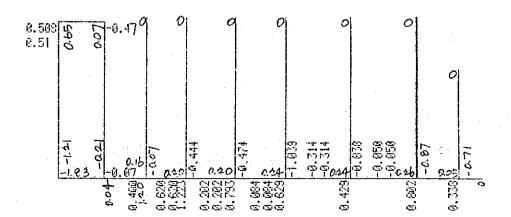
# CASE /3 TEMPORARY LOAD



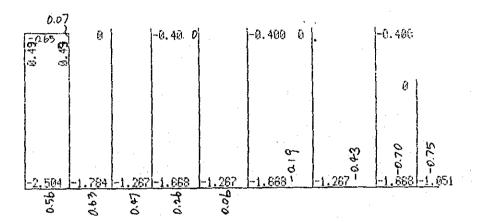
### CASE 14 TEMPORARY LOAD

### MOMENT



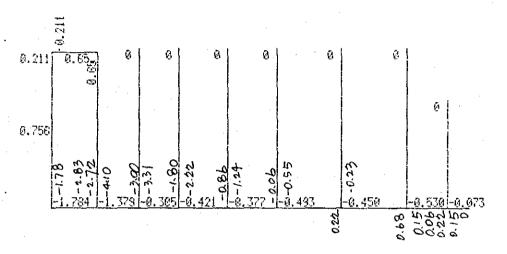


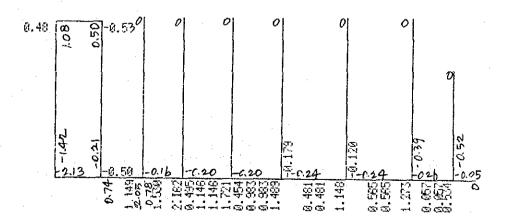
# CASE 14 TEMPORARY LOAD



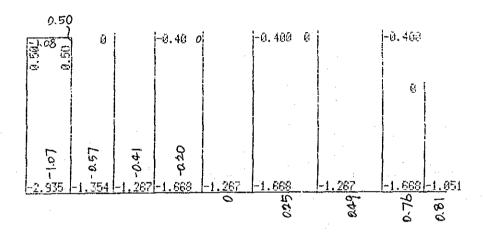
# CASE 15 TEMPORARY LOAD

### MOMENT





### CASE /5 TEMPORARY LOAD



### 2-5 DESIGN OF SECTION

```
SLAB
                                                   0.910 Case //
1.5
      HOMENT
                           M
                                 (t \cdot g)
      AXIAL FORCE
SHEAR FORCE
                                 (t)
                           Ν
                                                   0.000
                           S
                                                   0.520
                                  (t)
      WIDTH
                           b
                                                100.000
                                  (cm)
      DEPTH
                           h
                                  (n)
                                                 20.000
      EFFECTIVE DEPTH
                           d
                                                 15.000
                                  (n)
      CONCRETE COVER
                           ď′
                                  (n)
                                                   5.000
      CONCRETE COVER
                           ď"
                                 (n)
                                                   5,000
      MODULAR RATIO
                                                 15
                             n = Es / Ec =
      AREA OF REINFORCEMENT As
                                 (cm2)
                                                   6.330 D13@200
      AREA OF REINFORCEMENT As '
                                                  Б. 330
                                 (n)
```

```
WALL
                                                    Case 11
                                             3.050
      HOMENT
                              (x \cdot t)
      AXIAL FORCE
                                           4,170
                        N
                              (t)
                                      =
      SHEAR FORCE
                                      ==
                                             4, 270
                        S
                              (t)
                                          100,000
      HIDIH
                         b
                              (cn)
                                      ==
                                           30,000
      DEPTH
                              \langle n \rangle
                        h
      EFFECTIVE DEPTH
                              (11)
                                            23.000
                         d
                              (n)
                                             7,000
      CONCRETE COVER
                        d'
                         ď"
                                            7,000
      CONCRETE COVER
                              (n)
                                            15
      MODULAR RATIO
                         n=Es/Ec=
      AREA OF REINFORCEMENT As (cm2) = 9.930 D16@200 19
                                         ら、330 D13@200 外
      AREA OF REINFORCEMENT As '(") =
                              (Kg/cm2) = 42.21
      COMPRESSIVE STRESS
                        OC .
                              ( ") = 1255.96
      TENSILE STRESS
                         σs
      SHEARING STRESS
                         τ
WALL _
                                             2,350
                              (t \cdot x)
      MOMENT
                        M
                             (t)
                                             3.330
      AXIAL FORCE
SHEAR FORCE
                        N
                                      ==
                                             3.950
                        S
                              (t)
                                      =
                       , b
                                           100.000
      HIDIH
                             (cm)
      DEPTH
                        h
                             (n)
                                      = 30.000
      EFFECTIVE DEPTH
                        d
                              (n)
                                      =
                                            23.000
                                             7.000
                              (n)
      CONCRETE COVER
                        ď'
                                      =
                              (") =
                        ď″
                                            7.000
      CONCRETE COVER
                        n = Es / Ec =
                                            15
      MODULAR RATIO
      AREA OF REINFORCEMENT As (cm2) = 6.330 D13@200
      AREA OF REINFORCEMENT As '(")
                                           6.330
                              (Kg/cm2) =
                                            38.77
      COMPRESSIVE STRESS
                        σç
                              ( ") = 1451.84
                        σs
```

( "

) =

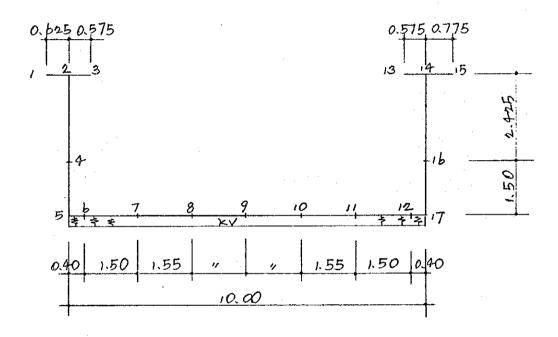
TENSILE STRESS

SHEARING STRESS

```
WALL
                                                          Case 14
10.13,16 NOMENT
                                                  0.530
                           M
                                  (t · m)
19,22,25 AXIAL FORCE
                                  (t)
                                                  0.000
                           N
        SHEAR FORCE
                            S
                                                  0.250
                                  (t)
        WIDTH
                                               100,000
                                  (cm)
                            b
        DEPTH
                                                 20.000
                            h
                                  (n)
        EFFECTIVE DEPTH
                                                 13.000
                            d
                                  (n)
                            ď
        CONCRETE COVER
                                                  7.000
                                  (n)
                            ď"
        CONCRETE COVER
                                                  7,000
                                  \{B\}^{\circ}.
       MODULAR RATIO
                             n = Es / Ec =
                                                 15
        AREA OF REINFORCEMENT As
                                  (cm2)
                                                  5.330 D13@200
        AREA OF REINFORCEMENT As '(")
                                                  6.330
        COMPRESSIVE STRESS
                                  (Kg/cm2) =
                                                 22.98
                            OC
                                  (n) =
                            σs
        TENSILE STRESS
                                               540.44
        SHEARING STRESS
                                     n ) =
 WALL
   28
        MOMENT
                                  (t · m)
                           N
                                 (t)
                                                  0.000
        AXIAL FORCE
        SHEAR FORCE
                           S
                                  (t)
                                                  0.000
                                               100.000
        WIDTH
                          b
                                  (cm)
                                  (")
                                                 25.000
        DEPTH
                           h
        EFFECTIVE DEPTH
                                                 18.000
                           d
                                  (n)
                           ď
                                  (n)
                                                 7.000
        CONCRETE COVER
        CONCRETE COVER
                           ď″
                                  (n)
                                                  7,000
        MODULAR RATIO
                           n = Es / Ec =
                                                 15
        AREA OF REINFORCEMENT As AREA OF REINFORCEMENT As
                                  (cm2)
                                                 12. 570 D13@100
                                  (n)
                                                  6.330 D13@200
       COMPRESSIVE STRESS
                                                50.24
                            σc
                                  (Kg/cn2) =
        TENSILE STRESS
                           o s
                                  1293.15
       SHEARING STRESS
                                     "
```

```
BASE
                                                6.140 Case !!
2, 3, 6, NOMENT
                                (t·m)
                          M
7.8.9 AXIAL FORCE
                                                0.000
                          N
                                (t)
                                         ----
      SHEAR FORCE
                                                2,720
                          S
                                         ==
                                (t)
                                              100.000
      WIDTH
                          b
                                (cm)
                                               40.000
      DEPTH
                          h
                                (n)
      EFFECTIVE DEPTH
                                               33.000
                          d.
                                (11)
                          ď′
      CONCRETE COVER
                                (11)
                                               10.000
      CONCRETE COVER
                                                7,000
                          ď"
                                (n)^{\circ}
                          n = Es / Ec =
                                               15
      MODULAR RATIO.
      AREA OF REINFORCEMENT As
                                (cm2) =
                                               16.270 D16@200十D13@200上
      AREA OF REINFORCEMENT As ' (" )
                                               9.930 D16@200下
                                               39.50
      COMPRESSIVE STRESS
                                (Kg/cm2) =
                          OC
                                ( " ) = 1281.61
( " ) = 0.92
      TENSILE STRESS
                          σs
      SHEARING STRESS
BASE.
                                                4. 120 Case //
11~29 HOMENT
                          M
                                (t \cdot m)
                                                0.000
      AXIAL FORCE
                          Ν
                                (t)
                                         ==
                                                2.770
      SHEAR FORCE
                          S
                                (t)
                                         = 100.000
      WIDTH
                        b
                                (cm)
      DEPTH
                                (n)
                                               40.000
                          h
      EFFECTIVE DEPTH
                                               33.000
                          d
                                (n)
      CONCRETE COVER
                          ď
                                (n)
                                               10,000
                          ď"
      CONCRETE COVER
                                               7,000
                                (n)
      MODULAR RATIO
                         n = E_s / E_c =
                                               15
      AREA OF REINFORCEMENT As AREA OF REINFORCEMENT As
                                              9.930 D16@200 上
                                (cm2) =
                                               9.930
                                (n)
                                                         17
                                (Kg/cm2) =
      COMPRESSIVE STRESS
                                               32.63
                          σç
                                (n) = 1361.92
      TENSILE STRESS
                          σs
                                ( · · //
```

# 3. FRAME OF SECTION @-@ 3-1 DIMENTION OF FRAME



KV=13007m2

### 3-2 INERTIA AND AREA

$$I = \frac{1}{12} \times 1.00 \times 0.15^{3} = 0.0003^{m4}$$

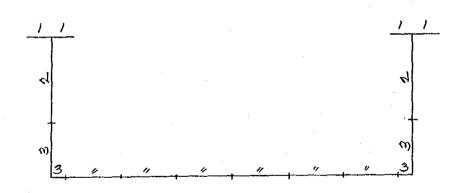
$$A = 1.00 \times 0.15 = 0.15^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.25^{3} = 0.0013^{m4}$$

$$A = 1.00 \times 0.25 = 0.25^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.40^{3} = 0.0053^{m4}$$

$$A = 1.00 \times 0.40 = 0.40^{m2}$$



$$I_1 = 0.0003$$
 nt  $A_1 = 0.15$  nt

$$I_2 = 0.00/3$$
  $A_2 = 0.25$ 

$$I_3 = 0.0053$$
  $A_3 = 0.40$ 

3-3 CALCULATION OF LOAD 3-3-1 VERTICAL LOAD

(I) SLAB

DEAD LOAD

0.15 × 2.5 = 0.38 7m2

LIVE LOAD

= 0.30 "

W1 = a 68 */m2

(2) WALL

 $t = 25^{cm}$   $PWI = 0.25 \times 2.5 = 0.63 \text{ m}^2$ 

t=40" Pw2= a40 x 2.5 = 1.00"

(3) BASE SLAB

DEAD LOAD

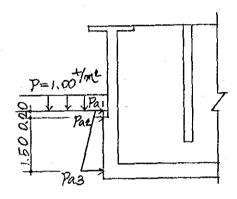
 $0.40 \times 2.5 = 1.00 \text{ m}^2$ 

P.L CONCRETE 0.25 x 2.3 = 0.58"

W2 = 1,58 t/m2

WATER LOAD W3 = 2.85 × 1.0 = 2.85 /m2

### 3-3-2 EARTH PRESSURE

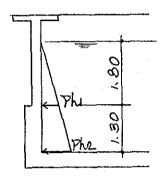


$$Pa_1 = 1.00 \times 0.5 = 0.50 \text{/m}^2$$

$$Pa_2 = (1.00 + 1.8 \times 0.20) \times 0.5 = 0.68$$

$$Pa_3 = (1.00 + 1.8 \times 1.70) \times 0.5 = 4.03$$

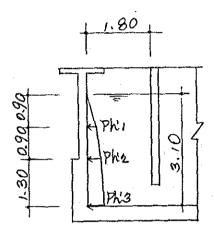
# 3-3-3 WATER PRESSURE



Phi = 1.80 × 1.0 = 1.80 /m2

Pha = 3.10 x 10 = 3.10"

#### 3-3-4 DYNAMIL WATER PRESSURE



$$tanh (\sqrt{3} \times \frac{0.90}{3.10}) = 0.46$$

$$Ph'_{1} = \sqrt{3} \times 0.05 \times 1.0 \times 3.10 \times \left\{ \frac{0.90}{3.10} - \frac{1}{2} \times \left( \frac{0.90}{3.10} \right)^{2} \right\} \times 0.4b = 0.03 \sqrt[4]{m^{2}}$$

$$Ph'_{2} = \sqrt{3} \times 0.05 \times 1.0 \times 3.10 \times \left\{ \frac{1.80}{3.10} - \frac{1}{2} \times \left( \frac{1.80}{3.10} \right)^{2} \right\} \times 0.4b = 0.05$$

$$Ph'_{3} = \sqrt{3} \times 0.05 \times 1.0 \times 3.10 \times \left\{ \frac{3.10}{3.10} - \frac{1}{2} \times \left( \frac{3.10}{3.10} \right)^{2} \right\} \times 0.4b = 0.0b$$

### 3-3-5 EARTHQUAKE LOAD

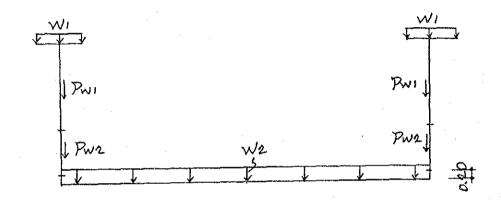
$$P_{E1} = ab8 \frac{1}{m^2} \times 1.20 \times 0.05 = 0.04^{t}$$
  
 $P_{E2} = ab8 \times 1.35 \times 0.05 = 0.05^{"}$ 

WALL

$$WE1 = 0.25 \times 2.5 \times 0.05 = 0.03 \text{ m}^2$$
  
 $WE2 = 0.40 \times 2.5 \times 0.05 = 0.05$ 

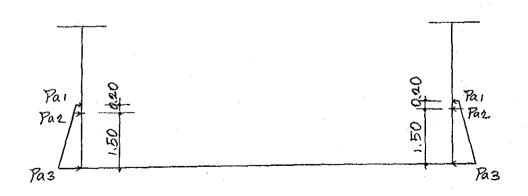
### 3-4 LOADING CHART

# CASE 1 VERTICAL LOAD

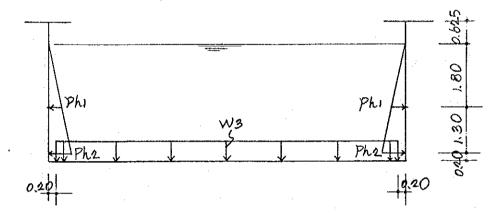


$$W1 = 0.68 \, \text{Mm}^2$$
  $W2 = 1.58 \, \text{Mm}^2$   
 $PW1 = 0.63 \, \text{Mm}^2$   $PW2 = 1.00 \, \text{Mm}^2$ 

### CASE 2 EARTH PRESSURE

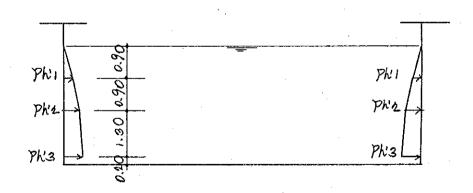


#### CASE 3 WATER PRESSURE



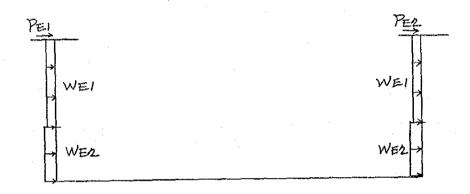
W3 = 2.85 /m2 Ph1 = 1.80 /m2 Ph2 = 3.10 /m2

### CASE 4 DYNAMIC WATER PRESSURE



Phi= a034m2 Phi2 = a054m2 Phi3 = a064m2

### CASES EARTHQUAKE LOAD



PEI = 0.04 T PE2 = 0.05 WEI = 0.03 7/m2 WE2 = 0.05 7/m2

### PERMANENT LOAD

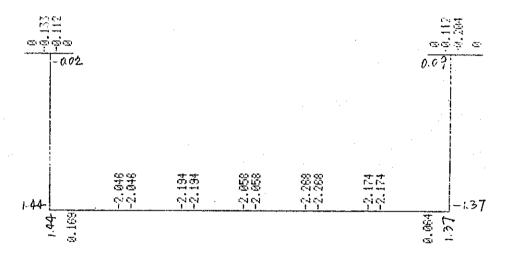
CASE 
$$b = 0 + 2$$
  
 $7 = 0 + 2 + 3$   
 $8 = 0 + 3$ 

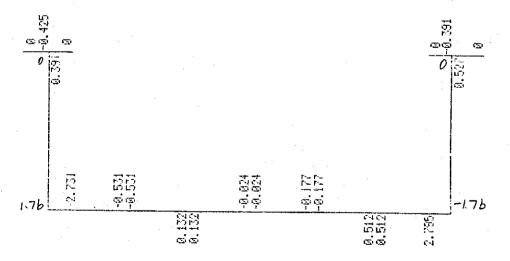
TEMPORARY LOAD (X = 0.667)

CASE 9 = 
$$(1 + (2) + (5)$$
  
 $(0 = (1) + (2) + (3) + (4) + (5)$ 

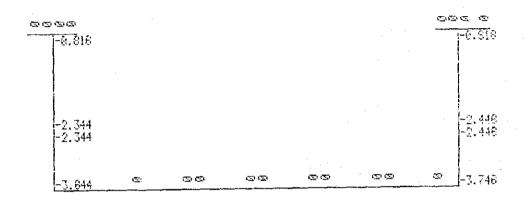
### CASE & PERMANENT LOAD

#### MOMENT



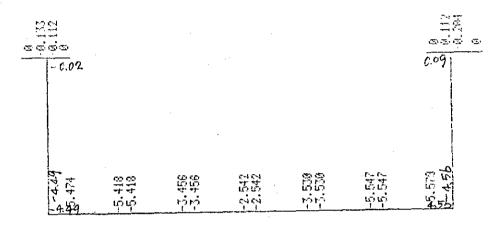


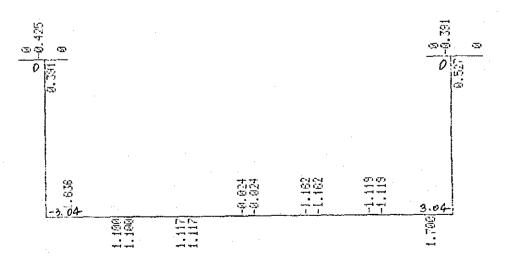
### CASE & PERMANENT LOAD



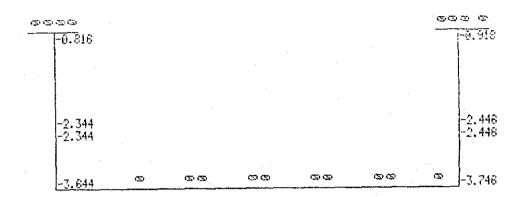
### CASE 7 PERMANENT LOAD

#### MOMENT



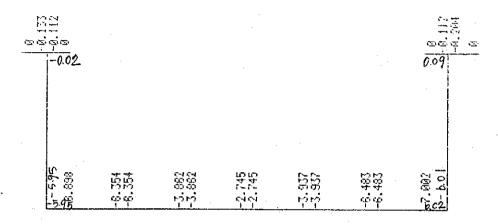


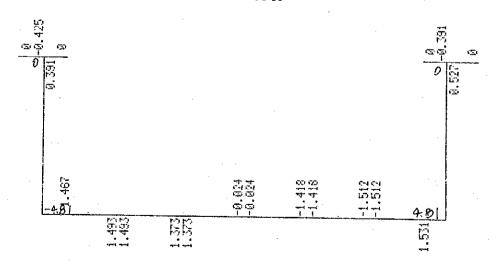
### CASE 7 PERMANENT LOAD



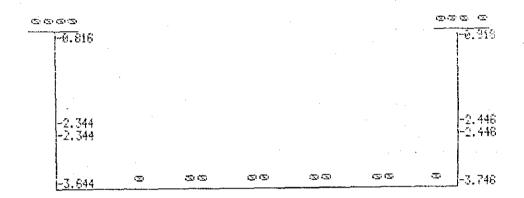
### CASE & PERMANENT LOAD

#### MOMENT



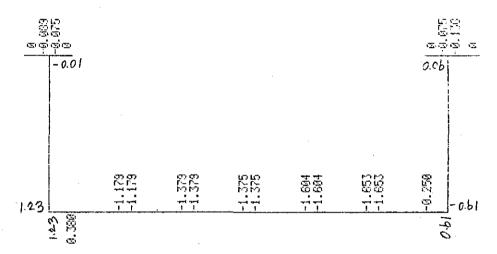


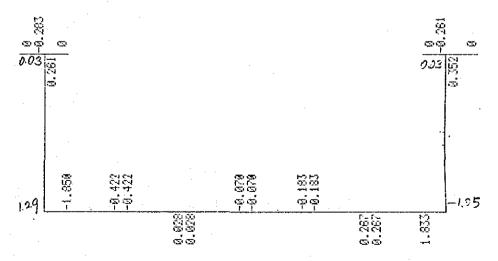
### CASE & PERMANENT LOAD



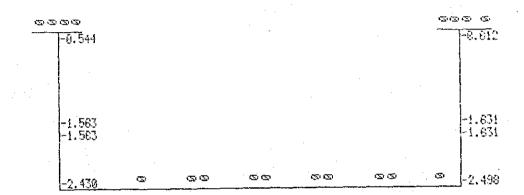
### CASE 9 TEMPORARY LOAD

#### MOMENT



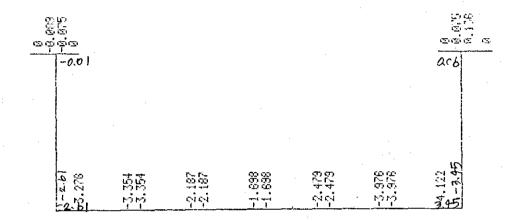


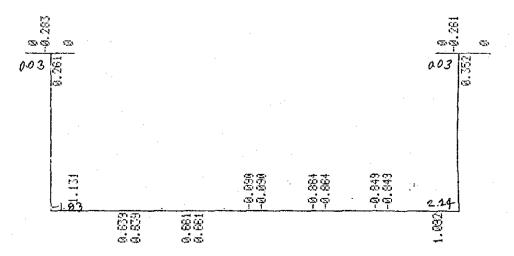
# CASE 9 TEMPORARY LOAD



#### CASE / TEMPORARY LOAD

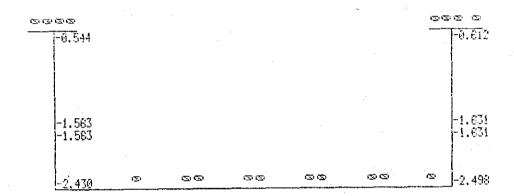
#### MOMENT





### CASE 10 TEMPORARY LOAD

#### AXIAL .



### 3-5 DESIGN OF SECTION

SLA						Cons. /
2,14	HOMENT	M	(t·m)	==	0.200	Case b
	AXIAL FORCE	N	(t)	==	0.000	i e
	SHEAR FORCE	S	(t)	===	0.530	
	WIDTH	b	(cm)	==	100.000	
		h	(n)		15.000	
	EFFECTIVE DEPTH	d	(#)	=	10.000	
	CONCRETE COVER	ď	(")	==	0.000	•
	CONCRETE COVER	ď"	(n)	=	5.000	
			Es /Ec	=	15	
	AREA OF REINFORCEMENT			==		D13@200 上
	AREA OF REINFORCEMENT	As '	( # · )	===	0.000	
	COMPRESSIVE STRESS	. σ c	 (Kg/cm2)	 ==	 12.90	
		σs τ	("))	=	357.82 0.60	

```
WALL____
                                                     Case 8
                                              0.990
4, 16 HOMENT
                     M
                            (t·m)
                                              0.000
     AXIAL FORCE
                              (t)
                        N
     SHEAR FORCE
                                             1.620
                              (t)
                                           100.000
     HIDIN
                        b
                              (cm)
                                            25.000
                              (11)
     DEPTH
                       h
     EFFECTIVE DEPTH
                                             18,000
                              (n)
                       d
                        ď′
     CONCRETE COVER
                                              7.000
                              ( ) )
     CONCRETE COVER
                        ď"
                              (n)
                                             7,000
     MODULAR RATIO
                        n = Es / Ec =
     AREA OF REINFORCEMENT As (cm2) = 9.930 D16@200 内AREA OF REINFORCEMENT As (") = 6.330 D13@200 外
                                         6.330 D13@200外
     COMPRESSIVE STRESS
                        \sigma c \quad (Kg/cm2) =
                                            21.00
                                           615.12
     TENSILE STRESS
                        \sigma s ( " " ) =
                              ( n ) =
WALL
                                       = % 5.060 Case 8
5,17 MOMENT
                        M
                            (t·m)
                                       = 0.000
      AXIAL FORCE
                      N (t)
                      S (t)
      SHEAR FORCE
                        b
                                          100.000
     MIDTH
                            (cm)
                                          40.000
      DEPTH
                            - ( y.)
                        h
```

33.000

7.000

7.000

```
COMPRESSIVE STRESS \sigma_c (Kg/cm2) = 31.26
TENSILE STRESS \sigma_s (") = 1050.52
SHEARING STRESS \tau (") = 1.64
```

d

ď

ď"

(n)

**(")** 

(n)

MODULAR RATIO n=Es/Ec = 15

AREA OF REINFORCEMENT As (cm2) = 15.270 D16@200+D13@200内

AREA OF REINFORCEMENT As (n) = 9.930 D16@200分

EFFECTIVE DEPTH

CONCRETE COVER

CONCRETE COVER

```
BASE
                                                 1.440 Case b
5,6,7, NOMENT
11,12,17 AXIAL FORCE
                                 (t·m)
                                                  0.000
                           N
                                 (t)
       SHEAR FORCE
                                                 2.730
                           S
                                          =
                                 (t)
       HIDIH
                           b
                                               100.000
                                 (cm)
                                          ==
       DEPTH
                           h
                                 (n)
                                          ==
                                                40.000
       EFFECTIVE DEPTH
                           d
                                 (n)
                                                29,000
       CONCRETE COVER
                           ď′
                                 (n)
                                                 8,000
       CONCRETE COVER
                           ď″
                                 (n)
                                                11,000
       HODULAR RATIO
                           n=Es/Ec=
       AREA OF REINFORCEMENT As (cm2) =
AREA OF REINFORCEMENT As (") =
                                                9.330 D16@200下
                                                16.270 D16@200+D13@200上
       COMPRESSIVE STRESS
                                 (Kg/cm2) =
                                              14.22
                           σc
       TENSILE STRESS
                                 ( n ) =
                                               582.27
                           Ø S
       SHEARING STRESS
                                                 1.03
```

```
7.000
                        (t \cdot m)
                                       0,000
AXIAL FORCE
                  N
                        (t)
SHEAR FORCE
                  S
                                       0.000
                        (t)
HIDTH
                  b
                                     100.000
                        (cm)
DEPTH
                                      40.000
                  h
                       (11)
EFFECTIVE DEPTH
                  d
                        (n)
                                      32,000
                  ď′
CONCRETE COVER
                        (n)
                                      11.000
                                Part
                  ď"
CONCRETE COVER
                                      8,000
                        (#)
MODULAR RATIO
                  n = Es / Ec =
                                      15
                                      15.270 D16@200+D13@200上
AREA OF REINFORCEMENT As (cm2) =
AREA OF REINFORCEMENT As '(")
                                     .9.330 D16@200 下
```

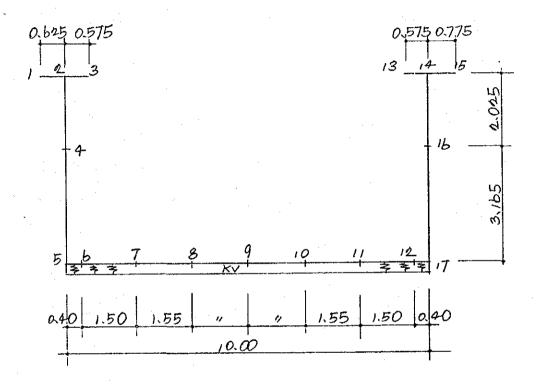
```
COMPRESSIVE STRESS \sigma_c (Kg/cm2) = 47.91
TENSILE STRESS \sigma_s ( " ) = 1500.50
SHEARING STRESS \tau ( " ) = 0.00
```

```
BASE .
                                                      3.940 Case 8
8,9,10 HOVENT
                             M
                                    (t \cdot \underline{n})
                                                      0.000
                             Ν
                                    (t)
                                              =
       AXIAL FORCE
                                                      0.000
       SHEAR FORCE
                                              ::=
                                    (t)
                                                   100.000
                             b
       WIDTH
                                    (cm)
                                                     40,000
                             h
       DEPTH
                                    (n)
                                                     32,000
       EFFECTIVE DEPTH
                             đ
                                    (n)
                             ď′
                                                     11.000
                                    (n)
       CONCRETE COVER
                                                      8,000
       CONCRETE COVER
                                    (n)
                                n = Es / Ec =
                                                     15
       MODULAR RATIO
                                                      9.930 D16@200上
       AREA OF REINFORCEMENT As (cm2)
AREA OF REINFORCEMENT As (")
                                    (cm2)
                                                      9.330
                                                     33.12
                                    (Kg/cm2) =
       COMPRESSIVE STRESS
                             σ¢
                                                 1329.38
                                       "
       TENSILE STRESS
                             σs
                                                      0.00
```

"

SHEARING STRESS

# 4. FRAME OF SECTION 3-3 4-1 DIMENTION OF FRAME



$$kv = kvo \left(\frac{Bv}{30}\right)^{-3/4}$$

$$kvo = \frac{1}{30} \times 1 \times 28 \times 20 = 18.69^{kg/cm^3}$$

$$Bv = \sqrt{3b34 \times 1040} = 1944^{cm}$$

$$kv = 18.67 \times \left(\frac{1944}{30}\right)^{-3/4} = 0.82^{kg/cm^3} = 820^{t/m^3}$$

$$kv = 820 \times 1.00^{m} = 820^{t/m^2}$$

### 4-2 INERTIA AND AREA

$$I = \frac{1}{12} \times 1.00 \times 0.15^{3} = 0.0003^{m4}$$

$$A = 1.00 \times 0.15 = 0.15^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.25^{3} = 0.0013^{m4}$$

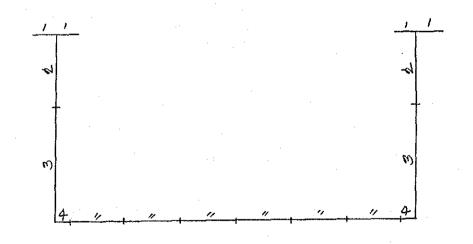
$$A = 1.00 \times 0.25 = 0.25^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.40^{3} = 0.053^{m4}$$

$$A = 1.00 \times 0.40 = 0.40^{m2}$$

$$I = \frac{1}{12} \times 1.00 \times 0.45^{3} = 0.0076^{m4}$$

$$A = 1.00 \times 0.45 = 0.45^{m2}$$



$$I_1 = 0.003^{m^4} A_1 = 0.15^{m^2} I_2 = 0.0013 A_2 = 0.25$$

$$I_3 = 0.0053$$
  $A_3 = 0.40$   $I_4 = 0.075$   $A_4 = 0.45$ 

# 4-3 CALCULATION OF LOAD 4-3-1 VERTICAL LOAD

(1) SLAB

DEAD LOAD 
$$0.15 \times 2.5 = 0.38 \frac{1}{m^2}$$
  
LIVE LOAD = 0.30 "

 $WI = 0.68 \frac{1}{m^2}$ 

(2) WALL

$$t = 25 \text{ cm}$$
  $Pw1 = 0.25 \times 2.5 = 0.63 \text{ m}^2$   
 $t = 40$   $Pw.2 = 0.40 \times 2.5 = 1.00$ 

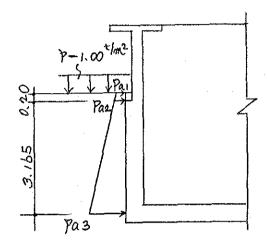
(3) BASE SLAB

DEAD LOAD 
$$0.45 \times 2.5 = 1.13 \text{ m}^2$$

PL CONCRETE  $0.15 \times 2.3 = 0.35$ 
 $W2 = 1.48 \text{ m}^2$ 

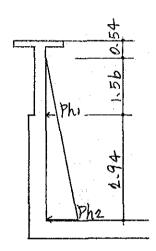
WATER LOAD W3 = 4.35 × 1.0 = 4.35 7m2

### 4-3-2 EARTH PRESSURE



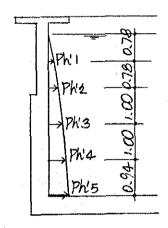
$$Pa_1 = 1.00 \times 0.5 \qquad = 0.50 \sqrt{m^2}$$

## 4-3-3 WATER PRESSURE



$$Phi = 1.5b \times 1.0 = 1.5b \sqrt{m^2}$$

#### 4-3-4 DYNAMIC WATER PRESSURE



$$tanh\left(\sqrt{3} \times \frac{4.80}{4.50}\right) = 0.95 \rightarrow 1.0$$

$$Ph'_{1} = \sqrt{3} \times 0.05 \times 1.0 \times 4.50 \times \left\{ \frac{0.78}{4.50} - \frac{1}{2} \times \left( \frac{0.78}{4.50} \right)^{2} \right\} = 0.06 \text{ m}^{2}$$

$$Ph'_{2} = \sqrt{3} \times 0.05 \times 1.0 \times 4.50 \times \left\{ \frac{1.5b}{4.50} - \frac{1}{2} \times \left( \frac{1.5b}{4.50} \right)^{2} \right\} = 0.11 \text{ "}$$

$$Ph'_{3} = \sqrt{3} \times 0.05 \times 1.0 \times 4.50 \times \left\{ \frac{2.5b}{4.50} - \frac{1}{2} \times \left( \frac{2.5b}{4.50} \right)^{2} \right\} = 0.16 \text{ "}$$

$$Ph'_{4} = \sqrt{3} \times 0.05 \times 1.0 \times 4.50 \times \left\{ \frac{3.5b}{4.50} - \frac{1}{2} \times \left( \frac{3.5b}{4.50} \right)^{2} \right\} = 0.19 \text{ "}$$

$$Ph'_{5} = \sqrt{3} \times 0.05 \times 1.0 \times 4.50 \times \left\{ \frac{4.50}{4.50} - \frac{1}{2} \times \left( \frac{4.50}{4.50} \right)^{2} \right\} = 0.19 \text{ "}$$

## 4-3-5 EARTHQUAKE LOAD

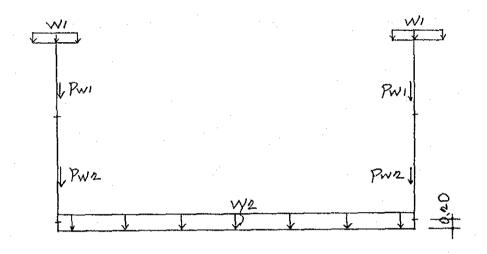
$$PE1 = 0.68 \text{ M}^2 \times 1.20 \times 0.05 = 0.04^{\frac{1}{2}}$$
  
 $PE2 = 0.68 \times 1.35 \times 0.05 = 0.05^{"}$ 

WALL

$$WE1 = 0.25 \times 2.5 \times 0.05 = 0.03 \frac{1}{10^{2}}$$

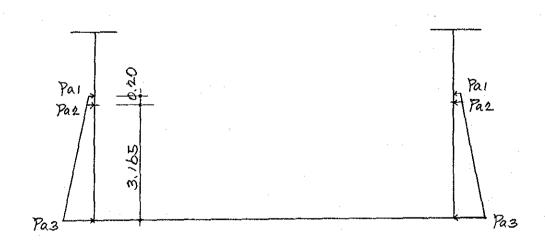
$$WE2 = 0.40 \times 2.5 \times 0.05 = 0.05$$

# 4-4 LOADING CHART CASE 1 VERTICAL LOAD



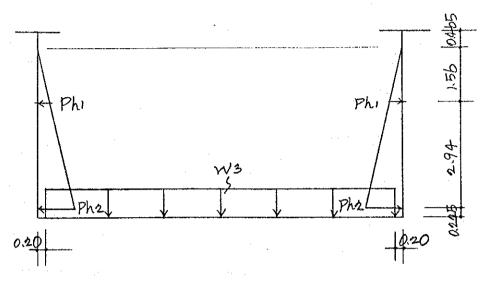
WI = 0.68*/m2 W2 = 1.48*/m2 PWI = 0.63*/m2 PW2 = 1.00*/m2

## CASE 2 EARTH PRESSURE



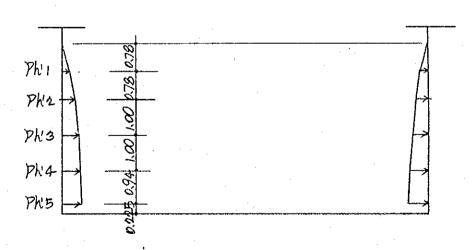
1 - 139

#### CASES WATER PRESSURE



W3 = 4.35 7m2 Ph1 = 1.56 7m2 Ph2 = 4.50 7m2

## CASE 4 DYNAMIC WATER PRESSURE

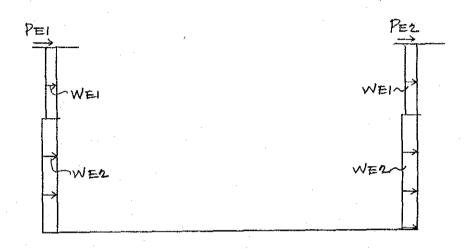


Phi-0.06 4m2 Phi2=0.114m2 Phi3=0.164m2

Ph/4=0.19 1/m2 Ph/5=0.19 1/m2

1 -140

#### CASES EARTHQUAKE LOAD



PEI=004+ PE2=0.05+ WEI=0.03/m2 WE2=0.05/m2

PERMANENT LOAD

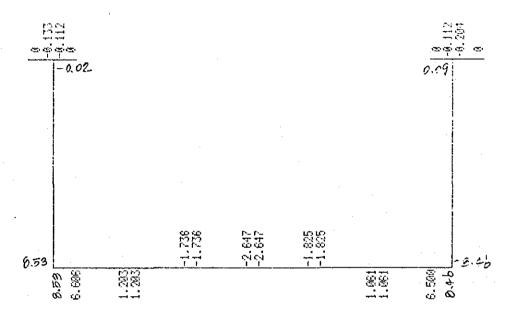
CASE 
$$b = 0 + 2$$
 $7 = 0 + 2 + 3$ 
 $8 = 0 + 3$ 

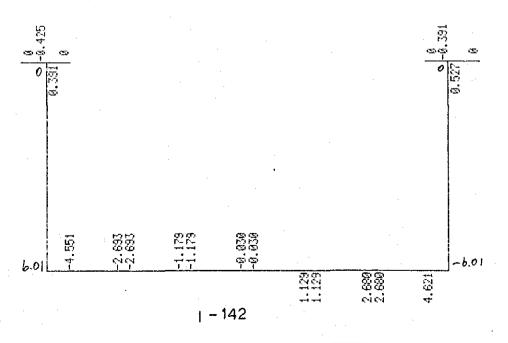
TEMPORARY LOAD (
$$d = 0.667$$
)

CASE 9 =  $0 + 2 + 5$ 
 $10 = 0 + 2 + 3 + 4 + 5$ 

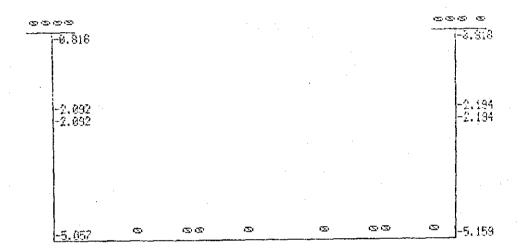
## CASE & PERMANENT LOAD

#### MOMENT



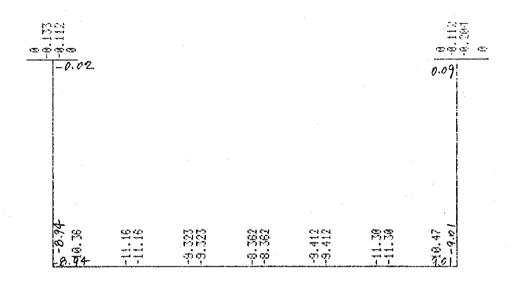


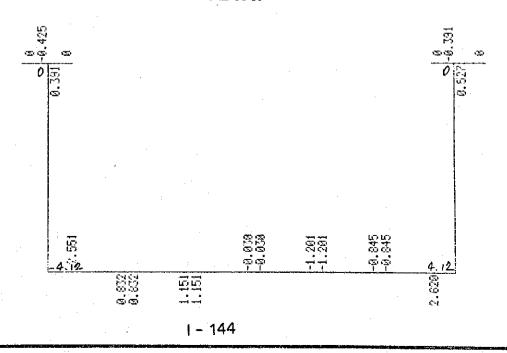
## CASE & PERMANENT LOAD



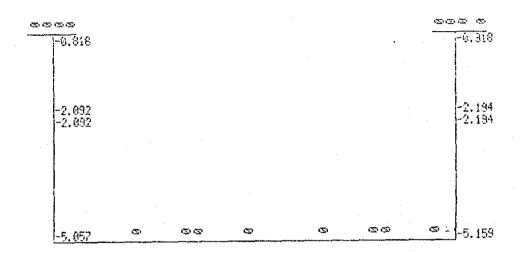
#### CASE 7 PERMANENT LOAD

#### MOMENT



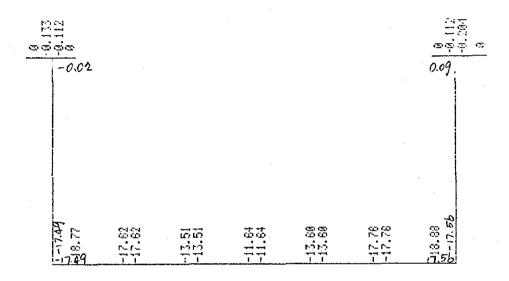


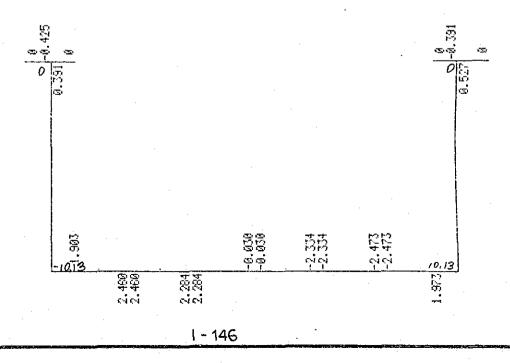
## CASE 7 PERMANENT LOAD



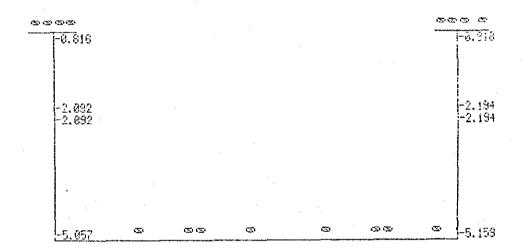
#### CASE 8 PERMANENT LOAD

#### MOMENT



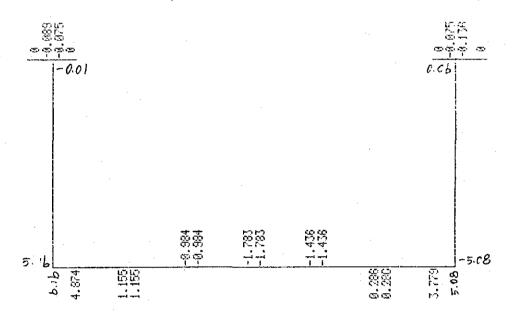


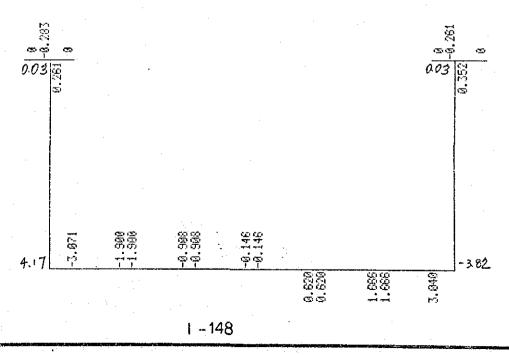
## CASE & PERMANENT LOAD



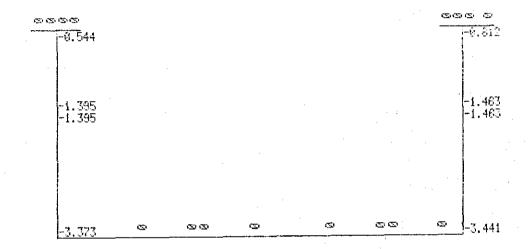
## CASE 9 TEMPORARY LOAD

#### MOMENT



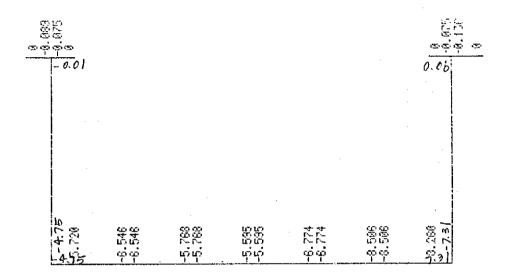


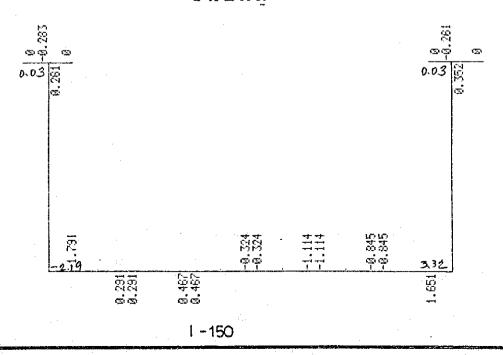
## CASE 9 TEMPORARY LOAD



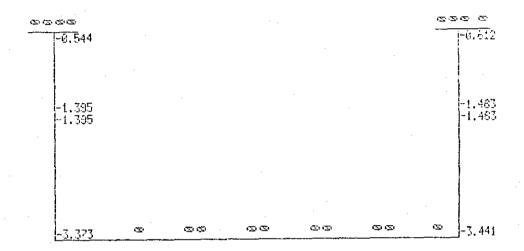
## CASE/O TEMPORARY LOAD

## MOMENT





#### CASE 10 TEMPORARY LOAD



## 4-5 DESIGN OF SECTION

```
SLAB
                                                 0. 200 Case b
2,14 HOMENT
                          M
                                 (t·m)
      AXIAL FORCE
SHEAR FORCE
                                                  0.000
                          N
                                 (t)
                                                  0.530
                        : S
                                 (t)
                                               100.000
      HIDIH
                          b
                                 (cm)
                                 (n)
                                                15,000
      DEPTH
                          h
                                 (n)
                                                 10.000
      EFFECTIVE DEPTH
                          d
                          ď′
                                 (n)
                                                  0.000
      CONCRETE COVER
                          ď"
                                                  5.000
      CONCRETE COVER
                                 (n)
      MODULAR RATIO
                           n = Es / Ec =
                                                 15
                                                  5.330 D13@200上
      AREA OF REINFORCEMENT As (cm2)
AREA OF REINFORCEMENT As (")
                                                  0.000
                                                 12.90
      COMPRESSIVE STRESS
                                 (Kg/cm2) =
                           σc
                                 (n) =
                                               357.82
      TENSILE STRESS
                           σs
      SHEARING STRESS
```

```
0.730 Case &
 4,16 MOMENT
                        M \qquad (t \cdot m) =
                                             0.000
                        N (t)
S (t)
b (cm)
     AXIAL FORCE
                                         ===
     SHEAR FORCE
                                               1.220
                                         ===
     WIDTH
                                              100,000
      DEPTH
                         h (n)
                                             25,000
      EFFECTIVE DEPTH
                         d (")
                                               18,000
                              (n)
(n)
                                               7.000
                          ď′
      CONCRETE COVER
                          ď"
      CONCRETE COVER
                                                7.000
      MODULAR RATIO n = Es/Ec = 15
AREA OF REINFORCEMENT As (cm2) = 9.930 D16@200 内
AREA OF REINFORCEMENT As (n) = 6.330 D13@200 外
      COMPRESSIVE STRESS
                                (Kg/cm2) =
                                             15.48
                          oc ·
      TENSILE STRESS
                          Ø S
                                (n) =
                                             453.57
                                (n) =
      SHEARING STRESS
                          τ
                                                0.75
WALL ___.
                                                         Case &
                                         = 1.15.280
5,17 MOMENT
                     M (t·m)
                       N (t)
S (t)
b (cm)
h (")
d (")
                                             0.000
      AXIAL FORCE
      SHEAR FORCE
                                               10.130
      WIDTH
                                         = 100.000
                                               40.000
      DEPTH
                     d
      EFFECTIVE DEPTH
                                               33.000
                         ď
      CONCRETE COVER
                                               7,000
                                (n)
                              (") =
                                               7.000
                         ď"
      CONCRETE COVER
                         "n=Es/Ec=15
      MODULAR RATIO
      AREA OF REINFORCEMENT As (cm2) = 33.680 D19@200+D27
AREA OF REINFORCEMENT As (") = 19.860 D16@100 9
                                               33. 680 D19@200+D22@200 内
```

(Kg/cm2) =

(n) = 1599.93(n) = 3.59

69.10

WALL

 $\sigma c$ 

σs

COMPRESSIVE STRESS

TENSILE STRESS

SHEARING STRESS

```
WALL_
                                                           Case b
5,17 NOMENT
                                                   8.530
                           M
                                  (t \cdot m)
      AXIAL FORCE
                                                   0.000
                           N
                                  (t)
      SHEAR FORCE
                                                   6.010
                           S
                                  (t)
      WIDTH
                                                100.000
                           b
                                  (cm)
      DEPTH
                                                 40.000
                           h
                                  (n)
      EFFECTIVE DEPTH
                                                  33.000
                           đ
                                  (n)
      CONCRETE COVER
CONCRETE COVER
                                                   7.000
                           ď′
                                  (n)
                                                   7,000
                                  (n)
      MODULAR RATIO
                                                  15
                             n = E_s / E_c =
                                                 19.860 D16@100 外
      AREA OF REINFORCEMENT As
                                  (cm2)
      AREA OF REINFORCEMENT As
                                                 33.680 D19@200+D22@200 内
      COMPRESSIVE STRESS
                                                 44.46
                                  (Kg/cm2) =
                           σç
      TENSILE STRESS
                                               1493.86
                                     H_{-}
      SHEARING STRESS
```

```
BASE
                                            8. 530 Case b
5,6,7, MOMENT
11,12,17 AXIAL FORCE
                        M
                              (t \cdot m)
                                            0.000
                        N
                              (t)
                                      =
      SHEAR FORCE
                                            4.520
                        S
                              (t)
                                      :==
                                          100.000
      WIDTH
                        b
                              (cm)
      DEPTH
                              (n)
                                           45,000
                        h
      EFFECTIVE DEPTH
                              (n)
                                           35.000
                        d
                       ď′
      CONCRETE COVER
                                            7,000
                              (n)
                                           10.000
                        ď"
                                    ===
      CONCRETE COVER
                              (n)
                                           15
      MODULAR RATIO
                        n = Es / Ec =
      AREA OF REINFORCEMENT As
                              (cm2) =
                                           19.860 D16@100 下
      AREA OF REINFORCEMENT As (")
                                           38.710 D22@100上
      COMPRESSIVE STRESS
                              (Kg/cm2) =
                                           39.41
                        σc
                              ( ") = 1403.74
      TENSILE STRESS
                        σs
                              (n) =
```

```
18.880 Case 8
HOMENT
                       (t · m)
                  N
                       (t)
                                     0.000
AXIAL FORCE
SHEAR FORCE
                  S
                                      2.470
                       (t)
                                    100.000
                       (cm)
                                ==
WIDTH
                  b
                       (n)
                                     45,000
DEPTH
                  h
                                ==
                                     38.000
EFFECTIVE DEPTH
                  d
                       (n)
                                =
                 ď
CONCRETE COVER
                       (n\cdot)
                                =
                                     10.000
                 d"
                                      7.000
CONCRETE COVER
                       (n)
                 n = E_s / E_c =
                                     15
MODULAR RATIO
AREA OF REINFORCEMENT As (cm2) =
                                     38.710 D22@100上
AREA OF REINFORCEMENT As '(")
                               = 19.860 D16@100T
```

(Kg/cm2) = 67.46

( n ) = 1508.53

(n) =

COMPRESSIVE STRESS

TENSILE STRESS

SHEARING STRESS

```
BASE.
                                                  13.600 Case 8
8,9,10 HOMENT
                           M
                                 (t · m)
      AXIAL FORCE
                                                   0.000
                                 (t)
                           N
      SHEAR FORCE
                           S
                                                   2.330
                                 (t)
      HIDTH
                                                100.000
                           b
                                 (cm)
      DEPTH
                           h
                                  (n)
                                                  45.000
      EFFECTIVE DEPTH
                           d
                                 (n)
                                                  38.000
      CONCRETE COVER
                           ď′
                                                  10,000
                                 (n)
      CONCRETE COVER
                           ď"
                                                   7.000
                                 (n)
      MODULAR RATIO
                             n = Es / Ec =
                                                  15
      AREA OF REINFORCEMENT As
AREA OF REINFORCEMENT As
                                                  29. 290 D22@200+D16@200 F
                                 (cm2)
                                                   9.930 D16@200 F
      COMPRESSIVE STRESS
                                  (Kg/cm2) =
                                                  55.17
                           σc
      TENSILE STRESS
                                  (n)
                                              1406.95
      SHEARING STRESS
```