BYE LAW APPLICATION FEES

REF. NO.: 914/1427 CERTIFICATE NO.: 17396 B

PROPOSAL: Building

LOCATION: Fox & Geese, Naas Rd.

APPLICANT: Packaging Ind. Ltd.

	1	2	3	4	5	6	7
CLASS	DWELLINGS/AREA LENGTH/STRUCTURE	RATE	AMT. OF FEE REQUIRED	AMT. LODGED	BALANCE DUE	RED. FEE APPL.	AMT. OF RED. FEE
A	Dwelling (Houses/Flats)	@ £55					
B	Domestic Ext. (Improvement/ Alts.)	@ £30					
C	Building for office or other comm. purpose 1410 m^2	@ £3.50 per M^2 or £70	£4935	£4935	—		
D	Building or other structure for purposes of agriculture	@ £1.00 per M^2 in excess of 300 M^2 Min. £70					
E	Petrol Filling Station	@ £200					
F	Dev. of prop. not coming within any of the forgoing classes	£70 or £9 per .1 hect. whichever is the greater					

Column 1 Certified: Signed: _____ Grade: _____ Date: _____

Column 1 Endorsed: Signed: _____ Grade: _____ Date: _____

Columns 2,3,4,5,6 & 7 Certified: Signed: M R [illegible] Grade: III Date: 12/2/92

Columns 2,3,4,5,6 & 7 Endorsed: Signed: _____ Grade: _____ Date: _____

PLANNING APPLICATION FEES

Reg. Ref. 91A/1427 Cert. No. 26517

PROPOSAL Demolition of Residential unit. 2 Storey offices + close of elevation

LOCATION Fox & Geese, Naas Road, D.12

APPLICANT Packaging Industries Ltd

CLASS	DWELLINGS/AREA LENGTH/STRUCT.	RATE	AMT. OF FEE REC.	AMOUNT LODGED	BALANCE DUE	BALANCE PAID
1	Dwellings	@£32				
2	Domestic,	@£16				
3	Agriculture	@50p per m2 in excess of 300m2. Min. £40				
4	Metres 1410.0m	@£1.75 per m2 or £40	£2467.50	£2470	£2.50	overpaid
5	x .1 hect.	@£25 per .1 hect. or £250				
6	x .1 hect.	@£25 per .1 hect. or £40				
7	x .1 hect.	@£25 per .1 hect. or £100				
8		@£100				
9	x metres	@£10 per m2 or £40				
10	x 1,000m	@£25 per £1000m or £40				
11	x .1 hect.	@£5 per .1 hect. or £40	£80	£80	—	

Column 1 Certified: Signed: [signature] Grade DTC Date 5/9/91

Column 1 Endorsed: Signed: ..... Grade ..... Date .....

Columns 2,3,4,5,6 & 7 Certified: Signed: [signature] Grade SO Date 5/9/91

Columns 2,3,4,5,6 & 7 Endorsed: Signed: ..... Grade ..... Date .....

LOCATION GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 TO 1982

ASSESSMENT OF FINANCIAL CONTRIBUTION

REG. REF.: 91M/1427

CONT. REG.:

SERVICES INVOLVED: WATER/FOUL SEWER/SURFACE WATER

AREA OF SITE:

FLOOR AREA OF PRESENT PROPOSAL: 15178 ft² J.Y. 5/9/91.

MEASURED BY:

CHECKED BY:

METHOD OF ASSESSMENT:

TOTAL ASSESSMENT

PLANNER'S ORDER NO: P/
DATED

ENTERED IN CONTRIBUTIONS REGISTER:

15178
1000 @ 750

= £11,383.50

£11384

17/10/91

DEVELOPMENT CONTROL ASSISTANT GRADE

3797
3
17891 D

works in lieu
of contributions
towards

Niall O'Byrne.

Register Reference : 91A/1427 Date : 9th September 1991

Development : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational change to existing buildings fronting onto Naas Road

LOCATION : Fox & Geese, Naas Road, Dublin 22

Applicant : Packaging Industries Limited

App. Type : PERMISSION

Planning Officer : N.O'BYRNE

Date Recd. : 30th August 1991

Attached is a copy of the application for the above development .Your report would be appreciated within the next 28 days.

Yours faithfully,

.....

for PRINCIPAL OFFICER

No objections to this proposal provided compliance with
1 Offices Premises Act 1958 & Regs made thereunder
2 Safety in Industries Acts 1955-80.
3 Health Safety & Welfare at work Act 1989.
a) Suitable and sufficient ventilation to be provided to all sanitary accommodation and adjoining lobbies.

Jackie Kelly
EHO 9/10/91.

for Ita Devine
John O'Reilly
SUPER.ENVIRON. HEALTH OFFICER,
33 GARDINER PLACE,
DUBLIN 1.
9/10/91

DUBLIN COUNTY COUNCIL

REG. REF: 91A/1427.

DEVELOPMENT: Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational change to existing buildings fronting onto Naas Road.

LOCATION: Fox & Geese, Naas Road.

APPLICANT: Packaging Industries Ltd.

DATE LODGED: 30.8.91.

While Roads are opposed to such developments immediately adjoining a National Primary Route it is recognised that what is being proposed is a considerable improvement on the existing situation on site.

Roads are prepared to recommend off-setting any roads contribution (i.e. 70 car spaces at £200 = £14,000) against improvement works (i.e. resurfacing, etc.) being carried out by the developer over the private access lane which serves this site and from thence the adjoining private houses. Details of these works, along his sites frontage only, should be submitted to Roads Department for approval.

Otherwise, no Roads objections.

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 17.10.91
Time 3.00

TB/BMcC
10.10.91.

SIGNED: _____ **ENDORSED:** _____

DATE: 11/10/91 **DATE:** _____

P/4832/91

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Register Reference : 91A/1427 Date Received : 30th August 1991

Correspondence Name and Address : The Ambrose Kelly Group, Fleming Court, Fleming's Place, Dublin 4

Development : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational details of existing building.

Location : Fox & Geese, Naas Road, Dublin 22

Applicant : Packaging Industries Limited

App. Type : Permission

Zoning :

Floor Area : Sq.metres

CONTRIBUTION:
Standard: £11,384
Roads:
Sers
Open Space:
Other:
SECURITY:
Bond / C.I.F.:
Cash:

(NOB/AC)

Report of the Dublin Planning Officer dated 14 October 1991.

This is an application for PERMISSION for a two-storey office development, single-storey warehouse, associated offices and production area and the demolition of a semi-detached dwelling at the Packaging Industries premises on the Naas Road at its junction with a cul-de-saced section on Robinhood Road.

The site is located in an area subject to the zoning objective "to provide for industrial and related uses". No change is proposed in the 1991 Draft Development Plan.

Reg. Ref. TA.1108 refers to a decision to refuse permission for the retention of a storage building, confirmed on appeal.

Reg. Ref. WA.258 refers to a decision to refuse permission for the retention of a storage building. This decision was confirmed on appeal. This application was identical to TA.1108.

Reg. Ref. XA.2127 refers to a decision to grant a temporary permission for the retention of a storage building.

Reg. Ref. 85A/0209 refers to a decision to grant a temporary permission for the retention of a storage building. This temporary permission expired on 30.08.90.

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/1427

Page No: 0002

Location: Fox & Geese, Naas Road, Dublin 22

The decision also required that pending the permission of alternative access across industrial lands to the south, that the sole access to the site shall be from the adjoining cul-de-saced section of Robinhood Road.

The current application refers to a proposal to upgrade the existing Packaging Industries premises and for extensions which include a warehousing building with associated offices and first-floor production area and a separate two-storey office building to the rear. It is also proposed to demolish a dwelling which is one half of a semi-detached pair.

The existing use of the site is light industry for the manufacturing of printed paper bags and labels and for the storage and distribution of a variety of plastic containers. The current operation of the business involves production areas, offices and storage being combined and this application represents a proposal to rationalise the existing business on the site and to consolidate the activities of the enterprise which currently uses storage facilities in adjoining industrial areas.

A section of the existing building on the site is excluded from the current application as this relates to an existing restaurant with a separate legal title. The first-floor level of the existing portion of the premises fronting onto the Naas Road is excluded for the same reason.

The main element of the proposed development is the warehouse with production space at the first-floor. The building is designed to use 2 different steel frame spans, one of 12m. and the other 19m. The ~~gain~~ between the two spans is at a slightly oblique angle to follow the site boundary. This approach enables a free 6m. wide access to the car parking area at the rear of the site.

The two-storey section of this warehouse is located on the site of the semi-detached cottage to be demolished. The party wall will be reconstructed to the satisfaction of the owner of the remaining property. The cottage to be demolished was uninhabitable at the time of inspection. The eaves height of the warehouse is proposed to be 6.5m. There is a proposed first-floor production area of 320 sq.m., with 510 sqm. of warehousing and ink store at ground level. Profiled ~~match~~ cladding is proposed as the external finish. The design of the elevation to the access road however includes a rendered relief panel to reduce the apparent bulk of the building.

The proposed office development is two-storey and adjoins the existing production area. The site for the offices is currently partly occupied by a number of small sheds and stores. The proposed office building includes provision for a 40 sq.m. showroom, board room and toilets. External finish proposed is painted smooth rendering with a rendered relief band and a tiled

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/1427

Page No: 0003

Location: Fox & Geese, Naas Road, Dublin 22

roof. The proposed offices provide for some additional office space for the existing enterprise on site and for re-locating existing office use from within the existing production area and, therefore, can be considered ancillary to the industrial use of the site.

The application includes proposals to alter and upgrade the existing sections of the elevation to the Naas Road which are within the applicants control. The proposals include reducing the size of existing windows to a scale which achieves a better integration of the development with that part of the premises not incl uded in this application. It is also proposed to replace existing pebble dash finish with painted smooth rendering and to close off an existing entrance f rom the Naas Road with railings on a dwarf wall. These proposals would improve an existing poor and prominent elevation.

Access to the site is proposed only from the existing lane adjoining the site. Provision is made for 69 car parking spaces. Twenty-eight of these spaces are proposed on a section of the site on the east side of the access lane. Five spaces also are indicated on the access lane with the balance within and to the rear of the site.

Roads Department report considers the proposal an improvement over the present situation on site. The report also recommends either ~~a financial contribution~~ condition towards improving the lane and frontage or the applicant paying a contribution towards the costs of such works.

The plans also indicate provision for signage, but details have not been provided.

Sanitary Services Section report noted.

Supervising Environmental Health Officer report not received.

The proposed development is consistent with the provision of the Development Plan 1983 and represent a reasonable expansion and consolidation of an existing established industrial use. The proposal also provides for upgrading a prominent elevation to the Naas Road.

I recommend that a decision to GRANT PERMISSION be made under the Local Government (Planning and Development) Acts 1963-1990, subject to the following (8) conditions:-

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/1427

Page No: 0004

Location: Fox & Geese, Naas Road, Dublin 22

C O N D I T I O N S / R E A S O N S

01 The development to be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application save as may be required by the other conditions attached hereto.
REASON:To ensure that the development shall be in accordance with the permission and that effective control be maintained.

02 That before development commences, approval under the Building Bye- Laws be obtained and all conditions of that approval be observed in the development.
REASON:In order to comply with the Sanitary Services Acts, 1878-1964.

03 That the requirements of the Supervising Environmental Health Officer be ascertained and strictly adhered to in the development.
REASON:- In the interest of health.

04 That a financial contribution in the sum of £ 11,384 be paid by the proposer to the Dublin County Council towards the cost of provision of public services in the area of the proposed development and which facilitate this development; this contribution to be paid before the commencement of development on the site.
REASON: The provision of such services in the area by the Council will facilitate the proposed development. It is considered reasonable that the developer should contribute towards the cost of providing the services.

05 That no advertising sign or structure be erected except those which are exempted development, without prior approval of Planning Authority.
REASON: In the interest of the proper planning and development of the area.

06 The applicant shall be responsible for improvements to the private side access lane serving the proposed development, including resurfacing and the provision of kerbing. Details in this regard, including a programme of implementation shall be submitted for the written agreement of the Planning Authority before any development commences.
NOTE: The applicant is advised to consult with the Council's Roads Department before submitting any proposals for compliance with this condition.

06 REASON: In the interest of the proper planning and development of the

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/1427

Page No: 0005

Location: Fox & Geese, Naas Road, Dublin 22

area.

07 The existing entrance off the Naas Road shall be closed off permanently before the occupation of the office or warehouse development permitted by this decision.

07 REASON: In the interest of the proper planning and development of the area.

08 Before any development commences the applicant shall submit, for the written agreement of the Planning Authority, proposals to discourage or avoid on-street car or lorry parking along the Naas Road frontage of the site.

08 REASON: In the interest of the proper planning and development of the area.

NOTE: Compliance with one or more of the conditions of this permission may result in material alterations to the development as initially proposed and, accordingly, may require the submission of a further planning application.

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/1427

Page No: 0006

Location: Fox & Geese, Naas Road, Dublin 22

Endorsed:-.....
for Principal Officer

.....
for Dublin Planning Officer

Order: A decision pursuant to Section 26(1) of the Local Government (Planning and Development) Acts, 1963-1990 to GRANT PERMISSION for the above proposal subject to the (8) conditions set out above is hereby made.

Dated : 21 OCTOBER 1991

.....
~~ASSISTANT COUNTY MANAGER~~/APPROVED OFFICER

to whom the appropriate powers have been delegated by order of the Dublin City and County Manager dated 21st October 1991.

Niall O'Byrne.

DUBLIN COUNTY COUNCIL

REG. REF: 91A/1427.

DEVELOPMENT: Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational change to existing buildings fronting onto Naas Road.

LOCATION: Fox & Geese, Naas Road.

APPLICANT: Packaging Industries Ltd.

DATE LODGED: 30.8.91.

While Roads are opposed to such developments immediately adjoining a National Primary Route it is recognised that what is being proposed is a considerable improvement on the existing situation on site.

Roads are prepared to recommend off-setting any roads contribution (i.e. 70 car spaces at £200 = £14,000) against improvement works (i.e. resurfacing, etc.) being carried out by the developer over the private access lane which serves this site and from thence the adjoining private houses. Details of these works, along his sites frontage only, should be submitted to Roads Department for approval.

Otherwise, no Roads objections.

PLANNING DEPT.
DEVELOPMENT CONTROL
Date 11.10.91
Time 10.30

TB/BMcC
10.10.91.

SIGNED: _____ ENDORSED: _____

DATE: 11/10/91 DATE: _____

SS + Cno_

Niall O'Byrne.

Register Reference : 91A/1427 Date : 9th September 1991

Development : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational change to existing buildings fronting onto Naas Road

LOCATION : Fox & Geese, Naas Road, Dublin 22

Applicant : Packaging Industries Limited

App. Type : PERMISSION

Planning Officer : N.O'BYRNE

Date Recd. : 30th August 1991

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 2.10.91
Time 10.00

Attached is a copy of the application for the above development. Your report would be appreciated within the next 28 days.

Yours faithfully,

.....

for PRINCIPAL OFFICER

DUBLIN Co. COUNCIL
12 SEP 1991
SAN SERVICES

DUBLIN CO. COUNCIL
SANITARY SERVICES
30 SEP 1991
Returned

Date received in Sanitary Services .....

FOUL SEWER

Satisfactory. Insufficient information, the applicant has not submitted drainage levels; invert levels; ground levels or finished floor levels.

SURFACE WATER Insufficient information; No permission can be granted until the applicant has established that the Roads department will grant access to the Naas Road sewer.

SENIOR ENGINEER, The applicant must submit invert levels and
SANITARY SERVICES DEPARTMENT, ground levels.
46/49 UPPER O'CONNELL STREET,
DUBLIN 1

B Lambert
23.9.91

J.R. 25/9/91

NFB3L.

Register Reference : 91A/1427 Date : 9th September 1991

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 2.10.91
Time 10.00

ENDORSED _____ DATE _____

WATER SUPPLY Available for zoned use 24 hour storage to be provided. applicant to consult & agree with S.S. Dept proposed w/main layout about to submit details of existing water main layout
Refer to C.F.O.

J Hall 16/9/91

P J Howell 20/9/91

ENDORSED _____ DATE 25/9/91

CONHAIRLE CHONTAE ATHA CLIATH

DUBLIN COUNTY COUNCIL

Building Control Department,
Liffey House,
Tara Street,
Dublin 1.

Telephone: 773066

Planning Department,
Irish Life Centre,
Lower Abbey Street,
Dublin 1.

Telephone: 724755
Extension: 231/234

28th February, 1992

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 TO 1982

LOCATION: Packaging Industries Limited, Fox & Geese, Naas Road

PROPOSED DEVELOPMENT: 2-storey offics building and associated warehouse building

APPLICANT: Packaging Industries Ltd.

PLANNING REG.REF.: 91A/1427

DATE OF RECEIPT OF SUBMISSION: 6th February, 1992

A Chara,

With reference to above, I acknowledge receipt of application for:

Building Bye-Law Approval

Mise, le mess

A. Smith

PRINCIPAL OFFICER

The Ambrose Kelly Group,
Fleming Court,
Fleming's Place,
Dublin 4

Dublin County Council
Comhairle Chontae Atha Cliath

Bye - Law Application Form

PLEASE READ INSTRUCTIONS AT BACK BEFORE COMPLETING FORM. ALL QUESTIONS MUST BE ANSWERED.

1. Application for Permission ☐ Outline Permission ☐ Approval ☑ Place ✓ in appropriate box.
Approval should be sought only where an outline permission was previously granted. Outline permission may not be sought for the retention of structures or continuances of uses.

2. Postal address of site or building (If none, give description sufficient to identify) *Packaging Industries Limited, Fox & Geese, Naas Road, Dublin 22.*

3. Name of applicant (Principal not Agent) *Packaging Industries Limited*
Address *Fox & Geese, Naas Road, Dublin 22.* Tel. No.

4. Name and address of person or firm responsible for preparation of drawings *The Ambrose Kelly Group, Fleming Court, Fleming's Place, Dublin 4.* Tel. No *607511*

5. Name and address to which notifications should be sent *The Ambrose Kelly Group, Fleming Court, Fleming's Place, Dublin 4.*

6. Brief description of proposed development *Building a 2-storey office building and associated warehoouse building.*

7. Method of drainage *Existing separate system* 8. Source of Water Supply *Existing Mains*

9. In the case of any building or buildings to be retained on site, please state:-
(a) Present use of each floor or use when last used. *Warehouse with associated offices*
(b) Proposed use of each floor *Warehouse with associated offices*

10 Does the proposal involve demolition, partial demolition or change of use of any habitable house or part thereof? *YES*

11.(a) Area of Site *4343* Sq. m.
(b) Floor area of proposed development *1410* Sq. m.
(c) Floor area of buildings proposed to be retained within site *900* Sq. m.

12. State applicant's legal interest or estate in site (i.e. freehold, leasehold, etc.) *Freehold Owner*

13. Are you now applying also for an approval under the Building Bye Laws?
Yes ☑ No ☐ Place ✓ in appropriate box.

14. Please state the extent to which the Draft Building Regulations have been taken in account in your proposal:
The Draft Building Regulations have been fully taken into account

15. List of documents enclosed with application.
See Covering Letter
BYE LAW APPLICATION
REC. No N57314

16. Gross floor space of proposed development (See back) *1410* Sq. m. £4935.00 Cq.

No of dwellings proposed (if any) *N/A* Class(es) of Development *4*

Fee Payable £ *4935.00* Basis of Calculation *1410 sq. m. @ £3.50 per sq.m.*

If a reduced fee is tendered details of previous relevant payment should be given
N/A

Signature of Applicant (or his Agent) *Kenneth Byrne* Date *5th February, 1992.*

Application Type
Register Reference
Amount Received £
Receipt No
Date

FOR OFFICE USE ONLY
91A/1427
3.68.44
BBL

RECEIVED
06 FEB 1992
REG. SEC.

LOCAL GOVERNMENT (PLANNING & DEVELOPMENT) REGULATIONS 1977 to 1984..

Outline of requirements for applications for permission or Approval under the Local Government (Planning & Development) Acts 1963 to 1983. The Planning Acts and Regulations made thereunder may be purchased from the Government Publications Sales Office, Sun Alliance House, Molesworth Street, Dublin 2.

1. Name and Address of applicant.

2. Particulars of the interest held in the land or structure, i.e. whether freehold, leasehold, etc.

3. The page of a newspaper, circulating in the area in which the land or structure is situate, containing the required statutory notice. The newspaper advertisement should state after the heading Co. Dublin.

   (a) The address of the structure or the location of the land.
   (b) The nature and extent of the development proposed. If retention of development is involved, the notice should be worded accordingly. Any demolition of habitable accommodation should be indicated.
   (c) The name of the applicant.

   NB. Applications must be received within 2 weeks from date of publication of the notice.

4. Four (4) sets of drawings to a stated scale must be submitted. Each set to include a layout or block plan, proposed and existing services to be shown on this drawing, location map, and drawings of relevant floor plans, elevations, sections, details of type and location of septic tank (if applicable) and such other particulars as are necessary to identify the land and to describe the works or structure to which the application relates (new work to be coloured or otherwise distinguished from any retained structures). Buildings, roads, boundaries and other features bounding the structure or other land to which the application relates shall be shown on site plans or layout plans. The location map should be of scale not less than 1: 2500 and should indicate the north point. The site of the proposed development must be outlined in red. Plans and drawings should indicate the name and address of the person by whom they were prepared. Any adjoining lands in which the applicant has an interest must be outlined in blue.

5. In the case of a proposed change of use of any structure or land, requirements in addition to 1, 2, & 3 are:
   (a) a statement of the existing use and the proposed use, or, where appropriate, the former use and the use proposed.

   (b) (i) Four (4) sets of the drawings to a stated scale must be submitted. Each set to consist of a plan or location map (marked or coloured in red so as to identify the structure or land to which the application relates) to a scale of not less than 1:2500 and to indicate the North point. Any adjoining lands in which the application has an interest must be outlined in blue.

   (ii) A layout and a survey plan of each floor of any structure to which the application relates.

   (c) Plans and drawings should indicate the name and address of the person by whom they were prepared.

6. Applications should be addressed to: Dublin County Council, Planning Department, Irish Life Centre, Lr. Abbey Street, Dublin 1, Tel. 724755.

SEPTIC TANK DRAINAGE: Where drainage by means of a septic tank is proposed, before a planning application is considered, the applicant may be required to arrange for a trial hole to be inspected and declared suitable for the satisfactory percolation of septic tank effluent. The trial hole to be dug seven feet deep at or about the site of the septic tank. Septic tanks are to be in accordance with I.I.R.S. S.R. 6:75.

INDUSTRIAL DEVELOPMENT:

The proposed use of an industrial premises should, where possible, be stated together with the estimated number of employees, (male and female). Details of trade effluents, if any, should be submitted.

Applicants to comply in full with the requirements of the Local Government (Water Pollution) Act, 1977 in particular the licencing provisions of Sections 4 and 16.

PLANNING APPLICATIONS

CLASS NO.	DESCRIPTION	FEE
1	Provision of dwelling -- House/Flat.	£32.00 each
2.	Domestic extensions/other improvements.	£16.00
3	Provision of agricultural buildings (See Regs.)	£40.00 minimum
4	Other buildings (i.e. offices, commercial, etc.)	£1.75 per sq. metre (Min. £40.00)
5.	Use of land (Mining, deposit or waste)	£25.00 per 0.1 ha (Min £250.00)
6.	Use of land (Camping, parking, storage)	£25.00 per 0.1 ha (Min. £40.00)
7.	Provision of plant/machinery/tank or other structure for storage purposes.	£25.00 per 0.1 ha (Min. £100.00)
8.	Petrol Filling Station.	£100.00
9	Advertising Structures.	£10.00 per m² (min £40.00)
10	Electricity transmission lines.	£25.00 per 1,000m (Min. £40.00)
11.	Any other development.	£5.00 per 0.1 ha (Min. £40.00)

BUILDING BYE-LAW APPLICATIONS

CLASS NO.	DESCRIPTION	FEE
A	Dwelling (House/Flat)	£55.00 each
B	Domestic Extension (improvement/alteration)	£30.00 each
C	Building — Office/ Commercial Purposes	£3.50 per m² (min. £70.00)
D	Agricultural Buildings/Structures	£1.00 per m² in excess of 300 sq. metres (min. - £70.00) (Max. - £300.00)
E	Petrol Filling Station	£200.00
F	Development or Proposals not coming within any of the foregoing classes.	£9.00 per 0.1 ha (£70.00 min.) Min. Fee £30.00 Max. Fee £20,000

Cheques etc should be made payable to: Dublin County Council

Gross Floor space is to be taken as the total floor space on each floor measured from the inside of the external walls.

For full details of Fees and Exemptions see Local Government (Planning and Development) (Fees) Regulations 1984.

RECEIPT CODE

COMHAIRLE CHONTAE ÁTHA CLIATH
DUBLIN COUNTY COUNCIL
46/49 UPPER O'CONNELL STREET,
DUBLIN 1.

PAID BY
CASH
CHEQUE ✓
M.O.
P.O.
A/C

REG. NO. N 57314

£4935.00

Received this 7th day of February 19 92

from Packaging Industries (Sales) Ltd.

the sum of four thousand nine hundred & thirty five Pounds

Pence, being 2x for

bye-law application at 10x Cooey Roads Rd.

Noeleen Deane Cashier

S. CAREY Class C
Principal Officer

architects

the ambrose kelly group

chairman
ambrose kelly

group architects
paul keenan *B.Arch (NUI) MRIAI*
michael j lyons *B.A. Dip.Arch*
patrick j reid *B.Arch (NUI) MRIAI*

technical director
bernard lynch *Dip.Arch Tech RIAI(Tech)*

date 5 February 1992

our ref KB/AF1/B031(001)

your ref

Dublin County Council
Bye Law Department
Liffey House
24-28 Tara Street
Dublin 2

RE: **PROPOSED WAREHOUSE AND ASSOCIATED OFFICE BUILDING AT FOX & GEESE, NAAS ROAD DUBLIN 22 FOR PACKAGING INDUSTRIES LIMITED**

Dear Sir

We wish to apply for Bye Law Approval for construction of a warehouse building with associated offices and production area to first floor and separate two storey office development to rear of existing buildings, on behalf of Packaging Industries Limited, Fox & Geese, Naas Road, Dublin 22.

We have received a Grant of Permission on this development under the Local Government (Planning and Development) Act 1963 - 1990. Grant Order No: P/5866/91. Date: 18 December 1991. Register Reference: 91A/1427.

Copy of the above Permission is enclosed.

Previous to this application, we have had meetings with both the Area Fire Officer and Road Engineer. In both meetings, the proposed development was tabled and discussed. All requirements from both parties have been fully incorporated into our application.

Cont/d...

Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

Station House, Station Road, London SE20 7BE
Telephone 081 659 1516 Fax 081 676 8955

Enclosed with our application is the following documentation:

1. Completed Application Form.

2. Cheque for the sum of £4,935.00 calculated on the following basis:

   1410 sq m at £5.50 per m sq = £4,935.00.

3. 4 no. copies of drawings:

Architectural Drawings:

B031 (P1) 01	-	Floor Plans and Site Layout	1:200
B031 (P1) 02	-	Elevations	1:100
B031 (P1) 03	-	Sections, Elevations and Block Plan	1:100 1:1000
B031 (P1) 04	-	Floor Plans to Warehouse	1:100
B031 (P1) 05	-	Floor Plans to Offices	1:50
B031 (P1) 06	-	Section CC and Details	1:50

Engineers Drawings:

9214-1	-	Foundations Plan Part Sheet 1
9214-2	-	Foundations Plan Part Sheet 2
9214-3	-	Ground Floor Plan Part Sheet 1
9214-4	-	Ground Floor Plan Part Sheet 2
9214-5	-	First Floor Plan
9214-6	-	Roof Plan Part Sheet 1
9214-7	-	Roof Plan Part Sheet 2
9214-8	-	Typical Sections through production buildings
9214-12	-	Office Building Ground Floor and Foundation Plans
9214-13	-	Office Building First Floor and Roof Plans
9214-14	-	Office Building Sections A-A B-B

Structural Calculations:

Structural Specifications

Blockwork
Concrete
Steel
Timber

Cont/d...

Trusting that the information enclosed in our application is to your satisfaction. Should you require any further information, please do not hesitate to contact the undersigned at the above telephone number.

Yours faithfully

Kenneth Byrne Dipl.Arch.(Tech)
THE AMBROSE KELLY GROUP

Encl.

Dublin County Council Comhairle Chontae Atha Cliath **Planning Department**

Bloc 2, Ionad Bheatha na hEirean
Bloc 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street.
Baile Atha Cliath 1.
Dublin 1.
Telephone (01) 724755
Fax (01) 724896

23 DEC 1991

NOTIFICATION TO GRANT PERMISSION
LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT)ACTS 1963-1990.

Grant Order Number : P/ 5866 /91 Date of Grant : 18th December 1991

Decision Order Number : P/ 4832 /91 Date of Decision : 22nd October 1991

Register Reference : 91A/1427 Date Received : 30th August 1991

Applicant : Packaging Industries Limited

Development : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational

Location : Fox & Geese, Naas Road, Dublin 22

Additional Information Requested/Received : //

Time Extension(s) up to and including :

A PERMISSION has been granted for the development described above, subject to the Conditions on the attached Numbered Pages.

NUMBER OF CONDITIONS:- ...8...ATTACHED.

Signed on behalf of the Dublin County Council.....
for Principal Officer

Date:...18 DEC 1991.....

APPROVAL of the Council under Building Bye-Laws must be obtained before the development is commenced and the terms of approval must be complied with in the carrying out of the work.

APPROVAL under the Building Bye Laws is not applicable to garden walls, entrances etc. APPROVAL under the Building Bye Laws cannot be obtained in respect of retention of work previously carried out.

The Ambrose Kelly Group,
Fleming Court,
Fleming's Place,
Dublin 4

DUBLIN COUNTY COUNCIL
Planning Dept Registry Section
APPLICATION RECEIVED
06FEB 1992
REG No. .....

Bloc 2, Ionad Bheatha na hEirea
Bloc 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street.
Baile Atha Cliath 1.
Dublin 1.
Telephone (01) 724755
Fax (01) 724896

Reg.Ref. 91A/1427
Decision Order No. P/ 4832 /91
Page No: 0002

01 The development to be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application save as may be required by the other conditions attached hereto.
REASON:To ensure that the development shall be in accordance with the permission and that effective control be maintained.

02 That before development commences, approval under the Building Bye- Laws be obtained and all conditions of that approval be observed in the development.
REASON:In order to comply with the Sanitary Services Acts, 1878-1964.

03 That the requirements of the Supervising Environmental Health Officer be ascertained and strictly adhered to in the development.
REASON: In the interest of health.

04 That a financial contribution in the sum of £11384. be paid by the proposer to the Dublin County Council towards the cost of provision of public services in the area of the proposed development and which facilitate this development; this contribution to be paid before the commencement of development on the site.
REASON: The provision of such services in the area by the Council will facilitate the proposed development. It is considered reasonable that the developer should contribute towards the cost of providing the services.

05 That no advertising sign or structure be erected except those which are exempted development, without prior approval of Planning Authority.
REASON: In the interest of the proper planning and development of the area.

06 The applicant shall be responsible for improvements to the private side access lane serving the proposed development, including resurfacing and the provision of kerbing. Details in this regard, including a programme of implementation shall be submitted for the written agreement of the Planning Authority before any development commences.
NOTE: The applicant is advised to consult with the Council's Roads Department before submitting any proposals for compliance with this condition.

06 REASON: In the interest of the proper planning and development of the area.

07 The existing entrance off the Naas Road shall be closed off permanently before the occupation of the office or warehouse development permitted by this decision.

07 REASON: In the interest of the proper planning and development of the area.

08 Before any development commences the applicant shall submit, for the written agreement of the Planning Authority, proposals to discourage or avoid on-street car or lorry parking along the Naas Road frontage of the

18 DEC 1991

Bloc 2, Ionad Bheatha na hEirean
Bloc 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street.
Baile Atha Cliath 1.
Dublin 1.
Telephone (01) 724755
Fax (01) 724896

site.

08 REASON: In the interest of the proper planning and development of the area.

NOTE: Compliance with one or more of the conditions of this permission may result in material alterations to the development as initially proposed and, accordingly, may require the submission of a further planning application.

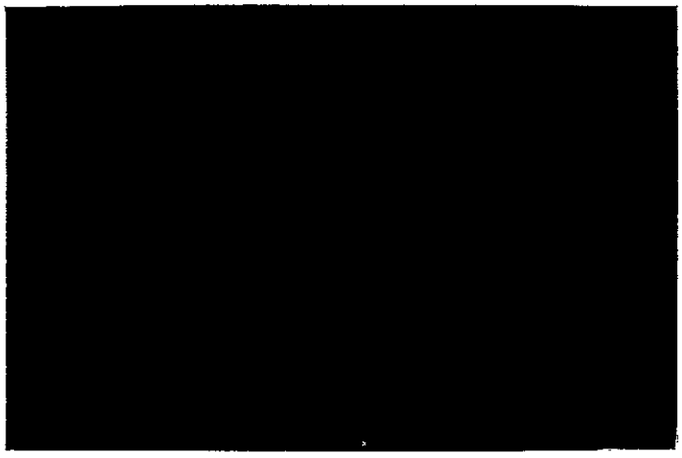
18 DEC 1991

DBFL

PACKAGING INDUSTRIES LTD.

STRUCTURAL DRAWINGS LIST

9214-1	Foundations Plan Part Sheet 1
9214-2	Foundations Plan Part Sheet 2
9214-3	Ground Floor Plan Part Sheet 1
9214-4	Ground Floor Plan Part Sheet 2
9214-5	First Floor Plan
9214-6	Roof Plan Part Sheet 1
9214-7	Roof Plan Part Sheet 2
9214-8	Typical Sections through production buildings
9214-12	Office Building Ground Floor and Foundation Plans
9214-13	Office Building First Floor and Roof Plans
9214-14	Office Building Sections A-A B-B



DBFL

CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

PACKAGING INDUSTRIES LTD.

STRUCTURAL SPECIFICATIONS

STRUCTURAL SPECIFICATIONS

BLOCKWORK

CONCRETE

STEEL

TIMBER

BLOCKWORK

SPECIFICATION FOR BLOCKWORK

GENERAL:

References herein to Irish, British or other National Standards of Practice do not give the year of issue or dates of amendment. The latest relevant published version including any relevant amendments at date of invitation to tender shall apply.

Where a Standard or Code of Practice has been superseded the latest edition of the superseding publication shall apply.

The preambles to the Bills of Quantities shall take precedence over the Standards and Codes of Practice referred to where those documents are at variance.

BLOCKWORK:

01. General

1. All blockwork shall be carried out in accordance with IS325 & BS5628 unless otherwise specified herein or directed by the Architect.

02. Concrete Blocks

1. All blocks shall be in accordance with I.S.20 and shall be obtained from an approved manufacturer. They shall have a co-ordinating size of 450mm x 225mm and shall be as desoribed on the Architect's drawings.

03. Dense Masonry

1. The dense masonry blocks shall be waterproofed dense concrete masonry blocks as manufactured by Messrs. Clondalkin Concrete Ltd., or other equal similar and approved complying with the requirements of I.S.20. The blocks shall be to selected colour or colours as directed by the Architect.

04. Handling and Storage

1. The blocks shall be off-loaded and moved to laying position mechanically. They shall be stored off the ground and covered to protect from rain and dirt.

05. Certificates

1. A manufacturer's certificate of the quality of the blocks shall be produced for all batches of blocks delivered to site.

06. Cement

1. The cement used in mortars shall be either Portland Cement to I.S.1. "Portland Cement", or Portland blast furnace cement to B.S.146, or sulphate resisting cement to B.S.4027. The use of high alumina cement is forbidden. Where masonry cements are permitted by the Architect in lieu of cement and lime they shall comply with the draft British Standard "Methods of Testing Mortars" and in any event they will not be permitted for mortar mixes stronger than 1:1:6 cement:lime:sand.

07. Lime

1. Lime used in mortars shall be non-hydraulic (calcium) limes or semi-hydraulic (calcium) and magnesium limes to conform to the requirements of I.S.8.

08. Sand

1. The sand shall be free from deleterious substances and shall comply with the requirements for quality and grading of sand for mortar given in B.S.1200.

09. Water

1. Water shall be free from impurities harmful to the mortar. Where the quality of supply is doubtful the water shall be tested in accordance with B.S.3148.

10. Admixtures

1. Admixtures, may be used subject to the Architect's approval in writing.

11. Mortars

1. A 1:1:6 (Cement:Lime:Sand) mortar shall generally be used in the superstructure. However where special conditions, either constructural or environmental prevail, attention must be given to the requirements of C.P.121, Clause 3.6 and Table 4.

2. The mortar mixes referred to in Table 4 are given in Table 6 of this Code. Any alternative mortar mix is subject to the Architect's written approval.

3. The mortar shall be water proofed and tinted if so required by the Architect. Special care shall be taken to maintain consistency of mortar.

12. Batching and Mixing of Mortars

1. The material for the mortar shall be measured accurately to conform with the specified mix proportions by weigh batching or by the use of gauge boxes.

2. The mortars shall be mixed by machine.

3. Mortars containing cements shall be used within two hours of the mixing of the cement and water and any mortar not then used shall be discarded and not re-tempered.

13. Filling of Cores, Etc

1. Where the cores of block walls are to be filled with concrete a 10mm aggregate concrete as elsewhere specified shall be used.

2 These cores shall be accurately lined up and be clean and clear of all protruding mortar etc.

3. The concrete shall be well tamped around the reinforcement to ensure that it is fully compacted.

14. Wall Ties

1. Cavity wall ties shall be approved vertical twist dovetail stainless steel straps with stainless steel restraining pin to retain the insulation unless otherwise directed by the Architect.

2. Internal collar jointed walls shall be tied together with flat stainless steel ragged ended ties of cross sectional area over 200mm x 3mm at centres not exceeding those in the attached table.

15. Handling and Storage of Materials

1. Cement shall be stored to ensure that it is not affected by dampness prior to use.

2. Sand shall be stored separately according to type where it will not be contaminated.

3. Reinforcement and ties shall be protected from becoming contaminated.

4. Facing blocks shall be carefully unloaded so as to avoid damage to the units. All blocks shall be stacked on prepared level areas to ensure that the stack is stable. Blocks used for fairfaced work shall be protected to prevent the exposed faces from becoming stained or marked. Precautions shall be taken to ensure that the manufacturer's recommended moisture content is not exceeded at the time of laying.

16. Testing of Blocks

1. Independent testing of blocks shall be carried out in accordance with clause 17 of I.S.20.

17. Workmanship

1. All blockwork shall be set out and built to the respective dimensions, thickness and heights shown upon the drawings.

2. All perpends, quoins, joints, etc., shall be kept strictly true and square, other angles shall be plumbed and the whole properly bonded or tied together and the bed joints levelled as the work proceeds.

3. The blockwork shall be built to the bond indicated, on the drawings. Where no bond is indicated, the units shall be laid in stretcher bond.

4. Blocks used for facing shall be cut with a masonry saw. Where it is necessary to cut the blocks wet they shall be dried to the manufacturer's recommended moisture content before being built into the wall.

5. The positions and size of the chasings shall be as indicated on the drawings and shall be carried out neatly using a chasing tool.

6. Concrete blocks should be used at a moisture content not exceeding the manufacturer's recommendations.

7. All painting of blockwork shall be carried out to the detail agreed with the Architect.

8. No block laying shall be carried out when the temperature is at or below 3 deg.C unless precautions are taken to ensure a minimum temperature of 4 deg.C in the work when laid and thereafter to maintain the temperature above freezing point until the mortar has hardened. Should any block wall be damaged by frost it shall be pulled down and made good at the contractor's expense. Walls shall, where necessary, be adequately braced during construction to prevent damage by winds or other causes.

9. Each block shall be laid and adjusted to its final position while the mortar is still plastic.

10. All blocks shall be laid on a full mortar bed. Vertical joints shall be filled. All joints are to be nominally 10mm thick.

11. Any mortar which extrudes from the joint of fairfaced units shall be cut away and on no account is mortar to be smeared on to the face of the block.

12. The junctions of all walls shall be block bonded unless specified or directed otherwise by the Architect.

18. Control Joints

1. Control joints shall be constructed as indicated on the drawings or as directed by the Architect. Expansion joints shall be cleaned out to ensure that mortar does not bridge the joint.

19. Double Leaf (Cavity) Walls

1. The walls shall be built with cavities of the width shown on the drawings and tied together with wall ties as specified embedded in the mortar at least 50mm. Unless otherwise detailed the wall ties shall be staggered in alternate courses and spaced in accordance with the following table.

MAXIMUM SPACING OF TIES

Least Leaf Thickness mm	Cavity Width mm	Horizontally mm	Vertically mm
75	50-75	450	450
90 or more	50-75	900	450
90 or more	75-100	675	450
90 or more	100-150	450	450

2. The spacing may be varied provided that the number of ties per unit area is maintained subject to the Architect's approval.

3. Additional ties shall be provided in every course within 225mm of openings and on each side of control joints. Ties shall be laid falling to the external leaf.

4. Where a wall is constructed of two separate leaves with a 10mm vertical joint between them the spacing of the ties shall be 450mm both horizontally and vertically and the vertical joint shall be filled with mortar as the work proceeds.

5. The cavity, ties and cores (where they are to be filled with concrete) shall be kept clear and clean of mortar droppings or other materials during construction and any extruding mortar shall be struck off flush. No cavity shall be sealed off until inspected and approved by Architect.

6. Weepholes 10mm wide by 75mm high, spaced at centres not exceeding 900m and extending through the vertical mortar joints of the outer leaf shall be provided at ground level and at positions where the cavity is bridged or at locations indicated on the drawings.

7. Vent holes shall be of the dimension as for weepholes and shall be positioned at locations indicated on the drawings.

20. Partitions

1. Partitions shall not be built on suspended slabs until after the props have been removed.

21. Lintels

1. Concrete block lintels shall be positioned and reinforced in accordance with the details shown on the drawings and shall have cavities filled with concrete as specified. The lintels are to be propped during construction to the satisfaction of the Engineer. All lintels shall have a minimum bearing length of 200mm unless otherwise detailed.

22. Protection

1. Where necessary walls shall be temporarily braced to prevent damage from backfilling operations.

2. The tops of constructed walls shall be protected from rain and in addition fairfaced work shall be protected against staining from construction activities.

3. At the completion of the work all temporary holes in mortar joints of fairfaced work shall be filled with mortar and suitably tooled. Any damaged blockwork shall be repaired with approved materials or replaced to the satisfaction of the Architect.

23. Sealing

1 Joints around door and window frames, control joints, abutting joints at external columns and other joints where sealing is indicated or required shall be brush painted with an approved primer and filled with an approved sealant of colour specified by the Architect, the whole of which shall be carried out in accordance with the manufacturer's recommendations.

24. Flashings

1. Wall flashings shall be built into or secured to the blockwork in accordance with the details shown on the drawings. Care shall be taken to ensure that the flashing has adequate laps.

25. Chases

1. No chases shall be provided or cut in the blockwork without the prior approval of the Architect. Where chases have to be cut, suitable power tools which do not operate by heavy impact should be used. The depth of chase should not exceed one-sixth of the thickness of a single leaf.

26. Damp Proofing

1. Horizontal damp-proof courses shall be provided at positions shown on the drawings and be positioned so as to fully cover the leaf thickness. All horizontal damp-proof courses shall be laid on an even bed of fresh mortar and eventually covered by mortar so as to maintain regular coursing and joint thickness and while exposed shall be protected from damage while the building is processing. Stepped damp-proof courses at openings shall extend beyond the end of the lintel by at least 100mm. All horizontal damp-proof courses shall protrude 10mm from the external face of the wall and be turned downwards. Vertical damp-proof courses shall be of adequate width and be fixed so as to separate the inner and outer leaves of the wall.

27. Backfilling

1. Backfilling shall not be placed against concrete masonry walls within 14 days of completion of the construction unless otherwise directed by the Engineer. Vehicles shall not be operated closer to the wall than a distance equal to the height of the wall below ground level.

28. Stability During Construction

1. Walls in the course of construction shall be propped by the contractor to ensure stability and to resist all lateral forces until such time as they have been adequately braced by the completed or partially completed structure.

29. Pointing of Blockwork

1. Pointing should be carried out from the top of the wall downwards. The joints shall be well brushed to remove dust and loose material and should be lightly wetted using a brush. The type of pointing shall be as directed by the Architect.

30. Damp Proof Course

1. Damp proof course shall be bitumen with hessian base and shall comply with I.S.57 or equivalent unless otherwise directed by the Architect.

31. Sample Panels

1. Sample panels of walling, if required by the Architect, shall be constructed in accordance with this specification at the commencement of work. These panels shall remain on site for the duration of the Contract unless otherwise directed by the Architect.

32. Tolerances for Blockwork

1. The following tolerances shall apply to blockwork except specified by the Architect.

Level ±10mm for dimensions to any nominally horizontal surface measured from the nearest reference level but not more than ±3mm under a 3m straight edge.

Position on Plan ±10mm for dimensions to any nominally vertical surface at the lower edge measured horizontally from the nearest reference line.

Plumbness ±5mm in any 1m but not more than 10mm except at window, door and other formed opes where a tolerance of ±5mm in the height of the ope on any nominally vertical face shall not be exceeded.

Cross-Section of Elements ±5mm unless otherwise indicated on the drawings or in this specification.

Straightness ±10mm measured horizontally at any level but not more than ±3mm under a 3m straight edge except where otherwise specified.

Joint Thickness (1) Horizontal joints - ±3mm but not more than ±10mm for the combined thickness in any 1m height for normal work. For unplastered blockwork exposed to view this tolerance shall be ±1.5mm but not more than ±5mm for the combined thickness in any 1m height.
(2) Vertical joints - ±3mm but not more than ±10mm in any 3m length for normal work. For unplastered blockwork exposed to view this tolerance shall be ±1.5mm but not more than ±5mm for the combined thickness in any 3m length.

Openings in Blockwork Notwithstanding the tolerances stated elsewhere, the permissible deviation in the specified dimension of the opening shall be ±5mm.

Tolerance for Blocks

1. The tolerance applying to individual blocks shall be as follows :

Length	±3mm
Height	±3mm
Thickness	±2mm

CONCRETE WORK

SPECIFICATION FOR CONCRETE WORK

01 General

1. The materials, labour and workmanship in and connected with the execution of the concrete work shall be the best of their kind without regard to any trade terms. The Contractor shall employ a duly qualified person experienced in reinforced concrete construction to supervise the work. The quality of materials and the standard of workmanship for the reinforced concrete shall comply with the relevant Clauses of BS8110 with regard to all requirements not otherwise described in this preamble.

   The Architect shall be afforded all reasonable opportunity and facility to inspect the materials and the manufacture of concrete and to take samples or to make any test.

2. The term "formwork" shall be deemed to include falsework.

3. References herein to Irish, British or other National Standards of Practice do not give the year of issue or dates of amendment. The latest relevant published version including any relevant amendments at date of invitation to tender shall apply.

   Where a Standard or Code of Practice has been superseded the latest edition of the superseding publication shall apply.

4. The preambles to the Bills of Quantities shall take precedence over the Standards and Codes of Practice referred to where those documents are at variance.

5. Do not scale the drawings. Use dimensions figured on the drawings for setting out the works.

02 Tolerances for Finished Work

Where more than one tolerance may be applied, the more stringent tolerance shall be adhered to.

1. Pad Foundations, Strip Footings : the permissible deviation for concrete foundations shall be -

Plan Dimensions	+75mm -25mm
Vertical Dimensions	±15mm

2. Elements below ground level : The permissible dimensional deviations for structural concrete elements below ground level shall be as follows:-

i Level - For any nominally horizontal surface when measured from the nearest reference level ±10mm.

ii Position on Plan - For the position of any nominally vertical surface at the lower edge when measured from the nearest reference line ±5mm.

iii Plumb - The permissible deviation from plumb of the upper and lower edges of any nominally vertical length of the surface whichever is the smaller.

iv Cross-Section of Elements - The permissible deviation of cross-sectional dimensions of elements from those shown on the drawings shall be ±5mm.

v Deviations at Junctions - the permissible deviation for abrupt changes in a nominally continuous surface at the junction of two concrete elements shall be ±5mm. The permissible deviation from the specified relationship of any two surfaces at a junction shall be ±5mm.

vi Bow, Bulging and Local Irregularities - The Permissible for bow, bulging and local irregularities in the surface of elements shall be 10mm measured from a 4m straight edge or 1 in 400 of the length of the element whichever is the smaller.

3. Elements above ground level : The permissible deviation for structural concrete elements above ground level shall be as follows:-

i Level - For any nominally horizontal surface when measured from the nearest reference level ±3mm.

In the particular case of floor slabs the deviation measured from a 3m straight edge shall not exceed this tolerance of 3mm.

ii Position on Plan - For the position of any nominally vertical surface at the lower edge when measured from the nearest reference line ±3mm.

iii Plumb - The permissible deviation from plumb of the upper and lower edges of any nominally vertical surface shall be ±10mm or 1 in 400 of the vertical length of the surface whichever is the smaller.

iv Cross-Section of Elements - The permissible deviation of cross-sectional dimensions of elements from those shown on the drawings shall be ±3m.

v Deviations at Junctions - The permissible deviation for abrupt changes in a nominally continuous surface at the junction of two concrete elements shall be ±3mm.

The permissible deviation from the specified relationship of any two surfaces at a junction shall be ±5mm.

vi Bow,Bulging and Local Irregularities - The permissible deviation for bow, bulging and local irregularities in the surface of elements shall be ±8mm measured from a 4m straight edge of 1 in 500 of the length of the element whichever is the smaller.

03 Cement

1. The cement shall be ordinary Portland Cement complying in all respects with either Irish Standard No.1 or BS 12. The Contractor shall provide details of proposed cements for approval and shall not under any circumstances use unapproved cements. Manufacturer's test certificates shall be provided by the Contractor as required.

2. Cement delivered in standard bags shall be properly stored in a weatherproof shed with the floor raised above ground level and having a clear space of at least 225mm between the underside of the floor beams and the ground surface. Cement delivered in bulk in a tanker shall be properly stored in a silo of BS or IS approved design. Each consignment shall be kept separate, identified and used in order of delivery.

3. Cement damaged in storage or handling shall not be used in the manufacturer of white concrete.

04 Aggregates

1. The aggregates for concrete shall consist of naturally occuring material complying in all respects with BS882 and IS No.5 (Note: the use of 'all-in' aggregates shall not be permitted). All aggregates shall be free from laminated, and/or flaky particles, dust, silt, clay and other impurities.

2. The fine aggregates shall be washed natural pit or river sand, passing a 6mm sieve and shall be graded from the largest to the smallest particles sizes to the Architect's satisfaction.

3. The coarse aggregate shall be retained on a 6mm sieve and shall be composed of clean washed gravel or clean crushed hard stone. It shall be delivered to site in two sizes up to 19mm when maximum aggregate size of 19mm is used, and three sizes up to 38mm when a maximum aggregate size of 38mm is used.

4. The use of marine aggregates shall be excluded .

5. The chloride content of the aggregate shall be such that the total chloride content of the concrete mix shall not exceed 0.35% expressed as a percentage of chloride ion by weight of cement.

6. The aggregates used for prestressed concrete shall be free from chloride.

7. Aggregates shall be chosen such that the drying shrinkage of the concrete is minimised and conforms to the requirements of BS1881 Part 2.

8. Special attention shall be given to the selection of aggregates to all exposed and waterproof concrete.

9. Before concreting operations are begun, samples of the aggregate shall be submitted to a laboratory, chosen by the Architect, for testing and approval. The weight of samples shall not be less than 15Kg for each size of coarse aggregate and 5Kg for the fine aggregate.

10. The quality of all aggregates delivered to the site shall be equal or superior to that of the approved samples.

11. Separate storage facilities with adequate provision for drainage shall be provided for each different size of aggregate used.

05 Water

1. Water shall be clean and free from harmful matter and shall be of potable quality.

06 Admixture

1. Admixtures other than those herein specified shall not be used without the written consent of the Architect. Under no circumstances shall calcium chloride be used as an additive in the concrete mix.

07 Mixing

1. The quantity of cement, the quantity of fine aggregates and the quantities of the various sizes of coarse aggregate shall be measured by weight only. A separate weighing device shall be provided for weighing the cement.

2. The amount of water shall be measured by volume or weight. Any solid admixture to be added shall be measured by weight only, but liquid or paste admixtures shall be measured by volume or weight.

3. The batch weight of aggregates shall be adjusted for the moisture content of the aggregate being used. The quantity of water contained in the aggregates shall be determined by the Contractor in accordance with a method approved by the Architect, and the quantity of water to be added to the mix shall be reduced by the quantity of water contained in the aggregates being used.

4. The accuracy of all measuring equipment shall be within 3% of the quantity of cement, water or total aggregates being measured and within 5% of the quantity of any admixture being used. All measuring equipment shall be maintained by the Contractor in a clean, serviceable condition.

5. The mixer shall comply with the requirements of BS1305 or BS4251. The mixing time shall not be less than two minutes or the time necessary to ensure compliance with the required strength. When the mixer is a lorry mounted mixer complying with BS4251 no water shall be added at the batching plant or in transit to site.

08 Concrete Mixes

1. The responsibility for producing concrete to the required strength is entirely that of the Contractor and he shall vary the cement content to achieve this strength. The minimum cement contents given in Table A are to provide a durable concrete for the various mixes.

   NOTE : Mix C35/20 is Grade 35 concrete with a minimum aggregate size of 20mm.

09 Ready-mixed Concrete

1. Ready-mixed concrete may be used on the basis of a designed mix, subject to the Architect's approval to the manufacturer and supplier. It shall be the Contractor's responsibility to ensure that his supplier shall fully comply with the specification and shall provide the Architect or his representative full co-operation and facilities for carrying out all inspection and testings that may be required.

2. Deliveries shall be accompanied by delivery dockets for each batch of concrete and they shall contain the following information.

(i) Name of the Ready-Mix Plant.
(ii) Serial number of the delivery docket.
(iii) Date.
(iv) Delivery Truck Number.
(v) Name of Purchaser.
(vi) Name of Contract.
(vii) Specified Grade of Concrete.
(viii) Specified Workability.
(ix) Maximum Aggregate Size.
(x) Time of Loading at Ready-Mix Plant.

10 Testing of Concrete

1. The quality of the concrete shall be verified by 28 day cube tests carried out in accordance with BS1881. Each cube shall be made from a single sample taken from a batch of concrete, Compliance with the specified strength may be assumed if ...

(a) The average strength determined from any group of four consecutive cubes exceeds the specified strength by not less than 7.5N per sq.mm.

(b) Each individual test is greater than 85 per cent of the specified characteristic strength grade (Table A).

11 Action to be taken in the event of Failure of Test Cubes

1. When the average strength of four consecutive test cubes fail to meet the first requirement, the mix proportions shall be adjusted to provide the specified strength. The responsibility of providing concrete which attains the specified strength is entirely that of the Contractor, and no adjustment of rates shall be permitted if additional cement is required to provide concrete with the specified strength.

2. In the event of cube failures the cost of additional test and/or the replacement of any portions of concrete deemed to be defective by the Architect shall be borne by the Contractor.

12 Concrete Blinding

1. The surface of the ground or hardcore under foundations and other concrete in contact with the ground or with hardcore shall be sealed with a layer of concrete Grade 10 (mix B Table A) average 50mm thick unless specified otherwise.

13 Jointing New Concrete

1. Treat the surface of the existing concrete at the joint before placing new concrete as follows ...

(a) When the concrete is between 2 and 4 hours old, wet the surface with a fine spray (not a jet) and at the same time brush the mortar from the face of the joint without disturbing the coarse aggregate.

(b) When the concrete is between 4 and 24 hours old and (a) has not been carried out, remove the mortar from the face of the joint with a wire brush or water jet without disturbing the coarse aggregate.

(c) When the concrete is between 1 and 3 days old and (a) or (b) has not been carried out, remove the mortar from the face ofthe joint by grit blasting or with a needle gun without disturbing the coarse aggregate and wash off any dust from the surface. Do not hack or hammer the surface.

14 Construotion

1. All vertical construction joints shall be formed with well braced timber stop ends holed or slotted where necessary to allow the reinforcement to pass through the joints. The concrete shall be compacted against the stop end of the full height of the lift.

2. The Contractor shall if required prepare a detailed layout of the construction joints for each section of the work, including details of all waterbars, which shall be submitted to the Architect for approval before any work commences.

3. The construction sequence shall be planned so as to minimise the number of construction joints as far as is practicable while limiting the shrinkage of the concrete.

4. The vertical joints shall be stepped and staggered in approved positions and such joints shall not be located at or adjacent to quoins.

5. Except where otherwise directed, the joints in ribbed floors shall be formed in the slab parallel to the ribs. The joints in floors shall be located in such positions as will minimise the number of joints required and shall run where possible parallel with the direction of span. In beams and suspended slabs an approved splayed or halving joint shall be provided.

6. Additional reinforcement shall be provided at joints where so directed by the Architects.

7. All kickers shall be cast monolithically with the base concrete.

16 Frost

1. Concreting work shall be suspended when the air temperature falls below 2 deg. celsius or when frost is expected.

2. Frozen aggregate shall be thawed out before use by the aid of approved equipment.

3. Concrete placed in cold weather shall be protected from damage by frost or other weather conditions until such time as it has achieved sufficient strength. Any damaged or weathered concrete shall be cut out and replaced by fresh concrete at the Contractor's expense.

4. The Contract shall provide a minimum and maximum thermometer of approved design for the purpose measuring the shade temperature of the outside air.

17 Curing

1. Horizontal and vertical slabs and other large areas of concrete shall be prevented from drying out for at least 7 days after the concrete has been placed. Precautions shall be taken during the initial period of at least 7 days to protect all reinforced work from exposure to sun, wind, rain and frost. Longer periods of curing and protection may be required during periods of low temperatures.

18 Traffic over Concrete

1. No traffic or temporary load of any kind will be allowed over any concrete until the following minimum time after casting, unless approved protective methods are adopted to the Architect's satisfaction.

(a) Foundations, ground floor slabs and other concrete in contact with the ground: 28 days

(b) Columns: 10 days

(c) Suspended slabs: 10 days

(d) Suspended beams: 14 days

These times are given for guidance only and do not relieve the Contractor of any responsibility for protecting the concrete work against damage from any cause whatsoever.

19 Horsing

1. The Contractor if requested shall submit dimensioned drawings of the systems of falsework which he proposed to adopt for the various sections of the work. This falsework shall be suitably proportioned and braces to withstand the weight of the freshly placed concrete, together with the weight of the workmen and materials.

2. Where supported on the ground the sole piece carrying the vertical supports shall be bedded on a solid base and shall have an area sufficiently large to ensure that there shall be no settlement under the full load. Adjustable screws or hardwood folding wedges shall be used for adjusting and striking the vertical supports.

3. When supported on the ground floor slab a system of timber spreaders shall be used to distribute the load. Unless a screed is to be subsequently applied to the slab, special precautions shall be taken to protect the surface from any damage.

4. All shuttering shall be removed without shock or vibration. Before the shuttering is stripped the concrete shall be exposed in order to ascertain that the concrete has sufficiently hardened.

5. Shuttering to vertical sufaces may be removed whenever the concrete will not be damaged by so doing. Shuttering and supports under slabs, beams, girders, arches and structures carrying the loads, shall not be removed without the Architect's approval. The striking of the horsing shall be carried out in an approved sequence of operations so that no undue shock or other damage is caused to the permanent work.

6. The Contractor shall be responsible for any injury to work and any consequential damage caused or arising from the removal of striking of formwork, centering and supports, and any advice, permission or approval given relative to their removal shall not relieve the Contractor from the responsibility here defined.

20 Removal of Formwork

1. The Contractor shall give the Architect no less than 24 hours notice of his intention to strike any formwork.

2. The time at which formwork is struck shall be the Contractor's responsibility but the minimum periods between concreting and the removal of forms, unless otherwise approved, shall be as stated in Table B. Days during which the average temperature is below 2 deg.C shall be disregarded in calculating the minimum time which shall elapse before forms are removed.

3. The stability of the structure and the protection of the concrete after striking the formwork shall remain the responsibility of the Contractor.

21 Formwork Generally

1. The design, erection and removal of formwork shall be the responsibility of the Contractor.

2. The formwork and supports and foundations shall be sufficiently rigid to resist without distortion or overstress all dead loads and incidental loads resulting from placing, vibration, etc. and they shall be designed taking into account the surface finish and tolerances required for the concrete.

3. The Contractor shall prepare full size setting-out sketches of the formwork for approval.

22 Mould Oil and Grease

1. All formwork shall be treated with approved mould oil or grease before use and shall be carefully cleaned down and further oiled or greased before re-use.

2. The type of mould oil or grease and its method of application to be used for shuttering for exposed surfaces shall be as recommended by the manufacturer for this kind of work and shall be suject to the Architect's approval. The use of specially faced boards of plywood shall not be permitted except with the approval of the Architect.

23 Holes and Chases in Concrete

1. Holes, chases and other openings required for the passage of pipes, conduits, etc, shall be formed by inserting suitable sleeves, cores and sinkings before placing the concrete. The Contractor shall ensure that the Sub-Contractors furnish him full information in regard to the position of such opes and chases, that their size and position have been checked by the Sub-Contractor before concreting commences, and that they are adequately fixed in position to ensure that they do not move during the concreting operation.

2. The position of bolts, clips, holes or other openings in the finished work shall not be permitted without the sanction of the Architect. Such holes and chases shall be made only in approved locations and shall be cut with approved tools.

24 Classification of Finishes

1. Type A finish shall be used below ground level where the element is covered on each side by earth or filling.

2. Type B finish shall be used for all beam, columns, walls, slabs, stairs not exposed to view. It shall also apply to both the inside and outside faces of lift pit walls and ducts.

3. Type E finish shall be used for all beams, columns, walls, slabs, stairs and other concrete elements exposed to view.

4. Where a rendered or plastered finish is specified the concrete surfaces shall have a Type B finish and be treated to provide an adequate key. Alternatively the formwork may be coated with an approved retarding compound which shall be removed with water and wire brush as soon as possible after concreting. Precautions shall be taken to ensure that the retarding compound does not come in contact with reinforcement.

25 Quality of Finish

1. The same type of formwork, formwork surface, release agent and curing compound shall be used throughout the entire area of any one specified finish. Individual plywood sheets, timber sections or small areas of formwork in large panels shall not be replaced in any location unless Type A finish has been specified. Formed surfaces of concrete not exposed in the completed works and not specified otherwise shall be free from honeycombing and excessive lipping and grout leakage.

2. Type A finish shall be achieved using closely-jointed sawn boards or patent steel forms as formwork. Formwork ties shall not remain in the finished concrete. Recesses left at ties shall be filled with a paste of cement and fine aggregate. The finished surface shall be free from voids, honeycombing, excessive grout loss or other large blemishes. Small blemishes caused by entrapped air or water may be expected.

3. Type B finish shall be achieved using closely-jointed wrought boards, plywood or metal panels in good condition arranged in a uniform pattern as formwork. Foam sealing strips fully compressed between formwork and concrete shall be used at all construction joints. Formwork ties shall not remain in the finished surface. The finished surface shall be free from voids, honeycombing, excessive grout loss or other large blemishes. Small blemishes caused by entrapped air or water may be expected. Recesses left at ties shall be filled with a paste of cement, white cement and fine aggregate to match the colour of the concrete.

4. Type E finish shall be achieved using plywood with a hard smooth surface without defects, in 'as new' condition and arranged in large sheets. Construction and day joints and all formwork joints shall be located and aligned to the satisfaction of the Architect.

Loose hardwood tongues shall be used between all plywood sheets and foam sealing strips fully compressed between formwork and concrete shall be used at all construction joints.

Formwork shall be effectively watertight. Formwork ties shall be arranged in a uniform pattern as directed by the Architect and shall be provided with rubber cones against the formwork so that a neat recess about 50mm diameter x 40mm deep is at the tie after stripping. The recess shall be treated as a minor surface blemish.

The concrete surface shall be smooth, free from honeycombing lipping and grout loss, shall have true clean arrises and shall be of uniform colour and texture. Only very minor surface blemishes shall be permitted.

While the concrete is still green all surface blemishes shall be filled with a fresh, specially prepared paste of cement, white cement and fine aggregate to match the colour of the concrete. After curing, the blemishes and surface where necessary shall be rubbed down with a fine carborundum stone to produce a smooth even surface.

In the case of ribbed and waffled slabs exposed to view an approved G.R.P. or polypropylene mould which shall be temporarily supported by an approved system compatible with the mould shall be used.

Joints between adjacent moulds shall be featured in the manner indicated on the Architect's drawings and the Contractor shall prepare a detailed scheme, for approval, by which this feature may be achieved.

Removal of moulds shall be achieved by the use of compressed air carried out strictly in accordance with the manufacturer's instructions.

26 Finish to tops of Slabs

1. The tops of all concrete slabs shall receive a finish which shall be compatible in all respects with any subsequent topping.

2. In the case of all roof slabs, unless specifically instructed by the Architect, the full thickness of the slab including any build up to achieve falls shall be carried out in a single concreting operation.

3. Where a slab is to receive a bonded screed at a subsequent stage, a tamped finish to the top surface shall be provided.

4. Where a floated finish is required the finished surface shall be free of float marks. The surface shall not be wetted nor shall additional cement be used to assist surface working.

27 Test Samples of Type E Finish

1. A test sample, of a size to be specified by the Architect, shall be prepared by the Contractor for the Architect's approval for each different element requiring a Type E finish, i.e. column, wall, beam, slab, etc. These samples shall be prepared in accordance with the specification and shall remain on site for the duration for the Contract unless otherwise directed by the Architect.

28 Reinforcement

1. Rolled mild steel bars, cold twisted bars and high tensile fabric reinforcement shall comply with the requirements of BS4449, 4461 and 4483 respectively. The Contractor shall deliver, free of charge, samples of the various reinforcements for testing as directed. Any consignment or reinforcement failing to comply with the tests shall be removed from site.

2. The sizes and other dimensions of the reinforcement shall be checked against the drawings and site dimensions before the material is ordered.

3. The reinforcement shall be cut, cold bent and hooked to the dimensions shown on the drawings and schedules or to such other dimensions as may be directed.

4. No alteration of substitution shall be made in the lengths, sizes or arrangement of the reinforcement, without the prior written approval of the Architect.

5. Annealed iron tying wire not less than 1.4mm diameter shall be used.

29 Fixing Reinforcement

1. The Contractor shall provide at his own expense all spacers and stools necessary to support the reinforcement in position. These spacers shall not crush or deform and shall maintain the correct cover to the reinforcement at all times. Special spacers to support reinforcement shall be used where such are shown on the drawings and schedules.

2. The type of spacer for concrete exposed to view must be approved by the Architect before fixing commences and such approval may not be given until a test sample of cast concrete has been examined.

3. Galvanised reinforcement shall be fixed with galvanised tying wire.

4. No metal part of any device for fixing reinforcement shall remain within the concrete provided for cover to the reinforcement, unless otherwise shown on the drawings.

30 Cutting and Bending

1. Reinforcement shall be cut and bent in accordance with BS4466 and the schedule provided.

2. High yield reinforcement shall not be cold bent when the air shade temperature is below 5 deg.C. Mild steel reinforcement shall not be cold bent whent he air temperature is below 0 deg.C.

3. Cold worked steel reinforcement shall not be heated.

31 Waterproof Concrete Construction

1. The following locations, and elsewhere as indicated by the Architect, shall be considered as waterpcof concrete construction and in these cases compliance with BS5337 in addition to CP110 and this specification shall be maintained -

   (i) Any underground service ducts.

2. Formwork ties in these area shall be of a type and quality suitable for use in water retaining work.

3. All horizontal and vertical construction joints shall include an approved waterbar as shown on the drawings unless specifically indicated otherwise.

32 Watertightness Testing

1. Tests shall be carried out on all waterproof concrete elements as directed by the Architect.

2. Accessible faces of concrete elements including roofs shall show no sign of leakage when the structure is tested for watertightness and at any subsequent stage.

3. The drop in the surface level of water retained by concrete elements with inaccessible faces shall not exceed 10mm in seven days when the structure is tested for watertightness.

4. Should any element prove to be unsatisfactory when tested for watertightness or at any subsequent stage they shall be made good at the Contractor's own expense to the satisfaction of the Architect.

33 Services through Walls and Floors of Waterproof Structures

1. When it is necessary for a pipe or other duct to pass through a wall or floor these shall be cast into the panel when it is concreted unless otherwise approved by the Architect. Puddle flanges shall be provided on all such penetrations.

2. If approval to pass the pipe through the construction at a later stage has been obtained then these opes shall be boxed out and the sides of the opening shall be treated as construction joints. The pipes which are later passed through the opening shall be fitted with puddle flanges. The side of the ope shall not coincide with any construction joints.

34 Inspection of Concrete Work

1. The Contractor shall provide the Architect full facilities for the inspection of the horsing, formwork and reinforcement at all times throughout the duration of the contract.

2. Due notice shall be given to the Architect so that each element can be inspected to the satisfaction of the Architect.

3. No Concreting shall commence until the formwork and reinforcement have been approved by the Architects.

4. Any additional work to be done to the horsing, formwork and reinforcement to satisfy the Architect shall be carried out at the Contractor's expense. No claims for delay or disruption due to such additional work shall be entertained.

35 Sequence of Construction

1. The sequence of concrete construction shall be subject to the approval of the Architect. It shall be arranged in such a way as to minimise the effects of differential shrinkage, deflection, settlement and thermal effect. The Contractor shall therefore arrange his concreting programme as far as possible in such a way that the structural elements and foundations are uniformly loaded and the load is uniformly increased. Particular attention shall be given to junctions of blocks and expansion joints.

TABLE A

MIX REF.	MIX	MINIMUM CEMENT CONTENT	SLUMP	LOCATION
A	C20/40	220	25-75	Bedding & Surround to Sewers.
B	C10/20	180	25-75	Blinding Generally
C	C35/20	330	25-75	Foundations, Rising walls walls and insitu superstructure. Supsended insitu floor slabs. Generally including Ground Floor Slabs.
D	C25/20	275	25-75	Manholes, Arches to Sewers Anchor Blocks.
E	C35/10	350	25/125	Blockwork Filling
F	C35/10	350	25/75	Structural Screeds
G	C40/20	350	25/75	Precast Concrete Elements

TABLE B

LOCATION	MINIMUM PERIOD	
	Surface Temperature of Concrete	
	Cold Weather 2 deg. - 5 deg.C	Normal Weather 16 deg.C
	DAYS	DAYS
Sides of Beams Walls and Columns	2	1
Slab soffit forms (props left under)	10	4
Beam soffit forms (props left under)	14	8
Props to slabs	21	11
Props to beams	28	16

STRUCTURAL STEEL

SPECIFICATION FOR STRUCTURAL STEELWORK

01 Steelwork Generally

1. All steelwork shall be in accordance with the requirements of B.S. 5950: Part 2: 1985.

2. Steelwork generally shall comply with BCSA Publication No.1/89 National Structural Steelwork Specification for Building Construction. It shall be assumed that the Steelwork Contractor is familiar with this publication.

02 Workshop and Erection Drawing

1. The Structural Steelwork Contractor shall prepare all the necessary workshop drawings and shall submit for approval all drawings in duplicate to the Architect or his representative for checking. One copy of each drawing will be returned to the Structural Steelwork Contractor. The Structural Steelwork Contractor shall, before commencing fabrication, provide two sets of the approved drawings for the Architect or his representative.

2. The Structural Steelwork Contractor shall not commence the fabrication of any part of the work until approval to the workshop drawings have been given.

03 Programme of Supply

1. The Structural Steelwork Contractor shall arrange his programme of fabrication, delivery and erection in consultation and agreement with the General Contractor and shall be prepared to amend this programme if required to do so by the General Contractor.

04 Cladding

1. The Structural Steelwork Contractor shall throughout the fabrication and erection period co-operate and consult with the Roofing Contractor.

05 Site Connections

1. All site connections shall be bolted unless noted otherwise on the drawings. The Structural Steelwork Contractor shall arrange to have an adequate supply of electric power where site welding is necessary.

06 Welding

1. All welding practice shall conform to the standards of B.S. 5135 : 1974.

07 Welding Electrodes

1. Rutile electrodes to B.S. 639 Classification E.21 - or E.31 - or low hydrogen electrodes to B.S. 639 Classification E.616 can be used. The electrodes should conform to B.S. 639:1976 Sections 1 and 2.

2. All electrodes shall be handled and stored with care to avoid damage; electrodes with damaged coatings must not be used and the manufacturer's instructions regarding protection and storage must be followed.

3. Where low hydrogen electrodes are being used, they must be oven dried immediately prior to use in the manner recommended by the electrode manufacturer. The manufacturer's instructions regarding current (AC or DC) and polarity should be followed.

08 Specification

1. The Structural Steelwork Contractor shall provide for the Architect's or his representative's approval a written specification of the type of electrodes and welding procedure he proposes to adopt.

09 Testing of Welders

1. Every welding operator, before he carries out any welding in this Contract, shall pass or have passed such qualifying tests which in the opinion of the Architect or his representative will prove his competence in carrying out the welding. Welders shall be tested to meet the requirements of B.S. 4872 : Part 1.

10 Testing and Examination of Welds

1. The Architect may appoint a specialist representative to supervise and check the welding and fabrication and the Contractor shall provide all the necessary facilities for the examination of the welding.

2. Any welding considered by the Architect to be unsatisfactory shall be rejected and the cost of replacing any such rejected material will be borne by the Contractor.

11 Splices

1. No splices of any description shall be used in any member without the written approval of the Architect.

12 Arrangement of Members to be Welded

1. All members to be welded shall be held in their correct position by jigs, bolts or clamps. The assembly of work to be welded shall be arranged so that whenever possible the work shall be done in a downhand position.

13 Preheating

1. The requirements of B.S. 5135 : 1974 shall apply to all welded joints in this Contract, wherever they may be made. The minimum area over which local preheating shall be effective shall in all cases be an area extending at least three inches or four times the thickness of the thicker part to be joined.

14 Inspection of Fabricated Steelwork

1. The Architect or his representative shall have access at all times to the Structural Steelwork Contractor's workshop for the purpose of inspecting the steelwork. Any steelwork found to be unsatisfactory at workshop inspection or subsequent inspection shall be rejected and replaced at the Structural Steelwork Contractor's expense.

15 Surface Preparation of Steelwork

1. All Steelwork shall be shot-blasted to B.S. 4232 : Second Quality or Swedish Standard Sa 2.5 (maximum surface profile 100 microns).

2. After shot-blasting remove all traces of loose rust, grit etc. by compressed air hose or careful clean dry brushing. Remove all laminations by careful grinding leaving the surface smooth.

16 Blast Priming

1. Priming of the clean blast steel should be carried out within 2 hours of shot-blast. The blast primer shall be a 2-pack epoxy zinc rich primer applied by airless spray to give a minimum dry film thickness of 20 microns.

17 Site Holding Primer

1. After fabrication carefully remove all weld spatter, rough edges etc. by grinding, chipping and scraping, and grind to a smooth surface. Remove any unsound primer around weld areas.

2. The site holding primer shall be a 2-pack epoxy zinc rich primer applied by airless spray to give a minimum dry film thickness of 30 microns for interior steel and 50 microns for exterior steel.

18 Patch Priming after Erection

1. After erection all site contaminants shall be removed and the steelwork shall be patch primer if required with the specified primer. All nuts and bolts shall be degreased and coated with one coat of the primer.

19 Holding Down Bolts

1. The Structural Steelwork Contractor shall provide all necessary holding down bolts as shown on the drawings and the rates shall include for the supply and delivery of these bolts in advance of the delivery of the steelwork.

20 Erection of Steelwork

1. The Structural Steelwork Contractor shall check the position, setting out and levels of all holding down bolts before erection has commenced and any difference in level or levels from those shown on the Contract Drawings shall be brought to the immediate notice of the Architect.

2. The Structural Steelwork Contractor shall provide all the plant necessary for the erection of the steelwork but he shall submit a list and description of the plant he proposes to use to the Architect.

21 Bolting

1. Unless specified otherwise all bolts and nuts shall be electrogalvanised 8.8 Grade Black Bolts to B.S. 3692. All threads shall comply with B.S. 84 - "Screw Threads of Whitworth Form". Washers shall be tapered whenever necessary to give the head and nut a true bearing.

2. All bolts shall be provided with steel washers under the nut and sufficient washer shall always be used to have the threaded portion of the bolt clear of the parent metal.

3. All bolt shanks shall project at least one thread beyond the nut.

4. All nuts shall be Grade 8.8.

22 Temporary Bracing

1. The Structural Steelwork Contractor shall provide all necessary temporary bracing and strutting to resist erection forces and wind forces and any other temporary bracing or strutting as required by the Architect until the roof covering has been completely erected.

23 Additional Holes

1. Any additional holes required shall be drilled on site. Burning holes in steelwork is not permitted. No holes will be drilled until approval for such holes has been given by the Architect.

24 Stacking of Steelwork

1. When stacking the fabricated steelwork before delivery the Structural Steelwork Contractor shall ensure that sufficient timber shims are placed between members to avoid undue bowing of the members. He shall also ensure that the steelwork is carefully unloaded and stored on site prior to erection.

STRUCTURAL TIMBER

SPECIFICATION FOR STRUCTURAL TIMBERWORK

01 CODES OF PRACTICE

1. Unless otherwise specified where reference is made to standards and codes of practice, the current version as published on the date of this Bill, including any amendments, shall apply.

2. Structural timber shall comply with C.P.112, Part 2 and laminated rafters shall in addition comply with B.S. 4169.

02 SPECIALIST SUPPLIERS

1. The contractor shall nominate specialist suppliers for the laminated members. The appointment of these suppliers shall be subject to the Architect's approval.

03 FUNCTIONS OF THE MAIN CONTRACTOR AND SUPPLIER OF LAMINATED MEMBERS

1. The supplier of the laminated members shall supply and deliver all timber sections in plain pieces of adequate length.

2. The main contractor shall erect these members on site in accordance with this specification.

04 TERMINOLOGY AND SPECIES NAMES

1. Timber terms are those of B.S. 565 and timber species are the standard names in B.S. 881 and 589.

05 TYPE AND GRADE OF TIMBER TO BE USED

1. General structural timber shall fall within group species S2 in accordance with Table 9 C.P. 112 and shall be stress graded to SS Grade in accordance with B.S. 4978 "Timber Grades for Structural Use" irrespective of any other grading carried out at source.

2. Laminated beams shall be formed with laminations graded LB in accordance with B.S. 4978 or Appendix A, C.P. 112 : Part 2, and each member shall be manufactured from single grade laminations.

06 MARKING OF TIMBER

1. The species group and stress grade shall be marked on all timber. All timber re-sawn from stress graded stock shall be regraded before use.

07 DIMENSIONS

1. Timber dimensions in general, which are shown on the drawings or referred to elsewhere, shall be basic sawn sizes unless otherwise indicated or where the details dictated otherwise. In particular member sizes shown for all laminated beams are finished sizes.

08 TOLERANCES

1. The permissible dimensional deviations for timber work generally shall be as specified in C.P. 112: Part 2, Clause A4, and B.S. 4471 : Part 1.

09 PLANE AND REGULARISED TIMBER

1. Reductions from basic sawn sizes and permissible deviations shall be as given in B.S.4471.

2. After planing, softwood already graded to B.S. 4978 shall be re-marked in accordance with paragraph 12 of that standard.

10 FINISH TO TIMBER

1. All timber exposed to view shall be planed and sanded on four sides prior to fabrication. In the case of laminated beams all machining is to be done after gluing. No cutter or sanding marks are permissible. In exposed surfaces voids shall be filled, glued inserts shall be selected with care to match grain and colour.

2. Outside laminations shall be free from loose knots and open knot holes. The timber for outside laminations shall be selected with reasonable care to match colour and grain at edge points.

11 LIMITS TO DEFECTS FOR CONSTRUCTIONAL PURPOSES

1. In the process of assembly and construction, the appropriate stress graded softwood shall be selected so that no defect permitted by such grading prejudices the strength of the completed structure at bearing joints and other assemblies.

12 LIMITS TO DISTORTION

1. Any piece which is bowed, sprung, twisted or cupped in excess of the limits set out in B.S. 4169 shall be rejected.

13 PRESERVATIVE TREATMENT

1. Timber members shall be pressure impregnated with an approved preservative applied in accordance with the recommendations of B.S. 5268 : Part 5 "Preservation Treatment for Construction Timbers".

2. In the case of laminated beams and other exposed timbers, the Architect's approval shall be obtained before the application of the preservatives.

3. Where further cutting is required to previously treated compounds, preservative shall be applied to those ares so cut to ensure that the entire member is treated before incorporation in the works.

14 COMPATIBILITY OF PRESERVATIVE AND GLUE

1. The contractor shall ensure the compatibility of the preservative, glue and structural timbers retardant coating and he shall also ensure that no corrosive effects to metal plates, connectors or bolts shall result from their use.

15 MOISTURE CONTENT

1. The moisture content at the time of fabrication of the laminated beams shall not exceed 18% and shall comply with the glue manufacturer's recommendations. Adequate measures shall be taken to ensure that the moisture content of the laminated beams does not rise above 20% during transportation, storage or erection.

16 JOINTING OF LAMINATIONS

1. End jointing of individual laminations shall be carried out using finger-joints or scarf-joints. No butt jointing of laminations shall be used. The jointing shall be staggered so that coinciding joints shall be separated by two full laminations.

2. The efficiency rating of the joint should be at least 0.75.

17 GLUE

1. The glue to be used shall be of Type WBP in accordance with B.S. 1204 : Part 1. Care shall be taken to ensure that the glue is stored, mixed and spread strictly in accordance with the glue manufacturers' instructions.

18 SURFACES TO BE GLUED

1. All surfaces to be glued shall be clean and free from dirt, dust, sawdust, oil and any other contaminating substances. Surfaces should be glued as soon as possible after they have been prepared. The surfaces to be joined shall be flat and any unevenness on them should not exceed 0.4mm in depth or height.

19 CURING PERIOD

1. All laminated member shall be stored at a suitable temperature for the curing period in accordance with the glue manufacturers' instructions.

20 WORKS APPLIED PROTECTIVE COAT

1. After curing, the laminated beams should be given one protective coat of varnish, to be approved by the Architect.

21 PROTECTION AND STORAGE OF STRUCTURAL TIMBER

1. Timber members shall at all times, be protected from damage, staining, decay, insect attack and avoidable exposure to the weather.

22 PROTECTION AND STORAGE OF STRUCTURAL TIMBER

1. The contractor shall prepare a level clean site for the storage of the timber members.

2. The members shall be stacked on timber shims such that no bowing or damage takes place and they shall be protected against exposure to rain and extremes of temperature.

23 PROTECTION AND STORAGE OF LAMINATED BEAMS

1. All steel plates required in the roof construction shall be hot dip galvanised to B.S. 729.

2. All steel bolts shall be electrogalvanised to B.S. 3383 : Part 2 unless specified otherwise.

24 INSPECTION OF TIMBER MEMBERS

1. The contractor shall afford the Architect or his representative every assistance in the inspection of timber members during all stages of fabrication and erection. Any member found to be, or suspected of being defective, shall be replaced or test loaded to the Architect's satisfaction at the contractor's own expense.

2. The contractor shall keep an approved type of moisture meter in his works for the control of the moisture content and for the use of the Architect at the time of inspection.

25 TESTING OF MEMBERS

1. The Architect may require sample members to be test loaded to confirm the adequacy and compliance with specification. Such testing where required shall be carried out by the contractor, or approved testing authority, in accordance with the relevant code of practice and to the Architect's satisfaction.

26 HANDLING OF MEMBERS

1. Care shall be taken at all times to ensure that the members suffer no damage or overstressing while they are being loaded, unloaded or lifted into position. Special care shall be taken to avoid damage to the sides and arrisses of members by lifting slings.

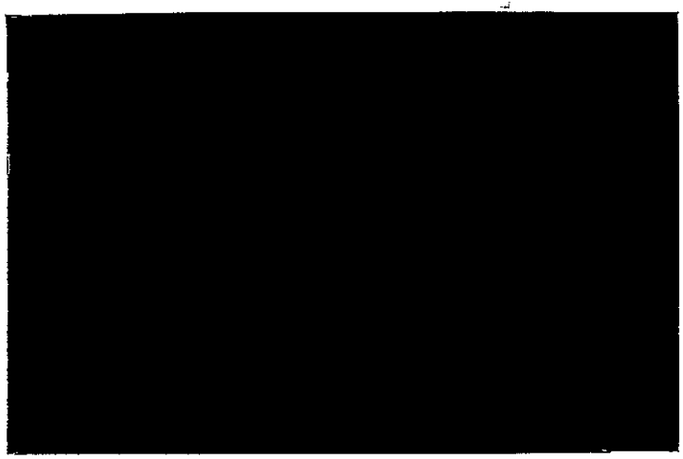
2. In all cases the suppliers' recommendations shall be sought and complied with as a minimum precaution.

27 ERECTION OF MEMBERS

1. The contractor shall at all times have a competent foreman in charge of the erection of the timber members who shall ensure that the work is carried out in accordance with the drawings, the aforementioned specifications and the suppliers recommendations. Any irregularities or inconsistencies shall be brought to the Architect's attention.

28 TEMPORARY BRACING

1. The contractor shall be responsible for the stability of the partially completed structure. He shall provide and fix, in addition to the permanent bracing, any temporary bracing necessary for the stability of the partially completed structure. He shall arrange his programme of erection so that no part of the structure is unduly exposed to possible loading in an unpropped or partially propped state.



DBFL

CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

PACKAGING INDUSTRIES LTD.

STRUCTURAL CALCULATIONS

OFFICES

CALCULATION SHEET	Page No. OB-0	Project No. 9214
Project PACKAGING INDUSTRIES LTD	By JH.	Chd.
Section OFFICE BUILDING	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

PACKAGING INDUSTRIES LTD.

FOX AND GEESE NAAS ROAD

OFFICE BUILDING CALCULATIONS.

CONTENTS

CALCULATION SHEET	Poge No. OB-1	Project No.
Project PACKAGE INDUSTRIES LTD. OFFICE BUILDING.	By JM	Chd.
Section LOADINGS.	Date JAN. 1992	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

LOADING

ROOF		KN/M²
CONCRETE TILES	0.5 x 1/cos 27.5	0.563
BATTENS + FELT	0.05 x 1/cos 27.5	0.056
TRUSSED RAFTERS	(ASSUMED)	0.140
INSULATION		0.020
PLASTERBOARD + SKIM		0.20
SERVICES		0.15
		1.129
IMPOSED 0.75 roof + 0.25 ATTIC		1.00
		2.129

ULTIMATE $(1.4 \times 1.129 + 1.6 \times 1.0) = 3.18\ KN/M^2$

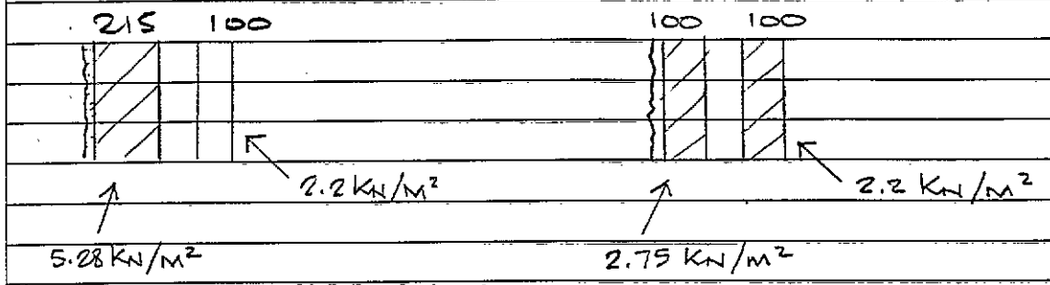
FIRST FLOOR	
275 CONC SLABS	6.60
CEILING	0.20
SERVICES	0.15
	6.950
IMPOSED 2.5 floor + 1.0 PARTITIONS	3.500
	10.45

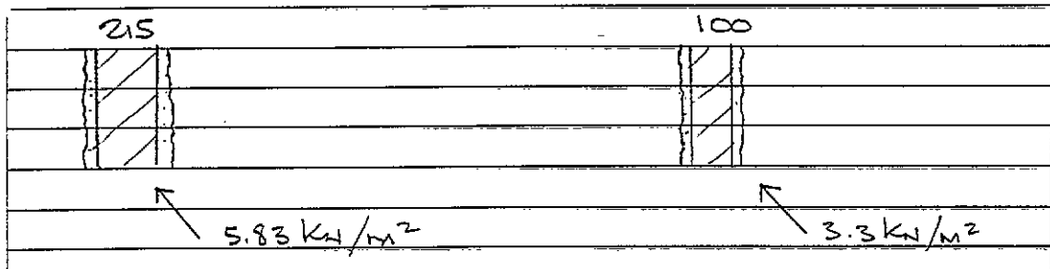
ULTIMATE $(1.4 \times 6.95 + 1.6 \times 3.5) = 15.33\ KN/M^2$

CALCULATION SHEET	Page No. OB-2	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

WALLS (CHARACTERISTIC LOAD PER M^2)





CALCULATION SHEET	Page No. OB-3	Project No.
Project	By	Chd.
Section	Date	Date

DBFE
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

DESIGN OF FIRST FLOOR CONCRETE SLAB

MAXIMUM SPAN FOR FIRST FLOOR SLABS

= 6.985 M (SEE NEXT PAGE)

MAXIMUM BENDING MOMENT =

$$\frac{15.33 \times 6.985^2}{8} = 93.49 \text{ KNM}$$

SECTION DESIGN.

$d = 275 - 25 - 10 = 240$

$$K = \frac{93.49 \times 10^6}{1000 \times 240^2 \times 35} = 0.046 \quad (\alpha f = 0.947)$$

$$As\ reqd = \frac{93.49 \times 10^6}{0.87 \times 460 \times 240 (0.947)} = 1028 \text{ mm}^2$$

TRY T20 @ 175 CTS = 1800 mm²

CHECK DEFLECTION

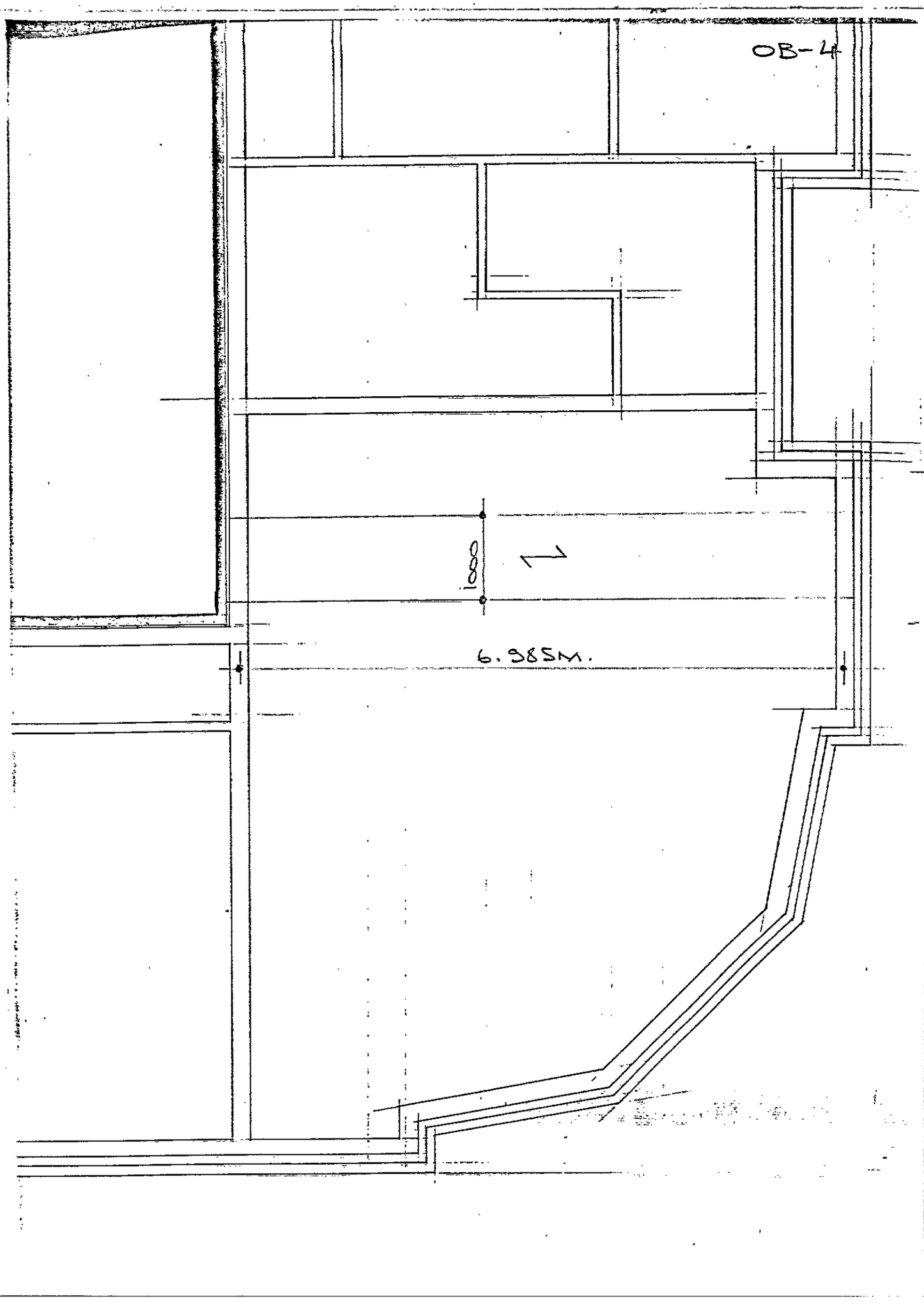
$M/bd^2 = 1.623$

$$f_s = \frac{5 \times 460 \times 1028}{8 \times 1800} = 164$$

$$M.F. = 0.55 + \frac{(477 - 164)}{120(0.9 + 1.623)} = 1.583$$

ALLOWABLE SPAN = $240 \times 20 \times 1.583$
= 7598

7598 > 6985 ∴ 275 SLAB WITH T20 @ 175 CRS SATISFACTORY.


OB-4
180
6.985M.

CALCULATION SHEET	Page No. OB-5	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

FOR REMAINDER OF FIRST FLOOR SLAB SLAB THICKNESS WILL BE REDUCED TO 200 mm.

MAXIMUM SPAN = 3.5M

REVISED LOADING = $15.33 - (0.075 \times 24 \times 1.4)$

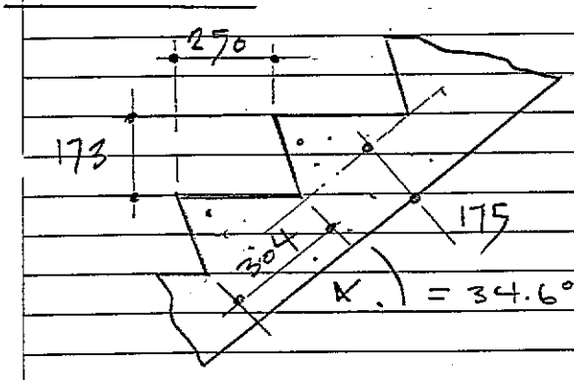
$= 12.81\ KN/m^2$

MAXIMUM BENDING MOMENT

$= \frac{12.81 \times 3.5^2}{8} = 19.61$

BY INSPECTION T16 @ 150 CTS SATISFACTORY.

STAIRS.

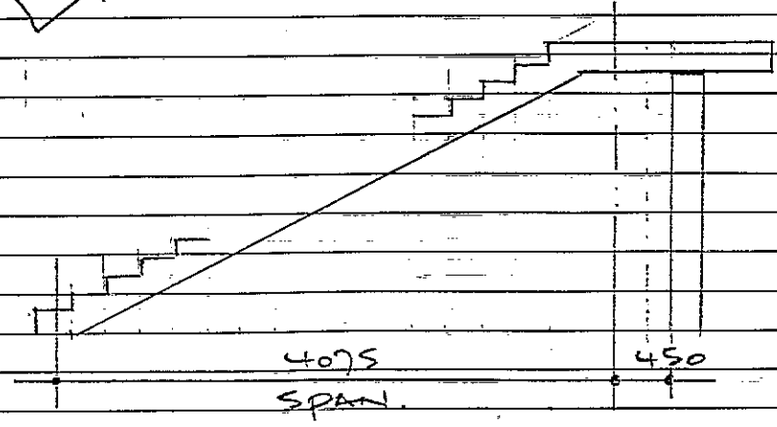


WT PER M^2 OF STAIRS

$= 7.17\ KN/m^2$

IMPOSED

$= 2.5\ KN/m^2$



CALCULATION SHEET	Page No. OB-6	Project No.
Project	By	Chd.
Section	Date	Date

DBE
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

ULTIMATE LOAD = $1.4 \times 7.17 + 1.6 \times 2.5$
$= 14.038$

MAX BENDING MOMENT = $\frac{14.038 \times 4.075^2}{10}$ WL/10

$= 23.31$ KNM

SECTION DESIGN

$K = \frac{23.31 \times 10^6}{1000 \times 142^2 \times 35}$ $d = 175 - 25 - 8 = 142$

$= 0.033$

$Z = 142(0.95) = 135$ $A_{s\,req} = \frac{23.31 \times 10^6}{0.87 \times 460 \times 135}$

$= 431\ mm^2$

USE T16 @ 200 $A_s = 1010\ mm^2$

DEFLECTION

$f_s = \frac{5 \times 460 \times 431}{8 \times 1010} = 122$ $M/bd^2 = 1.156$

$M.F. = 0.55 + \frac{(477 - 122)}{120(0.9 + 1.156)} = 1.988$

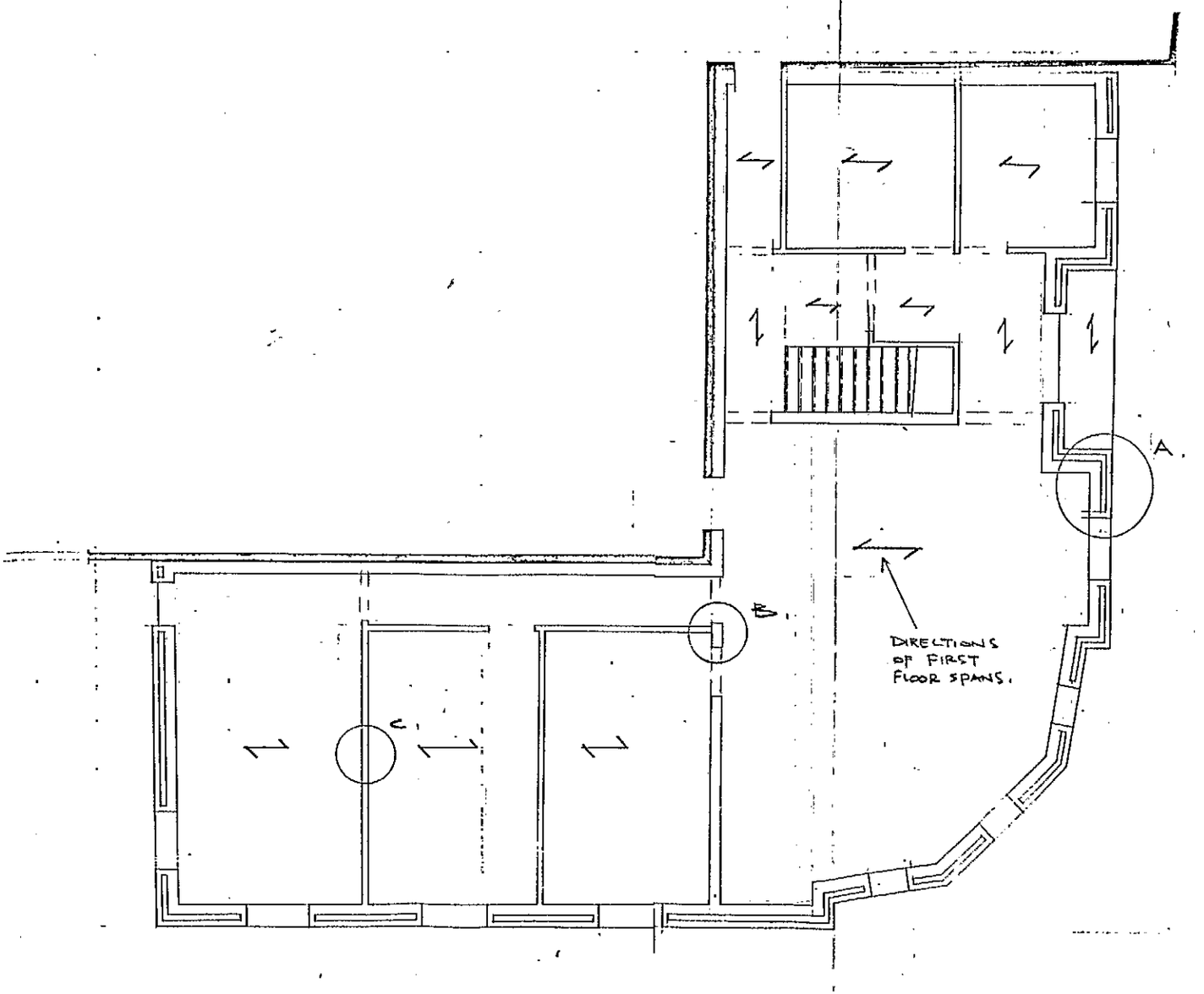
ALLOWABLE SPAN $= 20 \times 142 \times 1.988 = 5645$

$5645 > 4075$ ∴ SATISFACTORY.

OB-7

OB-

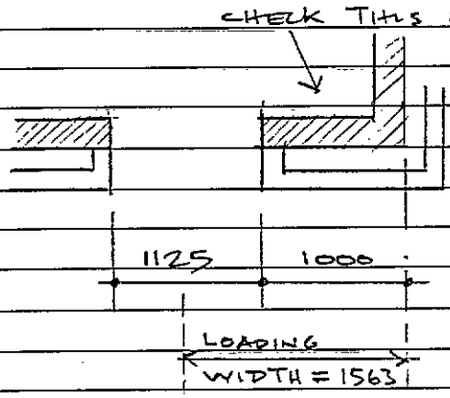
WALLS – VERTICAL LOAD CASES



CALCULATION SHEET	Page No. 08-8	Project No.
Project	By	Chd.
Section	Date	Date

DBEL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

WALLS - VERTICAL LOADING CASE 'A'



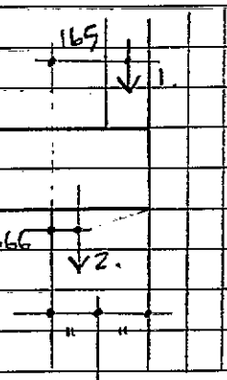
LOADING

	KN.	
ROOF		
1.129 X 1.4 X 4.0 X 1.563	9.88	δ_f = 1.4 Gk
1.00 X 1.6 X 4.0 X 1.563	10.00	= 1.6 Qk.
WALL 1ST → ROOF		
2.75 X 1.4 X 2.5 X 1.563	15.04	
1ST FLOOR SLAB		
15.33 X 6.985(0.5) X 1.563	83.68	
WINDOW HEAD		
5.28 X 1.4 X 0.562 X 0.45	1.87	
WALL SELF WT.		
5.28 X 1.4 X 2.5 X 1.00	18.48	
TOTAL LOAD	138.95	
	≐ 139.00	

CALCULATION SHEET	Page No. OB-9	Project No.
Project	By	Chd.
Section	Date	Date

DBE
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

FIND C.G. of Loads



Take MTS about inner face

LOAD 1.
= 9.88 + 10.00 + 15.04 = 34.92

LOAD 2.
= 83.68

LOAD 3.
= 1.87 + 18.48 = 20.35

MTS

34.92 × 165	=	5761.8
83.68 × 71.66	=	5996.5
20.35 × 107.5	=	2187.6
138.95		13945.9

$\frac{13945.9}{138.95} = 100.36$ $e = 107.5 - 100.36$

$= 7.133$

$ex = 7.133/215 = 0.033t$

$h = 2500$ $hef = 2500 \times 0.75 = 1875$

$tef = 215$ $S/R = 1875/215 = 8.72$

β = (IGNORING BRACING EFFECT OF RETURN)

$= 0.989$

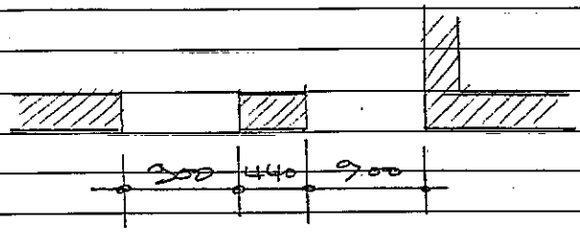
$fk\ reqd = \frac{139 \times 1000 \times 3.5}{1000 \times 215 \times 0.989} = 2.29\ N/mm^2$ $\gamma_m = 3.5$

USE 5N SOLIDS MORTAR (iii) $f_k = 3.6N/mm^2$

CALCULATION SHEET	Page No. OB – 10	Project No.
Project	By	Chd.
Section	Date	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

WALLS – VERTICAL LOADING CASE 'B'

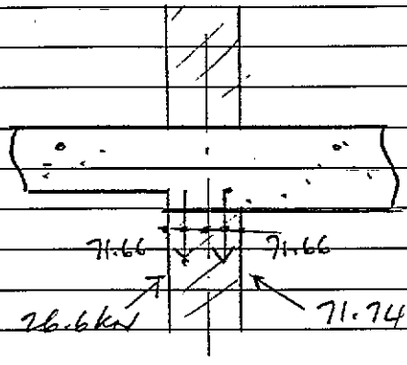


LOADING	
ROOF (TAKE 600 WIDTH)	KN
1.129 X 1.4 X 0.6 X 1.34	1.27
1.00 X 1.6 X 0.6 X 1.34	1.28
WALL 1ST → ROOF	
5.83 X 1.4 X 2.475 X 1.34	27.06
1ST FLOOR SLABS	
15.35 X 6.985 (0.5) X 1.34	71.74
12.81 X 3.100 (0.5) X 1.34	26.60
DOOR HEAD	
5.83 X 1.4 X 0.9 X 0.4	2.938
WALL SELF WT.	
5.83 X 1.4 X 2.5 X 0.440	8.97
	139.85

CALCULATION SHEET	Page No. OB – 11	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

FIND C.G of loads.



Take MTs about ℄ of wall.

$71.74 \times 35.84 - 26.6 \times 35.84 = (71.74 + 26.6) \times e$

$e = 16.45$

$ex = 16.45/215 = 0.076t$

$h = 2500 \quad hef = 2500 \times 0.75 = 1875$

$tef = 215 \quad s/t = 1875/215 = 8.72$

$\beta = 0.931$

AREA REDUCTION FACTOR
$= 0.7 + 1.5A = 0.794$

$$fk\ reqd \quad \frac{139.85 \times 1000 \times 3.5}{440 \times 215 \times 0.931 \times 0.794} = 6.999\ N/mm^2 \qquad \gamma m = 3.5$$

USE 20N SOLIDS MORTAR (iii) $fk = 7.9\ N/mm^2$

RECHECK FOR TYPICAL 1000 LENGTH

$$\text{LOADING} = \frac{1.27 + 1.28 + 27.06 + 71.74 + 26.6}{1.34}$$

$= 95.4$

S.W. OF HEIGHT GROUND → 15T } 115.8 kN

$= 5.83 \times 1.4 \times 2.5 = 20.4$

USE $\beta = 0.93$ AS ABOVE

CALCULATION SHEET	Page No. OB-12	Project No.
Project	By	Chd.
Section	Date	Date

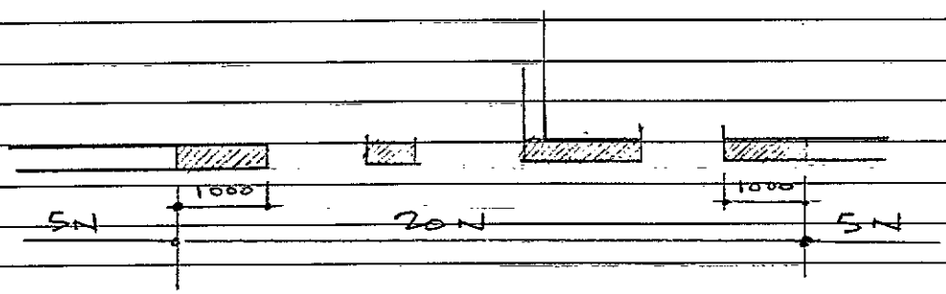
DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

f_k reqd = $\frac{115.8 \times 1000 \times 3.5}{215 \times 1000 \times 0.93}$

= 2.02

5N SOLIDS MORTAR (iii) f_k = 3.6

SATISFACTORY.



IN REGION OF DOOR OPES USE 20N

ELSEWHERE 5N WILL SUFFICE.

CALCULATION SHEET	Page No. OB – 13	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

WALLS – VERTICAL LOADING CASE 'C'

LOADING

FIRST FLOOR

$12.81 \times 3.25 \times 1.125^{*} = 46.83$ — 1.125 To Allow for Eleastic Sloak

WALL

$3.3 \times 1.4 \times 2.5 = 11.55$

TOTAL $= 11.55 + 46.83 = 58.38$

As spans are approx equal Take ex as min $0.05t$

$SRL = \dfrac{0.75 \times 2500}{100} = 18.75$

$\beta = 0.743$

f_k reqd $= \dfrac{58.38 \times 1000 \times 3.5}{1000 \times 100 \times 0.743} = 2.75 N/mm^2$ — $\gamma_m = 3.5$

USE 5N SOLIDS MORTAR (iii) $f_k = 5.0 N/mm^2$

OK ✓.

CALCULATION SHEET	Page No. OB-14	Project No.
Project	By	Chd.
Section	Date	Date

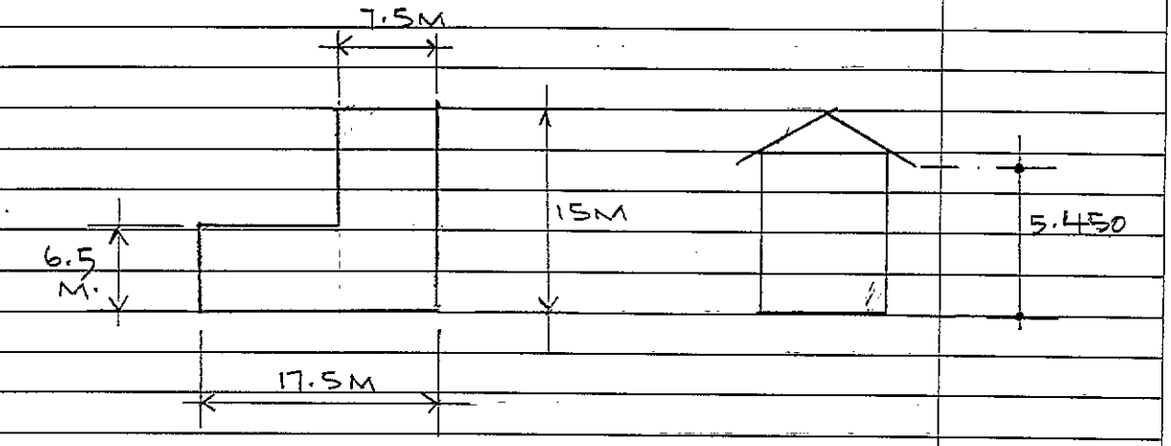
DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

WALLS - WIND LOADING.

SITE LOCATION — FOX and GEESE NAAS ROAD DUBLIN

BASIC WIND SPEED = 44M/S

S2 FACTOR CATEGORY 3 CLASS B.



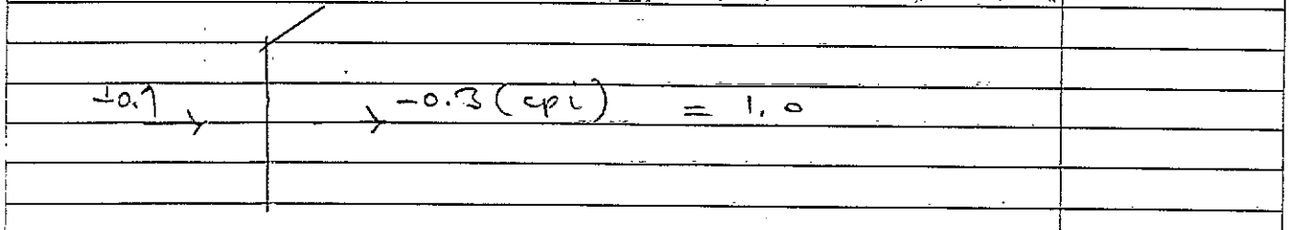
$h/w = > 1/2, < 3/2$ $\quad l/w = > 3/2, < 4$

VALUES OF CPE

WIND ANGLE K	A	B	C	D
0°	+0.7	-0.3	-0.7	-0.7
90°	-0.5	-0.5	+0.7	-0.1

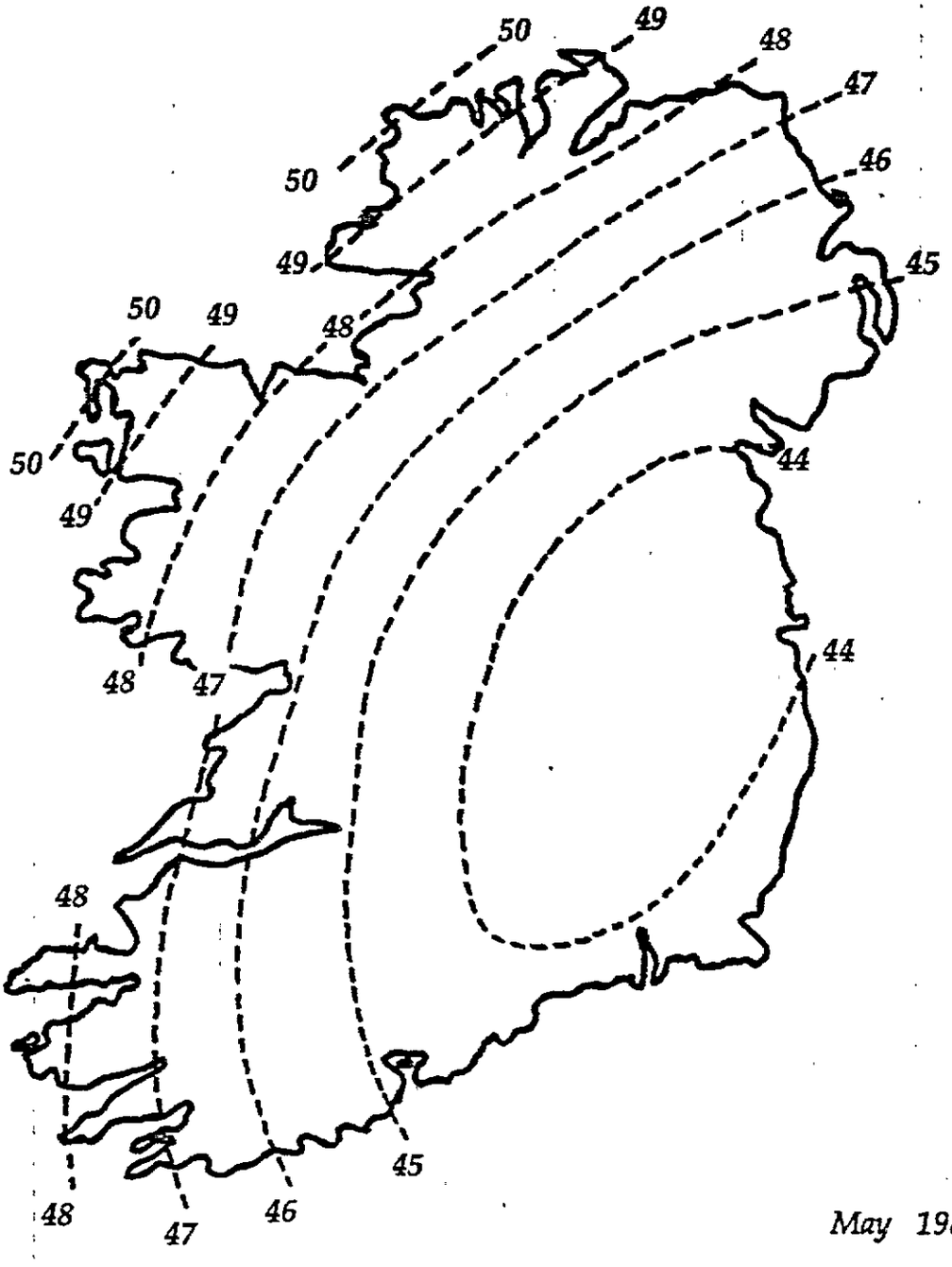
CP3 CHAPTER V PAGE 18.

TAKE CPE + CPi = 1.0



OB-15

METEOROLOGICAL SERVICE



Estimated maximum gust speed (m/s) with return period 50 years.
Valid for a height of 10m. above open level country.

CALCULATION SHEET	Page No. OB-16	Project No.
Project	By	Chd.
Section	Date	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

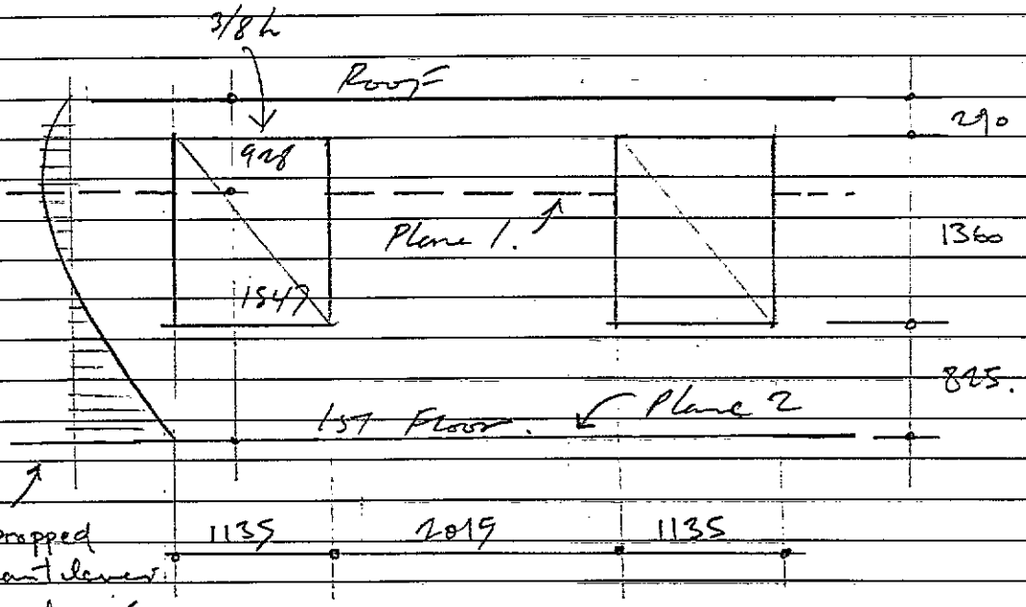
$S_1 = 1.0$

$S_2 = 0.65$. $\quad V_s = 44 \times 0.650 = 28.60$

$S_3 = 1.0$

$q = 28.6^2 \times 0.613 \times 10^{-3} = 0.501 \text{ N/mm}^2$ $\quad q = 0.501$

CONSIDER UPPER STOREY PIERS



WT OF WALL ABOVE PLANE 1

INNER $= 2.75 \times 1.199 \text{kN}^2 \times 0.9 = 5.44 \text{ kN}$ $\quad \gamma_f = 0.9$

OUTER $= 2.2 \times 1.199 \text{kN}^2 \times 0.9 = 4.35 \text{ kN}$

ROOF LOAD (INNER)

$= 1.129 \times 4.0 \times 0.9 \times 3.15 = 12.8 \text{ kN}$

CALCULATION SHEET	Page No. OB-17	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

CHECK WALL AT PLANE 1.

OUTER	Inner	
$f_{mx} = 0.25$	$f_{kx} = 0.25$	
$Z = 2015 \times 100^2/6$	$Z = 3.35 \times 10^6$	
$= 3.35 \times 10^6$		
		$\gamma_m = 3.5$
$M_r = \left(\frac{0.25}{3.5} + \frac{4.35 \times 1000}{2015 \times 100}\right) 3.35$	$M_r = \left(\frac{0.25}{3.5} + \frac{18.24 \times 1000}{2015 \times 100}\right) 3.35$	
$= 0.311$	$= 0.54$	

TOTAL $M_r = 0.311 + 0.54 = 0.853$ KNM

$\gamma_f = 1.4$

DESIGN $M_r = \frac{0.501 \times 1.4 \times 3.15 \times 2.475^2 \times 9}{12}$ $q = 0.501$

$= 0.952$ KNM

$0.952 > 0.853$ ∴ CHECK CRACKED SECTION.

$\frac{n_w}{2}\left(t - \frac{n_w \cdot \gamma_m}{1.1 f_k}\right)$ $f_k = 5.0$ Solid mortar (iii)

outer leaf	Inner leaf
$= \frac{4.35}{2}\left(0.1 - \frac{4.35 \times 3.5}{0.005 \times 10^6 \times 1.1}\right)$	$= \frac{18.24}{2}\left(0.1 - \frac{18.24 \times 3.5}{0.005 \times 10^6 \times 1.1}\right)$
$= 0.211$ KNM	$= 0.806$

CALCULATION SHEET	Page No. 05-18	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING GIVIL & STRUCTURAL ENGINEERS

TOTAL MR = 0.211 + 0.806 = 1.017 KNM

∴ 1.017 > 0.952

∴ WALL IS SATISFACTORY

CHECK WALL AT PLANE 2.

WT OF INNER LEAF
= 2.75 × 6.252 × 0.9 = 15.47 KN

WT OF OUTER LEAF
= 2.2 × 6.252 × 0.9 = 12.37 KN

ROOF = 12.9 KN

INNER	OUTER
$f_{kx} = 0.25$	$f_{kx} = 0.25$
$Z = 3.150 \times 100^2/6$ 5.25×10^6	$Z = 5.25 \times 10^6$
$M_r = \left(\frac{0.25}{3.5} + \frac{28.27 \times 1000}{3150 \times 100}\right) 5.25$	$M_r = \left(\frac{0.25}{3.5} + \frac{12.37 \times 1000}{3150 \times 100}\right) 5.25$
= 0.846	= 0.58
TOTAL = 1.427 KNM	

DESIGN MOMENT = $\frac{0.30 \times 1.4 \times 3.15 \times 2.475^2}{1.4}$

= 1.691 KNM

1.691 > 1.427 CHECK CRACKED SECTION.

CALCULATION SHEET	Page No. OB-19	Project No.
Project	By	Chd.
Section	Date	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

$\frac{M_w}{a}\left(t - \frac{n_w \gamma_m}{1.1 f_k}\right)$ $f_k = 5.0$

outer

$= \frac{12.37}{2}\left(0.100 - \frac{12.37 \times 3.5}{1.1 \times 0.005 \times 10^6}\right) = 0.569$ kNm

inner

$= \frac{24.27}{2}\left(0.100 - \frac{28.27 \times 3.5}{1.1 \times 0.005 \times 10^6}\right) = 1.159$ kNm

Total = 1.72 kNm

1.72 > 1.691

∴ WALL IS SATISFACTORY

CALCULATION SHEET	Page No. 08 - 20	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

FOUNDATIONS

CHECK 4 CASES

1) FRONT WALL

2) REAR WALL AGAINST EXISTING

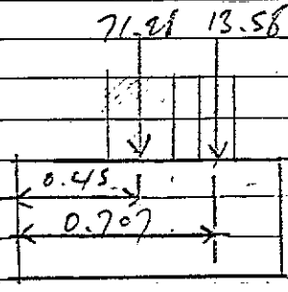
3) 215 internal wall

4) 100 internal wall.

CASE 1 FRONT WALL.

Loading

Roof	
2.129 X 4.0	8.516
wall (inner)	
2.75 X 2.5	6.875
5.26 X 3.675	19.4
FIRST FLOOR	
10.45 X 6.985(0.5)	36.49
	71.28
outer leaf	
2.2 X 6.175	13.58



$$\frac{71.28 \times 450 + 13.58 \times 707}{84.86} = 491$$

$$L = 491 - 450 = 41$$

$$\text{MAX PRESSURE} = \frac{84.86}{0.9}\left(1 + \frac{6 \times 0.041}{0.9}\right)$$

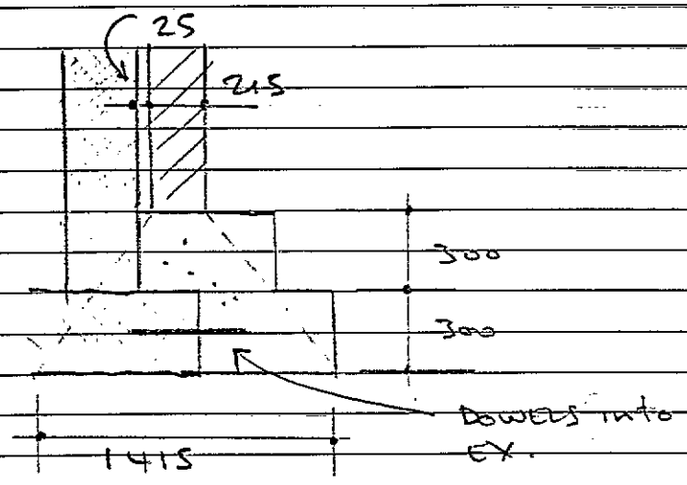
$$= 120\ \text{KN/m}^2 \quad \text{SATISFACTORY}$$

CALCULATION SHEET	Page No. OB-21	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

CASE 2 REAR WALL

Loading	KN
Roof (AS FRONT)	8.516
wall 5.83 X 6.175	36.00
Floor (AS FRONT)	36.49
	81.00



81 / 1.415 = 57.24 KN/m² PRESSURE

SATISFACTORY

NOTE EXACT DETAIL DEPENDANT UPON OPENING UP. ON SITE.

CALCULATION SHEET	Page No. OB-22	Project No.
Project	By	Chd.
Section	Date	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

CASE 3 (215 internal wall)

Loading

Slab

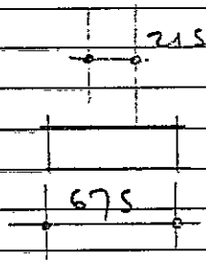
10.45 X 6.985(0.5)	36.49
8.65 X 1.55	13.40

WALL

5.85 X 3.675	21.49
	71.38

71.38 / 0.675 = 105 KN/m²

SATISFACTORY



CALCULATION SHEET	Page No. 08-23	Project No.
Project	By	Chd.
Section	Date	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

CASE 4 (100 internal wall)

Loading

Slab

8.65 X 3.2 — 27.68

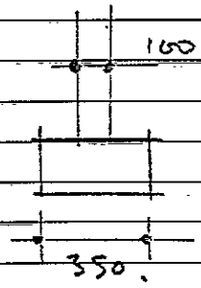
wall

3.3 X 3.675 — 12.1

39.8

39.8 / 0.35 = 113 KN/m²

SATISFACTORY.



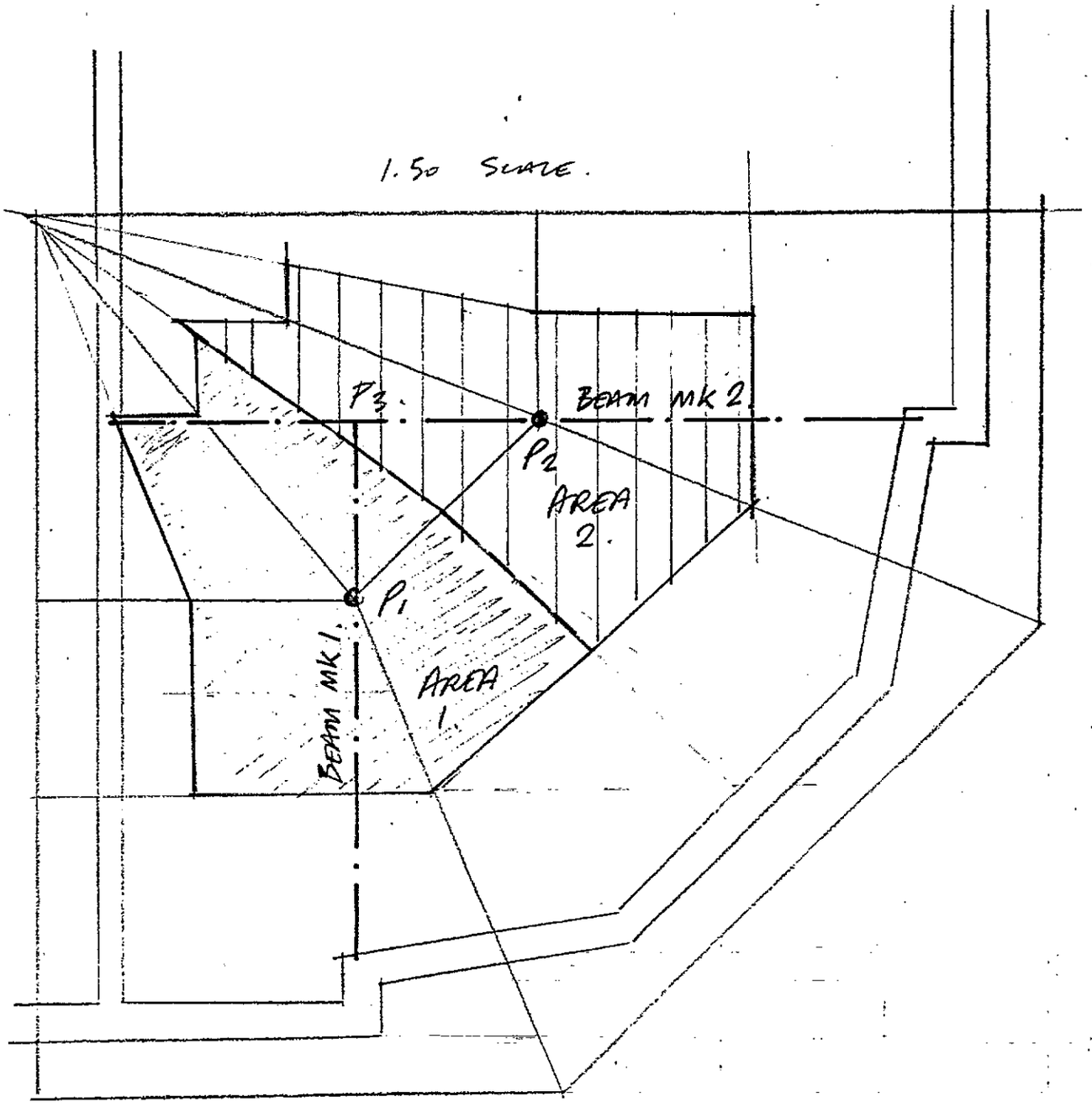
CALCULATION SHEET	Page No. OB-24	Project No.
Project	By	Chd.
Section ROOF	Date	Date

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

11

THE DESIGN OF THE ROOF EXCEPT FOR BEAMS AS DESIGNED ON PAGES OB-25 → OB-27 IS TO BE THE RESPONSIBLITY OF THE TRUSSED RAFTER MANUFACTURER/SUPPLIER"

SEE THE FOLLOWING PAGES FOR BEAMS IN ROOF SEE ALSO DRAWING No. 9214-13.



AREA 1. = 8.56 M² APPROX.

AREA 2. = 7.725 M² APPROX.

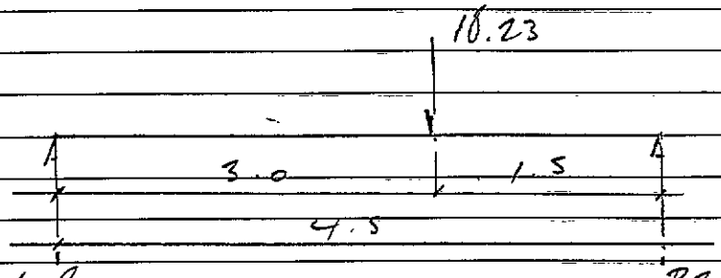
CALCULATION SHEET	Page No. OB-26	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

POINT LOAD P1

= 8.56 X 2.129 = 18.23 KN

PAGE OB-1



BEAM MK 1.

MAX BM = 6.08 X3 = 18.24 KNM

Try 203 X 133 X 30 UB.

Z_{xx} = 279.3 cm^3 r_y = 31.8

L/r = 3000/31.8 = 94.3 D/T = 21.5

p_{bz} = 165

f_{bc} = $18.24 \times 10^6 / 279.3 \times 10^3$ = 65.306 N/mm^2

satisfactory in Bending

$$\Delta = \frac{18230 \times 3000 \times 1500 (4500 + 1500)}{27 \times 210000 \times 2887 \times 10^4 \times 4500} \left(\sqrt{3 \times 3000 (4500 + 1500)} \right)$$

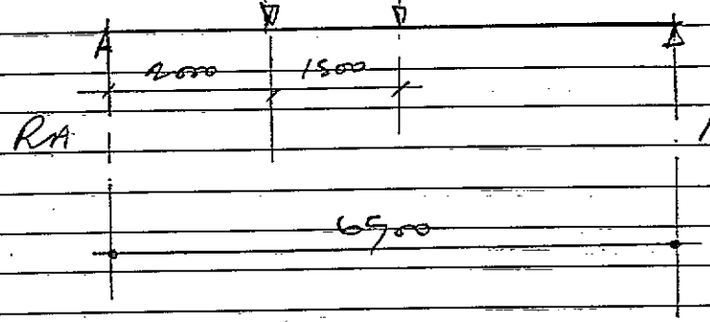
= 6.944 mm

4500/360 = 12.5mm ok

CALCULATION SHEET	Page No. OB-27	Project No.
Project	By	Chd.
Section	Date	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

12.15 $P_2 = (7.725)(1.129) = 16.44$



BEAM MK 2.

$R_A = 15.99$ $R_B = 12.59$

MAX BM = 37.74 KNM

Try 203 x 203 x 46 UC

$p_{bc} = 165$ $f_{bc} = \frac{37.74 \times 10^6}{449.2 \times 10^3} = 84$

ok for bending

ok for deflection by inspection

USE 203 x 203 x 46 UC.

INDUSTRIAL UNIT

CALCULATION SHEET	Page No. L-1	Project No. 9214
Project Packaging Industries Ltd. = Industrial Unit.	By RWF	Chd.
Section Loading	Date Jan '92	Date

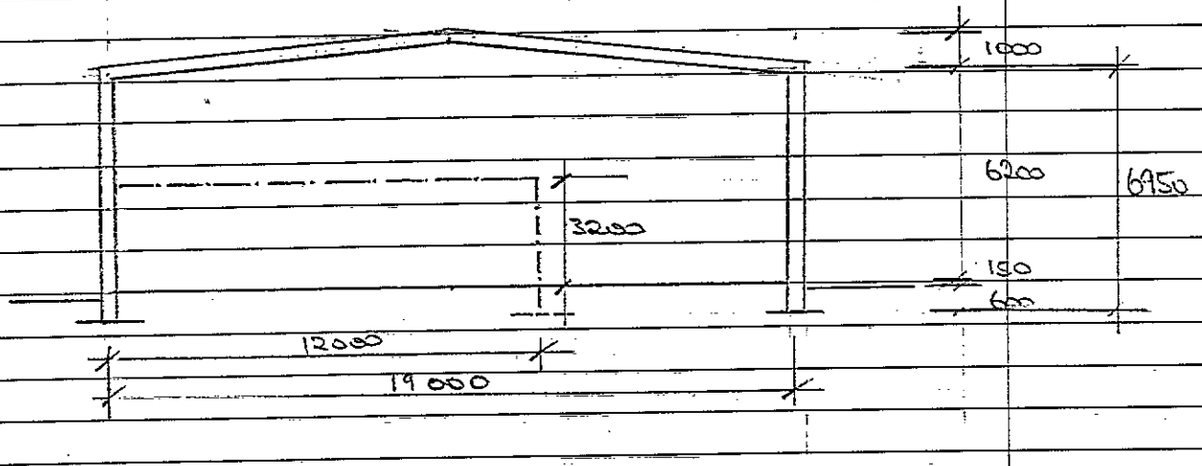
DBF
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

Industrial Unit

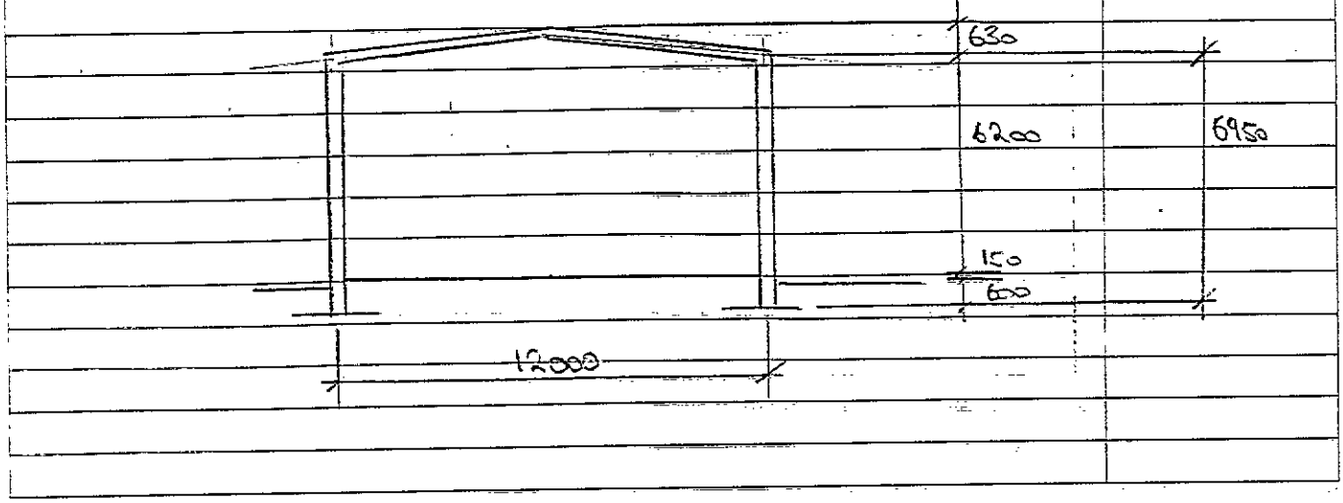
1.0 Loading

1.1 Geometry

1.1.1 19m Span Section



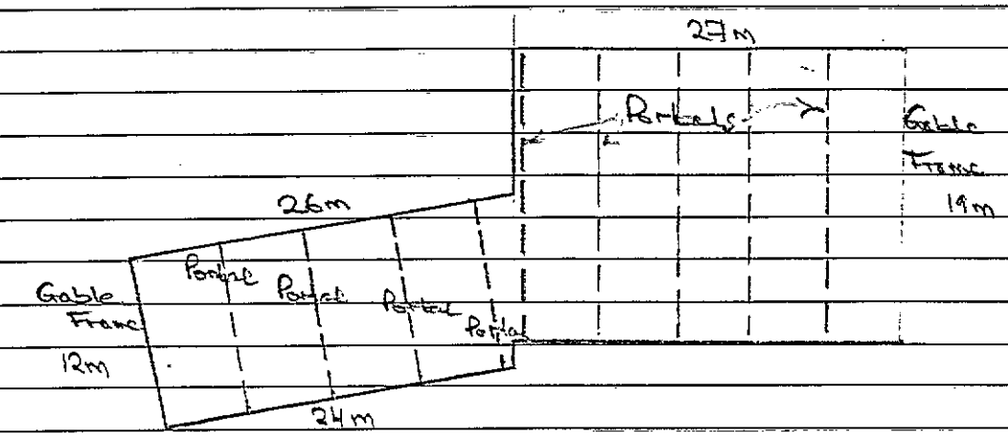
1.1.2 12m Span Section



CALCULATION SHEET	Page No. L-2	Project No. 9214
Project	By PNT	Chd.
Section Loading	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

1.1.3 Overall Plan



1.2 Dead + Live Loadings

Dead :

	Slope	Plan
Insulated metal Deck	0.15	
Purline	0.05	0.35
Portal Frames (rafters)	0.175	
Lights + fittings		0.10

$G_k = 0.48 \text{ kN/m}^2$

Live :

Superimposed $Q_k = 0.75 \text{ kN/m}^2$

$G_k + Q_k = 1.23 \text{ kN/m}^2$

1.3 Wind Loading

$V = 44$ m/s

Conservatively treat as Class B.
Category (3) — cp3:ch.V

$S_1 = 1.0$, $S_3 = 1.0$,

S_2 ; $h \leq 3$ $S_2 = 0.60$; $q = 0.43$ kN/m^2
$h < 5$ $S_2 = 0.65$; $q = 0.50$ "
$h < 10$ $S_2 = 0.74$; $q = 0.65$ "

Frictional Drag:

'19m Span Section'

$\frac{d}{h} = \frac{27}{6.35} = 4.2$; $\frac{d}{b} = \frac{27}{19} = 1.42$

$F' = 0.04 \times 0.65 \times 19 (27 - 4 \times 6.35) + 0.04 \times 0.65 \times 2 \times 6.35 (27 - 4 \times 6.35)$
$= 0.8 + 0.5$
$= 1.3$ kN

'12m Span Section'

$\frac{d}{h} = \frac{25}{6.35} = 3.9$; $\frac{d}{b} = \frac{25}{12} = 2.1$

$\Rightarrow$ no frictional drag.

'Take as Single Building'
(with worst possible combinations)

$\frac{d}{h} = \frac{52}{6.35} = 8.2$; $\frac{d}{b} = \frac{52}{12} = 4.3$

$F' = 0.04 \times 0.65 \times 19 (52 - 4 \times 6.35) + 0.04 \times 0.65 \times 2 \times 6.35 (52 - 4 \times 6.35)$
$= 13.1 + 8.8$
$= 21.9$ kN

CALCULATION SHEET	Page No. L-4	Project No. 9214
Project	By PMF	Chd.
Section Loading	Date Jan '92	Date

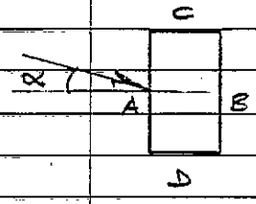
DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

External Pressure Co-effs. :

'19m Span Section'

$\frac{h}{w} = \frac{6.35}{19} = 0.33$; $\frac{l}{w} = \frac{27}{19} = 1.42$

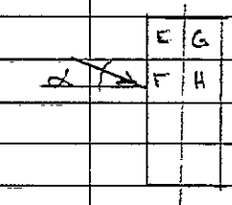
Walls —



α	A	B	C	D
0	+0.7	-0.2	-0.5	-0.5
90	-0.5	-0.5	+0.7	-0.8

Local C_f = −0.8 (0.25 w = 4.75m)

Roof — (slope = 6°)



α = 0		α = 90	
EF	GH	EG	FH
-0.96	-0.40	-0.80	-0.44

Local Co-eff. = −1.4 (0.15 w = 2.85m)

'12m Span Section'

$\frac{h}{w} = \frac{6.35}{12} = 0.53$; $\frac{l}{w} = \frac{25}{19} = 1.3$

Walls —

α	A	B	C	D
0	+0.7	-0.25	-0.16	-0.16
90	-0.16	-0.16	+0.7	-0.25

Local C_f = −1.1 (0.25w = 3m)

Roof — (slope = 6°)

α = 0		α = 90	
EF	GH	EG	FH
-0.94	-0.60	-0.92	-0.60

Local Co-eff = −2.0 (0.15 w = 1.8m)

CALCULATION SHEET	Page No. L-5	Project No. 9214
Project	By AJF	Chd.
Section Loading	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Internal Pressure Co-effs:

C_{pi} = +0.2 or −0.3

1.4 Loading to '19 m Span Portal'

Portals at 5.5m c/c

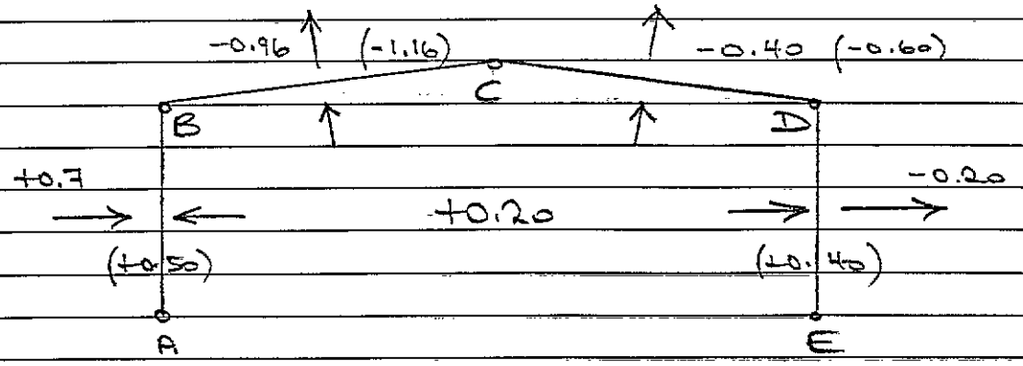
1.4.1 Dead + Live

W_t = 1.33 × 5.5 = 6.77 kN/m — p.2

1.4.2 Min. Dead + Wind (α = 0 : Int. Pressure)

min. Dead W_t = 0.38 × 5.5 = 2.10 kN/m — p.2

Wind (α = 0 : Int. Pressure) :



p.4

AB :	0.5 × 0.5* × 5.5	=	1.38 kN/m	*$q_{av.}$
BC :	1.16 × 0.65 × 5.5	=	4.15 "	
CD :	0.6 × 0.65 × 5.5	=	2.15 "	p.3
DE :	0.4 × 0.5* × 5.5	=	1.10 "	

1.5 Loading to '12m Span Portal'

Portals at 6.0 m c/c.

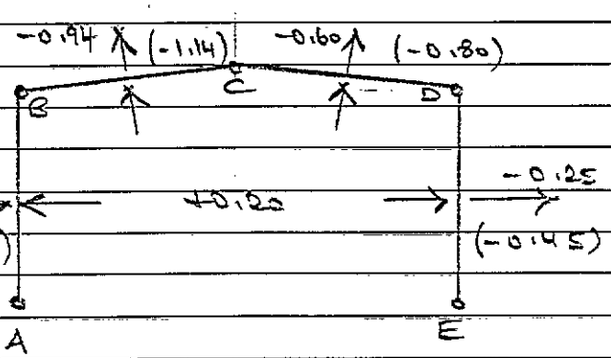
1.5.1 Dead + Live

$W = 1.23 \times 6 = 7.4$ kN/m — p.2

1.5.2 Min. Dead + Wind ($\alpha = 0$; Int. Pressure)

Min. Dead $W = 0.23 \times 6 = 2.3$ kN/m — p.2

Wind ($\alpha = 0$; Int. Pressure) :



— p.4

AB :	0.5 x 0.5*	x 6 =	1.50 kN/m	*self wt.
BC :	1.14 x 0.65	x 6 =	4.45 "	
CD :	0.8 x 0.65	x 6 =	3.12 "	p.3
DE :	0.45 x 0.5	x 6 =	1.35 "	

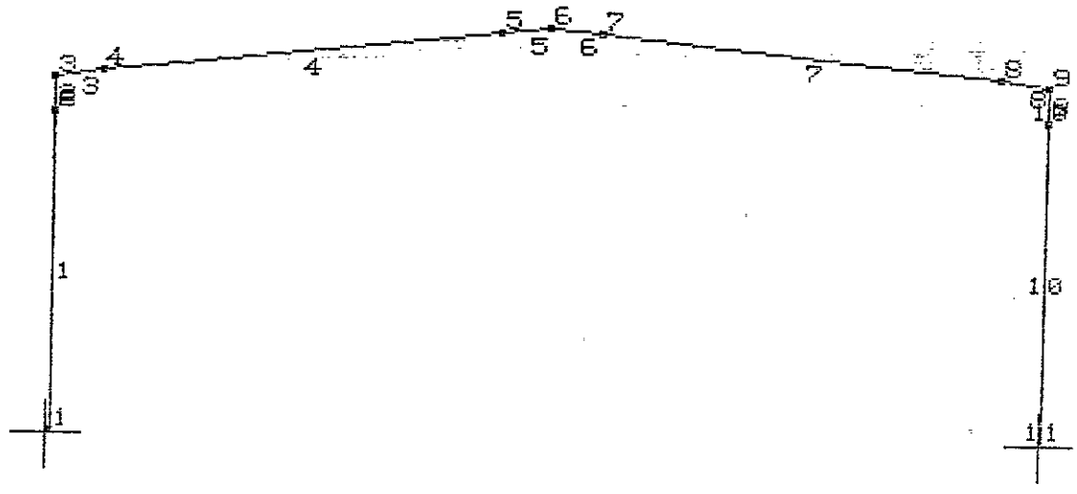
||

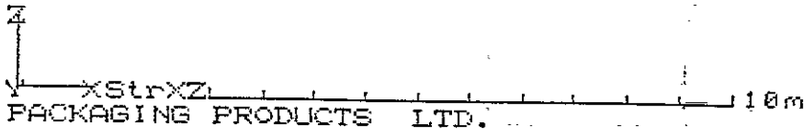
DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame —— DEAD + LIVE

PAGE	1
JOB NO.	9214
RUN NO.	1
AUTHOR	PMF
DATE	30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel)
Data File : PORTAL





PACKAGING PRODUCTS LTD.

DBFL CONSULTING ENGINEERS

PAGE 2
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Joint Co-ordinates

JOINT	X (m)	Z (m)
1	.000	.000
2	.000	6.260
3	.000	6.950
4	.950	7.050
5	8.550	7.850
6	9.500	7.950
7	10.450	7.850
8	18.050	7.050
9	19.000	6.950
10	19.000	6.260
11	19.000	.000

Section Properties

N.B. If a Shear Area value field is null (empty), shear distortions are ignored in the analysis.

SECTION NO.	REFERENCE	AREA Ax (cm2)	Iy (cm4)	zMAX (mm)	Az SHEAR AREA (cm2)
	DESCRIPTION				
1	Stanchion 533x210x92	1.180E+02	5.540E+04	2.665E+02	
2	Rafter 457x191x67	8.540E+01	2.940E+04	2.268E+02	

Member/Element Incidences

MEMBER/ ELEMENT NO.	NODE 1	NODE 2	NODE 3	NODE 4	MEMBER LENGTH (m)
1	1	2			6.260
2	2	3			.690
3	3	4			.955
4	4	5			7.642
5	5	6			.955
6	6	7			.955
7	7	8			7.642
8	8	9			.955
9	9	10			.690
10	10	11			6.260

Member/Element Details

MEMBER/ ELEMENT NO.	y AXIS FLEXURE TYPE	SECTION/ THICKNESS GROUP NO.	MATERIAL GROUP
1	FF	1	1
2	FF	1	1
3	FF	2	1
4	FF	2	1

DBFL CONSULTING ENGINEERS

PAGE 3
JOB NO. 9214
RUN NO. 1
AUTHOR FMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Member/Element Details

MEMBER/ ELEMENT NO.	Y AXIS FLEXURE TYPE NO.	SECTION/ THICKNESS GROUP	MATERIAL GROUP
5	FF	2	1
6	FF	2	1
7	FF	2	1
8	FF	2	1
9	FF	1	1
10	FF	1	1

Stress Directions
Angular directions relative to the element local x axis direction as defined by the Element Incidence Table and adjusted by Local Axes Re-Orientation Table.

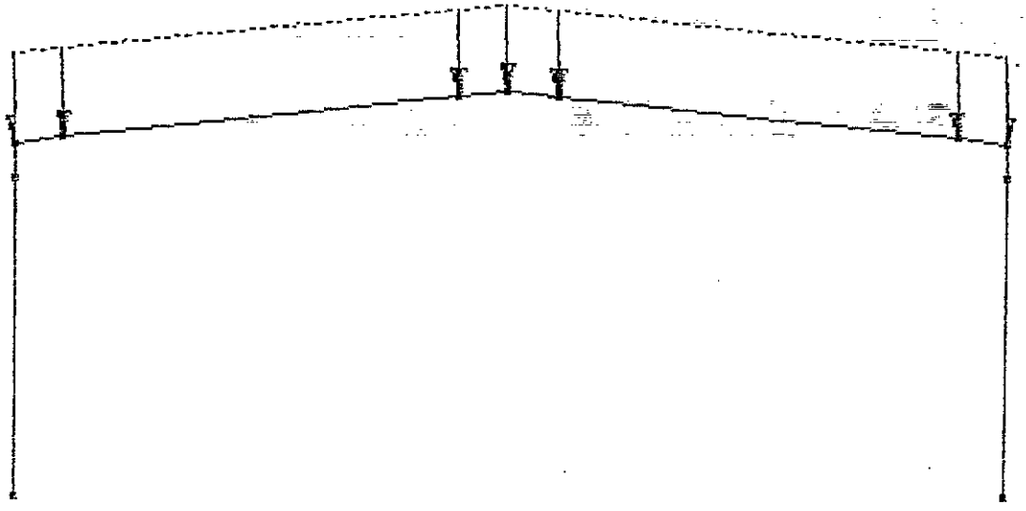
ORTHOGONAL STRESS AXES Ax 0
WOOD/ARMER MOMENT DIRECTION 1 A1 0
WOOD/ARMER MOMENT DIRECTION 2 A2 ..... 90.0

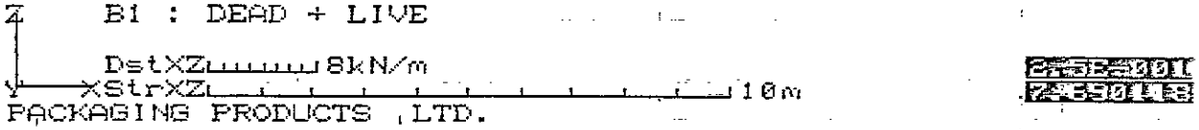
DBFL CONSULTING ENGINEERS

PAGE	4
JOB NO.	9214
RUN NO.	1
AUTHOR	PMF
DATE	30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





DBFL CONSULTING ENGINEERS

PAGE 5
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B1 : DEAD + LIVE
Load Groups

PLANE FRAME/FE LOAD TYPES	VALUE 1	VALUE 2	VALUE 3	VALUE 4
JF=Joint Forces	FX	FZ		
JM=Joint Moments	MY			
F?=Point Forces	F?	L		
M%=Point Moments	M%	L		
U?=Uniformly Distributed	U?			
T?=Triangularly Distrib. Load	T?			
V?=Variably Distributed Load	V?1	L1	V?2	L2
t =Temperature Elevation	t			
g =Gravitational Loading	gX	gZ		
Pz=Prestressing Force	Pz	ezs	ezm	eze
C!=Concentrated Element Loads	C!	LX(x)	LY(y)	LZ(z)
D!=Distributed Element Loads	D!			

N.B. 1. ? is one of X,Z (global directions) or x,z (member directions).
% is one of Y (global direction) or y (member direction).
! is one of X,Z (global directions) or x,y (element directions).
2. VALUES are load intensities except that:-
L,L1,L2 are distances along the member from NODE 1.
t is the temperature elevation of the group of members in degrees.
gX,gZ are 'g' factors; gZ=-1 for normal gravity loading.
ezs,ezm,eze are tendon offsets from the centroid at the start, middle and end of the member.
3. JOINT/MEMBER/ELEMENT LIST '9,2-6%2,40-30%5' means '9,2,4,6,40,35,30'

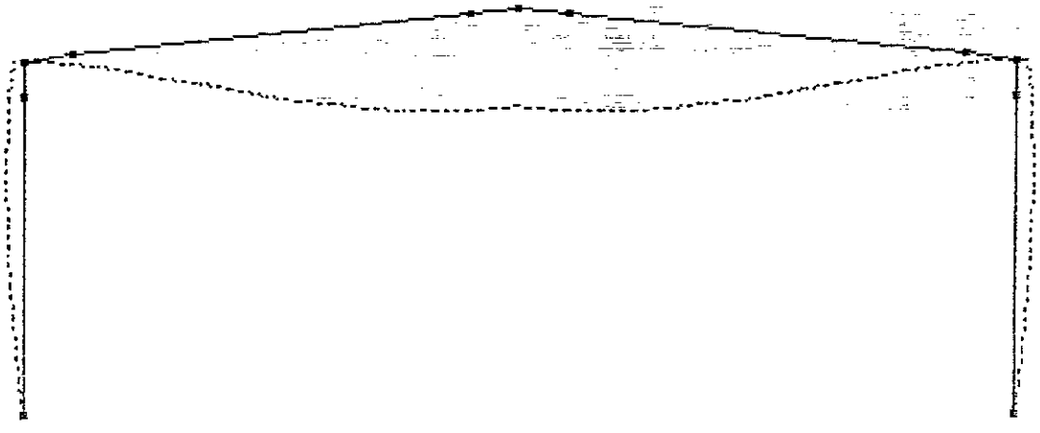
E	TYPE	MEMBER/JOINT/ELEMENT LIST	VALUE 1	VALUE 2	VALUE 3	VALUE 4
1	UZ	3,4,5,6,7,8	-6.7300			

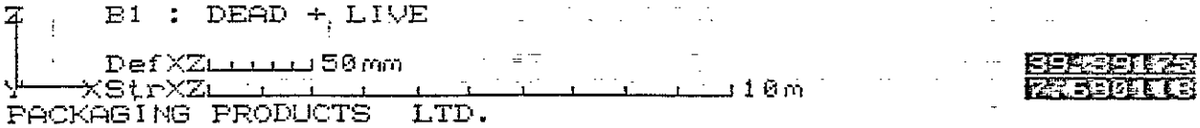
DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 6
JOB NO. 9214
RUN NO. 1
AUTHOR FMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





Basic Load Case B1 : DEAD + LIVE
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
1	.00000	.00000	-.00248
2	-6.55726	-.16637	.00182
3	-4.96177	-.18471	.00282
4	-4.57429	-4.02837	.00512
5	-.07151	-47.97919	.00170
6	.00000	-48.78953	.00000
7	.07150	-47.97920	-.00170
8	4.57428	-4.02837	-.00512
9	4.96177	-.18471	-.00282
10	6.55726	-.16637	-.00182

DBFL CONSULTING ENGINEERS

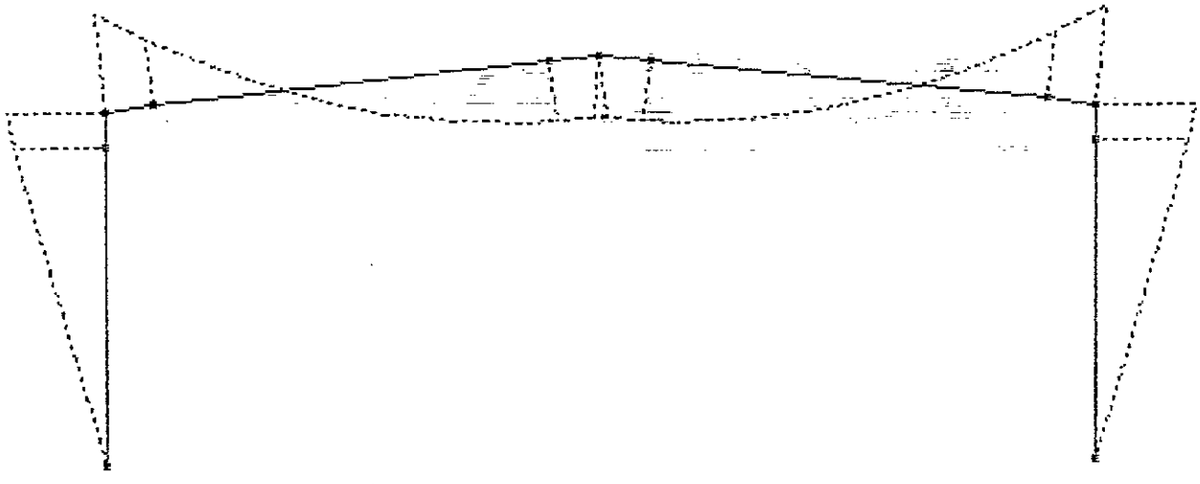
PAGE 7
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

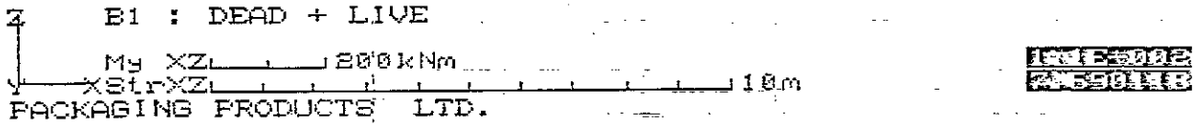
PACKAGING PRODUCTS LTD.
19m Portal Frame

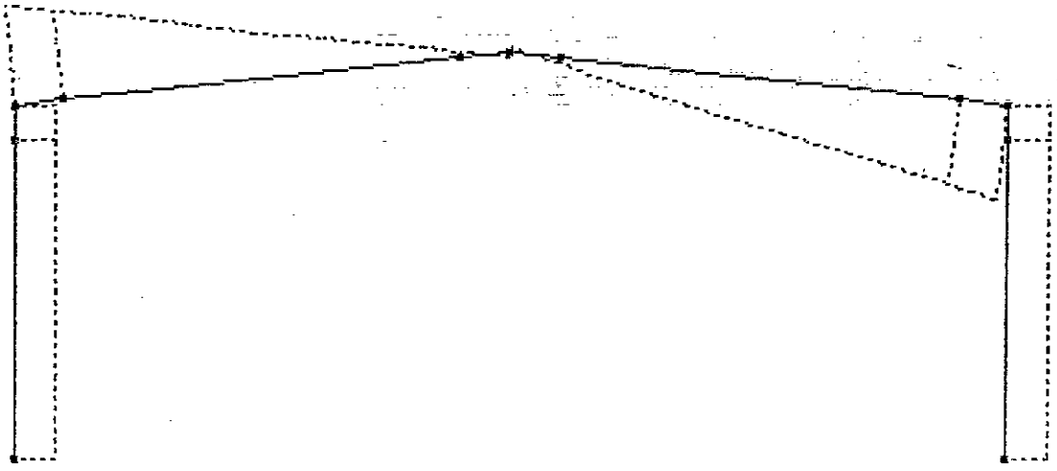
EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

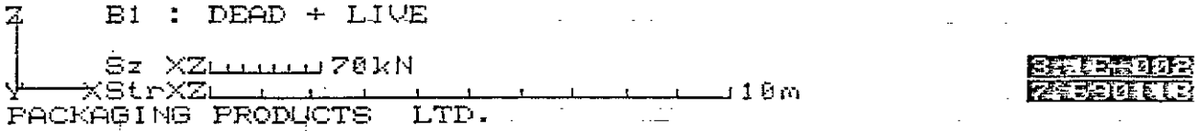
Basic Load Case B1 : DEAD + LIVE
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
11	.00000	.00000	.00248







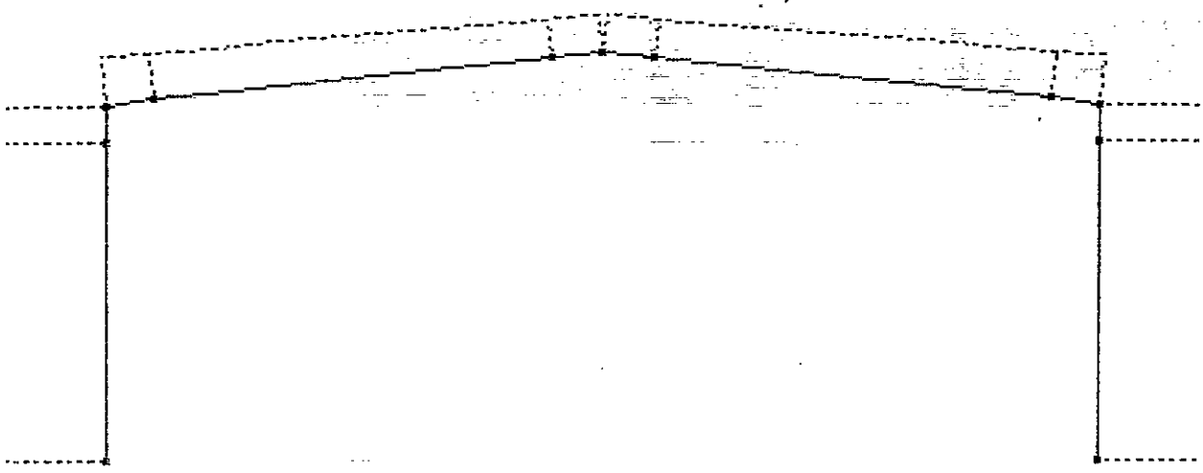

Z
B1 : DEAD + LIVE
Sz XZ 70kN
X Str XZ
10m
PACKAGING PRODUCTS LTD.

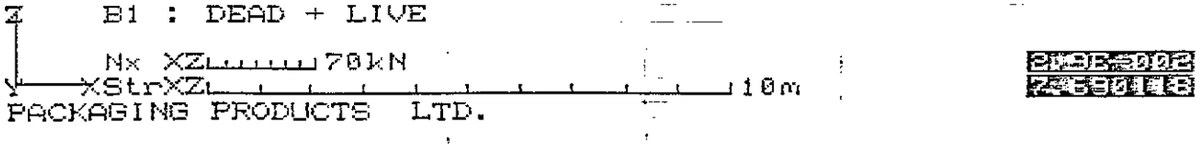
DBFL CONSULTING ENGINEERS

PAGE 9
JOB NO. 9214
RUN NO. 1
AUTHOR FMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





Basic Load Case B1 : DEAD + LIVE
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
1	1	64.2882	-24.9367	.0000
1	2	64.2882	-24.9367	-156.1038
2	2	64.2882	-24.9367	-156.1038
2	3	64.2882	-24.9367	-173.3101
3	3	31.5297	61.3245	-173.3101
3	4	30.8567	54.9310	-117.7837
4	4	30.8567	54.9310	-117.7837
4	5	25.4727	3.7830	106.5623
5	5	25.4727	3.7830	106.5623
5	6	24.7997	-2.6105	107.1223

DBFL CONSULTING ENGINEERS

PAGE 10
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

FACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B1 : DEAD + LIVE
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
6	6	24.7997	2.6105	107.1223
6	7	25.4727	-3.7830	106.5623
7	7	25.4727	-3.7830	106.5623
7	8	30.8567	-54.9310	-117.7836
8	8	30.8567	-54.9310	-117.7836
8	9	31.5297	-61.3245	-173.3101
9	9	64.2882	24.9367	-173.3101
9	10	64.2882	24.9367	-156.1038
10	10	64.2882	24.9367	-156.1038
10	11	64.2882	24.9367	.0000

Basic Load Case B1 : DEAD + LIVE
Member End Stresses

MBR	JOINT	Ax AXIAL (N/mm2)	By yAXIS BENDING (N/mm2)	Ax +ABS.By (N/mm2)	Ax -ABS.By (N/mm2)
1	1	5.4482	.0000	5.4482	5.4482
1	2	5.4482	-75.1073	80.5555	-69.6592
2	2	5.4482	-75.1073	80.5555	-69.6592
2	3	5.4482	-83.3859	88.8341	-77.9378
3	3	3.6920	-133.6964	137.3884	-130.0044
3	4	3.6132	-90.8617	94.4749	-87.2485
4	4	3.6132	-90.8617	94.4749	-87.2485
4	5	2.9828	82.2052	85.1879	-79.2224
5	5	2.9828	82.2052	85.1879	-79.2224
5	6	2.9039	82.6372	85.5411	-79.7333
6	6	2.9039	82.6372	85.5411	-79.7333
6	7	2.9828	82.2052	85.1879	-79.2224
7	7	2.9828	82.2052	85.1879	-79.2224
7	8	3.6132	-90.8617	94.4749	-87.2485
8	8	3.6132	-90.8617	94.4749	-87.2485
8	9	3.6920	-133.6964	137.3884	-130.0044
9	9	5.4482	-83.3859	88.8341	-77.9378
9	10	5.4482	-75.1073	80.5555	-69.6592
10	10	5.4482	-75.1073	80.5555	-69.6592
10	11	5.4482	.0000	5.4482	5.4482

Basic Load Case B1 : DEAD + LIVE
Support Reactions

JOINT	X FORCE (kN)	Z FORCE (kN)	Y MOMENT (kNm)
1	24.9367	64.2882	.0000
11	-24.9367	64.2882	.0000

Basic Load Case B1 : DEAD + LIVE
Load Balance

ENTRY		X LINEAR (kN)	Z LINEAR (kN)
1	EXTERNAL LOADS SUM	.0000	-128.5765
2	REACTIONS SUM	.0000	128.5765

DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 11
JOB NO. 9214
RUN NO. 1
AUTHOR FMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B1 : DEAD + LIVE
Global Joint Loads from Back-Substitution

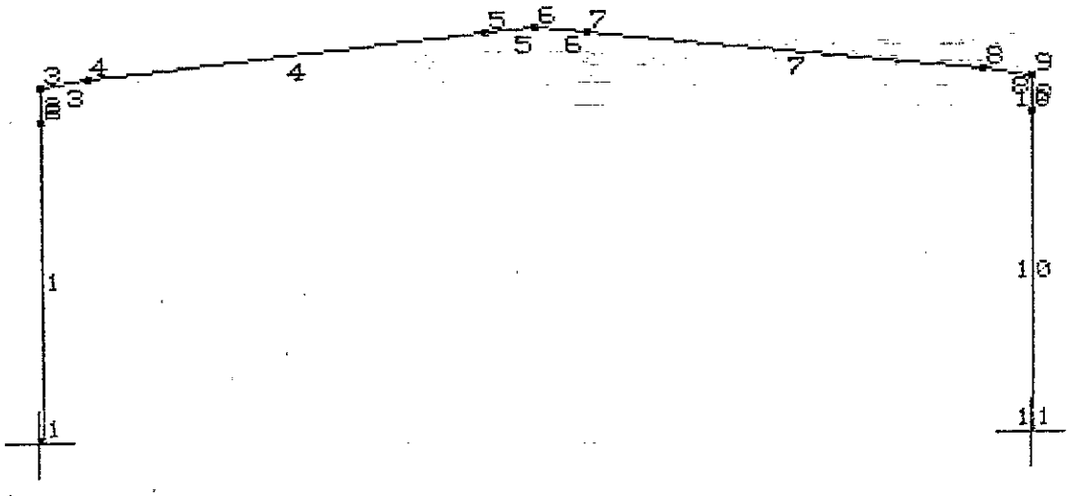
JOINT	X FORCE (kN)	Z FORCE (kN)	Y MOMENT (kNm)
1	-24.9367	-64.2882	.0000
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	.0000	.0000	.0000
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000	.0000	.0000
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	24.9367	-64.2882	.0000

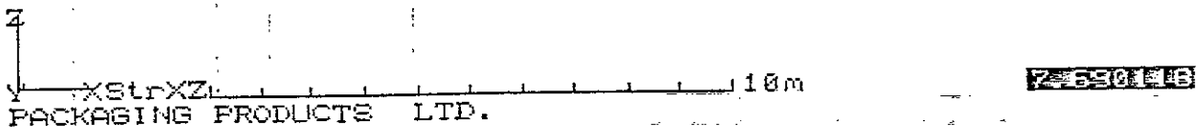
DEFL CONSULTING ENGINEERS

PAGE	13
JOB NO.	9214
RUN NO.	1
AUTHOR	FMF
DATE	30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame —— U.N. DEAD + WIND.

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





PACKAGING PRODUCTS LTD.

Material Properties

ENTRY NO.	TABLE REF./ DESCRIPTION	YOUNG'S MODULUS (kN/mm2)	POISSON'S RATIO	COEFFICIENT OF THERMAL EXP. (/ Deg C)	WEIGHT/UNIT VOLUME (kN/m3)
1	SI Steel - Deg. C	205	.300	1.200E-05	77

DBFL CONSULTING ENGINEERS

PAGE 14
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Joint Co-ordinates

JOINT	X (m)	Z (m)
1	.000	.000
2	.000	6.260
3	.000	6.950
4	.950	7.050
5	8.550	7.850
6	9.500	7.950
7	10.450	7.850
8	18.050	7.050
9	19.000	6.950
10	19.000	6.260
11	19.000	.000

Section Properties

N.B. If a Shear Area value field is null (empty), shear distortions are ignored in the analysis.

SECTION NO.	REFERENCE	AREA Ax (cm2)	Iy (cm4)	zMAX (mm)	Az SHEAR AREA (cm2)
	DESCRIPTION				
1	Stanchion 533x210x92	1.180E+02	5.540E+04	2.665E+02	
2	Rafter 457x191x67	8.540E+01	2.940E+04	2.268E+02	

Member/Element Incidences

MEMBER/ ELEMENT NO.	NODE 1	NODE 2	NODE 3	NODE 4	MEMBER LENGTH (m)
1	1	2			6.260
2	2	3			.690
3	3	4			.955
4	4	5			7.642
5	5	6			.955
6	6	7			.955
7	7	8			7.642
8	8	9			.955
9	9	10			.690
10	10	11			6.260

Member/Element Details

MEMBER/ ELEMENT NO.	y AXIS FLEXURE TYPE	SECTION/ THICKNESS GROUP NO.	MATERIAL GROUP
1	FF	1	1
2	FF	1	1
3	FF	2	1
4	FF	2	1

DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 15
JOB NO. 9214
RUN NO. 1
AUTHOR FMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File.: PORTAL

Member/Element Details

MEMBER/ ELEMENT NO.	y AXIS FLEXURE TYPE	SECTION/ THICKNESS GROUP NO.	MATERIAL GROUP
5	FF	2	1
6	FF	2	1
7	FF	2	1
8	FF	2	1
9	FF	1	1
10	FF	1	1

Stress Directions
Angular directions relative to the element local x axis direction as defined by the Element Incidence Table and adjusted by Local Axes Re-Orientation Table.

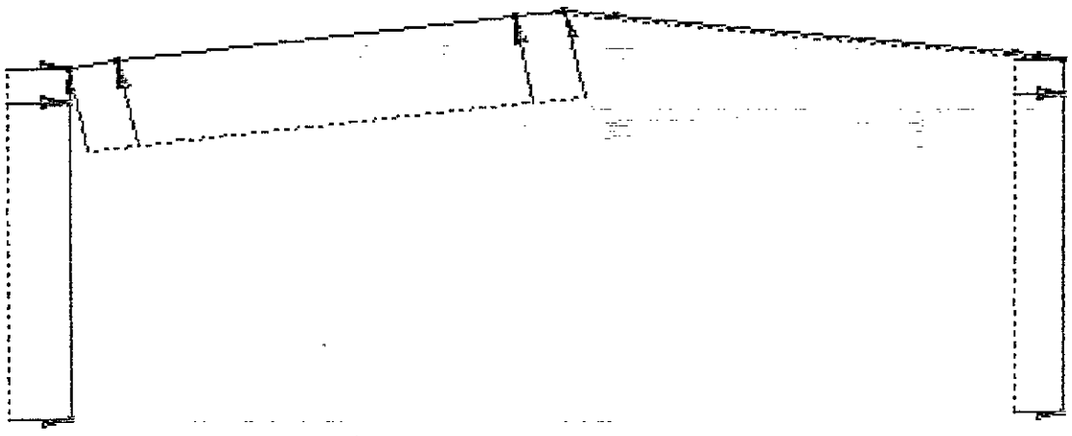
ORTHOGONAL STRESS AXES	Ax	.0
WOOD/ARMER MOMENT DIRECTION 1	A1	.0
WOOD/ARMER MOMENT DIRECTION 2	A2	90.0

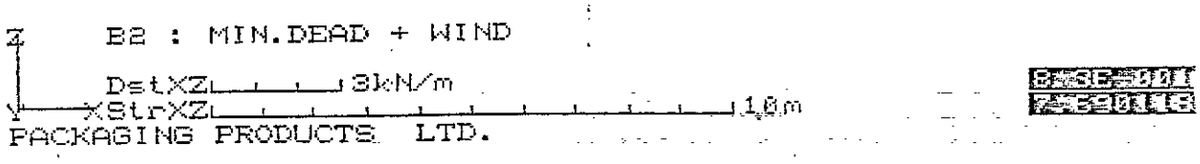
DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 16
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





DBFL CONSULTING ENGINEERS

PAGE 17
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B2 : MIN.DEAD + WIND
Load Groups

PLANE FRAME/FE LOAD TYPES	VALUE 1	VALUE 2	VALUE 3	VALUE 4
JF=Joint Forces	FX	FZ		
JM=Joint Moments	MY			
F?=Point Forces	F?	L		
M%=Point Moments	M%	L		
U?=Uniformly Distributed	U?			
T?=Triangularly Distrib. Load	T?			
V?=Variably Distributed Load	V?1	L1	V?2	L2
t =Temperature Elevation	t			
g =Gravitational Loading	gX	gZ		
Pz=Prestressing Force	Pz	ezs	ezm	eze
C!=Concentrated Element Loads	C!	LX(x)	LY(y)	LZ(z)
D!=Distributed Element Loads	D!			

N.B. 1. ? is one of X,Z (global directions) or x,z (member directions).
% is one of Y (global direction) or y (member direction).
! is one of X,Z (global directions) or x,y (element directions).
2. VALUES are load intensities except that:-
L,L1,L2 are distances along the member from NODE 1.
t is the temperature elevation of the group of members in degrees.
gX,gZ are 'g' factors; gZ=-1 for normal gravity loading.
ezs,ezm,eze are tendon offsets from the centroid at the start, middle and end of the member.
3. JOINT/MEMBER/ELEMENT LIST '9,2-6*2,40-30*5' means '9,2,4,6,40,35,30'

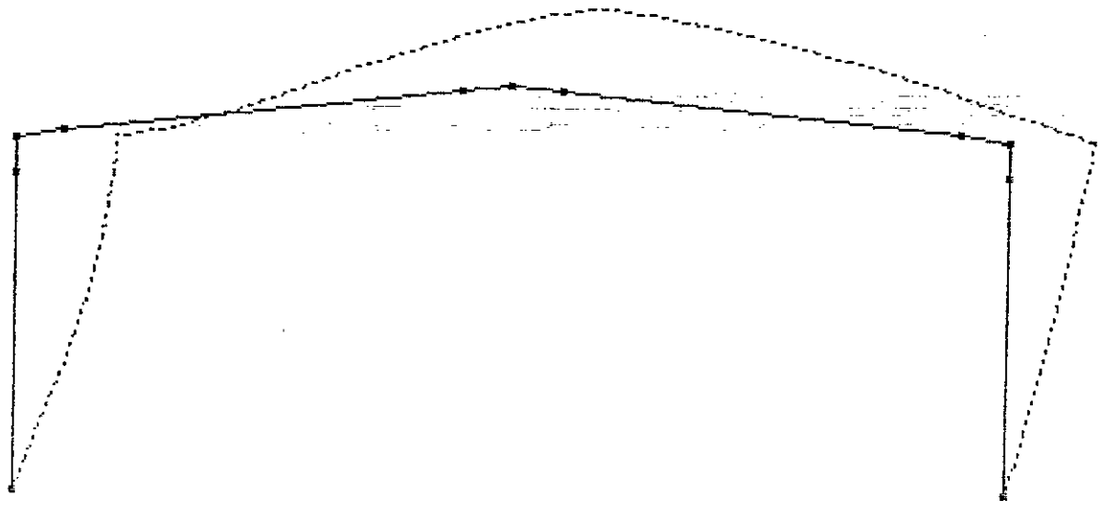
E TYPE MEMBER/JOINT/ELEMENT LIST	VALUE 1	VALUE 2	VALUE 3	VALUE 4
1 Uz 1,2	-1.3800			
2 Uz 3,4,5	4.1500			
3 Uz 6,7,8	2.1500			
4 Uz 9,10	1.1000			
5 UZ 3,4,5,6,7,8	-2.1000			

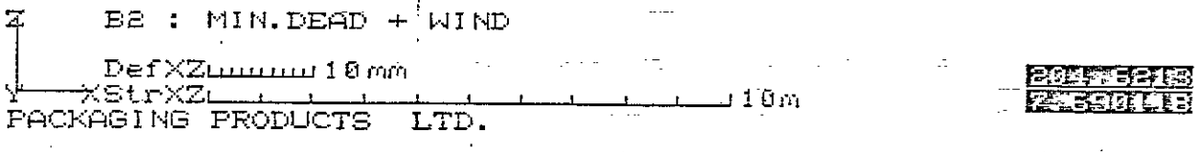
DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 18
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





Basic Load Case B2 : MIN.DEAD + WIND
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
1	.00000	.00000	.00202
2	9.12206	.04395	.00046
3	9.24089	.04879	.00017
4	9.32512	.22029	-.00049
5	8.60362	7.28755	-.00027
6	8.59352	7.41507	.00000
7	8.58531	7.30296	.00023
8	7.95003	1.03404	.00109
9	7.84457	.00789	.00106
10	7.11820	.00711	.00105

DBFL CONSULTING ENGINEERS

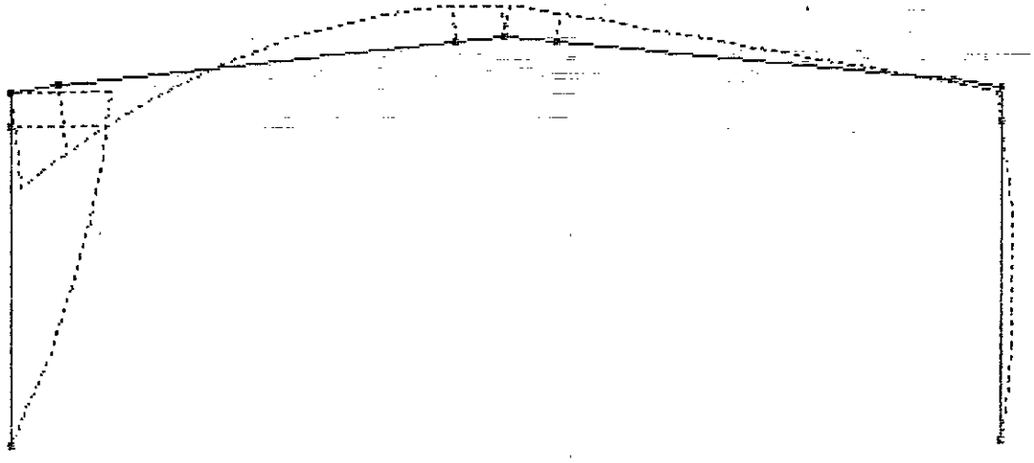
PACKAGING PRODUCTS LTD.
19m Portal Frame

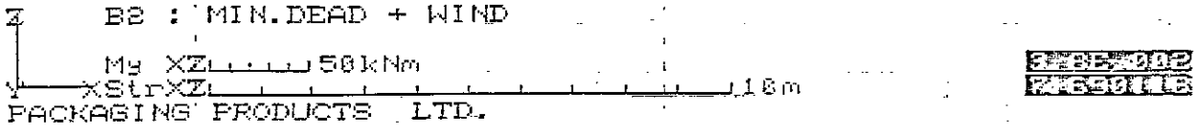
PAGE 19
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B2 : MIN.DEAD + WIND
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
11	.00000	.00000	.00123



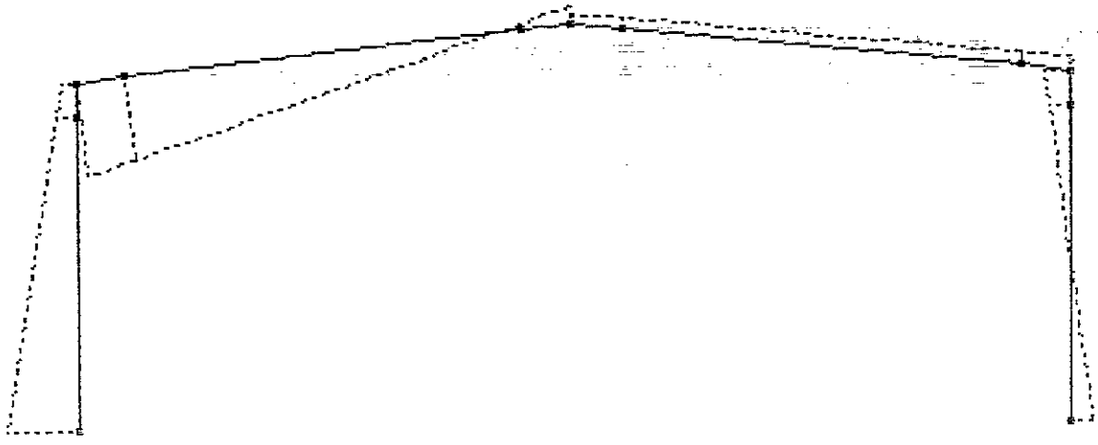


DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE	20
JOB NO.	9214
RUN NO.	1
AUTHOR	RMF
DATE	30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL



B2 : MIN.DEAD + WIND

Sz XZ 20kN

XStrXZ 10m

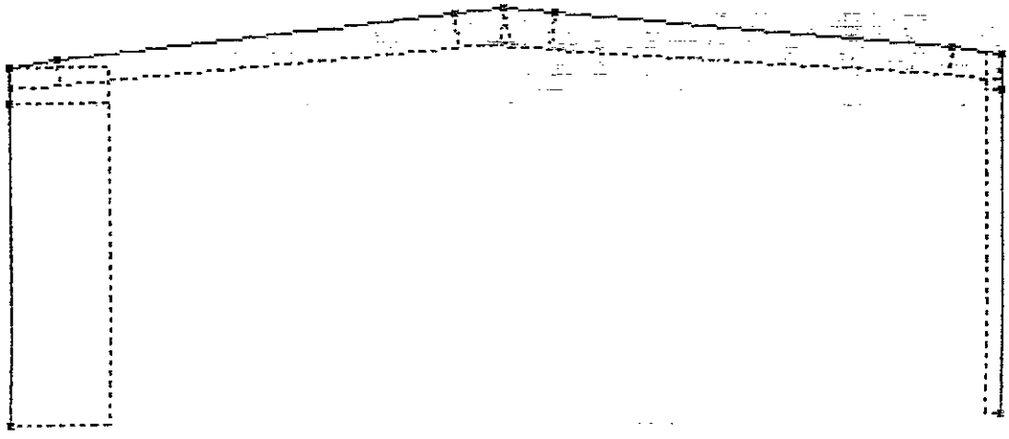
PACKAGING PRODUCTS LTD.

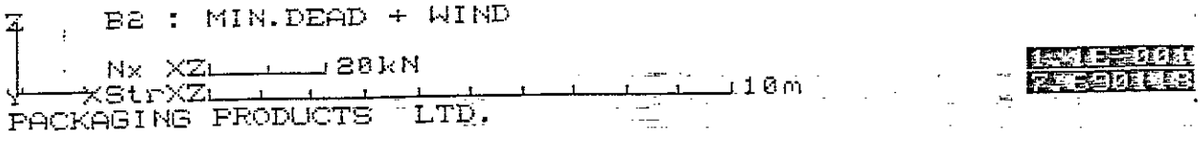
DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 21
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL





Basic Load Case B2 : MIN.DEAD + WIND
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
1	1	-16.9829	11.8827	.0000
1	2	-16.9829	3.2439	47.3463
2	2	-16.9829	3.2439	47.3463
2	3	-16.9829	2.2917	49.2561
3	3	-4.0570	-16.6497	49.2561
3	4	-4.2670	-14.6804	34.2920
4	4	-4.2670	-14.6804	34.2920
4	5	-5.9470	1.0738	-17.6988
5	5	-5.9470	1.0738	-17.6988
5	6	-6.1570	3.0431	-15.7325

DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
19m Portal Frame

PAGE 22
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B2 : MIN.DEAD + WIND
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
6	6	-6.6557	1.6944	-15.7325
6	7	-6.4457	1.7532	-14.0858
7	7	-6.4457	1.7532	-14.0858
7	8	-4.7657	2.2235	1.1089
8	8	-4.7657	2.2235	1.1089
8	9	-4.5557	2.2822	3.2610
9	9	-2.7466	-4.2917	3.2610
9	10	-2.7466	-3.5327	.5615
10	10	-2.7466	-3.5327	.5615
10	11	-2.7466	3.3533	.0000

Basic Load Case B2 : MIN.DEAD + WIND
Member End Stresses

MBR	JOINT	Ax AXIAL (N/mm2)	By yAXIS BENDING (N/mm2)	Ax +ABS.By (N/mm2)	Ax -ABS.By (N/mm2)
1	1	-1.4392	.0000	-1.4392	-1.4392
1	2	-1.4392	22.7801	21.3408	-24.2193
2	2	-1.4392	22.7801	21.3408	-24.2193
2	3	-1.4392	23.6989	22.2597	-25.1382
3	3	-.4751	37.9975	37.5225	-38.4726
3	4	-.4996	26.4538	25.9542	-26.9535
4	4	-.4996	26.4538	25.9542	-26.9535
4	5	-.6964	-13.6534	12.9570	-14.3498
5	5	-.6964	-13.6534	12.9570	-14.3498
5	6	-.7210	-12.1365	11.4155	-12.8575
6	6	-.7794	-12.1365	11.3571	-12.9158
6	7	-.7548	-10.8662	10.1115	-11.6210
7	7	-.7548	-10.8662	10.1115	-11.6210
7	8	-.5580	.8555	.2974	-1.4135
8	8	-.5580	.8555	.2974	-1.4135
8	9	-.5334	2.5156	1.9821	-3.0490
9	9	-.2328	1.5690	1.3362	-1.8017
9	10	-.2328	.2702	.0374	-.5029
10	10	-.2328	.2702	.0374	-.5029
10	11	-.2328	.0000	-.2328	-.2328

Basic Load Case B2 : MIN.DEAD + WIND
Support Reactions

JOINT	X FORCE (kN)	Z FORCE (kN)	Y MOMENT (kNm)
1	-11.8327	-16.9829	.0000
11	-3.3533	-2.7466	.0000

Basic Load Case B2 : MIN.DEAD + WIND
Load Balance

ENTRY		X LINEAR (kN)	Z LINEAR (kN)
1	EXTERNAL LOADS SUM	15.2360	19.7296
2	REACTIONS SUM	-15.2360	-19.7296

DBFL CONSULTING ENGINEERS

PAGE 23
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 30/1/92

PACKAGING PRODUCTS LTD.
19m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : PORTAL

Basic Load Case B2 : MIN.DEAD + WIND
Global Joint Loads from Back-Substitution

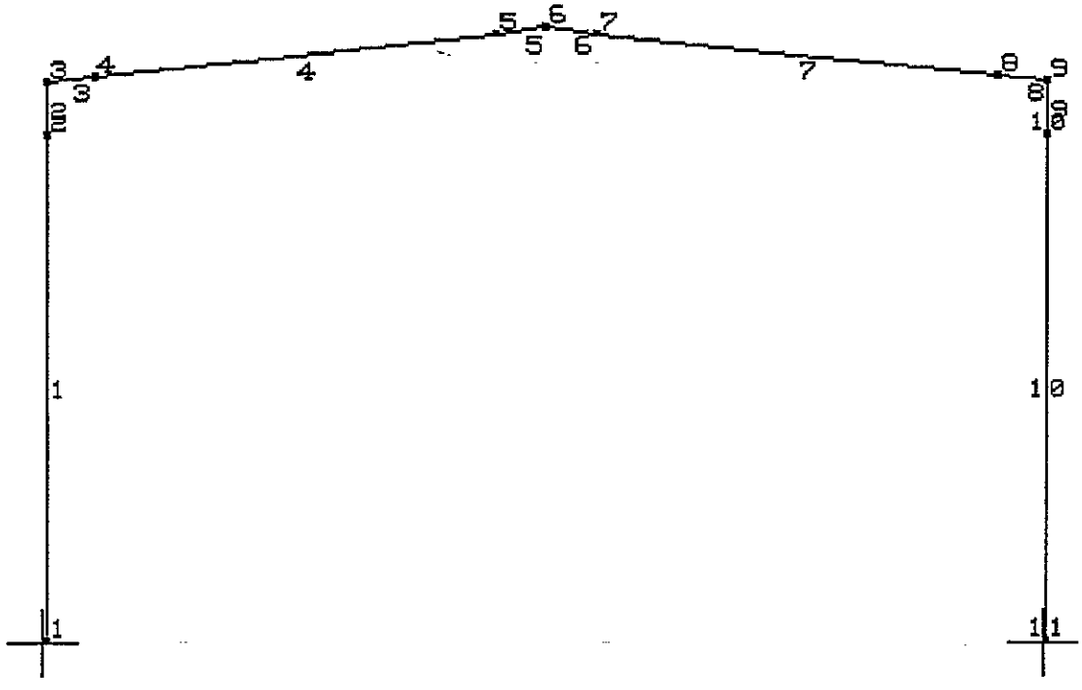
JOINT	X FORCE (kN)	Z FORCE (kN)	Y MOMENT (kNm)
1	11.8827	16.9829	.0000
2	.0000	.0000	.0000
3	.0000	.0000	.0000
4	.0000	.0000	.0000
5	.0000	.0000	.0000
6	.0000	.0000	.0000
7	.0000	.0000	.0000
8	.0000	.0000	.0000
9	.0000	.0000	.0000
10	.0000	.0000	.0000
11	3.3533	2.7466	.0000

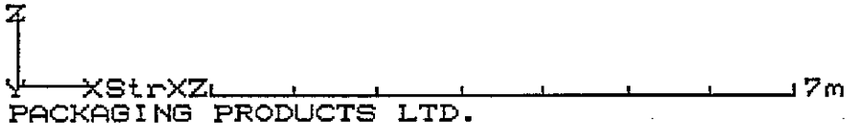
DBFL CONSULTING ENGINEERS

PACKAGING PRODUCTS LTD.
12m Portal Frame ——— DEAD + LIVE

PAGE	1
JOB NO.	9214
RUN NO.	1
AUTHOR	PMF
DATE	3/2/92

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl





12.17602

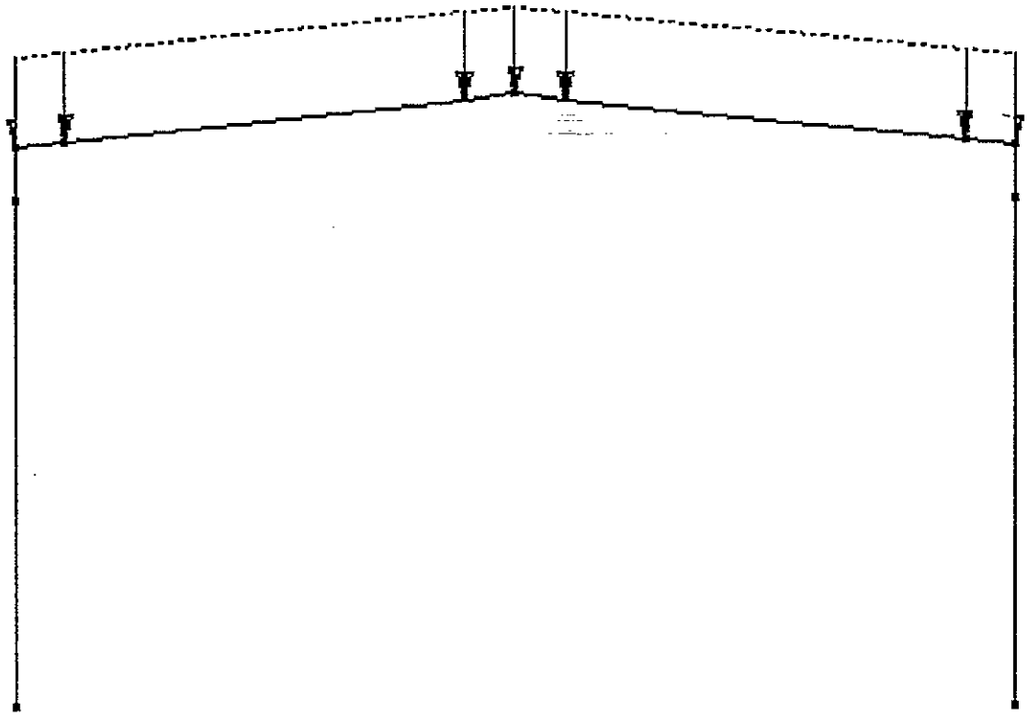
PACKAGING PRODUCTS LTD.

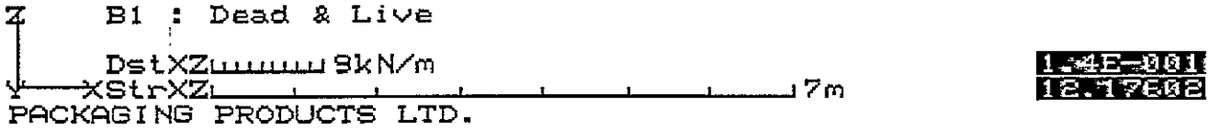
DBFL CONSULTING ENGINEERS

PAGE 2
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl





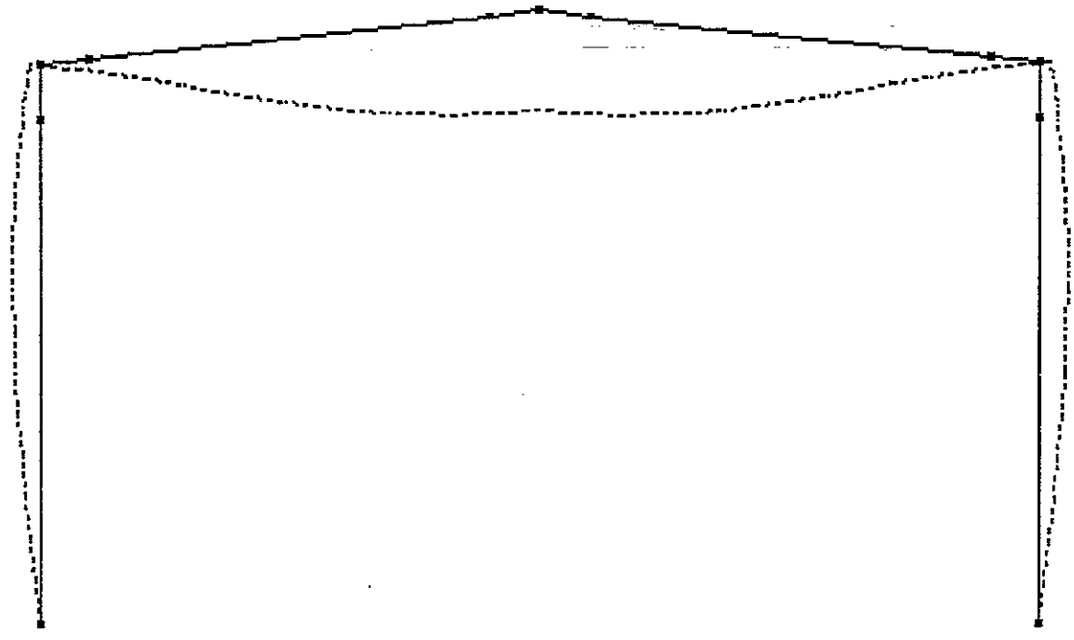
PACKAGING PRODUCTS LTD.

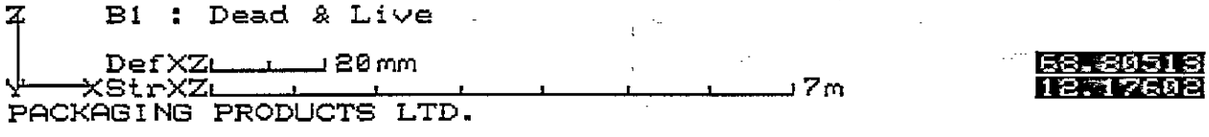
DBFL CONSULTING ENGINEERS

PAGE 3
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl





Basic Load Case B1 : Dead & Live
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
1	.00000	.00000	-.00161
2	-3.20530	-.15963	.00169
3	-1.77994	-.17723	.00246
4	-1.60047	-1.94630	.00337
5	-.02397	-17.37032	.00090
6	.00000	-17.64115	.00000
7	.02397	-17.37032	-.00090
8	1.60048	-1.94630	-.00337
9	1.77994	-.17723	-.00246
10	3.20530	-.15963	-.00169

DBFL CONSULTING ENGINEERS

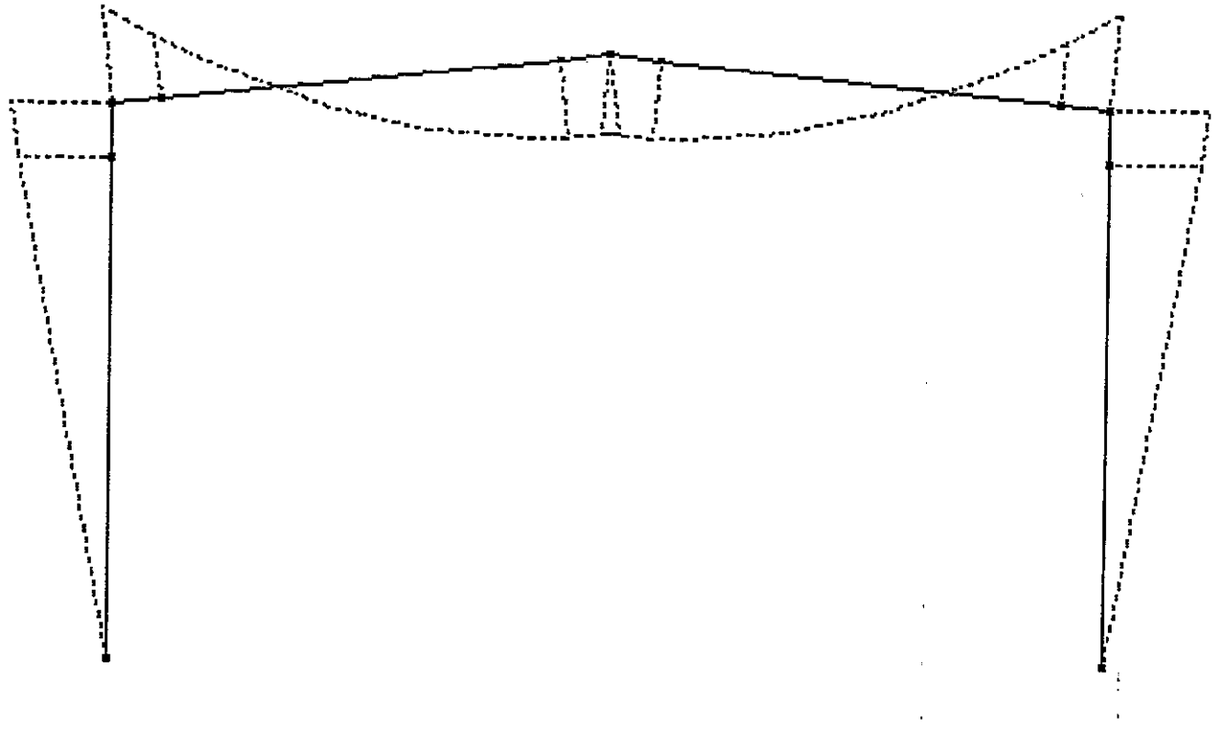
PAGE 4
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

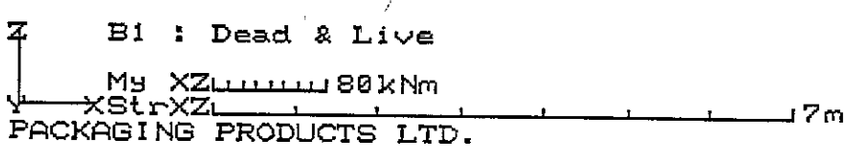
PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mport1

Basic Load Case B1 : Dead & Live
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
11	.00000	.00000	.00161





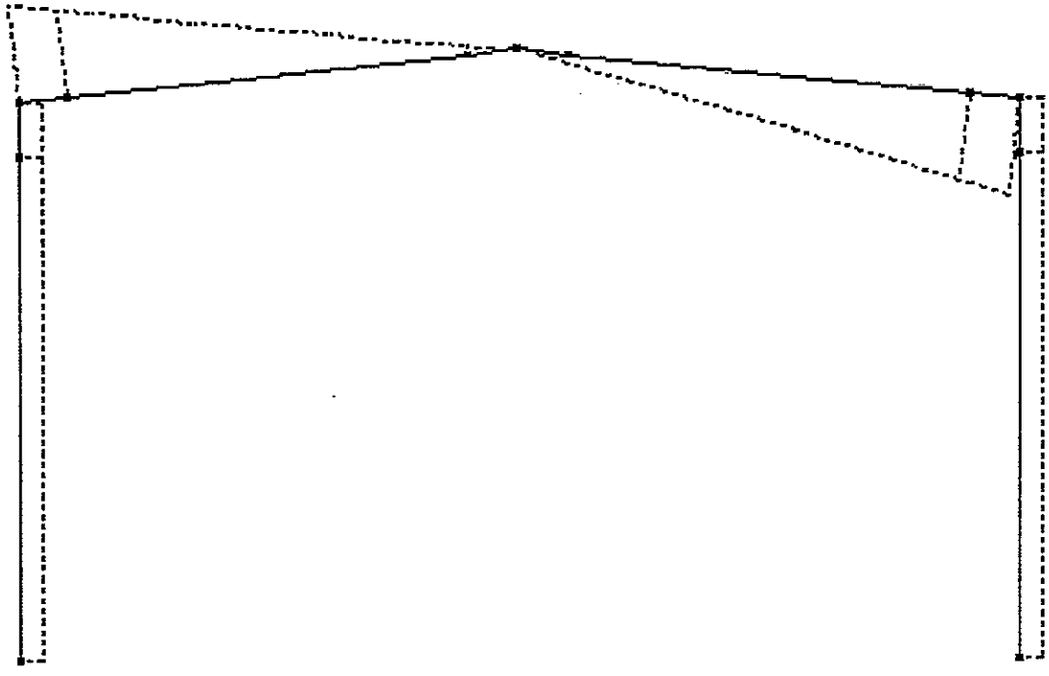
1.7E-03
12.7802

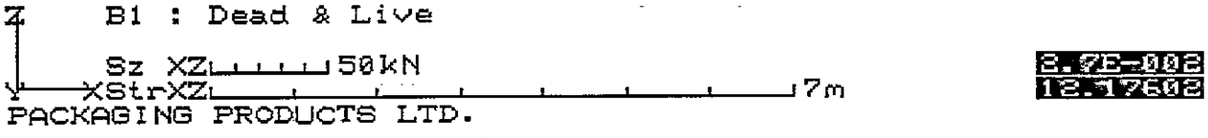
DBFL CONSULTING ENGINEERS

PAGE 5
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl





Basic Load Case B1 : Dead & Live
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
1	1	44.6441	-10.1533	.0000
1	2	44.6441	-10.1533	-63.5597
2	2	44.6441	-10.1533	-63.5597
2	3	44.6441	-10.1533	-70.5655
3	3	14.7598	43.3397	-70.5655
3	4	14.2936	38.8997	-45.7580
4	4	14.2936	38.8997	-45.7580
4	5	10.5640	3.3797	56.2706
5	5	10.5640	3.3797	56.2706
5	6	10.0978	-1.0603	56.9702

DBFL CONSULTING ENGINEERS

PAGE 6
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl

Basic Load Case B1 : Dead & Live
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
6	6	10.0978	1.0603	56.9702
6	7	10.5640	-3.3797	56.2706
7	7	10.5640	-3.3797	56.2706
7	8	14.2936	-38.8997	-45.7580
8	8	14.2936	-38.8997	-45.7580
8	9	14.7598	-43.3397	-70.5655
9	9	44.6441	10.1533	-70.5655
9	10	44.6441	10.1533	-63.5597
10	10	44.6441	10.1533	-63.5597
10	11	44.6441	10.1533	.0000

Basic Load Case B1 : Dead & Live
Support Reactions

JOINT	X FORCE (kN)	Z FORCE (kN)	Y MOMENT (kNm)
1	10.1533	44.6441	.0000
11	-10.1533	44.6441	.0000

Basic Load Case B1 : Dead & Live
Load Balance

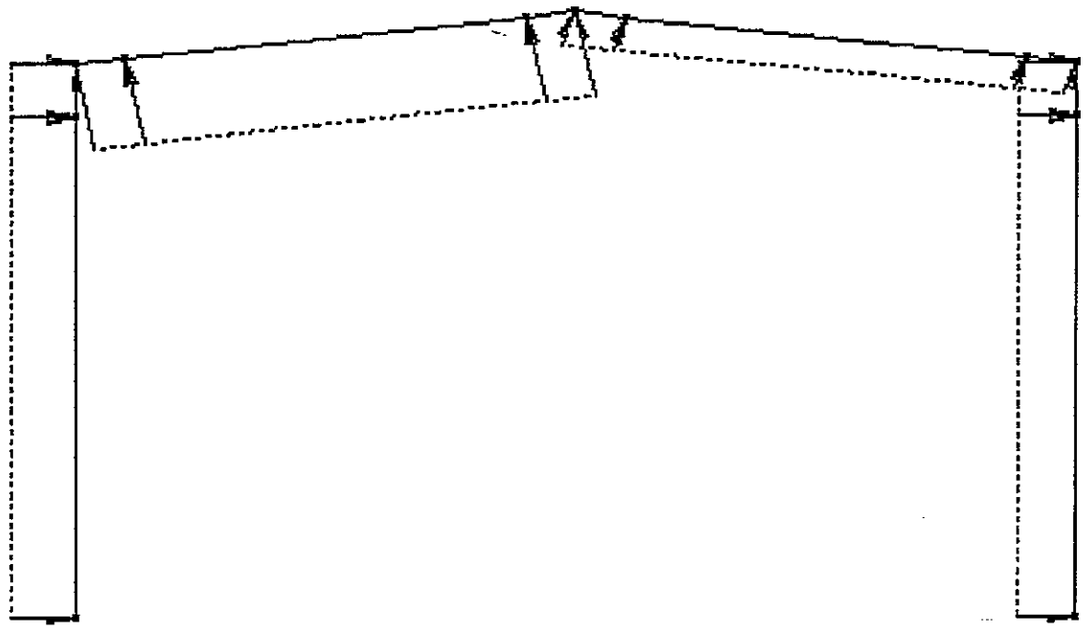
ENTRY		X LINEAR (kN)	Z LINEAR (kN)
1	EXTERNAL LOADS SUM	.0000	-89.2882
2	REACTIONS SUM	.0000	89.2882

DBFL CONSULTING ENGINEERS

PAGE 7
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame —— MIN. DEAD + WIND

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl



Z B2 : Min. Dead & Wind

DstXZ 3kN/m

XStrXZ 7m

5.0E-001
12.17602

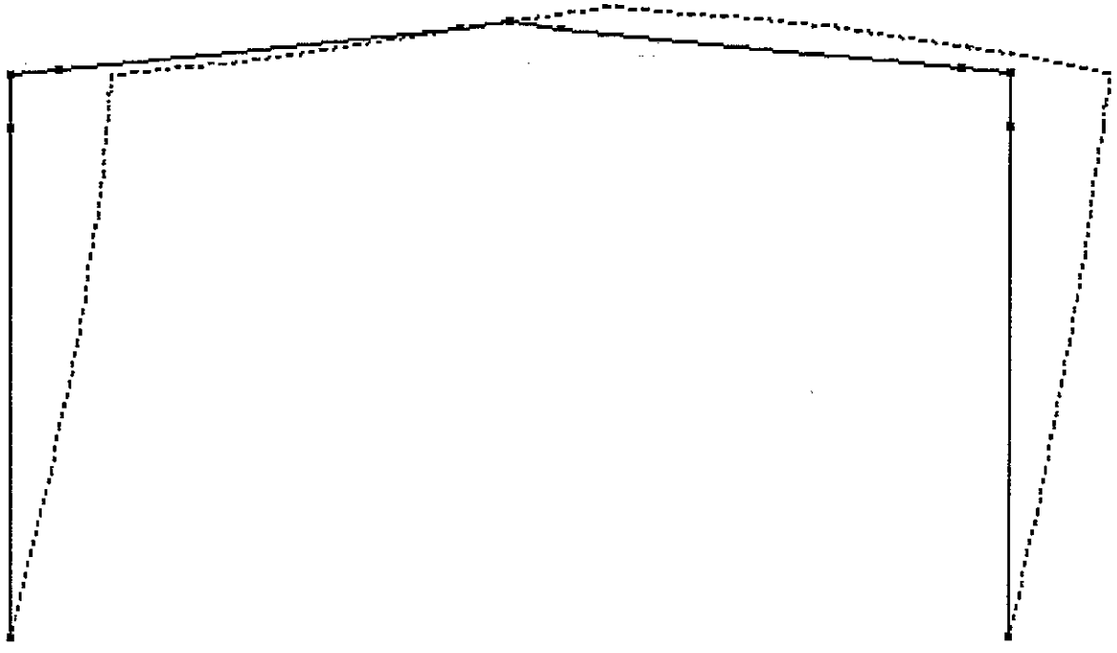
PACKAGING PRODUCTS LTD.

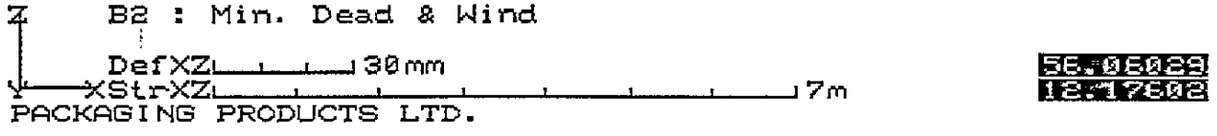
DBFL CONSULTING ENGINEERS

PAGE 8
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl





Basic Load Case B2 : Min. Dead & Wind
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
1	.00000	.00000	.00432
2	20.65847	.05742	.00152
3	21.53334	.06375	.00101
4	21.57734	-.34273	.00037
5	21.23633	3.02667	-.00082
6	21.19107	3.47559	-.00067
7	21.22883	3.82004	-.00048
8	20.95603	1.12254	.00172
9	20.83986	.00639	.00200
10	19.38622	.00576	.00221

DBFL CONSULTING ENGINEERS

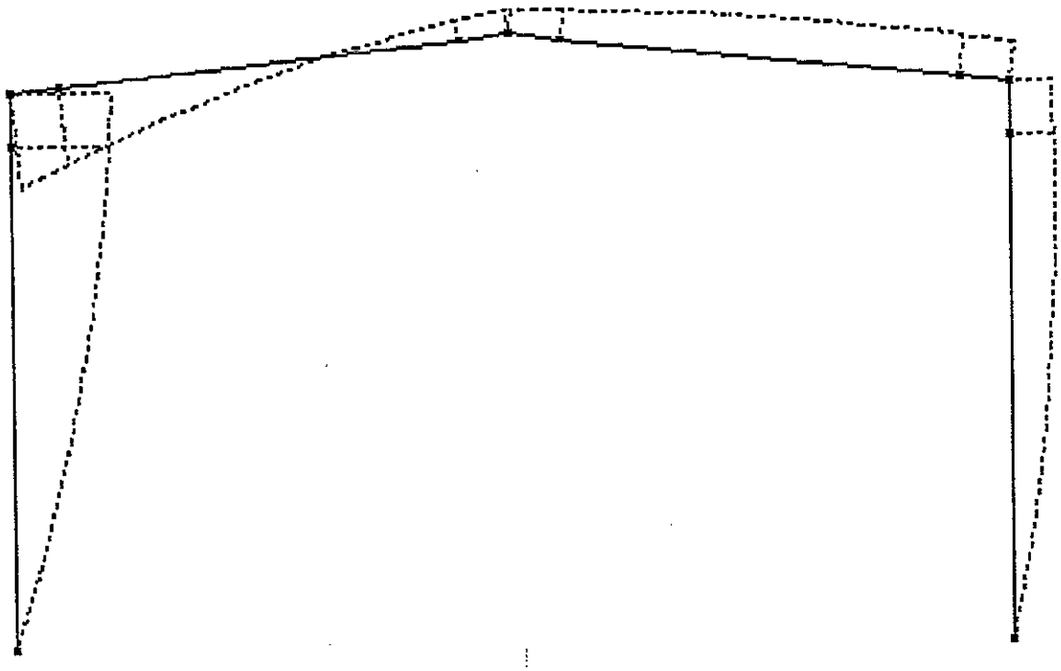
PAGE 9
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

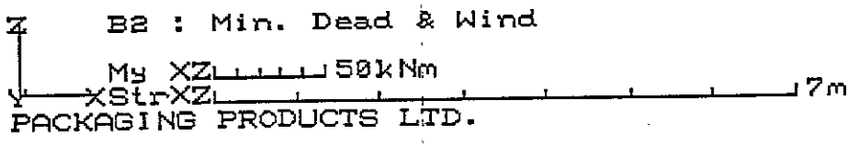
PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel)
Data File : 12mportl

Basic Load Case B2 : Min. Dead & Wind
Joint Displacements

JOINT	X LINEAR (mm)	Z LINEAR (mm)	Y ROTATION (rad)
11	.00000	.00000	.00365



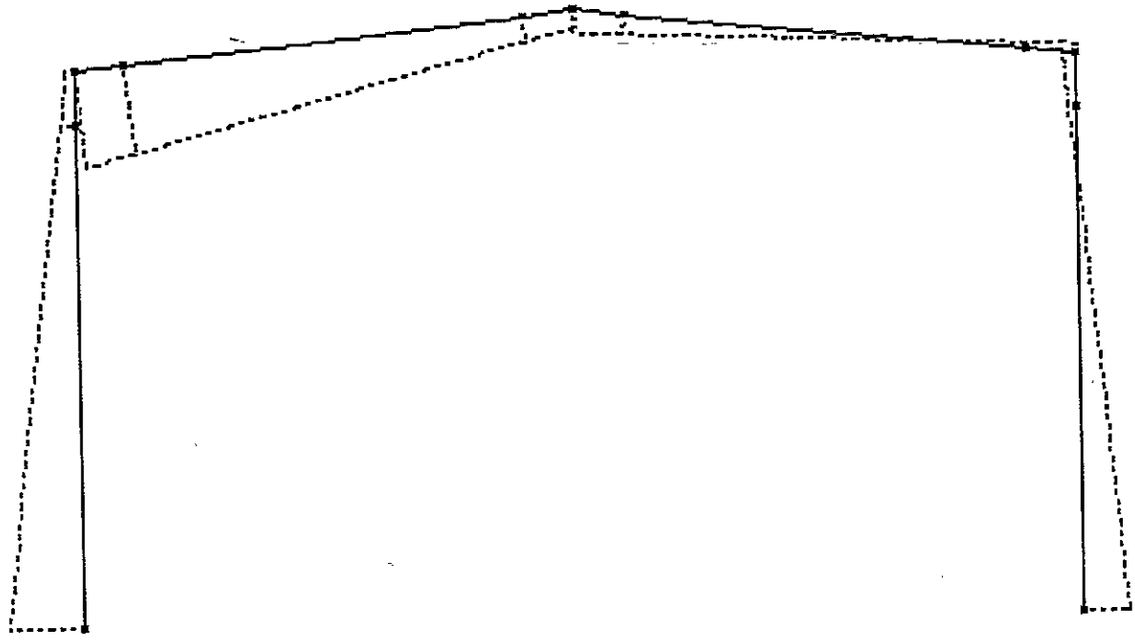


DBFL CONSULTING ENGINEERS

PAGE 10
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl



Basic Load Case B2 : Min. Dead & Wind
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
1	1	-16.0578	11.7229	.0000
1	2	-16.0578	2.3329	43.9947
2	2	-16.0578	2.3329	43.9947
2	3	-16.0578	1.2979	45.2474
3	3	-2.9677	-15.8344	45.2474
3	4	-3.1126	-14.5298	36.0880
4	4	-3.1126	-14.5298	36.0880
4	5	-4.2718	-4.0923	-8.8507
5	5	-4.2718	-4.0923	-8.8507
5	6	-4.4167	-2.7877	-10.9261

DBFL CONSULTING ENGINEERS

PAGE 11
JOB NO. 9214
RUN NO. 1
AUTHOR PMF
DATE 3/2/92

PACKAGING PRODUCTS LTD.
12m Portal Frame

EN202: PLANE FRAME/FINITE ELEMENT ANALYSIS-V4.0 (c) ENCAD SYSTEMS LTD. 1991
Units: S.I. METRIC (Steel) Data File : 12mportl

Basic Load Case B2 : Min. Dead & Wind
Member End Forces

MBR	JOINT	AXIAL Nx (kN)	SHEAR Sz (kN)	MOMENT My (kNm)
6	6	-3.7413	-3.6443	-10.9261
6	7	-3.5964	-3.1420	-12.9732
7	7	-3.5964	-3.1420	-12.9732
7	8	-2.4372	.8764	-18.4405
8	8	-2.4372	.8764	-18.4405
8	9	-2.2923	1.3787	-17.7603
9	9	-1.6105	-2.1358	-17.7603
9	10	-1.6105	-1.2043	-18.9126
10	10	-1.6105	-1.2043	-18.9126
10	11	-1.6105	7.2467	.0000

Basic Load Case B2 : Min. Dead & Wind
Support Reactions

JOINT	X FORCE (kN)	Z FORCE (kN)	Y MOMENT (kNm)
1	-11.7229	-16.0578	.0000
11	-7.2467	-1.6105	.0000

Basic Load Case B2 : Min. Dead & Wind
Load Balance

ENTRY		X LINEAR (kN)	Z LINEAR (kN)
1	EXTERNAL LOADS SUM	18.9696	17.6683
2	REACTIONS SUM	-18.9696	-17.6683

CALCULATION SHEET	Page No. FD – 1	Project No. 9214
Project Packaging Industries Ltd. – Industrial Unit	By FMF	Chd.
Section Frame Design	Date Jan '92	Date

DBEL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

Frame Design

1.1 19m Portal Frame

1.1.1 Stanchion Design

$l_x = 1.5 \times 6950 = 10425$ mm

$l_y = 0.75 \times 6950 = 5213$ mm

Axial Load = 64.2 kN (from rafter loading) — p. A-9

Add s-w stanchion, eaves beam, side sheeting

= 6.4 + 1.5 + 6.4 = 14.3 kN

$\Sigma F = 64.3 + 14.3 = 78.6$ kN

$M = 173.3$ kN-m — p. A-9

Try 533 x 210 x 92 kg/m U-B

$\left(\frac{l}{r}\right)_x = \frac{10425}{217} = 48$; $\left(\frac{l}{r}\right)_y = \frac{5213}{45.1} = 115.6$, $\frac{D}{T} = 34$

$p_c = 63.4$ N/mm² ; $p_{bc} = 140.4$ N/mm²

$f_c = \frac{78.6 \times 10^3}{11800} = 6.66$ N/mm²

$f_{bc} = \frac{173.3 \times 10^6}{2,080,000} = 82.2$ N/mm²

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{6.66}{63.4} + \frac{82.2}{140.4} = 0.11 + 0.59 = 0.70$

Try reducing to 533 x 210 x 82 kg/m U-B

$\left(\frac{l}{r}\right)_x = \frac{10,425}{213} = 49$; $\left(\frac{l}{r}\right)_y = \frac{5213}{45.8} = 119$; $\frac{D}{T} = 40$

$f_{bc} = 61$ N/mm² ; $f_{bc} = 137$ N/mm²

$f_c = \frac{78.6 \times 10^3}{10400} = 7.6$ N/mm²

$f_{bc} = \frac{172.8 \times 10^6}{1,800,000} = 96.0$ N/mm²

$\frac{f_c}{f_{bc}} + \frac{f_{bc}}{f_{bc}} = \frac{7.6}{61} + \frac{96.0}{137} = 0.12 + 0.70 = 0.82$ OK!

⇒ 533 × 210 × 82 kg/m U.C adequate

Note: Web buckling not significant !

1.1.2 Rafter Design

$l_x = 9552$ mm

$l_y = 0.5 \times 9552 = 4776$ mm

i.e. between nodes of rafter bracing

At eaves F = 21.0 kN
M = 173.2 kN·m ∴ A-9

At ridge F = 24.8 kN
M = 107.1 kN·m ⇒ Check 'eaves'

Try 457 × 191 × 67 kg/m U.C

$\left(\frac{l}{r}\right)_x = \frac{9552}{185} = 52$; $\left(\frac{l}{r}\right)_y = \frac{4776}{41.2} = 116$; $\frac{D}{T} = 36$

$f_{bc} = 63$ N/mm² ; $f_{bc} = 140$ N/mm²

$f_c = \frac{31.5 \times 10^3}{8540} = 3.7 \text{ N/mm}^2$

$f_{bc} = \frac{173.8 \times 10^6}{1,300,000} = 133.3 \text{ N/mm}^2$

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{3.7}{63} + \frac{133.3}{140} = 0.06 + 0.95 = 1.01$

Note: Moment at end of haunch = 117.8 kN-m

$\Rightarrow f_{bc} = 90.6 \text{ N/mm}^2$

$\therefore \frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = 0.71$ OK!

$\Rightarrow$ 457 x 191 x 67 kg/m U-B adequate.

Check Wind loading

Only necessary to check reversal situation

Rafter length may be fully in reversal $\Rightarrow l_y = 9552$

$\Rightarrow \left(\frac{l}{r}\right)_y = \frac{9552}{41.2} = 232$

$p_c = 18 \text{ N/mm}^2$; $p_{bc} = 56.6 \text{ N/mm}^2$

At ridge: $F = 6.7$ kN (p. A-21)

$M = 15.7$ kN-m

$f_c = \frac{6.7 \times 10^3}{8540} = 0.8 \text{ N/mm}^2$

$f_{bc} = \frac{15.7 \times 10^6}{1,300,000} = 12.1 \text{ N/mm}^2$

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{0.8}{18} + \frac{12.1}{56.6} = 0.04 + 0.21 = 0.25$ OK!

1.1.3 Deflection

$\Delta_{max\ vert.} = 48.8\ mm = \frac{l}{389}$ OK! — p. A-6

$\Delta_{max\ horiz.} = 9.2\ mm = \frac{h}{744}$ OK! — p. A-17

1.2 12m Portal Frame

1.2.1 Stanchion Design

$l_x = 10425\ mm$
$l_y = 5213\ mm$ — p. 1

Axial Load = 44.6 kN (from rafter loading) — p. A-27

Add S-W stanchion, eaves beam, side cladding
= 4.7 + 1.5 + 8.2 = 14.5 kN

based on 457 x 191 x 67 U-B

SF = 44.6 + 14.5 = 59.1 kN

M = 70.6 kN-m

Try 406 x 178 x 54 kg/m U-B. (although 457 x 191 x 67 input)

$\left(\frac{l}{r}\right)_x = \frac{10425}{165} = 63$; $\left(\frac{l}{r}\right)_y = \frac{5213}{38.5} = 135$; $\frac{D}{T} = 37$

$p_c = 49\ N/mm^2$; $p_{bc} = 120.5\ N/mm^2$

$f_c = \frac{59.1 \times 10^3}{6840} = 8.6\ N/mm^2$

$f_{bc} = \frac{70.6 \times 10^6}{925{,}000} = 76.3\ N/mm^2$

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{8.16}{49} + \frac{76.3}{120.5} = 0.18 + 0.63 = 0.81$ OK!

⇒ 406x178x54 kg/m U-B adequate for bending etc. but must check deflection (see below)

Check Wind Loading

Not significant in Stanchion design.

1.2.2 Rafter Design

l_x = 6032 mm

l_y = 0.5 x 6032 = 3016 mm
i.e. between roof & tie for bracing

At eaves F = 14.8 kN
M = 70.6 kN-m (p. A-27)

At ridge F = 10.1 kN
M = 57.0 kN-m ⇒ check 'eaves'

Try 406x178x54 kg/m U-B (as input)

$\left(\frac{l}{r}\right)_x = \frac{6032}{165} = 36.6$; $\left(\frac{l}{r}\right)_y = \frac{3016}{38.5} = 78$; $\frac{D}{T} = 37$

p_c = 106 N/mm² ; p_{bc} = 165 N/mm²

$f_c = \frac{14.8 \times 10^3}{6840} = 2.2$ N/mm²

$f_{bc} = \frac{70.6 \times 10^6}{925,000} = 76.3$ N/mm²

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{2.2}{106} + \frac{76.3}{165} = 0.02 + 0.46 = 0.48$ OK!

CALCULATION SHEET	Page No. FD-6	Project No. 9214
Project	By AWF	Chd.
Section Frame Design	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Check Wind Loading

Only necessary to check reversal situation

Rafter length may be fully in reversal $\Rightarrow l_y = 6032$ mm

$\Rightarrow \left(\frac{l}{r}\right)_y = \frac{6032}{38.5} = 156$

$p_c = 38\ N/mm^2$; $p_{bc} = 98\ N/mm^2$

Wind reversal $F = 2.4$ kN

$M = 18.4$ kN-m

$f_c = \frac{2.4 \times 10^3}{6840} = 0.4\ N/mm^2$

$f_{bc} = \frac{18.4 \times 10^6}{925{,}000} = 19.9\ N/mm^2$

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{0.4}{38} + \frac{19.9}{98} = 0.21$ OK!

$\Rightarrow$ 406 x 178 x 54 kg/m U-B more than adequate for bending etc. but must check deflection (see below).

11

1.2.3 Deflection

$\Delta_{max\ vert.} = 17.6\ mm = \frac{l}{681}$ OK! p. A-25

$\Delta_{max\ horiz} = 21.6\ mm = \frac{h}{322}$ ok! p. A-30

11

CALCULATION SHEET	Page No. FD-7	Project No. 9214
Project	By AVF	Chd.
Section Frame Design	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

1.3 Purlins

1.3.1 Purlins on 19m Frame

$l = 5.5m$

$c/c = \frac{9500}{6} = 1583$ say $1.6m$

Dead + Live loading = $1.23 - 0.18 = 1.05$ kN/m² (frame) — p. L-2

Wind Uplift = $(1.4 + 0.2) \times 0.65 - 0.2$ (sheeting + purlins) — p. L-3, p. L-4

$= 0.84$ kN/m²

Use Kingspan Overlap Purlin System

End Bay 178.15 *
Int. Bay 178.15

(* Use 178.15 end bay) good for 1.26 kN/m² — Kingspan p. 9

Total uplift on purlin = $0.84 \times 5.5 \times 1.6 = 7.4$ kN

with central sag rod can take 15.16 kN — OK! Kingspan p. 12

"

1.3.2 Purlins on 12m Frame

$l = 6m$

$c/c = \frac{6000}{4} = 1500$ $1.5m$

Dead + Live = 1.05 kN/m²

Wind Uplift = $(2.0 + 0.2) \times 0.65 - 0.2 = 1.23$ kN/m² — p. L-4

(Total on purlin = $1.23 \times 1.5 \times 6 = 11.1$ kN)

CALCULATION SHEET	Page No. FD-8	Project No. 9214
Project	By AMF	Chd.
Section Frame Design	Date Jan 92.	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Use Kingspan Overlap Purlin System

End Bay 178.18 good for 1.34 kN/m² (at 1.6 c/c) Kingspan p. 9

Int. Bays 178.15

With one line of sag rods purlin can take 13.65 kN > 11.1 OK! p. 12

1.4 Sheeting Rails

1.4.1 Sheeting Rails on 19m Frame & 12m Frame

l = 5.5m + 6m.

Wind loading

Take average of standard + high local p. L-3 p. L-4

$= \left(\frac{0.7 + 1.1}{2} + 0.3\right) \times 0.65$

$= 0.83$ kN/m² — pressure / suction

Take rails at 1.8m c/c.

Go for 178.18 Sleeved Sheeting Rails Kingspan p. 4.8

good for 1.06 kN/m² pressure

0.92 " suction

1.5 Roof + Wall Panelling

Kingspan 1000 Series

Double Span ; 1.8m span max.

With 35mm 'Panel Thickness' (0.55 / 0.4)

good for 2.52 pressure OK!

4.27 suction

Span metres	Section type End Bay	Section type Int. Bays	Total U.D.L. kN	APPLIED LOADS. kN/SQ. METRE. Centres of Purlins in metres 1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3
5.5	141.15	141.15	8.191	1.49	1.24	1.06	0.93	0.83	0.74	0.68	0.62	0.57	0.53	0.50
5.5	141.16	141.15	8.709	1.58	1.32	1.13	0.99	0.88	0.79	0.72	0.66	0.61	0.57	0.53
5.5	141.18	141.15	9.737	1.77	1.48	1.26	1.11	0.98	0.89	0.80	0.74	0.68	0.63	0.59
5.5	141.20	141.15	10.752	1.95	1.63	1.40	1.22	1.09	0.98	0.89	0.81	0.75	0.70	0.65
5.5	178.15	178.15	11.085	2.02	1.68	1.44	1.26	1.12	1.01	0.92	0.84	0.78	0.72	0.67
5.5	178.16	178.15	12.087	2.20	1.83	1.57	1.37	1.22	1.10	1.00	0.92	0.85	0.78	0.73
5.5	178.18	178.15	14.081	2.56	2.13	1.83	1.60	1.42	1.28	1.16	1.07	0.98	0.91	0.85
5.5	178.20	178.15	16.067	2.92	2.43	2.09	1.83	1.62	1.46	1.33	1.22	1.12	1.04	0.97
5.5	178.22	178.18	18.059	3.28	2.74	2.35	2.05	1.82	1.64	1.49	1.37	1.26	1.17	1.09
5.5	178.25	178.20	21.041	3.83	3.19	2.73	2.39	2.13	1.91	1.74	1.59	1.47	1.37	1.28
5.5	202.16	202.16	15.099	2.75	2.29	1.96	1.72	1.53	1.37	1.25	1.14	1.06	0.98	0.92
5.5	202.18	202.16	17.721	3.22	2.69	2.30	2.01	1.79	1.61	1.46	1.34	1.24	1.15	1.07
5.5	202.20	202.16	20.339	3.70	3.08	2.64	2.31	2.05	1.85	1.68	1.54	1.42	1.32	1.23
5.5	202.22	202.18	22.947	4.17	3.48	2.98	2.61	2.32	2.09	1.90	1.74	1.60	1.49	1.39
5.5	233.18	233.18	22.179	4.03	3.36	2.88	2.52	2.24	2.02	1.83	1.68	1.55	1.44	1.34
5.5	233.20	233.18	25.639	4.66	3.88	3.33	2.91	2.59	2.33	2.12	1.94	1.79	1.66	1.55
6	141.15	141.15	6.839	1.14	0.95	0.81	0.71	0.63	0.57	0.52	0.47	0.44	0.41	0.38
6	141.16	141.15	7.272	1.21	1.01	0.87	0.76	0.67	0.61	0.55	0.51	0.47	0.43	0.40
6	141.18	141.15	8.131	1.36	1.13	0.97	0.85	0.75	0.68	0.62	0.56	0.52	0.48	0.45
6	141.20	141.15	8.978	1.50	1.25	1.07	0.94	0.83	0.75	0.68	0.62	0.58	0.53	0.50
6	178.15	178.15	10.126	1.69	1.41	1.21	1.05	0.94	0.84	0.77	0.70	0.65	0.60	0.56
6	178.16	178.15	11.043	1.84	1.53	1.31	1.15	1.02	0.92	0.84	0.77	0.71	0.66	0.61
6	178.18	178.15	12.866	2.14	1.79	1.53	1.34	1.19	1.07	0.97	0.89	0.82	0.77	0.71
6	178.20	178.15	14.682	2.45	2.04	1.75	1.53	1.36	1.22	1.11	1.02	0.94	0.87	0.82
6	178.22	178.18	16.504	2.75	2.29	1.96	1.72	1.53	1.38	1.25	1.15	1.06	0.98	0.92
6	178.25	178.20	19.231	3.21	2.67	2.29	2.00	1.78	1.60	1.46	1.34	1.23	1.14	1.07
6	202.16	202.16	13.799	2.30	1.92	1.64	1.44	1.28	1.15	1.05	0.96	0.88	0.82	0.77
6	202.18	202.16	16.197	2.70	2.25	1.93	1.69	1.50	1.35	1.23	1.12	1.04	0.96	0.90
6	202.20	202.16	18.593	3.10	2.58	2.21	1.94	1.72	1.55	1.41	1.29	1.19	1.11	1.03
6	202.22	202.18	20.977	3.50	2.91	2.50	2.19	1.94	1.75	1.59	1.46	1.34	1.25	1.17
6	202.25	202.20	24.522	4.09	3.41	2.92	2.55	2.27	2.04	1.86	1.70	1.57	1.46	1.36
6	233.18	233.18	20.277	3.38	2.82	2.41	2.11	1.88	1.69	1.54	1.41	1.30	1.21	1.13
6	233.20	233.18	23.444	3.91	3.26	2.79	2.44	2.17	1.95	1.78	1.63	1.50	1.40	1.30
6	233.22	233.18	26.599	4.43	3.69	3.17	2.77	2.46	2.22	2.02	1.85	1.71	1.58	1.48
6	233.25	233.20	31.323	5.22	4.35	3.73	3.26	2.90	2.61	2.37	2.18	2.01	1.86	1.74
6.5	178.15	178.15	9.313	1.43	1.19	1.02	0.90	0.80	0.72	0.65	0.60	0.55	0.51	0.48
6.5	178.16	178.15	10.156	1.56	1.30	1.12	0.98	0.87	0.78	0.71	0.65	0.60	0.56	0.52
6.5	178.18	178.15	11.835	1.82	1.52	1.30	1.14	1.01	0.91	0.83	0.76	0.70	0.65	0.61
6.5	178.20	178.15	13.507	2.08	1.73	1.48	1.30	1.15	1.04	0.94	0.87	0.80	0.74	0.69
6.5	178.22	178.16	14.789	2.28	1.90	1.63	1.42	1.26	1.14	1.03	0.95	0.88	0.81	0.76
6.5	178.25	178.18	16.668	2.56	2.14	1.83	1.60	1.42	1.28	1.17	1.07	0.99	0.92	0.85
6.5	202.16	202.16	12.695	1.95	1.63	1.40	1.22	1.09	0.98	0.89	0.81	0.75	0.70	0.65
6.5	202.18	202.16	14.904	2.29	1.91	1.64	1.43	1.27	1.15	1.04	0.96	0.88	0.82	0.76
6.5	202.20	202.16	17.109	2.63	2.19	1.88	1.65	1.46	1.32	1.20	1.10	1.01	0.94	0.88
6.5	202.22	202.18	19.305	2.97	2.48	2.12	1.86	1.65	1.49	1.35	1.24	1.14	1.06	0.99
6.5	202.25	202.20	22.571	3.47	2.89	2.48	2.17	1.93	1.74	1.58	1.45	1.34	1.24	1.16
6.5	233.18	233.18	18.663	2.87	2.39	2.05	1.79	1.60	1.44	1.31	1.20	1.10	1.03	0.96
6.5	233.20	233.18	21.581	3.32	2.77	2.37	2.08	1.84	1.66	1.51	1.38	1.28	1.19	1.11
6.5	233.22	233.18	24.488	3.77	3.14	2.69	2.35	2.09	1.88	1.71	1.57	1.45	1.35	1.26
6.5	233.25	233.20	28.839	4.44	3.70	3.17	2.77	2.46	2.22	2.02	1.85	1.71	1.58	1.48
6.5	233.30	233.22	36.035	5.54	4.62	3.96	3.46	3.08	2.77	2.52	2.31	2.13	1.98	1.85
6.5	263.20	262.20	24.989	3.84	3.20	2.75	2.40	2.14	1.92	1.75	1.60	1.48	1.37	1.28
6.5	263.22	263.20	28.475	4.38	3.65	3.13	2.74	2.43	2.19	1.99	1.83	1.68	1.56	1.46
6.5	263.25	262.20	33.693	5.18	4.32	3.70	3.24	2.88	2.59	2.36	2.16	1.99	1.85	1.73
6.5	263.28	263.22	38.892	5.98	4.99	4.27	3.74	3.32	2.99	2.72	2.49	2.30	2.14	1.99
6.5	263.30	263.25	42.353	6.52	5.43	4.65	4.07	3.62	3.26	2.96	2.71	2.51	2.33	2.17

Kingspan Overlap Purlin System

Wind Uplift Load Tables

Nett Loads including Purlin Weight kN

The load tables for Kingspan Zed Purlins are relevant only when fitted in accordance with instructions given in this manual.
The loads given in the tables are for the net wind uplift to which the dead load of the cladding system should be added. The self weight of the purlin has been included.

The loads given in the tables have been confirmed by full scale tests and calculated in accordance with BS 5950 : Part 5 : 1987 using a load factor of 1.4.
For roof slopes in excess of 25° please contact our technical department.

Section												
End Bay	141.15		141.16		141.18		141.20		178.15		178.16	
Int. Bay	141.15		141.15		141.15		141.15		178.15		178.15	
Span	Number of Sag Rods											
metres	1	2	1	2	1	2	1	2	1	2	1	2
4	12.485	13.68	13.547	14.84	15.653	17.15	14.24	15.59	16.323	17.88	20.703	22.68
4.5	11.125	12.19	12.071	13.22	13.717	15.02	12.69	13.90	14.540	15.93	15.845	17.36
5	10.040	11.00	9.980	10.93	11.158	12.22	11.46	12.55	13.118	14.37	14.294	15.66
5.5	7.795	8.54	8.289	9.08	9.268	10.15	10.23	11.21	11.957	13.10	13.029	14.27
6	6.590	7.22	7.007	7.68	7.835	8.58	8.65	9.48	10.992	12.04	11.977	13.12
6.5									9.814	10.75	10.440	11.44
7									8.508	9.32	9.051	9.91
7.5									7.457	8.17	7.933	8.69

Section												
End Bay	178.18		178.20		178.22		178.25		202.16		202.18	
Int. Bay	178.15		178.15		178.18		178.20		202.16		202.16	
Span	Number of Sag Rods											
metres	1	2	1	2	1	2	1	2	1	2	1	2
4	20.703	22.68	23.607	25.86	21.25	23.28	24.74	27.10	22.173	24.29		
4.5	18.440	20.20	21.025	23.03	18.95	20.76	22.04	24.14	19.747	21.63		
5	16.634	18.22	18.965	20.77	17.09	18.71	19.89	21.79	17.811	19.51	20.878	22.87
5.5	15.159	16.60	17.282	18.93	15.58	17.06	18.13	19.86	16.230	17.78	19.024	20.84
6	13.646	14.95	15.081	16.52	14.33	15.69	16.67	18.26	14.917	16.34	17.482	19.15
6.5	11.683	12.80	12.911	14.14	13.27	14.53	15.44	16.92	13.807	15.12	16.181	17.72
7	10.128	11.09	11.194	12.26	12.25	13.41	13.80	15.12	12.861	14.09	14.949	16.37
7.5	8.88	9.72	9.813	10.75	10.73	11.76	12.10	13.25	11.685	12.80	13.085	14.33
8									10.327	11.31	11.564	12.67
8.5									9.205	10.08	10.307	11.29
9											9.259	10.14

Section												
End Bay	202.20		202.22		202.25		233.18		233.20		233.22	
Int. Bay	202.18		202.18		202.20		233.18		233.18		233.18	
Span	Number of Sag Rods											
metres	1	2	1	2	1	2	1	2	1	2	1	2
5	23.943	26.22	26.992	29.56								
5.5	21.814	23.89	24.591	26.93	22.84	25.02	23.745	26.01	27.421	30.03		
6	20.044	21.95	22.594	24.75	21.18	23.20	21.815	23.89	25.191	27.59	28.555	31.28
6.5	18.550	20.32	20.901	22.89	19.61	21.48	20.186	22.11	23.307	25.53	26.419	28.94
7	16.532	18.11	18.099	19.82	18.27	20.02	18.794	20.59	21.697	23.77	24.951	26.93
7.5	14.470	15.85	15.843	17.35	17.12	18.75	17.591	19.27	20.306	22.24	23.012	25.21
8	12.789	14.01	14.003	15.34	15.80	17.31	16.541	18.12	19.092	20.91	21.172	23.19
8.5	11.400	12.49	12.482	13.67	14.08	15.43	15.543	17.02	17.199	18.84	18.842	20.64
9	10.239	11.22	11.211	12.28	12.65	13.86	13.937	15.27	15.421	16.89	16.894	18.50
9.5							12.580	13.78	13.921	15.25	15.252	16.71
10											13.853	15.17

Kingspan Sleeved Sheeting Rail System

Load Tables Cont.

Span metres	Section type	Load type	Total U.D.L. kN	APPLIED LOADS. kN/SQ. METRE. Centres of Sheeting Rails in metres 1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3
6	141.15	Pressure	6.733	1.12	0.94	0.80	0.70	0.62	0.56	0.51	0.47	0.43	0.40	0.37
6		Suction	6.147	1.02	0.85	0.73	0.64	0.57	0.51	0.47	0.43	0.39	0.37	0.34
6	141.16	Pressure	7.334	1.22	1.02	0.87	0.76	0.68	0.61	0.56	0.51	0.47	0.44	0.41
6		Suction	6.696	1.12	0.93	0.80	0.70	0.62	0.56	0.51	0.47	0.43	0.40	0.37
6	141.18	Pressure	8.521	1.42	1.18	1.01	0.89	0.79	0.71	0.65	0.59	0.55	0.51	0.47
6		Suction	7.781	1.30	1.08	0.93	0.81	0.72	0.65	0.59	0.54	0.50	0.46	0.43
6	141.20	Pressure	9.701	1.62	1.35	1.15	1.01	0.90	0.81	0.73	0.67	0.62	0.58	0.54
6		Suction	8.856	1.48	1.23	1.05	0.92	0.82	0.74	0.67	0.62	0.57	0.53	0.49
6	178.15	Pressure	8.924	1.49	1.24	1.06	0.93	0.83	0.74	0.68	0.62	0.57	0.53	0.50
6		Suction	8.148	1.36	1.13	0.97	0.85	0.75	0.68	0.62	0.57	0.52	0.49	0.45
6	178.16	Pressure	9.766	1.63	1.36	1.16	1.02	0.90	0.81	0.74	0.68	0.63	0.58	0.54
6		Suction	8.916	1.49	1.24	1.06	0.93	0.83	0.74	0.68	0.62	0.57	0.53	0.50
6	178.18	Pressure	11.425	1.90	1.59	1.36	1.19	1.06	0.95	0.87	0.79	0.73	0.68	0.63
6		Suction	10.431	1.74	1.45	1.24	1.09	0.97	0.87	0.79	0.72	0.67	0.62	0.58
6	178.20	Pressure	13.061	2.18	1.81	1.55	1.36	1.21	1.09	0.99	0.91	0.84	0.78	0.73
6		Suction	11.924	1.99	1.66	1.42	1.24	1.10	0.99	0.90	0.83	0.76	0.71	0.66
6	178.22	Pressure	14.686	2.45	2.04	1.75	1.53	1.36	1.22	1.11	1.02	0.94	0.87	0.82
6		Suction	13.408	2.23	1.86	1.60	1.40	1.24	1.12	1.02	0.93	0.86	0.80	0.74
6	178.25	Pressure	17.062	2.84	2.37	2.03	1.78	1.58	1.42	1.29	1.18	1.09	1.02	0.95
6		Suction	15.578	2.60	2.16	1.85	1.62	1.44	1.30	1.18	1.08	1.00	0.93	0.87
6	202.16	Pressure	12.698	2.12	1.76	1.51	1.32	1.18	1.06	0.96	0.88	0.81	0.76	0.71
6		Suction	11.593	1.93	1.61	1.38	1.21	1.07	0.97	0.88	0.81	0.74	0.69	0.64
6	202.18	Pressure	14.932	2.49	2.07	1.78	1.56	1.38	1.24	1.13	1.04	0.96	0.89	0.83
6		Suction	13.633	2.27	1.89	1.62	1.42	1.26	1.14	1.03	0.95	0.87	0.81	0.76
6	202.20	Pressure	17.142	2.86	2.38	2.04	1.79	1.59	1.43	1.30	1.19	1.10	1.02	0.95
6		Suction	15.651	2.61	2.17	1.86	1.63	1.45	1.30	1.19	1.09	1.00	0.93	0.87
6	202.22	Pressure	19.319	3.22	2.68	2.30	2.01	1.79	1.61	1.46	1.34	1.24	1.15	1.07
6		Suction	17.638	2.94	2.45	2.10	1.84	1.63	1.47	1.34	1.22	1.13	1.05	0.98
6	202.25	Pressure	21.998	3.67	3.06	2.62	2.29	2.04	1.83	1.67	1.53	1.41	1.31	1.22
6		Suction	20.084	3.35	2.79	2.39	2.09	1.86	1.67	1.52	1.39	1.29	1.20	1.12
6	233.18	Pressure	19.158	3.19	2.66	2.28	2.00	1.77	1.60	1.45	1.33	1.23	1.14	1.06
6		Suction	17.492	2.92	2.43	2.08	1.82	1.62	1.46	1.33	1.21	1.12	1.04	0.97
6	233.20	Pressure	22.132	3.69	3.07	2.63	2.31	2.05	1.84	1.68	1.54	1.42	1.32	1.23
6		Suction	20.208	3.37	2.81	2.41	2.11	1.87	1.68	1.53	1.40	1.30	1.20	1.12
6	233.22	Pressure	25.072	4.18	3.48	2.98	2.61	2.32	2.09	1.90	1.74	1.61	1.49	1.39
6		Suction	22.891	3.82	3.18	2.73	2.38	2.12	1.91	1.73	1.59	1.47	1.36	1.27
6	233.25	Pressure	29.412	4.90	4.09	3.50	3.06	2.72	2.45	2.23	2.04	1.89	1.75	1.63
6		Suction	26.853	4.48	3.73	3.20	2.80	2.49	2.24	2.03	1.86	1.72	1.60	1.49

CALCULATION SHEET	Page No. FD-12	Project No. 9214
Project	By RJF	Chd.
Section Frame Design	Date Jan '92	Date

DBEL CONSULTING CIVIL & STRUCTURAL ENGINEERS

1.6 Gable Ends

Design wrt 19m frame end.

c/c columns = 6.3m (say)

Reaction to gable beam

= 1.23 x 3 + 0.2 x 2 + 0.25 kp. 4-3
roof side cladding s-w

= 4.34 kN/m

From wind table

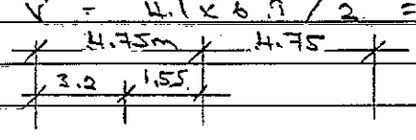
udl = 0.65 x 1 (say) = 0.65 kN/m

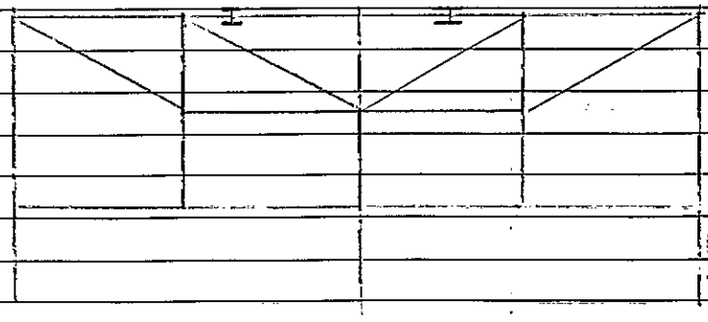
Point load : Max. col. ht. = 6.9m

Wind to col. = 0.65 x 6.3 = 4.1 kN/m

M = 4.1 x 6.9² / 8 = 24.4 kN-m

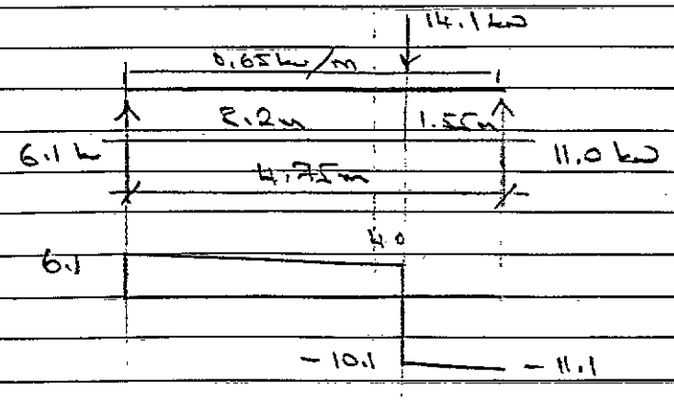
V = 4.1 x 6.9 / 2 = 14.1 kN





M_{x-x} = 4.34 x 6.3² / 8 = 21.5 kN-m

M_{y-y} :



CALCULATION SHEET	Page No. FD-13	Project No. 9214
Project	By PWF	Chd.
Section Frame Design	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

$N_{y-y} = 6.1 \times 3.2 - 0.65 \times 3.2^2/2 = \underline{16.2\ kN\text{-}m}$

$l_x = 6300$; $l_y = 1600$ (c/c purlins)

Try $\underline{203 \times 203 \times 46\ kg/m\ U\text{-}C}$ (Also see p. 15)

$\left(\frac{l}{r}\right)_x = \frac{6300}{88.1} = 72$; $\left(\frac{l}{r}\right)_{yy} = \frac{1600}{51.1} = 31.3$

$p_{bc} = 165\ N/mm^2$

$f_{bc} = \frac{21.5 \times 10^6}{449,500} + \frac{16.2 \times 10^6}{151,000} = 47.9 + 107.3 = 155.2\ N/mm^2$ OK!

Check Web: d : $d_{web} = 450$ p. 12

$\Delta = \frac{1}{384} \times \frac{0.65 \times 4.75 \times 10^3 \times 4750^2}{205,000 \times 1,540 \times 10^4} + \frac{14.1 \times 10^3 \times 4750^3}{48 \times 205,000 \times 1,540 \times 10^4} \left[\frac{3 \times 1550}{4750} - 4\left(\frac{1550}{4750}\right)^3\right]$

$= 1.4 + 8.4 = \underset{I_{y-y}}{9.8\ mm} = \frac{l}{484}$ OK! See p. 34

Internal Columns

Load to Col. $= F_v = 4.34 \times 6.3 + 0.2 \times 6.2 \times 5.8 = 34.7\ kN$

$M_{(max)} = 24.4\ kN\text{-}m$ p. 12

$l_x = 6900\ mm$; $l_y = 1800\ mm$ (c/c rafters)

With $203 \times 133 \times 25\ kg/m\ U\text{-}B$

$\Delta = 25\ mm = \frac{l}{275}$

Try $\underline{254 \times 146 \times 31\ kg/m\ U\text{-}B}$

$\left(\frac{l}{r}\right)_x = \frac{6900}{105} = 66$; $\left(\frac{l}{r}\right)_{yy} = \frac{1800}{33.5} = 54$

$p_c = 120\ N/mm^2$; $p_{bc} = 165\ N/mm^2$

$f_c = \frac{34.7 \times 10^3}{4000} = 8.7 \text{ N/mm}^2$

$f_{bc} = \frac{24.4 \times 10^6}{353,000} = 69.1 \text{ N/mm}^2$

$\frac{f_c}{f_{cx}} + \frac{f_{bc}}{f_{bc}} = \frac{8.7}{120} + \frac{69.1}{165} = 0.49$

$\Delta = \frac{5 \times 4.1 \times 6.9 \times 10^3 \times 6900^3}{384 \times 205,000 \times 4440 \times 10^4} = 13.8 \text{ mm} = \frac{h}{519}$ OK

f. 12

Corner Columns

Take $M_{x-x} = M_{y-y} = \frac{24.4}{2} = 12.2 \text{ kN-m}$ (approx) f. 12

Try 203 x 203 x 46 kg/m U-C

$f_{bc} = \frac{12.2 \times 10^6}{449,000} + \frac{12.2 \times 10^6}{151,000} = 27.2 + 80.8 = 108 \text{ N/mm}^2$

$\left(\frac{l}{r}\right)_x = \frac{6300}{88.1} = 72$; $\left(\frac{l}{r}\right)_y = \frac{6300}{51.1} = 123$; $D = 8.5$

$\Rightarrow f_c = 57 \text{ N/mm}^2$; $f_{bc} = 149.7 \text{ N/mm}^2$

Take axial load = 2.9 (S-W) + (0.8 + 2.1) (cover beams + cladding) x2 + $1.2 \times 6 \times \frac{6.0}{2} \times \frac{2}{2}$

= 22.2 kN

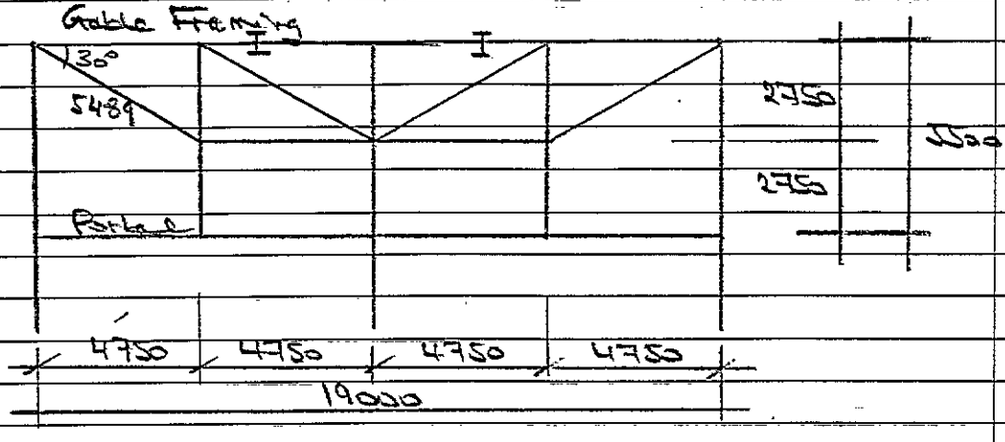
$f_c = \frac{22.2 \times 10^3}{5880} = 3.8 \text{ N/mm}^2$

$\frac{f_{cx}}{f_{cx}} + \frac{f_{bc}}{f_{bc}} = \frac{3.8}{57} + \frac{108}{149.7} = 0.07 + 0.72 = 0.79$ OK

Note: will have additional F_x due to tower bracing.

1.7 Rafter Level Bracing

1.7.1 19m Frame

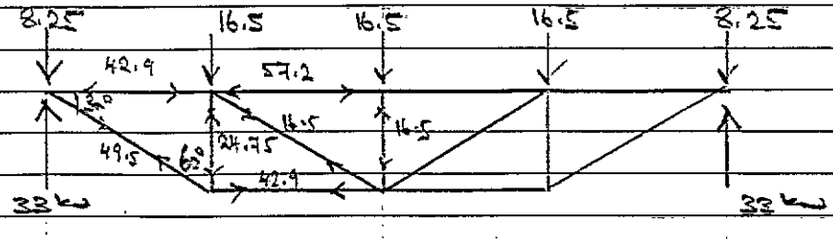


Wind loading from gable wall = 0.65 x 6.9/2 = 2.24 kN/m — p L-3

⇒ 2.24 x 19 = 43 kN

Roof Frictional Drag = 22 kN — p. L-3

ΣF_w = 43 + 22 = 65 kN



Design of Members

Gable Framing Beam (203x203x 46 U-C) : — pp. 12-13

$f_c = \frac{57.2 \times 10^3}{5880} = 9.7$ N/mm² ; $p_c = 113$ N/mm²

$\frac{f_c}{p_c} + \frac{f_b}{p_{bc}} = \frac{9.7}{1.25 \times 113} + \left(\frac{47.9}{165} + \frac{107.3}{1.25 \times 165}\right)$ — p. 13

= 0.07 + 0.81 = 0.88 OK!

Main Strut : $l_x = 5500 \times 0.85 = 4675$ mm

$l_y = 2750 \times 0.85 = 2337$ mm

$F_c = 24.75$ kN

Try 178 x 102 RSJ $\left(\frac{l}{r}\right)_y = \frac{2337}{23.9} = 98$

$\Rightarrow f_c = 81$ N/mm² (x 1.25)

$f_c = \frac{24.75 \times 10^3}{2420} = 10.2$ N/mm²

Try 152 x 89 RSJ $\left(\frac{l}{r}\right)_y = \frac{2337}{21} = 111.3$

$\Rightarrow f_c = 63$ N/mm²

$f_c = \frac{24.75 \times 10^3}{2050} = 12.1$ N/mm² ($\Delta = 1.11$ mm OK!)

Diagonal Tie : $F_t = 49.5$ kN ; $f_t = 155$ N/mm²

Area'd $= \frac{49.5 \times 10^3}{155} = 319$ mm²

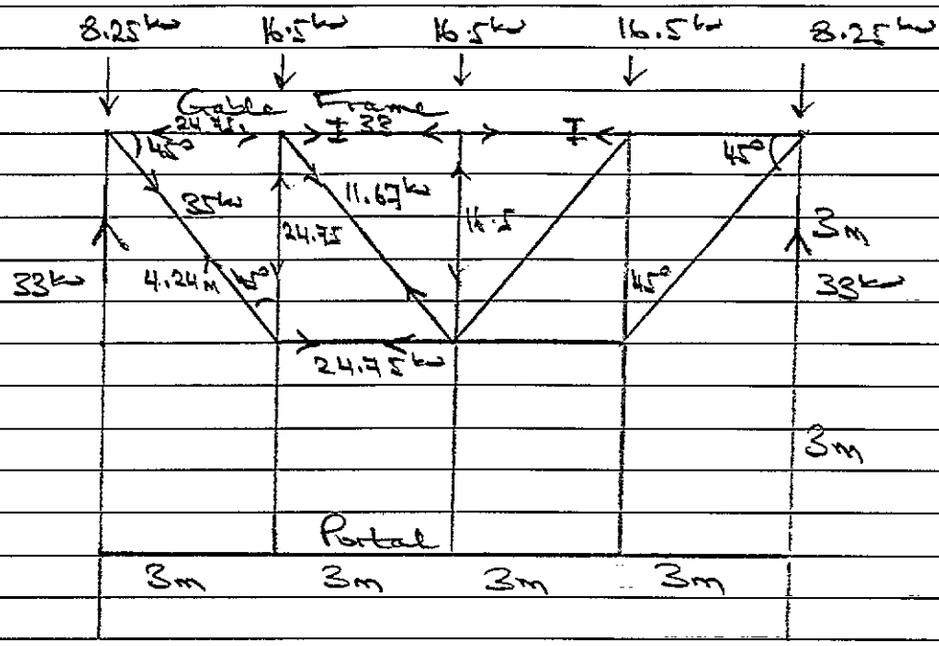
Use 70 x 70 x 6 RSA , $A = 818$ mm²

$\Delta = 9.94$ mm $= \frac{l}{550}$ OK!

Main Tie : $F_t = 42.9$ kN

Again use 70x70x6 RSA.

1.7.2 12m Frame



loads as per p. 15

All members as per 19m. frame

p/. 15-16

1.8 Eaves Beam

Take $l_x = l_y = 5.5m / 6m$

Beam must take compression to vertical forces; $F_c = 33$ kN

Vertical loading to beam

$= 1.23 \times \frac{1.6}{2} + 0.2 \times \frac{1.8}{2} + 0.2 = 1.146$ kN/m (S-W)

(roof) (cladding)

$M_x = 1.146 \times 6^2 / 8 = 6.6$ kN-m

Horiz. loading to beam $= 0.65 \times \frac{1.8}{2} = 0.585$ kN/m

$M_H = 0.585 \times 6^2 / 8 = 2.6$ kN-m

CALCULATION SHEET	Page No. FD-18	Project No. 9214
Project	By RJF	Chd.
Section Frame Design	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Try 254 x 146 x 31 kg/m U.B.

$\left(\frac{l}{r}\right)_y = \frac{6000}{33.5} = 179$; $\frac{D}{T} = 29$

$p_c = 29 \text{ N/mm}^2$; $p_{bc} = 80.5 \text{ N/mm}^2$

$f_c = \frac{32 \times 10^3}{4000} = 8.25 \text{ N/mm}^2$

$f_{bc} = \frac{6.6 \times 10^6}{353,000} + \frac{2.6 \times 10^6}{61,500} = 18.7 + 42.3 = 61 \text{ N/mm}^2$

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{8.25}{1.25 \times 29} + \frac{61}{1.25 \times 80.5} = 0.23 + 0.61 = 0.84$ OK

CALCULATION SHEET	Page No. FF 1	Project No. 9214
Project Packaging Industries Ltd. — Industries UNIT	By AHF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

First Floor

1.1 Loading

Check average loading from 100 block walls:

$\Sigma l = 6+8+6+1+5 = 26\,m$

$\Sigma W = 26 \times 2.6 \times 0.1 \times 22 = 148.7\,kN$

$A = 8\times8 + 7\times2 + 6\times2 = 90\,m^2$

Average $w = \frac{148.7}{90} = 1.65\,kN/m^2$

Taking above plus 'corridors' at $4.0\,kN/m^2$

$\Rightarrow \Sigma$ live $= 5.65\,kN/m^2$

Design for Live $= 6.0\,kN/m^2$

Dead:

Take 200 slab	=	$4.8\,kN/m^2$
Services etc.	=	1.0 "
		$5.8\,kN/m^2$

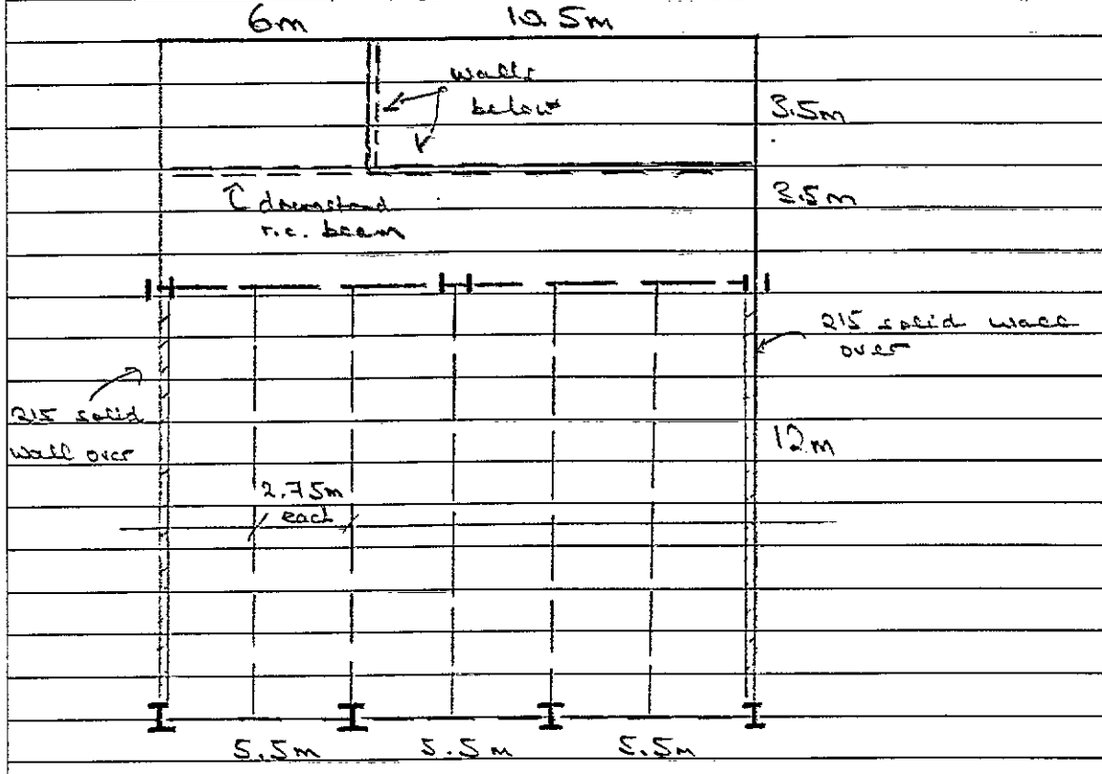
$G_k + Q_k = 5.8 + 6 = 11.8\,kN/m^2$

$1.4G_k + 1.6Q_k = 17.7\,kN/m^2$

CALCULATION SHEET	Page No. FF-2	Project No. 9214
Project	By AJF	Chd.
Section First Floor	Date Jan '92	Date

DBEL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

1.2 Design of First Floor Slab



Take l_{max} = 3.5m

M_{max} = 17.7 x 3.5² / 8 = 27 kN-m

V_{max} = 17.7 x 3.5 / 2 = 31 kN

Taking 200 deep slab

d = 200 − 30 − 10 = 160 mm

$K = \frac{27 \times 10^6}{10^3 \times 160^2 \times 25} = 0.03 \Rightarrow z = 0.95d = 152$ mm

A_s reqd = $\frac{27 \times 10^6}{0.87 \times 460 \times 152}$ = 444 mm²/m OK!

CALCULATION SHEET	Page No. FF-3	Project No. 9214
Project	By AMF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

$v = \frac{31 \times 10^3}{160 \times 10^2} = 0.19 \text{ N/mm}^2$ OK!

$\frac{M}{bd^2} = \frac{27 \times 10^6}{10^2 \times 160^2} = 1.05$

Tension Reinf. factor at face = 1.363

$\frac{l}{d}_{all'd} = 26 \times 1.363 = 35.44$

$\therefore l_{all'd} = 35.44 \times 160 = 5670$ mm OK!

Downstand from off corner of walls below

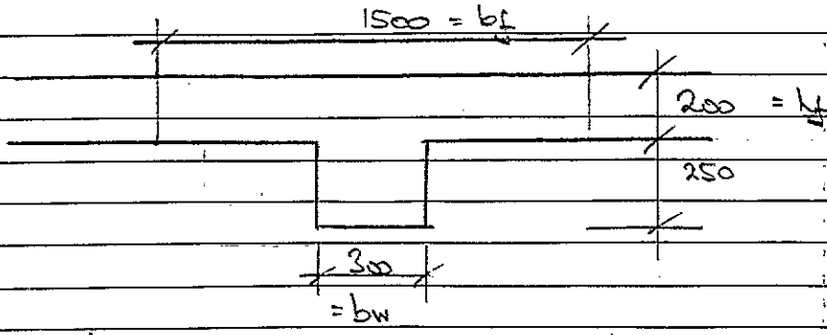
$l = 6$m

$W_{dL} = 17.7 \times 3.5 \times 1.1 = 68$ kN/m Say 70 kN/m (incl. S-W.)

$M_{max} = 70 \times 6^2/8 = 315$ kN-m

$V_{max} = 70 \times 6/2 = 210$ kN

Design as flanged beam, $b_f = b_w + \frac{6x}{5} = 300 + 1200 = 1500$



$\frac{b}{b_w} = \frac{1500}{300} = 5$; $\frac{d}{h_f} = \frac{400}{200} = 2$

$\Rightarrow \beta_f = 0.15$; $\beta_f f_{cu} bd^2 = 0.15 \times 35 \times 1500 \times 400^2 = 1{,}260$ kN-m

$> M_{max} = 315$ kN-m

CALCULATION SHEET	Page No. FF-4	Project No. 9214
Project	By PMF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

$$\therefore A_s = \frac{315\times10^6 + 0.1\times35\times300\times400\,(0.45\times400 - 200)}{0.87\times460\,(400 - 0.5\times200)} \quad *$$

$$= 2554\ mm^2$$

or without * $A_s = 2624\ mm^2$ $\left(3750 - 1720 = 2726\ mm^2\right)$

Increase beam width to 400 to suit placement of reinforcement.

$$v = \frac{210\times10^3}{400\times394} = 1.33\ N/mm^2$$

$$\frac{100A_s}{bd} = \frac{100\times2726}{400\times394} = 1.73$$

$$v_c = 0.76\times1.119 = 0.85\ N/mm^2$$

$$v - v_c = 0.48\ N/mm^2$$

$$\Rightarrow S_v = \frac{0.87\times410\times157}{400\,(1.33 - 0.85)} = 291\ mm$$

i.e. T10's at 250 c/c.

$$\frac{M}{bd^2} = \frac{215\times10^6}{1500\times394^2} = 1.35$$

Tension Reinf. factor = 1.26

$$\frac{l}{d\ adj'd} = 1.26\times20.8 = 26.2$$

$$\therefore l_{adj'd} = 26.2\times394 = 10.334\ m$$ OK!

1.3 Design of First Floor Beams

1.3.1 Beams at 2.75 m c/c

l = 12 m

Beams at 2.75 m c/c.

b = 12000 / 3 = 4000

or

= c/c + $b_{f,c}$ = 2750

or

= b_f + 12 d_f = 228 + 12 × 200 = 2628

$\therefore b$ = 2628 mm

Service Loading $G_k + Q_k$ = 11.8 kN/m² — f.1

Beams at 2.75 m c/c

$\Rightarrow$ Udl = 11.8 × 2.75 × 1.1 = 36 kN/m

2 continuity

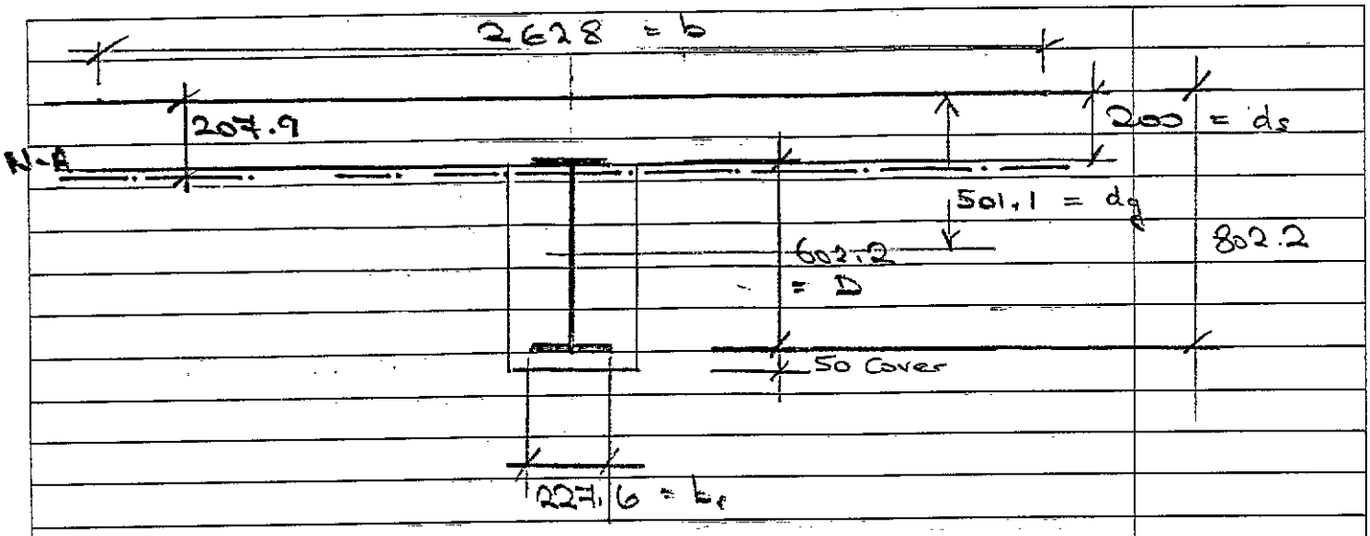
M_{max} (service) = $\frac{36 \times 12^2}{8}$ = 648 kN-m

$V_{max\ (service)}$ = $\frac{36 \times 12}{2}$ = 216 kN

Design as composite action beam with 200 thick concrete deck slab.

CALCULATION SHEET	Page No FF-6	Project No. 9214
Project	By DMF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS



Try 610 x 229 x 101 kg/m U-B.

Determine o/a N-A:

Moments of areas about interface =

$$\frac{b}{m} \times d_s \times \frac{d_s}{2} = \frac{2628}{15} \times 200 \times \frac{200}{2} = 3,504,000$$

$$A_s \times \frac{D}{2} = 12900 \times \frac{602.2}{2} = 3,884,190$$

$\Rightarrow$ N-A lies in steel

$$d_c = \frac{\left(\frac{2628 \times 200}{15}\right) \times 100 + 12900 \times 501.1}{\frac{2628 \times 200}{15} + 12900} = 207.9 \text{ mm}$$

$$I_g = \frac{2628 \times 200^3}{12 \times 15} + \frac{2628 \times 200}{15}(207.9 - 100)^2 + 757 \times 10^6 + 12900(501.1 - 207.9)^2$$

$$= 116.8 \times 10^6 + 403 \times 10^6 + 757 \times 10^6 + 1,109 \times 10^6$$

$$= 2390.8 \times 10^6 \text{ mm}^4$$

$$Z_{cc} = \frac{15 \times 2390.8 \times 10^6}{207.9} = 172.5 \times 10^6 \text{ mm}^3 \quad \text{(concrete units)}$$

$$Z_{st.} = \frac{2390.8 \times 10^6}{(802.2 - 207.9)} = 4.023 \times 10^6 \text{ mm}^3 \quad \text{(steel units)}$$

CALCULATION SHEET	Poge No. FF-7	Project No. 9214
Project	By PNF	Chd.
Section First Floor	Date Jan'92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

$M = 648\ kN\text{-}m$

$f_{cc} = \frac{648 \times 10^6}{172.5 \times 10^6} = 3.76\ N/mm^2 = 0.11 f_{cu}$

$f_{st\ bottom} = f_{bc} = \frac{648 \times 10^6}{4.023 \times 10^6} = 161\ N/mm^2 < 165$ ok!

$f_{st\ top} = f_{bc}$ ~ very small ok!

$\Rightarrow$ 200 slab over 610 x 229 x 101 kg/m U-B adequate.

$v = \frac{216 \times 10^3}{10.6 \times 602.2} = 33.8\ N/mm^2$

1.8.2 Edge beams at 2.75m c/c

$l = 12m$.

$b = 2750/2 = 1375mm$

Loading to beam:

from floor $= 11.8 \times 2.75/2 = 16.2\ kN/m$

from wall $= 0.215 \times 23 \times 3.1$ (av.) $= 14.6\ kN/m$

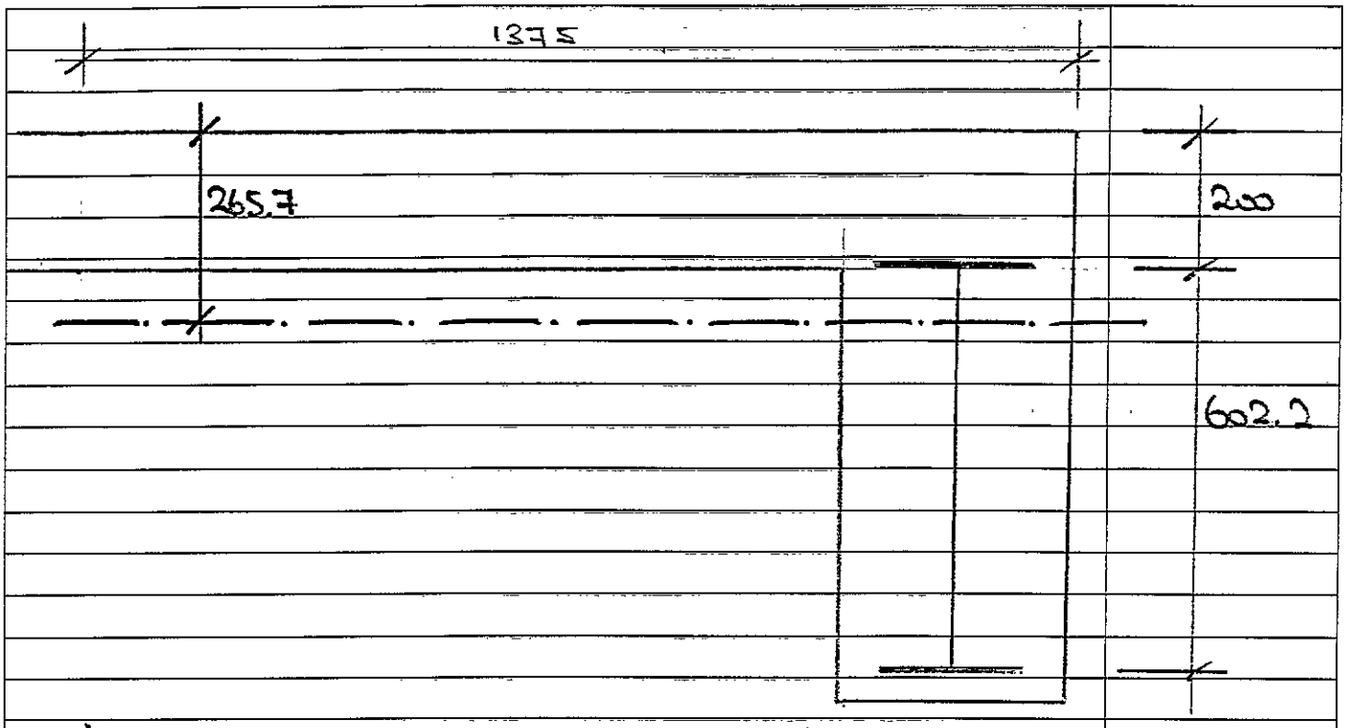
Σ udl $= 16.2 + 14.6 = 30.8\ kN/m$

$M_{max\ (service)} = \frac{30.8 \times 12^2}{8} = 554\ kN\text{-}m$

$V_{max\ (service)} = \frac{30.8 \times 12}{2} = 185\ kN$

CALCULATION SHEET	Page No. FF-8	Project No. 92.14
Project	By AJF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS



Again try 610 x 229 x 101 kg/m U-B

$$d_c = \frac{\left(\frac{1375 \times 200}{15}\right) \times 100 + 12900 \times 501.1}{\frac{1375 \times 200}{15} + 12900} = 265.7 \text{ mm}$$

$$I_g = \frac{1375 \times 200^3}{12 \times 15} + \frac{1375 \times 200}{15}\left(265.7 - 100\right)^2 + 757 \times 10^6 + 12900\left(501.1 - 265.7\right)^2$$

$$= 61.1 \times 10^6 + 503.4 \times 10^6 + 757 \times 10^6 + 714.8 \times 10^6$$

$$= 2,036.3 \times 10^6 \text{ mm}^4$$

$$Z_{cc} = \frac{15 \times 2,036.3 \times 10^6}{265.7} = 115 \times 10^6 \text{ mm}^3 \text{ (concrete units)}$$

$$Z_{st.} = \frac{2,036.3 \times 10^6}{(802.2 - 265.7)} = 3.8 \times 10^6 \text{ mm}^2 \text{ (steel units)}$$

$f_{cc} = \frac{554 \times 10^6}{115 \times 10^6} = 4.82 \text{ N/mm}^2 = 0.14 f_{cu}$ p.7

$f_{st\ bottom} = \frac{554 \times 10^6}{3.8 \times 10^6} = 145.8 \text{ N/mm}^2 < 165$ OK!

$f_{st\ lat} = f_{bc}$ ✓ smaller ⇒ OK!

⇒ 200 slab over 610 x 229 x 101 kg/m U-B

✓ OK! as before

1.33 Support Beam at Internal Support Line

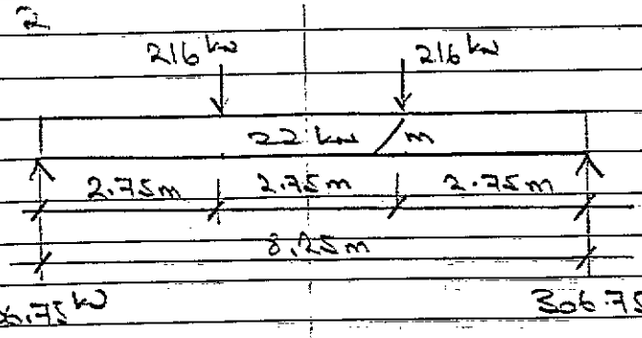
$l = 8.25\text{m}$

Loading to beam

Point loads at ½ points = 216 kN p.5

Udl from slab + beam S-W

$= \frac{11.8 \times 3.8}{2} + 1 = 21.65$ say 22 kN/m

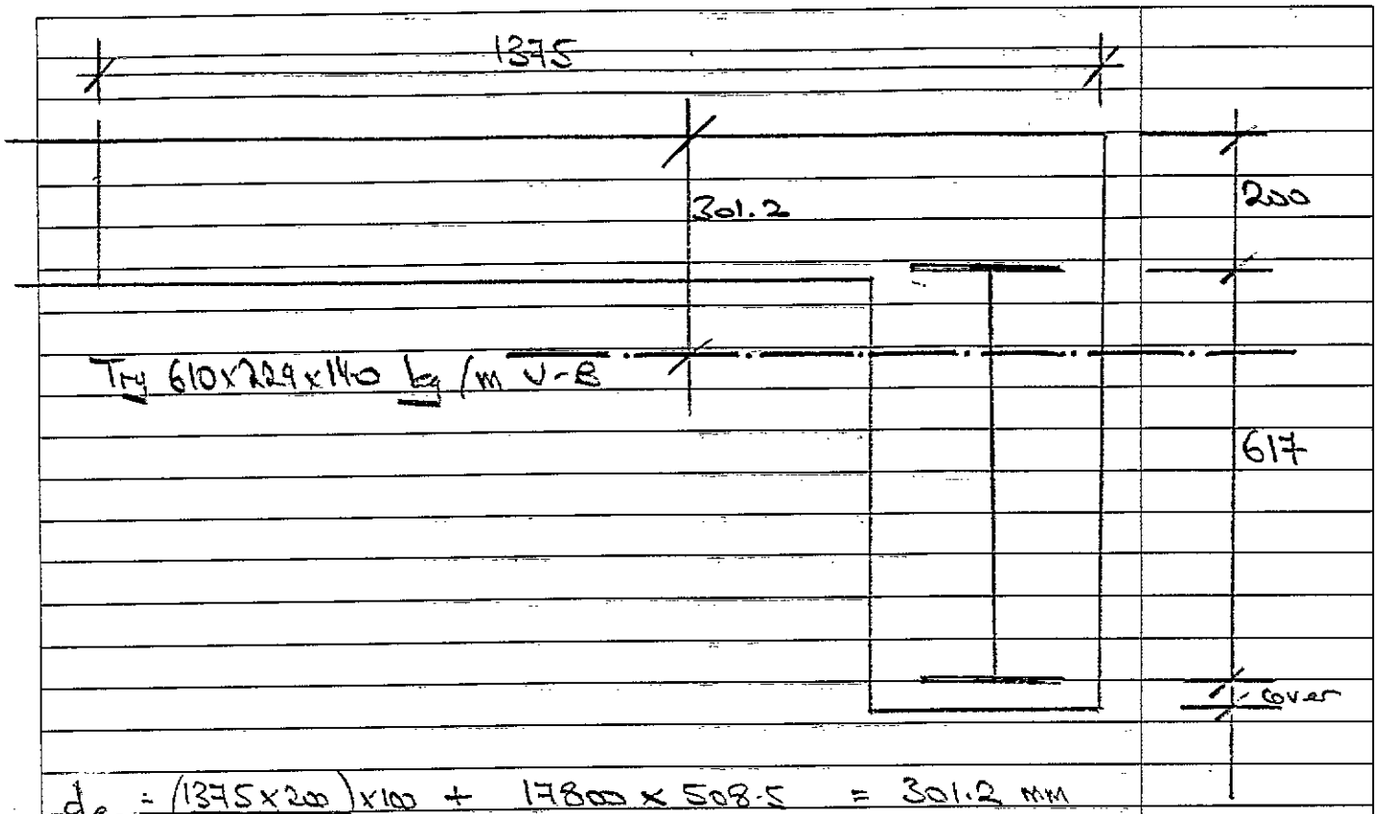


$N_{max} = \frac{306.75 \times 4.125 - 22 \times 4.125^2}{2} - 216 \times 1.375 = 481 \text{ kN-m}$

Based on 1.3 + 1.5 the same steel beam composite will not be adequate. Therefore try heavier section

CALCULATION SHEET	Page No. FF-10	Project No. 9214
Project	By PHF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS



Try 610x229x140 kg/m U-B

$$d_e = \frac{\left(\frac{1375 \times 200}{15}\right) \times 100 + 17800 \times 508.5}{\frac{1375 \times 200}{15} + 17800} = 301.2 \text{ mm}$$

$$I_g = \frac{1375 \times 200^3}{12 \times 15} + \frac{1375 \times 200}{15}(301.2 - 100)^2 + 1{,}120 \times 10^6 + 17800(508.5 - 301.2)^2$$

$$= (61.1 + 742.2 + 1{,}120 + 764.9) \times 10^6$$

$$= 2{,}688.2 \times 10^6 \text{ mm}^4$$

$$Z_{cc} = \frac{15 \times 2{,}688.2 \times 10^6}{301.2} = 133.9 \times 10^6 \text{ mm}^3 \quad \text{(concrete units)}$$

$$Z_{st} = \frac{2{,}688.2 \times 10^6}{(817 - 301.2)} = 5.21 \times 10^6 \text{ mm}^3 \quad \text{(steel units)}$$

$f_{cc} = 781 \times 10^6 / 133.9 \times 10^6 = 5.83 \text{ N/mm}^2 = 0.17 f_{cu}$ ϕ.9

$f_{st} = f_y = 781 \times 10^6 / 5.21 \times 10^6 = 150 \text{ N/mm}^2 < 165$ OK!

⇒ 200 slab over 610x229x140 kg/m U-B OK!

CALCULATION SHEET	Page No. FF-11	Project No. 9214
Project	By PMF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

1.3.4 Support Beam at External Support Line

i.e. onto stanchion of portal frames.

$l = 5.5\,m$

Loading to beam

Single point load at mid-span = 216 kN

$M_{max} = \frac{216 \times 5.5}{4} = 297$ kN-m

Do as standard internal beam

200 slab over 610 x 229 x 101 kg/m U-B

good for $M = 554$ kN-m

ff. F-9

1.4 Support Columns to First Floor

1.4.1 Central Columns

Load to max. loaded column

$= 216 + 2 \times 306.75 = 830$ kN

f.5 & 9

$l_e \approx 3.5\,m$

Use 254 x 254 x 73 kg/m U-C

$P_c = 1210$ kN

1.4.2 Check Stanchion of Portal Frames

Ref. calculations ff FD-1 & FD-2

Additional Axial Load to Stanchion

$= 216 + 2 \times \frac{216}{2} = 432$ kN

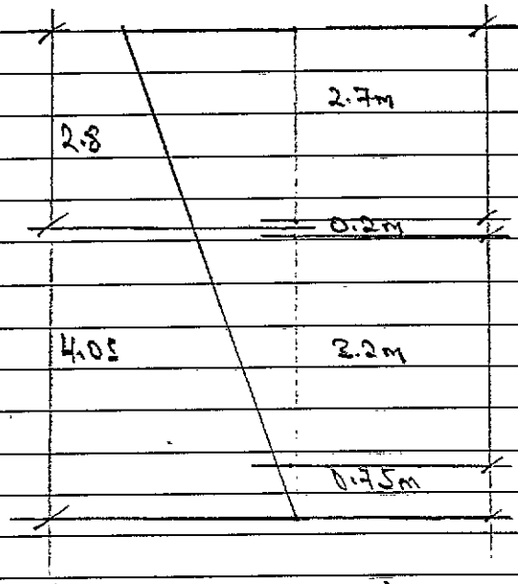
(above) & f.5

CALCULATION SHEET	Page No. FF-12	Project No. 9214
Project	By AMF	Chd.
Section First Floor	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

$\Sigma F_c = 432 + 78.6 = 510.6$ kN — p. FD-1

At level at which additional axial load occurs moment has reduced to approx. $178.2 \times \frac{4.05}{6.85} = 102.5$ kN-m — p. A-9



Conservatively take previous effective lengths — p. FD-2

$l_x = 10{,}425$ mm ; $l_y = 5213$ mm

Try 533 x 210 x 101 kg/m U-E

$\left(\frac{l}{r}\right)_x = \frac{10{,}425}{218} = 48$; $\left(\frac{l}{r}\right)_y = \frac{5213}{45.6} = 114$; $\frac{D}{T} = \frac{51}{T}$

$p_c = 65$ N/mm^2 ; $p_{bc} = 142$ N/mm^2

$f_c = \frac{510.6 \times 10^3}{12900} = 39.6$ N/mm^2

$f_{bc} = \frac{102.5 \times 10^6}{2{,}300{,}000} = 44.6$ N/mm^2

$\frac{f_c}{p_c} + \frac{f_{bc}}{p_{bc}} = \frac{39.6}{65} + \frac{44.6}{142} = 0.61 + 0.32 = 0.92$ OK!

⇒ 533 x 210 x 101 kg/m U-E OK!

(Increase in original section size)

CALCULATION SHEET	Page No. FF-13	Project No. 9214
Project	By PMF	Chd.
Section First Floor	Date Jan '92	Date

DBEL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

1.5 First Floor Ceilings

Max. span = 4700 mm.

Using S.R. 11, 44 x 225 @ 300 c/c (SCA) good for "floor"

This based on loading = 0.3+1.5 = 1.8 kN/m² SR:11 Table 3

Ceiling Joists based on 0.25 + 0.25 = 0.5 kN/m²

⇒ may span w/ centres to 400 c/c.

44 x 175 @ 400 c/c (SCA) good for L = 4.1 m span.

Summary

Joists (SCA) at 400 c/c	Max. Span allo'd.	
44 x 115	2.19 m	
44 x 125	2.52 m	
44 x 150	3.34 m	
44 x 175	4.12 m	
44 x 225	4.7 m	(Span)

CALCULATION SHEET	Page No. W-1	Project No. 9214.
Project Packaging Industries Ltd. — Industrial Unit	By PWF	Chd.
Section Walls	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Walls

1.1 100 - 100 - 100 Wall at Base of Sheeting

Height above floor = 1.1 m

q = 0.43 kN/m² — p. L-3

$1.4q$ = 0.6 kN/m²

$M = 0.6 \times 1.1^2 / 8 = 0.091$ kN-m.

Z per leaf $= \frac{10^3 \times 100^2}{6} = 1.67 \times 10^6$ mm³

M_1 per leaf $= \frac{0.25 \times 1.67 \times 10^6}{3.5} = 0.12$ kN-m

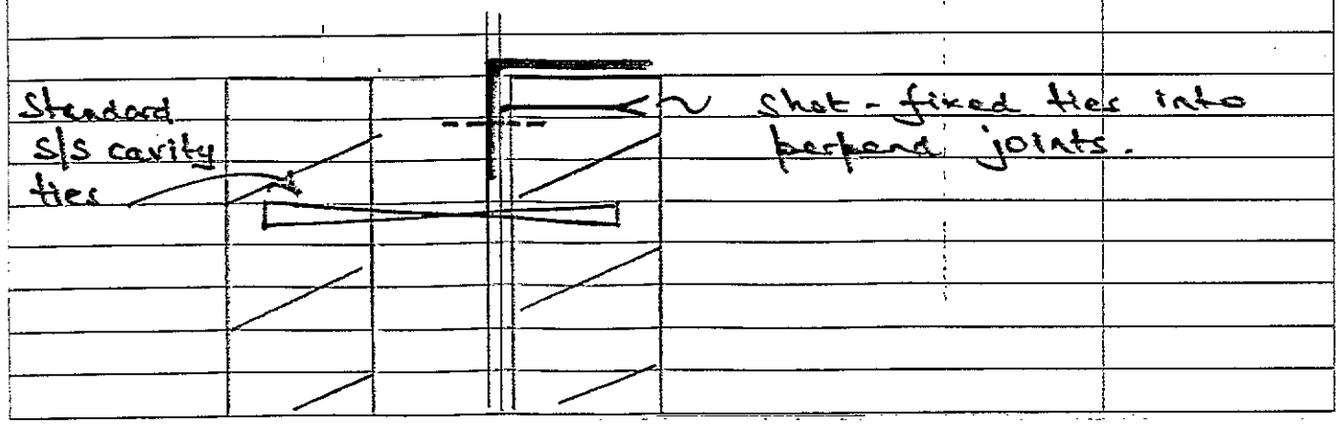
Two leaves ⇒ M_r = 0.24 kN-m >> 0.091 kN-m ok!

1.2 Support Angle at Head of 100 - 100 - 100 Wall

Wall to angle (service) = $0.43 \times 1.1 / 2 = 0.24$ kN/m

l_{max} = 6 m.

$M = 0.24 \times 6^2 / 8 = 1.08$ kN-m



CALCULATION SHEET	Page No. W-2	Project No. 9214
Project	By PMF	Chd.
Section Walls	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Take l_x = 6000
l_y = 0 ∴ tied into blockwork

Try 150 × 75 × 10 RSA

$\left(\frac{l}{r}\right) = \frac{6000}{48.1} = 125$ | $\frac{D}{T} = 15$

p_{bc} = 158.5 N/mm²

$f_{bc} = \frac{1.08 \times 10^6}{21,800} = 21$ N/mm² OK!

$\Delta = \frac{5 \times 1.08 \times 6 \times 10^3 \times 6000^3}{384 \times 205,000 \times 501 \times 10^4} = 17.7$ mm = $\frac{l}{338}$ OK!

1.3 100 - 100 - 215 External Wall

Max. panel size = 6m long × 6.1m high.

Supported (simply) on 4 sides.

Average $q = \frac{0.42 \times 2 + 0.5 \times 2 + 0.65 \times 1.1}{6.1} = 0.5$ kN/m² p.L-3

$1.4q = 1.4 \times 0.5 = 0.70$ kN/m²

$\frac{h}{l} = 1.0$; $M = \frac{0.25}{0.514} \approx 0.5$

$\alpha = 0.057$ — Table 9(E) Cl 5628.1

$M_{horiz.} = 0.057 \times 0.7 \times 6^2 = 1.44$ kN-m

$Z_{outer\ leaf} = 1.67 \times 10^6$ mm³ — p. 1

$Z_{inner\ leaf} = \frac{10^2 \times 215^2}{6} = 7.70 \times 10^6$ mm³

$M_r = \frac{0.514 \times 1.67 \times 10^6}{3.5} + \frac{0.514 \times 7.70 \times 10^6}{3.5}$ — Raised on EW blocks

$= 0.25 + 1.13$

$= 1.38$ kN-m ~ approx. 4% under required capacity ⇒ OK!

(Note: At most this is a temporary situation if rails fixed later)

1.4 215 Solid Internal Walls

Max. height above floor = 3.2 m

$\frac{h_{ef}}{t_{ef}} = \frac{3200}{215} = 15$

Take wall loaded from one side only, i.e. $e = t/6 = 0.167t$

⇒ $\beta = 0.70$

Using 2N (Solids), $f_k = 3.6$ N/mm²

Capacity/m length $= \frac{0.7 \times (1000 \times 215) \times 3.6}{3.5} = 155$ kN/m

S-W wall at height = 3.2 + 0.75 = 3.95 m (to ground)

is $0.215 \times 22 \times 1.4 \times 3.95 = 26$ kN/m

∴ Residual Strength of 215 internal wall at ground floor level

$= 155 - 26 = 129$ kN/m (Ultimate)

$= 92$ kN/m (Service)

1.5 Check 215 Walls at Ground Floor Offices

Loading to wall = 17.7 x 3.5 x 1.1 = 68 kN/m — p. FF-1

< 129 kN/m ∴ OK! — p. 3

"

1.6 Check 100 Walls at First Floor Level

Max. height to ceiling = 2400 mm

$\frac{h_{ef}}{t_{ef}} = \frac{2400}{100} = 24$

If loaded from one side, $e = 0.167t$

∴ $\beta = 0.383$

Capacity /m length = $\frac{0.383 \times (1000 \times 100) \times 5.0}{3.5}$ = 54.7 kN/m

If $e = 0$, $\beta = 0.53$

Capacity /m length = $\frac{0.53 \times (1000 \times 100) \times 5.0}{3.5}$ = 75.7 kN/m

S-W wall = 0.1 x 22 x 1.4 x 2.4 = 7.4 kN/m

Residual Strength of Walls

Loaded from one side ($e = t/6$):

Capacity = 54.7 − 7.4 = 47.3 kN/m

Loaded from both sides ($e = 0$):

Capacity = 75.7 − 7.4 = 68.3 kN/m

"

CALCULATION SHEET	Page No. F-1	Project No. 9214
Project Packaging Industries Ltd. — Industrial Unit	By PMF	Chd.
Section Foundations	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Foundations

1.1 Base to Standard Stanchion to 19m Frame

Loadcase 1 : F_V = 64.3 kN, F_H = 24.9 kN — f. A-10

Loadcase 2 : F_V = −16.9 kN, F_H = −11.9 kN — f. A-21

Examine Loadcase 1

Add s-w stanchion, eaves beam, side sheeting = 14.3 kN — f. FD-1

Add s-w base at 2.0 × 1.5 × 0.5 = 36 kN (× 2 × F_V (loadcase 2))

Add backfill etc. 0.60 × 1.5 × 2 × 1.7 = 32.4 kN

Σ F_V = 64.3 + 14.3 + 36 + 32.4 = 147 kN

Height from bottom of stanchion i.e. top of plinth, to u/s foundation
≈ 0.75 + 0.5 = 1.25 m

M = 24.9 × 1.25 = 31.1 kN-m

$e = \frac{M}{N} = \frac{31.1}{147} = 0.21\ m < \frac{D}{6}$ (= 0.333')

$p = \frac{147}{1.5 \times 2} \pm \frac{31.1 \times 6}{1.5 \times 2^2}$

= 49 ± 31.1 = 80 or 18 kN/m² OK!

Examine loadcase 2

As above stanchion s-w, eaves, sheeting, s-w base & backfill = 82.7 kN

$\Sigma F_v = -16.9 + 82.7 = 65.8$ kN

$M = 11.9 \times 1.25 = 14.9$ kN-m

Righting Moment $M_r = 65.8 \times \frac{2}{2} = 65.8$

F.O.S. $= \frac{65.8}{14.9} = 4.4$ OK!

⇒ 1.5 x 2.0 x 0.5 adequate

1.2 Base to Structure Connection First Floor

Only max. loadcase relevant : $F_v = 510.6$ kN (p. FF-12)
$F_H = 24.9$ kN (+ A-10)

Add s-w base @ $2.4 \times 3.0 \times 0.15$ = 86 kN

Add backfill @ $0.6 \times 1.5 \times 2.4 \times 3$ = 78 kN

$\Sigma F_v = 511 + 86 + 78 = 675$ kN

$M = 31.3$ kN-m (p.1)

$e = \frac{31.3}{675} = 0.046$ m $<< \frac{D}{6}$

$p = \frac{675}{2.4 \times 3.0} \pm \frac{31.3 \times 6}{2.4 \times 3^2} = 94 \pm 8.7 = 102.7$ or 85.3 kN/m²

OK!

⇒ 2.4 x 3.0 x 0.5 adequate.

CALCULATION SHEET	Page No. F-3	Project No. 9214
Project	By AMF	Chd.
Section Foundations	Date Jan '92	Date

DBEL CONSULTING CIVIL & STRUCTURAL ENGINEERS

1.3 Base to Standard Stanchion to 12m Frame

Loadcase 1 : F_v = 44.6 kN — p. A-28

F_H = 10.2 kN

Loadcase 2 : F_v = −16.1 kN

F_H = −11.7 kN — p. A-33

Examine Loadcase 1

Add s-w stanchion, eaves beam + side sheeting = 14.5 kN — p. FD-4

Add s-w base 1.8×1.2×0.5 = 25.9 kN

Add backfill etc 0.6×18×1.8×1.2 = 23.3 kN

ΣF_v = 44.6 + 63.7 = 108.3 kN

M = 10.2×1.25 = 12.75 kN-m — p. 1

$e = \frac{M}{N} = \frac{12.75}{108.3} = 0.118\,m < \frac{D}{6}\ (= 0.3)$

$p = \frac{108.3}{1.2\times1.8} \pm \frac{12.75\times6}{1.2\times1.8^2} = 50.1 \pm 20$

= 70 or 30 kN/m²

Examine Loadcase 2

As above stanchion, eaves beam s-w, plus backfill etc. = 63.7 kN

∴ ΣF_v = −16.1 + 63.7 = 47.6 kN

M = 11.7×1.25 = 14.6 kN-m

M_r = Restoring Moment = $\frac{47.6 \times 1.8}{2}$ = 42.84

$\therefore$ F.O.S. = $\frac{42.84}{14.6}$ = 2.9 OK!

$\Rightarrow$ 1.2 x 1.8 x 0.15 adequate

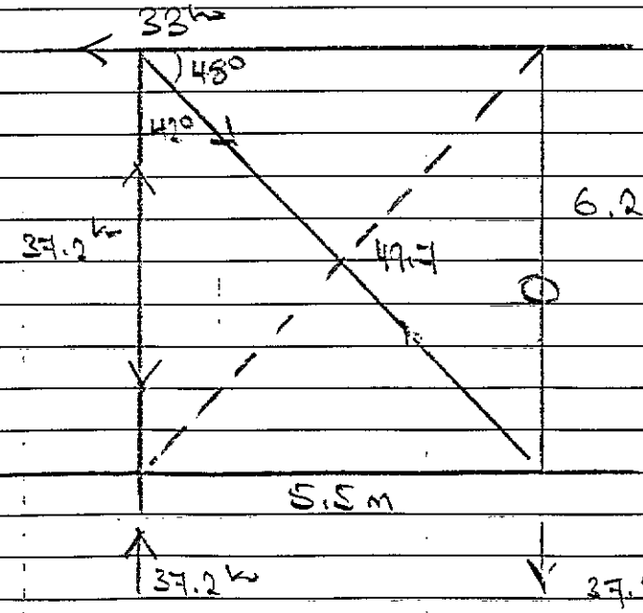
" "

1.4 Bases to Gable Columns

Determine loading to column from Hz action at foot of wind tower X-bracing.

Comp. force in cable beam = 22t →

Max. situation is at the close section spacing of 5.5 m



Size to resist overturning.

Min. F_r = 22.3 kN

F_H = 14.1 kN

p. FD-14
p. FD-12

CALCULATION SHEET	Page No. F-2	Project No. 9214
Project	By AF	Chd.
Section Foundations	Date Jan '92	Date

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS

Add S.W base at $1.8 \times 1.8 \times 0.5$ = 39 kN

Add backfill etc. $0.6 \times 18 \times 1.8 \times 1.8$ = 35 kN

$\Sigma F_v = -37.2 + 22.3 + 39 + 35 = 59.1$ kN

O.T.M. $= 14.1 \times 1.25 = 17.6$ kN-m

Restoring M $= 59.1 \times \frac{1.8}{2} = 53$ kN-m

F.O.S. $= \frac{53}{17.6} = 3$ OK

$\Rightarrow$ 1.8 x 1.8 x 0.5 adequate

1.2 Bases Under Structures Supporting Brick Floor

$F_v = 830$ kN

$\Rightarrow$ 2.9 x 2.9 x 0.5 adequate

$\phi = \frac{830}{2.9^2} = 99$ kN/m^2

Dublin County Council Comhairle Chontae Atha Cliath **Planning Department**

Bloc 2, Ionad Bheatha na hEireann,
Block 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)724755
Fax. (01)724896

NOTIFICATION OF DECISION TO GRANT PERMISSION
LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT)ACTS 1963-1990.

Decision Order Number : P/ 4832 /91 Date of Decision : 22nd October 1991

Register Reference : 91A/1427 Date Received : 30th August 1991

Applicant : Packaging Industries Limited

Development : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational

Location : Fox & Geese, Naas Road, Dublin 22

Floor Area : Sq.Metres

Time Extension(s) up to and including :

Additional Information Requested/Received : //

In pursuance of its functions under the above mentioned Acts,the Dublin County Council,being the Planning Authority for the County Health District of Dublin, did by Order dated as above make a decision to GRANT PERMISSION in respect of the above proposal.

The Ambrose Kelly Group,
Fleming Court,
Fleming's Place,
Dublin 4

Dublin County Council Comhairle Chontae Atha Cliath **Planning Department**

Bloc 2, Ionad Bheatha na hEireann,
Block 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)724755
Fax. (01)724896

Reg.Ref. 91A/1427
Decision Order No. P/ 4832 /91

Subject to the Conditions on the attached Numbered Pages.

NUMBER OF CONDITIONS:- ..8.....ATTACHED.

Signed on behalf of the Dublin County Council.....for Principal Officer

Date:..24/10/91.....

Dublin County Council Comhairle Chontae Atha Cliath **Planning Department**

Bloc 2, Ionad Bheatha na hEireann,
Block 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)724755
Fax. (01)724896

Reg.Ref. 91A/1427
Decision Order No. P/ 4832 /91
Page No: 0003

C O N D I T I O N S / R E A S O N S

01 The development to be carried out in its entirety in accordance with the plans, particulars and specifications lodged with the application save as may be required by the other conditions attached hereto.
REASON:To ensure that the development shall be in accordance with the permission and that effective control be maintained.

02 That before development commences, approval under the Building Bye- Laws be obtained and all conditions of that approval be observed in the development.
REASON:In order to comply with the Sanitary Services Acts, 1878-1964.

03 That the requirements of the Supervising Environmental Health Officer be ascertained and strictly adhered to in the development.
REASON: In the interest of health.

04 That a financial contribution in the sum of £11384. be paid by the proposer to the Dublin County Council towards the cost of provision of public services in the area of the proposed development and which facilitate this development; this contribution to be paid before the commencement of development on the site.
REASON: The provision of such services in the area by the Council will facilitate the proposed development. It is considered reasonable that the developer should contribute towards the cost of providing the services.

05 That no advertising sign or structure be erected except those which are exempted development, without prior approval of Planning Authority.
REASON: In the interest of the proper planning and development of the area.

06 The applicant shall be responsible for improvements to the private side access lane serving the proposed development, including resurfacing and the provision of kerbing. Details in this regard, including a programme of implementation shall be submitted for the written agreement of the Planning Authority before any development commences.
NOTE: The applicant is advised to consult with the Council's Roads Department before submitting any proposals for compliance with this condition.

06 REASON: In the interest of the proper planning and development of the area.

07 The existing entrance off the Naas Road shall be closed off permanently before the occupation of the office or warehouse development permitted by this decision.

07 REASON: In the interest of the proper planning and development of the

Dublin County Council Comhairle Chontae Atha Cliath Planning Department

Bloc 2, Ionad Bheatha na hEireann,
Block 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)724755
Fax. (01)724896

area.

08 Before any development commences the applicant shall submit, for the written agreement of the Planning Authority, proposals to discourage or avoid on-street car or lorry parking along the Naas Road frontage of the site.

08 REASON: In the interest of the proper planning and development of the area.

NOTE: Compliance with one or more of the conditions of this permission may result in material alterations to the development as initially proposed and, accordingly, may require the submission of a further planning application.

Dublin County Council Comhairle Chontae Atha Cliath **Planning Department**

Bloc 2, Ionad Bheatha na hEireann,
Block 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)724755
Fax. (01)724896

Register Reference : 91A/1427 Date : 3rd September 1991

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 TO 1983

For the attention of: N.R.P

Development : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor

LOCATION : Fox & Geese, Naas Road, Dublin 22

Applicant : Packaging Industries Limited

App. Type : PERMISSION

With reference to above application received on 30th August 1991,please ensure that the Site Notice submitted with this application is displayed on site,as required by the Local Government (Planning and Development) Regulations 1977.

Yours faithfully,

.....

for PRINCIPAL OFFICER

Dublin County Council Comhairle Chontae Atha Cliath **Planning Department**

Building Control Department,
Liffey House,
Tara Street,
Dublin 1.
Telephone:773066

Bloc 2, Ionad Bheatha na hEireann,
Block 2, Irish Life Centre,
Sraid na Mainistreach Iacht,
Lower Abbey Street,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)724755
Fax. (01)724896

Register Reference : 91A/1427 Date : 3rd September 1991

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 TO 1990

Dear Sir/Madam,

DEVELOPMENT : Demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to include elevational change to existing buildings fronting onto Naas Road

LOCATION : Fox & Geese, Naas Road, Dublin 22

APPLICANT : Packaging Industries Limited

APP. TYPE : PERMISSION

With reference to the above, I acknowledge receipt of your application received on 30th August 1991.

Yours faithfully,

.....

for PRINCIPAL OFFICER

The Ambrose Kelly Group,
Fleming Court,
Fleming's Place,
Dublin 4

Dublin County Council
Comhairle Chontae Átha Cliath

Planning Application Form/ Bye - Law Application Form

PLEASE READ INSTRUCTIONS AT BACK BEFORE COMPLETING FORM. ALL QUESTIONS MUST BE ANSWERED.

1. Application for Permission [/] Outline Permission [ ] Approval [ ] Place / in appropriate box.
Approval should be sought only where an outline permission was previously granted. Outline permission may not be sought for the retention of structures or continuances of uses.

2. Postal address of site or building ..... *Packaging Industries Limited, Fox & Geese, Naas Road,*
(If none, give description sufficient to identify)..... *Dublin 22.*

3. Name of applicant (Principal not Agent)..... *Packaging Industries Limited*
Address... *Fox & Geese, Naas Road, Dublin 22.* Tel. No. *508759*

4. Name and address of ..... *The Ambrose Kelly Group, Fleming Court, Fleming's Place,*
person or firm responsible for preparation of drawings ..... *Dublin 4.* Tel. No *607511*

5. Name and address to which ..... *The Ambrose Kelly Group, Fleming Court, Fleming's Place,*
notifications should be sent *Dublin 4.*

6. Brief description of ... *Demolition of single-storey residential unit, erection of 2-storey offices*
proposed development *and associated warehouse building and elevation change to existing.*

7. Method of drainage *Existing separate systems* 8. Source of Water Supply ..... *Existing Mains*

9. In the case of any building or buildings to be retained on site, please state:-
(a) Present use of each floor or use when last used. ..... *Warehouse with Associated Offices*
(b) Proposed use of each floor ..... *Warehouse with Associated Offices.*

£ 2550 2/9 N 47685

Site Notice

10 Does the proposal involve demolition, partial demolition or change of use of any habitable house or part thereof? ..... *YES*

11.(a) Area of Site ..... *4343* Sq. m.

(b) Floor area of proposed development ..... *1410* Sq. m.

(c) Floor area of buildings proposed to be retained within site ..... *900* Sq. m.

12.State applicant's legal interest or estate in site (i.e. freehold, leasehold, etc.) ..... *Freehold Owner*

13.Are you now applying also for an approval under the Building Bye Laws?
Yes [ ] No [/] Place / in appropriate box.

14.Please state the extent to which the Draft Building Regulations have been taken in account in your proposal:
The Draft Building Regulations have been fully taken into account.

15.List of documents enclosed with application. ..... *See Covering Letter*

16.Gross floor space of proposed development (See back) ..... *1410* Sq. m.

No of dwellings proposed (if any) ..... *N/A* Class(es) of Development *4*

Fee Payable £ *2,550.00* Basis of Calculation *1410 sq. m @ £1.75/m. sq. = £2,470.00 & £40 Elevational change & £40 demolition*
If a reduced fee is tendered details of previous relevant payment should be given *N/A*

Signature of Applicant (or his Agent) *Kenneth Byrne* Date *30/08/91*

FOR OFFICE USE ONLY

Application Type P
Register Reference 91A/1427
Amount Received £ 3.12.0
Receipt No
Date 18/13

RECEIVED
30 AUG 1991
RE

LOCAL GOVERNMENT (PLANNING & DEVELOPMENT) REGULATIONS 1977 to 1984.

Outline of requirements for applications for permission or Approval under the Local Government (Planning & Development) 1963 to 1983. The Planning Acts and Regulations made thereunder may be purchased from the Government Publications Sales Office, Sun Alliance House, Molesworth Street, Dublin 2.

1. Name and Address of applicant.

2. Particulars of the interest held in the land or structure, i.e. whether freehold, leasehold, etc.

3. The page of a newspaper, circulating in the area in which the land or structure is situate, containing the required statutory notice. The newspaper advertisement should state after the heading Co. Dublin.

   (a) The address of the structure or the location of the land.
   (b) The nature and extent of the development proposed. If retention of development is involved, the notice should be worded accordingly. Any demolition of habitable accommodation should be indicated.
   (c) The name of the applicant.

   NB. Applications must be received within 2 weeks from date of publication of the notice.

4. Four (4) sets of drawings to a stated scale must be submitted. Each set to include a layout or block plan, proposed and existing services to be shown on this drawing, location map, and drawings of relevant floor plans, elevations, sections, details of type and location of septic tank (if applicable) and such other particulars as are necessary to identify the land and to describe the works or structure to which the application relates (new work to be coloured or otherwise distinguished from any retained structures). Buildings, roads, boundaries and other features bounding the structure or other land to which the application relates shall be shown on site plans or layout plans. The location map should be of scale not less than 1: 2500 and should indicate the north point. The site of the proposed development must be outlined in red. Plans and drawings should indicate the name and address of the person by whom they were prepared. Any adjoining lands in which the applicant has an interest must be outlined in blue.

5. In the case of a proposed change of use of any structure or land, requirements in addition to 1, 2, & 3 are.
   (a) a statement of the existing use and the proposed use, or, where appropriate, the former use and the use proposed.

   (b) (i) Four (4) sets of the drawings to a stated scale must be submitted. Each set to consist of a plan or location map (marked or coloured in red so as to identify the structure or land to which the application relates) to a scale of not less than 1:2500 and to indicate the North point. Any adjoining lands in which the application has an interest must be outlined in blue.

   (ii) A layout and a survey plan of each floor of any structure to which the application relates.

   (c) Plans and drawings should indicate the name and address of the person by whom they were prepared.

6. Applications should be addressed to: Dublin County Council, Planning Department, Irish Life Centre, Lr. Abbey Street, Dublin 1, Tel. 724755.

SEPTIC TANK DRAINAGE: Where drainage by means of a septic tank is proposed, before a planning application is considered, the applicant may be required to arrange for a trial hole to be inspected and declared suitable for the satisfactory percolation of septic tank effluent. The trial hole to be dug seven feet deep at or about the site of the septic tank. Septic tanks are to be in accordence with I.I.R.S. S.R. 6:75.

INDUSTRIAL DEVELOPMENT:

The proposed use of an industrial premises should, where possible, be stated together with the estimated number of employees, (male and female). Details of trade effluents, if any, should be submitted.

Applicants to comply in full with the requirements of the Local Government (Water Pollution) Act,1977 in particular the licencing provisions of Sections 4 and 16.

PLANNING APPLICATIONS

CLASS NO.	DESCRIPTION	FEE
1.	Provision of dwelling — House/Flat.	£32.00 each
2.	Domestic extensions/other improvements.	£16.00
3.	Provision of agricultural buildings (See Regs.)	£40.00 minimum
4.	Other buildings (i.e. offices, commercial, etc.)	£1.75 per sq. metre (Min. £40.00)
5.	Use of land (Mining, deposit or waste)	£25.00 per 0.1 ha (Min £250.00)
6.	Use of land (Camping, parking, storage)	£25.00 per 0.1 ha (Min. £40.00)
7.	Provision of plant/machinery/tank or other structure for storage purposes.	£25.00 per 0.1 ha (Min. £100.00)
8.	Petrol Filling Station.	£100.00
9.	Advertising Structures.	£10.00 per m^2 (min £40.00)
10.	Electricity transmission lines.	£25.00 per 1,000m (Min. £40.00)
11.	Any other development.	£5.00 per 0.1 ha (Min. £40.00)

BUILDING BYE-LAW APPLICATIONS

CLASS NO.	DESCRIPTION	FEE
A	Dwelling (House/Flat)	£55.00 each
B	Domestic Extension (improvement/alteration)	£30.00 each
C	Building — Office/ Commercial Purposes	£3.50 per m^2 (min. £70.00)
D	Agricultural Buildings/Structures	£1.00 per m^2 in excess of 300 sq. metres (min. - £70.00) (Max. - £300.00)
E	Petrol Filling Station	£200.00
F	Development or Proposals not coming within any of the foregoing classes.	£9.00 per 0.1 ha (£70.00 min.) Min. Fee £30.00 Max. Fee £20,000

Cheques etc. should be made payable to: Dublin County Council.

Gross Floor space is to be taken as the total floor space on each floor measured from the inside of the external walls.

For full details of Fees and Exemptions see Local Government (Planning and Development) (Fees) Regulations 1984.

COMHAIRLE CHONTAE ÁTHA CLIATH

RECEIPT CODE

DUBLIN COUNTY COUNCIL

[redacted]

Issue of this receipt is not an

46/49 UPPER O'CONNELL STREET,

DUBLIN 1.

N 47685

£ 2550.00

Received this 2nd day of September 19 91

from Packaging Industries Ltd.
Fox & Geese,
Naas Rd.

the sum of Two thousand five hundred & fifty Pounds

Pence being fee for

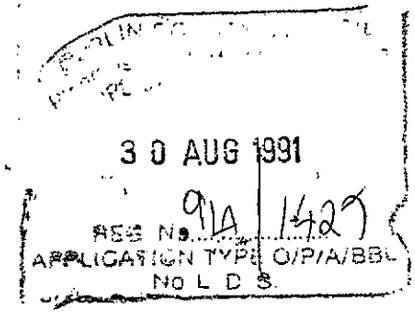
planning application at Fox and

Geese

Noeleen Deane Cashier

S. CAREY
Principal Officer

Class 4



"*APPLICATION TO PLANNING AUTHORITY*"

Planning Permission is being sought for demolition of single storey residential unit to rear of site, erection of single storey warehouse with associated offices and production area to first floor and separate two storey office development to rear of existing buildings. Permission to inclade elevational change to existing buildings fronting onto Naas Road on behalf of Packaging Industries Limited, Fox and Geese, Naas Road, Dublin 12.

architects

the ambrose kelly group

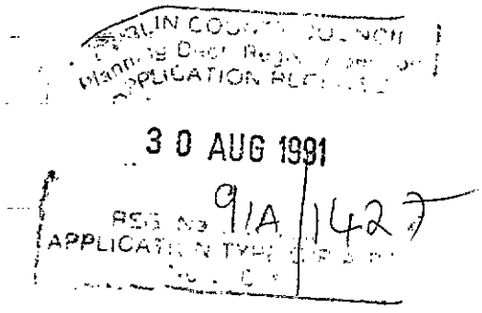
Date 29 August 1991

Our ref KB/SG1/B031(004)

Your ref

ambrose kelly *chairman*
paul keenan *B.Arch MRIAI*
michael lyons *B.A. Dip.Arch*
vernon leahy *B.Arch*
bernard lynch *DipArch. Tech RIAI(Tech)*
patrick j reid *B.Arch MRIAI*
john r giltrap *F.Inst.D*

Dublin County Council,
Planning Department,
Block 2,
Irish Life Centre,
Lower Abbey Street,
DUBLIN 1.



Re:- **PROPOSED WAREHOUSE & ASSOCIATED OFFICE BUILDING AT FOX & GEESE, NAAS ROAD, DUBLIN 12 FOR PACKAGING INDUSTRIES LIMITED**

Dear Sir,

We wish to apply for Planning Permission for demolition of single-storey derelict residential unit to rear of site, construction of warehouse building with associated offices and production area to first floor and separate two-storey office development to rear of existing buildings. Permission to include elevational change to existing building fronting onto Naas Road on behalf of Packaging Industries Limited, Fox & Geese, Naas Road, Dublin 12.

We would also like to take this opportunity to receive agreement on specific user consent. The use associated with this development would be light industrial. Packaging Industires Limited are involved in the manufacturing of printed paper bags, labels, storage and disbribution of a variety of plastic containers along with associated offices.

Cont/d...

Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

Station House, Station Road, London SE20 7BE
Telephone 081 659 1516 Fax 081 676 8955

Previous to this application, we have had meetings with both the Area Planning Officer and the Road Engineer. In both meetings the proposed development was tabled and discussed. All requirements from both parties have been fully incorporated into the development.

This application is necessitated by the fact that at present, Packaging Industries Limited conduct their main business from the existing buildings on site. They also have necessity to lease two other premises in adjoining industrial estates for storage facilities and extra office accommodation needed to provide proper customer service. With this application they wish now to consolidate their premises to one location in order to improve their business performance.

The existing entrance off the Naas Road is to be shut off permanently in order to avoid any hindrance to traffic leaving the site via the private side access lane.

The new car park to the front of the site will have 10 spaces allocated solely to customer use, again to avoid obstruction on the Naas Road.

Enclosed with our application is the following documentation:-

1. Completed Application Form.
2. Cheque for the sum of £2,550.00 calculated on the following basis:

Warehouse Gross Floor Area	=	1115 sq. m.
Office Gross Floor Area	=	295 sq. m.
TOTAL	**=**	**1410 sq. m.**
1410 sq. m. @ £1.75/m. sq.	=	£2,467.50
Plus elevational change to existing buildings	=	£ 40.00
Plus Demolition of Residential Unit	=	£ 40.00
TOTAL	**=**	**£2,550.00**

3. 4 no. copies of drawings - B031 (P1) 01, 02 and 03.
4. Copy of site planning notice (to be displayed on site from 30/8/91 - 1/10/91).
5. Covering Letter
6. A staff survey has been included to show the parking requirement needed for this development by our client.

Cont/d...

Trusting that the information enclosed in our application will be of help to you in making your final decision. Should you require any further information, please do not hesitate to contact the undersigned at the above telephone number.

Yours faithfully,

Kenneth Byrne Dipl Arch (Tech)
THE AMBROSE KELLY GROUP

Encls.

architects

the ambrose kelly group

Date 30 August 1991

Our ref KB/AF1/B031(005)

Your ref

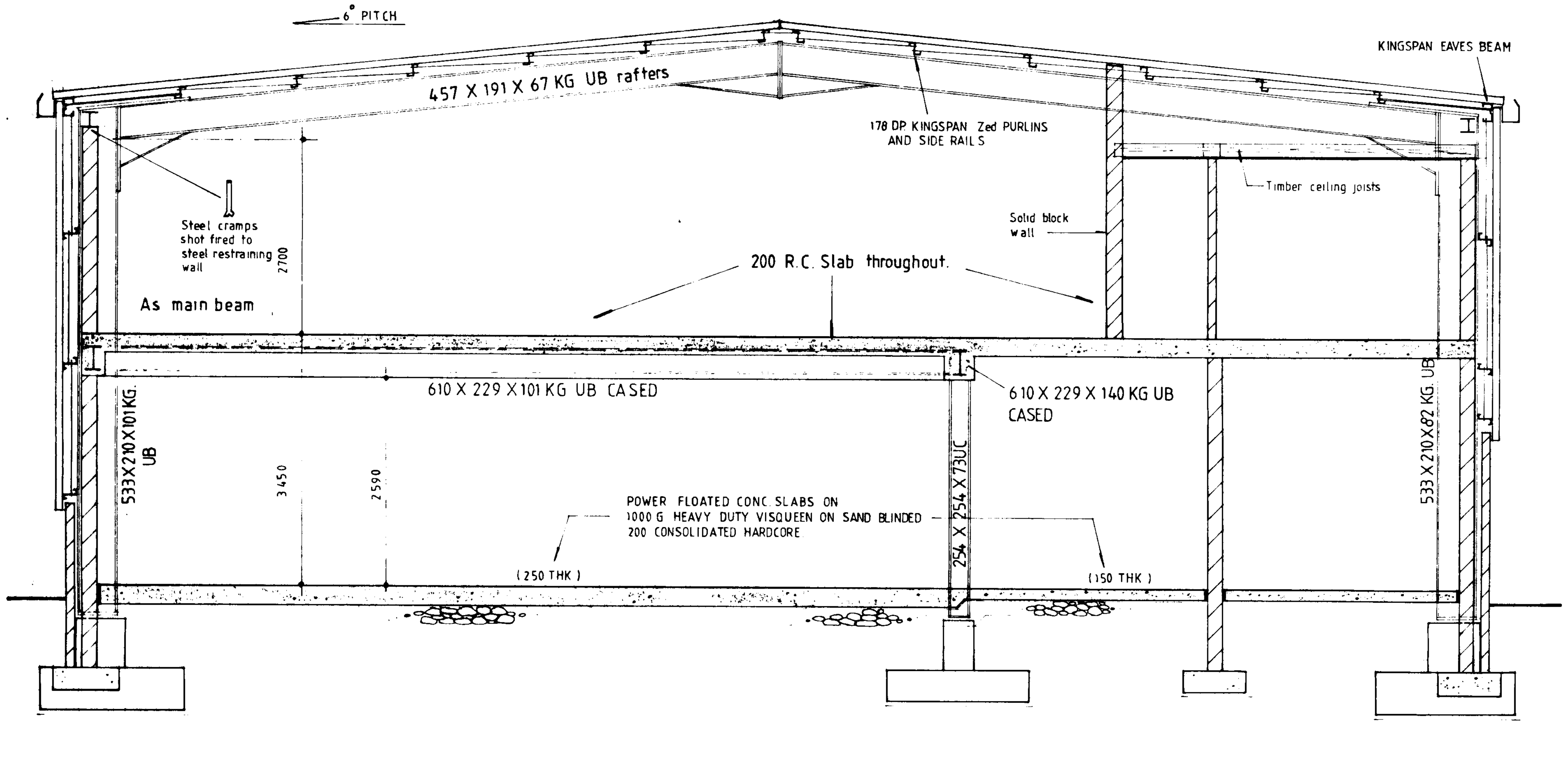
ambrose kelly *chairman*
paul keenan *B.Arch MRIAI*
michael lyons *B.A. Dip.Arch*
vernon leahy *B.Arch*
bernard lynch *DipArch. Tech RIAI(Tech)*
patrick j reid *B.Arch MRIAI*
johu r giltrap *F.Inst.D*

STAFF CAR PARKING REQUIREMENT FOR PROPOSED DEVELOPMENT AT PACKAGING INDUSTRIES LIMITED
FOX & GEESE NAAS ROAD DUBLIN 22

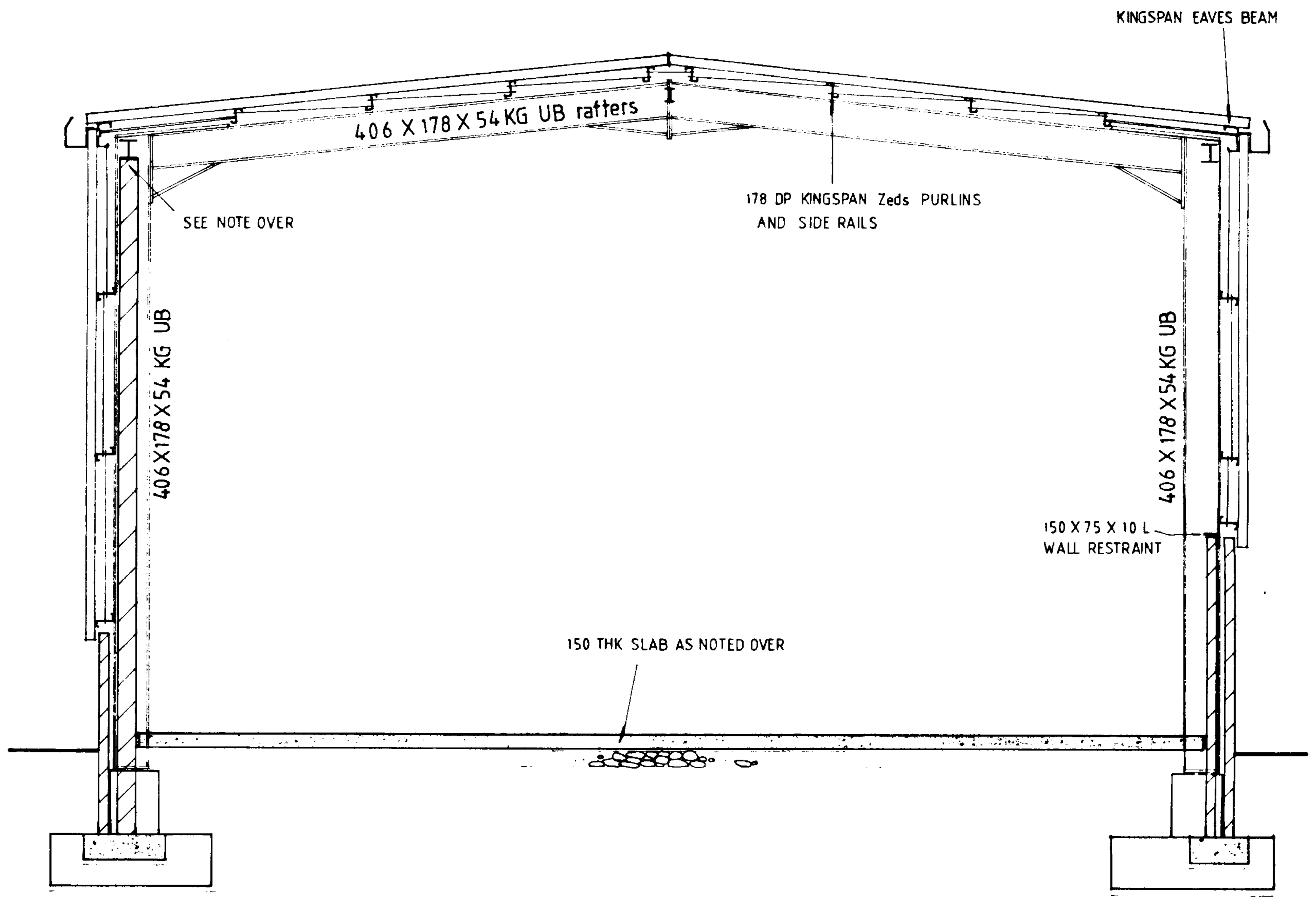
Present Staff on site	=	23
Present no. car park requirement	=	9
Present Staff off site	=	15
Present no. car park requirement	=	10
Proposed staff on proposed development	=	40
Proposed staff car parking requirement	=	25-30
Customer only spaces	=	10
Total no. of spaces	=	40
No. car parking spaces provided	=	69
Development Plan standards @ 3 cars per 100 m sq gross floor space	=	70

Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

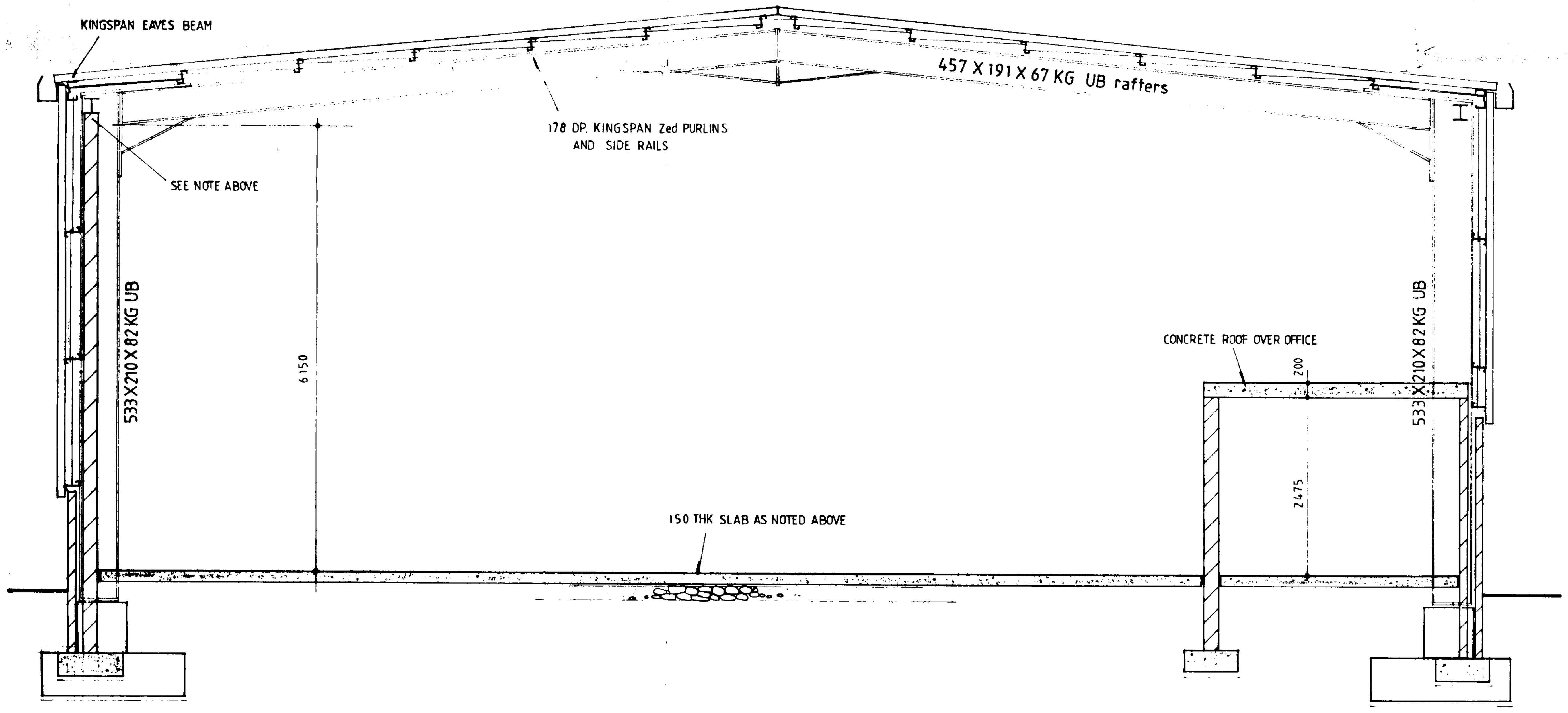
Station House, Station Road, London SE20 7BE
Telephone 081 659 1516 Fax 081 676 8955



Production Area.

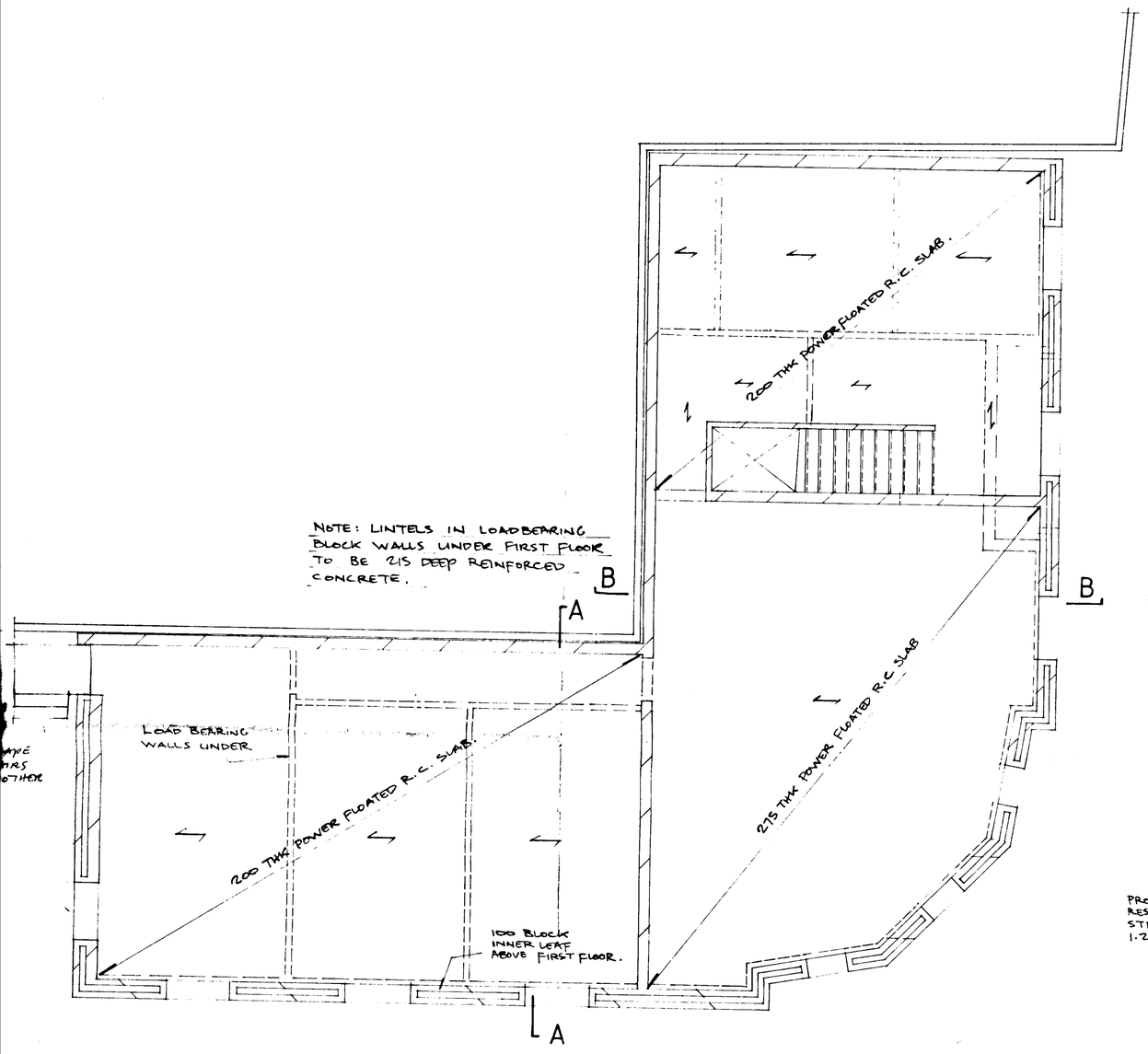


Production Storage and Distribution.

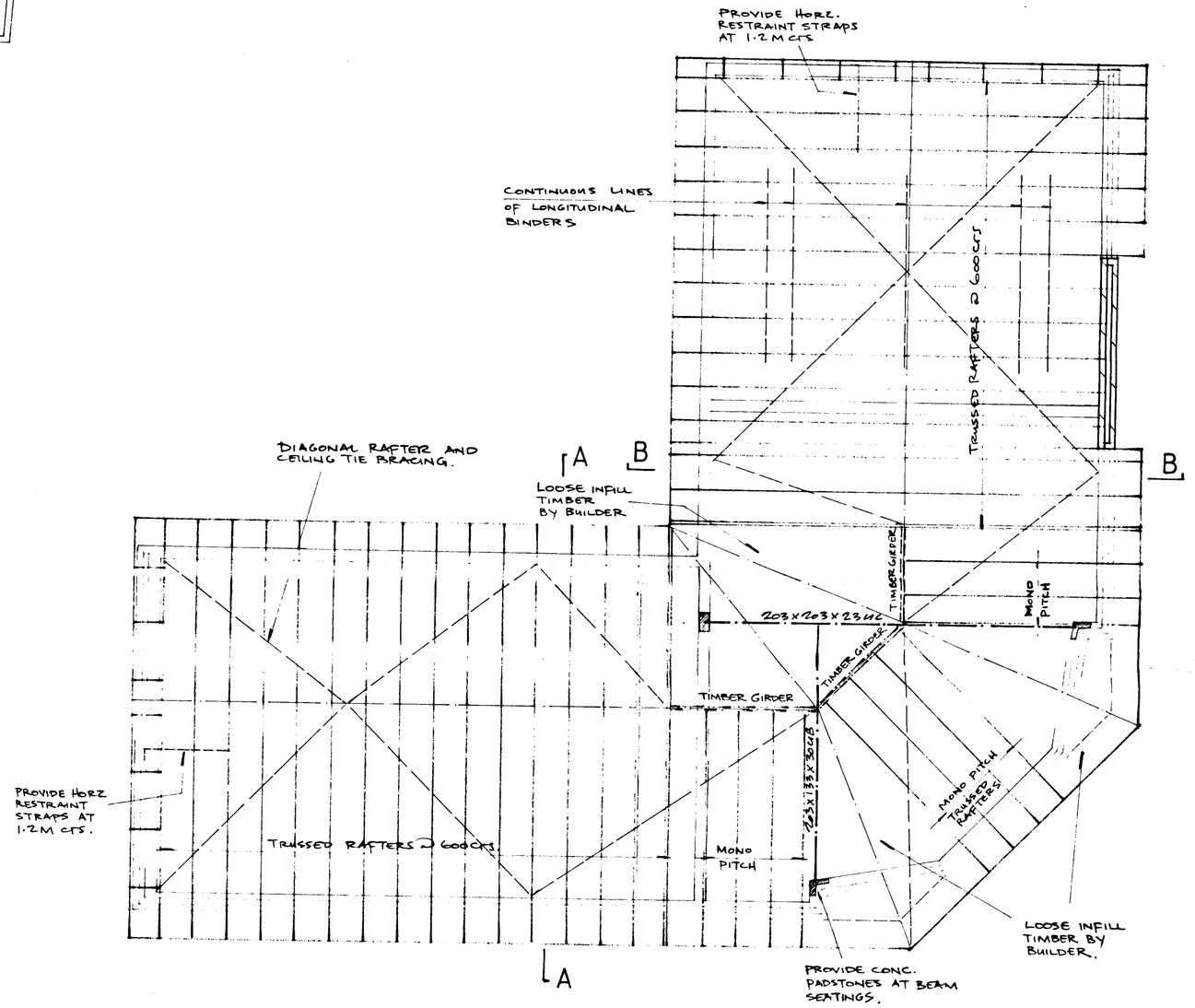


Paper Ream Storage.

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS	PROJECT Packaging Industries Ltd.
	DRG TITLE Typical Sections thro' Production Buildings
24 HOLLES STREET DUBLIN 2 TELEPHONE 766343-762398 FACSIMILE 610825	ARCHITECT The Ambrose Kelly Group
SCALE 1:50 DATE JAN 1992	9214 – 8



FIRST FLOOR SLAB



ROOF PLAN

DBFL
CONSULTING CIVIL & STRUCTURAL ENGINEERS
74 HOLLES STREET DUBLIN 2
TELEPHONE 766343+762398
FACSIMILE 610825

PROJECT: Packaging Industries Ltd

DRG TITLE: OFFICE BUILDING

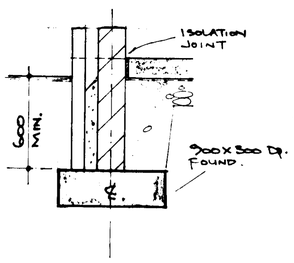
First FLoor and Roof Plans

ARCHITECT: The Ambrose Kelly Group

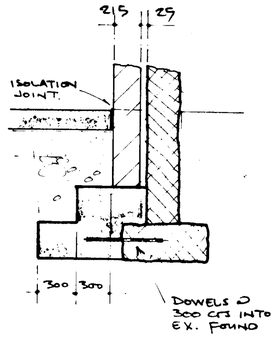
SCALE : 50

DATE JAN 1992

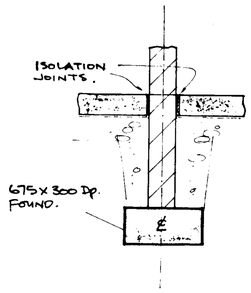
9214 – 13



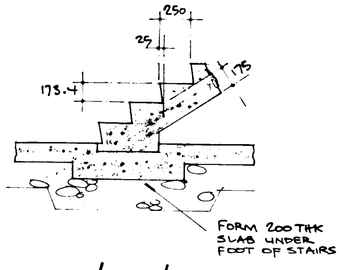
1 — 1



2 — 2



3 — 3



4 — 4

FOUNDATIONS

GROUND FLOOR PLAN.

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS
24 HOLLES STREET DUBLIN 2
TELEPHONE 766343 • 762398
FACSIMILE 610825

PROJECT: Packaging Industries Ltd.

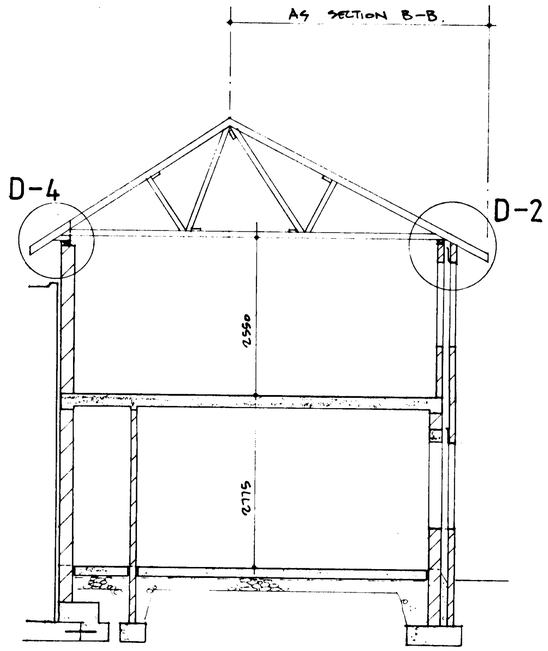
DRG TITLE: OFFICE BUILDING
Ground Floor and Foundation Plans

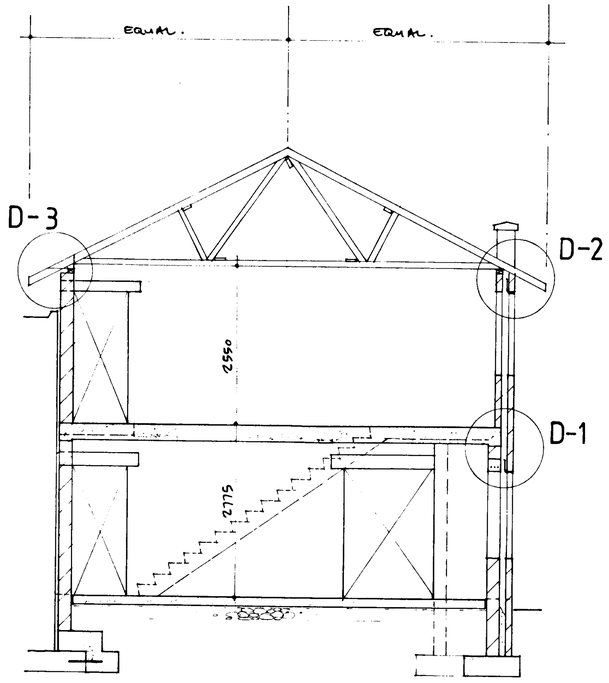
ARCHITECT: The Ambrose Kelly Group.

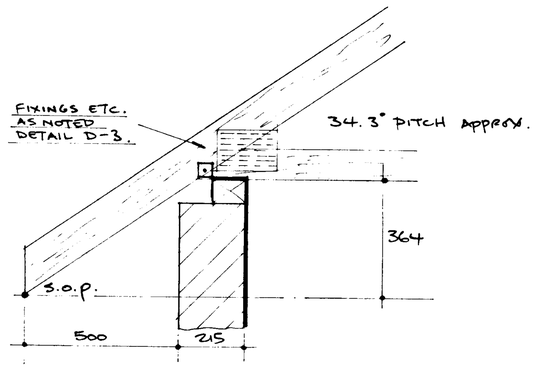
SCALE 1:50

DATE JAN 1992

9214 — 12

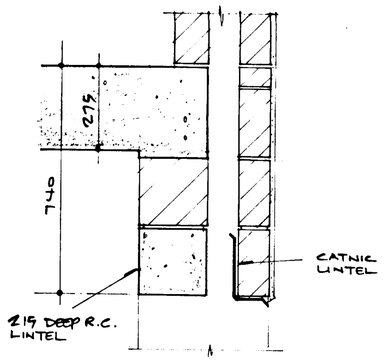






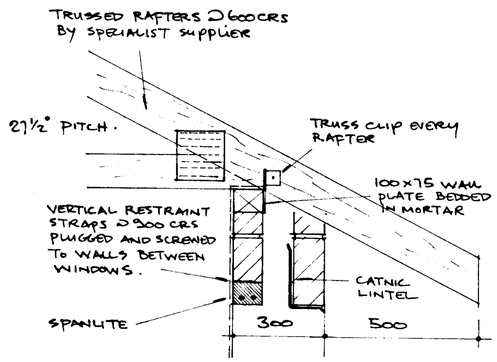
DETAIL D – 4

A — A

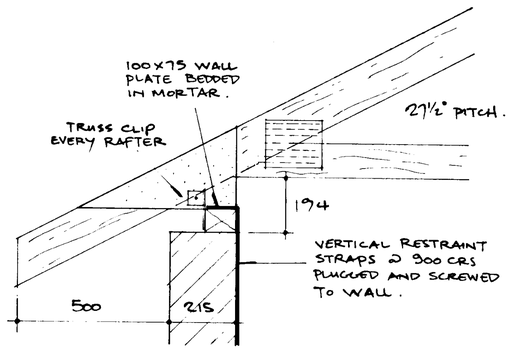


DETAIL D – 1

B — B



DETAIL D – 2



DETAIL D – 3

DBFL
CONSULTING CIVIL & STRUCTURAL ENGINEERS
24 HOLLES STREET DUBLIN 2
TELEPHONE 766343 • 762398
FACSIMILE 610825

PROJECT: Packaging Industries Ltd.

DRG TITLE: OFFICE BUILDING

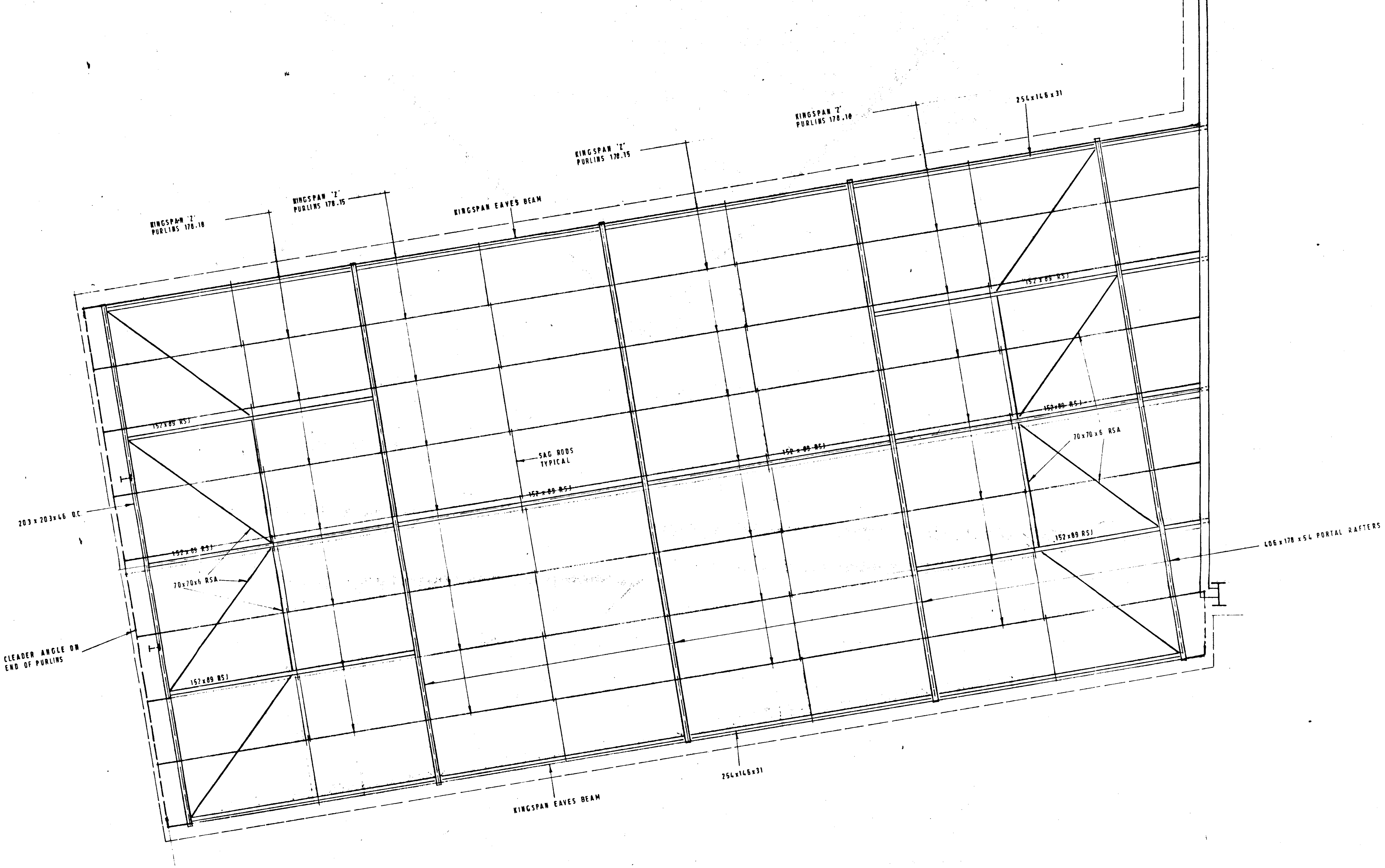
SECTIONS A-A B-B

ARCHITECT: The Ambrose Kelly Group

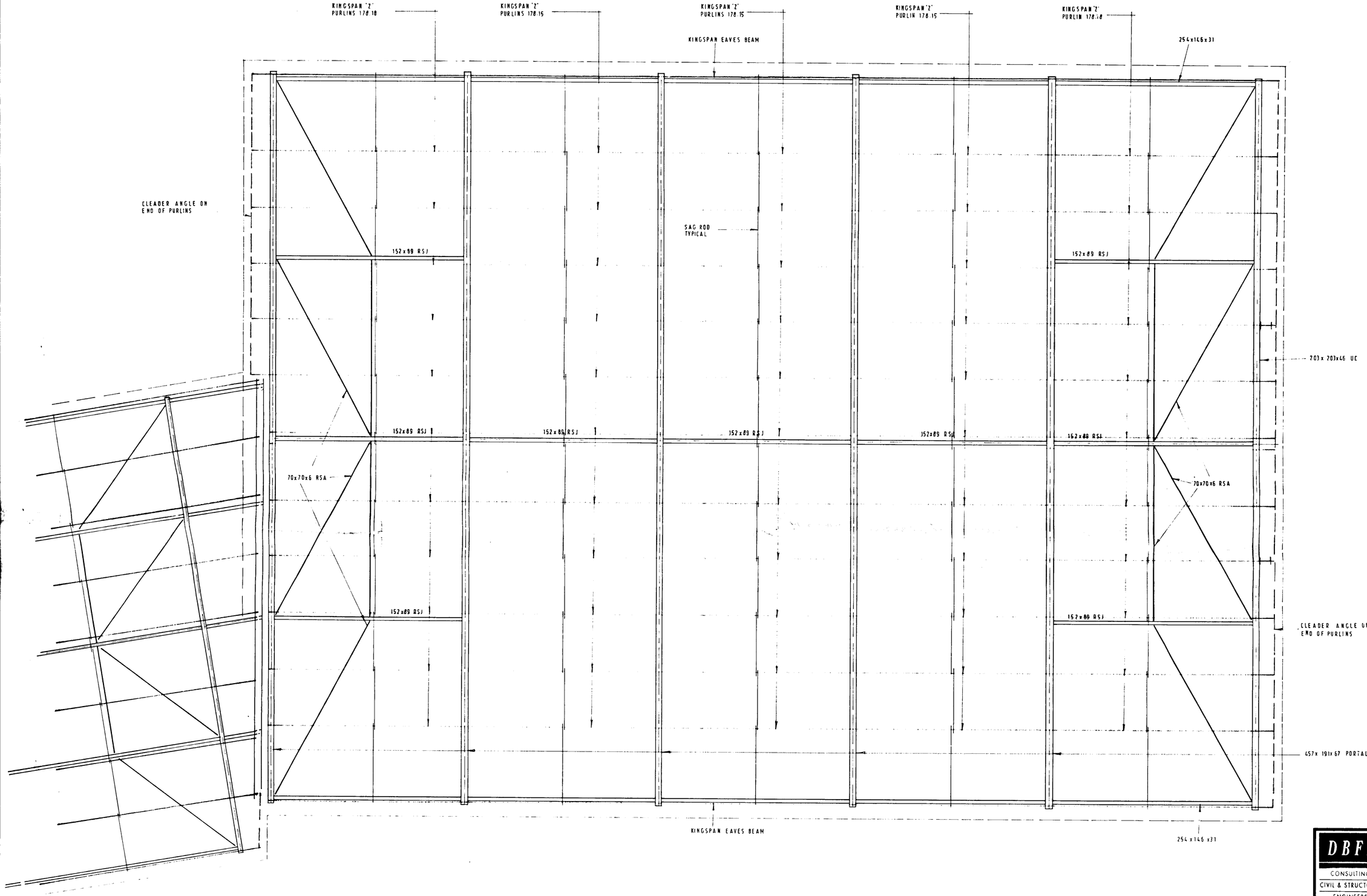
SCALE 1:50 1:10

DATE JAN 1992

9214 – 14



DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS	PROJECT: Packaging Industries Ltd.
	DRG TITLE: ROOF PLAN PART SHEET 2.
24 HOLLES STREET DUBLIN 2 TELEPHONE 766343•762398 FACSIMILE 610825	ARCHITECT: The Ambrose Kelly Group
SCALE 1:50 DATE JAN.1992	9214 ▻ 7



DBFL
CONSULTING CIVIL & STRUCTURAL ENGINEERS
24 HOLLES STREET DUBLIN 2
TELEPHONE 766343+762398
FACSIMILE 610825

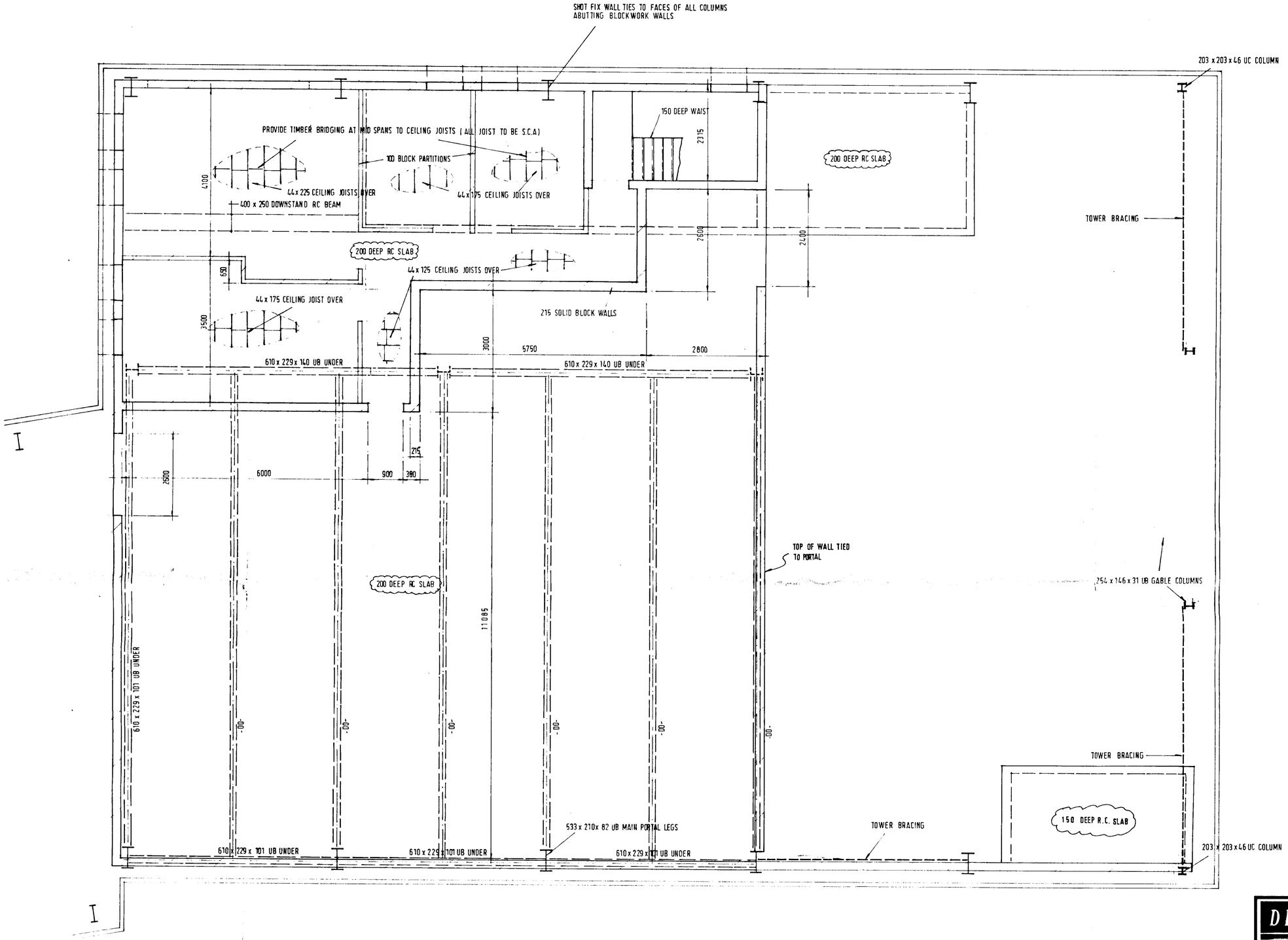
PROJECT
Packaging Industries Ltd.

DRG TITLE
ROOF PLAN
PART SHEET 1.

ARCHITECT
The Ambrose Kelly Group

SCALE 1:50
DATE JAN. 1992

9214 – 6



DBFL
CONSULTING CIVIL & STRUCTURAL ENGINEERS

24 HOLLES STREET DUBLIN 2
TELEPHONE 766243+762398
FACSIMILE 610825

PROJECT: Packaging Industries Ltd.

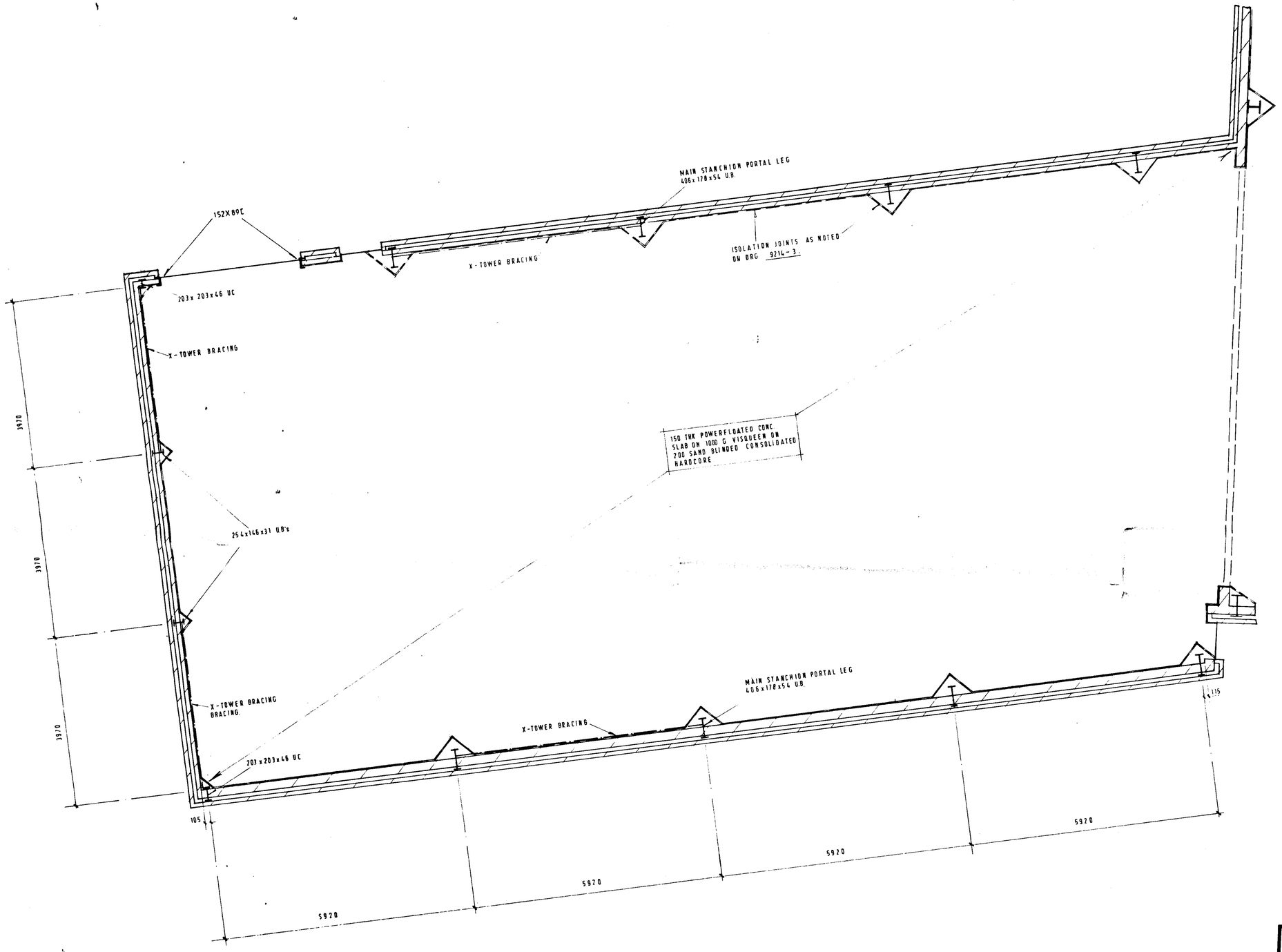
DRG TITLE: FIRST FLOOR PLAN

ARCHITECT: The Ambrose Kelly Group

SCALE 1:50

DATE JAN 1992

9214 – 5



DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS
24 HOLLES STREET DUBLIN 2
TELEPHONE 766343+762398
FACSIMILE 610825

PROJECT
Packaging Industries Ltd

DRG TITLE
GROUND FLOOR PLAN
PART SHEET 2.

ARCHITECT
The Ambrose Kelly Group

SCALE 1:50
DATE JAN 1992

9214 – 4

NOTE. ALL WALLS TO BE TIED TO STEEL STANCHIONS USING STAINLESS CRAMPS AT 450 CRS. VERT.

229 X 89 C

WELL FOR DOOR TRACK TO LATER DETAIL

MAIN STANCHION PORTAL LEGS 533x210x82 KG UB EXCEPT AS NOTED.

152 X 89 C

X-TOWER BRACING

200 CONC ROOF OVER

215 SOLID LOAD BEARING BLOCK WALL.

RC STAIRS

3285

215

125

203 x 203 x 46 UC

450 X 215 CONC. COLUMNS

REINFORCED CONC HEADS OVER WINDOWS IN 215 WALLS

TYPICALLY 12mm COMPRESSIBLE FILLER BOARD ISOLATION JOINT WITH PROPRIETARY SEALANT.

6341

254 X 254 X 73 UC

AROUND COLUMNS 20mm COMPRESSIBLE FILLER BOARD ISOLATION JOINT WITH PROPRIETARY SEALANT.

254 x 146 x 31 U.B.

EXCEPT WHERE NOTED 150 POWER FLOATED CONC SLAB ON 1000 G VISQUEEN ON 200 SAND BLINDED CONSOLIDATED HARDCORE.

X-TOWER BRACING (LOW LEVEL)

6317

750 THK POWERFLOATED CONC SLAB ON 1000 G HEAVY DUTY VISQUEEN ON 200 SAND BLINDED CONSOLIDATED HARD-CORE

15500

254 x 146 x 31 U.B.

6341

129

SOLID BLOCK INNER LEAF.

STANCHIONS PORTAL LEGS 533 x 210 x 101 KG UB

X-TOWER BRACING

150 CONC ROOF OVER

203 x 203 x 46 UC

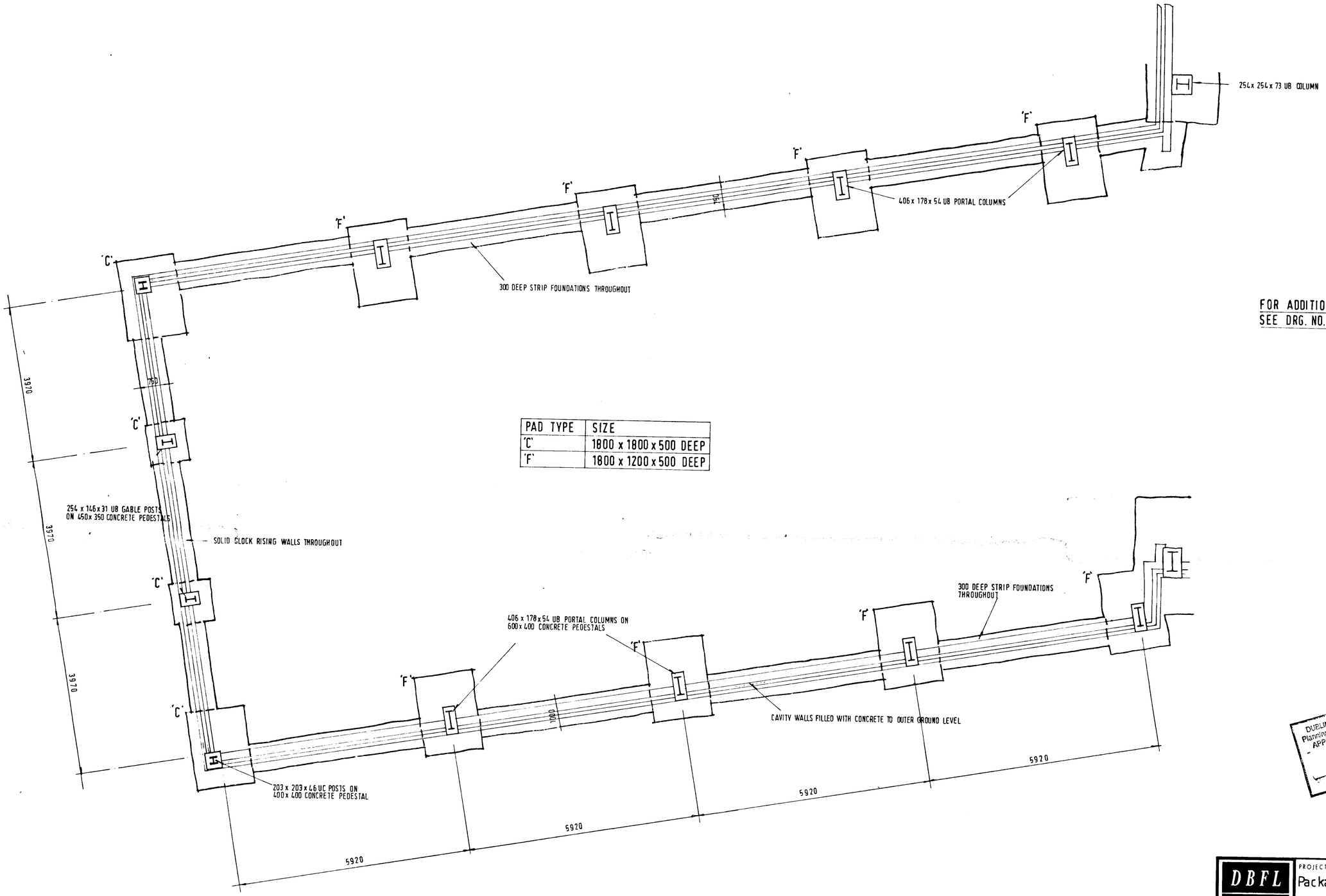
515

EXISTING HOUSE

5260 5267 5260 5250 5514

DUBLIN COUNTY COUNCIL
Planning Dept. Registry Section
APPLICATION RECEIVED
06 FEB 1992
REG NO. 9214/92

DBFL CONSULTING CIVIL & STRUCTURAL ENGINEERS	PROJECT: Packaging Industries Ltd.
	DRG TITLE: GROUND FLOOR PLAN PART SHEET 1.
24 HOLLES STREET DUBLIN 2 TELEPHONE 766343+762398 FACSIMILE 610825	ARCHITECT: The Ambrose Kelly Group
SCALE 1:50 DATE JAN 1992	9214 – 3



PAD TYPE	SIZE
'C'	1800 x 1800 x 500 DEEP
'F'	1800 x 1200 x 500 DEEP

FOR ADDITIONAL FOUNDATION LAYOUT
SEE DRG. NO. 9214 - 1

DBFL
CONSULTING
CIVIL & STRUCTURAL
ENGINEERS
24 HOLLES STREET DUBLIN 2
TELEPHONE 766343 • 762398
FACSIMILE 610825

PROJECT
Packaging Industries Ltd.

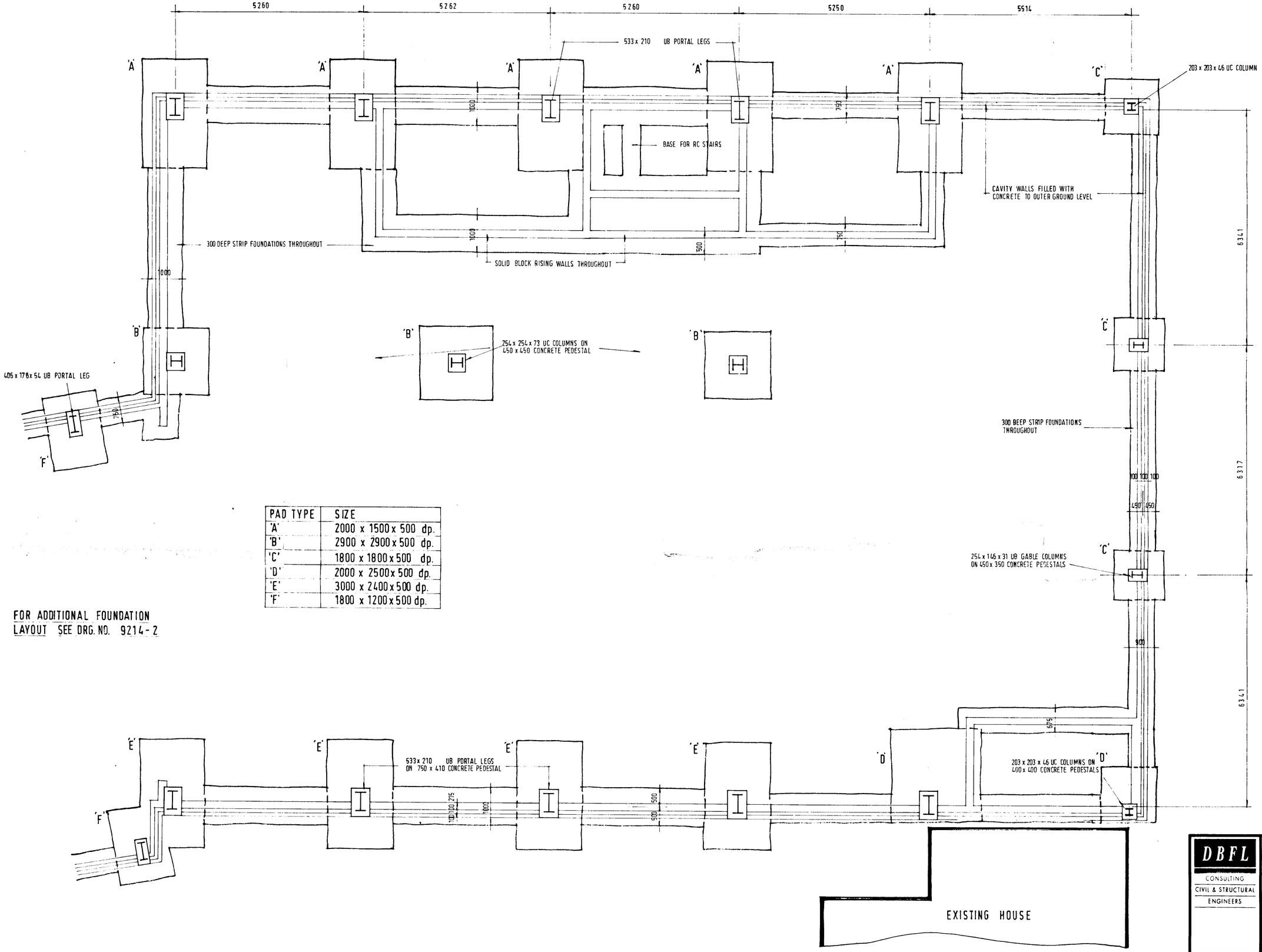
DRG TITLE
FOUNDATION PLAN
PART SHEET 2

ARCHITECT
The Ambrose Kelly Group

SCALE 1: 50

DATE JAN. 1992

9214 - 2



PAD TYPE	SIZE
'A'	2000 x 1500 x 500 dp.
'B'	2900 x 2900 x 500 dp.
'C'	1800 x 1800 x 500 dp.
'D'	2000 x 2500 x 500 dp.
'E'	3000 x 2400 x 500 dp.
'F'	1800 x 1200 x 500 dp.

FOR ADDITIONAL FOUNDATION LAYOUT SEE DRG. NO. 9214-2

DBFL
CONSULTING CIVIL & STRUCTURAL ENGINEERS
24 HOLLES STREET DUBLIN 2
TELEPHONE 766343+762398
FACSIMILE 610825

PROJECT: Packaging Industries Ltd.

DRG TITLE: FOUNDATION PLAN PART SHEET 1.

ARCHITECT: The Ambrose Kelly Group

SCALE 1:50

DATE JAN. 1992

9214 - 1

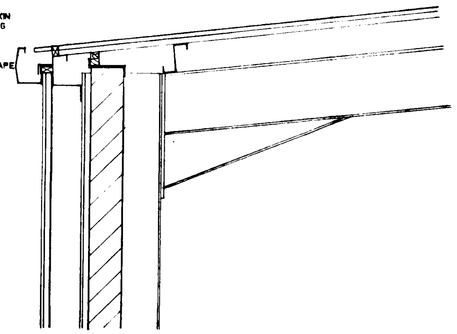
notes

no dimensions are to be scaled from this drawing

P.V.C. COLOUR COATED DOUBLE SKIN METAL DECK INSULATED CLADDING ON SHEET RAILS ON STEEL PORTAL TO ENGINEERS DETAIL

PATENT KBS COATED, WEDGE SHAPE MINERAL FIBER STRIP AS FIRE STOP TO 1 HOUR RATING ON PATENT METAL BASE

EAVES FLASHING AND FILLER WITH EAVES BEEAM



P.V.C COLOUR COATED DOUBLE SKIN METAL DECK INSULATED CLADDING ON SHEETING RAILS ON STEEL PORTAL TO ENGINEERS DETAILS

P.C. CONCRETE CAVITY CLOSER

PATENT METAL DRIP TO CLADDING

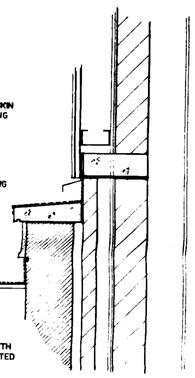
No5 LEAD FLASHING TO TOP OF COPING

D.P.C

25mm SAND/CEMENT RENDER

No.5 LEAD FLASHING ONTO EXISTING ROOF

EXISTING PARTY WALL BUILT UP 300mm ABOVE ROOF LEVEL IN 215mm SOLID BLOCKWORK AND CAPPED WITH A P.C. COPING WITH OVERHANG AND DRIP INCORPORATED



FLASHING DETAIL TO ADJOINING BUILDING.

P.V.C. COLOUR COATED PROFILED METAL DECK DOUBLE SKIN INSULATED PANEL ON GALVANISED PURLINS AT REQ. CTS. ON STEEL PORTAL TO ENG. DETAILS.

PATENT KBS. PROFILED COATED WEDGE SHAPE FIBRE STRIP FIRE STOP TO 1 HOUR FIRE RATING ON PATENT METAL BASE.

P.V.C COLOUR COATED DOUBLE SKIN METAL DECK INSULATION CLADDING ON SHEET RAILS ON STEEL PORTAL TO ENGINEERS DETAIL

KBS WALLHEAD FIRE SEAL

EAVES FILLER WITH EAVES BEAM

215 MM SOLID CONCRETE BLOCKWORK INNER LEAF.

ALL STRUCTURAL STEEL TO BE CLAD IN 1 HOUR FIRE BOARD

215mm SOLID CONCRETE BLOCKWORK 100mm CAVITY WITH 50mm INSULATION 100mm BLOCKWORK OUTER LEAF WITH 25mm SAND / CEMENT RENDER SMOOTH

FOUNDATIONS TO ENGINEERS DESIGN AND DETAIL.

ALL STRUCTURAL COLUMNS TO HAVE 1 HOUR FIRE PROTECTION.

1 HOUR FIRE RATED SHUTTER CONNECTED DIRECT TO ALARM DETECTION SYSTEM.

15M 1 HOUR FIRE BOARD BOTH SIDES OF WALL.

215 MM SOLID BLOCK WALL AS 1 HOUR FIRE BREAK CARRIE UP TO UNDERSIDE OF ROOF LEVL.

LABEL PRINTING PRODUCTION AREA.

CAST IN SITU CONCRETE FLOOR SLAB TO ENGINEERS DESIGN & DETAIL.

PAPER BAG PRODUCTION AREA.

215 MM SOLID CONCRETE BLOCKWORK TO OFFICE.

GLAZING & FRAMES TO HAVE 1 HOUR FIRE RATED PROTECTION.

STRUCTURAL STEEL COLUMNS TO BE ENCASED IN CONCRETE WITH 50MM MIN COVER TO ENG. DETAILS.

SUSPENDED CEILING TO OFFICE ONLY.

MALE TOILET.

OFFICE.

215 MM BLOCKWORK 100 MM CAVITY WITH 50 MM INSULATION 100 MM BLOCKWORK

D.P.C.

250mm CONCRETE FLOOR SLAB WITH A DUST PROOF FINISH ON 1000G. VISQUEEN D.P.M. ON 150mm COMPACTED HARDCORE TO ENGINEERS DETAILS

150MM CONCRETE FLOOR SLAB WITH A DUST PROOF FINISH ON 1000G. VISQUEEN D.P.M. ON 150mm COMPACTED HARDCORE TO ENGINEERS DETAILS

EAVES FILLER WITH EAVES BEAM IN ACCORDANCE WITH MANUFACTURES INSTRUCTIONS.

PROFILED PVC. COATED GUTTER.

PATENT WINDOW FLASHING BY CLADDING CONTRACTOR.

PVC COATED DOUBLE GLAZED ALUMINIUM WINDOWS WITH PERMAVENTS INSTALLED.

PATENT WINDOW CILL.

PVC COATED DOUBLE SKIN PROFILED METAL DECK ON SHEETING RAILS AT REQ. CTS. ON STEEL PORTA FRAME TO ENGINEERS DESIGN & DETAILS.

PATENT WINDOW FLASHING BY CLADDING CONTRACTOR.

DOUBLE GLAZED WINDOW WITH PERMAVENTS INSTALLED.

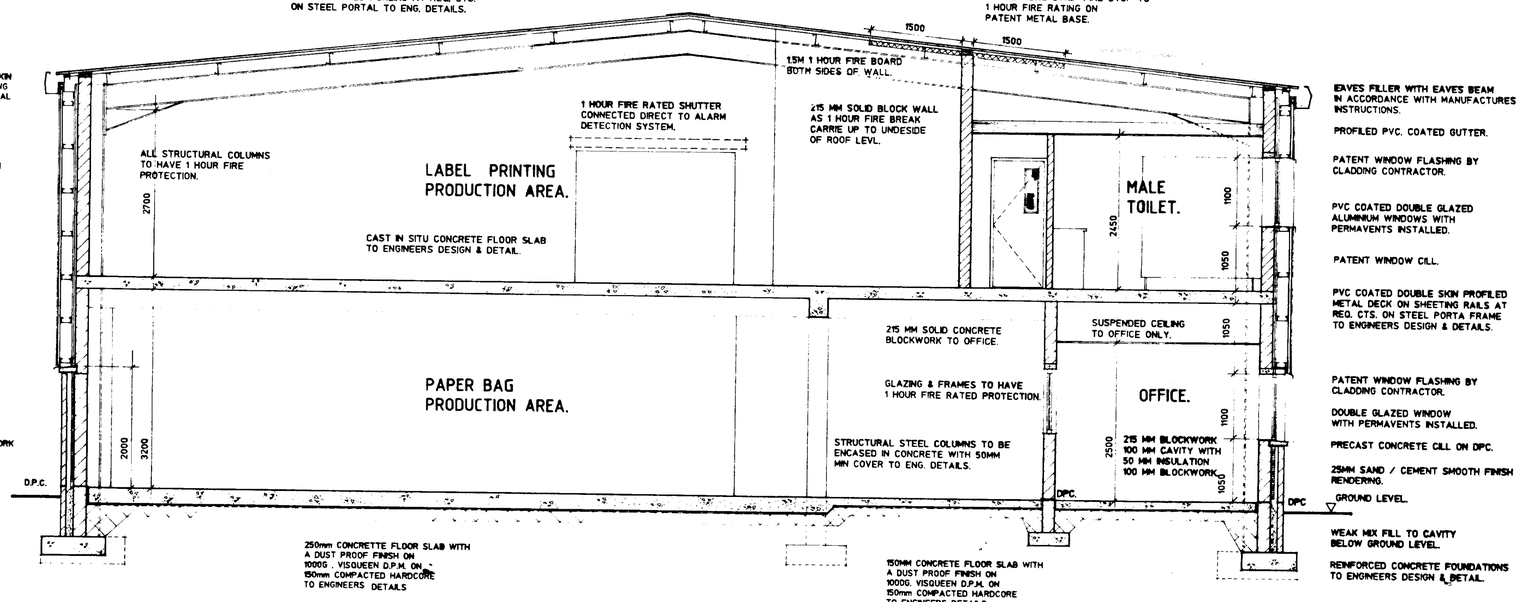
PRECAST CONCRETE CILL ON DPC.

25MM SAND / CEMENT SMOOTH FINISH RENDERING.

GROUND LEVEL.

WEAK MIX FILL TO CAVITY BELOW GROUND LEVEL.

REINFORCED CONCRETE FOUNDATIONS TO ENGINEERS DESIGN & DETAIL.



SECTION C-C

project PROPOSED FACTORY + OFFICES - FOX & GEESE NAAS RD. DUBLIN 12.

client PACKAGING INDUSTRIES LTD.

title SECTION C-C.

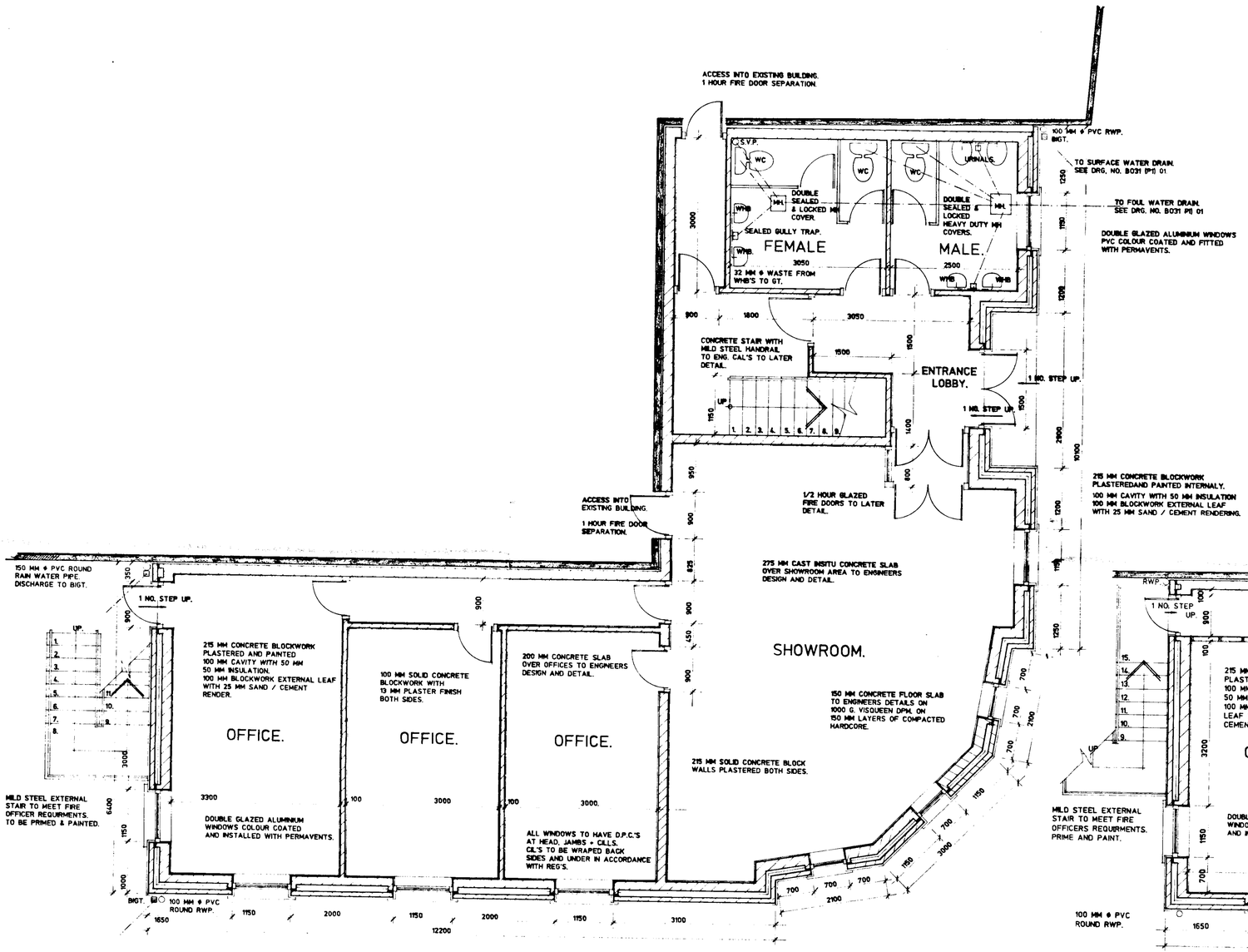
drawing no B031 (P1) 006.

drawn KB date JAN 92 scale 1:20 1:50.

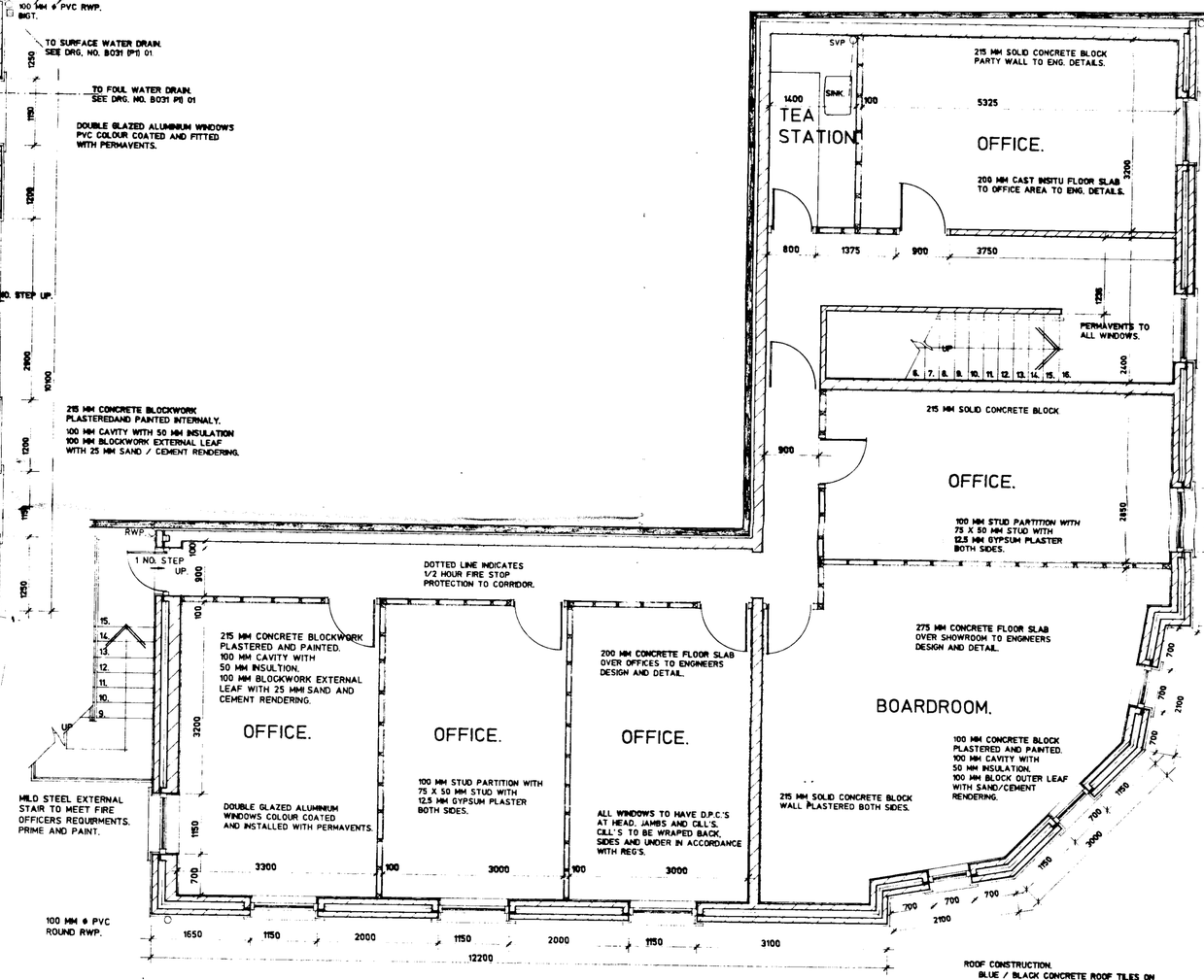
architects
the ambrose kelly group
Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

notes

no dimensions are to be scaled from this drawing



GROUND FLOOR PLAN.



FIRST FLOOR PLAN.

ROOF CONSTRUCTION.
BLUE / BLACK CONCRETE ROOF TILES ON 50 X 38 MM TREATED ROOF BATTENS AT REQUIRED CTS. IN ACCORDANCE WITH MANUFACTURES INSTRUCTIONS ON UNTEARABLE SARKING FELT ON TRUSSED RAFTERS AT 600MM CTS BY SPECIALIST SUPPLIER.

13 MM FOILED BACKED PLASTER BOARD TO UNDERSIDE OF ROOF TRUSSES WITH 100 MM QUILT INSULATION BETWEEN CEILING JOIST'S.

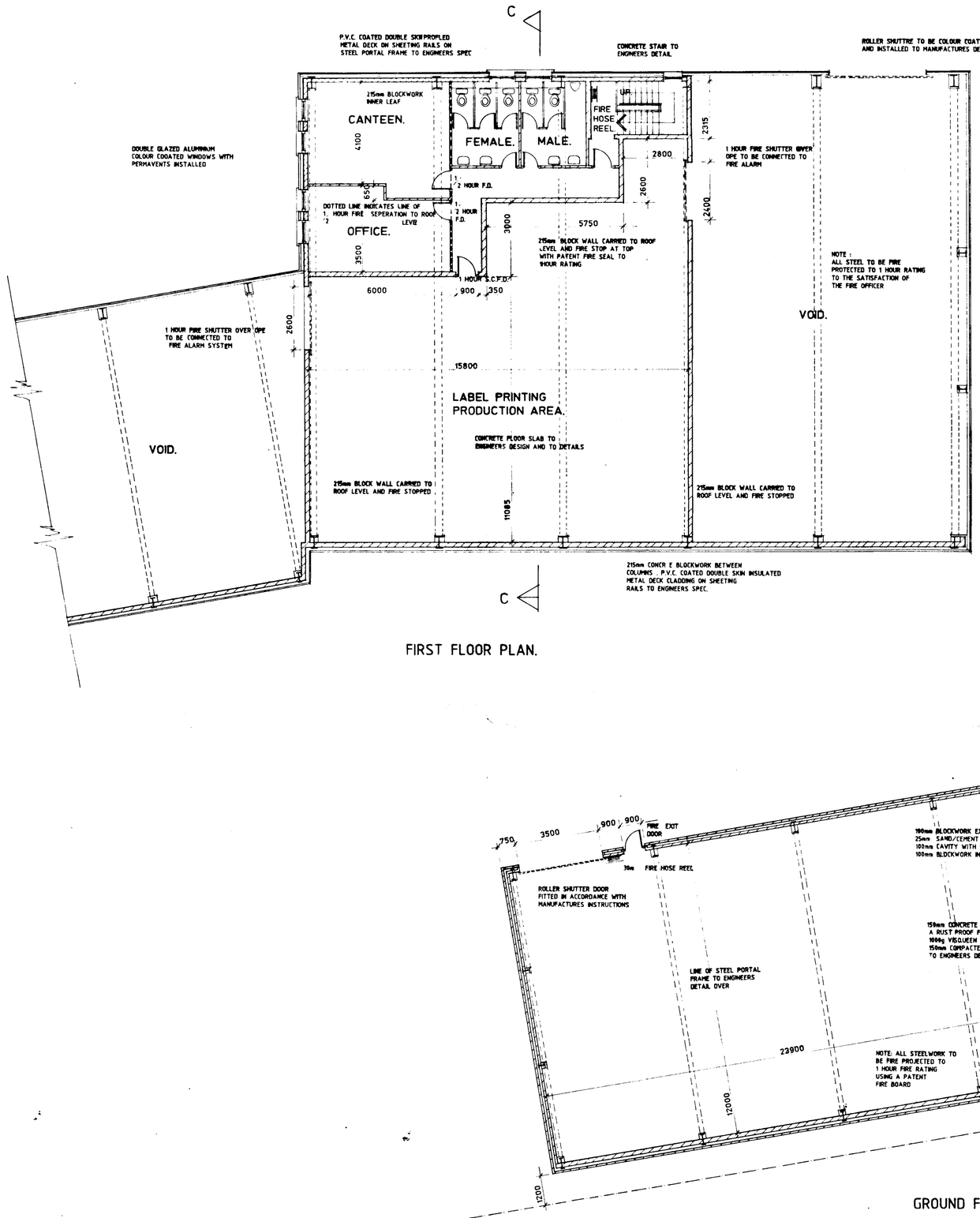
PATENT EAVES VENTILATOR'S TO BE INSTALLED TO ALLOW ADEQUATE CROSS VENTILATION TO EACH AND EVERY ROOF VOID.

project	PROPOSED FACTORY & OFFICES FOX & GEESE NAAS RD. DUBLIN 12.
client	PACKAGING INDUSTRIES LTD.
title	FLOOR PLANS TO OFFICES.
drawing no	B031 (P1) 005.
drawn	KB
date	FEB '92
scale	1:50.

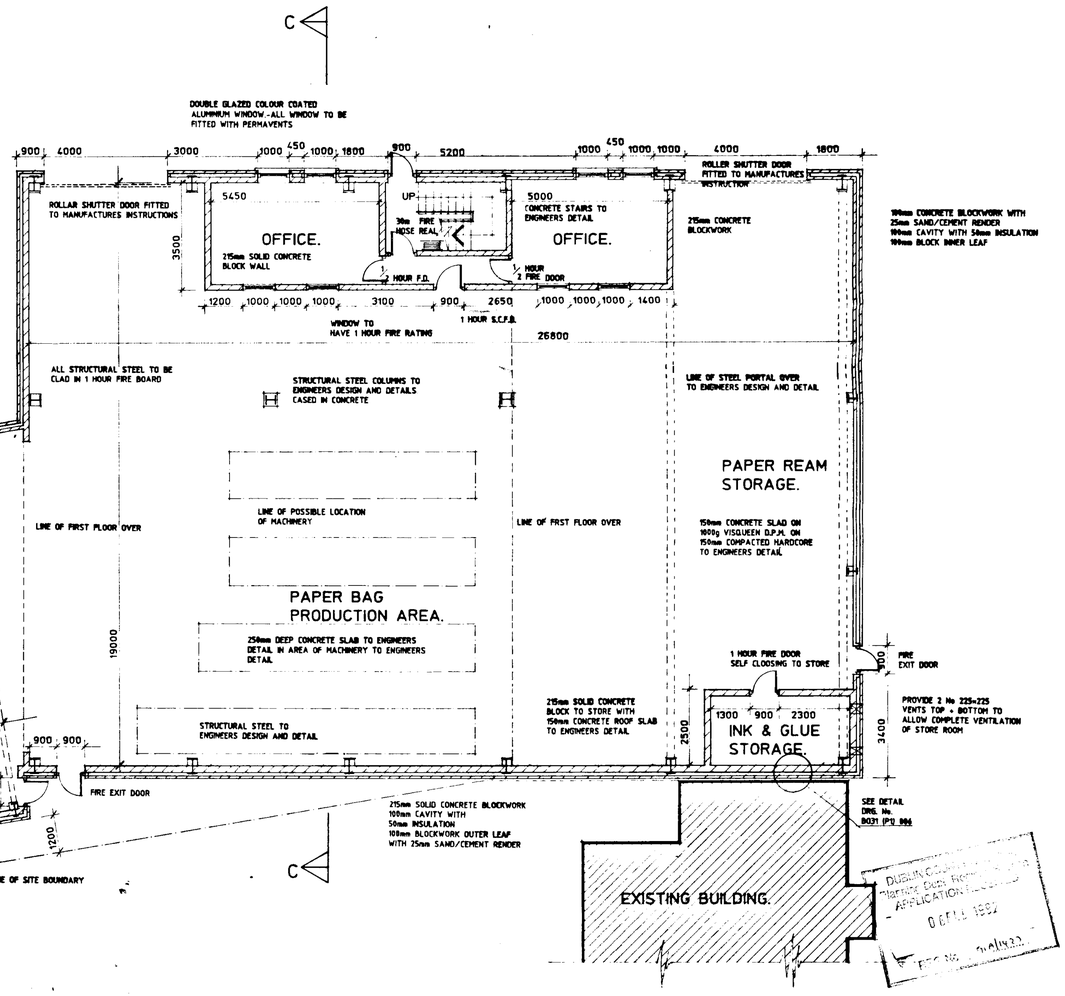
architects
the ambrose kelly group
Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

notes

no dimensions are to be scaled from this drawing



FIRST FLOOR PLAN.

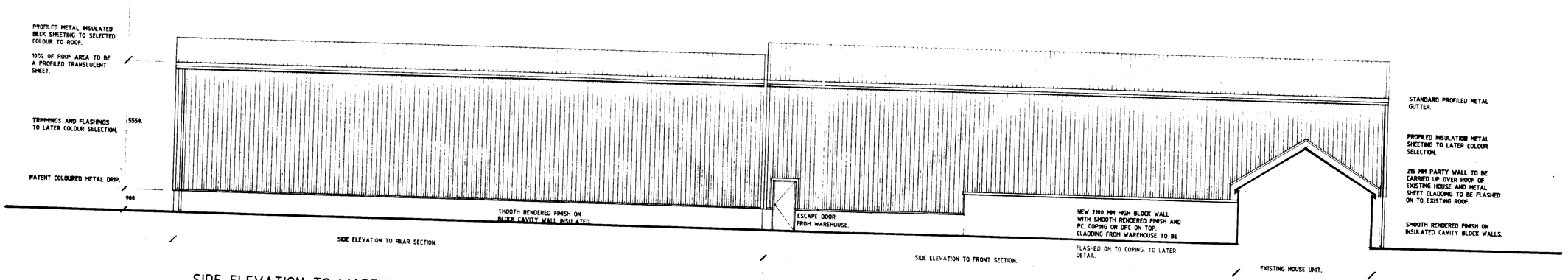


GROUND FLOOR PLAN.

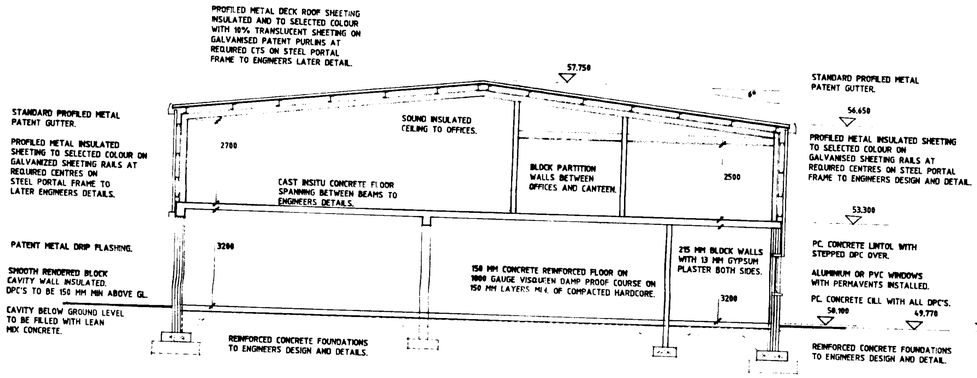
project	PROPOSED FACTORY + OFFICES - FOX & GEESE NAAS RD DUBLIN 12.
client	PACKAGING INDUSTRIES LTD.
title	FLOOR PLANS TO WAREHOUSE.
drawing no	B031 - (P1) 004
drawn	KB date JAN 92 scale 1:100

architects
the ambrose kelly group
Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

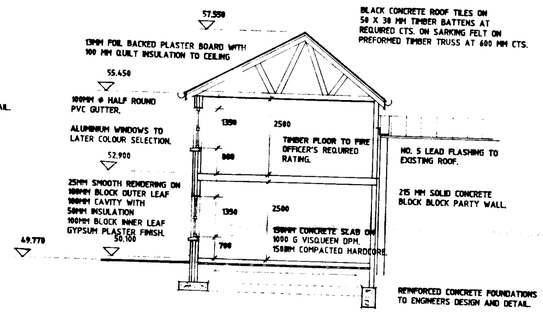
notes



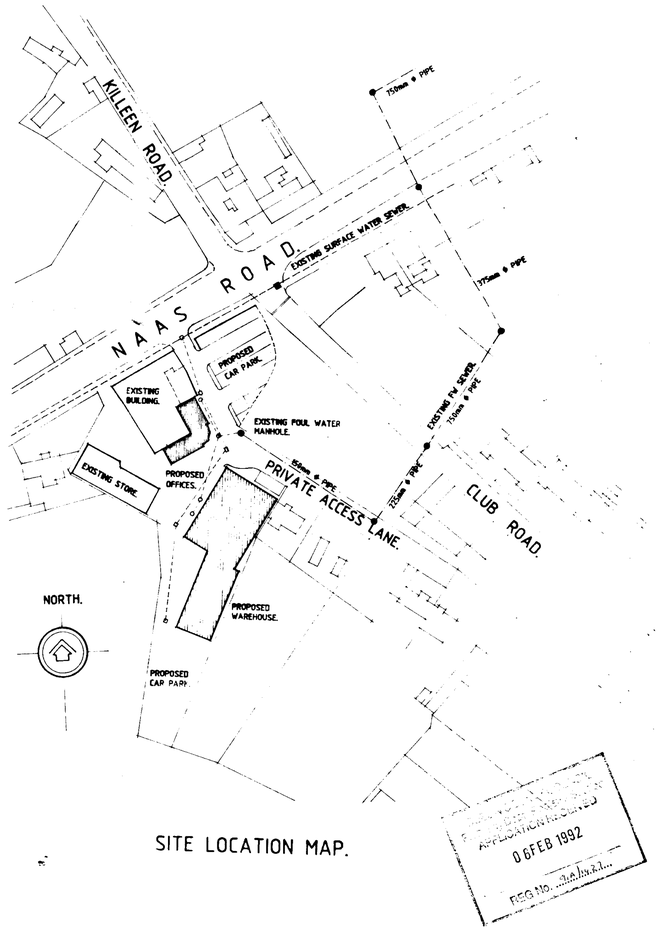
SIDE ELEVATION TO WAREHOUSE.



SECTION A-A



SECTION B-B.



SITE LOCATION MAP.

REV: A REVISED FOR BYE LAWS 31/1/92. K.B

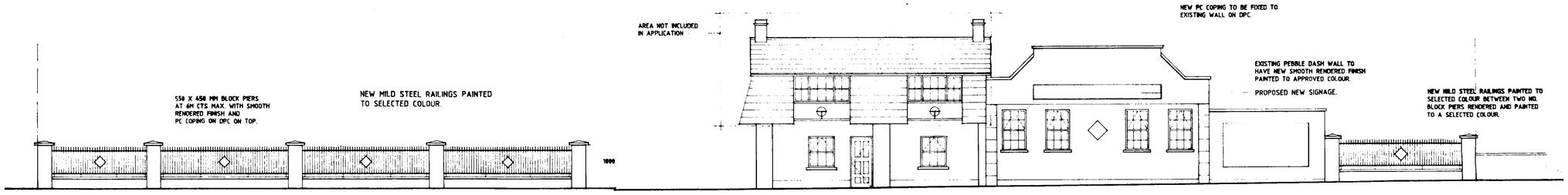
revisions	A
project	PROPOSED WAREHOUSE AND OFFICES, FOX AND GEESE, DUBLIN 12.
client	PACKAGING INDUSTRIES LTD.
title	SECTIONS, ELEVATION, BLOCK PLAN.
drawing no	B031 (P1) 03 A
drawn	KB date 28.8.91. scale 1:100; 1:1000.

architects
the ambrose kelly group
Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511. Fax 01 607620

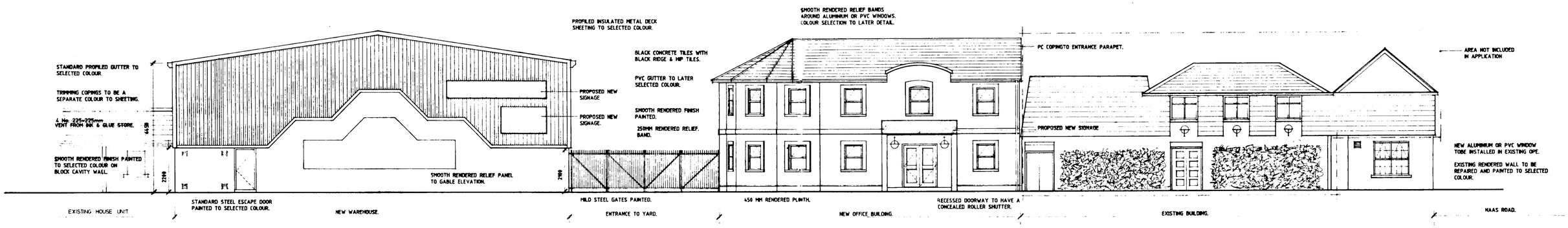
JDH 148BB

notes

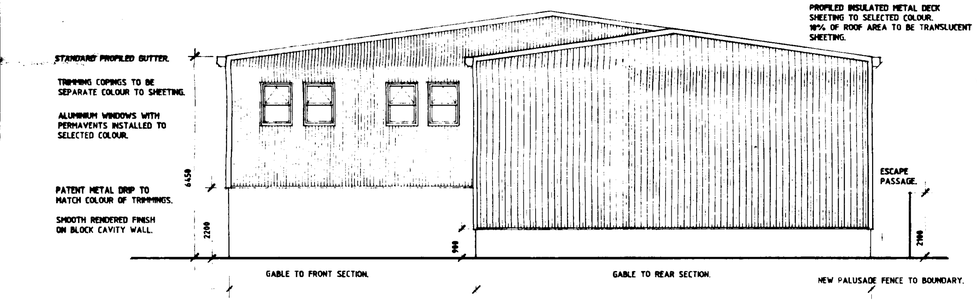
no dimensions are to be scaled from this drawing



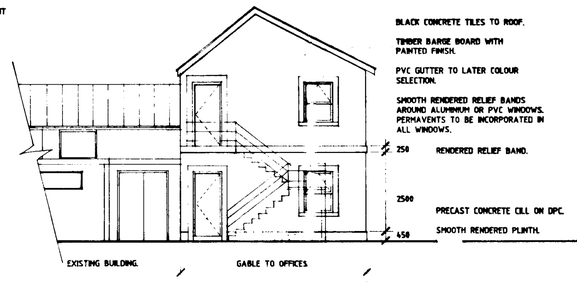
FRONT ELEVATION TO NAAS ROAD.



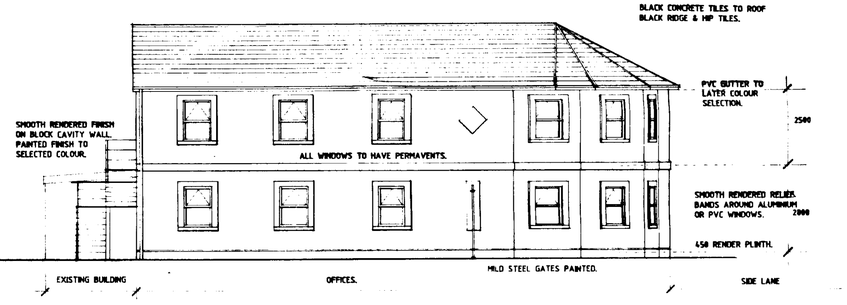
ELEVATION TO SIDE LANE.



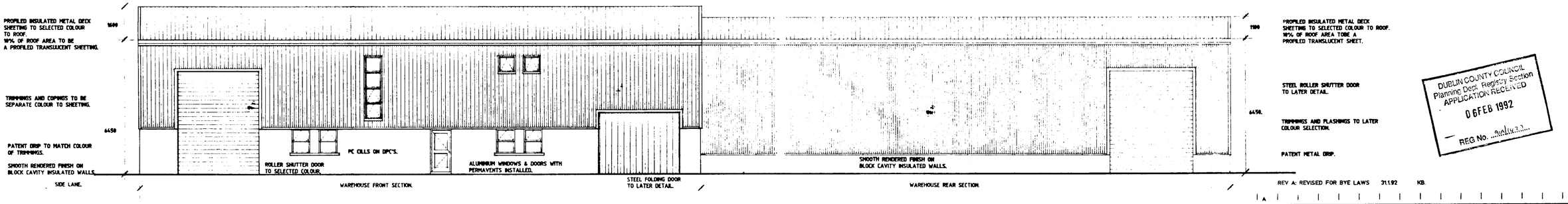
REAR GABLE ELEVATION TO WAREHOUSE.



GABLE ELEVATION TO OFFICES.



OFFICE ELEVATION TO YARD.



WAREHOUSE ELEVATION TO YARD.

REV A: REVISED FOR BYE LAWS 31.1.92 KB.

project PROPOSED WAREHOUSE & OFFICES FOX & GEESE NAAS ROAD DUBLIN 12.

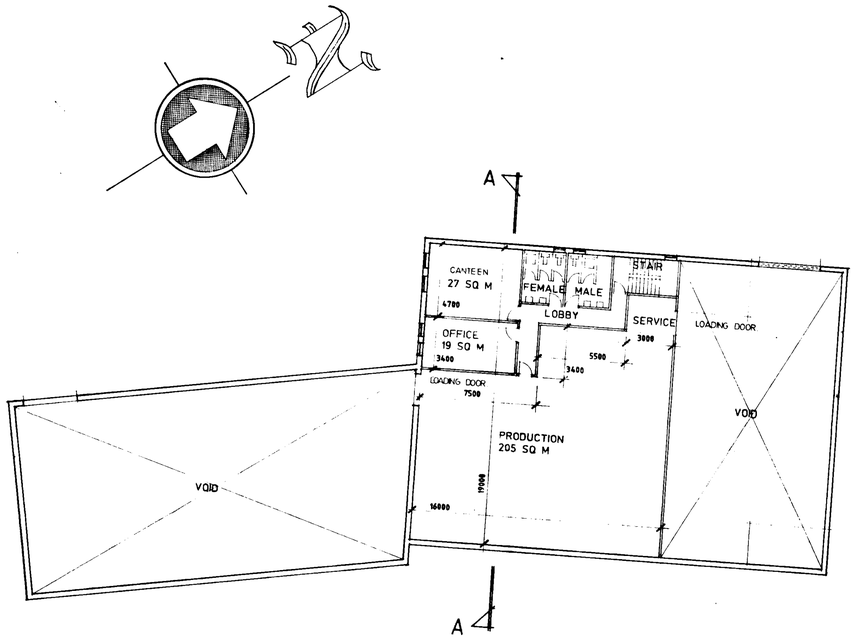
client PACKAGING INDUSTRIES LTD.

title ELEVATIONS.

drawing no B031 (P1) 02. A

drawn KB date 26.8.91 scale 1:100

architects
the ambrose kelly group
Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620



FIRST FLOOR PLAN TO INDUSTRIAL UNIT.

GROUND FLOOR PLAN TO INDUSTRIAL UNIT.

PROPOSED OFFICES FIRST FLOOR PLAN.
scale 1:200

FOUL WATER DRAINAGE

MH No.	COVER LEVEL	INVERT LEVEL
FW MH 1	49.700	49.300
FW MH 2	49.750	48.600
FW MH 3	49.850	49.100
FW MH 4	49.850	49.200
MH 164	49.700	48.400

SURFACE WATER DRAINAGE

MH No.	COVER LEVEL	INVERT LEVEL
SW MH11	49.550	46.550
SW MH 2	49.700	49.050
SW MH 3	49.770	49.225
SW MH 4	49.900	49.625
SW MH 5	50.500	50.000

REV. A. REVISED FOR BYE LAWS. 31.1.92 K.B.

revisions

project PROPOSED FACTORY & OFFICES FOX & GEESE NAAS ROAD DUBLIN. 12.

client PACKAGING INDUSTRIES LTD.

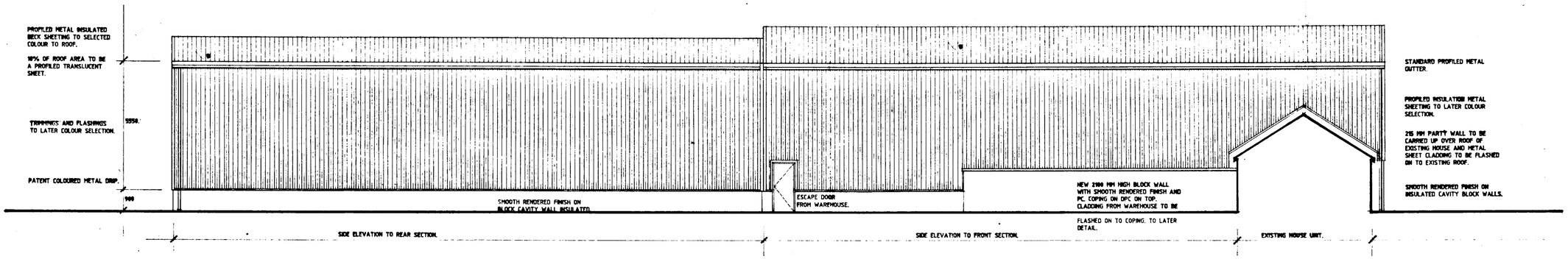
title FLOOR PLANS & SITE LAYOUT.

drawing no B031 (P1) 01 A

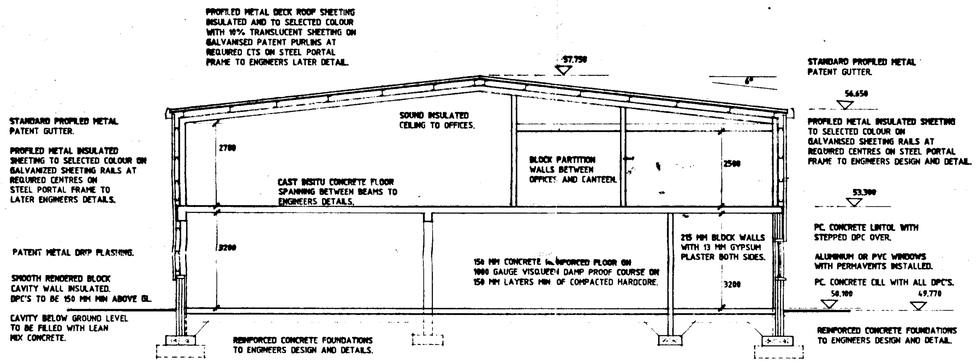
drawn KB. date 27.7.91. scale 1:200.

architects
the ambrose kelly group
Fleming Court Fleming Place Dublin 4
Telephone 01 607511 Fax 01 607620

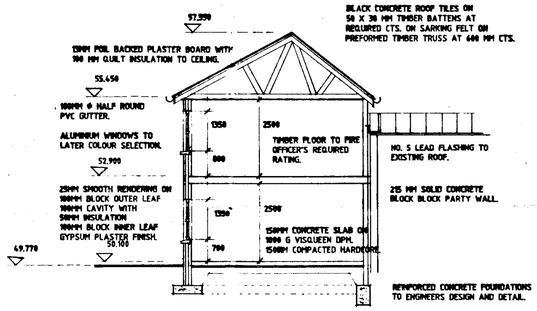
notes



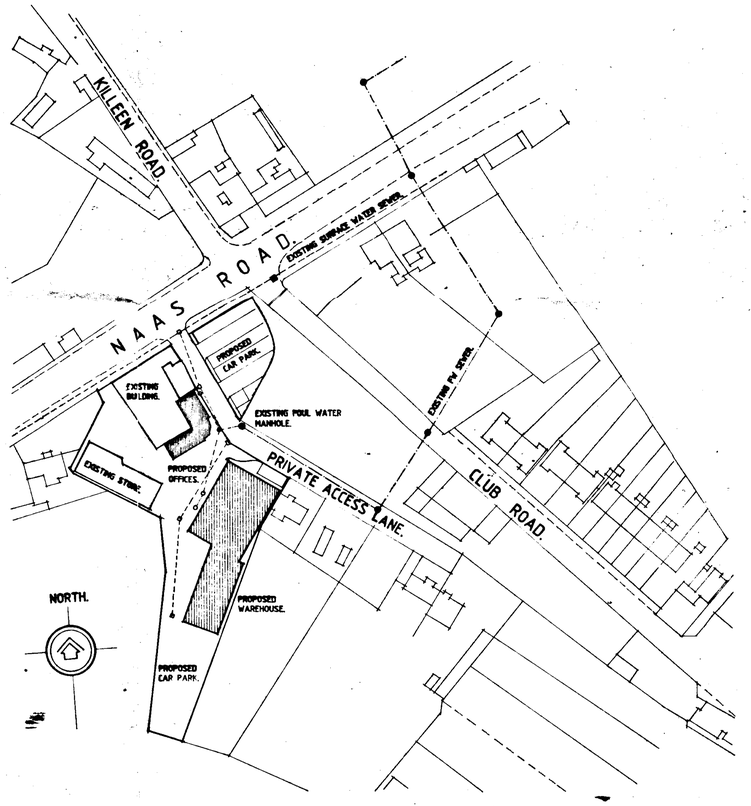
SIDE ELEVATION TO WAREHOUSE.



SECTION A-A



SECTION B-B.



SITE LOCATION MAP.

revisions

project	PROPOSED WAREHOUSE AND OFFICES, FOX AND GEESE, DUBLIN 12.
client	PACKAGING INDUSTRIES LTD.
title	SECTIONS, ELEVATION, BLOCK PLAN.
drawing no	B031 (P1) 03
drawn	KB
date	28.8.91.
scale	1:100; 1:1000.

architects
the ambrose kelly group
Fleming Court, Fleming's Place, Dublin 4
Telephone 01 607511 Fax 01 607620

JDH 14888