

39545

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39545

**ÇOK KATLI BETONARME BİR YAPININ  
PROJELENDİRİLMESİ**

**YÜKSEK LİSANS TEZİ**  
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## ÖNSÖZ

Yüksek lisans tezi olarak sunulan bu çalışmada düşey ve yatay yükler altında bir yapının statik ve betonarme hesabı TS 500'e göre yapılarak, gerekli kalıp resimleri çizilmiş ve donatı detayları gösterilmiştir. Sistemin statik hesabı SAP90 (Yapı Analiz Programı) bilgisayar programıyla, betonarme hesabı ise tablo ve abaklardan faydalanılarak çözülmüştür.

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## NOTASYON LİSTESİ

A	: Alan
Ac	: Beton alanı
As	: Donatı alanı
bw	: Genişlik, tabla genişliği, kolon enkesiti küçük boyu
b	: Tablalı kirişlerde gövde genişliği
C	: Deprem katsayısı
Co	: Deprem blge katsayı
d	: Deplasman, yararlı yükseklik
E	: Elastisite modülü, deprem etkisi
G	: Kayma modülü
F	: Yapıya etkileyen yatay yük
Fa	: Zımbalama çerçevesi içersinde kalan yayılı yüklerinin toplamı
Fi	: i. kata etkileyen yatay yük
fcd	: Hesapta kullanılacak beton basınç dayanımı
fctd	: Hesapta kullanılacak beton çekme dayanımı
fyd	: Hesapta kullanılacak beton akma dayanımı
g	: Öz ağırlık, sabit yük
H	: Yapının toplam yüksekliği
h	: Kiriş yüksekliği, kat yüksekliği, kolon enkesitinin eğilme yönündeki boyu
hf	: Tabla kalınlığı
I	: Atalet momenti, yapı önem katsayısı
K	: Yapı tipi katsayısı, $K=bd^2/M$
Ko	: Zemin katsayısı
L	: Açıklık, eleman boyu
M	: Eğilme momenti
Md	: Hesapta kullanılacak eğilme momenti
m	: Döşemelerde uzun kenarın kısa kenara oranı
N	: Eksenel kuvvet
P	: Toplam yük

q : Hareketli yük  
S : Kolon yapı dinamik katsayısı  
T : Kesme kuvveti, yapı özel periyodu  
Up : Zımbalama çevresinin uzunluğu  
Vc : Beton tarafından taşınan kesme kuvveti  
Vcr : Eğik çatlamayı oluşturan kesme kuvveti  
Vpd : Hesapta kullanılacak zımbalama yükü  
Vpr : Zımbalamada kesitin taşıma gücü  
W : Toplam yapı ağırlığı, mukavemet momenti  
Wi : i katın ağırlığı  
 $\sigma_{zem}$  : Zemin emniyet gerilmesi  
 $\rho$  : Donatı oranı  
As : Donatı alanı

## ÖZET

Yüksek lisans tezi olarak sunulan bu çalışmada çok katlı betonarme bir yapının düşey ve yatay yükler altında statik ve betonarme hesabı yapılmıştır.

Yapının statik hesabında SAP90 (Yapı Analiz Programı) bilgisayar programı kullanılmıştır. Programın kapasitesinin sınırlı olmasından dolayı döşemeler düğüm noktası sayısına göre bölümlere ayrılarak hesaplanmıştır. Döşeme tipinin kirişsiz döşeme olmasından dolayı yaklaşık yöntemler kullanılmış ve kabuller yapılmıştır.

Yapı sistemi 4 normal kat ve 2 bodrum kattan oluşmuş altı katlı betonarme bir yapıdır. Yapının bodrum katlarının etrafı perde duvarlarla çevrilmiştir. Döşeme sistemi; kat yüksekliğinin sınırlı olmasından ve düz bir tavan istenmesinden dolayı kirişsiz döşeme uygun görülmüştür. Döşeme kalınlığı 20 cm olarak seçilmiştir. Normal kat yüksekliği 2,79 m dir.

Düşey yükler altında hesapta; sabit yükler 1.4 ve hareketli yükler 1.6 katsayısıyla arttırılmıştır. Yatay yük hesabında; yapının ağırlığı bulunmuş ve her kata gelen kuvvetler hesaplanmıştır. Kata gelen kuvvetler iki aksa paylaştırılmış ve depremin her iki doğrultusu içinde hesap yapılmıştır.

Düşey ve yatay yüklerden oluşan kesit tesirleri hesaplanmış, bunların süperpozisyonu sonucunda elde edilen en elverişsiz etkilere göre kesit hesapları yapılmıştır.

Yapının temel kısmında iki farklı tip temel uygulanmıştır. Perde duvarların altına perde altı temeli ve çekirdek, kolon ve iki büyük perdeyi içine alan bir radye temel düzenlenmiştir.

Radye plağın statik hesabı; kirişsiz döşemelere benzetilerek SAP 90 bilgisayar programıyla yapılmıştır.

## SUMMARY

### DESIGN OF MULTISTOREY REINFORCED CONCRETE BUILDING

In this thesis, the static and reinforced concrete calculation of a multistorey building under vertical and horizontal loads are made.

The static calculations are made by the use of computer software SAP90 (Static Analysis program). On the other hand the reinforced concrete design is achieved by using tables prepared to design all kinds of concrete structures.

The building designed has a reinforced concrete skeleton, four normal storey, and two basement storeys. First level of basement is partially surrounded by shear wall and the second level of basement is fully surrounded by shear walls from three sides. The second basement is designed as a car park, the other storeys are designed as offices. Above the basement, the normal storeys have cantilevers on three sides.

Building support system is composed of columns, 415 by 25 cm shear walls, a core in which elevator hall is located and slab without beam. The columns are not used in the middle of the slab, but they are used on the sides and at the beginning of consoles.

Because of the height of storeys is limited and a smooth ceiling is desired, slab without beam is thought to be the best choice. Measures chosen concerning the building are given below:

The thickness of the slab	: 20 cm
Height of normal storeys besides first floor	: 279 cm
Height of the first floor	: 387 cm
Height of the first basemnt	: 271 cm
Height of the second basement	: 320 cm

To compare with the computer results calculation of two axes which perpendicular to each other of the slab of a normal storey is done by equivalent frame method. For this purpose, assuming a beam which has the same rigidity with the slab between two columns, a frame composed of columns and equivalent beams is formed on the 4-4 axis.

The calculation of this frame is made by the help of the Hardy Cross-method for the loads on it. The loads



which are used in the solution of that frame, are calculated by the weights of equivalent beams that per unit length.

**Load Analysis.**

Loads of Normal storey for reinforced concrete design.

Reinforced concrete slab (20 cm)	= 0,500 t/m <sup>2</sup>
Coating + Ceiling Plaster	= 0,150 t/m <sup>2</sup>
	<hr/>
Dead load	g = 0,650 t/m <sup>2</sup>
Live load	q = 0,350 t/m <sup>2</sup>

Multiplying dead loads by 1.4 and live loads by 1.6 final loads are determined, then for this final loads, cross section effects are determined. Multiplying by a coefficient, the determined moment are distributed to middle and column strips.

In two direction of the axis of the column or shear wall, the span length smaller than 0,25 l<sub>1</sub> and 0,25 l<sub>2</sub> is chosen as column strip and the length smaller than 0,5 l<sub>1</sub> and 0,5 l<sub>2</sub> is chosen to the middle strip. (Figure-1)

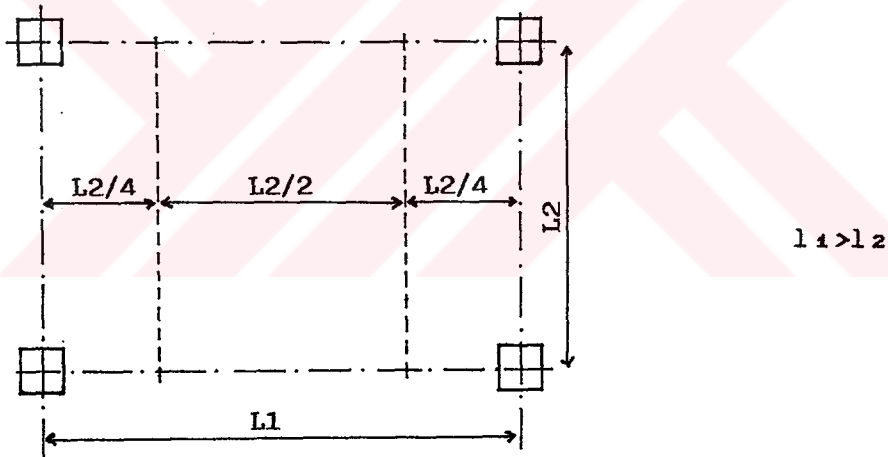


Figure-1. Column and Middle Strip Width

The solution of slab is achieved by using SAP90's (Structural Analysis Program) Frame data. While solving for the slab's unknown properties, dividing the slab in to two parts in two direction, a grid system is formed. In this grid system, crossing points of grid elements called crucial nodes are numbered. Because of the restriction of the 100 crucial points education version SAP90 program. Normal storey's slab are divided into two parts and each of them is solved as if they are two different slabs.

The following assumption are made while determining the border conditions of the slab.

- Side beams do not displace
- The crucial points on the column and shear wall are

restricted to displacement

- The other crucial points are not allowed to horizontal displacement, but only vertical displacement is allowed.
- Along the axis dividing the slab's grid members do not rotate around it's axis.

The other floor slabs are also divided into parts in the same way, explained above and nodes are formed not to exceed the capacity of the program. In order to determine slab's loads, an approximate load calculation is done for easiness. To achieve this approximate calculation, drawing straight lines at the midpoints of the grid elements intersected in a node the area is created. Total slab load in created area assumed to be applied as a single vertical force.

As a result of the calculation that are made under these loads, the cross section effects of each member are determined. Then the moments per unit length are determined by dividing the cross section effects to the width of members.

The slab is divided in columns and middle strip and using the cross section effects which are the most unfavourable one on these bands, reinforced concrete design of these slabs is made. These calculations are repeated for the other direction and so the slab without beam design in two directions is made.

Another calculation for the system under vertical and horizontal loads are made and the cross section effects which are occurred on columns and shear walls are determined. The structure is defined totally as a three dimensional frame which is composed of equivalent beams which connects columns and shear walls.

In this system, for the vertical loads; beams's load per unit length are defined and under these loads the calculation result is superposed by the result under the horizontal loads.

Calculating of the system under lateral loads;

The building which is in the 1.st degree earthquake area and the purpose of usage is as an office. In the outer sides of the building wall, complete hallow bricks which have holes on them are used and in the inside walls of the building half bricks are used.

First of all the total weight of the building is calculated.

C = The coefficient of earthquake.

C = Co.K.S.I

Co= 0,1

K = 1,0

I = 1,0

S = 1,0 (calculated)

These coefficients are used for semi-dynamic earthquake design forces. Under earthquake forces behaviour of the support system of the building below the ground level is different than that of the support system of the building above the ground level. In order to design the building for earthquake forces, forces acting on each floor due to earthquake and coefficient of structural behavior, K, is determined assuming ground surfaces to be as foundation of the structure for the part of the structure above ground level and the part of the structure from the structure above the ground level.

As the basement's rigidity is bigger than the other stories because of the shear walls around the underground floor. The coefficient K is assumed to be 1,5.

For normal stories  $C = 0,1$

For basement stories  $C = 0,15$  (shear wall system)

The  $F_i$  lateral forces that effect at the stories level of the building are calculated according to the weight and height of the building.

$F_i$  forces determined are divided in to two axes of the structure and calculations carried out for earthquake forces acting in two direction perpendicular to each other of the building.

Reinforced concrete design of the building is made by using the most unfavourable cross section effect resulted from loads due to earthquake and vertical loads. Reinforced concrete design of the beams in the building is done by the use of cross section effects of the beams at opening and support points and reasonable amount of bar determine from calculation is exceeded the minimum bar required which is  $\min A_s = 12 / f_{yd} \cdot b \cdot w \cdot d$ . If the magnitude of the shear stresses of beams at the point which have a distance  $d$  from the support surface is greater than the magnitude of  $V_{cr} = 0,65 \cdot f_{ctd} \cdot b \cdot w \cdot d$ . Reinforced concrete design of beams are made by taking shear forces into consideration.

The minimum dimension of the rectangular cross sections of columns of the building design is 25 cm. The thickness of concrete cover exposed to outside effects is chosen to be 2,5 cm on the other hands, the thickness of concrete cover exposed to inside is chosen to be 2 cm.

Wrapping horizontal bar around vertical bar, buckling of vertical bar of columns is restricted and vertical strength of columns is increased. Diameter of shear reinforcement used the condition below.

$$\phi h \geq \phi 1/3$$

$$S \leq 12\phi 1$$

$$S \leq 20 \text{ cm}$$

$\phi_h$  = the diameter of shear reinforcement.  
 $\phi_l$  = the diameter of vertical reinforcement.  
S = length between two shear reinforcement.

Reinforced concrete design of the columns carried out by using tables. Reinforced concrete design of shear walls in the building is made like design of columns, and appropriate amount of bar is placed in shear walls.

Because second basement storey is surrounded by shear walls from three sides, foundation of the building is designed as shear wall foundation. Foundation of the structure is designed so that magnitude of soil stress formed under foundation of the building is less than  $\sigma_{zem}=2,5 \text{ kg/cm}^2$  and pull stress is not formed through out the foundation.

In the middle of the building, a mat poundation containing a core, two large shear wall and two columns is formed. Then, after determination of dimensions of the foundation, static design of mat slab is carried out by using SAP 90 computer software in terms of maximum soil stress formed under foundation.

Calculation of bar per unit lenght is made at band of opening and columns of mat slab designed like slab without beams.

## BÖLÜM 1. GİRİŞ

Günümüzde yapı sistemlerinin hesabında ve boyutlandırılmasında çeşitli yöntemler kullanılmaktadır. Bu yöntemler genel olarak analitik ve yaklaşık yöntemler olarak sınıflandırılabilir. Yaklaşık olarak çözülemeyen problemler bilgisayarların gelişine paralel olarak gelişen ve büyük bir uygulama alanı bulan sayısal yöntemler veya bazı özel hallerde yaklaşık yöntemlerle çözülebilmektedir.

Bu çalışmada çok katlı betonarme bir yapının taşıyıcı sisteminin projelendirilmesi amaçlanmıştır. Sistemin taşıyıcı sisteminde döşeme tipi, kirişsiz döşeme olarak seçilmiştir. Kirişsiz döşemeler; arada kirişler olmadan doğrudan doğruya kolonlara oturan, eğilmeye çalışan, çift doğrultuda donatılı betonarme plaklardır.

Kirişsiz döşemeler genellikle yapı yüksekliğinin az tutulması gereken yerlerde ve düz bir tavan istendiğinde uygun olurlar. Tavanda süreklilik gerektiren depolarda, hafif ve değişebilen bölmeli bürolarda, fazla derine inmesi istenmeyen temellerde ve benzeri durumlarda kullanılır. Kalıp, demir ve betonlama işçilikleri kirişli döşemelere oranla daha basit ve ekonomiktir. Buna karşılık daha çok çelik kullanılır. Bu bakımdan ekonomik olup olmadıkları yük ve açıklıklara göre her özel durum için incelenmelidir.

Kirişsiz döşemeler, gerek hesap, gerekse inşaatlarının basit ve kolay olması, özel problemlerin çıkmaması için, düzgün sıralanmış birbirine dik eksenler üzerindeki kolonlara oturmalıdır. Ayrıca heriki doğrultuda en az üç açıklığın bulunması ve kenar

açıklıkların iç açıklıklara göre biraz küçük düzenlenmesi momentlerin dengelenmesi bakımından önemlidir.

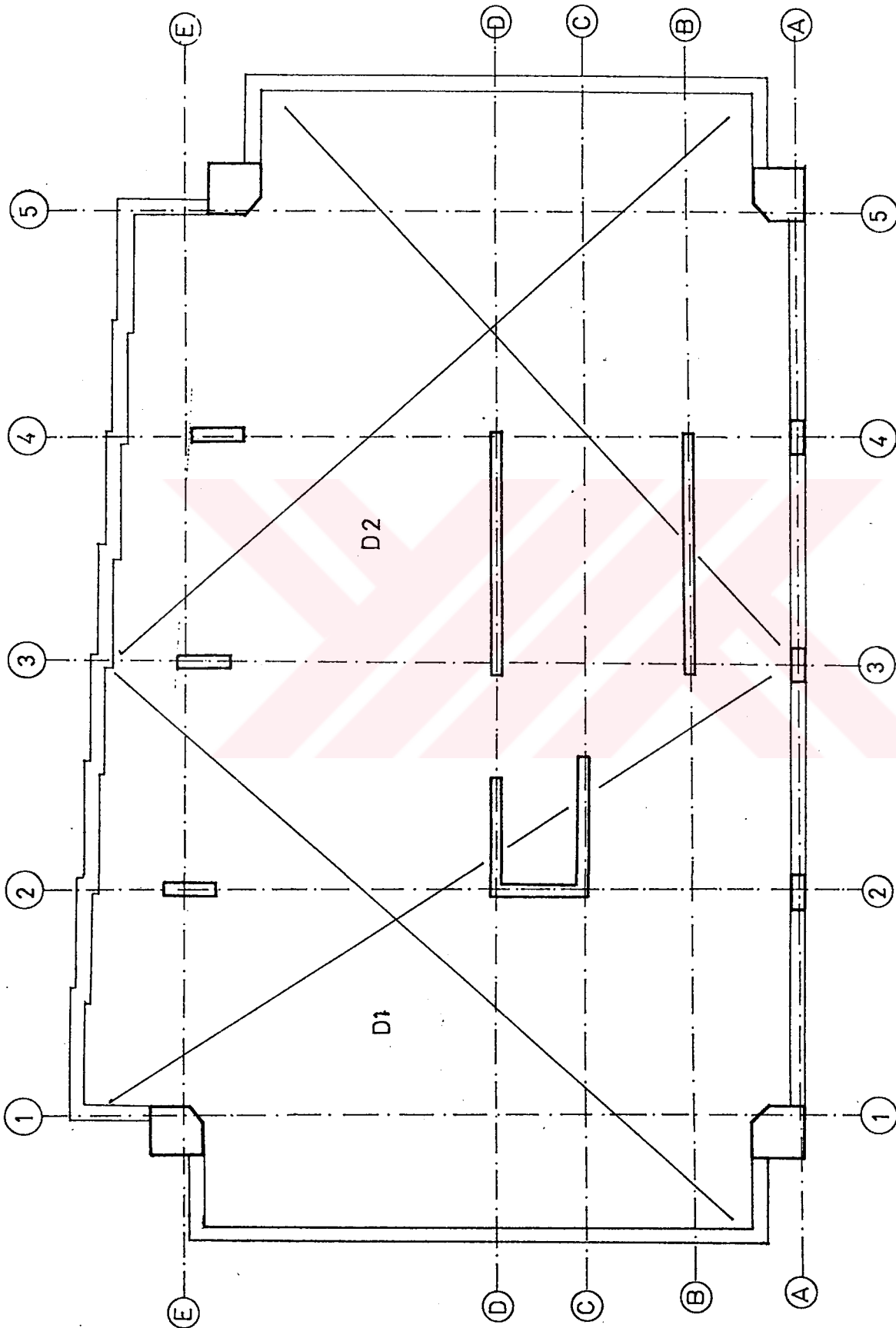
Yapılan bu çalışmada; sistem, yaklaşık yöntemi kullanmak için belirtilen şartlara uymamaktadır. Bu sebepten dolayı döşeme sisteminin çözümünde çeşitli kabuller yapılmış ve bu kabullere göre sistem, bilgisayar programından faydalanılarak yaklaşık olarak çözümü yapılmıştır.

Taşıyıcı sistemin statik hesabında ölü yükler, hareketli yükler ve deprem etkisi gözönüne alınmıştır. Yapının projelendirilmesin de hesaba alınacak yükler TS 498'den alınmıştır.[2] Deprem etkileri ise, Afet Bölgele- rinde Yapılacak Yapılar hakkında Yönetmelikten alınmıştır.[3].

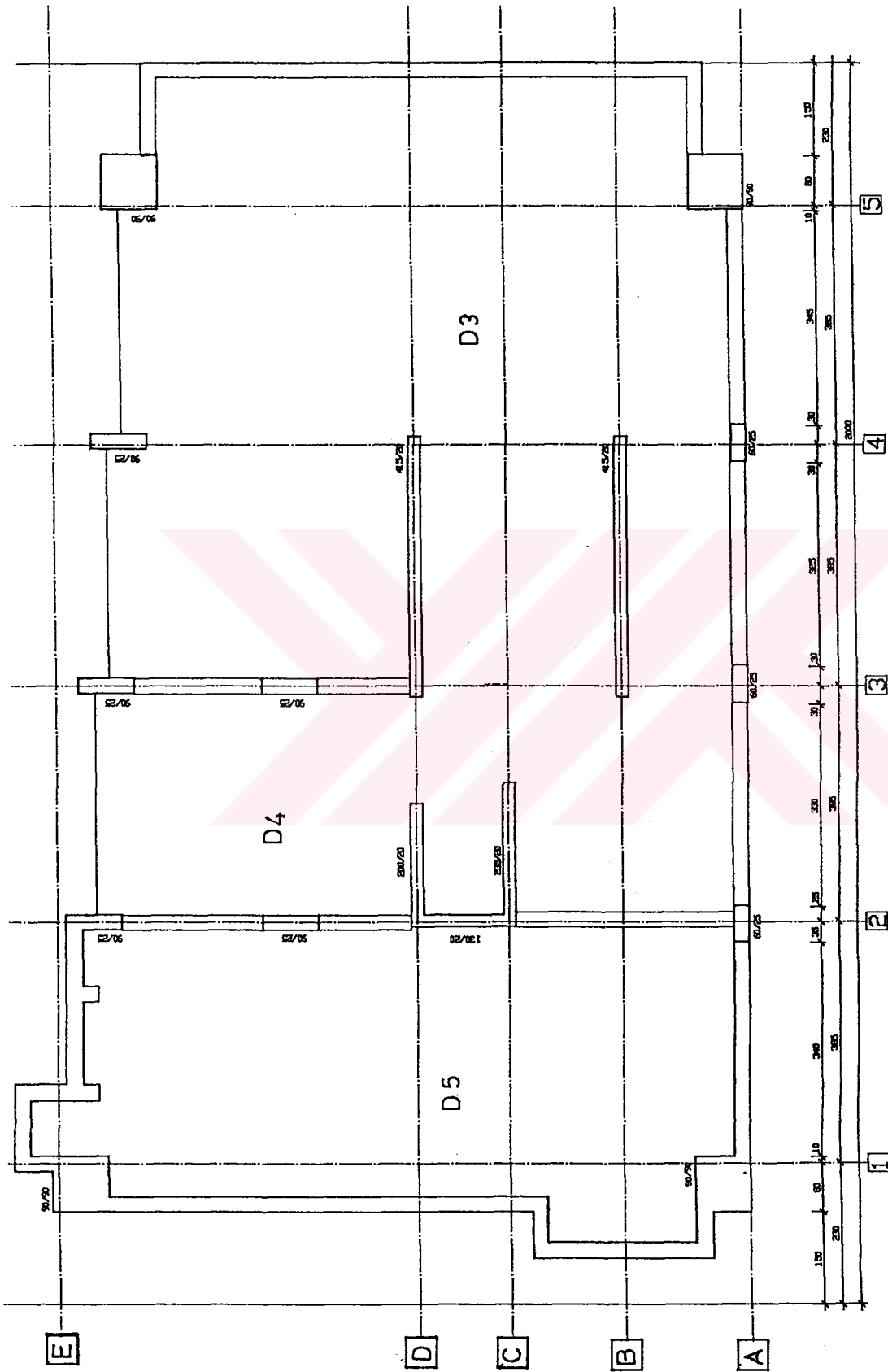
Betonarme yapıların hesap ve yapım kuralları ile ilgili standart TS 500 [1] gözönünde tutulmuştur. Bu standart ile A.B.Y.Y.H.Y. hükümlerine bağlı olarak projelendirme gerçekleştirilmiştir.

Hesapların yapılışında yük aktarma sırasına uygun olarak döşemelerden hesaba başlanmış ve temellere doğru bir sıra izlenmiştir. Hesap yöntemi olarak taşıma gücü yöntemi kullanılmıştır.

Kesit tesirlerinin saptanmasında, depremli durum ile depremsiz durumda elde edilen süperpozisyonların kıyaslanması yapılmış ve en elverişsiz duruma göre kesit donatısı seçilmiştir.

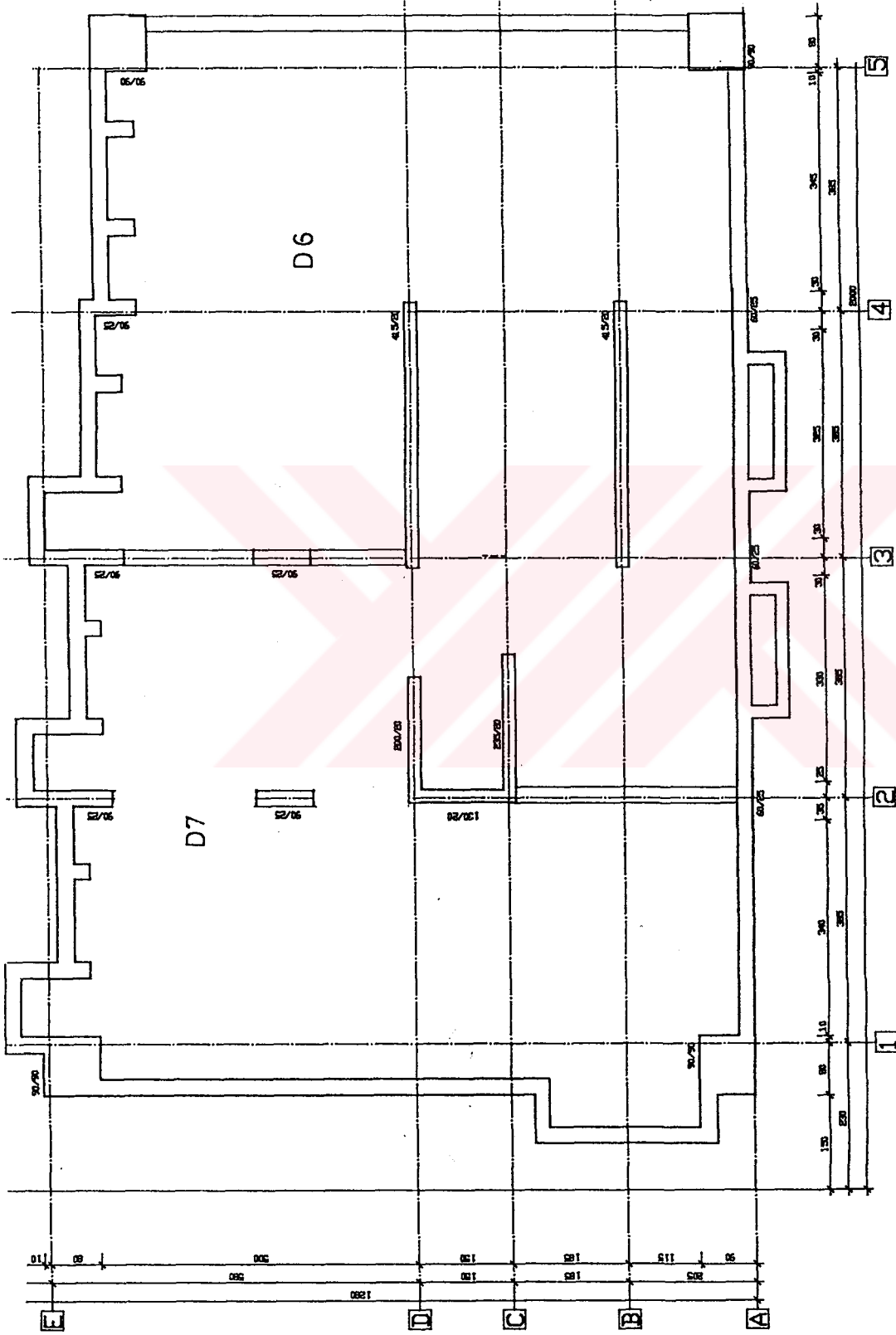


Şekil 1.1 Normal Kat Kalıp Planı



Şekil 1.2 Zemin Kat Kalıp Planı





Şekil 1.3 Bodrum Kat Kalıp Planı

## BÖLÜM 2. ÇOK KATLI BİR YAPININ PROJELENDİRMESİ

### 2.1. Döşemenin Boyutlandırması

#### 2.1.1. Döşeme kalınlığının hesaplanması

Döşeme kalınlığı bağıntı (2.1.1) den ve 15 cm den az olmamalıdır.

$$h_f \geq \frac{l_{yn}(800+\beta \cdot f_{yd})}{36000} \quad (2.1.1)$$

$$h_f \geq 15 \text{ cm}$$

$$h_f \geq \frac{385(800+0,07 \cdot 3650)}{36000}$$

$$h_f = 20 \text{ cm seçilmiştir.}$$

#### 2.1.2 Döşeme Yük Analizi

$$\text{Plak kendi ağırlığı (20 cm)} = 0,500 \text{ t/m}^2$$

$$\text{Kaplama + Sıva} = 0,150 \text{ t/m}^2$$

$$\text{Sabit Yük} \quad g = 0,650 \text{ t/m}^2$$

$$\text{Hareketli Yük} \quad g = 0,350 \text{ t/m}^2$$

### 2.2 Eşdeğer Çerçeve Yöntemiyle Döşeme Hesabı. (4-4 Aksı)

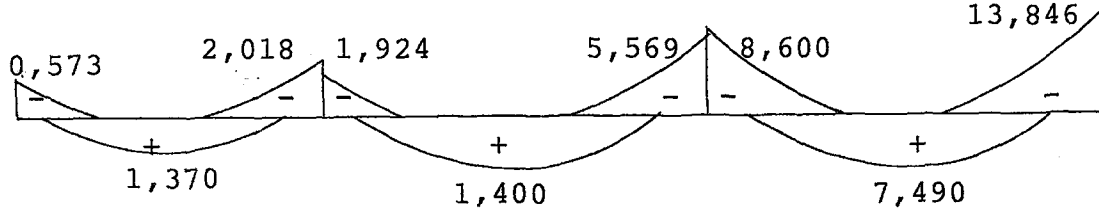
$$\text{Hesap yükü } P_d = 1,4g + 1,6g = 1,470 \text{ t/m}^2$$

$$\text{Kolonlar : } C_1 = 25 * 60 \quad C_2 = 20 * 80 \quad C_3 = 90 * 25$$

$$\text{Kirişler : } k_1 = 20 * 385 \quad k_2 = 20 * 190 \quad k_3 = 20 * 385$$

Sistemin en elverişsiz yüklere göre statik hesabı yapılmış ve bulunan momentler kolon ve açıklık şeritlerine dağıtılmıştır. (Zemin kat 4-4 aksı)

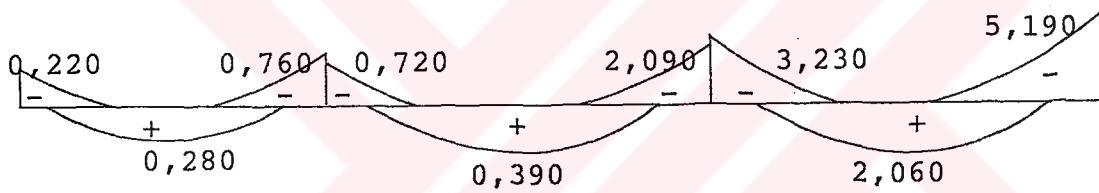
M (tm)



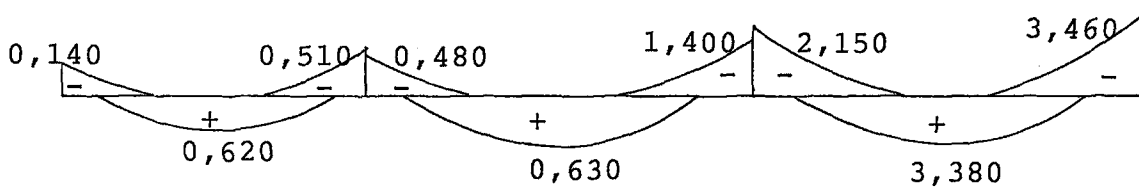
Elverişsiz Moment Diyagramı

2.2.1 Momentlerin Şeritlere Dağıtılması. Kolon Şeridi

M(tm)



Açıklık Şeridi



Yapılan bu hesapla bulunan kolon ve açıklık şeridi momentleri, bilgisayarla bulunan değerlerle karşılaştırılacaktır.

2.3. Normal Kat Döşemesi Statik Hesabı

Döşeme sistemi olarak; kat yüksekliğinin sınırlı olmasından ve düz bir tavan istenmesinden dolayı kirişsiz döşeme seçilmiştir. Döşeme kalınlığı 20 cm dir.

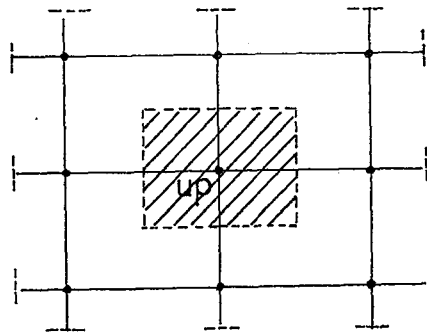
Döşeme iki doğrultuda elemanlara bölünmüş ve bir ızgara sistemi oluşturulmuştur. Bu sistemde elemanların kesim noktalarına d.n. numaraları verilmiştir. Kullanılan SAP90 programı 100.d.n.sıyla sınırlı olduğundan, normal kat döşemesi ikiye bölünerek hesap yapılmıştır.

Döşemenin sınır şartlarını belirlerken, kenarlarda bulunan kirişlerin çökme yapmadığı kabul edilmiştir. Kolon ve perde üzerindeki düğüm noktalarında döşemenin düşey yer değiştirmesi tutulmuştur. Diğer düğüm noktalarında döşemenin düşey yer değiştirmesine müsaade edilmiştir. Kat döşemesinin ikiye bölünen kısmında sınır şartları tanımlanırken, bölünme doğrultusundaki eksen (y eksen) etrafındaki dönme yapmadığı kabul edilmiştir.

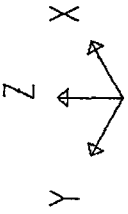
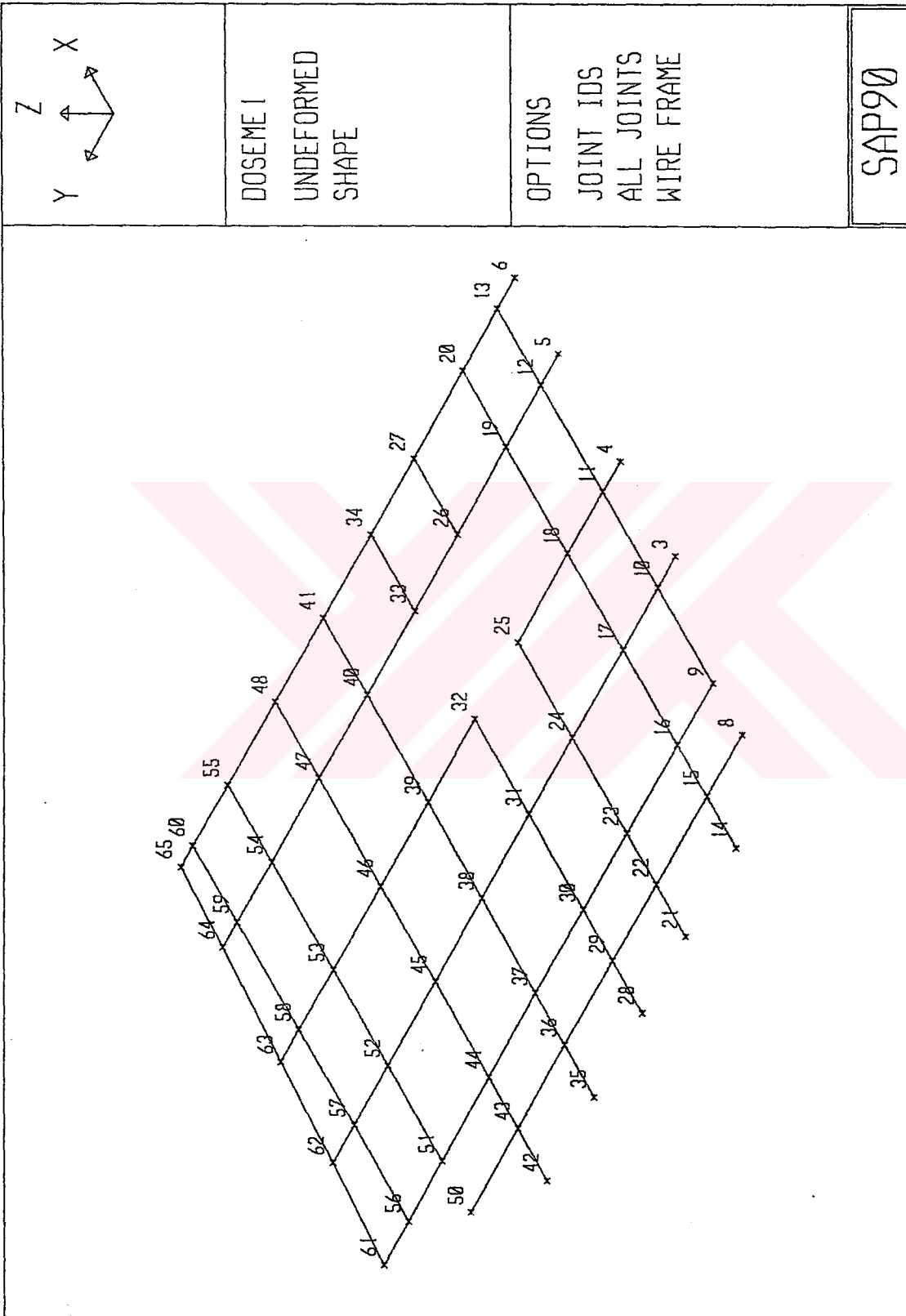
Normal kat döşemesi iki bölümde çözüldüğünden, döşemenin sol tarafı Döşeme 1, sağ tarafı Döşeme 2 adı altında çözümü yapılmıştır.

Döşemenin yükü tanımlanırken, kolaylık sağlaması açısından bir düğüm noktasında birleşen elemanların orta noktalarından çıkılan doğruların oluşturduğu alan içerisinde kalan döşemenin ağırlığı o düğüm noktasına tekil düşey yük olarak verilmiştir. (Şekil 2.3.1)

Çıkan sonuçlar elemanların genişliklerine bölünerek, birim boydaki moment değerleri hesap edilmiştir.



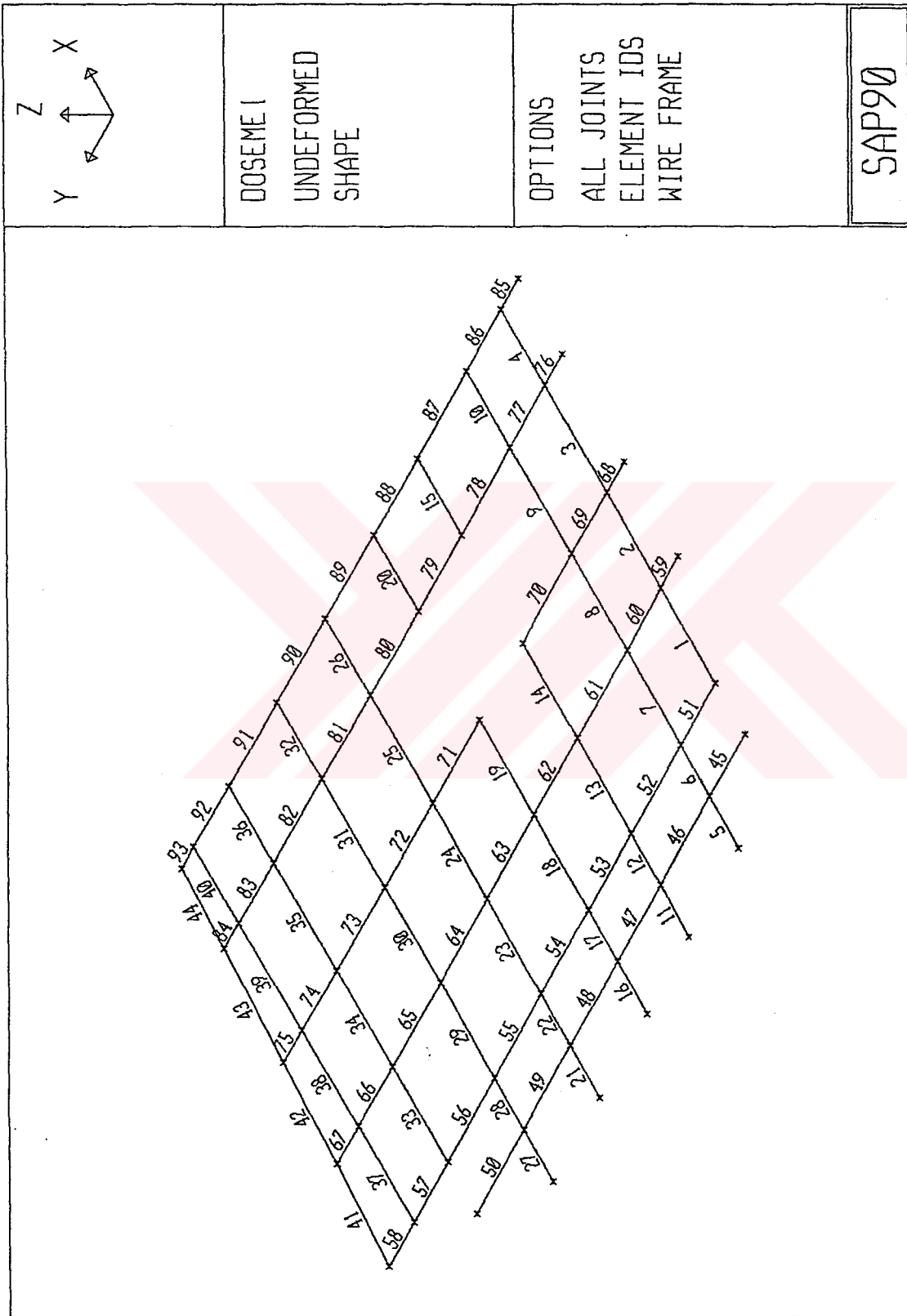
Şekil 2.3.1 Tekil Yük İçin Hesaplanan Döşeme Alanı



DOSEMEI  
UNDEFORMED  
SHAPE

OPTIONS  
JOINT IDS  
ALL JOINTS  
WIRE FRAME

SAP90



NORMAL KAT DOSEMESI (DOSEME1)  
SYSTEM  
L=2

JOINTS

3	X=415	Y=0	
4	X=615	Y=0	
5	X=840	Y=0	
6	X=1000	Y=0	
8	X=107.5	Y=65	
9	X=215	Y=65	
11	X=615	Y=65	G=9,11,1
12	X=840	Y=65	
13	X=1000	Y=65	
14	X=0	Y=195	
16	X=215	Y=195	G=14,16,1
18	X=615	Y=195	G=16,18,1
19	X=840	Y=195	
20	X=1000	Y=195	
21	X=0	Y=380	
23	X=215	Y=380	G=21,23,1
25	X=615	Y=380	G=23,25,1
26	X=840	Y=380	
27	X=1000	Y=380	
28	X=0	Y=540	
42	X=0	Y=890	G=28,42,7
29	X=107.5	Y=540	
50	X=107.5	Y=1065	G=29,50,7
30	X=215	Y=540	
51	X=215	Y=1065	G=30,51,7
31	X=415	Y=540	
52	X=415	Y=1065	G=31,52,7
32	X=615	Y=540	
53	X=615	Y=1065	G=32,53,7
33	X=840	Y=540	
54	X=840	Y=1065	G=33,54,7
34	X=1000	Y=540	
55	X=1000	Y=1065	G=34,55,7
56	X=215	Y=1190	
58	X=615	Y=1190	G=56,58,1
59	X=840	Y=1190	
60	X=1000	Y=1190	
61	X=215	Y=1280	
63	X=615	Y=1257	G=61,63,1
64	X=840	Y=1244	
65	X=1000	Y=1235	

RESTRAINTS

3,48,1	R=1,1,0,0,0,1
50,65,1	R=1,1,0,0,0,1
14,42,7	R=1,1,1,0,0,1
8,9,1	R=1,1,1,0,0,1
3,5,1	R=1,1,1,0,0,1
53	R=1,1,1,0,0,1
25,32,7	R=1,1,1,1,1,1
6,55,7	R=1,1,0,0,1,1
60,65,5	R=1,1,0,0,1,1
6,34,14	R=1,1,1,0,1,1

55 R=1,1,1,0,1,1

FRAME

NM=19

1	I=463826	A=2750	G=114000	J=1159565	E=285000
2	I=341932	A=1650	G=114000	J=854830	
3	I=305876	A=1450	G=114000	J=764690	
4	I=270471	A=1290	G=114000	J=676176	
5	I=284583	A=1350	G=114000	J=711456	
6	I=86666	A=2600	G=114000	J=216665	
7	I=105000	A=3150	G=114000	J=262500	
8	I=115000	A=3450	G=114000	J=287500	
9	I=116666	A=3500	G=114000	J=291665	
10	I=100000	A=3000	G=114000	J=250000	
11	I=71666	A=2150	G=114000	J=179165	
12	I=65000	A=1950	G=114000	J=162500	
13	I=61666	A=1850	G=114000	J=154165	
14	I=60000	A=1800	G=114000	J=150000	
15	I=102666	A=3080	G=114000	J=256665	
16	I=133333	A=4000	G=114000	J=333332	
17	I=141666	A=4250	G=114000	J=354165	
18	I=53333	A=1600	G=114000	J=133333	
19	I=111666	A=3350	G=114000	J=279165	

1,9,10 M=6 G=3,1,1,1

LP=24,18

5,14,15 M=7 G=5,1,1,1

11,21,22 M=8 G=3,1,1,1

15,26,27 M=8

16,28,29 M=19 G=3,1,1,1

20,33,34 M=19

21,35,36 M=9 G=5,1,1,1

27,42,43 M=9 G=5,1,1,1

33,51,52 M=10 G=3,1,1,1

37,56,57 M=11

38,57,58 M=12

39,58,59 M=13

40,59,60 M=14

41,61,62 M=2

42,62,63 M=3

43,63,64 M=5

44,64,65 M=4

45,8,15 M=11 G=5,1,7,7

LP=16,24

51,9,16 M=15 G=5,1,7,7

57,51,56 M=1

58,56,61 M=1

59,3,10 M=16 G=6,1,7,7

66,52,57 M=16 G=1,1,5,5

68,4,11 M=17 G=2,1,7,7

71,32,39 M=17 G=2,1,7,7

74,53,58 M=17 G=1,1,5,5

76,5,12 M=8 G=6,1,7,7

83,54,59 M=8 G=1,1,5,5

85,6,13 M=18 G=6,1,7,7

92,55,60 M=18 G=1,1,5,5

LOADS

10 F=0,0,-1000 L=1

11 F=0,0,-1065

12 F=0,0,-965

13 F=0,0,-400



15 F=0,0,-853  
16 F=0,0,-1220  
17 F=0,0,-1580  
18 F=0,0,-1680  
19 F=0,0,-1520  
22 F=0,0,-930  
23 F=0,0,-1330  
24 F=0,0,-1730  
26 F=0,0,-1250  
27 F=0,0,-700  
29 F=0,0,-1020  
30 F=0,0,-1450  
31 F=0,0,-1880  
33 F=0,0,-1360  
36 F=0,0,-950  
37 F=0,0,-1350  
38 F=0,0,-1750  
39 F=0,0,-1860  
40 F=0,0,-1690  
41 F=0,0,-700  
43 F=0,0,-950  
44 F=0,0,-1350  
45 F=0,0,-1750  
46 F=0,0,-1860  
47 F=0,0,-1690  
48 F=0,0,-700  
52 F=0,0,-1500  
54 F=0,0,-1450  
56 F=0,0,-230  
57 F=0,0,-450  
58 F=0,0,-430  
59 F=0,0,-280  
60 F=0,0,-100  
61,65,1 F=0,0,-220  
10 F=0,0,-700  
11 F=0,0,-746  
12 F=0,0,-676  
13 F=0,0,-280  
15 F=0,0,-597  
16 F=0,0,-854  
17 F=0,0,-1106  
18 F=0,0,-1176  
19 F=0,0,-1064  
22 F=0,0,-651  
23 F=0,0,-931  
24 F=0,0,-1211  
26 F=0,0,-875  
27 F=0,0,-490  
29 F=0,0,-714  
30 F=0,0,-1015  
31 F=0,0,-1316  
33 F=0,0,-952  
36 F=0,0,-665  
37 F=0,0,-945  
38 F=0,0,-1225  
39 F=0,0,-1302  
40 F=0,0,-1183  
41 F=0,0,-490  
43 F=0,0,-665

44 F=0,0,-945  
45 F=0,0,-1225  
46 F=0,0,-1302  
47 F=0,0,-1183  
48 F=0,0,-490  
52 F=0,0,-1050  
54 F=0,0,-1015  
56 F=0,0,-161  
57 F=0,0,-315  
58 F=0,0,-301  
59 F=0,0,-196  
60 F=0,0,-70  
61,65,1 F=0,0,-154

COMBÓ

1 C=1.4,1.6

L=2

NORMAL KAT DOSEMESI (DOSEME1)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE	AXIAL TORQ
			SHEAR	MOMENT		SHEAR MOMENT	
1 -----							
1	1	.000			.000		87781.461
		.000	1269.129	-25704.149			
	200.000		1269.129	228121.703			
	200.000				.000		87781.461
2 -----							
1	1	.000			.000		76658.172
		.000	-269.529	42979.740			
	200.000		-269.529	-10926.119			
	200.000				.000		76658.172
3 -----							
1	1	.000			.000		47382.441
		.000	423.675	-44742.298			
	225.000		423.675	50584.631			
	225.000				.000		47382.441
4 -----							
1	1	.000			.000		55901.895
		.000	-478.785	2089.510			
	160.000		-478.785	-74516.162			
	160.000				.000		55901.895
5 -----							
1	1	.000			.000		.000
		.000	1083.830	.000			
	107.500		1083.830	116511.741			
	107.500				.000		.000
6 -----							
1	1	.000			.000		-107508.148
		.000	-409.942	226587.363			
	107.500		-409.942	182518.592			
	107.500				.000		-107508.148
7 -----							
1	1	.000			.000		119893.328
		.000	-267.023	227003.973			
	200.000		-267.023	173599.352			
	200.000				.000		119893.328
8 -----							
1	1	.000			.000		151215.844
		.000	-1829.856	123924.482			
	200.000		-1829.856	-242046.796			
	200.000				.000		151215.844
9 -----							
1	1	.000			.000		-51884.348
		.000	1366.403	-139079.619			
	225.000		1366.403	168361.053			
	225.000				.000		-51884.348
10 -----							
1	1	.000			.000		18951.367

		.000	-3016.200	161445.826		
		160.000	-3016.200	-321146.177		
		160.000			.000	18951.367
11	-----					
	1	.000			.000	.000
		.000	4281.591	.000		
		107.500	4281.591	460271.006		
		107.500			.000	.000
12	-----					
	1	.000			.000	-46563.711
		.000	1734.100	398598.021		
		107.500	1734.100	585013.780		
		107.500			.000	-46563.711
13	-----					
	1	.000			.000	57956.961
		.000	-1669.930	593171.335		
		200.000	-1669.930	259185.275		
		200.000			.000	57956.961
14	-----					
	1	.000			.000	52689.621
		.000	-7359.985	432047.363		
		200.000	-7359.985	-1.0399E+06		
		200.000			.000	52689.621
15	-----					
	1	.000			.000	52271.770
		.000	-1841.833	-4176.544		
		160.000	-1841.833	-298869.796		
		160.000			.000	52271.770
16	-----					
	1	.000			.000	.000
		.000	4749.440	.000		
		107.500	4749.440	510564.810		
		107.500			.000	.000
17	-----					
	1	.000			.000	-30135.391
		.000	1768.808	451115.105		
		107.500	1768.808	641261.981		
		107.500			.000	-30135.391
18	-----					
	1	.000			.000	-39871.801
		.000	-1661.581	644930.807		
		200.000	-1661.581	312614.579		
		200.000			.000	-39871.801
19	-----					
	1	.000			.000	80069.992
		.000	-8996.742	563025.482		
		200.000	-8996.742	-1.2363E+06		
		200.000			.000	80069.992
20	-----					
	1	.000			.000	-23784.412
		.000	-5511.656	235942.812		
		160.000	-5511.656	-645922.224		
		160.000			.000	-23784.412
21	-----					
	1	.000			.000	.000

		.000	4478.883	.000	
		107.500	4478.883	481479.935	
		107.500			.000
22		-----			
	1	.000			.000
		.000	1682.254	394327.131	10723.884
		107.500	1682.254	575169.410	
		107.500			.000
23		-----			
	1	.000			.000
		.000	-1405.847	526942.287	-115922.258
		200.000	-1405.847	245772.982	
		200.000			.000
24		-----			
	1	.000			.000
		.000	-3582.855	229121.243	-181155.547
		200.000	-3582.855	-487449.679	
		200.000			.000
25		-----			
	1	.000			.000
		.000	2711.698	-361496.393	93144.570
		225.000	2711.698	248635.670	
		225.000			.000
26		-----			
	1	.000			.000
		.000	-1283.576	84201.360	-74953.164
		160.000	-1283.576	-121170.838	
		160.000			.000
27		-----			
	1	.000			.000
		.000	1610.284	.000	.000
		107.500	1610.284	173105.510	
		107.500			.000
28		-----			
	1	.000			.000
		.000	-264.212	271305.382	136736.922
		107.500	-264.212	242902.549	
		107.500			.000
29		-----			
	1	.000			.000
		.000	167.059	220594.747	-60387.746
		200.000	167.059	254006.631	
		200.000			.000
30		-----			
	1	.000			.000
		.000	-1631.671	153051.957	-39182.590
		200.000	-1631.671	-173282.160	
		200.000			.000
31		-----			
	1	.000			.000
		.000	885.539	-154359.425	-33051.266
		225.000	885.539	44886.950	
		225.000			.000
32		-----			
	1	.000			.000
					25923.834

		.000	-422.138	28514.472		
		160.000	-422.138	-39027.633		
		160.000			.000	25923.834
33	-----					
	1	.000			.000	21410.172
		.000	2068.346	-83957.337		
		200.000	2068.346	329711.820		
		200.000			.000	21410.172
34	-----					
	1	.000			.000	-45552.336
		.000	-3064.347	321867.861		
		200.000	-3064.347	-291001.560		
		200.000			.000	-45552.336
35	-----					
	1	.000			.000	-9727.399
		.000	2255.009	-277691.304		
		225.000	2255.009	229685.797		
		225.000			.000	-9727.399
36	-----					
	1	.000			.000	-10693.959
		.000	-3241.619	250590.665		
		160.000	-3241.619	-268068.326		
		160.000			.000	-10693.959
37	-----					
	1	.000			.000	14814.975
		.000	425.377	12394.197		
		200.000	425.377	97469.570		
		200.000			.000	14814.975
38	-----					
	1	.000			.000	-59834.266
		.000	-723.548	87370.293		
		200.000	-723.548	-57339.365		
		200.000			.000	-59834.266
39	-----					
	1	.000			.000	16446.232
		.000	447.564	-58068.217		
		225.000	447.564	42633.661		
		225.000			.000	16446.232
40	-----					
	1	.000			.000	-25933.225
		.000	-420.501	35103.581		
		160.000	-420.501	-32176.593		
		160.000			.000	-25933.225
41	-----					
	1	.000			.000	2745.281
		.000	600.768	111516.754		
		200.330	600.768	231868.889		
		200.330			.000	2745.281
42	-----					
	1	.000			.000	-135172.844
		.000	-958.994	186805.282		
		200.330	-958.994	-5310.260		
		200.330			.000	-135172.844
43	-----					
	1	.000			.000	3541.621

		.000	446.342	-62203.999		
		225.375	446.342	38390.379		
		225.375			.000	3541.621
44	-----					
	1	.000			.000	-43415.613
		.000	-199.345	32095.758		
		160.253	-199.345	150.076		
		160.253			.000	-43415.613
45	-----					
	1	.000			.000	.000
		.000	128.606	.000		
		130.000	128.606	16718.749		
		130.000			.000	.000
46	-----					
	1	.000			.000	110075.625
		.000	-527.022	124226.895		
		185.000	-527.022	26727.817		
		185.000			.000	110075.625
47	-----					
	1	.000			.000	48402.637
		.000	-323.131	73291.528		
		160.000	-323.131	21590.508		
		160.000			.000	48402.637
48	-----					
	1	.000			.000	-11047.067
		.000	87.101	51725.899		
		175.000	87.101	66968.498		
		175.000			.000	-11047.067
49	-----					
	1	.000			.000	-98199.875
		.000	489.730	56244.614		
		175.000	489.730	141947.349		
		175.000			.000	-98199.875
50	-----					
	1	.000			.000	.000
		.000	-29.774	5210.426		
		175.000	-29.774	.000		
		175.000			.000	.000
51	-----					
	1	.000			.000	-25704.148
		.000	3406.013	-87781.461		
		130.000	3406.013	355000.243		
		130.000			.000	-25704.148
52	-----					
	1	.000			.000	18781.232
		.000	188.694	127598.766		
		185.000	188.694	162507.186		
		185.000			.000	18781.232
53	-----					
	1	.000			.000	26938.787
		.000	241.125	57986.513		
		160.000	241.125	96566.441		
		160.000			.000	26938.787
54	-----					
	1	.000			.000	30607.613

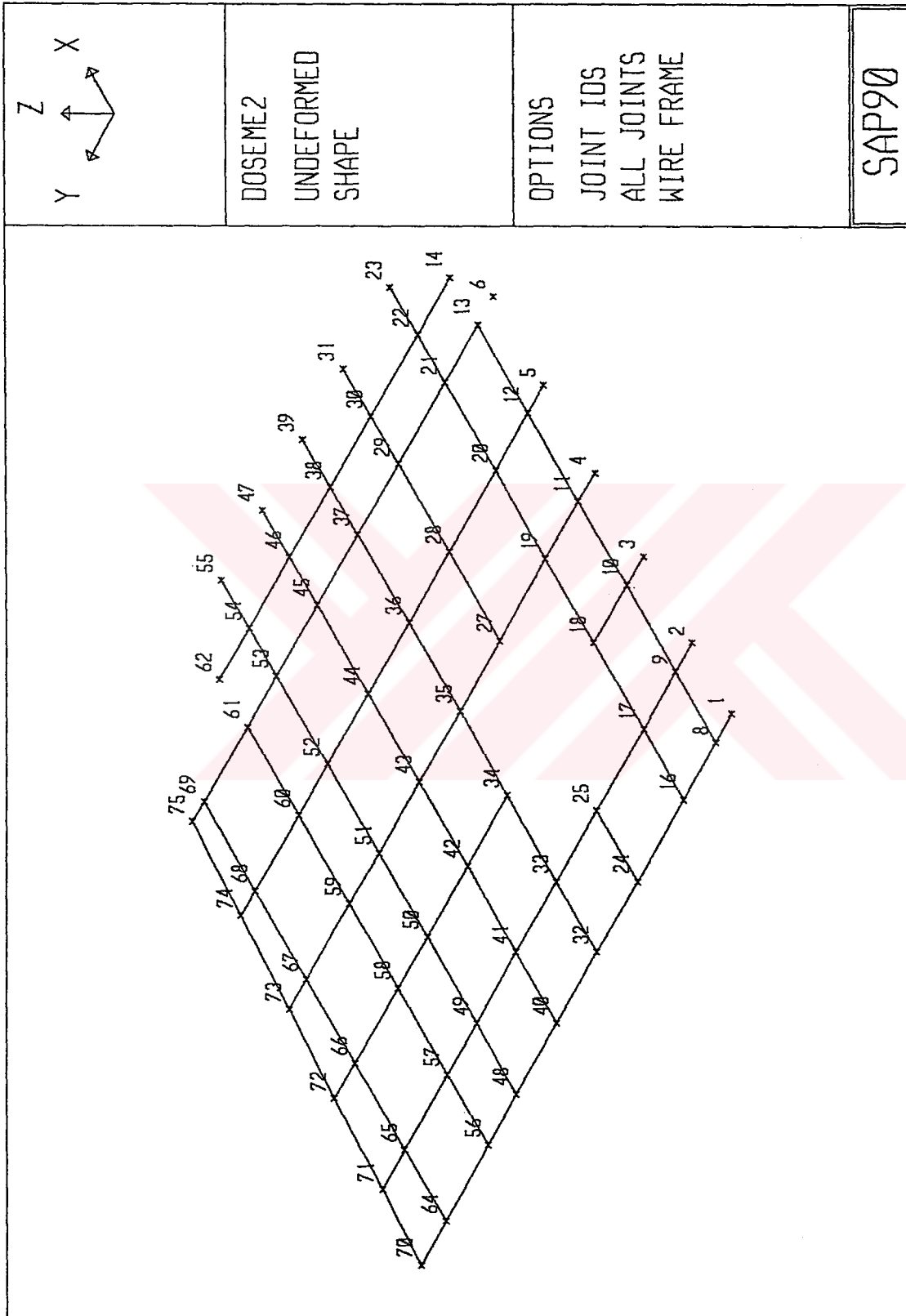
		.000	17.514	106302.851		
		175.000	17.514	109367.773		
		175.000			.000	30607.613
55	-----					
	1	.000			.000	-17619.510
		.000	-296.386	236013.914		
		175.000	-296.386	184146.386		
		175.000			.000	-17619.510
56	-----					
	1	.000			.000	-39927.313
		.000	-4129.658	381271.054		
		175.000	-4129.658	-341419.042		
		175.000			.000	-39927.313
57	-----					
	1	.000			.000	-123884.648
		.000	2160.145	-362829.213		
		125.000	2160.145	-92811.062		
		125.000			.000	-123884.648
58	-----					
	1	.000			.000	-111490.453
		.000	1155.168	-107626.037		
		90.000	1155.168	-3660.886		
		90.000			.000	-111490.453
59	-----					
	1	.000			.000	.000
		.000	1943.375	.000		
		65.000	1943.375	126319.347		
		65.000			.000	.000
60	-----					
	1	.000			.000	-185141.969
		.000	962.033	137442.639		
		130.000	962.033	262506.946		
		130.000			.000	-185141.969
61	-----					
	1	.000			.000	-234816.828
		.000	-1456.734	231184.439		
		185.000	-1456.734	-38311.276		
		185.000			.000	-234816.828
62	-----					
	1	.000			.000	-61954.746
		.000	-126.279	-33043.935		
		160.000	-126.279	-53248.631		
		160.000			.000	-61954.746
63	-----					
	1	.000			.000	188456.156
		.000	2471.282	-173190.421		
		175.000	2471.282	259283.901		
		175.000			.000	188456.156
64	-----					
	1	.000			.000	171804.422
		.000	238.290	324517.190		
		175.000	238.290	366217.928		
		175.000			.000	171804.422
65	-----					
	1	.000			.000	70849.742

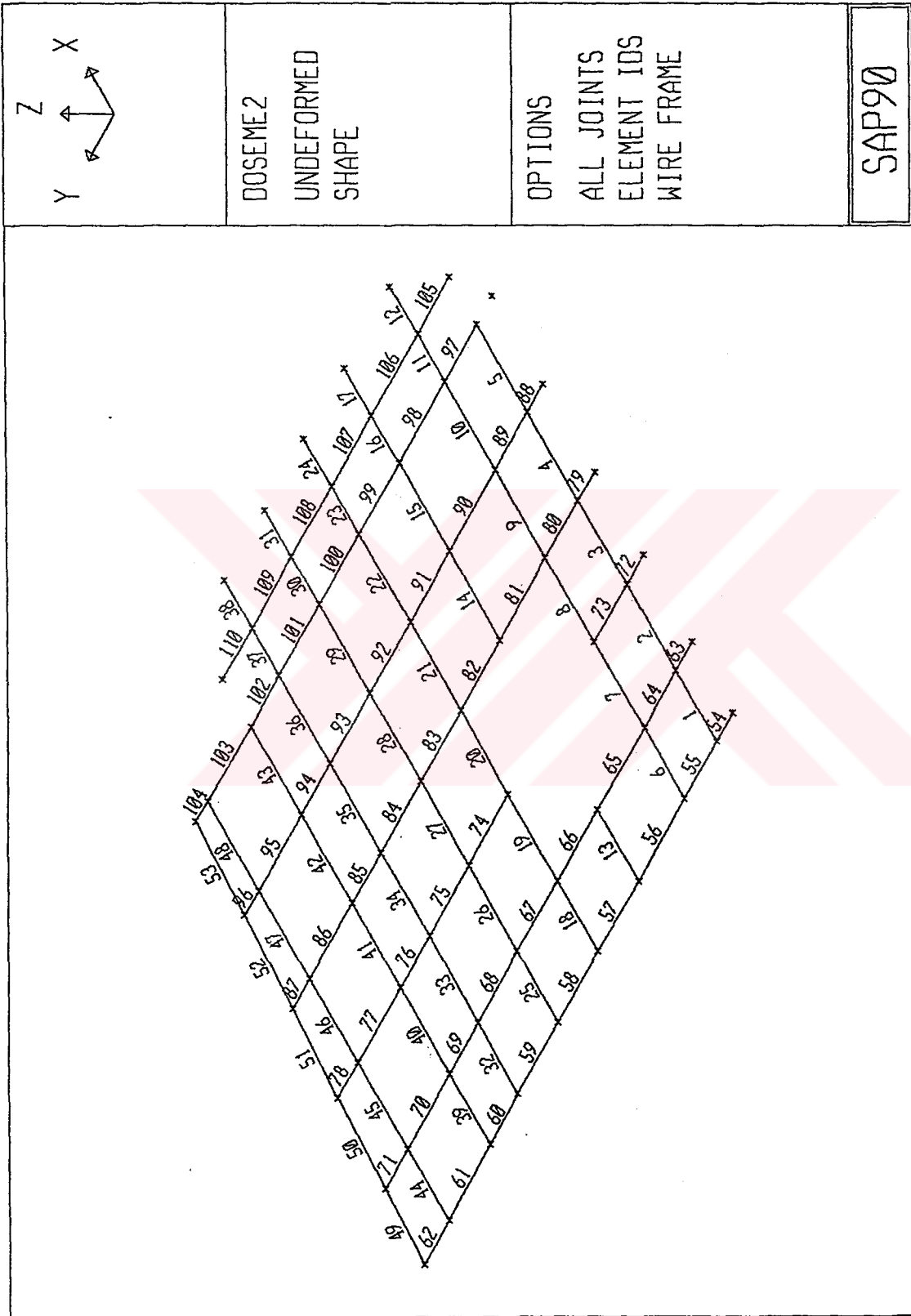
		.000	-2372.980	345012.773		
		175.000	-2372.980	-70258.739		
		175.000			.000	70849.742
66	-----					
	1	.000			.000	63005.785
		.000	-1020.287	-3296.230		
		125.000	-1020.287	-130832.128		
		125.000			.000	63005.785
67	-----					
	1	.000			.000	52906.508
		.000	-1005.362	-56182.886		
		78.500	-1005.362	-135103.806		
		78.500			.000	52906.508
68	-----					
	1	.000			.000	.000
		.000	4029.630	.000		
		65.000	4029.630	261925.938		
		65.000			.000	.000
69	-----					
	1	.000			.000	-33816.180
		.000	651.825	291201.664		
		130.000	651.825	375938.950		
		130.000			.000	-33816.180
70	-----					
	1	.000			.000	69151.000
		.000	-6778.034	579039.135		
		185.000	-6778.034	-674897.173		
		185.000			.000	69151.000
71	-----					
	1	.000			.000	-108622.406
		.000	12119.631	-1.3822E+06		
		175.000	12119.631	738711.883		
		175.000			.000	-108622.406
72	-----					
	1	.000			.000	17330.881
		.000	1137.878	464411.770		
		175.000	1137.878	663540.456		
		175.000			.000	17330.881
73	-----					
	1	.000			.000	36253.617
		.000	-6066.532	657409.130		
		175.000	-6066.532	-404233.938		
		175.000			.000	36253.617
74	-----					
	1	.000			.000	49563.871
		.000	4214.448	-440058.876		
		125.000	4214.448	86747.076		
		125.000			.000	49563.871
75	-----					
	1	.000			.000	48835.020
		.000	1959.735	10466.575		
		67.000	1959.735	141768.849		
		67.000			.000	48835.020
76	-----					
	1	.000			.000	.000



		.000	1319.915	.000	
		65.000	1319.915	85794.472	
		65.000			.000
77	-----				.000
	1	.000			.000
		.000	-210.224	77275.020	-48495.121
		130.000	-210.224	49945.854	
		130.000			.000
78	-----				-48495.121
	1	.000			.000
		.000	341.979	-20889.859	-55410.348
		185.000	341.979	42376.191	
		185.000			.000
79	-----				-55410.348
	1	.000			.000
		.000	-966.189	-9895.579	-59586.891
		160.000	-966.189	-164485.743	
		160.000			.000
80	-----				-59586.891
	1	.000			.000
		.000	1118.268	-140701.331	176355.922
		175.000	1118.268	54995.561	
		175.000			.000
81	-----				176355.922
	1	.000			.000
		.000	854.742	223093.295	11921.608
		175.000	854.742	372673.189	
		175.000			.000
82	-----				11921.608
	1	.000			.000
		.000	-2096.380	313698.092	-4450.870
		175.000	-2096.380	-53168.434	
		175.000			.000
83	-----				-4450.870
	1	.000			.000
		.000	-253.752	-52201.874	16453.998
		125.000	-253.752	-83920.889	
		125.000			.000
84	-----				16453.998
	1	.000			.000
		.000	-91.287	-41541.431	8923.919
		54.000	-91.287	-46470.935	
		54.000			.000
85	-----				8923.919
	1	.000			.000
		.000	305.746	.000	
		65.000	305.746	19873.466	
		65.000			.000
86	-----				
	1	.000			.000
		.000	-1181.040	75775.361	
		130.000	-1181.040	-77759.816	
		130.000			.000
87	-----				
	1	.000			.000

	.000	826.286	-58808.449	
	185.000	826.286	94054.443	
	185.000			.000
88	-----			
1	.000			.000
	.000	-2779.547	146326.213	
	160.000	-2779.547	-298401.295	
	160.000			.000
89	-----			
1	.000			.000
	.000	3215.665	-322185.708	
	175.000	3215.665	240555.710	
	175.000			.000
90	-----			
1	.000			.000
	.000	168.089	165602.544	
	175.000	168.089	195018.121	
	175.000			.000
91	-----			
1	.000			.000
	.000	-2018.049	220941.954	
	175.000	-2018.049	-132216.647	
	175.000			.000
92	-----			
1	.000			.000
	.000	1426.246	-142910.606	
	125.000	1426.246	35370.204	
	125.000			.000
93	-----			
1	.000			.000
	.000	753.745	9436.978	
	45.000	753.745	43355.521	
	45.000			.000





NORMAL KAT DOSEMESI (DOSEME2)  
SYSTEM  
L=2

JOINTS

1	X=0	Y=0	Z=0	
2	X=160	Y=0		
3	X=355	Y=0		
4	X=545	Y=0		
6	X=945	Y=0		G=4,6,1
8	X=0	Y=65		
9	X=160	Y=65		
10	X=355	Y=65		
11	X=545	Y=65		
13	X=945	Y=65		G=11,13,1
14	X=1052.5	Y=65		
16	X=0	Y=195		
17	X=160	Y=195		
18	X=355	Y=195		
19	X=545	Y=195		
21	X=945	Y=195		G=19,21,1
23	X=1160	Y=195		G=21,23,1
24	X=0	Y=380		
48	X=0	Y=860		
49	X=160	Y=860		Q=24,25,48,49,1,8
34	X=355	Y=540		
50	X=355	Y=860		G=34,50,8
27	X=545	Y=380		
29	X=945	Y=380		
51	X=545	Y=860		
53	X=945	Y=860		Q=27,29,51,53,1,8
31	X=1160	Y=380		
55	X=1160	Y=860		G=31,55,8
30	X=1052.5	Y=380		
54	X=1052.5	Y=860		G=30,54,8
56	X=0	Y=975		
57	X=160	Y=975		
58	X=355	Y=975		
59	X=545	Y=975		
61	X=945	Y=975		G=59,61,1
62	X=1052.5	Y=975		G=61,62,1
64	X=0	Y=1145		
65	X=160	Y=1145		
66	X=355	Y=1145		
67	X=545	Y=1145		
69	X=945	Y=1145		G=67,69,1
70	X=0	Y=1244		
71	X=160	Y=1235		
72	X=355	Y=1224		
73	X=545	Y=1213		
74	X=745	Y=1201.5		
75	X=945	Y=1190		

RESTRAINTS

1,6,1	R=1,1,0,0,0,1
8,25,1	R=1,1,0,0,0,1
27,75,1	R=1,1,0,0,0,1
6	R=1,1,1,1,1,1
61	R=1,1,1,1,1,1

1,6,1 R=1,1,1,0,0,1  
15,63,48 R=1,1,1,0,0,1  
23,55,8 R=1,1,1,0,0,1  
14,62,48 R=1,1,1,0,0,1  
17,19,1 R=1,1,1,1,1,1  
33,35,1 R=1,1,1,1,1,1  
59 R=1,1,1,0,0,1  
1 R=1,1,1,0,1,1  
8,64,8 R=1,1,0,0,1,1  
70 R=1,1,0,0,1,1  
24 R=1,1,1,0,0,1  
13 R=1,1,1,1,1,1  
57 R=1,1,1,0,0,1

FRAME

NM=24

1	I=86666	A=2600	G=114000	J=216665	E=285000
2	I=105000	A=3150	G=114000	J=262500	
3	I=43333	A=1300	G=114000	J=10833	
4	I=115000	A=3450	G=114000	J=287500	
5	I=106666	A=3200	G=114000	J=266665	
6	I=53333	A=1600	G=114000	J=133333	
7	I=91666	A=2750	G=114000	J=229165	
8	I=95000	A=2850	G=114000	J=237500	
9	I=90000	A=2700	G=114000	J=225000	
10	I=86666	A=2600	G=114000	J=216665	
11	I=79333	A=2380	G=114000	J=198333	
12	I=75333	A=2260	G=114000	J=188333	
13	I=71666	A=2150	G=114000	J=179165	
14	I=357441	A=1750	G=114000	J=893602	
15	I=324852	A=1550	G=114000	J=812130	
16	I=305876	A=1450	G=114000	J=764690	
17	I=270471	A=1290	G=114000	J=676178	
18	I=247031	A=1200	G=114000	J=617578	
19	I=118333	A=3550	G=114000	J=295833	
20	I=128333	A=3850	G=114000	J=320833	
21	I=130000	A=3900	G=114000	J=325000	
22	I=133333	A=4000	G=114000	J=333333	
23	I=102500	A=3075	G=114000	J=256250	
24	I=463826	A=2750	G=114000	J=1159565	

1,8,9	M=1	G=4,1,1,1	LP=27,20
6,16,17	M=2		
7,17,18	M=3	G=1,1,1,1	
9,19,20	M=3	G=3,1,1,1	
13,24,25	M=4		
14,27,28	M=4	G=3,1,1,1	
18,32,33	M=5		
19,33,34	M=6	G=1,1,1,1	
21,35,36	M=5	G=3,1,1,1	
25,40,41	M=5	G=6,1,1,1	
32,48,49	M=7	G=6,1,1,1	
39,56,57	M=8	G=4,1,1,1	
44,64,65	M=9		
45,65,66	M=10		
46,66,67	M=11		
47,67,68	M=12		
48,68,69	M=13		
49,70,71	M=14		
50,71,72	M=15		

51,72,73	M=16		
52,73,74	M=17		
53,74,75	M=18		
54,1,8	M=6		LP=19,28
55,8,16	M=6	G=6,1,8,8	
62,64,70	M=6		
63,2,9	M=19		
64,9,17	M=19	G=6,1,8,8	
71,65,71	M=19		
72,3,10	M=20		
73,10,18	M=20		
74,34,42	M=20	G=3,1,8,8	
78,66,72	M=20		
79,4,11	M=21		
80,11,19	M=21	G=6,1,8,8	
87,67,73	M=21		
88,5,12	M=22		
89,12,20	M=22	G=6,1,8,8	
96,68,74	M=22		
97,13,21	M=23	G=5,1,8,8	
103,61,69	M=24		
104,69,75	M=24		
105,14,22	M=13	G=5,1,8,8	

LOADS

8	F=0,0,-400	L=1
9	F=0,0,-900	
10	F=0,0,-970	
11	F=0,0,-980	
12	F=0,0,-1000	
16	F=0,0,-640	
20	F=0,0,-1580	
21	F=0,0,-1222	
22	F=0,0,-850	
25	F=0,0,-690	
27	F=0,0,-860	
28	F=0,0,-1730	
29	F=0,0,-1330	
30	F=0,0,-940	
32	F=0,0,-640	
36	F=0,0,-1600	
37	F=0,0,-1230	
38	F=0,0,-860	
40	F=0,0,-640	
41	F=0,0,-1420	
42	F=0,0,-1540	
43	F=0,0,-1560	
44	F=0,0,-1600	
45	F=0,0,-1230	
46	F=0,0,-860	
48	F=0,0,-560	
49	F=0,0,-1230	
50	F=0,0,-1330	
51	F=0,0,-1350	
52	F=0,0,-1380	
53	F=0,0,-1060	
54	F=0,0,-750	
56	F=0,0,-570	
57	F=0,0,-1270	

58 F=0,0,-1380  
60 F=0,0,-1430  
64 F=0,0,-540  
65 F=0,0,-1160  
66 F=0,0,-1210  
67 F=0,0,-1170  
68 F=0,0,-1150  
69 F=0,0,-550  
70 F=0,0,-200  
71 F=0,0,-400  
72 F=0,0,-380  
73 F=0,0,-330  
74 F=0,0,-270  
75 F=0,0,-130  
8 F=0,0,-280 L=2  
9 F=0,0,-630  
10 F=0,0,-679  
11 F=0,0,-686  
12 F=0,0,-700  
16 F=0,0,-448  
20 F=0,0,-1106  
21 F=0,0,-854  
22 F=0,0,-595  
25 F=0,0,-483  
27 F=0,0,-602  
28 F=0,0,-1211  
29 F=0,0,-931  
30 F=0,0,-658  
32 F=0,0,-448  
36 F=0,0,-1120  
37 F=0,0,-861  
38 F=0,0,-602  
40 F=0,0,-448  
41 F=0,0,-994  
42 F=0,0,-1078  
43 F=0,0,-1092  
44 F=0,0,-1120  
45 F=0,0,-861  
46 F=0,0,-602  
48 F=0,0,-392  
49 F=0,0,-861  
50 F=0,0,-931  
51 F=0,0,-945  
52 F=0,0,-966  
53 F=0,0,-742  
54 F=0,0,-525  
56 F=0,0,-400  
57 F=0,0,-890  
58 F=0,0,-970  
60 F=0,0,-1000  
64 F=0,0,-378  
65 F=0,0,-812  
66 F=0,0,-847  
67 F=0,0,-819  
68 F=0,0,-805  
69 F=0,0,-385  
70 F=0,0,-140  
71 F=0,0,-280  
72 F=0,0,-266

73 F=0,0,-231  
74 F=0,0,-189  
75 F=0,0,-91

COMBO  
1 C=1.4,1.6



**NORMAL KAT DOSEMESI (DOSEME2)**

FRAME ELEMENT FORCES							
ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE	
ID	COMB	ENDI	SHEAR	MOMENT	FORCE	SHEAR	
						MOMENT	TORQ
1 -----							
	1	.000			.000		14614.518
		.000	-297.050	28252.920			
		160.000	-297.050	-19275.143			
		160.000			.000		14614.518
2 -----							
	1	.000			.000		1308.132
		.000	100.756	-11731.636			
		195.000	100.756	7915.712			
		195.000			.000		1308.132
3 -----							
	1	.000			.000		-5895.193
		.000	-325.911	11858.794			
		190.000	-325.911	-50064.376			
		190.000			.000		-5895.193
4 -----							
	1	.000			.000		-93041.258
		.000	931.589	-87949.599			
		200.000	931.589	98368.230			
		200.000			.000		-93041.258
5 -----							
	1	.000			.000		101125.266
		.000	-2376.543	248861.837			
		200.000	-2376.543	-226446.861			
		200.000			.000		101125.266
6 -----							
	1	.000			.000		-9916.365
		.000	-1367.885	109430.796			
		160.000	-1367.885	-109430.796			
		160.000			.000		-9916.365
7 -----							
	1	.000			.000		
		195.000			.000		
8 -----							
	1	.000			.000		
		190.000			.000		
9 -----							
	1	.000			.000		-5971.790
		.000	2187.517	-256146.968			
		200.000	2187.517	181356.356			
		200.000			.000		-5971.790
10 -----							
	1	.000			.000		-4349.122
		.000	-1059.949	161326.164			
		200.000	-1059.949	-50663.654			
		200.000			.000		-4349.122
11 -----							
	1	.000			.000		9463.801
		.000	1984.789	-42930.748			

	107.500	1984.789	170434.023		
	107.500			.000	9463.801
12	-----				
	1	.000		.000	.000
		.000	-526.297	56576.931	
		107.500	-526.297	.000	
		107.500		.000	.000
13	-----				
	1	.000		.000	3250.286
		.000	395.769	-42508.530	
		160.000	395.769	20814.510	
		160.000		.000	3250.286
14	-----				
	1	.000		.000	-54398.781
		.000	3256.622	-383468.445	
		200.000	3256.622	267855.962	
		200.000		.000	-54398.781
15	-----				
	1	.000		.000	-57212.641
		.000	926.606	217979.274	
		200.000	926.606	403300.492	
		200.000		.000	-57212.641
16	-----				
	1	.000		.000	38876.199
		.000	-1613.007	459212.581	
		107.500	-1613.007	285814.331	
		107.500		.000	38876.199
17	-----				
	1	.000		.000	.000
		.000	-3488.657	375030.629	
Ç		107.500	-3488.657	.000	
		107.500		.000	.000
18	-----				
	1	.000		.000	25975.820
		.000	-1682.381	134590.519	
		160.000	-1682.381	-134590.519	
		160.000		.000	25975.820
19	-----				
	1	.000		.000	
		195.000		.000	
20	-----				
	1	.000		.000	
		190.000		.000	
21	-----				
	1	.000		.000	23466.326
		.000	7036.714	-943839.123	
		200.000	7036.714	463503.579	
		200.000		.000	23466.326
22	-----				
	1	.000		.000	6971.516
		.000	1025.836	238472.747	
		200.000	1025.836	443639.922	
		200.000		.000	6971.516
23	-----				
	1	.000		.000	-15545.429

		.000	-1309.821	467988.670		
		107.500	-1309.821	327182.914		
		107.500			.000	-15545.429
24	-----					
	1	.000			.000	.000
		.000	-3859.619	414909.057		
		107.500	-3859.619	.000		
		107.500			.000	.000
25	-----					
	1	.000			.000	-19765.988
		.000	-387.299	32472.822		
		160.000	-387.299	-29495.060		
		160.000			.000	-19765.988
26	-----					
	1	.000			.000	-18535.047
		.000	32.508	-9958.849		
		195.000	32.508	-3619.799		
		195.000			.000	-18535.047
27	-----					
	1	.000			.000	-9658.176
		.000	-644.377	-10077.944		
		190.000	-644.377	-132509.539		
		190.000			.000	-9658.176
28	-----					
	1	.000			.000	116538.250
		.000	2222.132	-296779.654		
		200.000	2222.132	147646.676		
		200.000			.000	116538.250
29	-----					
	1	.000			.000	64691.902
		.000	860.882	143606.810		
		200.000	860.882	315783.283		
		200.000			.000	64691.902
30	-----					
	1	.000			.000	-67660.211
		.000	-960.228	344643.116		
		107.500	-960.228	241418.657		
		107.500			.000	-67660.211
31	-----					
	1	.000			.000	.000
		.000	-2813.329	302432.819		
		107.500	-2813.329	.000		
		107.500			.000	.000
32	-----					
	1	.000			.000	31925.072
		.000	-1138.326	78491.487		
		160.000	-1138.326	-103640.645		
		160.000			.000	31925.072
33	-----					
	1	.000			.000	-44814.809
		.000	1368.404	-128886.260		
		195.000	1368.404	137952.532		
		195.000			.000	-44814.809
34	-----					
	1	.000			.000	76835.266

		.000	-1443.603	108263.284			
		190.000	-1443.603	-166021.219			
		190.000			.000	76835.266	
35		-----					
	1	.000			.000	32300.445	
		.000	1841.520	-196361.621			
		200.000	1841.520	171942.297			
		200.000			.000	32300.445	
36		-----					
	1	.000			.000	75886.578	
		.000	-1277.495	206573.012			
		200.000	-1277.495	-48925.969			
		200.000			.000	75886.578	
37		-----					
	1	.000			.000	-120860.031	
		.000	2223.576	-35286.638			
		107.500	2223.576	203747.771			
		107.500			.000	-120860.031	
38		-----					
	1	.000			.000	.000	
		.000	-740.914	79648.260			
		107.500	-740.914	.000			
		107.500			.000	.000	
39		-----					
	1	.000			.000	16837.650	
		.000	-3751.247	291315.372			
		160.000	-3751.247	-308884.106			
		160.000			.000	16837.650	
40		-----					
	1	.000			.000	10192.872	
		.000	3472.508	-325140.131			
		195.000	3472.508	351998.890			
		195.000			.000	10192.872	
41		-----					
	1	.000			.000	57425.426	
		.000	-3562.982	332797.705			
		190.000	-3562.982	-344168.814			
		190.000			.000	57425.426	
42		-----					
	1	.000			.000	62176.770	
		.000	3496.845	-350636.640			
		200.000	3496.845	348732.319			
		200.000			.000	62176.770	
43		-----					
	1	.000			.000	3036.488	
		.000	-3494.136	349700.856			
		200.000	-3494.136	-349126.284			
		200.000			.000	3036.488	
44		-----					
	1	.000			.000	-14939.512	
		.000	-591.071	58048.641			
		160.000	-591.071	-36522.666			
		160.000			.000	-14939.512	
45		-----					
	1	.000			.000	69207.914	

		.000	699.153	-43216.102		
		195.000	699.153	93118.817		
		195.000			.000	69207.914
46	-----					
	1	.000			.000	8850.824
		.000	-709.130	85458.882		
		190.000	-709.130	-49275.765		
		190.000			.000	8850.824
47	-----					
	1	.000			.000	97468.898
		.000	472.851	-37974.175		
		200.000	472.851	56596.084		
		200.000			.000	97468.898
48	-----					
	1	.000			.000	32101.412
		.000	-709.623	60869.544		
		200.000	-709.623	-81054.966		
		200.000			.000	32101.412
49	-----					
	1	.000			.000	33913.961
		.000	-61.301	97250.999		
		160.253	-61.301	87427.325		
		160.253			.000	33913.961
50	-----					
	1	.000			.000	147388.422
		.000	-85.298	111380.359		
		195.310	-85.298	94720.743		
		195.310			.000	147388.422
51	-----					
	1	.000			.000	128801.109
		.000	-805.193	150523.141		
		190.318	-805.193	-2719.649		
		190.318			.000	128801.109
52	-----					
	1	.000			.000	244680.469
		.000	-428.565	69122.513		
		200.330	-428.565	-16732.163		
		200.330			.000	244680.469
53	-----					
	1	.000			.000	135228.656
		.000	-1695.458	98351.975		
		200.330	-1695.458	-241299.816		
		200.330			.000	135228.656
54	-----					
	1	.000			.000	
		.000	628.102	.000		
		65.000	628.102	40826.635		
		65.000			.000	
55	-----					
	1	.000			.000	
		.000	-82.848	26212.117		
		130.000	-82.848	15441.937		
		130.000			.000	
56	-----					
	1	.000			.000	

		.000	-327.763	25358.302	
		185.000	-327.763	-35277.777	
		185.000			.000
57		-----			
	1	.000			.000
		.000	327.975	-38528.063	
		160.000	327.975	13947.929	
		160.000			.000
58		-----			
	1	.000			.000
		.000	397.556	-12027.892	
		160.000	397.556	51581.137	
		160.000			.000
59		-----			
	1	.000			.000
		.000	-827.944	71347.124	
		160.000	-827.944	-61123.965	
		160.000			.000
60		-----			
	1	.000			.000
		.000	-1100.818	-93049.037	
		115.000	-1100.818	-219643.162	
		115.000			.000
61		-----			
	1	.000			.000
		.000	1212.428	-236480.813	
		170.000	1212.428	-30368.008	
		170.000			.000
62		-----			
	1	.000			.000
		.000	442.699	-15428.496	
		99.000	442.699	28398.699	
		99.000			.000
63		-----			
	1	.000			.000
Ç		.000	1291.286	.000	.000
		65.000	1291.286	83933.587	
		65.000			.000
64		-----			
	1	.000			.000
		.000	-1374.520	97239.973	7543.507
		130.000	-1374.520	-81447.636	
		130.000			.000
65		-----			
	1	.000			.000
		.000	584.595	-52521.615	9653.105
		185.000	584.595	55628.455	
		185.000			.000
66		-----			
	1	.000			.000
		.000	-758.436	58878.741	-11161.403
		160.000	-758.436	-62471.024	
		160.000			.000
67		-----			
	1	.000			.000
					-1651.736

		.000	2515.218	-208082.887		
		160.000	2515.218	194351.964		
		160.000			.000	-1651.736
68	-----					
	1	.000			.000	17884.475
		.000	-1482.989	193121.025		
		160.000	-1482.989	-44157.278		
		160.000			.000	17884.475
69	-----					
	1	.000			.000	-7361.141
		.000	-7089.319	32582.603		
		115.000	-7089.319	-782689.115		
		115.000			.000	-7361.141
70	-----					
	1	.000			.000	-23617.166
		.000	5197.427	-776044.336		
		170.000	5197.427	107518.228		
		170.000			.000	-23617.166
71	-----					
	1	.000			.000	-30310.602
		.000	984.003	23370.802		
		90.000	984.003	111931.048		
		90.000			.000	-30310.602
72	-----					
	1	.000			.000	.000
		.000	996.978	.000		
		65.000	996.978	64803.595		
		65.000			.000	.000
73	-----					
	1	.000			.000	3943.083
		.000	-1020.755	72006.921		
		130.000	-1020.755	-60691.171		
		130.000			.000	3943.083
74	-----					
	1	.000			.000	8163.977
		.000	2070.642	-200275.163		
		160.000	2070.642	131027.479		
		160.000			.000	8163.977
75	-----					
	1	.000			.000	1705.832
		.000	-1133.274	122150.608		
		160.000	-1133.274	-59173.188		
		160.000			.000	1705.832
76	-----					
	1	.000			.000	-27983.416
		.000	-1672.867	-180823.264		
		115.000	-1672.867	-373202.971		
		115.000			.000	-27983.416
77	-----					
	1	.000			.000	-47184.602
		.000	1878.622	-420435.526		
		170.000	1878.622	-101069.708		
		170.000			.000	-47184.602
78	-----					
	1	.000			.000	-54844.535

		.000	237.706	-40712.618		
		79.000	237.706	-21933.875		
		79.000			.000	-54844.535
79	-----					
	1	.000			.000	.000
		.000	1336.700	.000		
		65.000	1336.700	86885.509		
		65.000			.000	.000
80	-----					
	1	.000			.000	-37885.223
		.000	-2390.400	174031.573		
		130.000	-2390.400	-136720.482		
		130.000			.000	-37885.223
81	-----					
	1	.000			.000	177840.438
		.000	2182.380	-200457.233		
		185.000	2182.380	203282.983		
		185.000			.000	177840.438
82	-----					
	1	.000			.000	-205628.000
		.000	-3241.442	257681.763		
		160.000	-3241.442	-260949.036		
		160.000			.000	-205628.000
83	-----					
	1	.000			.000	111451.641
		.000	5589.619	-496221.136		
		160.000	5589.619	398117.882		
		160.000			.000	111451.641
84	-----					
	1	.000			.000	-52818.477
		.000	-1208.090	271921.455		
		160.000	-1208.090	78627.120		
		160.000			.000	-52818.477
85	-----					
	1	.000			.000	-83158.883
		.000	-7895.212	123161.943		
		115.000	-7895.212	-784787.417		
		115.000			.000	-83158.883
86	-----					
	1	.000			.000	-89626.703
		.000	5338.608	-789538.759		
		170.000	5338.608	118024.640		
		170.000			.000	-89626.703
87	-----					
	1	.000			.000	-78325.117
		.000	1208.227	29406.565		
		68.000	1208.227	111566.015		
		68.000			.000	-78325.117
88	-----					
	1	.000			.000	.000
		.000	766.097	.000		
		65.000	766.097	49796.305		
		65.000			.000	.000
89	-----					
	1	.000			.000	150493.609



		.000	1554.230	-144370.217		
		130.000	1554.230	57679.635		
		130.000			.000	150493.609
90	-----					
	1	.000			.000	130463.414
		.000	820.095	56056.967		
		185.000	820.095	207774.604		
		185.000			.000	130463.414
91	-----					
	1	.000			.000	80586.727
		.000	-1209.489	210588.464		
		160.000	-1209.489	17070.269		
		160.000			.000	80586.727
92	-----					
	1	.000			.000	-144444.109
		.000	769.389	33565.080		
		160.000	769.389	156667.306		
		160.000			.000	-144444.109
93	-----					
	1	.000			.000	-148483.969
		.000	-1901.362	208513.656		
		160.000	-1901.362	-95704.233		
		160.000			.000	-148483.969
94	-----					
	1	.000			.000	-113853.258
		.000	-2259.947	-139290.366		
		115.000	-2259.947	-399184.307		
		115.000			.000	-113853.258
95	-----					
	1	.000			.000	-112884.719
		.000	1129.033	-340044.025		
		170.000	1129.033	-148108.385		
		170.000			.000	-112884.719
96	-----					
	1	.000			.000	-108611.258
		.000	-586.493	-82740.898		
		56.500	-586.493	-115877.751		
		56.500			.000	-108611.258
97	-----					
	1	.000			.000	-65270.375
		.000	7067.855	-835005.612		
		130.000	7067.855	83815.540		
		130.000			.000	-65270.375
98	-----					
	1	.000			.000	-57537.469
		.000	945.917	70002.618		
		185.000	945.917	244997.332		
		185.000			.000	-57537.469
99	-----					
	1	.000			.000	-1625.381
		.000	133.930	148908.493		
		160.000	133.930	170337.364		
		160.000			.000	-1625.381
100	-----					
	1	.000			.000	22723.367

		.000	-630.013	192854.309		
		160.000	-630.013	92052.278		
		160.000			.000	22723.367
101	-----					
	1	.000			.000	51583.199
		.000	-1908.503	224404.388		
		160.000	-1908.503	-80956.060		
		160.000			.000	51583.199
102	-----					
	1	.000			.000	65222.531
		.000	-8080.774	115790.547		
		115.000	-8080.774	-813498.418		
		115.000			.000	65222.531
103	-----					
	1	.000			.000	-314194.031
		.000	4118.681	-972172.340		
		170.000	4118.681	-271996.567		
		170.000			.000	-314194.031
104	-----					
	1	.000			.000	-233139.078
		.000	2023.058	-239895.154		
		45.000	2023.058	-148857.523		
		45.000			.000	-233139.078
105	-----					
	1	.000			.000	.000
		.000	-46.545	.000		
		130.000	-46.545	-6050.883		
		130.000			.000	.000
106	-----					
	1	.000			.000	-113857.094
		.000	322.540	3412.917		
		185.000	322.540	63082.880		
		185.000			.000	-113857.094
107	-----					
	1	.000			.000	-24640.793
		.000	-170.610	101959.078		
		160.000	-170.610	74661.536		
		160.000			.000	-24640.793
108	-----					
	1	.000			.000	63085.348
		.000	211.989	59116.107		
		160.000	211.989	93034.270		
		160.000			.000	63085.348
109	-----					
	1	.000			.000	124099.516
		.000	-102.110	25374.061		
		160.000	-102.110	9036.387		
		160.000			.000	124099.516
110	-----					
	1	.000			.000	.000
		.000	972.379	-111823.641		
		115.000	972.379	.000		
		115.000			.000	.000

#### 2.4. Normal Kat Döşemesi Betonarme Kesit Hesapları:

Daha öncede bahsedildiği üzere, kirişsiz döşemeler de momentler, kolon ve açıklık şeritlerine paylaştırılmaktadır.

Kolon şeritinin genişliği, kolon (veya perde) aksının her iki yönünde 0,25 l<sub>1</sub> veya 0,25 l<sub>2</sub> den küçük olanı temel alınarak belirlenmiştir. Açıklık şeritinin genişliği, iki aks arasında 0,25 l<sub>1</sub> veya 0,25 l<sub>2</sub> nin arasında kolon 0,50 l<sub>1</sub> ve 0,50 l<sub>2</sub> lik alanlar dır.

Döşemede kolon ve açıklık şeritleri içerisinde kalan elemanlarda meydana gelen, kesit tesirlerinin en elverişsizleri alınarak, kolon ve açıklık şeritleri için ayrı ayrı betonarme kesit hesapları yapılmıştır. Betonarme hesaplarda abaklardan faydalanılmıştır.

##### 2.4.1 Normal Kat Döşemesi Betonarme Hesapları

(X- Doğrultusunda)

$$h_f = 20 \text{ cm}$$

$$d = 20 - 2 = 18 \text{ cm}$$

$$K = \frac{bdz}{M}$$

$$A_s = k_s \frac{M}{d}$$

[b,d]: cm

[M] : tcm

Malzeme : BS 20. BÇ III

b' : Şerit Genişliği

Tablo 2.4.1.1 A-A Aksı Kolon Şeridi

$b' = 90$  cm (şerit genişliği)

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,61	531,14	0,294	1,00		Ø10/40 (1,97 cm <sup>2</sup> )	
2,28	142,10	0,301	3,82	Ø10/20 (3,93)		
0,64	506,25	0,294	1,05		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
0,51	635,30	0,293	0,83	Ø10/20 (3,93)		
-0,90	360	0,295	1,48		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
0,12	2700	0,290	0,20	Ø10/20 (3,93)		
-0,97	334	0,296	1,60		Ø10/40+Ø10/35 (4,21 cm <sup>2</sup> )	
+2,47	131,17	0,302	4,14	Ø10/17.5 (4,49)		
-2,25	143,36	0,301	3,78		Ø10/35 (2,25 cm <sup>2</sup> )	Ø10/33 (2,38)

Tablo 2.4.1.2 C-C Aksı Kolon Şeridi

$b' = 137,5$  cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
3,43	94,46	0,306	5,83	Ø10/13,5 (5,82cm <sup>2</sup> )		
-6,01	53,91	0,312	10,42		Ø10/27 (2,91)	Ø10/10 (7,51)
-	-	-	-	-	-	-
-1,68	192,86	0,299	2,79	Ø10/27 (2,91cm <sup>2</sup> )		

Tablo 2.4.1.3 D-D Aksı Kolon Şeridi (Solyan)

b' = 180 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
+3,43	94,46	0,305	5,81	Ø10/13,5 (5,82)		
-6,57	49,32	0,320	11,68		Ø10/27+Ø10/33 (5,29 cm <sup>2</sup> )	Ø10/12 (6,54cm <sup>2</sup> )
2,76	117,39	0,303	4,65	Ø10/16,5 (4,76)		
-3,86	83,94	0,307	6,58		Ø10/33 (2,38cm <sup>2</sup> )	Ø10/18,5 (4,25cm <sup>2</sup> )

Tablo 2.4.1.4 E-E Aksı Kolon Şeridi

b' =135 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,70	462,80	0,294	1,14		Ø10/40 (1,96 cm <sup>2</sup> )	
+1,88	172,34	0,299	3,12	Ø10/20 (3,93cm <sup>2</sup> )		
-1,66	195,10	0,298	2,75		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
+2,03	159,60	0,300	3,38	Ø10/20 (3,93)		
-2,73	118,68	0,303	4,60		Ø10/40+Ø10/36 (4,21cm <sup>2</sup> )	Ø10/33 (2,38)
+2,46	131,71	0,301	4,11	Ø10/18 (4,49)		
-2,45	132,25	0,301	4,09		Ø10/38+Ø10/38 (4,31 cm <sup>2</sup> )	
+2,44	132,78	0,301	4,08	Ø10/19 (4,13)		
-2,44	132,78	0,301	4,08		Ø10/38 (2,02 cm <sup>2</sup> )	Ø10/33 (2,38)
2,32	139	0,301	3,88	Ø10/20 (3,93cm <sup>2</sup> )		

Tablo 2.4.1.5 D-D Aksı Kolon Şeridi (Sağyan)

b' = 197,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-5,11	53,41	0,313	8,88		Ø10/32 (2,45 cm <sup>2</sup> )	Ø10/12 (6,54)
2,83	114,48	0,303	4,76	Ø10/16 (4,91)		

Tablo 2.4.1.6 A-A ve C-C Aksı Arası Açıklık Şeridi

b' = 190 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Ø10/27 (2,91 cm <sup>2</sup> )	
+3,43	94,46	0,306	5,83	Ø10/13,5 (5,83)		
-4,43	73,14	0,310	7,63		Ø10/27+Ø10/40 (4,88 cm <sup>2</sup> )	Ø10/20 (3,93)
+1,06	305,66	0,296	1,74	Ø10/20 (3,93)		
-1,68	192,86	0,299	2,79		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/33 (2,38)

Tablo 2.4.1.7 C-C ve D-D Aksı Arası Açıklık Şeridi

b' = 85 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Ø10/27 (2,91 cm <sup>2</sup> )	
+3,43	94,46	0,306	5,83	Ø10/13,5 (5,83)		
-4,43	73,14	0,310	7,63		Ø10/27 (2,92 cm <sup>2</sup> )	Ø10/14 (5,61)

Tablo 2.4.1.8 D-D ve E-E Aksları arası açıklık Şeridi  
b' =272,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
3,28	98,78	0,305	5,56	Ø10/13,5 (5,82)		
-2,79	116,13	0,303	4,69		Ø10/27+Ø10/40 (4,87 cm <sup>2</sup> )	
1,50	216	0,238	1,98	Ø10/20 (3,93)		
-1,84	176	0,299	3,06		Ø10/40+Ø10/40 (3,93 cm <sup>2</sup> )	
1,50	216	0,238	1,98	Ø10/20 (3,93)		
-1,85	175,10	0,299	3,06		Ø10/40+Ø10/40 (3,93 cm <sup>2</sup> )	
-2,15	150,7	0,300	3,58	Ø10/20 (3,93)		
-2,42	133,88	0,301	4,05		Ø10/40+Ø10/40 (3,93 cm <sup>2</sup> )	Ø10/33 (2,38)
+1,48	218,91	0,238	1,98	Ø10/20 (3,93)		

Tablo 2.4.1.9 B-B ve D-D Aksları Arası Açıklık Şeridi  
b' =167,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,16	150	0,300	3,6		Ø10/36 (2,15)	Ø10/33 (2,38)
2,57	126	0,302	4,3	Ø10/18 (4,36)		
					Ø10/36 (2,15)	

Tablo 2.4.1.10. B-B Aksı Kolon Şeridi (Sağ yan)

b' = 135 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,63	198	0,299	2,71		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/33 (2,38)
+1,16	279	0,296	1,91	Ø10/20 (3,93)		
-0,36	900	0,291	0,58		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
+0,38	852	0,291	0,61	Ø10/20 (3,93)		

2.4.2. Normal kat Döşemesi Betonarme Hesapları  
(Y Doğrultusu)

Tablo 2.4.2.1. 1-1 Aksı Kolon Şeridi

d = 17 cm      b' = 150

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,25	144	0,301	3,98		Ø10/36 (2,18cm <sup>2</sup> )	Ø10/33 (2,38)
2,46	131,7	0,301	4,36	Ø10/18 (4,36)		
-3,63	89,26	0,306	6,53		Ø10/36 (2,18cm <sup>2</sup> )	Ø10/18 (4,36)



Tablo 2.4.2.2. 2-2 Aksı Kolon Şeridi

b' = 192,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,21	146,60	0,301	3,91		Ø10/32 (2,46cm <sup>2</sup> )	Ø10/33 (2,38)
+2,72	119	0,300	4,80	Ø10/16 (4,91)		
-5,49	59	0,309	9,98		Ø10/32 (2,46cm <sup>2</sup> )	
-7,96	40,70	0,332	15,54		Ø10/25 (3,14cm <sup>2</sup> )	Ø12/9 (12,59)
3,47	93,37	0,306	6,25	Ø10/12,5 (6,28)		
-5,47	59,23	0,315	10,14		Ø10/25+Ø10/40 (5,10cm <sup>2</sup> )	Ø10/15 (5,24)
0,66	490,9	0,294	1,14	Ø10/20 (3,93)		

Tablo 2.4.2.3 3-3 Aksı Kolon Şeridi

b = 192,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,73	187,28	0,299	3,04		Ø10/40 (1,96cm <sup>2</sup> )	
0,95	341	0,295	1,65	Ø10/20 (3,93)		
-1,58	205	0,298	2,77		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
1,83	177	0,299	3,22	Ø10/20 (3,93)		
-4,03	80,40	0,308	7,30		Ø10/40+Ø10/28 (4,77cm <sup>2</sup> )	Ø10/3 (2,62)
3	108	0,304	5,37	Ø10/14 (5,61)		
-4,39	73,80	0,310	8,00		Ø10/28 (2,80cm <sup>2</sup> )	Ø10/15 (5,24)
5,42	59,78	0,315	10,04	Ø10/7,5 (10,47)		

Tablo 2.4.2.4. 4-4 Aksı Kolon Şeridi

b = 192,5 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,64	197,56	0,299	2,88		Ø10/40 (1,96cm <sup>2</sup> )	
0,9	360	0,295	1,56	Ø10/20 (3,93)		
-1,03	314,6	0,295	1,79		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
1,32	245,45	0,297	2,31	Ø10/20 (3,93)		
-2,54	127,56	0,302	4,51		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	Ø10/33 (2,38)
2,04	158,82	0,300	3,60	Ø10/20 (3,93)		
-5,66	57,24	0,316	10,52		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	Ø10/12 (6,54)
0,61	531,14	0,293	1,05	Ø10/20 (3,93)		

Tablo 2.4.2.5. 5-5 Aksı Kolon Şeridi

b = 150 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-6,95	46,62	0,325	13,29		Ø10/23 (3,42cm <sup>2</sup> )	Ø10/7,5 (10,47)
3,72	87,09	0,307	6,72	Ø10/11,5 (6,83)		
-7,48	43,31	0,327	14,39		Ø10/23 (3,42cm <sup>2</sup> )	Ø10/7 (11,22)

Tablo 2.4.2.6. 1-1 Aksı Konsol Açıklık Şeridi

b = 160 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
+1,31	220	0,298	2,29	Φ10/20 (3,93)		
					Φ10/40 (1,96cm <sup>2</sup> )	

Tablo 2.4.2.7. 1-1 ve 2-2 Aksları Arası Açıklık Şeridi

b = 192,5 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
1,16	249	0,297	2,02	Φ10/20 (3,93)		
-0,87	332	0,295	1,51		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	
1,83	157,92	0,300	3,23	Φ10/20 (3,93)		
-0,68	425	0,294	1,176		Φ10/40 (1,96cm <sup>2</sup> )	

Tablo 2.4.2.8. 2-2 ve 3-3 Aksları Arası Açıklık Şeridi  
b = 192,5 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
+0,44	656	0,293	0,76	Φ10/20 (3,93)		
-0,38	760	0,292	0,66		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	
+0,22	1313	0,291	0,38	Φ10/20 (3,93)		
-0,85	340	0,295	1,48		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	
1,93	149,7	0,301	3,42	Φ10/20 (3,93)		
-0,44	656,8	0,293	0,76		Φ10/40 (1,96cm <sup>2</sup> )	

Tablo 2.4.2.9. 3-3 ve 4-4 Aksları Arası Açıklık Şeridi  
b = 192,5 cm

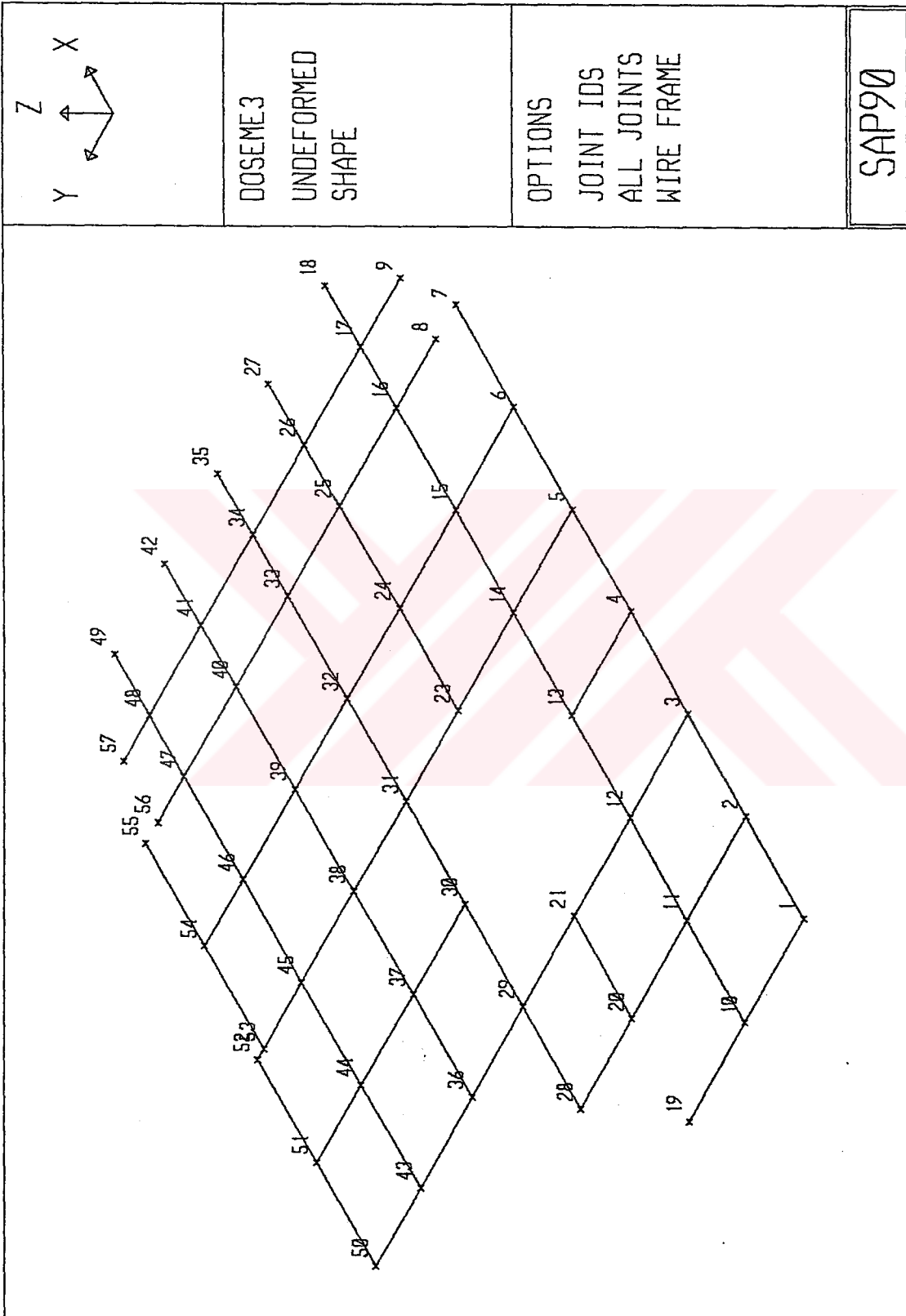
Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
0,37	781	0,234	0,51	Φ10/20 (3,93)		
-0,32	903	0,292	0,55		Φ10/40 (1,96cm <sup>2</sup> )	
-	-	-	-	-	-	-
-1,04	277,88	0,296	1,81		Φ10/40 (1,96cm <sup>2</sup> )	
0,68	425	0,294	1,18	Φ10/20 (3,93)		
-2,18	132,57	0,301	3,86		Φ10/40 (1,96cm <sup>2</sup> )	

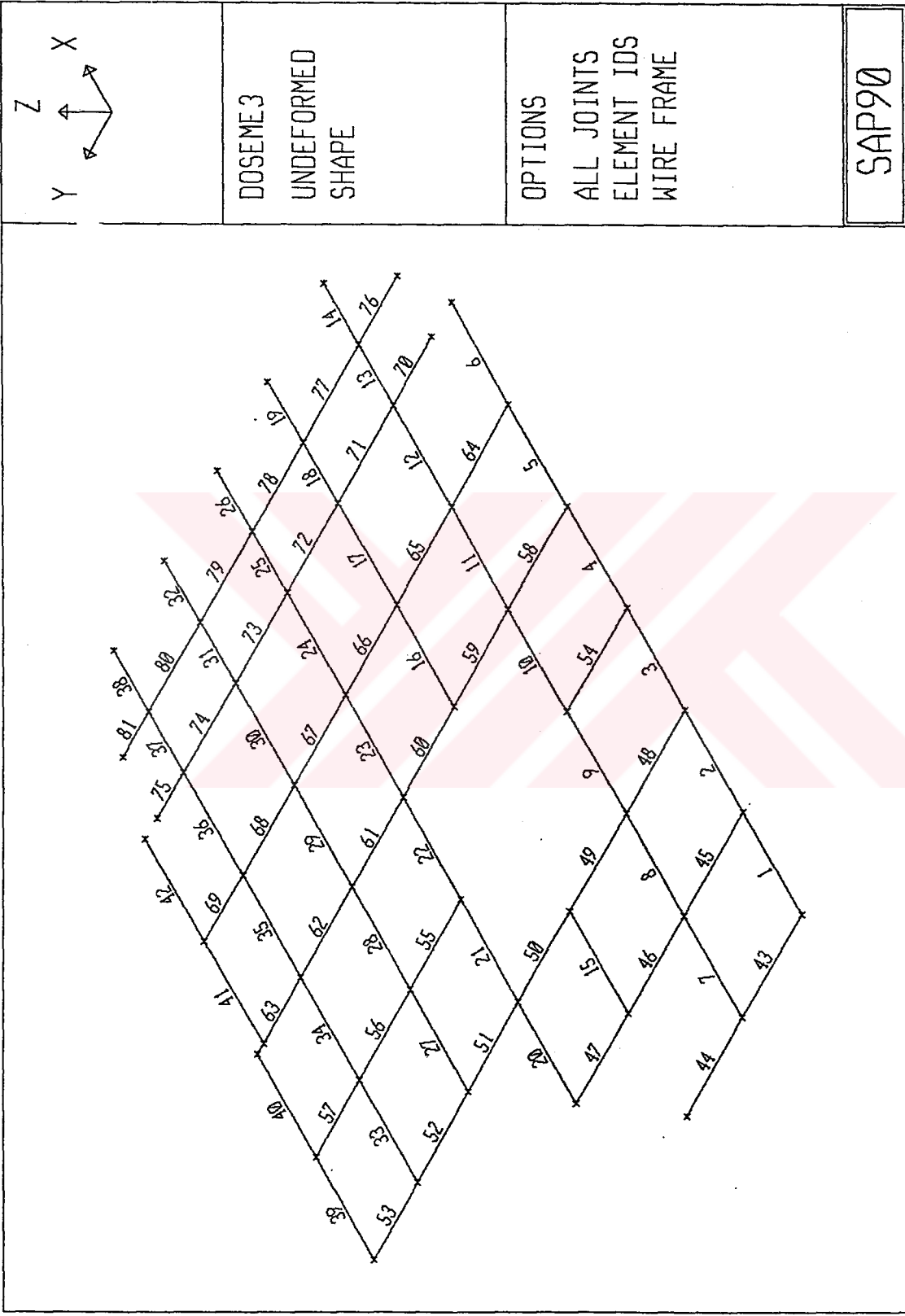
Tablo 2.4.2.10. 4-4 ve 5-5 Aksları Arası Açıklık Şeridi  
b = 192,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,72	401	0,294	1,25		Ø10/40 (1,96cm <sup>2</sup> )	
1,05	275	0,295	1,82	Ø10/20 (3,93)		
-2,00	144,5	0,301	3,54		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/33 (2,38)

## 2.5. Zemin Kat Döşemesi Statik Hesabı

Zemin Kat Döşemesinde bulunan 3 farklı tip döşeme vardır. Bunlar Döşeme 3, Döşeme 4 ve Döşeme 5 adı altında çözümleri yapılmıştır.





ZEMIN KAT DOSEMESI (DOSEME3)  
SYSTEM  
L=2

JOINTS

1 X=0 Y=0  
7 X=1155 Y=0 G=1,7,1  
10 X=0 Y=195  
16 X=1155 Y=195 G=10,16,1  
8 X=1155 Y=65  
9 X=1270 Y=65  
18 X=1385 Y=195 G=16,18,1  
19 X=0 Y=380  
21 X=385 Y=380 G=19,21,1  
23 X=770 Y=380  
25 X=1155 Y=380 G=23,25,1  
27 X=1385 Y=380 G=25,27,1  
28 X=192.5 Y=550  
29 X=385 Y=550  
33 X=1155 Y=550  
43 X=385 Y=890  
47 X=1155 Y=890 Q=29,33,43,47,1,7  
34 X=1270 Y=550  
48 X=1270 Y=890 G=34,48,7  
35 X=1385 Y=550  
49 X=1385 Y=890 G=35,49,7  
50 X=385 Y=1035  
52 X=770 Y=1035 G=50,52,1  
53 X=770 Y=1015  
55 X=1155 Y=1015 G=53,55,1  
56 X=1155 Y=975  
57 X=1270 Y=975

RESTRAINTS

1,21,1 R=1,1,0,0,0,1  
23,57,1 R=1,1,0,0,0,1  
1,7,2 R=1,1,1,0,0,1  
8 R=1,1,1,1,1,1  
9 R=1,1,1,0,0,1  
12,14,1 R=1,1,1,1,1,1  
19,20,1 R=1,1,1,1,1,1  
28 R=1,1,1,1,1,1  
29,31,1 R=1,1,1,1,1,1  
50 R=1,1,1,0,0,1  
52,53,1 R=1,1,1,0,0,1  
55,56,1 R=1,1,1,1,1,1  
18,27,9 R=1,1,1,0,0,1  
35,49,7 R=1,1,1,0,0,1  
57 R=1,1,1,0,0,1

FRAME

NM=16

1 I=126666 A=3800 G=114000 J=316665 E=285000  
2 I=126666 A=3800 G=114000 J=316665  
3 I=105000 A=3550 G=114000 J=262500  
4 I=118333 A=1700 G=114000 J=295833  
5 I=56666 A=1700 G=114000 J=141665  
6 I=113333 A=3400 G=114000 J=283333  
7 I=105000 A=3150 G=114000 J=262500



8	I=98333	A=2950	G=114000	J=245833
9	I=85000	A=2550	G=114000	J=212500
10	I=48333	A=1450	G=114000	J=120833
11	I=41666	A=1250	G=114000	J=104165
12	I=64166	A=1925	G=114000	J=160415
13	I=128333	A=3850	G=114000	J=320833
14	I=102500	A=3075	G=114000	J=256250
15	I=76666	A=2300	G=114000	J=191665
16	I=76666	A=2300	G=114000	J=191665

1,1,2 M=1 G=5,1,1,1 LP=45,39

7,10,11 M=2 G=1,1,1,1

9,12,13 M=1 G=1,1,1,1

11,14,15 M=2 G=1,1,1,1

13,16,17 M=3 G=1,1,1,1

15,20,21 M=4

16,23,24 M=4 G=3,1,1,1

20,28,29 M=5 G=2,1,1,1

23,31,32 M=6 G=3,1,1,1

27,36,37 M=6 G=5,1,1,1

33,43,44 M=7 G=1,1,1,1

35,45,46 M=8 G=1,1,1,1

37,47,48 M=9 G=1,1,1,1

39,50,51 M=10 G=1,1,1,1

41,53,54 M=11 G=1,1,1,1

43,1,10 M=12 G=1,1,9,9 LP=15,25

45,2,11 M=13 G=1,1,9,9

47,20,28 M=12

48,3,12 M=13 G=1,6,1,1

58,5,14 M=13 G=1,6,1,1

49,12,21 M=12 G=1,1,9,8

59,14,23 M=12 G=1,1,9,8

65,15,24 M=13 G=1,1,9,8

71,16,25 M=14 G=1,1,9,8

70,8,16 M=14

76,9,17 M=15 G=1,1,8,9

78,26,34 M=15

51,29,36 M=16 G=2,1,7,7

55,30,37 M=13 G=2,1,7,7

61,31,38 M=13 G=2,1,7,7

67,32,39 M=13 G=1,1,7,7

73,33,40 M=14 G=1,1,7,7

79,34,41 M=15 G=1,1,7,7

69,46,54 M=13

75,47,56 M=14

81,48,57 M=15

LOADS

2,6,2 F=0,0,-940 L=1

10 F=0,0,-760

11 F=0,0,-1520

15 F=0,0,-1520

16 F=0,0,-1220

17 F=0,0,-910

21 F=0,0,-860

23 F=0,0,-860

24 F=0,0,-1710

25 F=0,0,-1370

26 F=0,0,-1020

32 F=0,0,-1630

33 F=0,0,-1310  
34 F=0,0,-980  
37,39,1 F=0,0,-1640  
40 F=0,0,-1310  
41 F=0,0,-980  
44 F=0,0,-1520  
45 F=0,0,-1500  
46 F=0,0,-1420  
47 F=0,0,-1000  
48 F=0,0,-720  
51 F=0,0,-720  
54 F=0,0,-630  
2,6,2 F=0,0,-658 L=2  
10 F=0,0,-532  
11 F=0,0,-1064  
15 F=0,0,-1064  
16 F=0,0,-854  
17 F=0,0,-637  
21 F=0,0,-602  
23 F=0,0,-602  
24 F=0,0,-1197  
25 F=0,0,-959  
26 F=0,0,-714  
32 F=0,0,-1141  
33 F=0,0,-917  
34 F=0,0,-686  
37,39,1 F=0,0,-1148  
40 F=0,0,-917  
41 F=0,0,-686  
44 F=0,0,-1064  
45 F=0,0,-1050  
46 F=0,0,-994  
47 F=0,0,-700  
48 F=0,0,-504  
51 F=0,0,-504  
54 F=0,0,-441

COMBO

1 C=1.4,1.6

□

### ZEMIN KAT DOSEMESI (DOSEME3)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE	AXIAL TORQ
			SHEAR	MOMENT		SHEAR	
1 -----							
1	1	.000			.000		40525.234
		.000	1069.695	-26249.228			
		192.500	1069.695	179667.025			
		192.500			.000		40525.234
2 -----							
2	1	.000			.000		17467.232
		.000	-1603.602	161210.248			
		192.500	-1603.602	-147483.085			
		192.500			.000		17467.232
3 -----							
3	1	.000			.000		8730.592
		.000	1097.252	-127437.086			
		192.500	1097.252	83784.009			
		192.500			.000		8730.592
4 -----							
4	1	.000			.000		-15269.533
		.000	-958.234	81999.695			
		192.500	-958.234	-102460.387			
		192.500			.000		-15269.533
5 -----							
5	1	.000			.000		-50166.422
		.000	1054.656	-114476.817			
		192.500	1054.656	88544.432			
		192.500			.000		-50166.422
6 -----							
6	1	.000			.000		.000
		.000	-941.243	181189.292			
		192.500	-941.243	.000			
		192.500			.000		.000
7 -----							
7	1	.000			.000		11795.068
		.000	231.094	20429.858			
		192.500	231.094	64915.369			
		192.500			.000		11795.068
8 -----							
8	1	.000			.000		-33086.359
		.000	-1541.328	116720.314			
		192.500	-1541.328	-179985.387			
		192.500			.000		-33086.359
9 -----							
9	1	.000			.000		
		192.500			.000		
10 -----							
10	1	.000			.000		
		192.500			.000		

11	-----					
	1	.000			.000	-145398.609
		.000	4609.516	-561275.332		
		192.500	4609.516	326056.557		
		192.500			.000	-145398.609
12	-----					
	1	.000			.000	-122332.172
		.000	-1794.269	333607.286		
		192.500	-1794.269	-11789.536		
		192.500			.000	-122332.172
13	-----					
	1	.000			.000	123665.695
		.000	2049.519	6078.246		
		115.000	2049.519	241772.951		
		115.000			.000	123665.695
14	-----					
	1	.000			.000	.000
		.000	-1079.260	124114.927		
		115.000	-1079.260	.000		
		115.000			.000	.000
15	-----					
	1	.000			.000	2178.929
		.000	502.912	-70627.353		
		192.500	502.912	26183.179		
		192.500			.000	2178.929
16	-----					
	1	.000			.000	-75085.883
		.000	1804.192	-201390.615		
		192.500	1804.192	145916.269		
		192.500			.000	-75085.883
17	-----					
	1	.000			.000	-52597.348
		.000	1353.621	146566.231		
		192.500	1353.621	407138.296		
		192.500			.000	-52597.348
18	-----					
	1	.000			.000	50579.199
		.000	-1041.552	428521.421		
		115.000	-1041.552	308742.973		
		115.000			.000	50579.199
19	-----					
	1	.000			.000	.000
		.000	-3402.106	391242.207		
		115.000	-3402.106	.000		
		115.000			.000	.000
20	-----					
	1	.000			.000	
		192.500			.000	
21	-----					
	1	.000			.000	
		192.500			.000	
22	-----					
	1	.000			.000	
		192.500			.000	
23	-----					

	1	.000			.000	-5007.612
		.000	8441.529	-1.0814E+06		
		192.500	8441.529	543581.786		
		192.500			.000	-5007.612
24	-----					
	1	.000			.000	24834.607
		.000	1193.548	241259.790		
		192.500	1193.548	471017.698		
		192.500			.000	24834.607
25	-----					
	1	.000			.000	-1612.990
		.000	-1168.873	476448.898		
		115.000	-1168.873	342028.486		
		115.000			.000	-1612.990
26	-----					
	1	.000			.000	.000
		.000	-3842.900	441933.484		
		115.000	-3842.900	.000		
		115.000			.000	.000
27	-----					
	1	.000			.000	-69993.156
		.000	413.936	-8326.654		
		192.500	413.936	71355.982		
		192.500			.000	-69993.156
28	-----					
	1	.000			.000	-15956.969
		.000	-533.437	26917.990		
		192.500	-533.437	-75768.542		
		192.500			.000	-15956.969
29	-----					
	1	.000			.000	198202.422
		.000	2058.702	-245883.511		
		192.500	2058.702	150416.715		
		192.500			.000	198202.422
30	-----					
	1	.000			.000	137919.094
		.000	466.408	161149.110		
		192.500	466.408	250932.575		
		192.500			.000	137919.094
31	-----					
	1	.000			.000	-58032.570
		.000	-652.581	293502.742		
		115.000	-652.581	218455.926		
		115.000			.000	-58032.570
32	-----					
	1	.000			.000	.000
		.000	-2550.932	293357.154		
		115.000	-2550.932	.000		
		115.000			.000	.000
33	-----					
	1	.000			.000	-14729.305
		.000	1082.551	-23762.900		
		192.500	1082.551	184628.184		
		192.500			.000	-14729.305
34	-----					

1	.000			.000	93528.273
	.000	-725.469	115375.652		
	192.500	-725.469	-24277.083		
	192.500			.000	93528.273
35	-----				
1	.000			.000	24557.691
	.000	1022.449	-70293.094		
	192.500	1022.449	126528.365		
	192.500			.000	24557.691
36	-----				
1	.000			.000	74009.039
	.000	-3121.913	320219.090		
	192.500	-3121.913	-280749.211		
	192.500			.000	74009.039
37	-----				
1	.000			.000	-116769.844
	.000	3482.822	-193796.129		
	115.000	3482.822	206728.361		
	115.000			.000	-116769.844
38	-----				
1	.000			.000	.000
	.000	-583.312	67080.925		
	115.000	-583.312	.000		
	115.000			.000	.000
39	-----				
1	.000			.000	1996.409
	.000	913.314	-22404.440		
	192.500	913.314	153408.579		
	192.500			.000	1996.409
40	-----				
1	.000			.000	71542.805
	.000	-1819.695	216289.107		
	192.500	-1819.695	-134002.269		
	192.500			.000	71542.805
41	-----				
1	.000			.000	.000
	.000	658.581	.000		
	192.500	658.581	126776.899		
	192.500			.000	.000
42	-----				
1	.000			.000	-51706.383
	.000	-1421.326	123830.224		
	192.500	-1421.326	-149774.939		
	192.500			.000	-51706.383
43	-----				
1	.000			.000	-26249.229
	.000	833.494	-40525.234		
	195.000	833.494	122006.103		
	195.000			.000	-26249.229
44	-----				
1	.000			.000	-5819.371
	.000	-1312.800	110211.035		
	185.000	-1312.800	-132656.878		
	185.000			.000	-5819.371
45	-----				

	1	.000			.000	-18456.777
		.000	304.497	23058.002		
		195.000	304.497	82434.829		
		195.000			.000	-18456.777
46	-----					
	1	.000			.000	33348.168
		.000	-1753.482	127316.257		
		185.000	-1753.482	-197077.833		
		185.000			.000	33348.168
47	-----					
	1	.000			.000	
		170.000			.000	
48	-----					
	1	.000			.000	20045.998
		.000	-67.205	8736.640		
		195.000	-67.205	-4368.320		
		195.000			.000	20045.998
49	-----					
	1	.000			.000	12538.424
		.000	770.244	-70018.115		
		185.000	770.244	72476.956		
		185.000			.000	12538.424
50	-----					
	1	.000			.000	-13644.755
		.000	-894.045	74655.885		
		170.000	-894.045	-77331.683		
		170.000			.000	-13644.755
51	-----					
	1	.000			.000	54493.992
		.000	657.107	-114063.111		
L		170.000	657.107	-2354.978		
		170.000			.000	54493.992
52	-----					
	1	.000			.000	46167.340
		.000	243.171	67638.178		
		170.000	243.171	108977.231		
		170.000			.000	46167.340
53	-----					
	1	.000			.000	22404.439
		.000	-839.380	123706.536		
		145.000	-839.380	1996.409		
		145.000			.000	22404.439
54	-----					
	1	.000			.000	-1784.314
		.000	-313.313	24000.125		
		195.000	-313.313	-37095.981		
		195.000			.000	-1784.314
55	-----					
	1	.000			.000	50809.996
		.000	4289.198	-551766.024		
		170.000	4289.198	177397.639		
		170.000			.000	50809.996
56	-----					
	1	.000			.000	6372.004
		.000	1103.770	123361.451		

	170.000	1103.770	311002.405		
	170.000			.000	6372.004
57	-----				
	1 .000			.000	-62880.527
	.000	-918.610	202744.824		
	145.000	-918.610	69546.397		
	145.000			.000	-62880.527
58	-----				
	1 .000			.000	-12016.430
	.000	-268.438	34896.888		
	195.000	-268.438	-17448.444		
	195.000			.000	-12016.430
59	-----				
	1 .000			.000	96440.578
	.000	1543.219	-148225.553		
	185.000	1543.219	137269.942		
	185.000			.000	96440.578
60	-----				
	1 .000			.000	-104950.039
	.000	-2428.173	212355.822		
	170.000	-2428.173	-200433.540		
	170.000			.000	-104950.039
61	-----				
	1 .000			.000	82128.711
	.000	8002.986	-887898.378		
	170.000	8002.986	472609.260		
	170.000			.000	82128.711
62	-----				
	1 .000			.000	-87986.258
	.000	1278.047	258449.866		
	170.000	1278.047	475717.873		
	170.000			.000	-87986.258
63	-----				
	1 .000			.000	-134002.266
	.000	-4249.871	544688.459		
	145.000	-4249.871	-71542.806		
	145.000			.000	-134002.266
64	-----				
	1 .000			.000	92644.859
	.000	-372.901	-50166.422		
	195.000	-372.901	-122882.133		
	195.000			.000	92644.859
65	-----				
	1 .000			.000	100195.586
	.000	2200.484	-145948.561		
	185.000	2200.484	261141.057		
	185.000			.000	100195.586
66	-----				
	1 .000			.000	100845.547
	.000	-1658.145	238652.524		
	170.000	-1658.145	-43232.141		
	170.000			.000	100845.547
67	-----				
	1 .000			.000	-201476.438
	.000	1482.236	-73074.361		

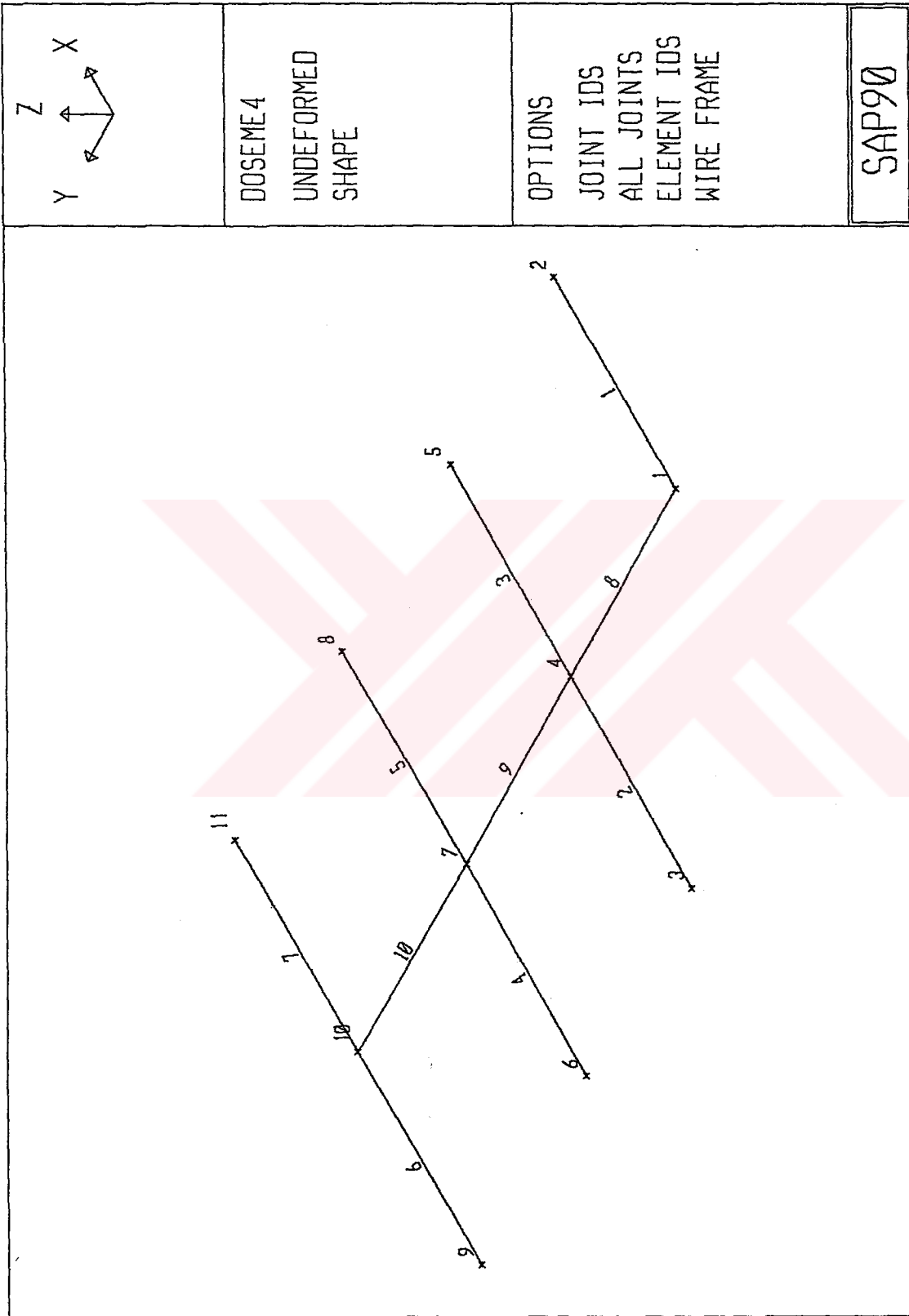


		170.000	1482.236	178905.747		
		170.000			.000	-201476.438
68	-----					
	1	.000			.000	-190744.047
		.000	-1058.269	239189.085		
		170.000	-1058.269	59283.321		
		170.000			.000	-190744.047
69	-----					
	1	.000			.000	2946.675
		.000	-492.307	9831.971		
		125.000	-492.307	-51706.381		
		125.000			.000	2946.675
70	-----					
	1	.000			.000	-51884.059
		.000	8306.941	-860762.372		
		130.000	8306.941	219140.020		
		130.000			.000	-51884.059
71	-----					
	1	.000			.000	-34016.277
		.000	1388.753	-26857.851		
		185.000	1388.753	230061.472		
		185.000			.000	-34016.277
72	-----					
	1	.000			.000	-12633.153
		.000	331.526	126884.927		
		170.000	331.526	183244.336		
		170.000			.000	-12633.153
73	-----					
	1	.000			.000	-7201.953
		.000	-607.253	209691.935		
		170.000	-607.253	106458.867		
		170.000			.000	-7201.953
74	-----					
	1	.000			.000	35368.215
		.000	-2789.465	302410.525		
		170.000	-2789.465	-171798.477		
		170.000			.000	35368.215
75	-----					
	1	.000			.000	122321.297
		.000	-11914.200	18980.406		
		85.000	-11914.200	-993726.562		
		85.000			.000	122321.297
76	-----					
	1	.000			.000	.000
		.000	-722.345	.000		
		130.000	-722.345	-93904.786		
		130.000			.000	.000
77	-----					
	1	.000			.000	-117658.023
		.000	113.235	29760.910		
		185.000	113.235	50709.367		
		185.000			.000	-117658.023
78	-----					
	1	.000			.000	-35158.789
		.000	-96.611	101288.565		

	170.000	-96.611	84864.750		
	170.000			.000	-35158.789
79	-----				
1	.000			.000	64746.207
	.000	107.816	83251.759		
	170.000	107.816	101580.486		
	170.000			.000	64746.207
80	-----				
1	.000			.000	139647.438
	.000	-463.433	43547.915		
	170.000	-463.433	-35235.730		
	170.000			.000	139647.438
81	-----				
1	.000			.000	.000
	.000	1788.301	-152005.571		
	85.000	1788.301	.000		
	85.000			.000	.000

□





ZEMIN KAT DOSEMESI (DOSEME4)  
SYSTEM  
L=2

JOINTS

1 X=192.5 Y=0  
2 X=385 Y=0  
3 X=0 Y=170  
5 X=385 Y=170 G=3,5,1  
6 X=0 Y=340  
8 X=385 Y=340 G=6,8,1  
9 X=0 Y=510  
11 X=385 Y=510 G=9,11,1

RESTRAINTS

1,10,3 R=1,1,0,0,0,1  
3,9,3 R=1,1,1,0,0,1  
2,11,3 R=1,1,1,0,0,1  
1,2,1 R=1,1,1,1,1,1

FRAME

NM=3  
1 I=56666 A=1700 J=141665 E=285000 G=114000  
2 I=113333 A=3400 J=283333 G=114000  
3 I=12833 A=3850 J=320833 G=114000  
1,1,2 M=1 LP=3,1  
2,3,4 M=2 G=1,1,1,1  
4,6,7 M=2 G=1,1,1,1  
6,9,10 M=1 G=1,1,1,1  
8,1,4 M=3 G=2,1,3,3 LP=1,5

LOADS

4 F=0,0,-1640 L=1  
7 F=0,0,-1640  
10 F=0,0,-820  
4 F=0,0,-1148 L=2  
7 F=0,0,-1148  
10 F=0,0,-820

COMBO

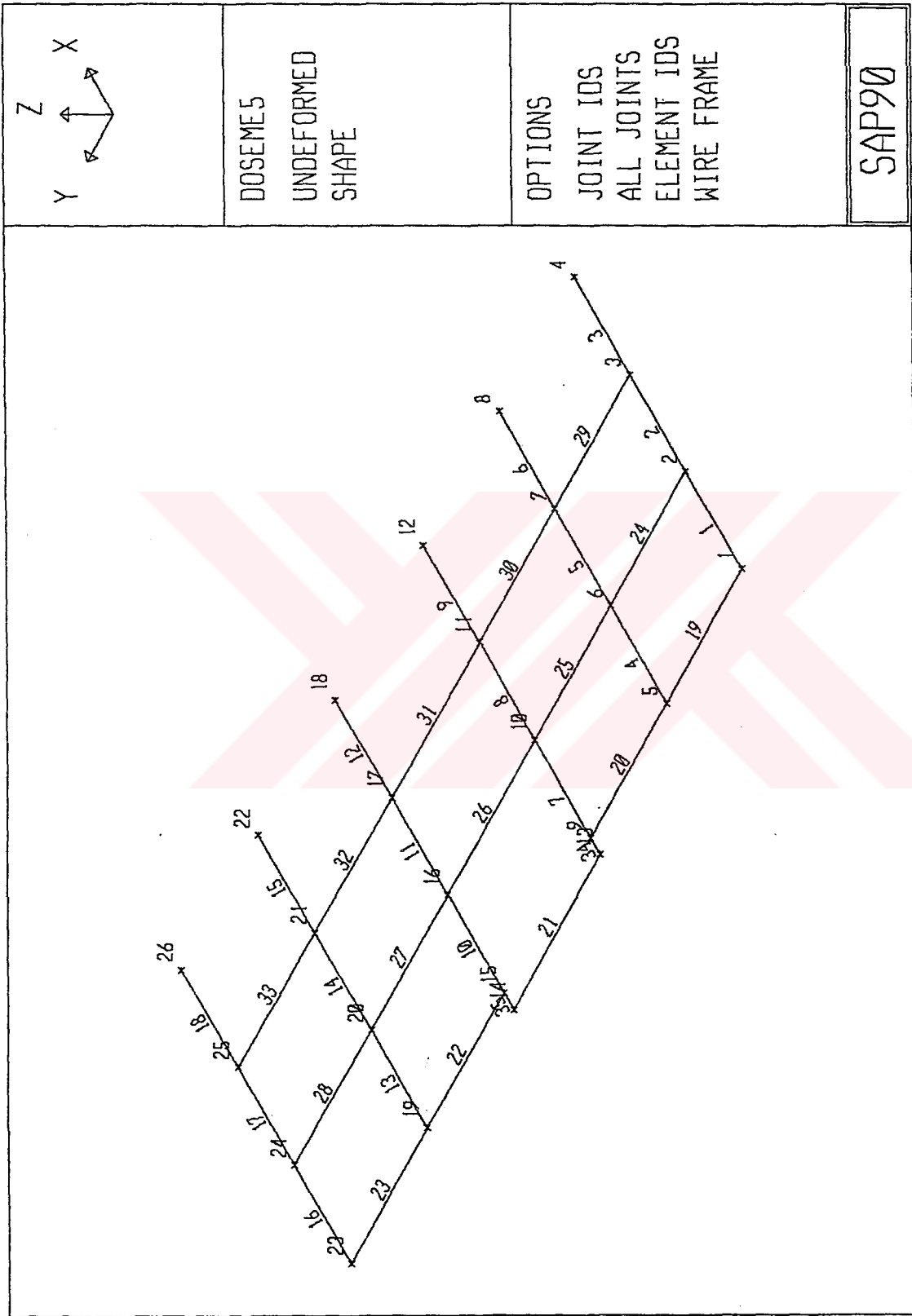
1 C=1.4,1.6

□

ZEMIN KAT DOSEMESI (DOSEME4)

FRAME ELEMENT FORCES

ELT	LOAD	DIST	1-2 PLANE		AXIAL	1-3 PLANE	AXIAL
ID	COMB	ENDI	SHEAR	MOMENT	FORCE	SHEAR	MOMENT TORQ
1 -----							
	1	.000			.000		
		192.500			.000		
2 -----							
	1	.000			.000		.000
		.000	970.031	.000			
		192.500	970.031	186731.000			
		192.500			.000		.000
3 -----							
	1	.000			.000		.000
		.000	-970.031	186731.000			
		192.500	-970.031	.000			
		192.500			.000		.000
4 -----							
	1	.000			.000		.000
		.000	2009.416	.000			
		192.500	2009.416	386812.560			
		192.500			.000		.000
5 -----							
	1	.000			.000		.000
		.000	-2009.416	386812.560			
		192.500	-2009.416	.000			
		192.500			.000		.000
6 -----							
	1	.000			.000		.000
		.000	1340.354	.000			
		192.500	1340.354	258018.169			
		192.500			.000		.000
7 -----							
	1	.000			.000		.000
		.000	-1340.354	258018.169			
		192.500	-1340.354	.000			
		192.500			.000		.000
8 -----							
	1	.000			.000		.000
		.000	2085.998	-298953.387			
		170.000	2085.998	55666.209			
		170.000			.000		.000
9 -----							
	1	.000			.000		.000
		.000	-106.740	55666.209			
		170.000	-106.740	37520.402			
		170.000			.000		.000
10 -----							
	1	.000			.000		.000
		.000	-220.708	37520.402			
		170.000	-220.708	.000			
		170.000			.000		.000



SAP90

ZEMIN KAT DOSEMESI (DOSEMES)  
SYSTEM  
L=2

JOINTS

1 X=0 Y=0  
4 X=435 Y=0  
9 X=0 Y=400  
12 X=435 Y=400 Q=1,4,9,12,1,4  
13 X=-25 Y=400  
14 X=-25 Y=630  
15 X=0 Y=630  
18 X=435 Y=630  
23 X=0 Y=1030  
26 X=435 Y=1030 Q=15,18,23,26,1,4

RESTRAINTS

1,26,1 R=1,1,0,0,0,1  
1,23,22 R=1,1,1,1,1,1  
26 R=1,1,1,0,0,1  
12 R=1,1,1,1,1,1  
4,8,4 R=1,1,1,0,0,1  
18,22,4 R=1,1,1,0,0,1

FRAME

NM=6

1 I=66666 A=2000 J=166667 E=285000 G=114000  
2 I=133333 A=4000 J=333333 G=114000  
3 I=143333 A=4300 J=358333 G=114000  
4 I=48333 A=1450 J=120833 G=114000  
5 I=86666 A=2900 J=241666 G=114000  
6 I=56666 A=1700 J=141667 G=114000  
1,1,2 M=1 G=2,1,1,1 LP=6,3  
4,5,6 M=2 G=2,1,1,1  
7,9,10 M=3 G=2,1,1,1  
10,15,16 M=3 G=2,1,1,1  
13,19,20 M=2 G=2,1,1,1  
16,23,24 M=1 G=2,1,1,1  
19,1,5 M=4 G=1,1,4,4 LP=6,12  
21,13,14 M=6  
22,15,19 M=4 G=1,1,4,4  
24,2,6 M=5 G=1,1,4,4  
26,10,16 M=5  
27,16,20 M=5 G=1,1,4,4  
29,3,7 M=5 G=1,1,4,4  
31,11,17 M=5  
32,17,21 M=5 G=1,1,4,4  
34,13,9 M=3  
35,14,15 M=3

LOADS

2 F=0,0,-730  
3 F=0,0,-730  
5 F=0,0,-730  
6 F=0,0,-1450  
7 F=0,0,-1450  
9 F=0,0,-780  
10 F=0,0,-1560  
11 F=0,0,-1560

13 F=0,0,-400  
14 F=0,0,-400  
15 F=0,0,-780  
16 F=0,0,-1560  
17 F=0,0,-1560  
19 F=0,0,-730  
20 F=0,0,-1450  
21 F=0,0,-1450  
24 F=0,0,-730  
25 F=0,0,-730  
2 F=0,0,-511  
3 F=0,0,-511  
5 F=0,0,-511  
6 F=0,0,-1015  
7 F=0,0,-1015  
9 F=0,0,-546  
10 F=0,0,-1092  
11 F=0,0,-1092  
13 F=0,0,-280  
14 F=0,0,-280  
15 F=0,0,-546  
16 F=0,0,-1092  
17 F=0,0,-1092  
19 F=0,0,-511  
20 F=0,0,-1015  
21 F=0,0,-1015  
24 F=0,0,-511  
25 F=0,0,-511

COMBO

1 C=1.4,1.6

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ZEMIN KAT DOSEMESI (DOSEMES)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE		XIAL TORQ
			SHEAR	MOMENT		SHEAR	MOMENT	
1 -----								
	1	.000			.000			-217788.156
		.000	4607.422	-382917.682				
		145.000	4607.422	285158.481				
		145.000			.000			-217788.156
2 -----								
	1	.000			.000			59136.043
		.000	1242.397	34901.829				
		145.000	1242.397	215049.455				
		145.000			.000			59136.043
3 -----								
	1	.000			.000			.000
		.000	-112.156	16262.563				
		145.000	-112.156	.000				
		145.000			.000			.000
4 -----								
	1	.000			.000			441700.063
		.000	2043.880	-69962.144				
		145.000	2043.880	226400.457				
		145.000			.000			441700.063
5 -----								
	1	.000			.000			404773.625
		.000	-133.963	161744.387				
		145.000	-133.963	142319.749				
		145.000			.000			404773.625
6 -----								
	1	.000			.000			.000
		.000	-436.922	63353.627				
		145.000	-436.922	.000				
		145.000			.000			.000
7 -----								
	1	.000			.000			164307.266
		.000	-400.791	148383.044				
		145.000	-400.791	90268.391				
		145.000			.000			164307.266
8 -----								
	1	.000			.000			237301.938
		.000	-5228.920	466532.685				
		145.000	-5228.920	-291660.651				
		145.000			.000			237301.938
9 -----								
	1	.000			.000			215401.578
		.000	-15689.620	-722.639				
		145.000	-15689.620	-2.2757E+06				
		145.000			.000			215401.578
10 -----								

	1	.000			.000	-223310.516
		.000	-217.617	102788.564		
		145.000	-217.617	71234.047		
		145.000			.000	-223310.516
11	-----					
	1	.000			.000	-233415.813
		.000	-1205.581	288126.648		
		145.000	-1205.581	113317.388		
		145.000			.000	-233415.813
12	-----					
	1	.000			.000	.000
		.000	-2023.597	293421.495		
		145.000	-2023.597	.000		
		145.000			.000	.000
13	-----					
	1	.000			.000	-419394.750
		.000	3056.354	-99518.488		
		145.000	3056.354	343652.877		
		145.000			.000	-419394.750
14	-----					
	1	.000			.000	-353572.625
		.000	698.001	297739.851		
		145.000	698.001	398950.011		
		145.000			.000	-353572.625
15	-----					
	1	.000			.000	.000
		.000	-3128.052	453567.478		
		145.000	-3128.052	.000		
		145.000			.000	.000
16	-----					
	1	.000			.000	294894.219
		.000	5185.633	-440020.045		
		145.000	5185.633	311896.726		
		145.000			.000	294894.219
17	-----					
	1	.000			.000	-59888.879
		.000	1100.546	79565.578		
		145.000	1100.546	239144.755		
		145.000			.000	-59888.879
18	-----					
	1	.000			.000	.000
		.000	60.426	-8761.817		
		145.000	60.426	.000		
		145.000			.000	.000
19	-----					
	1	.000			.000	-78878.836
		.000	6287.168	-922941.457		
		200.000	6287.168	334492.089		
		200.000			.000	-78878.836
20	-----					
	1	.000			.000	-148840.984
		.000	2505.888	-107207.975		
		200.000	2505.888	393969.569		
		200.000			.000	-148840.984
21	-----					

1	.000		.000	25799.027
	.000	98.278	229662.306	
	230.000	98.278	252266.347	
	230.000			.000
22	-----			25799.027
1	.000			.000
	.000	-2492.504	475576.859	149930.625
	200.000	-2492.504	-22923.981	
	200.000			.000
23	-----			149930.625
1	.000			.000
	.000	-7286.258	396470.754	50412.145
	200.000	-7286.258	-1.0608E+06	
	200.000			.000
24	-----			50412.145
1	.000			.000
	.000	1627.624	-276924.203	-250256.656
	200.000	1627.624	48600.677	
	200.000			.000
25	-----			-250256.656
1	.000			.000
	.000	354.467	85527.124	-314912.719
	200.000	354.467	156420.610	
	200.000			.000
26	-----			-314912.719
1	.000			.000
	.000	1469.796	83425.933	61351.574
	230.000	1469.796	421479.076	
	230.000			.000
27	-----			61351.574
1	.000			.000
	.000	-1255.040	431584.382	278244.188
	200.000	-1255.040	180576.385	
	200.000			.000
28	-----			278244.188
1	.000			.000
	.000	-2347.687	114754.274	232331.141
	200.000	-2347.687	-354783.096	
	200.000			.000
29	-----			232331.141
1	.000			.000
	.000	-382.847	-59136.044	-198786.891
	200.000	-382.847	-17433.351	
	200.000			.000
30	-----			-198786.891
1	.000			.000
	.000	-3530.888	387340.266	-277753.000
	200.000	-3530.888	-318837.422	
	200.000			.000
31	-----			-277753.000
1	.000			.000
	.000	3217.012	-296937.057	13184.998
	230.000	3217.012	442975.746	
	230.000			.000
32	-----			13184.998

	1	.000			.000	193289.109
		.000	322.228	209559.928		
		200.000	322.228	274005.448		
		200.000			.000	193289.109
33	-----					
	1	.000			.000	247906.578
		.000	697.280	-79567.176		
		200.000	697.280	59888.879		
		200.000			.000	247906.578
34	-----					
	1	.000			.000	-229662.313
		.000	1050.278	-25799.028		
		25.000	1050.278	457.933		
		25.000			.000	-229662.313
35	-----					
	1	.000			.000	252266.344
		.000	853.722	25799.028		
		25.000	853.722	47142.067		
		25.000			.000	252266.344



2-6 Zemin Kat Döşemesi Betonarme Kesit Hesapları

2-6-1 Döşeme 3. Betonarme Hesabı (x doğrultusu)

Tablo 2.6.1.1. A-A Aksı Kolon Şeridi

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,73	187,28	0,299	2,87		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/33 (2,38)
1,82	178	0,299	3,02	Ø10/20 (3,93)		
-2,43	133,3	0,302	4,08		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
-0,84	385	0,295	1,38	Ø10/20 (3,93)		
-2,2	147	0,301	3,68		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
+1,81	179	0,299	3,00	Ø10/20 (3,93)		
-1,28	253	0,297	2,11		Ø10/40 (1,96cm <sup>2</sup> )	

Tablo 2.6.1.2. B-B Aksı Kolon Şeridi

b = 137,5

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-3,55	91,26	0,306	6,04		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/19 (4,13)
2,11	153,55	0,301	3,53	Ø10/20 (3,93)		
-0,88	358	0,295	1,44		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/33 (2,38)
-2,41	134,44	0,301	4,03	Ø10/19 (3,13)		

Tablo 2.6.1.3. D-D Aksı Kolon Şeridi

b = 211 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-6,36	50,94	0,320	11,31		Ø10/32 (2,45cm <sup>2</sup> )	Ø10/9 (8,73)
2,8	115,71	0,303	4,71	Ø10/16 (4,91)		

Tablo 2.6.1.4. E-E Aksı Kolon Şeridi

b = 122,5 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,45	233,40	0,298	2,40		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/33 (2,38)
2,16	150	0,300	3,60	Ø10/20 (3,93)		
-2,05	158	0,300	3,42		Ø10/40+Ø10/28 (3,77 cm <sup>2</sup> )	
-3,20	101,25	0,304	5,40	Ø10/14 (5,61)		
-3,31	97,88	0,305	5,61		Ø10/28+Ø10/40 (4,77 cm <sup>2</sup> )	
2,06	157,28	0,301	3,44	Ø10/20 (3,93)		

Tablo 2.6.1.5. A-A ve C-C Aksları arası açıklık şeridi

b = 190 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
1,16	279,3	0,296	1,91	Ø10/20 (3,93cm <sup>2</sup> )		
-1,79	181	0,300	2,98		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/33 (2,38cm <sup>2</sup> )

Tablo 2.6.1.6. B-B ve D-D Aksları arası açıklık şeridi  
b = 177,5

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-4,72	68,64	0,301	7,89		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/13 (6,04)
0,26	1246	0,291	0,42	Ø10/20 (3,93)		
-	-	-	-	-	-	-
-1,12	289	0,296	1,84		Ø10/38 (2,06 cm <sup>2</sup> )	
2,40	135	0,301	4,01	Ø10/19 (4,13)		

Tablo 2.6.1.7. D-D ve E-E Aksları arası açıklık şeridi  
b = 245 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,08	4050	0,289	0,13		Ø10/40 (1,96 cm <sup>2</sup> )	
0,42	771	0,292	0,68	Ø10/20 (3,93)		
-1,44	225	0,297	2,38		Ø10/40+Ø10/40 (3,93 cm <sup>2</sup> )	
1,72	188,37	0,299	2,86	Ø10/20 (3,93)		

2.6.2. Döşeme 4 Betonarme Hesabı (x doğrultusu)

Tablo 2.6.2.1. 2-2 ve 3-3 Aksı Arası Açıklık Şeridi

b = 490 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/33 (2,38)
2,27	142,73	0,301	3,79	Ø10/20 (3,93)		
-1,03	314,56	0,295	1,68		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/33 (2,38)

2.6.3. Döşeme 5 Betonarme Hesabı (x doğrultusu)

Tablo 2.6.3.1. A-A Aksı kolon şeridi

b = 250 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-3,87	83,72	0,308	6,62		Ø10/32 (2,46cm <sup>2</sup> )	Ø10/18 (4,36)
2,85	113,68	0,303	4,79	Ø10/16 (4,91)		
-0,49	561,22	0,292	0,79		Ø10/32 (2,45 cm <sup>2</sup> )	Ø10/33 (2,38)

Tablo 2.6.3.2. D-D Aksı orta kolon şeridi

b = 390 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,27	255	0,296	2,08		Ø10/36 (2,18cm <sup>2</sup> )	
2,17	149,3	0,301	3,63	Ø10/18 (4,36)		
-10,58	30,52	0,354	20,81		Ø10/36 (2,18cm <sup>2</sup> )	Ø14/8 (19,24)



2.6.4. Döşeme 3 Betonarme Hesabı (y doğrultusu)

Tablo 2.6.4.1. 2-2 ve 3-3 Aksları arası açıklık şeridi

b' = 192,5 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
+0,66	437,8	0,294	1,14	Φ10/20 (3,93)		
-1,02	283,3	0,296	1,78		Φ10/40 (1,97cm <sup>2</sup> )	

Tablo 2.6.4.2. 5-5 Aksı sağ kenar açıklık şeridi

b = 172,5 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,82	352,4	0,294	1,42		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/33 (2,38)
1,00	289	0,296	1,74	Φ10/20 (3,93)		
-1,32	218,9	0,298	2,31		Φ10/40 (1,96cm <sup>2</sup> )	Φ10/33 (2,38)

Tablo 2.6.4.3. 2-2 Aksı kolon şeridi

b' = 96 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-3,48	83,04	0,307	6,28		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/18 (4,36)
1,27	227,56	0,297	2,22	Φ10/20 (3,93)		
-3,91	73,91	0,310	7,13		Φ10/40 (1,96cm <sup>2</sup> )	Φ10/15 (5,24)

Tablo 2.6.4.4. 3-3 ve 4-4 Aksları arası açıklık şeridi  
b' = 192,5 d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,2	1445	0,290	0,34		Ø10/40 (1,96 cm <sup>2</sup> )	
0,12	2408	0,290	0,21	Ø10/20 (3,93)		
-0,2	1445	0,290	0,34		Ø10/40 (1,96cm <sup>2</sup> )	
-	-	-	-	-	-	-
-2,86	101,04	0,304	5,11		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/20 (3,93)
1,62	178,4	0,299	2,85	Ø10/20 (3,93)		
-2,86	101,04	0,304	5,11		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/20 (3,93)

Tablo 2.6.4.5. 4-4 ve 5-5 Aksları arası açıklık şeridi  
b' = 192,5 d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,75	385,3	0,294	1,30		Ø10/40 (1,96 cm <sup>2</sup> )	
1,36	212,5	0,298	2,38	Ø10/20 (3,93)		
-0,38	760,5	0,293	0,65		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
1,24	233,06	0,297	2,17	Ø10/20 (3,93)		
-0,27	1070,3	0,291	0,46		Ø10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.6.4.6. 3-3 Aksı kolon şeridi

b = 192,5 cm

d = 17 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,46	117,48	0,303	4,38		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/20 (3,93)
0,04	7225	0,289	0,07	Ø10/20 (3,93)		
-0,62	466,13	0,293	1,07		Ø10/40+10/40 (3,93cm <sup>2</sup> )	
0,38	760,5	0,292	0,65	Ø10/20 (3,93)		
-1,12	258,03	0,296	1,95		Ø10/40+10/40 (3,93 cm <sup>2</sup> )	
0,64	451,56	0,294	1,11	Ø10/20 (3,93)		
-4,68	61,75	0,314	8,64		Ø10/40+10/40 (3,93cm <sup>2</sup> )	Ø10/16 (4,91)
0,64	451,56	0,294	1,11	Ø10/20 (3,93)		
-5,81	49,74	0,321	10,97		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/8,5 (9,24)

Tablo 2.6.4.7. 4-4 Aksı kolon şeridi

b = 192,5 cm

d = 17 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,46	117,48	0,303	4,38		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/20 (3,93)
0,18	1605,5	0,290	0,31	Ø10/20 (3,93cm <sup>2</sup> )		
-0,77	375,32	0,294	1,33		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
1,10	262,73	0,296	1,92	Ø10/20 (3,93)		
-4,61	62,69	0,313	8,48		Ø10/40+Ø10/30 (4,59cm <sup>2</sup> )	Ø10/20 (3,93)
2,83	102,12	0,304	5,06	Ø10/15 (5,24)		
-3,05	94,75	0,305	5,47		Ø10/30 (2,62cm <sup>2</sup> )	Ø10/20 (3,93)

Tablo 2.6.4.8. 5-5 Aksı kolon şeridi

b = 154 cm d = 17 cm

Md tm/m	K	ks	$\frac{A_s}{cm^2/m}$	Seçilen	Mevcut	Ek
-7,52	38,43	0,335	14,81		Ø10/40 (1,96 cm <sup>2</sup> )	Ø12/8 (14,14)
1,96	147,45	0,300	3,43	Ø10/20 (3,93cm <sup>2</sup> )		
-7,95	36,35	0,339	15,85		Ø10/40 (1,96 cm <sup>2</sup> )	Ø12/8 (14,14)

2.6.5. Döşeme 4 Betonarme Kesit Hesapları (y doğrultusu)

Tablo 2.6.5.1. Açıklık şeridi

b = 192,5 cm d = 17 cm

Md tm/m	K	ks	$\frac{A_s}{cm^2/m}$	Seçilen	Mevcut	Ek
-1,55	186,45	0,299	2,73		Ø10/40 (1,96 cm <sup>2</sup> )	
0,30	963	0,291	0,51	Ø10/20 (3,93)		
-1,55	186,45	0,299	2,73		Ø10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.6.5.2. Kolon şeridi (Ek donatılar)

b = 96 cm d = 17 cm

Md tm/m	K	ks	$\frac{A_s}{cm^2/m}$	Seçilen	Mevcut	Ek
-5,11	56,56	0,316	9,49		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/10 (7,85)
-4,86	59,47	0,315	9,00	Ø10/10		
-6,48	44,60	0,325	12,38		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/7,5 (10,47cm <sup>2</sup> )

2.6.6. Döşeme 5 Betonarme Kesit Hesapları (y doğrultusu)

Tablo 2.6.6.1. 1-1 ve 2-2 Aksı arası açıklık şeridi

b = 192,5

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,43	202,09	0,298	2,51		Ø10/30 (2,62cm <sup>2</sup> )	
2,24	129,02	0,302	3,98	Ø10/15 (5,24)		
-1,84	157,06	0,300	3,25		Ø10/30 (2,62cm <sup>2</sup> )	

Tablo 2.6.6.2. 1-1 Aksı kolon şeridi

b = 96 cm                      d = 17 cm

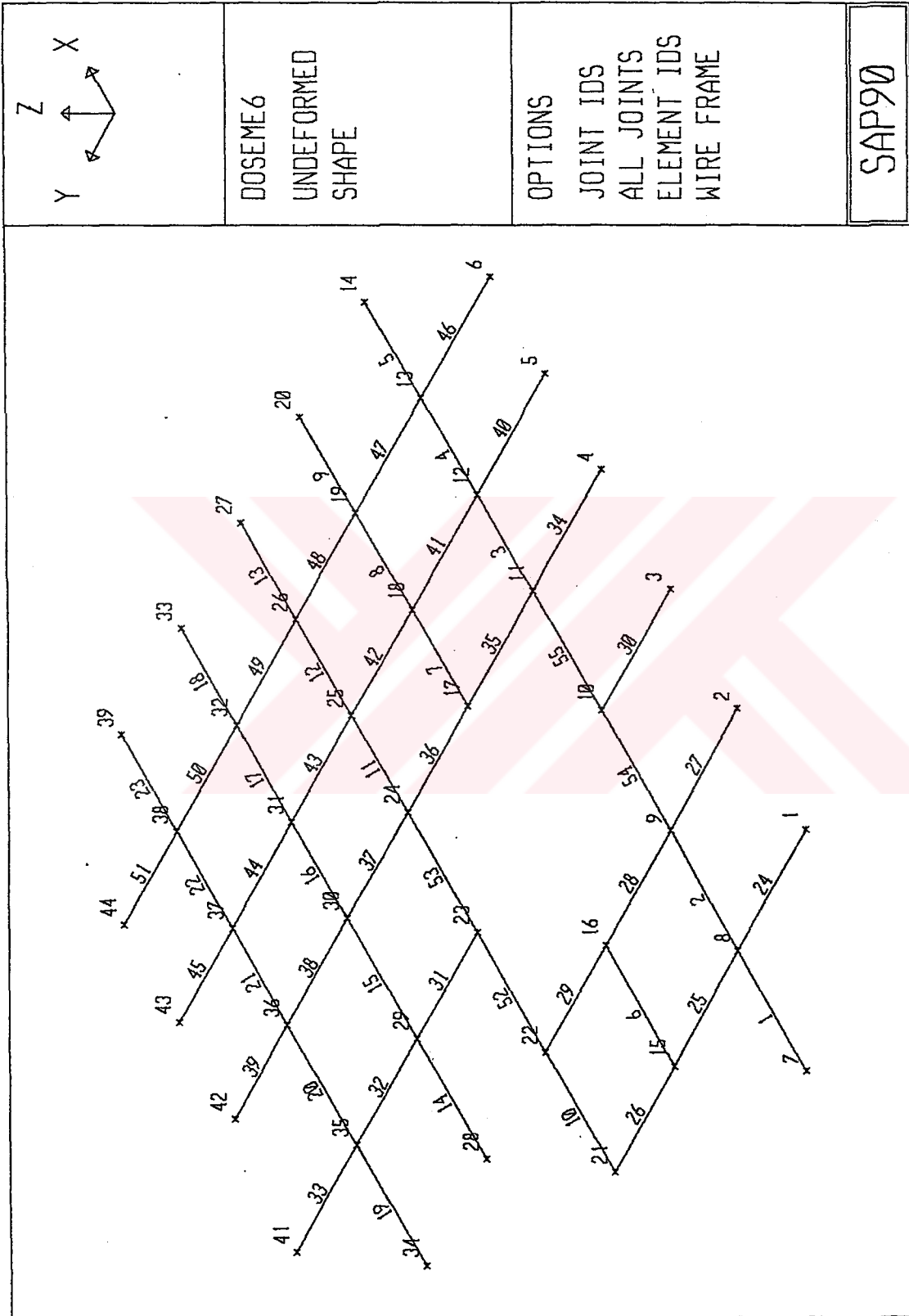
Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-5,51	52,45	0,318	10,31		Ø10/34 (2,20cm <sup>2</sup> )	Ø10/10 (7,85)
2,47	117,00	0,303	4,40	Ø10/17 (4,62)		
-1,92	150,5	0,300	3,39		Ø10/34+Ø10/34 (4,62cm <sup>2</sup> )	
2,47	117	0,303	4,40	Ø10/17 (4,62)		
-1,92	150,5	0,300	3,39		Ø10/34+Ø10/34 (4,62cm <sup>2</sup> )	
2,47	117	0,303	4,40	Ø10/17 (4,62)		
-5,51	52,45	0,318	10,31		Ø10/34 (2,20cm <sup>2</sup> )	Ø10/10 (7,85)

Tablo 2.6.6.3. 2-2 Aksı kolon şeridi  
b = 96 cm d = 17 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-3,21	90,03	0,306	5,78		Ø10/40 (1,95cm <sup>2</sup> )	Ø10/20 (3,93)
2,01	143,8	0,301	3,56	Ø10/20 (3,93)		
-4,09	70,66	0,311	7,48		Ø10/40 (1,95cm <sup>2</sup> )	Ø10/20 (3,93)
-5,12	56,44	0,316	9,52		Ø10/36 (2,18cm <sup>2</sup> )	Ø10/10 (7,85)
2,30	125,65	0,302	4,08	Ø10/18 (4,36)		
-5	57,8	0,316	9,29		Ø10/36+Ø10/36 (4,36cm <sup>2</sup> )	Ø10/16 (4,91cm <sup>2</sup> )
2,30	125,65	0,302	4,08	Ø10/18 (4,36)		
-4,13	69,97	0,311	7,56		Ø10/36 (2,18cm <sup>2</sup> )	Ø10/14 (5,61cm <sup>2</sup> )

## 2.7. Bodrum Kat Döşemesi Statik Hesabı

Bodrum kat döşemesi iki bölüme ayrılmıştır. Bunların Döşeme 6 ve Döşeme 7 adı altında çözümleri yapılmıştır. Burada kullanılan birimler kg, cm cinsindedir. Statik hesap çıktılarında da sonuçlar aynı birimdedir. (kg, kgcm, cm, vb).



SAP90

BODRUM KAT DOSEMESI (DOSEME6)  
SYSTEM  
L=2

JOINTS

1 x=192.5 y=0  
4 x=770 y=0 G=1,4,1  
6 x=1080 y=0 G=4,6,1  
7 x=0 y=195  
11 x=770 y=195 G=7,11,1  
14 x=1235 y=195 G=11,14,1  
15 x=192.5 y=380  
16 x=385 y=380  
17 x=770 y=380  
20 x=1235 y=380 G=17,20,1  
36 x=770 y=890  
39 x=1235 y=890  
24 x=770 y=550  
27 x=1235 y=550 Q=24,27,36,39,1,6  
21 x=192.5 y=550  
22 x=385 y=550  
34 x=385 y=890  
35 x=577.5 y=890  
23 x=577.5 y=550  
41 x=577.5 y=1060 Q=22,23,34,35,1,6  
42 x=770 y=1040  
44 x=1080 y=1040 G=42,44,1

RESTRAINTS

1,39,1 R=1,1,0,0,0,1  
41,44,1 R=1,1,0,0,0,1  
2 R=1,1,1,0,0,1  
4,6,1 R=1,1,1,0,0,1  
9,11,1 R=1,1,1,1,1,1  
15,21,6 R=1,1,1,0,0,1  
22,24,1 R=1,1,1,1,1,1  
28 R=1,1,1,0,0,1  
41,44,1 R=1,1,1,0,0,1  
14,20,6 R=1,1,1,0,0,1  
27,39,6 R=1,1,1,0,0,1

FRAME

NM=9

1 I=126666 A=3800 J=316665 E=285000 G=114000  
2 I=118333 A=3550 J=295833 E=285000 G=114000  
3 I=113333 A=3400 J=283333 E=285000 G=114000  
4 I=106666 A=3200 J=266665 E=285000 G=114000  
5 I=128333 A=3850 J=320833 E=285000 G=114000  
6 I=64166 A=1925 J=160415 E=285000 G=114000  
7 I=115833 A=3475 J=289583 E=285000 G=114000  
8 I=103833 A=3100 J=258333 E=285000 G=114000  
9 I=51666 A=1550 J=2.5\*51666 E=285000 G=114000  
1,7,8 M=1 G=1,1,1,1 LP=18,13  
3,11,12 M=1 G=2,1,1,1  
6,15,16 M=2  
7,17,18 M=2 G=2,1,1,1  
10,21,22 M=3  
11,24,25 M=3 G=2,1,1,1  
14,28,29 M=3 G=4,1,1,1



19,34,35 M=3	G=1,1,1,1		36 F=0,0,-1029
21,36,37 M=4	G=2,1,1,1		37 F=0,0,-868
24,1,8 M=5	G=1,1,7,7	LP=1,9	38 F=0,0,-868
26,15,21 M=5			
27,2,9 M=5			COMBO
28,9,16 M=6	G=1,1,7,6		1 C=1.4,1.6
30,3,10 M=5			
31,23,29 M=5	G=2,1,6,6		
34,4,11 M=7			
35,11,17 M=9	G=1,1,6,7		
37,24,30 M=7	G=2,1,6,6		
40,5,12 M=8	G=1,1,7,6		
42,18,25 M=8			
43,25,31 M=8	G=2,1,6,6		
46,6,13 M=8	G=1,1,7,6		
48,19,26 M=8			
49,26,32 M=8	G=2,1,6,6		
52,22,23 M=8	G=1,1,1,1		

LOADS

1 F=0,0,-940 L=1  
3 F=0,0,-940  
7 F=0,0,-920  
8 F=0,0,-1830  
12 F=0,0,-1470  
13 F=0,0,-1470  
16 F=0,0,-860  
17 F=0,0,-780  
18 F=0,0,-1380  
19 F=0,0,-1380  
25 F=0,0,-1320  
26 F=0,0,-1320  
29 F=0,0,-1640  
30 F=0,0,-1480  
31 F=0,0,-1320  
32 F=0,0,-1320  
34 F=0,0,-820  
35 F=0,0,-1640  
36 F=0,0,-1470  
37 F=0,0,-1240  
38 F=0,0,-1240  
1 F=0,0,-658 L=2  
3 F=0,0,-658  
7 F=0,0,-644  
8 F=0,0,-1281  
12 F=0,0,-1029  
13 F=0,0,-1029  
16 F=0,0,-602  
17 F=0,0,-546  
18 F=0,0,-966  
19 F=0,0,-966  
25 F=0,0,-924  
26 F=0,0,-924  
29 F=0,0,-1148  
30 F=0,0,-1036  
31 F=0,0,-924  
32 F=0,0,-924  
34 F=0,0,-574  
35 F=0,0,-1148

BODRUM KAT DOSEMESI (DOSEME6)

FRAME ELEMENT FORCES

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE	
			SHEAR	MOMENT		SHEAR	TORQ
1 -----							
	1	.000			.000		.000
		.000	-2318.400	.000			
		192.500	-2318.400	-446292.000			
		192.500			.000		.000
2 -----							
	1	.000			.000		-482276.625
		.000	-6064.930	14591.504			
		192.500	-6064.930	-1.1529E+06			
		192.500			.000		-482276.625
3 -----							
	1	.000			.000		-101949.719
		.000	5341.527	-593329.950			
		155.000	5341.527	234606.662			
		155.000			.000		-101949.719
4 -----							
	1	.000			.000		-10918.543
		.000	786.347	220917.270			
		155.000	786.347	342800.995			
		155.000			.000		-10918.543
5 -----							
	1	.000			.000		.000
		.000	-2027.750	314301.318			
		155.000	-2027.750	.000			
		155.000			.000		.000
6 -----							
	1	.000			.000		-167963.344
		.000	2342.234	-395632.036			
		192.500	2342.234	55247.933			
		192.500			.000		-167963.344
7 -----							
	1	.000			.000		-19281.445
		.000	1456.301	-113342.157			
		155.000	1456.301	112384.471			
		155.000			.000		-19281.445
8 -----							
	1	.000			.000		-11690.285
		.000	1142.558	195010.915			
		155.000	1142.558	372107.403			
		155.000			.000		-11690.285
9 -----							
	1	.000			.000		.000
		.000	-2513.151	389538.404			
		155.000	-2513.151	.000			
		155.000			.000		.000
10 -----							
	1	.000			.000		70115.883

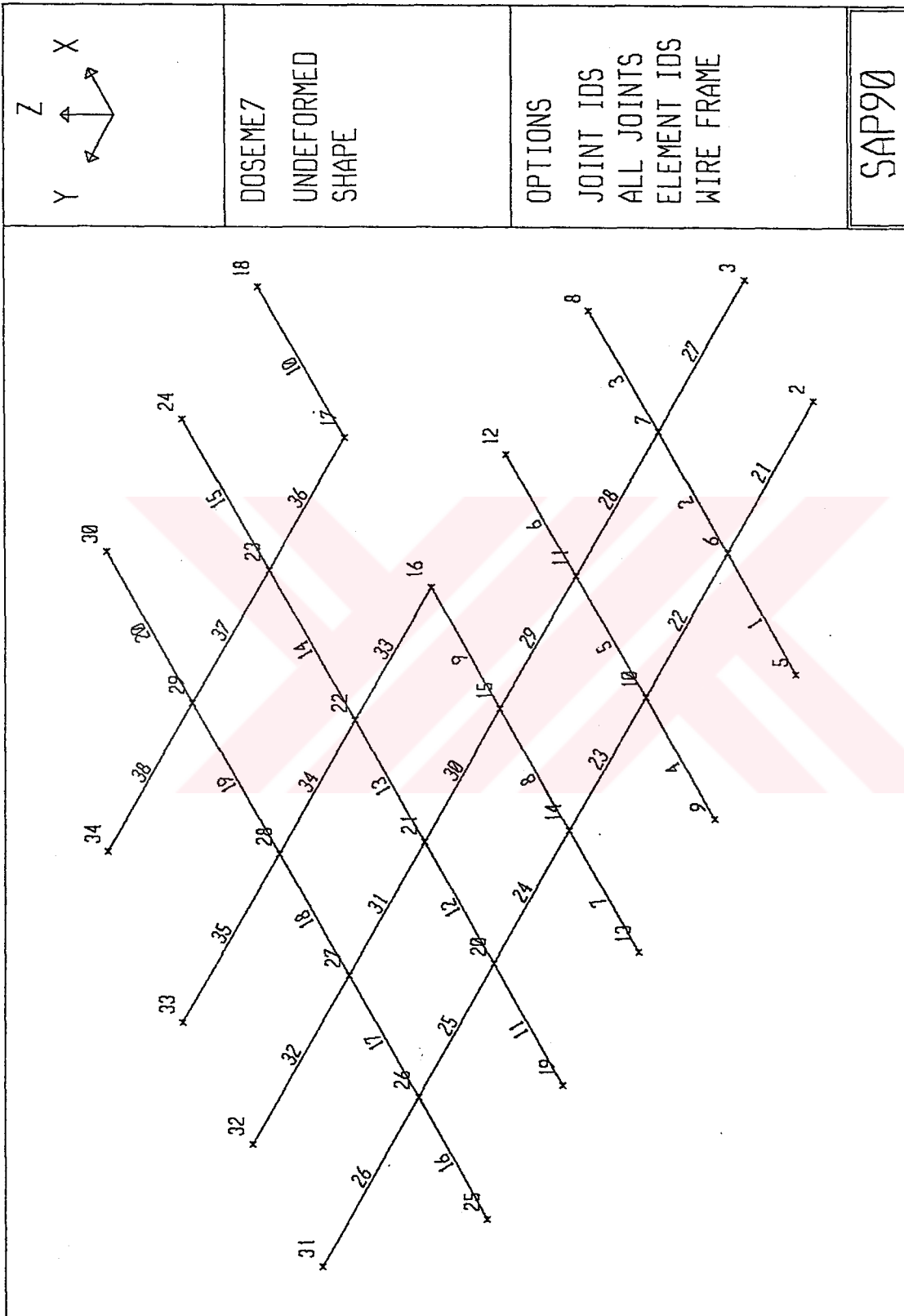
		.000	508.453	-65251.469		
		192.500	508.453	32625.734		
		192.500			.000	70115.883
11	-----					
	1	.000			.000	-46611.078
		.000	8967.093	-920436.654		
		155.000	8967.093	469462.826		
		155.000			.000	-46611.078
12	-----					
	1	.000			.000	11697.685
		.000	1083.634	283835.962		
		155.000	1083.634	451799.185		
		155.000			.000	11697.685
13	-----					
	1	.000			.000	.000
		.000	-2744.764	425438.452		
		155.000	-2744.764	.000		
		155.000			.000	.000
14	-----					
	1	.000			.000	.000
		.000	1649.758	.000		
		192.500	1649.758	317578.336		
		192.500			.000	.000
15	-----					
	1	.000			.000	25525.328
		.000	-1046.898	86162.537		
		192.500	-1046.898	-115365.243		
		192.500			.000	25525.328
16	-----					
	1	.000			.000	127491.500
		.000	2345.575	-206215.438		
		155.000	2345.575	157348.718		
		155.000			.000	127491.500
17	-----					
	1	.000			.000	88087.953
		.000	889.436	203543.039		
		155.000	889.436	341405.581		
		155.000			.000	88087.953
18	-----					
	1	.000			.000	.000
		.000	-2526.676	391634.785		
		155.000	-2526.676	.000		
		155.000			.000	.000
19	-----					
	1	.000			.000	.000
		.000	-2066.400	.000		
		192.500	-2066.400	-397782.000		
		192.500			.000	.000
20	-----					
	1	.000			.000	44701.664
		.000	821.983	-210298.732		
		192.500	821.983	-52067.067		
		192.500			.000	44701.664
21	-----					
	1	.000			.000	29277.119

		.000	515.406	-17768.890		
		155.000	515.406	62119.017		
		155.000			.000	29277.119
22	-----					
	1	.000			.000	-19517.551
		.000	381.012	132614.508		
		155.000	381.012	191671.363		
		155.000			.000	-19517.551
23	-----					
	1	.000			.000	.000
		.000	-1154.010	178871.566		
		155.000	-1154.010	.000		
		155.000			.000	.000
24	-----					
	1	.000			.000	.000
		.000	-2368.800	.000		
		195.000	-2368.800	-461916.000		
		195.000			.000	.000
25	-----					
	1	.000			.000	460883.500
		.000	-3233.870	20360.641		
		185.000	-3233.870	-577905.267		
		185.000			.000	460883.500
26	-----					
	1	.000			.000	65251.469
		.000	2823.869	-409941.922		
		170.000	2823.869	70115.884		
		170.000			.000	65251.469
27	-----					
	1	.000			.000	
		195.000			.000	
28	-----					
	1	.000			.000	26456.756
		.000	626.464	-37888.804		
		185.000	626.464	78007.023		
		185.000			.000	26456.756
29	-----					
	1	.000			.000	-28791.176
		.000	801.498	-89956.321		
		170.000	801.498	46298.260		
		170.000			.000	-28791.176
30	-----					
	1	.000			.000	
		.000	-2368.800	.000		
		195.000	-2368.800	-461916.000		
		195.000			.000	
31	-----					
	1	.000			.000	43932.531
		.000	4762.527	-676771.593		
		170.000	4762.527	132858.037		
		170.000			.000	43932.531
32	-----					
	1	.000			.000	-187483.266
		.000	3326.382	107332.708		
		170.000	3326.382	672817.713		

33	170.000			.000	-187483.266
	1	.000		.000	.000
		.000	-3694.800	628116.049	
		170.000	-3694.800	.000	
		170.000		.000	.000
34	1	.000		.000	
		195.000		.000	
35	1	.000		.000	54276.527
		.000	1521.249	-139969.241	
		185.000	1521.249	141461.821	
		185.000		.000	54276.527
36	1	.000		.000	-59065.633
		.000	-1900.652	160743.267	
		170.000	-1900.652	-162367.546	
		170.000		.000	-59065.633
37	1	.000		.000	56552.016
		.000	7632.604	-864697.534	
		170.000	7632.604	432845.132	
		170.000		.000	56552.016
38	1	.000		.000	-34298.176
		.000	510.531	330878.960	
		170.000	510.531	417669.258	
		170.000		.000	-34298.176
39	1	.000		.000	.000
		.000	-2887.292	433093.802	
		150.000	-2887.292	.000	
		150.000		.000	.000
40	1	.000		.000	.000
		.000	242.360	.000	
		195.000	242.360	47260.240	
		195.000		.000	.000
41	1	.000		.000	-13689.393
		.000	1093.140	-43770.938	
		185.000	1093.140	158459.984	
		185.000		.000	-13689.393
42	1	.000		.000	68937.055
		.000	-2070.717	150868.823	
		170.000	-2070.717	-201153.074	
		170.000		.000	68937.055
43	1	.000		.000	-116689.813
		.000	2486.343	-259461.837	
		170.000	2486.343	163216.420	
		170.000		.000	-116689.813
44					

	1	.000			.000	-70495.492
		.000	616.082	202619.965		
		170.000	616.082	307353.926		
		170.000			.000	-70495.492
45	-----					
	1	.000			.000	.000
		.000	-2374.324	356148.598		
		150.000	-2374.324	.000		
		150.000			.000	.000
46	-----					
	1	.000			.000	.000
		.000	520.072	.000		
		195.000	520.072	101414.015		
		195.000			.000	.000
47	-----					
	1	.000			.000	-28499.678
		.000	-370.231	90495.472		
		185.000	-370.231	22002.724		
		185.000			.000	-28499.678
48	-----					
	1	.000			.000	-11068.676
		.000	-192.122	10312.439		
		170.000	-192.122	-22348.317		
		170.000			.000	-11068.676
49	-----					
	1	.000			.000	-37429.406
		.000	309.876	-10650.633		
		170.000	309.876	42028.254		
		170.000			.000	-37429.406
50	-----					
	1	.000			.000	12799.797
		.000	399.588	130116.211		
		170.000	399.588	198046.102		
		170.000			.000	12799.797
51	-----					
	1	.000			.000	.000
		.000	-1190.190	178528.550		
		150.000	-1190.190	.000		
		150.000			.000	.000
52	-----					
	1	.000			.000	
		192.500			.000	
53	-----					
	1	.000			.000	
		192.500			.000	
54	-----					
	1	.000			.000	
		192.500			.000	
55	-----					
	1	.000			.000	
		192.500			.000	

□



BODRUM KAT DOSEMESI (DOSEME7)  
SYSTEM  
L=2

JOINTS

2 x=155 y=0  
3 x=310 y=0 G=2,3,1  
5 x=0 y=195  
8 x=465 y=195  
9 x=0 y=380  
12 x=465 y=380 Q=5,8,9,12,1,4  
13 x=0 y=550  
16 x=465 y=550  
25 x=0 y=890  
28 x=465 y=890 Q=13,16,25,28,1,6  
17 x=657.5 y=550  
18 x=850 y=550  
29 x=657.5 y=890  
30 x=850 y=890 Q=17,18,29,30,1,6  
31 x=155 y=1105  
33 x=465 y=1105 G=31,33,1  
34 x=657.5 y=1080

RESTRAINTS

5,34,1 R=1,1,0,0,0,1  
2,3,1 R=1,1,1,0,0,1  
8,16,4 R=1,1,1,1,1,1  
17,18,1 R=1,1,1,1,1,1  
9 R=1,1,1,0,0,1  
13,25,6 R=1,1,1,0,0,1  
22,24,2 R=1,1,1,0,0,1  
32,34,1 R=1,1,1,0,0,1

FRAME

NM=8

1 I=126666 A=3800 J=316665 E=285000 G=114000  
2 I=118333 A=3550 J=295833 E=285000 G=114000  
3 I=113333 A=3400 J=283333 E=285000 G=114000  
4 I=128333 A=3850 J=320833 E=285000 G=114000  
5 I=120000 A=3600 J=300000 E=285000 G=114000  
6 I=103333 A=3100 J=258333 E=285000 G=114000  
7 I=115833 A=3475 J=289583 E=285000 G=114000  
8 I=56666 A=1700 J=141665 E=285000 G=114000  
1,5,6 M=1 G=2,1,1,1 LP=10,7  
4,9,10 M=2 G=2,1,1,1  
7,13,14 M=3 G=2,1,1,1  
11,19,20 M=3 G=4,1,1,1  
16,25,26 M=4 G=4,1,1,1  
10,17,18 M=8  
21,2,6 M=6 G=2,1,4,4 LP=2,7  
24,14,20 M=6 G=2,1,6,6  
26,26,31 M=6  
27,3,7 M=6 G=2,1,4,4  
30,15,21 M=6 G=1,1,6,6  
32,27,32 M=6  
33,16,22 M=7 G=1,1,6,6  
35,28,33 M=7  
36,17,23 M=4 G=1,1,6,6  
38,29,34 M=4



LOADS

5 F=0,0,-760 L=1  
6 F=0,0,-1480  
7 F=0,0,-1480  
10 F=0,0,-1380  
11 F=0,0,-1380  
14 F=0,0,-1320  
15 F=0,0,-1320  
20 F=0,0,-1320  
21 F=0,0,-1320  
23 F=0,0,-1640  
26 F=0,0,-1500  
27 F=0,0,-1490  
28 F=0,0,-1670  
29 F=0,0,-1730  
30 F=0,0,-720  
31 F=0,0,-830

5 F=0,0,-532 L=2  
6 F=0,0,-1036  
7 F=0,0,-1036  
10 F=0,0,-966  
11 F=0,0,-966  
14 F=0,0,-924  
15 F=0,0,-924  
20 F=0,0,-924  
21 F=0,0,-924  
23 F=0,0,-1148  
26 F=0,0,-1050  
27 F=0,0,-1043  
28 F=0,0,-1169  
29 F=0,0,-1211  
30 F=0,0,-504  
31 F=0,0,-581

COMBO

1 C=1.4,1.6

□

**BODRUM KAT DOSEMESI (DOSEME7)**

**FRAME ELEMENT FORCES**

ELT ID	LOAD COMB	DIST ENDI	1-2 PLANE		AXIAL FORCE	1-3 PLANE	AXIAL TORQ
			SHEAR	MOMENT		SHEAR	
1 -----							
1	1	.000			.000		.000
		.000	-1915.200	.000			
	155.000		-1915.200	-296856.000			
	155.000				.000		.000
2 -----							
2	1	.000			.000		19515.709
		.000	248.553	-52154.368			
	155.000		248.553	-13628.678			
	155.000				.000		19515.709
3 -----							
3	1	.000			.000		75278.469
		.000	-3078.585	-14883.523			
	155.000		-3078.585	-492064.147			
	155.000				.000		75278.469
4 -----							
4	1	.000			.000		.000
		.000	4541.056	.000			
	155.000		4541.056	703863.705			
	155.000				.000		.000
5 -----							
5	1	.000			.000		-91674.016
		.000	-2302.668	483903.242			
	155.000		-2302.668	126989.654			
	155.000				.000		-91674.016
6 -----							
6	1	.000			.000		-26296.375
		.000	-5168.828	162070.562			
	155.000		-5168.828	-639097.823			
	155.000				.000		-26296.375
7 -----							
7	1	.000			.000		.000
		.000	2322.145	.000			
	155.000		2322.145	359932.497			
	155.000				.000		.000
8 -----							
8	1	.000			.000		-17749.807
		.000	-1040.120	362221.211			
	155.000		-1040.120	201002.587			
	155.000				.000		-17749.807
9 -----							
9	1	.000			.000		-4689.102
		.000	-4613.882	169830.025			
	155.000		-4613.882	-545321.619			
	155.000				.000		-4689.102
10 -----							
10	1	.000			.000		

11		192.500		.000	
11	1	.000		.000	.000
		.000	1993.087	.000	
		155.000	1993.087	308928.491	
		155.000		.000	.000
12	1	.000		.000	-46350.141
		.000	16.322	309669.607	
		155.000	16.322	312199.459	
		155.000		.000	-46350.141
13	1	.000		.000	-9616.535
		.000	-5834.749	333316.362	
		155.000	-5834.749	-571069.676	
		155.000		.000	-9616.535
14	1	.000		.000	-43532.703
		.000	4312.834	-520840.290	
		192.500	4312.834	309380.306	
		192.500		.000	-43532.703
15	1	.000		.000	.000
		.000	-1901.519	366042.411	
		192.500	-1901.519	.000	
		192.500		.000	.000
16	1	.000		.000	.000
		.000	4064.912	.000	
		155.000	4064.912	630061.398	
		155.000		.000	.000
17	1	.000		.000	205275.969
		.000	-3158.108	602290.399	
		155.000	-3158.108	112783.701	
		155.000		.000	205275.969
18	1	.000		.000	-29515.045
		.000	-2295.625	89013.297	
		155.000	-2295.625	-266808.504	
		155.000		.000	-29515.045
19	1	.000		.000	55890.207
		.000	160.969	-255834.686	
		192.500	160.969	-224848.064	
		192.500		.000	55890.207
20	1	.000		.000	.000
		.000	1814.400	-349272.000	
		192.500	1814.400	.000	
		192.500		.000	.000
21	1	.000		.000	.000
		.000	2489.578	.000	
		195.000	2489.578	485467.649	

22	195.000			.000	.000
-----	1	.000		.000	244701.625
		.000	-3403.775	465951.940	
		185.000	-3403.775	-163746.463	
23	185.000			.000	244701.625
-----	1	.000		.000	24741.168
		.000	-37.651	-72072.449	
		170.000	-37.651	-78473.066	
24	170.000			.000	24741.168
-----	1	.000		.000	27029.883
		.000	-1.785	-60723.260	
		170.000	-1.785	-61026.777	
25	170.000			.000	27029.883
-----	1	.000		.000	27770.998
		.000	-1351.420	-14676.635	
		170.000	-1351.420	-244418.031	
26	170.000			.000	27770.998
-----	1	.000		.000	.000
		.000	2091.600	-449694.000	
		215.000	2091.600	.000	
27	215.000			.000	.000
-----	1	.000		.000	.000
		.000	569.331	.000	
		195.000	569.331	111019.558	
28	195.000			.000	.000
-----	1	.000		.000	-1254.845
		.000	166.869	55256.799	
		185.000	166.869	86127.484	
29	185.000			.000	-1254.845
-----	1	.000		.000	33826.063
		.000	-444.571	20749.847	
		170.000	-444.571	-54827.299	
30	170.000			.000	33826.063
-----	1	.000		.000	2653.500
		.000	-197.210	-67888.003	
		170.000	-197.210	-101413.707	
31	170.000			.000	2653.500
-----	1	.000		.000	23770.402
		.000	2327.460	-138147.314	
		170.000	2327.460	257520.925	
32	170.000			.000	23770.402
-----	1	.000		.000	.000
		.000	-2289.823	492311.939	
		215.000	-2289.823	.000	

33	215.000			.000	.000
1	.000			.000	-61203.203
	.000	-3511.153	198965.330		
	170.000	-3511.153	-397930.660		
	170.000			.000	-61203.203
34					
1	.000			.000	-10973.818
	.000	4889.334	-364014.491		
	170.000	4889.334	467172.228		
	170.000			.000	-10973.818
35					
1	.000			.000	.000
	.000	-1775.660	381766.975		
	215.000	-1775.660	.000		
	215.000			.000	.000
36					
1	.000			.000	67761.828
	.000	1228.755	-270480.960		
	170.000	1228.755	-61592.634		
	170.000			.000	67761.828
37					
1	.000			.000	124423.938
	.000	3310.308	-105125.337		
	170.000	3310.308	457627.047		
	170.000			.000	124423.938
38					
1	.000			.000	.000
	.000	-2702.722	513517.255		
	190.000	-2702.722	.000		
	190.000			.000	.000

□

2.8. Bodrum Kat Döşemesi Betonarme Kesit Hesapları

2.8.1. Döşeme 6 Betonarme Hesabı (X-Doğrultusu)

Tablo 2.8.1.1. A-A ve C-C Aksları Arası Açıklık Şeridi  
(Sol yan)

b = 190 cm d = 18 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,34	138,46	0,301	3,91		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/40 (1,96)
0,15	2160	0,290	0,24	Ø10/20 (3,93)		
-6,06	53,46	0,318	10,71		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/9 (8,73)

Tablo 2.8.1.2. B-B ve D-D Aksları Arası Açıklık Şeridi  
b' = 177,5 cm d = 18 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,63	514,28	0,293	1,03		Ø10/40 (1,96 cm <sup>2</sup> )	
2,18	148,62	0,301	3,65	Ø10/20 (3,93)		
-0,63	514,28	0,293	1,03		Ø10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.8.1.3. D-D ve E-E Aksları Arası Açıklık Şeridi  
b' = 245 cm d = 18 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Ø10/40 (1,96 cm <sup>2</sup> )	
+1,86	174,19	0,299	3,09	Ø10/20 (3,93)		
-1,21	267,77	0,296	1,99		Ø10/40+Ø10/40 (3,93cm <sup>2</sup> )	
+2,30	140,87	0,301	3,85	Ø10/20 (3,93)		
					Ø10/40 (3,93 cm <sup>2</sup> )	

Tablo 2.8.1.3. B-B Aksı Kolon Şeridi (Sağyan)  
b' = 137,5 cm d = 18 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-3,12	103,84	0,304	5,27		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/20 (3,93)
1,8	180	0,299	2,99	Φ10/20 (3,93)		
					Φ10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.8.1.4. D-D Aksı Kolon Şeridi  
b' = 212 cm d = 18 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-5,41	59,89	0,314	9,44		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/11 (7,14cm <sup>2</sup> )
2,75	117,82	0,303	4,63	Φ10/16 (4,91)		
					Φ10/32 (2,45 cm <sup>2</sup> )	

Tablo 2.8.1.5. E-E Aksı Kolon Şeridi  
b' = 122,5 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Φ10/40 (1,96 cm <sup>2</sup> )	
1,2	270	0,296	1,97	Φ10/20 (3,93)		
-2,49	130,12	0,301	4,16		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	Φ10/33 (2,38cm <sup>2</sup> )
1,2	270	0,296	1,97	Φ10/20 (3,93)		
					Φ10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.8.1.6. C-C Aksı Açıklık Şeridi

b' = 177,5 cm

M tm/m	K	ks	As <sub>2</sub> cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,22	145,94	0,300	3,7		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/33 (2,38cm <sup>2</sup> )
0,6	540	0,293	0,98	Φ10/20 (3,93)		
					Φ10/40 (1,96 cm <sup>2</sup> )	

2.8.2. Döşeme 6 Betonarme Hesabı (Y-Doğrultusu)

Tablo 2.8.2.1. 2-2 ve 3-3 Aksı Arası Açıklık Şeridi

b' = 192,5 cm d = 17 cm

M tm/m	K	ks	As <sub>2</sub> cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,39	120,92	0,302	4,00		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/33 (2,38)
0,20	1445	0,291	0,32	Φ10/20 (3,93)		
-2,99	96,66	0,305	5,07		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/25 (3,14)

Tablo 2.8.2.2. 3-3 ve 4-4 Aksları Arası Açıklık Şeridi

b' = 192,5 cm d = 17 cm

Md tm/m	K	ks	As <sub>2</sub> cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,40	120,42	0,302	4,03	Φ10/19 4,13cm <sup>2</sup>		
-3,52	82,10	0,307	6,00		Φ10/26 (3,02cm <sup>2</sup> )	Φ10/26 (3,02)
3,50	82,57	0,307	1,97	Φ10/13 6,04cm <sup>2</sup>		
					Φ10/26 (3,02 cm <sup>2</sup> )	



Tablo 2.8.2.3. 4-4 ve 5-5 Aksları Arası Açıklık Şeridi  
b' = 192,5 cm

M tm/m	K	ks	As <sub>s</sub> cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Φ10/40 (1,96 cm <sup>2</sup> )	
0,82	352,44	0,295	1,34	Φ10/20 (3,93)		
-1,35	214,08	0,297	2,23		Φ10/40+Φ10/40 (3,93 cm <sup>2</sup> )	
1,85	156,22	0,301	3,09	Φ10/20 (3,93)		

Tablo 2.8.2.4. 3-3 Aksı Kolon Şeridi  
b' = 96 cm

M tm/m	K	ks	As <sub>s</sub> cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,93	310,75	0,295	1,53	Φ10/40 (1,96)		
-0,35	825,71	0,292	0,57		Φ10/40 (1,96 cm <sup>2</sup> )	
0,41	704,88	0,293	0,67	Φ10/20 (3,93)		
-0,54	535,18	0,294	0,88		Φ10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.8.2.5. 4-4 Aksı Kolon Şeridi  
b' = 192,5 cm

M tm/m	K	ks	As <sub>s</sub> cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,76	164,20	0,299	2,92		Φ10/40 (1,96)	Φ10/33 2,38cm <sup>2</sup>
0,16	1806,25	0,530	0,47	Φ10/20 (3,93)		
-0,73	395,89	0,295	1,19		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	
0,84	344,05	0,295	1,37	Φ10/20 (3,93)		
-4,49	64,36	0,317	7,90		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	Φ10/20 3,93cm <sup>2</sup>
2,25	128,44	0,302	3,775	Φ10/20 (3,93)		
-0,36	802,78	0,293	0,586		Φ10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.8.2.6. 5-5 Aksı Kolon Şeridi  
b' = 96 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-2,57	112,45	0,303	4,33		Φ40/20 (3,93 cm <sup>2</sup> )	Φ10/33 (2,38)
				Φ10/20 3,93cm <sup>2</sup>		
-0,25	1156	0,291	0,41		Φ10/40+Φ10/40 (3,93cm <sup>2</sup> )	
				Φ10/20 3,93cm <sup>2</sup>		
-2,41	119,92	0,303	4,06		Φ10/40 (3,93 cm <sup>2</sup> )	Φ10/33 (2,38)

Tablo 2.8.2.7. 2-2 Aksı Kolon Şeridi  
b' = 97 cm

M tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-6,04	47,85	0,323	10,83		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/9 (8,73)
				Φ10/20 3,93cm <sup>2</sup>		
-5,29	54,63	0,317	9,32		Φ10/40 (1,96cm <sup>2</sup> )	Φ10/9 (8,73)

2.8.3. Döşeme 7 Betonarme Hesabı (X-Doğrultusu)

Tablo 2.8.3.1. A-A ve B-B Aksları Arası Açıklık Şeridi  
b' = 195 cm      d = 18 cm

Md tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,53	211,76	0,298	2,53		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/33 (2,38)
				Φ10/20 (3,93)		
-2,58	125,58	0,302	4,33		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/33 (2,38)

Tablo 2.8.3.2. D-D ve E-E Aksları Arası Açıklık Şeridi  
b' = 277,5 cm d = 18 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Φ10/24 (3,42 cm <sup>2</sup> )	
3,71	87,33	0,307	6,33	Φ10/12 (6,54)		
-3,36	96,43	0,305	5,69		Φ10/24+Φ10/40 (5,23cm <sup>2</sup> )	Φ10/33 (2,38)
2,15	150,70	0,300	3,58	Φ10/20 (3,93)		
-2,05	158,05	0,300	3,42		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/33 (2,38)

Tablo 2.8.3.3. A-A Aksı Kolon Şeridi  
b' = 97,5 cm d = 18 cm

M tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,22	1472,7	0,291	0,36		Φ10/40 (1,96 cm <sup>2</sup> )	
				Φ10/20 3,93cm <sup>2</sup>		
-0,22	1472,7	0,291	0,36		Φ10/40 (1,96cm <sup>2</sup> )	

Tablo 2.8.3.4. C-C Aksı Kolon Şeridi  
b' = 135 cm d = 18 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,6	540	0,294	0,98		Φ10/40 (3,27 cm <sup>2</sup> )	
3,96	81,82	0,308	6,78	Φ10/12 (6,54)		
-3,59	90,25	0,306	6,10	-	Φ10/24 (3,27 cm <sup>2</sup> )	Φ10/24 (3,27)

Tablo 2.8.3.5. D-D Aksı Kolon Şeridi  
b' = 176 cm d = 18 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,15	281,74	0,296	1,89		Ø10/40 (1,96 cm <sup>2</sup> )	
2,13	152,11	0,301	3,56	Ø10/20 (3,93)		
-3,21	100,93	0,305	5,44		Ø10/40 (1,96cm <sup>2</sup> )	Ø10/20 3,93cm <sup>2</sup>

Tablo 2.8.3.6. E-E Aksı Kolon Şeridi  
b' = 137,5 cm d = 18 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,74	437,84	0,295	1,21		Ø10/40 (1,96 cm <sup>2</sup> )	
				Ø10/20 (3,93)		
-0,63	514,29	0,294	1,03		Ø10/40+Ø10/40 (3,93 cm <sup>2</sup> )	
				Ø10/20		
-0,55	589	0,293	0,90		Ø10/40 (1,96 cm <sup>2</sup> )	

#### 2.8.4. Döşeme 7 Betonarme Hesabı (Y-Doğrultusu)

Tablo 2.8.4.1. 1-1 ve 2-2 Aksları Arası Açıklık Şeridi  
b' = 192,5 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
					Ø10/24 (3,27 cm <sup>2</sup> )	
3,3	82,33	0,306	5,63	Ø10/12 (6,54)		
-1,06	272,64	0,296	1,85		Ø10/24+Ø10/40 (5,23cm <sup>2</sup> )	
0,72	401,38	0,294	1,25	Ø10/20 3,93cm		
-2,90	99,66	0,305	5,20		Ø10/40+Ø10/24 (5,23cm <sup>2</sup> )	
3,17	91,17	0,306	5,20	Ø10/12 (6,54)		
					Ø10/24 (3,27 cm <sup>2</sup> )	

Tablo 2.8.4.2. 2-2 ve 3-3 Aksları Arası Açıklık Şeridi  
b' = 192,5 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,40	206,43	0,298	2,45		Φ10/32 (2,45 cm <sup>2</sup> )	
2,66	108,65	0,304	4,76	Φ10/16 (4,91)		
					Φ10/32 (2,45 cm <sup>2</sup> )	

Tablo 2.8.4.3. 1-1 Aksı Kolon Şeridi  
b' = 176 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-0,9	321,11	0,296	1,57		Φ10/40 (1,96 cm <sup>2</sup> )	
				Φ10/20 (3,93)		
-2,8	103,21	0,304	5,00		Φ10/40+Φ10/40 (3,93 cm <sup>2</sup> )	Φ10/33 (2,38)
				Φ10/20 (3,93)		
-0,63	458,73	0,294	1,09		Φ10/40 (1,96 cm <sup>2</sup> )	

Tablo 2.8.4.4. 2-2 Aksı Kolon şeridi  
b' = 192,5 cm d = 17 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-3,02	95,70	0,305	5,42		Φ10/40 (1,96cm <sup>2</sup> )	Φ10/20 (3,93)
0,72	401,39	0,295	1,25	Φ10/20 (3,93)		
-2,65	109,06	0,304	4,74		Φ10/40 (1,96cm <sup>2</sup> )	Φ10/20 (3,93)
-4,4	65,68	0,312	8,07		Φ10/40 (1,96 cm <sup>2</sup> )	Φ10/40 (6,54)
1,14	253,51	0,297	1,99	Φ10/20 (3,93)		
-6,25	46,24	0,324	11,91		Φ10/20+Φ10/32 (4,42 cm <sup>2</sup> )	Φ10/10 (7,85)
2,68	107,84	0,304	4,80	Φ10/16 (4,91)		
-1,27	227,56	0,298	2,23		Φ10/32 (2,45 cm <sup>2</sup> )	

Tablo 2.8.4.5. 3-3 Aksı Kolon Şeridi  
b' = 95 cm d = 17 cm

M tm/m	K	ks	$A_s$ cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-1,06	272,64	0,296	1,85		Ø10/40 (1,96 cm <sup>2</sup> )	
				Ø10/20 (3,93)		
-4,92	58,74	0,315	9,12		Ø10/40+Ø10/40 (3,93 cm <sup>2</sup> )	Ø10/15 (5,24)
				Ø10/20 (3,93)		
-2,48	116,53	0,303	4,42		Ø10/40 (1,96 cm <sup>2</sup> )	Ø10/33 (2,38)

## 2.9. Düşey Yükler Altında Yapının Statik Hesabı

Mevcut yapının düşey ve yatay yükler altında hesabı SAP90 bilgisayar programıyla yapılmıştır. Bunun için yapının çerçeve, perde ve çekirdekten oluşan taşıyıcı sistemi üç boyutlu olarak tanımlanmıştır. Sistemin döşemesi kirişsiz döşeme olduğundan, çerçeve sistemini oluştururken kirişler, döşemenin rijitliğine eşdeğer birer kiriş gibi alınmıştır. Bu kirişleri alırken, açıklıkların ortasından geçen eksenle tanımlanmış alandaki döşemenin rijitliğine eşdeğer kirişler olarak alınmıştır.

Programda sistemin sınır şartları tanımlanırken, bütün düğüm noktalarında sınırlamalar serbest bırakılmış, temelde ise sınırlamalar tutulmuştur.

Bu sistemde düşey yükler için hesap, perde ve kolonlarda düşey yüklerden dolayı meydana gelen kesit tesirlerini bulmak için yapılmıştır. Düşey yük olarak, çerçevdeki eşdeğer kiriş elemanlarının birim boydaki ağırlıkları tanımlanmış ve bu değer altında sistemin kesit zorları hesaplanmıştır.

YATAY VE DUSEY YUK HESABI  
SYSTEM

L=3

JOINTS

1	X=0	Y=0	Z=1250
2	X=425	Y=0	Z=1250
3	X=810	Y=0	Z=1250
4	X=1195	Y=0	Z=1250
5	X=1620	Y=0	Z=1250
6	X=810	Y=202.5	Z=1250
7	X=1002.5	Y=202.5	Z=1250
8	X=1195	Y=202.5	Z=1250
9	X=1620	Y=202.5	Z=1250
10	X=0	Y=367.5	Z=1250
11	X=425	Y=367.5	Z=1250
12	X=537.5	Y=367.5	Z=1250
13	X=650	Y=367.5	Z=1250
14	X=810	Y=367.5	Z=1250
15	X=425	Y=452.5	Z=1250
16	X=0	Y=537.5	Z=1250
17	X=425	Y=537.5	Z=1250
18	X=520	Y=537.5	Z=1250
19	X=615	Y=537.5	Z=1250
20	X=810	Y=537.5	Z=1250
21	X=1002.5	Y=537.5	Z=1250
22	X=1195	Y=537.5	Z=1250
23	X=1620	Y=537.5	Z=1250
24	X=0	Y=1082.5	Z=1250
25	X=425	Y=1060	Z=1250
26	X=810	Y=1037.5	Z=1250
27	X=1195	Y=1015	Z=1250
28	X=1620	Y=992.5	Z=1250
29	X=0	Y=0	Z=971
30	X=425	Y=0	
31	X=810	Y=0	
32	X=1195	Y=0	
33	X=1620	Y=0	
34	X=810	Y=202.5	
35	X=1002.5	Y=202.5	
36	X=1195	Y=202.5	
37	X=1620	Y=202.5	
38	X=0	Y=367.5	
39	X=425	Y=367.5	
40	X=537.5	Y=367.5	
41	X=650	Y=367.5	
42	X=810	Y=367.5	
43	X=425	Y=452.5	
44	X=0	Y=537.5	
45	X=425	Y=537.5	
46	X=520	Y=537.5	
47	X=615	Y=537.5	
48	X=810	Y=537.5	
49	X=1002.5	Y=537.5	
50	X=1195	Y=537.5	
51	X=1620	Y=537.5	
52	X=0	Y=1082.5	
53	X=425	Y=1060	
54	X=810	Y=1037.5	

55	X=1195	Y=1015	
56	X=1620	Y=992.5	
57	X=0	Y=0	Z=692
58	X=425	Y=0	
59	X=810	Y=0	
60	X=1195	Y=0	
61	X=1620	Y=0	
62	X=810	Y=202.5	
64	X=1195	Y=202.5	
65	X=1620	Y=202.5	
66	X=0	Y=367.5	
67	X=425	Y=367.5	
68	X=537.5	Y=367.5	
69	X=650	Y=367.5	
70	X=810	Y=367.5	
71	X=425	Y=452.5	
72	X=0	Y=537.5	
73	X=425	Y=537.5	
74	X=520	Y=537.5	
75	X=615	Y=537.5	
76	X=810	Y=537.5	
77	X=1002.5	Y=537.5	
78	X=1195	Y=537.5	
79	X=1620	Y=537.5	
80	X=0	Y=1082.5	
81	X=425	Y=1060	
82	X=810	Y=1037.5	
83	X=1195	Y=1015	
84	X=1620	Y=992.5	
85	X=0	Y=0	Z=413
86	X=425	Y=0	
87	X=810	Y=0	
88	X=1195	Y=0	
89	X=1620	Y=0	
90	X=810	Y=202.5	
91	X=1002.5	Y=202.5	
92	X=1195	Y=202.5	
93	X=1620	Y=202.5	
94	X=0	Y=367.5	
95	X=425	Y=367.5	
96	X=537.5	Y=367.5	
97	X=650	Y=367.5	
98	X=810	Y=367.5	
99	X=425	Y=452.5	
100	X=0	Y=537.5	
101	X=425	Y=537.5	
102	X=520	Y=537.5	
103	X=615	Y=537.5	
104	X=810	Y=537.5	
105	X=1002.5	Y=537.5	
106	X=1195	Y=537.5	
107	X=1620	Y=537.5	
108	X=0	Y=1082.5	
109	X=425	Y=1060	
110	X=810	Y=1037.5	
111	X=1195	Y=1015	
112	X=1620	Y=0	Z=26
114	X=425	Y=0	Z=26
115	X=810	Y=0	Z=134



116	X=1195	Y=0	Z=134
117	X=1620	Y=0	Z=134
118	X=810	Y=202.5	
119	X=1002.5	Y=202.5	
120	X=1195	Y=202.5	
121	X=1620	Y=202.5	
122	X=0	Y=367.5	Z=26
123	X=425	Y=367.5	Z=26
124	X=537.5	Y=367.5	Z=134
125	X=650	Y=367.5	
126	X=810	Y=367.5	
127	X=425	Y=452.5	Z=26
128	X=0	Y=537.5	Z=26
129	X=425	Y=537.5	Z=26
130	X=520	Y=537.5	Z=134
131	X=615	Y=537.5	Z=134
132	X=810	Y=537.5	
133	X=1002.5	Y=537.5	
134	X=1195	Y=537.5	
135	X=1620	Y=537.5	
136	X=0	Y=1082.5	Z=26
137	X=425	Y=1060	Z=26
138	X=810	Y=1037.5	Z=134
139	X=1195	Y=1015	Z=134
140	X=1620	Y=992.5	Z=134
141	X=425	Y=0	Z=134
142	X=425	Y=367.5	Z=134
143	X=425	Y=537.5	Z=134
144	X=810	Y=1037.5	Z=26
145	X=425	Y=737.5	Z=26
146	X=810	Y=737.5	Z=134
147	X=0	Y=0	Z=-235
148	X=425	Y=0	Z=-235
149	X=425	Y=0	Z=-131
150	X=810	Y=0	Z=-131
151	X=1195	Y=0	
152	X=1620	Y=0	Z=-131
153	X=810	Y=202.5	
154	X=1002.5	Y=202.5	
155	X=1195	Y=202.5	
156	X=1620	Y=202.5	
157	X=0	Y=367.5	Z=-235
180	X=425	Y=367.5	Z=-235
158	X=425	Y=367.5	Z=-131
159	X=537.5	Y=367.5	Z=-131
160	X=650	Y=367.5	
161	X=810	Y=367.5	
162	X=425	Y=452.5	Z=-235
163	X=0	Y=537.5	Z=-235
164	X=425	Y=537.5	Z=-235
165	X=425	Y=537.5	Z=-131
166	X=520	Y=537.5	
167	X=615	Y=537.5	
168	X=810	Y=537.5	
169	X=1002.5	Y=537.5	
170	X=1195	Y=537.5	
171	X=1620	Y=537.5	
172	X=425	Y=737.5	Z=-235
173	X=810	Y=737.5	Z=-131

174 X=0 Y=1082.5 Z=-235  
175 X=425 Y=1060  
176 X=810 Y=1037.5  
177 X=810 Y=1037.5 Z=-131  
178 X=1195 Y=1015 Z=-131  
179 X=1620 Y=992.5 Z=-131  
199 X=0 Y=0 Z=-555  
181 X=425 Y=0 Z=-555  
182 X=810 Y=0 Z=-396  
183 X=1195 Y=0 Z=-396  
184 X=1620 Y=0 Z=-396  
185 X=1002.5 Y=202.5  
186 X=537.5 Y=367.5  
187 X=425 Y=452.5 Z=-555  
188 X=520 Y=537.5 Z=-555  
189 X=1002.5 Y=537.5 Z=-396  
190 X=425 Y=737.5 Z=-555  
191 X=810 Y=737.5  
192 X=0 Y=1082.5  
193 X=425 Y=1037.5 Z=-555  
195 X=1195 Y=1015 Z=-396  
196 X=1620 Y=992.5 Z=-396  
197 X=0 Y=367.5 Z=-555  
198 X=0 Y=537.5

RESTRAINTS

1,180,1 R=0,0,0,0,0  
181,199,1 R=1,1,1,1,1

FRAME

NM=34 Z=-1

1	I=260417,65104	A=3800	E=285000	W=9.5
2	I=66666,1666666	A=2000	E=285000	W=5
3	I=11888880,128333	A=3850	E=285000	W=9.625
4	I=178333,31902161	A=5350	E=285000	W=13.375
5	I=183333,34661458	A=5500	E=285000	W=13.75
6	I=2703724,75000	A=2350	E=285000	W=5.875
7	I=480000,622080000	A=14400	E=285000	W=36
8	I=1428958,63333	A=1900	E=285000	W=4.75
9	I=226666,65506666	A=6800	E=285000	W=17
10	I=271666,113195520	A=8150	E=285000	W=20.375
11	I=230000,68439375	A=6900	E=285000	W=17.25
12	I=268333,106666666	A=8050	E=285000	W=20.125
13	I=256666,95111042	A=7700	E=285000	W=19.25
14	I=1023541,56666	A=1700	E=285000	W=4.25
15	I=128333,11888880	A=3850	E=285000	W=9.625
16	I=5467500,5467500	A=8100	E=285000	
17	I=450000,78125	A=1500	E=285000	
18	I=1518750,117188	A=2250	E=285000	
19	I=119122292,276666	A=8300	E=285000	
20	I=8188333,113333	A=3400	E=285000	
21	I=13333333,133333	A=4000	E=285000	
22	I=21629792,156666	A=4700	E=285000	
23	I=141666,15992838	A=4250		W=10.625
24	I=181666,29632635	A=5450		W=13.625
25	I=174000,29632635	A=5220		W=13.05
26	I=166666,26041667	A=5000		W=12.50
27	I=153333,20278333	A=4600		W=11.50
28	I=118888802,501302	A=9625		

29 I=2624400,140625 A=2700  
30 I=10235417,221354 A=4250  
31 I=97612552,240885 A=4625  
32 I=133333333,520833 A=10000  
33 I=118888802,1987500 A=11250  
34 I=10235416,10235416 A=28900  
1,1,2 M=1 G=1,1,1,1 LP=8,5  
3,3,4 M=1 G=1,1,1,1  
5,6,7 M=3 G=1,1,1,1  
7,8,9 M=4  
8,10,11 M=5  
9,11,12 M=6 G=1,1,1,1  
11,13,14 M=5  
12,16,17 M=7  
13,17,18 M=8 G=1,1,1,1  
15,19,20 M=9  
16,20,21 M=3 G=1,1,1,1  
18,22,23 M=10  
19,24,25 M=11 G=3,1,1,1  
23,1,10 M=12 LP=3,0  
24,10,16 M=12 G=1,1,6,8  
26,2,11 M=13  
27,11,15 M=14 G=1,1,4,2  
29,17,25 M=13  
30,3,6 M=13 G=1,4,1,2  
31,6,14 M=15 G=1,1,8,6  
33,20,26 M=13  
35,8,22 M=15  
36,22,27 M=13  
37,5,9 M=12  
38,9,23 M=12 G=1,1,14,5  
55,29,30 M=1 G=1,1,1,1 LP=36,33  
57,31,32 M=1 G=1,1,1,1  
59,34,35 M=3 G=1,1,1,1  
61,36,37 M=4  
62,38,39 M=5  
63,39,40 M=6 G=1,1,1,1  
65,41,42 M=5  
66,44,45 M=7  
67,45,46 M=8 G=1,1,1,1  
69,47,48 M=9  
70,48,49 M=3 G=1,1,1,1  
72,50,51 M=10  
73,52,53 M=11 G=3,1,1,1  
77,29,38 M=12 LP=3,0  
78,38,44 M=12 G=1,1,6,8  
80,30,39 M=13  
81,39,43 M=14 G=1,1,4,2  
83,45,53 M=13  
84,31,34 M=13 G=1,4,1,2  
85,34,42 M=15 G=1,1,8,6  
87,48,54 M=13  
89,36,50 M=15  
90,50,55 M=13  
91,33,37 M=12  
92,37,51 M=12 G=1,1,14,5  
109,57,58 M=1 G=1,1,1,1 LP=64,51  
111,59,60 M=1 G=1,1,1,1  
113,62,63 M=3 G=1,1,1,1

115,64,65 M=4  
116,66,67 M=5  
117,67,68 M=6 G=1,1,1,1  
119,68,70 M=5  
120,72,73 M=7  
121,73,74 M=8 G=1,1,1,1  
123,75,76 M=9  
124,76,77 M=3 G=1,1,1,1  
126,78,79 M=10  
127,80,81 M=11 G=3,1,1,1  
131,57,66 M=12 LP=3,0  
132,66,72 M=12 G=1,1,6,8  
134,58,67 M=13  
135,67,71 M=14 G=1,1,4,2  
137,73,81 M=13  
138,59,62 M=13 G=1,4,1,2  
139,62,70 M=15 G=1,1,8,6  
141,76,82 M=13  
143,64,78 M=15  
144,78,83 M=13  
145,61,65 M=12  
146,65,79 M=12 G=1,1,14,5  
163,85,86 M=1 G=1,1,1,1 LP=92,79  
165,87,88 M=1 G=1,1,1,1  
167,90,91 M=3 G=1,1,1,1  
169,92,93 M=4  
170,94,95 M=5  
171,95,96 M=6 G=1,1,1,1  
173,97,98 M=5  
174,100,101 M=7  
175,101,102 M=8 G=1,1,1,1  
177,103,104 M=9  
178,104,105 M=3 G=1,1,1,1  
180,106,107 M=10  
181,108,109 M=11 G=3,1,1,1  
185,85,94 M=12 LP=3,0  
186,94,100 M=12 G=1,1,6,8  
188,86,95 M=13  
189,95,99 M=14 G=1,1,4,2  
191,101,109 M=13  
192,87,90 M=13 G=1,4,1,2  
193,90,98 M=15 G=1,1,8,6  
195,104,110 M=13  
197,92,106 M=15  
198,106,111 M=13  
199,89,93 M=12  
200,93,107 M=12 G=1,1,14,5  
217,113,114 M=1 LP=120,117  
218,141,115 M=1  
219,115,116 M=1 G=1,1,1,1  
221,118,119 M=3 G=1,1,1,1  
223,120,121 M=4  
224,122,123 M=5  
225,142,124 M=6  
226,124,125 M=6  
227,125,126 M=5  
228,128,129 M=7  
229,143,130 M=8  
230,130,131 M=8

231,131,132 M=9  
232,132,133 M=3 G=1,1,1,1  
234,134,135 M=10  
235,136,137 M=24  
236,137,144 M=25  
237,138,139 M=26  
238,139,140 M=27  
239,113,122 M=23  
240,122,128 M=23  
241,128,136 M=23  
242,114,123 M=23  
243,123,127 M=14 G=1,1,4,2  
339,129,145 M=13  
245,145,137 M=13  
246,115,118 M=13  
247,118,126 M=15 G=1,1,8,6  
340,132,146 M=13  
249,146,138 M=13  
250,116,120 M=13  
251,120,134 M=15  
252,134,139 M=13  
253,117,121 M=12  
254,121,135 M=12  
255,135,140 M=12  
273,147,148 M=1 LP=155,152  
274,149,150 M=1  
275,150,151 M=1 G=1,1,1,1  
277,153,154 M=3 G=1,1,1,1  
279,155,156 M=4  
280,157,180 M=5  
281,158,159 M=6 G=1,1,1,1  
283,160,161 M=5  
284,163,164 M=7  
285,165,166 M=8 G=1,1,1,1  
287,167,168 M=9  
288,168,169 M=3 G=1,1,1,1  
290,170,171 M=10  
291,174,175 M=24  
292,175,176 M=25  
293,177,178 M=26  
294,178,179 M=27  
295,147,157 M=23 LP=3,0  
296,157,163 M=23 G=1,1,6,11  
298,149,158 M=13  
299,180,162 M=14  
300,162,164 M=14  
301,164,172 M=13  
302,172,175 M=13  
303,150,153 M=13  
304,153,161 M=15 G=1,1,8,7  
306,168,173 M=13 G=1,1,5,4  
308,151,155 M=13  
309,155,170 M=15  
310,170,178 M=13  
311,152,156 M=12  
312,156,171 M=12  
313,171,179 M=12  
40,1,29 M=16 G=1,4,4,4 LP=3,0  
50,24,52 M=16 G=1,4,4,4 LP=3,0

41,2,30 M=17	G=2,1,1,1	LP=2,0
51,25,53 M=18	G=2,1,1,1	LP=3,0
45,7,35 M=19	G=1,4,14,14	LP=2,0
46,12,40 M=22		LP=2,0
47,15,43 M=20		LP=3,0
48,18,46 M=21		LP=2,0
94,29,57 M=16	G=1,4,4,4	LP=3,0
104,52,80 M=16	G=1,4,4,4	LP=3,0
95,30,58 M=17	G=2,1,1,1	LP=2,0
105,53,81 M=18	G=2,1,1,1	LP=3,0
99,35,63 M=19	G=1,4,14,14	LP=2,0
100,40,68 M=22		LP=2,0
101,43,71 M=20		LP=3,0
102,46,74 M=21		LP=2,0
148,57,85 M=16	G=1,4,4,4	LP=3,0
158,80,108 M=16	G=1,4,4,4	LP=3,0
149,58,86 M=17	G=2,1,1,1	LP=2,0
159,81,109 M=18	G=2,1,1,1	LP=3,0
153,63,91 M=19	G=1,4,14,14	LP=2,0
154,68,96 M=22		LP=2,0
155,71,99 M=20		LP=3,0
156,74,102 M=21		LP=2,0
202,85,113 M=16		LP=3,0
203,86,141 M=17		LP=2,0
204,87,115 M=17	G=1,1,1,1	LP=2,0
206,89,117 M=16	G=1,10,23,23	LP=3,0
207,91,119 M=19	G=1,4,14,14	LP=2,0
208,96,124 M=22		
209,99,127 M=20		LP=3,0
210,102,130 M=21		LP=2,0
212,108,136 M=16		LP=3,0
213,109,137 M=18		
214,110,138 M=18	G=1,1,1,1	
341,141,114 M=17		LP=2,0
342,138,144 M=18		LP=3,0
256,113,147 M=16		LP=3,0
257,114,149 M=28		LP=2,0
258,115,150 M=17		
259,116,151 M=17		
260,117,152 M=16		LP=3,0
261,119,154 M=19		LP=2,0
262,124,159 M=22		
263,127,162 M=20		LP=3,0
264,130,166 M=21		LP=2,0
265,133,169 M=19		
266,145,172 M=18		LP=3,0
267,146,173 M=18		
268,136,174 M=16		
269,137,175 M=18		
270,144,177 M=18		
271,139,178 M=18		
272,140,179 M=16		
337,122,157 M=32		LP=3,0
338,128,163 M=32		LP=3,0
314,147,199 M=16		
329,174,192 M=16		
315,149,148 M=32		LP=2,0
316,148,181 M=32		
317,150,182 M=31		

318,151,183 M=31  
319,152,184 M=16  
334,179,196 M=16  
320,154,185 M=19 G=1,6,15,4  
321,159,186 M=22  
323,162,187 M=20 LP=3,0  
325,166,188 M=21 LP=2,0  
327,172,190 M=18 LP=3,0  
328,173,191 M=18  
330,175,193 M=33  
331,177,176 M=33  
332,176,194 M=33  
333,178,195 M=33  
343,157,197 M=32  
344,163,198 M=32  
335,142,123 M=34 LP=2,0  
336,143,129 M=34  
322,158,180 M=34  
324,165,164 M=34

LOADS

1 F=30490,0,0 L=2  
24 F=30490,0,0 L=2  
29 F=25775,0,0 L=2  
52 F=25775,0,0 L=2  
57 F=21065,0,0 L=2  
80 F=21065,0,0 L=2  
85 F=16350,0,0 L=2  
108 F=16350,0,0 L=2  
113 F=9120,0,0 L=2  
136 F=9120,0,0 L=2  
147 F=5190,0,0 L=2  
174 F=5190,0,0 L=2  
1 F=0,30490 L=3  
5 F=0,30490 L=3  
29 F=0,25775,0 L=3  
33 F=0,25775,0 L=3  
57 F=0,21065,0 L=3  
61 F=0,21065,0 L=3  
85 F=0,16350,0 L=3  
89 F=0,16350,0 L=3  
113 F=0,9120,0 L=3  
117 F=0,9120,0 L=3  
147 F=0,5190,0 L=3  
152 F=0,5190,0 L=3

COMBO

1 C=1.5,0,0  
2 C=1,1,0  
3 C=1,-1,0  
4 C=1,0,1  
5 C=1,0,-1

YATAY VE DUSEY YUK HESABI

FRAME ELEMENT FORCES						
ELT LOAD	AXIAL DIST	1-2 PLANE			1-3 PLANE	
ID COMB	FORCE ENDI	SHEAR	MOMENT	SHEAR	MOMENT	
1 -----						
1	3161.30					
	.0	3742.60	-373378.79	-23.59	4825.09	
	262.6	-.01	118096.07	-23.59	-1370.80	
	425.0	-2313.65	-69728.11	-23.59	-5201.02	
2	-15657.43					
	.0	764.56	164395.76	-44.50	10097.41	
	80.5	-.01	195161.39	-44.50	6515.88	
	425.0	-3272.94	-368636.36	-44.50	-8815.88	
3	19872.50					
	.0	4225.57	-662234.15	13.05	-3663.96	
	425.0	188.07	275665.54	13.05	1881.18	
4	5610.31					
	.0	930.55	114326.19	-57.80	12447.15	
	98.0	-.01	159901.39	-57.80	6785.05	
	425.0	-3106.95	-348157.57	-57.80	-12119.43	
5	-1395.25					
	.0	4059.58	-612164.58	26.35	-6013.70	
	425.0	22.08	255186.75	26.35	5184.73	
2 -----						
1	4996.07					
	.0	2858.85	-195292.98	-54.83	10937.59	
	200.6	-.01	91480.34	-54.83	-62.74	
	385.0	-2627.40	-150737.75	-54.83	-10172.40	
2	-7040.58					
	.0	234.61	182920.21	-77.78	15456.92	
	24.7	-.01	185817.26	-77.78	13536.04	
	385.0	-3422.89	-430821.99	-77.78	-14487.54	
3	13702.01					
	.0	3577.19	-443310.85	4.67	-873.47	
	376.5	-.01	230177.79	4.67	884.87	
	385.0	-80.31	229838.33	4.67	924.34	
4	13518.21					
	.0	1056.62	21680.78	41.35	-7699.67	
	111.2	-.01	80441.08	41.35	-3101.03	
	385.0	-2600.88	-275589.27	41.35	8218.43	
5	-6856.79					
	.0	2755.18	-282071.41	-114.45	22283.12	
	290.0	-.01	117456.90	-114.45	-10910.81	
	385.0	-902.32	74605.61	-114.45	-21781.63	
3 -----						
1	1572.09					
	.0	3058.24	-235881.31	-11.93	2577.53	
	214.6	-.01	92288.55	-11.93	17.74	
	385.0	-2428.01	-114561.46	-11.93	-2014.52	
2	-5646.09					
	.0	926.77	58960.23	-14.93	3583.77	
	97.6	-.01	104165.43	-14.93	2126.97	
	385.0	-2730.73	-288302.86	-14.93	-2165.47	
3	7742.21					
	.0	3150.89	-373468.65	-.97	-147.07	



	331.7	-.01	149062.47	-.97	-468.82
	385.0	-506.61	135554.25	-.97	-520.55
4	11624.68				
	.0	1146.09	11538.62	90.72	-18070.40
	120.6	-.01	80671.88	90.72	-7125.68
	385.0	-2511.41	-251283.86	90.72	16856.97
5	-9528.56				
	.0	2931.56	-326047.04	-106.62	21507.10
	308.6	-.01	126271.42	-106.62	-11395.47
	385.0	-725.94	98535.25	-106.62	-19542.99
4	-----				
1	-464.30				
	.0	2923.48	-184991.60	10.26	-2152.89
	205.2	-.01	114894.80	10.26	-47.49
	425.0	-3132.77	-229463.74	10.26	2208.60
2	-2795.45				
	.0	88.74	232080.35	4.99	-896.66
	9.3	-.01	232494.81	4.99	-850.03
	425.0	-3948.76	-588173.90	4.99	1224.55
3	2176.38				
	.0	3809.24	-478735.82	8.69	-1973.87
	401.0	-.01	284964.49	8.69	1511.41
	425.0	-228.26	282222.24	8.69	1720.25
4	4234.55				
	.0	1146.36	23759.71	40.70	-8802.81
	120.7	-.01	92925.08	40.70	-3891.67
	425.0	-2891.14	-347005.91	40.70	8494.17
5	-4853.62				
	.0	2751.62	-270415.18	-27.02	5932.29
	289.6	-.01	128080.00	-27.02	-1892.66
	425.0	-1285.88	41054.25	-27.02	-5549.36
242	-----				
1	-1715.67				
	.0	3002.28	-205292.17	-3011.86	13207.46
	188.4	-.01	77490.23	-3011.86	-554163.19
	367.5	-2854.75	-178183.53	-3011.86	-1093649.32
2	-1176.24				
	.0	1524.90	-68923.35	-8741.89	34746.40
	143.5	-.01	40504.11	-8741.89	-1219899.03
	367.5	-2379.78	-226007.30	-8741.89	-3177896.41
3	-1111.32				
	.0	2478.14	-204799.54	4726.08	-17136.45
	233.2	-.01	84196.22	4726.08	1085160.35
	367.5	-1426.55	-11570.74	4726.08	1719697.31
4	3903.73				
	.0	-1265.52	485645.03	-9818.58	28636.39
	367.5	-5170.20	-696918.50	-9818.58	-3579690.58
5	-6191.29				
	.0	5268.56	-759367.92	5802.77	-11026.44
	367.5	1363.87	459340.46	5802.77	2121491.48
339	-----				
1	210.08				
	.0	535.46	72798.97	9577.42	-2621897.78
	18.5	-.01	77763.83	9577.42	-2444288.62
	200.0	-5239.54	-397608.45	9577.42	-706413.35

2	12343.92	.0	3631.83	-301716.15	-3133.13	264748.24
		188.7	-.01	40886.93	-3133.13	-326371.07
		200.0	-218.17	39650.66	-3133.13	-361878.55
3	-12063.81	.0	-2917.88	398781.45	15903.03	-3760611.95
		200.0	-6767.88	-569795.26	15903.03	-580005.92
4	-35309.43	.0	-14258.48	1515491.23	4538.49	3942989.71
		200.0	-18108.48	-1721204.59	4538.49	4850688.66
5	35589.53	.0	14972.43	-1418425.93	8231.40	-7438853.43
		200.0	11122.43	1191059.99	8231.40	-5792573.13
-----						
245						
1	614.45	.0	5347.30	-361017.15	9588.20	-706413.35
		185.2	-.02	134109.88	9588.20	1069210.01
		322.5	-3964.89	-138104.08	9588.20	2385780.68
2	10787.72	.0	3544.67	-233389.85	-3253.42	-361878.55
		184.1	-.01	92966.11	-3253.42	-960961.46
		322.5	-2663.45	-91293.06	-3253.42	-1411106.20
3	-9968.44	.0	3585.06	-247966.35	16037.68	-580005.92
		186.2	-.01	85868.24	16037.68	2406809.93
		322.5	-2623.07	-92845.72	16037.68	4592147.11
4	-16598.01	.0	-2942.63	634880.89	4619.68	4850688.66
		322.5	-9150.75	-1315176.56	4619.68	6340535.91
5	17417.28	.0	10072.36	-1116237.09	8164.58	-5792573.13
		322.5	3864.23	1131037.78	8164.58	-3159495.00
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340						
1	-49.62	.0	1902.44	-52255.22	-646.60	340487.72
		65.9	-.01	10416.50	-646.60	297885.72
		200.0	-3872.56	-249266.48	-646.60	211167.19
2	984.56	.0	4684.88	-292202.30	-4158.21	1388602.43
		200.0	834.88	259774.45	-4158.21	556960.18
3	-1050.72	.0	-2148.29	222528.68	3296.07	-934618.81
		200.0	-5998.29	-592129.75	3296.07	-275403.92
4	-6773.90	.0	-6507.72	242429.33	-348.72	-1628946.47
		200.0	-10357.72	-1444115.67	-348.72	-1698689.67
5	6707.74	.0	9044.32	-312102.95	-513.42	2082930.09
		200.0	5194.32	1111760.37	-513.42	1980245.93
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249						
1	-1486.38	.0	5824.39	-410328.08	-640.23	211167.19
		201.7	-.02	177091.38	-640.23	82025.44
		300.0	-2838.11	37612.76	-640.23	19097.66
2	-3240.01					

		.0	4284.60	-319460.39	-4316.84	556960.18
		222.6	-.01	157365.00	-4316.84	-403869.53
		300.0	-1490.40	99668.92	-4316.84	-738091.77
3	1258.16					
		.0	3481.25	-227643.72	3463.20	-275403.92
		180.8	-.01	87138.23	3463.20	350897.27
		300.0	-2293.75	-49518.57	3463.20	763555.32
4	19094.25					
		.0	-9689.48	1544713.02	-296.21	-1698689.67
		300.0	-15464.48	-2228380.26	-296.21	-1787553.83
5	-21076.10					
		.0	17455.33	-2091817.13	-557.43	1980245.93
		300.0	11680.33	2278530.61	-557.43	1813017.38
298	-----					
1	1861.55					
		.0	5490.87	-339120.65	-14.38	-556.50
		190.2	-.02	182950.81	-14.38	-3290.55
		367.5	-5120.69	-271101.43	-14.38	-5840.25
2	1251.06					
		.0	3348.45	-182708.36	-199.18	17331.54
		173.9	-.01	108516.33	-199.18	-17315.31
		367.5	-3725.92	-252067.57	-199.18	-55867.53
3	1231.00					
		.0	3972.70	-269452.50	180.01	-18073.55
		206.4	-.01	140478.92	180.01	19076.21
		367.5	-3101.67	-109401.00	180.01	48080.52
4	-6289.10					
		.0	427.21	382870.57	481.70	-37350.50
		22.2	-.01	387611.01	481.70	-26659.97
		367.5	-6647.17	-760046.70	481.70	139673.80
5	8771.17					
		.0	6893.95	-835031.43	-500.87	36608.50
		358.1	-.01	399423.69	-500.87	-142766.62
		367.5	-180.43	398578.13	-500.87	-147460.81
306	-----					
1	467.13					
		.0	2626.96	-103639.22	-1162.61	328005.98
		91.0	-.01	15857.17	-1162.61	222235.25
		200.0	-3148.04	-155747.31	-1162.61	95484.97
2	716.48					
		.0	4185.09	-247146.64	-5247.53	311913.92
		200.0	335.09	204871.55	-5247.53	-737592.67
3	-93.64					
		.0	-682.48	108961.02	3697.39	125427.39
		200.0	-4532.48	-412534.63	3697.39	864905.97
4	-4513.22					
		.0	-3946.37	132097.63	12632.31	-399619.57
		200.0	-7796.37	-1042176.16	12632.31	2126843.08
5	5136.06					
		.0	7448.98	-270283.25	-14182.45	836960.89
		200.0	3598.98	834513.08	-14182.45	-1999529.78
307	-----					
1	2433.18					
		.0	4361.22	-229847.80	-1177.90	95484.97
		151.0	-.02	99507.53	-1177.90	-82423.29

	300.0	-4301.28	-220855.76	-1177.90	-257884.71
2	5444.45				
	.0	3127.61	-189378.89	-5019.04	-737592.67
	162.5	-.01	64696.79	-5019.04	-1553053.54
	300.0	-2647.39	-117347.37	-5019.04	-2243303.59
3	-2200.21				
	.0	2687.36	-117084.84	3448.50	864905.97
	139.6	-.01	70497.01	3448.50	1346329.93
	300.0	-3087.64	-177126.98	3448.50	1899457.31
4	-37569.66				
	.0	-1109.58	589301.82	12571.06	2126843.08
	300.0	-6884.58	-609823.08	12571.06	5898161.02
5	40813.90				
	.0	6924.55	-895765.55	-14141.59	-1999529.78
	300.0	1149.55	315348.73	-14141.59	-6242007.30
40	-----				
1	-22086.27				
	.0	-17119.13	3422219.58	-1061.75	373378.79
	279.0	-17119.13	-1354018.28	-1061.75	77149.76
2	-12321.38				
	.0	-7275.47	2100497.77	1180.42	-164395.76
	279.0	-7275.47	70641.61	1180.42	164940.04
3	-17126.99				
	.0	-15550.04	2462461.67	-2596.09	662234.15
	279.0	-15550.04	-1875999.31	-2596.09	-62073.70
4	-11671.64				
	.0	-15199.75	1527284.64	1133.03	-114326.19
	279.0	-15199.75	-2713445.22	1133.03	201789.87
5	-17776.73				
	.0	-7625.76	3035674.80	-2548.70	612164.58
	279.0	-7625.76	908087.51	-2548.70	-98923.53
44	-----				
1	-20928.86				
	.0	-16930.43	2971187.23	1792.64	-229463.74
	279.0	-16930.43	-1752401.35	1792.64	270681.66
2	-16746.08				
	.0	-14871.51	2172300.45	3265.47	-588173.90
	279.0	-14871.51	-1976852.06	3265.47	322892.92
3	-11159.06				
	.0	-7702.39	1789282.53	-875.29	282222.24
	279.0	-7702.39	-359683.07	-875.29	38015.96
4	-11930.48				
	.0	-7982.35	637651.28	2023.41	-347005.91
	279.0	-7982.35	-1589423.46	2023.41	217524.71
5	-15974.66				
	.0	-14591.55	3323931.70	366.77	41054.25
	279.0	-14591.55	-747111.68	366.77	143384.17
50	-----				
1	-24118.11				
	.0	21272.61	-3390496.55	-4199.15	538647.03
	279.0	21272.61	2544562.79	-4199.15	-632916.04
2	-14372.09				
	.0	17420.09	-2149061.73	-6533.43	1735.85
	279.0	17420.09	2711143.33	-6533.43	-1821092.34
3	-17785.38				

		.0	10943.40	-2371600.34	934.57	716460.19
		279.0	10943.40	681607.06	934.57	977204.29
4	-19019.31					
		.0	10075.54	-3096370.58	-647.62	694963.95
		279.0	10075.54	-285294.04	-647.62	514276.65
5	-13138.16					
		.0	18287.94	-1424291.49	-4951.24	23232.09
		279.0	18287.94	3678044.42	-4951.24	-1358164.70
54	-----					
1	-22191.35					
		.0	14936.03	-2702333.84	251.03	-500000.22
		279.0	14936.03	1464818.94	251.03	-429962.83
2	-16592.28					
		.0	7703.27	-1891255.01	-3734.25	-687430.76
		279.0	7703.27	257958.67	-3734.25	-1729287.26
3	-12996.18					
		.0	12211.43	-1711856.77	4068.96	20763.80
		279.0	12211.43	1695133.24	4068.96	1156003.49
4	-16452.38					
		.0	13440.96	-3140739.34	1951.86	-55281.41
		279.0	13440.96	609288.71	1951.86	489287.29
5	-13136.09					
		.0	6473.75	-462372.45	-1617.15	-611385.55
		279.0	6473.75	1343803.20	-1617.15	-1062571.06
41	-----					
1	-9714.42					
		.0	754.75	-125564.86	-833.74	129039.55
		279.0	754.75	85009.28	-833.74	-103573.73
2	-6105.38					
		.0	-3569.58	551556.57	-194.80	32898.69
		279.0	-3569.58	-444356.88	-194.80	-21450.50
3	-6847.17					
		.0	4575.91	-718976.39	-916.85	139154.05
		279.0	4575.91	557702.58	-916.85	-116647.81
4	-1413.29					
		.0	-2436.67	369838.34	5046.82	-755467.60
		279.0	-2436.67	-309993.68	5046.82	652595.41
5	-11539.26					
		.0	3443.00	-537258.16	-6158.47	927520.34
		279.0	3443.00	423339.38	-6158.47	-790693.72
42	-----					
1	-8130.18					
		.0	520.09	-85143.56	-208.72	23321.74
		279.0	520.09	59961.93	-208.72	-34910.56
2	-3417.08					
		.0	-3195.43	489782.22	1013.29	-149012.47
		279.0	-3195.43	-401742.66	1013.29	133695.78
3	-7423.17					
		.0	3888.88	-603306.97	-1291.58	180108.12
		279.0	3888.88	481691.91	-1291.58	-180243.19
4	-1852.15					
		.0	-1913.82	287127.90	4400.02	-655947.77
		279.0	-1913.82	-246827.69	4400.02	571657.57
5	-8988.10					
		.0	2607.27	-400652.65	-4678.31	687043.42

		279.0	2607.27	326776.93	-4678.31	-618204.99
43	-----					
	1	-7354.26				
		.0	420.34	-70430.14	142.10	-18338.93
		279.0	420.34	46844.39	142.10	21307.84
	2	-5352.24				
		.0	-3353.33	520383.21	-965.56	142477.32
		279.0	-3353.33	-415195.12	-965.56	-126912.63
	3	-4453.44				
		.0	3913.78	-614290.07	1155.03	-166929.22
		279.0	3913.78	477654.31	1155.03	155323.08
	4	-2235.53				
		.0	-1806.45	275043.58	4372.37	-645914.10
		279.0	-1806.45	-228955.63	4372.37	573976.63
	5	-7570.14				
		.0	2366.90	-368950.44	-4182.90	621462.19
		279.0	2366.90	291414.82	-4182.90	-545566.18
51	-----					
	1	-17218.03				
		.0	3983.34	-701503.14	65.21	-9240.13
		279.0	3983.34	409849.57	65.21	8952.94
	2	-11561.44				
		.0	1623.79	-337412.82	2410.11	-356780.00
		279.0	1623.79	115624.31	2410.11	315639.66
	3	-11395.92				
		.0	3687.34	-597924.70	-2323.16	344459.82
		279.0	3687.34	430841.79	-2323.16	-303702.41
	4	-16326.78				
		.0	10236.88	-2054993.66	-1895.48	279317.97
		279.0	10236.88	801096.35	-1895.48	-249521.48
	5	-6630.59				
		.0	-4925.76	1119656.14	1982.43	-291638.15
		279.0	-4925.76	-254630.26	1982.43	261458.73
52	-----					
	1	-18812.07				
		.0	1482.39	-665074.93	18.71	-6664.28
		279.0	1482.39	-251488.00	18.71	-1443.79
	2	-12001.01				
		.0	308.13	-309342.64	2203.29	-329008.86
		279.0	308.13	-223374.87	2203.29	285707.80
	3	-13081.74				
		.0	1668.39	-577423.92	-2178.34	320123.15
		279.0	1668.39	-111942.46	-2178.34	-287632.85
	4	-15597.70				
		.0	4898.11	-1554950.00	-1632.35	235797.58
		279.0	4898.11	-188378.09	-1632.35	-219627.99
	5	-9485.05				
		.0	-2921.59	668183.43	1657.30	-244683.29
		279.0	-2921.59	-146939.24	1657.30	217702.94
53	-----					
	1	-17152.73				
		.0	2921.40	-616014.76	-150.94	18766.99
		279.0	2921.40	199057.22	-150.94	-23343.92
	2	-11516.91				
		.0	3309.90	-571526.45	2284.59	-340535.27

	279.0	3309.90	351936.73	2284.59	296864.21
3	-11353.39				
	.0	585.30	-249826.56	-2485.83	365557.92
	279.0	585.30	-86527.10	-2485.83	-327989.43
4	-14496.19				
	.0	6317.37	-1571664.14	-1983.57	288237.30
	279.0	6317.37	190881.03	-1983.57	-265179.67
5	-8374.11				
	.0	-2422.16	750311.14	1782.33	-263214.65
	279.0	-2422.16	74528.59	1782.33	234054.45
45	-----				
1	-23323.80				
	.0	12141.47	-2173329.42	284.55	.00
	279.0	12141.47	1214141.83	284.55	79390.74
2	-19888.20				
	.0	11115.48	318701.10	313.88	.00
	279.0	11115.48	3419920.26	313.88	87572.85
3	-11210.20				
	.0	5073.15	-3216473.66	65.52	.00
	279.0	5073.15	-1801064.49	65.52	18281.47
4	-22212.42				
	.0	9353.58	-1479866.32	27.97	.00
	279.0	9353.58	1129781.82	27.97	7803.28
5	-8885.98				
	.0	6835.05	-1417906.25	351.44	.00
	279.0	6835.05	489073.95	351.44	98051.04
49	-----				
1	-34429.67				
	.0	27131.64	-4487621.00	580.01	.00
	279.0	27131.64	3082105.54	580.01	161823.63
2	-37239.22				
	.0	-2185.73	2024654.14	527.88	.00
	279.0	-2185.73	1414834.83	527.88	147278.27
3	-8667.01				
	.0	38361.25	-8008148.81	245.47	.00
	279.0	38361.25	2694639.23	245.47	68486.57
4	-21302.25				
	.0	20249.69	-1439029.91	-101.69	.00
	279.0	20249.69	4210633.73	-101.69	-28371.08
5	-24603.98				
	.0	15925.82	-4544464.76	875.04	.00
	279.0	15925.82	-101159.68	875.04	244135.93
46	-----				
1	-28357.83				
	.0	-18839.71	3602353.71	-49.09	.00
	279.0	-18839.71	-1653926.29	-49.09	-13697.24
2	-17573.91				
	.0	-23139.18	4615565.18	109.00	.00
	279.0	-23139.18	-1840265.02	109.00	30412.30
3	-20236.53				
	.0	-1980.44	187573.09	-174.46	.00
	279.0	-1980.44	-364970.04	-174.46	-48675.29
4	-2867.85				
	.0	5869.07	52888.69	-577.01	.00
	279.0	5869.07	1690359.91	-577.01	-160984.69

5	-34942.59	.0	-30988.69	4750249.58	511.55	.00
		279.0	-30988.69	-3895594.97	511.55	142721.70
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47	1	-818.60	.0	-10326.94	1720347.40	-20.52 .00
			279.0	-10326.94	-1160868.63	-20.52 -5723.96
	2	6389.99	.0	-8935.30	1187517.55	-17.09 .00
			279.0	-8935.30	-1305431.85	-17.09 -4766.96
	3	-7481.45	.0	-4833.95	1106278.98	-10.27 .00
			279.0	-4833.95	-242392.99	-10.27 -2864.99
	4	-1534.23	.0	26188.24	-5664577.56	-55.52 .00
			279.0	26188.24	1641942.78	-55.52 -15489.84
	5	442.77	.0	-39957.50	7958374.09	28.16 .00
			279.0	-39957.50	-3189767.62	28.16 7857.90
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48	1	-25402.69	.0	-25433.34	4527875.61	-134.41 .00
			279.0	-25433.34	-2568026.95	-134.41 -37499.57
	2	-8395.33	.0	-35593.14	6141402.49	-86.60 .00
			279.0	-35593.14	-3789083.73	-86.60 -24161.31
	3	-25474.93	.0	1682.02	-104235.01	-92.61 .00
			279.0	1682.02	365047.80	-92.61 -25838.12
	4	-27780.36	.0	-30421.65	5423772.49	-163.49 .00
			279.0	-30421.65	-3063867.46	-163.49 -45614.01
	5	-6089.90	.0	-3489.47	613394.99	-15.72 .00
			279.0	-3489.47	-360168.48	-15.72 -4385.42
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202	1	-77280.98	.0	415.42	238758.07	689.37 -298899.62
			387.0	415.42	399524.71	689.37 -32112.00
	2	-40008.38	.0	5638.41	-879521.21	6864.68 -191326.45
			387.0	5638.41	1302544.36	6864.68 2465304.70
	3	-63032.92	.0	-5084.52	1197865.30	-5945.52 -207206.37
			387.0	-5084.52	-769844.75	-5945.52 -2508120.69
	4	-33529.44	.0	21757.17	1290242.05	5653.30 -716043.00
			387.0	21757.17	9710266.69	5653.30 1471782.38
	5	-69511.87	.0	-21203.28	-971897.96	-4734.13 317510.18
			387.0	-21203.28	-9177567.07	-4734.13 -1514598.38
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203	1	-42969.47	.0	-307.96	82759.92	-489.82 121382.29
			279.0	-307.96	-3160.51	-489.82 -15276.46



2	-26087.50	.0	-2124.80	354481.39	-133.04	43319.51
		279.0	-2124.80	-238338.30	-133.04	6200.85
3	-31205.13	.0	1714.19	-244134.83	-520.05	118523.54
		279.0	1714.19	234124.29	-520.05	-26569.46
4	454.71	.0	-825.10	225276.65	1891.20	-359711.92
		279.0	-825.10	-4924.97	1891.20	167932.08
5	-57747.33	.0	414.48	-114930.09	-2544.29	521554.97
		279.0	414.48	710.96	-2544.29	-188300.70
204 -----						
1	-31773.23	.0	-205.07	49058.82	-600.24	76502.61
		279.0	-205.07	-8155.57	-600.24	-90963.67
2	-14597.88	.0	-3214.90	389450.44	7.62	12239.40
		279.0	-3214.90	-507505.30	7.62	14365.70
3	-27766.43	.0	2941.47	-324038.68	-807.94	89764.08
		279.0	2941.47	496631.21	-807.94	-135650.59
4	-2054.37	.0	-1805.56	245436.21	4370.08	-573299.56
		279.0	-1805.56	-258315.81	4370.08	645953.62
5	-44418.68	.0	1532.14	-180024.45	-5170.40	675303.03
		279.0	1532.14	247441.72	-5170.40	-767238.51
205 -----						
1	-33452.39	.0	2.75	10116.35	-1087.54	185091.34
		279.0	2.75	10884.65	-1087.54	-118331.57
2	-25729.26	.0	-2811.88	345188.41	-1576.49	229495.33
		279.0	-2811.88	-439325.44	-1576.49	-210344.11
3	-18873.92	.0	2815.55	-331699.94	126.44	17293.13
		279.0	2815.55	453838.31	126.44	52568.68
4	-4797.43	.0	-996.91	133536.67	3377.34	-401172.55
		279.0	-996.91	-144600.85	3377.34	541104.16
5	-39805.75	.0	1000.58	-120048.21	-4827.39	647961.00
		279.0	1000.58	159113.71	-4827.39	-698879.58
206 -----						
1	-81334.57	.0	-11244.15	1494253.10	1856.77	-458521.26
		279.0	-11244.15	-1642863.87	1856.77	59516.41
2	-66005.20	.0	-13564.09	2485280.93	6180.48	-176708.31
		279.0	-13564.09	-1299100.29	6180.48	1547644.23
3	-42440.89	.0	-1428.11	-492943.46	-3704.79	-434653.36
		279.0	-1428.11	-891384.87	-3704.79	-1468289.03
4	-44068.65					

	.0	18577.42	1559828.34	1123.51	-179423.65
	279.0	18577.42	6742928.42	1123.51	134035.29
5 -64377.44					
	.0	-33569.62	432509.13	1352.18	-431938.03
	279.0	-33569.62	-8933413.58	1352.18	-54680.08
216	-----				
1-104601.85					
	.0	7746.12	-1075903.26	2760.73	-659141.30
	279.0	7746.12	1085262.90	2760.73	111103.42
2 -98565.42					
	.0	-884.53	838439.26	13624.26	-3376721.97
	279.0	-884.53	591654.29	13624.26	424445.49
3 -40903.72					
	.0	11212.69	-2272976.93	-9943.28	2497866.91
	279.0	11212.69	855362.90	-9943.28	-276307.59
4 -69597.74					
	.0	30549.08	-137419.45	-154.49	980572.37
	279.0	30549.08	8385774.10	-154.49	937469.32
5 -69871.40					
	.0	-20220.93	-1297118.22	3835.47	-1859427.43
	279.0	-20220.93	-6938756.90	3835.47	-789331.42
207	-----				
1 -94918.53					
	.0	-3144.39	3324800.83	6.15	31921.27
	279.0	-3144.39	2447515.18	6.15	33635.83
2 -75215.20					
	.0	-59574.65	-4888171.42	-158.18	67143.19
	279.0	-59574.65	-21509499.00	-158.18	23009.62
3 -51342.84					
	.0	55382.13	9321239.18	166.38	-24581.49
	279.0	55382.13	24772852.57	166.38	21838.16
4-109389.67					
	.0	-12975.34	-1108786.09	1578.86	35190.08
	279.0	-12975.34	-4728906.94	1578.86	475692.31
5 -17168.36					
	.0	8782.82	5541853.85	-1570.67	7371.62
	279.0	8782.82	7992260.51	-1570.67	-430844.54
211	-----				
1-153484.99					
	.0	13461.22	-408835.91	1019.33	-125657.38
	279.0	13461.22	3346844.72	1019.33	158736.32
2-140773.34					
	.0	-40684.31	-4851275.69	709.93	-71672.91
	279.0	-40684.31	-16202199.33	709.93	126396.88
3 -63873.31					
	.0	58632.61	4306161.15	649.18	-95870.26
	279.0	58632.61	20664658.95	649.18	85251.54
4 -87452.59					
	.0	10066.99	-4853691.47	1577.03	20040.49
	279.0	10066.99	-2045000.96	1577.03	460031.03
5-117194.06					
	.0	7881.30	4308576.92	-217.92	-187583.65
	279.0	7881.30	6507460.58	-217.92	-248382.60
208	-----				
1 -52320.96					

	.0	-6655.62	797346.03	-479.66	79024.88
	279.0	-6655.62	-1059571.64	-479.66	-54799.89
2	-29261.03				
	.0	-20474.57	-378656.89	-802.95	144531.32
	279.0	-20474.57	-6091063.02	-802.95	-79490.98
3	-40500.26				
	.0	11600.42	1441784.93	163.40	-39164.81
	279.0	11600.42	4678300.83	163.40	6424.45
4	79770.09				
	.0	5828.35	-1357537.17	656.23	50769.19
	279.0	5828.35	268572.78	656.23	233857.09
5	-149531.38				
	.0	-14702.51	2420665.20	-1295.77	54597.32
	279.0	-14702.51	-1681334.97	-1295.77	-306923.61
209	-----				
1	-134647.36				
	.0	-3100.88	714288.54	-75.32	12101.93
	387.0	-3100.88	-485752.24	-75.32	-17047.74
2	-65422.26				
	.0	1694.50	-118819.00	-47.29	22394.17
	387.0	1694.50	536950.78	-47.29	4094.68
3	-114107.55				
	.0	-5829.00	1071203.72	-53.14	-6258.26
	387.0	-5829.00	-1184620.42	-53.14	-26825.00
4	-91583.89				
	.0	48347.49	-2348505.48	-31.77	7193.50
	387.0	48347.49	16361971.81	-31.77	-5100.24
5	-87945.92				
	.0	-52481.99	3300890.20	-68.66	8942.40
	387.0	-52481.99	-17009641.45	-68.66	-17630.07
210	-----				
1	-24828.05				
	.0	-6465.51	935753.07	-146.39	22178.57
	279.0	-6465.51	-868125.28	-146.39	-18665.27
2	-3059.80				
	.0	-22186.91	1107647.91	-199.35	30708.79
	279.0	-22186.91	-5082499.13	-199.35	-24908.53
3	-30044.27				
	.0	13566.22	140022.85	4.15	-1137.36
	279.0	13566.22	3924998.76	4.15	21.50
4	-125483.19				
	.0	-6017.68	419753.57	1555.10	-91282.28
	279.0	-6017.68	-1259178.08	1555.10	342589.65
5	92379.12				
	.0	-2603.01	827917.19	-1750.29	120853.71
	279.0	-2603.01	101677.71	-1750.29	-367476.68
212	-----				
1	-110286.69				
	.0	7042.12	-1675765.37	-7749.34	2021499.31
	387.0	7042.12	1049536.05	-7749.34	-977496.94
2	-43916.84				
	.0	9283.27	-1939614.88	5045.65	-1425514.46
	387.0	9283.27	1653009.97	5045.65	527151.85
3	-103132.08				
	.0	106.23	-294738.95	-15378.11	4120846.87

	387.0	106.23	-253628.57	-15378.11	-1830481.11
4-107722.55	.0	23419.00	308280.83	-9823.43	3311042.88
	387.0	23419.00	9371433.81	-9823.43	-490623.65
5 -39326.37	.0	-14029.50	-2542634.65	-509.03	-615710.46
	387.0	-14029.50	-7972052.41	-509.03	-812705.61
213 -----					
1 -71960.99	.0	936.51	-289952.31	-271.13	71390.97
	387.0	936.51	72476.80	-271.13	-33536.84
2 -54226.48	.0	1098.16	-252071.50	977.33	-187102.65
	387.0	1098.16	172917.88	977.33	191124.85
3 -41721.52	.0	150.52	-134531.58	-1338.84	282290.61
	387.0	150.52	-76282.15	-1338.84	-235840.64
4 -65059.07	.0	9248.26	-550905.95	-1016.89	226783.14
	387.0	9248.26	3028168.75	-1016.89	-166751.83
5 -30888.92	.0	-7999.58	164302.86	655.38	-131595.19
	387.0	-7999.58	-2931533.02	655.38	122036.04
214 -----					
1 -38994.83	.0	-1850.77	126416.05	-582.38	75377.89
	279.0	-1850.77	-389948.39	-582.38	-87105.44
2 -28770.46	.0	-3041.37	306808.27	1567.41	-272335.93
	279.0	-3041.37	-541735.28	1567.41	164970.56
3 -23222.64	.0	573.68	-138253.54	-2343.91	372839.79
	279.0	573.68	21804.10	-2343.91	-281111.14
4 -30980.53	.0	14452.18	-774681.07	-1348.75	233279.61
	279.0	14452.18	3257475.90	-1348.75	-143021.50
5 -21012.57	.0	-16919.87	943235.80	572.25	-132775.75
	279.0	-16919.87	-3777407.09	572.25	26880.91
215 -----					
1 -69620.86	.0	1833.80	-259016.66	56.72	-15495.78
	279.0	1833.80	252612.74	56.72	329.92
2 -36678.13	.0	1928.11	-60325.45	2075.47	-318031.63
	279.0	1928.11	477618.61	2075.47	261023.33
3 -56149.68	.0	516.95	-285030.09	-1999.84	297370.58
	279.0	516.95	-140801.62	-1999.84	-260583.43
4 -60931.57	.0	6003.58	-176217.82	-1126.73	166923.43
	279.0	6003.58	1498781.89	-1126.73	-147433.50
5 -31896.24	.0	-3558.52	-169137.73	1202.36	-187584.47
	279.0	-3558.52	-1161964.90	1202.36	147873.40

341	-----				
1	-45695.89				
	.0	2392.10	-170481.90	-502.00	-15276.46
	108.0	2392.10	87864.58	-502.00	-69492.34
2	-25435.01				
	.0	-11589.55	163311.93	-98.21	6200.85
	108.0	-11589.55	-1088359.46	-98.21	-4405.68
3	-35492.83				
	.0	14779.01	-390621.13	-571.12	-26569.46
	108.0	14779.01	1205512.23	-571.12	-88250.78
4	520.84				
	.0	-12027.02	282987.99	1804.95	167932.08
	108.0	-12027.02	-1015930.18	1804.95	362866.56
5	-61448.69				
	.0	15216.48	-510297.19	-2474.28	-188300.70
	108.0	15216.48	1133082.94	-2474.28	-455523.01
342	-----				
1	-45376.20				
	.0	-835.97	-364361.93	-743.61	118677.97
	108.0	-835.97	-454646.20	-743.61	38367.83
2	-31288.31				
	.0	3494.39	-434160.05	-94.74	29684.68
	108.0	3494.39	-56765.62	-94.74	19452.58
3	-29213.29				
	.0	-4609.01	-51655.86	-896.74	128552.61
	108.0	-4609.01	-549429.32	-896.74	31704.53
4	-49847.13				
	.0	5177.83	1008230.50	-2380.78	214004.42
	108.0	5177.83	1567436.08	-2380.78	-43120.31
5	-10654.47				
	.0	-6292.45	-1494046.40	1389.30	-55767.13
	108.0	-6292.45	-2173631.01	1389.30	94277.41
256	-----				
1	-82787.55				
	.0	-2397.92	525988.42	-818.62	142010.50
	261.0	-2397.92	-99868.42	-818.62	-71648.47
2	-42305.56				
	.0	-4744.40	1312977.61	-7885.82	2338329.10
	261.0	-4744.40	74689.89	-7885.82	280128.86
3	-68077.84				
	.0	1547.17	-611659.72	6794.34	-2148981.76
	261.0	1547.17	-207847.79	6794.34	-375660.16
4	-34416.84				
	.0	-36153.01	9361981.92	-3730.61	1402493.26
	261.0	-36153.01	-73954.98	-3730.61	428803.76
5	-75966.56				
	.0	32955.79	-8660664.03	2639.12	-1213145.93
	261.0	32955.79	-59202.92	2639.12	-524335.06
257	-----				
1	-51907.49				
	.0	-5114.96	338996.40	-2278.81	135799.83
	157.0	-5114.96	-464052.95	-2278.81	-221973.34
2	-30111.54				
	.0	-50856.32	-733863.95	-1430.13	64517.67
	157.0	-50856.32	-8718306.53	-1430.13	-160012.62

	.0	-22801.50	-5738933.96	-4171.29	-473.11
	265.0	-22801.50	-11781330.76	-4171.29	-1105864.71
261	-----				
1	-117408.97				
	.0	-917.32	801580.88	-218.76	33635.83
	265.0	-917.32	558491.92	-218.76	-24335.09
2	-92534.45				
	.0	-35497.48	-20879463.45	-306.11	23009.62
	265.0	-35497.48	-30286296.42	-306.11	-58109.17
3	-64010.84				
	.0	34274.39	21948237.96	14.43	21838.16
	265.0	34274.39	31030952.30	14.43	25662.39
4	-136877.89				
	.0	-16145.08	-5893466.81	-282.35	475692.31
	265.0	-16145.08	-10171913.56	-282.35	400870.41
5	-19667.40				
	.0	14921.99	6962241.32	-9.33	-430844.54
	265.0	14921.99	10916569.45	-9.33	-433317.19
262	-----				
1	-81595.84				
	.0	-6762.97	991662.04	220.29	-54799.89
	265.0	-6762.97	-800523.81	220.29	3578.24
2	-55810.33				
	.0	-17941.49	-1615195.80	324.92	-79490.98
	265.0	-17941.49	-6369689.37	324.92	6611.72
3	-52984.12				
	.0	8924.20	2937411.85	-31.19	6424.45
	265.0	8924.20	5302324.29	-31.19	-1840.74
4	80955.76				
	.0	-2290.00	-726709.04	-420.50	233857.09
	265.0	-2290.00	-1333558.48	-420.50	122424.69
5	-189750.21				
	.0	-6727.29	2048925.09	714.23	-306923.61
	265.0	-6727.29	266193.40	714.23	-117653.70
263	-----				
1	-106466.60				
	.0	921.44	-282950.40	69.72	-17047.74
	261.0	921.44	-42453.87	69.72	1149.54
2	-23013.83				
	.0	-4082.08	751000.91	79.62	4094.68
	261.0	-4082.08	-314421.30	79.62	24876.01
3	-118941.64				
	.0	5310.67	-1128268.12	13.34	-26825.00
	261.0	5310.67	257816.14	13.34	-23343.29
4	-73110.92				
	.0	-23981.40	10271854.22	62.19	-5100.24
	261.0	-23981.40	4012710.13	62.19	11130.23
5	-68844.55				
	.0	25209.99	-10649121.43	30.78	-17630.07
	261.0	25209.99	-4069315.29	30.78	-9597.51
264	-----				
1	-52568.94				
	.0	-4032.32	604619.11	35.35	-18665.27
	265.0	-4032.32	-463945.28	35.35	-9298.27
2	-28223.40				

3	-39098.45	.0	44036.37	1185859.15	-1608.28	116548.76
		157.0	44036.37	8099569.27	-1608.28	-135951.83
4	-1139.49	.0	-39239.79	-699706.01	5578.14	-122778.47
		157.0	-39239.79	-6860353.33	5578.14	752989.47
5	-68070.50	.0	32419.84	1151701.22	-8616.55	303844.91
		157.0	32419.84	6241616.07	-8616.55	-1048953.92
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258						
1	-39782.81	.0	-23.41	-2537.30	-209.29	19606.86
		265.0	-23.41	-8741.49	-209.29	-35855.80
2	-18446.49	.0	-2855.53	256918.83	481.33	-86582.68
		265.0	-2855.53	-499796.71	481.33	40970.98
3	-34597.25	.0	2824.31	-260301.89	-760.39	112725.16
		265.0	2824.31	488141.38	-760.39	-88778.72
4	1567.30	.0	-2744.37	291221.71	2265.11	-253295.06
		265.0	-2744.37	-436036.47	2265.11	346959.17
5	-54611.04	.0	2713.15	-294604.77	-2544.17	279437.54
		265.0	2713.15	424381.15	-2544.17	-394766.91
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259						
1	-42402.79	.0	-94.02	9436.71	-352.30	39002.62
		265.0	-94.02	-15479.84	-352.30	-54355.62
2	-33540.35	.0	-3045.30	268260.62	-1404.75	191949.61
		265.0	-3045.30	-538744.02	-1404.75	-180310.24
3	-22996.71	.0	2919.93	-255678.34	935.03	-139946.12
		265.0	2919.93	518104.24	935.03	107836.07
4	-5845.98	.0	-2682.74	282281.38	2808.06	-317901.49
		265.0	-2682.74	-428644.84	2808.06	426235.30
5	-50691.07	.0	2557.37	-269699.10	-3277.79	369904.98
		265.0	2557.37	408005.05	-3277.79	-498709.46
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260						
1	-102424.43	.0	-12563.31	1368087.59	1450.48	-185353.77
		265.0	-12563.31	-1961190.51	1450.48	199024.10
2	-83003.07	.0	-13460.20	1008853.48	4412.37	972900.56
		265.0	-13460.20	-2558098.86	4412.37	2142177.98
3	-53562.84	.0	-3290.89	815263.30	-2478.39	-1220038.92
		265.0	-3290.89	-56821.81	-2478.39	-1876812.51
4	-56577.81	.0	6050.41	7563050.74	6105.27	-246665.25
		265.0	6050.41	9166410.08	6105.27	1371230.17
5	-79988.09					

	.0	-18899.41	-149689.94	67.14	-24908.53
	265.0	-18899.41	-5158032.67	67.14	-7117.33
3 -41868.52					
	.0	13522.98	955848.75	-20.01	21.50
	265.0	13522.98	4539438.97	-20.01	-5280.37
4-151253.24					
	.0	3599.47	46010.83	-951.04	342589.65
	265.0	3599.47	999869.47	-951.04	90564.17
5 81161.32					
	.0	-8975.89	760147.98	998.17	-367476.68
	265.0	-8975.89	-1618463.17	998.17	-102961.87
265 -----					
1-185219.75					
	.0	14101.71	-1469684.69	-679.17	158736.32
	265.0	14101.71	2267269.58	-679.17	-21243.34
2-179437.59					
	.0	-58562.37	-14275486.43	-684.29	126396.88
	265.0	-58562.37	-29794515.33	-684.29	-54940.86
3 -67522.08					
	.0	77364.66	12315906.85	-221.26	85251.54
	265.0	77364.66	32817541.43	-221.26	26616.41
4 -98012.63					
	.0	38042.17	-5513742.57	-164.27	460031.03
	265.0	38042.17	4567433.63	-164.27	416498.64
5-148947.04					
	.0	-19239.89	3554162.99	-741.28	-248382.60
	265.0	-19239.89	-1544407.52	-741.28	-444823.10
266 -----					
1 -10586.83					
	.0	404.37	-36591.30	-10.78	.00
	261.0	404.37	68949.92	-10.78	-2812.64
2 -3762.84					
	.0	-1556.21	273040.51	120.29	.00
	261.0	-1556.21	-133129.04	120.29	31394.42
3 -10352.94					
	.0	2095.37	-321828.91	-134.65	.00
	261.0	2095.37	225062.27	-134.65	-35144.61
4 -15165.85					
	.0	18711.41	-2356085.48	-81.19	.00
	261.0	18711.41	2527593.34	-81.19	-21189.73
5 1050.07					
	.0	-18172.25	2307297.08	66.82	.00
	261.0	-18172.25	-2435660.11	66.82	17439.54
267 -----					
1 -9696.94					
	.0	-1436.76	161061.60	-6.37	.00
	265.0	-1436.76	-219680.36	-6.37	-1688.27
2 -3449.71					
	.0	-4224.57	579234.83	158.63	.00
	265.0	-4224.57	-540276.10	158.63	42036.57
3 -9479.54					
	.0	2308.89	-364486.03	-167.12	.00
	265.0	2308.89	247368.95	-167.12	-44287.60
4 -668.25					
	.0	25868.16	-2988828.69	-52.50	.00



	265.0	25868.16	3866233.11	-52.50	-13913.07
5 -12261.01	.0	-27783.84	3203577.50	44.01	.00
	265.0	-27783.84	-4159140.26	44.01	11662.04
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268	1-119197.09				
	.0	-1531.10	637400.85	1692.65	-620523.60
	261.0	-1531.10	237783.26	1692.65	-178742.65
2 -48896.23	.0	-3685.88	1333689.50	4760.61	471356.28
	261.0	-3685.88	371675.09	4760.61	1713875.18
3-110033.23	.0	1644.41	-483821.70	-2503.75	-1298721.08
	261.0	1644.41	-54630.74	-2503.75	-1952198.72
4-115597.83	.0	-30052.76	8785030.13	-8473.71	-228.20
	261.0	-30052.76	941259.29	-8473.71	-2211866.46
5 -43331.63	.0	28011.29	-7935162.33	10730.57	-827136.60
	261.0	28011.29	-624214.95	10730.57	1973542.92
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269	1 -83955.60				
	.0	573.92	-67061.74	191.93	-33088.72
	261.0	573.92	82732.36	191.93	17004.85
2 -62064.56	.0	-499.89	103981.71	1647.48	-226327.62
	261.0	-499.89	-26488.34	1647.48	203664.36
3 -49876.23	.0	1265.12	-193397.37	-1391.57	182209.33
	261.0	1265.12	136798.16	-1391.57	-180991.23
4 -79663.13	.0	609.29	1692494.25	-1390.49	184535.61
	261.0	609.29	1851519.15	-1390.49	-178382.58
5 -32277.66	.0	155.94	-1781909.90	1646.40	-228653.90
	261.0	155.94	-1741209.33	1646.40	201055.72
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270	1 -49007.26				
	.0	2983.62	-442887.23	1601.68	-162841.20
	157.0	2983.62	25541.75	1601.68	88621.81
2 -35049.68	.0	-3290.00	-31479.08	5709.72	-413228.10
	157.0	-3290.00	-548009.61	5709.72	483198.52
3 -30293.33	.0	7268.17	-559037.22	-3574.16	196106.49
	157.0	7268.17	582065.28	-3574.16	-365036.10
4 -51158.52	.0	26026.75	1560514.56	-1627.26	75314.58
	157.0	26026.75	5646714.77	-1627.26	-180165.49
5 -14184.49	.0	-22048.59	-2151030.87	3762.83	-292436.19
	157.0	-22048.59	-5612659.11	3762.83	298327.90
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271	1 -84538.82				
	.0	1093.74	-386796.61	-60.43	4863.77

	265.0	1093.74	-96955.67	-60.43	-11150.00
2 -46833.06	.0	-4166.88	64961.75	1388.18	-197961.60
	265.0	-4166.88	-1039260.29	1388.18	169906.36
3 -65885.37	.0	5625.19	-580690.56	-1468.75	204446.62
	265.0	5625.19	909986.06	-1468.75	-184773.02
4 -73635.59	.0	26930.18	-138432.70	-1228.09	189567.61
	265.0	26930.18	6998064.05	-1228.09	-135877.02
5 -39082.84	.0	-25471.86	-377296.12	1147.52	-183082.58
	265.0	-25471.86	-7127338.28	1147.52	121010.36
272	-----				
1-124519.70	.0	10611.29	-1643068.22	653.01	-169591.11
	265.0	10611.29	1168924.56	653.01	3457.70
2-113186.42	.0	2411.08	-1164442.53	6890.01	-55377.40
	265.0	2411.08	-525506.92	6890.01	1770475.49
3 -52839.84	.0	11737.31	-1026315.09	-6019.33	-170744.09
	265.0	11737.31	2084073.00	-6019.33	-1765865.22
4 -84344.67	.0	23173.54	5403474.48	-6063.38	955861.49
	265.0	23173.54	11544463.10	-6063.38	-650934.66
5 -81681.60	.0	-9025.15	-7594232.11	6934.07	-1181982.98
	265.0	-9025.15	-9985897.02	6934.07	655544.92
337	-----				
1 -9494.20	.0	3884.03	-176969.00	-2407.18	360524.05
	261.0	3884.03	836761.81	-2407.18	-267750.01
2 -4245.87	.0	21121.61	-281903.03	345.75	-7671.68
	261.0	21121.61	5230837.85	345.75	82568.70
3 -8413.06	.0	-15942.91	45944.36	-3555.32	488370.41
	261.0	-15942.91	-4115155.44	-3555.32	-439568.71
4 -3194.42	.0	79620.28	-786409.27	-315.24	87988.56
	261.0	79620.28	19994483.05	-315.24	5711.79
5 -9464.51	.0	-74441.58	550450.60	-2894.34	392710.18
	261.0	-74441.58	-18878800.64	-2894.34	-362711.81
338	-----				
1 -17610.44	.0	939.36	375055.03	-5199.38	760906.20
	261.0	939.36	620227.32	-5199.38	-596133.00
2 -10199.72	.0	19129.30	95764.21	315.27	-10967.66
	261.0	19129.30	5088511.04	315.27	71317.49
3 -13280.87	.0	-17876.82	404309.16	-7247.78	1025509.27
	261.0	-17876.82	-4261541.28	-7247.78	-866161.49

4	-15974.71	.0	79963.99	-324057.67	-4665.32	715250.08
		261.0	79963.99	20546544.94	-4665.32	-502398.32
5	-7505.88	.0	-78711.52	824131.04	-2267.19	299291.52
		261.0	-78711.52	-19719575.18	-2267.19	-292445.68
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314						
1	-88513.65	.0	-228.18	58005.26	-304.55	117694.20
		320.0	-228.18	-15013.52	-304.55	20236.82
2	-45561.95	.0	672.73	147810.59	539.72	327178.15
		320.0	672.73	363083.99	539.72	499887.28
3	-72456.25	.0	-976.97	-70470.25	-945.79	-170252.55
		320.0	-976.97	-383102.02	-945.79	-472904.85
4	-37367.55	.0	3901.04	-59458.13	-1017.94	489042.69
		320.0	3901.04	1188875.23	-1017.94	163301.14
5	-80650.65	.0	-4205.29	136798.47	611.87	-332117.09
		320.0	-4205.29	-1208893.25	611.87	-136318.71
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329						
1	-127684.30	.0	639.87	-157295.72	546.82	93114.63
		320.0	639.87	47464.20	546.82	268097.91
2	-53746.03	.0	762.46	92003.10	490.01	1687634.85
		320.0	762.46	335991.04	490.01	1844437.26
3	-116499.70	.0	90.70	-301730.72	239.09	-1563482.01
		320.0	90.70	-272705.43	239.09	-1486973.39
4	-122184.02	.0	-148.10	605097.20	4663.62	-1873333.71
		320.0	-148.10	557704.42	4663.62	-380974.40
5	-48061.71	.0	1001.27	-814824.83	-3934.53	1997486.55
		320.0	1001.27	-494418.81	-3934.53	738438.27
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315						
1	-60106.83	.0	-1086.31	-632433.81	-418.28	117147.31
		104.0	-1086.31	-745410.34	-418.28	73646.65
2	-34746.05	.0	-8873.54	-8720757.33	-75.66	22695.75
		104.0	-8873.54	-9643605.19	-75.66	14827.08
3	-45396.39	.0	7425.12	7877512.24	-482.04	133500.67
		104.0	7425.12	8649724.74	-482.04	83368.45
4	-2943.95	.0	-10662.18	-6884318.15	-891.33	370118.91
		104.0	-10662.18	-7993185.32	-891.33	277421.09
5	-77198.49	.0	9213.77	6041073.06	333.62	-213922.49
		104.0	9213.77	6999304.87	333.62	-179225.56
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316						

1	-63247.58	.0	-2167.93	-508200.28	-422.77	73646.65
		320.0	-2167.93	-1201939.38	-422.77	-61638.70
2	-37220.30	.0	-7864.00	-9402969.06	-91.33	14827.08
		320.0	-7864.00	-11919448.97	-91.33	-14399.88
3	-47109.81	.0	4973.42	8725368.69	-472.35	83368.45
		320.0	4973.42	10316863.13	-472.35	-67785.06
4	-5355.16	.0	-3903.21	-7766150.94	-870.50	277421.09
		320.0	-3903.21	-9015179.23	-870.50	-1139.68
5	-78974.95	.0	1012.63	7088550.56	306.81	-179225.56
		320.0	1012.63	7412593.39	306.81	-81045.26
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317						
1	-47794.81	.0	-3220.44	-1664.99	-212.31	38981.08
		265.0	-3220.44	-855080.31	-212.31	-17281.19
2	-22404.53	.0	-45552.10	-350728.07	439.66	-79376.78
		265.0	-45552.10	-12422035.62	439.66	37131.86
3	-41321.89	.0	41258.19	348508.08	-722.74	131351.55
		265.0	41258.19	11281928.54	-722.74	-60173.45
4	-1806.68	.0	-43344.81	-290186.22	137.34	61471.65
		265.0	-43344.81	-11776561.41	137.34	97867.48
5	-61919.73	.0	39050.90	287966.24	-420.42	-9496.87
		265.0	39050.90	10636454.33	-420.42	-120909.07
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318						
1	-51516.17	.0	-500.92	-61937.94	-526.35	87812.38
		265.0	-500.92	-194681.84	-526.35	-51671.64
2	-40686.28	.0	-36112.67	-430759.92	-815.98	130277.61
		265.0	-36112.67	-10000617.87	-815.98	-85956.63
3	-28001.94	.0	35444.78	348176.00	114.17	-13194.43
		265.0	35444.78	9741042.08	114.17	17061.10
4	-10166.32	.0	-51488.27	-294189.79	-308.21	173439.72
		265.0	-51488.27	-13938581.46	-308.21	91764.89
5	-58521.90	.0	50820.38	211605.87	-393.60	-56356.55
		265.0	50820.38	13679005.67	-393.60	-160660.42
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319						
1	-123271.50	.0	-84.66	7038.25	-7184.90	1024400.88
		265.0	-84.66	-15395.52	-7184.90	-879597.56
2	-98071.56	.0	7082.91	-1877830.50	-6934.28	-374245.76
		265.0	7082.91	-859.06	-6934.28	-2211829.26
3	-66290.44					

	.0	-7195.79	1887214.84	-2645.59	1740113.60
	265.0	-7195.79	-19668.30	-2645.59	1039032.52
4 -69938.03					
	.0	939.37	-1103061.58	-33424.89	10655824.68
	265.0	939.37	-854128.20	-33424.89	1798228.05
5 -94423.97					
	.0	-1052.25	1112445.92	23845.03	-9289956.84
	265.0	-1052.25	833600.84	23845.03	-2971024.80
334 -----					
1-144374.40					
	.0	-2373.71	255811.11	7930.01	-1579646.64
	265.0	-2373.71	-373220.76	7930.01	521805.35
2-127640.49					
	.0	-10040.30	-1343135.03	4686.39	-2308159.01
	265.0	-10040.30	-4003814.96	4686.39	-1066265.02
3 -64858.71					
	.0	6875.36	1684216.51	5886.95	201963.49
	265.0	6875.36	3506187.27	5886.95	1762005.48
4 -97521.38					
	.0	10295.27	602324.23	-25908.82	9227081.00
	265.0	10295.27	3330570.71	-25908.82	2361242.43
5 -94977.83					
	.0	-13460.21	-261242.75	36482.17	-11333276.52
	265.0	-13460.21	-3828198.39	36482.17	-1665501.97
320 -----					
1-139769.79					
	.0	2215.43	-1113630.43	96.19	-24335.09
	265.0	2215.43	-526540.95	96.19	1155.13
2-109073.92					
	.0	-1054.75	-30344519.04	221.37	-58109.17
	265.0	-1054.75	-30624028.98	221.37	553.70
3 -77285.80					
	.0	4008.66	28859678.47	-93.12	25662.39
	265.0	4008.66	29921974.38	-93.12	986.48
4-155710.43					
	.0	12739.45	-11140260.65	-1493.92	400870.41
	265.0	12739.45	-7764306.61	-1493.92	4982.17
5 -30649.30					
	.0	-9785.54	9655420.09	1622.17	-433317.19
	265.0	-9785.54	7062252.00	1622.17	-3441.99
326 -----					
1-218311.26					
	.0	10674.09	-2163090.96	36.07	-21243.34
	265.0	10674.09	665542.94	36.07	-11683.90
2-212465.74					
	.0	-83911.12	-29403068.49	171.86	-54940.86
	265.0	-83911.12	-51639515.02	171.86	-9398.51
3 -78615.94					
	.0	98143.24	26518947.20	-123.76	26616.41
	265.0	98143.24	52526905.61	-123.76	-6180.02
4-114310.26					
	.0	58955.57	557931.39	-1628.40	416498.64
	265.0	58955.57	16181158.02	-1628.40	-15026.08
5-176771.42					
	.0	-44723.45	-3442052.67	1676.49	-444823.10

	265.0	-44723.45	-15293767.44	1676.49	-552.45
321	-----				
1-104808.84					
	.0	-2285.09	481551.79	-15.56	3578.24
	265.0	-2285.09	-123996.92	-15.56	-546.46
2 -73406.02					
	.0	-21970.06	-3244480.84	-4.26	6611.72
	265.0	-21970.06	-9066547.72	-4.26	5482.77
3 -66339.10					
	.0	18923.28	3886549.90	-16.49	-1840.74
	265.0	18923.28	8901218.49	-16.49	-6211.38
4 54344.67					
	.0	7575.22	-859251.74	-310.29	122424.69
	265.0	7575.22	1148182.37	-310.29	40196.99
5-194089.79					
	.0	-10622.01	1501320.80	289.54	-117653.70
	265.0	-10622.01	-1313511.60	289.54	-40925.59
323	-----				
1 -99060.01					
	.0	-819.26	223351.59	25.65	1149.54
	320.0	-819.26	-38812.70	25.65	9356.49
2 -9902.39					
	.0	-1068.05	110471.79	8.55	24876.01
	320.0	-1068.05	-231305.76	8.55	27611.31
3-122177.63					
	.0	-24.30	187330.33	25.65	-23343.29
	320.0	-24.30	179555.50	25.65	-15135.98
4 -74398.22					
	.0	-17316.59	5059285.96	-91.72	11130.23
	320.0	-17316.59	-482023.03	-91.72	-18219.07
5 -57681.80					
	.0	16224.24	-4761483.84	125.91	-9597.51
	320.0	16224.24	430272.77	125.91	30694.40
325	-----				
1 -67463.93					
	.0	-460.01	160771.87	36.00	-9298.27
	424.0	-460.01	-34272.35	36.00	5967.83
2 -38290.76					
	.0	756.49	-2461083.78	36.42	-7117.33
	424.0	756.49	-2140333.85	36.42	8324.41
3 -51661.15					
	.0	-1369.83	2675446.26	11.59	-5280.37
	424.0	-1369.83	2094637.38	11.59	-367.30
4-138412.00					
	.0	2480.66	-95696.61	-278.37	90564.17
	424.0	2480.66	956102.61	-278.37	-27463.16
5 48460.09					
	.0	-3094.01	310059.09	326.37	-102961.87
	424.0	-3094.01	-1001799.08	326.37	35420.27
327	-----				
1 -20446.33					
	.0	138.88	-21090.25	40.74	-2812.64
	320.0	138.88	23352.87	40.74	10222.77
2 -8493.51					
	.0	-150.69	21182.35	8.34	31394.42

	320.0	-150.69	-27039.31	8.34	34064.77
3 -18768.26	.0	335.87	-49302.68	45.97	-35144.61
	320.0	335.87	58176.47	45.97	-20434.41
4 -28140.72	.0	-4570.89	1202726.20	40.82	-21189.73
	320.0	-4570.89	-259958.68	40.82	-8126.50
5 878.95	.0	4756.07	-1230846.54	13.49	17439.54
	320.0	4756.07	291095.84	13.49	21756.86
328 -----					
1 -17206.21	.0	529.28	-145579.87	8.92	-1688.27
	424.0	529.28	78836.15	8.92	2095.10
2 -6242.23	.0	503.40	-146025.65	-69.87	42036.57
	424.0	503.40	67416.52	-69.87	12412.54
3 -16699.38	.0	202.31	-48080.84	81.77	-44287.60
	424.0	202.31	37698.35	81.77	-9619.08
4 -7355.03	.0	-7188.28	2234755.13	8.75	-13913.07
	424.0	-7188.28	-813077.37	8.75	-10202.51
5 -15586.58	.0	7893.99	-2428861.62	3.15	11662.04
	424.0	7893.99	918192.24	3.15	12995.97
330 -----					
1 -96869.38	.0	2878.33	-168069.35	777.23	-93760.25
	320.0	2878.33	752997.24	777.23	154953.22
2 -70640.11	.0	-1141.97	-155495.21	3882.94	-212512.05
	320.0	-1141.97	-520926.45	3882.94	1030029.59
3 -58519.07	.0	4979.75	-68597.25	-2846.64	87498.39
	320.0	4979.75	1524922.78	-2846.64	-823425.30
4 -90248.06	.0	54573.22	1407722.05	-1348.39	-4019.72
	320.0	54573.22	18871150.99	-1348.39	-435503.75
5 -38911.12	.0	-50735.44	-1631814.52	2384.69	-120993.94
	320.0	-50735.44	-17867154.67	2384.69	642108.04
331 -----					
1 -56840.56	.0	1763.39	-207975.40	-2864.43	305272.16
	104.0	1763.39	-24582.39	-2864.43	7371.93
2 -38975.44	.0	4069.87	-662766.24	-5319.92	438868.13
	104.0	4069.87	-239499.37	-5319.92	-114403.66
3 -36811.97	.0	-1718.68	385465.71	1500.69	-31838.58
	104.0	-1718.68	206722.85	1500.69	124232.89
4 -61398.49	.0	30604.71	5017668.58	-5155.95	148763.43
	104.0	30604.71	8200558.72	-5155.95	-387454.93

5	-14388.93					
		.0	-28253.52	-5294969.10	1336.71	258266.11
		104.0	-28253.52	-8233335.24	1336.71	397284.16
332	-----					
1	-60668.97					
		.0	2519.97	-10017.78	1414.82	-241844.66
		320.0	2519.97	796373.56	1414.82	210896.41
2	-42356.10					
		.0	1210.47	-220670.59	4797.03	-436584.89
		320.0	1210.47	166679.75	4797.03	1098465.08
3	-38535.86					
		.0	2149.49	207313.55	-2910.61	114125.34
		320.0	2149.49	895151.67	-2910.61	-817269.88
4	-63291.65					
		.0	32121.34	8202485.23	537.32	-420419.54
		320.0	32121.34	18481314.93	537.32	-248476.02
5	-17600.31					
		.0	-28761.38	-8215842.27	1349.10	97959.99
		320.0	-28761.38	-17419483.51	1349.10	529671.23
333	-----					
1	-99786.32					
		.0	-3119.53	-826353.15	416.28	-1428.81
		265.0	-3119.53	-1653028.35	416.28	108885.30
2	-57151.97					
		.0	-27499.86	-1568083.81	8073.14	-281932.05
		265.0	-27499.86	-8855547.19	8073.14	1857449.03
3	-75896.45					
		.0	23340.49	466279.62	-7518.10	280026.97
		265.0	23340.49	6651509.40	-7518.10	-1712268.63
4	-83899.16					
		.0	158272.57	6416723.53	-6400.81	272613.42
		265.0	158272.57	48358955.06	-6400.81	-1423600.48
5	-49149.27					
		.0	-162431.94	-7518527.73	6955.85	-274518.50
		265.0	-162431.94	-50562992.86	6955.85	1568780.88
343	-----					
1	-18656.31					
		.0	157.52	681405.01	-241.63	78857.43
		320.0	157.52	731810.22	-241.63	1534.95
2	-8867.23					
		.0	15519.85	5009853.31	-190.48	153558.15
		320.0	15519.85	9976203.86	-190.48	92605.03
3	-16007.85					
		.0	-15309.82	-4101313.30	-131.70	-48414.91
		320.0	-15309.82	-9000456.90	-131.70	-90558.43
4	-6175.77					
		.0	33751.25	19500276.41	-1001.52	172825.81
		320.0	33751.25	30300676.03	-1001.52	-147660.91
5	-18699.31					
		.0	-33541.23	-18591736.40	679.34	-67682.57
		320.0	-33541.23	-29324929.08	679.34	149707.50
344	-----					
1	-35173.15					
		.0	-2433.27	995572.08	-887.49	217361.77
		320.0	-2433.27	216926.49	-887.49	-66636.50



2	-20860.83					
		.0	13481.83	5227381.33	-225.00	180548.36
		320.0	13481.83	9541566.81	-225.00	108549.37
3	-26036.70					
		.0	-16726.19	-3899951.88	-958.33	109267.34
		320.0	-16726.19	-9252331.49	-958.33	-197398.04
4	-31146.18					
		.0	26670.50	20441787.62	-1140.90	194550.65
		320.0	26670.50	28976348.82	-1140.90	-170536.54
5	-15751.35					
		.0	-29914.86	-19114358.17	-42.43	95265.05
		320.0	-29914.86	-28687113.50	-42.43	81687.88

□



## 2.10. Yatay Yüklere Altında Yapının Statik Hesabı.

Yapının depreme dayanıklı olarak boyutlandırılmasında kullanılacak eşdeğer statik yatay yüklerin toplamı;

$$F = C.W \quad \text{dır.}$$

W = Toplam yapı ağırlığı

C = Deprem katsayısı

### 2.10.1. Toplam Yapı Ağırlığının Hesabı

Deprem Bölgesi : I  
Kat Adedi : 6  
Kullanılan Malzeme : BS20/ BÇ III  
Kullanım Amacı : Büro  
Sabit Yük : 0,650 t/m<sup>2</sup>  
Hareketli Yük : 0,350 t/m<sup>2</sup>

- Normal Katlar İçin :

Toplam iç duvar boyu  $L_i = 47,30$  m  
Toplam dış duvar boyu  $L_d = 49,40$  m  
Toplam kiriş boyu  $L_k = 49,40$  m  
Perde toplam boyu  $L_p = 13,95$  m  
Kat Alanı  $A = 221,03$  m<sup>2</sup>

Kolonlar : 25x90 → 3 Ad.  
25x60 → 3 Ad.  
90x90 → 4 Ad.

- Kat Ağırlığı :

Döşeme :  $221,03(m^2) \times 0,650(t/m^2) = 143,67$  ton (Sbt. Yük)

$221,03(m^2) \times 0,350(t/m^2) = 77,36$  ton (Hrk. Yük)

İç duvar:  $2,59(m) \times 0,25(t/m^2) \times 47,30(m) = 30,75$  ton

Dış duvar:  $2,59(m) \times 0,42(t/m^2) \times 49,40(m) = 53,85$  ton

Perde :  $0,20(m) \times 2,5(t/m^3) \times 13,95(m) \times 2,79(m) = 19,46$  ton

Kolon :  $2,79(1,688+1,125+8,100) = 30,45$  ton

Kiriş :  $0,25(m) \cdot 0,30(m) \cdot 2,5(t/m^3) \times 49,40(m) = 9,26$  ton

$W_i = G_i + n_i Q_i$

$$W_i = (5,38+287,44) + 0,3.77,36 = 316,028 \text{ ton}$$

- 1. Bodrum Katın Ağırlığı

Toplam iç duvar boyu  $L_i = 12,50 \text{ m}$

Toplam dış duvar boyu  $L_d = 46,50 \text{ m}$

Kiriş boyu  $L_{k_1} = 23,65 \text{ m}$

$L_{k_2} = 8,00 \text{ m}$

Perde toplam boyu  $L_{p_1} = 13,95 \text{ m}$  (20 cm lik)

$L_{p_2} = 27,55 \text{ m}$  (25 cm lik)

Kot Alanı  $A = 175,74 \text{ m}^2$

Kolonlar  $25 \times 90 \rightarrow 5 \text{ Ad.}$

$25 \times 60 \rightarrow 3 \text{ Ad.}$

$90 \times 90 \rightarrow 4 \text{ Ad.}$

Döşeme Ağırlığı  $175,75 \times 0,650 = 114,23 \text{ t}$

Duvar Ağırlığı  $12,50 \times 2,59 \times 0,42 = 13,60 \text{ t}$

$46,50 \times 2,59 \times 0,25 = 18,06 \text{ t}$

Perde Ağırlığı  $13,95 \times 0,20 \times 2,79 \times 2,5 = 19,46 \text{ t}$

$27,55 \times 0,25 \times 2,79 \times 2,5 = 48,04$

Kiriş Ağırlığı  $0,25 \times 0,84 \times 23,65 \times 2,5 = 12,42 \text{ t}$

$0,25 \times 1,08 \times 8 \times 2,5 = 5,4 \text{ t}$

Kolon Ağırlığı  $5 \times 0,25 \times 0,90 \times 2,5 \times 2,65 = 7,45 \text{ t}$

$3 \times 0,25 \times 0,60 \times 2,5 \times 2,65 = 2,98 \text{ t}$

$4 \times 0,90 \times 0,90 \times 2,5 \times 2,65 = 21,47 \text{ t}$

Hareketli Yük  $175,74 \times 0,350 = 61,51 \text{ ton}$

$\Sigma G_i = 275,16 \text{ ton}$

$\Sigma Q_i = 61,51 \text{ ton}$

$W_i = G_i + n_i Q_i = 275,16 + 0,30.61,51 = 293,613 \text{ ton}$

- 2. Bodrum Katın Ağırlığı

Döşeme Ağırlığı  $175,74 \times 0,50 = 114,23 \text{ t}$

Duvar  $21,50 \times 2,65 \times 0,25 = 14,24 \text{ t}$

Perde  $13,95 \times 0,20 \times 2,79 \times 2,5 = 19,46 \text{ t}$

$47,90 \times 0,25 \times 3,20 \times 2,5 = 95,80 \text{ t}$

Kiriş  $7,05 \times 1,24 \times 0,25 \times 2,5 = 5,46 \text{ t}$

Kolon  $4 \times 0,25 \times 0,90 \times 3,20 \times 2,5 = 7,20 \text{ t}$

$2 \times 0,90 \times 0,90 \times 2,65 \times 2,5 = 12,96 \text{ t}$

$$\begin{aligned} 2 \times 0,90 \times 0,90 \times 2,65 \times 2,5 &= 10,73 \text{ t} \\ 1 \times 0,25 \times 0,60 \times 3,20 \times 2,5 &= 1,44 \text{ t} \\ 2 \times 0,25 \times 0,60 \times 2,65 \times 2,5 &= 1,99 \text{ t} \\ 1 \times 0,25 \times 0,90 \times 2,65 \times 2,5 &= \underline{1,49 \text{ t}} \\ &35,81 \text{ t} \end{aligned}$$

Hareketli Yük  $175,74 \times 0,350 = 61,51 \text{ t}$

$\Sigma G_i = 285 \text{ t}$

$\Sigma Q_i = 61,51 \text{ t}$

$W_i = 285 + 0,30 \cdot 61,51 = 303,45 \text{ ton}$

Normal Katların Toplam Ağırlığı :

$$\begin{aligned} \Sigma W_n &= 4 \times 316,028 = \\ &1264,11 \text{ ton} \end{aligned}$$

Bodrum Katların Toplam Ağırlığı :

$$\begin{aligned} \Sigma W_b &= 293,613 + 303,45 = \\ &597,06 \text{ ton} \end{aligned}$$

## 2.10.2. Deprem Katsayısının (C) Hesabı

$$C = C_0 \cdot K \cdot S \cdot I \geq C_0 / 2$$

$C_0$  = Deprem Bölgesi Katsayısı

$K$  = Yapı Tipi "

$S$  = Yapı Dinamik "

$I$  = Yapı Önem "

$C_0 = 0,10$  (I. derece deprem bölgesi)

$K = 1,00$

$I = 1,00$  (işyeri)

Bina doğal periyodu  $T = \frac{0,09 H}{\sqrt{D}}$

$H$  : Binanın temel üst kotundan ölçülen yüksekliği

$D$  : Yatay yük doğrultusunda bina genişliği (m)

$N$  : Temel üstü kat adedi

a) x Doğrultusunda Deprem Hesabı

$H = 18,75 \text{ m}$

$$D = 16,20 \text{ m}$$

$$N = 6 \text{ Adet}$$

$$T = \frac{0,09.H}{\sqrt{D}} = \frac{0,19.18,75}{\sqrt{6,10}} = 0,419 \text{ sn}$$

$$T = (0,07 \sim 0,10)N$$
$$= (0,42 \sim 0,60)$$

$$T = 0,60 \text{ sn (Daha elverişsiz A.B.Y.Y.H.Y)}$$

$$T_0 = 0,40 \text{ sn (Sıkı, kum, çakıl)}$$

$$\sigma_z = 2,5 \text{ kg/cm}^2$$

$$S = \frac{1}{|0,8+T-T_0|} = \frac{1}{|0,8+0,6-0,40|} = 1$$

$$S_{\max} \leq 1 \text{ olmalıdır. (A.B.Y.Y.H.Y)}$$

$$C = C_0 . K . S . I \geq C_0 / 2$$
$$= 0,1 . 1 . 1 . 1 = 0,1 \geq \frac{0,1}{2} = 0,05$$

$$C_1 = 0,1 \text{ Üst katlar için}$$

$$\text{Bodrum Katlar için: } K = 1,5 \text{ alınabilir.}$$

$$C = 0,1 . 1,5 . 1 . 1 = 0,15$$

$$C_2 = 0,15 \text{ Bodrum katları için (Perde duvarlı sistem)}$$

- Yapının kat düzeyine uygulanacak  $F_i$  kuvvetleri :

$$F_i = (F - F_t) \frac{W_i h_i}{\sum W h_i}$$

$$\frac{H}{D} = \frac{18,75}{16,20} = 1,16 \leq 3 \quad F_t = 0 \text{ alınabilir.}$$

$$F = C . W = C_1 (W_1) + C_2 W_2$$
$$= (1264,112)0,1 + 0,15(597,06)$$
$$= 215,97 \text{ ton}$$

$$W_2 = \text{Bodrum kat ağırlığı}$$

$$W_1 = \text{Üst yapı} \quad "$$

KAT NO	$W_i$ (t)	$h_i$ (m)	$W_i \cdot h_i$ (tm)	$\frac{F}{\sum W_i h_i}$ t/tm	$F_i$ (t)	$T_{oi}$ (t)	$F_i$ (kg)
6	316,028	18,05	5704,31	0,01069	60,98	60,98	60980
5	316,028	15,26	4822,59	"	51,55	112,53	51550
4	316,028	12,47	3940,87	"	42,13	154,66	42130
3	316,028	9,68	3059,15	"	32,70	187,36	32700
2	293,613	5,81	1705,89	"	18,24	205,60	18240
1	303,45	3,20	971,04	"	10,38	215,98	10380
$\Sigma$	-	-	20303,85	"	-	-	-

B) Y Doğrultusunda Deprem Hesabı

H = 18,75 m

D = 10,40

N = 6 Adet

$$T = \frac{0,09 \cdot 18,75}{\sqrt{10,40}} = 0,523 \text{ sn}$$

$$T = (0,42 \sim 0,60) \longrightarrow T = 0,6 \text{ sn}$$
$$T_o = 0,40$$

$$S = \frac{1}{|0,8 + 0,6 - 0,40|} = 1$$

$$C = C_o \cdot K \cdot S \cdot I \geq C_o / 2$$

$$C_1 = 0,1 \quad C_2 = 0,15$$

$C_1$  ve  $C_2$  aynı olduğu için kat düzeyine uygulanacak  $F_i$  kuvvetleri x doğrultusundakiyle aynıdır.

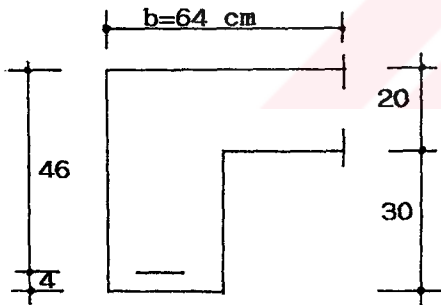
Taşıyıcı sistemin bodrum üstündeki kısmı (üst yapı) ile altındaki kısmın (alt yapının) deprem esnasında davranışı çok farklıdır. Üst yapıda statik denk kat yükleri ve K yapı davranışı katsayısı bodrum üstü temel üstü imiş gibi kabul edilerek hesap edilmiştir. Alt yapıda ise bu kısmın ayrı bir bina imiş gibi kabul edilerek statik denk kat yükleri bulunmuştur. Ancak bu kısımda K yapı davranış katsayısı 1,5 alınmıştır [5].

## 2.11. Kirişlerin Betonarme Hesabı

### 2.11.1. A-A Aksı Normal Kat Kirişleri

#### K4 Kirişi Açıklık Donatısı Hesabı

A-A Aksı üzerindeki kirişler üzerinde max. açıklık momenti K4 kirişinde olduğu için, hesap bu kiriş baz alınarak yapılmıştır.



Etkili Tabla Genişliği

$$b = b_w + l_p / 10 \leq b_1 + 6 h_f$$

$$b = 25 + \frac{385}{10} = 64 \text{ cm alındı } \leq 25 + 120 = 145 \text{ cm}$$

$$M_d = 2,84 \text{ tm} = 284 \text{ tcm.}$$

$$d = 46 \text{ cm}$$

$$b = 64 \text{ cm}$$

$$K = \frac{bd^2}{M} = \frac{64 \cdot 46^2}{284} = 476,8 \rightarrow kx = 0,065 \quad x = kx \cdot d < 20 \text{ cm.}$$

olduğu için dikdörtgen kesit hesabı yapılacaktır.

$$k_s = 0,294$$

$$A_s = 0,294 \frac{284}{46} = 1,81 \text{ cm}^2$$

$$\min A_s = \frac{12}{f_{yd}} b_w \cdot d$$

$$= \frac{12}{3650} 25.46 = 3,78 \text{ cm}^2$$

$A_s < \min A_s$  Kullanılan donatı  $3\Phi 14$  ( $4,62 \text{ cm}^2$ )  
(1 pilye+2 düz)

Diğer kirişlerdeki max. açıklık momenti bu değerden daha küçük olduğundan dolayı, A-A Aksı üzerindeki kirişlerde  $\min A_s$  yeterli olmaktadır.

#### Mesnet Donatısı Hesabı

##### K1 Sol Mesnet

$$M = -7,55 \text{ tm}$$

##### Mesnet Momenti Düzeltmesi

$$\Delta M = \frac{V \cdot a}{3} \quad a = 90 \text{ cm}$$

$$V = 4,763 \text{ t}$$

$$\Delta M = \frac{4,763 \cdot 0,9}{3} = 1,43 \text{ tm}$$

$$M_d = M - \Delta M$$

$$= 7,55 - 1,43 = 6,12 \text{ tm}$$

$$= 612 \text{ tcm}$$

$$K = \frac{bd^2}{M} = \frac{25.46^2}{612} = 86,44 \rightarrow k_s = 0,307$$

$$A_s = 0,307 \frac{512}{46} = 4,08 \text{ cm}^2$$

$$\min A_s = \frac{12}{3650} 25.46 = 3,78 \text{ cm}^2 \quad A_s > \min A_s$$

$$\text{Mevcut donatı : } 2\Phi 12 \text{ (montaj)} + 1\Phi 14 = 2,26 + 1,54 = 3,8 \text{ cm}^2$$

$$\text{Ek donatı : } 4,08 - 3,8 = 0,28 \text{ cm}^2 \quad 1\Phi 14 \text{ (1,54 cm}^2)$$



K1 Sağ-K2 Sol Mesnet

$M = -6,72 \text{ tm}$        $V = 4,406 \text{ t}$        $a = 60 \text{ cm}$

$\Delta M = \frac{V \cdot a}{3} = \frac{4,406 \cdot 0,6}{3} = 0,88 \text{ tm}$

$M_d = -5,84 \text{ tm} = -584 \text{ tcm}$

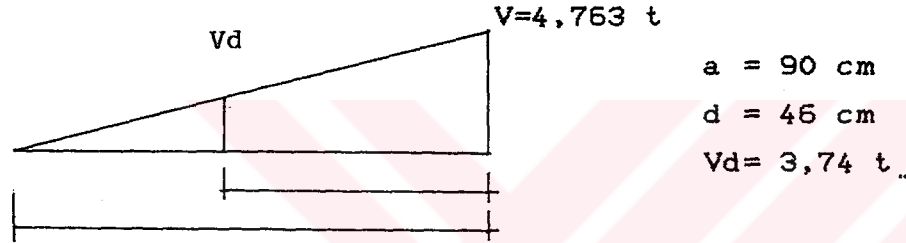
$K = \frac{25 \cdot 46^2}{584} = 90,58 \rightarrow k_s = 0,306$

$A_s = 3,88 \text{ cm}^2$

$\text{min } A_s = 3,78 \text{ cm}^2$

Mevcut donatı :  $2\Phi 12 \text{ (montaj)} + 2\Phi 14 = 2,26 + 3,08 = 5,34 \text{ cm}^2$

Kayma Hesabı



$V_{\text{max}} = 0,25 f_c d \cdot b_v \cdot d = 0,25 \cdot 170 \cdot 25 \cdot 46 = 48,88 \text{ t}$

$V_{\text{max}} > V'_d = 4,25$  Kesit yeterlidir.

Yapı 1. derece deprem bölgesinde olduğu için kayma hesabında betonun katkısı  $V_c = 0$  alınmıştır [3]. Ayrıca pilyelerin kayma dayanımları ihmal edilmiş ve kesme kuvveti sadece etriyelerle karşılanmıştır.

$V_{vs} = \frac{A_{sv}}{s} \cdot d \cdot f_{ywd}$

$S < \frac{d}{2}$ ,  $b_v$ , 20 cm

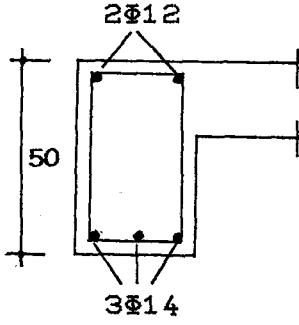
$S = 20 \text{ cm}$  seçilirse

$A_{sv} = \frac{V_{vs} \cdot s}{d \cdot f_{ywd}} = \frac{3,74 \cdot 20 \cdot 10^3}{46 \cdot 1910} = 985 \text{ cm}^2$

$A_{sv} = n \cdot A_o \rightarrow A_o = \frac{0,85}{2} = 0,43 \text{ cm}^2$

Seçilen etriye  $\Phi 8/20 \text{ cm}$  (çift kollu)

$$V_{vs} = \frac{2.0,50}{20} \cdot 46.1910 = 4,393 \text{ t} > V_d = 3,74 \text{ t.}$$

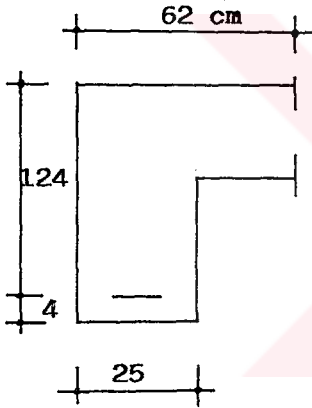


L=146 cm

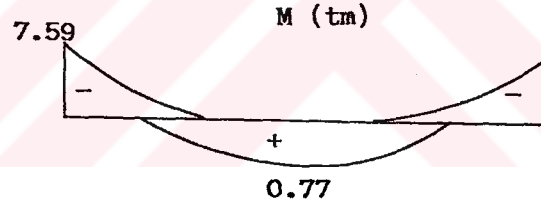
Φ8/20 (etriye)

### 2.11.2. Zemin Kat Kirişleri Betonarme Hesabı

#### K242 No'lu Kiriş



$$b = 25 + \frac{367,5}{10} = 62 \text{ cm}$$



#### Açıklık Donatısı Hesabı

$$M = 0,77 \text{ tm}$$

$$b = 62 \text{ cm}$$

$$K = \frac{62 \cdot 124^2}{77} = 12.380 \rightarrow k_s = 0,289$$

$$A_s = 0,289 \frac{77}{124} = 0,17 \text{ cm}^2$$

$$\min A_s = \frac{12}{3650} 25,124 = 10,19 \text{ cm}^2 \quad 6\Phi16 (12,06 \text{ cm}^2)$$

(2 pilye+4 düz)

$$A_{s \text{ govde}} = 0,08 A_{\text{aciklik}} = 0,82 \text{ cm}^2 \quad 4\Phi10 (3,14 \text{ cm}^2)$$

K242 Sol Mesnet

$M = -7,59 \text{ tm}$

$\Delta M = \frac{V \cdot a}{3} \quad V = 5,268 \text{ t} \quad a = 25 \text{ cm}$

$\Delta M = \frac{5,268 \cdot 0,25}{3} = 0,44 \text{ tm}$

$M_d = M - \Delta M = -7,151 \text{ tm}$

$K = \frac{bd^2}{M} = \frac{62 \cdot 124^2}{715} = 1333 \rightarrow k_s = 0,291$

$A_s = 0,291 \frac{715}{124} = 1,68 \text{ cm}^2$

$\min A_s > A_s \quad \min A_s = 10,19 \text{ cm}^2$

Mevcut donatı :  $2\Phi 16 + 2\Phi 12$  (montaj)  $= 4,02 + 2,26 = 6,28 \text{ cm}^2$

Ek donatı :  $10,19 - 6,28 = 3,91 \text{ cm}^2$   
 $(2\Phi 16)(4,02 \text{ cm}^2)$

K242 Sağ Mesnet

Sağ mesnette de  $\min A_s$  çıkacağı aşıkardır. (sol mesnete bakarak)

Kullanılacak Donatı:

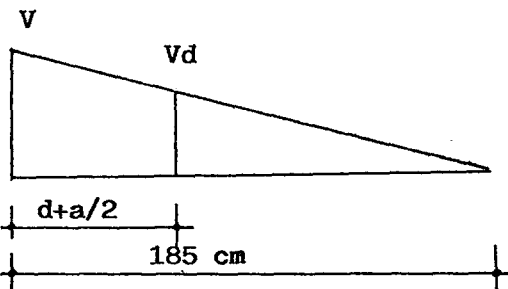
Mevcut :  $2\Phi 16$  (pilye) +  $2\Phi 12$  (Montaj)  $= 6,28 \text{ cm}^2$

Ek Donatı :  $2\Phi 16 = 4,02 \text{ cm}^2$

Kesitteki toplam donatı :  $10,30 \text{ cm}^2$

Gerekli min. donatı  $\min A_s = 10,19 \text{ cm}^2$

K242 Kayma Hesabı



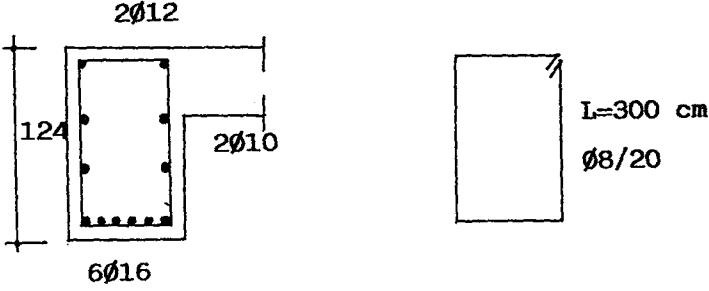
$V = 5,268$

$V_d = 1,38$

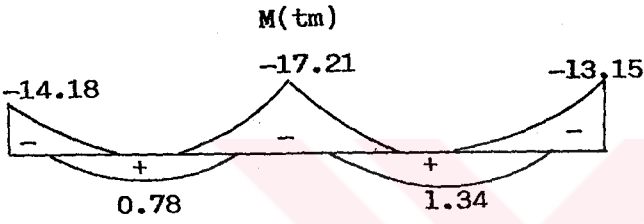
$$V_{cr} = 0,65 f_{ctd} \cdot b_v \cdot d$$
$$= 0,65 \cdot 10 \cdot 25 \cdot 124 = 20,15 \text{ t} \gg V_d \text{ olduğundan kayma}$$

hesabına gerek yoktur.

min etriye  $\varnothing 8/20 \text{ cm}$



K339-K245 No'lu Kirişler



Açıklık Donatısı :

$$M_d = 134 \text{ tcm}$$

$$d = 40$$

$$b = 45 \text{ cm}$$

$$b_v = 25 \text{ cm}$$

$$K = \frac{45 \cdot 40^2}{134} = 537,31 \rightarrow k_s = 0,294$$

$$A_s = k_s \frac{M}{d} = 0,294 \frac{134}{40} = 0,98 \text{ cm}^2$$

$$\min A_s = \frac{12}{f_{yd}} b_v \cdot d$$

$$= \frac{12}{3650} \cdot 25 \cdot 40 = 3,28 \text{ cm}^2$$

$A_s < \min A_s$  Seçilen Donatı  $3\varnothing 14$  ( $4,62 \text{ cm}^2$ )  
(1 pilye+2 düz)

K339 Sol-K245 Sağ Mesnet

$$M = -14,18 \text{ tm}$$

$$a = 90 \text{ cm}$$

$$\Delta M = \frac{V \cdot a}{3}$$

$$\Delta M = \frac{14,97 \cdot 0,90}{3} = 4,49 \text{ tm}$$

$$M_d = M - \Delta M = -9,69 \text{ tm.} = 969 \text{ tcm}$$

$$K = \frac{25 \cdot 40^2}{1969} = 41,27 \text{ cm}^2 \longrightarrow ks = 0,330$$

$$A_s = 0,330 \frac{9,69}{40} = 7,99 \text{ cm}^2$$

Mevcut Donatı : 1 $\Phi$ 14 (pilye)+2 $\Phi$ 12 (montaj) = 38 cm<sup>2</sup>

Gerekli ek donatı : 4,20 cm<sup>2</sup>

Kullanılan ek donatı : 3 $\Phi$ 14 (=4,62 cm<sup>2</sup>)

#### K339 Sağ-K245 Sol Mesnet

$$M = -17,21 \text{ tm} \quad a = 90 \text{ cm}$$

$$\Delta M = \frac{18,11 \cdot 0,9}{3} = 5,43 \text{ tm}$$

$$M_d = M - \Delta M = 11,77 \text{ tm.}$$

$$K = \frac{bd^2}{M} \frac{25 \cdot 40^2}{1177} = 33,98 \longrightarrow ks = 0,343$$

$$A_s = ks \frac{M_d}{d} = 0,343 \frac{1177}{40} = 10,09 \text{ cm}^2$$

Mevcut Donatı : 2 $\Phi$ 14 (pilye)+2 $\Phi$ 12 (montaj) = 5,34 cm<sup>2</sup>

Gerekli ek donatı : 4,75 cm<sup>2</sup>

Kullanılan ek donatı : 4 $\Phi$ 14 (=6,16 cm<sup>2</sup>)

K339-K245 Kayma Hesabı

$V=18.11 \text{ t}$

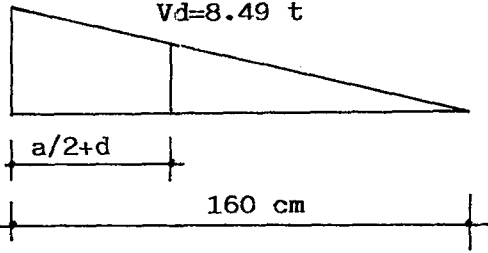
$V_d=8.49 \text{ t}$

$V_{cr} = 0,65 \cdot 10 \cdot 25 \cdot 40 = 6,5 \text{ t.}$

$a = 90 \text{ cm}$

$d = 40 \text{ cm}$

$\frac{a}{2} + d = 85 \text{ cm}$



$V_d > V_{cr}$  Kayma hesabı yapılmalıdır.

$S = 15 \text{ cm}$  seçilirse

$A_{sv} = \frac{8,49 \cdot 15 \cdot 10^3}{40 \cdot 1910} = 1,66 \text{ cm}^2$

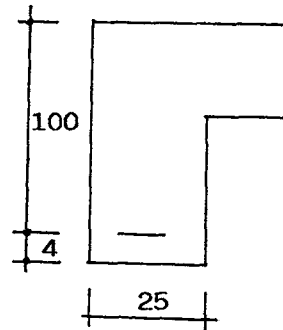
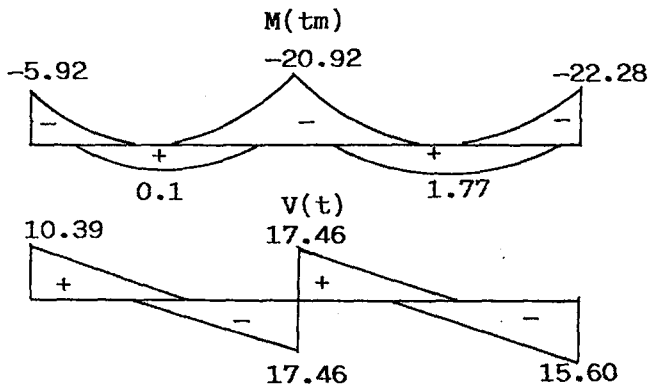
$A_{sv} = n \cdot A_o \rightarrow A_o = 0,83 \text{ cm}^2 \quad (\text{Ø}12/15 \text{ cm})$

K340-249 Kirişi

$l_{\text{açıklık}} = 1,15 l_o = 1,15 \cdot 1,5 = 1,725 \text{ m}$

$\frac{l}{d} = \frac{1,725}{1,00} = 1,725 < 2,5$  olduğundan yüksek kiriş hesabı yapılacaktır.

Açıklık Donatısı Hesabı:



$A_{s \text{ açıklık}} = \frac{Md}{(z \cdot f_{yd})}$

$\frac{l}{h} = \frac{1,725}{1,04} > 1$

$z = 0,2 ((1+1,5 \cdot h))$

$z = 0,2 (172,5+1,5 \cdot 104) = 65,7 \text{ cm}$

$$A_s = \frac{177.10^3}{65,7.3650} = 0,74 \text{ cm}^2$$

$$\min A_s = \frac{12}{f_{yd}} \cdot b_w \cdot d = \frac{12}{3650} \cdot 25.100 = 8,22 \text{ cm}^2$$

Seçilen Donatı  $6\Phi 14 (=9,24 \text{ cm}^2)$

$\frac{1}{h} > 1$  için açıklık donatısı genişliği

$$x = 0,25h - 0,051 = 17,35 \text{ cm}$$

Mesnet Donatısı Hesabı :

$$A_s = \frac{M_d}{z \cdot f_{yd}} = \frac{2092.10^3}{65,7.3650} = 8,72 \text{ cm}^2$$

$$A_{s_{\text{üst}}} = 0,5 \cdot 8,72 \left( \frac{1,725}{1,04} - 1 \right) = 2,87 \text{ cm}^2 \quad 2\Phi 14 (3,08 \text{ cm}^2)$$

Bu donatı  $x = 0,2h = 20 \text{ cm}$  lik kısma konacaktır.

$$A_{s_{\text{orta}}} = A_s - A_{s_{\text{üst}}} = 5,85 \text{ cm}^2 \quad 4\Phi 14 (6,16 \text{ cm}^2)$$

$x = 64 \text{ cm}$  lik kısma konacaktır.

Gövde Donatısı Hesabı :

Yüksek kirişe her iki doğrultuda ve her iki yüze tek çubuk alanı.

$$A_s = 0,001 \cdot b \cdot t$$

$$t \leq 20 \text{ cm}$$

$$A_s = 0,001 \cdot 25 \cdot 20 = 0,5 \text{ cm}^2$$

$$\Phi 8/20 (2,51 \text{ cm}^2/\text{m})$$

Mesnet bölgelerinde donatı aralıkları yarıya düşürülmüştür. Yatay donatı; açıklık donatı şeridi kadar ve  $0,3h=31,2 \text{ cm}$  boyunda, Düşey donatı;  $0,2h=21 \text{ cm}$  genişliğinde,  $0,5h=52 \text{ cm}$  yüksekliğinde konmuştur.

$$\frac{1}{b} = \frac{1,725}{0,25} \cong 7 < 20 \text{ yanal burkulma için güvenlidir.}$$

Mesnet yüzündeki kesme kuvveti;

$$V_d = 17,46 \text{ t}$$

$$V_d < 0,20 \cdot b \cdot h \cdot f_{cd} = 0,20 \cdot 25 \cdot 104 \cdot 130 = 67,60 \text{ t}$$

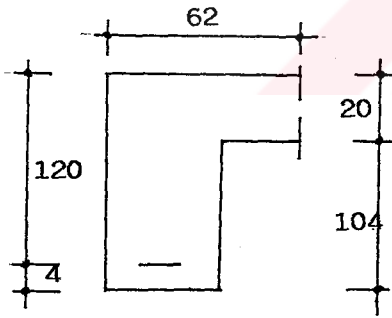
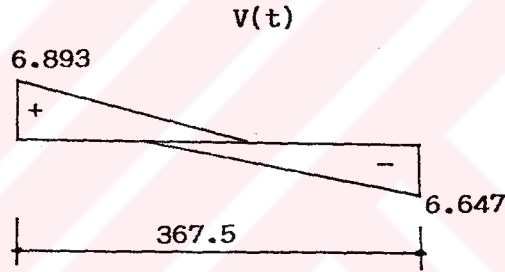
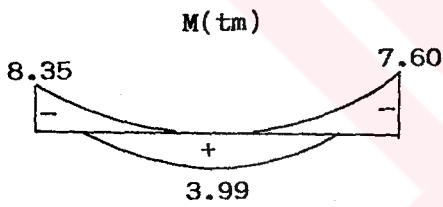
Ezilme Kontrolü :

$$\begin{aligned} \text{Kenar mesnet } A_{\max} &= 0,8 \cdot b \cdot (e+h_o) \cdot 0,85 \cdot f_{cd} \\ &= 0,8 \cdot 25 \cdot (20+20) \cdot 0,85 \cdot 0,13 \\ &= 88,4 \text{ t} > 1,1 \cdot A = 19,2 \text{ t} \end{aligned}$$

$$\begin{aligned} \text{Orta mesnet } B_{\max} &= 1,2 \cdot b \cdot (e+2h_o) \cdot 0,85 \cdot f_{cd} \\ &= 198,9 \text{ t} > 1,1 \cdot B = 17,16 \text{ t} \end{aligned}$$

### 2.11.3. Bodrum Kat Kirişleri Betonarme Hesabı

K298



Etkili Tabla Genişliği

$$b = b_v + \frac{l}{10} \leq b_1 + 6h_s$$

$$b = 25 + 36,75 = 62 \text{ cm}$$

$$M_d = 3,99 \text{ tm} = 399 \text{ tcm}$$

$$d = 120 \text{ cm}$$

$$b = 62 \text{ cm}$$

$$K = \frac{bd^2}{M} = \frac{62 \cdot 120^2}{399} = 2237 \rightarrow kx = 0,029$$

$$x = 120 \cdot 0,029 = 3,48 < 20 \text{ cm}$$

$$k_s = 0,290 \quad A_s = k_s \frac{M_d}{d} = 0,290 \frac{399}{120} = 0,96 \text{ cm}^2$$

$$\min A_s = \frac{12}{f_{yd}} b_v \cdot d = \frac{12}{3650} \cdot 25 \cdot 120 = 9,86 \text{ cm}^2$$



5Φ16 (10,05 cm<sup>2</sup>)  
2 pilye+3 düz

$$A_{s \text{ govde}} = 0,08 \cdot 9,86 = 0,78 \text{ cm}^2$$

4Φ10 (3,14 cm<sup>2</sup>)

K298 Mesnet Donatısı Hesabı

M = 8,35 tm      a = 25 cm      V = 6,893 t

$$\Delta M = \frac{V \cdot a}{3} = \frac{6,893 \cdot 0,25}{3} = 0,57 \text{ tm}$$

Md = m - Δm  
= 8,35 - 0,57 = -7,78 tm.

$$K = \frac{25 \cdot 120^2}{778} = 462,72 \longrightarrow ks = 0,294$$

$$A_s = 1,91 \text{ cm}^2$$

min A<sub>s</sub> = 9,86 cm<sup>2</sup> > A<sub>s</sub>

(pilye)

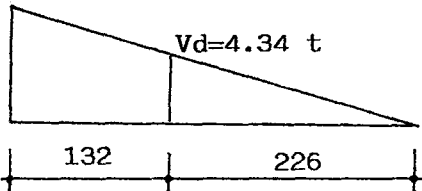
Mevcut donatı : 2Φ16+2Φ12 (montaj) = 4,02+2,26 = 6,28 cm<sup>2</sup>

Ek donatı : 3,58 cm<sup>2</sup>      2Φ16 (4,02 cm<sup>2</sup>)

Kayma Hesabı

$$\frac{6,89}{3,58} = \frac{V_d}{2,26} \longrightarrow V_d = 4,34$$

V=6.89 t

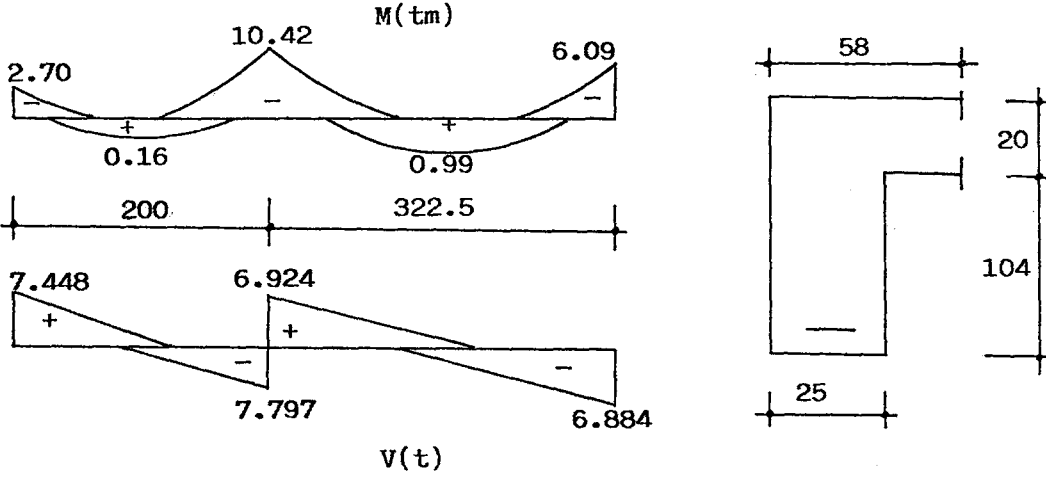


$$V_{cr} = 0,65 \cdot f_{ctd} \cdot b_v \cdot d$$
$$= 0,65 \cdot 10 \cdot 25 \cdot 120 = 19,5 \text{ t}$$

V<sub>cr</sub> > V<sub>d</sub> olduğundan kayma hesabına gerek yoktur.

Öngörülen kayma donatısı : Φ8/20 cm

K306-K307 Açıklık Donatısı Hesabı



$$M = 0,99 \text{ tm}$$

$$K = \frac{bd^2}{M} = \frac{58 \cdot 120^2}{99} = 8436 \rightarrow ks = 0,289$$

$$A_s = 0,289 \frac{99}{120} = 0,24 \text{ cm}^2$$

$$\min A_s = \frac{12}{fyd} b_w \cdot d = \frac{12}{3650} \cdot 25 \cdot 120 = 9,86 \text{ cm}^2$$

5Φ16 (10,05 cm<sup>2</sup>)  
(2 pilye+3 düz)

Orta Mesnet Donatısı

$$M = -10,42 \text{ tm} \quad a = 90 \text{ cm} \quad V = 7,797 \text{ t}$$

$$\Delta M = \frac{7,797 \cdot 990}{3} = 2,34$$

$$Md = -10,42 - (-2,34) = -8,08 \text{ tm}$$

$$K = \frac{25 \cdot 120^2}{808} = 445,54 \rightarrow ks = 0,294$$

$$A_s = ks \frac{M}{d} = 0,294 \frac{808}{120} = 1,97 \text{ cm}^2$$

$$\min A_s > A_s$$

$$\text{Mevcut Donatısı} : 4\Phi 16 (\text{pilye}) + 2\Phi 12 (\text{montaj}) = 10,30 \text{ cm}^2$$

K306 Sol Mesnet

$$M = -2,70 \text{ tm} \quad a = 20 \text{ cm} \quad V = 7,448$$

$$\Delta M = \frac{7,448 \cdot 0,20}{3} = 0,49$$

$$M = -2,20 \text{ tm}$$

$$K = \frac{25 \cdot 120^2}{220} = 1636 \rightarrow ks = 0,291$$

$$A_s = 0,291 \cdot \frac{220}{120} = 0,53 \text{ cm}^2$$

$$\text{min } A_s = 2\Phi 16 \text{ (pilye)} + 2\Phi 12 \text{ (montaj)} = 6,28 \text{ cm}^2$$

$$\text{Ek donatı : } 2\Phi 16 \text{ (4,02 cm}^2\text{)}$$

Kayma Hesabı

$$V_{cr} = 0,65 \text{ pctd. } b_v \cdot d \\ = 0,65 \cdot 10 \cdot 25 \cdot 120 = 19,5 \text{ t}$$

$V_{cr} > V > V_d$  olduğundan kayma hesabına gerek yoktur.

Öngörülen donatı :  $\Phi 8/20$

KK1 Konsol Kirişi :

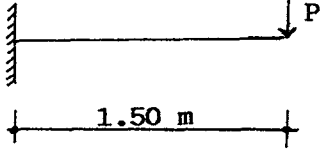
Normal kat döşemesinin kenarlarında 1,5 m uzunlukta konsollar mevcuttur. Bu konsolları çevreleyen kirişlerin yük almadığı kabulü ile döşemeye asılmışlardır. Birim boydaki kiriş ağırlığından meydana gelen moment hesaplanmış ve buna karşı gelen donatı döşemeye ek donatı olarak konmuştur.

Konsol kirişlerde açıklık ve mesnet kesitlerine min. donatı konmuştur.

$$\text{min } A_s = \frac{12}{f_{yd}} \cdot b \cdot d \\ = \frac{12}{3650} \cdot 25 \cdot 46 = 3,78 \text{ cm}^2$$

Kullanılan donatı  $3\Phi 14 \text{ (4,62 cm}^2\text{)}$

Döşemeye Konacak Ek Donatı :



$$P=0,25 \cdot 0,5 \cdot 2,5=0,3125 \text{ t/m}$$

$$1,5 P=0,47 \text{ t/m}$$

$$M=0,47 \cdot 1,5 = 0,71 \text{ tm/m}$$

$$K = \frac{100 \cdot 20^2}{71} = 563 \quad \rightarrow \quad k_s = 0,293$$

$$A_s = 1,04 \text{ cm}^2/\text{m} \quad \Phi 10/40 \quad (1,96 \text{ cm}^2)$$

2.12. Kolonların Betonarme Hesabı

Dikdörtgen kesitli kolonlarda en küçük boyutu 25 cm'dir. Donatının beton örtüsü, dış etkilere maruz elemanlarda 2,5 cm ve içteki elemanlarda 2 cm'dir. Kolonlarda minimum boyuna donatı oranı (Deprem bölgesi)  $\rho_{\min} = 0,010$  ve maksimum donatı oranı ise beton kalitesine bağlı olarak BS 20 için  $\rho_{\max} = 0,035$ .

Kolonlarda sünek davranış sebebiyle boyuna donatı olarak BÇIII kullanılmıştır. Düşey donatının bindirme bölgesinde ise maksimum donatı oranı BS 20 için  $\rho_{\max} = 0,050$  olarak arttırılabilir.

Söz konusu bu değerler, beton ile çeliğin beraber çalışması için ve kolonun güç tükenmesi durumuna büyük plastik şekil değiştirmeler yaparak erişmesini sağlamak için öngörülmüştür.

Kolonlarda boyuna donatı, enine donatı ile sarılarak, hem boyuna donatının burkulması önlenmiş ve hem de kolon betonu enine doğrultuda sarılarak aksenal mukavemeti arttırılmış olur. Kullanılan bu etriyenin çapı,

$$\phi h \geq \phi_l / 3 \quad ; \quad s \leq 12\phi_l \\ \leq 20 \text{ cm}$$

şartlarını sağlamasına çalışılmıştır.

$\phi h$  : Etrişye çapı

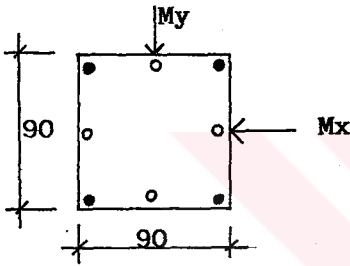
$\phi l$  : Boyuna donatı çapı

S : Etriye aralığıdır.

### 2.12.1. Üçüncü Normal Kot Kolonlarının Betonarme Hesabı

Kolonlar özelliklerine göre numaralandırılmıştır. Parantez içindeki değerler eleman numaralarını göstermektedir.

#### S1 Kolonu (40, 64, 50, 54)



$$M_x = 36,89 \text{ tm}$$

$$M_y = 13,54 \text{ tm}$$

$$N = 13,12 \text{ t}$$

$$m_y = \frac{|M_y|}{bh^2 f_{cd}} = \frac{1354}{90^3 \cdot 0,17} = 0,01$$

$$m_x = \frac{|M_x|}{bh^2 f_{cd}} = \frac{3689}{90^3 \cdot 0,17} = 0,03$$

$$b=90 \text{ cm} \quad h=90 \text{ cm} \quad n = \frac{N}{bh f_{cd}} = \frac{13,12}{90 \cdot 90 \cdot 0,17} = 0,009$$

$m_x > m_y \rightarrow$  olduğu için

$$m_1 = 0,03 \rightarrow w \cong 0,1$$

$$m_2 = 0,01$$

$$A_s = v \cdot \frac{b \cdot h}{f_{yd}/f_{cd}} = 0,1 \cdot \frac{90 \times 90}{26,8} = 30,22 \text{ cm}^2$$

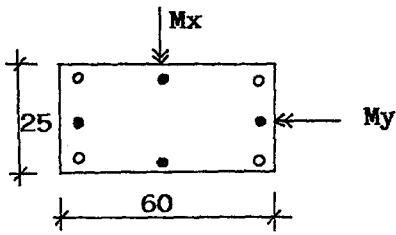
$$\rho_{\min} = 0,010$$

$$A_{s_{\min}} = 0,01 \times 90 \times 90 = 81 \text{ cm}^2 > 30,22 \text{ cm}^2$$

$$\text{Seçilen donatı : } \frac{3A_s}{16} = \frac{3,81}{16} = 15,18 \text{ cm}^2 \quad 3\phi 26 (15,93 \text{ cm}^2)$$

Kullanılan etriye :  $\Phi 10/20 \text{ cm}$ .

S2 Kolonu (41, 42, 43)



$M_x = 5,34 \text{ tm} = 534 \text{ tcm}$

$$m_x = \frac{534}{25 \cdot 60^2 \cdot 0,17} = 0,035$$

$M_y = 9,30 \text{ tm} = 930 \text{ tcm}$

$$m_y = \frac{930}{25^2 \cdot 60 \cdot 0,17} = 0,15$$

$N = 11,56 \text{ t}$

$$n = \frac{11,56}{25 \cdot 60 \cdot 0,17} = 0,05$$

$m_1 = 0,15$

$m_2 = 0,035 \rightarrow w \cong 0,4$

$n = 0,05$

$$A_s = w \frac{b \cdot h}{f_{yd}/f_{cd}} = 0,4 \frac{25 \cdot 60}{26,8} = 22,39 \text{ cm}^2$$

$\rho_{\min} = 0,01$

$\min A_s = 0,01 \cdot 25 \cdot 60 = 15 \text{ cm}^2$

$A_s > \min A_s$

Seçilen  $\frac{3A_s}{16} = 4,19 \text{ cm}^2$

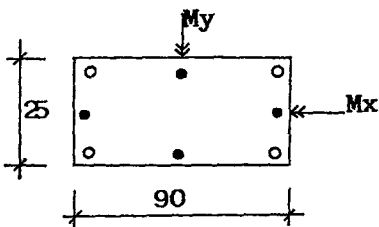
$3\Phi 14 (4,62 \text{ cm}^2)$

Kullanılan etriye  $\Phi 8/15 \text{ cm}$

$s \leq 12\Phi 1 \quad S = 15 \text{ cm}$

$\leq 20 \text{ cm}$

S3 Kolonu (51, 52, 53)



$M_x = 2,78 \text{ tm} = 278 \text{ tcm}$

$$m_x = \frac{278}{25 \cdot 90^2 \cdot 0,17} = 0,03$$

$M_y = 20,65 \text{ tm} = 2065 \text{ tcm}$

$$m_y = \frac{2065}{25^2 \cdot 90 \cdot 0,17} = 0,06$$

$$N = 16,37 \text{ t}$$

$$n = \frac{16,37}{25.60.0,17} = 0,04$$

$$m_1 = 0,06$$

$$m_2 = 0,03 \quad w \cong 0,4 \quad n = 0,05$$

$$A_s = 0,2 \frac{25.60}{26,8} = 16,79 \text{ cm}^2$$

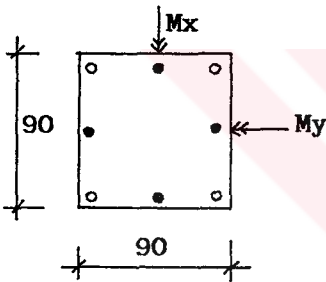
$$\min A_s > A_s$$

$$\text{Kullanılan Donatı } \frac{3A_s}{16} = 4,22 \text{ cm}^2 \quad 3\Phi 14 (4,62 \text{ cm}^2)$$

Etriye  $\Phi 8/15 \text{ cm}$

### 2.12.2. İkinci Normal Kat Kolonları

S4 Kolonu (94, 98, 104, 108)



$$M_x = 35,26 \text{ tm}$$

$$m_x = \frac{3526}{90^3.0,17} = 0,03$$

$$M_y = 53,60 \text{ tm}$$

$$m_y = \frac{5360}{90^3.0,17} = 0,04$$

$$N = 38,89 \text{ t}$$

$$n = \frac{38,89}{90.90.0,17} = 0,03$$

$$m_1 = 0,04$$

$$m_2 = 0,03 \quad \rightarrow w \cong 0,2$$

$$n = 0,03$$

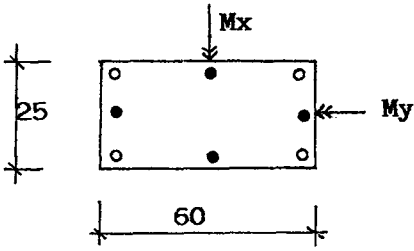
$$A_s = 0,2 \frac{90.90}{26,8} = 60,44 \text{ cm}^2$$

$$\min A_s = 81 \text{ cm}^2 > 60,44$$

$$\text{Seçilen Donatı } \frac{3A_s}{16} = 15,18 \text{ cm}^2 \quad 3\Phi 26 (15,93 \text{ cm}^2)$$

Kullanılan Etriye  $\Phi 10/20 \text{ cm}$

S5 Kolonu (95, 96, 97)



$M_x = 3,33 \text{ tm}$

$$m_x = \frac{333}{60^3 \cdot 25 \cdot 0,17} = 0,02$$

$M_y = 8,35 \text{ tm}$

$$m_y = \frac{838}{25^3 \cdot 60 \cdot 0,17} = 0,13$$

$N = 26,04 \text{ t}$

$$n = \frac{26,04}{25 \cdot 60 \cdot 0,17} = 0,1$$

$m_1 = 0,13$

$m_2 = 0,02 \rightarrow w \cong 0,30$

$n = 0,1$

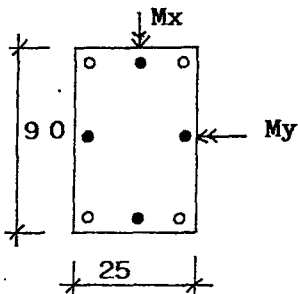
$$A_s = 0,3 \frac{25 \cdot 60}{248} = 16,80 \text{ cm}^2$$

$\min A_s = 15 \text{ cm}^2$

Seçilen Donatı  $\frac{3A_s}{16} = 3515 \text{ cm}^2 \quad 3\Phi 14 (4,62 \text{ cm}^2)$

Kullanılan Etriye  $\Phi 8/15 \text{ cm}$

S6 Kolonu (105, 106, 107)



$M_x = 2,07 \text{ tm}$

$$m_x = \frac{297}{25^2 \cdot 90 \cdot 0,17} = 0,03$$

$M_y = 20,51 \text{ tm}$

$$m_y = \frac{2051}{90^2 \cdot 25 \cdot 0,17} = 0,06$$



$$N = 31,897 \text{ t}$$

$$n = \frac{31,897}{90 \cdot 25 \cdot 0,17} = 0,08$$

$$m_1 = 0,06$$

$$m_2 = 0,03 \rightarrow w \cong 0,2$$

$$n = 0,08$$

$$A_s = 0,2 \frac{25 \cdot 90}{26,8} = 16,79 \text{ cm}^2$$

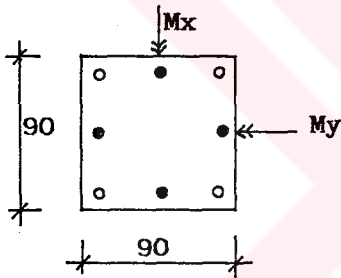
$$\min A_s = 22,5 \text{ cm}^2$$

$$\text{Kullanılan Donatı } \frac{3A_s}{16} = 4,22 \text{ cm}^2 \quad 3\Phi 14 \text{ (4,62 cm}^2)$$

Etriye  $\Phi 8/15 \text{ cm}$

### 2.12.3. Birinci Normal Kat Kolonları

#### S7 Kolonu (148, 152, 158, 162)



$$M_x = 13,14 \text{ tm}$$

$$m_x = \frac{1914}{90^3 \cdot 0,17} = 0,015$$

$$M_y = 50,26 \text{ tm}$$

$$m_y = \frac{5026}{90^3 \cdot 0,17} = 0,04$$

$$N = 69,24 \text{ t}$$

$$n = \frac{68,24}{90 \cdot 0,17} = 0,05$$

$$N = 69,24 \text{ t}$$

$$m_1 = 0,04$$

$$m_2 = 0,015 \rightarrow w \cong 0,2$$

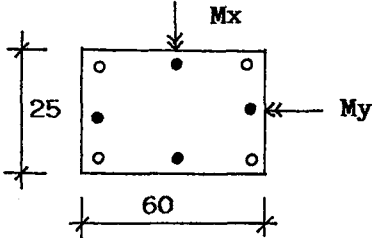
$$n = 0,05$$

$$A_s = 0,2 \frac{90 \cdot 90}{26,8} = 60,44 \text{ cm}^2$$

$$\min A_s = 81 \text{ cm}^2 > 60,44$$

Seçilen Donatı  $\frac{3A_s}{16} = 15,18 \text{ cm}^2$        $3\Phi 26$  ( $15,93 \text{ cm}^2$ )  
Kullanılan Etriye  $\Phi 10/20 \text{ cm}$

S8 Kolonu (149, 150, 151)



$M_x = 2,43 \text{ tm} = 243 \text{ tcm}$

$m_x = \frac{243}{60^2 \cdot 25 \cdot 0,17} = 0,02$

$M_y = 10,00 \text{ tm} = 1000 \text{ tcm}$

$m_y = \frac{1000}{25^2 \cdot 60 \cdot 0,17} = 0,16$

$N = 42,33 \text{ t}$

$n = \frac{42,33}{25 \cdot 60 \cdot 0,17} = 0,17$

$m_1 = 0,16$

$m_2 = 0,02 \rightarrow w \cong 0,3$

$n = 0,17$

$A_s = 0,2 \frac{25 \cdot 90}{26,8} = 1479 \text{ cm}^2$

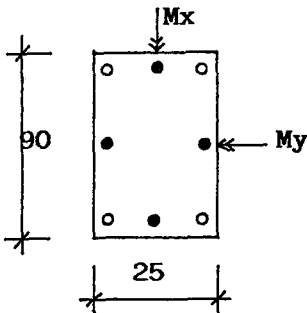
$\rho_{\min} = 0,01$

$\min A_s = 0,01 \cdot 25 \cdot 60 = 15 \text{ cm}^2$

Seçilen Donatı  $\frac{3A_s}{16} = 3,15 \text{ cm}^2$        $3\Phi 14$  ( $4,62 \text{ cm}^2$ )

Kullanılan Etriye  $\Phi 8/15 \text{ cm}$

S9 Kolonu (159, 160, 161) Betonarme Hesabı



$$M_x = 3,11 \text{ tm} = 311 \text{ tcm}$$

$$m_x = \frac{311}{25^2 \cdot 90 \cdot 0,17} = 0,03$$

$$M_y = 19,12 \text{ tm} = 1912 \text{ tcm}$$

$$m_y = \frac{1912}{90^2 \cdot 25 \cdot 0,17} = 0,06$$

$$N = 40,35 \text{ t}$$

$$n = \frac{40,35}{90 \cdot 25 \cdot 0,17} = 0,11$$

$$m_1 = 0,06$$

$$m_2 = 0,03 \quad \longrightarrow \quad w \cong 0,2$$

$$n = 0,11$$

$$A_s = 0,2 \frac{25 \cdot 90}{26,8} = 16,70 \text{ cm}^2$$

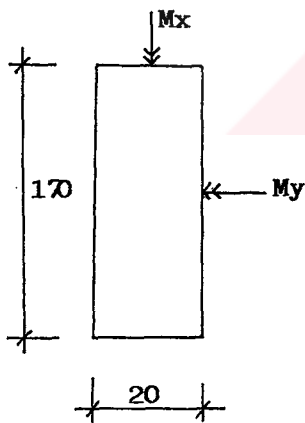
$$\min A_s = 0,01 \cdot 25 \cdot 90 = 22,5 \text{ cm}^2$$

$$\min A_s > A_s$$

Kullanılan Donatı  $\frac{3A_s}{16} = 4,22 \text{ cm}^2 \quad 3\Phi 14 (4,62 \text{ cm}^2)$

Etriye  $\Phi 8/15 \text{ cm}$

P1 Perdesi (155)



$$m_x = 12 \text{ tcm}$$

$$m_y = 98,38 \text{ tcm}$$

$$N = 34,348 \text{ t}$$

$$m_x = \frac{12}{20^2 \cdot 170 \cdot 0,17} = 0,00$$

$$m_y = \frac{9838}{170^2 \cdot 20 \cdot 0,17} = 0,1$$

$$n = \frac{34,348}{20 \cdot 170 \cdot 0,17} = 0,06$$

$$m_1 = 0,1$$

$$m_2 = 0,00 \quad \longrightarrow \quad w \cong 0,25$$

$$n = 0,06$$

$$A_s = 0,25 \frac{170 \cdot 20}{26,8} = 31,72 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 20 \cdot 170 = 34 \text{ cm}^2$$

$$A_s < \min A_s$$

100 cm için donatı miktarı;

$$A_s = 0,25 \frac{100.20}{26,8} = 18,66 \text{ cm}^2$$

Perdenin bir yüzündeki donatı

$$A_{sv} = \frac{18,66}{2} = 9,33 \text{ cm}^2 \quad \Phi 14/15 (10,26 \text{ cm}^2)$$

$$S_v = 15 \text{ cm}$$

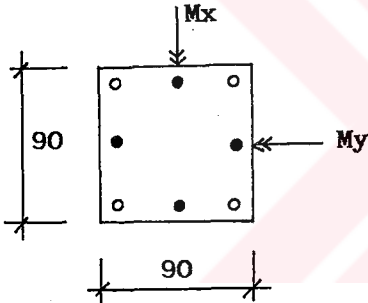
$$S_c = 7,5$$

Yatay donatı :

$$A_{sH} = 0,00125.20.100 = 2,5 \text{ cm}^2 \quad \Phi 12/30 \text{ cm} (3,77 \text{ cm}^2)$$

#### 2.12.4. Zemin Kat Kolonları

##### S10 Kolonu (202, 206, 212, 216)



$$M_x = 93,18 \text{ tm} = 9318 \text{ tcm}$$

$$m_x = \frac{9318}{90^2 \cdot 0,17} = 0,07$$

$$M_y = 33,32 \text{ tm} = 3332 \text{ tcm}$$

$$m_y = \frac{3332}{90^2 \cdot 0,17} = 0,03$$

$$N = 107,33 \text{ t}$$

$$n = \frac{107,33}{90^2 \cdot 0,17} = 0,08$$

$$m_1 = 0,07$$

$$m_2 = 0,03 \quad \longrightarrow \quad \omega \cong 0,25$$

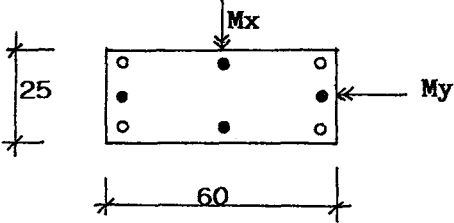
$$n = 0,08$$

$$A_s = 0,25 \frac{90 \cdot 90}{26,8} = 75,56 \text{ cm}^2$$

$$\min A_s = 81 \text{ cm}^2 > 75,56 \text{ cm}^2$$

Seçilen Donatı  $\frac{3A_s}{16} = 15,18 \text{ cm}^2$       3 $\Phi$ 26 (15,93 cm<sup>2</sup>)  
Kullanılan Etriye  $\Phi$ 10/20 cm

S11 Kolonu (203, 204, 205)



$M_x = 2,25 \text{ tm} = 255 \text{ tcm}$

$$m_x = \frac{255}{60^2 \cdot 25 \cdot 0,17} = 0,02$$

$M_y = 6,49 \text{ tm} = 649 \text{ tcm}$

$$m_y = \frac{649}{25^2 \cdot 60 \cdot 0,17} = 0,1$$

$N = 2,108 \text{ t}$

$$n = \frac{2,108}{25 \cdot 60 \cdot 0,17} = 0,108$$

$m_1 = 0,1$

$m_2 = 0,02 \rightarrow \omega \cong 0,30$

$n = 0,008$

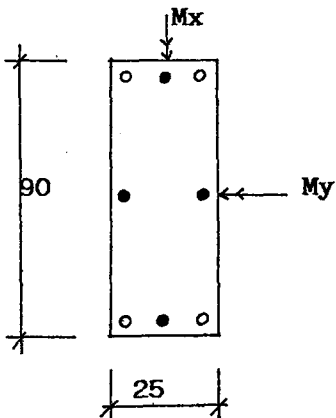
$$A_s = 0,30 \frac{25 \cdot 90}{26,8} = 16,79 \text{ cm}^2$$

$$\rho_{\min} = 0,01 \quad \min A_s = 0,01 \cdot 25 \cdot 60 = 15 \text{ cm}^2$$

$A_s > \min A_s$

Kullanılan Donatı  $\frac{3A_s}{16} = 3,15 \text{ cm}^2$       3 $\Phi$ 14 (4,62 cm<sup>2</sup>)  
Etriye  $\Phi$ 8/15 cm

S12 kolonu (213, 214, 215)



$$M_x = 2,49 \text{ tm}$$

$$m_x = \frac{149}{25^2 \cdot 90 \cdot 0,17} = 0,02$$

$$M_y = 37,93 \text{ tm}$$

$$m_y = \frac{3793}{90^2 \cdot 60 \cdot 0,17} = 0,11$$

$$N = 21,054 \text{ t}$$

$$n = \frac{21,054}{90 \cdot 25 \cdot 0,17} = 0,05$$

$$m_1 = 0,11$$

$$m_2 = 0,02 \rightarrow \omega \cong 0,25$$

$$n = 0,05$$

$$A_s = 0,2 \frac{25 \cdot 90}{25 \cdot 8} = 20,98 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 90 = 22,5 \text{ cm}^2$$

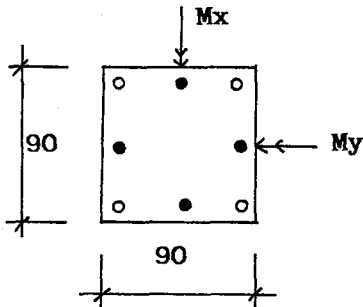
$$\min A_s > A_s$$

$$\text{Donatı } \frac{3A_s}{16} = 4,22 \text{ cm}^2 \quad 3\Phi 14 \text{ (4,62 cm}^2\text{)}$$

Etriye  $\Phi 8/15 \text{ cm}$

### 2.12.5. I. Bodrum Kat Düşey Elemanları

#### S13 Kolonu (255, 260, 268, 272)



$$M_x = 118,17 \text{ tm}$$

$$m_x = \frac{11817}{90^3 \cdot 0,17} = 0,09$$

$$M_y = 10,84 \text{ tm}$$

$$m_y = \frac{1084}{90^3 \cdot 0,17} = 0,01$$

$$N = 80,17 \text{ t}$$

$$n = \frac{80,17}{90^2 \cdot 0,17} = 0,05$$

$$m_1 = 0,09$$

$$m_2 = 0,01 \quad \rightarrow \quad \omega = 0,30$$

$$n = 0,05$$

$$A_s = 0,30 \frac{90 \cdot 90}{26,8} = 90,67 \text{ cm}^2$$

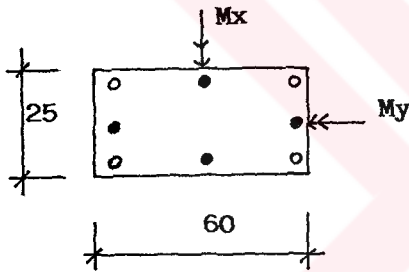
$$\min A_s = 81 \text{ cm}^2$$

$$A_s > \min A_s$$

$$\text{Seçilen Donatı} \quad \frac{3A_s}{16} = 17 \text{ cm}^2 \quad 3\Phi 28 \text{ (18,47 cm}^2\text{)}$$

Seçilen Etriye  $\Phi 10/20$  cm

S14 Kolonu (258, 259)



$$M_x = 4,27 \text{ tm}$$

$$m_x = \frac{427}{60^2 \cdot 25 \cdot 0,17} = 0,03$$

$$M_y = 4,28$$

$$m_y = \frac{428}{25^2 \cdot 60 \cdot 0,17} = 0,07$$

$$N = 5,778 \text{ t}$$

$$n = \frac{5,778}{25 \cdot 60 \cdot 0,17} = 0,02$$

$$m_1 = 0,07$$

$$m_2 = 0,03 \quad \rightarrow \quad \omega = 0,25$$

$$n = 0,02$$

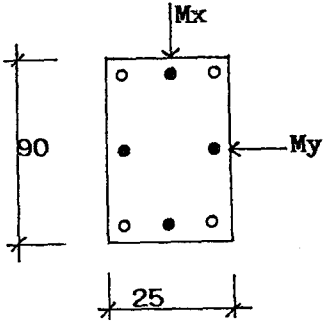
$$A_s = 0,25 \frac{60 \cdot 25}{26,8} = 13,99 \text{ cm}^2$$

$$\min A_s = 15 \text{ cm}^2$$

$$\text{Seçilen Donatı} \quad \frac{3A_s}{16} = 2,81 \text{ cm}^2 \quad 3\Phi 14 \text{ (4,62 cm}^2\text{)}$$

Etriye  $\Phi 8/15$  cm

S15 Kolonu (269, 270, 271)



$M_x = 1,85 \text{ tm}$

$$m_x = \frac{185}{25^2 \cdot 90 \cdot 0,17} = 0,02$$

$M_y = 71,46 \text{ tm}$

$$m_y = \frac{7146}{90^2 \cdot 25 \cdot 0,17} = 0,21$$

$N = 34,461 \text{ t}$

$$n = \frac{34,461}{90 \cdot 25 \cdot 0,17} = 0,09$$

$m_1 = 0,21$

$m_2 = 0,02 \rightarrow \omega = 0,5$

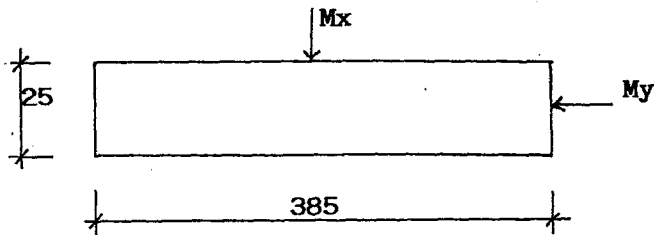
$n = 0,09$

$$A_s = 0,5 \frac{25 \cdot 90}{26,8} = 41,97 \text{ cm}^2$$

$\min A_s = 22,5 \text{ cm}^2$

Seçilen Donatı  $\frac{3A_s}{16} = 7,87 \text{ cm}^2$       3 $\Phi$ 20 (9,42 cm<sup>2</sup>)

P1 Perde (257) Duvarı



$M_x = 87,05 \text{ tm}$

$$m_x = \frac{8705}{385^2 \cdot 25 \cdot 0,17} = 0,01$$



$$M_y = 1,55 \text{ tm}$$

$$m_y = \frac{155}{25^2 \cdot 385 \cdot 0,17} = 0,004$$

$$N = 28,172 \text{ t}$$

$$n = \frac{28,172}{25 \cdot 385 \cdot 0,17} = 0,02$$

$$m_1 = 0,010$$

$$m_2 = 0,004 \quad \rightarrow \quad \omega = 0,1$$

$$n = 0,02$$

$$A_s = 0,1 \frac{25 \cdot 100}{26,8} = 9,32 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 100 = 25 \text{ cm}^2$$

Perdenin bir yüzündeki donatı:

$$\min A_{sv} = \frac{25}{2} = 12,5 \text{ cm}^2 \quad \Phi 16/15 \text{ cm}^2 \quad (\text{Düsey donatı})$$

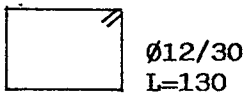
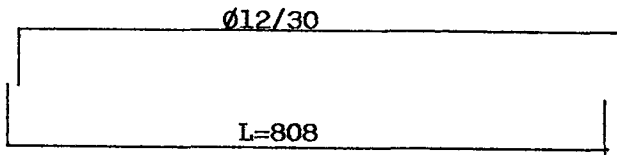
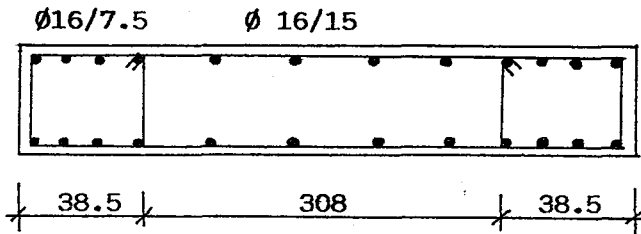
$$\min A_{SH} = \rho_H \cdot b \cdot l = 0,00125 \cdot 25 \cdot 100 = 3,125 \text{ cm}^2$$
$$\Phi 12/30 \text{ cm} (3,77 \text{ cm}^2)$$

$$l_{uc} = 0,1 l \omega = 0,1 \cdot 385 = 38,5 \text{ cm}$$

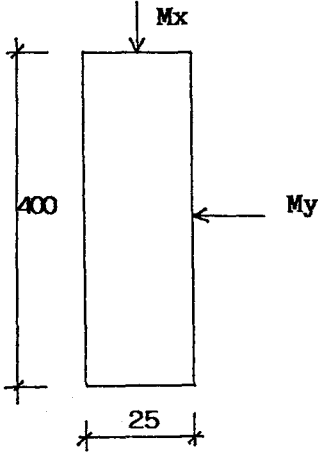
$$\min \rho_{uc} = 0,005$$

$$\min A_{s_{uc}} = 0,005 \cdot 25 \cdot 38,5 = 4,81 \text{ cm}^2$$

$$\text{Mevcut donatı} = 12 \Phi 16 (24,13 \text{ cm}^2) > 4,81 \text{ cm}^2$$



P2 Perdesi (337, 338) Duvarı



$$M_y = 205,71 \text{ tm} = 20571 \text{ tcm}$$

$$M_x = 7,34 \text{ tm} = 734 \text{ tcm}$$

$$N = 12,262 \text{ t}$$

$$m_y = \frac{20571}{25 \cdot 400^2 \cdot 0,17} = 0,03$$

$$m_x = \frac{734}{25^2 \cdot 400 \cdot 0,17} = 0,02$$

$$n = \frac{12,262}{25 \cdot 400 \cdot 0,17} = 0,007$$

$$m_1 = 0,03$$

$$m_2 = 0,02 \quad \omega \cong 0,1 \quad A_s = 0,1 \cdot \frac{25 \cdot 400}{26,8} = 37,31 \text{ cm}^2$$

$$n = 0,007$$

$$\min A_s = 0,01 \cdot 25 \cdot 400 = 100 \text{ cm}^2$$

100 için donatı miktarı

$$A_s = 0,1 \cdot \frac{15 \cdot 100}{26,8} = 9,33 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 100 = 25 \text{ cm}^2$$

Perdenin bir yüzündeki donatı

$$A_{sv} = \frac{25}{2} = 12,5 \text{ cm}^2 \quad \Phi 16/15 \text{ cm} (13,41 \text{ cm}^2)$$

$$\text{Yatay donatı : } A_{SH} = \rho_H \cdot b \cdot l = 0,00125 \cdot 25 \cdot 100 = 3,125 \text{ cm}^2 \\ \Phi 16/15 \text{ cm} (13,41 \text{ cm}^2)$$

$$l_{uc} = 0,1 \cdot 400 = 40 \text{ cm}$$

$$\min A_{suc} = 0,005 \cdot 25 \cdot 40 = 5 \text{ cm}^2$$

$$\text{mevcut } 12\Phi 16 (24,13 \text{ cm}^2) > 5 \text{ cm}^2$$

Taşıyıcı olarak seçilmeyen diğer perde elemanlarına min. donatı konmuştur.

$$\min \rho_v = 0,0025$$

$$\text{Bir yüz için min } \rho_v = 0,00125$$

1 m uzunluk için

$$A_{sv} = 0,00125 \cdot 25 \cdot 100 = 3,125 \text{ cm}^2$$

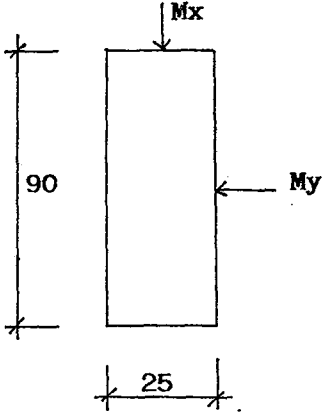
$$\text{Seçilen donatı } \Phi 12/30 \text{ cm} (3,77 \text{ cm}^2)$$

$$A_{SH} = A_{sv} \longrightarrow \Phi 12/30$$

sv = 30 cm, SH : 30 cm

sc = 15 cm

S16 Kolonu (266, 267)



$$M_x = 0,124 \text{ tm} = 12,4 \text{ tcm}$$

$$M_y = 41,79 \text{ tm} = 4179 \text{ tcm}$$

$$N = 12,197 \text{ t}$$

$$m_x = \frac{12,4}{25^2 \cdot 90 \cdot 0,17} = 0,001$$

$$m_y = \frac{4179}{90^2 \cdot 25 \cdot 0,17} = 0,12$$

$$n = \frac{12,197}{25 \cdot 90 \cdot 0,17} = 0,03$$

$$m_1 = 0,12$$

$$m_2 = 0,001 \quad \omega \cong 0,30$$

$$n = 0,03$$

$$A_s = 0,3 \frac{25 \cdot 90}{26,8} = 25,18 \text{ cm}^2$$

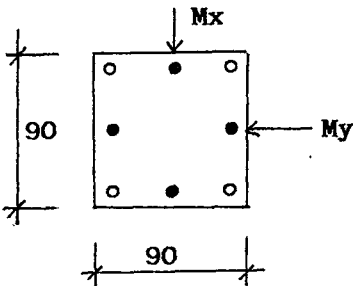
$$\min A_s = 22,5 \text{ cm}^2$$

$$\text{Seçilen donatı : } \frac{3A_s}{16} = 4,72 \text{ cm}^2 \quad 3\Phi 15 (6,03 \text{ cm}^2)$$

Etriye :  $\Phi 8/15$  cm

2.12.6. II. Bodrum Kat Düşey Elemanları

S17 Kolonu (314, 319, 329, 334)



$$M_x = 37,51 \text{ tm}$$

$$m_x = \frac{3751}{90^3 \cdot 0,17} = 0,03$$

$$M_y = 113,78 \text{ tm}$$

$$m_y = \frac{11378}{90^3 \cdot 0,17} = 0,09$$

$$N = 89,91 \text{ t}$$

$$n = \frac{89,91}{90^2 \cdot 0,17} = 0,07$$

$$m_1 = 0,09$$

$$m_2 = 0,03 \quad \longrightarrow \quad \omega = 0,30$$

$$n = 0,07$$

$$A_s = 0,30 \frac{90 \cdot 90}{26,8} = 90,67 \text{ cm}^2$$

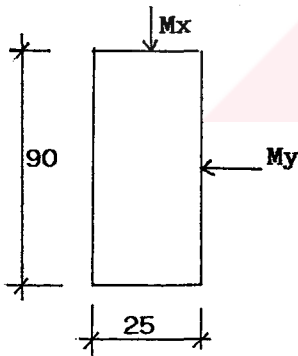
$$\min A_s = 81 \text{ cm}^2$$

$$A_s > \min A_s$$

Seçilen Donatı  $\frac{3A_s}{16} = 17 \text{ cm}^2 \quad 3\Phi 28 (18,47 \text{ cm}^2)$

Seçilen Etriye  $\Phi 10/20 \text{ cm}$

S18 Kolonu (327, 328)



$$M_x = 0,124 \text{ tm} = 12,4 \text{ tcm}$$

$$m_x = \frac{12,4}{25^2 \cdot 90 \cdot 0,17} = 0,001$$

$$M_y = 24,42 \text{ tm} = 2442 \text{ tcm}$$

$$m_y = \frac{2442}{90^2 \cdot 25 \cdot 0,17} = 0,07$$

$$N = 15,47 \text{ t}$$

$$n = \frac{15,47}{25 \cdot 60 \cdot 0,17} = 0,04$$

$$m_1 = 0,07$$

$$m_2 = 0,001 \quad \longrightarrow \quad \omega = 0,25$$

$$n = 0,04$$

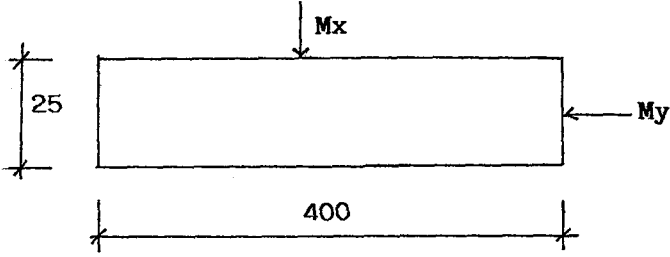
$$A_s = 0,25 \frac{25.90}{26.8} = 20,98 \text{ cm}^2$$

$$\min A_s = 22,5 \text{ cm}^2$$

$$\text{Seçilen Donatı} \quad \frac{3A_s}{16} = 4,22 \text{ cm}^2 \quad 3\Phi 14 (4,03 \text{ cm}^2)$$

Etriye  $\Phi 8/15 \text{ cm}$

P1 Perde Duvarı (315, 315)



$$M_x = 118,83 \text{ tm}$$

$$m_x = \frac{11883}{400^2 \cdot 25 \cdot 0,17} = 0,02$$

$$M_y = 0,14 \text{ tm}$$

$$m_y = \frac{14}{25^2 \cdot 400 \cdot 0,17} = 0,00$$

$$N = 35,235 \text{ t}$$

$$n = \frac{35,235}{25 \cdot 400 \cdot 0,17} = 0,02$$

$$m_1 = 0,02$$

$$m_2 = 0,00 \quad \rightarrow \omega \cong 0,1$$

$$n = 0,02$$

$$A_s = 0,1 \frac{25 \cdot 400}{26.8} = 37,31 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 400 = 100 \text{ cm}^2$$

100 cm'lik boy için donatı miktarı

$$\min A_s = 0,01 \cdot 25 \cdot 100 = 25 \text{ cm}^2$$

Perdenin bir yüzündeki donatı:

$$\min A_{sv} = \frac{25}{2} = 12,5 \text{ cm}^2 \quad \Phi 16/15 \text{ cm}^2$$

$$\min A_{SH} = \rho_H \cdot b \cdot l = 0,00125 \cdot 25 \cdot 100 = 3,125 \text{ cm}^2$$

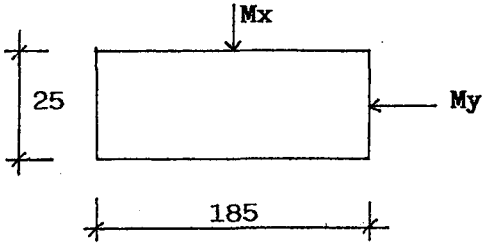
$\Phi 12/30 \text{ cm } (3,77 \text{ cm}^2)$

$$l_{uc} = 0,1 l \omega = 0,1 \cdot 400 = 40 \text{ cm}$$

$$\min \rho_{uc} = 0,005$$

$$\min A_{s_{uc}} = 0,005 \cdot 25 \cdot 40 = 5 \text{ cm}^2$$

P2 Perde Duvarı (317, 318)



$$M_x = 139,40 \text{ tm} = 13940 \text{ tcm} \quad m_x = \frac{13940}{185^2 \cdot 25 \cdot 0,17} = 0,09$$

$$M_y = 1,74 \text{ tm} = 174 \text{ tcm} \quad m_y = \frac{174}{25^2 \cdot 185 \cdot 0,17} = 0,009$$

$$N = 10,09 \text{ t} \quad n = \frac{10,09}{25 \cdot 400 \cdot 0,17} = 0,005$$

$$m_1 = 0,09$$

$$m_2 = 0,009 \quad \omega \cong 0,30$$

$$n = 0,005$$

$$A_s = 0,30 \frac{25 \cdot 185}{26,8} = 51,77 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 185 = 46,25 \text{ cm}^2$$

Birim boy için (100 cm) donatı miktarı

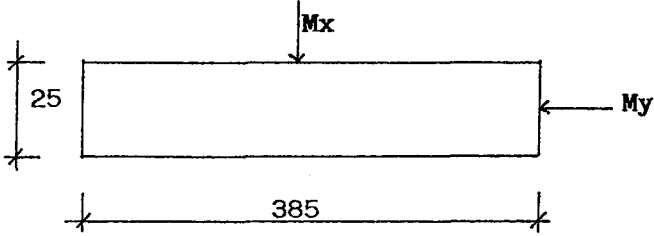
$$A_s = 0,30 \frac{25 \cdot 100}{26,8} = 27,98 \text{ cm}^2$$

Perdenin bir yüzündeki donatı :

$$\min A_{sv} = \frac{27,98}{2} = 13,99 \text{ cm}^2 \quad \Phi 16/14 \text{ cm } (14,36 \text{ cm}^2)$$

$$\min A_{SH} = 3,125 \text{ cm}^2 \quad \Phi 12/30 \text{ cm } (3,77 \text{ cm}^2)$$
$$l_{uc} = 18,5 \text{ cm.}$$

P3 Perde Duvarı (330, 331, 332, 333)



$$M_x = 506,47 \text{ tm}$$

$$m_x = \frac{50647}{385^2 \cdot 25 \cdot 0,17} = 0,08$$

$$M_y = 15,60 \text{ tm}$$

$$m_y = \frac{1560}{25^2 \cdot 385 \cdot 0,17} = 0,04$$

$$N = 39.613 \text{ t}$$

$$n = \frac{39,613}{25 \cdot 385 \cdot 0,17} = 0,02$$

$$m_1 = 0,08$$

$$m_2 = 0,04$$

$$n = 0,02$$

$$\omega \cong 0,20$$

$$A_s = 0,20 \frac{25 \cdot 385}{26,8} = 71,83 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 385 = 96,25 \text{ cm}^2$$

Birim boy için (100 cm) donatı miktarı

$$A_s = 0,01 \cdot 25 \cdot 385 = 96,25 \text{ cm}^2$$

Perdenin bir yüzündeki donatı :

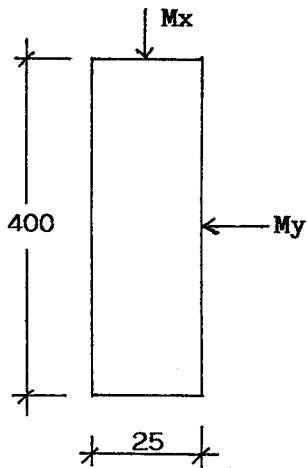
$$\min A_{sv} = 12,5 \text{ cm}^2 \quad \Phi 16/15 \text{ cm}$$

$$\min A_{SH} = 0,00125 \cdot 25 \cdot 100 = 3,125 \text{ cm}^2$$
$$\Phi 12/30 \text{ cm } (3,77 \text{ cm}^2)$$

$$sv : 15 \text{ cm}$$

$$SH : 30 \text{ cm}$$

P4 Perde Duvarı (343, 344)



$$\begin{aligned} M_x &= 1,47 \text{ tm} = 147 \text{ tcm} \\ M_y &= 303,70 \text{ tm} = 30370 \text{ tcm} \\ N &= 12,894 \text{ t} \end{aligned}$$

$$m_x = \frac{147}{25^2 \cdot 400 \cdot 0,17} = 0,003$$

$$m_y = \frac{30370}{400^2 \cdot 25 \cdot 0,17} = 0,04$$

$$n = \frac{12,894}{25 \cdot 400 \cdot 0,17} = 0,007$$

$$m_1 = 0,04$$

$$m_2 = 0,003 \rightarrow \omega \cong 0,1 \quad A_s = 0,1 \frac{25 \cdot 400}{26,8} = 37,31 \text{ cm}^2$$

$$n = 0,007$$

$$\min A_s = 0,01 \cdot 25 \cdot 400 = 100 \text{ cm}^2$$

100 cm için donatı miktarı :

$$A_s = 0,1 \frac{25 \cdot 100}{26,8} = 9,33 \text{ cm}^2$$

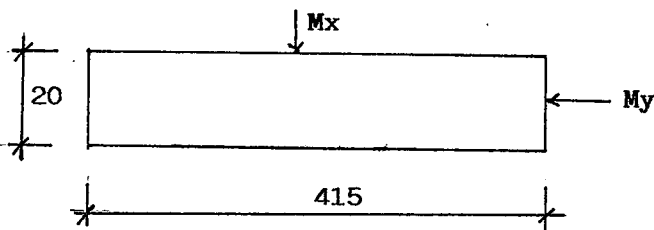
$$\min A_s = 0,01 \cdot 25 \cdot 100 = 25 \text{ cm}^2$$

Perdenin bir yüzündeki donatı

$$A_{sv} = \frac{25}{2} = 12,5 \text{ cm}^2 \quad \Phi 16/15 \text{ cm} (13,41 \text{ cm}^2)$$

$$\begin{aligned} \text{Yayat donatı : } A_{sh} &= 0,00125 \cdot 25 \cdot 100 = 3,125 \text{ cm}^2 \\ &\quad \Phi 12/30 \text{ cm} (3,77 \text{ cm}^2) \end{aligned}$$

P5 Perdesi (320, 326)



$$\begin{aligned} M_x &= 524,86 \text{ tm} = 52486 \text{ tcm} \\ m_x &= \frac{52486}{20 \cdot 415^2 \cdot 0,17} = 0,09 \end{aligned}$$



$$M_y = 0,26 \text{ tm} = 26 \text{ tcm}$$

$$m_y = \frac{26}{25^2 \cdot 415 \cdot 0,17} = 0,00$$

$$N = 78,50 \text{ t}$$

$$n = \frac{78,50}{25 \cdot 415 \cdot 0,17} = 0,06$$

$$m_1 = 0,09$$

$$m_2 = 0,00 \quad \omega \cong 0,26$$

$$n = 0,006$$

$$A_s = 0,26 \frac{25 \cdot 415}{26,8} = 80,52 \text{ cm}^2$$

$$\min A_s = 0,01 \cdot 25 \cdot 415 = 83 \text{ cm}^2$$

100 cm için donatı miktarı

$$\min A_s = 0,01 \cdot 20 \cdot 100 = 20 \text{ cm}^2$$

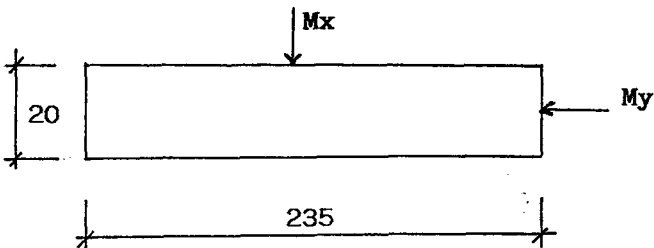
Perdenin bir yüzündeki donatı :

$$A_{sv} = \frac{20}{2} = 10 \text{ cm}^2 \quad \Phi 14/15 \text{ cm} \quad (10,26 \text{ cm}^2)$$

$$A_{SH} = \rho_H \cdot b \cdot l = 0,00125 \cdot 20 \cdot 100 = 2,5 \text{ cm}^2$$
$$\Phi 12/30 \text{ cm} \quad (3,77 \text{ cm}^2)$$

$$l_{uc} = 0,1 \cdot 415 = 41,5 \text{ cm}$$

P6 Perdesi (321)



$$M_x = 90,97 \text{ tm}$$

$$m_x = \frac{9097}{235^2 \cdot 20 \cdot 0,17} = 0,05$$

$$M_y = 1,22 \text{ tm}$$

$$m_y = \frac{122}{235 \cdot 20^2 \cdot 0,17} = 0,007$$

$$N = 71,554 \text{ t}$$

$$n = \frac{71,554}{25 \cdot 235 \cdot 0,17} = 0,09$$

$$m_1 = 0.05$$

$$m_2 = 0.07 \quad \omega \cong 0.2$$

$$n = 0.09$$

$$A_s = 0.2 \frac{25.235}{26.8} = 35.08 \text{ cm}^2$$

$$\min A_s = 0.01.25.235 = 47 \text{ cm}^2$$

100 cm için donatı miktarı

$$\min A_s = 0.01.20.100 = 20 \text{ cm}^2$$

Perdenin bir yüzündeki donatı :

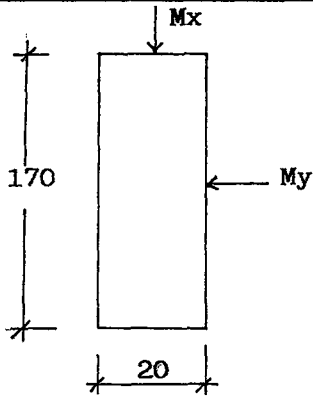
$$A_{sv} = \frac{20}{2} = 10 \text{ cm}^2 \quad \Phi 14/15 \text{ cm} \quad (10,26 \text{ cm}^2)$$

$$A_{SH} = 0,00125.20.100 = 2,5 \text{ cm}^2 \quad \Phi 12/30 \text{ cm} \quad (3,77 \text{ cm}^2)$$

$$l_{uc} = 0,1 l_{\omega} = 23,5 \text{ cm}$$

Diğer katlardaki perdelere etkileyen kesit zorları bu değerlerden daha küçüktür. 2. Bodrum kattaki bu değerlerle dahi kesitte min donatı çıkmaktadır. Diğer katlarda burada bulunan donatılar aynen kullanılacaktır.

P7 Perdesi (323, 263, 209)



$$M_x = 0,188 \text{ tm}$$

$$M_y = 167,20 \text{ tm}$$

$$N = 86,266 \text{ t}$$

$$m_x = \frac{18,8}{20^2 \cdot 170 \cdot 0,17} = 0,002$$

$$m_y = \frac{16720}{170^2 \cdot 20 \cdot 0,17} = 0,17$$

$$n = \frac{86,166}{20 \cdot 170 \cdot 0,17} = 0,15$$

$$m_1 = 0,17$$

$$m_2 = 0,002 \quad \rightarrow \quad \omega \cong 0,35$$

$$n = 0,15$$

$$A_s = 0,35 \frac{20 \cdot 170}{26,8} = 44,40 \text{ cm}^2$$

$$\min A_s = 0,01.25.170 = 34 \text{ cm}^2$$

100 cm için donatı miktarı :

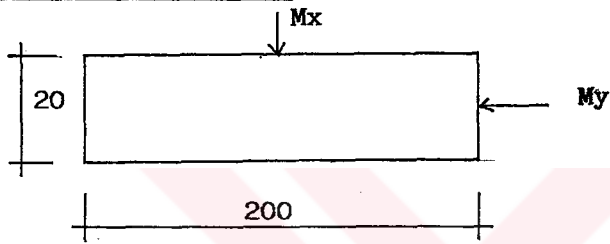
$$A_s = 0,35 \frac{20.100}{26,8} = 26,12 \text{ cm}^2$$

Perdenin bir yüzündeki donatı

$$A_{sv} = \frac{26,12}{2} = 13,06 \text{ cm}^2 \quad \Phi 16/15 \text{ cm} (13,41 \text{ cm}^2)$$

$$A_{SH} = 0,00125.25.100 = 2,5 \text{ cm}^2 \quad \Phi 12/30 \text{ cm} (3,77 \text{ cm}^2)$$

P8 (325) Perdesi



$$M_x = 26,54 = 2654 \text{ tcm}$$

$$m_x = \frac{2654}{200^2 \cdot 20 \cdot 0,17} = 0,02$$

$$M_y = 0,05 \text{ tm} = 5 \text{ tcm}$$

$$m_y = \frac{5}{200 \cdot 20^2 \cdot 0,17} = 0,001$$

$$N = 51,472$$

$$n = \frac{51,472}{200 \cdot 20 \cdot 0,17} = 0,07$$

$$m_1 = 0,02$$

$$m_2 = 0,0004 \quad \omega = 0,1$$

$$n = 0,07$$

$$A_s = 0,1 \frac{20 \cdot 200}{26,8} = 14,93 \text{ cm}^2$$

$$\min A_s = 0,01.20.200 = 40 \text{ cm}^2$$

$$A_s > \min A_s$$

100 cm için donatı miktarı

$$\min A_s = 0,01.20.100 = 20 \text{ cm}^2$$

Perdenin bir yüzündeki donatı

$$A_{sv} = \frac{20}{2} = 10 \text{ cm}^2 \quad \Phi 14/15 \quad (10,26 \text{ cm}^2)$$

$$A_{SH} = 2,5 \text{ cm}^2 \quad \Phi 12/30 \text{ cm} \quad (3,77 \text{ cm}^2)$$

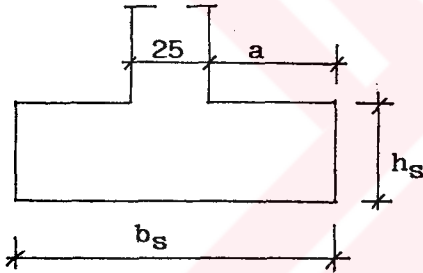
$$l_{uc} = 0,1 l_{\omega} = 20 \text{ cm}$$

### 2.13. Temel Hesabı

Malzeme BS 20 BÇ III

Zemin Gerilmesi  $\sigma_{zem} = 2,50 \text{ kg/cm}^2$

#### 2.13.1. A-A Aksı Üzerindeki Perde Temeli



Arttırılmış Yükler

$$M_g + m_g = 9,29 \text{ tm/m}$$

$$N_g + N_q = 22,42 \text{ t/m}$$

Kullanma Yükleri

$$M_d = 9,29/1,33 = 5,98 \text{ tm/m}$$

$$N_d = 22,432/1,33 = 16,86 \text{ t/m}$$

Temel yüksekliğinin belirlenmesi

$$V_{d1} = \frac{N_d}{2} = \frac{22,42}{2} = 11,21 \text{ t}$$

$$V_{d1} < V_{cr} = 0,65 f_{ctd} \cdot b \cdot d$$

$$11210 < 0,65 \cdot 10 \cdot 100 \cdot d \rightarrow d \geq 17,25 \text{ cm}$$

$$d = 30 \text{ cm} \quad h = 35 \text{ cm} \text{ seçildi.}$$

Kullanma Yükleri Altında bs'in hesabı:

$$\sigma_{zem} = \frac{(N + \text{Temel Ağırlığı})}{bs} + \frac{M \cdot 6}{bs^2}$$

$$25 = \frac{16,86 + 2,5 \cdot 0,35 \cdot 1}{bs} + \frac{6 \cdot 6,98}{bs^2}$$

$$25 \cdot bs^2 = 17,74 \cdot bs + 41,88$$

$$b_s^2 - 0,71 b_s - 1,67 = 0$$

$$b_s = 2,45$$

$$a = 1,10 \text{ m}$$

$$\sigma_{z \text{ min}}^{\text{max}} = \frac{15,86 + 2,5 \cdot 0,35}{(2,45)} \mp \frac{6,6,98}{(2,45)^2 \cdot 1}$$

$$\sigma_{\text{max}} = 14,20 \text{ t/m}^2 < 25 \text{ t/m}^2 \quad (\text{uygun})$$

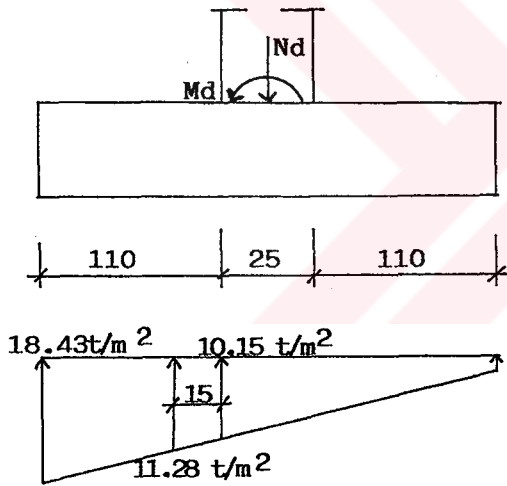
$$\sigma_{\text{min}} = 0,28 \text{ t/m}^2 > 0 \quad \text{uygun}$$

Betonarme Hesabı

$$\sigma_{1,2} = \frac{22,42}{2,45} \mp \frac{6,9,29}{(2,45)^2}$$

$$\sigma_1 = 18,43 \text{ t/m}^2$$

$$\sigma_2 = 0,1 \text{ t/m}^2$$



$$V = 0,5 (18,43 + 0,1) \cdot 1,10 = 10,27 \text{ t/m}$$

$$M = 0,5 \cdot 18,43 \cdot 1,1^2 \cdot \frac{2}{3} + 0,5 \cdot 0,1 \cdot 1,1^2 \cdot \frac{1}{3} = 4,48 \text{ tm/m}$$

Kayma Hesabı

$$V_{cr} = 0,65 \cdot f_{ctd} \cdot b \cdot d$$

$$= 0,65 \cdot 10 \cdot 100 \cdot 30 = 19500 \text{ kgf/m}$$

$$V_d = 10,27 \text{ t/m} < 19,5 \text{ t/m} \quad \text{Kayma hesabına gerek yok.}$$

Eğilme Hesabı

$$b = 100 \text{ cm} \quad d = 30 \text{ cm} \quad md = 9,48 \text{ tm/m}$$

$$K = \frac{100 \cdot 30^2}{948} = 94,94 \rightarrow ks = 0,305$$

$$A_s = 0,35 \frac{948}{30} = 9,64 \text{ cm}^2/\text{m}$$

$$\begin{aligned} \min A_s &= 0,002 \cdot b \cdot d \\ &= 0,002 \cdot 100 \cdot 30 = 6 \text{ cm}^2/\text{m} \end{aligned}$$

Seçilen donatı :  $\Phi 14/15$  (13,41 cm<sup>2</sup>)

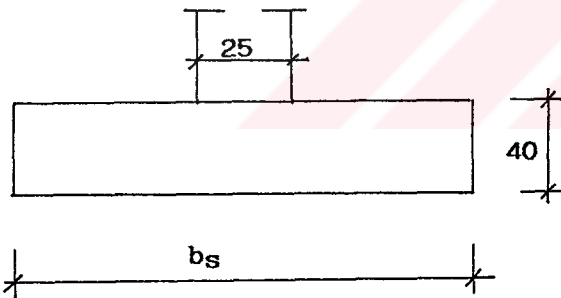
$$A_s \text{ dağıtma} = \frac{9,64 \cdot 2,45}{5} = 4,72 \text{ cm}^2 \quad 6\Phi 12 \text{ (6,79 cm}^2\text{)}$$

Zımbalama Kontrolü :

$$V_{pd} = [0,5 (18,43+11,28)] \cdot 1,10 = 16,34 \text{ t/m}$$

$$V_{pr} = \gamma f_{ctd} \cdot U_p \cdot d = 1 \cdot 10 \cdot 100 \cdot 30 = 30 \text{ t/m} > 16,34 \text{ t/m}$$

2.13.2. E-E Aksı Üzerindeki Perde Temeli



Arttırılmış Yükler

$$M_d = 10,97 \text{ tm/m}$$

$$N_d = 30,92 \text{ t/m}$$

Kullanma Yükleri

$$M_d = 10,97 / 1,33 = 8,24 \text{ tm/m}$$

$$N_d = 30,92 / 1,33 = 23,25 \text{ t/m}$$

$$\sigma_{zem} = \frac{23,25 + 2,5 \cdot 0,4}{bs} \mp \frac{8,24 \cdot 6}{bs^2}$$

$$25 bs^2 - 24,13 bs - 49,44 = 0$$

$$bs^2 - 0,97 bs - 1,97 = 0$$

$$b = 2,45 \text{ m}$$

$$a = 1,10 \text{ m}$$

$$\sigma_{z \text{ min}}^{\max} = \frac{23,25 + 2,5 \cdot 0,4}{2,45} \mp \frac{8,24 \cdot 6}{(2,45)^2}$$

$$\sigma_{\max} = 18,13 \text{ t/m}^2 < 25 \text{ t/m}^2$$

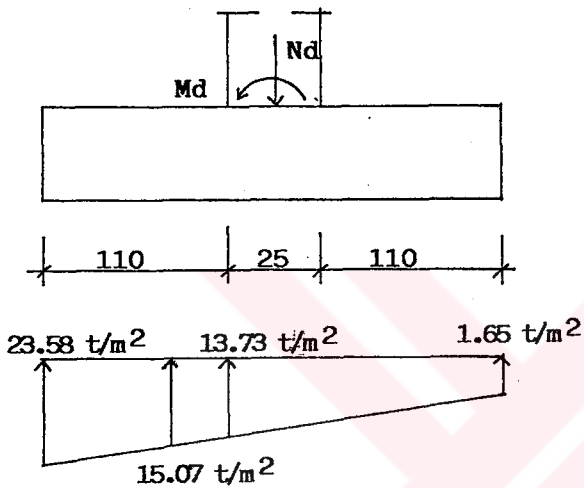
$$\sigma_{\min} = 1,66 \text{ t/m}^2 > 0$$

Betonarme Hesabı

$$\sigma_{1,2} = \frac{30,92}{2,45} \mp \frac{6,10,97}{(2,45)^2}$$

$$\sigma_1 = 23,58 \text{ t/m}^2$$

$$\sigma_2 = 1,65 \text{ t/m}^2$$



$$V = 0,5 (23,58 + 13,73) \cdot 1,10 = 20,52 \text{ t/m}$$

$$M = 0,5 \cdot 23,58 (1,1)^2 \frac{2}{3} + 0,5 \cdot 13,73 (1,1)^2 \frac{1}{3} = 12,28 \text{ tm/m}$$

Kayma Hesabı :

$$V_{cr} = 0,65 \cdot 10 \cdot 100 \cdot 35 = 22,76 \text{ t/m}$$

$$V_d = 20,52 \text{ t/m} < V_{cr}$$

Eğilme Hesabı :

$$b = 100 \text{ cm} \quad d = 35 \text{ cm} \quad Md = 12,28 \text{ tm/m}$$

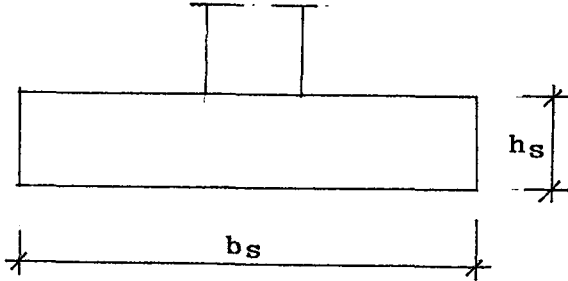
$$K = \frac{100 \cdot 35^2}{376} = 99,76 \quad \rightarrow \quad ks = 0,304$$

$$A_s = 0,304 \frac{1228}{35} = 10,66 \text{ cm}^2/\text{m}$$

Seçilen donatı  $\Phi 16/15$  ( $13,41 \text{ cm}^2$ )

$$\text{As dağıtma} = \frac{10,66 \cdot 2,45}{5} = 5,22 \text{ cm}^2 \quad 6\Phi 12 (6,79 \text{ cm}^2)$$

### 2.13.3. 1-1 Aksı Üzerindeki Perde Temeli



Arttırılmış Yüklər

$$M_d = 2,8 \text{ tm/m}$$

$$N_d = 18,41 \text{ t/m}$$

Kullanma Yükləri

$$M_d = 2,8/1,33 = 2,11 \text{ tm/m}$$

$$N_d = 18,41/1,33 = 13,84 \text{ t/m}$$

Temel Yüksekliğinin belirlenmesi:

$$V_{d1} = 9,21 \text{ t}$$

$$V_{d1} < V_{cr} = 0,65 \text{ fctd.b.d}$$

$$9210 < 0,65 \cdot 10 \cdot 100 \cdot d \rightarrow d \geq 15 \text{ cm}$$

$$d = 30 \text{ cm} \quad h = 35 \text{ cm seçildi.}$$

$$\sigma_{zem} = \frac{(N+Ng)}{bs \cdot 1} \mp \frac{M \cdot 6}{bs^2 \cdot 1}$$

$$25 = \frac{13,84 + 2,5 \cdot 0,35}{bs} \pm \frac{2,11 \cdot 6}{bs^2}$$

$$bs^2 - 0,59 bs - 0,51 = 0$$

$$b = 1,45 \text{ m}$$

$$a = 60 \text{ m}$$

$$\sigma_{z \min}^{\max} = \frac{13,84 + 0,875}{1,45} \mp \frac{2,11 \cdot 6}{(1,45)^2}$$

$$\sigma_{\max} = 16,17 \text{ t/m}^2 < 25 \text{ t/m}^2$$

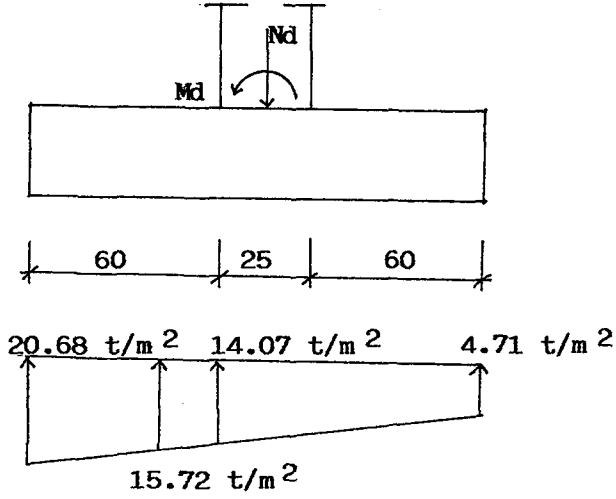
$$\sigma_{\min} = 4,12 \text{ t/m}^2 > 0$$

Betonarme Hesabı

$$\sigma_{1,2} = \frac{18,41}{1,45} \mp \frac{6 \cdot 2,8}{(1,45)^2}$$

$$\sigma_{1,2} = 20,68 \text{ t/m}^2$$
$$4,71 \text{ t/m}^2$$





$$V = 0,5 (20,68+14,07) \cdot 0,6 = 10,43 \text{ t/m}$$

$$M = 0,5 \cdot 20,68 \cdot 0,6^2 \cdot \frac{2}{3} + 0,5 \cdot 14,07 \cdot 0,6^2 \cdot \frac{1}{3} = 3,3 \text{ tm/m}$$

Kayma Hesabı :

$$V_{cr} = 0,65 \cdot 10 \cdot 100 \cdot 30 = 19,500 \text{ t/m}$$

$$V_d = 10,43 \text{ t/m} < 19,5 \text{ t/m} \text{ (Kayma hesabına gerek yok)}$$

Eğilme Hesabı :

$$b = 100 \text{ cm} \quad d = 30 \text{ cm} \quad Md = 3,3 \text{ tm/m}$$

$$K = \frac{100 \cdot 30^2}{333} = 270,3 \rightarrow ks = 0,296$$

$$A_s = 0,296 \cdot \frac{333}{30} = 3,29 \text{ cm}^2/\text{m}$$

$$\text{Min } A_s = 0,002 \cdot 100 \cdot 30 = 6 \text{ cm}^2/\text{m}$$

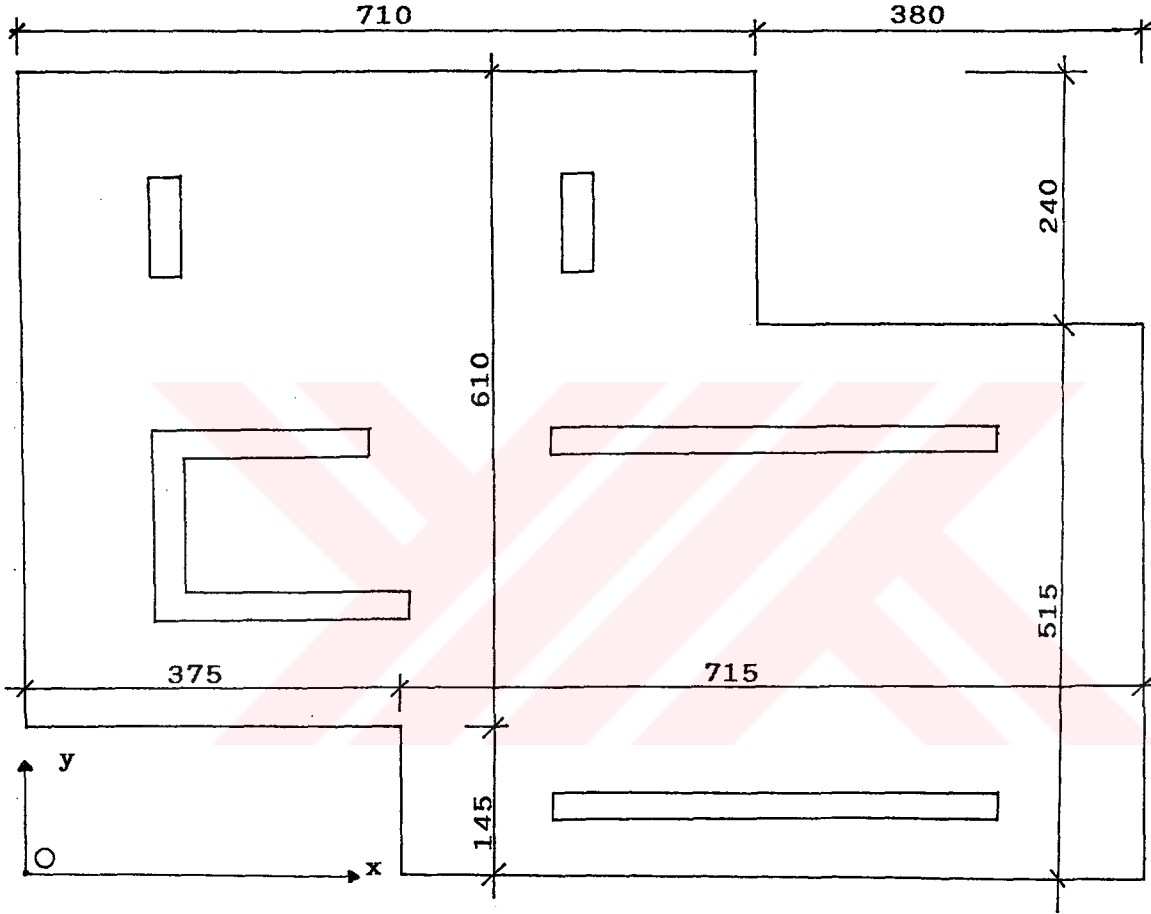
$$\Phi 14/20 \text{ cm} (7,69 \text{ cm}^2)$$

$$\text{As dağıtma} = \frac{3,29 \cdot 1,45}{5} = 0,95 \text{ cm}^2 \quad 4\Phi 10 (3,14 \text{ cm}^2)$$

#### 2.13.4. Radye Temel Hesabı

Temelde 320, 326, 323, 325 no'lu perdelerin ve kirişsiz 327, 328 no'lu kolonların tamamı kapsayacak şekilde bir radye temel tasarımı yapılmıştır.

Radye plağın ağırlık merkezi ile düşey yüklerin bileşkesinin etkime noktası mümkün olduğu kadar üst üste gelecek şekilde (Normal kuvvetlerden dolayı moment oluşmaması veya en aza indirgenmesi için) ampattan boyları hesaplanmıştır.



Şekil 2.13.4.1. Radye Temeli Planı

Temele etkiyen toplam kuvvet :  
 $\Sigma N = 677,95 \text{ t}$  (Arttırılmış yük)  
Toplam momentler :  
 $\Sigma m_x = 866,77 \text{ tm}$   
 $\Sigma m_y = 99,31 \text{ tm}$   
Temel Alanı :  $67,74 \text{ m}^2$

Tablo 2.13.4.1. Temele Etkiyen Yüklere

Eleman No	P320	P326	P321	P325	P323	S327	S328
N (t)	109,6	212,3	193,5	51,47	74,68	20,98	15,46
Mx (tm)	307	518	14,70	26,54	0,18	0,23	0,12
My (tm)	4,35	4,46	1,18	1,08	52,85	10,98	24,41

Temel Kalınlığının Hesaplanması :

Birim boya gelen toplam moment  $M = 79,52 \text{ tm/m}$

Dikdörtgen kesitler için düzenlenmiş abakta dengeli donatının 0,75'ine tekabül eden K değeri okunarak, d hesaplanmıştır.

$$K = 31$$

$$K = \frac{bd^2}{M} \rightarrow d = \sqrt{\frac{KM}{b}}$$

$$d_{\min} = 49,6 \text{ cm}$$

Eksantrisiteden doğabilecek etkilerde gözönüne alınarak  $d = 70 \text{ cm}$  seçildi.

Temel Ağırlık Merkezi

$$X = 526 \text{ cm}$$

$$Y = 367 \text{ cm}$$

Düşey Yüklere Bileşke Noktesi

$$X_b = 476 \text{ cm}$$

$$Y_b = 314 \text{ cm}$$

$$e_x = 526 - 476 = 50 \text{ cm}$$

$$e_y = 367 - 317 = 50 \text{ cm}$$

Kullanma Yükleri Altında Zemin Gerilmesi Tahkiki

Temel Ağırlığı  $N_g = 67,74 \cdot 0,7 \cdot 2,5 = 118,55 \text{ t}$

$\Sigma N = 677,95 / 1,33 = 509,74 \text{ t}$

$\Sigma m_x = 866,77 / 1,33 = 651,70 \text{ tm}$

$\Sigma m_y = 99,31 / 1,33 = 74,67 \text{ tm}$

$$\sigma = \frac{\Sigma N + N_g}{A} \mp \frac{M_x}{I_y} x$$

X Doğrultusunda meydana gelen gerilmeler ;

$$\sigma_{\max} = \frac{509,74 + 118,55}{67,74} \mp \frac{509,74 \cdot 0,5 + 651,7}{610,54} \cdot 5,26$$

$$\sigma_{\max} = 17,08 \text{ t/m}^2 < 25 \text{ t/m}^2$$

$$\sigma_{\min} = 1,47 \text{ t/m}^2 > 0$$

Y Doğrultusu için;

$$\sigma_{\max} = \frac{509,74 + 118,55}{67,74} \mp \frac{509,74 \cdot 0,53 + 74,67}{273,83} \cdot 3,67$$

$$\sigma_{\max} = 13,89 \text{ t/m}^2 < 25 \text{ t/m}^2$$

$$\sigma_{\min} = 4,65 \text{ t/m}^2 > 0$$

Temel Plağına Gelen Yükler;

$$\sigma_{1,2} = \frac{677,95}{67,74} \mp \frac{677,95 \cdot 0,5 + 866,77}{610,54} \cdot 5,26$$

$$\left. \begin{array}{l} \sigma_1 = 20,40 \text{ t/m}^2 \\ \sigma_2 = 0,3 \text{ t/m}^2 \end{array} \right\} \text{ x yönünde}$$

$$\sigma_{1,2} = \frac{677,95}{67,74} \mp \frac{677,95 \cdot 0,53 + 99,31}{273,83} \cdot 3,67$$

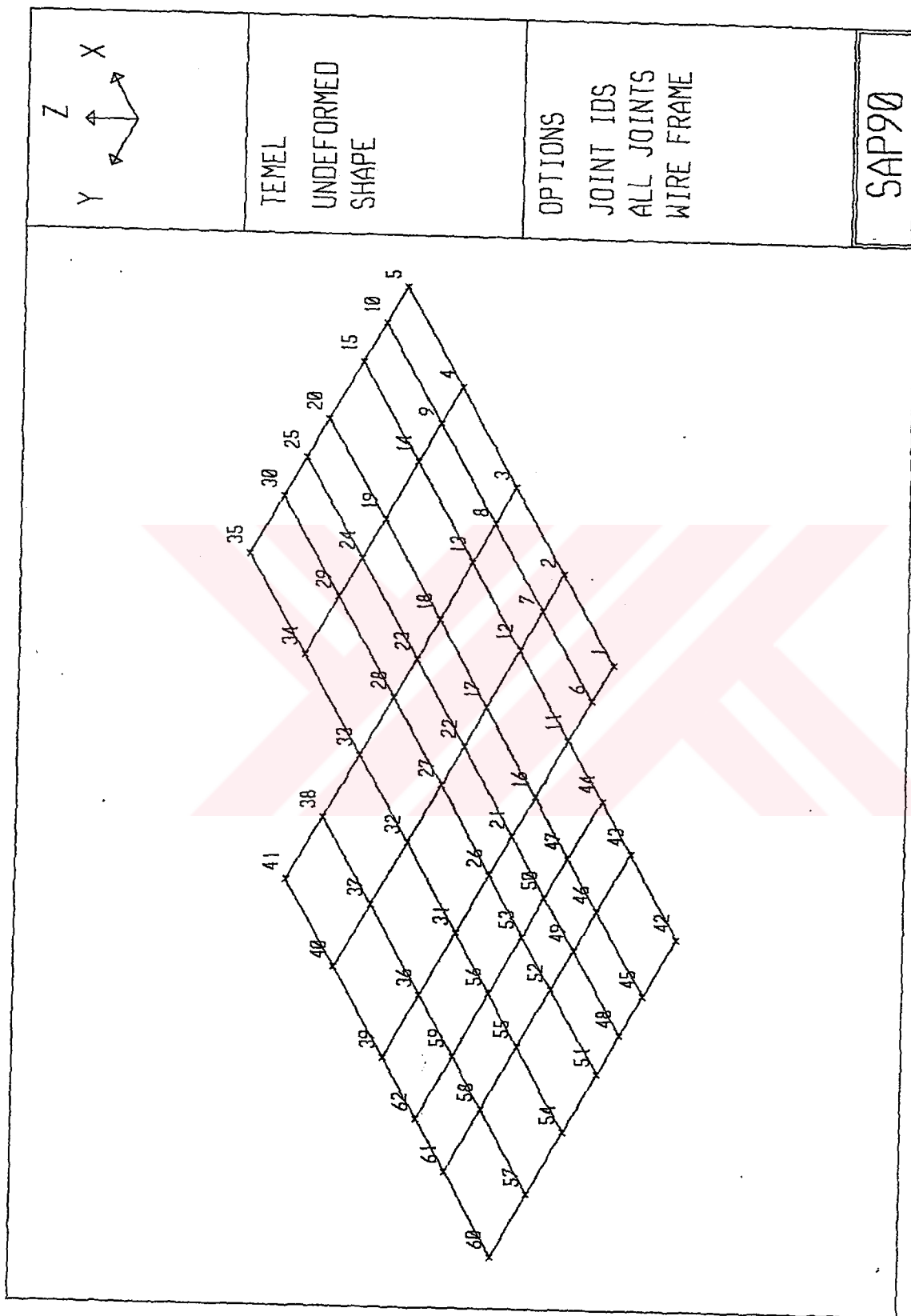
$$\left. \begin{array}{l} \sigma_1 = 15,15 \text{ t/m}^2 \\ \sigma_2 = 3,86 \text{ t/m}^2 \end{array} \right\} \text{ y yönünde}$$

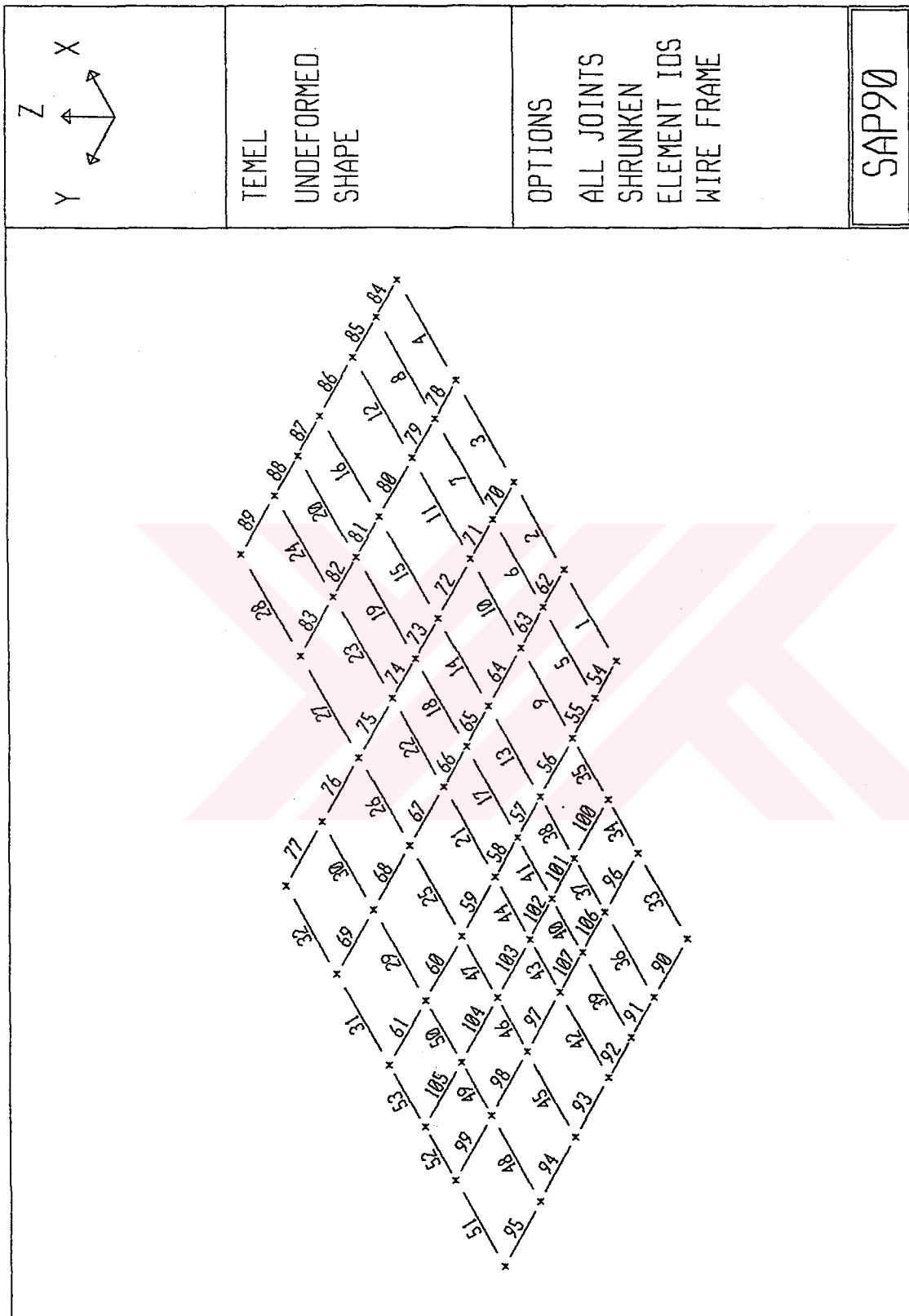
Bulunan bu gerilmelerin max'u alınarak, temel plađına düzgün yayılı etkiyormuş gibi düşünölmüş ve statik hesap bu yük altında yapılmıştır.

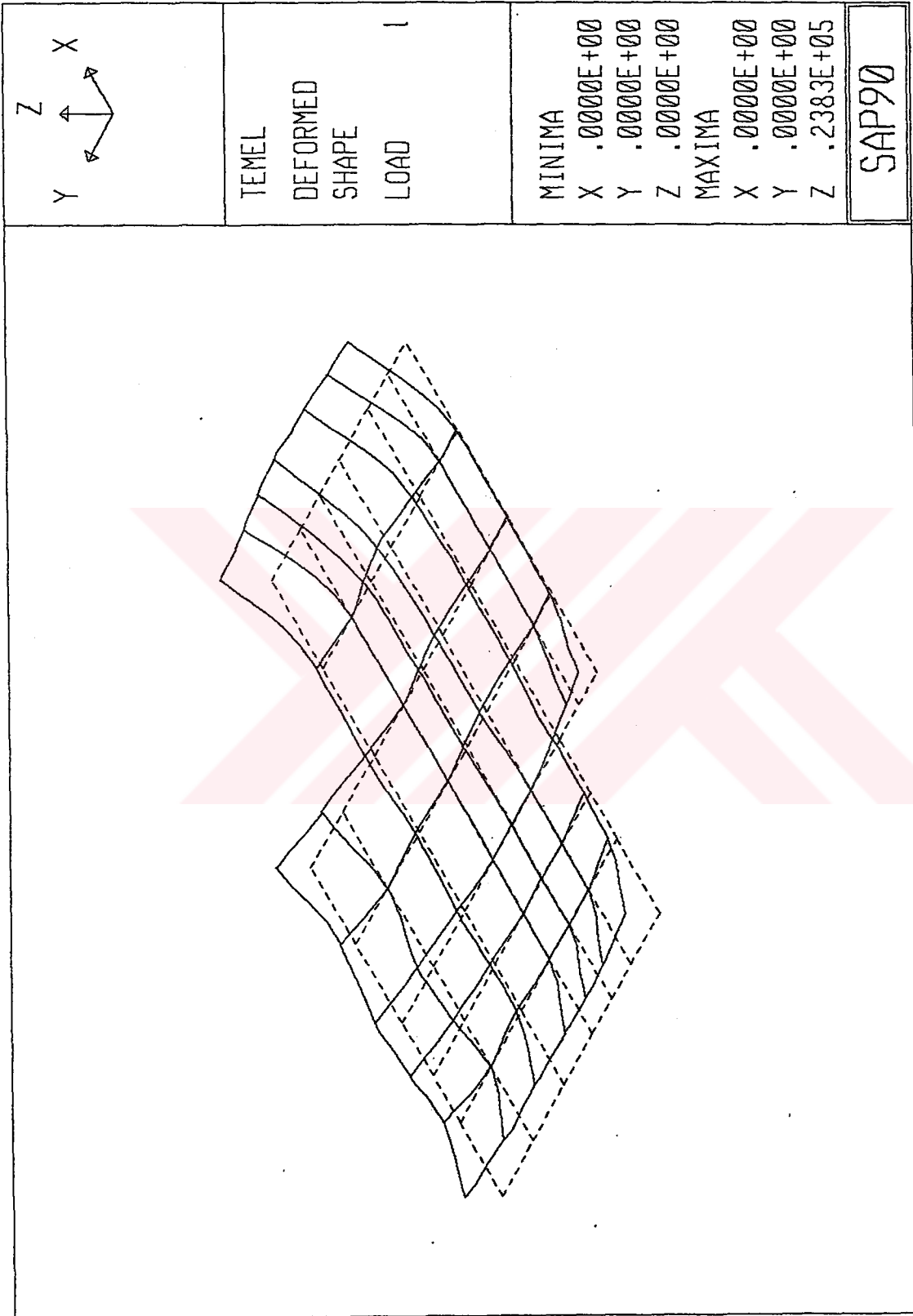
Temel kirişsiz döşeme gibi düşünölerek SAP90 bilgisayar programıyla, aynen üst yapıdaki döşemeler gibi çözülmüştür. Radye plak kolon ve açıklık şeritlerine ayrılmış ve bu şeritler içerisindeki en elverişsiz kesit tesirleri alınmıştır. Betonarme hesabı birim boy için, bu etkilere göre hesaplanmıştır.

Statik hesapta birim alana gelen yükler, her düğüm noktasının etki alanıyla çarpılmış ve düğüm noktalarına tekil yük olarak etki ettirilmiştir.











RADYE TEMEL HESABI

SYSTEM

L=1

JOINTS

1	X=375	Y=0	
2	X=545	Y=0	
3	X=710	Y=0	
5	X=1090	Y=0	G=3,5,1
6	X=375	Y=70	
7	X=545	Y=70	
8	X=710	Y=70	
10	X=1090	Y=70	G=8,10,1
11	X=375	Y=145	
12	X=545	Y=145	
13	X=710	Y=145	
15	X=1090	Y=145	G=13,15,1
16	X=375	Y=255	
17	X=545	Y=255	
18	X=710	Y=255	
20	X=1090	Y=255	G=18,20,1
21	X=375	Y=330	
22	X=545	Y=330	
23	X=710	Y=330	
25	X=1090	Y=330	G=23,25,1
26	X=375	Y=405	
27	X=545	Y=405	
28	X=710	Y=405	
30	X=1090	Y=405	G=28,30,1
31	X=375	Y=515	
32	X=545	Y=515	
33	X=710	Y=515	
35	X=1090	Y=515	G=33,35,1
36	X=375	Y=635	
37	X=545	Y=635	
38	X=710	Y=635	
39	X=375	Y=755	
40	X=545	Y=755	
41	X=710	Y=755	
42	X=0	Y=145	
43	X=160	Y=145	
44	X=260	Y=145	
45	X=0	Y=255	
46	X=160	Y=255	
47	X=260	Y=255	
48	X=0	Y=330	
49	X=160	Y=330	
50	X=260	Y=330	
51	X=0	Y=405	
52	X=160	Y=405	
53	X=260	Y=405	
54	X=0	Y=515	
55	X=160	Y=515	

56	X=260	Y=515
57	X=0	Y=635
58	X=160	Y=635
59	X=260	Y=635
60	X=0	Y=755
61	X=160	Y=755
62	X=260	Y=755

RESTRAINTS

1, 62, 1	R=1, 1, 0, 0, 0, 1
7, 9, 1	R=1, 1, 1, 1, 1, 1
27, 29, 1	R=1, 1, 1, 1, 1, 1
16	R=1, 1, 1, 1, 1, 1
47, 53, 6	R=1, 1, 1, 1, 1, 1
46, 52, 3	R=1, 1, 1, 1, 1, 1
37, 58, 21	R=1, 1, 1, 1, 1, 1
26	R=1, 1, 1, 0, 0, 1

FRAME

NM=18

1	SH=R	T=70, 85	E=285000	G=114000
2	SH=R	T=70, 142.5	E=285000	G=114000
3	SH=R	T=70, 167.5	E=285000	G=114000
4	SH=R	T=70, 177.5	E=285000	G=114000
5	SH=R	T=70, 82.5	E=285000	G=114000
6	SH=R	T=70, 190	E=285000	G=114000
7	SH=R	T=70, 95	E=285000	G=114000
8	SH=R	T=70, 35	E=285000	G=114000
9	SH=R	T=70, 72.5	E=285000	G=114000
10	SH=R	T=70, 92.5	E=285000	G=114000
11	SH=R	T=70, 55	E=285000	G=114000
12	SH=R	T=70, 75	E=285000	G=114000
13	SH=R	T=70, 115	E=285000	G=114000
14	SH=R	T=70, 120	E=285000	G=114000
15	SH=R	T=70, 60	E=285000	G=114000
16	SH=R	T=70, 80	E=285000	G=114000
17	SH=R	T=70, 130	E=285000	G=114000
18	SH=R	T=70, 107.5	E=285000	G=114000
1, 1, 2	M=8	G=3, 1, 1, 1	LP=17, 13	
5, 6, 7	M=9	G=1, 3, 3, 3		
6, 7, 8	M=9	G=1, 1, 1, 1		
9, 11, 12	M=10	G=3, 1, 1, 1		
13, 16, 17	M=10	G=3, 1, 1, 1		
17, 21, 22	M=12	G=3, 1, 1, 1		
21, 26, 27	M=10	G=1, 3, 3, 3		
22, 27, 28	M=10	G=1, 1, 1, 1		
25, 31, 32	M=13	G=1, 1, 1, 1		
27, 33, 34	M=11	G=1, 1, 1, 1		
29, 36, 37	M=14	G=1, 1, 1, 1		
31, 39, 40	M=15	G=1, 1, 1, 1		
33, 42, 43	M=11	G=1, 1, 1, 1		
35, 44, 11	M=11			
36, 45, 46	M=10			
37, 46, 47	M=10	G=1, 6, 6, 6		

38,47,16	M=10	G=1,6,6,10	
39,48,49	M=12	G=1,1,1,1	
41,50,21	M=12		
42,51,52	M=10		
45,54,55	M=13	G=1,1,1,1	
47,56,31	M=13		
48,57,58	M=14	G=1,1,1,1	
50,59,36	M=14		
51,60,61	M=15	G=1,1,1,1	
53,62,39	M=15		
54,1,6	M=1	G=1,1,5,5	LP=17,23
56,11,16	M=2	G=4,1,5,5	
61,36,39	M=2		
62,2,7	M=3	G=6,1,5,5	
69,37,40	M=3		
70,3,8	M=4	G=5,1,5,5	
76,33,38	M=5	G=2,1,5,3	
78,4,9	M=6	G=5,1,5,5	
84,5,10	M=7	G=5,1,5,5	
90,42,45	M=16	G=5,1,3,3	
96,43,46	M=17		
97,52,55	M=17	G=2,1,3,3	
100,44,47	M=18	G=5,1,3,3	
106,46,49	M=17	G=1,1,3,3	

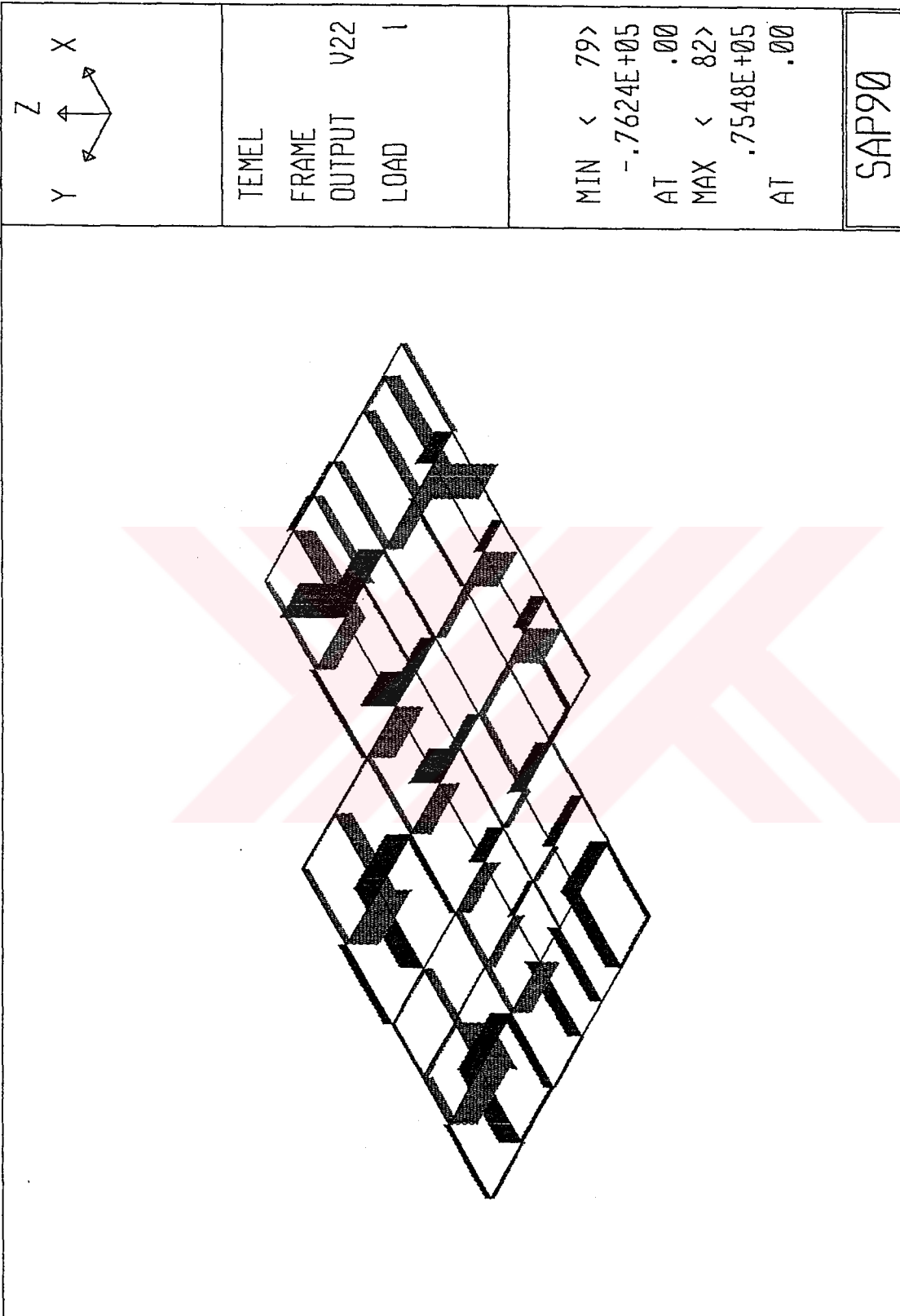
LOADS

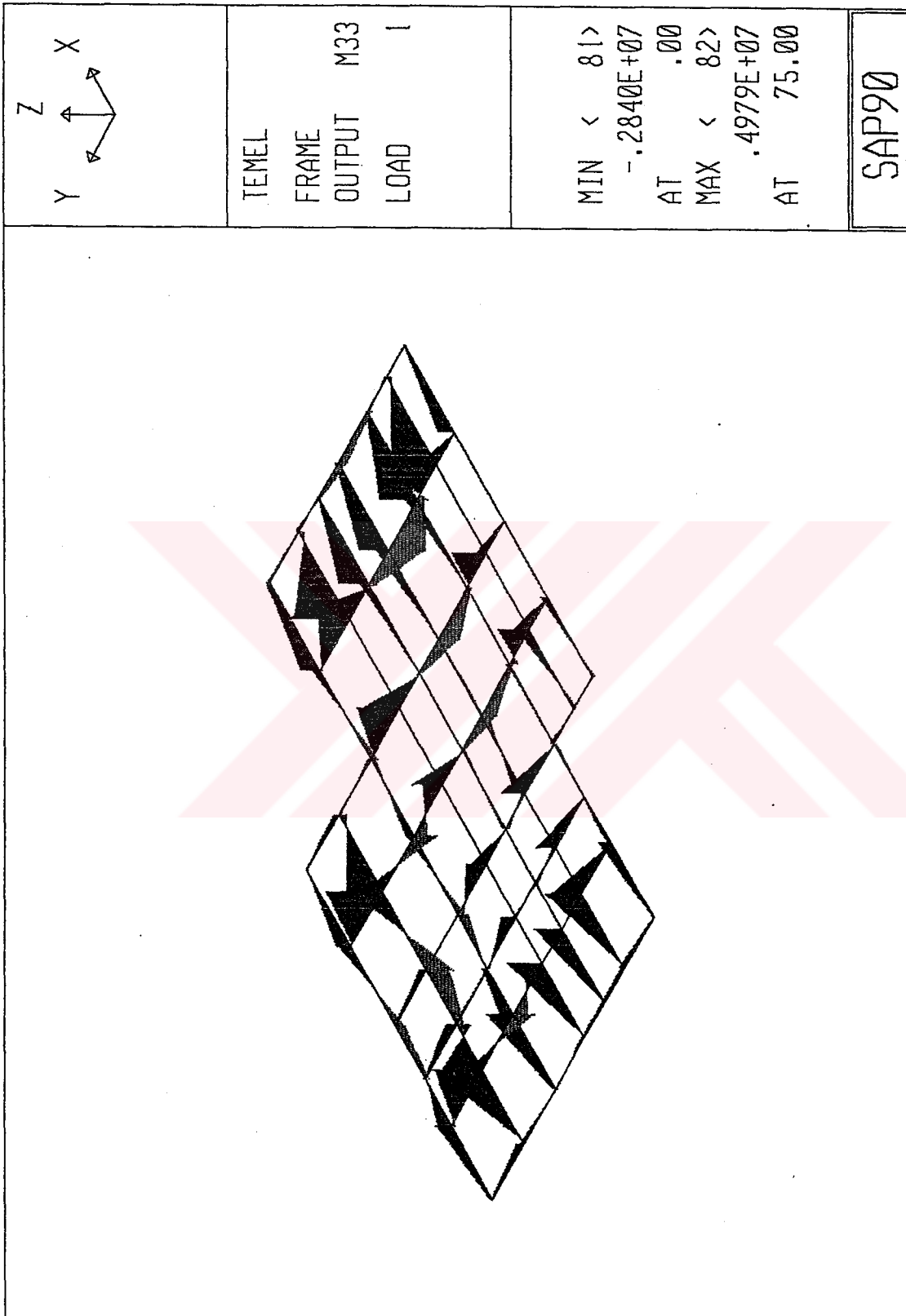
1	F=0,0,-6069
2	F=0,0,-11959.5
3	F=0,0,-12673,5
4	F=0,0,-13566
5	F=0,0,-6783
6	F=0,0,-12572
10	F=0,0,-14051
11	F=0,0,-16040
12	F=0,0,-31607
13	F=0,0,-33494
14	F=0,0,-35853
15	F=0,0,-17926
17	F=0,0,-31607
18	F=0,0,-33494
19	F=0,0,-35853
20	F=0,0,-17926
21	F=0,0,-21803
22	F=0,0,-25620
23	F=0,0,-27157
24	F=0,0,-29070
25	F=0,0,-14535
30	F=0,0,-17926
31	F=0,0,-33430
32	F=0,0,-39236
33	F=0,0,-41641
34	F=0,0,-10450
35	F=0,0,-5225
36	F=0,0,-34884

38 F=0,0,-20196  
39 F=0,0,-17442  
40 F=0,0,-20502  
41 F=0,0,-10098  
42 F=0,0,-8976  
43 F=0,0,-14586  
44 F=0,0,-12062  
45 F=0,0,-15090  
48 F=0,0,-12240  
50 F=0,0,-16447  
51 F=0,0,-15096  
54 F=0,0,-18768  
55 F=0,0,-30498  
56 F=0,0,-12363  
57 F=0,0,-19584  
59 F=0,0,-26316  
60 F=0,0,-9792  
61 F=0,0,-15912  
62 F=0,0,-13158



7/11/79  
M...





EDUCATIONAL VERSION OF SAP90  
PROGRAM:SAP90/FILE:RADYE TEMEL.F3F

RADYE TEMEL HESABI

FRAME ELEMENT FORCES

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE		AXIAL FORCE	AXIAL TORQ
			SHEAR	MOMENT		
1 -----						
1	1	.000			.000	-30929.328
		.000	-4228.794	188295.019		
		170.000	-4228.794	-530599.887		
		170.000			.000	-30929.328
2 -----						
2	1	.000			.000	-5315.912
		.000	433.171	-69728.073		
		165.000	433.171	1745.147		
		165.000			.000	-5315.912
3 -----						
3	1	.000			.000	4731.048
		.000	-1012.688	29712.609		
		190.000	-1012.688	-162698.130		
		190.000			.000	4731.048
4 -----						
4	1	.000			.000	-33069.703
		.000	6368.328	-1.2901E+06		
		190.000	6368.328	-80125.200		
		190.000			.000	-33069.703
5 -----						
5	1	.000			.000	-227332.063
		.000	-7940.592	333803.136		
		170.000	-7940.592	-1.0161E+06		
		170.000			.000	-227332.063
8 -----						
8	1	.000			.000	-117331.172
		.000	20234.132	-3.5023E+06		
		190.000	20234.132	342214.407		
		190.000			.000	-117331.172
9 -----						
9	1	.000			.000	-485355.406
		.000	-1249.594	-15776.623		
		170.000	-1249.594	-228207.639		
		170.000			.000	-485355.406
10 -----						
10	1	.000			.000	-57520.348
		.000	88.592	8746.172		
		165.000	88.592	23363.786		
		165.000			.000	-57520.348

11	1	.000			.000	-116233.531
		.000	-5044.974	72551.842		
		190.000	-5044.974	-885993.195		
		190.000			.000	-116233.531
12	1	.000			.000	148697.781
		.000	14837.665	-2.9024E+06		
		190.000	14837.665	-83230.998		
		190.000			.000	148697.781
13	1	.000			.000	46288.398
		.000	8745.638	-847379.042		
		170.000	8745.638	639379.399		
		170.000			.000	46288.398
14	1	.000			.000	5327.702
		.000	-755.323	164044.990		
		165.000	-755.323	39416.770		
		165.000			.000	5327.702
15	1	.000			.000	27048.051
		.000	-5115.025	-23636.918		
		190.000	-5115.025	-995491.702		
		190.000			.000	27048.051
16	1	.000			.000	9860.520
		.000	10292.673	-2.2400E+06		
		190.000	10292.673	-284395.214		
		190.000			.000	9860.520
17	1	.000			.000	133924.797
		.000	2781.382	-258091.189		
		170.000	2781.382	214743.832		
		170.000			.000	133924.797
18	1	.000			.000	28471.332
		.000	-501.289	96392.613		
		165.000	-501.289	13679.964		
		165.000			.000	28471.332
19	1	.000			.000	86114.859
		.000	-3863.146	51962.567		
		190.000	-3863.146	-682035.203		
		190.000			.000	86114.859
20	1	.000			.000	-62799.191
		.000	11792.227	-2.2855E+06		
		190.000	11792.227	-45003.015		
		190.000			.000	-62799.191
21	1	.000			.000	144440.453
		.000	-150.795	19350.217		
		170.000	-150.795	-6284.888		
		170.000			.000	144440.453



24	1	.000			.000	242936.563
		.000	24717.839	-4.2416E+06		
		190.000	24717.839	454809.251		
		190.000			.000	242936.563
25	1	.000			.000	352693.125
		.000	-7271.115	573667.696		
		170.000	-7271.115	-662421.812		
		170.000			.000	352693.125
26	1	.000			.000	-507471.281
		.000	6336.046	-685190.024		
		165.000	6336.046	360257.606		
		165.000			.000	-507471.281
27	1	.000			.000	35966.391
		.000	-6180.695	538520.422		
		190.000	-6180.695	-635811.618		
		190.000			.000	35966.391
28	1	.000			.000	161427.172
		.000	6129.136	-1.4688E+06		
		190.000	6129.136	-304269.233		
		190.000			.000	161427.172
29	1	.000			.000	475934.594
		.000	-27576.237	2.1225E+06		
		170.000	-27576.237	-2.5655E+06		
		170.000			.000	475934.594
30	1	.000			.000	-640663.250
		.000	19869.635	-2.6953E+06		
		165.000	19869.635	583220.872		
		165.000			.000	-640663.250
31	1	.000			.000	-100554.602
		.000	-9896.397	708925.823		
		170.000	-9896.397	-973461.738		
		170.000			.000	-100554.602
32	1	.000			.000	49534.656
		.000	6934.485	-1.1011E+06		
		165.000	6934.485	43079.917		
		165.000			.000	49534.656
33	1	.000			.000	47615.773
		.000	-5514.445	-107698.350		
		160.000	-5514.445	-990009.500		
		160.000			.000	47615.773
34	1	.000			.000	-49368.949
		.000	1946.311	-351797.789		
		100.000	1946.311	-157166.654		
		100.000			.000	-49368.949

35	-----					
	1	.000			.000	-15912.934
		.000	2823.878	-97473.475		
		115.000	2823.878	227272.524		
		115.000			.000	-15912.934
36	-----					
	1	.000			.000	-160560.406
		.000	-18565.688	139183.278		
		160.000	-18565.688	-2.8313E+06		
		160.000			.000	-160560.406
39	-----					
	1	.000			.000	-27868.578
		.000	-13319.900	-6910.851		
		160.000	-13319.900	-2.1381E+06		
		160.000			.000	-27868.578
40	-----					
	1	.000			.000	.000
		.000	2404.830	-146937.050		
		100.000	2404.830	93545.936		
		100.000			.000	.000
42	-----					
	1	.000			.000	47445.516
		.000	-17243.979	74964.787		
		160.000	-17243.979	-2.6841E+06		
		160.000			.000	47445.516
45	-----					
	1	.000			.000	21893.576
		.000	-11472.322	-266487.852		
		160.000	-11472.322	-2.1021E+06		
		160.000			.000	21893.576
46	-----					
	1	.000			.000	-423059.031
		.000	7061.487	-1.1273E+06		
		100.000	7061.487	-421108.053		
		100.000			.000	-423059.031
47	-----					
	1	.000			.000	-189585.063
		.000	8495.871	-178402.986		
		115.000	8495.871	798622.154		
		115.000			.000	-189585.063
48	-----					
	1	.000			.000	223376.547
		.000	-27212.544	368229.843		
		160.000	-27212.544	-3.9858E+06		
		160.000			.000	223376.547
49	-----					
	1	.000			.000	-712173.250
		.000	43792.905	-3.1750E+06		
		100.000	43792.905	1.2043E+06		
		100.000			.000	-712173.250
50	-----					
	1	.000			.000	-84274.438
		.000	10274.607	593511.370		
		115.000	10274.607	1.7751E+06		
		115.000			.000	-84274.438

51	-----					
	1	.000			.000	-150394.297
		.000	-6217.122	-201280.854		
		160.000	-6217.122	-1.1960E+06		
		160.000			.000	-150394.297
52	-----					
	1	.000			.000	151758.516
		.000	11513.229	-1.0456E+06		
		100.000	11513.229	105685.178		
		100.000			.000	151758.516
53	-----					
	1	.000			.000	41565.484
		.000	4219.791	248515.672		
		115.000	4219.791	733791.622		
		115.000			.000	41565.484
54	-----					
	1	.000			.000	188295.016
		.000	-1840.206	30929.328		
		70.000	-1840.206	-97885.123		
		70.000			.000	188295.016
55	-----					
	1	.000			.000	522098.156
		.000	-6471.615	129446.940		
		75.000	-6471.615	-355924.178		
		75.000			.000	522098.156
56	-----					
	1	.000			.000	279049.000
		.000	-18438.142	113518.282		
▲		110.000	-18438.142	-1.9147E+06		
		110.000			.000	279049.000
57	-----					
	1	.000			.000	141188.750
		.000	5809.546	-213462.240		
		75.000	5809.546	222253.714		
		75.000			.000	141188.750
58	-----					
	1	.000			.000	-116902.438
		.000	-18774.836	88328.911		
		75.000	-18774.836	-1.3198E+06		
		75.000			.000	-116902.438
59	-----					
	1	.000			.000	-97552.227
		.000	18021.982	-1.4642E+06		
		110.000	18021.982	518193.688		
		110.000			.000	-97552.227
60	-----					
	1	.000			.000	-322506.688
		.000	358.967	-24084.494		
		120.000	358.967	18991.550		
		120.000			.000	-322506.688
61	-----					
	1	.000			.000	24865.799
		.000	3325.812	-541217.487		
		120.000	3325.812	-142120.082		
		120.000			.000	24865.799

62	-----					
	1	.000			.000	460871.813
		.000	-16621.465	-25613.416		
		70.000	-16621.465	-1.1891E+06		
		70.000			.000	460871.813
63	-----					
	1	.000			.000	55428.395
		.000	41585.082	-2.4215E+06		
		75.000	41585.082	697403.704		
		75.000			.000	55428.395
64	-----					
	1	.000			.000	292382.219
		.000	8639.896	269568.657		
		110.000	8639.896	1.2200E+06		
		110.000			.000	292382.219
65	-----					
	1	.000			.000	-182952.203
		.000	-13466.144	1.2609E+06		
		75.000	-13466.144	250957.125		
		75.000			.000	-182952.203
66	-----					
	1	.000			.000	-301303.438
		.000	-35803.472	356410.597		
		75.000	-35803.472	-2.3288E+06		
		75.000			.000	-301303.438
67	-----					
	1	.000			.000	11879.067
L		.000	23671.296	-1.5168E+06		
		110.000	23671.296	1.0871E+06		
		110.000			.000	11879.067
68	-----					
	1	.000			.000	-10889.146
		.000	-29171.865	1.9472E+06		
		120.000	-29171.865	-1.5534E+06		
		120.000			.000	-10889.146
69	-----					
	1	.000			.000	127648.430
		.000	37332.883	-4.3299E+06		
		120.000	37332.883	150089.253		
		120.000			.000	127648.430
70	-----					
	1	.000			.000	27967.461
		.000	-11227.141	-10051.959		
		70.000	-11227.141	-795951.820		
		70.000			.000	27967.461
71	-----					
	1	.000			.000	-18513.543
		.000	40188.414	-2.7149E+06		
		75.000	40188.414	299238.146		
		75.000			.000	-18513.543
72	-----					
	1	.000			.000	30674.514
		.000	11827.980	357951.333		
		110.000	11827.980	1.6590E+06		
		110.000			.000	30674.514

73	-----				
	1	.000		.000	-32379.174
		.000	-17306.318	1.6373E+06	
		75.000	-17306.318	339334.894	
		75.000		.000	-32379.174
74	-----				
	1	.000		.000	5903.429
		.000	-41101.460	281691.365	
		75.000	-41101.460	-2.8009E+06	
		75.000		.000	5903.429
75	-----				
	1	.000		.000	448037.969
		.000	32614.138	-3.2514E+06	
		110.000	32614.138	336158.994	
		110.000		.000	448037.969
76	-----				
	1	.000		.000	626300.813
		.000	3489.879	-207278.670	
		120.000	3489.879	211506.840	
		120.000		.000	626300.813
77	-----				
	1	.000		.000	43079.918
		.000	3163.515	-429156.411	
		120.000	3163.515	-49534.654	
		120.000		.000	43079.918
78	-----				
	1	.000		.000	-1.1274E+06
		.000	-20947.017	37800.750	
		70.000	-20947.017	-1.4285E+06	
		70.000		.000	-1.1274E+06
79	-----				
	1	.000		.000	2.4812E+06
		.000	76238.302	-4.8849E+06	
		75.000	76238.302	832951.155	
		75.000		.000	2.4812E+06
80	-----				
	1	.000		.000	464802.906
		.000	20502.663	568019.833	
		110.000	20502.663	2.8233E+06	
		110.000		.000	464802.906
81	-----				
	1	.000		.000	-779708.563
		.000	-30758.035	2.8405E+06	
		75.000	-30758.035	533647.669	
		75.000		.000	-779708.563
82	-----				
	1	.000		.000	-2.3832E+06
		.000	-75483.408	682561.721	
		75.000	-75483.408	-4.9787E+06	
		75.000		.000	-2.3832E+06
83	-----				
	1	.000		.000	832993.438
		.000	22759.831	-2.3781E+06	
		110.000	22759.831	125460.773	
		110.000		.000	832993.438

84	-----					
	1	.000			.000	80125.203
		.000	-414.672	-33069.702		
		70.000	-414.672	-62096.710		
		70.000			.000	80125.203
85	-----					
	1	.000			.000	-262089.203
		.000	5768.460	-179427.881		
		75.000	5768.460	253206.631		
		75.000			.000	-262089.203
86	-----					
	1	.000			.000	-178858.203
		.000	2680.125	401904.420		
		110.000	2680.125	696718.171		
		110.000			.000	-178858.203
87	-----					
	1	.000			.000	105537.008
		.000	-4953.202	706578.690		
		75.000	-4953.202	335088.559		
		75.000			.000	105537.008
88	-----					
	1	.000			.000	150540.016
		.000	-7695.975	272289.369		
		75.000	-7695.975	-304908.774		
		75.000			.000	150540.016
89	-----					
	1	.000			.000	-304269.219
		.000	-904.136	-61972.209		
		110.000	-904.136	-161427.164		
		110.000			.000	-304269.219
90	-----					
	1	.000			.000	-107698.352
		.000	-3461.555	-47615.772		
		110.000	-3461.555	-428386.857		
		110.000			.000	-107698.352
91	-----					
	1	.000			.000	31484.928
		.000	14.133	-267826.455		
		75.000	14.133	-266766.478		
		75.000			.000	31484.928
92	-----					
	1	.000			.000	24574.076
		.000	1094.033	-238897.900		
		75.000	1094.033	-156845.416		
		75.000			.000	24574.076
93	-----					
	1	.000			.000	99538.867
		.000	3242.012	-204290.930		
		110.000	3242.012	152330.430		
		110.000			.000	99538.867
94	-----					
	1	.000			.000	-166948.984
		.000	-4053.666	130436.854		
		120.000	-4053.666	-356003.065		
		120.000			.000	-166948.984

95	-----					
	1	.000			.000	201280.859
		.000	3574.878	-579379.606		
		120.000	3574.878	-150394.296		
		120.000			.000	201280.859
96	-----					
	1	.000			.000	638211.688
		.000	-22046.756	96984.722		
		110.000	-22046.756	-2.3282E+06		
		110.000			.000	638211.688
97	-----					
	1	.000			.000	-508592.625
		.000	23747.495	-1.4282E+06		
		110.000	23747.495	1.1840E+06		
		110.000			.000	-508592.625
98	-----					
	1	.000			.000	466209.906
		.000	-25284.313	1.6290E+06		
		120.000	-25284.313	-1.4051E+06		
		120.000			.000	466209.906
99	-----					
	1	.000			.000	-150382.703
		.000	33642.352	-3.7349E+06		
		120.000	33642.352	302152.810		
		120.000			.000	-150382.703
100	-----					
	1	.000			.000	59693.180
		.000	-12939.567	-33456.017		
		110.000	-12939.567	-1.4568E+06		
		110.000			.000	59693.180
101	-----					
	1	.000			.000	46772.969
		.000	7021.085	-263290.690		
		75.000	7021.085	263290.690		
		75.000			.000	46772.969
102	-----					
	1	.000			.000	-46772.969
		.000	-7021.085	263290.690		
		75.000	-7021.085	-263290.690		
		75.000			.000	-46772.969
103	-----					
	1	.000			.000	225229.781
		.000	12459.648	-1.1626E+06		
		110.000	12459.648	207960.595		
		110.000			.000	225229.781
104	-----					
	1	.000			.000	467934.844
		.000	-1337.736	-25513.365		
		120.000	-1337.736	-186041.652		
		120.000			.000	467934.844
105	-----					
	1	.000			.000	-142830.500
		.000	5864.562	-813940.434		
		120.000	5864.562	-110193.032		
		120.000			.000	-142830.500

2.13.4.1. Radye Temel Betonarme Hesabı

2.13.4.1.1. X Doğrultusunda Betonarme Hesap

B-B Aksı kolon Şeridi

Sağ Konsol

$$M = -48,30 \text{ tm/m}$$

$$b = 100 \text{ cm}$$

$$d = 65 \text{ cm}$$

$$K = \frac{100 \cdot 65^2}{4830} = 22,81 \text{ cm}^2/\text{m} \quad \Phi 22/15 \quad (25,34 \text{ cm}^2)$$

$$A_s = 0,307 \cdot \frac{4830}{65} = 22,81 \text{ cm}^2/\text{m} \quad \Phi 22/15 \quad (25,34 \text{ cm}^2)$$

Sol Konsol

$$M_d = -14,01$$

$$K = \frac{100 \cdot 65^2}{1401} = 301 \rightarrow k_s = 0,307$$

$$A_s = 0,296 \cdot \frac{1401}{65} = 6,37 \text{ cm}^2/\text{m} \quad \Phi 14/20 \quad (10,05 \text{ cm}^2)$$

D-D Aksı Kolon Şeridi

Sağ Konsol

$$M = -45,85 \text{ tm/m}$$

$$K = \frac{100 \cdot 65^2}{4585} = 92,15 \rightarrow k_s = 0,306$$

$$A_s = 21,58 \text{ cm}^2/\text{m} \quad \Phi 22/15 \quad (25,34 \text{ cm}^2)$$



Tablo 2.13.4.1.1. B-B ve D-D Aksları Açıklık Şeridi  
d = 65      b = 167,5

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-31,37	134	0,302	14,57		Φ10/30 (2,62)	Φ16/15 (13,41)
6,91	611	0,293	3,11	Φ10/15 (5,24)		
-9,5	444	0,294	4,29		Φ10/30 (2,62)	Φ10/20 (3,93)

C-C Aksı Sol Konsol

M = -30,27 tm/m

$K = \frac{100 \cdot 65^2}{3027} = 139,58 \rightarrow ks = 0,302$

$A_s = 0,302 \cdot \frac{3027}{65} = 14,06 \text{ cm}^2/\text{m} \quad \Phi 18/15 \quad (16,97 \text{ cm}^2)$

D-D Aksı Solyan

M = 29,01

K = 145  $\rightarrow ks = 0,301$

As = 13,43 cm<sup>2</sup>/m      Φ18/15      (16,97 cm<sup>2</sup>)

Tablo 2.13.4.1.2. E-E Aksı Kolon Şeridi  
d = 65      b = 350 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-33,33	126,7	0,302	15,48		Φ10/30 (5,13)	Φ14/15 (10,26)
17,43	242,4	0,297	7,96	Φ14/15 (10,26)		
-21,66	195	0,299	9,97		Φ14/15 (5,13)	Φ14/30

2.13.4.1.2. Y Doğrultusunda Betonarme Hesap

Tablo 2.13.4.1.2.1.3-3 ve 4-4 Aksları Arası Açıklık Şeridi  
b = 545 cm d = 63 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-25,78	153,96	0,301	12,31		Φ14/30 (5,13)	Φ14/20 (7,69)
14,73	269,45	0,297	6,94	Φ14/15 (10,26)		
-26,20	151,49	0,300	12,47		Φ14/30	Φ14/15 (10,26)

Tablo 2.13.4.1.2.2. 3-3 Aksı Kolon Şeridi  
b = 260 cm d = 63 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-14,32	277,16	0,296	6,73		Φ14/40+Φ14/15 (14,11 cm <sup>2</sup> )	
11,64	340,98	0,295	5,46	Φ14/20 (7,69)		
-25,85	153,54	0,300	12,30		Φ14/40 (3,85)	Φ14/15 (10,26)

Tablo 2.13.4.1.2.3. 1-1 ve 3-3 Aksları Arası Açıklık Şeridi  
b = 260 cm      d = 63 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-13,55	292,9	0,296	6,36		Ø12/40 (2,83)	Ø12/20
2,63	1509	0,291	1,22	Ø12/20 (5,65)		
-10,81	367,2	0,295	5,06		Ø12/20+Ø12/20 (5,65)	
5,18	766,22	0,293	2,41	Ø12/20 (5,65)		

Tablo 2.13.4.1.2.4. 1-1 Aksı Kolon Şeridi  
b = 274 cm      d = 63 cm

Md tm/m	K	ks	As cm <sup>2</sup> /m	Seçilen	Mevcut	Ek
-17,90	221,73	0,298	8,46	Ø14/15 (10,26)		
-10,98	361,47	0,295	5,14	(7,69)	Ø12/30 (3,77)	Ø12/30 (3,77)
12,53	316,76	0,296	5,88	Ø12/15 (7,54)		
-28,73	138,15	0,301	13,72		Ø12/30 (3,77)	Ø14/15 (10,26)

Kayma Hesabı :

$$\begin{aligned} V_{d_{max}} &= 40 \text{ t/m} & V_{cr} &= 0,65 f_{ctd}.b.d \\ & & &= 0,65.10.100.65 \\ & & &= 42,250 \text{ t} \end{aligned}$$

$V_{d_{max}} < V_{cr}$  Kayma Hesabına gerek kalmıyor.

## KAYNAKLAR

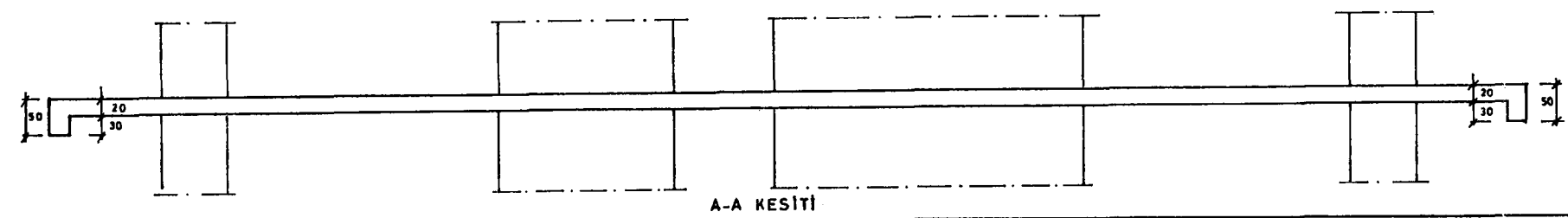
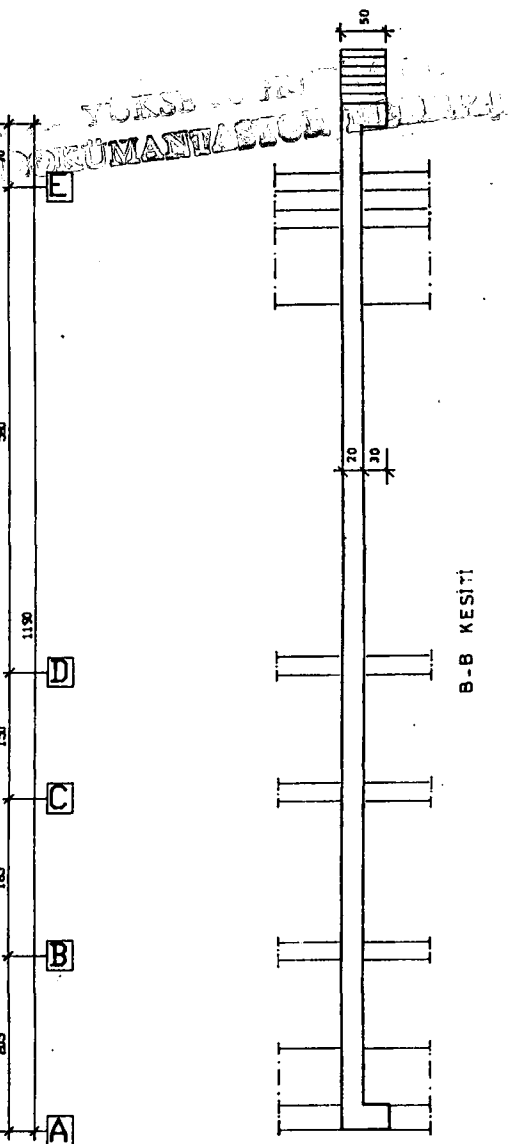
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EKLER: Kalıp Resimleri ve Donatı Detayları



## ÖZGEÇMİŞ

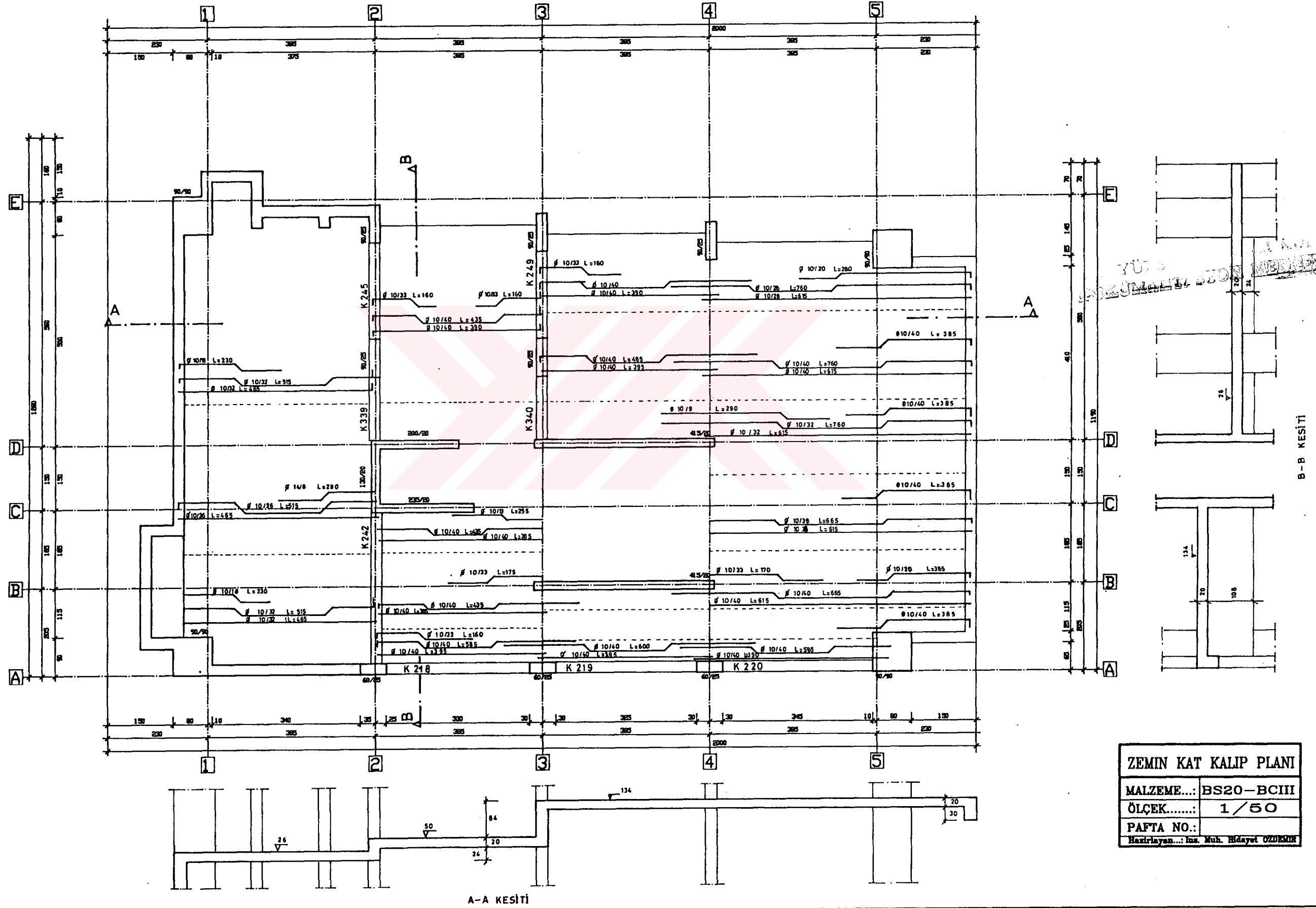
Hidayet ÖZDEMİR, 1969 yılında Kayseri'de doğdu. İlk Orta ve Lise öğrenimini Kayseri de tamamladı. 1991 yılında İ.T.Ü İnşaat Fakültesi İnşaat Mühendisliği bölümünden mezun oldu. Aynı yıl İ.T.Ü Fen Bilimleri Enstitüsü İnşaat Anabilim dalı Yapı programında Yüksek Lisans öğrenimine başladı. 1992 yılında Karayolları 17.Bölge Müdürlüğünde çalışmaya başladı. Halen aynı yerde çalışmaya devam etmektedir.

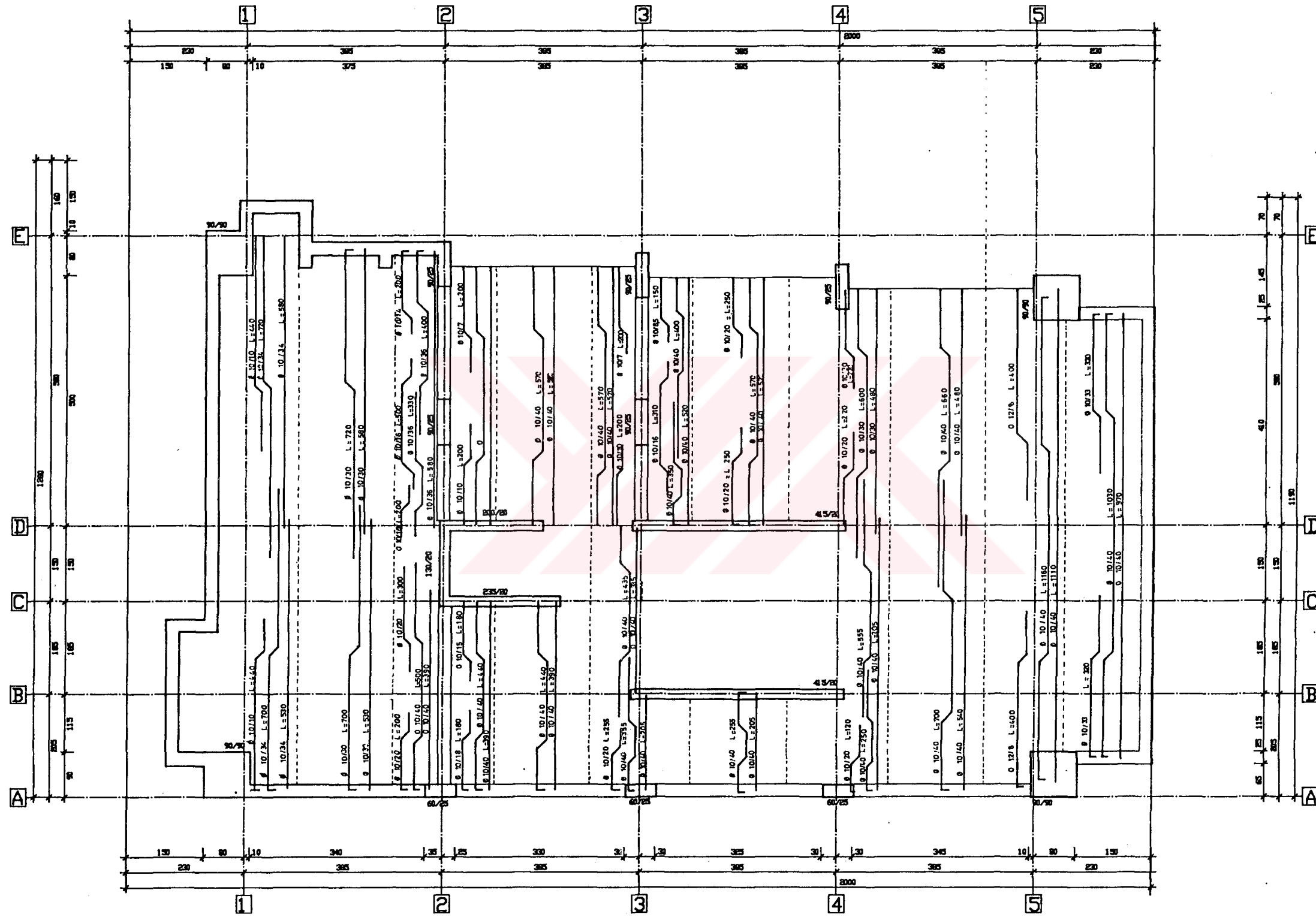


NORMAL KAT KALIP PLANI	
MALZEME...	BS20-BCIII
ÖLÇEK.....	1/50
PAFTA NO.:	
Hazırlayan...: İns. Muh. Hidayet ÖZDEMİR	

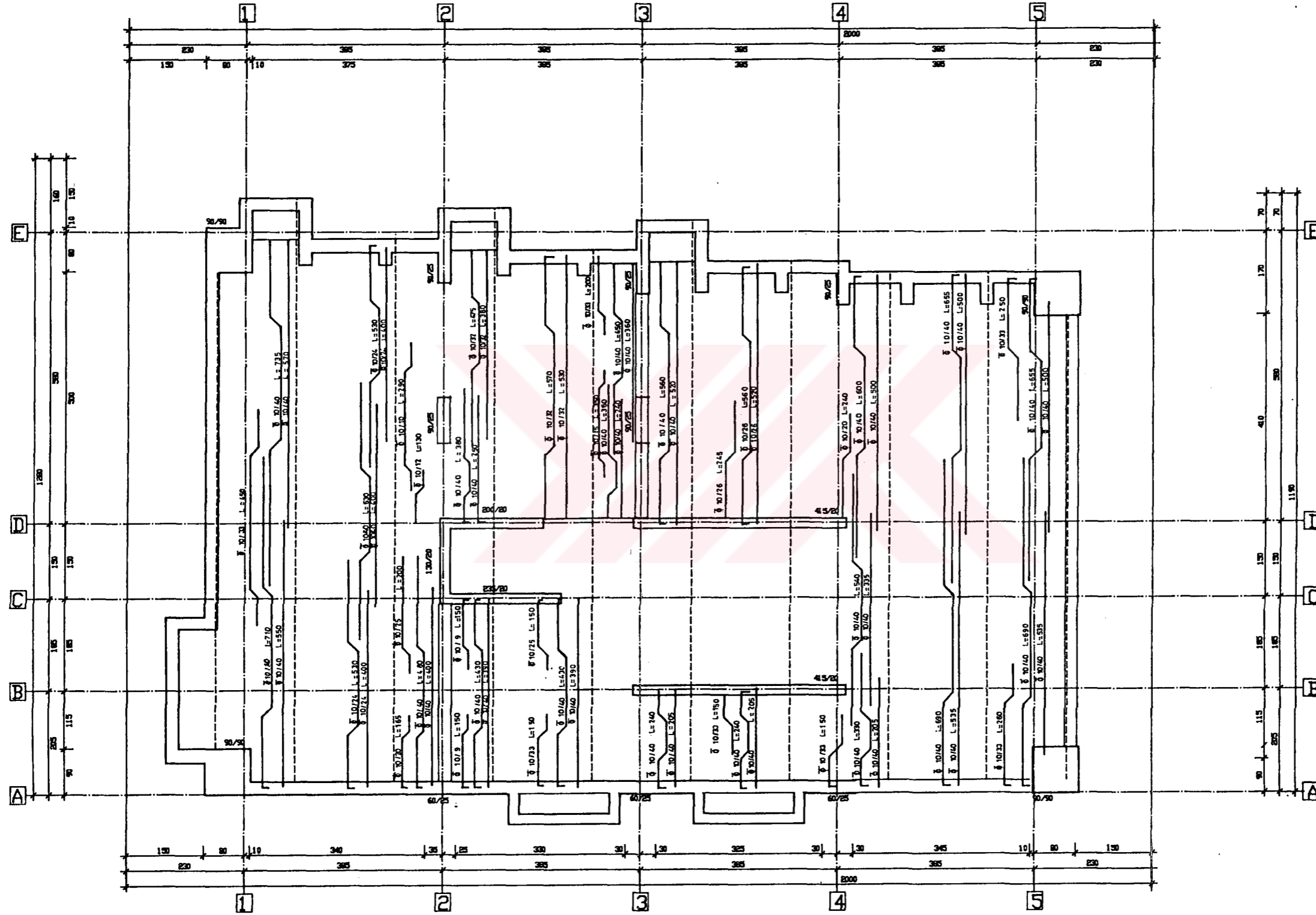




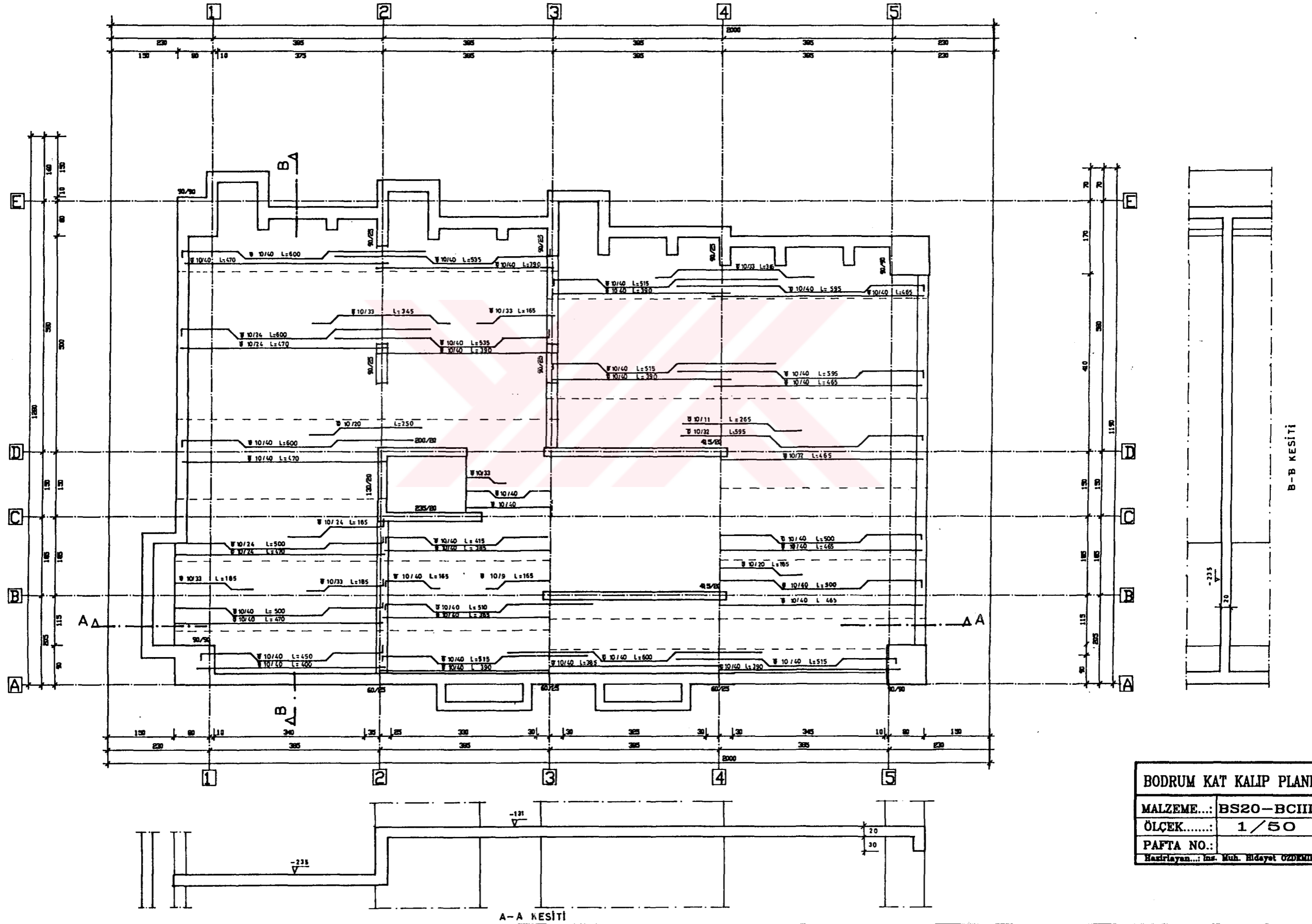


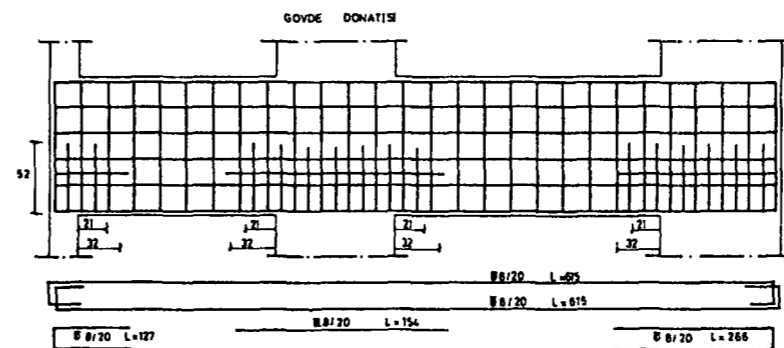
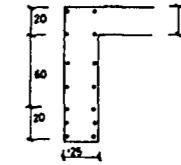
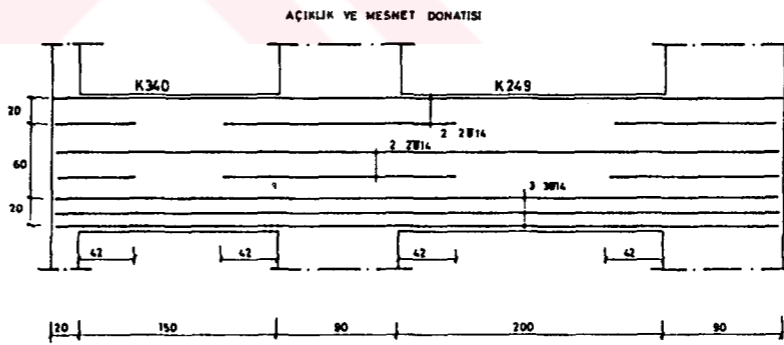
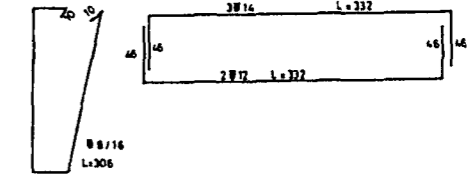
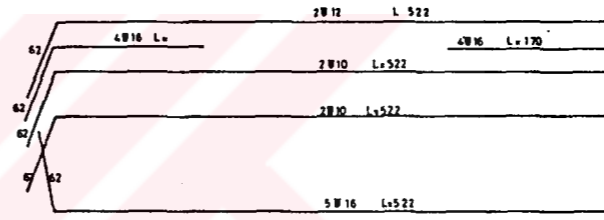
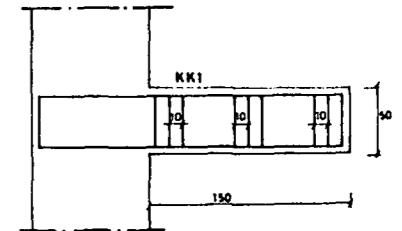
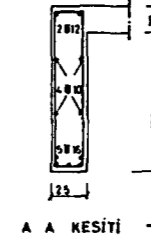
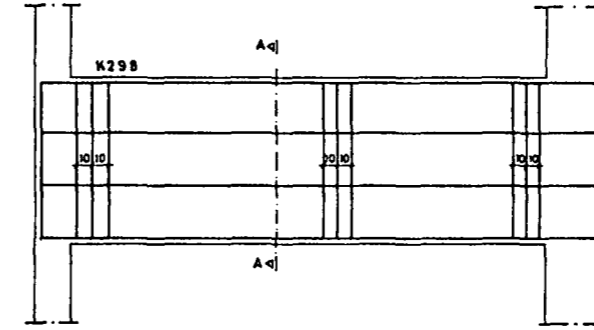
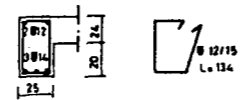
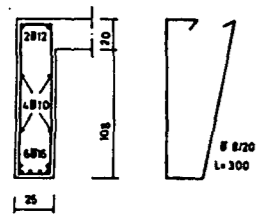
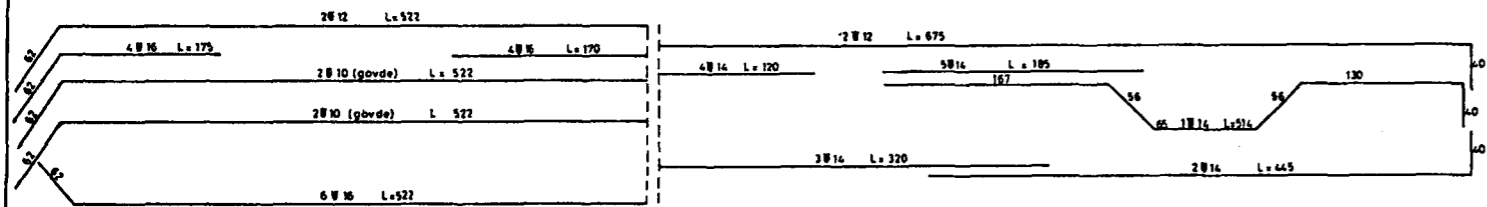
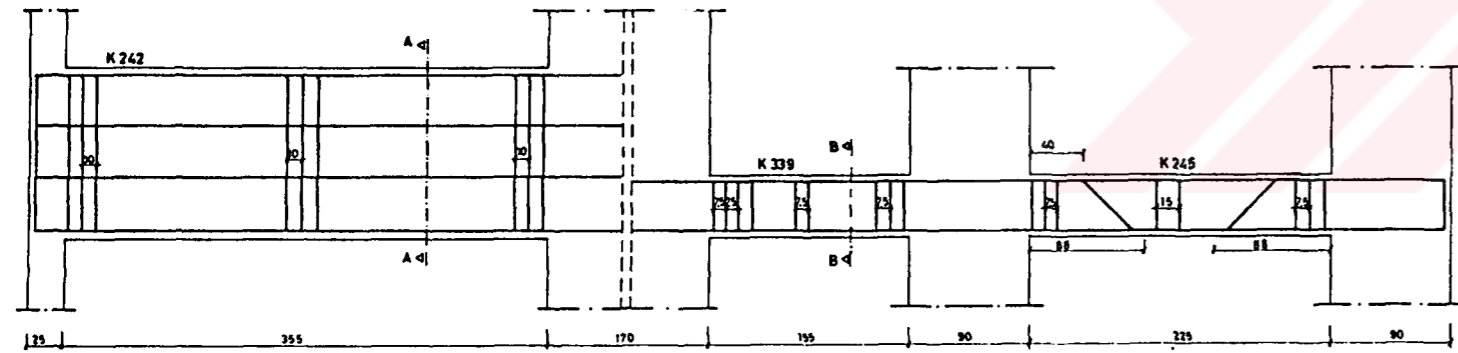
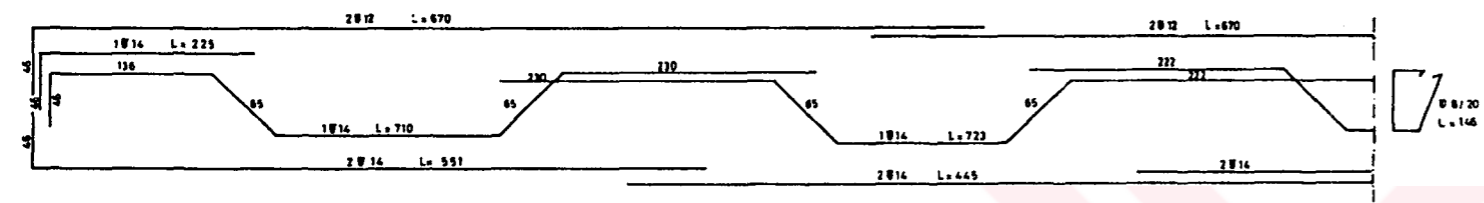
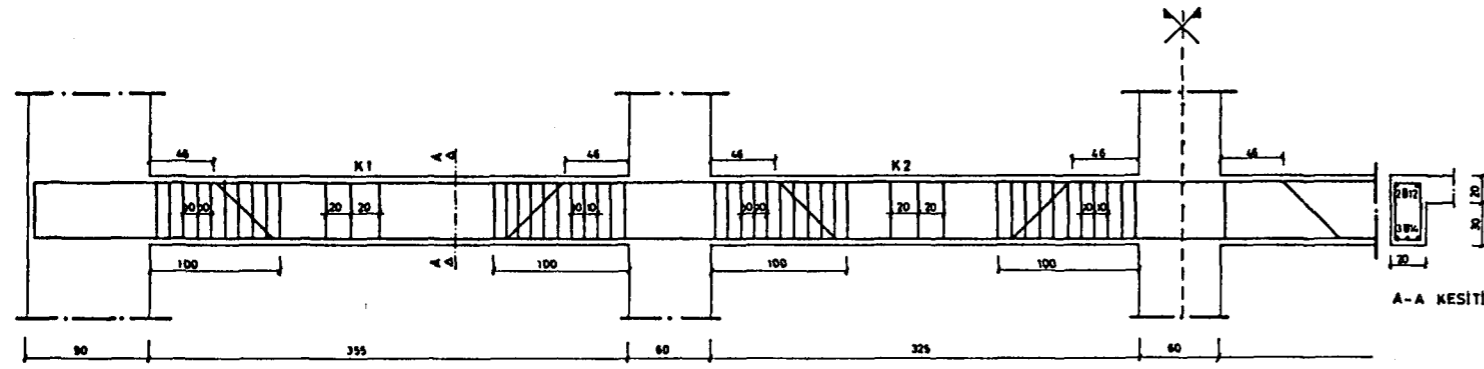


ZEMİN KAT KALIP PLANI	
MALZEME.....:	BS20-BCIII
ÖLÇEK.....:	1/50
PAFTA NO.:	
Hazırlayan: İsm. Muh. Bıdayet ÖZDEMİR	

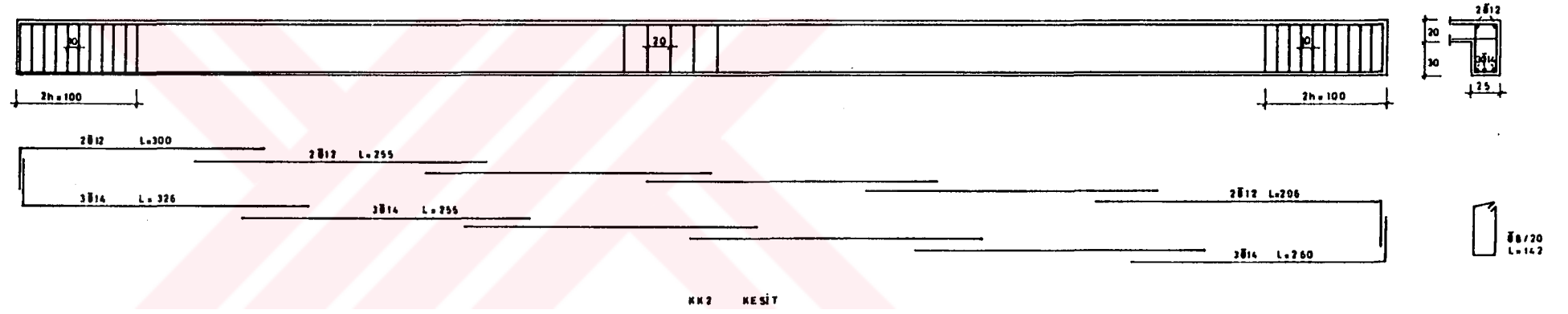
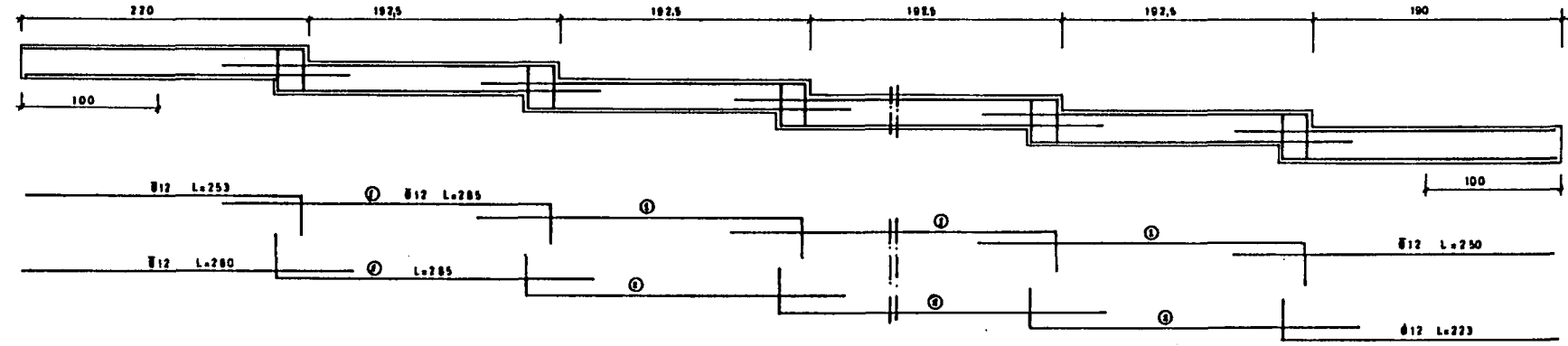


BODRUM KAT KALIP PLANI	
MALZEME....	BS20-BCIII
ÖLÇEK.....	1/50
PAFTA NO.:	
Hazırlayan...: İns. Muh. Hidayet ÖZDEMİR	

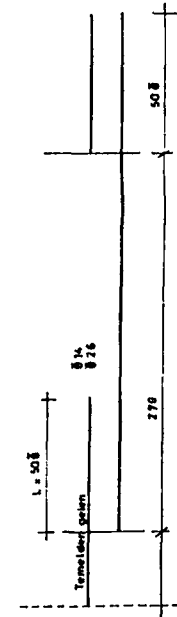
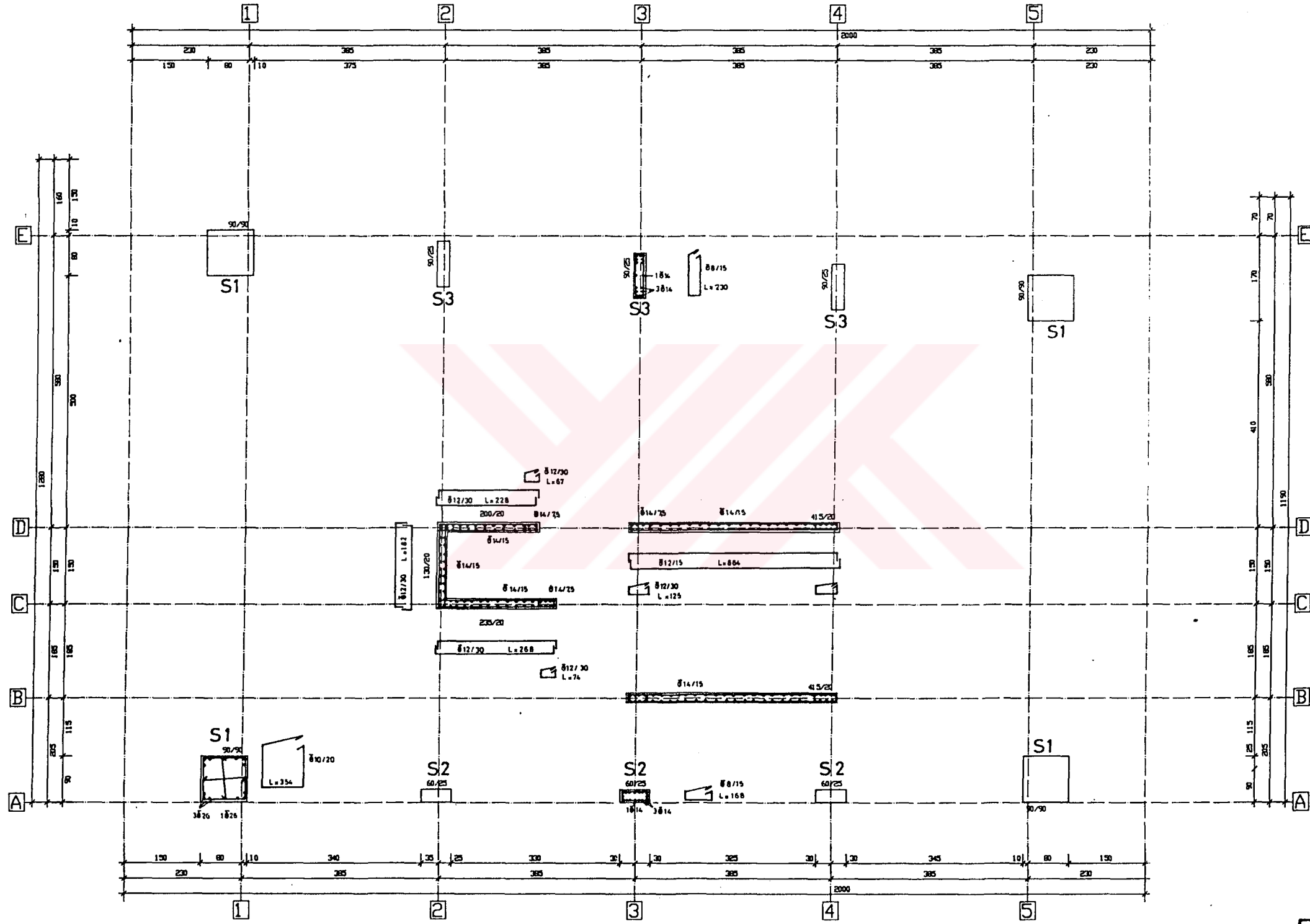




KİRİŞ DETAYLARI	
MALZEME	BS20 / BCIII
ÖLÇEK	1/20
PAF TA NO	
Hazırlayan	H. ÖZDEMİR



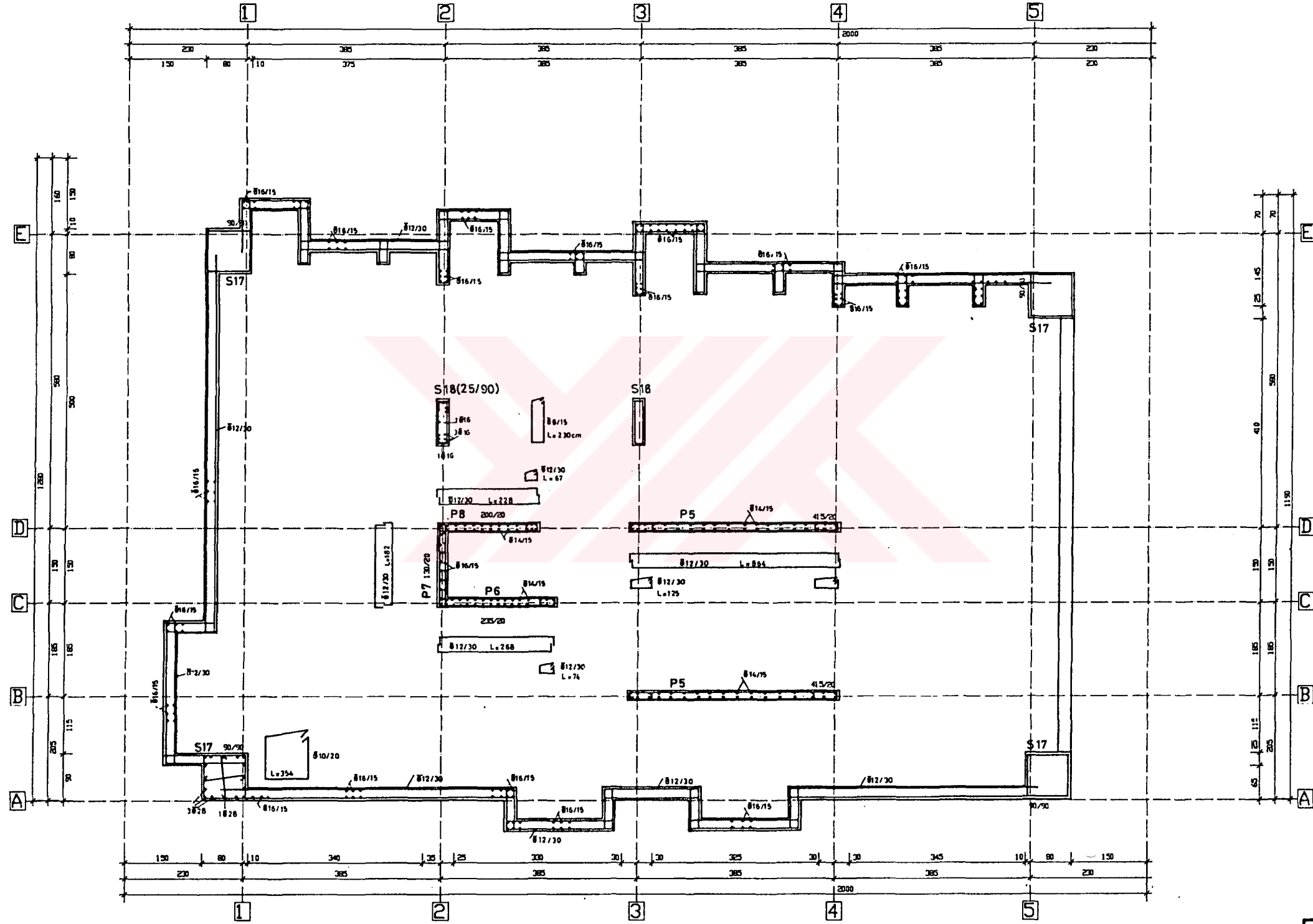
KİRİŞ DETAYLARI	
MALZEME	BS20 / BCIII
ÖLÇEK	1/20
PAFTA NO	
Hazırlayan	H. ÖZDEMİR



NORMAL KAT KOLON APLİKASYON PLANI	
MALZEME....	BS20-BCIII
ÖLÇEK.....	
PAFTA NO.:	
Hazırlayan...: Ins. Muh. Hidayet ÖZDEMİR	



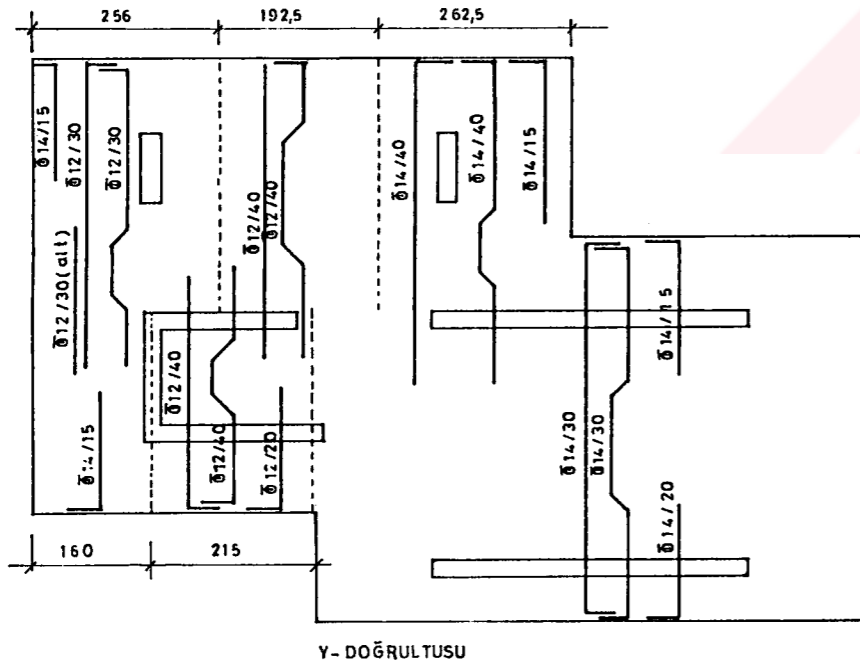
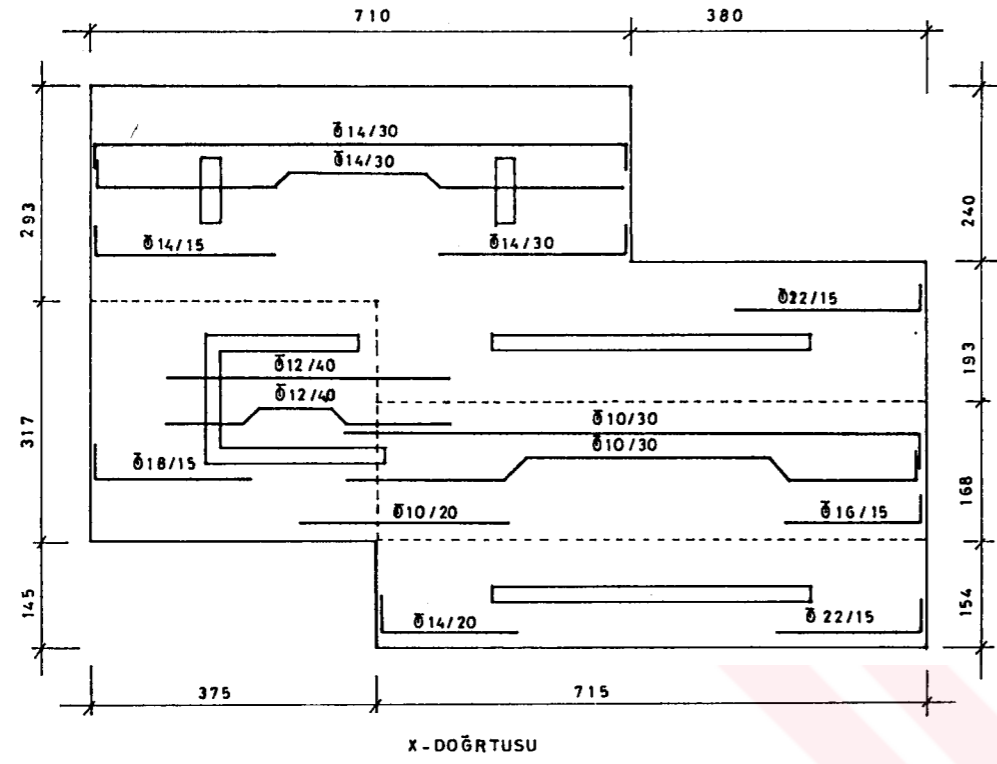




I. BODRUM KAT KOLON APLİKASYON PLANI	
MALZEME...:	BS20-BCIII
ÖLÇEK.....:	
PAFTA NO.:	
Hazırlayan...: İns. Muh. Hidayet OZDEMİR	



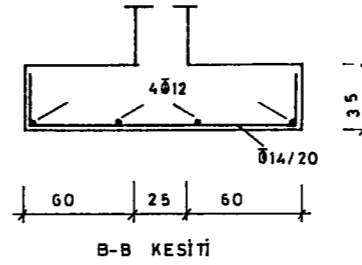
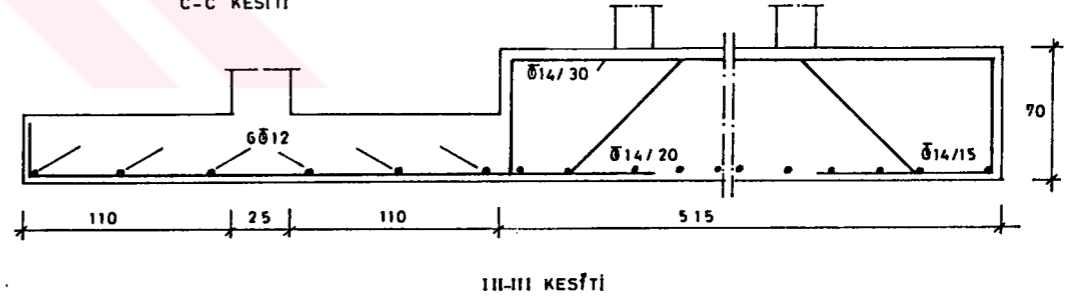
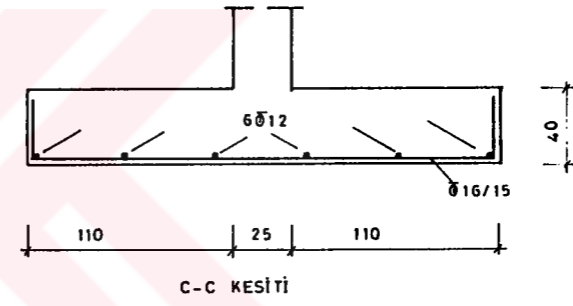
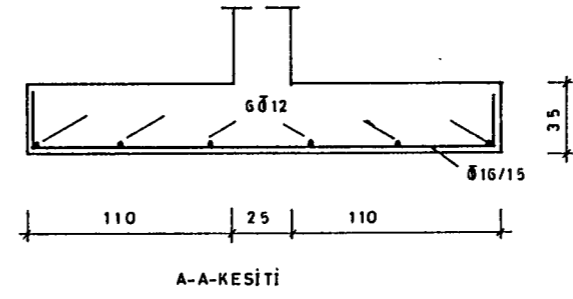
230



RADYE TEMEL  
Ö: 1/50



Etr: 8/25  
L: 114



PERDE ALTI TEMELİ  
Ö: 1/20

TEMEL DETAYI	
MALZEME	BS20 - BÇ III
ÖLÇEK	1/50 - 1/20
PAFTA NO	
Hazırlayan	H. Özdemir