



1954

**TMMOB
ELEKTRİK
MÜHENDİSLERİ
ODASI**

T. P. - 3 - 3

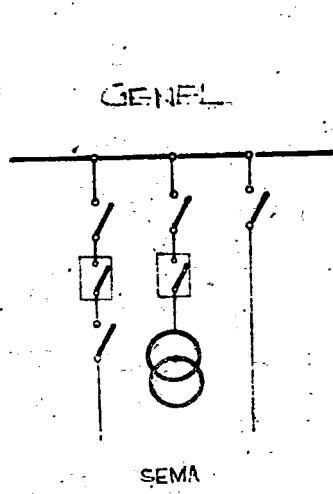
KULE ÇIKIŞLI 2 HÜCRELİ

6,3 - 15 - 30 kV

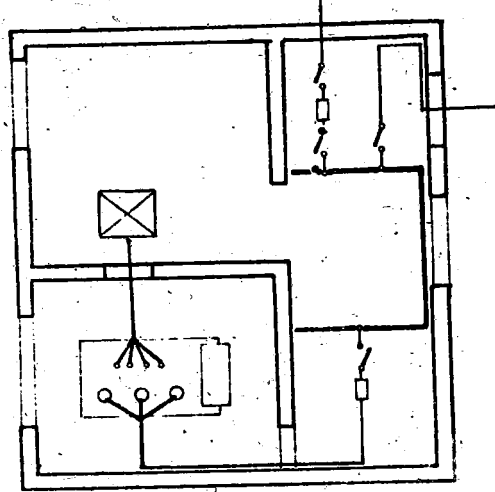
TRANSFORMATÖR BİNASI

DEĞİŞİKLİK			TARİH	İMZA
a)				
b)				
6.3-15-30kV 2 HÜCRELİ KULE ÇIKIŞLI TİP TRANSFORMATÖR BİNASI MONTAJ PLÂNI			ÖLÇEK : 1/50	
			NO. LU PLÂN İPTÂL EDİLDİ	
			NO. LU PLÂN İPTÂL EDİLDİ	
			PLÂN NO. : 114 1/35	
Proje Yapanın Dp. No. Unvanı Adı Soyadı	İMZA	İMZA TARİHİ	ARŞİV KAYIT NO. :	
ELK.Y. MÜH. HÜSEYİN BODUR ODA NO: 343				
ÇİZEN : Ş. ÖZDE MİR				

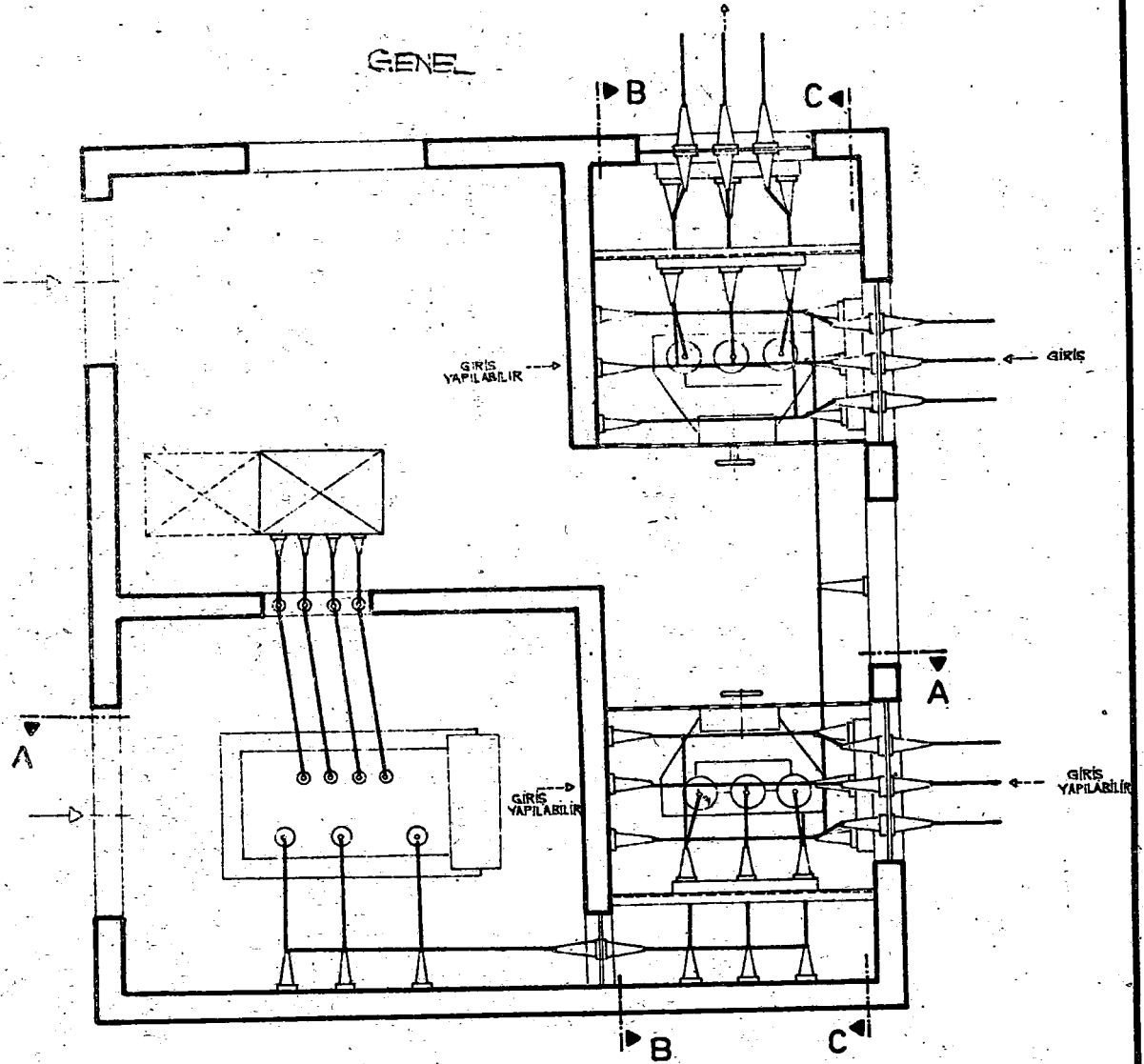
0.50m²

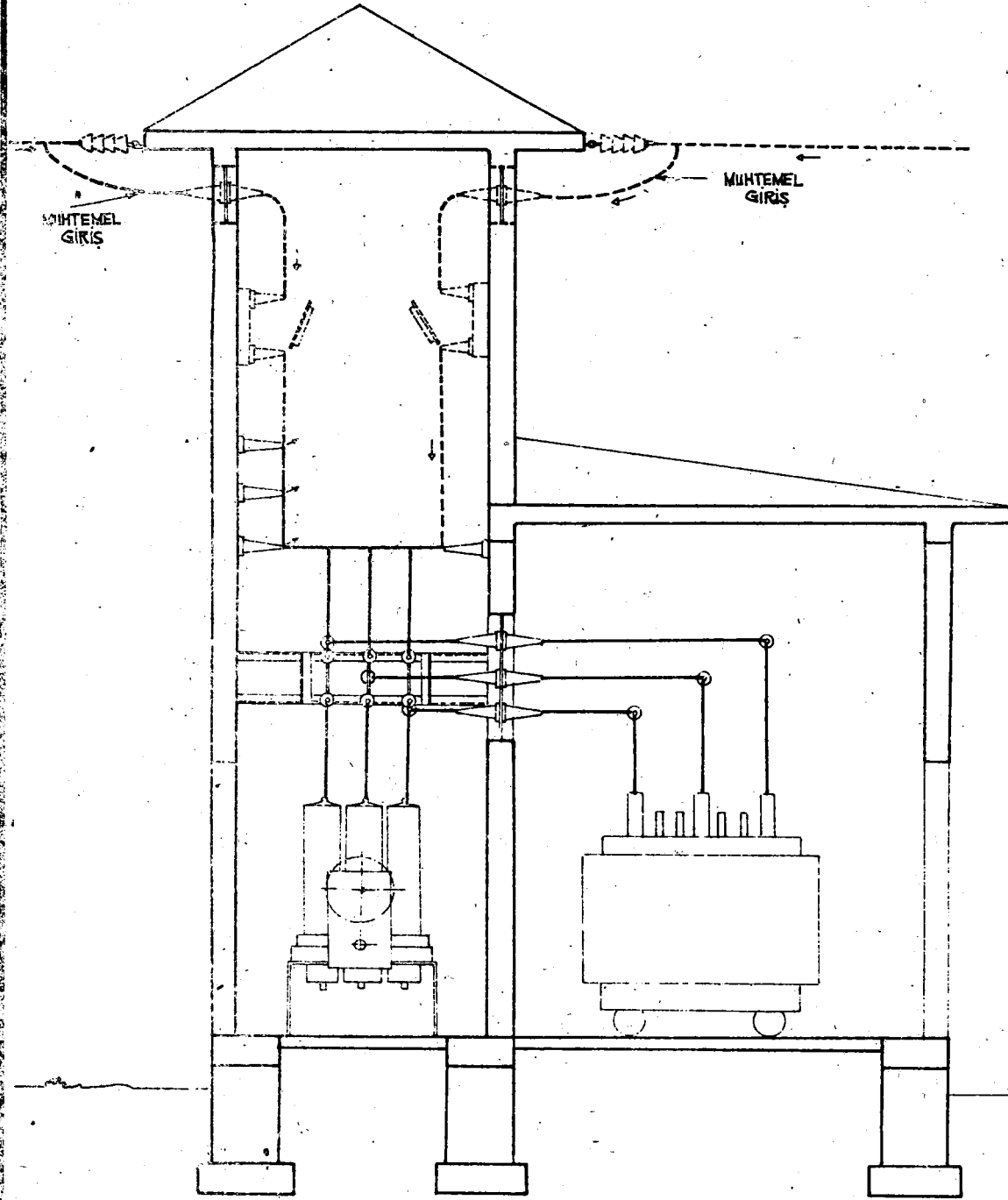


GENEL MONTAJ PLANI

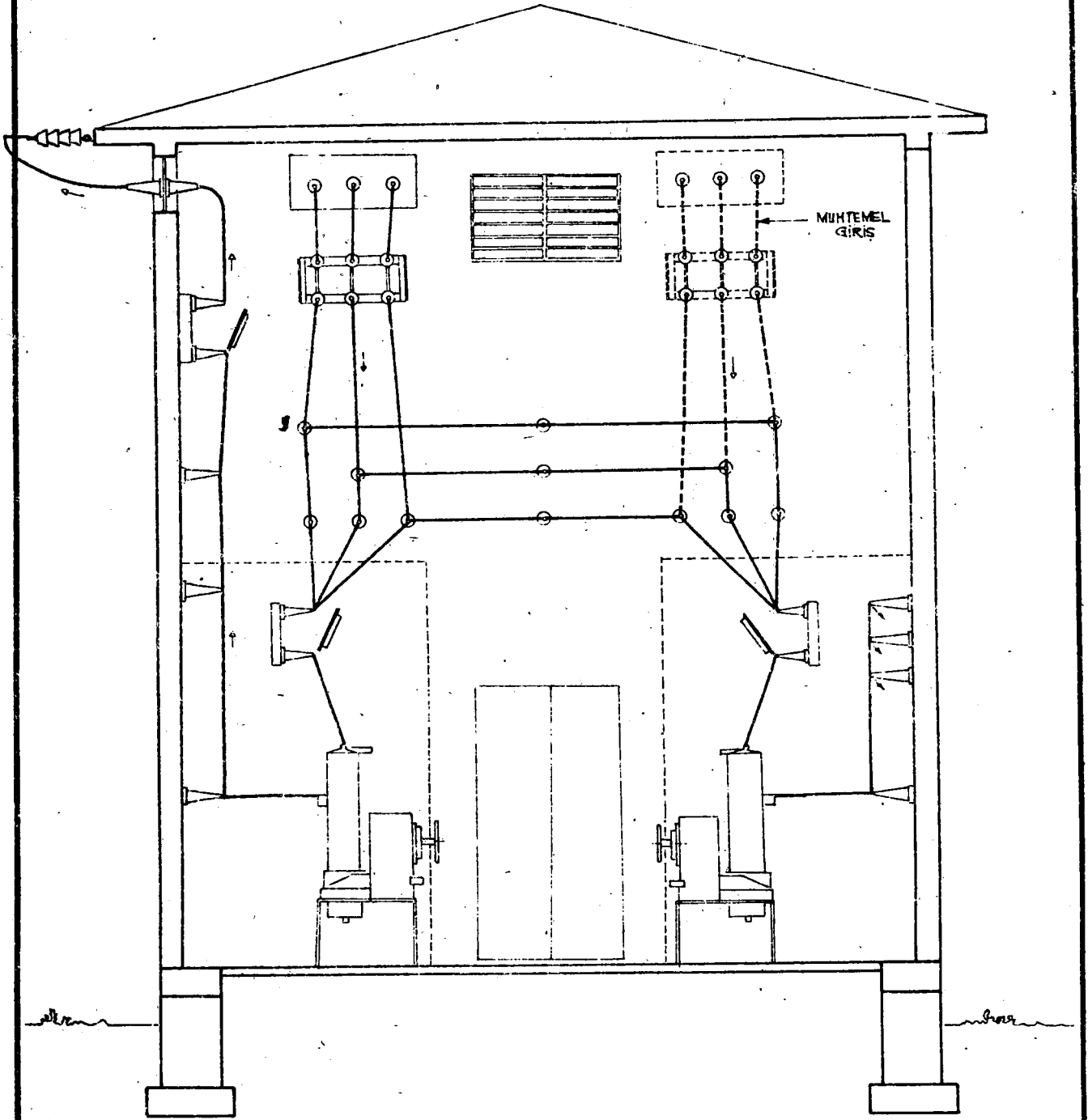


GENEL

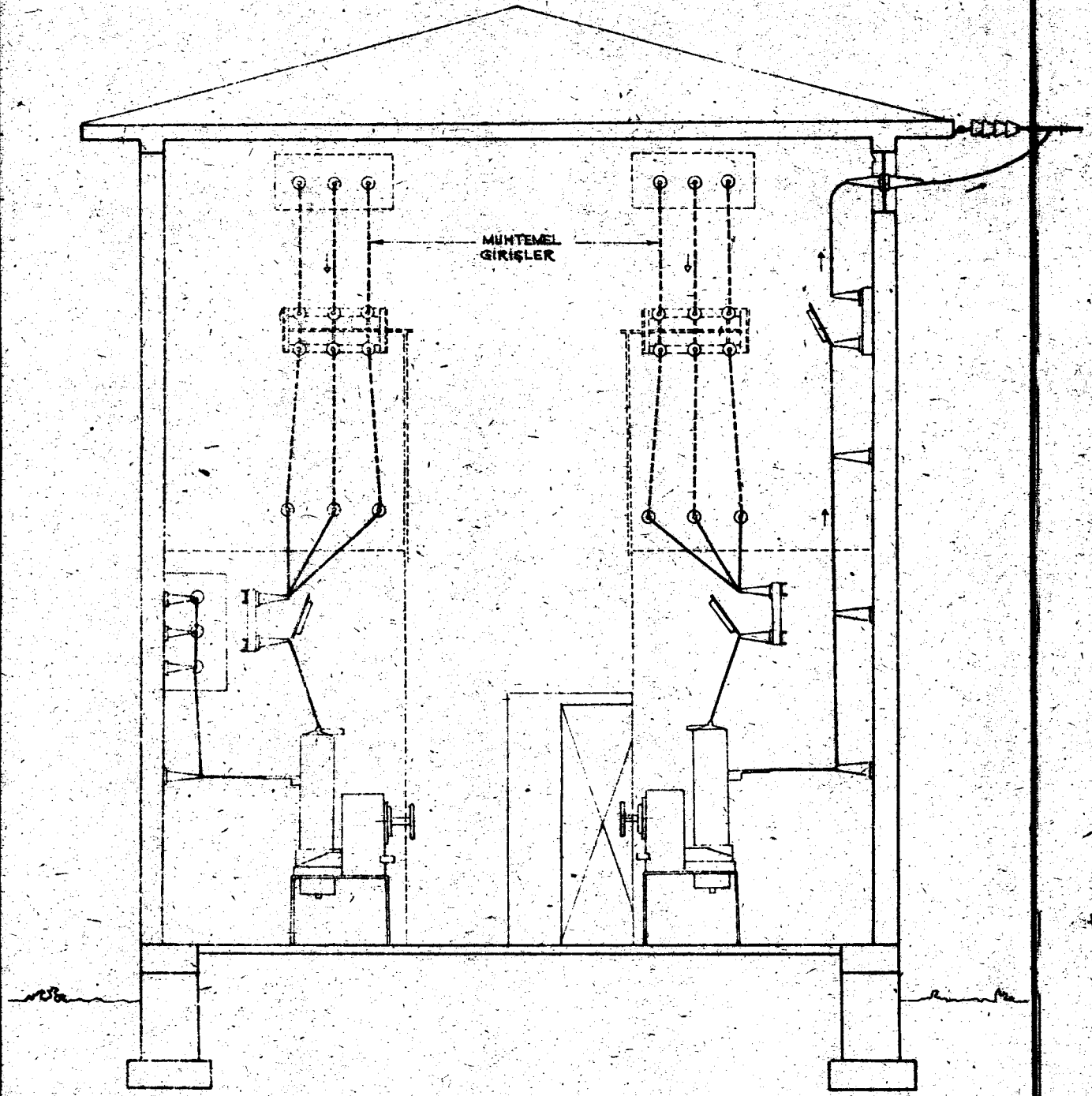




A-A KESİTİ



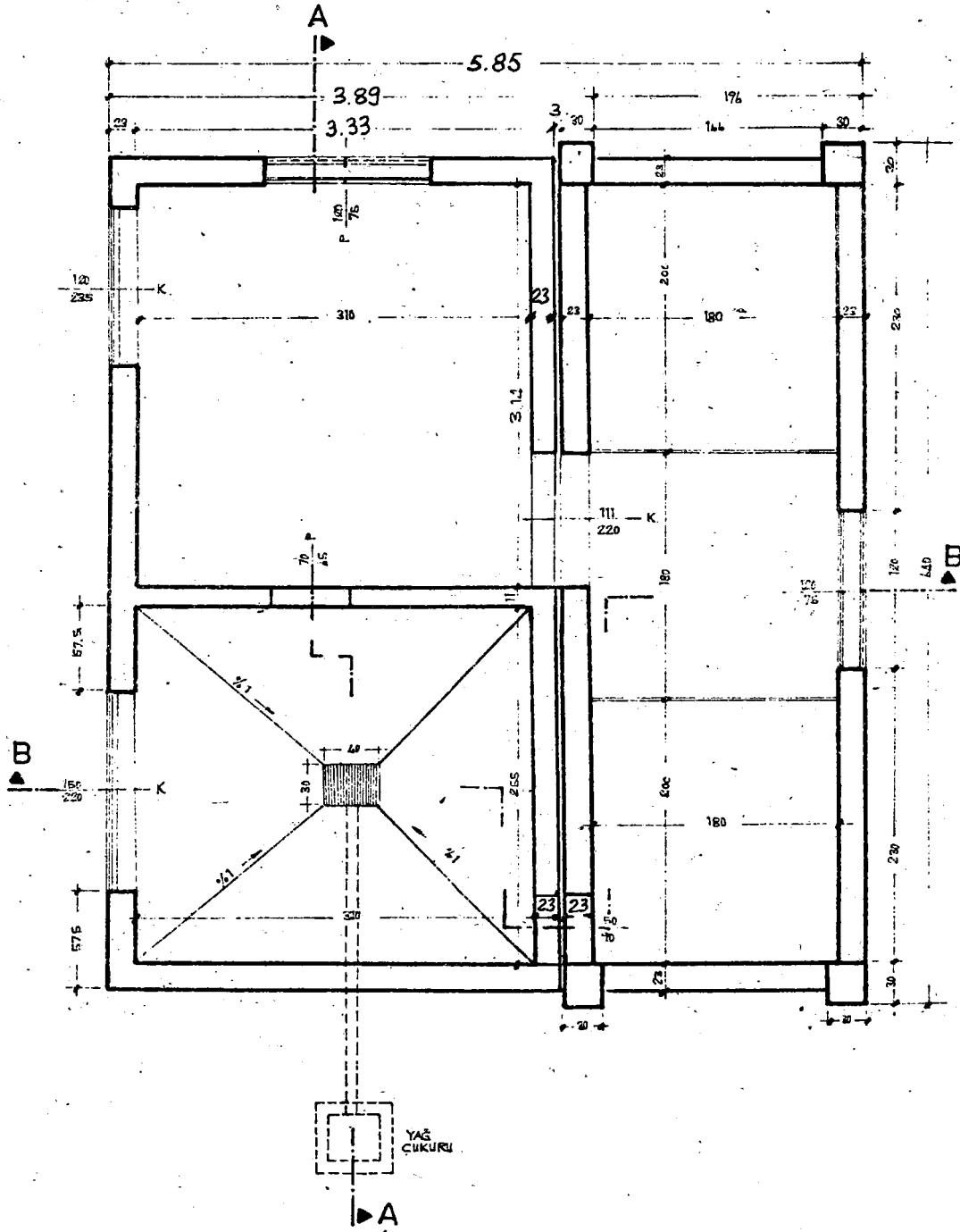
B - B, KESİTİ



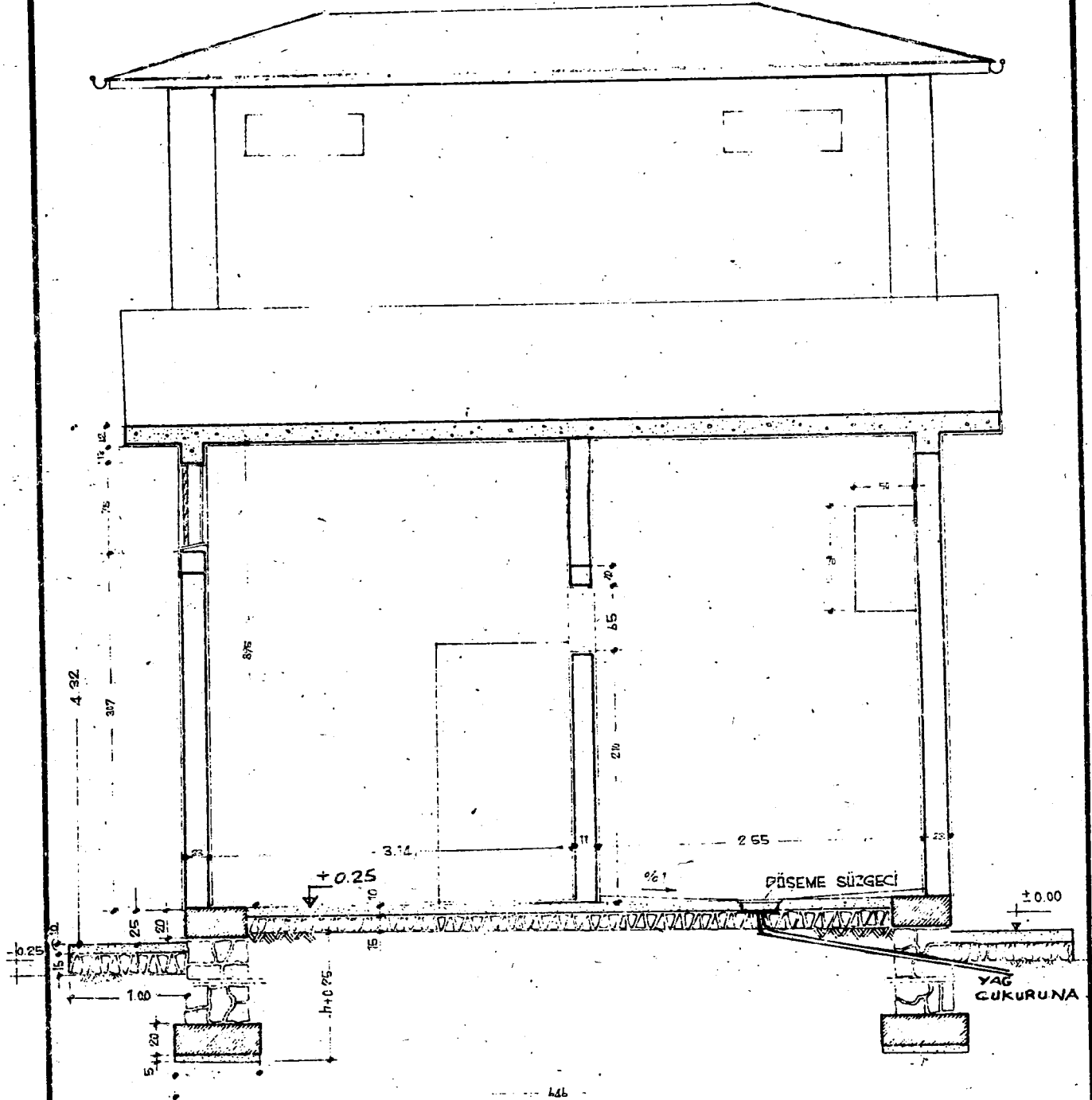
C - C KESİTİ

72
54

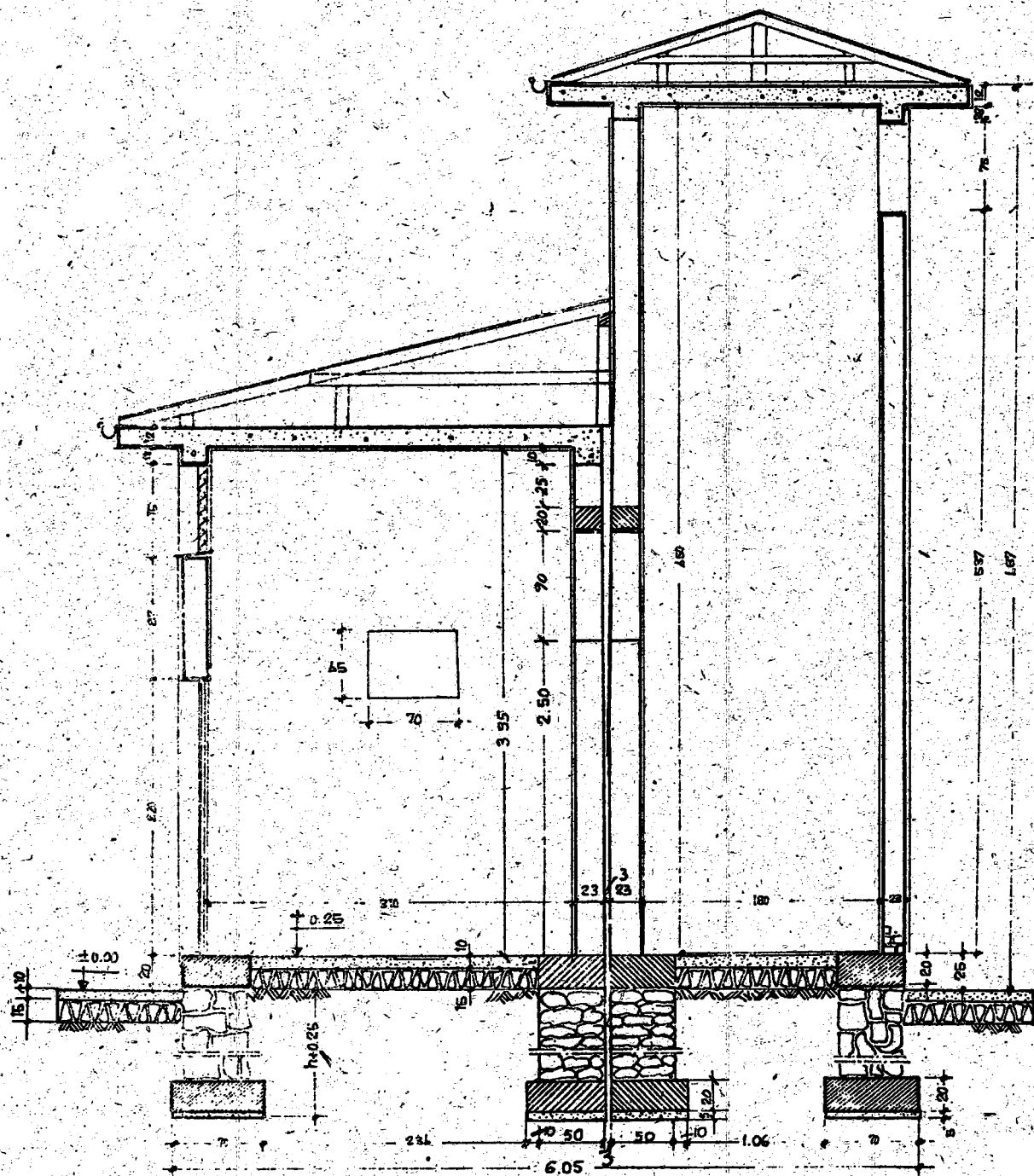
DÖŞEMELİK		TARİH	İMZA
2)		16.7.975	
51			
6.3 - 15 - 34.5' W 2 HÜCRELİ KULE ÇIKIŞI TİP TRANSFORMATÖR BİNASI MİMÂRİ PROJESİ		ÖLÇEK 1/50	
		NO.LU PLÂN İPTÂL EDİLDİ	
		NO.LU PLÂN İPTÂL EDİLDİ	
PROJEYİ YAPANIN, DİPL. NO, ÜNVANI, ADI, SOYADI	İMZA	İMZA TARİHİ	PLÂN NO 114 _1/36
YÜK. İNŞ. MÜH. ÇETİN PEKİNER O.P.A. NO : 8730 - DİP. NO : 7153 TELEFON : 174701			ARŞİV KAYIT NO
ÇİZEN : 			



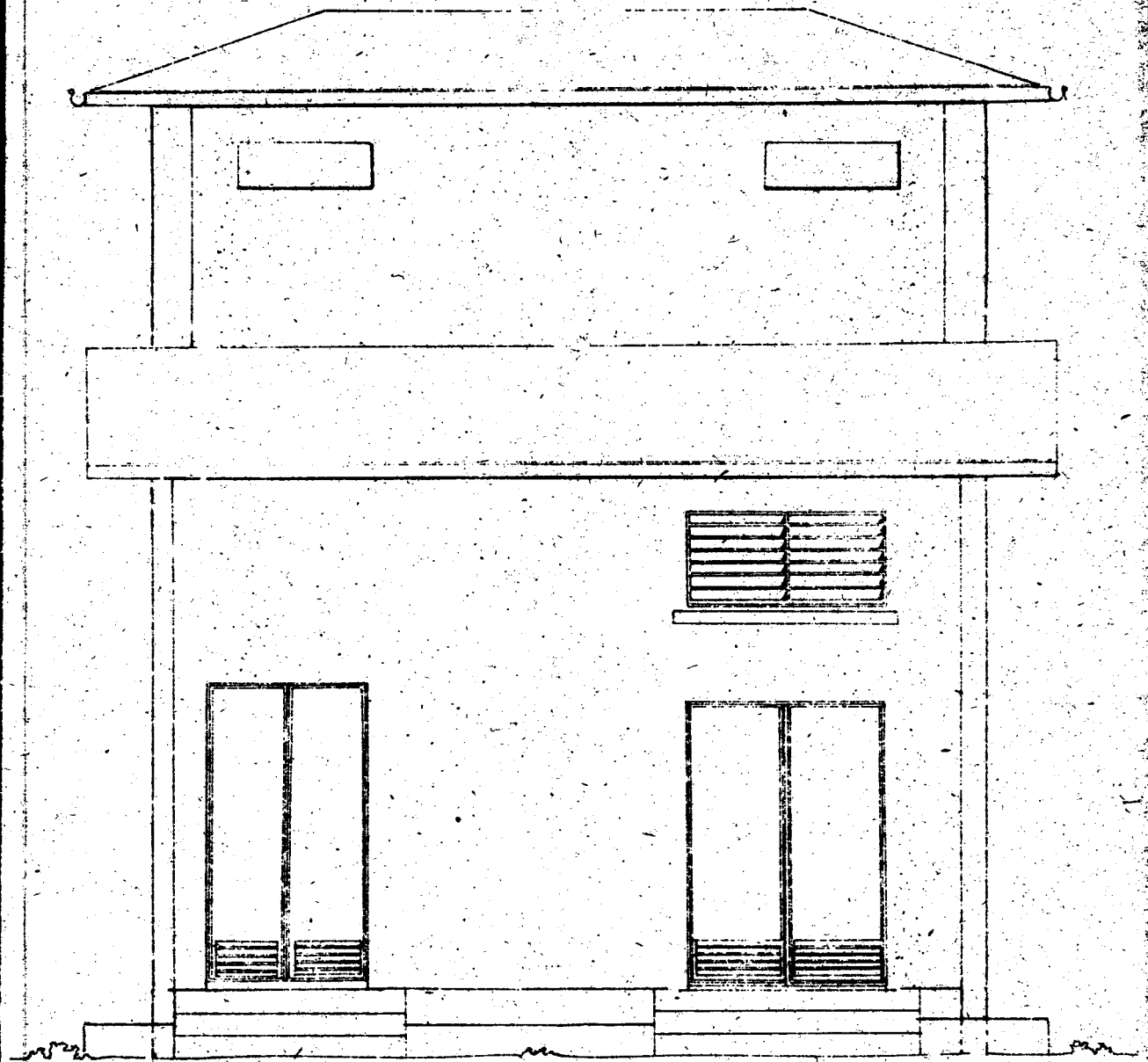
P.L.ÂN



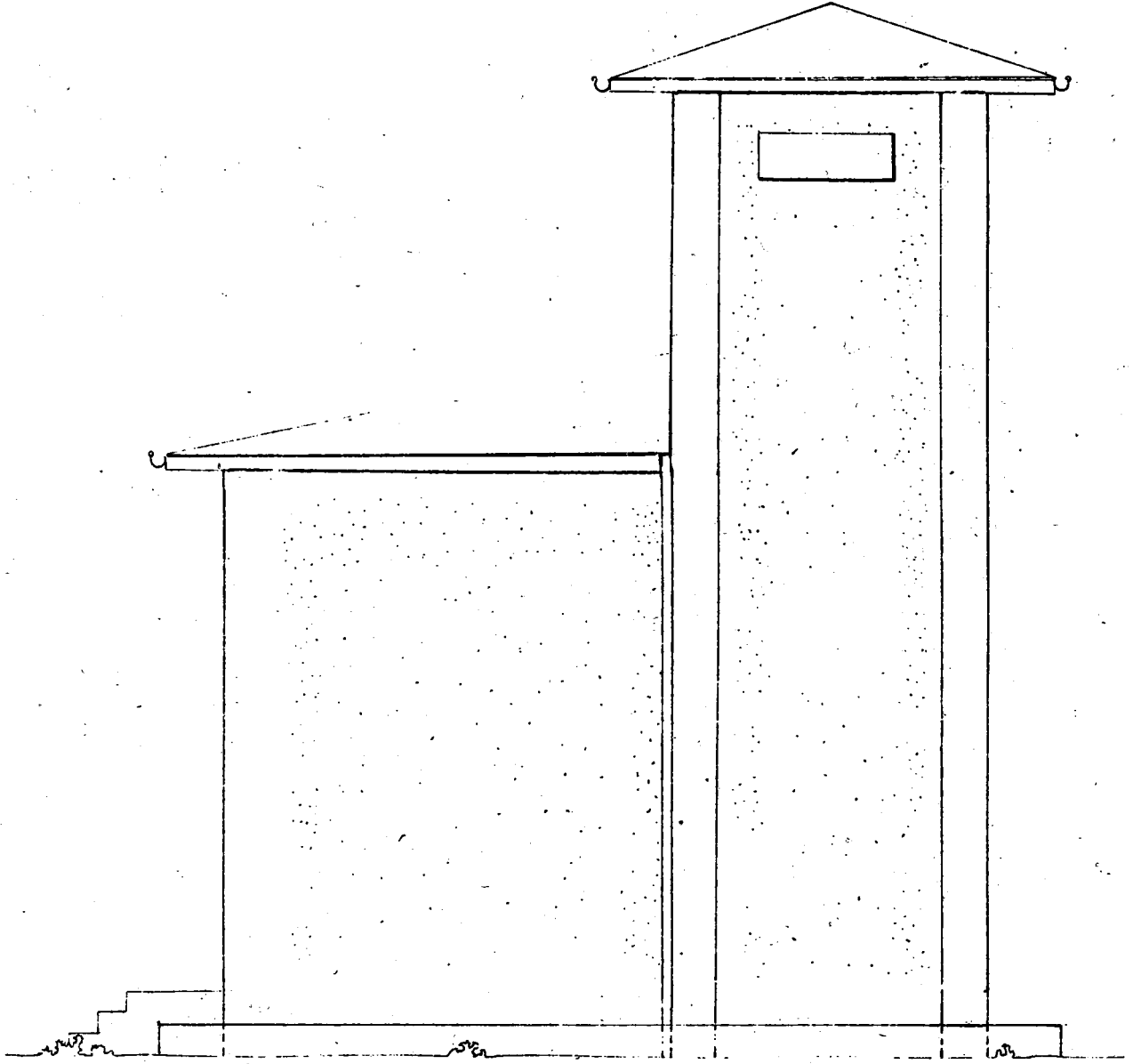
A-A KESİTİ



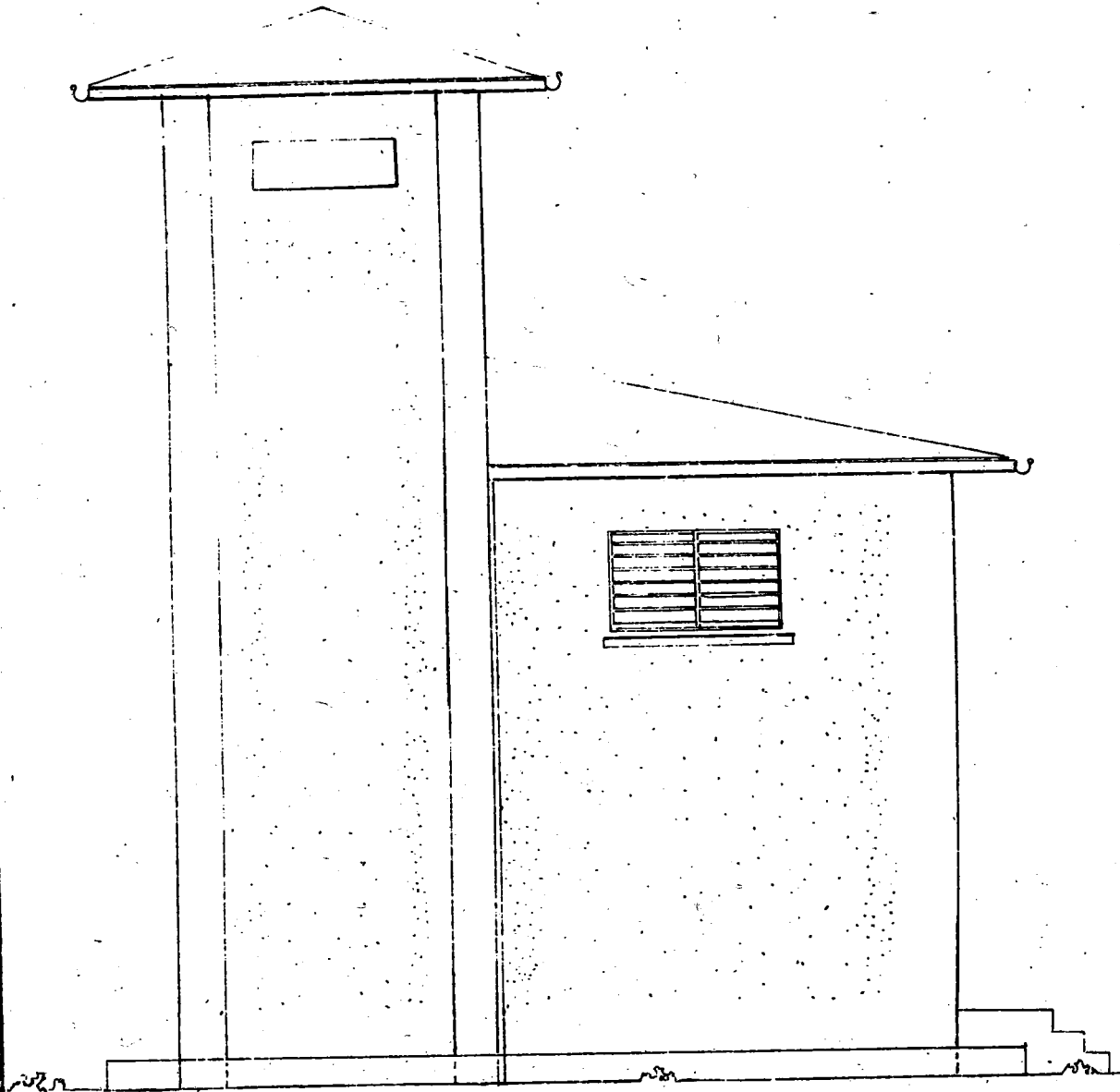
B-B KESİTİ



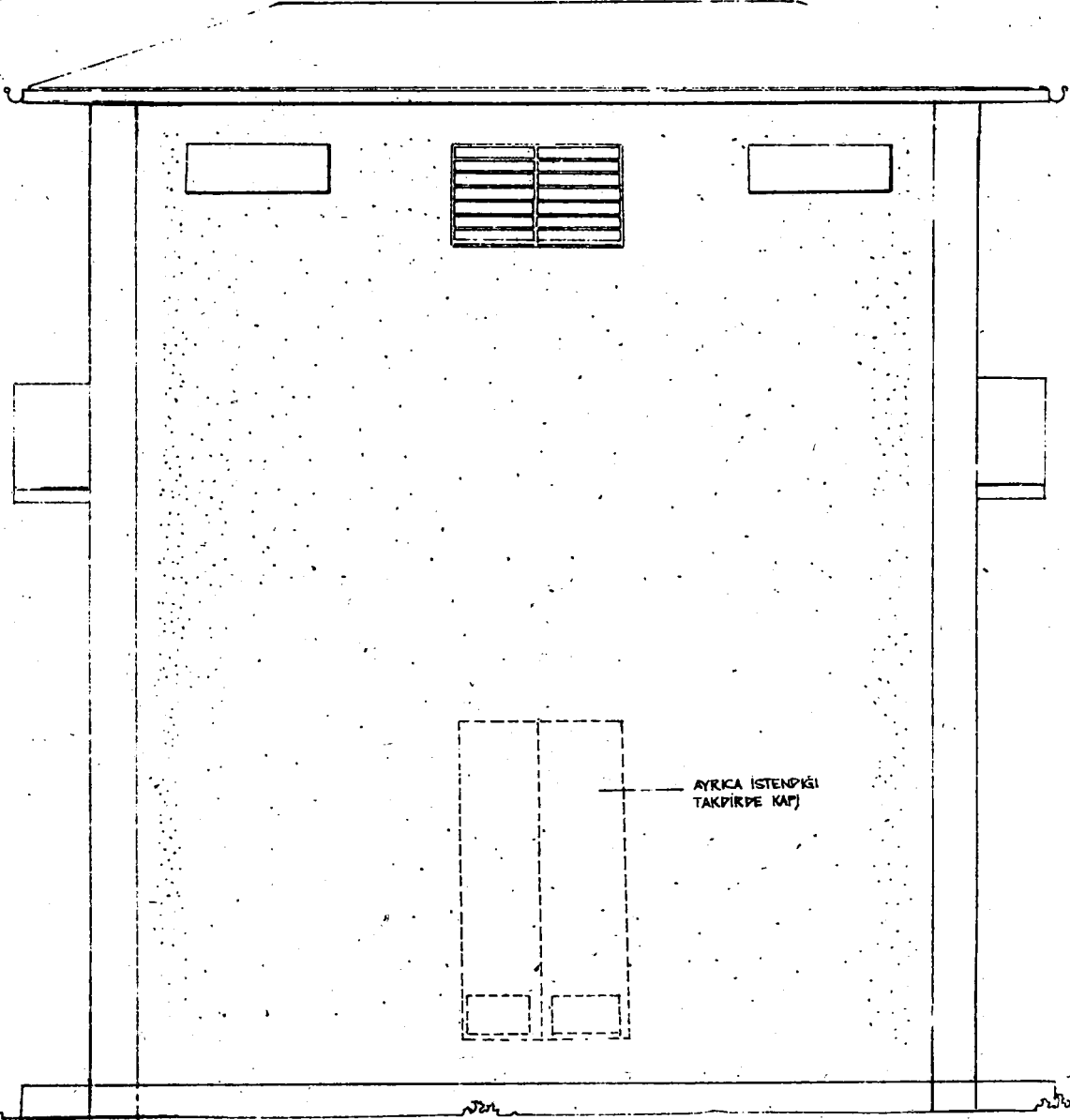
ÖN GÖRÜNÜŞ



SAĞ YAN CEPHE



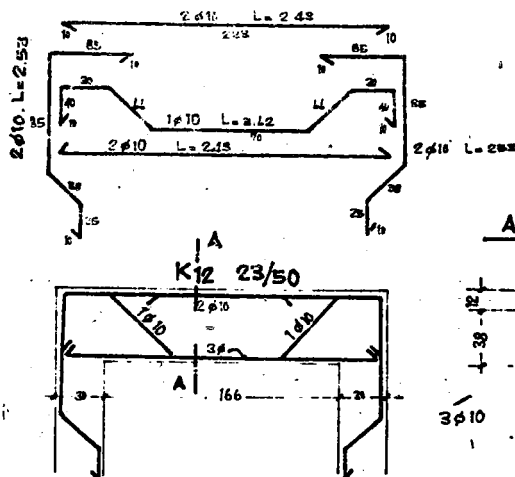
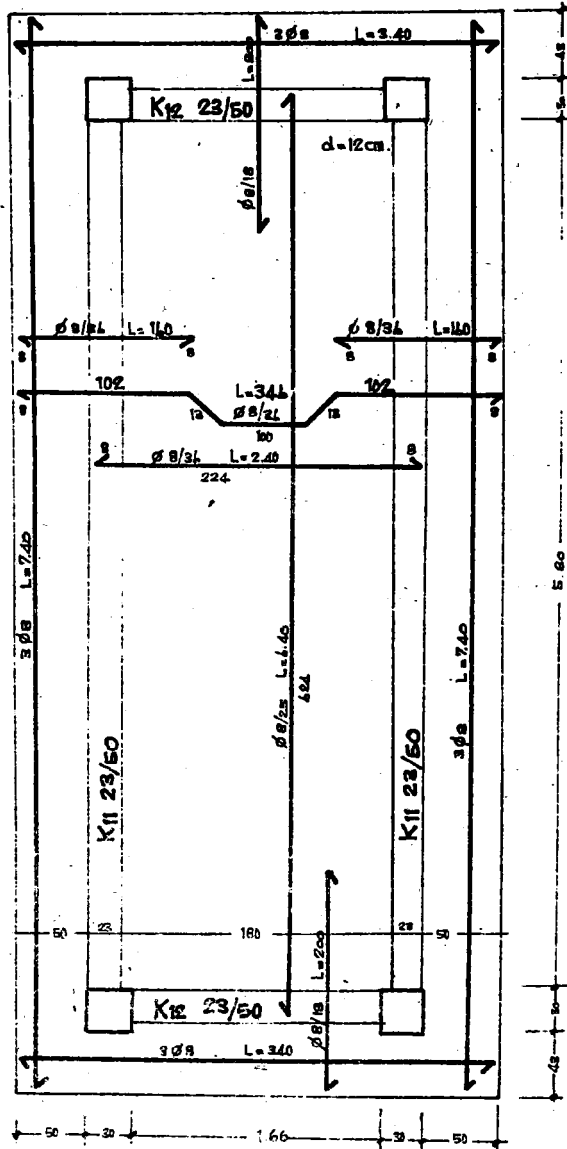
SOL YAN CEPHE



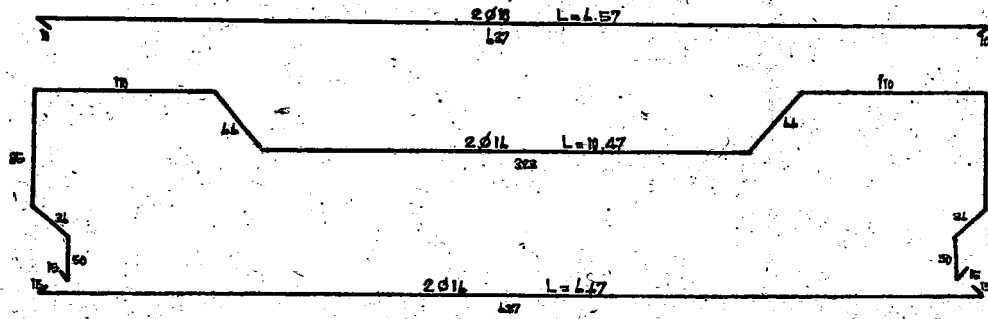
24.K
3

72
54

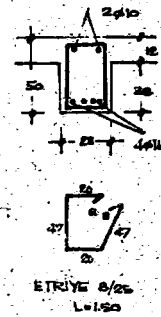
DEĞİŞİKLİK			TARİH.	İMZA
a)			16.7.975	
b)				
30 - 15 - 6,3 kV 2 HÜCRELİ KULE ÇIKISLI TRANSFORMATÖR BİNASI BETONARME RESİMLERİ			ÖLÇEK 1/50	
			NÖ. LÜ PLÂN İPTAL EDİLDİ	
			NÖ. LÜ PLÂN İPTAL EDİLDİ	
			PLÂN NO 114_1/37	
PROJEYİ YAPANIN DİP NO, UNVANI, ADI, SOYADI	İMZA	İMZA TARİHİ		ARŞİV KAYIT NO
YİK. İNŞ. MÜH. ÇETİN PEKİNER OP. NO: 5720 - DİP. NO: 475 TEL: 174701				
ÇİZEN: SAVAS BAYIR.				



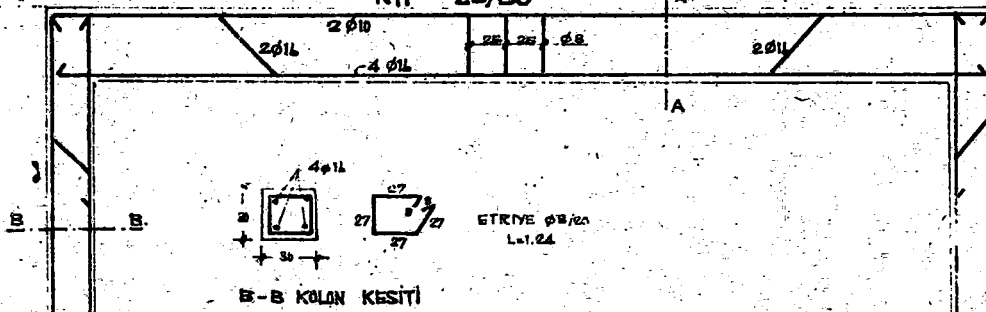
ETRİYE $\phi 8/25$
 L=150mm



A-A KESİTİ



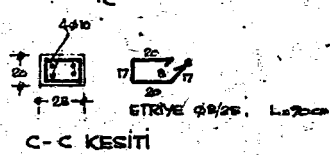
K11 23/50



B-B KOLON KESİTİ



TUĞLA DİVAR ARA HATLI 23/20 2500x B.A.



C-C KESİTİ



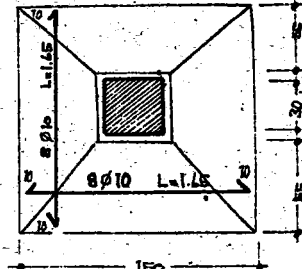
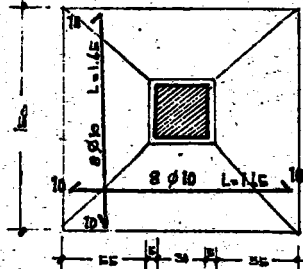
D-D SUBAŞMAN HATLI KESİTİ

SUBAŞMAN HATLI 50/20 2500x B.A.

SIKİSTIRILMIŞ
TOPRAK DOLGU

BLOKAT
2000x BETON

NOT : h(100) m.den AZ OLMAMAK ÜZERE
MAHALLİNDE KONTROLLÜKÇA TESPİT
EDİLECEKTİR



A-A KESİTİ

Technical drawing showing two cross-sections of a wall, labeled A-A KESİTİ.

The left section shows a wall with dimensions 23x23 cm at the top, 4φ10 reinforcement bars, and a base with 6φ10 reinforcement bars. The right section shows a similar wall with dimensions 23x23 cm at the top, 4φ10 reinforcement bars, and a base with 6φ10 reinforcement bars.

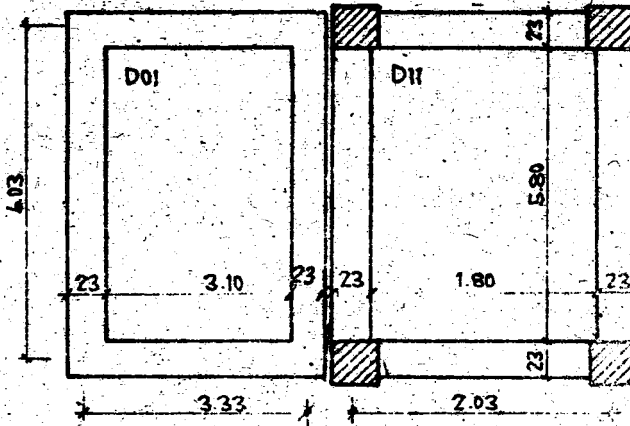
Both sections show a concrete core (BLOKAT) and a surrounding concrete layer (BETON).

Annotations include:

- ETRİYE φ8/25 L=1.80m
- 150 DOZ GÖBETON
- 300 DZ. B.A. BETONU
- BLOKAT
- BETON
- ±0.00
- +0.25
- 10
- 15
- 1.00
- 50
- 70
- 20
- 150 DZ. GÖBETON
- 300 DZ. B.A. BETONU
- ETRİYE φ8/25 L=1.80m

30-6.3-15-2 HÜCRELİ ÇIKIŞLAR KULELİ

TRANSFORMATÖR BİNASI BETONARME HESAPLARI



malzeme St1 B140

$$\text{Yük Döşeme zarfı} = 0.12 \times 2.4 = 0.288 \text{ t/m}^2$$

$$\text{Siv.} = 0.057$$

$$\text{çatı} = 0.100$$

$$\text{kar} = 0.075$$

$$q = q = 0.520 \text{ t/m}^2$$

D01 DÖŞEMESİ:

$$\epsilon = \frac{4.03}{3.33} = 1.81 \text{ tek doğrultuda}$$

$$M = \frac{0.520 \times 3.33^2}{8} = 0.72 \text{ tm} \quad h = 10 \text{ cm}$$

$$C_b = 48 \text{ Kg/cm}^2 \quad f_{cs} = 5.30 \text{ cm}^2$$

$$\text{donatı } 4/10/13^5 \text{ (10' 12' 13' 5')}$$

$$\text{diğer doğrultu terzi } 4/2/25$$

D11 DÖŞEMESİ:

$$\epsilon = \frac{4.03}{2.03} = 2.97 \text{ tek doğrultuda}$$

$$h = 10 \text{ cm} \quad C_b = 27 \text{ Kg/cm}^2 \quad f_{cs} = 2.09 \text{ cm}^2$$

$$M = \frac{0.520 \times 2.03^2}{8} = 0.27 \text{ tm}$$

$$\text{donatı } 4/8/18 \text{ (1plye düz)}$$

$$\text{diğer doğrultu terzi } 4/2/25$$

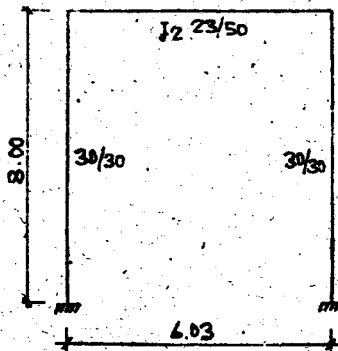
SACAK TAHKİKİ:

$$M = \frac{0.520 \times 0.62^2}{2} = 0.10 \text{ tm}$$

$$\text{donatı } 4/8/18$$

ÇERÇEVE HESABI:

Sistem her iki istikamette çerçeve olarak hesaplanacak.



$$\text{Kiriş atalet momenti } b = 2.25 \text{ m} \text{ ve } b_1 = 2.25 \times 12 + 23 = 50 \text{ cm}$$

$$\frac{b_0}{b} = \frac{23}{50} = 0.46$$

$$\frac{d}{d_0} = \frac{12}{50} = 0.24$$

$$M = 1.87 \quad I_2 = \frac{50 \times 50^3}{1.87} = 33.42 \text{ dm}^4$$

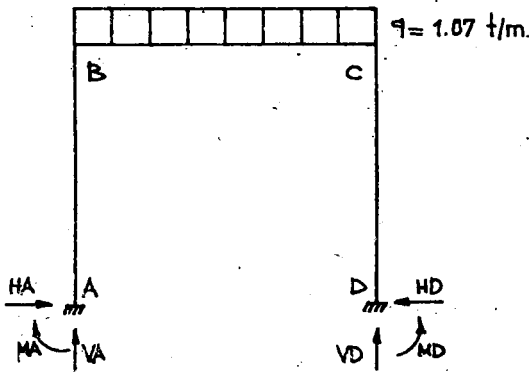
$$I_1 = \frac{3.0^4}{12} = 6.75 \text{ dm}^4$$

$$K = \frac{I_2}{I_1} \cdot \frac{h}{l} = \frac{33.42}{6.75} \cdot \frac{8.00}{6.03} = 6.6$$

$$N_1 = 6.6 + 2.0 = 8.6$$

$$N_2 = 6 \times 6.6 + 1 = 40.6$$

ZATİ YÜK :



$$\text{Yük : döşemeden} = 0.5 \times 0.520 \times 2.03 = 0.530 \text{ t/m.}$$

$$\text{Sıcaktan} = 0.50 \times 0.520 = 0.260$$

$$\text{Kiriş zati} = 0.23 \times 0.50 \times 2.4 = 0.280$$

$$q = 1.07 \text{ t/m.}$$

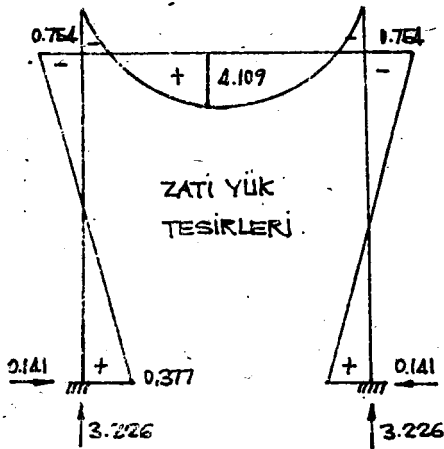
$$M_A = M_D = \frac{1.07 \times 6.03^2}{12 \times 8.6} = 0.377 \text{ tm.}$$

$$M_B = M_C = \frac{1.07 \times 6.03^2}{6.86} = 0.754 \text{ tm.}$$

$$M_{\max} M = \frac{1.07 \times 6.03^2}{8} - 0.754 = 4.109 \text{ tm.}$$

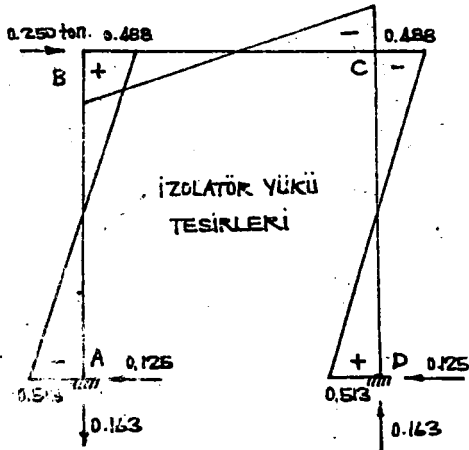
$$V_A = V_D = \frac{1.07 \times 6.03}{2} = 3.226 \text{ ton.}$$

$$H_A = H_D = \frac{3 \times 0.377}{8.00} = 0.141 \text{ ton.}$$



İZOLATÖR YÜKÜ :

$$P = 0.250 \text{ ton.}$$



$$\begin{aligned} M_A &= - \\ M_D &= + \end{aligned} = \frac{0.25 \times 8.00}{2} \times \frac{1+3 \times 6.6}{40.6} = \begin{aligned} &-0.513 \\ &+0.513 \end{aligned}$$

$$\begin{aligned} M_B &= + \\ M_C &= - \end{aligned} = \frac{0.25 \times 8.00}{2} \times \frac{3 \times 6.6}{40.6} = \begin{aligned} &+0.488 \\ &-0.488 \end{aligned}$$

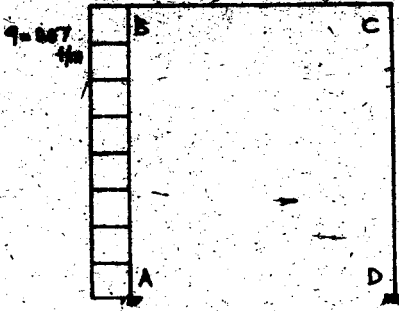
$$V_A = V_D = \frac{2 \times 0.488}{6.03} = 0.163$$

$$H_A = H_D = \frac{0.250}{2} = 0.125$$

TAM RÜZGÂR :

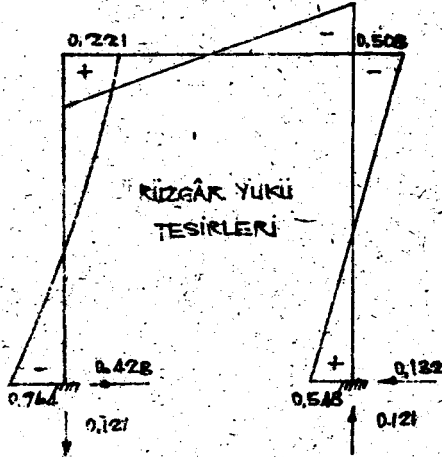
$$\text{RÜZGÂR YÜKÜ : } W = 1.2 \times 50 = 60 \text{ kg/m}^2$$

$$Q = 60 \times \frac{2.26}{2} \approx 70 \text{ kg/m.}$$



$$\begin{aligned} M_A &= \frac{0.07 \times 8.0^2}{4} \left(-\frac{3+6.6}{4 \times 8.6} + \frac{1+2 \times 6.6}{40.6} \right) = -0.764 \text{ tm} \\ M_D &= \frac{0.07 \times 8.0^2}{4} \left(-\frac{3+6.6}{4 \times 8.6} + \frac{1+2 \times 6.6}{40.6} \right) = +0.548 \text{ tm} \end{aligned}$$

$$\begin{aligned} M_B &= \frac{0.07 \times 8.0^2}{4} \left(-\frac{6.6}{4 \times 8.6} + \frac{2 \times 6.6}{40.6} \right) = +0.221 \text{ tm} \\ M_C &= \frac{0.07 \times 8.0^2}{4} \left(-\frac{6.6}{4 \times 8.6} + \frac{2 \times 6.6}{40.6} \right) = -0.508 \text{ tm} \end{aligned}$$



$$V_A = V_D = \frac{0.07 \times 6.6 \times 8.0^2}{4.03 \times 40.6} = 0.121 \text{ tm}$$

$$H_D = \frac{0.07 \times 8.00 (3+2 \times 6.6)}{8 \times 8.6} = 0.132 \text{ tm}$$

$$H_A = -(0.07 \times 8.00 - 0.132) = -0.428 \text{ tm}$$

KII CERÇEVE KIRIŞ HESABI:

$$G_b/G_c = 50/1400$$

$$M_{max} = 410.9 \text{ tcm}$$

$$\eta = \frac{d}{h} = \frac{12}{47} = 0.26$$

$$i_3 = 0.777 \quad i_6 = 1.37$$

$$b = \frac{1.37 \times 410.9}{47^2} = 25.5 \text{ cm} < b_{max} = 4.5 \times 12 + 23 = 77 \text{ cm}$$

$$f_e = \frac{0.777 \times 410.9}{47} = 6.97 \text{ cm}^2$$

donatı üstte 2 ϕ 10

altta 4 ϕ 16 (2 ϕ 11ye)

MESNET TAHKİKİ:

$$X_{max} = -75.4 - 48.8 - 50.8 = -175 \text{ tcm}$$

$$K_2 = 47 \sqrt{\frac{23}{175}} = 17.4 \rightarrow C_b = 30 \text{ Kg/cm}^2 \quad K_3 = 0.777$$

$$f_e = \frac{0.777 \times 175}{47} = 2.9 \text{ cm}^2$$

Donatı mevcut 2 ϕ 10+2 ϕ 16 (5.60 cm²)
Kati ilave istemez

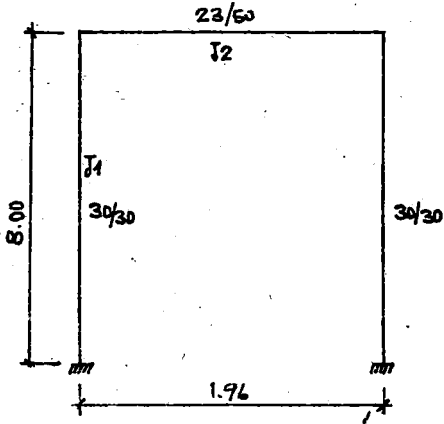
KAYMA TAHKİKİ:

$$C_0 = \frac{350}{23 \times 43} = 3.55 \text{ Kg/cm}^2 < C_{adm} = 6 \text{ Kg/cm}^2$$

etr. ϕ 8/25

$$Z = k_z \cdot h = 0.919 \times 47 = 43$$

K12 KIRIŞI ÇERÇEVESİ:



$$b = 2.25 \times 12 + 23 = 50 \text{ cm.}$$

$$\frac{b_0}{b} = \frac{23}{50} = 0.46$$

$$J_2 = \frac{5 \times 5^3}{18.7} = 33.42 \text{ dm}^4$$

$$\frac{d}{d_0} = \frac{12}{50} = 0.24$$

$\mu = 18.7$

$$J_1 = \frac{3^4}{12} = 6.75 \text{ dm}^4$$

$$N_1 = 20 + 2 = 22$$

$$K = \frac{33.42}{6.75} \cdot \frac{8.00}{1.96} = 20$$

$$N_2 = 6 \times 20 + 1 = 121$$

ZATI YÜK:

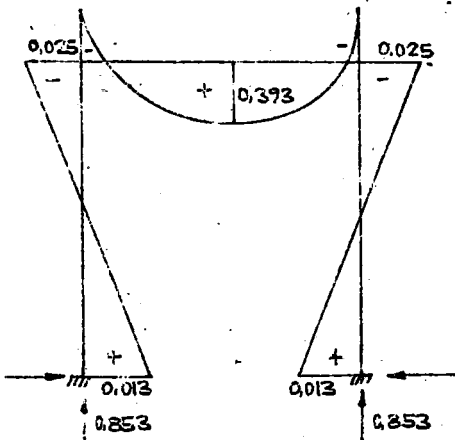


$$\text{Yük: döşemeden} = 0.315 \times 0.520 \times 2.03 = 0.33$$

$$\text{sacaktan} = 0.50 \times 0.520 = 0.26$$

$$\text{Kiriş zati} = 0.23 \times 0.50 \times 2.4 = 0.28$$

$$q = 0.87 \text{ t/m.}$$



$$M_A = M_D = \frac{0.87 \times 1.96^2}{12 \times 22} = 0.013 \text{ t.m.}$$

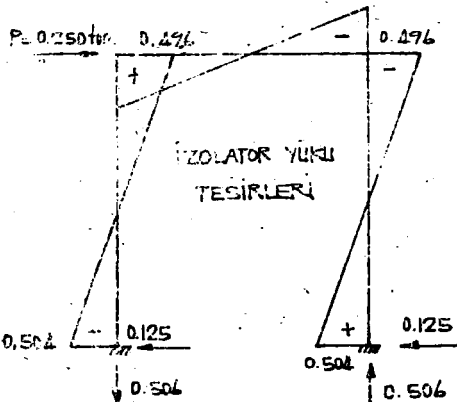
$$M_B = M_C = -\frac{0.87 \times 1.96^2}{4 \times 22} = -0.025 \text{ t.m.}$$

$$V_A = V_D = \frac{0.87 \times 1.96}{2} = 0.853 \text{ ton.}$$

$$\text{Max } M = \frac{0.87 \times 1.96}{8} - 0.025 = 0.393 \text{ t.m.}$$

İZOLATOR YÜKÜ:

$$P = 0.250 \text{ ton.}$$

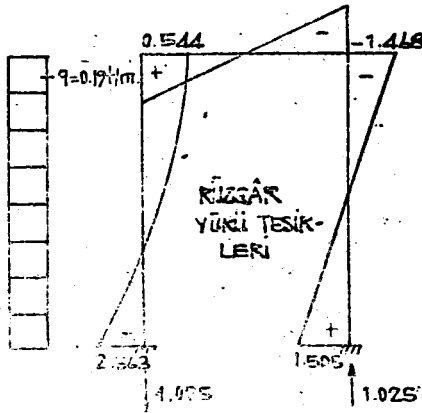


$$\begin{aligned} M_A &= \frac{0.25 \times 8}{2} \cdot \frac{1 + 3 \times 20}{121} = -0.504 \text{ t.m.} \\ M_D &= \frac{0.25 \times 8}{2} \cdot \frac{1 + 3 \times 20}{121} = +0.504 \text{ t.m.} \end{aligned}$$

$$\begin{aligned} M_B &= \frac{0.25 \times 8}{2} \cdot \frac{3 \times 20}{121} = +0.496 \text{ t.m.} \\ M_C &= \frac{0.25 \times 8}{2} \cdot \frac{3 \times 20}{121} = -0.496 \text{ t.m.} \end{aligned}$$

$$V_A = -V_D = \frac{2 \times 0.496}{1.96} = 0.506 \text{ ton}$$

RÜZGÂR YÜKÜ:



$$W = 1.2 \times 50 = 60 \text{ kg/cm}^2$$

$$q = 60 \times \frac{6.26}{2} = 0.170 \text{ t/m}$$

$$\begin{aligned} M_A &= \frac{0.17 \times 8.0^2}{4} \left(-\frac{3+20}{4 \times 22} + \frac{1+4 \times 20}{121} \right) = -2.563 \\ M_D &= \frac{0.17 \times 8.0^2}{4} \left(-\frac{3+20}{4 \times 22} + \frac{1+4 \times 20}{121} \right) = +1.505 \end{aligned}$$

$$\begin{aligned} M_B &= \frac{0.17 \times 8.0^2}{4} \left(-\frac{20}{6 \times 22} + \frac{2 \times 20}{121} \right) = +0.544 \\ M_C &= \frac{0.17 \times 8.0^2}{4} \left(-\frac{20}{6 \times 22} + \frac{2 \times 20}{121} \right) = -1.468 \end{aligned}$$

$$V_A = -V_D = \frac{0.17 \times 20 \times 8^2}{1.96 \times 121} = 1.025$$

KÖR İÇİSİ DONATI HESABI:

Alan = 39.5 ton.

$$F = \frac{2777 \times 39.5}{4} = 0.46 \text{ cm}^2$$

min. teçhizat üstte 2φ10
Altta 3φ10 (1Piliye)

MOMENT ZARFI:

$$X = -2.5 - 47.6 - 146.8 = -196.9 \text{ tcm.}$$

$$K_1 = 47 \sqrt{\frac{21}{10.5}} = 1.5 \rightarrow C_3 = 32 \text{ kg/cm}^2 \quad K_3 = 0.781$$

$$F_e = \frac{9531 \times 10^4}{17} = 560 \text{ cm}^2$$

$$\begin{aligned} \text{Mevcut } 2\phi 10 + 1\phi 10 &= 2.36 \text{ cm}^2 \\ \text{İlave } 2\phi 10 &= 1.57 \text{ cm}^2 \\ \hline &= 3.93 \text{ cm}^2 \end{aligned}$$

MESNETİ:

$$X = +24.4 + 47.6 - 2.5 = 70.5$$

$$F_e = \frac{9531 \times 10^4}{17} = 560 \text{ cm}^2$$

$$\begin{aligned} \text{Mevcut } 3\phi 10 &= 2.36 \\ \text{İlave } 2\phi 10 &= 1.57 \\ \hline &= 3.93 \text{ cm}^2 \end{aligned}$$

KÖR HESABI:

$$K_1 \text{ Zati} = 3.224 + 0.253 = 4.077 \text{ ton}$$

$$M_{\text{zati}} = 0.377 \text{ tcm.} \quad M_y = 0.013$$

$$K_1 \text{ izol.} = 0.113 + 0.506 = 0.619 \text{ ton}$$

$$M_{\text{izol.}} = 0.513 \text{ ton} \quad M_y = 0.504$$

$$K_1 \text{ rüzg.} = 1.025 \text{ ton}$$

$$M_{\text{rüzg.}} = 1.505 \text{ ton} \quad M_y = 1.505$$

$$K_1 \text{ izol.} = (0.30^2 \times 8.00) \times 2.4 = 1.728 \text{ ton}$$

$$M_{\text{max}} = 0.87 \text{ tcm.} \quad M_{y \text{ max}} = 2.022$$

$$N = 7.501 \text{ ton.}$$

$$C_0 = \frac{7.501}{30 \times 30} = 8.33 \text{ kg/cm}^2$$

$$\gamma = \frac{0.87}{7.50 \times 0.30} + \frac{2.022}{7.50 \times 0.30} = 1.30 \rightarrow \mu = \mu_0 = 0.004$$

$$F_e = F_e' = 0.004 \times 30 \times 30 = 3.6 \text{ cm}^2 \rightarrow F_e + F_e' = 2 \times 3.6$$

$$\text{donatı } 4\phi 16 (8.04 \text{ cm}^2) = 7.20 \text{ cm}^2$$

$$\text{İçer. } 4\phi 20$$

FLANBAT TAHKIKI:

$$g = \frac{800}{30} = 27 \rightarrow w = 1.48$$

$$P_{em} = \frac{(K_b \cdot F_b + C_s \cdot F_e)}{3w}$$

$$K_b = 144$$

$$F_b = 30 \times 30 = 900 \text{ cm}^2$$

$$C_s = 2400$$

$$F_e = 8.04 \text{ cm}^2$$

$$P_{em} = \frac{144 \times 900 + 2400 \times 8.04}{3 \times 1.48} = 33.535 \text{ ton} > N = 7.501 \text{ ton}$$

TEMEL HESABI:

$$N = 11.53 \text{ ton}$$

$$M = 2.94 \text{ ton}$$

$$C_{zem} = 15 \text{ t/m}^2$$

$$c = \frac{M}{N} = \frac{2.022}{7.50} = 0.27 \text{ cm}$$

$$C_3 = \frac{7.00}{1.50 \times 1.50} \left(17 - \frac{6 \times 0.25}{1.50} \right) = \begin{cases} 1.48 \text{ t/m}^2 \\ 0.00 \end{cases}$$

$$C_3' = (15 - 2) \times 1.00 = 13 \text{ t/m}^2 > 1.48$$

$$M_1 = \frac{1}{2} \times 4.01 \times 0.40 \times \frac{0.40}{3} + \frac{1}{2} \times 1.48 \times 0.40 \times \frac{2}{3} \times 0.40 = 1.04 \text{ t/m}$$

$$K_2 = 25 \sqrt{\frac{150}{104}} = 30$$

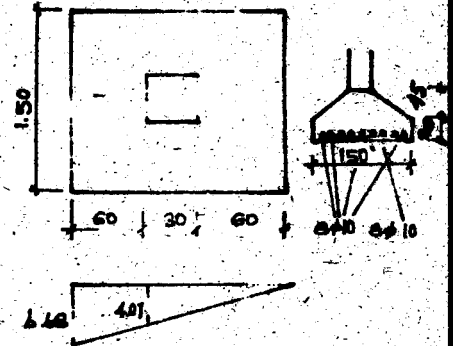
$$C_b = 16$$

$$K_3 = 0.751$$

$$f_e = \frac{0.751 \times 104}{25} = 3.12 \text{ cm}^2$$

Donatı 8 ϕ 10

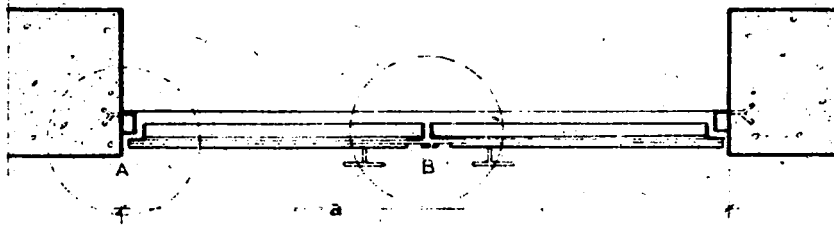
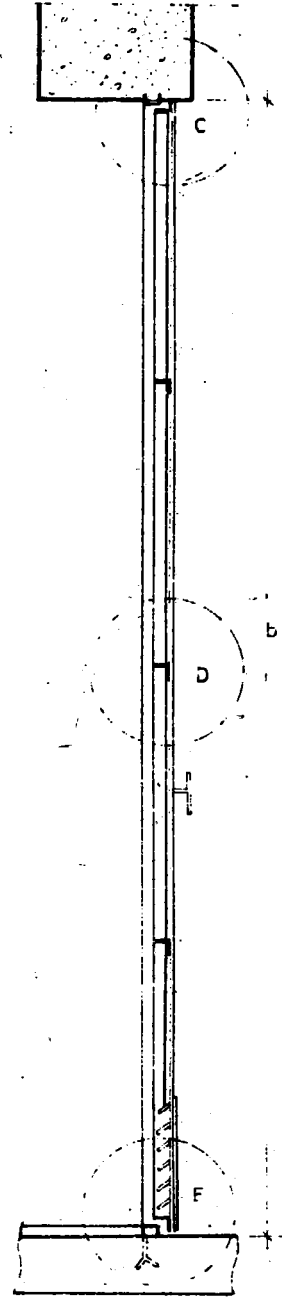
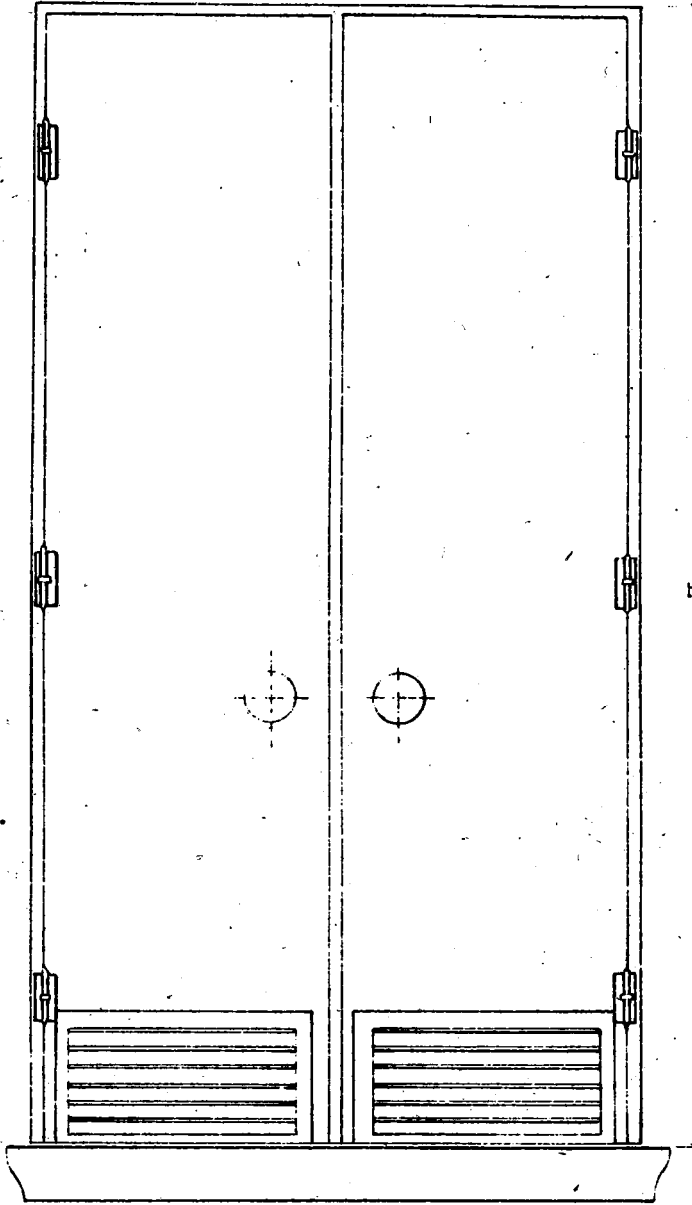
Heriki istikamette



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58

DEĞİŞİKLİK					
DEĞİŞİKLİK SEBEBİ					
DEĞİŞİKLİĞE AİT PROJEYİ YAPANIN	ADI VE SOYADI	UNVANI	ODA NO	TARİH	İMZA
TRAFO BİNALARI KAPI, PENCERE PANCUR, KABLO KANALI, TEL KAFES KAPI V.S DETAY PLÂNLARI					ÖLÇEK
					NOLU PLÂN İPTÂL EDİLDİ
					NOLU PLÂN İPTÂL EDİLDİ
PROJEYİ YAPAN	İMZA	İMZA TARİHİ	PLÂN NO:		
YÜK. MÜH. HÜSEYİN BODUR ODA NO: 343		8.10.1973	1/60		
ÇİZEN: İLKNUR ŞENİZ			ARŞİV KAYIT NO:		

0.50 m.²



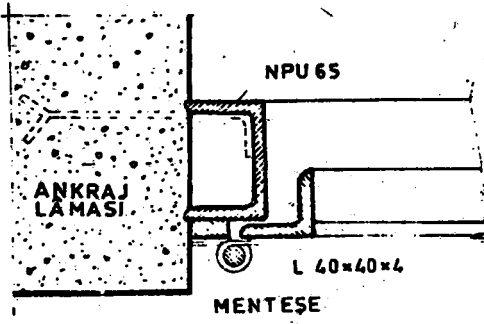
- SEBEKE TRAFÖ MERKEZLERİNDE VE TRAFÖ KAPISINDA
- SEBEKE TRAFÖLERİNDE VE GİRİŞ KAPISINDA
- İVİZİ MERKEZLERİNDE VE GİRİŞ KAPISINDA

(a) cm.

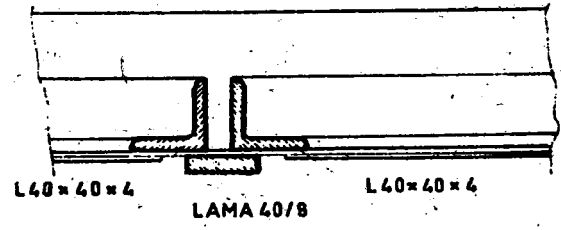
(b) cm.

TRAFÖ KAPI PLÂNI

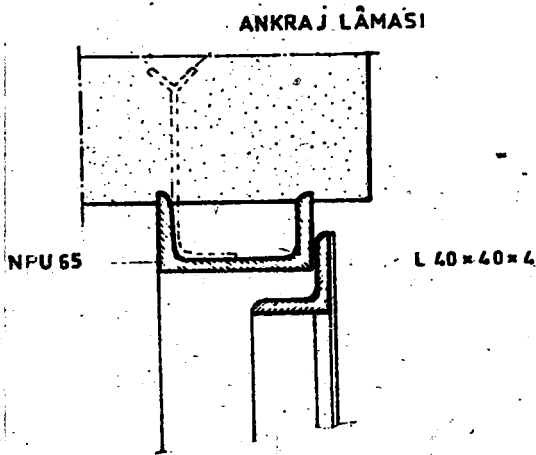
ÖLÇEK: 1/15



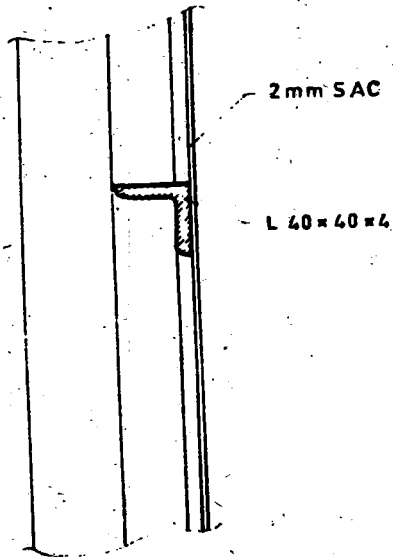
A DETAYI ÖLÇEK: 1/4



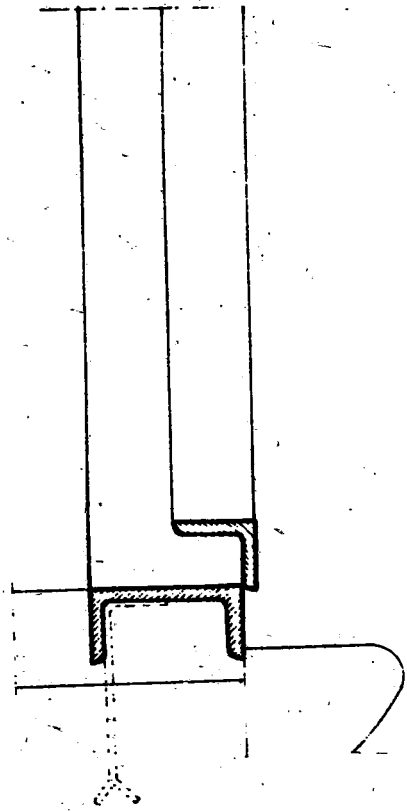
B DETAYI ÖLÇEK: 1/4



C DETAYI ÖLÇEK: 1/4



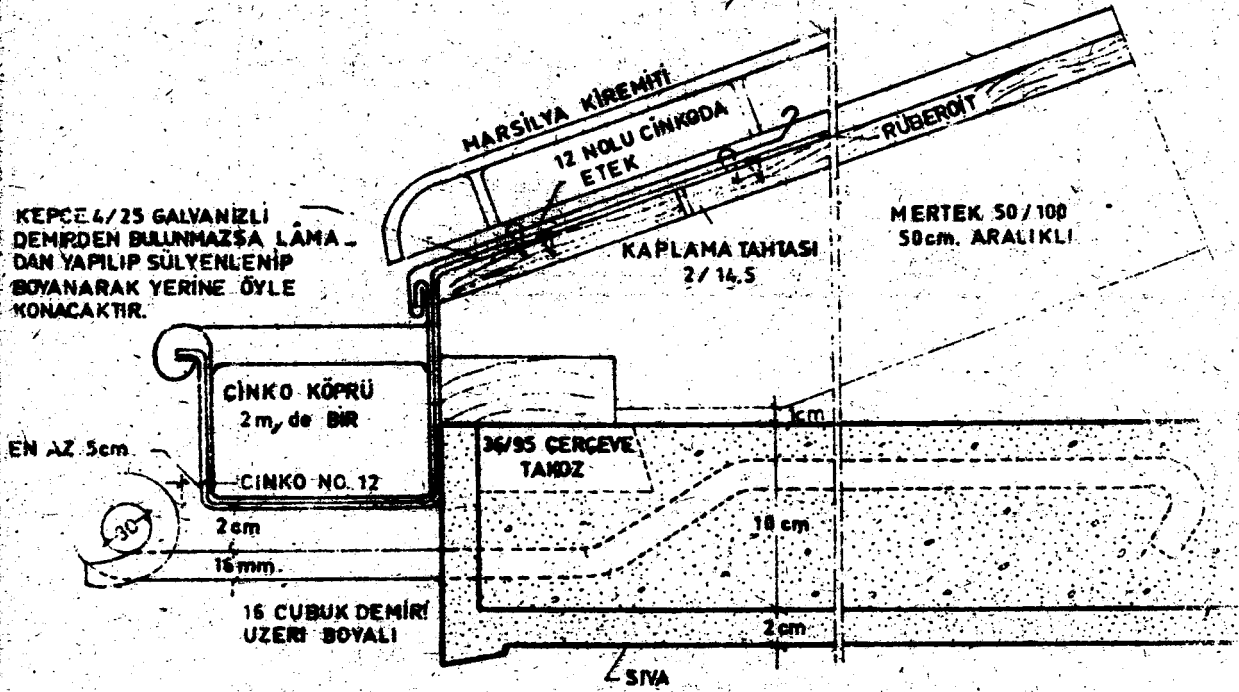
D DETAYI ÖLÇEK: 1/4



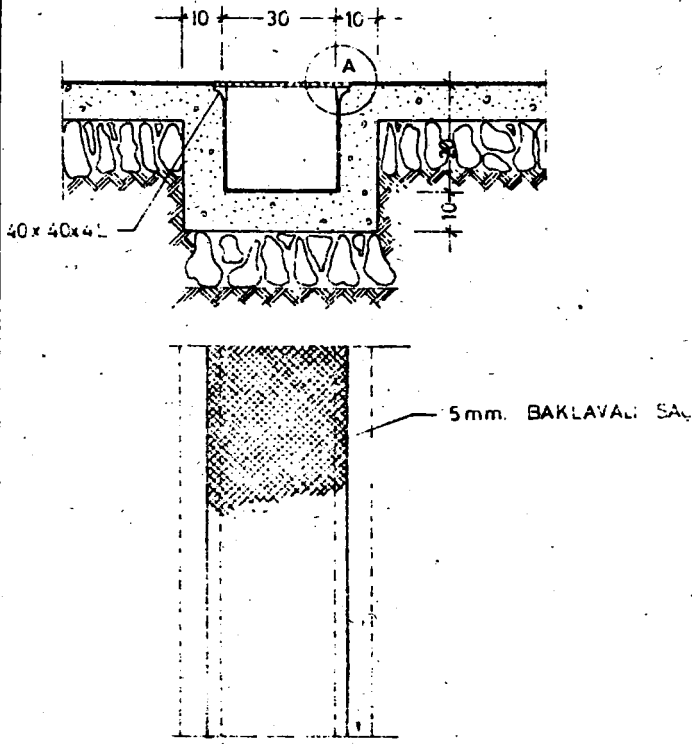
E DETAYI ÖLÇEK: 1/4

TRAFO KAPI DETAYLARI

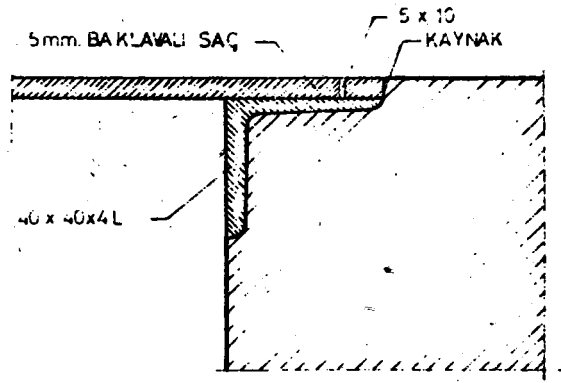
KEPCE 4/25 GALVANİZLİ
DEMİRDEN BULUNMAZSA LÂMA
DAN YAPILIP SÜLYENLENİP
BOYANARAK YERİNE ÖYLE
KONACAKTIR.



ÇATI DETAYI
ÖLÇEK: 1/4

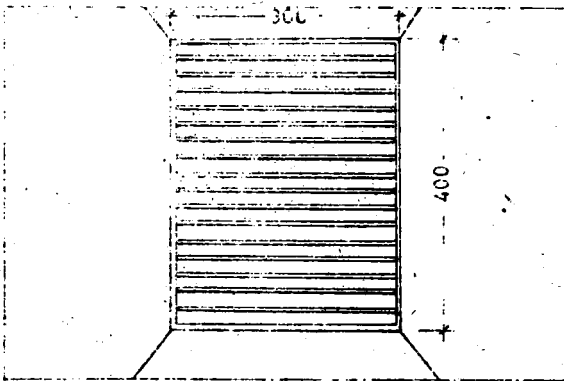
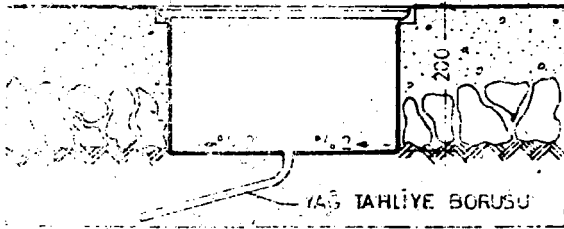


KABLO KANALI DETAYI

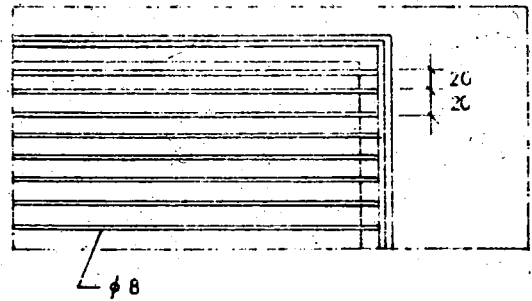
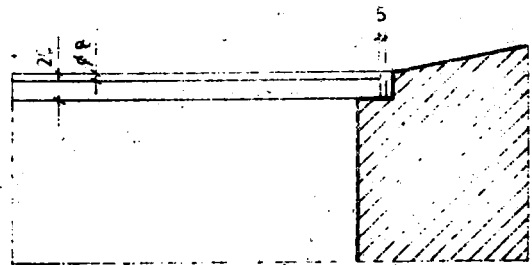


A DETAYI ÖLÇEK: 1/2,5

KABLO KANALI DETAYI



YAĞ ÇUKURU DETAYI ÖLÇEK: 1/10



IZGARA DETAYI ÖLÇEK: 1/5

YAĞ ÇUKURU DETAYI