

Se eliminó información del documento, ya que contiene datos personales de conformidad con los artículos 5 fracción XXXVI, 122 y 128 de la Ley de Transparencia y Acceso a la Información Pública del Estado de Chihuahua.

PROYECTO:
MEMORIA DESCRIPTIVA

OBRA:
CASA HABITACION
MODELO 188
TRES NIVELES

DATOS GENERALES
PROPIETARIO

UBICACIÓN

REGLAMENTOS UTILIZADOS

A.- Analisis de cargas
" Reglamento de Construcción de la Cd. de Chihuahua, Chih. "

B.- Diseño de elementos de Concreto
" Reglamento de construcciones de concreto "
ACI - 318 - 11

C.- Diseño de elementos de Acero
" Manual de construccion de acero "
IMCA Quinta Edicion

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DISEÑO DE TRABES

TRABE T-1

W=	2975.00 kg-m	b=	20.00
Long =	4.00 m	h=	45.00
		d=	42.50

Flexion

M (+) = $wl^2 / 8$	5950.0 kg-m
M (-) = $wl^2 / 12$	3966.7 kg-m

$M_u / \phi \cdot b \cdot d^2$	ρ	$A_s \text{ (cm}^2\text{)} =$
18.301	0.00330	2.805
12.200	0.00330	2.600

Usar 2 Vrs. No. 5 en lecho superior

Usar 3 Vrs. No. 6 en lecho inferior

Revisión de flecha

$$\Delta = 5 \cdot w \cdot l^4 / 384 \cdot E \cdot I$$

$$\Delta = 0.031$$

$$L/180 = 2.222$$

$$L/300 = 1.333$$

$$L/220 - 0.5 = 2.318$$

o.k

Cortante

$$V_u = w \cdot l / 2$$

$$f_v \cdot V_c = 0.53 \cdot 0.85 \cdot 14 \cdot b \cdot d$$

$$V_u - f_v \cdot V_c =$$

$$V_s = V_u - f_v \cdot V_c / 0.85 =$$

$$S = f_y \cdot d \cdot A_s / V_s =$$

$$S = d/2$$

$$5950.00 \text{ kgs}$$

$$5415.36 \text{ kgs}$$

$$534.64 \text{ kgs}$$

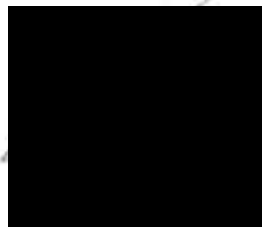
$$628.96 \text{ kgs}$$

$$482.44 \text{ cms}$$

$$21.25 \text{ cms}$$

con vrs. No. 3

Usar estribos No. 3 a cada 20 cms



TRABE T-2

W= 1700.00 kg-m
 Long = 4.50 m
 b= 20.00
 h= 40.00
 d= 37.50

Flexion
 $M (+) = w l^2 / 8$ 4303.1 kg-m
 $M (-) = w l^2 / 12$ 2868.8 kg-m

$M_u / h^3 b^3 d^3$ ρ $A_s (cm^2) =$
 17.000 0.00330 2.475
 11.333 0.00330 2.475

Usar 2 Vrs. No. 5 en lecho superior
 Usar 2 Vrs. No. 6 en lecho inferior

Revisión de flecha

$\Delta = 5 \cdot w \cdot l^4 / 384 \cdot E \cdot I$
 $\Delta = 0.041$ a.k.
 $L/180 = 2.500$
 $L/300 = 1.500$
 $L/220 + 0.5 = 2.545$

Cortante

$V_u = w l / 2$ 3825.00 kgs
 $f_c V_c = 0.53 \cdot 0.85 \cdot 14 \cdot b \cdot d$ 4778.26 kgs
 $V_u - f_c V_c = -953.26$ kgs
 $V_s = V_u - f_c V_c / 0.85 = -1121.48$ kgs
 $S = f_y \cdot d \cdot A_s / V_s = -238.75$ cms.
 $S = d/2$ 18.75 cms.

con vrs. No. 3

Usar estribos No. 3 a cada 20 cms.

TRABE T-3

$W = 1530.00 \text{ kg-mi}$
 $\text{Long} = 3.00 \text{ mi}$
 $b = 15.00$
 $h = 40.00$
 $d = 37.50$

Flexion
 $M (+) = w l^2 / 8 = 1721.3 \text{ kg-mi}$
 $M (-) = w l^2 / 12 = 1147.5 \text{ kg-mi}$

$M_u / f_r b^* d^2$
 9.057
 6.044
 ρ
 0.00330
 0.00330
 $A_s (\text{cm}^2) =$
 1.856
 1.856

Usar 2 Vrs. No. 4 en lecho superior
 Usar 2 Vrs. No. 5 en lecho inferior

Revisión de flecha

$\Delta = 5 \cdot w \cdot l^4 / 384 \cdot E \cdot I$
 $\Delta = 0.010$
 $L/180 = 1.867$
 $L/300 = 1.000$
 $L/220 + 0.5 = 1.884$
 ok

Cortante

$V_u = w l / 2 = 2295.00 \text{ kgs}$
 $f_r V_c = 0.53 \cdot 0.85 \cdot 14 \cdot b^* d = 3583.70 \text{ kgs}$
 $V_u - f_r V_c = -1268.70 \text{ kgs}$
 $V_s = V_u - f_r V_c / 0.85 = -1516.11 \text{ kgs}$
 $S = f_y \cdot d \cdot A_s / V_s = -176.60 \text{ cms}$
 $S = d/2 = 18.75 \text{ cms}$

con vrs. No. 3

Usar estribos No. 2 a cada 15 cms



TRABE T-4

W= 2040.00 kg-mi
 Long. = 3.40 mi
 b= 60.00
 h= 15.00
 d= 12.50

Flexion

M (+) = wL**2 / 8 2947.6 kg-mi
 M (-) = wL**2 / 12 1965.2 kg-mi

MU / fi*b*d**2 ra As (cm2) =
 34.937 0.00700 5.250
 23.291 0.00400 3.000

Usar 4 Vrs. No. 3 en lecho superior

Usar 4 Vrs. No. 4 en lecho inferior

Revisión de flecha

Delta = 5*w*L**4 / 384 * E * I

Delta = 0.100
 L/180 = 1.889
 L/300 = 1.133
 L/220+ 0.5 = 2.045

ok

Cortante

Vu = w*L / 2 3468.00 kgs
 fi*Vc = 0.53*0.85*14.14*b*d 4778.26 kgs
 Vu - fi*Vc = -1310.26 kgs
 Vs = Vu - fi*Vc / 0.85 = -1541.48 kgs
 S = fy * d * As / Vs = -57.90 cms
 S = d/2 6.25 cms.

con vrs. No. 3

Usar estribos No. 2 a cada 15 cms.



TRABE T-5

W= 1300.00 kg-mi
Long. = 2.70 mi
b= 40.00
h= 15.00
d= 12.50

Flexion
M (+) = w**2 / 8 1184.6 kg-mi
M (-) = w**2 / 12 789.6 kg-mi

Mu / fi*b*d**2
21.060
14.040
ro
0.00400
0.00330
As (cm2) =
2.000
1.850

Usar 3 Vrs. No. 3 en lecho superior
Usar 3 Vrs. No. 4 en lecho inferior

Revisión de flecha

Delta = 5*w*l**4 / 384*E*I
Delta = 0.036
L/180 = 1.500
L/300 = 0.900
L/220+0.5 = 1.727
o.k.

Cortante

Vu = w*l / 2 1755.00 kgs
fi*Vc = 0.53*0.85*14.14*b*d 3185.51 kgs
Vu - fi*Vc = -1430.51 kgs
Vs = Vu - fi*Vc / 0.85 = -1682.95 kgs
S = fy*d*As / Vs = -53.03 cms
S = d/2 6.25 cms

con vrs. No. 3

Usar estribos No. 2 a cada 15 cms



TRABE T-6

W= 2550.00 kg-mi
 Long. = 1.50 mi
 b= 15.00
 h= 40.00
 d= 37.50

Flexion
 $M(+) = w \cdot l^2 / 2 = 2868.6 \text{ kg-mi}$
 $M(-) = w \cdot l^2 / 12 = 478.1 \text{ kg-mi}$

$M_u / f_t \cdot b \cdot d^2 = 15.111$
 15.111
 2.519
 $\rho = 0.00330$
 0.00330
 $A_s (\text{cm}^2) = 1.650$
 1.650

Usar 3 Vrs. No. 5 en lecho superior
 Usar 2 Vrs. No. 4 en lecho inferior

Revisión de flecha

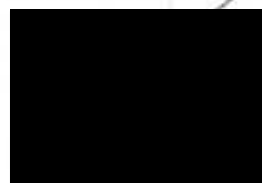
Delta = $5 \cdot w \cdot l^4 / 384 \cdot E \cdot I$
 Delta = 0.001
 L/180 = 0.833
 L/300 = 0.500
 L/220 + 0.5 = 1.182
 o.k.

Cortante

$V_u = w \cdot l / 2 = 1912.50 \text{ kgs}$
 $f_t \cdot V_c = 0.53 \cdot 0.85 \cdot 14.14 \cdot b \cdot d = 3583.70 \text{ kgs}$
 $V_u - f_t \cdot V_c = -1671.20 \text{ kgs}$
 $V_s = V_u - f_t \cdot V_c / 0.85 = -1966.11 \text{ kgs}$
 $S = f_y \cdot d \cdot A_s / V_s = -136.18 \text{ cms}$
 $S = d / 2 = 18.75 \text{ cms}$

Usar estribos No. 2 a cada 15 cms

con vrs. No. 3



TRABE T-7

W= 1275.00 kg-mi
 Long. = 6.30 mi
 b= 15.00
 h= 40.00
 d= 37.50

Flexion

M (+) = $wl^2/8$ 6925.6 kg-mi
 M (-) = $wl^2/12$ 4217.1 kg-mi

$Ml / f \cdot b \cdot d^2$ ro As (cm2) =
 33.320 0.00800 3.375
 22.213 0.00400 2.250

Usar 2 Vrs. No. 5 en lecho superior
 Usar 2 Vrs. No. 6 en lecho inferior

Revisión de flecha

Delta = $5 \cdot w \cdot l^4 / 384 \cdot E \cdot I$
 Delta = 0.156
 L/180 = 3.500
 L/300 = 2.100
 L/220 + 0.5 = 3.384

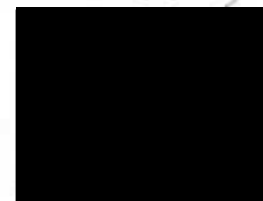
o.k.

Cortante

Vu = $w \cdot l / 2$ 4016.25 kgs
 f'Vc = $0.53 \cdot 0.85 \cdot 14 \cdot b \cdot d$ 3563.70 kgs
 Vu - f'Vc = 452.55 kgs
 Vs = $Vu - f'Vc / 0.85$ = 508.89 kgs.
 S = $f_y \cdot d \cdot A_s / V_s$ 526.15 cms.
 S = d/2 18.75 cms

con vrs. No. 3

Usar estribos No. 2 a cada 15 cms



CASTILLO C-1

PROPIEDADES DE SECCION

Base	15.00
Peralte	15.00
Recubrimiento	2.00
Concreto	200.00
Acero	4200.00
Modulo	800.10
Inercia	13335.00
Bd	1.00
Lx	1.00
Area	225.00
Ix	13335.00
Radio	8.46
Esbeltes	35.00 mayor 22

DATOS DE COLUMNA

Columna	c-1		
Pu		3000.00 kg	
Mu		450.00 kg-mi	
Momentos	Minimos ACI		
exentricidad minima	2.500		
	M2 min		11.430 k-cm
	M2 min		0.114 k-mi
M2	9881.250	mayor O.K.	
CARGA Po	4050.000 K		
Cmx	1.000	0.750	3037.50 k
Delta	1.300	mayor a 1	

MOMENTO AMPLIFICADO

Mc	12.573 real	1.500
e/u	0.19884	

FACTORES

Phi Pn / Ag x e/H	
0.2223225678 x 0.112994932	0.0288765 x Phi Mn / Ag x H

Phi x Pn / Ag

Phi x Mn / Ag x H

Valor	0.140
Area gruesa	2.8400

Area de refuerzo transversal

Separacion maxima d/2	7.487
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USAR 15 x 15 CMS , ARMADO CON 4 No. 3 Y Estribos No. 2 a cada 20.0 cms.

CASTILO K-1

PROPIEDADES DE SECCION

Base	15.00
Peralte	15.00
Recubrimiento	2.00
Concreto	200.00
Acero	4200.00
Modulo	800.10
Inercia	13335.00
Bd	1.00
Lx	1.00
Area	225.00
Ix	13335.00
Radio	8.46
Esbeltes	35.00 mayor 22

DATOS DE COLUMNA

Columna	k-1
Pu	3000.00 kg
Mu	450.00 kg-mi
Momentos	Minimos ACI
exentricidad minima	2.500
	M2 min
	M2 min
M2	9881.250 mayor O.K.
	11.430 k-cm
	0.114 k-mi
CARGA Po	4050.000 K
Cmx	1.000
Delta	0.750
	1.300 mayor a 1
	3037.50 k

MOMENTO AMPLIFICADO

Mc	12.573 real	1.500
e/u	0.19884	

FACTORES

Phi Pn / Ag x e/H	
0.2223225678 x 0.112994932	0.0286765 x Phi Mn / Ag x H

Phi x Pn / Ag

Phi x Mn / Ag x H

Valor	0.140
Area gruesa	2.8400

Area de refuerzo transversal

Separacion maxima d/2	7.487
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USAR 15 x 15 CMS , CON ARMEX 15-15/4

CASTILO K-2

PROPIEDADES DE SECCION

Base	35.00
Peralte	35.00
Recubrimiento	2.00
Concreto	200.00
Acero	4200.00
Modulo	800.10
Inercia	13335.00
Bd	1.00
Lx	1.00
Area	1225.00
Ix	13335.00
Radio	8.46
Esbeltes	35.00 mayor 22

DATOS DE COLUMNA

Columna	k-2		
Pu		3000.00 kg	
Mu		450.00 kg-mi	
Momentos	Minimos ACI		
exentricidad minima	2.500		
	M2 min		11.430 k-cm
	M2 min		0.114 k-mi
M2	9881.250	mayor O.K.	
CARGA Po	4050.000 K		
Cmx	1.000	0.750	3037.50 k
Delta	1.300	mayor a 1	

MOMENTO AMPLIFICADO

Mc	12.573	real	1.500
e/u	0.19884		

FACTORES

Phi Pn / Ag x e/H
0,2223225678 x 0,112994932 0,0288765 x Phi Mn / Ag x H

Phi x Pn / Ag

Phi x Mn / Ag x H

Valor	0.140
Area gruesa	2.8400

Area de refuerzo transversal
Separacion maxima d/2

17.467

USAR 35 x 35 CMS , ARMADO CON 8 No. 4 Y Estribos No. 3 a cada 20.0 cms.

PROCEDIMIENTO DE ANALISIS Y DISEÑO :

LOSA DE PISO

Espesor de losa para diseño

$$l_n = (l_m \cdot 1.25 + l_n) / 1.80$$

$l_m =$	330.0	cms
$l_n =$	450.0	cms
$h_{min} =$	8.67	cms
Usar	13.00	cms

ANALISIS DE CARGAS :

CARGAS MUERTAS :

Peso propio 268.00 kg/m²

CARGAS VIVAS

Habitacionales 250.00 kg/m²

CARGA DE SERVICIO

538.00 kg/m²

CARGA ULTIMA

695.60 kg/m²

CARGA DE DISEÑO

700.00 kg/m²

DISEÑO DE LOSA DE PISO

CARGA DE DISEÑO 700.00 kg/m²

Losa en dos direcciones

$d = 10.50$ cms.

$f_y = 4200.0$ kg/cm²

$$M_u = coef \times W \times (a + b)^2$$

Acero No. 3
a cada

$$A_s = M_u / f_y \times d$$

losa tipo	$m =$	Coefficiente			
claro corto $a1 =$	3.30	$a1/b1$			
claro largo $b1 =$	4.80	0.733333			
Positiva Corto		0.07500	571.73	1.30	54.77
Largo		0.03500	486.13	1.15	53.11

USAR LOSA SOLIDA DE 13 CMS. DE ESPESOR

USAR ACERO CON MALLA SOLDADA 66-8/8

EN AMBOS LECHOS

VERIFICAR DETALLES EN PLANOS.

$f_y = 5000.00$ kg/cm²

$f_c = 200.00$ kg/cm²

CONTRATRABE CT-I INTERIOR

$w = 2280.00 \text{ kg/ml}$
 $\text{Long.} = 3.65 \text{ ml}$
 $b = 20.00$
 $h = 25.00$
 $d = 22.50$

Flexión

$M(+) = w l^2 / 8 = 4224.4125 \text{ kg}\cdot\text{ml}$
 $M(-) = w l^2 / 12 = 2816.28 \text{ kg}\cdot\text{ml}$

$M_u / \phi \cdot b \cdot d^2 = 46.3584$
 30.9056
 $\rho = 0.00380$
 0.00330
 $A_s (\text{cm}^2) = 1.710$
 1.465

Usar Armex 15-20/4
 mas 2 vrs #3 en lecho superior
 $f_y = 6000.00 \text{ kg/cm}^2$ en armex
 $f_c = 200.00 \text{ kg/cm}^2$

Revisión de flecha

$\Delta = 5 \cdot w \cdot l^4 / 384 \cdot E \cdot I$
 $\Delta = 0.119$
 $L/180 = 2.139$
 $L/300 = 1.283$
 $L/220 + 0.5 = 2.250$

O.K

Cortante

$V_u = w \cdot l / 2 = 4389.00 \text{ kgs}$
 $\phi \cdot V_c = 0.53 \cdot 0.85 \cdot 14.14 \cdot b \cdot d = 2868.96 \text{ kgs}$
 $V_u - \phi \cdot V_c = 1522.04 \text{ kgs}$
 $V_s = V_u - \phi \cdot V_c / 0.85 = 1790.64 \text{ kgs}$
 $S = f_y \cdot d \cdot A_s / V_s = 89.72 \text{ cms.}$
 $S = d/2 = 11.25 \text{ cms.}$

con vrs No 3

Usar contratrabe de 20 x 25 cms
 Usar Armex 15-20/4
 mas 2 vrs #3 en lecho superior
 $f_y = 6000.00 \text{ kg/cm}^2$ en armex
 $f_c = 200.00 \text{ kg/cm}^2$

CONTRATRABE CT-E EXTERIOR

$W = 1140.00 \text{ kg-mi}$
 $L_{\text{long}} = 4.50 \text{ mi}$
 $b = 20.00$
 $n = 25.00$
 $d = 22.50$

Flexion
 $M (+) = w l^2 / 8 = 2885.626 \text{ kg-mi}$
 $M (-) = w l^2 / 12 = 1923.75 \text{ kg-mi}$

$M_u / f_t b d^2 = 31.6667$
 21.1111
 $\rho = 0.00380$
 0.00330
 $A_s (\text{cm}^2) = 1.710$
 1.485

Usar Armex 15-20/4
 mas 1 vr #3 en lecho superior
 $f_y = 6000.00 \text{ kg/cm}^2$ en armex
 $f_c = 200.00 \text{ kg/cm}^2$

Revisión de flecha

$\Delta = 5 w l^4 / 384 E I$
 $\Delta = 0.111$
 $L/180 = 2.500$
 $L/300 = 1.500$
 $L/220 + 0.5 = 2.545$

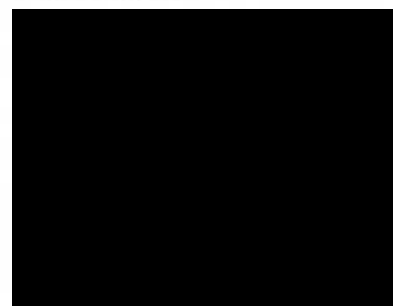
o.k.

Cortante

$V_u = w l / 2 = 2565.00 \text{ kgs}$
 $f_t V_c = 0.63 \cdot 0.85 \cdot 14.14 \cdot b \cdot d = 2868.96 \text{ kgs}$
 $V_u - f_t V_c = -301.96 \text{ kgs}$
 $V_s = V_u - f_t V_c / 0.65 = -355.24 \text{ kgs}$
 $S = f_y \cdot d \cdot A_s / V_s = -452.22 \text{ cms}$
 $S = d/2 = 11.25 \text{ cms}$

con vrs. No 3

Usar contratrabe de 20 x 25 cms
 Usar Armex 15-20/4
 Area de acero = 1.28 cm²
 $f_y = 6000.00 \text{ kg/cm}^2$ en armex
 $f_c = 200.00 \text{ kg/cm}^2$



CONCRETE FOOTING DESIGN

FOOTING ID : zapata aislada ZA-1 COLINDANTE Code: ACI 318-08

SOIL DATA	CONCRETE DATA	COLUMN DATA
Max. Vert Press. = 12000.000 kgf/M ²	F _c = 210.921 kgf/cm ²	F _c = 281.228 kgf/cm ²
Max. Flexural Press. = 120000.000 kgf/M ²	Density = 2402.770 kgf/M ³	X Dim. = 15.000 cm
Density = 1441.662 kgf/M ³	F _y = 4218.419 kgf/cm ²	Z Dim. = 15.000 cm
Phi Angle = 0.524 Rad		X Offset = 0.000 M
Coeff. of Friction = 0.333		Z Offset = 0.000 M
Cohesion = 0.000 kgf/M ²		

SURCHARGE DATA

Ftg. Depth = 0.400 M	+X,+Z Quadrant = 0.000 kgf/M ²	
FS Uplift = 1.000	+X,-Z Quadrant = 0.000 kgf/M ²	

BASE PLATE DATA

FS Overturning = 1.000	-X,-Z Quadrant = 0.000 kgf/M ²	X Dim. = 0.000 cm
FS Sliding = 1.000	-X,+Z Quadrant = 0.000 kgf/M ²	Z Dim. = 0.000 cm

FACTORED LOADS INPUT						
LOAD CASE	VERTICAL LOAD	DL/TOTAL RATIO	MX	MZ	HX	HZ
1	-8950.000 kgf	0.00	0.000 M -kgf	0.000 M -kgf	0.000 kgf	0.000 kgf

FOOTING DESIGN SHEAR STRESSES (ONE WAY) SHEAR STRESSES (TWO WAY)

X Dimension = 0.96 M	+X Area = 3.106 kgf/cm ²	+X Area = 10.925 kgf/cm ²
Z Dimension = 0.96 M	-X Area = 3.106 kgf/cm ²	-X Area = 10.925 kgf/cm ²
Thickness = 18.000 cm	+Z Area = 5.868 kgf/cm ²	+Z Area = 10.925 kgf/cm ²
Max. Press. = 4702.999 kgf/M ²	-Z Area = 5.868 kgf/cm ²	-Z Area = 10.925 kgf/cm ²
Allow. = 6.546 kgf/cm ²	Allow. = 13.093 kgf/cm ²	

Design Controlled by Soil Pressures

BOTTOM STEEL DESIGN (Parallel to X Axis)

Moment (+X Area) = 276.484 M -kgf

(-X Area) = 276.484 M -kgf

Steel Required = 2.057 cm² (Min)

Dist. to Centroid = 8.890 cm

BOTTOM STEEL DESIGN (Parallel to Z Axis)

Moment (+Z Area) = 276.484 M -kgf

(-Z Area) = 276.484 M -kgf

Steel Required = 2.261 cm²

Dist. to Centroid = 11.430 cm

Typical Spacings

3 #3 Bars at 30.480 cm. Centers (Anchor)

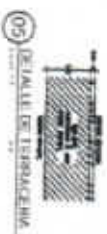
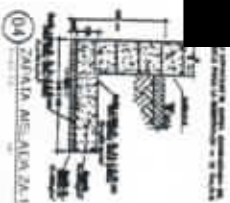
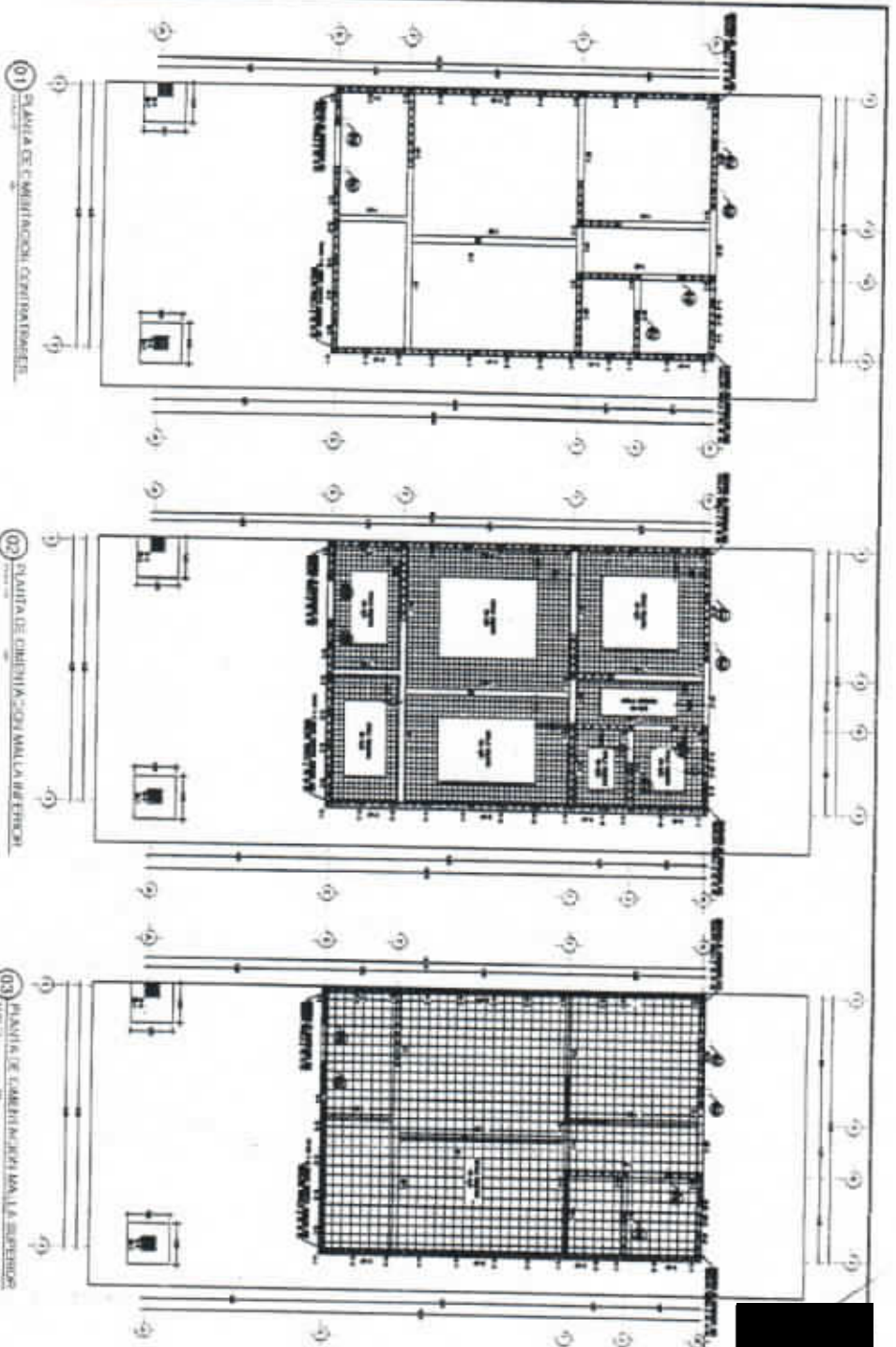
3 #4 Bars at 30.480 cm. Centers (Anchor)

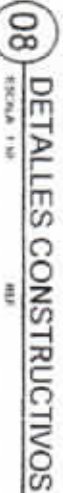
Typical Spacings

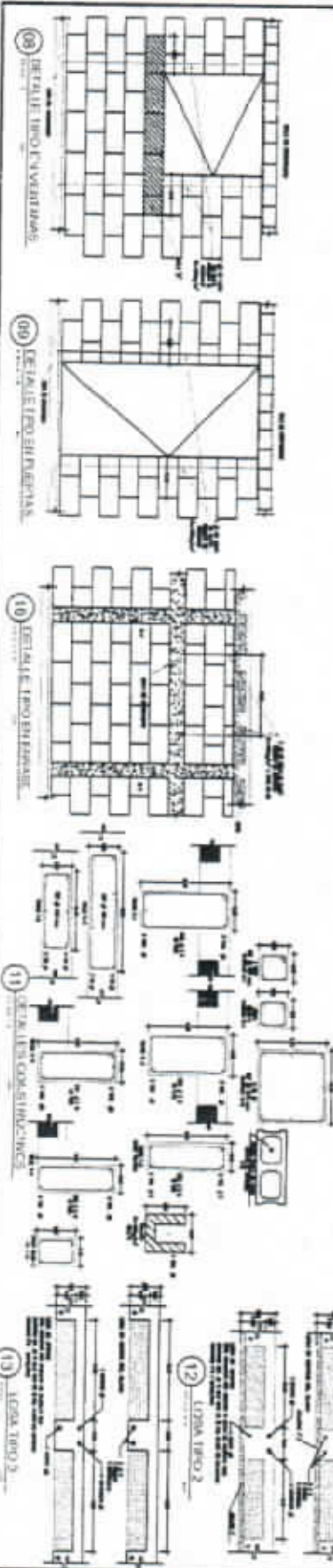
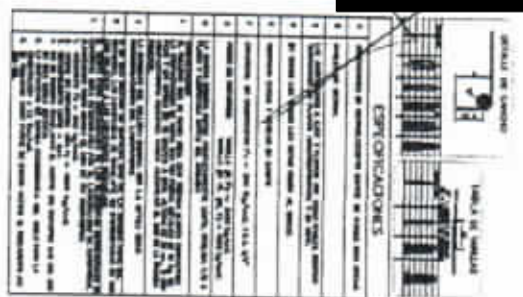
4 #3 Bars at 20.320 cm. Centers (Anchor)

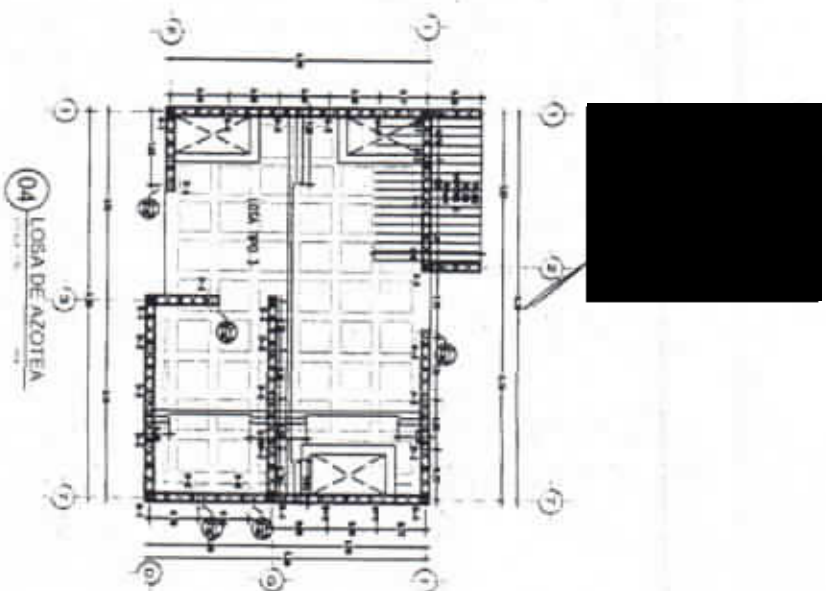
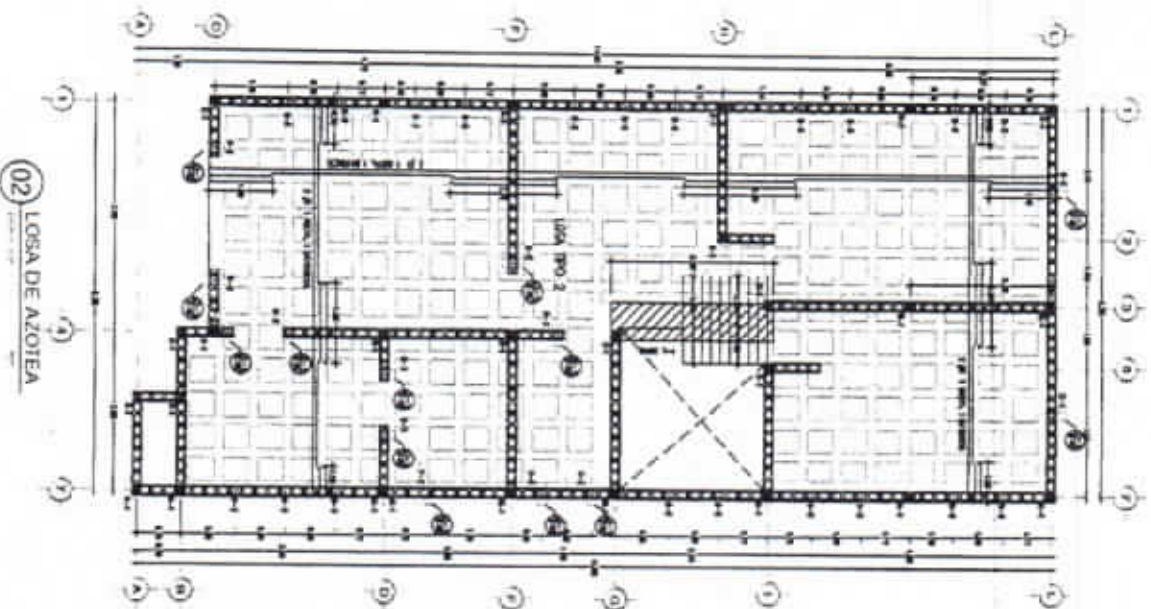
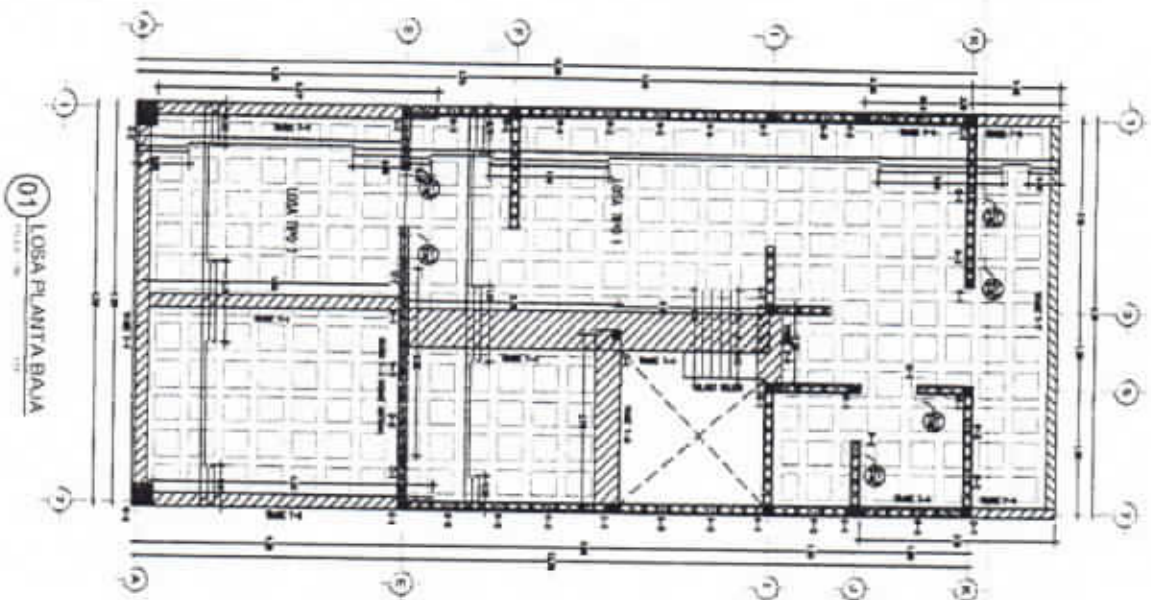
QUANTITIES : 2.066 kgfs of Steel and 0.067 M³ of Concrete.

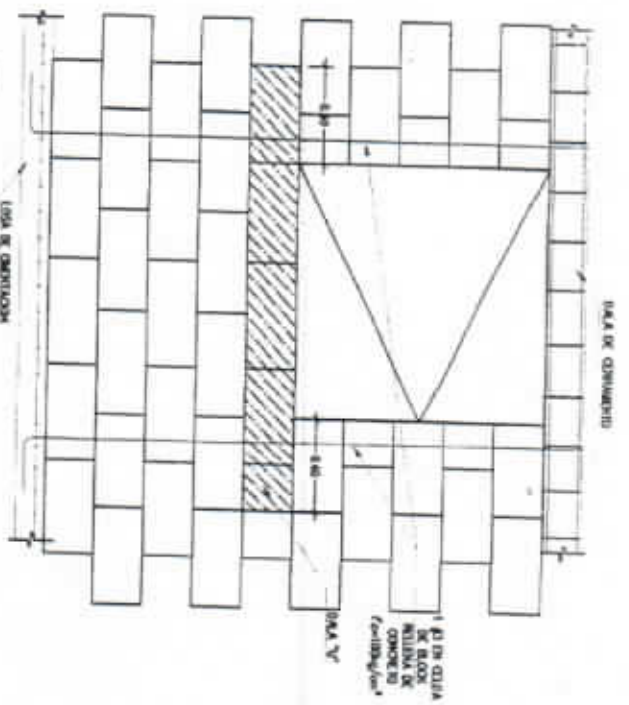
USAR ZAPATA DE 1.00 x 1.00 x 0.20 ml.
 ARMAR CON VRS. No. 4 @ 20 CMS.
 AMBOS SENTIDOS
 AMBOS LECHOS

[illegible]

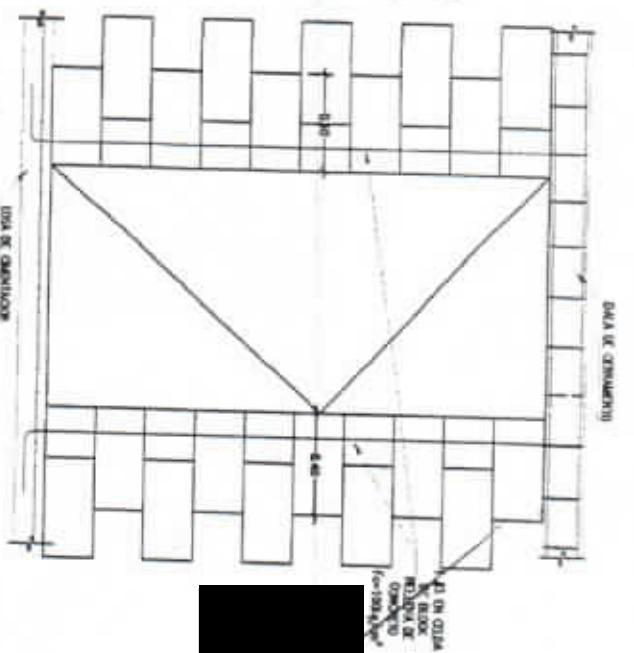
[illegible]



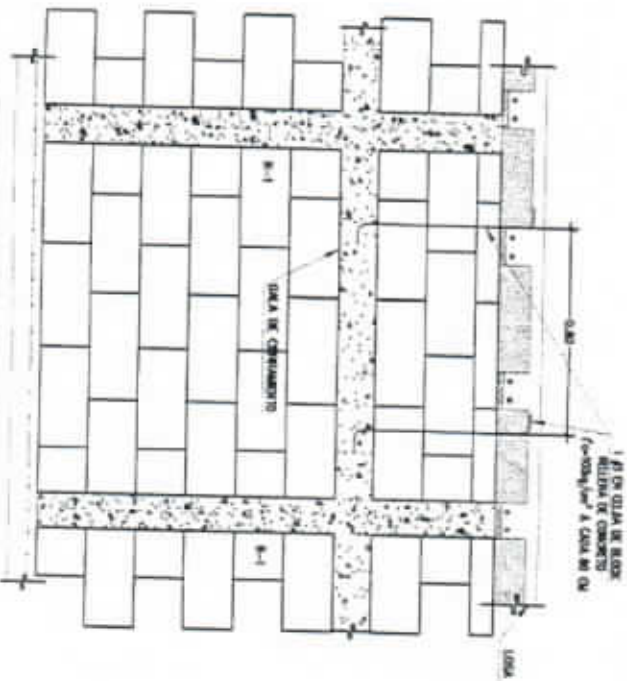




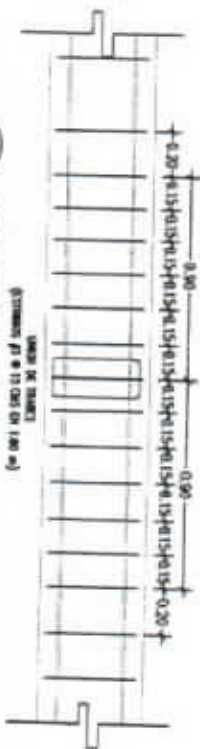
08 DETALLE TIPO EN VENTANAS
Escala 1:20
H.F.



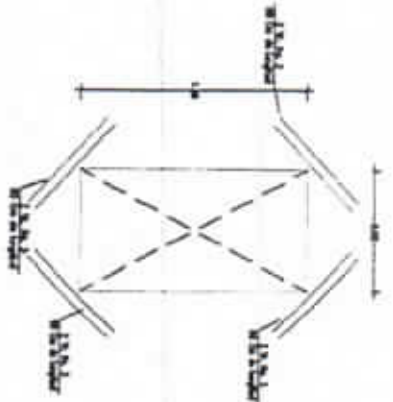
09 DETALLE TIPO EN PUERTAS
Escala 1:20
H.F.



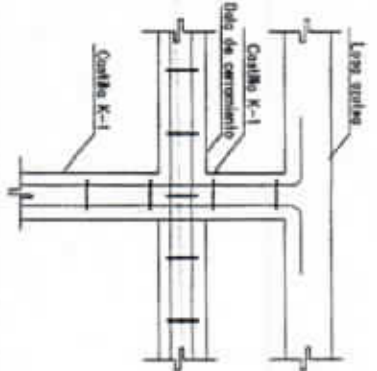
10 DETALLE TIPO EN ENRASE
Escala 1:20
H.F.



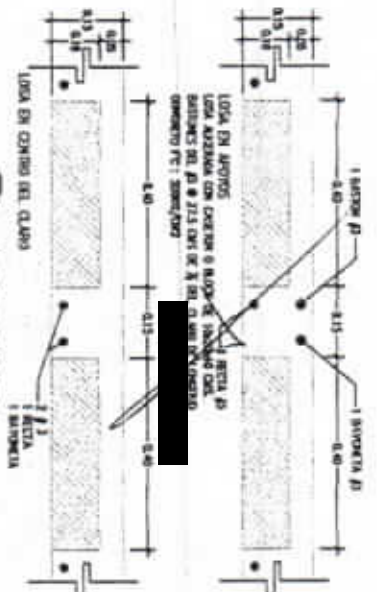
03 CONEXION TRABE CON TRABE
Escala 1:20
H.F.



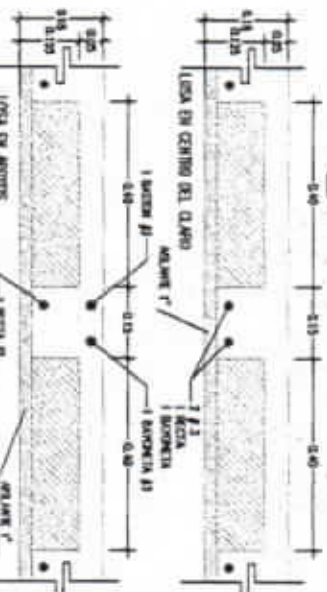
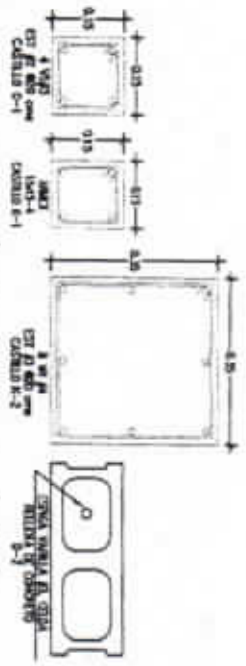
05 DETALLE REFUERZO PARA DOMO
ESCALA 1/20 REF.



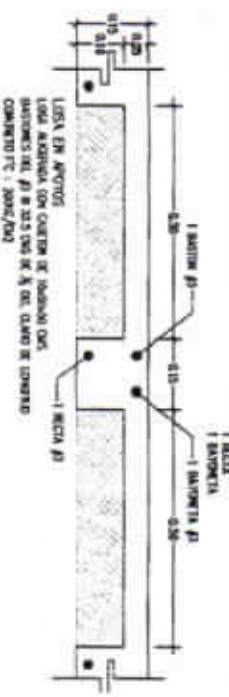
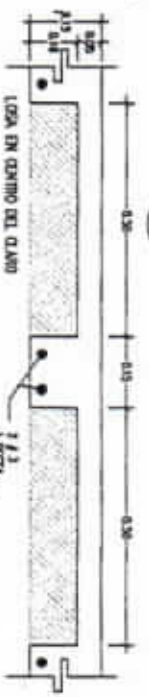
06 DETALLE TIPO CASTILLO EN ENRASE
ESCALA 1/10 REF.



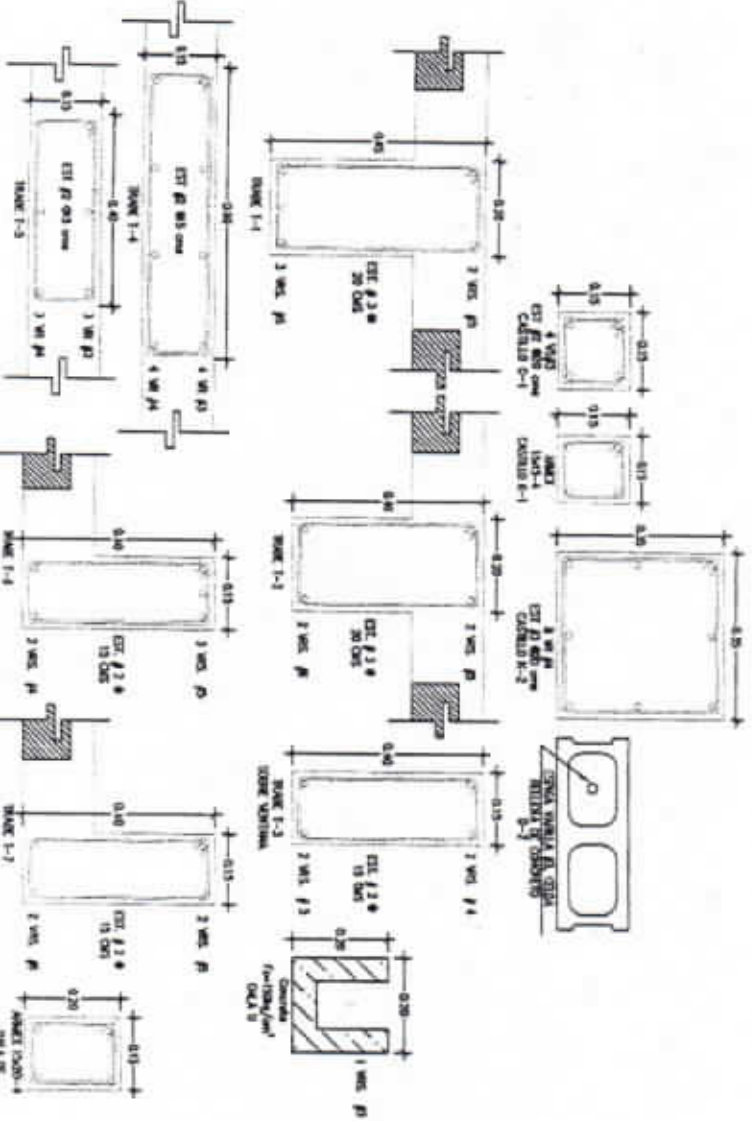
07 LOSA TIPO 1
ESCALA 1/10 REF.



12 LOSA TIPO 2
ESCALA 1/10 REF.



13 LOSA TIPO 3
ESCALA 1/10 REF.



11 DETALLES CONSTRUCTIVOS
ESCALA 1/10 REF.

