RÉPUBLIQUE DU SÉNÉGAL

ÉCOLE POLYTECHNIQUE DE THIÈS

GC. 0125

P R O J E T   D E   F I N   D'E T U D E S

EN VUE DE L'OBTENTION DU DIPLÔME D'INGÉNIEUR DE CONCEPTION

O P T I O N   GENIE CIVIL

T I T R E   ANALYSE ET DIMENSIONNEMENT DE L'IMMEUBLE DU SIEGE
                  SOCIAL DE LA COMMUNAUTE ELECTRIQUE DU BENIN
                  A LOME   (TOGO)

AUTEUR   : JEAN-BAPTISTE VIADINOU
DIRECTEUR   : THOMAS AQUIN
CO-DIRECTEUR :

DATE : MAI 1988

A mon père SIMON

A ma mère ELISABETH

A mon jeune frère MARCEL

A mes jeunes soeurs CHARLOTTE et HONORINE

A mes amis et compagnons

REMERCIEMENTS

Nous ne manquerons pas de saisir cette occasion qui nous est offerte pour remercier avec la plus grande sincérité notre directeur de projet Monsieur Thomas AQUIN professeur à l'E.P.T qui n'a cessé de déployer ses efforts afin que nous puissions mener à bien notre étude.

De même qu'à Monsieur Philippe GOMEZ et à Monsieur Victor GBAGUIDI respectivement directeur général et directeur technique de l'entreprise GOMEZ à Cotonou qui ont bien voulu à la fin de notre stage de maîtrise dans leur entreprise, nous remettre ce projet et tous les documents qui nous ont permis de réaliser cette étude.

Nos remerciements vont également:

- A nos parents qui ne se sont jamais lassés de nous assister à tout moment et de nous inculquer la foi et le désir de vaincre.

- A ma tante AGNES, son mari HOUSSOU Barthelemy et à ses enfants

- A monsieur et madame Didier AFFOYON et à leurs enfants à Dakar, qui durant tout notre séjour au Sénégal n'ont ménagé aucun effort pour nous acceuillir au sein de leur foyer. Ainsi durant tout le temps que nous avons passer au Sénégal, leur comportement à notre égard nous a permis de ne pas nous sentir aussi loin de nos parents; nous les assurons qu'actuellement ils ne nous est pas aiser de trouver tous les mots pour leur exprimer notre gratitude mais nous les prions d'accepter en cette occasion qui nous est offerte, nos simples remerciements.

- A l'ensemble de nos enseignants, du cours d'initiation au cours de génie qui ont concouru à notre formation.

- Et enfin à tous ceux qui ont contribué de près ou de loin, matériellement ou moralement à notre formation.

SOMMAIRE

Vu que ses activités auront augmenté à la suite de la construction du barrage de Nangbéto sur le fleuve MONO, la Communauté Electrique du Bénin a initié le projet de construction de son siège social à Lomé.

C'est ainsi que l'exécution du gros oeuvre dans la construction de ce siège a été confié à l'entreprise GOMEZ.

Cette dernière nous a proposé dans le cadre de notre projet de fin d'étude d'étudier son immeuble administratif qui sera à sept niveaux:

- le sous-sol

- le rez-de-chaussée

- les cinq étages

Dans ce cadre nous tenterons de faire la présentation des différentes phases de l'étude.
Ainsi nous aurons:

- l'analyse structurale de chaque partie, et une fois celle-ci faite les calculs seront effectués à l'aide de l'ordinateur avec le logiciel P. Frame. Ainsi nous aurons les efforts de dimensionnement

- le dimensionnement des différents ouvrages en utilisant la nouvelle norme canadienne

-le plan de béton des différents ouvrages.

TABLE DES MATIERES

INTRODUCTION

Après l'étude que nous venons de terminer, nous nous sommes proposés d'attirer l'attention des projeteurs sur le côté essentiellement expérimental de la technique du béton armé.

En effet, les calculs font un large appel aux lois fondamentales du comportement de la matière; ce qui leur confère un aspect à la fois scientifique et mathématique.

Prenons conscience que l'établissement d'un projet tel qu'il se pose peut se résumer ainsi:

- Prendre connaissance du programme des actions à prendre en compte (charges)

- Prendre connaissance de la nature et la résistance du sol sur lequel la construction devra être édifiée

- Concevoir ou imaginer une structure qui pourra conduire les actions prévues jusqu'au sol où devront se trouver leur réactions (semelles)

Par ailleurs nous demeurons convaincus que ceci ne saurait être fait que si le projecteur est capable d'imaginer les dispositions générales d'une structure, sans calculs mais en faisant appel à ses qualités de constructeur à savoir:

- Connaissance d'une plage importante des formes de structures possibles

- Notions quasi-instinctives des compositions et décompositions des forces et leur cheminement. Ainsi que les sollicitations (efforts normaux, efforts tranchants et moments fléchissants) crées

- Sens de simplifications des formes et de l'économie des moyens

- Sens de l'esthétique et de la construction

- Imagination, réflexion et persévérance et surtout un solide bon sens et beaucoup de travail.

Une struture ainsi conçue dans ses grandes lignes et prédimensionnée par quelques évaluations simplifiées et approximatives permettra d'aborder les calculs proprement dits. Ce qui permettra de dimensionner définitivement chaque élément en conformité avec la sécurité imposée et les règlement en vigueur.

ANALYSE STRUCTURALE ET DIMENTIONNEMENT EN BETON ARME DES DIFFERENTS OUVRAGES

<u>Vue en plan du rez de chaussée.</u>

Afin de fixer les idées nous allons représenter schématiquement la vue en plan du rez-de-chaussée de la partie sur laquelle sera portée la majeure partie de notre travail.

Ainsi on a :
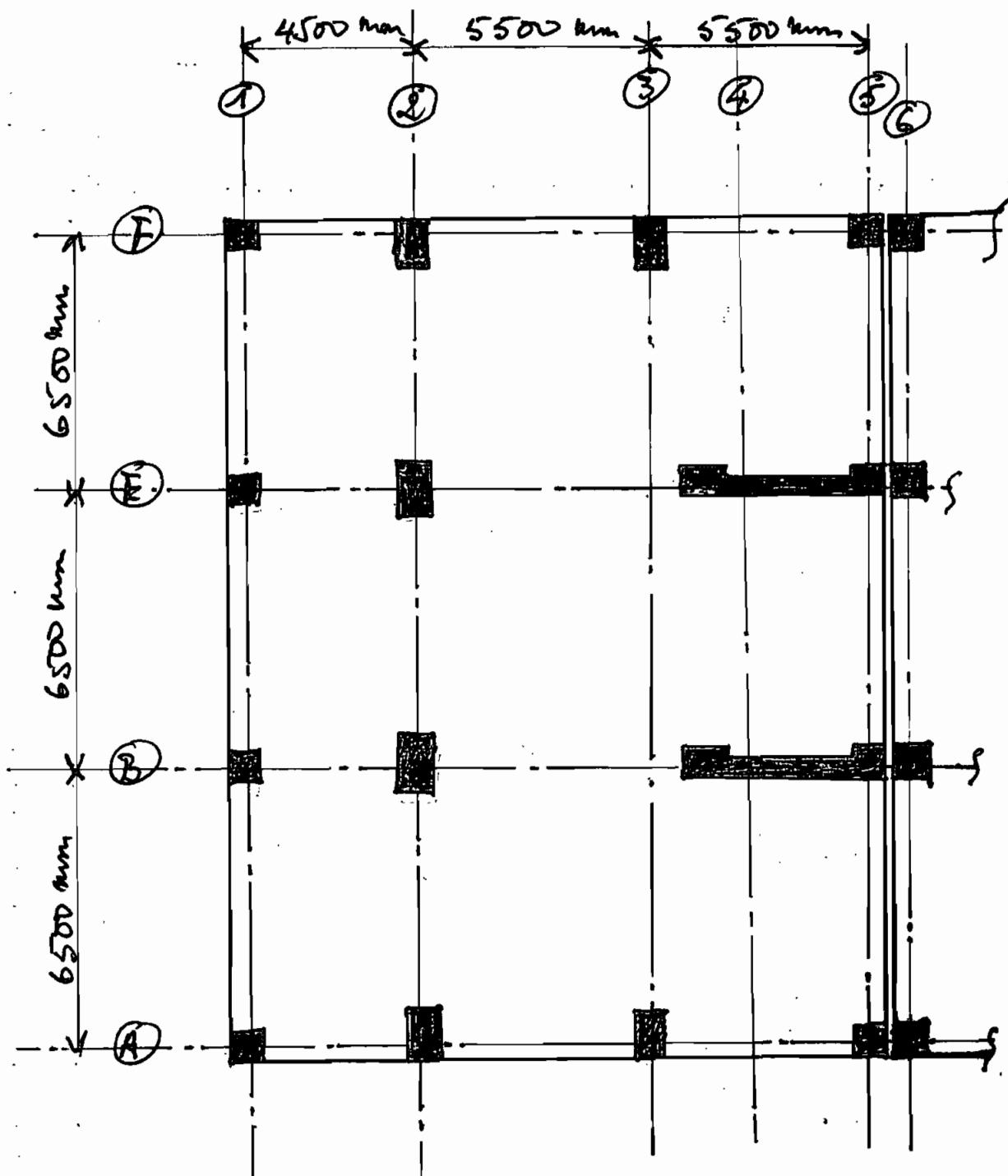
1- Analyse structurale pour le dimensionnement des poteaux.

1-1 Descente de charges.

Le principe de la descente de charges consiste à considérer les cadres plans. Ainsi pour chaque tableau de poteau, on considère respectivement au niveau de chaque plancher toutes les charges permanentes et surcharges appliquées sur la **surface** tributaire correspondant à ce poteau. Ainsi les charges obtenues sont considerées **comme** des forces appliquées au noeud du cadre, correspondant au point d'intersection de la surface tributaire et du poteau. Pour calculer les moments appliqués au noeud, on fait la somme algébrique de tous les moments d'extrémités (appuyant sur ce poteau) de toutes les poutres reliant ce poteau.

Exemple de moment d'extremité des poutres.

$$\frac{wL^2}{12} \qquad \frac{wL^2}{12}$$
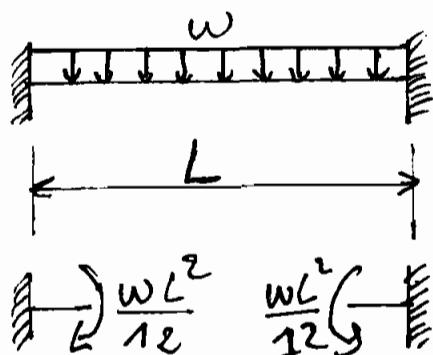
Schémas montrant la surface tributaire d'une colonne et celle d'une poutre.

a) uni-directionnel

b) bi-directionnel   c) dalle bi-directionnelle avec poutres

d) dalle uni-directionnelle avec poutres principales et secondaires

e) dalle bi-directionnelle avec poutres princ. et second.

Poutre secondaire

Poutre maitresse

colonne ☐ surface colonne

Poutre ▦ surface poutre

30°   45°
60°   45°
60°   45°
30°   45°

60°   45°
30°   45°
45°   60°
45°   30°
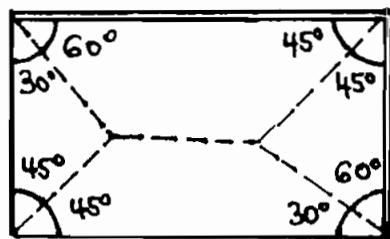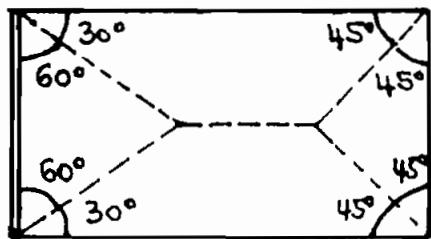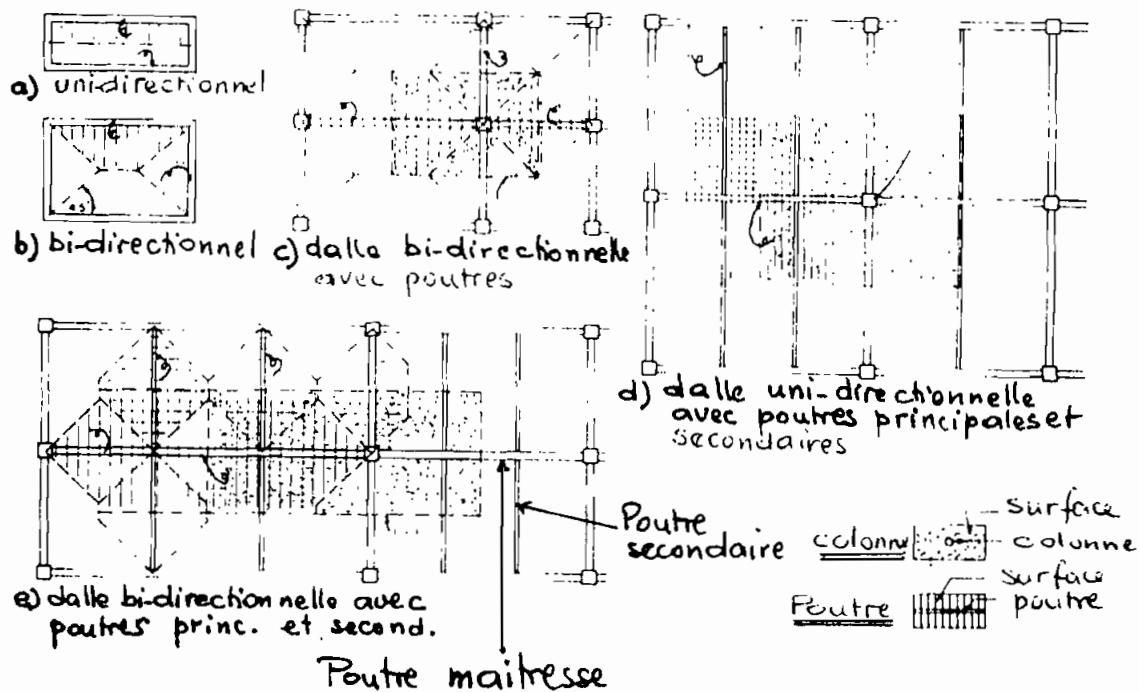
Quant aux effets du vent sur les cadres nous allons les faire reprendre par les murs de refend des plans B et E dans le cas où le vent souffle parallèlement à ceux-ci. Et dans le cas où le vent souffle parallèlement au plan 1 on les fera reprendre par tous les poteaux.

Ainsi en considérant le cadre qui est dans le plan 2 et dont le modèle mathématique est à la page suivante, nous avons la descente de charges suivante:

<u>chargement gravitaire</u>

Nous allons prendre pour poids du béton 2400 kg/m³

Calcul des chargements:

charge morte plus poids du plancher sont:

$$\text{dalle + tuile (23 cm)} = \frac{2400 \times 9,81}{1000} \times 0,23 = 5,415 \frac{KN}{m^2}$$

Plafond + installation electrique $= 0,5 \frac{KN}{m^2}$

$$\overline{5,915 \frac{KN}{m^2}}$$

mur $2,1 \, KN/m^2$

Nous prenons des poutres de 300×450 et des poteaux de 500×500 et nous avons un poids propre de $0,3(0,45-0,20) \times \frac{2400}{1000} \times 9,81$

$\simeq 1,77 \, KN/m$ pour les poutres

et de $0,5 \times 0,5 \times \frac{2400}{1000} \times 9,81 = 5,89 \, KN/m$ pour les poteaux

0,75 m

59 60 61 62 63

41 42 43 44 45 46

3,74 m

(7) (14) (21) (28)

54 55 56 57 58

35 36 37 38 39 40

4,08 m

(6) (13) (20) (27)

2 m

(49) (50) (51) (52) (53)

29 30 31 32 33 34

3,74 m

(5) (12) (19) (26)

(44) (45) (46) (47) (48)

23 24 25 26 27 28

3,74 m

(4) (11) (18) (25)

(39) (40) (41) (42) (43)

17 18 19 20 21 22

3,74 m

(3) (10) (17) (34)

(34) (35) (36) (37) (38)

11 12 13 14 15 16

4,08 m

(2) (9) (16) (23)

(29) (30) (31) (32) (33)

5 6 7 8 9 10

3,5 m

(1) (8) (15) (22)

1 2 3 4

3,25 m * 6,5 m * 6,5 m * 6,5 m * 1,75 m
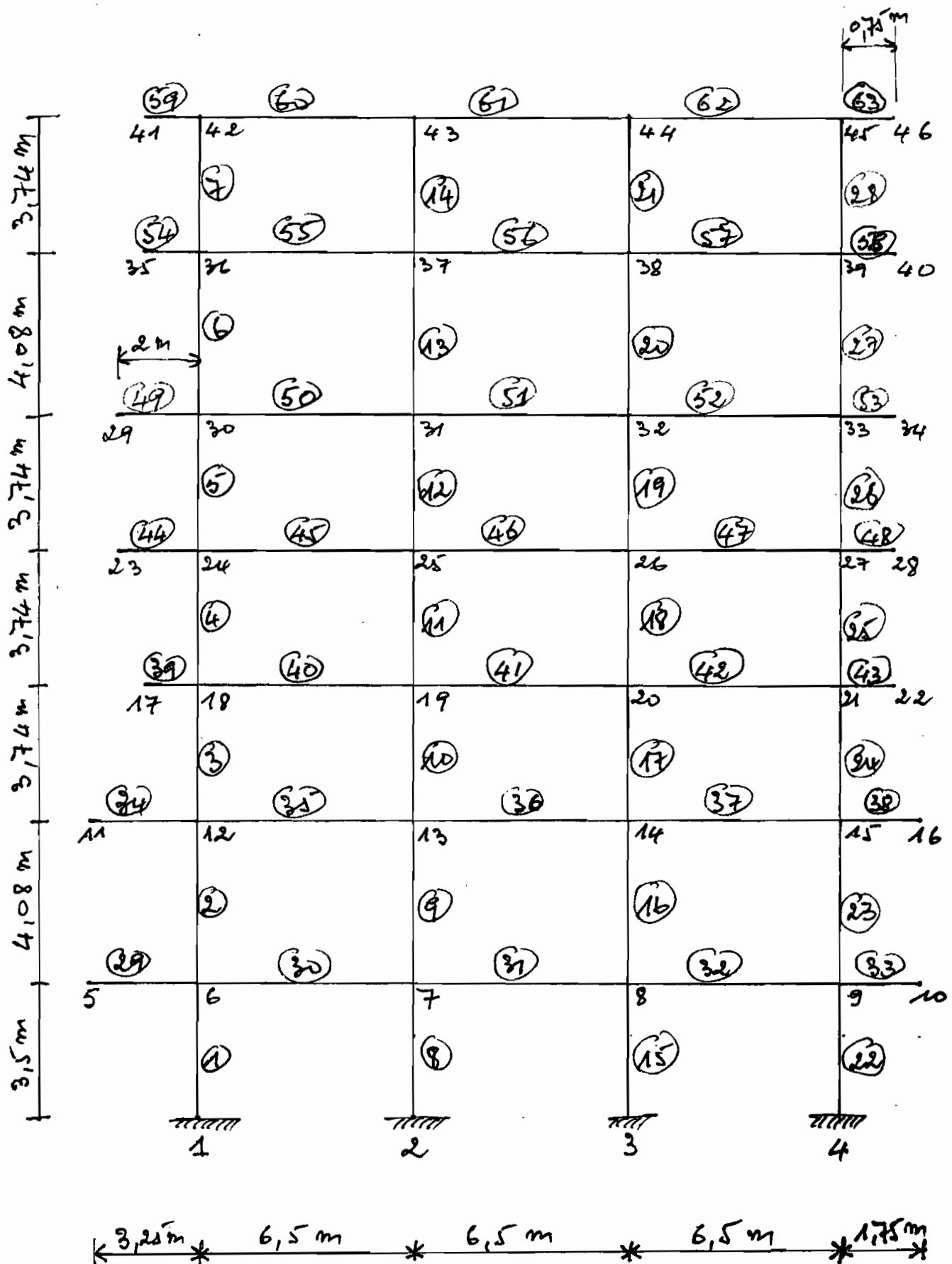
Notation : 2 = noeud 2

(2) = membrure 2

Pour les charges vives $\overset{\text{ou surcharges}}{\underset{x}{\text{nous}}}$ allons prendre :
(Voir tableau page 136)

  — Pour la toiture $1 \text{ KN}/m^2$

  — Pour le rez-de-chaussée :

Utilisation de la surface du plancher : $4,8 \text{ KN}/m^2$

Cloison $\underline{\qquad\qquad 1,2 \text{ KN}/m^2}$

$\qquad\qquad\qquad\qquad\qquad\qquad 6 \text{ KN}/m^2$

  — Pour les autres niveaux

Utilisation de la surface du plancher : $2,4 \text{ KN}/m^2$

Cloison $\underline{\qquad\qquad 1,2 \text{ KN}/m^2}$

$\qquad\qquad\qquad\qquad\qquad\qquad 3,6 \text{ KN}/m^2$

Ainsi nous allons donner l'exemple de charges appliquées aux nœuds 44, 38, 32, 26, 20, 14, 8

nœud 44

Surface tributaire $4,75 \times 6,5 = 30,875 \ m^2$

charge permanente :

dalle + tuile + plafond :	$5,915 \times 30,875 =$	$182,63 \text{ KN}$
poutre	$1,77(6,5 + 4,75) =$	$19,91 \text{ KN}$
mur	$2,1 \times 6,5 \times 1,5 =$	$20,48 \text{ KN}$
poteau	$5,89 \times 3,74 =$	$\underline{22,03 \text{ KN}}$
		$245,05 \text{ KN}$

Surcharge :

$\qquad 1 \times 30,875 \qquad\qquad = 30,875 \text{ KN}.$

noeud 38

charge permanente :

Salle + tuile + plafond : $5,915 \times 30,875 = 182,63\,KM$

Poutre $\qquad 1,77(6,5+4,75) = 19,91\,KM$

mur $\qquad 2 \times 2,1 \times 6,5 \times 3,74 = 102,10\,KM$

Poteau $\qquad 5,89 \times 4,08 \qquad = \underline{24,03\,KM}$

$\qquad\qquad\qquad\qquad\qquad\qquad\quad 328,67\,KM$

Surcharge : $\qquad 3,6 \times 30,875 \qquad = 111,15\,KM$

noeud 32

charge permanente :

Salle + tuile + plafond : $5,915 \times 30,875 = 182,63\,KM$

Poutre $\qquad 1,77(6,5+4,75) = 19,91\,KM$

mur $\qquad 2,1 \times 6,5 \times 4,08 = 55,69\,KM$

Poteau $\qquad 5,89 \times 3,74 = \underline{22,03\,KM}$

$\qquad\qquad\qquad\qquad\qquad\qquad\quad 280,26\,KM$

Surcharge :

$\qquad 3,6 \times 30,875 \qquad = 111,15\,KM$

noeud 26 et 20

charge permanente :

Salle + tuile + plafond : $5,915 \times 30,875 = 182,63\,KM$

Poutre $\qquad 1,77(6,5+4,75) = 19,91\,KM$

mur $\qquad 2,1 \times 6,5 \times 3,74 = 51,05\,KM$

Poteau $\qquad 5,89 \times 3,74 = \underline{22,03\,KM}$

$\qquad\qquad\qquad\qquad\qquad\qquad\quad 275,62\,KM$

Surcharge : $3,6 \times 30,875 = 111,15\,KM$

noeud 14

surface tributaire : $6,5 \times 6,25 = 40,625 \, m^2$

charge permanente :

salle + tuile + plafond : $5,915 \times 40,625 = 240,30 \, KN$

Poutre $\qquad 1,77(6,5 + 6,25) = 22,57 \, KN$

mur $\qquad 2,1 \times 3,74 \times 6,5 = 51,05 \, KN$

Poteau $\qquad 5,89 \times 3,74 \quad = \underline{22,03 \, KN}$

$$335,95 \, KN$$

Surcharge :

$$3,6 \times 40,625 = 146,25 \, KN$$

noeud 8

charge permanente :

salle + tuile + plafond = $5,915 \times 40,625 = 240,30 \, KN$

Poutre $\qquad 1,77(6,5 + 6,25) = 22,57 \, KN$

Colonne $\qquad 5,89 \times 4,08 \quad = \underline{24,03 \, KN}$

$$286,90 \, KN$$

Surcharge :

$$6 \times 40,625 = 243,75 \, KN$$

Remarque :

Quant aux charges appliquées aux autres noeuds et les moments appliqués à chaque noeuds (toutes causées par les chargements gravitaires) nous pouvons les lire dans les données de chargement sur la sortie de l'ordinateur : "STRUC 12"

Changement du vent

Considérons toujours le cadre du plan 2 et nous allons calculer l'effet du vent sur ce dernier.

La pression ou succion exercée par le vent est $P = q \cdot C_e \, C_g \, C_p$

Les coefficients d'exposition C_e aux différents niveaux sont égaux à $(h/10)^{0,2}$

Le coefficient de rafale C_g est égale à 2

Le coefficient de pression du mur au vent est egal à 0,8 et le coefficient de pression du mur sous le vent est egal à -0,5 Ainsi

$$C_p = 0,8 - (-0,5) = 1,3$$

Quant à la vitesse instantanée maximale de rafale du vent elle est de 34 m/s = 122,4 km/h.

$$q = 50 \cdot 10^{-6} \times 122,4^2 = 0,749 \, KM/m^2$$

Le coefficient de rafale pour 122,4 Km/h est 1,977 (ref suppl C.M.B P.164)

$$q_{moy\,horaire} = \frac{0,749}{1,977} = 0,38 \, KM/m^2$$

$$\Rightarrow P = 0,38 \left(\frac{h}{10}\right)^{0,2} \times 1,3 \times 2 \times A$$

Les charges du vent sont :

Rez de chaussée : $0,38 \times 0,9 \times 2 \times 1,3 \times 31,31 = 27,9\ KN$

1er étage $\qquad \times 0,905 \times \qquad \times 30,30 = 27,1\ KN$

2.e étage $\qquad \times 0,996 \times \qquad \times 22,44 = 22,1\ KN$

3.e étage $\qquad \times 1,063 \times \qquad \times 22,44 = 23,6\ KN$

4.e étage $\qquad \times 1,116 \times \qquad \times 23,46 = 25,9\ KN$

5.e étage $\qquad \times 1,164 \times \qquad \times 23,46 = 27,0\ KN$

Toiture $\qquad \times 1,202 \times \qquad \times 18,72 = 22,3\ KN$

Ces charges horizontales du vent seront appliquées respectivement aux noeuds 6, 12, 18, 24, 30, 36 et 42

Remarquons que l'effet du vent sur le cadre est négligeable quand il souffle parallèlement au plan A c'est-à-dire perpendiculairement au plan du cadre, ceci parce que dans ce cas toutes les forces seront reprises par les murs de refend. Ainsi nous allons tenir compte uniquement des forces du vent calculées ci-dessus pour le dimensionnement des éléments du cadre.

2-2- Combinaisons des charges

Une fois que nous avons trouvé les charges permanentes, les surcharges et les charges du vent appliquées sur le cadre, nous pouvons calculer, à l'aide de logiciel P-FRAME, les efforts internes et les moments dans les

membrures, de même les réactions. A l'aide des résultats obtenus nous pouvons dimensionner les semelles et les poteaux. Afin d'avoir le cas critique de chargement considérons les combinaisons suivantes :

$$D + L$$
$$1,25 D + 1,5 L$$
$$1,25 D + 1,5 W$$
$$1,25 D - 1,5 W$$
$$1,25 D + 0,7(1,5L + 1,5W) = 1,25 D + 1,05L + 1,05W$$
$$1,25 D + 0,7(1,5L - 1,5W) = 1,25 D + 1,05L - 1,05 W$$

Pour trouver les dimensions des semelles nous allons considérer la combinaison $D + L$ des charges de service. Et pour le dimensionnement en béton des poteaux et des semelles nous devons prendre pour chaque élément à dimensionner le cas critique de chargement entre les 5 autres combinaisons. Les résultats finaux sont sur la sortie d'ordinateur "STRUC 12" à la page 56.

N.B : Pour les 6 combinaisons ci-dessus :

D désigne les charges permanentes

L des surcharges

W des charges du vent.

Dimensionnement des poteaux

Tableau I

Poteau	Section de béton (mm²)	Longueur L (m)	Charge Pondérée Pu (KN)	Moment Pondéré Mu (KN.m)	Moment dû au vent (KN.m)	Moment dû au Poids mort (KN.m)	β_d	Niveau
1	600×400	3,50	2811	172,3	154,6	17,7	0,10	Sous-sol
2	600×400	4,08	2144	114,6	79,4	35,2	0,31	Rez de chaussée
3	500×400	3,74	1565	92,4	68,28	24,1	0,26	1ᵉ étage
4	500×400	3,74	1271	102,7	35,9	44,7	0,44	2ᵉ étage
5	400×300	3,74	916	71,8	30,6	27,6	0,39	3ᵉ étage
6	400×300	4,08	560	71,0	22,2	32,7	0,46	4ᵉ étage
7	300×300	3,74	188	52,2	9,5	29,4	0,56	5ᵉ étage
8	600×400	3,50	3825	177,3	173,3	4,0	0,02	Sous-sol
9	600×400	4,08	3098	172,3	142,5	29,7	0,17	Rez de chaussée
10	500×400	3,74	2478	128,6	110,3	18,4	0,14	1ᵉ étage
11	500×400	3,74	1968	102,7	94,7	8,0	0,08	2ᵉ étage
12	400×300	3,74	1460	68,6	63,7	4,9	0,07	3ᵉ étage
13	400×300	4,08	943	53,7	47,7	5,9	0,11	4ᵉ étage
14	300×300	3,74	365	19,5	19,2	0,3	0,02	5ᵉ étage
15	600×400	3,50	3826	177,3	171,6	5,7	0,03	Sous-sol
16	600×400	4,08	3099	164,1	145,3	18,8	0,12	Rez de chaussée
17	500×400	3,74	2459	117,1	110,4	6,7	0,06	1ᵉ étage
18	500×400	3,74	1954	102,0	94,6	7,4	0,07	2ᵉ étage
19	400×300	3,74	1449	67,8	63,6	4,2	0,06	3ᵉ étage
20	400×300	4,08	934	53,0	47,7	5,3	0,10	4ᵉ étage
21	300×300	3,74	357	19,4	18	1,4	0,07	5ᵉ étage

Tableau I (suite)

Poteau	Section de béton (mm²)	Longueur L (mm)	Charge Pondéré Pu (KN)	Moment Pondéré Mu (KN·m)	Moment dû au vent (KN·m)	Moment dû au Poids mort (KN·m)	βd	Niveau
22	600×400	3,50	2449	161,8	150	11,8	0,07	Sous-Sol
23	600×400	4,08	1922	119,1	60,7	30,6	0,26	Rez de chaussée
24	500×400	3,74	1451	94,1	68,6	25,5	0,27	1ᵉ étage
25	500×400	3,74	1158	101,8	35,9	44,0	0,43	2ᵉ étage
26	400×300	3,74	864	72,6	30,5	28,3	0,39	3ᵉ étage
27	400×300	4,08	567	72,3	22,2	33,3	0,46	4ᵉ étage
28	300×300	3,74	194	47,7	9,5	29,8	0,62	5ᵉ étage

Tableau II

Calcul de $0,5 E_c I_g / \ell_n$ pour les poutres.

Poutre	Section (mm²)	$0,5 E_c I_g / \ell_n$
30, 31, 32, 35 36 et 37	600×350	$11,94 \cdot 10^9$ N·mm
40, 41, 42, 45 46 et 47	600×350	$11,74 \cdot 10^9$ N·mm
50, 51, 52, 55 56 et 57	600×300	$9,9 \cdot 10^9$ N·mm
60, 61 et 62	500×300	$5,63 \cdot 10^9$ N·mm

Tableau III

Poteau	Ec Ig/ln ×10³ N.mm	ψ_A	ψ_B	K	$\frac{Klu}{r}$	ρg min ×100	EI ×10¹² N.mm²	Σcr (KN)	Σu (KN)	Niveau et δ
1	61,6	9,90	1	1,9	35,1	1	50,58	13504	2811	Sous-Sol
8	61,6	4,95	1	1,7	29,6	1	54,55	20537	3825	δ=1,41
15	61,6	4,95	1	1,6	29,6	1	54,02	20338	3826	
22	61,6	9,90	1	1,9	35,1	1	52,00	13883	2449	
2	56,7	7,80	9,9	2,82	56,4	2	54,80	56615	2143	Rdc de chaussée
9	56,7	3,90	4,95	2,1	42,2	1,5	54,46	10064	3098	
16	56,7	3,90	4,95	2,1	42,2	1,5	56,89	10513	3099	δ=1,97
23	56,7	7,80	9,9	2,82	56,4	2	56,98	5839	1922	
3	36,4	6,2	7,8	2,55	55,5	1,5	27,83	4284	1565	1er étage
10	36,4	3,1	3,9	1,92	41,8	1,5	30,76	8352	2478	
17	36,4	3,1	3,9	1,92	41,8	1,5	33,08	8982	2459	δ=1,90
24	36,4	6,2	7,8	2,55	55,5	1,5	27,41	4250	1451	

Tableau III (Suite)

Poteau N°	$E_c I_g/\ell_g$ ×10⁹ N.mm	ψ_A	ψ_B	K	$\dfrac{K\ell_u}{r}$	ρg_{min} ×10²	EI ×10¹² N.mm²	P_{cr} (KN)	P_u (KN)	Niveau et δ
4	36,4	4,29	6,2	2,25	48,9	1	21,52	4855	1271	2.ᵉ étage
11	36,4	2,15	3,1	1,72	37,4	1	28,70	9711	1968	
18	36,4	2,15	3,1	1,72	37,4	1	28,97	9802	1954	δ=1,53
25	36,4	4,29	6,2	2,25	48,9	1	21,67	4284	1158	
5	13,95	2,68	4,29	1,90	51,7	1,5	9,22	2556	916	3.ᵉ étage
12	13,95	1,34	2,15	1,53	41,6	1,5	11,97	5118	1460	
19	13,95	1,34	2,15	1,53	41,6	1,5	12,09	5169	1449	δ=1,88
26	13,95	2,68	4,29	1,90	51,7	1,5	9,22	2556	894	
6	12,59	1,86	2,68	1,65	46,7	1	7,85	2349	565	4.ᵉ étage
13	12,59	1,00	1,34	1,37	41,3	1	10,32	4481	943	
20	12,59	1,00	1,34	1,37	41,3	1	10,42	4524	934	δ=1,55
27	12,59	1,86	2,68	1,65	46,7	1	7,85	2342	565	
7	5,80	1,05	1,86	1,43	52,7	1	2,99	1448	188	5.ᵉ étage
14	5,80	1,02	1,00	1,31	48,3	1	4,57	2582	325	
21	5,80	1,02	1,00	1,31	48,3	1	4,32	2464	357	δ=1,28
28	5,80	1,05	1,86	1,43	52,7	1	2,88	1365	194	

Exemple des valeurs calculées dans le tableau III, pour le poteau 15

Dans le plan 1 tous les poteaux du cadre sont non contreventés.

on a $f_y = 400 \, MPa$

$f_c' = 20 \, MPa$ pour les poutres

$f_c' = 30 \, MPa$ pour les poteau.

poutre 600 x 350

poteau 600 x 400
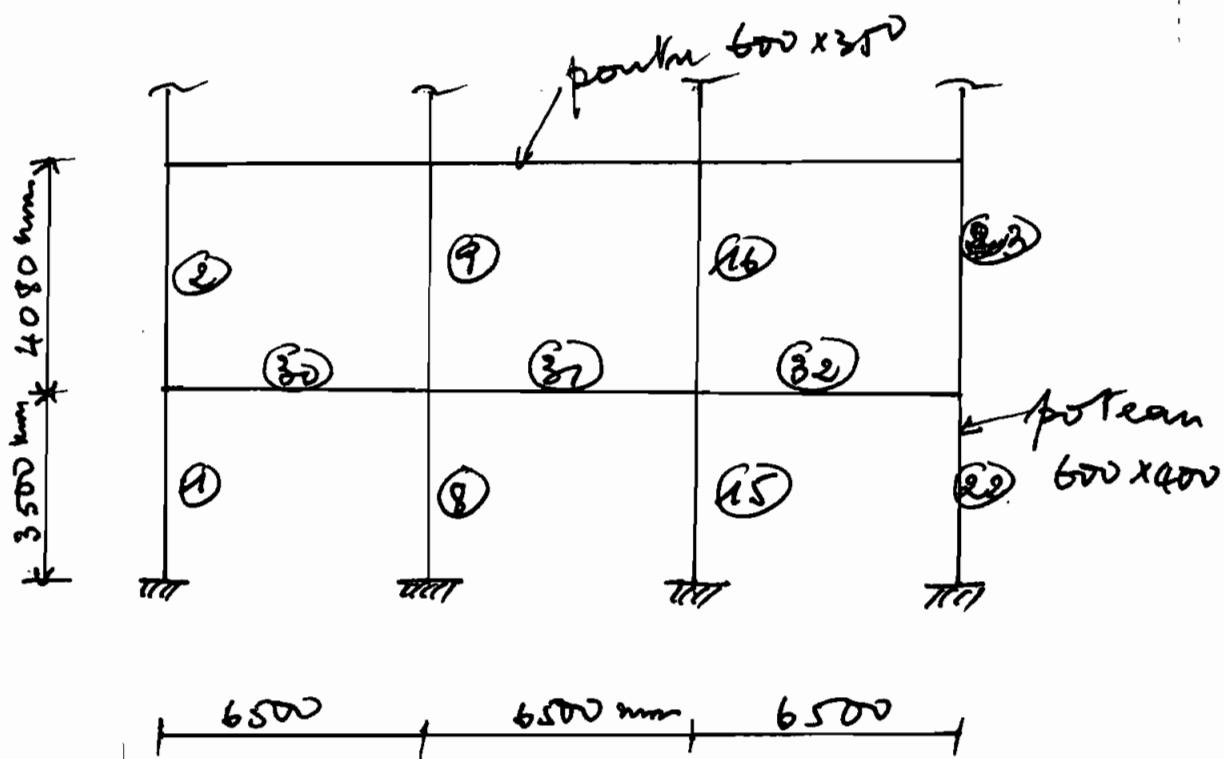
Facteur pour la longueur effective.

$$\Psi = \frac{\Sigma EI/\ell \text{ colonne}}{\Sigma EI/\ell \text{ poutre}}$$

Pour les poutres 30, 31, 32

$$0,5 \frac{E_c I_g}{\ell_n} = 0,5 \times 5000 \sqrt{20} \times \frac{600^3 \times 350}{12 (6500 - 600)}$$

$$= 11,94 \cdot 10^9 \, N \cdot mm$$

Pour les poteaux 1, 8, 15 et 22

$$\frac{E_c I_g}{\ell_n} = 5000 \sqrt{30} \times \frac{400 \times 600^3}{12(3500-300)} = 61,6 \cdot 10^9 \, N.mm$$

Pour les poteaux 2, 9, 16 et 23

$$\frac{E_c I_g}{\ell_n} = 5000 \sqrt{30} \times \frac{400 \times 600^3}{12(4080-600)} = 56,7 \cdot 10^9 \, N.mm$$

Calcul de ψ et de K.

Pour les colonnes 1 et 22

$$\psi_A = \frac{(61,6+56,7) \cdot 10^9}{11,94 \cdot 10^9} = 9,90 \quad \Big\| \Rightarrow K = 1,90$$

$$\psi_B = 1$$

Pour les colonnes 8 et 15

$$\psi_A = \frac{(61,6 + 56,7) \cdot 10^9}{2 \times 11,94 \cdot 10^9} = 4,95 \quad \Big\| \Rightarrow K = 1,60$$

$$\psi_B = 1$$

Pour la colonne 15 on a :

$$\frac{K \ell_n}{r} = \frac{1,6 \times 3200}{\sqrt{\frac{1}{12}} \times 600} = 29,6 > 22$$

$$\Rightarrow \text{Colonne élancée.}$$

Facteur de majoration $\delta_{étage}$ de moment pour les poteaux du sous-sol

$$P_{cr} = \frac{\pi^2 E I}{(K \ell)^2}$$

$$EI = \frac{k \, bh^3}{1 + \beta_d}$$

où k est lu sur les abaques de la page $\bigcirc$ et est une fonction des pourcentage d'acier ℓ_g dans le poteau. Ainsi pour les calculs nous imposons une valeur minimale à ℓ_g pour chaque poteau de l'étage afin d'avoir à la fin des calculs le facteur $\delta_{étge} < 2$. Ceci pour éviter l'instabilité dûe au déplacement horizontal, pour l'étage entier.

· Pour la colonne 1

$\ell_{g\,min} = 1\%$

$\gamma = 0,75$ $\Rightarrow k = 644$

$\beta_d = 0,10$

$$EI = \frac{k \, bh^3}{1 + \beta_d} = \frac{644 \times 400 \times 600^3}{1 + 0,1} = 50,58 \cdot 10^{12} \, N.mm^2$$

$$P_{cr} = \frac{\pi^2 \, EI}{(K\ell)^2} = \frac{\pi^2 \times 50,58 \cdot 10^{12}}{(1,9 \times 3200)^2} = 13504 \, KN$$

· Pour la colonne 8

$\ell_{g\,min} = 1\%$

$\gamma = 0,75$ $\Rightarrow k = 644$

$\beta_d = 0,02$

$$EI = \frac{k \, bh^3}{1 + \beta_d} = \frac{644 \times 400 \times 600^3}{1 + 0,02} = 54,55 \cdot 10^{12} \, N.mm^2$$

$$P_{cr} = \frac{\pi^2 EI}{(K\ell)^2} = \frac{\pi^2 \times 54{,}55 \cdot 10^{12}}{(1{,}6 \times 3200)^2} = 20537 \ KN$$

. Pour la colonne 15

$$e_{g_{min}} = 1\% \ \| \Rightarrow k = 644$$
$$\gamma = 0{,}75$$

$$P_d = 0{,}03 \ . \quad ; \quad K = 1{,}6$$

$$EI = \frac{k\,b h^3}{1+P_d} = 54{,}02 \cdot 10^{12} \ N \cdot mm^2$$

$$P_{cr} = \frac{\pi^2 EI}{(K\ell)^2} = 20338 \ KN.$$

. Pour la colonne 22

$$e_{g_{min}} = 1\% \ \| \Rightarrow k = 644$$
$$\gamma = 0{,}75$$

$$P_d = 0{,}07 \qquad K = 1{,}9$$

$$EI = \frac{k\,b h^3}{1+P_d} = 52{,}00 \cdot 10^{12} \ N \cdot mm^2$$

$$P_{cr} = \pi^2 EI / (K\ell)^2 = 13883 \ KN.$$

Ainsi on a :

$$\delta_{etage} = \frac{1}{1 - \frac{\Sigma P_u}{\phi \Sigma P_{cr}}} = \frac{1}{1 - \frac{2811 + 3825 + 3826 + 2449}{0{,}65(13504 + 20537 + 20338 + 13883)}}$$

$$\delta_{etage} = 1{,}41 \ \angle \ 2 \qquad O.K.$$

<u>Calcul des armatures pour les poteaux 15, 16, 17, 18, 19, 20 et 21</u>

Pour ces calculs nous allons utiliser les abaques des pages 138 et 139

Et nous allons prendre

$$f'_c = 30 \, MPa$$
$$f_y = 400 \, MPa$$

<u>Poteau 15 (600 × 400)</u>

<u>choix de δ</u>

Pour la colonne $\delta = \dfrac{C_m}{1 - \dfrac{P_u}{\phi P_{cr}}}$

$$C_m = 0,6 + 0,4 \frac{M_1}{M_2} \quad \text{où} \quad |M_1| < |M_2|$$

$$= 0,6 - 0,4 \times \frac{75,4}{172,21} = 0,425$$

$$\delta_{col} = \frac{0,425}{1 - \dfrac{3826}{0,65 \times 20338}} = 0,598 < \delta_{etage}$$

donc on prend $\delta = \delta_{etage} = 1,41$

<u>Armatures</u>

on choisit des barres $\phi 25$ (d = 25,2 mm)
ligature $\phi 10$ (d = 11,3 mm)
enrobage de 40 mm.

$$\gamma = \frac{600 - 2 \times 40 - 2 \times 11,3 - 25,2}{600} = 0,78$$

on prend $\gamma = 0,75$

$P_u = 3826 \ KN$

$M_u = M_{\Delta+L} + \delta M_w = 5,7 + 1,41 \times 171,6$

$\qquad = 247,7 \ KN \cdot m$

$\dfrac{P_u}{A_g} = \dfrac{3826 \cdot 10^3}{600 \times 400} = 15,95 \ MPa$ $\Bigg\} \Rightarrow \theta_g = 1,65\%$

$\dfrac{M_u}{A_g h} = \dfrac{247,7 \cdot 10^6}{600^2 \times 400} = 1,72 \ MPa$ $\qquad > \theta_{g_{min}} = 1\%$

Donc on prend $\theta_g = 1,65\%$

$\Rightarrow A_g = 0,0165 \times 600 \times 400 = 3960 \ mm^2$

$\qquad = 8 \ \phi \ 25$

Espacement des cadres

$S < 48 \times 11,3 = 542$ $\Big\} \Rightarrow$ on prend $S = 400^{mm}$

$S < 400$ $\qquad\qquad\qquad\qquad \phi \ 10$

Poteau 16 (600 × 400)

Après vérification on choisit $\delta = \delta_{étage} = 1,97$

Armatures

$\delta = 0,75$

$P_u = 3099 \ KN$

$M_u = M_{\Delta+L} + \delta M_w = 18,8 + 1,97 \times 145,3$

$\qquad = 305,1 \ KN \cdot m$

$\dfrac{P_u}{A_g} = \dfrac{3099 \cdot 10^3}{600 \times 400} = 12,91 \ MPa$ $\Big\} \Rightarrow \theta_g = 1,4\%$

$\dfrac{M_u}{A_g h} = \dfrac{305,1 \cdot 10^6}{600^2 \times 400} = 2,12 \ MPa$ $\qquad < \theta_{g_{min}} = 1,5\%$

Donc on prend $\rho_g = \rho_{g\,min} = 1,5\%$

$\Rightarrow A_s = 0,015 \times 600 \times 400 = 3600 \ mm^2$

$\qquad = 8 \ \phi \ 25$

Pour l'espacement des cadres on prend
aussi $S = 400 \ mm$ pour $\phi \ 10$

Poteau 17 (500×400)

Après vérification on choisit $\delta = \delta_{étage} = 1,90$

Armatures

$\gamma = \dfrac{500 - 2 \times 40 - 2 \times 11,3 - 25,2}{500} = 0,74$

on choisit $\gamma = 0,70$

$P_u = 2459 \ KN$

$M_u = M_{D+L} + \delta \, M_w = 6,7 + 1,9 \times 110,4$

$\qquad = 216,5 \ KN \cdot m$

$\dfrac{P_u}{A_g} = \dfrac{2459 \cdot 10^3}{500 \times 400} = 12,30 \ MPa \left.\begin{array}{l} \\ \end{array}\right\} \Rightarrow \rho_g = 1,3\%$

$\dfrac{M_u}{A_g h} = \dfrac{216,5 \cdot 10^6}{500^2 \times 400} = 2,17 \ MPa \quad < \rho_{g\,min} = 1,5\%$

Donc on prend $\rho_g = \rho_{g\,min} = 1,5\%$

$\Rightarrow A_s = 0,015 \times 500 \times 400 = 3000 \ mm^2$

$\qquad = 4 \ \phi \ 25 \ et \ 4 \ \phi \ 20$

Pour l'espacement des cadres on
prend aussi $S = 400 \ mm$ pour $\phi \ 10$

Poteau 18 (500 × 400)

on choisit $\delta = \delta_{etage} = 1,53$

Armature

$\gamma = 0,70$

$P_u = 1954$ KN

$M_u = 7,4 + 1,53 \times 94,6 = 152,2$ KN.m

$\dfrac{P_u}{A_g} = \dfrac{1954 \cdot 10^3}{500 \times 400} = 9,8$ MPa

$\dfrac{M_u}{A_g h} = \dfrac{152,2 \cdot 10^6}{500^2 \times 400} = 1,53$ MPa $\quad \Rightarrow \ell_g = 1\%$
$\quad = \ell_{g \, min}$

Donc on prend $\ell = 1\%$

$\Rightarrow A_s = 0,01 \times 500 \times 400 = 2000 = 4\phi 25$

Pour l'espacement des cadres on prend
$S = 400$ mm pour $\phi 10$

Poteau 19 (400 × 300)

Après vérification on prend $\delta = \delta_{etage} = 1,88$

$\gamma = \dfrac{400 - 2 \times 40 - 2 \times 11,3 - 25,2}{400} = 0,68$

on prend $\gamma = 0,65$

$P_u = 1449$ KN

$M_u = 4,2 + 1,88 \times 63,6 = 123,8$ KN.m

$\dfrac{P_u}{A_g} = \dfrac{1449 \cdot 10^3}{400 \times 300} = 12,1$ MPa

$\dfrac{M_u}{A_g h} = \dfrac{123,8 \cdot 10^6}{400^2 \times 300} = 2,6$ MPa $\quad \Rightarrow \ell_g = 1,9\%$
$\quad > \ell_{min} = 1,5\%$

Donc on prend $\ell_g = 1,9\%$

$\Rightarrow A_s = 0,019 \times 400 \times 300 = 2280 = 8\phi20$

Espacement des cadres :

on choisit $\phi8$

$S < 48 \times 8 = 384$

$S < 300$

$\Rightarrow S = 300$ mm

$\phi8$

Poteau 20 (400 × 300)

on choisit $\delta = \delta_{etage} = 1,51$

Armatures

$\gamma = 0,65$

$P_u = 934$ KN

$M_u = M_{0u} + \delta M_w = 5,3 + 1,51 \times 47,7$

$= 77,4$ KN.m

$\dfrac{P_u}{A_y} = \dfrac{934 \cdot 10^3}{400 \times 300} = 7,8$ M Pa

$\dfrac{M_u}{A_g h} = \dfrac{77,4 \cdot 10^6}{400^2 \times 300} = 1,62$ MPa

$\Rightarrow \ell_g = 1\% = \ell_{g_{min}}$

Donc on prend $\ell_g = 1\%$

$A_s = 0,01 \times 400 \times 300$

$= 1200$ mm$^2 = 4\phi20$

Pour l'espacement des cadres on prend $S = 300$ mm pour $\phi8$

Poteau 21 (300 x 300)

On choisit $\delta = \delta$ étage $= 1,28$

Armatures

on choisit des barres $\phi 20$ $(d = 19,5 \text{ mm})$

Ligature $\phi 8$

Enrobage 40 mm

$$\gamma = \frac{300 - 2 \times 40 - 2 \times 8 - 19,5}{300} = 0,61$$

on prend $\gamma = 0,6$

$P_u = 357 \text{ KN}$

$M_u = M_{0+L} + \delta M_w = 1,4 + 1,28 \times 18 = 24,5 \text{ KN} \cdot m$

$$\frac{P_u}{Ag} = \frac{357 \cdot 10^3}{300^2} = 4 \text{ MPa}$$

$$\frac{M_u}{A_g h} = \frac{24,5 \cdot 10^6}{300^3} = 0,91 \text{ MPa}$$

$\rightarrow \ell = 1\% = \ell_{g\,min}$

on prend $\ell_g = 1\%$

$A_s = 0,01 \times 300^2 = 900 \text{ mm}^2$

$\qquad = 4 \phi 20$

Pour l'espacement des cadres on prend $S = 300 \text{ mm} \quad \phi 8$

2.- Calcul de la semelle au noeud 3

Nous allons mettre la semelle à la côte -2 m, or d'après les études géotechnique on a :

$$q_a = (23,4 + 4,93 B) \times 10 \ KN/m^2$$
$$= (234 + 49,3 B) \ KN/m^2$$

. Calcul des dimensions de la semelle

On a la charge de service qui est de 2882 KN et le moment de service qui est de 115 KN·m. Majorons cette charge de 4% (à cause du poids propre de la semelle et celui du sol), donc on a $\Sigma P = 3004$ KN.

Supposons d'abord une semelle carreé de cote B, on a :

$$A = \frac{\Sigma P}{q_a} \Rightarrow B^2 = \frac{3004}{234 + 49,3 B}$$

$$\Rightarrow B = 2,84 \ m$$
$$\Rightarrow A = 8,07 \ m^2$$

Donc on prend alors une semelle rectangulaire de 2,5 m × 3,5 m.

Verification :

on a $B = \sqrt{2,5 \times 3,5} = 2,958 \Rightarrow q_a = 379 KN/m^2$

$P = 3004$ KM, $M = 115$ KN·m

$$\Rightarrow e = \frac{M}{P} = \frac{115}{3004} = 0,0382 \ m$$

$$\sigma_{max} = \frac{P}{A}\left(1 + \frac{6e}{h}\right) = \frac{3004}{2,5 \times 3,5}\left(1 + \frac{6 \times 0,0382}{3,5}\right)$$

$\tau_{max} = 366 \, KN/m^2 < 379 \, KN/m^2 \quad O.K.$

donc la section de $2,5 \, m \times 3,5 \, m$ convient.

. <u>Dimensionnement aux efforts tranchants</u>

on a la charge pondérée $P_u = 3828 \, KN$ et le moment pondéré $M_u = 177,3 \, KN \cdot m$

Soit une excentricité de :

$e = \dfrac{177,3}{3826} = 0,046 \, m$

$q_{max} = \dfrac{P_u}{A}\left(1 + \dfrac{6e}{h}\right) = \dfrac{3826}{2,5 \times 3,5}\left(1 + \dfrac{6 \times 0,046}{3,5}\right)$

$\qquad = 472 \, KN/m^2$

$q_{min} = \dfrac{P_u}{A}\left(1 - \dfrac{6e}{h}\right) = \dfrac{3826}{2,5 \times 3,5}\left(1 - \dfrac{6 \times 0,046}{3,5}\right)$

$\qquad = 403 \, KN/m^2$

a) <u>Poutre linéaire</u> (cisaillement unidirectionnelle)
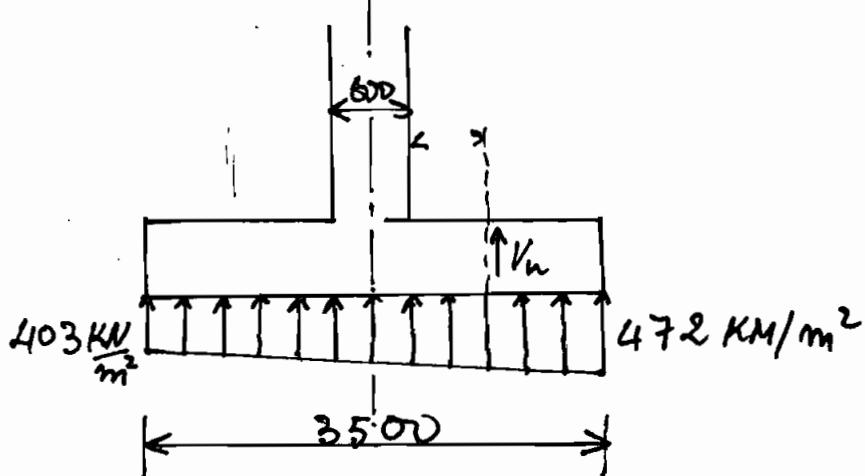
Afin de trouver l'épaisseur de la semelle pour le dimensionnement en cisaillement nous allons utiliser la table de la page 140

Ainsi on a :

$$a_b = 1,45 \, m \quad \text{et} \quad q_{sf} = 472 \, KN/m^2$$

$$\Rightarrow \quad d > 680 \, mm$$

b.) <u>Poinçonnement</u> :

La section critique est à $d/2$ tout autour du poteau. Pour le dimensionnement en poinçonnement utilisons la table de la page 141. Ainsi on a :

$$\frac{A_f}{A_c} = \frac{3,5 \times 2,5}{0,6 \times 0,4} = 36,45$$

$$h = \sqrt{A_c} = \sqrt{0,6 \times 0,4} = 0,489 \, m$$

$$q_{sf} = 472 \, KN/m^2$$

on trouve alors $\dfrac{d}{h} = 1,44$

$$\Rightarrow \quad d \geq 1,44 \times 0,489 \, m = 0,705$$

$$d \geq 705 \, mm$$

soit un enrobage de 75 mm et des barres $\phi 20$

$$H = 705 + 20 + 75 = 800 \, mm$$

Donc nous allons prendre une semelle de hauteur 800 mm.

. <u>Flexion dans le sens de la longueur</u>.

Nous allons utiliser la table de la page. 142 Alors on a :

$$d = 705 \, mm$$

$$q_{sf} \, a_b^2 = 472 \times 1,45^2 = 992 \text{ KN}$$
$$\Rightarrow A_s = 2200 \text{ mm}^2/\text{m}$$
$$\text{Soit } e = 130 \text{ mm}.$$

· Flexion dans le sens de la largeur

Utilisons toujours la table de la page 142

Alos on a:

$$d = 705 \text{ mm}$$
$$q_{sf} \, a_b^2 = 472 \times 1,05^2 = 520 \text{ KN}$$
$$\Rightarrow A_s = 1610 \text{ mm}^2$$
$$\text{on prend } e = 180 \text{ mm}.$$

l_d requis pour $\phi 20 \Rightarrow l_d = 510 \text{ mm} = l_{bd}$

longueur disponible $= 1050 - 75 = 975 \text{ mm}$
$$> 520 \text{ mm} \quad \text{O.K.}$$

Donc cette longueur est suffisante pour transférer par frottement les contraintes de l'acier vers le béton.

· Transmission des contraintes à la surface de contact.

La pression à la surface de contact entre le poteau et la semelle est de 3826 KN.

La resistance moment à cette surface est de 177,3 KN·m .

Soit une excentricité de :
$$e = \frac{177,3}{3826} = 0,0463 \text{ m}$$

La contrainte à la surface de contact est:

$$f_b = \frac{3826 \cdot 10^3}{600 \times 400}\left(1 + \frac{6 \times 0,0463}{0,6}\right) = 23,33 \text{ MPa}$$

$$f_{b \text{ admissible}} = 0,85 \, \phi_c \, f'_c \sqrt{A_2/A_1} \leq 1,7 \, \phi_c \, f'_c$$

$$\sqrt{A_2/A_1} = \sqrt{\frac{3500 \times 2500}{600 \times 400}} = 6,03 > 2$$

Alors $f_{b \text{ admissible}} = 1,7 \, \phi_c \, f'_c$

$$= 1,7 \times 0,6 \times 20 = 20,4 \text{ MPa}$$

on a 20,4 MPa < 23,33 MPa ⟹ on a besoin de goujons entre le poteau et la semelle pour transmettre la pression de contact.

Vu le petit écart qu'il y a entre ces deux valeurs, nous pouvons prendre le pourcentage minimal de compression qui est $\rho_{g \text{ min}} = 1\%$

$$\Rightarrow A_s = 0,01 \times 600 \times 400 = 2400 \text{ mm}^2$$

on utilise 8 goujons nº 20

La longueur d'ancrage droit en compression pour ces goujons est la plus grande des deux valeurs suivantes:

$$l_d = \frac{0,24 \, d_b \, f_y}{\sqrt{f'_c}} = \frac{0,24 \times 19,5 \times 400}{\sqrt{20}} = 419 \text{ mm}$$

$$l_d = 0,044 \, d_b \, f_y = 0,044 \times 19,5 \times 400 = 344 \text{ mm}$$

Longueur disponible est:

$$705 - 20 = 685 \text{ mm} > 419 \text{ mm} \quad O.K.$$

3 - Analyse structurale pour le dimensionnement d'une poutre continue

3-1- Analyse structurale.

Pour cette analyse nous allons prendre la poutre du plan 2 au niveau du rez-de-chaussée. Ainsi nous avons un cadre dont le modèle mathématique est le suivant :
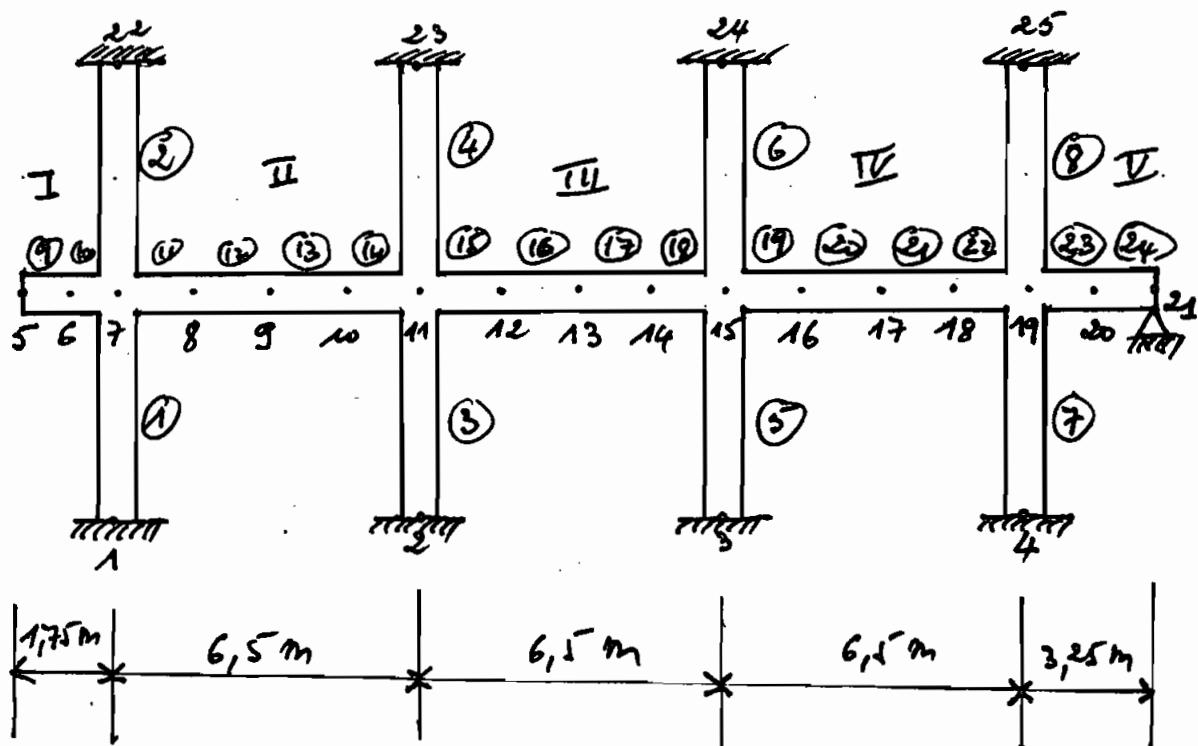
Notation : 2 = nœud 2

(2) = membrure 2

II = portée n° 2

Nous pouvons lire les charges permanentes et les surcharges appliquées sur les membrures de la poutre dans les données de

chargement sur la sortie de l'ordinateur:
"STRUC.O2" page 93

Pour le dimensionnement de la poutre
nous trouvons l'enveloppe des moments et
des efforts tranchants en nous servant premiè-
rement de la ligne d'influence afin de
prendre les chargements (toutes les charges
et les surcharges adéquates) qui produiraient
les efforts maximum.

Alors soit A toute la charge permanente.

B la surcharge de la portée n.° 1

C   "   "   n.° 2

D   "   "   n.° 3

E   "   "   n.° 4

F   "   "   n.° 5

Nous allons considérer les combinaisons
suivantes :

$$1,25A + 1,5B + 1,5C + 1,5D + 1,5E + 1,5F$$

$$1,25A + 1,5C + 1,5E$$

$$1,25A + 1,5B + 1,5D + 1,5F$$

$$1,25A + 1,5B + 1,5C + 1,5E$$

$$1,25A + 1,5C + 1,5D + 1,5F$$

$$1,25A + 1,5B + 1,5D + 1,5E$$

$$1,25A + 1,5C + 1,5E + 1,5F$$

Nous pouvons calculer à l'aide du logiciel 'P-FRAME, les efforts internes et les moments dans les membrures (dûs aux chargements gravitaires). Ceci toujours sur la sortie de l'ordinateur " STRUC 02 " page 93

Une fois ces résultats obtenus, nous devons, pour le dimensionnement, tenir compte aussi de l'effet du vent sur la poutre. Pour cela nous allons nous servir des résultats obtenus sur la sortie de l'ordinateur "STRUC 12" pour les efforts internes et les moments causés par le vent.

Au total, nous aurons les enveloppes des moments et des efforts tranchants suivantes :
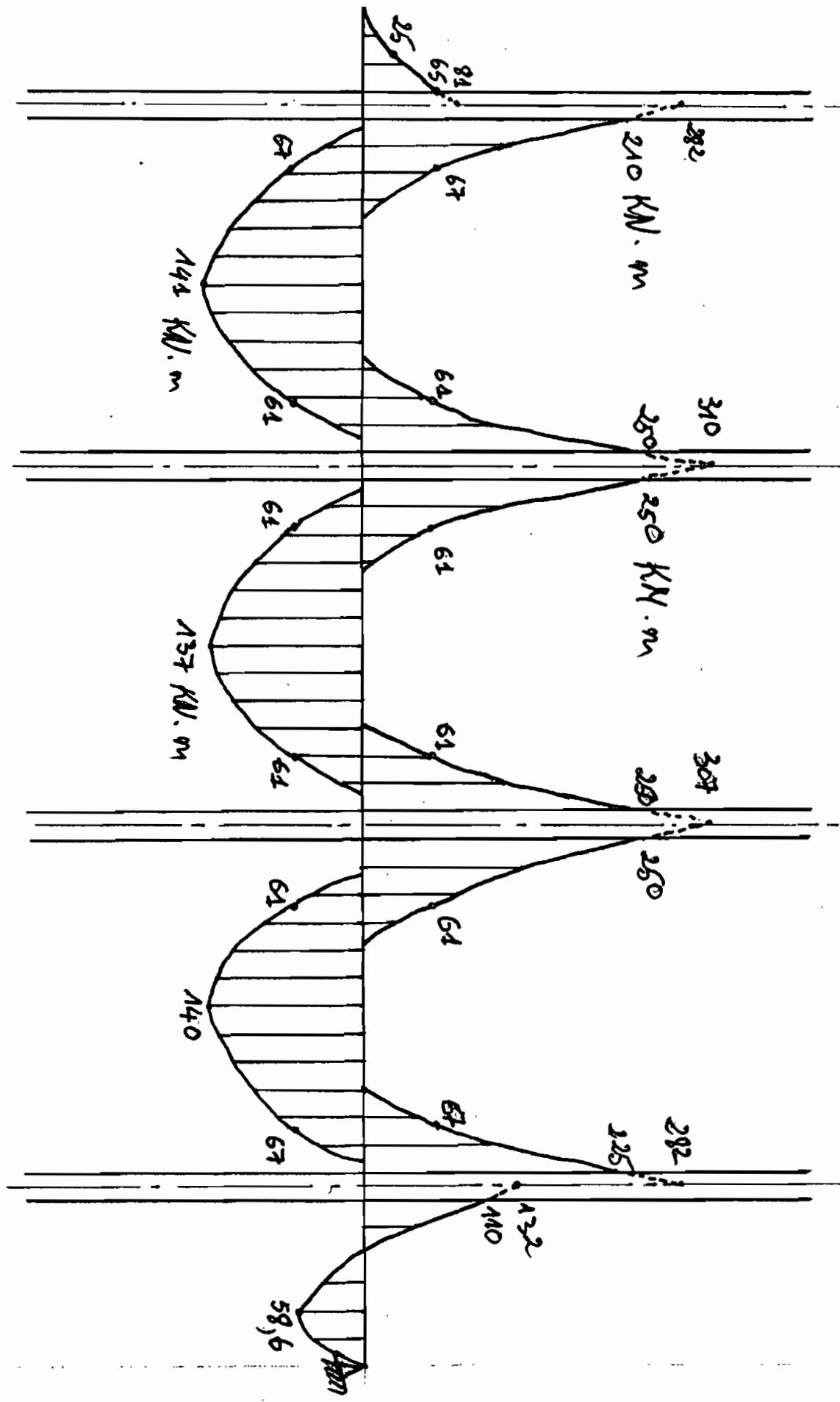
Enveloppe des Moments.

Enveloppe des efforts tranchants
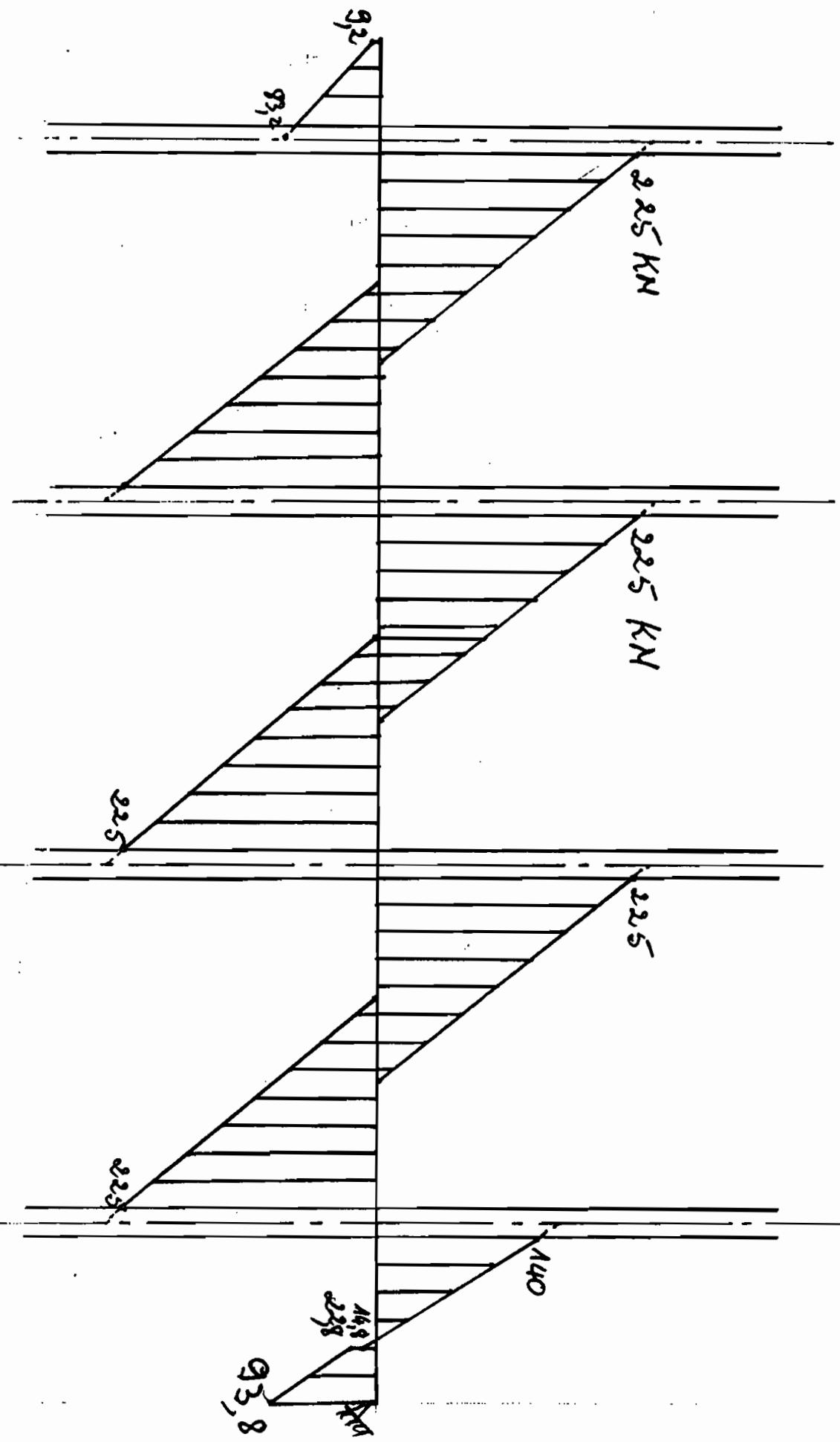
3-2- Dimensionnement de la poutre continue

Dimensionnement en flexion.

Nous avons une poutre de 600 x 350 avec $d = 530$ mm

$$f'_c = 20 \, MPa$$
$$f_y = 400 \, MPa$$

Les moments de dimensionnement que nous allons utiliser (d'après l'analyse) sont :

$-65 \, KN.m$; $-110 \, KN.m$; $-210 \, KN.m$; $-225 \, KN.m$

$-250 \, KN.m$; $+58,6 \, KN.m$; $+137 \, KN.m$; $+141 \, KN.m$

Ainsi nous avons les tableaux suivants :

Pour les moments négatifs

M_u (KN.m)	-65	-110	-210	-225	-250
K_r (MPa)	0,67	1,12	2,14	2,29	2,55
$100 \, p$	0,35	0,35	0,72	0,78	0,88
A_s (mm²)	723	723	1487	1610	1817
Choix d'armature	2 ϕ 25	2 ϕ 25	3 ϕ 25	4 ϕ 25	4 ϕ 25

Pour les moments positifs

M_u (KN.m)	$+58,6$	$+137$	$+141$
K_r (MPa)	0,60	1,4	1,44
$100 \, p$	0,35	0,44	0,46
A_s (mm²)	723	910	950
Choix d'armature	2 ϕ 25	2 ϕ 25	2 ϕ 25

Dimensionnement en cisaillement.

Pour dimensionner en cisaillement, nous allons prendre 225 KN comme effort tranchant pour la portée 2, 3, 4 et 140 KN pour la portée 5

Pour la portée 2, 3 et 5

Le diagramme des efforts tranchant est le suivant :
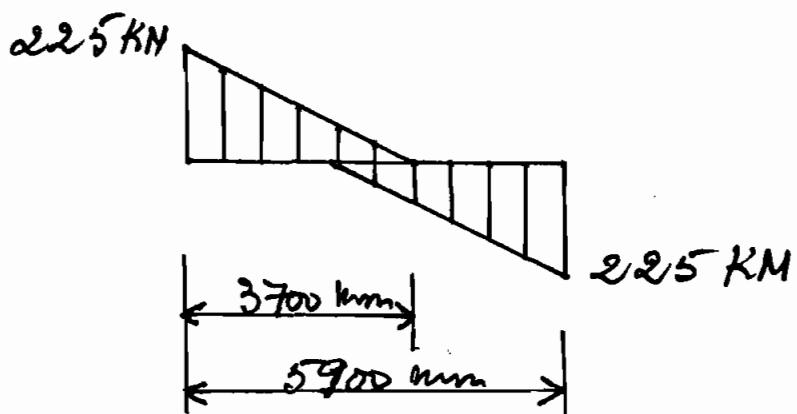
$$V_d = \frac{225(3700-530)}{3700} = 193 \ KN$$

Vérification de la section :

$$V_d < \lambda \phi_c \sqrt{f'_c} \ bd = 0,6\sqrt{20} \times 350 \times 530/_{1000}$$
$$= 497 \ KM$$

on a $193 \ KM < 497 \ KM$ O.K.

$\Rightarrow$ La section est suffisamment grande.

Effort tranchant repris par le béton.

$$V_c = 0,2 \ \lambda \ \phi_c \sqrt{f'_c} \ bd = 0,2 \times 0,6\sqrt{20} \times 350 \times 530/_{1000}$$
$$= 99,5 \ KN.$$

Effort tranchant repris par les étriers

$$V_s = V_d - V_c = 193 \, KN - 99,5 \, KN = 93,5 \, KN$$

Espacement d'étrier

On choisit les étriers $\phi \, 10$

$$\Rightarrow A_v = 2 \times 100 \, mm^2 = 200 \, mm^2$$

$$V_s = \phi_s A_v \frac{f_y d}{S} \Rightarrow S = \frac{\phi_s A_v f_y d}{V_s}$$

$$S = \frac{0,85 \times 200 \times 400 \times 530}{93,5 \cdot 10^3} = 386 \, mm$$

$$S = 386 \, mm.$$

Espacement maximal permis.

On calcule d'abord la quantité $0,4 \, \phi_c \sqrt{f_c'} \, bd$

$$0,4 \, \phi_c \sqrt{f_c'} \, bd = 0,4 \times 0,6 \times \sqrt{20} \times 350 \times 530 \cdot 10^{-3}$$
$$= 199 \, KN$$

$$V_s < 199 \, KN$$

Donc espacement maximal $= \frac{d}{2}$ ou $600 \, mm$

$$\frac{d}{2} = \frac{530}{2} = 265 \, mm$$

On prend $S = 260 \, mm.$

Distance à partir de la quelle on n'a plus besoin d'étriers.

$$V_f = \frac{V_y}{2} = 49,75 \, KN.$$
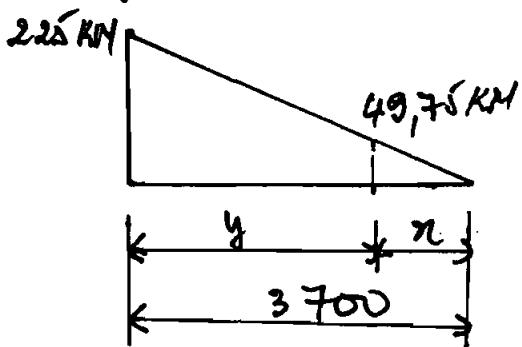
$$\frac{49,75}{n} = \frac{225}{3700}$$

$$\Rightarrow n = \frac{3700 \times 49,75}{225}$$

$$= 818 \, mm$$

$y = 3700 - 818 = 2885 \, mm \simeq \dfrac{5900}{2} = 2950 \, mm.$

⟹ on a besoin de 26 étriers dont :

- 2 sont respectivement chacun à 75 mm des poteaux

- 2 autres sont respectivement chacun à 100 mm d'un des deux autres.

- les restes sont espacés de 250 mm.

Pour la portée 1

$$\dfrac{49,75 - 9,2}{x} = \dfrac{83,2 - 9,2}{1750}$$

⟹ $x = \dfrac{1750 \times 40,55}{74} = 958 \, mm$

⟹ $y = 792 \, mm.$

On a besoin alors de 5 étriers dont :

- le 1ᵉ est à 75 mm du poteau

- le 2ᵉ est à 100 mm du premier

- les restes sont espacés de 250 mm.

Pour la portée 5

$$\dfrac{140}{2000} = \dfrac{49,75}{x} \implies x = 710 \, mm \text{ et } y = 1290 \, mm$$

Donc on a besoin de 7 étriers dont la répartition est analogue au cas précédent.

Quant à la seconde partie de cette portée où $V = 93,8 \, KN$ on a besoin de 4 étriers répartis de la même manière que les cas précédents.

4- Calcul d'une dalle

Nous allons calculer la dalle du rez-de-chaussée limitée par les axes 1-B-2-E. Ainsi nous avons une dalle dans deux directions encastrée de deux côtés opposés.
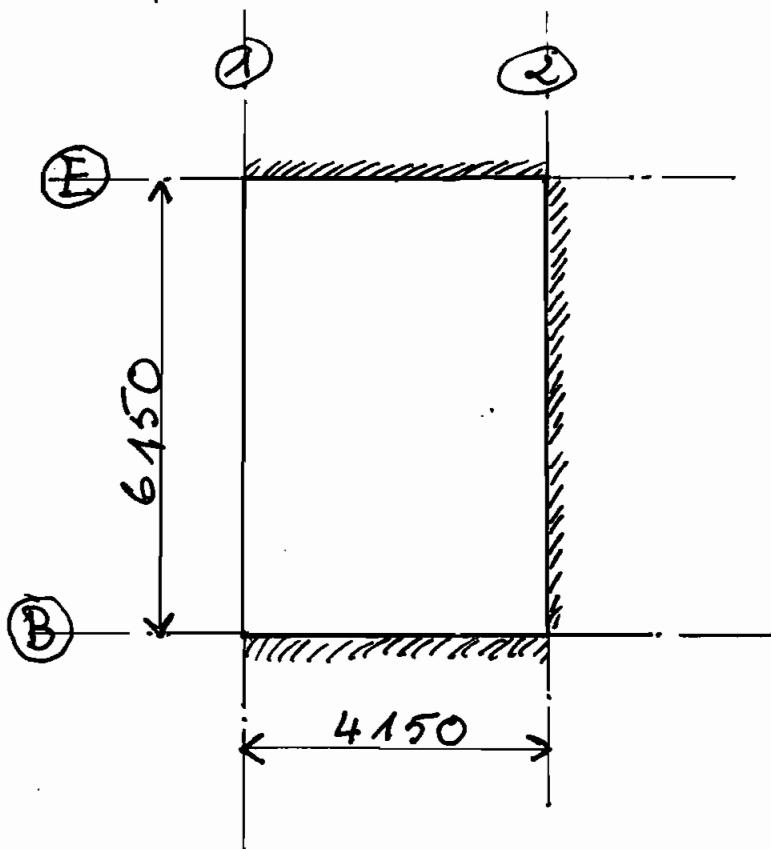
La charge totale pondérée appliquée sur la dalle est : $1,25 \times 5,915 + 1,5 \times 6 = 16,4 \text{ KN}/m^2$. Les figures de la page 143 nous permettent de trouver les efforts internes et les moments dans la dalle.

Pour notre cas nous avons :

$$\frac{\ell_y}{\ell_n} = \frac{6150}{4150} = 1,5$$

Ainsi :

$$m_{x\,erm} = \frac{Pl_x^2}{10,6} = \frac{16,4 \times 4,15^2}{10,6} = 26,7 \; KN \cdot m/m$$

$$m_{x\,m} = \frac{Pl_x^2}{25,2} = 11,2 \; KN \cdot m/m$$

$$m_{y\,ermin} = \frac{Pl_x^2}{12,7} = 22,24 \; KN \cdot m/m$$

$$m_{y\,m} = \frac{Pl_x^2}{55} = 5,2 \; KN \cdot m/m$$

$$q_{x\,erm} = \frac{Pl_x}{1,71} = 39,8 \; KN/m$$

$$q_{x\,m} = \frac{Pl_x}{2,51} = 27,2 \; KN/m$$

$$q_{y\,erm} = \frac{Pl_x}{1,85} = 36,8 \; KN/m$$

Vérification de la flèche :

On aura une flèche de

$$f_m = \frac{Pl_x^4}{Ed^3} \times 0,0409 = \frac{16,4 \times 4,15^4 \times 0,0409}{5000\sqrt{20} \cdot 10^3 \times (0,2)^3}$$

$$= 1,12 \cdot 10^{-3} m = 1,12 \; mm.$$

La limite de la flèche est :

$$f_L = \frac{l_x}{360} = 11,52 \; mm > 1,12 \; mm \qquad O.K.$$

Dimensionnement en flexion.

On a choisi :

- L'épaisseur minimale d'enrobage pour une résistance de 2 heures au feu : $e = 25 \; mm$
- Les barres $\phi \, 10 \; (d = 11,3 \; mm)$

Ainsi $d = 200 - 25 - 11,3 - 11,3/2 = 158$ mm

on a $A_{s\,min} = 0,002\, A_g = 0,002 \times 200 \times 1000$

$$= 400 \text{ mm}^2$$

Nous avons le tableau des résultats suivant:

Moment (KN·m)	26,7	11,2	22,24	5,2
K_r (MPa)	1,07	0,45	0,90	0,21
$100\,\ell$	0,34	0,15	0,28	0,15
A_s (mm²)	538	237	443	237
$A_s = Max(A_s, A_{s\,min})$	538	400	443	400
ℓ pour $\varnothing 10$	$\ell = 180$ mm	$\ell = 250$ mm	$\ell = 220$ mm	$\ell = 250$ mm

Dimensionnement en cisaillement

$$V_d = \frac{39,8\,(2075 - 158)}{2075} = 36,77 \text{ KN}$$

Trouvons la force de cisaillement que peut reprendre le béton :

$$V_c = 0,2\, \lambda\, \phi_c \sqrt{f_c'}\; bd = 0,2 \times 1 \times 0,6 \sqrt{20} \times 1000 \times 158 / 1000$$

$$= 84,8 \text{ KN}$$

$$\frac{V_c}{2} = \frac{84,8}{2} = 42,4 \text{ KN} > 36,77 \text{ KN} \qquad O.K$$

$\Rightarrow$ le béton peut reprendre tous les efforts de cisaillement et on n'a pas besoin d'acier de cisaillement.

5- Calcul du mur de soutènement.

Nous allons considérer le mur de sou-
tènement compris entre les axes 1 et 6 ; et
parallèle à l'axe A.

Pour les calculs nous allons prendre une
bande de 1 m. Ainsi nous avons la structure
suivante :
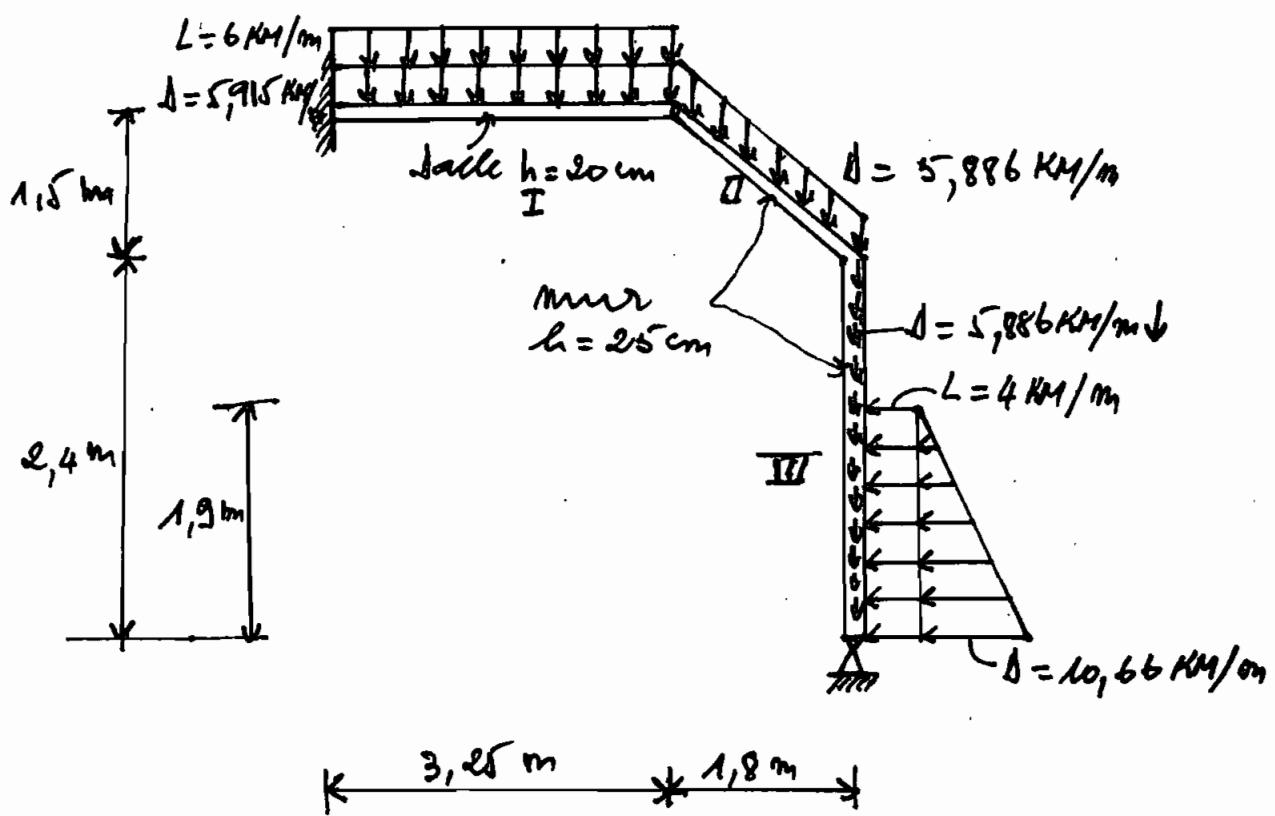
Calcul des charges mises sur la structure

La partie I de la structure qui est une
partie de la dalle du-rez-de-chaussée est
soumise à une charge permanente de 5,915 KN/m
et une surcharge de 6 KN/m.

La partie II qui fait partie du mur est

soumise uniquement à son poids propre qui est de : $0,25 \times 1 \times \dfrac{2400}{1000} \times 9,81 = 5,886$ KN/m

La partie III est soumise à son poids propre qui est de 5,886 KN/m et à la force horizontale de poussée que nous allons calculer.

Force de poussée.

- La force permanente de poussée est due à la poussée de la terre et sa valeur à une profondeur d du sol est :

$$P_1 = \gamma d K_a$$

on γ = poids volumique de la terre

$K_a = 0,33$ est le coefficient de poussée

Ainsi nous avons en bas du mur

$$P_1 = 17 \times 1,9 \times 0,33 = 10,66 \text{ KN/m}^2$$

Pour une tranchée de 1 m on a $P_1 = 10,66$ KN/m

- La surcharge de poussée : Nous avons une surcharge verticale de 12 KN/m² (d'après la table de la page 136) pour les trottoirs et voies d'accès privées pour automobiles aménagés au-dessus d'un sous-sol, soit une poussée linéaire horizontale de :

$$12 \dfrac{KN}{m^2} \times 1 m \times 0,33 = 4 \text{ KN/m}$$

Au total nous avons la mise en charge qui est sur la structure à la page précédente.

Pour le dimensionnement nous allons considérer le cas critique des combinaisons suivantes :

$$A + B + C$$
$$A + B$$
$$A + C$$
$$1,25A + 1,5B + 1,5C$$
$$1,25A + 1,5B$$
$$1,25A + 1,5C$$

avec

A = charge permanente

B = surcharge sur la dalle du Rez-de-chaussée

C = surcharge due à la poussée de la terre.

Une fois la mise en charge terminée et en considérant ces combinaisons, nous allons calculer les efforts internes et les moments dans le mur, ainsi que les réactions au sol à l'aide du logiciel "P-FRAME". Nous avons les résultats sur la sortie d'ordinateur "STRUC 03" à la page 120

Dimensionnement en flexion

On choisit les barres ϕ 10 $(d = 11,3\ mm)$

et un enrobage de 40 mm

$$d = 250 - 40 - \frac{11,3}{2} = 204,35\ mm$$

on prend $d = 200\ mm$

Le moment de dimensionnement est de 26,5 KN·m

$$K_r = \frac{26,5 \cdot 10^6}{200^2 \times 1000} = 0,67$$

on a pris $f'_c = 20\ MPa$, $f_y = 400\ MPa$

$\Rightarrow \varepsilon = 0,21\%$

$A_s = \varepsilon bd = 0,0021 \times 1000 \times 200 = 420\ mm^2$

$A_{s\,min} = 0,002\,Ag = 0,002 \times 1000 \times 250 = 500\ mm^2$

Donc on prend $A_s = A_{s\,min} = 500\ mm^2$

Soit $e = 200\ mm$

Longueur d'ancrage

Elle est $0,019\,A_b\,f_y / \sqrt{f'_c} \geq 0,058\,d_b\,f_y$

on a $0,019\,A_b\,f_y / \sqrt{f'_c} = 0,019 \times 100 \times 400 / \sqrt{20}$

$$= 170\ mm$$

et $0,058\,d_b\,f_y = 0,058 \times 11,3 \times 400$

$$= 263\ mm > 170\ mm$$

On choisit une longueur d'ancrage de 300 mm

Dimensionnement en compression.

On a une force maximale de compression

de 53,5 KN. Or la force de compression admis-

sible par le béton est:

$$c_c = 0,85 \, \phi_c \, f'_c (Ag - A_{st})$$
$$= 0,85 \times 0,6 \times 20 (250 \times 1000 - 560) \cdot 10^{-3}$$
$$= 2544 \, KN \gg 53,5 \, KN \qquad O.K.$$

$\Rightarrow$ on n'a pas besoin d'acier de compression.

Dimensionnement en cisaillement

La force maximale de cisaillement dans le mur est $18 \, KN$, or la force de cisaillement que peut prendre le béton est:

$$V_c = 0,2 \, d \, \phi_c \sqrt{f'_c} \, bd = 0,2 \times 0,6\sqrt{20} \times 1000 \times \frac{200}{1000}$$
$$= 107,3 \, KN$$

$$\frac{V_c}{2} = 53,6 \, KN > 18 \, KM \qquad O.K$$

$\Rightarrow$ on n'a pas besoin d'acier pour prendre les effort de cisaillement.

Dimensionnement de la semelle filante du mur

La réaction R_y due aux charges de service que nous allons prendre pour trouver les dimensions de la semelle est $R_y = 53,5 \, KN$.

Calcul de la longeur de la semelle:

Soit B cette longeur

on a $q_{adm} = 234 \, KN/m^2$

$$R_y = 98 \Rightarrow B = \frac{R_y}{9} = \frac{41,5}{234} = 0,178 \text{ m}$$

$$= 178 \text{ mm}.$$

Or nous avons un mur d'épaisseur 250 mm. Donc comme semelle filante on a besoin seulement d'une dalle de propreté de largeur 600 mm et d'épaisseur 200 mm.

Vérification de la sécurité au renversement et de la sécurité au glissement.

Sécurité au renversement.

Etant donné que la partie supérieure du mur se repose sur la dalle du rez de chaussée, nous aurons la sécurité au renversement.

Sécurité au glissement.

Pour vérifier la sécurité au glissement nous allons prendre le cas critique, c'est à dire le cas où il y a la surcharge de la poussée, mais il n'y a pas de surcharge sur la dalle du rez de chaussée. Ainsi nous avons considéré le cas de la combinaison 3 (Voir la sortie d'ordinateur "STRUC 03" page 120)

Alors on a : $R_x = 7,887$ KN

$$R_y = 34,657 \text{ KN}$$

Pour le sol on a $\varphi = 30°$

$$\Rightarrow K_a = 0,33 \text{ et } K_p = 3$$

Soit A la surface de base

$$H = \mathcal{Z} A$$

$$\mathcal{Z} = \frac{R_y}{A} \text{ tg } \delta$$

avec $\delta = \frac{2}{3} \varphi = 20°$ car nous avons une surface de contact béton sable.

$$\Rightarrow H = \mathcal{Z} A = R_y \text{ tg } 20°$$

Pour avoir la sécurité au glissement il faut que :

$$\frac{H}{R_x} \geq 1,5 \text{ soit } \frac{R_y}{R_x} \text{ tg } 20° \geq 1,5$$

on a : $\frac{R_y}{R_x} \text{ tg } 20° = \frac{34,657}{7,887} \text{ tg } 20°$

$$= 1,59 \geq 1,5 \quad O.K$$

$\Rightarrow$ On a la sécurité au glissement.

6- Calcul du 1ᵉʳ volet de l'escalier reliant le Rez de chaussée au 1ᵉʳ étage

L'escalier a une largeur de 1,4 m et la forme suivante :

$$\overset{0,22}{\longmapsto}\quad 1,75 \quad * \quad 3\,m \quad * \quad 1,4\,m \quad \overset{0,22}{\longmapsto}$$
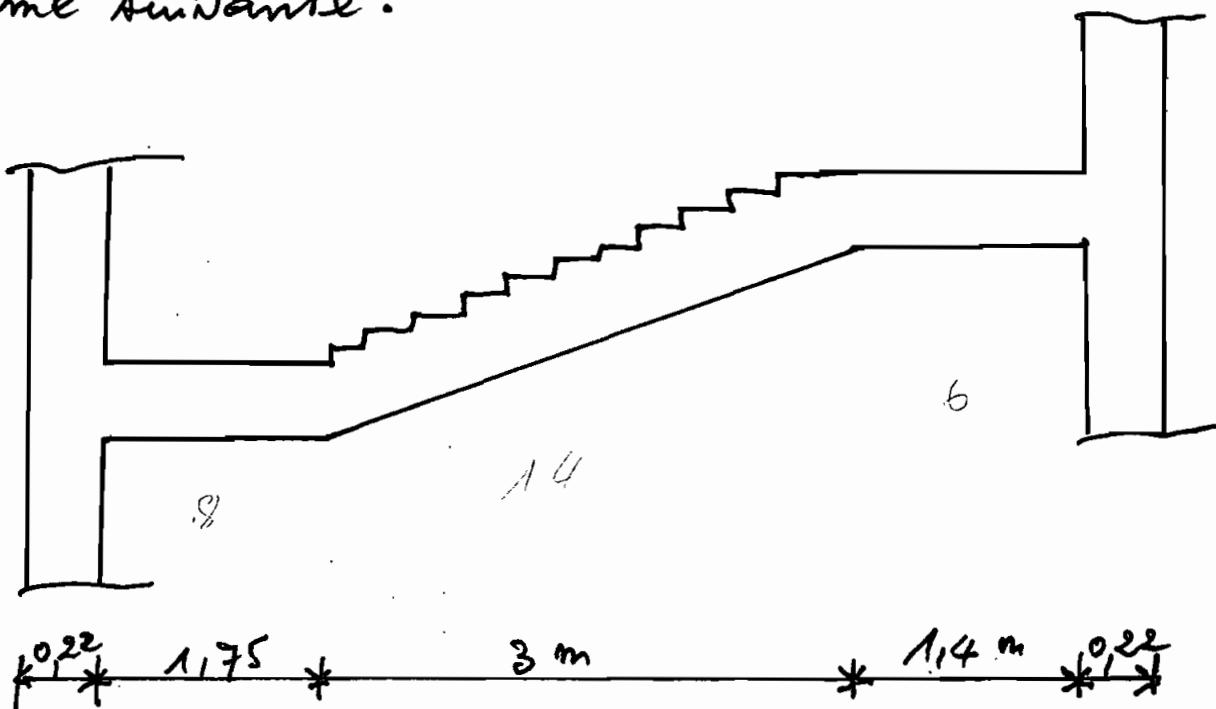
Nous avons une dalle d'épaisseur 20 cm, mais pour les calculs nous allons prendre 25 cm à cause des marches au dessous de la dalle. Ainsi nous avons

charge linéaire morte =

$$\frac{2400}{1000} \times 9,81 \times 1,4 \times 0,25 = 8,24 \ KN/m$$

charge linéaire vive =

$$4,8 \times 1,4 = 6,72 \ KN/m.$$

Soit au total on a une charge linéaire pondérée de : $q = 1,25 \times 8,24 + 1,5 \times 6,72 = 20,38 \ KN/m$

On a un moment au centre = $\dfrac{q\ell^2}{24} = \dfrac{20,38 \times 6,37^2}{24} = 34,5 \ KN.m$

et un moment d'encastrement $= \dfrac{q \ell^2}{12} = 69$ KN. m

Alors nous avons le chargement et les diagrammes des efforts suivants :

$q = 20,38$ KN/m

69 KN.m   69 KN. m

34,5 KN. m
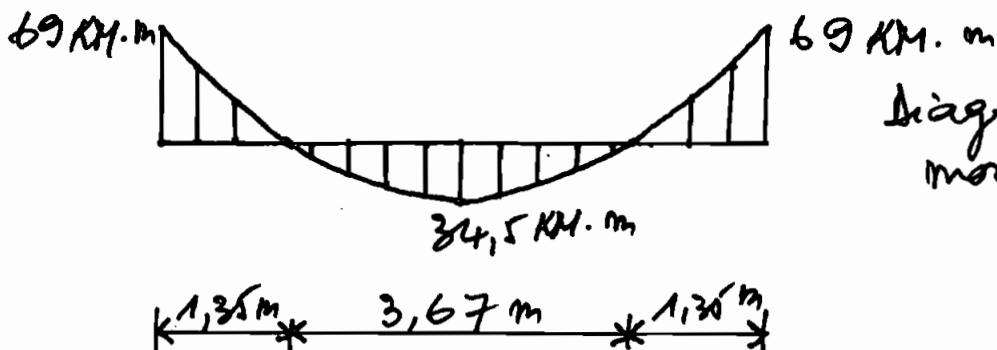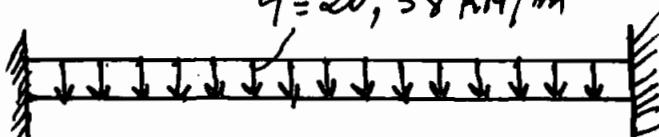
Diagramme des moments

1,35 m   3,67 m   1,35 m

65 KN

65 KN
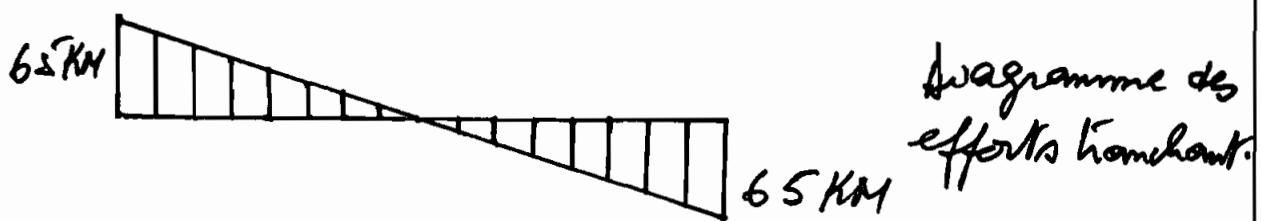
Diagramme des efforts tranchant.

Passons à présent au dimensionnement de l'escalier qui est p. considéré comme une poutre dont la section est la suivante :

on choisit barres ϕ 10 ($d = 11,3^{mm}$)

enrobage 20 mm

$\Rightarrow d = 200 - 20 - 11,3/2 \simeq 170$ mm .

200   170

1400
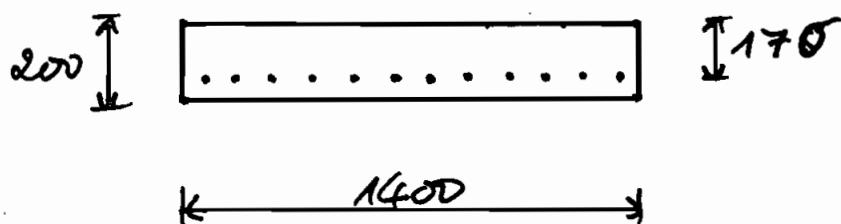
Nous avons le tableau suivant:

M_u (KN. m)	69	34,5
K_n (MPa)	1,71	0,86
100 ρ	0,56	0,27
A_s (mm²)	1333	643
Choix d'Armature	14 ϕ 10	7 ϕ 10
Écartement (mm)	$e = 110$	$e = 225$

Pour les aciers de répartition A_r, on peut prendre $A_r = 0,002 \, A_g = 0,002 \times 200 \times 1000$

$$= 400 \, mm^2 / m$$

Soit $4 \, \phi \, 10 / m \Rightarrow e = 250 \, mm$

Dimensionnement en cisaillement.

. Vérification de la section

on a $V_d = \dfrac{65 \, (3,18 - 0,11 - 0,17)}{3,18} = 59,3 \, KN$

$V_d < 1 \, \phi_c \sqrt{f_c'} \, bd = 0,6 \sqrt{20} \times 1400 \times 170/1000$

$$= 638 \, KN$$

On a $59,3^{KN} < 638 \, KN \Rightarrow$ La section est suffi-
samment grande.

. Effort repris par le béton

$V_c = 0,2 \, d \, \phi_c \sqrt{f_c'} \, bd = 0,2 \times 0,6 \sqrt{20} \times 1400 \times 170/1000$

$$= 127,72 \, KN$$

on a $V_d < \dfrac{V_c}{2} \Rightarrow$ on n'a pas besoin des
étriers de cisaillement.

7 - Conclusion et recommandations.

Nous n'allons pas développer une théorie sur la conclusion parce que tout notre travail sera résumé par les plans de béton de la page 144 à 150.

Cependant le seul gage de succès d'un projet de construction est sa bonne réalisation. C'est pourquoi, nous nous sommes proposés de faire mention de recommandations pratiques utiles quant à la réalisation de certains ouvrages:

- Décaper la couche superficielle du sol de fondation et au besoin, compacter le sol car la stabilité de l'ensemble du bâtiment est le probleime le plus important.

- Après coffrage attendre deux semaines avant de commencer à décoffrer. De plus il est possible de décoffrer complètement à 28 jours après le coffrage.

- Il faut éviter de mettre les agglos de remplissage avant 14 jours après le décoffrage des poutres. De plus avant d'appliquer les agglos jusqu'au niveau de la poutre ou dalle du plancher haut, il faut appliquer une charge équivalente à celle estimée sur le plancher.

- Avant de poser l'enduit sur la face inférieure du plancher, attendre la pose de toutes les charges que doivent recevoir le plancher afin d'éviter la fissuration de l'enduit.

- ANNEXES -

A-1:

CALCUL DE STRUCTURE
POUR LE DIMENSIONNEMENT
DES POTEAUX
SORTIE D'ORDINATEUR:
"STRUC 1L"

SOFTEK SERVICES LTD.

_ Micro Engineering Software _

REGISTRATION NO. 100158

P-FRAME

Release 1.03

<C> Copyright Softek Services Ltd. 1983,1984

STR. 12   INITIALIZING DATA   DRIVE A

TOTAL MEMBERS	TOTAL JOINTS	TOTAL SPRINGS	TOTAL SECTIONS	TOTAL LD CASES	TOTAL LD COMB	YOUNGMOD (MPA)	SHEARMOD (MPA)
63	46	0	7	3	6	24000	10000

CLIENT: ENTREPRISE GOMEZ /COTONOU /BENIN
USER NAME: VIADINOU JEAN-BAPTISTE
FRAME DESCRIPTION: SOLUTION DE CADRE RIGIDE
UNITS (M/I): M
BANDWIDTH OPTIMIZATION (Y/N): N

STR. 12   JOINT DATA   DRIVE A

JOINT NO.	X-FREEDOM	Y-FREEDOM	Z-FREEDOM	X-COORDINATE (METERS)	Y-COORDINATE (METERS)
1	0	0	0	+3.2500	+0.0000
2	0	0	0	+9.7500	+0.0000
3	0	0	0	+16.2500	+0.0000
4	0	0	0	+22.7500	+0.0000
5	1	1	1	+0.0000	+3.5000
6	1	1	1	+3.2500	+3.5000
7	1	1	1	+9.7500	+3.5000
8	1	1	1	+16.2500	+3.5000
9	1	1	1	+22.7500	+3.5000
10	1	1	1	+24.5000	+3.5000
11	1	1	1	+0.0000	+7.5800
12	1	1	1	+3.2500	+7.5800
13	1	1	1	+9.7500	+7.5800
14	1	1	1	+16.2500	+7.5800
15	1	1	1	+22.7500	+7.5800
16	1	1	1	+24.5000	+7.5800
17	1	1	1	+2.5000	+11.3200
18	1	1	1	+3.2500	+11.3200
19	1	1	1	+9.7500	+11.3200
20	1	1	1	+16.2500	+11.3200
21	1	1	1	+22.7500	+11.3200
22	1	1	1	+23.5000	+11.3200
23	1	1	1	+1.7500	+15.0600
24	1	1	1	+3.2500	+15.0600
25	1	1	1	+9.7500	+15.0600
26	1	1	1	+16.2500	+15.0600
27	1	1	1	+22.7500	+15.0600
28	1	1	1	+23.5000	+15.0600
29	1	1	1	+1.7500	+18.8000
30	1	1	1	+3.2500	+18.8000
31	1	1	1	+9.7500	+18.8000
32	1	1	1	+16.2500	+18.8000
33	1	1	1	+22.7500	+18.8000
34	1	1	1	+23.5000	+18.8000
35	1	1	1	+2.5000	+22.8800
36	1	1	1	+3.2500	+22.8800
37	1	1	1	+9.7500	+22.8800
38	1	1	1	+16.2500	+22.8800
39	1	1	1	+22.7500	+22.8800
40	1	1	1	+23.5000	+22.8800
41	1	1	1	+2.5000	+26.6200
42	1	1	1	+3.2500	+26.6200
43	1	1	1	+9.7500	+26.6200
44	1	1	1	+16.2500	+26.6200
45	1	1	1	+22.7500	+26.6200
46	1	1	1	+23.5000	+26.6200

STR. 12   MEMBER DATA   DRIVE A

Section Properties Data :

SECTION NUMBER	X-SECTIONAL AREA (MM2)	MOM. INERTIA 1.0E+06 (MM4)	SHEAR AREA (MM2)
1	+90,000.000	+675.000	+75,000.000
2	+120,000.000	+1,600.000	+100,000.000
3	+150,000.000	+3,125.000	+125,000.000
4	+200,000.000	+4,166.666	+166,660.000
5	+240,000.000	+7,200.000	+200,000.000
6	+180,000.000	+5,400.000	+150,000.000
7	+210,000.000	+6,300.000	+175,000.000

Member Connectivity Data :

MEMBER NUMBER	LOWER JOINT	GREATER JOINT	LOWER END TYPE	GREATER END TYPE	SECTION NUMBER
1	1	6	1	1	5
2	6	12	1	1	5
3	12	18	1	1	4
4	18	24	1	1	4
5	24	30	1	1	2
6	30	36	1	1	2
7	36	42	1	1	1
8	2	7	1	1	5
9	7	13	1	1	5
10	13	19	1	1	4
11	19	25	1	1	4
12	25	31	1	1	2
13	31	37	1	1	2
14	37	43	1	1	1
15	3	8	1	1	5
16	8	14	1	1	5
17	14	20	1	1	4
18	20	26	1	1	4
19	26	32	1	1	2
20	32	38	1	1	2
21	38	44	1	1	1
22	4	9	1	1	5
23	9	15	1	1	5
24	15	21	1	1	4
25	21	27	1	1	4
26	27	33	1	1	2
27	33	39	1	1	2
28	39	45	1	1	1
29	5	6	1	1	7
30	6	7	1	1	7
31	7	8	1	1	7
32	8	9	1	1	7
33	9	10	1	1	7
34	11	12	1	1	7
35	12	13	1	1	7
36	13	14	1	1	7
37	14	15	1	1	7

38	15	16	1	1	7
39	17	18	1	1	7
40	18	19	1	1	7
41	19	20	1	1	7
42	20	21	1	1	7
43	21	22	1	1	7
44	23	24	1	1	7
45	24	25	1	1	7
46	25	26	1	1	7
47	26	27	1	1	7
48	27	28	1	1	7
49	29	30	1	1	6
50	30	31	1	1	6
51	31	32	1	1	6
52	32	33	1	1	6
53	33	34	1	1	6
54	35	36	1	1	6
55	36	37	1	1	6
56	37	38	1	1	6
57	38	39	1	1	6
58	39	40	1	1	6
59	41	42	1	1	3
60	42	43	1	1	3
61	43	44	1	1	3
62	44	45	1	1	3
63	45	46	1	1	3

STR. 12   LOAD DATA   DRIVE A

LOAD CASE   1

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
1	46	0	charge permanente

Joint Load Data :

RECORD NUMBER	LOADED JOINT	HORIZONTAL LOAD (KN)	VERTICAL LOAD (KN)	EXTERNAL MOMENT (KN-M)
1	1	+0.0000	+0.0000	+0.0000
2	2	+0.0000	+0.0000	+0.0000
3	3	+0.0000	+0.0000	+0.0000
4	4	+0.0000	+0.0000	+0.0000
5	5	+0.0000	+0.0000	+0.0000
6	6	+0.0000	-298.4200	-33.5000
7	7	+0.0000	-286.9000	+0.0000
8	8	+0.0000	-286.9000	+0.0000
9	9	+0.0000	-248.8000	+68.4000
10	10	+0.0000	+0.0000	+0.0000
11	11	+0.0000	+0.0000	+0.0000
12	12	+0.0000	-302.1000	+93.2000
13	13	+0.0000	-335.9500	+0.0000
14	14	+0.0000	-335.9500	+0.0000
15	15	+0.0000	-272.8000	+68.4000
16	16	+0.0000	+0.0000	+0.0000
17	17	+0.0000	+0.0000	+0.0000
18	18	+0.0000	-171.1300	-51.8000
19	19	+0.0000	-275.6200	+0.0000
20	20	+0.0000	-275.6200	+0.0000
21	21	+0.0000	-171.1300	+51.8000
22	22	+0.0000	+0.0000	+0.0000
23	23	+0.0000	+0.0000	+0.0000
24	24	+0.0000	-201.7200	-51.8000
25	25	+0.0000	-275.6200	+0.0000
26	26	+0.0000	-275.6200	+0.0000
27	27	+0.0000	-171.1300	+51.8000
28	28	+0.0000	+0.0000	+0.0000
29	29	+0.0000	+0.0000	+0.0000
30	30	+0.0000	-204.0300	-51.8000
31	31	+0.0000	-280.2600	+0.0000
32	32	+0.0000	-280.2600	+0.0000
33	33	+0.0000	-175.9300	+51.8000
34	34	+0.0000	+0.0000	+0.0000
35	35	+0.0000	+0.0000	+0.0000
36	36	+0.0000	-237.9300	-51.8000
37	37	+0.0000	-328.6700	+0.0000
38	38	+0.0000	-329.6700	+0.0000
39	39	+0.0000	-237.9300	+51.8000

40	40	+0.0000	+0.0000	+0.0000
41	41	+0.0000	+0.0000	+0.0000
42	42	+0.0000	-141.7500	-51.8000
43	43	+0.0000	-245.0500	+0.0000
44	44	+0.0000	-245.0500	+0.0000
45	45	+0.0000	-141.7500	+51.8000
46	46	+0.0000	+0.0000	+0.0000

LOAD CASE 2

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
2	46	0	surcharge

Joint Load Data :

RECORD NUMBER	LOADED JOINT	HORIZONTAL LOAD (KN)	VERTICAL LOAD (KN)	EXTERNAL MOMENT (KN-M)
1	1	+0.0000	+0.0000	+0.0000
2	2	+0.0000	+0.0000	+0.0000
3	3	+0.0000	+0.0000	+0.0000
4	4	+0.0000	+0.0000	+0.0000
5	5	+0.0000	+0.0000	+0.0000
6	6	+0.0000	-195.0000	-38.9000
7	7	+0.0000	-243.7500	+0.0000
8	8	+0.0000	-243.7500	+0.0000
9	9	+0.0000	-150.0000	+69.4000
10	10	+0.0000	+0.0000	+0.0000
11	11	+0.0000	+0.0000	+0.0000
12	12	+0.0000	-117.0000	+23.2000
13	13	+0.0000	-146.2500	+0.0000
14	14	+0.0000	-146.2500	+0.0000
15	15	+0.0000	-90.0000	+41.7000
16	16	+0.0000	+0.0000	+0.0000
17	17	+0.0000	+0.0000	+0.0000
18	18	+0.0000	-50.4000	-31.5000
19	19	+0.0000	-111.1500	+0.0000
20	20	+0.0000	-111.1500	+0.0000
21	21	+0.0000	-50.4000	+31.5000
22	22	+0.0000	+0.0000	+0.0000
23	23	+0.0000	+0.0000	+0.0000
24	24	+0.0000	-66.1500	-31.5000
25	25	+0.0000	-111.1500	+0.0000
26	26	+0.0000	-111.1500	+0.0000
27	27	+0.0000	-50.4000	+31.5000
28	28	+0.0000	+0.0000	+0.0000
29	29	+0.0000	+0.0000	+0.0000
30	30	+0.0000	-66.1500	-31.5000
31	31	+0.0000	-111.1500	+0.0000
32	32	+0.0000	-111.1500	+0.0000
33	33	+0.0000	-50.4000	+31.5000
34	34	+0.0000	+0.0000	+0.0000
35	35	+0.0000	+0.0000	+0.0000

36	36	+0.0000	-50.4000	-31.5000
37	37	+0.0000	-111.1500	+0.0000
38	38	+0.0000	-111.1500	+0.0000
39	39	+0.0000	-50.4000	+31.5000
40	40	+0.0000	+0.0000	+0.0000
41	41	+0.0000	+0.0000	+0.0000
42	42	+0.0000	-14.0000	-31.5000
43	43	+0.0000	-30.8750	+0.0000
44	44	+0.0000	-30.8750	+0.0000
45	45	+0.0000	-14.0000	+8.8000
46	46	+0.0000	+0.0000	+0.0000

LOAD CASE 3

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
3	7	0	chargement du vent

Joint Load Data :

RECORD NUMBER	LOADED JOINT	HORIZONTAL LOAD (KN)	VERTICAL LOAD (KN)	EXTERNAL MOMENT (KN-M)
1	6	+27.9000	+0.0000	+0.0000
2	12	+27.1000	+0.0000	+0.0000
3	18	+22.1000	+0.0000	+0.0000
4	24	+23.6000	+0.0000	+0.0000
5	30	+25.9000	+0.0000	+0.0000
6	36	+27.0000	+0.0000	+0.0000
7	42	+22.3000	+0.0000	+0.0000

STR. 12 LOAD COMBINATION DATA DRIVE A

LOAD COMB	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT
1	1	1	2	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	1.25	2	1.5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	1.25	3	1.5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1.25	3	-1.5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	1	1.25	2	1.05	3	1.05	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1.25	2	1.05	3	-1.05	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL STRUCTURE DEGREES OF FREEDOM = 126
THE HALF-BANDWIDTH = 21 AT MEMBER 2

STR. 12   JOINT DEFORMATIONS   DRIVE A

MEM NO.	LD. CSE	X-DISPLACE JL. MM.	Y-DISPLACE JL. MM.	ROTATION JL. RAD.	X-DISPLACE JG. MM.	Y-DISPLACE JG. MM.	ROTATION JG. RAD.
1	1	+0.00000	+0.00000	+0.00000	-0.09519	-0.95523	-0.00008
	2	+0.00000	+0.00000	+0.00000	-0.07030	-0.34230	-0.00008
	3	+0.00000	+0.00000	+0.00000	+2.12214	+0.07055	-0.00072
2	1	-0.09519	-0.95523	-0.00008	-0.65756	-1.85630	+0.00041
	2	-0.07030	-0.34230	-0.00008	-0.33625	-0.60298	+0.00014
	3	+2.12214	+0.07055	-0.00072	+6.07171	+0.13425	-0.00076
3	1	-0.65756	-1.85630	+0.00041	-1.10773	-2.60204	-0.00021
	2	-0.33625	-0.60298	+0.00014	-0.53680	-0.79429	-0.00012
	3	+6.07171	+0.13425	-0.00076	+9.73659	+0.18326	-0.00064
4	1	-1.10773	-2.60204	-0.00021	-1.14742	-3.21271	-0.00023
	2	-0.53680	-0.79429	-0.00012	-0.55839	-0.94537	-0.00014
	3	+9.73659	+0.18326	-0.00064	+12.77374	+0.21521	-0.00056
5	1	-1.14742	-3.21271	-0.00023	-1.22860	-3.96578	-0.00041
	2	-0.55839	-0.94537	-0.00014	-0.60323	-1.10998	-0.00024
	3	+12.77374	+0.21521	-0.00056	+16.60434	+0.24531	-0.00052
6	1	-1.22860	-3.96578	-0.00041	-1.28840	-4.49741	-0.00049
	2	-0.60323	-1.10998	-0.00024	-0.63231	-1.19578	-0.00029
	3	+16.60434	+0.24531	-0.00052	+19.83690	+0.25970	-0.00035
7	1	-1.28840	-4.49741	-0.00049	-1.32575	-4.73497	-0.00112
	2	-0.63231	-1.19578	-0.00029	-0.48303	-1.21422	-0.00066
	3	+19.83690	+0.25970	-0.00035	+22.14892	+0.26369	-0.00022
8	1.	+0.00000	+0.00000	+0.00000	-0.11302	-1.22821	+0.00006
	2	+0.00000	+0.00000	+0.00000	-0.07721	-0.52580	+0.00004
	3	+0.00000	+0.00000	+0.00000	+2.10138	-0.00829	-0.00056
9	1	-0.11302	-1.22821	+0.00006	-0.65111	-2.45604	+0.00002
	2	-0.07721	-0.52580	+0.00004	-0.33704	-0.96540	+0.00001
	3	+2.10138	-0.00829	-0.00056	+6.04215	-0.01595	-0.00058
10	1	-0.65111	-2.45604	+0.00002	-1.08532	-3.55305	+0.00002
	2	-0.33704	-0.96540	+0.00001	-0.52697	-1.33837	+0.00001
	3	+6.04215	-0.01595	-0.00058	+9.71526	-0.02227	-0.00046
11	1	-1.08532	-3.55305	+0.00002	-1.15765	-4.43557	-0.00004
	2	-0.52697	-1.33837	+0.00001	-0.56417	-1.62507	-0.00002
	3	+9.71526	-0.02227	-0.00046	+12.74555	-0.02692	-0.00036
12	1	-1.15765	-4.43557	-0.00004	-1.22624	-5.55077	-0.00005
	2	-0.56417	-1.62507	-0.00002	-0.60188	-1.95963	-0.00002
	3	+12.74555	-0.02692	-0.00036	+16.57411	-0.03177	-0.00029
13	1	-1.22624	-5.55077	-0.00005	-1.29038	-6.37058	-0.00008
	2	-0.60188	-1.95963	-0.00002	-0.63436	-2.16695	-0.00004
	3	+16.57411	-0.03177	-0.00029	+19.80386	-0.03370	-0.00018

14	1	-1.29038	-6.37058	-0.00008	-1.34580	-6.80308	+0.00005
	2	-0.63436	-2.16695	-0.00004	-0.49374	-2.22728	+0.00003
	3	+19.80386	-0.03370	-0.00018	+22.11682	-0.03406	-0.00009
15	1	+0.00000	+0.00000	+0.00000	-0.11706	-1.23054	+0.00005
	2	+0.00000	+0.00000	+0.00000	-0.07864	-0.52438	+0.00002
	3	+0.00000	+0.00000	+0.00000	+2.08497	+0.00816	-0.00055
16	1	-0.11706	-1.23054	+0.00005	-0.64822	-2.46133	+0.00010
	2	-0.07864	-0.52438	+0.00002	-0.33950	-0.96181	+0.00005
	3	+2.08497	+0.00816	-0.00055	+6.02451	+0.01584	-0.00058
17	1	-0.64822	-2.46133	+0.00010	-1.06992	-3.55300	+0.00007
	2	-0.33950	-0.96181	+0.00005	-0.51988	-1.32918	+0.00003
	3	+6.02451	+0.01584	-0.00058	+9.70088	+0.02213	-0.00046
18	1	-1.06992	-3.55300	+0.00007	-1.16843	-4.43245	+0.00006
	2	-0.51988	-1.32918	+0.00003	-0.57050	-1.61126	+0.00003
	3	+9.70088	+0.02213	-0.00046	+12.73030	+0.02674	-0.00036
19	1	-1.16843	-4.43245	+0.00006	-1.22370	-5.54386	+0.00007
	2	-0.57050	-1.61126	+0.00003	-0.60057	-1.93872	+0.00004
	3	+12.73030	+0.02674	-0.00036	+16.55469	+0.03156	-0.00029
20	1	-1.22370	-5.54386	+0.00007	-1.29499	-6.36129	+0.00010
	2	-0.60057	-1.93872	+0.00004	-0.63859	-2.13904	+0.00004
	3	+16.55469	+0.03156	-0.00029	+19.78355	+0.03349	-0.00018
21	1	-1.29499	-6.36129	+0.00010	-1.36661	-6.79281	-0.00003
	2	-0.63859	-2.13904	+0.00004	-0.50363	-2.19054	+0.00004
	3	+19.78355	+0.03349	-0.00018	+22.09669	+0.03386	-0.00009
22	1	+0.00000	+0.00000	+0.00000	-0.11417	-0.85936	+0.00021
	2	+0.00000	+0.00000	+0.00000	-0.07810	-0.27589	+0.00019
	3	+0.00000	+0.00000	+0.00000	+2.07209	-0.07042	-0.00071
23	1	-0.11417	-0.85936	+0.00021	-0.65051	-1.68710	+0.00028
	2	-0.07810	-0.27589	+0.00019	-0.34543	-0.49331	+0.00014
	3	+2.07209	-0.07042	-0.00071	+6.01880	-0.13414	-0.00076
24	1	-0.65051	-1.68710	+0.00028	-1.06183	-2.38739	+0.00022
	2	-0.34543	-0.49331	+0.00014	-0.51562	-0.66313	+0.00013
	3	+6.01880	-0.13414	-0.00076	+9.69357	-0.18312	-0.00064
25	1	-1.06183	-2.38739	+0.00022	-1.17726	-2.95327	+0.00028
	2	-0.51562	-0.66313	+0.00013	-0.57580	-0.79300	+0.00016
	3	+9.69357	-0.18312	-0.00064	+12.72802	-0.21503	-0.00056
26	1	-1.17726	-2.95327	+0.00028	-1.22149	-3.67111	+0.00045
	2	-0.57580	-0.79300	+0.00016	-0.59905	-0.94254	+0.00026
	3	+12.72802	-0.21503	-0.00056	+16.54606	-0.24510	-0.00052
27	1	-1.22149	-3.67111	+0.00045	-1.29710	-4.20354	+0.00053
	2	-0.59905	-0.94254	+0.00026	-0.64323	-1.03397	+0.00032
	3	+16.54606	-0.24510	-0.00052	+19.77597	-0.25949	-0.00035
28	1	-1.29710	-4.20354	+0.00053	-1.38695	-4.44142	+0.00117
	2	-0.64323	-1.03397	+0.00032	-0.51164	-1.05910	+0.00026
	3	+19.77597	-0.25949	-0.00035	+22.08852	-0.26348	-0.00022

29	1	-0.09519	-0.70604	-0.00008	-0.09519	-0.95523	-0.00008
	2	-0.07030	-0.08859	-0.00008	-0.07030	-0.34230	-0.00008
	3	+2.12214	+2.40199	-0.00072	+2.12214	+0.07055	-0.00072
30	1	-0.09519	-0.95523	-0.00008	-0.11302	-1.22821	+0.00006
	2	-0.07030	-0.34230	-0.00008	-0.07721	-0.52580	+0.00004
	3	+2.12214	+0.07055	-0.00072	+2.10138	-0.00829	-0.00056
31	1	-0.11302	-1.22821	+0.00006	-0.11706	-1.23054	+0.00005
	2	-0.07721	-0.52580	+0.00004	-0.07864	-0.52438	+0.00002
	3	+2.10138	-0.00829	-0.00056	+2.08497	+0.00816	-0.00055
32	1	-0.11706	-1.23054	+0.00005	-0.11417	-0.85936	+0.00021
	2	-0.07864	-0.52438	+0.00002	-0.07810	-0.27589	+0.00019
	3	+2.08497	+0.00816	-0.00055	+2.07209	-0.07042	-0.00071
33	1	-0.11417	-0.85936	+0.00021	-0.11417	-0.49196	+0.00021
	2	-0.07810	-0.27589	+0.00019	-0.07810	+0.06001	+0.00019
	3	+2.07209	-0.07042	-0.00071	+2.07209	-1.30911	-0.00071
34	1	-0.65756	-3.20065	+0.00041	-0.65756	-1.85630	+0.00041
	2	-0.33625	-1.06568	+0.00014	-0.33625	-0.60298	+0.00014
	3	+6.07171	+2.60696	-0.00076	+6.07171	+0.13425	-0.00076
35	1	-0.65756	-1.85630	+0.00041	-0.65111	-2.45604	+0.00002
	2	-0.33625	-0.60298	+0.00014	-0.33704	-0.96540	+0.00001
	3	+6.07171	+0.13425	-0.00076	+6.04215	-0.01595	-0.00058
36	1	-0.65111	-2.45604	+0.00002	-0.64822	-2.46133	+0.00010
	2	-0.33704	-0.96540	+0.00001	-0.33950	-0.96181	+0.00005
	3	+6.04215	-0.01595	-0.00058	+6.02451	+0.01584	-0.00058
37	1	-0.64822	-2.46133	+0.00010	-0.65051	-1.68710	+0.00028
	2	-0.33950	-0.96181	+0.00005	-0.34543	-0.49331	+0.00014
	3	+6.02451	+0.01584	-0.00058	+6.01880	-0.13414	-0.00076
38	1	-0.65051	-1.68710	+0.00028	-0.65051	-1.19030	+0.00028
	2	-0.34543	-0.49331	+0.00014	-0.34543	-0.24418	+0.00014
	3	+6.01880	-0.13414	-0.00076	+6.01880	-1.47013	-0.00076
39	1	-1.10773	-2.44644	-0.00021	-1.10773	-2.60204	-0.00021
	2	-0.53680	-0.70800	-0.00012	-0.53680	-0.79429	-0.00012
	3	+9.73659	+0.66582	-0.00064	+9.73659	+0.18326	-0.00064
40	1	-1.10773	-2.60204	-0.00021	-1.08532	-3.55305	+0.00002
	2	-0.53680	-0.79429	-0.00012	-0.52697	-1.33837	+0.00001
	3	+9.73659	+0.18326	-0.00064	+9.71526	-0.02227	-0.00046
41	1	-1.08532	-3.55305	+0.00002	-1.06992	-3.55300	+0.00007
	2	-0.52697	-1.33837	+0.00001	-0.51988	-1.32918	+0.00003
	3	+9.71526	-0.02227	-0.00046	+9.70088	+0.02213	-0.00046
42	1	-1.06992	-3.55300	+0.00007	-1.06183	-2.38739	+0.00022
	2	-0.51988	-1.32918	+0.00003	-0.51562	-0.66313	+0.00013
	3	+9.70088	+0.02213	-0.00046	+9.69357	-0.18312	-0.00064
43	1	-1.06183	-2.38739	+0.00022	-1.06183	-2.21915	+0.00022
	2	-0.51562	-0.66313	+0.00013	-0.51562	-0.56705	+0.00013
	3	+9.69357	-0.18312	-0.00064	+9.69357	-0.66623	-0.00064

44	1	−1.14742	−2.86488	−0.00023	−1.14742	−3.21271	−0.00023
	2	−0.55839	−0.73521	−0.00014	−0.55839	−0.94537	−0.00014
	3	+12.77374	+1.05728	−0.00056	+12.77374	+0.21521	−0.00056
45	1	−1.14742	−3.21271	−0.00023	−1.15765	−4.43557	−0.00004
	2	−0.55839	−0.94537	−0.00014	−0.56417	−1.62507	−0.00002
	3	+12.77374	+0.21521	−0.00056	+12.74555	−0.02692	−0.00036
46	1	−1.15765	−4.43557	−0.00004	−1.16843	−4.43245	+0.00006
	2	−0.56417	−1.62507	−0.00002	−0.57050	−1.61126	+0.00003
	3	+12.74555	−0.02692	−0.00036	+12.73030	+0.02674	−0.00036
47	1	−1.16843	−4.43245	+0.00006	−1.17726	−2.95327	+0.00028
	2	−0.57050	−1.61126	+0.00003	−0.57580	−0.79300	+0.00016
	3	+12.73030	+0.02674	−0.00036	+12.72802	−0.21503	−0.00056
48	1	−1.17726	−2.95327	+0.00028	−1.17726	−2.74360	+0.00028
	2	−0.57580	−0.79300	+0.00016	−0.57580	−0.66959	+0.00016
	3	+12.72802	−0.21503	−0.00056	+12.72802	−0.63504	−0.00056
49	1	−1.22860	−3.35759	−0.00041	−1.22860	−3.96578	−0.00041
	2	−0.60323	−0.75417	−0.00024	−0.60323	−1.10998	−0.00024
	3	+16.60434	+1.03016	−0.00052	+16.60434	+0.24531	−0.00052
50	1	−1.22860	−3.96578	−0.00041	−1.22624	−5.55077	−0.00005
	2	−0.60323	−1.10998	−0.00024	−0.60188	−1.95963	−0.00002
	3	+16.60434	+0.24531	−0.00052	+16.57411	−0.03177	−0.00029
51	1	−1.22624	−5.55077	−0.00005	−1.22370	−5.54386	+0.00007
	2	−0.60188	−1.95963	−0.00002	−0.60057	−1.93872	+0.00004
	3	+16.57411	−0.03177	−0.00029	+16.55469	+0.03156	−0.00029
52	1	−1.22370	−5.54386	+0.00007	−1.22149	−3.67111	+0.00045
	2	−0.60057	−1.93872	+0.00004	−0.59905	−0.94254	+0.00026
	3	+16.55469	+0.03156	−0.00029	+16.54606	−0.24510	−0.00052
53	1	−1.22149	−3.67111	+0.00045	−1.22149	−3.33656	+0.00045
	2	−0.59905	−0.94254	+0.00026	−0.59905	−0.75017	+0.00026
	3	+16.54606	−0.24510	−0.00052	+16.54606	−0.63651	−0.00052
54	1	−1.28840	−4.13168	−0.00049	−1.28840	−4.49741	−0.00049
	2	−0.63231	−0.97838	−0.00029	−0.63231	−1.19578	−0.00029
	3	+19.83690	+0.52320	−0.00035	+19.83690	+0.25970	−0.00035
55	1	−1.28840	−4.49741	−0.00049	−1.29038	−6.37058	−0.00008
	2	−0.63231	−1.19578	−0.00029	−0.63436	−2.16695	−0.00004
	3	+19.83690	+0.25970	−0.00035	+19.80386	−0.03370	−0.00018
56	1	−1.29038	−6.37058	−0.00008	−1.29499	−6.36129	+0.00010
	2	−0.63436	−2.16695	−0.00004	−0.63859	−2.13904	+0.00004
	3	+19.80386	−0.03370	−0.00018	+19.78355	+0.03349	−0.00018
57	1	−1.29499	−6.36129	+0.00010	−1.29710	−4.20354	+0.00053
	2	−0.63859	−2.13904	+0.00004	−0.64323	−1.03397	+0.00032
	3	+19.78355	+0.03349	−0.00018	+19.77597	−0.25949	−0.00035
58	1	−1.29710	−4.20354	+0.00053	−1.29710	−3.80510	+0.00053
	2	−0.64323	−1.03397	+0.00032	−0.64323	−0.79119	+0.00032
	3	+19.77597	−0.25949	−0.00035	+19.77597	−0.52292	−0.00035

59	1	-1.32575	-3.89470	-0.00112	-1.32575	-4.73497	-0.00112
	2	-0.48303	-0.71983	-0.00066	-0.48303	-1.21422	-0.00066
	3	+22.14892	+0.43026	-0.00022	+22.14892	+0.26369	-0.00022
60	1	-1.32575	-4.73497	-0.00112	-1.34580	-6.80308	+0.00005
	2	-0.48303	-1.21422	-0.00066	-0.49374	-2.22728	+0.00003
	3	+22.14892	+0.26369	-0.00022	+22.11682	-0.03406	-0.00009
61	1	-1.34580	-6.80308	+0.00005	-1.36661	-6.79281	-0.00003
	2	-0.49374	-2.22728	+0.00003	-0.50363	-2.19054	+0.00004
	3	+22.11682	-0.03406	-0.00009	+22.09669	+0.03386	-0.00009
62	1	-1.36661	-6.79281	-0.00003	-1.38695	-4.44142	+0.00117
	2	-0.50363	-2.19054	+0.00004	-0.51164	-1.05910	+0.00026
	3	+22.09669	+0.03386	-0.00009	+22.08852	-0.26348	-0.00022
63	1	-1.38695	-4.44142	+0.00117	-1.38695	-3.56538	+0.00117
	2	-0.51164	-1.05910	+0.00026	-0.51164	-0.86682	+0.00026
	3	+22.08852	-0.26348	-0.00022	+22.08852	-0.43006	-0.00022

STR. 12 MEMBER END ACTIONS DRIVE A

MEM NO.	LD. CSE	AXIAL (KN) LOWER JT.	SHEAR (KN) LOWER JT.	BM (KN-M) LOWER JT.	AXIAL (KN) UPPER JT.	SHEAR (KN) UPPER JT.	BM (KN-M) UPPER JT.
1	1	+1572.030	-10.227	-14.113	-1572.030	+10.227	-21.683
	2	+563.330	-9.226	-12.292	-563.330	+9.226	-20.000
	3	-116.103	+38.648	+103.052	+116.103	-38.648	+32.217
2	1	+1272.100	+3.594	-13.434	-1272.100	-3.594	+28.099
	2	+368.023	-3.873	-17.238	-368.023	+3.873	+1.434
	3	-89.930	+26.845	+56.606	+89.930	-26.845	+52.924
3	1	+957.106	-1.410	+13.971	-957.106	+1.410	-19.243
	2	+245.527	-3.261	+0.785	-245.527	+3.261	-12.980
	3	-62.900	+22.665	+39.244	+62.900	-22.665	+45.523
4	1	+783.747	-18.789	-34.483	-783.747	+18.789	-35.789
	2	+193.905	-10.880	-19.676	-193.905	+10.880	-21.017
	3	-41.004	+17.108	+29.798	+41.004	-17.108	+34.184
5	1	+579.904	-10.856	-18.518	-579.904	+10.856	-22.082
	2	+126.755	-6.399	-10.970	-126.755	+6.399	-12.963
	3	-23.178	+15.370	+28.350	+23.178	-15.370	+29.133
6	1	+375.269	-12.423	-24.570	-375.269	+12.423	-26.117
	2	+60.564	-7.291	-14.377	-60.564	+7.291	-15.368
	3	-10.161	+9.563	+17.890	+10.161	-9.563	+21.125
7	1	+137.199	-11.107	-18.029	-137.199	+11.107	-23.511
	2	+10.651	-5.930	-9.490	-10.651	+5.930	-12.689
	3	-2.304	+4.523	+7.898	+2.304	-4.523	+9.018
8	1	+2021.283	+0.010	-3.177	-2021.283	-0.010	+3.213
	2	+865.312	-0.614	-2.865	-865.312	+0.614	+0.714
	3	+13.635	+50.335	+115.524	-13.635	-50.335	+60.649
9	1	+1733.408	-10.673	-19.753	-1733.408	+10.673	-23.791
	2	+620.621	-4.851	-8.717	-620.621	+4.851	-11.076
	3	+10.821	+46.958	+96.616	-10.821	-46.958	+94.974
10	1	+1407.926	-7.912	-14.907	-1407.926	+7.912	-14.684
	2	+478.674	-3.559	-6.590	-478.674	+3.559	-6.721
	3	+8.107	+37.717	+67.575	-8.107	-37.717	+73.486
11	1	+1132.651	-2.471	-2.900	-1132.651	+2.471	-6.340
	2	+367.957	-1.439	-1.962	-367.957	+1.439	-3.419
	3	+5.974	+32.318	+57.738	-5.974	-32.318	+63.132
12	1	+858.758	-2.046	-3.770	-858.758	+2.046	-3.881
	2	+257.629	-1.011	-1.885	-257.629	+1.011	-1.898
	3	+3.734	+22.277	+40.867	-3.734	-22.277	+42.450
13	1	+578.690	-2.167	-4.115	-578.690	+2.167	-4.725
	2	+146.345	-0.995	-1.898	-146.345	+0.995	-2.163
	3	+1.363	+15.088	+29.741	-1.363	-15.088	+31.818
14	1	+249.791	-0.417	-1.345	-249.791	+0.417	-0.216

	2	+0.000	-0.000	+0.000	-0.000	+0.000	-0.000
	3	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
30	1	+13.822	+1.510	+1.618	-13.822	-1.510	+8.195
	2	+5.353	+0.307	-1.662	-5.353	-0.307	+3.656
	3	+16.097	-26.173	-88.823	-16.097	+26.173	-81.303
31	1	+3.139	+2.485	+8.345	-3.139	-2.485	+7.806
	2	+1.116	+1.248	+4.347	-1.116	-1.248	+3.765
	3	+12.721	-23.359	-75.963	-12.721	+23.359	-75.872
32	1	-2.247	+3.120	+6.491	+2.247	-3.120	+13.787
	2	-0.422	+2.918	+5.570	+0.422	-2.918	+13.395
	3	+9.990	-25.934	-80.702	-9.990	+25.934	-87.869
33	1	+0.000	-0.000	-0.000	-0.000	+0.000	-0.000
	2	-0.000	+0.000	+0.000	+0.000	-0.000	-0.000
	3	+0.000	-0.000	-0.000	+0.000	+0.000	+0.000
34	1	+0.000	+0.000	-0.000	-0.000	-0.000	+0.000
	2	+0.000	+0.000	-0.000	-0.000	-0.000	+0.000
	3	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
35	1	-5.004	+12.894	+51.130	+5.004	-12.894	+32.678
	2	+0.613	+5.497	+20.981	-0.613	-5.497	+14.747
	3	+22.920	-27.030	-92.168	-22.920	+27.030	-83.528
36	1	-2.243	+2.425	+6.020	+2.243	-2.425	+9.743
	2	+1.905	+1.194	+2.919	-1.905	-1.194	+4.840
	3	+13.678	-24.316	-79.021	-13.678	+24.316	-79.031
37	1	+1.780	+2.991	+5.375	-1.780	-2.991	+14.067
	2	+4.596	+1.004	+1.106	-4.596	-1.004	+5.417
	3	+4.426	-27.090	-83.667	-4.426	+27.090	-92.418
38	1	+0.000	-0.000	-0.000	+0.000	+0.000	-0.000
	2	-0.000	-0.000	-0.000	+0.000	+0.000	-0.000
	3	+0.000	-0.000	-0.000	+0.000	+0.000	+0.000
39	1	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
	2	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
	3	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
40	1	-17.380	+2.229	+1.926	+17.380	-2.229	+12.565
	2	-7.620	+1.222	+1.157	+7.620	-1.222	+6.785
	3	+16.542	-21.896	-75.321	-16.542	+21.896	-67.000
41	1	-11.938	+1.884	+5.019	+11.938	-1.884	+7.228
	2	-5.499	+0.788	+1.897	+5.499	-0.788	+3.226
	3	+11.144	-19.763	-64.224	-11.144	+19.763	-64.232
42	1	-6.279	-1.375	-8.090	+6.279	+1.375	-0.850
	2	-3.305	-0.887	-5.061	+3.305	+0.887	-0.706
	3	+5.671	-21.916	-67.055	-5.671	+21.916	-75.402
43	1	-0.000	-0.000	-0.000	+0.000	+0.000	+0.000
	2	-0.000	-0.000	-0.000	+0.000	+0.000	+0.000
	3	+0.000	-0.000	-0.000	+0.000	+0.000	+0.000
44	1	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000

	2	+0.000	-0.000	-0.000	-0.000	+0.000	+0.000
	3	-0.000	+0.000	+0.000	+0.000	+0.000	-0.000
45	1	+7.934	+2.123	+2.507	-7.934	-2.123	+11.290
	2	+4.481	+1.000	+0.486	-4.481	-1.000	+6.013
	3	+21.862	-17.826	-62.534	-21.862	+17.826	-53.338
46	1	+8.359	+0.396	-1.180	-8.359	-0.396	+3.754
	2	+4.908	+0.178	-0.709	-4.908	-0.178	+1.868
	3	+11.821	-15.587	-50.662	-11.821	+15.587	-50.653
47	1	+6.844	-2.360	-12.709	-6.844	+2.360	-2.631
	2	+4.110	-1.114	-6.655	-4.110	+1.114	-0.585
	3	+1.768	-17.796	-53.266	-1.768	+17.796	-62.408
48	1	+0.000	-0.000	-0.000	+0.000	+0.000	+0.000
	2	+0.000	-0.000	-0.000	-0.000	+0.000	+0.000
	3	-0.000	-0.000	-0.000	+0.000	+0.000	+0.000
49	1	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
	2	+0.000	-0.000	+0.000	-0.000	+0.000	-0.000
	3	-0.000	+0.000	+0.000	+0.000	-0.000	-0.000
50	1	-1.567	+0.606	-5.148	+1.567	-0.606	+9.086
	2	-0.891	+0.041	-4.159	+0.891	-0.041	+4.425
	3	+20.093	-13.017	-47.023	-20.093	+13.017	-37.588
51	1	-1.688	+0.414	-1.091	+1.688	-0.414	+3.780
	2	-0.875	+0.175	-0.629	+0.875	-0.175	+1.767
	3	+12.903	-10.646	-34.602	-12.903	+10.646	-34.596
52	1	-1.469	-1.015	-10.724	+1.469	+1.015	+4.126
	2	-1.007	-0.214	-5.049	+1.007	+0.214	+3.659
	3	+5.741	-12.992	-37.532	-5.741	+12.992	-46.919
53	1	+0.000	-0.000	-0.000	+0.000	+0.000	+0.000
	2	+0.000	-0.000	-0.000	-0.000	+0.000	-0.000
	3	-0.000	-0.000	-0.000	+0.000	+0.000	+0.000
54	1	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
	2	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
	3	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
55	1	+1.316	+0.140	-7.654	-1.316	-0.140	+8.564
	2	+1.360	-0.486	-6.642	-1.360	+0.486	+3.480
	3	+21.960	-7.856	-29.024	-21.960	+7.856	-22.043
56	1	+3.065	+0.369	-2.494	-3.065	-0.369	+4.893
	2	+2.811	-0.133	-1.893	-2.811	+0.133	+1.028
	3	+13.498	-6.704	-21.788	-13.498	+6.704	-21.786
57	1	+1.397	-0.509	-10.168	-1.397	+0.509	+6.857
	2	+3.085	+0.375	-4.493	-3.085	-0.375	+6.932
	3	+5.039	-7.856	-22.042	-5.039	+7.856	-29.021
58	1	-0.000	-0.000	-0.000	+0.000	+0.000	+0.000
	2	+0.000	-0.000	-0.000	+0.000	+0.000	+0.000
	3	-0.000	-0.000	-0.000	+0.000	+0.000	-0.000
59	1	+0.000	-0.000	+0.000	-0.000	+0.000	-0.000

	2	+0.000	-0.000	+0.000	-0.000	+0.000	-0.000
	3	-0.000	+0.000	+0.000	+0.000	-0.000	+0.000
60	1	+11.107	-4.551	-28.289	-11.107	+4.551	-1.295
	2	+5.930	-3.349	-18.811	-5.930	+3.349	-2.961
	3	+17.777	-2.304	-9.018	-17.777	+2.304	-5.959
61	1	+11.524	+0.189	+1.511	-11.524	-0.189	-0.279
	2	+5.475	+0.617	+1.833	-5.475	-0.617	+2.178
	3	+11.152	-2.094	-6.806	-11.152	+2.094	-6.805
62	1	+11.266	+4.361	+0.370	-11.266	-4.361	+27.975
	2	+4.438	-0.515	-4.140	-4.438	+0.515	+0.793
	3	+4.525	-2.305	-5.962	-4.525	+2.305	-9.022
63	1	+0.000	-0.000	-0.000	+0.000	+0.000	-0.000
	2	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
	3	+0.000	-0.000	-0.000	-0.000	+0.000	+0.000

STR. 12   SUPPORT REACTIONS   DRIVE A

JOINT NUMBER	LOAD CSE	X-REACTION (KNTS)	Y-REACTION (KNTS)	Z-REACTION (KNTS-M)
1	1	+10.227	+1572.030	−14.113
	2	+9.226	+563.330	−12.292
	3	−38.648	−116.103	+103.052
2	1	−0.010	+2021.283	−3.177
	2	+0.614	+865.312	−2.865
	3	−50.335	+13.635	+115.524
3	1	+1.074	+2025.119	−4.503
	2	+1.654	+862.975	−4.067
	3	−49.756	−13.422	+114.414
4	1	−11.292	+1414.258	+9.395
	2	−11.495	+454.033	+10.640
	3	−37.161	+115.890	+99.978

STR. 12   JOINT DEFORMATIONS   DRIVE A

MEM NO.	LD. CMB	X-DISPLACE JL. MM.	Y-DISPLACE JL. MM.	ROTATION JL. RAD.	X-DISPLACE JG. MM.	Y-DISPLACE JG. MM.	ROTATION JG. RAD.
1	1	+0.00000	+0.00000	+0.00000	-0.16549	-1.29753	-0.00015
	2	+0.00000	+0.00000	+0.00000	-0.22444	-1.70748	-0.00021
	3	+0.00000	+0.00000	+0.00000	+3.06422	-1.08821	-0.00117
	4	+0.00000	+0.00000	+0.00000	-3.30220	-1.29986	+0.00098
	5	+0.00000	+0.00000	+0.00000	+2.03544	-1.47937	-0.00093
	6	+0.00000	+0.00000	+0.00000	-2.42105	-1.62753	+0.00058
2	1	-0.16549	-1.29753	-0.00015	-0.99382	-2.45928	+0.00056
	2	-0.22444	-1.70748	-0.00021	-1.32633	-3.22485	+0.00073
	3	+3.06422	-1.08821	-0.00117	+8.28561	-2.11900	-0.00062
	4	-3.30220	-1.29986	+0.00098	-9.92952	-2.52174	+0.00166
	5	+2.03544	-1.47937	-0.00093	+5.20028	-2.81254	-0.00013
	6	-2.42105	-1.62753	+0.00058	-7.55032	-3.09447	+0.00147
3	1	-0.99382	-2.45928	+0.00056	-1.64454	-3.39633	-0.00032
	2	-1.32633	-3.22485	+0.00073	-2.18987	-4.44399	-0.00043
	3	+8.28561	-2.11900	-0.00062	+13.22022	-2.97767	-0.00122
	4	-9.92952	-2.52174	+0.00166	-15.98955	-3.52744	+0.00071
	5	+5.20028	-2.81254	-0.00013	+8.27511	-3.89414	-0.00106
	6	-7.55032	-3.09447	+0.00147	-12.17173	-4.27898	+0.00030
4	1	-1.64454	-3.39633	-0.00032	-1.70581	-4.15809	-0.00037
	2	-2.18987	-4.44399	-0.00043	-2.27186	-5.43395	-0.00050
	3	+13.22022	-2.97767	-0.00122	+17.72634	-3.69308	-0.00113
	4	-15.98955	-3.52744	+0.00071	-20.59489	-4.33870	+0.00055
	5	+8.27511	-3.89414	-0.00106	+11.39184	-4.78257	-0.00103
	6	-12.17173	-4.27898	+0.00030	-15.43302	-5.23450	+0.00015
5	1	-1.70581	-4.15809	-0.00037	-1.83183	-5.07576	-0.00064
	2	-2.27186	-5.43395	-0.00050	-2.44059	-6.62220	-0.00086
	3	+17.72634	-3.69308	-0.00113	+23.37076	-4.58927	-0.00129
	4	-20.59489	-4.33870	+0.00055	-26.44226	-5.32519	+0.00028
	5	+11.39184	-4.78257	-0.00103	+15.26542	-5.86514	-0.00131
	6	-15.43302	-5.23450	+0.00015	-19.60370	-6.38028	-0.00021
6	1	-1.83183	-5.07576	-0.00064	-1.92071	-5.69319	-0.00078
	2	-2.44059	-6.62220	-0.00086	-2.55897	-7.41544	-0.00104
	3	+23.37076	-4.58927	-0.00129	+28.14485	-5.23222	-0.00114
	4	-26.44226	-5.32519	+0.00028	-31.36585	-6.01132	-0.00008
	5	+15.26542	-5.86514	-0.00131	+18.55432	-6.60465	-0.00128
	6	-19.60370	-6.38028	-0.00021	-23.10318	-7.15002	-0.00054
7	1	-1.92071	-5.69319	-0.00078	-1.80878	-5.94919	-0.00178
	2	-2.55897	-7.41544	-0.00104	-2.38173	-7.74004	-0.00239
	3	+28.14485	-5.23222	-0.00114	+31.56620	-5.52318	-0.00173
	4	-31.36585	-6.01132	-0.00008	-34.88056	-6.31425	-0.00107
	5	+18.55432	-6.60465	-0.00128	+21.09200	-6.91677	-0.00233
	6	-23.10318	-7.15002	-0.00054	-25.42073	-7.47052	-0.00186
8	1	+0.00000	+0.00000	+0.00000	-0.19022	-1.75401	+0.00010
	2	+0.00000	+0.00000	+0.00000	-0.25708	-2.32396	+0.00014
	3	+0.00000	+0.00000	+0.00000	+3.01080	-1.54769	-0.00075

	4	+0.00000	+0.00000	+0.00000	-3.29334	-1.52283	+0.00091
	5	+0.00000	+0.00000	+0.00000	+1.98411	-2.09605	-0.00046
	6	+0.00000	+0.00000	+0.00000	-2.42879	-2.07865	+0.00070
9	1	-0.19022	-1.75401	+0.00010	-0.98815	-3.42144	+0.00003
	2	-0.25708	-2.32396	+0.00014	-1.31945	-4.51816	+0.00003
	3	+3.01080	-1.54769	-0.00075	+8.24934	-3.09398	-0.00084
	4	-3.29334	-1.52283	+0.00091	-9.87712	-3.04613	+0.00088
	5	+1.98411	-2.09605	-0.00046	+5.17648	-4.10047	-0.00057
	6	-2.42879	-2.07865	+0.00070	-7.51204	-4.06698	+0.00063
10	1	-0.98815	-3.42144	+0.00003	-1.61229	-4.89142	+0.00003
	2	-1.31945	-4.51816	+0.00003	-2.14711	-6.44887	+0.00004
	3	+8.24934	-3.09398	-0.00084	+13.21623	-4.47471	-0.00067
	4	-9.87712	-3.04613	+0.00088	-15.92953	-4.40791	+0.00072
	5	+5.17648	-4.10047	-0.00057	+8.29105	-5.86998	-0.00046
	6	-7.51204	-4.06698	+0.00063	-12.11099	-5.82322	+0.00052
11	1	-1.61229	-4.89142	+0.00003	-1.72182	-6.06064	-0.00006
	2	-2.14711	-6.44887	+0.00004	-2.29332	-7.98207	-0.00009
	3	+13.21623	-4.47471	-0.00067	+17.67126	-5.56485	-0.00060
	4	-15.92953	-4.40791	+0.00072	-20.56539	-5.50409	+0.00049
	5	+8.29105	-5.86998	-0.00046	+11.34338	-7.27906	-0.00046
	6	-12.11099	-5.82322	+0.00052	-15.42227	-7.22252	+0.00031
12	1	-1.72182	-6.06064	-0.00006	-1.82813	-7.51040	-0.00007
	2	-2.29332	-7.98207	-0.00009	-2.43563	-9.87790	-0.00009
	3	+17.67126	-5.56485	-0.00060	+23.32836	-6.98611	-0.00049
	4	-20.56539	-5.50409	+0.00049	-26.39397	-6.89080	+0.00037
	5	+11.34338	-7.27906	-0.00046	+15.23803	-9.02943	-0.00038
	6	-15.42227	-7.22252	+0.00031	-19.56760	-8.96271	+0.00022
13	1	-1.82813	-7.51040	-0.00007	-1.92474	-8.53753	-0.00012
	2	-2.43563	-9.87790	-0.00009	-2.56452	-11.21365	-0.00016
	3	+23.32836	-6.98611	-0.00049	+28.09281	-8.01377	-0.00037
	4	-26.39397	-6.89080	+0.00037	-31.31877	-7.91267	+0.00016
	5	+15.23803	-9.02943	-0.00039	+18.51500	-10.27391	-0.00032
	6	-19.56760	-8.96271	+0.00022	-23.07311	-10.20313	+0.00005
14	1	-1.92474	-8.53753	-0.00012	-1.83954	-9.03036	+0.00008
	2	-2.56452	-11.21365	-0.00016	-2.42286	-11.84478	+0.00010
	3	+28.09281	-8.01377	-0.00037	+31.49299	-8.55495	-0.00007
	4	-31.31877	-7.91267	+0.00016	-34.85748	-8.45276	+0.00020
	5	+18.51500	-10.27391	-0.00032	+21.02199	-10.87827	-0.00000
	6	-23.07311	-10.20313	+0.00005	-25.42334	-10.80673	+0.00018
15	1	+0.00000	+0.00000	+0.00000	-0.19571	-1.75492	+0.00008
	2	+0.00000	+0.00000	+0.00000	-0.26430	-2.32474	+0.00010
	3	+0.00000	+0.00000	+0.00000	+2.98113	-1.52594	-0.00076
	4	+0.00000	+0.00000	+0.00000	-3.27379	-1.55041	+0.00090
	5	+0.00000	+0.00000	+0.00000	+1.96032	-2.08021	-0.00049
	6	+0.00000	+0.00000	+0.00000	-2.41813	-2.09734	+0.00067
16	1	-0.19571	-1.75492	+0.00008	-0.98772	-3.42314	+0.00015
	2	-0.26430	-2.32474	+0.00010	-1.31952	-4.51938	+0.00020
	3	+2.98113	-1.52594	-0.00076	+8.22649	-3.05290	-0.00074
	4	-3.27379	-1.55041	+0.00090	-9.84704	-3.10042	+0.00098
	5	+1.96032	-2.08021	-0.00049	+5.15899	-4.06993	-0.00043
	6	-2.41813	-2.09734	+0.00067	-7.49248	-4.10320	+0.00078

17	1	-0.98772	-3.42314	+0.00015	-1.58981	-4.88218	+0.00010
	2	-1.31952	-4.51938	+0.00020	-2.11723	-6.43502	+0.00014
	3	+8.22649	-3.05290	-0.00074	+13.21392	-4.40805	-0.00061
	4	-9.84704	-3.10042	+0.00098	-15.88873	-4.47444	+0.00078
	5	+5.15899	-4.06993	-0.00043	+8.30265	-5.81365	-0.00037
	6	-7.49248	-4.10320	+0.00078	-12.06921	-5.86012	+0.00061
18	1	-1.58981	-4.88218	+0.00010	-1.73893	-6.04371	+0.00010
	2	-2.11723	-6.43502	+0.00014	-2.31629	-7.95745	+0.00013
	3	+13.21392	-4.40805	-0.00061	+17.63491	-5.50045	-0.00047
	4	-15.88873	-4.47444	+0.00078	-20.55599	-5.58067	+0.00062
	5	+8.30265	-5.81365	-0.00037	+11.30725	-7.20430	-0.00027
	6	-12.06921	-5.86012	+0.00061	-15.42638	-7.26046	+0.00050
19	1	-1.73893	-6.04371	+0.00010	-1.82427	-7.48258	+0.00011
	2	-2.31629	-7.95745	+0.00013	-2.43048	-9.83790	+0.00015
	3	+17.63491	-5.50045	-0.00047	+23.30242	-6.88248	-0.00034
	4	-20.55599	-5.58067	+0.00062	-26.36167	-6.97716	+0.00052
	5	+11.30725	-7.20430	-0.00027	+15.22221	-8.93234	-0.00017
	6	-15.42638	-7.26046	+0.00050	-19.54265	-8.99861	+0.00043
20	1	-1.82427	-7.48258	+0.00011	-1.93358	-8.50033	+0.00014
	2	-2.43048	-9.83790	+0.00015	-2.57663	-11.16017	+0.00019
	3	+23.30242	-6.88248	-0.00034	+28.05658	-7.90138	-0.00013
	4	-26.36167	-6.97716	+0.00052	-31.29407	-8.00185	+0.00039
	5	+15.22221	-8.93234	-0.00017	+18.48347	-10.16244	-0.00002
	6	-19.54265	-8.99861	+0.00043	-23.06199	-10.23277	+0.00035
21	1	-1.93358	-8.50033	+0.00014	-1.87023	-8.98335	+0.00001
	2	-2.57663	-11.16017	+0.00019	-2.46370	-11.77682	+0.00003
	3	+28.05658	-7.90138	-0.00013	+31.43677	-8.44023	-0.00017
	4	-31.29407	-8.00185	+0.00039	-34.85329	-8.54180	+0.00010
	5	+18.48347	-10.16244	-0.00002	+20.96446	-10.75553	-0.00008
	6	-23.06199	-10.23277	+0.00035	-25.43859	-10.82663	+0.00010
22	1	+0.00000	+0.00000	+0.00000	-0.19227	-1.13525	+0.00040
	2	+0.00000	+0.00000	+0.00000	-0.25986	-1.48803	+0.00055
	3	+0.00000	+0.00000	+0.00000	+2.96543	-1.17983	-0.00080
	4	+0.00000	+0.00000	+0.00000	-3.25084	-0.96857	+0.00132
	5	+0.00000	+0.00000	+0.00000	+1.95098	-1.43782	-0.00028
	6	+0.00000	+0.00000	+0.00000	-2.40041	-1.28994	+0.00121
23	1	-0.19227	-1.13525	+0.00040	-0.99594	-2.18041	+0.00043
	2	-0.25986	-1.48803	+0.00055	-1.33128	-2.84884	+0.00057
	3	+2.96543	-1.17983	-0.00080	+8.21506	-2.31008	-0.00079
	4	-3.25084	-0.96857	+0.00132	-9.84135	-1.90767	+0.00150
	5	+1.95098	-1.43782	-0.00028	+5.14391	-2.76770	-0.00030
	6	-2.40041	-1.28994	+0.00121	-7.49558	-2.48601	+0.00131
24	1	-0.99594	-2.18041	+0.00043	-1.57745	-3.05053	+0.00035
	2	-1.33128	-2.84884	+0.00057	-2.10071	-3.97894	+0.00047
	3	+8.21506	-2.31008	-0.00079	+13.21307	-3.25892	-0.00069
	4	-9.84135	-1.90767	+0.00150	-15.86764	-2.70956	+0.00125
	5	+5.14391	-2.76770	-0.00030	+8.30957	-3.87281	-0.00026
	6	-7.49558	-2.48601	+0.00131	-12.04693	-3.48825	+0.00109
25	1	-1.57745	-3.05053	+0.00035	-1.75306	-3.74627	+0.00044
	2	-2.10071	-3.97894	+0.00047	-2.33528	-4.88109	+0.00060
	3	+13.21307	-3.25892	-0.00069	+17.62046	-4.01413	-0.00049
	4	-15.86764	-2.70956	+0.00125	-20.56360	-3.36905	+0.00119

	5	+8.30957	-3.87281	-0.00026	+11.28826	-4.75002	-0.00007
	6	-12.04693	-3.48825	+0.00109	-15.44059	-4.29846	+0.00111
26	1	-1.75306	-3.74627	+0.00044	-1.82054	-4.61365	+0.00070
	2	-2.33528	-4.88109	+0.00060	-2.42544	-6.00269	+0.00094
	3	+17.62046	-4.01413	-0.00049	+23.29222	-4.95653	-0.00023
	4	-20.56360	-3.36905	+0.00119	-26.34595	-4.22125	+0.00134
	5	+11.28826	-4.75002	-0.00007	+15.21749	-5.83590	+0.00028
	6	-15.44059	-4.29846	+0.00111	-19.52923	-5.32120	+0.00137
27	1	-1.82054	-4.61365	+0.00070	-1.94033	-5.23750	+0.00085
	2	-2.42544	-6.00269	+0.00094	-2.58622	-6.80537	+0.00115
	3	+23.29222	-4.95653	-0.00023	+28.04258	-5.64365	+0.00014
	4	-26.34595	-4.22125	+0.00134	-31.28532	-4.86518	+0.00119
	5	+15.21749	-5.83590	+0.00028	+18.46800	-6.61255	+0.00064
	6	-19.52923	-5.32120	+0.00137	-23.06153	-6.06762	+0.00137
28	1	-1.94033	-5.23750	+0.00085	-1.89859	-5.50052	+0.00142
	2	-2.58622	-6.80537	+0.00115	-2.50114	-7.14043	+0.00184
	3	+28.04258	-5.64365	+0.00014	+31.39909	-5.94700	+0.00113
	4	-31.28532	-4.86518	+0.00119	-34.86646	-5.15656	+0.00179
	5	+18.46800	-6.61255	+0.00064	+20.92204	-6.94049	+0.00150
	6	-23.06153	-6.06762	+0.00137	-25.46385	-6.38718	+0.00196
29	1	-0.16549	-0.79463	-0.00015	-0.16549	-1.29753	-0.00015
	2	-0.22444	-1.01544	-0.00021	-0.22444	-1.70748	-0.00021
	3	+3.06422	+2.72043	-0.00117	+3.06422	-1.08821	-0.00117
	4	-3.30220	-4.48554	+0.00098	-3.30220	-1.29986	+0.00098
	5	+2.03544	+1.54652	-0.00093	+2.03544	-1.47937	-0.00093
	6	-2.42105	-3.49766	+0.00058	-2.42105	-1.62753	+0.00058
30	1	-0.16549	-1.29753	-0.00015	-0.19022	-1.75401	+0.00010
	2	-0.22444	-1.70748	-0.00021	-0.25708	-2.32396	+0.00014
	3	+3.06422	-1.08821	-0.00117	+3.01080	-1.54769	-0.00075
	4	-3.30220	-1.29986	+0.00098	-3.29334	-1.52283	+0.00091
	5	+2.03544	-1.47937	-0.00093	+1.98411	-2.09605	-0.00046
	6	-2.42105	-1.62753	+0.00058	-2.42879	-2.07865	+0.00070
31	1	-0.19022	-1.75401	+0.00010	-0.19571	-1.75492	+0.00008
	2	-0.25708	-2.32396	+0.00014	-0.26430	-2.32474	+0.00010
	3	+3.01080	-1.54769	-0.00075	+2.98113	-1.52594	-0.00076
	4	-3.29334	-1.52283	+0.00091	-3.27379	-1.55041	+0.00090
	5	+1.98411	-2.09605	-0.00046	+1.96032	-2.08021	-0.00049
	6	-2.42879	-2.07865	+0.00070	-2.41813	-2.09734	+0.00067
32	1	-0.19571	-1.75492	+0.00008	-0.19227	-1.13525	+0.00040
	2	-0.26430	-2.32474	+0.00010	-0.25986	-1.48803	+0.00055
	3	+2.98113	-1.52594	-0.00076	+2.96543	-1.17983	-0.00080
	4	-3.27379	-1.55041	+0.00090	-3.25084	-0.96857	+0.00132
	5	+1.96032	-2.08021	-0.00049	+1.95098	-1.43782	-0.00028
	6	-2.41813	-2.09734	+0.00067	-2.40041	-1.28994	+0.00121
33	1	-0.19227	-1.13525	+0.00040	-0.19227	-0.43195	+0.00040
	2	-0.25986	-1.48803	+0.00055	-0.25986	-0.52493	+0.00055
	3	+2.96543	-1.17983	-0.00080	+2.96543	-2.57862	-0.00080
	4	-3.25084	-0.96857	+0.00132	-3.25084	+1.34872	+0.00132
	5	+1.95098	-1.43782	-0.00028	+1.95098	-1.92651	-0.00028
	6	-2.40041	-1.28994	+0.00121	-2.40041	+0.82263	+0.00121
34	1	-0.99382	-4.26633	+0.00056	-0.99382	-2.45928	+0.00056

	2	−1.32633	−5.59933	+0.00073	−1.32633	−3.22485	+0.00073
	3	+8.28561	−0.09037	−0.00062	+8.28561	−2.11900	−0.00062
	4	−9.92952	−7.91124	+0.00166	−9.92952	−2.52174	+0.00166
	5	+5.20028	−2.38247	−0.00013	+5.20028	−2.81254	−0.00013
	6	−7.55032	−7.85708	+0.00147	−7.55032	−3.09447	+0.00147
35	1	−0.99382	−2.45928	+0.00056	−0.98815	−3.42144	+0.00003
	2	−1.32633	−3.22485	+0.00073	−1.31945	−4.51816	+0.00003
	3	+8.28561	−2.11900	−0.00062	+8.24934	−3.09398	−0.00084
	4	−9.92952	−2.52174	+0.00166	−9.87712	−3.04613	+0.00088
	5	+5.20028	−2.81254	−0.00013	+5.17648	−4.10047	−0.00057
	6	−7.55032	−3.09447	+0.00147	−7.51204	−4.06698	+0.00063
36	1	−0.98815	−3.42144	+0.00003	−0.98772	−3.42314	+0.00015
	2	−1.31945	−4.51816	+0.00003	−1.31952	−4.51938	+0.00020
	3	+8.24934	−3.09398	−0.00084	+8.22649	−3.05290	−0.00074
	4	−9.87712	−3.04613	+0.00088	−9.84704	−3.10042	+0.00098
	5	+5.17648	−4.10047	−0.00057	+5.15899	−4.06993	−0.00043
	6	−7.51204	−4.06698	+0.00063	−7.49248	−4.10320	+0.00078
37	1	−0.98772	−3.42314	+0.00015	−0.99594	−2.18041	+0.00043
	2	−1.31952	−4.51938	+0.00020	−1.33128	−2.84884	+0.00057
	3	+8.22649	−3.05290	−0.00074	+8.21506	−2.31008	−0.00079
	4	−9.84704	−3.10042	+0.00098	−9.84135	−1.90767	+0.00150
	5	+5.15899	−4.06993	−0.00043	+5.14391	−2.76770	−0.00030
	6	−7.49248	−4.10320	+0.00078	−7.49558	−2.48601	+0.00131
38	1	−0.99594	−2.18041	+0.00043	−0.99594	−1.43449	+0.00043
	2	−1.33128	−2.84884	+0.00057	−1.33128	−1.85416	+0.00057
	3	+8.21506	−2.31008	−0.00079	+8.21506	−3.69307	−0.00079
	4	−9.84135	−1.90767	+0.00150	−9.84135	+0.71731	+0.00150
	5	+5.14391	−2.76770	−0.00030	+5.14391	−3.28791	−0.00030
	6	−7.49558	−2.48601	+0.00131	−7.49558	−0.20064	+0.00131
39	1	−1.64454	−3.15445	−0.00032	−1.64454	−3.39633	−0.00032
	2	−2.18987	−4.12006	−0.00043	−2.18987	−4.44399	−0.00043
	3	+13.22022	−2.05933	−0.00122	+13.22022	−2.97767	−0.00122
	4	−15.98955	−4.05678	+0.00071	−15.98955	−3.52744	+0.00071
	5	+8.27511	−3.10235	−0.00106	+8.27511	−3.89414	−0.00106
	6	−12.17173	−4.50057	+0.00030	−12.17173	−4.27898	+0.00030
40	1	−1.64454	−3.39633	−0.00032	−1.61229	−4.89142	+0.00003
	2	−2.18987	−4.44399	−0.00043	−2.14711	−6.44887	+0.00004
	3	+13.22022	−2.97767	−0.00122	+13.21623	−4.47471	−0.00067
	4	−15.98955	−3.52744	+0.00071	−15.92953	−4.40791	+0.00072
	5	+8.27511	−3.89414	−0.00106	+8.29105	−5.86998	−0.00046
	6	−12.17173	−4.27898	+0.00030	−12.11099	−5.82322	+0.00052
41	1	−1.61229	−4.89142	+0.00003	−1.58981	−4.88218	+0.00010
	2	−2.14711	−6.44887	+0.00004	−2.11723	−6.43502	+0.00014
	3	+13.21623	−4.47471	−0.00067	+13.21392	−4.40805	−0.00061
	4	−15.92953	−4.40791	+0.00072	−15.88873	−4.47444	+0.00078
	5	+8.29105	−5.86998	−0.00046	+8.30265	−5.81365	−0.00037
	6	−12.11099	−5.82322	+0.00052	−12.06921	−5.86012	+0.00061
42	1	−1.58981	−4.88218	+0.00010	−1.57745	−3.05053	+0.00035
	2	−2.11723	−6.43502	+0.00014	−2.10071	−3.97894	+0.00047
	3	+13.21392	−4.40805	−0.00061	+13.21307	−3.25892	−0.00069
	4	−15.88873	−4.47444	+0.00078	−15.86764	−2.70956	+0.00125
	5	+8.30265	−5.81365	−0.00037	+8.30957	−3.87281	−0.00026

	6	-12.06921	-5.86012	+0.00061	-12.04693	-3.48825	+0.00109
43	1	-1.57745	-3.05053	+0.00035	-1.57745	-2.78621	+0.00035
	2	-2.10071	-3.97894	+0.00047	-2.10071	-3.62452	+0.00047
	3	+13.21307	-3.25892	-0.00069	+13.21307	-3.77329	-0.00069
	4	-15.86764	-2.70956	+0.00125	-15.86764	-1.77459	+0.00125
	5	+8.30957	-3.87281	-0.00026	+8.30957	-4.06889	-0.00026
	6	-12.04693	-3.48825	+0.00109	-12.04693	-2.66980	+0.00109
44	1	-1.70581	-3.60009	-0.00037	-1.70581	-4.15809	-0.00037
	2	-2.27186	-4.68391	-0.00050	-2.27186	-5.43395	-0.00050
	3	+17.72634	-1.99518	-0.00113	+17.72634	-3.69308	-0.00113
	4	-20.59489	-5.16702	+0.00055	-20.59489	-4.33870	+0.00055
	5	+11.39184	-3.24292	-0.00103	+11.39184	-4.78257	-0.00103
	6	-15.43302	-5.46321	+0.00015	-15.43302	-5.23450	+0.00015
45	1	-1.70581	-4.15809	-0.00037	-1.72182	-6.06064	-0.00006
	2	-2.27186	-5.43395	-0.00050	-2.29332	-7.98207	-0.00009
	3	+17.72634	-3.69308	-0.00113	+17.67126	-5.58485	-0.00060
	4	-20.59489	-4.33870	+0.00055	-20.56539	-5.50409	+0.00049
	5	+11.39184	-4.78257	-0.00103	+11.34338	-7.27906	-0.00046
	6	-15.43302	-5.23450	+0.00015	-15.42227	-7.22252	+0.00031
46	1	-1.72182	-6.06064	-0.00006	-1.73893	-6.04371	+0.00010
	2	-2.29332	-7.98207	-0.00009	-2.31629	-7.95745	+0.00013
	3	+17.67126	-5.58485	-0.00060	+17.63491	-5.50045	-0.00047
	4	-20.56539	-5.50409	+0.00049	-20.55599	-5.58067	+0.00062
	5	+11.34338	-7.27906	-0.00046	+11.30725	-7.20430	-0.00027
	6	-15.42227	-7.22252	+0.00031	-15.42638	-7.26046	+0.00050
47	1	-1.73893	-6.04371	+0.00010	-1.75306	-3.74627	+0.00044
	2	-2.31629	-7.95745	+0.00013	-2.33528	-4.88109	+0.00060
	3	+17.63491	-5.50045	-0.00047	+17.62046	-4.01413	-0.00049
	4	-20.55599	-5.58067	+0.00062	-20.56360	-3.36905	+0.00119
	5	+11.30725	-7.20430	-0.00027	+11.28826	-4.75002	-0.00007
	6	-15.42638	-7.26046	+0.00050	-15.44059	-4.29846	+0.00111
48	1	-1.75306	-3.74627	+0.00044	-1.75306	-3.41318	+0.00044
	2	-2.33528	-4.88109	+0.00060	-2.33528	-4.43388	+0.00060
	3	+17.62046	-4.01413	-0.00049	+17.62046	-4.38206	-0.00049
	4	-20.56360	-3.36905	+0.00119	-20.56360	-2.47694	+0.00119
	5	+11.28826	-4.75002	-0.00007	+11.28826	-4.79936	-0.00007
	6	-15.44059	-4.29846	+0.00111	-15.44059	-3.46577	+0.00111
49	1	-1.83183	-4.11176	-0.00064	-1.83183	-5.07576	-0.00064
	2	-2.44059	-5.32824	-0.00086	-2.44059	-6.62220	-0.00086
	3	+23.37076	-2.65176	-0.00129	+23.37076	-4.58927	-0.00129
	4	-26.44226	-5.74222	+0.00028	-26.44226	-5.32519	+0.00028
	5	+15.26542	-3.90720	-0.00131	+15.26542	-5.86514	-0.00131
	6	-19.60370	-6.07053	-0.00021	-19.60370	-6.38028	-0.00021
50	1	-1.83183	-5.07576	-0.00064	-1.82813	-7.51040	-0.00007
	2	-2.44059	-6.62220	-0.00086	-2.43563	-9.87790	-0.00009
	3	+23.37076	-4.58927	-0.00129	+23.32836	-6.98611	-0.00049
	4	-26.44226	-5.32519	+0.00028	-26.39397	-6.89080	+0.00037
	5	+15.26542	-5.86514	-0.00131	+15.23803	-9.02943	-0.00038
	6	-19.60370	-6.38028	-0.00021	-19.56760	-8.96271	+0.00022
51	1	-1.82813	-7.51040	-0.00007	-1.82427	-7.48258	+0.00011
	2	-2.43563	-9.87790	-0.00009	-2.43048	-9.83790	+0.00015

	3	+23.32836	-6.98611	-0.00049	+23.30242	-6.88248	-0.00034
	4	-26.39397	-6.89080	+0.00037	-26.36167	-6.97716	+0.00052
	5	+15.23803	-9.02943	-0.00038	+15.22221	-8.93234	-0.00017
	6	-19.56760	-8.96271	+0.00022	-19.54265	-8.99861	+0.00043
52	1	-1.82427	-7.48258	+0.00011	-1.82054	-4.61365	+0.00070
	2	-2.43048	-9.83790	+0.00015	-2.42544	-6.00269	+0.00094
	3	+23.30242	-6.88248	-0.00034	+23.29222	-4.95653	-0.00023
	4	-26.36167	-6.97716	+0.00052	-26.34595	-4.22125	+0.00134
	5	+15.22221	-8.93234	-0.00017	+15.21749	-5.83590	+0.00028
	6	-19.54265	-8.99861	+0.00043	-19.52923	-5.32120	+0.00137
53	1	-1.82054	-4.61365	+0.00070	-1.82054	-4.08673	+0.00070
	2	-2.42544	-6.00269	+0.00094	-2.42544	-5.29596	+0.00094
	3	+23.29222	-4.95653	-0.00023	+23.29222	-5.12547	-0.00023
	4	-26.34595	-4.22125	+0.00134	-26.34595	-3.21594	+0.00134
	5	+15.21749	-5.83590	+0.00028	+15.21749	-5.62672	+0.00028
	6	-19.52923	-5.32120	+0.00137	-19.52923	-4.29005	+0.00137
54	1	-1.92071	-5.11007	-0.00078	-1.92071	-5.69319	-0.00078
	2	-2.55897	-6.63219	-0.00104	-2.55897	-7.41544	-0.00104
	3	+28.14485	-4.37980	-0.00114	+28.14485	-5.23222	-0.00114
	4	-31.36585	-5.94941	-0.00008	-31.36585	-6.01132	-0.00008
	5	+18.55432	-5.64255	-0.00128	+18.55432	-6.60465	-0.00128
	6	-23.10318	-6.74127	-0.00054	-23.10318	-7.15002	-0.00054
55	1	-1.92071	-5.69319	-0.00078	-1.92474	-8.53753	-0.00012
	2	-2.55897	-7.41544	-0.00104	-2.56452	-11.21365	-0.00016
	3	+28.14485	-5.23222	-0.00114	+28.09281	-8.01377	-0.00037
	4	-31.36585	-6.01132	-0.00008	-31.31877	-7.91267	+0.00016
	5	+18.55432	-6.60465	-0.00128	+18.51500	-10.27391	-0.00032
	6	-23.10318	-7.15002	-0.00054	-23.07311	-10.20313	+0.00005
56	1	-1.92474	-8.53753	-0.00012	-1.93358	-8.50033	+0.00014
	2	-2.56452	-11.21365	-0.00016	-2.57663	-11.16017	+0.00019
	3	+28.09281	-8.01377	-0.00037	+28.05658	-7.90138	-0.00013
	4	-31.31877	-7.91267	+0.00016	-31.29407	-8.00185	+0.00039
	5	+18.51500	-10.27391	-0.00032	+18.48347	-10.16244	-0.00002
	6	-23.07311	-10.20313	+0.00005	-23.06199	-10.23277	+0.00035
57	1	-1.93358	-8.50033	+0.00014	-1.94033	-5.23750	+0.00085
	2	-2.57663	-11.16017	+0.00019	-2.58622	-6.80537	+0.00115
	3	+28.05658	-7.90138	-0.00013	+28.04258	-5.64365	+0.00014
	4	-31.29407	-8.00185	+0.00039	-31.28532	-4.86518	+0.00119
	5	+18.49347	-10.16244	-0.00002	+18.46800	-6.61255	+0.00064
	6	-23.06199	-10.23277	+0.00035	-23.06153	-6.06762	+0.00137
58	1	-1.94033	-5.23750	+0.00085	-1.94033	-4.59629	+0.00085
	2	-2.58622	-6.80537	+0.00115	-2.58622	-5.94316	+0.00115
	3	+28.04258	-5.64365	+0.00014	+28.04258	-5.54076	+0.00014
	4	-31.28532	-4.86518	+0.00119	-31.28532	-3.97200	+0.00119
	5	+18.46800	-6.61255	+0.00064	+18.46800	-6.13619	+0.00064
	6	-23.06153	-6.06762	+0.00137	-23.06153	-5.03806	+0.00137
59	1	-1.80878	-4.61453	-0.00178	-1.80878	-5.94919	-0.00178
	2	-2.38173	-5.94813	-0.00239	-2.38173	-7.74004	-0.00239
	3	+31.56620	-4.22299	-0.00173	+31.56620	-5.52318	-0.00173
	4	-34.88056	-5.51377	-0.00107	-34.88056	-6.31425	-0.00107
	5	+21.09200	-5.17243	-0.00233	+21.09200	-6.91677	-0.00233
	6	-25.42073	-6.07597	-0.00186	-25.42073	-7.47052	-0.00186

60	1	-1.80878	-5.94919	-0.00178	-1.83954	-9.03036	+0.00008
	2	-2.38173	-7.74004	-0.00239	-2.42286	-11.84478	+0.00010
	3	+31.56620	-5.52318	-0.00173	+31.49299	-8.55495	-0.00007
	4	-34.86056	-6.31425	-0.00107	-34.85748	-8.45276	+0.00020
	5	+21.09200	-6.91677	-0.00233	+21.02199	-10.87827	-0.00000
	6	-25.42073	-7.47052	-0.00186	-25.42334	-10.80673	+0.00018
61	1	-1.83954	-9.03036	+0.00008	-1.87023	-8.98335	+0.00001
	2	-2.42286	-11.84478	+0.00010	-2.46370	-11.77682	+0.00003
	3	+31.49299	-8.55495	-0.00007	+31.43677	-8.44023	-0.00017
	4	-34.85748	-8.45276	+0.00020	-34.85329	-8.54180	+0.00010
	5	+21.02199	-10.87827	-0.00000	+20.96446	-10.75553	-0.00008
	6	-25.42334	-10.80673	+0.00018	-25.43859	-10.82663	+0.00010
62	1	-1.87023	-8.98335	+0.00001	-1.89859	-5.50052	+0.00142
	2	-2.46370	-11.77682	+0.00003	-2.50114	-7.14043	+0.00184
	3	+31.43677	-8.44023	-0.00017	+31.39909	-5.94700	+0.00113
	4	-34.85329	-8.54180	+0.00010	-34.86646	-5.15656	+0.00179
	5	+20.96446	-10.75553	-0.00008	+20.92204	-6.94049	+0.00150
	6	-25.43859	-10.82663	+0.00010	-25.46385	-6.38718	+0.00196
63	1	-1.89859	-5.50052	+0.00142	-1.89859	-4.43220	+0.00142
	2	-2.50114	-7.14043	+0.00184	-2.50114	-5.75696	+0.00184
	3	+31.39909	-5.94700	+0.00113	+31.39909	-5.10182	+0.00113
	4	-34.86646	-5.15656	+0.00179	-34.86646	-3.81164	+0.00179
	5	+20.92204	-6.94049	+0.00150	+20.92204	-5.81845	+0.00150
	6	-25.46385	-6.38718	+0.00196	-25.46385	-4.91532	+0.00196

STR. 12   MEMBER END ACTIONS   DRIVE A

MEM NO.	LD. CMB	AXIAL (KN) LOWER JT.	SHEAR (KN) LOWER JT.	BM (KN-M) LOWER JT.	AXIAL (KN) UPPER JT.	SHEAR (KN) UPPER JT.	BM (KN-M) UPPER JT.
1	1	+2135.360	-19.454	-26.405	-2135.360	+19.454	-41.684
	2	+2810.032	-26.624	-36.079	-2810.032	+26.624	-57.105
	3	+1790.883	+45.188	+136.937	-1790.883	-45.188	+21.221
	4	+2139.191	-70.757	-172.218	-2139.191	+70.757	-75.430
	5	+2434.626	+18.109	+77.657	-2434.626	-18.109	-14.277
	6	+2678.442	-63.053	-138.752	-2678.442	+63.053	-81.932
2	1	+1640.123	-0.279	-30.672	-1640.123	+0.279	+29.533
	2	+2142.160	-1.317	-42.650	-2142.160	+1.317	+37.274
	3	+1455.230	+44.761	+68.116	-1455.230	-44.761	+114.509
	4	+1725.019	-35.775	-101.701	-1725.019	+35.775	-44.263
	5	+1882.123	+28.613	+24.543	-1882.123	-28.613	+92.199
	6	+2070.976	-27.762	-94.328	-2070.976	+27.762	-18.941
3	1	+1202.633	-4.670	+14.757	-1202.633	+4.670	-32.223
	2	+1564.673	-6.653	+18.642	-1564.673	+6.653	-43.524
	3	+1102.034	+32.236	+76.330	-1102.034	-32.236	+44.231
	4	+1290.732	-35.759	-41.402	-1290.732	+35.759	-92.339
	5	+1388.141	+18.613	+59.495	-1388.141	-18.613	+10.116
	6	+1520.231	-28.984	-22.917	-1520.231	+28.984	-85.482
4	1	+977.652	-29.670	-54.159	-977.652	+29.670	-56.805
	2	+1270.541	-39.807	-72.618	-1270.541	+39.807	-76.261
	3	+918.178	+2.175	+1.593	-918.178	-2.175	+6.541
	4	+1041.190	-49.148	-87.800	-1041.190	+49.148	-96.013
	5	+1140.230	-16.948	-32.476	-1140.230	+16.948	-30.910
	6	+1226.338	-52.874	-95.051	-1226.338	+52.874	-102.697
5	1	+706.659	-17.255	-29.488	-706.659	+17.255	-35.046
	2	+915.013	-23.168	-39.602	-915.013	+23.168	-47.048
	3	+690.114	+9.485	+19.377	-690.114	-9.485	+16.097
	4	+759.647	-36.624	-65.672	-759.647	+36.624	-71.302
	5	+833.637	-4.151	-4.898	-833.637	+4.151	-10.625
	6	+882.310	-36.427	-64.433	-882.310	+36.427	-71.804
6	1	+435.833	-19.714	-38.947	-435.833	+19.714	-41.485
	2	+559.932	-26.465	-52.278	-559.932	+26.465	-55.698
	3	+453.845	-1.185	-3.877	-453.845	+1.185	-0.958
	4	+484.327	-29.873	-57.547	-484.327	+29.873	-64.334
	5	+522.010	-13.143	-27.024	-522.010	+13.143	-26.601
	6	+543.347	-33.225	-64.592	-543.347	+33.225	-70.964
7	1	+147.849	-17.037	-27.519	-147.849	+17.037	-36.200
	2	+187.474	-22.779	-36.772	-187.474	+22.779	-48.422
	3	+168.042	-7.099	-10.689	-168.042	+7.099	-15.862
	4	+174.954	-20.668	-34.384	-174.954	+20.668	-42.915
	5	+180.262	-15.361	-24.208	-180.262	+15.361	-33.243
	6	+185.101	-24.860	-40.794	-185.101	+24.860	-52.181
8	1	+2886.595	-0.604	-6.042	-2886.595	+0.604	+3.927
	2	+3824.571	-0.909	-8.268	-3824.571	+0.909	+5.087
	3	+2547.056	+75.516	+169.315	-2547.056	-75.516	+94.990
	4	+2506.151	-75.490	-177.257	-2506.151	+75.490	-86.958

	5	+3449.498	+52.220	+114.321	-3449.498	-52.220	+68.448
	6	+3420.864	-53.484	-128.279	-3420.864	+53.484	-58.916
9	1	+2354.029	-15.524	-28.470	-2354.029	+15.524	-34.868
	2	+3097.691	-20.618	-37.766	-3097.691	+20.618	-46.354
	3	+2182.991	+57.097	+120.233	-2182.991	-57.097	+112.722
	4	+2150.528	-83.778	-169.615	-2150.528	+83.778	-172.201
	5	+2829.774	+30.872	+67.603	-2829.774	-30.872	+58.354
	6	+2807.050	-67.741	-135.291	-2807.050	+67.741	-141.093
10	1	+1886.600	-11.471	-21.497	-1886.600	+11.471	-21.405
	2	+2477.918	-15.229	-28.519	-2477.918	+15.229	-28.436
	3	+1772.068	+46.685	+82.728	-1772.068	-46.685	+91.875
	4	+1747.748	-66.465	-119.996	-1747.748	+66.465	-128.584
	5	+2271.027	+25.976	+45.400	-2271.027	-25.976	+51.749
	6	+2254.003	-53.230	-96.507	-2254.003	+53.230	-102.572
11	1	+1500.609	-3.909	-4.862	-1500.609	+3.909	-9.759
	2	+1967.750	-5.246	-6.568	-1967.750	+5.246	-13.054
	3	+1424.774	+45.389	+82.982	-1424.774	-45.389	+86.773
	4	+1406.854	-51.566	-90.233	-1406.854	+51.566	-102.623
	5	+1808.442	+29.335	+54.940	-1808.442	-29.335	+54.774
	6	+1795.897	-38.533	-66.310	-1795.897	+38.533	-77.804
12	1	+1116.387	-3.057	-5.655	-1116.387	+3.057	-5.779
	2	+1459.891	-4.074	-7.540	-1459.891	+4.074	-7.698
	3	+1079.048	+30.859	+56.589	-1079.048	-30.859	+58.824
	4	+1067.846	-35.973	-66.013	-1067.846	+35.973	-68.526
	5	+1347.878	+19.772	+36.219	-1347.878	-19.772	+37.728
	6	+1340.037	-27.010	-49.602	-1340.037	+27.010	-51.416
13	1	+725.035	-3.162	-6.013	-725.035	+3.162	-6.888
	2	+942.879	-4.201	-7.990	-942.879	+4.201	-9.151
	3	+725.407	+19.924	+39.468	-725.407	-19.924	+41.821
	4	+721.318	-25.340	-49.754	-721.318	+25.340	-53.633
	5	+878.455	+12.089	+24.092	-878.455	-12.089	+25.232
	6	+875.593	-19.596	-38.364	-875.593	+19.596	-41.587
14	1	+284.632	+0.038	-0.768	-284.632	-0.038	+0.912
	2	+364.501	+0.162	-0.816	-364.501	-0.162	+1.422
	3	+312.554	+9.416	+16.339	-312.554	-9.416	+18.877
	4	+311.923	-10.459	-19.701	-311.923	+10.459	-19.417
	5	+349.043	+6.913	+11.538	-349.043	-6.913	+14.318
	6	+348.602	-6.999	-13.690	-348.602	+6.999	-12.488
15	1	+2888.094	-2.729	-8.570	-2888.094	+2.729	-0.980
	2	+3825.861	-3.825	-11.730	-3825.861	+3.825	-1.656
	3	+2511.266	+73.290	+165.991	-2511.266	-73.290	+90.525
	4	+2551.533	-75.976	-177.249	-2551.533	+75.976	-88.668
	5	+3423.429	+49.163	+110.235	-3423.429	-49.163	+61.837
	6	+3451.616	-55.323	-130.034	-3451.616	+55.323	-63.599
16	1	+2355.139	-9.653	-22.652	-2355.139	+9.653	-16.733
	2	+3098.312	-12.865	-30.217	-3098.312	+12.865	-22.270
	3	+2155.709	+62.462	+126.465	-2155.709	-62.462	+128.381
	4	+2188.251	-78.613	-164.065	-2188.251	+78.613	-156.677
	5	+2809.023	+37.949	+74.893	-2809.023	-37.949	+79.937
	6	+2831.803	-60.804	-128.478	-2831.803	+60.804	-119.604
17	1	+1872.563	-2.939	-4.331	-1872.563	+2.939	-6.660

	2	+2458.578	-3.799	-5.547	-2458.578	+3.799	-8.660
	3	+1739.226	+53.612	+96.768	-1739.226	-53.612	+103.743
	4	+1763.445	-59.706	-106.268	-1763.445	+59.706	-117.034
	5	+2237.928	+36.088	+65.755	-2237.928	-36.088	+69.216
	6	+2254.882	-43.235	-76.371	-2254.882	+43.235	-85.328
18	1	+1490.728	+4.915	+9.356	-1490.728	-4.915	+9.027
	2	+1953.915	+6.567	+12.490	-1953.915	-6.567	+12.072
	3	+1402.006	+52.478	+94.265	-1402.006	-52.478	+102.001
	4	+1419.764	-44.423	-78.819	-1419.764	+44.423	-87.322
	5	+1784.791	+39.720	+71.639	-1784.791	-39.720	+76.915
	6	+1797.222	-28.110	-49.519	-1797.222	+28.110	-55.611
19	1	+1108.007	+2.602	+4.715	-1108.007	-2.602	+5.018
	2	+1448.049	+3.477	+6.301	-1448.049	-3.477	+6.701
	3	+1064.240	+35.505	+65.071	-1064.240	-35.505	+67.718
	4	+1075.370	-31.237	-57.364	-1075.370	+31.237	-59.461
	5	+1330.680	+26.433	+48.419	-1330.680	-26.433	+50.442
	6	+1338.471	-20.286	-37.285	-1338.471	+20.286	-38.584
20	1	+718.414	+2.690	+5.208	-718.414	-2.690	+5.768
	2	+933.368	+3.553	+6.901	-933.368	-3.553	+7.597
	3	+719.221	+25.035	+49.155	-719.221	-25.035	+52.990
	4	+723.311	-20.220	-40.052	-723.311	+20.220	-42.444
	5	+868.306	+19.049	+37.419	-868.306	-19.049	+40.302
	6	+871.169	-12.629	-25.026	-871.169	+12.629	-26.502
21	1	+278.964	+1.295	+2.973	-278.964	-1.295	+1.872
	2	+356.141	+1.878	+4.195	-356.141	-1.878	+2.830
	3	+311.210	+10.263	+19.345	-311.210	-10.263	+19.037
	4	+311.843	-9.617	-16.702	-311.843	+9.617	-19.264
	5	+342.535	+8.369	+15.949	-342.535	-8.369	+15.352
	6	+342.979	-5.546	-9.284	-342.979	+5.546	-11.458
22	1	+1868.292	+22.787	+20.035	-1868.292	-22.787	+59.718
	2	+2448.873	+31.357	+27.704	-2448.873	-31.357	+82.046
	3	+1941.658	+69.856	+161.711	-1941.658	-69.856	+82.785
	4	+1593.988	-41.627	-138.223	-1593.988	+41.627	-7.471
	5	+2366.242	+65.204	+127.893	-2366.242	-65.204	+100.319
	6	+2122.873	-12.835	-82.061	-2122.873	+12.835	+37.140
23	1	+1475.529	+25.456	+50.899	-1475.529	-25.456	+52.962
	2	+1921.149	+34.800	+70.227	-1921.149	-34.800	+71.756
	3	+1595.657	+57.680	+117.284	-1595.657	-57.680	+118.050
	4	+1325.789	-23.833	-56.066	-1325.789	+23.833	-41.173
	5	+1877.475	+57.966	+119.014	-1877.475	-57.966	+117.488
	6	+1688.567	+0.907	-2.331	-1688.567	-0.907	+6.033
24	1	+1116.724	+19.080	+37.653	-1116.724	-19.080	+33.706
	2	+1450.393	+25.680	+50.585	-1450.393	-25.680	+45.460
	3	+1217.761	+48.817	+88.494	-1217.761	-48.817	+94.080
	4	+1029.163	-19.419	-29.538	-1029.163	+19.419	-43.087
	5	+1418.323	+46.268	+85.564	-1418.323	-46.268	+87.479
	6	+1286.305	-1.496	+2.941	-1286.305	+1.496	-8.538
25	1	+892.931	+28.664	+51.150	-892.931	-28.664	+56.053
	2	+1157.831	+38.486	+68.661	-1157.831	-38.486	+75.277
	3	+969.254	+48.158	+84.836	-969.254	-48.158	+95.277
	4	+846.405	-3.064	-4.202	-846.405	+3.064	-7.257
	5	+1125.828	+51.632	+91.321	-1125.828	-51.632	+101.784

	6	+1039.833	+15.777	+28.995	-1039.833	-15.777	+30.010
26	1	+667.927	+17.710	+30.464	-667.927	-17.710	+35.771
	2	+863.698	+23.766	+40.890	-863.698	-23.766	+47.995
	3	+725.698	+36.951	+66.375	-725.698	-36.951	+71.823
	4	+656.237	-8.966	-18.316	-656.237	+8.966	-15.217
	5	+836.190	+36.905	+65.473	-836.190	-36.905	+72.552
	6	+787.567	+4.763	+6.190	-787.567	-4.763	+11.624
27	1	+440.368	+20.186	+39.744	-440.368	-20.186	+42.613
	2	+566.595	+27.113	+53.359	-566.595	-27.113	+57.261
	3	+485.027	+30.176	+58.148	-485.027	-30.176	+64.970
	4	+454.544	+1.482	+4.431	-454.544	-1.482	+1.617
	5	+548.222	+33.770	+65.539	-548.222	-33.770	+72.244
	6	+526.884	+13.685	+27.937	-526.884	-13.685	+27.897
28	1	+151.904	+15.704	+26.899	-151.904	-15.704	+31.832
	2	+193.509	+20.739	+35.771	-193.509	-20.739	+41.792
	3	+175.195	+20.870	+34.741	-175.195	-20.870	+43.315
	4	+168.279	+7.294	+11.031	-168.279	-7.294	+16.249
	5	+189.398	+23.494	+40.204	-189.398	-23.494	+47.662
	6	+184.557	+13.990	+23.607	-184.557	-13.990	+28.716
29	1	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
	2	+0.000	+0.000	+0.000	-0.000	-0.000	+0.000
	3	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
	4	+0.000	+0.000	-0.000	-0.000	-0.000	+0.000
	5	-0.000	-0.000	+0.000	+0.000	+0.000	-0.000
	6	+0.000	+0.000	-0.000	-0.000	-0.000	+0.000
30	1	+19.174	+1.816	-0.044	-19.174	-1.816	+11.851
	2	+25.306	+2.347	-0.471	-25.306	-2.347	+15.728
	3	+41.423	-37.373	-131.212	-41.423	+37.373	-111.710
	4	-6.869	+41.147	+135.256	+6.869	-41.147	+132.198
	5	+39.800	-25.273	-92.986	-39.800	+25.273	-71.285
	6	+5.995	+29.691	+93.541	-5.995	-29.691	+99.451
31	1	+4.255	+3.733	+12.691	-4.255	-3.733	+11.570
	2	+5.598	+4.978	+16.951	-5.598	-4.978	+15.404
	3	+23.004	-31.933	-103.513	-23.004	+31.933	-104.051
	4	-15.157	+38.145	+124.375	+15.157	-38.145	+123.565
	5	+18.452	-20.111	-64.766	-18.452	+20.111	-65.956
	6	-9.261	+28.943	+94.756	+8.261	-28.943	+93.376
32	1	-2.669	+6.038	+12.062	+2.669	-6.038	+27.182
	2	-3.442	+8.276	+16.469	+3.442	-8.276	+37.327
	3	+12.176	-35.001	-112.939	-12.176	+35.001	-114.569
	4	-17.794	+42.801	+129.168	+17.794	-42.801	+149.037
	5	+7.237	-20.267	-70.775	-7.237	+20.267	-60.963
	6	-13.742	+34.194	+98.700	+13.742	-34.194	+123.561
33	1	+0.000	-0.000	-0.000	+0.000	+0.000	-0.000
	2	-0.000	-0.000	-0.000	+0.000	+0.000	-0.000
	3	+0.000	-0.000	-0.000	-0.000	+0.000	+0.000
	4	+0.000	+0.000	+0.000	-0.000	-0.000	-0.000
	5	+0.000	-0.000	-0.000	-0.000	+0.000	+0.000
	6	+0.000	+0.000	+0.000	-0.000	-0.000	-0.000
34	1	+0.000	+0.000	-0.000	-0.000	-0.000	+0.000
	2	+0.000	+0.000	-0.000	-0.000	-0.000	+0.000

	3	−0.000	−0.000	+0.000	+0.000	+0.000	−0.000
	4	+0.000	+0.000	−0.000	−0.000	−0.000	+0.000
	5	−0.000	+0.000	−0.000	+0.000	−0.000	+0.000
	6	+0.000	+0.000	−0.000	−0.000	−0.000	+0.000
35	1	−4.391	+18.390	+72.111	+4.391	−18.390	+47.426
	2	−5.335	+24.362	+95.383	+5.335	−24.362	+62.969
	3	+28.125	−24.428	−74.339	−28.125	+24.428	−84.444
	4	−40.634	+56.662	+202.164	+40.634	−56.662	+166.140
	5	+18.454	−6.493	−10.834	−18.454	+6.493	−31.371
	6	−29.677	+50.270	+182.718	+29.677	−50.270	+144.037
36	1	−0.338	+3.619	+8.940	+0.338	−3.619	+14.584
	2	+0.054	+4.822	+11.904	−0.054	−4.822	+19.440
	3	+17.713	−33.442	−111.006	−17.713	+33.442	−106.367
	4	−23.321	+39.505	+126.058	+23.321	−39.505	+130.726
	5	+13.558	−21.247	−72.382	−13.558	+21.247	−65.721
	6	−15.166	+29.816	+93.563	+15.166	−29.816	+100.244
37	1	+6.376	+3.995	+6.481	−6.376	−3.995	+19.484
	2	+9.119	+5.244	+8.377	−9.119	−5.244	+25.710
	3	+8.863	−36.896	−118.782	−8.863	+36.896	−121.044
	4	−4.414	+44.374	+132.220	+4.414	−44.374	+156.211
	5	+11.698	−23.652	−79.971	−11.698	+23.652	−73.767
	6	+2.404	+33.237	+95.730	−2.404	−33.237	+120.311
38	1	−0.000	−0.000	−0.000	+0.000	+0.000	−0.000
	2	−0.000	−0.000	−0.000	+0.000	+0.000	−0.000
	3	+0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	4	+0.000	+0.000	+0.000	+0.000	−0.000	−0.000
	5	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	6	−0.000	−0.000	+0.000	+0.000	+0.000	−0.000
39	1	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
	2	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
	3	−0.000	+0.000	+0.000	+0.000	−0.000	+0.000
	4	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
	5	−0.000	+0.000	+0.000	+0.000	−0.000	+0.000
	6	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
40	1	−24.999	+3.451	+3.082	+24.999	−3.451	+19.350
	2	−33.154	+4.619	+4.142	+33.154	−4.619	+25.884
	3	+3.089	−30.057	−110.574	−3.089	+30.057	−84.795
	4	−46.538	+35.630	+115.389	+46.538	−35.630	+116.207
	5	−12.356	−18.921	−75.465	+12.356	+18.921	−47.520
	6	−47.095	+27.060	+82.709	+47.095	−27.060	+93.181
41	1	−17.438	+2.672	+6.917	+17.438	−2.672	+10.454
	2	−23.172	+3.538	+9.120	+23.172	−3.538	+13.874
	3	+1.793	−27.289	−90.063	−1.793	+27.289	−87.313
	4	−31.639	+31.999	+102.610	+31.639	−31.999	+105.383
	5	−8.996	−17.568	−59.169	+8.996	+17.568	−55.021
	6	−32.398	+23.934	+75.702	+32.398	−23.934	+79.866
42	1	−9.584	−2.263	−13.151	+9.584	+2.263	−1.556
	2	−12.806	−3.050	−17.704	+12.806	+3.050	−2.121
	3	+0.658	−34.594	−110.695	−0.658	+34.594	+114.165
	4	−16.355	+31.155	+90.469	+16.355	−31.155	+112.039
	5	−5.364	−25.663	−85.834	+5.364	+25.663	−80.975
	6	−17.273	+20.361	+54.981	+17.273	−20.361	+77.368

43	1	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	2	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	3	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	4	−0.000	−0.000	−0.000	+0.000	+0.000	−0.000
	5	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	6	−0.000	−0.000	−0.000	+0.000	+0.000	−0.000
44	1	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
	2	+0.000	+0.000	−0.000	−0.000	−0.000	+0.000
	3	−0.000	+0.000	+0.000	+0.000	−0.000	+0.000
	4	+0.000	+0.000	−0.000	−0.000	−0.000	+0.000
	5	−0.000	+0.000	+0.000	+0.000	−0.000	+0.000
	6	+0.000	+0.000	−0.000	−0.000	−0.000	+0.000
45	1	+12.415	+3.122	+2.993	−12.415	−3.122	+17.303
	2	+16.639	+4.153	+3.863	−16.639	−4.153	+23.132
	3	+42.710	−24.086	−90.668	−42.710	+24.086	−65.894
	4	−22.876	+29.393	+96.935	+22.876	−29.393	+94.118
	5	+37.577	−15.015	−62.017	−37.577	+15.015	−35.579
	6	−8.333	+22.421	+69.305	+8.333	−22.421	+76.430
46	1	+13.267	+0.574	−1.889	−13.267	−0.574	+5.622
	2	+17.811	+0.763	−2.538	−17.811	−0.763	+7.495
	3	+28.180	−22.885	−77.468	−28.180	+22.885	−71.287
	4	−7.284	+23.875	+74.518	+7.284	−23.875	+80.672
	5	+28.014	−15.684	−55.414	−28.014	+15.684	−46.531
	6	+3.190	+17.049	+50.976	−3.190	−17.049	+59.840
47	1	+10.954	−3.474	−19.364	−10.954	+3.474	−3.217
	2	+14.720	−4.621	−25.868	−14.720	+4.621	−4.167
	3	+11.207	−29.644	−95.785	−11.207	+29.644	−96.902
	4	+5.902	+23.744	+64.014	−5.902	−23.744	+90.324
	5	+14.727	−22.806	−78.803	−14.727	+22.806	−69.433
	6	+11.014	+14.566	+33.056	−11.014	−14.566	+61.625
48	1	+0.000	−0.000	−0.000	−0.000	+0.000	+0.000
	2	+0.000	−0.000	−0.000	−0.000	+0.000	+0.000
	3	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	4	+0.000	−0.000	−0.000	−0.000	+0.000	+0.000
	5	−0.000	−0.000	−0.000	+0.000	+0.000	+0.000
	6	+0.000	−0.000	−0.000	−0.000	+0.000	+0.000
49	1	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
	2	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
	3	−0.000	+0.000	+0.000	+0.000	−0.000	+0.000
	4	+0.000	+0.000	−0.000	−0.000	−0.000	+0.000
	5	−0.000	+0.000	+0.000	+0.000	−0.000	+0.000
	6	+0.000	+0.000	+0.000	−0.000	−0.000	+0.000
50	1	−2.459	+0.647	−9.307	+2.459	−0.647	+13.511
	2	−3.296	+0.819	−12.674	+3.296	−0.819	+17.995
	3	+28.180	−18.768	−76.969	−28.180	+18.768	−45.025
	4	−32.099	+20.283	+64.099	+32.099	−20.283	+67.740
	5	+18.202	−12.868	−60.176	−18.202	+12.868	−23.464
	6	−23.993	+14.468	+38.571	+23.993	−14.468	+55.472
51	1	−2.564	+0.589	−1.720	+2.564	−0.589	+5.547
	2	−3.423	+0.780	−2.307	+3.423	−0.780	+7.376
	3	+17.245	−15.452	−53.267	−17.245	+15.452	−47.169

60	1	+17.037	-7.901	-47.100	-17.037	+7.901	-4.256
	2	+22.779	-10.713	-63.578	-22.779	+10.713	-6.060
	3	+40.549	-9.145	-48.888	-40.549	+9.145	-10.557
	4	-12.782	-2.233	-21.835	+12.782	+2.233	+7.320
	5	+38.776	-11.626	-64.582	-38.776	+11.626	-10.984
	6	+1.445	-6.787	-45.644	-1.445	+6.787	+1.529
61	1	+16.999	+0.807	+3.344	-16.999	-0.807	+1.899
	2	+22.617	+1.162	+4.638	-22.617	-1.162	+2.918
	3	+31.133	-2.904	-8.320	-31.133	+2.904	-10.556
	4	-2.323	+3.378	+12.097	+2.323	-3.378	+9.858
	5	+31.863	-1.314	-3.333	-31.863	+1.314	-5.207
	6	+8.444	+3.083	+10.959	-8.444	-3.083	+9.083
62	1	+15.704	+3.846	-3.770	-15.704	-3.846	+28.768
	2	+20.739	+4.678	-5.748	-20.739	-4.678	+36.158
	3	+20.870	+1.993	-8.481	-20.870	-1.993	+21.435
	4	+7.294	+8.909	+9.405	-7.294	-8.909	+48.501
	5	+23.494	+2.490	-10.145	-23.494	-2.490	+26.328
	6	+13.990	+7.331	+2.375	-13.990	-7.331	+45.274
63	1	+0.000	-0.000	-0.000	-0.000	+0.000	-0.000
	2	+0.000	-0.000	-0.000	-0.000	+0.000	-0.000
	3	+0.000	-0.000	-0.000	-0.000	+0.000	-0.000
	4	-0.000	-0.000	-0.000	+0.000	+0.000	-0.000
	5	+0.000	-0.000	-0.000	-0.000	+0.000	-0.000
	6	-0.000	-0.000	-0.000	+0.000	+0.000	-0.000

STR. 12   SUPPORT REACTIONS   DRIVE A

JOINT NUMBER	LOAD CMB	X-REACTION (KNTS)	Y-REACTION (KNTS)	Z-REACTION (KNTS-M)
1	1	+19.454	+2135.360	−26.405
	2	+26.624	+2810.032	−36.079
	3	−45.188	+1790.883	+136.937
	4	+70.757	+2139.191	−172.218
	5	−19.109	+2434.626	+77.657
	6	+63.053	+2678.442	−138.752
2	1	+0.604	+2886.595	−6.042
	2	+0.909	+3824.571	−8.268
	3	−75.516	+2547.056	+169.315
	4	+75.490	+2506.151	−177.257
	5	−52.220	+3449.498	+114.321
	6	+53.484	+3420.864	−128.279
3	1	+2.729	+2888.094	−8.570
	2	+3.825	+3825.861	−11.730
	3	−73.290	+2511.266	+165.991
	4	+75.976	+2551.533	−177.249
	5	−49.163	+3423.429	+110.235
	6	+55.323	+3451.616	−130.034
4	1	−22.787	+1868.292	+20.035
	2	−31.357	+2448.873	+27.704
	3	−69.856	+1941.658	+161.711
	4	+41.627	+1593.988	−138.223
	5	−65.204	+2366.242	+127.893
	6	+12.835	+2122.873	−82.061

A-2:

CALCUL DE STRUCTURE
POUR LE DIMENSIONNEMENT
DE LA POUTRE CONTINUE.
SORTIE D'ORDINATEUR:
"STRUC 02"

SOFTEK SERVICES LTD.

_ Micro Engineering Software _

REGISTRATION NO. 100158

P-FRAME

Release 1.03

<C> Copyright Softek Services Ltd. 1983,1984

STR. 02   INITIALIZING DATA   DRIVE A

TOTAL MEMBERS	TOTAL JOINTS	TOTAL SPRINGS	TOTAL SECTIONS	TOTAL LD CASES	TOTAL LD COMB	YOUNGMOD (MPA)	SHEARMOD (MPA)
24	25	0	3	6	7	24000	10000

CLIENT: ENTREPRISE GOMEZ /COTONOU /BENIN
USER NAME: VIADINOU JEAN-BAPTISTE
FRAME DESCRIPTION: SOLUTION DE CADRE RIGIDE
UNITS (M/I): M
BANDWIDTH OPTIMIZATION (Y/N): N

STR. 02   JOINT DATA   DRIVE A

JOINT NO.	X-FREEDOM	Y-FREEDOM	Z-FREEDOM	X-COORDINATE (METERS)	Y-COORDINATE (METERS)
1	0	0	0	+1.7500	+0.0000
2	0	0	0	+8.2500	+0.0000
3	0	0	0	+14.7500	+0.0000
4	0	0	0	+21.2500	+0.0000
5	1	1	1	+0.0000	+3.5000
6	1	1	1	+0.8750	+3.5000
7	1	1	1	+1.7500	+3.5000
8	1	1	1	+3.3750	+3.5000
9	1	1	1	+5.0000	+3.5000
10	1	1	1	+6.6250	+3.5000
11	1	1	1	+8.2500	+3.5000
12	1	1	1	+9.8750	+3.5000
13	1	1	1	+11.5000	+3.5000
14	1	1	1	+13.1250	+3.5000
15	1	1	1	+14.7500	+3.5000
16	1	1	1	+16.3750	+3.5000
17	1	1	1	+18.0000	+3.5000
18	1	1	1	+19.6250	+3.5000
19	1	1	1	+21.2500	+3.5000
20	1	1	1	+23.5000	+3.5000
21	0	0	1	+24.5000	+3.5000
22	0	0	0	+1.7500	+7.5800
23	0	0	0	+8.2500	+7.5800
24	0	0	0	+14.7500	+7.5800
25	0	0	0	+21.2500	+7.5800

STR. 02　　　MEMBER DATA　　　DRIVE A

Section Properties Data :

SECTION NUMBER	X-SECTIONAL AREA (MM2)	MOM. INERTIA 1.0E+06 (MM4)	SHEAR AREA (MM2)
1	+175,000.000	+3,645.830	+145,830.000
2	+240,000.000	+7,200.000	+200,000.000
3	+210,000.000	+6,300.000	+175,000.000

Member Connectivity Data :

MEMBER NUMBER	LOWER JOINT	GREATER JOINT	LOWER END TYPE	GREATER END TYPE	SECTION NUMBER
1	1	7	1	1	2
2	7	22	1	1	2
3	2	11	1	1	2
4	11	23	1	1	2
5	3	15	1	1	2
6	15	24	1	1	2
7	4	19	1	1	2
8	19	25	1	1	2
9	5	6	1	1	3
10	6	7	1	1	3
11	7	8	1	1	3
12	8	9	1	1	3
13	9	10	1	1	3
14	10	11	1	1	3
15	11	12	1	1	3
16	12	13	1	1	3
17	13	14	1	1	3
18	14	15	1	1	3
19	15	16	1	1	3
20	16	17	1	1	3
21	17	18	1	1	3
22	18	19	1	1	3
23	19	20	1	1	3
24	20	21	1	1	3

STR. 02   LOAD DATA   DRIVE A

LOAD CASE   1

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
1	3	16	charge permanente

Joint Load Data :

RECORD NUMBER	LOADED JOINT	HORIZONTAL LOAD (KN)	VERTICAL LOAD (KN)	EXTERNAL MOMENT (KN-M)
1	5	+0.0000	-7.3500	+0.0000
2	20	+0.0000	-10.5000	+0.0000
3	21	+0.0000	-10.5000	+0.0000

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	9	+0.0000	-17.0000	+0.0000
2	10	+0.0000	-17.0000	+0.0000
3	11	+0.0000	-27.2500	+0.0000
4	12	+0.0000	-27.2500	+0.0000
5	13	+0.0000	-27.2500	+0.0000
6	14	+0.0000	-27.2500	+0.0000
7	15	+0.0000	-27.2500	+0.0000
8	16	+0.0000	-27.2500	+0.0000
9	17	+0.0000	-27.2500	+0.0000
10	18	+0.0000	-27.2500	+0.0000
11	19	+0.0000	-27.2500	+0.0000
12	20	+0.0000	-27.2500	+0.0000
13	21	+0.0000	-27.2500	+0.0000
14	22	+0.0000	-27.2500	+0.0000
15	23	+0.0000	-27.2500	+0.0000
16	24	+0.0000	-27.2500	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

LOAD CASE 2

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
2	0	2	surcharge sur la portee n1

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	9	+0.0000	-14.0000	+0.0000
2	10	+0.0000	-14.0000	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

LOAD CASE 3

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
3	0	4	surcharge sur la portee n2

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	11	+0.0000	-24.2500	+0.0000
2	12	+0.0000	-24.2500	+0.0000
3	13	+0.0000	-24.2500	+0.0000
4	14	+0.0000	-24.2500	+0.0000

Point Load Data :

REC	MEM	PT. LOAD	DIST.	PT. LOAD	DIST.	PT. LOAD	DIST.

NO.	NO.	1 (KN)	(M)	2 (KN)	(M)	3 (KN)	(M)

Temperature Load Data :

RECORD	MEMBER	TEMPERATURE	COEFFICIENT OF
NUMBER	NUMBER	DIFFERENCE	EXPANSION
		(CENTIGRADE)	(MM/MM/C X 100)

LOAD CASE 4

Initializing Data :

LOAD	NO. OF	NO. OF	DESCRIPTION
CASE	LOADED	LOADED	
NO.	JOINTS	MEMBERS	

| 4 | 0 | 4 | surcharge sur la portee n3 |

Distributed Load Data :

| RECORD | LOADED | SLOPED LD. | LOCAL XY | PROJ. LOAD |
NUMBER	MEMBER	KN/M SLOPE	KN/M PERP.	KN/M HORIZ
1	15	+0.0000	-24.2500	+0.0000
2	16	+0.0000	-24.2500	+0.0000
3	17	+0.0000	-24.2500	+0.0000
4	18	+0.0000	-24.2500	+0.0000

Point Load Data :

| REC | MEM | PT. LOAD | DIST. | PT. LOAD | DIST. | PT. LOAD | DIST. |
| NO. | NO. | 1 (KN) | (M) | 2 (KN) | (M) | 3 (KN) | (M) |

Temperature Load Data :

RECORD	MEMBER	TEMPERATURE	COEFFICIENT OF
NUMBER	NUMBER	DIFFERENCE	EXPANSION
		(CENTIGRADE)	(MM/MM/C X 100)

LOAD CASE 5

Initializing Data :

LOAD	NO. OF	NO. OF	DESCRIPTION
CASE	LOADED	LOADED	
NO.	JOINTS	MEMBERS	

| 5 | 0 | 4 | surcharge sur la portee n4 |

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	19	+0.0000	-24.2500	+0.0000
2	20	+0.0000	-24.2500	+0.0000
3	21	+0.0000	-24.2500	+0.0000
4	22	+0.0000	-24.2500	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

LOAD CASE 6

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
6	0	2	surcharge sur la portee n5

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	23	+0.0000	-24.2500	+0.0000
2	24	+0.0000	-24.2500	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

STR. 02   LOAD COMBINATION DATA   DRIVE A

LOAD COMB	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT
1	1	1.25	2	1.5	3	1.5	4	1.5	5	1.5	6	1.5
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2	1	1.25	3	1.5	5	1.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
3	1	1.25	2	1.5	4	1.5	6	1.5	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1.25	2	1.5	3	1.5	5	1.5	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
5	1	1.25	3	1.5	4	1.5	6	1.5	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1.25	2	1.5	4	1.5	5	1.5	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
7	1	1.25	3	1.5	5	1.5	6	1.5	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL STRUCTURE DEGREES OF FREEDOM = 49
THE HALF-BANDWIDTH = 6 AT MEMBER 9

STR. 02 JOINT DEFORMATIONS DRIVE A

MEM NO.	LD. CSE	X-DISPLACE JL. MM.	Y-DISPLACE JL. MM.	ROTATION JL. RAD.	X-DISPLACE JG. MM.	Y-DISPLACE JG. MM.	ROTATION JG. RAD.
1	1	+0.00000	+0.00000	+0.00000	+0.00659	−0.04031	−0.00013
	2	+0.00000	+0.00000	+0.00000	−0.00269	−0.00831	+0.00005
	3	+0.00000	+0.00000	+0.00000	+0.00567	−0.02556	−0.00021
	4	+0.00000	+0.00000	+0.00000	+0.00202	+0.00105	+0.00002
	5	+0.00000	+0.00000	+0.00000	+0.00216	−0.00008	−0.00000
	6	+0.00000	+0.00000	+0.00000	+0.00029	+0.00000	+0.00000
2	1	+0.00659	−0.04031	−0.00013	+0.00000	+0.00000	+0.00000
	2	−0.00269	−0.00831	+0.00005	+0.00000	+0.00000	+0.00000
	3	+0.00567	−0.02556	−0.00021	+0.00000	+0.00000	+0.00000
	4	+0.00202	+0.00105	+0.00002	+0.00000	+0.00000	+0.00000
	5	+0.00216	−0.00008	−0.00000	+0.00000	+0.00000	+0.00000
	6	+0.00029	+0.00000	+0.00000	+0.00000	+0.00000	+0.00000
3	1	+0.00000	+0.00000	+0.00000	+0.00391	−0.05873	+0.00001
	2	+0.00000	+0.00000	+0.00000	−0.00170	+0.00032	−0.00000
	3	+0.00000	+0.00000	+0.00000	+0.00087	−0.02708	+0.00018
	4	+0.00000	+0.00000	+0.00000	+0.00264	−0.02682	−0.00018
	5	+0.00000	+0.00000	+0.00000	+0.00233	+0.00114	+0.00001
	6	+0.00000	+0.00000	+0.00000	+0.00032	−0.00003	−0.00000
4	1	+0.00391	−0.05873	+0.00001	+0.00000	+0.00000	+0.00000
	2	−0.00170	+0.00032	−0.00000	+0.00000	+0.00000	+0.00000
	3	+0.00087	−0.02708	+0.00018	+0.00000	+0.00000	+0.00000
	4	+0.00264	−0.02682	−0.00018	+0.00000	+0.00000	+0.00000
	5	+0.00233	+0.00114	+0.00001	+0.00000	+0.00000	+0.00000
	6	+0.00032	−0.00003	−0.00000	+0.00000	+0.00000	+0.00000
5	1	+0.00000	+0.00000	+0.00000	+0.00187	−0.05854	−0.00001
	2	+0.00000	+0.00000	+0.00000	−0.00096	−0.00003	+0.00000
	3	+0.00000	+0.00000	+0.00000	+0.00069	+0.00117	−0.00001
	4	+0.00000	+0.00000	+0.00000	−0.00097	−0.02685	+0.00018
	5	+0.00000	+0.00000	+0.00000	+0.00307	−0.02675	−0.00018
	6	+0.00000	+0.00000	+0.00000	+0.00037	+0.00033	+0.00000
6	1	+0.00187	−0.05854	−0.00001	+0.00000	+0.00000	+0.00000
	2	−0.00096	−0.00003	+0.00000	+0.00000	+0.00000	+0.00000
	3	+0.00069	+0.00117	−0.00001	+0.00000	+0.00000	+0.00000
	4	−0.00097	−0.02685	+0.00018	+0.00000	+0.00000	+0.00000
	5	+0.00307	−0.02675	−0.00018	+0.00000	+0.00000	+0.00000
	6	+0.00037	+0.00033	+0.00000	+0.00000	+0.00000	+0.00000
7	1	+0.00000	+0.00000	+0.00000	−0.00022	−0.04908	+0.00010
	2	+0.00000	+0.00000	+0.00000	−0.00031	+0.00000	−0.00000
	3	+0.00000	+0.00000	+0.00000	+0.00021	−0.00010	+0.00000
	4	+0.00000	+0.00000	+0.00000	−0.00021	+0.00125	−0.00001
	5	+0.00000	+0.00000	+0.00000	−0.00034	−0.02800	+0.00016
	6	+0.00000	+0.00000	+0.00000	+0.00056	−0.01554	−0.00005
8	1	−0.00022	−0.04908	+0.00010	+0.00000	+0.00000	+0.00000
	2	−0.00031	+0.00000	−0.00000	+0.00000	+0.00000	+0.00000
	3	+0.00021	−0.00010	+0.00000	+0.00000	+0.00000	+0.00000

	4	-0.00021	+0.00125	-0.00001	+0.00000	+0.00000	+0.00000
	5	-0.00034	-0.02800	+0.00016	+0.00000	+0.00000	+0.00000
	6	+0.00056	-0.01554	-0.00005	+0.00000	+0.00000	+0.00000
9	1	+0.00659	-0.04988	+0.00004	+0.00659	-0.01331	+0.00004
	2	-0.00269	-0.21613	+0.00013	-0.00269	-0.09945	+0.00012
	3	+0.00567	+0.34752	-0.00021	+0.00567	+0.16098	-0.00021
	4	+0.00202	-0.02838	+0.00002	+0.00202	-0.01366	+0.00002
	5	+0.00216	+0.00248	-0.00000	+0.00216	+0.00120	-0.00000
	6	+0.00029	-0.00003	+0.00000	+0.00029	-0.00002	+0.00000
10	1	+0.00659	-0.01331	+0.00001	+0.00659	-0.04031	-0.00013
	2	-0.00269	-0.09945	+0.00012	-0.00269	-0.00831	+0.00005
	3	+0.00567	+0.16098	-0.00021	+0.00567	-0.02556	-0.00021
	4	+0.00202	-0.01366	+0.00002	+0.00202	+0.00105	+0.00002
	5	+0.00216	+0.00120	-0.00000	+0.00216	-0.00008	-0.00000
	6	+0.00029	-0.00002	+0.00000	+0.00029	+0.00000	+0.00000
11	1	+0.00659	-0.04031	-0.00013	+0.00592	-0.69948	-0.00042
	2	-0.00269	-0.00831	+0.00005	-0.00244	+0.03935	+0.00001
	3	+0.00567	-0.02556	-0.00021	+0.00447	-0.74990	-0.00044
	4	+0.00202	+0.00105	+0.00002	+0.00218	+0.06760	+0.00005
	5	+0.00216	-0.00008	-0.00000	+0.00221	-0.00557	-0.00000
	6	+0.00029	+0.00000	+0.00000	+0.00030	+0.00012	+0.00000
12	1	+0.00592	-0.69948	-0.00042	+0.00525	-1.08596	+0.00002
	2	-0.00244	+0.03935	+0.00001	-0.00219	+0.03953	-0.00001
	3	+0.00447	-0.74990	-0.00044	+0.00327	-1.16547	+0.00001
	4	+0.00218	+0.06760	+0.00005	+0.00233	+0.14588	+0.00003
	5	+0.00221	-0.00557	-0.00000	+0.00225	-0.01200	-0.00000
	6	+0.00030	+0.00012	+0.00000	+0.00031	+0.00028	+0.00000
13	1	+0.00525	-1.08596	+0.00002	+0.00458	-0.64005	+0.00043
	2	-0.00219	+0.03953	-0.00001	-0.00194	+0.01795	-0.00001
	3	+0.00327	-1.16547	+0.00001	+0.00207	-0.73188	+0.00044
	4	+0.00233	+0.14588	+0.00003	+0.00248	+0.14477	-0.00005
	5	+0.00225	-0.01200	-0.00000	+0.00229	-0.01217	+0.00000
	6	+0.00031	+0.00028	+0.00000	+0.00032	+0.00029	-0.00000
14	1	+0.00458	-0.64005	+0.00043	+0.00391	-0.05873	+0.00001
	2	-0.00194	+0.01795	-0.00001	-0.00170	+0.00032	-0.00000
	3	+0.00207	-0.73188	+0.00044	+0.00087	-0.02708	+0.00018
	4	+0.00248	+0.14477	-0.00005	+0.00264	-0.02682	-0.00018
	5	+0.00229	-0.01217	+0.00000	+0.00233	+0.00114	+0.00001
	6	+0.00032	+0.00029	-0.00000	+0.00032	-0.00003	-0.00000
15	1	+0.00391	-0.05873	+0.00001	+0.00340	-0.57869	-0.00038
	2	-0.00170	+0.00032	-0.00000	-0.00151	-0.00333	-0.00000
	3	+0.00087	-0.02708	+0.00018	+0.00083	+0.14615	+0.00005
	4	+0.00264	-0.02682	-0.00018	+0.00174	-0.71863	-0.00043
	5	+0.00233	+0.00114	+0.00001	+0.00252	+0.06468	+0.00005
	6	+0.00032	-0.00003	-0.00000	+0.00033	-0.00151	-0.00000
16	1	+0.00340	-0.57869	-0.00038	+0.00289	-0.96212	-0.00000
	2	-0.00151	-0.00333	-0.00000	-0.00133	-0.00326	+0.00000
	3	+0.00083	+0.14615	+0.00005	+0.00078	+0.14591	-0.00003
	4	+0.00174	-0.71863	-0.00043	+0.00083	-1.13550	+0.00000
	5	+0.00252	+0.06468	+0.00005	+0.00270	+0.14253	+0.00003
	6	+0.00033	-0.00151	-0.00000	+0.00035	-0.00335	-0.00000

17	1	+0.00289	-0.96212	-0.00000	+0.00238	-0.57964	+0.00038
	2	-0.00133	-0.00326	+0.00000	-0.00115	-0.00149	+0.00000
	3	+0.00078	+0.14591	-0.00003	+0.00074	+0.06624	-0.00005
	4	+0.00083	-1.13550	+0.00000	-0.00007	-0.71845	+0.00043
	5	+0.00270	+0.14253	+0.00003	+0.00289	+0.14273	-0.00004
	6	+0.00035	-0.00335	-0.00000	+0.00036	-0.00343	+0.00000
18	1	+0.00238	-0.57964	+0.00038	+0.00187	-0.05854	-0.00001
	2	-0.00115	-0.00149	+0.00000	-0.00096	-0.00003	+0.00000
	3	+0.00074	+0.06624	-0.00005	+0.00069	+0.00117	-0.00001
	4	-0.00007	-0.71845	+0.00043	-0.00097	-0.02685	+0.00018
	5	+0.00289	+0.14273	-0.00004	+0.00307	-0.02675	-0.00018
	6	+0.00036	-0.00343	+0.00000	+0.00037	+0.00033	+0.00000
19	1	+0.00187	-0.05854	-0.00001	+0.00135	-0.63029	-0.00042
	2	-0.00096	-0.00003	+0.00000	-0.00080	+0.00030	+0.00000
	3	+0.00069	+0.00117	-0.00001	+0.00057	-0.01239	-0.00000
	4	-0.00097	-0.02685	+0.00018	-0.00078	+0.14326	+0.00004
	5	+0.00307	-0.02675	-0.00018	+0.00222	-0.71313	-0.00043
	6	+0.00037	+0.00033	+0.00000	+0.00042	+0.01829	+0.00001
20	1	+0.00135	-0.63029	-0.00042	+0.00082	-1.06448	-0.00002
	2	-0.00080	+0.00030	+0.00000	-0.00064	+0.00028	-0.00000
	3	+0.00057	-0.01239	-0.00000	+0.00045	-0.01201	+0.00000
	4	-0.00078	+0.14326	+0.00004	-0.00059	+0.14253	-0.00003
	5	+0.00222	-0.71313	-0.00043	+0.00137	-1.12350	+0.00000
	6	+0.00042	+0.01829	+0.00001	+0.00047	+0.03956	+0.00001
21	1	+0.00082	-1.06448	-0.00002	+0.00030	-0.67916	+0.00041
	2	-0.00064	+0.00028	-0.00000	-0.00047	+0.00012	-0.00000
	3	+0.00045	-0.01201	+0.00000	+0.00033	-0.00535	+0.00000
	4	-0.00059	+0.14253	-0.00003	-0.00040	+0.06414	-0.00005
	5	+0.00137	-1.12350	+0.00000	+0.00052	-0.70622	+0.00043
	6	+0.00047	+0.03956	+0.00001	+0.00051	+0.03725	-0.00001
22	1	+0.00030	-0.67916	+0.00041	-0.00022	-0.04908	+0.00010
	2	-0.00047	+0.00012	-0.00000	-0.00031	+0.00000	-0.00000
	3	+0.00033	-0.00535	+0.00000	+0.00021	-0.00010	+0.00000
	4	-0.00040	+0.06414	-0.00005	-0.00021	+0.00125	-0.00001
	5	+0.00052	-0.70622	+0.00043	-0.00034	-0.02800	+0.00016
	6	+0.00051	+0.03725	-0.00001	+0.00056	-0.01554	-0.00005
23	1	-0.00022	-0.04908	+0.00010	-0.00007	-0.12186	+0.00005
	2	-0.00031	+0.00000	-0.00000	-0.00010	-0.00001	+0.00000
	3	+0.00021	-0.00010	+0.00000	+0.00007	+0.00043	-0.00000
	4	-0.00021	+0.00125	-0.00001	-0.00006	-0.00517	+0.00000
	5	-0.00034	-0.02800	+0.00016	-0.00010	+0.06012	-0.00004
	6	+0.00056	-0.01554	-0.00005	+0.00017	-0.13767	+0.00008
24	1	-0.00007	-0.12186	+0.00005	+0.00000	+0.00000	+0.00014
	2	-0.00010	-0.00001	+0.00000	+0.00000	+0.00000	+0.00000
	3	+0.00007	+0.00043	-0.00000	+0.00000	+0.00000	-0.00000
	4	-0.00006	-0.00517	+0.00000	+0.00000	+0.00000	+0.00001
	5	-0.00010	+0.06012	-0.00004	+0.00000	+0.00000	-0.00006
	6	+0.00017	-0.13767	+0.00008	+0.00000	+0.00000	+0.00016

STR. 02   MEMBER END ACTIONS   DRIVE A

MEM NO.	LD. CSE	AXIAL (KN) LOWER JT.	SHEAR (KN) LOWER JT.	BM (KN-M) LOWER JT.	AXIAL (KN) UPPER JT.	SHEAR (KN) UPPER JT.	BM (KN-M) UPPER JT.
1	1	+66.337	-10.020	-11.010	-66.337	+10.020	-24.061
	2	+13.675	+3.760	+4.126	-13.675	-3.760	+9.036
	3	+42.065	-16.383	-18.145	-42.065	+16.383	-39.196
	4	-1.728	+1.402	+1.624	+1.728	-1.402	+3.284
	5	+0.137	-0.018	+0.041	-0.137	+0.018	-0.103
	6	-0.003	+0.015	+0.025	+0.003	-0.015	+0.027
2	1	-56.907	-7.939	-21.794	+56.907	+7.939	-10.598
	2	-11.731	+2.993	+8.211	+11.731	-2.993	+3.999
	3	-36.086	-12.663	-34.861	+36.086	+12.663	-16.803
	4	+1.482	+0.928	+2.605	-1.482	-0.928	+1.180
	5	-0.117	-0.148	-0.364	+0.117	+0.148	-0.240
	6	+0.003	-0.007	-0.014	-0.003	+0.007	-0.016
3	1	+96.661	+1.040	+1.272	-96.661	-1.040	+2.367
	2	-0.526	-0.376	-0.467	+0.526	+0.376	-0.847
	3	+44.561	+14.175	+15.862	-44.561	-14.175	+33.751
	4	+44.146	-13.818	-15.364	-44.146	+13.818	-32.998
	5	-1.882	+1.194	+1.400	+1.882	-1.194	+2.778
	6	+0.043	-0.012	-0.004	-0.043	+0.012	-0.037
4	1	-82.920	+0.538	+1.568	+82.920	-0.538	+0.628
	2	+0.451	-0.177	-0.523	-0.451	+0.177	-0.197
	3	-38.226	+10.597	+29.290	+38.226	-10.597	+13.944
	4	-37.870	-10.547	-29.079	+37.870	+10.547	-13.951
	5	+1.614	+0.752	+2.125	-1.614	-0.752	+0.942
	6	-0.037	-0.029	-0.073	+0.037	+0.029	-0.045
5	1	+96.336	-0.640	-0.662	-96.336	+0.640	-1.578
	2	+0.042	-0.016	-0.045	-0.042	+0.016	-0.010
	3	-1.929	-1.090	-1.198	+1.929	+1.090	-2.617
	4	+44.192	+13.865	+15.464	-44.192	-13.865	+33.063
	5	+44.024	-13.692	-15.211	-44.024	+13.692	-32.711
	6	-0.550	+0.327	+0.375	+0.550	-0.327	+0.768
6	1	-82.641	-0.597	-1.611	+82.641	+0.597	-0.826
	2	-0.036	+0.048	+0.113	+0.036	-0.048	+0.083
	3	+1.655	-0.862	-2.367	-1.655	+0.862	-1.150
	4	-37.910	+10.478	+28.924	+37.910	-10.478	+13.827
	5	-37.765	-10.479	-28.883	+37.765	+10.479	-13.871
	6	+0.472	+0.222	+0.622	-0.472	-0.222	+0.285
7	1	+80.778	+7.971	+8.900	-80.778	-7.971	+19.000
	2	-0.004	-0.015	-0.026	+0.004	+0.015	-0.027
	3	+0.169	+0.093	+0.110	-0.169	-0.093	+0.216
	4	-2.051	-1.020	-1.145	+2.051	+1.020	-2.424
	5	+46.074	+12.796	+14.288	-46.074	-12.796	+30.499
	6	+25.569	-4.195	-4.671	-25.569	+4.195	-10.011
8	1	-69.295	+6.003	+16.579	+69.295	-6.003	+7.915
	2	+0.003	+0.008	+0.016	-0.003	-0.008	+0.017
	3	-0.145	+0.057	+0.161	+0.145	-0.057	+0.070
	4	+1.759	-0.753	-2.085	-1.759	+0.753	-0.988

	5	−39.524	+9.636	+26.610	+39.524	−9.636	+12.703
	6	−21.934	−3.187	−8.791	+21.934	+3.187	−4.211
9	1	+0.000	−7.350	−0.000	+0.000	+22.225	−12.939
	2	+0.000	+0.000	−0.000	+0.000	+12.250	−5.359
	3	+0.000	−0.000	+0.000	+0.000	+0.000	−0.000
	4	+0.000	+0.000	−0.000	+0.000	−0.000	+0.000
	5	+0.000	−0.000	+0.000	+0.000	+0.000	−0.000
	6	+0.000	+0.000	−0.000	+0.000	−0.000	+0.000
10	1	−0.000	−22.225	+12.939	+0.000	+37.100	−38.894
	2	+0.000	−12.250	+5.359	+0.000	+24.500	−21.437
	3	+0.000	−0.000	+0.000	+0.000	+0.000	−0.000
	4	+0.000	+0.000	−0.000	+0.000	−0.000	+0.000
	5	+0.000	−0.000	+0.000	+0.000	+0.000	−0.000
	6	+0.000	+0.000	−0.000	+0.000	−0.000	+0.000
11	1	+2.081	+86.144	+84.749	−2.081	−41.862	+19.256
	2	−0.768	+0.906	+4.190	+0.768	−0.906	−2.718
	3	+3.720	+78.151	+74.057	−3.720	−38.745	+20.921
	4	−0.475	−3.211	−5.889	+0.475	+3.211	+0.672
	5	−0.130	+0.254	+0.467	+0.130	−0.254	−0.054
	6	−0.022	−0.006	−0.013	+0.022	+0.006	+0.002
12	1	+2.081	+41.862	−19.256	−2.081	+2.419	+51.304
	2	−0.768	+0.906	+2.718	+0.768	−0.906	−1.246
	3	+3.720	+38.745	−20.921	−3.720	+0.662	+51.863
	4	−0.475	−3.211	−0.672	+0.475	+3.211	−4.545
	5	−0.130	+0.254	+0.054	+0.130	−0.254	+0.359
	6	−0.022	−0.006	−0.002	+0.022	+0.006	−0.008
13	1	+2.081	−2.419	−51.304	−2.081	+46.700	+11.395
	2	−0.768	+0.906	+1.246	+0.768	−0.906	+0.226
	3	+3.720	−0.662	−51.863	−3.720	+40.068	+18.771
	4	−0.475	−3.211	+4.545	+0.475	+3.211	−9.763
	5	−0.130	+0.254	−0.359	+0.130	−0.254	+0.772
	6	−0.022	−0.006	+0.008	+0.022	+0.006	−0.019
14	1	+2.081	−46.700	−11.395	−2.081	+90.981	−100.471
	2	−0.768	+0.906	−0.226	+0.768	−0.906	+1.698
	3	+3.720	−40.068	−18.771	−3.720	+79.474	−78.357
	4	−0.475	−3.211	+9.763	+0.475	+3.211	−14.980
	5	−0.130	+0.254	−0.772	+0.130	−0.254	+1.185
	6	−0.022	−0.006	+0.019	+0.022	+0.006	−0.029
15	1	+1.579	+88.599	+96.536	−1.579	−44.318	+11.459
	2	−0.569	−0.071	−0.328	+0.569	+0.071	+0.213
	3	+0.141	+3.314	+15.317	−0.141	−3.314	−9.933
	4	+2.797	+78.805	+77.057	−2.797	−39.399	+18.984
	5	−0.572	−3.242	−6.088	+0.572	+3.242	+0.820
	6	−0.039	+0.074	+0.140	+0.039	−0.074	−0.020
16	1	+1.579	+44.318	−11.459	−1.579	−0.037	+47.498
	2	−0.569	−0.071	−0.213	+0.569	+0.071	+0.098
	3	+0.141	+3.314	+9.933	−0.141	−3.314	−4.548
	4	+2.797	+39.399	−18.984	−2.797	+0.007	+50.990
	5	−0.572	−3.242	−0.820	+0.572	+3.242	−4.447
	6	−0.039	+0.074	+0.020	+0.039	−0.074	+0.100
17	1	+1.579	+0.037	−47.498	−1.579	+44.244	+11.579

	2	-0.569	-0.071	-0.098	+0.569	+0.071	-0.018
	3	+0.141	+3.314	+4.548	-0.141	-3.314	+0.836
	4	+2.797	-0.007	-50.990	-2.797	+39.413	+18.961
	5	-0.572	-3.242	+4.447	+0.572	+3.242	-9.715
	6	-0.039	+0.074	-0.100	+0.039	-0.074	+0.220
18	1	+1.579	-44.244	-11.579	-1.579	+88.526	-96.296
	2	-0.569	-0.071	+0.018	+0.569	+0.071	-0.133
	3	+0.141	+3.314	-0.836	-0.141	-3.314	+6.221
	4	+2.797	-39.413	-18.961	-2.797	+79.820	-77.103
	5	-0.572	-3.242	+9.715	+0.572	+3.242	-14.983
	6	-0.039	+0.074	-0.220	+0.039	-0.074	+0.340
19	1	+1.622	+90.451	+99.485	-1.622	-46.170	+11.519
	2	-0.505	+0.007	+0.031	+0.505	-0.007	-0.020
	3	+0.369	-0.270	-1.238	-0.369	+0.270	+0.798
	4	-0.590	+3.283	+15.116	+0.590	-3.283	-9.782
	5	+2.641	+78.547	+76.576	-2.641	-39.141	+19.045
	6	-0.143	-0.948	-1.730	+0.143	+0.948	+0.190
20	1	+1.622	+46.170	-11.519	-1.622	-1.888	+50.566
	2	-0.505	+0.007	+0.020	+0.505	-0.007	-0.008
	3	+0.369	-0.270	-0.798	-0.369	+0.270	+0.359
	4	-0.590	+3.283	+9.782	+0.590	-3.283	-4.447
	5	+2.641	+39.141	-19.045	-2.641	+0.265	+50.632
	6	-0.143	-0.948	-0.190	+0.143	+0.948	-1.350
21	1	+1.622	+1.888	-50.566	-1.622	+42.393	+17.656
	2	-0.505	+0.007	+0.008	+0.505	-0.007	+0.003
	3	+0.369	-0.270	-0.359	-0.369	+0.270	-0.080
	4	-0.590	+3.283	+4.447	+0.590	-3.283	+0.887
	5	+2.641	-0.265	-50.632	-2.641	+39.672	+18.183
	6	-0.143	-0.948	+1.350	+0.143	+0.948	-2.890
22	1	+1.622	-42.393	-17.656	-1.622	+86.674	-87.211
	2	-0.505	+0.007	-0.003	+0.505	-0.007	+0.014
	3	+0.369	-0.270	+0.080	-0.369	+0.270	-0.519
	4	-0.590	+3.283	-0.887	+0.590	-3.283	+6.222
	5	+2.641	-39.672	-18.183	-2.641	+79.078	-78.301
	6	-0.143	-0.948	+2.890	+0.143	+0.948	-4.431
23	1	-0.346	+63.399	+51.632	+0.346	-2.086	+22.039
	2	-0.482	-0.001	-0.002	+0.482	+0.001	+0.001
	3	+0.333	+0.044	+0.142	-0.333	-0.044	-0.044
	4	-0.324	-0.527	-1.712	+0.324	+0.527	+0.527
	5	-0.520	+6.521	+21.192	+0.520	-6.521	-6.521
	6	+0.865	+46.555	+23.233	-0.865	+8.008	+20.133
24	1	-0.346	-8.414	-22.039	+0.346	+35.664	-0.000
	2	-0.482	-0.001	-0.001	+0.482	+0.001	-0.000
	3	+0.333	+0.044	+0.044	-0.333	-0.044	+0.000
	4	-0.324	-0.527	-0.527	+0.324	+0.527	-0.000
	5	-0.520	+6.521	+6.521	+0.520	-6.521	+0.000
	6	+0.865	-8.008	-20.133	-0.865	+32.258	-0.000

STR. 02   SUPPORT REACTIONS   DRIVE A

JOINT NUMBER	LOAD CSE	X-REACTION (KNTS)	Y-REACTION (KNTS)	Z-REACTION (KNTS-M)
1	1	+10.020	+66.337	-11.010
	2	-3.760	+13.675	+4.126
	3	+16.383	+42.065	-18.145
	4	-1.402	-1.728	+1.624
	5	+0.018	+0.137	+0.041
	6	-0.015	-0.003	+0.025
2	1	-1.040	+96.661	+1.272
	2	+0.376	-0.526	-0.467
	3	-14.175	+44.561	+15.862
	4	+13.818	+44.146	-15.364
	5	-1.194	-1.882	+1.400
	6	+0.012	+0.043	-0.004
3	1	+0.640	+96.336	-0.662
	2	+0.016	+0.042	-0.045
	3	+1.090	-1.929	-1.198
	4	-13.865	+44.192	+15.464
	5	+13.692	+44.024	-15.211
	6	-0.327	-0.550	+0.375
4	1	-7.971	+80.778	+8.900
	2	+0.015	-0.004	-0.026
	3	-0.093	+0.169	+0.110
	4	+1.020	-2.051	-1.145
	5	-12.796	+46.074	+14.288
	6	+4.195	+25.569	-4.671
21	1	+0.346	+46.164	-0.000
	2	+0.482	+0.001	-0.000
	3	-0.333	-0.044	+0.000
	4	+0.324	+0.527	-0.000
	5	+0.520	-6.521	+0.000
	6	-0.865	+32.258	-0.000
22	1	-7.939	+56.907	-10.598
	2	+2.993	+11.731	+3.999
	3	-12.663	+36.086	-16.803
	4	+0.928	-1.482	+1.180
	5	-0.148	+0.117	-0.240
	6	-0.007	-0.003	-0.016
23	1	+0.538	+82.920	+0.628
	2	-0.177	-0.451	-0.197
	3	+10.597	+38.226	+13.944
	4	-10.547	+37.870	-13.951
	5	+0.752	-1.614	+0.942
	6	-0.029	+0.037	-0.045
24	1	-0.597	+82.641	-0.826
	2	+0.048	+0.036	+0.083
	3	-0.862	-1.655	-1.150
	4	+10.478	+37.910	+13.827

	5	-10.479	+37.765	-13.871
	6	+0.222	-0.472	+0.285
25	1	+6.003	+69.295	+7.915
	2	+0.008	-0.003	+0.017
	3	+0.057	+0.145	+0.070
	4	-0.753	-1.759	-0.988
	5	+9.636	+39.524	+12.703
	6	-3.187	+21.934	-4.211

STR. 02 JOINT DEFORMATIONS DRIVE A

MEM NO.	LD. CMB	X-DISPLACE JL. MM.	Y-DISPLACE JL. MM.	ROTATION JL. RAD.	X-DISPLACE JG. MM.	Y-DISPLACE JG. MM.	ROTATION JG. RAD.
1	1	+0.00000	+0.00000	+0.00000	+0.01944	−0.09974	−0.00039
	2	+0.00000	+0.00000	+0.00000	+0.01999	−0.08885	−0.00049
	3	+0.00000	+0.00000	+0.00000	+0.00769	−0.06127	−0.00007
	4	+0.00000	+0.00000	+0.00000	+0.01596	−0.10132	−0.00041
	5	+0.00000	+0.00000	+0.00000	+0.02022	−0.08715	−0.00046
	6	+0.00000	+0.00000	+0.00000	+0.01049	−0.06140	−0.00007
	7	+0.00000	+0.00000	+0.00000	+0.02043	−0.08885	−0.00049
2	1	+0.01944	−0.09974	−0.00039	+0.00000	+0.00000	+0.00000
	2	+0.01999	−0.08885	−0.00049	+0.00000	+0.00000	+0.00000
	3	+0.00769	−0.06127	−0.00007	+0.00000	+0.00000	+0.00000
	4	+0.01596	−0.10132	−0.00041	+0.00000	+0.00000	+0.00000
	5	+0.02022	−0.08715	−0.00046	+0.00000	+0.00000	+0.00000
	6	+0.01049	−0.06140	−0.00007	+0.00000	+0.00000	+0.00000
	7	+0.02043	−0.08885	−0.00049	+0.00000	+0.00000	+0.00000
3	1	+0.00000	+0.00000	+0.00000	+0.01159	−0.15212	+0.00003
	2	+0.00000	+0.00000	+0.00000	+0.00969	−0.11232	+0.00031
	3	+0.00000	+0.00000	+0.00000	+0.00678	−0.11322	−0.00026
	4	+0.00000	+0.00000	+0.00000	+0.00715	−0.11184	+0.00030
	5	+0.00000	+0.00000	+0.00000	+0.01063	−0.15431	+0.00002
	6	+0.00000	+0.00000	+0.00000	+0.00979	−0.11146	−0.00024
	7	+0.00000	+0.00000	+0.00000	+0.01017	−0.11236	+0.00031
4	1	+0.01159	−0.15212	+0.00003	+0.00000	+0.00000	+0.00000
	2	+0.00969	−0.11232	+0.00031	+0.00000	+0.00000	+0.00000
	3	+0.00678	−0.11322	−0.00026	+0.00000	+0.00000	+0.00000
	4	+0.00715	−0.11184	+0.00030	+0.00000	+0.00000	+0.00000
	5	+0.01063	−0.15431	+0.00002	+0.00000	+0.00000	+0.00000
	6	+0.00979	−0.11146	−0.00024	+0.00000	+0.00000	+0.00000
	7	+0.01017	−0.11236	+0.00031	+0.00000	+0.00000	+0.00000
5	1	+0.00000	+0.00000	+0.00000	+0.00564	−0.15136	−0.00003
	2	+0.00000	+0.00000	+0.00000	+0.00798	−0.11154	−0.00030
	3	+0.00000	+0.00000	+0.00000	−0.00000	−0.11299	+0.00026
	4	+0.00000	+0.00000	+0.00000	+0.00654	−0.11158	−0.00030
	5	+0.00000	+0.00000	+0.00000	+0.00248	−0.11119	+0.00024
	6	+0.00000	+0.00000	+0.00000	+0.00404	−0.15361	−0.00001
	7	+0.00000	+0.00000	+0.00000	+0.00854	−0.11104	−0.00029
6	1	+0.00564	−0.15136	−0.00003	+0.00000	+0.00000	+0.00000
	2	+0.00798	−0.11154	−0.00030	+0.00000	+0.00000	+0.00000
	3	−0.00000	−0.11299	+0.00026	+0.00000	+0.00000	+0.00000
	4	+0.00654	−0.11158	−0.00030	+0.00000	+0.00000	+0.00000
	5	+0.00248	−0.11119	+0.00024	+0.00000	+0.00000	+0.00000
	6	+0.00404	−0.15361	−0.00001	+0.00000	+0.00000	+0.00000
	7	+0.00854	−0.11104	−0.00029	+0.00000	+0.00000	+0.00000
7	1	+0.00000	+0.00000	+0.00000	−0.00040	−0.12494	+0.00028
	2	+0.00000	+0.00000	+0.00000	−0.00046	−0.10350	+0.00038
	3	+0.00000	+0.00000	+0.00000	−0.00022	−0.08279	+0.00003
	4	+0.00000	+0.00000	+0.00000	−0.00093	−0.10350	+0.00038

	5	+0.00000	+0.00000	+0.00000	+0.00057	-0.08294	+0.00003
	6	+0.00000	+0.00000	+0.00000	-0.00156	-0.10148	+0.00035
	7	+0.00000	+0.00000	+0.00000	+0.00038	-0.12681	+0.00029
8	1	-0.00040	-0.12494	+0.00028	+0.00000	+0.00000	+0.00000
	2	-0.00046	-0.10350	+0.00038	+0.00000	+0.00000	+0.00000
	3	-0.00022	-0.08279	+0.00003	+0.00000	+0.00000	+0.00000
	4	-0.00093	-0.10350	+0.00038	+0.00000	+0.00000	+0.00000
	5	+0.00057	-0.08294	+0.00003	+0.00000	+0.00000	+0.00000
	6	-0.00156	-0.10148	+0.00035	+0.00000	+0.00000	+0.00000
	7	+0.00038	-0.12681	+0.00029	+0.00000	+0.00000	+0.00000
9	1	+0.01944	+0.09584	-0.00004	+0.01944	+0.05694	-0.00010
	2	+0.01999	+0.46265	-0.00027	+0.01999	+0.22663	-0.00031
	3	+0.00769	-0.42916	+0.00028	+0.00769	-0.18633	+0.00022
	4	+0.01596	+0.13845	-0.00007	+0.01596	+0.07745	-0.00012
	5	+0.02022	+0.41632	-0.00024	+0.02022	+0.20432	-0.00028
	6	+0.01049	-0.42540	+0.00028	+0.01049	-0.18451	+0.00022
	7	+0.02043	+0.46260	-0.00027	+0.02043	+0.22661	-0.00031
10	1	+0.01944	+0.05674	-0.00010	+0.01944	-0.09974	-0.00039
	2	+0.01999	+0.22663	-0.00031	+0.01999	-0.08885	-0.00049
	3	+0.00769	-0.18633	+0.00022	+0.00769	-0.06127	-0.00007
	4	+0.01596	+0.07745	-0.00012	+0.01596	-0.10132	-0.00041
	5	+0.02022	+0.20432	-0.00028	+0.02022	-0.08715	-0.00046
	6	+0.01049	-0.18451	+0.00022	+0.01049	-0.06140	-0.00007
	7	+0.02043	+0.22661	-0.00031	+0.02043	-0.08885	-0.00049
11	1	+0.01944	-0.09974	-0.00039	+0.01748	-1.84696	-0.00110
	2	+0.01999	-0.08885	-0.00049	+0.01742	-2.00755	-0.00119
	3	+0.00769	-0.06127	-0.00007	+0.00746	-0.71375	-0.00043
	4	+0.01596	-0.10132	-0.00041	+0.01376	-1.94853	-0.00117
	5	+0.02022	-0.08715	-0.00046	+0.01782	-1.89762	-0.00111
	6	+0.01049	-0.06140	-0.00007	+0.01032	-0.72229	-0.00043
	7	+0.02043	-0.08885	-0.00049	+0.01787	-2.00737	-0.00119
12	1	+0.01748	-1.84696	-0.00110	+0.01551	-2.84513	+0.00007
	2	+0.01742	-2.00755	-0.00119	+0.01484	-3.12366	+0.00004
	3	+0.00746	-0.71375	-0.00043	+0.00723	-1.07892	+0.00006
	4	+0.01376	-1.94853	-0.00117	+0.01156	-3.06436	+0.00002
	5	+0.01782	-1.89762	-0.00111	+0.01543	-2.88642	+0.00009
	6	+0.01032	-0.72229	-0.00043	+0.01014	-1.09735	+0.00006
	7	+0.01787	-2.00737	-0.00119	+0.01530	-3.12324	+0.00004
13	1	+0.01551	-2.84513	+0.00007	+0.01355	-1.67161	+0.00111
	2	+0.01484	-3.12366	+0.00004	+0.01227	-1.91614	+0.00120
	3	+0.00723	-1.07892	+0.00006	+0.00700	-0.55554	+0.00044
	4	+0.01156	-3.06436	+0.00002	+0.00935	-1.88921	+0.00118
	5	+0.01543	-2.88642	+0.00009	+0.01303	-1.68028	+0.00113
	6	+0.01014	-1.09735	+0.00006	+0.00997	-0.57423	+0.00045
	7	+0.01530	-3.12324	+0.00004	+0.01274	-1.91570	+0.00120
14	1	+0.01355	-1.67161	+0.00111	+0.01159	-0.15212	+0.00003
	2	+0.01227	-1.91614	+0.00120	+0.00969	-0.11232	+0.00031
	3	+0.00700	-0.55554	+0.00044	+0.00678	-0.11322	-0.00026
	4	+0.00935	-1.88921	+0.00118	+0.00715	-0.11184	+0.00030
	5	+0.01303	-1.68028	+0.00113	+0.01063	-0.15431	+0.00002
	6	+0.00997	-0.57423	+0.00045	+0.00979	-0.11146	-0.00024
	7	+0.01274	-1.91570	+0.00120	+0.01017	-0.11236	+0.00031

15	1	+0.01159	-0.15212	+0.00003	+0.01010	-1.49234	-0.00099
	2	+0.00969	-0.11232	+0.00031	+0.00926	-0.40712	-0.00033
	3	+0.00678	-0.11322	-0.00026	+0.00508	-1.80858	-0.00113
	4	+0.00715	-0.11184	+0.00030	+0.00699	-0.41212	-0.00033
	5	+0.01063	-0.15431	+0.00002	+0.00859	-1.58436	-0.00106
	6	+0.00979	-0.11146	-0.00024	+0.00836	-1.70929	-0.00105
	7	+0.01017	-0.11236	+0.00031	+0.00977	-0.40940	-0.00033
16	1	+0.01010	-1.49234	-0.00099	+0.00861	-2.48314	-0.00000
	2	+0.00926	-0.40712	-0.00033	+0.00884	-0.76999	-0.00000
	3	+0.00508	-1.80858	-0.00113	+0.00339	-2.91581	-0.00000
	4	+0.00699	-0.41212	-0.00033	+0.00684	-0.77488	-0.00000
	5	+0.00859	-1.58436	-0.00106	+0.00655	-2.69206	-0.00005
	6	+0.00836	-1.70929	-0.00105	+0.00692	-2.69698	+0.00005
	7	+0.00977	-0.40940	-0.00033	+0.00936	-0.77501	-0.00000
17	1	+0.00861	-2.48314	-0.00000	+0.00713	-1.49615	+0.00098
	2	+0.00884	-0.76999	-0.00000	+0.00841	-0.41110	+0.00033
	3	+0.00339	-2.91581	-0.00000	+0.00169	-1.80959	+0.00113
	4	+0.00684	-0.77488	-0.00000	+0.00669	-0.41333	+0.00033
	5	+0.00655	-2.69206	-0.00005	+0.00452	-1.70801	+0.00105
	6	+0.00692	-2.69698	+0.00005	+0.00548	-1.59036	+0.00106
	7	+0.00936	-0.77501	-0.00000	+0.00895	-0.41625	+0.00033
18	1	+0.00713	-1.49615	+0.00098	+0.00564	-0.15136	-0.00003
	2	+0.00841	-0.41110	+0.00033	+0.00798	-0.11154	-0.00030
	3	+0.00169	-1.80959	+0.00113	-0.00000	-0.11299	+0.00026
	4	+0.00669	-0.41333	+0.00033	+0.00654	-0.11158	-0.00030
	5	+0.00452	-1.70801	+0.00105	+0.00248	-0.11119	+0.00024
	6	+0.00548	-1.59036	+0.00106	+0.00404	-0.15361	-0.00001
	7	+0.00895	-0.41625	+0.00033	+0.00854	-0.11104	-0.00029
19	1	+0.00564	-0.15136	-0.00003	+0.00413	-1.63337	-0.00108
	2	+0.00798	-0.11154	-0.00030	+0.00587	-1.87614	-0.00117
	3	-0.00000	-0.11299	+0.00026	-0.00006	-0.54509	-0.00043
	4	+0.00654	-0.11158	-0.00030	+0.00467	-1.87569	-0.00117
	5	+0.00248	-0.11119	+0.00024	+0.00200	-0.56412	-0.00044
	6	+0.00404	-0.15361	-0.00001	+0.00264	-1.64222	-0.00110
	7	+0.00854	-0.11104	-0.00029	+0.00650	-1.84870	-0.00115
20	1	+0.00413	-1.63337	-0.00108	+0.00262	-2.76028	-0.00005
	2	+0.00587	-1.87614	-0.00117	+0.00376	-3.03386	-0.00002
	3	-0.00006	-0.54509	-0.00043	-0.00011	-1.05702	-0.00006
	4	+0.00467	-1.87569	-0.00117	+0.00280	-3.03343	-0.00002
	5	+0.00200	-0.56412	-0.00044	+0.00152	-1.07546	-0.00006
	6	+0.00264	-1.64222	-0.00110	+0.00124	-2.80162	-0.00007
	7	+0.00650	-1.84870	-0.00115	+0.00446	-2.97451	-0.00000
21	1	+0.00262	-2.76028	-0.00005	+0.00111	-1.76404	+0.00107
	2	+0.00376	-3.03386	-0.00002	+0.00165	-1.91631	+0.00117
	3	-0.00011	-1.05702	-0.00006	-0.00017	-0.69667	+0.00042
	4	+0.00280	-3.03343	-0.00002	+0.00094	-1.91613	+0.00117
	5	+0.00152	-1.07546	-0.00006	+0.00104	-0.70488	+0.00042
	6	+0.00124	-2.80162	-0.00007	-0.00016	-1.81189	+0.00108
	7	+0.00446	-2.97451	-0.00000	+0.00242	-1.86043	+0.00114
22	1	+0.00111	-1.76404	+0.00107	-0.00040	-0.12494	+0.00028
	2	+0.00165	-1.91631	+0.00117	-0.00046	-0.10350	+0.00038
	3	-0.00017	-0.69667	+0.00042	-0.00022	-0.08279	+0.00003
	4	+0.00094	-1.91613	+0.00117	-0.00093	-0.10350	+0.00038

	5	+0.00104	-0.70488	+0.00042	+0.00057	-0.08294	+0.00003
	6	-0.00016	-1.81189	+0.00108	-0.00156	-0.10148	+0.00035
	7	+0.00242	-1.86043	+0.00114	+0.00038	-0.12681	+0.00029
23	1	-0.00040	-0.12494	+0.00028	-0.00012	-0.27577	+0.00012
	2	-0.00046	-0.10350	+0.00038	-0.00014	-0.06150	+0.00000
	3	-0.00022	-0.08279	+0.00003	-0.00007	-0.36658	+0.00018
	4	-0.00093	-0.10350	+0.00038	-0.00028	-0.06151	+0.00000
	5	+0.00057	-0.08294	+0.00003	+0.00017	-0.36593	+0.00018
	6	-0.00156	-0.10148	+0.00035	-0.00048	-0.06991	+0.00001
	7	+0.00038	-0.12681	+0.00029	+0.00012	-0.26800	+0.00012
24	1	-0.00012	-0.27577	+0.00012	+0.00000	+0.00000	+0.00032
	2	-0.00014	-0.06150	+0.00000	+0.00000	+0.00000	+0.00008
	3	-0.00007	-0.36658	+0.00018	+0.00000	+0.00000	+0.00042
	4	-0.00028	-0.06151	+0.00000	+0.00000	+0.00000	+0.00008
	5	+0.00017	-0.36593	+0.00018	+0.00000	+0.00000	+0.00042
	6	-0.00048	-0.06991	+0.00001	+0.00000	+0.00000	+0.00009
	7	+0.00012	-0.26800	+0.00012	+0.00000	+0.00000	+0.00031

STR. 02   MEMBER END ACTIONS   DRIVE A

MEM NO.	LD. CMB	AXIAL (KN) LOWER JT.	SHEAR (KN) LOWER JT.	BM (KN-M) LOWER JT.	AXIAL (KN) UPPER JT.	SHEAR (KN) UPPER JT.	BM (KN-M) UPPER JT.
1	1	+164.140	−29.360	−32.255	−164.140	+29.360	−70.504
	2	+146.224	−37.126	−40.917	−146.224	+37.126	−89.024
	3	+100.836	−4.759	−5.100	−100.836	+4.759	−11.556
	4	+166.737	−31.485	−34.728	−166.737	+31.485	−75.471
	5	+143.422	−34.974	−38.506	−143.422	+34.974	−83.903
	6	+101.047	−4.807	−5.075	−101.047	+4.807	−11.751
	7	+146.219	−37.104	−40.880	−146.219	+37.104	−88.984
2	1	−140.806	−23.270	−63.877	+140.806	+23.270	−31.066
	2	−125.438	−29.140	−80.080	+125.438	+29.140	−38.811
	3	−86.502	−4.054	−11.040	+86.502	+4.054	−5.502
	4	−143.034	−24.651	−67.763	+143.034	+24.651	−32.813
	5	−123.034	−27.537	−75.648	+123.034	+27.537	−36.705
	6	−86.682	−4.265	−11.564	+86.682	+4.265	−5.838
	7	−125.433	−29.151	−80.101	+125.433	+29.151	−38.835
3	1	+250.340	+3.045	+3.729	−250.340	−3.045	+6.929
	2	+184.845	+24.353	+27.483	−184.845	−24.353	+57.753
	3	+186.321	−20.008	−22.164	−186.321	+20.008	−47.865
	4	+184.057	+23.790	+26.782	−184.057	−23.790	+56.482
	5	+253.951	+1.818	+2.331	−253.951	−1.818	+4.031
	6	+183.434	−18.200	−20.058	−183.434	+18.200	−43.641
	7	+184.910	+24.335	+27.477	−184.910	−24.335	+57.696
4	1	−214.753	+1.567	+4.569	+214.753	−1.567	+1.824
	2	−158.568	+17.695	+49.081	+158.568	−17.695	+23.115
	3	−159.834	−15.456	−42.553	+159.834	+15.456	−20.506
	4	−157.892	+17.430	+48.297	+157.892	−17.430	+22.818
	5	−217.850	+0.704	+2.166	+217.850	−0.704	+0.707
	6	−157.357	−14.285	−39.256	+157.357	+14.285	−19.025
	7	−158.624	+17.652	+48.971	+158.624	−17.652	+23.047
5	1	+249.088	−1.709	−1.751	−249.088	+1.709	−4.232
	2	+183.561	−22.973	−25.443	−183.561	+22.973	−54.963
	3	+185.946	+20.464	+22.864	−185.946	−20.464	+48.759
	4	+183.624	−22.997	−25.510	−183.624	+22.997	−54.978
	5	+182.990	+18.852	+21.133	−182.990	−18.852	+44.849
	6	+252.806	−0.564	−0.517	−252.806	+0.564	−1.459
	7	+182.736	−22.483	−24.879	−182.736	+22.483	−53.811
6	1	−213.678	−1.635	−4.401	+213.678	+1.635	−2.272
	2	−157.467	−17.758	−48.889	+157.467	+17.758	−23.565
	3	−159.513	+15.376	+42.474	+159.513	−15.376	+20.260
	4	−157.521	−17.686	−48.719	+157.521	+17.686	−23.440
	5	−156.976	+14.011	+38.755	+156.976	−14.011	+18.410
	6	−216.868	−0.676	−1.783	+216.868	+0.676	−0.975
	7	−156.759	−17.425	−47.956	+156.759	+17.425	−23.137
7	1	+205.608	+21.454	+23.959	−205.608	−21.454	+51.129
	2	+170.337	+29.299	+32.722	−170.337	−29.299	+69.823
	3	+136.244	+2.119	+2.362	−136.244	−2.119	+5.056
	4	+170.331	+29.276	+32.684	−170.331	−29.276	+69.782
	5	+136.503	+2.282	+2.566	−136.503	−2.282	+5.421

	6	+167.002	+27.606	+30.800	-167.002	-27.606	+65.821
	7	+208.690	+23.006	+25.715	-208.690	-23.006	+54.806
8	1	-176.380	+16.145	+44.589	+176.380	-16.145	+21.282
	2	-146.123	+22.043	+60.881	+146.123	-22.043	+29.054
	3	-116.976	+1.606	+4.432	+116.876	-1.606	+2.121
	4	-146.117	+22.055	+60.904	+146.117	-22.055	+29.080
	5	-117.098	+1.679	+4.651	+117.098	-1.679	+2.201
	6	-143.261	+20.840	+57.534	+143.261	-20.840	+27.492
	7	-179.023	+17.263	+47.694	+179.023	-17.263	+22.739
9	1	+0.000	-9.188	-0.000	+0.000	+46.156	-24.213
	2	+0.000	-9.188	+0.000	+0.000	+27.781	-16.174
	3	+0.000	-9.187	-0.000	+0.000	+46.156	-24.213
	4	+0.000	-9.188	-0.000	+0.000	+46.156	-24.213
	5	+0.000	-9.188	+0.000	+0.000	+27.781	-16.174
	6	+0.000	-9.187	-0.000	+0.000	+46.156	-24.213
	7	+0.000	-9.188	+0.000	+0.000	+27.781	-16.174
10	1	-0.000	-46.156	+24.213	+0.000	+83.125	-80.773
	2	-0.000	-27.781	+16.174	+0.000	+46.375	-48.617
	3	-0.000	-46.156	+24.213	+0.000	+83.125	-80.773
	4	-0.000	-46.156	+24.213	+0.000	+83.125	-80.773
	5	-0.000	-27.781	+16.174	+0.000	+46.375	-48.617
	6	-0.000	-46.156	+24.213	+0.000	+83.125	-80.773
	7	-0.000	-27.781	+16.174	+0.000	+46.375	-48.617
11	1	+6.089	+221.820	+215.155	-6.089	-107.360	+52.304
	2	+7.986	+225.287	+217.722	-7.986	-110.826	+55.370
	3	+0.705	+104.213	+103.369	-0.705	-48.861	+21.004
	4	+6.834	+226.646	+224.008	-6.834	-112.185	+51.293
	5	+7.436	+220.080	+208.169	-7.436	-105.619	+56.462
	6	+0.542	+104.604	+104.088	-0.542	-49.252	+20.920
	7	+7.953	+225.277	+217.703	-7.953	-110.817	+55.373
12	1	+6.089	+107.360	-52.304	-6.089	+7.101	+133.764
	2	+7.986	+110.826	-55.370	-7.986	+3.635	+142.463
	3	+0.705	+48.861	-21.004	-0.705	+6.490	+55.430
	4	+6.834	+112.185	-51.293	-6.834	+2.276	+140.594
	5	+7.436	+105.619	-56.462	-7.436	+8.841	+135.095
	6	+0.542	+49.252	-20.920	-0.542	+6.099	+55.981
	7	+7.953	+110.817	-55.373	-7.953	+3.644	+142.451
13	1	+6.089	-7.101	-133.764	-6.089	+121.562	+29.224
	2	+7.986	-3.635	-142.463	-7.986	+118.096	+43.557
	3	+0.705	-6.490	-55.430	-0.705	+61.842	-0.089
	4	+6.834	-2.276	-140.594	-6.834	+116.737	+43.896
	5	+7.436	-8.841	-135.095	-7.436	+123.302	+27.728
	6	+0.542	-6.099	-55.981	-0.542	+61.451	+1.097
	7	+7.953	-3.644	-142.451	-7.953	+118.105	+43.529
14	1	+6.089	-121.562	-29.224	-6.089	+236.023	-261.314
	2	+7.986	-118.096	-43.557	-7.986	+232.557	-241.348
	3	+0.705	-61.842	+0.089	-0.705	+117.193	-145.555
	4	+6.834	-116.737	-43.896	-6.834	+231.198	-238.800
	5	+7.436	-123.302	-27.728	-7.436	+237.763	-265.638
	6	+0.542	-61.451	-1.097	-0.542	+116.802	-143.734
	7	+7.953	-118.105	-43.529	-7.953	+232.566	-241.392
15	1	+4.611	+229.069	+249.816	-4.611	-114.608	+29.422

	2	+1.328	+110.857	+134.514	-1.328	-55.506	+0.656
	3	+5.257	+228.962	+235.973	-5.257	-114.501	+43.090
	4	+0.475	+110.751	+134.022	-0.475	-55.399	+0.975
	5	+6.323	+234.038	+259.441	-6.323	-119.577	+27.872
	6	+4.457	+223.988	+226.631	-4.457	-109.527	+44.350
	7	+1.269	+110.968	+134.724	-1.269	-55.616	+0.626
16	1	+4.611	+114.608	-29.422	-4.611	-0.148	+122.661
	2	+1.328	+55.506	-0.656	-1.328	-0.154	+45.879
	3	+5.257	+114.501	-43.090	-5.257	-0.040	+136.154
	4	+0.475	+55.399	-0.975	-0.475	-0.047	+46.025
	5	+6.323	+119.577	-27.872	-6.323	-5.117	+129.186
	6	+4.457	+109.527	-44.350	-4.457	+4.934	+129.333
	7	+1.269	+55.616	-0.626	-1.269	-0.265	+46.029
17	1	+4.611	+0.148	-122.661	-4.611	+114.313	+29.901
	2	+1.328	+0.154	-45.879	-1.328	+55.198	+1.156
	3	+5.257	+0.040	-136.154	-5.257	+114.421	+43.219
	4	+0.475	+0.047	-46.025	-0.475	+55.304	+1.129
	5	+6.323	+5.117	-129.186	-6.323	+109.344	+44.501
	6	+4.457	-4.934	-129.333	-4.457	+119.395	+28.316
	7	+1.269	+0.265	-46.029	-1.269	+55.087	+1.487
18	1	+4.611	-114.313	-29.901	-4.611	+228.774	-248.857
	2	+1.328	-55.198	-1.156	-1.328	+110.549	-133.513
	3	+5.257	-114.421	-43.219	-5.257	+228.882	-235.715
	4	+0.475	-55.304	-1.129	-0.475	+110.656	-133.713
	5	+6.323	-109.344	-44.501	-6.323	+223.805	-226.184
	6	+4.457	-119.395	-28.316	-4.457	+233.855	-258.699
	7	+1.269	-55.087	-1.487	-1.269	+110.438	-133.003
19	1	+4.685	+233.992	+257.490	-4.685	-119.531	+29.747
	2	+6.543	+230.479	+237.365	-6.543	-116.018	+44.164
	3	+0.170	+116.576	+144.482	-0.170	-61.225	-0.018
	4	+5.785	+230.489	+237.411	-5.785	-116.028	+44.135
	5	+1.482	+116.161	+142.580	-1.482	-60.809	+1.208
	6	+4.346	+235.819	+261.941	-4.346	-121.358	+28.265
	7	+6.328	+229.057	+234.770	-6.328	-114.596	+44.449
20	1	+4.685	+119.531	-29.747	-4.685	-5.070	+130.985
	2	+6.543	+116.018	-44.164	-6.543	-1.557	+139.694
	3	+0.170	+61.225	+0.018	-0.170	-5.873	+54.499
	4	+5.785	+116.028	-44.135	-5.785	-1.567	+139.681
	5	+1.482	+60.809	-1.208	-1.482	-5.458	+55.050
	6	+4.346	+121.358	-28.265	-4.346	-6.897	+132.471
	7	+6.328	+114.596	-44.449	-6.328	-0.135	+137.668
21	1	+4.685	+5.070	-130.985	-4.685	+109.391	+46.223
	2	+6.543	+1.557	-139.694	-6.543	+112.904	+49.224
	3	+0.170	+5.873	-54.499	-0.170	+49.478	+19.069
	4	+5.785	+1.567	-139.681	-5.785	+112.894	+49.228
	5	+1.482	+5.458	-55.050	-1.482	+49.894	+18.945
	6	+4.346	+6.897	-132.471	-4.346	+107.564	+50.679
	7	+6.328	+0.135	-137.668	-6.328	+114.326	+44.889
22	1	+4.685	-109.391	-46.223	-4.685	+223.852	-224.537
	2	+6.543	-112.904	-49.224	-6.543	+227.365	-227.244
	3	+0.170	-49.478	-19.069	-0.170	+104.830	-106.306
	4	+5.785	-112.894	-49.228	-5.785	+227.355	-227.224
	5	+1.482	-49.894	-18.945	-1.482	+105.246	-107.105

	6	+4.346	-107.564	-50.679	-4.346	+222.025	-217.112
	7	+6.328	-114.326	-44.889	-6.328	+228.786	-233.890
23	1	-0.624	+158.136	+128.818	+0.624	+0.349	+48.692
	2	-0.713	+89.095	+96.541	+0.713	-12.454	+17.702
	3	-0.343	+148.290	+96.818	+0.343	+10.195	+58.539
	4	-1.436	+89.094	+96.537	+1.436	-12.453	+17.703
	5	+0.879	+148.356	+97.034	-0.879	+10.128	+58.472
	6	-2.420	+88.238	+93.757	+2.420	-11.598	+18.559
	7	+0.585	+158.927	+131.390	-0.585	-0.443	+47.901
24	1	-0.624	-13.474	-48.692	+0.624	+83.911	-0.000
	2	-0.713	-0.671	-17.702	+0.713	+34.733	-0.000
	3	-0.343	-23.320	-58.539	+0.343	+93.757	-0.000
	4	-1.436	-0.672	-17.703	+1.436	+34.734	-0.000
	5	+0.879	-23.253	-58.472	-0.879	+93.691	-0.000
	6	-2.420	-1.527	-18.559	+2.420	+35.590	-0.000
	7	+0.585	-12.682	-47.901	-0.585	+83.120	-0.000

STR. 02   SUPPORT REACTIONS   DRIVE A

JOINT NUMBER	LOAD CMB	X-REACTION (KNTS)	Y-REACTION (KNTS)	Z-REACTION (KNTS-M)
1	1	+29.360	+164.140	-32.255
	2	+37.126	+146.224	-40.917
	3	+4.759	+100.836	-5.100
	4	+31.485	+166.737	-34.728
	5	+34.974	+143.422	-38.506
	6	+4.807	+101.047	-5.075
	7	+37.104	+146.219	-40.880
2	1	-3.045	+250.340	+3.729
	2	-24.353	+184.845	+27.483
	3	+20.008	+186.321	-22.164
	4	-23.790	+184.057	+26.782
	5	-1.818	+253.951	+2.331
	6	+18.200	+183.434	-20.058
	7	-24.335	+184.910	+27.477
3	1	+1.709	+249.088	-1.751
	2	+22.973	+183.561	-25.443
	3	-20.464	+185.946	+22.864
	4	+22.997	+183.624	-25.510
	5	-18.852	+182.990	+21.133
	6	+0.564	+252.806	-0.517
	7	+22.483	+182.736	-24.879
4	1	-21.454	+205.608	+23.959
	2	-29.299	+170.337	+32.722
	3	-2.119	+136.244	+2.362
	4	-29.276	+170.331	+32.684
	5	-2.282	+136.503	+2.566
	6	-27.606	+167.002	+30.800
	7	-23.006	+208.690	+25.715
21	1	+0.624	+97.036	-0.000
	2	+0.713	+47.858	-0.000
	3	+0.343	+106.882	-0.000
	4	+1.436	+47.859	-0.000
	5	-0.879	+106.816	-0.000
	6	+2.420	+48.715	-0.000
	7	-0.585	+96.245	-0.000
22	1	-23.270	+140.806	-31.066
	2	-29.140	+125.438	-38.811
	3	-4.054	+86.502	-5.502
	4	-24.651	+143.034	-32.813
	5	-27.537	+123.034	-36.705
	6	-4.265	+86.682	-5.838
	7	-29.151	+125.433	-38.835
23	1	+1.567	+214.753	+1.824
	2	+17.695	+158.568	+23.115
	3	-15.456	+159.834	-20.506
	4	+17.430	+157.892	+22.818
	5	+0.704	+217.850	+0.707

	6	−14.285	+157.357	−19.025
	7	+17.652	+158.624	+23.047
24	1	−1.635	+213.678	−2.272
	2	−17.758	+157.467	−23.565
	3	+15.376	+159.513	+20.260
	4	−17.686	+157.521	−23.440
	5	+14.011	+156.976	+18.410
	6	−0.676	+216.868	−0.975
	7	−17.425	+156.759	−23.137
25	1	+16.145	+176.380	+21.282
	2	+22.043	+146.123	+29.054
	3	+1.606	+116.876	+2.121
	4	+22.055	+146.117	+29.080
	5	+1.679	+117.098	+2.201
	6	+20.840	+143.261	+27.492
	7	+17.263	+179.023	+22.739

A-3:

CALCUL DE STRUCTURE
POUR LE DIMENSIONNEMENT
DU MUR DE SOUTENEMENT.
SORTIE D'ORDINATEUR:
"STRUC 03"

SOFTEK SERVICES LTD.

_ Micro Engineering Software _

REGISTRATION NO. 100158

P-FRAME

Release 1.03

<C> Copyright Softek Services Ltd. 1983,1984

STR. 03   INITIALIZING DATA   DRIVE A

TOTAL MEMBERS	TOTAL JOINTS	TOTAL SPRINGS	TOTAL SECTIONS	TOTAL LD CASES	TOTAL LD COMB	YOUNGMOD (MPA)	SHEARMOD (MPA)
9	10	0	2	3	6	24000	10000

```
CLIENT: ENTREPRISE GOMEZ /COTONOU /BENIN
USER NAME: VIADINOU JEAN-BAPTISTE
FRAME DESCRIPTION: SOLUTION DE CADRE RIGIDE
UNITS (M/I): M
BANDWIDTH OPTIMIZATION (Y/N): N
```

STR. 03   JOINT DATA   DRIVE A

JOINT NO.	X-FREEDOM	Y-FREEDOM	Z-FREEDOM	X-COORDINATE (METERS)	Y-COORDINATE (METERS)
1	0	0	0	+0.0000	+3.9000
2	1	1	1	+3.2500	+3.9000
3	1	1	1	+4.1500	+3.1500
4	1	1	1	+5.0500	+2.4000
5	1	1	1	+5.0500	+2.1500
6	1	1	1	+5.0500	+1.9000
7	1	1	1	+5.0500	+1.4250
8	1	1	1	+5.0500	+0.9500
9	1	1	1	+5.0500	+0.4750
10	0	0	1	+5.0500	+0.0000

STR. 03   MEMBER DATA   DRIVE A

Section Properties Data :

SECTION NUMBER	X-SECTIONAL AREA (MM2)	MOM. INERTIA 1.0E+06 (MM4)	SHEAR AREA (MM2)
1	+200,000.000	+666.670	+166,666.670
2	+250,000.000	+1,302.080	+208,333.330

Member Connectivity Data :

MEMBER NUMBER	LOWER JOINT	GREATER JOINT	LOWER END TYPE	GREATER END TYPE	SECTION NUMBER
1	1	2	1	1	1
2	2	3	0	1	2
3	3	4	1	1	2
4	4	5	1	1	2
5	5	6	1	1	2
6	6	7	1	1	2
7	7	8	1	1	2
8	8	9	1	1	2
9	9	10	1	1	2

STR. 03　　　　　　　LOAD DATA　　　　DRIVE A

LOAD CASE　1

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
1	0	9	charge permanente

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	1	-5.9150	+0.0000	+0.0000
2	2	-5.8860	+0.0000	+0.0000
3	3	-5.8860	+0.0000	+0.0000
4	4	-5.8860	+0.0000	+0.0000
5	5	-5.8860	+0.0000	+0.0000
6	6	-5.8860	-1.3325	+0.0000
7	7	-5.8860	-3.9975	+0.0000
8	8	-5.8860	-6.6625	+0.0000
9	9	-5.8860	-9.3275	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

LOAD CASE　2

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
2	0	1	surcharge sur la dalle du R.C

Distributed Load Data :

RECORD	LOADED	SLOPED LD.	LOCAL XY	PROJ. LOAD

NUMBER	MEMBER	KN/M SLOPE	KN/M PERP.	KN/M HORIZ
1	1	-6.0000	+0.0000	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

LOAD CASE 3

Initializing Data :

LOAD CASE NO.	NO. OF LOADED JOINTS	NO. OF LOADED MEMBERS	DESCRIPTION
3	0	4	surcharge de la poussee

Distributed Load Data :

RECORD NUMBER	LOADED MEMBER	SLOPED LD. KN/M SLOPE	LOCAL XY KN/M PERP.	PROJ. LOAD KN/M HORIZ
1	6	+0.0000	-4.0000	+0.0000
2	7	+0.0000	-4.0000	+0.0000
3	8	+0.0000	-4.0000	+0.0000
4	9	+0.0000	-4.0000	+0.0000

Point Load Data :

REC NO.	MEM NO.	PT. LOAD 1 (KN)	DIST. (M)	PT. LOAD 2 (KN)	DIST. (M)	PT. LOAD 3 (KN)	DIST. (M)

Temperature Load Data :

RECORD NUMBER	MEMBER NUMBER	TEMPERATURE DIFFERENCE (CENTIGRADE)	COEFFICIENT OF EXPANSION (MM/MM/C X 100)

STR. 03   LOAD COMBINATION DATA   DRIVE A

LOAD COMB	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT	LOAD CASE	COMB FACT
1	1	1	2	1	3	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2	1	1	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
3	1	1	3	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1.25	2	1.5	3	1.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
5	1	1.25	2	1.5	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1.25	3	1.5	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL STRUCTURE DEGREES OF FREEDOM = 25
THE HALF-BANDWIDTH = 6   AT MEMBER 2

STR. 03   JOINT DEFORMATIONS   DRIVE A

MEM NO.	LD. CSE	X-DISPLACE JL. MM.	Y-DISPLACE JL. MM.	ROTATION JL. RAD.	X-DISPLACE JG. MM.	Y-DISPLACE JG. MM.	ROTATION JG. RAD.
1	1	+0.00000	+0.00000	+0.00000	-0.00532	-0.54938	+0.00001
	2	+0.00000	+0.00000	+0.00000	-0.00210	-0.42698	+0.00007
	3	+0.00000	+0.00000	+0.00000	-0.00134	+0.20764	+0.00010
2	1	-0.00532	-0.54938	+0.00001	+0.26427	-0.22211	+0.00033
	2	-0.00210	-0.42698	+0.00007	+0.22534	-0.15201	+0.00026
	3	-0.00134	+0.20764	+0.00010	-0.10561	+0.08304	-0.00012
3	1	+0.26427	-0.22211	+0.00033	+0.43599	-0.01092	+0.00007
	2	+0.22534	-0.15201	+0.00026	+0.34808	-0.00269	+0.00005
	3	-0.10561	+0.08304	-0.00012	-0.17534	-0.00012	-0.00005
4	1	+0.43599	-0.01092	+0.00007	+0.44008	-0.01005	-0.00002
	2	+0.34808	-0.00269	+0.00005	+0.35230	-0.00241	-0.00001
	3	-0.17534	-0.00012	-0.00005	-0.18640	-0.00010	-0.00003
5	1	+0.44008	-0.01005	-0.00002	+0.42362	-0.00911	-0.00010
	2	+0.35230	-0.00241	-0.00001	+0.34317	-0.00213	-0.00006
	3	-0.18640	-0.00010	-0.00003	-0.19155	-0.00009	-0.00001
6	1	+0.42362	-0.00911	-0.00010	+0.34978	-0.00717	-0.00020
	2	+0.34317	-0.00213	-0.00006	+0.29463	-0.00160	-0.00014
	3	-0.19155	-0.00009	-0.00001	-0.18158	-0.00007	+0.00005
7	1	+0.34978	-0.00717	-0.00020	+0.24171	-0.00500	-0.00024
	2	+0.29463	-0.00160	-0.00014	+0.21416	-0.00106	-0.00019
	3	-0.18158	-0.00007	+0.00005	-0.14326	-0.00005	+0.00011
8	1	+0.24171	-0.00500	-0.00024	+0.12087	-0.00261	-0.00026
	2	+0.21416	-0.00106	-0.00019	+0.11240	-0.00053	-0.00023
	3	-0.14326	-0.00005	+0.00011	-0.07958	-0.00002	+0.00015
9	1	+0.12087	-0.00261	-0.00026	+0.00000	+0.00000	-0.00025
	2	+0.11240	-0.00053	-0.00023	+0.00000	+0.00000	-0.00024
	3	-0.07958	-0.00002	+0.00015	+0.00000	+0.00000	+0.00017

STR. 03   MEMBER END ACTIONS   DRIVE A

MEM NO.	LD. CSE	AXIAL (KN) LOWER JT.	SHEAR (KN) LOWER JT.	BM (KN-M) LOWER JT.	AXIAL (KN) UPPER JT.	SHEAR (KN) UPPER JT.	BM (KN-M) UPPER JT.
1	1	+7.855	+12.774	+10.278	-7.855	+6.449	-0.000
	2	+3.103	+12.776	+9.835	-3.103	+6.724	-0.000
	3	+1.985	-0.290	-0.941	-1.985	+0.290	-0.000
2	1	+10.163	+0.074	+0.000	-14.578	+5.223	-3.016
	2	+6.688	-3.179	+0.000	-6.688	+3.179	-3.724
	3	+1.710	+1.048	+0.000	-1.710	-1.048	+1.228
3	1	+14.578	-5.223	+3.016	-18.992	+10.521	-12.238
	2	+6.688	-3.179	+3.724	-6.688	+3.179	-7.448
	3	+1.710	+1.048	-1.228	-1.710	-1.048	+2.456
4	1	+20.241	+7.855	+12.238	-21.712	-7.855	-10.274
	2	+6.724	+3.103	+7.448	-6.724	-3.103	-6.672
	3	+0.290	+1.985	-2.456	-0.290	-1.985	+2.952
5	1	+21.712	+7.855	+10.274	-23.184	-7.855	-8.311
	2	+6.724	+3.103	+6.672	-6.724	-3.103	-5.896
	3	+0.290	+1.985	-2.952	-0.290	-1.985	+3.449
6	1	+23.184	+7.855	+8.311	-25.980	-7.222	-4.730
	2	+6.724	+3.103	+5.896	-6.724	-3.103	-4.422
	3	+0.290	+1.985	-3.449	-0.290	-0.085	+3.940
7	1	+25.980	+7.222	+4.730	-28.775	-5.323	-1.750
	2	+6.724	+3.103	+4.422	-6.724	-3.103	-2.948
	3	+0.290	+0.085	-3.940	-0.290	+1.815	+3.529
8	1	+28.775	+5.323	+1.750	-31.571	-2.159	+0.027
	2	+6.724	+3.103	+2.948	-6.724	-3.103	-1.474
	3	+0.290	-1.815	-3.529	-0.290	+3.715	+2.216
9	1	+31.571	+2.159	-0.027	-34.367	+2.272	-0.000
	2	+6.724	+3.103	+1.474	-6.724	-3.103	+0.000
	3	+0.290	-3.715	-2.216	-0.290	+5.615	+0.000

STR. 03   SUPPORT REACTIONS   DRIVE A

JOINT NUMBER	LOAD CSE	X-REACTION (KNTS)	Y-REACTION (KNTS)	Z-REACTION (KNTS-M)
1	1	+7.855	+12.774	+10.278
	2	+3.103	+12.776	+9.835
	3	+1.985	−0.290	−0.941
10	1	+2.272	+34.367	−0.000
	2	−3.103	+6.724	+0.000
	3	+5.615	+0.290	+0.000

STR. 03   JOINT DEFORMATIONS   DRIVE A

MEM NO.	LD. CMB	X-DISPLACE JL. MM.	Y-DISPLACE JL. MM.	ROTATION JL. RAD.	X-DISPLACE JG. MM.	Y-DISPLACE JG. MM.	ROTATION JG. RAD.
1	1	+0.00000	+0.00000	+0.00000	-0.00876	-0.76873	+0.00018
	2	+0.00000	+0.00000	+0.00000	-0.00742	-0.97637	+0.00009
	3	+0.00000	+0.00000	+0.00000	-0.00666	-0.34174	+0.00011
	4	+0.00000	+0.00000	+0.00000	-0.01182	-1.01574	+0.00027
	5	+0.00000	+0.00000	+0.00000	-0.00980	-1.32720	+0.00013
	6	+0.00000	+0.00000	+0.00000	-0.00866	-0.37527	+0.00016
2	1	-0.00876	-0.76873	+0.00018	+0.38400	-0.29108	+0.00047
	2	-0.00742	-0.97637	+0.00009	+0.48961	-0.37412	+0.00059
	3	-0.00666	-0.34174	+0.00011	+0.15866	-0.13907	+0.00021
	4	-0.01182	-1.01574	+0.00027	+0.50993	-0.38109	+0.00062
	5	-0.00980	-1.32720	+0.00013	+0.66834	-0.50566	+0.00080
	6	-0.00866	-0.37527	+0.00016	+0.17192	-0.15307	+0.00023
3	1	+0.38400	-0.29108	+0.00047	+0.60872	-0.01373	+0.00006
	2	+0.48961	-0.37412	+0.00059	+0.78406	-0.01361	+0.00011
	3	+0.15866	-0.13907	+0.00021	+0.26065	-0.01104	+0.00001
	4	+0.50993	-0.38109	+0.00062	+0.80409	-0.01786	+0.00007
	5	+0.66834	-0.50566	+0.00080	+1.06710	-0.01769	+0.00015
	6	+0.17192	-0.15307	+0.00023	+0.28197	-0.01383	+0.00000
4	1	+0.60872	-0.01373	+0.00006	+0.60597	-0.01256	-0.00007
	2	+0.78406	-0.01361	+0.00011	+0.79237	-0.01246	-0.00003
	3	+0.26065	-0.01104	+0.00001	+0.25368	-0.01015	-0.00006
	4	+0.80409	-0.01786	+0.00007	+0.79894	-0.01633	-0.00009
	5	+1.06710	-0.01769	+0.00015	+1.07854	-0.01617	-0.00004
	6	+0.28197	-0.01383	+0.00000	+0.27049	-0.01272	-0.00008
5	1	+0.60597	-0.01256	-0.00007	+0.57523	-0.01133	-0.00016
	2	+0.79237	-0.01246	-0.00003	+0.76679	-0.01124	-0.00016
	3	+0.25368	-0.01015	-0.00006	+0.23206	-0.00920	-0.00010
	4	+0.79894	-0.01633	-0.00009	+0.75694	-0.01472	-0.00022
	5	+1.07854	-0.01617	-0.00004	+1.04427	-0.01458	-0.00021
	6	+0.27049	-0.01272	-0.00008	+0.24219	-0.01153	-0.00013
6	1	+0.57523	-0.01133	-0.00016	+0.46282	-0.00883	-0.00028
	2	+0.76679	-0.01124	-0.00016	+0.64440	-0.00876	-0.00033
	3	+0.23206	-0.00920	-0.00010	+0.16820	-0.00723	-0.00015
	4	+0.75694	-0.01472	-0.00022	+0.60679	-0.01146	-0.00038
	5	+1.04427	-0.01458	-0.00021	+0.87916	-0.01135	-0.00045
	6	+0.24219	-0.01153	-0.00013	+0.16485	-0.00906	-0.00017
7	1	+0.46282	-0.00883	-0.00028	+0.31261	-0.00611	-0.00033
	2	+0.64440	-0.00876	-0.00033	+0.45587	-0.00606	-0.00044
	3	+0.16820	-0.00723	-0.00015	+0.09845	-0.00504	-0.00014
	4	+0.60679	-0.01146	-0.00038	+0.40848	-0.00791	-0.00043
	5	+0.87916	-0.01135	-0.00045	+0.62338	-0.00785	-0.00060
	6	+0.16485	-0.00906	-0.00017	+0.08725	-0.00632	-0.00014
8	1	+0.31261	-0.00611	-0.00033	+0.15369	-0.00317	-0.00033
	2	+0.45587	-0.00606	-0.00044	+0.23327	-0.00314	-0.00048
	3	+0.09845	-0.00504	-0.00014	+0.04129	-0.00263	-0.00010

	4	+0.40848	−0.00791	−0.00043	+0.20032	−0.00410	−0.00043
	5	+0.62338	−0.00785	−0.00060	+0.31969	−0.00406	−0.00066
	6	+0.08725	−0.00632	−0.00014	+0.03172	−0.00330	−0.00009
9	1	+0.15369	−0.00317	−0.00033	+0.00000	+0.00000	−0.00032
	2	+0.23327	−0.00314	−0.00048	+0.00000	+0.00000	−0.00049
	3	+0.04129	−0.00263	−0.00010	+0.00000	+0.00000	−0.00008
	4	+0.20032	−0.00410	−0.00043	+0.00000	+0.00000	−0.00042
	5	+0.31969	−0.00406	−0.00066	+0.00000	+0.00000	−0.00067
	6	+0.03172	−0.00330	−0.00009	+0.00000	+0.00000	−0.00006

STR. 03   MEMBER END ACTIONS   DRIVE A

MEM NO.	LD. CMB	AXIAL (KN) LOWER JT.	SHEAR (KN) LOWER JT.	BM (KN-M) LOWER JT.	AXIAL (KN) UPPER JT.	SHEAR (KN) UPPER JT.	BM (KN-M) UPPER JT.
1	1	+12.943	+25.261	+19.173	-12.943	+13.463	-0.000
	2	+10.958	+25.551	+20.114	-10.958	+13.173	-0.000
	3	+9.840	+12.485	+9.337	-9.840	+6.739	-0.000
	4	+17.451	+34.698	+26.189	-17.451	+18.582	-0.000
	5	+14.474	+35.132	+27.601	-14.474	+18.147	-0.000
	6	+12.796	+15.534	+11.436	-12.796	+8.496	-0.000
2	1	+18.562	-2.056	+0.000	-22.976	+7.354	-5.512
	2	+16.852	-3.104	+0.000	-21.266	+8.402	-6.740
	3	+11.874	+1.123	+0.000	-16.288	+4.175	-1.788
	4	+25.302	-3.103	+0.000	-30.820	+9.724	-7.514
	5	+22.737	-4.675	+0.000	-28.255	+11.297	-9.356
	6	+15.269	+1.665	+0.000	-20.788	+4.957	-1.928
3	1	+22.976	-7.354	+5.512	-27.391	+12.651	-17.230
	2	+21.266	-8.402	+6.740	-25.681	+13.699	-19.686
	3	+16.288	-4.175	+1.788	-20.703	+9.472	-9.782
	4	+30.820	-9.724	+7.514	-36.338	+16.346	-22.785
	5	+28.255	-11.297	+9.356	-33.773	+17.919	-26.470
	6	+20.788	-4.957	+1.928	-26.306	+11.578	-11.614
4	1	+27.254	+12.943	+17.230	-28.725	-12.943	-13.994
	2	+26.964	+10.958	+19.686	-28.436	-10.958	-16.946
	3	+20.530	+9.840	+9.782	-22.002	-9.840	-7.322
	4	+35.821	+17.451	+22.785	-37.660	-17.451	-18.422
	5	+35.386	+14.474	+26.470	-37.226	-14.474	-22.851
	6	+25.735	+12.796	+11.614	-27.575	-12.796	-8.414
5	1	+28.725	+12.943	+13.994	-30.197	-12.943	-10.758
	2	+28.436	+10.958	+16.946	-29.907	-10.958	-14.207
	3	+22.002	+9.840	+7.322	-23.473	-9.840	-4.862
	4	+37.660	+17.451	+19.422	-39.499	-17.451	-14.060
	5	+37.226	+14.474	+22.851	-39.065	-14.474	-19.233
	6	+27.575	+12.796	+8.414	-29.414	-12.796	-5.215
6	1	+30.197	+12.943	+10.758	-32.993	-10.410	-5.212
	2	+29.907	+10.958	+14.207	-32.703	-10.325	-9.152
	3	+23.473	+9.840	+4.862	-26.269	-7.307	-0.790
	4	+39.499	+17.451	+14.060	-42.994	-13.810	-6.635
	5	+39.065	+14.474	+19.233	-42.560	-13.683	-12.545
	6	+29.414	+12.796	+5.215	-32.909	-9.155	-0.002
7	1	+32.993	+10.410	+5.212	-35.789	-6.612	-1.169
	2	+32.703	+10.325	+9.152	-35.499	-8.427	-4.698
	3	+26.269	+7.307	+0.790	-29.065	-3.508	+1.779
	4	+42.994	+13.810	+6.635	-46.489	-8.587	-1.316
	5	+42.560	+13.683	+12.545	-46.055	-11.309	-6.610
	6	+32.909	+9.155	+0.002	-36.404	-3.932	+3.106
8	1	+35.789	+6.612	+1.169	-38.584	-1.547	+0.769
	2	+35.499	+8.427	+4.698	-38.295	-5.262	-1.447
	3	+29.065	+3.508	-1.779	-31.861	+1.556	+2.243
	4	+46.489	+8.587	+1.316	-49.984	-1.781	+1.146

	5	+46.055	+11.309	+6.610	-49.550	-7.353	-2.177
	6	+36.404	+3.932	-3.106	-39.898	+2.874	+3.357
9	1	+38.584	+1.547	-0.769	-41.380	+4.784	-0.000
	2	+38.295	+5.262	+1.447	-41.091	-0.831	-0.000
	3	+31.861	-1.556	-2.243	-34.657	+7.887	-0.000
	4	+49.984	+1.781	-1.146	-53.479	+6.608	-0.000
	5	+49.550	+7.353	+2.177	-53.044	-1.815	-0.000
	6	+39.898	-2.874	-3.357	-43.393	+11.262	-0.000

STR. 03   SUPPORT REACTIONS   DRIVE A

JOINT NUMBER	LOAD CMB	X-REACTION (KNTS)	Y-REACTION (KNTS)	Z-REACTION (KNTS-M)
1	1	+12.943	+25.261	+19.173
	2	+10.959	+25.551	+20.114
	3	+9.840	+12.485	+9.337
	4	+17.451	+34.698	+26.189
	5	+14.474	+35.132	+27.601
	6	+12.796	+15.534	+11.436
10	1	+4.784	+41.380	-0.000
	2	-0.831	+41.091	-0.000
	3	+7.887	+34.657	-0.000
	4	+6.608	+53.479	-0.000
	5	-1.815	+53.044	-0.000
	6	+11.262	+43.393	-0.000

A-4:

TABLES ET DIAGRAMMES
UTILISES

Utilisation de la surface de plancher ou de toit	Charge minimale de calcul, en kN/m²
Lieux de réunion dont au moins 80 p. 100 de la surface est occupée par des sièges fixes à dossier:	
Auditoriums	
Eglises	
Salles de classe (sièges fixes ou non)	
Salles d'audience	
Salles de conférences	
Salles de spectacles	
et autres lieux d'utilisation analogue	2.4
Lieux de réunion n'entrant pas dans la catégorie susmentionnée	
Balcons	
Eglises	
Foyer et halls d'entrée	
Gymnases	
Musées	
Patinoires	
Pistes de danse	
Promenoirs	
Salles à manger	
Salles de spectacles	
et autres lieux d'utilisation analogue	
Scènes	
Stades	
Stades couverts	
Tribunes et gradins	4.8
Attiques dont l'accès limité ne permet pas le stockage de matériaux ou d'équipement	0.5
Balcons intérieurs et extérieurs	4.8
Corridors, halls et allées de plus de 1 200 mm de largeur (sauf corridors aux étages supérieurs consacrés à l'hébergement dans les immeubles d'appartements, les hôtels et les motels)	4.8
Corridors, entrées et allées de 1 200 mm ou moins de largeur	(1)
Aires réservées à l'équipement et *locaux techniques*, notamment:	
Chambres de transformateurs	
Installations de ventilation et de conditionnement d'air	
Installations mécaniques (sauf ascenseurs)	
Salles des génératrices	
Salles des machines	
Salles des pompes	3.6(2)
Colonne 1	2

Utilisation de la surface de plancher ou de toit	Charge minimale de calcul, en kN/m²
Issues et escaliers de secours	4.8
Usines	6.0(2)
Garages	
d'automobiles	2.4
de camions légers et d'autobus non chargés	6.0
de camions et d'autobus chargés, et	
tous autres lieux pour camions	12.0
Cuisines (sauf celles d'une habitation)	4.8
Bibliothèques	
salles des rayonnages	7.2
salles de lecture et d'étude	2.9
Bureaux (sauf salles d'entreposage des dossiers et salles d'ordinateur)	
au rez-de-chaussée ou au sous-sol	4.8
aux étages supérieurs	2.4
Salles d'opération et laboratoires	3.6
Locaux de récréation ne pouvant pas servir à des réunions, notamment:	
salles de billard	
salles de quilles	3.6
Aires d'habitation	
Chambres et pièces de séjour dans les immeubles d'appartements, les hôtels, motels, internats, collèges, hôpitaux	1.9
Espaces servant au commerce de gros et de détail	4.8
Toits (pour les *surcharges* dues à la neige voir l'article 4.1.7.1.)	1.0(3)
Trottoirs et voies d'accès privées pour automobiles, aménagés au-dessus d'un sous-sol	12.0
Aires de stockage	4.8(2)
Salles de toilettes	2.4
Dalles souterraines recouvertes de terre	(2)
Entrepôts (voir aires de stockage)	—
Colonne 1	2

Remarques:

(1) Les corridors, entrées et allées de 1 200 mm au plus de largeur doivent être conçus pour supporter une charge de calcul au moins égale à celle qui est exigée pour les usages qu'ils desservent.

(2) Les charges dues à l'utilisation prévue doivent être calculées lors de la conception.

(3) Cette valeur tient compte des charges occasionnelles de courte durée, celles dues aux ouvriers, par exemple. Cette charge ne s'ajoute pas aux charges dues à la neige, à la glace et à la pluie.

Table des valeurs des surcharges.

CAN3 A23.3 (19..)

Table 2.3
Rectangular Beams
Reinforcement Ratio ρ (%) for Resistance Factors K_r (MPa)
Reinforcement $f_y = 400$ MPa

K_r (MPa) / f'_c	20	25	30	35	40
0.5	0.15	0.15	0.15	0.15	0.15
0.6	0.18	0.18	0.18	0.18	0.18
0.7	0.21	0.21	0.21	0.21	0.21
0.8	0.25	0.24	0.24	0.24	0.24
0.9	0.28	0.27	0.27	0.27	0.27
1.0	0.31	0.31	0.30	0.30	0.30
1.1	0.34	0.34	0.34	0.33	0.33
1.2	0.38	0.37	0.37	0.37	0.36
1.3	0.41	0.40	0.40	0.40	0.40
1.4	0.44	0.44	0.43	0.43	0.43
1.5	0.48	0.47	0.47	0.46	0.46
1.6	0.51	0.50	0.50	0.49	0.49
1.7	0.55	0.54	0.53	0.53	0.52
1.8	0.59	0.57	0.56	0.56	0.56
1.9	0.62	0.61	0.60	0.59	0.59
2.0	0.66	0.64	0.63	0.63	0.62
2.1	0.70	0.68	0.67	0.66	0.65
2.2	0.74	0.72	0.70	0.69	0.69
2.3	0.78	0.75	0.74	0.73	0.72
2.4	0.82	0.79	0.77	0.76	0.75
2.5	0.86	0.83	0.81	0.80	0.79
2.6	0.90	0.86	0.84	0.83	0.82
2.7	0.94	0.90	0.88	0.87	0.86
2.8	0.99	0.94	0.92	0.90	0.89
2.9	1.03	0.98	0.95	0.94	0.92
3.0	1.07	1.02	0.99	0.97	0.96
3.1	1.12	1.06	1.03	1.01	0.99
3.2	1.17	1.10	1.07	1.05	1.03
3.3	1.22	1.15	1.11	1.08	1.07
3.4	1.27	1.19	1.15	1.12	1.10
3.5	1.32	1.23	1.19	1.16	1.14
3.6	1.37	1.28	1.23	1.19	1.17
3.7	1.43	1.32	1.27	1.23	1.21
3.8	1.49	1.37	1.31	1.27	1.25
3.9		1.41	1.35	1.31	1.28
4.0		1.46	1.39	1.35	1.32
4.2		1.56	1.48	1.43	1.40
4.4		1.66	1.57	1.51	1.48
4.6		1.77	1.66	1.60	1.55
4.8		1.89	1.75	1.68	1.63
5.0			1.85	1.77	1.72
5.2			1.95	1.86	1.80
5.4			2.06	1.95	1.88
5.6			2.17	2.05	1.97
5.8			2.29	2.14	2.06
6.0				2.24	2.15
6.2				2.35	2.24
6.4				2.46	2.34
6.6					2.44
6.8					2.54
7.0					2.64
7.2					2.75
7.4					

$$K_r = \frac{M_r \, 10^6}{bd^2} = \rho \phi_s f_y \left[1 - \frac{\rho \phi_s f_y}{1.7 \phi_c f'_c} \right]$$

$$\rho = \frac{A_s}{bd}$$

$0.85 \phi_c f'_c$; $C = 0.85 \phi_c f'_c ab$; $T = \rho bd \phi_s f_y$
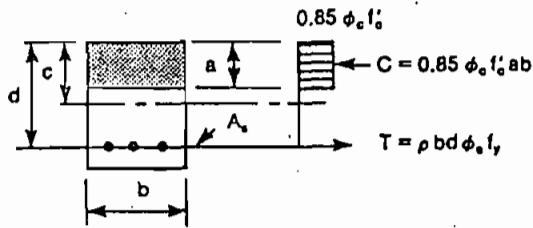
Table 2.2
Rectangular Beams
Resistance Factors K_r (MPa) for Basic Reinforcement ratios ρ (%)
Reinforcement $f_y = 400$ MPa

f'_c	20	25	30	35	40
β_1	0.85	0.85	0.85	0.81	0.77
1.0 ρ MAX (%)	1.53	1.91	2.30	2.55	2.77
K_r (MPa)	3.88	4.84	5.81	6.57	7.25
.80 ρ MAX (%)	1.22	1.53	1.84	2.04	2.22
K_r (MPa)	3.31	4.14	4.97	5.59	6.15
.60 ρ MAX (%)	0.92	1.15	1.38	1.53	1.66
K_r (MPa)	2.64	3.30	3.97	4.45	4.87
.55 ρ MAX (%)	0.84	1.05	1.26	1.40	1.52
K_r (MPa)	2.46	3.07	3.69	4.13	4.53
.50 ρ MAX (%)	0.77	0.96	1.15	1.28	1.39
K_r (MPa)	2.27	2.84	3.40	3.81	4.17
.45 ρ MAX (%)	0.69	0.86	1.03	1.15	1.25
K_r (MPa)	2.07	2.59	3.11	3.48	3.80
.40 ρ MAX (%)	0.61	0.77	0.92	1.02	1.11
K_r (MPa)	1.87	2.34	2.80	3.13	3.42
.35 ρ MAX (%)	0.54	0.67	0.80	0.89	0.97
K_r (MPa)	1.66	2.07	2.49	2.78	3.03
.30 ρ MAX (%)	0.46	0.57	0.69	0.77	0.83
K_r (MPa)	1.44	1.80	2.16	2.41	2.63
.20 ρ MAX (%)	0.31	0.38	0.46	0.51	0.55
K_r (MPa)	0.99	1.23	1.48	1.65	1.80
ρ MIN (%)	0.35	0.35	0.35	0.35	0.35
K_r (MPa)	1.12	1.13	1.14	1.15	1.16

$$\rho = \frac{A_s}{bd} \qquad \rho_{max} = 0.36 \beta_1 \frac{f'_c}{f_y} \qquad \beta_1 = \frac{a}{c} \qquad \rho_{min} = \frac{1.4}{f_y}$$

$$K_r = \frac{M_r \, 10^6}{bd^2} = \rho \phi_s f_y \quad 1 - \frac{\rho \phi_s f_y}{1.7 \phi_c f'_c}$$

$0.85 \phi_c f'_c$; $C = 0.85 \phi_c f'_c ab$; $T = \rho bd \phi_s f_y$
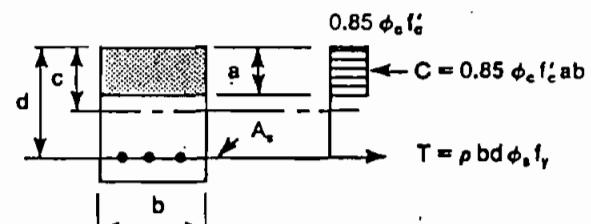
Table 7.10.3 Interaction Diagrams for Axial Load and Moment Resistance for Rectangular Column with an Equal Number of Bars on all Four Faces.
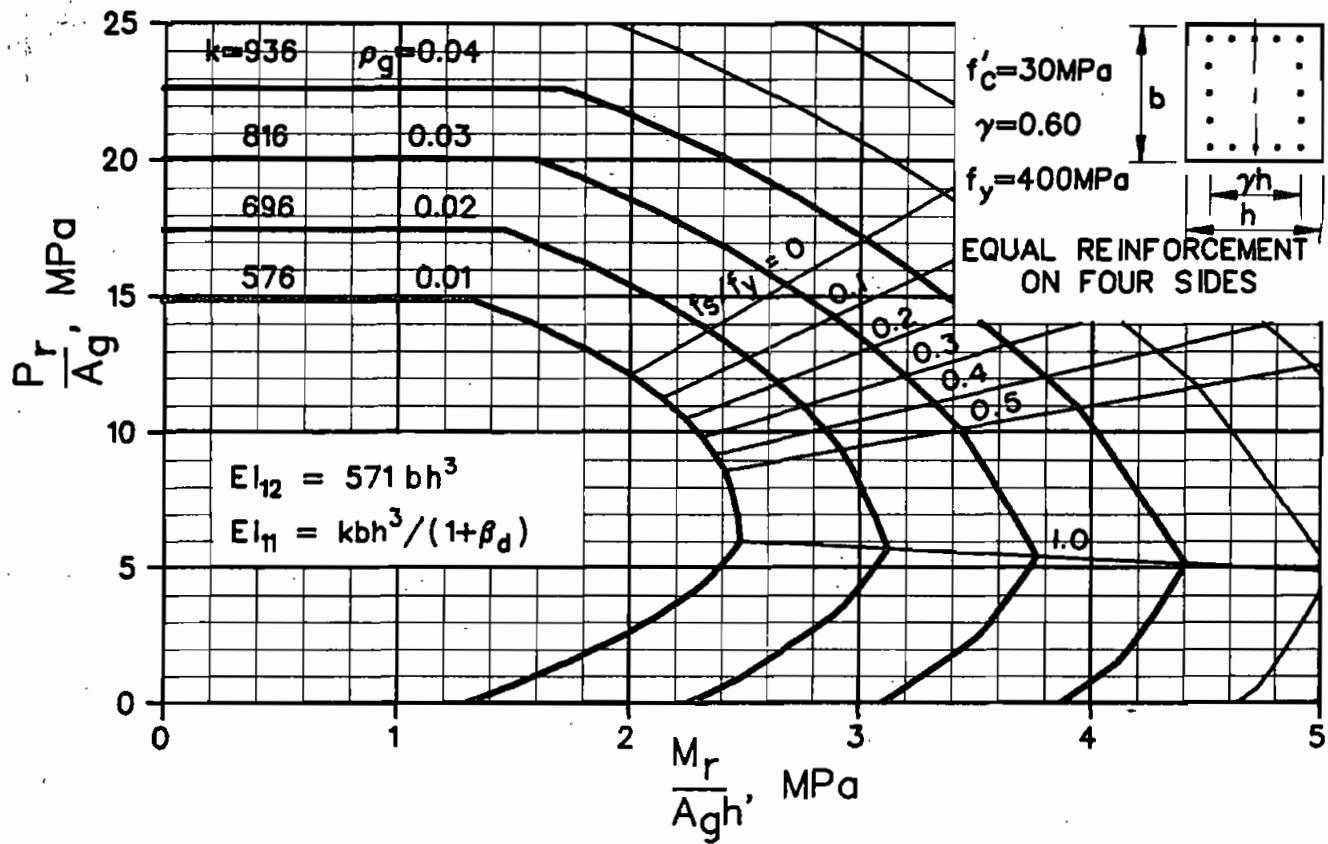
Table 7.10.4 Interaction Diagrams for Axial Load and Moment Resistance for Rectangular Column with an Equal Number of Bars on all Four Faces.
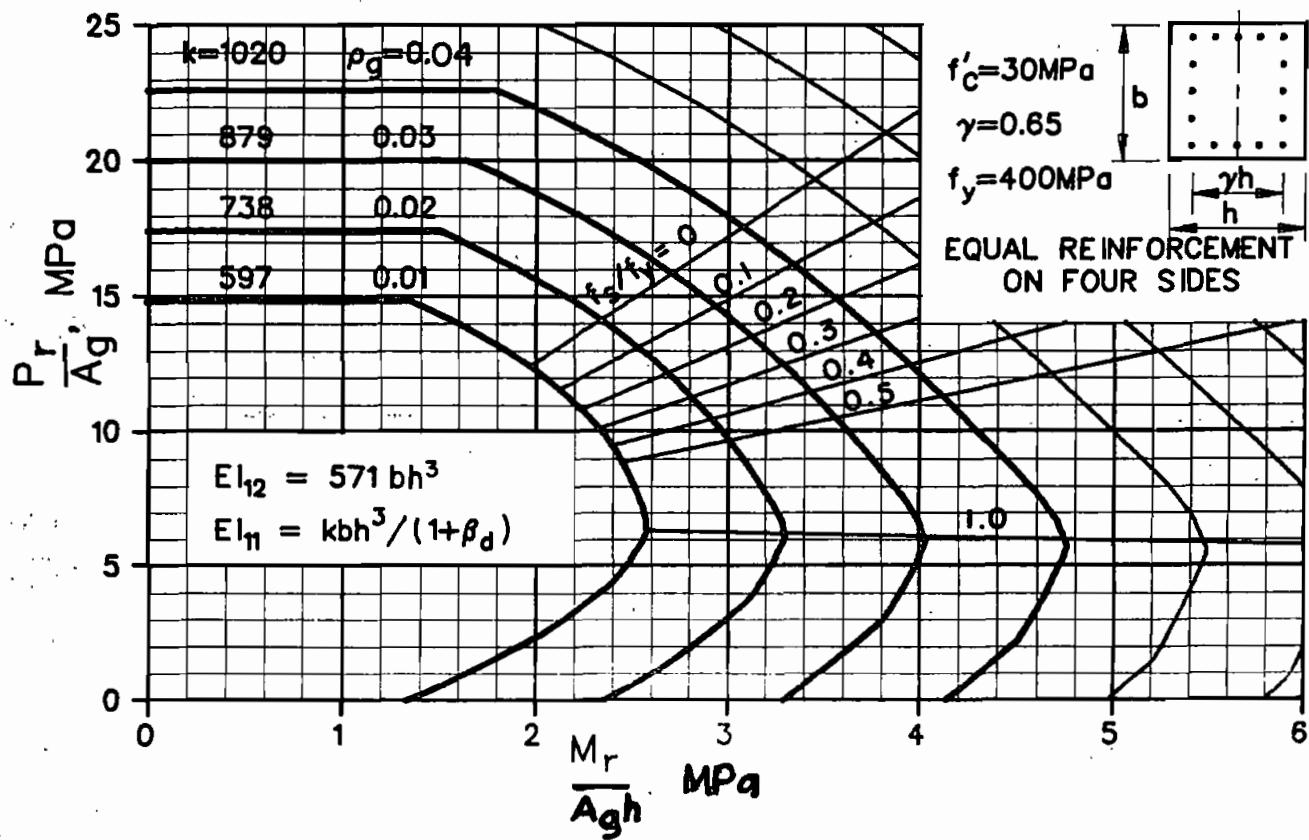
Table 7.10.5 Interaction Diagrams for Axial Load and Moment Resistance for Rectangular Column with an Equal Number of Bars on all Four Faces.

$$EI_{12} = 571\,bh^3$$
$$EI_{11} = kbh^3/(1+\beta_d)$$
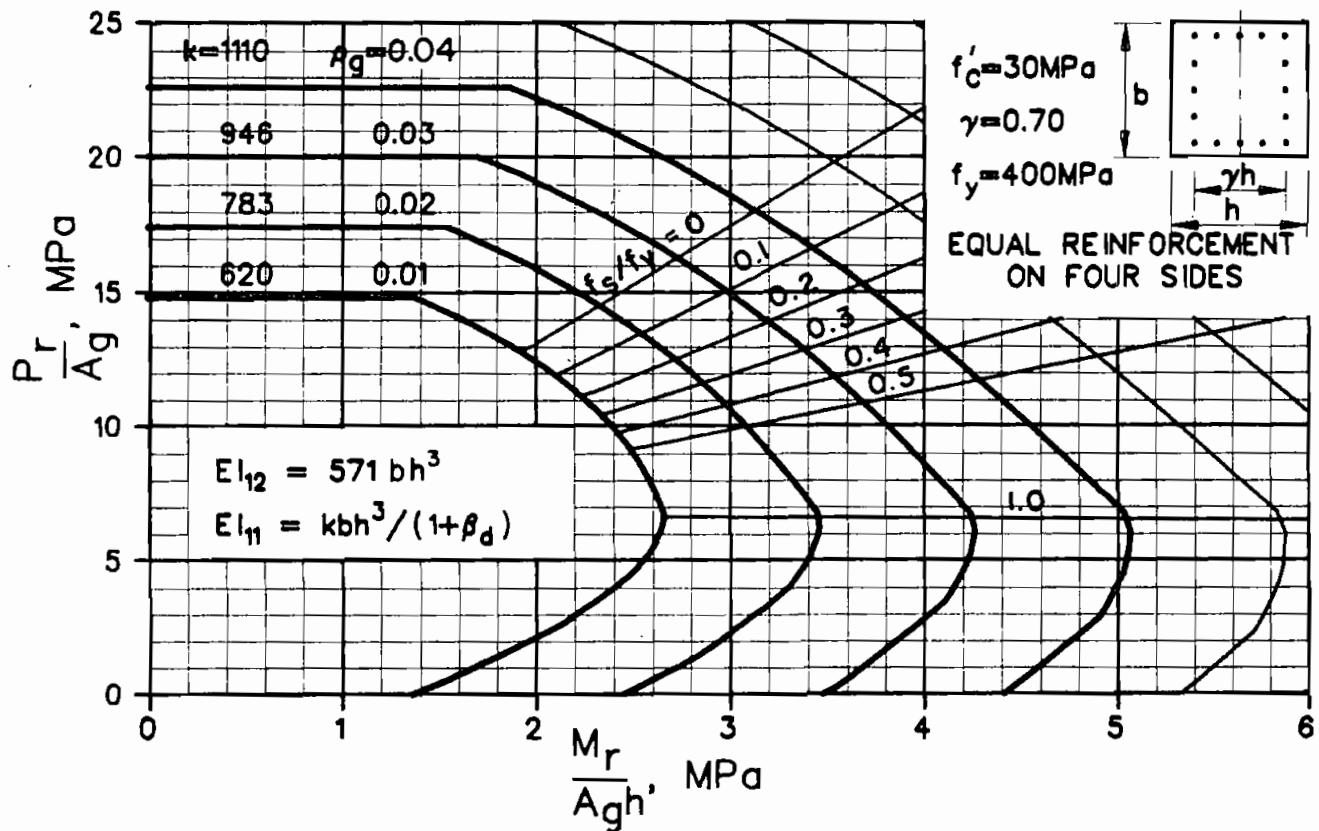
Table 7.10.6 Interaction Diagrams for Axial Load and Moment Resistance for Rectangular Column with an Equal Number of Bars on all Four Faces.


$$EI_{12} = 571\,bh^3$$
$$EI_{11} = kbh^3/(1+\beta_d)$$
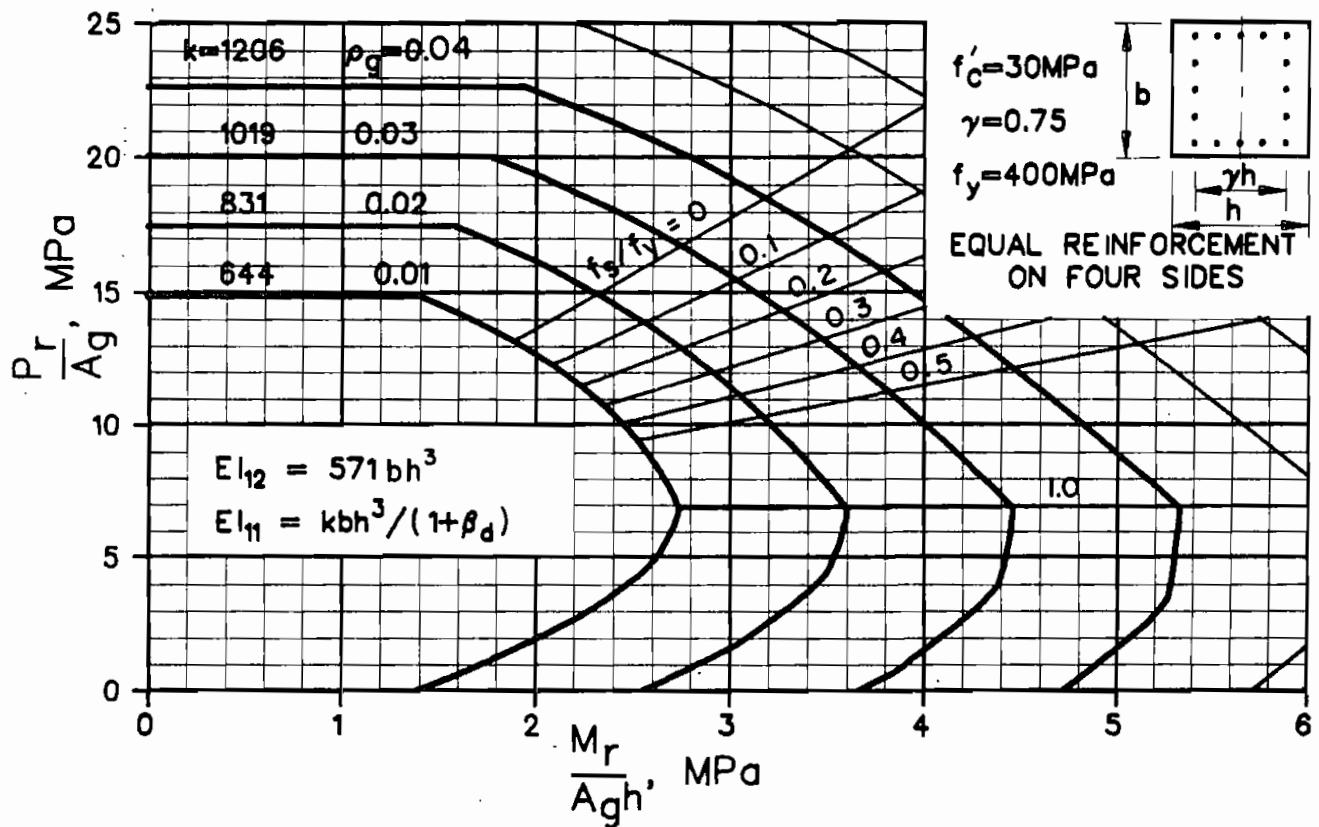
9. Pile cap thickness

(From Std Clause 12.11.2.1)

$h_f = d + 1.5d_b + \text{cover} + \text{pile embedment}$
  $= 800 + 38 + 50 + 100$
  $= 988$ mm
Use $h_f = 1000$ mm

Table 9.1   Effective depth d required by one way (beam) shear action on spread footings
$f_c' = 20$ MPa

Plan   Elevation
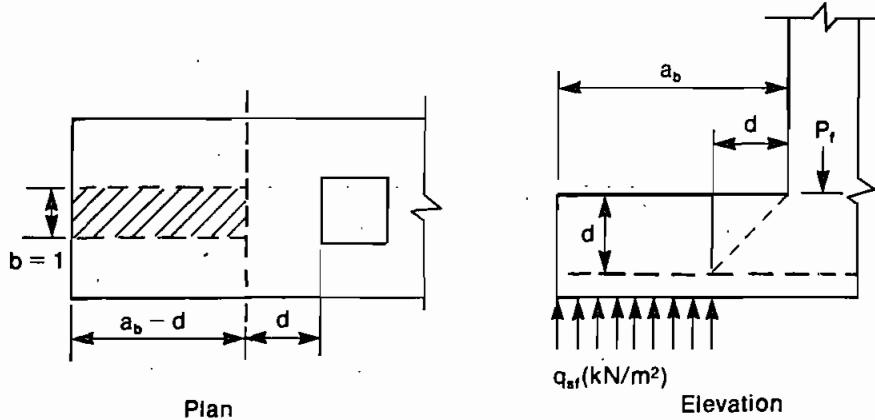
Values of effective depth d in mm

q_{sf} (kN/m²)	a_b (m)															d/a_b
	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00	
100	150	150	150	150	157	188	219	251	282	314	345	376	408	439	471	157
150	150	150	150	174	218	262	305	349	393	436	480	524	567	611	655	218
200	150	150	162	217	271	325	380	434	488	542	597	651	705	760	814	271
250	150	150	190	254	317	381	444	508	572	635	699	762	826	889	953	317
300	150	150	215	286	358	430	501	573	645	717	788	860	932	1003	1075	358
350	150	157	236	315	394	473	552	631	710	789	868	947	1026	1105	1184	394
400	150	170	256	341	427	512	597	683	768	854	939	1024	1110	1195	1281	427
450	150	182	273	364	456	547	638	729	820	912	1003	1094	1185	1277	1368	456
500	150	192	289	385	482	578	675	771	868	964	1061	1157	1254	1350	1446	482
550	150	202	303	404	506	607	708	809	911	1012	1113	1214	1315	1417	1518	506
600	150	211	316	422	527	633	739	844	950	1055	1161	1266	1372	1478	1583	527
650	150	219	328	438	547	657	766	876	985	1095	1205	1314	1424	1533	1643	547
700	150	226	339	452	566	679	792	905	1018	1132	1245	1358	1471	1584	1698	566
750	150	233	349	466	582	699	816	932	1049	1165	1282	1398	1515	1632	1748	582
800	150	239	359	478	598	718	837	957	1077	1197	1316	1436	1556	1675	1795	598
850	150	245	367	490	612	735	858	980	1103	1225	1348	1471	1593	1716	1838	612
900	150	250	375	501	626	751	877	1002	1127	1252	1378	1503	1628	1754	1879	626
950	150	255	383	511	639	766	894	1022	1150	1278	1405	1533	1661	1789	1917	639
1000	150	260	390	520	650	780	911	1041	1171	1301	1431	1561	1691	1822	1952	650
1100	150	268	403	537	672	806	940	1075	1209	1344	1478	1613	1747	1881	2016	672
1200	150	276	414	552	690	829	967	1105	1243	1381	1520	1658	1796	1934	2072	690
1300	150	283	424	566	707	849	990	1132	1274	1415	1557	1698	1840	1981	2123	707
1400	150	289	433	578	722	867	1012	1156	1301	1445	1590	1734	1879	2024	2168	722
1500	150	294	441	589	736	883	1031	1178	1325	1473	1620	1767	1914	2062	2209	736

Note:
Capacity reduction factor $\varphi_c = 0.60$ has been included in table values.
Minimum effective depths have been determined according to:
1) one way shear requirements (CSA Standard A23.3, Clauses 11.2.5.2, 11.10.1.1, 15.5.2)
2) minimum depth requirements (CSA Standard A23.3, Clause 15.7)

Table 9.3 Effective depth d required by two way (punching) shear action on spread footings supporting columns with aspect ratios not exceeding 2.0.
$f'_c = 20$ MPa

A_f = area of footing, m²
A_c = area of column, m²

For circular, polygonal, or rectangular columns with aspect ratios not exceeding 2.0, use $h = \sqrt{A_c}$.

$$q_{sf} = P_f/A_f$$
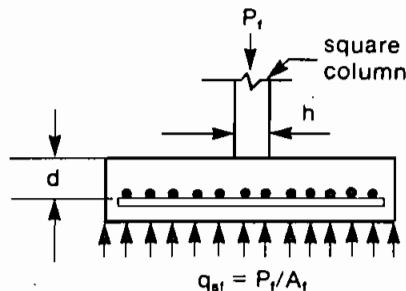
Values of footing to column area ratio, A_f/A_c

q_{sf} (kN/m²)	d/h															
	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
100	34	43	53	65	77	89	103	118	133	150	167	185	204	224	244	266
150	23	30	36	44	52	61	70	80	90	101	113	125	138	152	166	180
200	18	23	28	34	40	46	53	61	69	77	86	96	105	116	126	137
250	15	19	23	27	32	38	44	50	56	63	70	78	86	94	103	112
300	12	16	19	23	28	32	37	42	48	53	59	66	72	79	87	94
350	11	14	17	20	24	28	32	37	41	46	52	57	63	69	75	82
400	10	12	15	18	21	25	29	33	37	41	46	51	56	61	67	73
450	9	11	14	16	19	23	26	30	33	37	42	46	51	55	60	66
500	8	10	13	15	18	21	24	27	30	34	38	42	46	51	55	60
550	8	10	12	14	16	19	22	25	28	31	35	39	43	47	51	55
600	7	9	11	13	15	18	20	23	26	29	33	36	40	43	47	51
650	7	8	10	12	14	17	19	22	25	27	31	34	37	41	44	48
700	6	8	10	12	14	16	18	21	23	26	29	32	35	38	42	45
750	6	8	9	11	13	15	17	19	22	24	27	30	33	36	39	43
800	6	7	9	10	12	14	16	19	21	23	26	29	31	34	37	41
850	6	7	8	10	12	14	16	18	20	22	25	27	30	33	36	39
900	5	7	8	10	11	13	15	17	19	21	24	26	29	31	34	37
950	5	6	8	9	11	13	14	16	18	20	23	25	28	30	33	36
1000	5	6	7	9	10	12	14	16	18	20	22	24	26	29	32	34
1100	5	6	7	8	10	11	13	15	16	18	20	22	25	27	29	32
1200	4	5	7	8	9	11	12	14	15	17	19	21	23	25	28	30
1300	4	5	6	7	9	10	12	13	15	16	18	20	22	24	26	28
1400	4	5	6	7	8	10	11	12	14	16	17	19	21	23	25	27
1500	4	5	6	7	8	9	11	12	13	15	16	18	20	22	24	26

Note:
Capacity reduction factor $\omega_c = 0.60$ has been included in table values. Columns with aspect ratios greater than 2.0 must be considered on an individual basis. Also minimum depth requirements of Clause 15.7 must be checked.

Table 9.5 (Cont'd). Steel areas per 1.0 m width for spread footings

$$f'_c = 20 \text{ MPa}$$
$$f_y = 400 \text{ MPa}$$
$$\text{Max. } d_b = 27.4 \sqrt{a_b - 0.075}$$
$$\leq 43.1 (a_b - 0.075)$$

Plan

Elevation

$$q_{sf} = P_f/A_f \text{ (kN/m}^2)$$
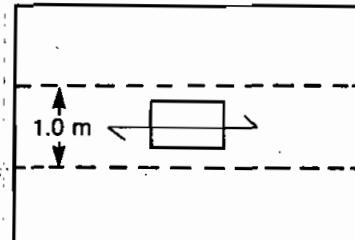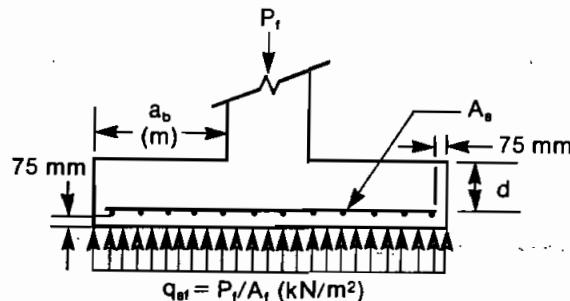
Values of A_s (mm²) required in a 1 m width of footing

$q_{sf} a_b^2$ (kN)	550	575	600	625	650	675	700	725	750	775	800	825	850	900	950	1000
										d (mm)						
400	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	2000	2100	2200
500	1396	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	2000	2100	2200
600	1691	1609	1536	1469	1500	1550	1600	1650	1700	1750	1800	1850	1900	2000	2100	2200
700	1992	1894	1806	1726	1653	1587	1600	1650	1700	1750	1800	1850	1900	2000	2100	2200
800	2299	2184	2081	1987	1902	1825	1754	1688	1700	1750	1800	1850	1900	2000	2100	2200
900	2613	2480	2360	2253	2155	2066	1984	1909	1840	1775	1800	1850	1900	2000	2100	2200
1000	2934	2782	2645	2522	2411	2310	2218	2133	2054	1982	1914	1851	1900	2000	2100	2200
1200	3601	3405	3231	3075	2936	2809	2693	2588	2490	2401	2317	2240	2168	2037	2100	2200
1400	4305	4058	3841	3649	3477	3322	3182	3054	2936	2828	2728	2636	2549	2393	2256	2200
1600	5051	4744	4479	4245	4038	3852	3684	3532	3393	3265	3147	3038	2937	2755	2595	2453
1800	5850	5471	5148	4867	4619	4399	4202	4023	3860	3712	3575	3449	3332	3121	2937	2775
2000	6713	6246	5854	5518	5225	4966	4735	4528	4340	4169	4012	3867	3733	3494	3285	3101
2200	7661	7079	6603	6202	5857	5555	5287	5048	4833	4637	4458	4294	4142	3872	3637	3431
2400		7987	7406	6926	6520	6168	5859	5585	5339	5117	4915	4730	4560	4257	3995	3765
2600			8274	7698	7218	6809	6454	6141	5861	5610	5383	5176	4985	4648	4358	4104
2800				8527	7959	7483	7074	6717	6400	6118	5863	5632	5420	5047	4726	4447
3000				9431	8751	8194	7722	7315	6958	6641	6356	6099	5865	5452	5100	4795
3500						10189	9503	8935	8449	8027	7654	7322	7022	6502	6063	5686
4000								10790	10118	9553	9065	8637	8257	7608	7068	6611
4500										11271	10623	10070	9588	8781	8124	7574
5000												11659	11041	10035	9237	8580
5500													12657	11389	10418	9636
6000														12873	11683	10750
6500															13050	11932
7000																13197
7500																14566

Note:
Steel areas shown are based on flexural and minimum reinforcement (Clause 7.8.1) requirements. Where numerical values are not shown, required steel area is in excess of that specified in Clause 10.3.3 and effective depth d must be increased.

ENCASTREMENT DE 3 COTES ET APPUI SIMPLE DU QUATRIEME POUR UNE DALLE.

$l_y : l_z$		1,00	1,05	1,10	1,15	1,20	1,25	1,30	1,35	1,40	1,45	1,50
$m_{x_{erm}} = -$		18,3	16,6	15,4	14,4	13,5	12,7	12,2	11,6	11,2	10,9	10,6
$m_{x_m} =$	$p \cdot l_x^2$:	59,5	51,6	46,1	41,4	37,5	34,2	31,8	29,6	28,0	26,4	25,2
$m_{y_{ermin}} = -$		16,2	15,4	14,8	14,3	13,9	13,5	13,3	13,1	13,0	12,8	12,7
$m_{y_m} =$		44,1	43,6	43,7	44,2	44,8	45,8	46,9	48,6	50,3	52,3	55,0
$q_{x_{erm}} =$		2,21	2,10	2,01	1,95	1,89	1,85	1,81	1,78	1,76	1,73	1,71
$\bar{q}_{x_{rm}} =$	$p \cdot l_x$:	3,04	2,92	2,84	2,77	2,70	2,65	2,61	2,57	2,54	2,52	2,51
$q_{y_{erm}} = \pm$		2,11	2,05	2,00	1,97	1,94	1,91	1,89	1,87	1,86	1,85	1,85
$f_m = \dfrac{p \cdot l_x^4}{E \cdot d^3} \cdot$		0,0188	0,0212	0,0230	0,0260	0,0284	0,0308	0,0329	0,0351	0,0371	0,0391	0,0409

$l_y : l_z$		1,50	1,55	1,60	1,65	1,70	1,75	1,80	1,85	1,90	1,95	2,00
$m_{x_{erm}} = -$		10,6	10,3	10,1	9,9	9,7	9,5	9,4	9,2	9,0	8,9	8,8
$m_{x_m} =$	$p \cdot l_x^2$:	25,2	24,2	23,3	22,5	21,7	21,1	20,5	20,0	19,5	19,1	18,7
$m_{y_{ermin}} = -$		12,7	12,6	12,6	12,5	12,5	12,4	12,4	12,3	12,3	12,3	12,3
$m_{y_m} =$		55,0	58,2	61,6	65,6	70,4	75,0	79,6	84,7	89,8	95,4	101,0
$q_{x_{erm}} =$		1,71	1,70	1,69	1,68	1,67	1,66	1,65	1,64	1,63	1,62	1,61
$\bar{q}_{x_{rm}} =$	$p \cdot l_x$:	2,51	2,50	2,50	2,49	2,49	2,48	2,48	2,48	2,47	2,47	2,47
$q_{y_{erm}} = \pm$		1,85	1,84	1,84	1,84	1,84	1,83	1,83	1,83	1,83	1,82	1,82
$f_m = \dfrac{p \cdot l_x^4}{E \cdot d^3} \cdot$		0,0409	0,0426	0,0442	0,0457	0,0471	0,0484	0,0495	0,0507	0,0518	0,0529	0,0539

$$\bar{q}_{x_{erm}} = q_{x_{erm}}$$
$$\bar{q}_{y_{erm}} = |q_{y_{erm}}|$$
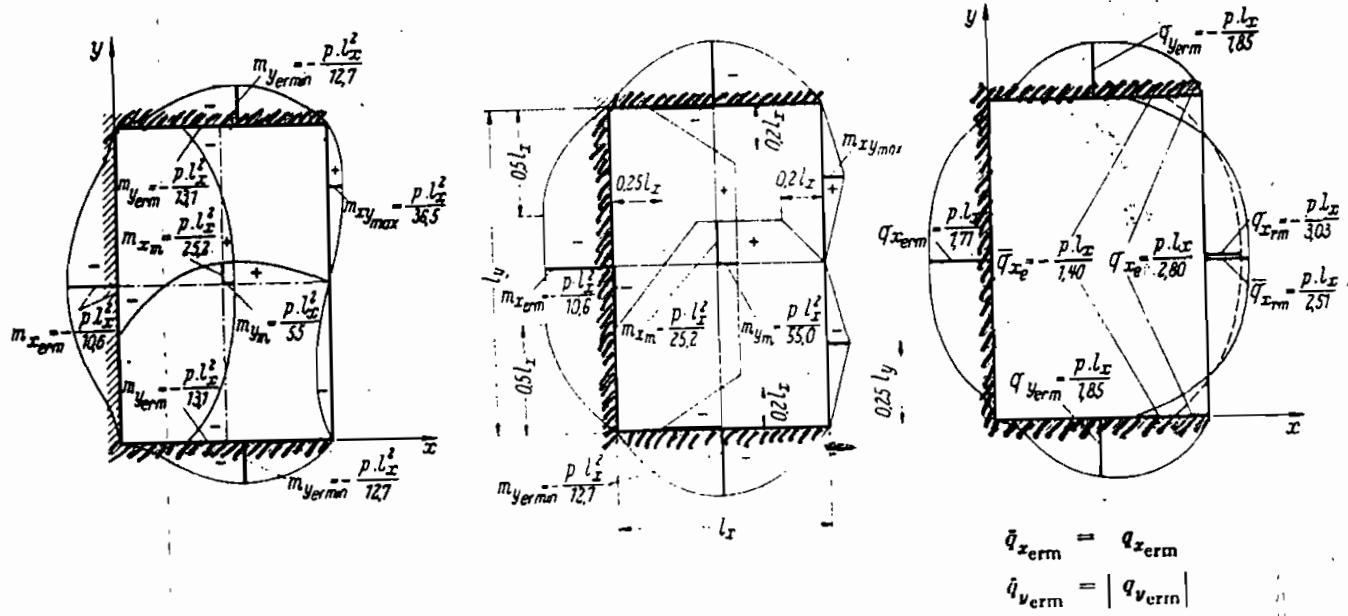
DIAGRAMMES DES SOLLICITATIONS POUR $\quad l_y : l_z = 1,5$

A-5 :

PLANS DE BETON DES DIFFERENTS OUVRAGES CALCULES

13- Bibliographie.

Aram Samikian
Béton armé - Calcul aux etats limites
- Théorie et pratique (Nouvelle édition 1987)

Association canadienne de norma-
lisation. (CAN 3 - A 23.3 - M 84)
Calcul des ouvrages en béton dans les
batiments - Norme nationale du Canada.

Canadian Portland cement
Association
Concrete design Handbook.

Laurent Labonté
Dessin de charpente en béton.

A. Ghali A. M. Neville.
Structural Analysis. A unified classical
and matrix approach

Pierre Sibille
Notes de cours STRUCTURE I de l'école
Polytechnique de Montréal (1981)

Ismaïla Guèye
Note de cours de Mécanique des sols II
de l'Ecole Polytechnique de Thiès.

Atelier des travaux d'architecture
et d'Ingemierie R. K. Farah (Lome-Togo)

Plans d'architecture pour le projet
de construction du siège de la C.E.B

Laboratoire National du Bâtiment
et des Travaux publics à Lomé-Togo.
Etude géotechnique des sol de fonda-
tion pour la construction du siège de la C.E.B

P- FRAME

logiciel de calcul des structures
(Mai 1984)