REF. NO.: 91A/142 CERTIFICATE NO.: 143980

PROPOSAL: Ind. dev.

LOCATION: Ballymount Rd. Upper

APPLICANT: Lawnwood 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 1824m²	@ £3.50 per m² or £70	6384.00	£6314	~~40.00~~		transferred from overpayment on pl.p. applic
D	Building or other structure for purposes of agriculture	@ £1.00 per m² in excess of 300 m² Min. £70			No Bal. due.		
E	Petrol Filling Station	@ £200					
F	Dev. of prop. not coming within any of the foregoing classes	£70 or £9 per 0.1 hectare 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. O'D Grade: III Date: 4/4/91

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

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/0142 Date : 19th February 1991

Dear Sir/Madam,

Development : 1824 sq. metre of light industrial development including manufacturing and warehousing uses

LOCATION : Ballymount Road Upper, Ballymount Little

Applicant : Larnwood Ltd,

App. Type : PERMISSION

Date Recd : 8th February 1991

Your application in relation to the above was submitted with a fee of £40.00 .

On examination of the plans submitted it would appear that the appropriate amount should be £3192.00.

I should be obliged if you would submit the balance of £3152.00 as soon as possible as a decision cannot be made on this application until the correct fee is received.

Yours faithfully,

.....

PRINCIPAL OFFICER

Integrated Development Services Limited,
146 Lower Drumcondra Road,
Dublin 9.

F.: 91A/0142 CERTIFICATE NO: 24231

PROPOSAL: Manufacturing & Warehouse development

LOCATION: Ballymount Road Upper, Ballymount Little

APPLICANT: Leewood Ltd

1	2	3	4	5	6	7
DWELLINGS/AREA LENGTH/STRUCT	RATE	AMT. OF FEE REQ'D	AMOUNT LODGED	BALANCE DUE	BALANCE DUE	DATE/ RECEIPT NO
Dwellings	@£32					
	@£16					
	@50p per M² in excess of 300M² Min.£40					
metres² 1824.0m²	@£1.75 per M² or £40	£3192	£40	£3152		
x .1 hect.	@£25 per hect. or £250					
x .1 hect.	@£35 per hect. or £40					
x .1 hect.	@£85 per hect. or £100					
	@£100					
x metres²	@£10 per M² or £40					
x1,000m²	@£35 per 1,000M² or £40					
x .1 hect.	@£5 per hect. or £40					

£3192 4/3/91 N34073

£40 overpayment transferred to bye-laws applic. Cert No. 14398B

Column 1 Certified: Signed: [signature] Grade: DTI Date: 14/2/91

Column 1 Endorsed: Signed: Grade: Date:

Columns 2,3,4,5,6 & 7 Certified Signed: [signature] Grade: S.O. Date: 13/2/91

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

DUBLIN COUNTY COUNCIL

PLANNING DEPARTMENT

Register Reference : 91A/0142 Date Received : 8th February 1991

Applicant : Larnwood Ltd, Appl.Type : PERMISSION

Development : 1824 sq. metre of light industrial development including manufacturing and warehousing uses

LOCATION : Ballymount Road Upper, Ballymount Little

O.S.REFS. 22-1

AREA REFERENCE WS0505

HISTORY

FEES CERTIFICATE NO.

FEE CLASS

MEASUREMENT FOR FEES

SIGNED ..... DATE .....

SENIOR EXECUTIVE DRAUGHTSMAN

FEE PAID	FEE ASSESSED	BALANCE DUE

CERTIFIED _____ GRADE _____ DATE _____

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

ASSESSMENT OF FINANCIAL CONTRIBUTION

REG. REF.: 91A/142

CONT. REG.:

SERVICES INVOLVED: WATER/FOUL SEWER/SURFACE WATER

AREA OF SITE: 3.05 Acres — MBeatty

FLOOR AREA OF PRESENT PROPOSAL: 19634 FT²

MEASURED BY: J.Y. 14/2/91.

CHECKED BY:

METHOD OF ASSESSMENT:

TOTAL ASSESSMENT

MANAGER'S ORDERED NO: P/ /
DATED

ENTERED IN CONTRIBUTIONS REGISTER:

Standard
nil
Paid in full
CA1625

DEVELOPMENT CONTROL ASSISTANT GRADE

Roads
£10,000
Contribution
not to be
indexed per
MK A Dempsey
27/3/91

7/6

91A/142

RW/GC

14/2/91

Integrated Development Services Ltd.,
146 Lower Drumcondra Road,
Dublin 9.

Re; Proposed industrial development at Ballymount Road Upper for Larnwood Ltd.
Reg.Ref. 91A/0142

Dear Sirs,

I refer to the above application lodged on 8/2/91.
Your cheque in the sum of £3,192.00 is returned herewith as it has been incorrectly dated.

As the 2-month period within which the planning authority must make a decision will not begin to run until the correct fee has been paid it is important that you submit the amended cheque as soon as possible.

Yours faithfully,

for PRINCIPAL OFFICER

716

Integrated Development Services Ltd.

Property Acquisition and Development Consultants.
146 Lower Drumcondra Road, Dublin 9, Ireland. Telephone: (01) 370936, 379362, 360033. Fax: (01) 369303.

Dublin Co. Council,
Planning Department,
Irish Life Centre,
Lower Abbey St.,
Dublin, 1.

12th February, 1991.

RE; 1824 SQ.M. OF INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPPER.

914/142

Dear Sirs,

Further to the application for planning permission lodged Friday 8th February we now enclose our clients cheque in the amount of IR£3,192.00.

As we paid IR£40.00 at the time of application we have now over-paid by IR£40.00.

If you wish same can be returned to us or held by Dublin County Council pending the bye law application.

Yours faithfully,

PETER T. CAGNEY
for INTEGRATED DEVELOPMENT SERVICES.

PP.

13. FEB 91

ENCL.

Seol aon fhreagra chun
(Reply to)

AN RÚN[redacted]
(The Secre[redacted])

faoin uimhir seo:—
(Quoting)

AN ROINN COSANTA
(Department of Defence)

TEACH NA PÁIRCE
(Park House)

BAILE ÁTHA CLIATH, 7
(Dublin, 7)

2/50719

Teileafón 01/[redacted] 771881

13 March, 1991.

Dear Sir,

Re: Planning Applications which might affect the use of Casement Aerodrome, Baldonnel, Co. Dublin.

I am directed by the Minister for Defence to refer to applications:

91A/0129 - B. Murphy, Redgap, Rathcoole. MD

91A/0134 - S. Kelly, Athgoe North. MG

91A/0138 - T & S Taverns Ltd., The Red Cow Inn, Clondalkin. MD

91A/0142 - Larnwood Ltd., Ballymount Road Upper, Ballymount Little. MD

91B/0103 - Michael Smyth, Saggart Hill, Crooksling.

No objection is seen to these developments provided they are not of exceptional height.

Yours sincerely,

JOHN P. MORAN
EXECUTIVE OFFICER

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 15/3/91
Time 12.45

The Secretary,
Dublin County Council,
Planning Department,
Irish Life Mall,
Lower Abbey Street,
Dublin 1.

SS only.

Register Reference : 91A/0142 Date : 26th February 1991

Development : 1824 sq. metre of light industrial development including manufacturing and warehousing uses

MD

LOCATION : Ballymount Road Upper, Ballymount Little

Applicant : Larnwood Ltd,

App. Type : PERMISSION

Planning Officer : M.DARLEY

Date Recd. : 8th February 1991

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

Yours faithfully,

DUBLIN Co. COUNCIL
-6 MAR 1991
SAN SERVICES

.....
PRINCIPAL OFFICER

Date received in Sanitary Services .....

FOUL SEWER

Available as indicated

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 12/4/91
Time 11:30

SURFACE WATER

Available as indicated

Note ; The S.W. outfall is considered inadequate in size & gradient. Applicant to submit an alternative acceptable design. This can be addressed by way of an acceptable compliance drawing prior to the commencement of construction.

SENIOR ENGINEER,
SANITARY SERVICES DEPARTMENT,
46/49 UPPER O'CONNELL STREET,
DUBLIN 1

SA...
10 APR 1991
Returned

J. Rice
for 5/4/91

Register Reference : 91A/0142 Date : 26th February 1991

ENDORSED _____ DATE _____

WATER SUPPLY: Available for general use 24 hour storage to be provided applicant to consult & agree with Sanitary Services watermain layout.

Refer to C.F.O. 7/3/91

ENDORSED _____ DATE 8/3/91

9/4/91

DUBLIN COUNTY COUNCIL

REG. REF:	91/A/142
LOCATION:	Ballymount Road Upper.
APPLICANT:	Larnwood Ltd.
PROPOSAL:	1824 sq.m. of light industrial development incl. manufacturing and warehousing uses.
DATE LODGED:	8th February, 1991.

Following discussions with Planning Department on 14/3/91 it was agreed that the following conditions should apply:-

1. Applicant to consult with Roads Dept. in respect of internal layout to render it suitable for the circulation of heavy goods vehicle within the site.

2. Applicant to consult with Roads Dept. in respect of entrance layout and gates to be such that they can only open inwards.

3. All car parking spaces to be clearly marked out and lined on site.

4. A financial contribution, in the sum of money equivalent to the value of £10,000 as on 1st January, 1991, and updated in accordance with the Wholesale Price Index-Building and Construction (Capital Goods) as published by the Central Statistics Office to the value pertaining at the time of payment shall be paid by the developer to Dublin County Council towards the cost of road improvements and Traffic Management proposals on Ballymount Road Upper.

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 20.3.91
Time 4.00

TB/MM 14/3/91.

SIGNED: [signature] ENDORSED:

DATE: 14/3/91 DATE:

P/1335/91

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Register Reference : 91A/0142 Date Received : 8th February 1991

Correspondence Name and Address : Integrated Development Services Limited, 146 Lower Drumcondra Road, Dublin 9.

CN625 II New file

CONTRIBUTION:
Standard: Nil
Roads. 10,000
S Sers:
Open Space:
Other:
SECURITY:
Bond / C.I.F.:
Cash:

Development : 1824 sq. metre of light industrial development including manufacturing and warehousing uses

Location : Ballymount Road Upper, Ballymount Little

Applicant : Larnwood Ltd,

App. Type : Permission

Zoning : 'E' - Industrial

Report of the Dublin Planning Officer, dated 21st March, 1991.

This application is for permission to erect 1,824sq. metres of light industrial advance units for manufacturing and warehouse uses at Ballymount Road Upper, Ballymount Little.

ZONING AND PLANNING HISTORY:

The site is located in an area zoned 'industrial'. The proposed site has apparently been subdivided from an existing complex of industrial buildings, the remainder of which (although retaining an access right of way through the applicants' site) are now in different ownership.

Various applications have been granted on the larger site over the years with Reg. File Ref. SA.85 relating to one of the larger applications on the site on which extensions and additional buildings have been constructed incrementally. Reg. Ref. TA.106 permitted a boiler house, wood waste storage site and boiler stack on the area of the applicants' site where the proposed units are to be located. This is to the rear of the main existing buildings and the current proposal involves the demolition of most of these buildings/structures permitted under TA.106.

DEPARTMENTAL REPORTS:

The Roads Department report indicates no objection subject to four conditions and these are noted and agreed.

The Sanitary Services report has not been received.

REPRESENTATIONS:

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/0142

Page No: 0002

Location: Ballymount Road Upper, Ballymount Little

No objections lodged.

PLANNING COMMENT:

The proposal, which may entail the omission of some or all internal party walls depending on market demand, is acceptable in principle. Poor internal circulation layout and undisciplined on-site parking were noted on a site inspection. (The site is used by more than one Company).

I recommend that a decision to GRANT PERMISSION be made under the Local Government (Planning and Development) Acts, 1963-1990, subject to the following (14) conditions:-

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 Act, 1878-1964.

03 That the requirements of the Chief Fire officer be ascertained and strictly adhered to in the development.
REASON: In the interest of safety and the avoidance of fire hazard.

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

05 That the water supply and drainage arrangements, including the disposal of surface water, be in accordance with the requirements of the County Council.
REASON: In order to comply with the Sanitary Services Acts, 1978 - 1964.

06 That no industrial effluent be permitted without prior approval from Planning Authority.
REASON: In the interest of health.

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/0142

Page No: 0003

Location: Ballymount Road Upper, Ballymount Little

07 That off-street car parking facilities and parking for trucks be provided in accordance with the Development Plan Standards, and that all car parking spaces be clearly marked out and lined on site prior to commencement of use

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

08 That the area between the building and roads must not be used for truck parking or other storage or display purpose, but must be reserved for car parking and landscaping as shown on lodged plans.
REASON: In the interest of the proper planning and development of the area.

09 That the applicants shall carry out the development to the satisfaction of ~~consult with the~~ Dublin County Councils Roads Department in respect of: (a) the proposed internal layout to render it suitable for the circulation of Heavy Goods Vehicles within the site, (b) the proposed entrance layout and gates which shall open in an inwards direction only.
REASON: In the interest of public safety and of the proper planning and development of the area.

10 A financial contribution in the sum of ~~money equivalent to the value of~~ £10,000 ~~as on 1 January, 1991, and updated in accordance with the Wholesale Price Index-Building and Construction (Capital Goods) as published by the Central Statistics Office to the value pertaining at the time of payment~~ shall be paid by the developer to Dublin County Council towards the cost of road improvements and traffic management proposals on Ballymount Road Upper. 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.

11 That details of landscaping and boundary treatment be submitted to and approved in writing by Planning Authority and work theron completed prior to occupation of units.
REASON: In the interest of amenity.

12 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.

13 That the proposed units shall not be used for direct retailing or

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Reg.Ref: 91A/0142

Page No: 0004

Location: Ballymount Road Upper, Ballymount Little

supermarket trading without the prior approval of the Planning Authority, or An Bord Pleanala.

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

14 Prior to commencement of development details of all external finishes to be agreed with the Planning Authority.

14 REASON: In the interests of visual amenity.

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 (14) conditions set out above is hereby made.

Dated : 28 March 1991 .....K.O'Dublin.....

ASSISTANT CITY AND COUNTY MANAGER

to whom the appropriate powers have been delegated by order of the Dublin City and County Manager dated ~~21st February 1991~~ 27th March 1991.

DUBLIN COUNTY COUNCIL

REG. REF: 91/A/142

LOCATION: Ballymount Road Upper.

APPLICANT: Larnwood Ltd.

PROPOSAL: 1824 sq.m. of light industrial development incl. manufacturing and warehousing uses.

DATE LODGED: 8th February, 1991.

MDT

Following discussions with Planning Department on 14/3/91 it was agreed that the following conditions should apply:-

1. Applicant to consult with Roads Dept. in respect of internal layout to render it suitable for the circulation of heavy goods vehicle within the site.

2. Applicant to consult with Roads Dept. in respect of entrance layout and gates to be such that they can only open inwards.

3. All car parking spaces to be clearly marked out and lined on site.

4. A financial contribution, in the sum of money equivalent to the value of £10,000 as on 1st January, 1991, and updated in accordance with the Wholesale Price Index-Building and Construction (Capital Goods) as published by the Central Statistics Office to the value pertaining at the time of payment shall be paid by the developer to Dublin County Council towards the cost of road improvements and Traffic Management proposals on Ballymount Road Upper.

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 14/3/91
Time 3.50

TB/MM 14/3/91.

SIGNED: C. F. Burke ENDORSED:

DATE: 14/3/91 DATE:

COMHAIRLE 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

10 April 1991

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

LOCATION: Ballymount Road Upper, Ballymount Little

PROPOSED DEVELOPMENT: Light Ind. Advance Units Dev. to include for manufacturing & warehousing

APPLICANT: Larnwood Limited

PLANNING REG.REF.: 91A/0142

DATE OF RECEIPT OF SUBMISSION: 22 March 1991

A Chara,

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

Building Bye Law Approval.

Mise, le meas

A. Smith

PRINCIPAL OFFICER

Integrated Development Services Ltd,
146 Lower Drumcondra Road,
Drumcondra,
Dublin 9.

Dublin County Council
Comhairle Chontae Atha Cliath

[redacted]

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 ...BALLYMOUNT ROAD UPPER, BALLYMOUNT LITTLE...
(If none, give description sufficient to identify)...

3. Name of applicant (Principal not Agent)...LARNWOOD LIMITED...

Address...c/o 146 LOWER DRUMCONDRA ROAD, DUBLIN, 9.... Tel. No...01-370936...

4. Name and address of ...INTEGRATED DEVELOPMENT SERVICES LTD., 146 LOWER DRUMCONDRA ROAD,...
person or firm responsible for preparation of drawings ...DRUMCONDRA, DUBLIN, 9.... Tel. No ...01-370936...

5. Name and address to which ...AS 4 ABOVE... notifications should be sent

6. Brief description of proposed development ...1824 SQ.M. OF LIGHT INDUSTRIAL ADVANCE UNITS DEVELOPMENT TO INCLUDE FOR MANUFACTURING AND WAREHOUSING.

7. Method of drainage ...EXISTING SEWERS... 8. Source of Water Supply ...EXISTING WATERMAIN...

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. ...LIGHT INDUSTRIAL / ANCILLARY OFFICES...
(b) Proposed use of each floor ...AS (a)...

BYE LAW APPLICATION.
REC. No. N 34626
£6344.00

10 Does the proposal involve demolition, partial demolition or change of use of any habitable house or part thereof? ...NO...

11.(a) Area of Site ...12350... Sq. m.

(b) Floor area of proposed development ...1824... Sq. m.

(c) Floor area of buildings proposed to be retained within site ...c. 2900... Sq. m.

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

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

14. Please state the extent to which the Draft Building Regulations have been taken in account in your proposal:
...AS FAR AS POSSIBLE...

15. List of documents enclosed with application. ...SEE LETTER OF APPLICATION...

16. Gross floor space of proposed development (See back) ...1824... Sq. m.

No of dwellings proposed (if any) ...NONE... Class(es) of Development ...CLASS C...

Fee Payable £...6,384.00... Basis of Calculation ...1824 x £3.50...
If a reduced fee is tendered details of previous relevant payment should be given
...SEE LETTER OF APPLICATION. £40 ALREADY PAID...

Signature of Applicant (or his Agent) ...[signature]... Date ...20TH MARCH, 1991...

FOR OFFICE USE ONLY

Application Type ...
Register Reference ... BBL 2.20.4.2
Amount Received £...
Receipt No ... 91A/0142
Date ...

RECEIVED
22 MAR 1991
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 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.

RECEIPT CODE

COMHAIRLE CHONTAE ÁTHA CLIATH

PAID BY — DUBLIN COUNTY COUNCIL
46/49 UPPER O'CONNELL STREET,
DUBLIN 1.

CASH ●
CHEQUE
M.O.
B.L.
I.T.

BYE LAW APPLICATION

REC. No. N 34626

£ 6344.00

Received this 22nd day of March 1991

from Yarnwood Ltd,

c/o 146 Lr. Drumcondra Rd,

D.9

the sum of six thousand three hundred - forty four Pounds

—— Pence, being fee for

bye-law application at Ballymount Rd.

[illegible] Cashier

S. CAREY
Principal Officer

Integrated Development Services Ltd.

Property Acquisition and Development Consultants.

146 Lower Drumcondra Road, Dublin 9, Ireland. Telephone: (01) 370936, 379362, 360033. Fax: (01) 369303.

Principal Officer,
Dublin Co. Council,
Building Bye Law Dept.,
Block II,
Irish Life Centre,
Lower Abbey St.,
Dublin, 1.

20th March, 1991.

RE; 1824 SQ.M. OF INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPPER.

Dear Sirs,

On behalf of Larnwood Ltd. we wish to apply for Building Bye Law Approval to construct the above.

We enclose;

ENGINEERS DRAWINGS ;	Horgan Lynch & Partners.
2 No. Copies ;	Structural Engineers Certificate.
	Drawing No. PL/01/01 : Foundations GA and RC Details.
	Drawing No. PL/01/02 : Ground Floor Slab GA.
	Drawing no. PL/01/03 : Structural Steelwork Layout.
	Drawing No. PL/01/04A: Section A-A Portal Frames Elevations.
	Drawing No. PL/01/05 : Structural Steelwork Elevations.
	Design Calculations.
ARCHITECTS DRAWINGS;	Integrated Development Services Ltd.
2 No. Copies ;	Drawing No. 91021/2 : Site Location Map.
	Drawing No. 91021/3 : Site Layout Plan.
	Drawing No. 91021/4A : Ground Floor Plan.
	Drawing No. 91021/5A : Elevations and Section.
	Drawing No. 91021/6 : Section and Details.
	Specification of Works.
	Clients cheque in the amount of £6,344.00.
	Completed Application Form.

The Building Bye Law fee for this development is £6,384.00. We are in credit of £40.00 from our previous planning application. Therefore the cheque enclosed is made out for the balance of £6,344.00.

The application shows four units but depending on market forces it may well be that the internal party walls may be omitted to suit.

.....Over/.....

...

The proposed use is light industrial to include for warehousing and manufacturing uses.

A planning application has been lodged for the above Reg. Ref. 91A/0142.

If you have any queries please contact us.

Yours faithfully,

KEVIN J. HAMELL
for INTEGRATED DEVELOPMENT SERVICES.

ENCLS.

Pinewood
Bishopstown,
Cork, Ireland
Telephone 021-545333
Fax No. 353-21-342497

58, North Great Charles Street,
Mountjoy Square,
Dublin 1
Telephone 01-728588
Fax No. 01-365195

Partners:
M. J. Horgan B.E., C.Eng., M.I.C.E., M.I.E.I.
D. F. Lynch B.E., C.Eng., F.I.E.I.
F. V. Murray B.E., C.Eng., M.I.Struct.E., M.I.E.I.
P. L. Anthony B.E., C.Eng., M.I.Struct.E., M.I.C.E., M.I.E.I.

HORGAN LYNCH + PARTNERS
CONSULTING ENGINEERS

Our ref *Your ref* *Reply to* *Date*

L.D.C.
8 MAR 1991
RECEIVED

LARNWOOD LTD.

DEVELOPMENT AT BALLYMOUNT ROAD UPPER

ARCHITECT. Integrated Development Services

We act as Consulting Engineers for the above project.

We hereby certify that the design of the project has been carried out by a competent and experienced Chartered Engineer and in accordance with Irish Standard Specifications and British Standard Specifications and Codes of Practice where applicable.

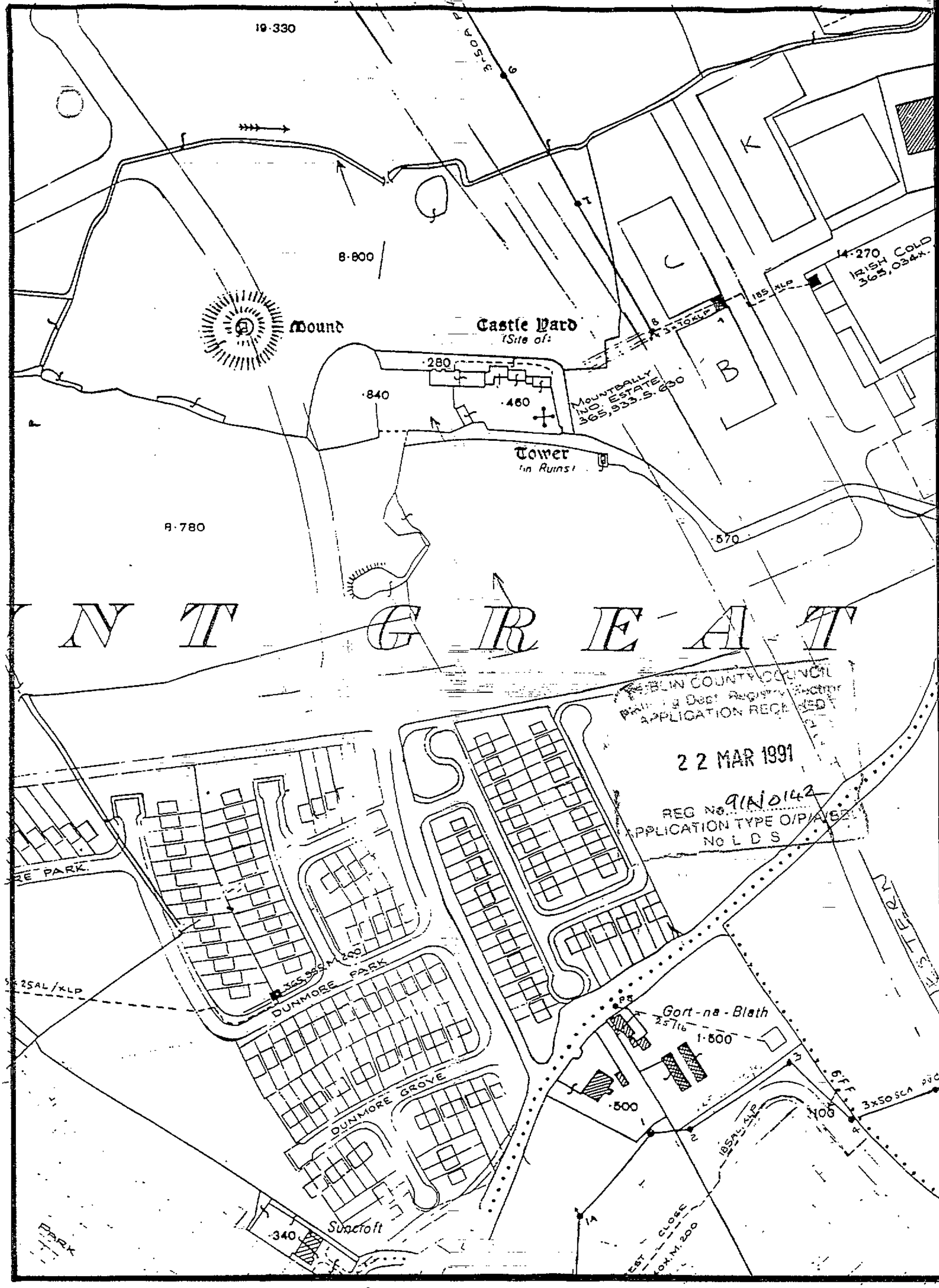
In particular, design will be in accordance with the following codes:-

Reinforced Concrete	B.S. 8110 1985
Foundations	B.S. 8004
Loadings	B.S. 6399
Blockwork	B.S. 5628 1978
Timber	B.S. 5268 Part 2 1984
Structural Steel	B.S. 449 Part 2

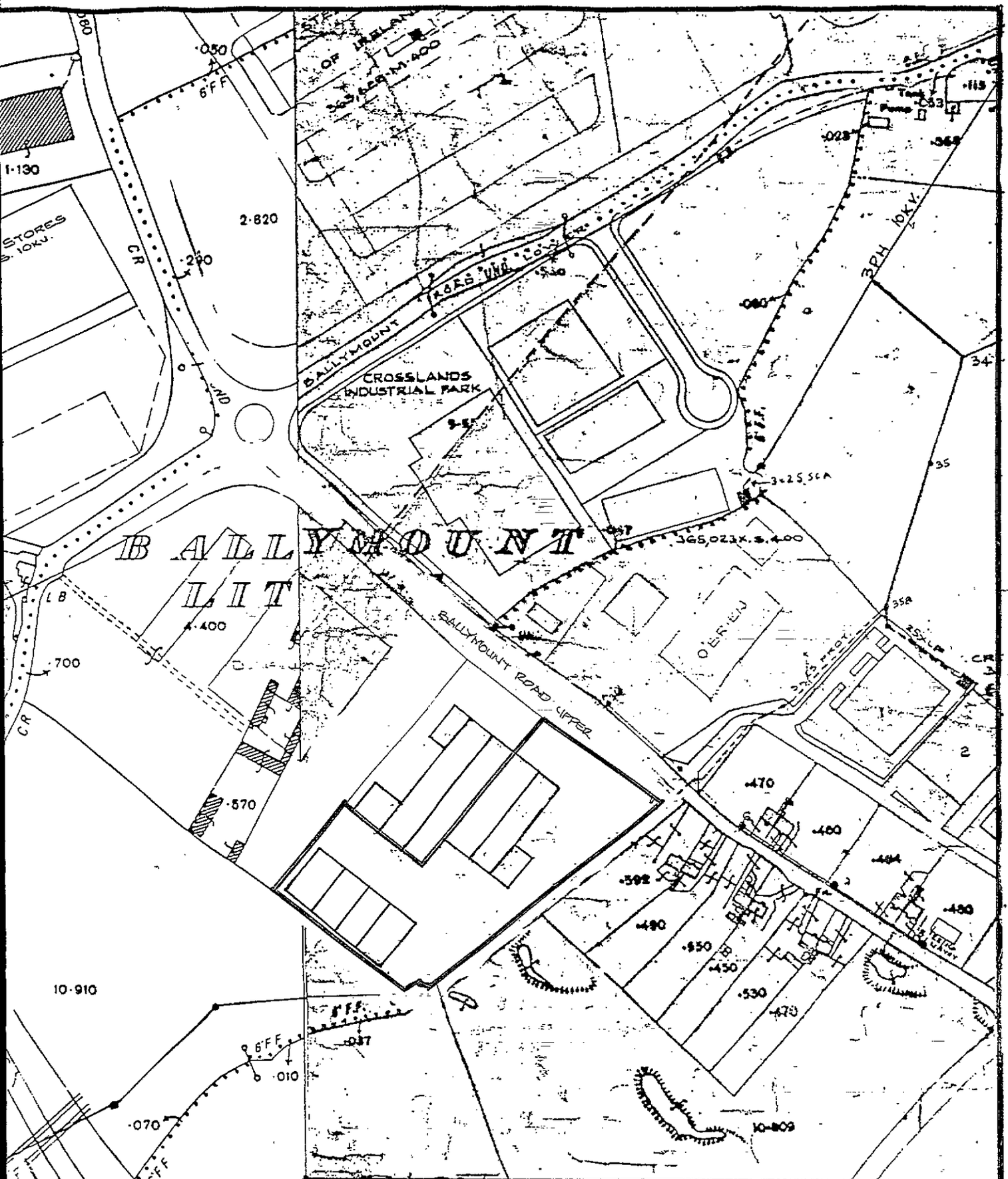
Signed,

Peter Anthony B.E. C. Eng. MIEI Struct.E. MICE

For the attention of:
PLANNING DEPARTMENT, DUBLIN CO. COUNCIL AND TO WHOM IT MAY CONCERN



19·330
8·800
Mound
Castle Yard
(Site of)
·280
·840
·460
Tower
(in Ruins)
8·780
·570
MOUNTBALLY NO ESTATE 365,933.5.630
IRISH COLD
14·270
K
C
B
NT GREAT
DUBLIN COUNTY COUNCIL
Planning Dept. Registry Section
APPLICATION RECEIVED
22 MAR 1991
REG No. 91A/0142
APPLICATION TYPE O/P/A/BBL
No L D S
RE PARK
DUNMORE PARK
DUNMORE GROVE
Gort-na-Blath
1·600
·500
Suncroft
·340
PARK



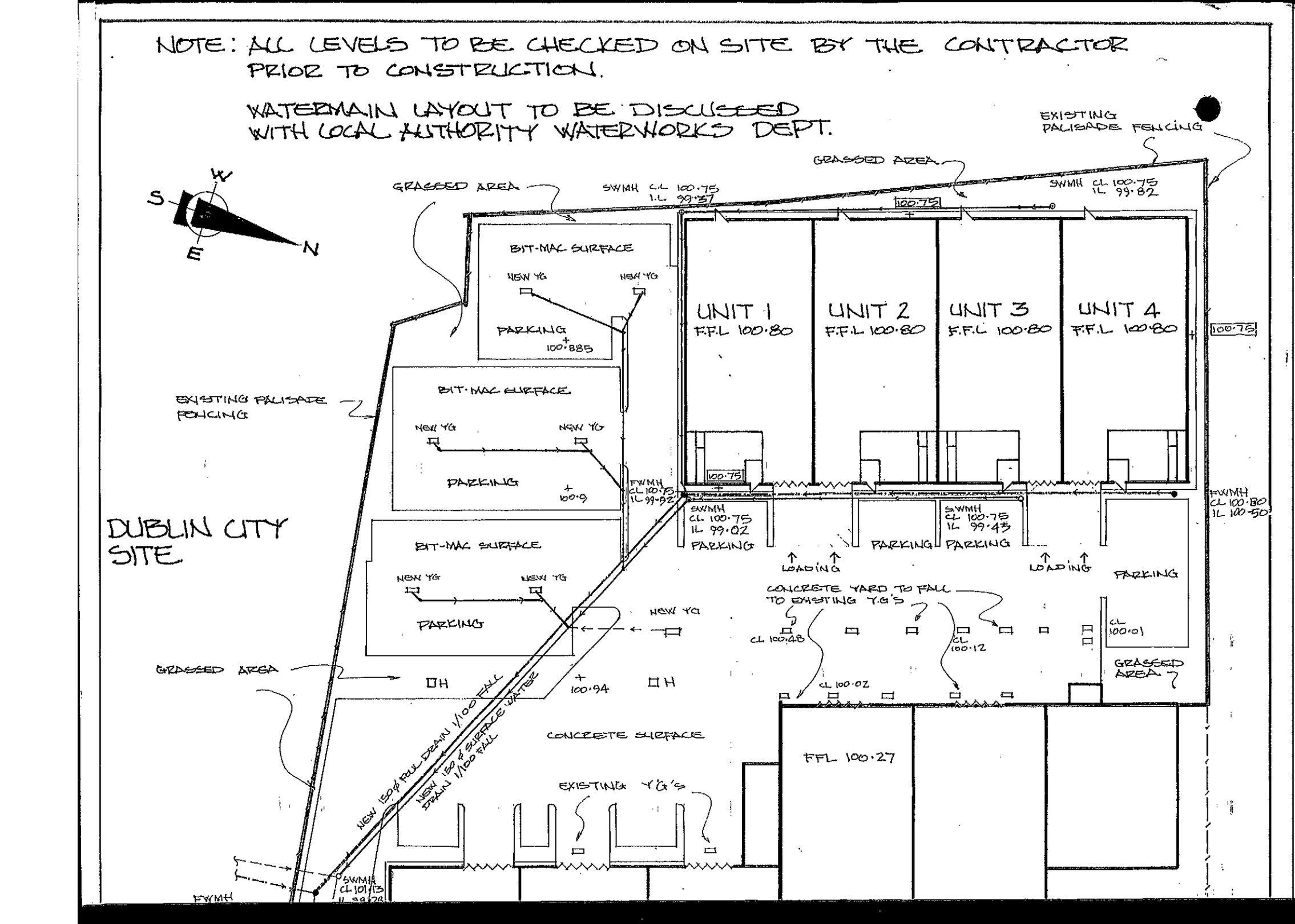
INTEGRATED DEVELOPMENT SERVICES
146 LOWER DRUMCONDRA ROAD DUBLIN 9. PH 370936

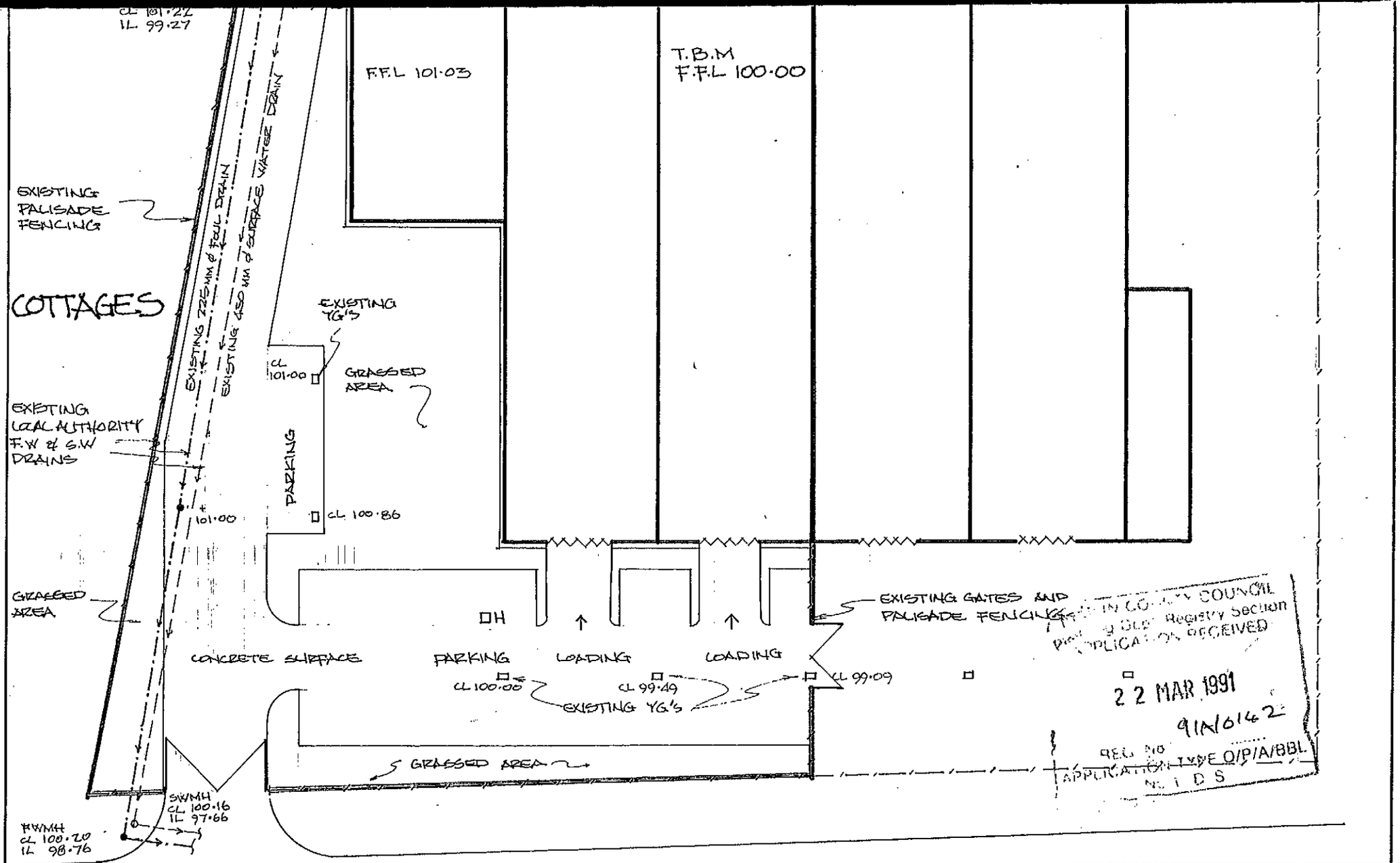
SITE LOCATION MAP FOR NEW INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPR. FOR LARKWOOD LIMITED

DRG. Nº	SCALE	DATE	REV Nº
91021/1	1:2500	3/91	

NOTE: ALL LEVELS TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

WATERMAIN LAYOUT TO BE DISCUSSED WITH LOCAL AUTHORITY WATERWORKS DEPT.





SITE PLAN 1:500

NEW S.W DRAIN

NEW F.W DRAIN

000·00 NEW LEVELS

INTEGRATED DEVELOPMENT SERVICES

146 LOWER DRUMCONDRA ROAD DUBLIN 9. PH 370936/379362

SITE LAYOUT PLAN FOR NEW INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPPER, FOR LARNWOOD LIMITED.

DATE:	SCALE	DRG TITLE	DRG N°	REVISION
FEB 91	1:500	SITE LAYOUT PLAN	91021/3	

HORGAN LYNCH & PARTNERS
CONSULTING ENGINEERS
CALCULATION SHEET

JOB:-

Designed | Checked | Date

SHEET NO.

CONTENTS.

HORGAN LYNCH & PARTNERS
CONSULTING ENGINEERS
CALCULATION SHEET

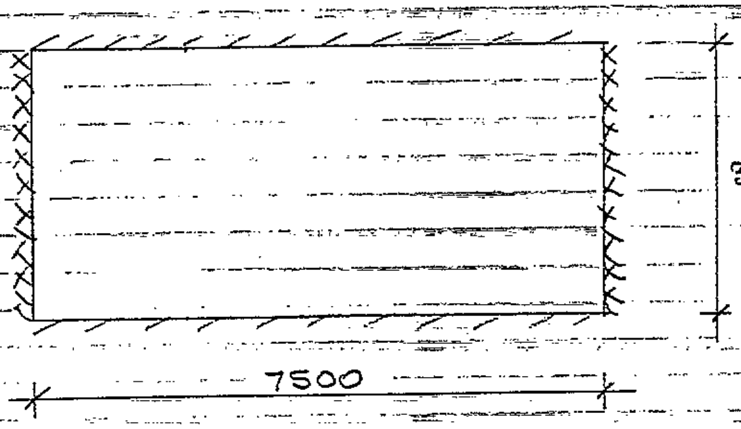
JOB:- Industrial Dev. at Ballymount Rd. UPS

Designed NF | Checked | Date March '91

SHEET NO. 45

Design of external wall panels
(for wind loading).

1) Wall panel at side and rear elevations.



Limiting dimensions :-

1) panel supported on four edges
2) $h \times L = 2025\, t_{ef}^2$ maximum

$t_{ef} = 2/3(t_1 + t_2) = 2/3(100+100) = 133$

$\therefore$ Max $h \times L = 2025(133)^2 \times 10^{-6}$
$= 36\ m^2$

actual $h \times L = 3.6 \times 7.5 = 27\ m^2$

$50\, t_{ef} = 50(133) \times 10^{-3} = 6.65\ m$
$< 7.5m$

$\Rightarrow$ increase inner leaf to 215 mm.

$\Rightarrow 50\, t_{ef} = 50(2/3)(100+215) = 10.5m$
$> 7.5m,\ 3.6m$

Bending Moments

M_o (outer leaf) $= \alpha_o \gamma_f W_{ko} L^2$

$\mu = \frac{f_{xacper}}{f_{xaper}} = \frac{0.25}{0.4} = 0.625$

$h/L = \frac{3.6}{7.5} = 0.48$

BS 5325 Table 3 $\Rightarrow \alpha_o = 0.0176$

$\gamma_f = 1.2$

$\therefore M_o = (0.0176)(1.2)(W_{ko})(7.5)^2$

$= 1.188\ W_{ko} \longrightarrow$ (i)

$M_o = 1.188 W_{ko}$

M_I (inner leaf) $= \alpha_I \gamma_f W_{kI} L^2$

$\mu = 0.625$, $h/L = 0.48$ } as for outer leaf

$\alpha_I = 0.0176$

$\therefore M_I = (0.0176)(1.2)(W_{kI})(7.5)^2$

$= 1.188\ W_{kI} \longrightarrow$ (ii)

$M_I = 1.188 W_{kI}$

Moment of resistance :

$$M_R = \left(\frac{f_{xa\,perp}}{\gamma_m}\right) Z$$

$$M_R = M_{R_o} + M_{R_I}$$

M_{R_o} (outer leaf) :-

$$Z_o = \frac{1000}{6} \times 100^2 = 1.66 \times 10^6 \ mm^3/m$$

Table 3 $f_{xa\,perp} = 0.4$

$\gamma_m = 3.5$

$$\therefore M_{R_o} = \left[\left(\frac{0.4}{3.5}\right) 1.66 \times 10^6\right] 10^{-6}$$

$$= 0.189 \ kNm/m \text{ height.}$$

Equating to (i) $= 1.188\, W_{k_o}$

$$\therefore W_{k_o} = 0.16 \ kN/m^2.$$

$W_{k_o} = 0.16 kN/m^2$

M_{R_I} (inner leaf) :-

$$Z_I = \frac{1000}{6} \times 215^2 = 7.7 \times 10^6 \ mm^3/m$$

$f_{xa\,perp} = 0.4$

$\gamma_m = 3.5$

$$\therefore M_{R_I} = \left[\frac{0.4}{3.5} \times 7.7 \times 10^6\right] 10^{-6}$$

$$= 0.88 \ kNm/m \text{ height.}$$

Equating to (ii) $= 1.188\ W_{ks}$

$\therefore W_{ks} = 0.741\ kN/m^2$.

Here, maximum moment of resistance of wall $= 0.160 + 0.741$

$= 0.901\ kN/m^2$.

$W_{ks} = 0.93 kN/m^2$

actual wind force:-

from page 3,

for $h = 3m$, $q = 0.359\ kN/m^2$.

$C_{pe} = 0.7$, $C_{pi} = -0.3$

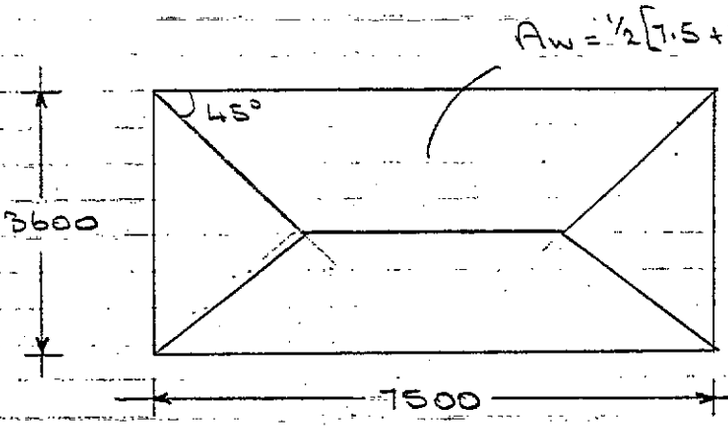
$\Rightarrow$ wind pressure $= (1.0)(0.359) = 0.359\ kN/m^2$

$< 0.901\ kN/m^2$

$\Rightarrow$ panel adequate in flexure.

panel adequate in flexure

Shear



$A_w = \frac{1}{2}[7.5 + (7.5 - 3.6)] \times (3.6/2)$

$= 10.26\ m^2$.

Assuming the wind load to be taken to the supports as shown.

Total load to supports

$= 1.2 \times 0.359 \times 10.26$

$= 4.42$ kN.

Taking the load as a U.D.L along the support, the design shear force/m run

$= \frac{4.42}{7.5} = 0.59$ kN

$\therefore$ Design shear stress, $v_H = \frac{0.59 \times 10^3}{(100+215) \times 1000}$

$= 0.0019$ N/mm².

$f_v = 0.35$ N/mm² (self-wt ignored)

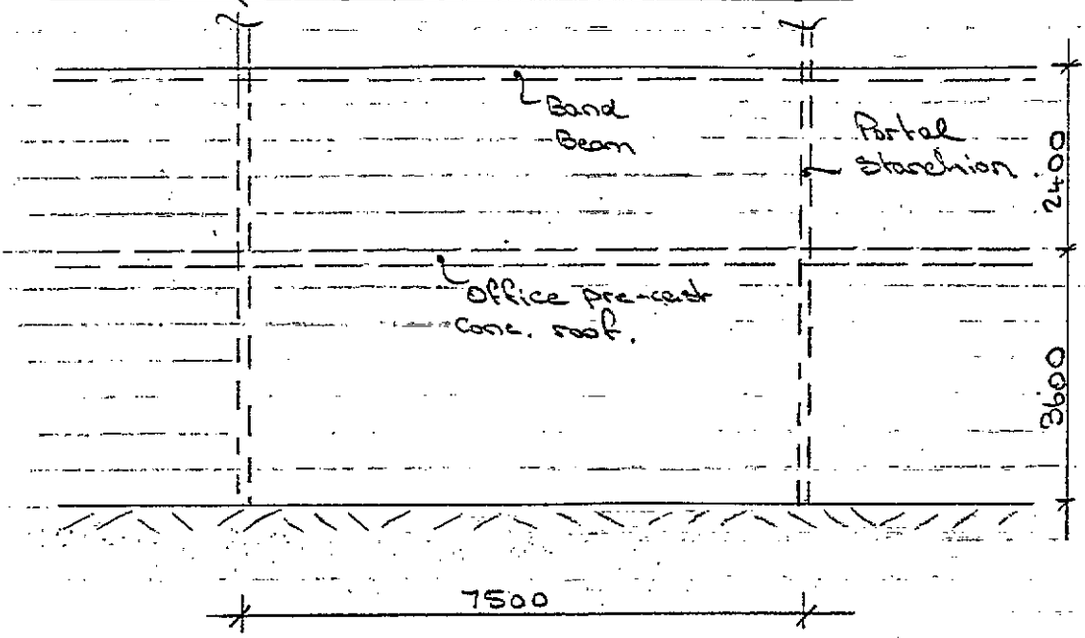
$\gamma_m = 2.5$

thus $f_v/\gamma_m = \frac{0.35}{2.5} = 0.1$ N/mm²

> 0.0019 N/mm²

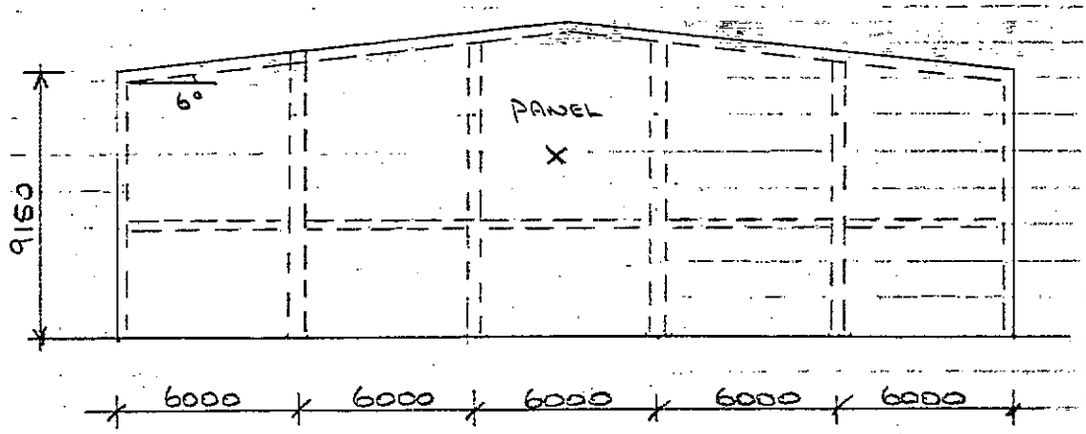
Shear resistance adequate.

2) Wall panels at front elevation:-

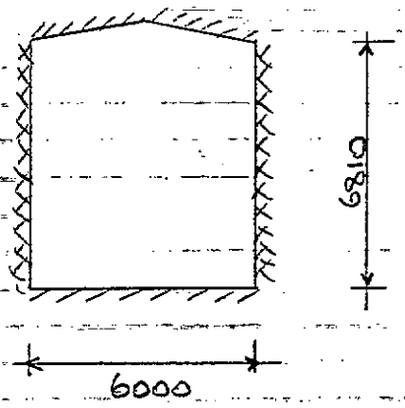


From the previous wall panel calculations, by inspection, the above is adequate to resist the applied wind forces.

3) Internal wall panels:-



Panel x :-



Limiting Dimensions :-

1) Panel supported on four edges.

2) $h \times L = 2025\ t_{ef}^2$ maximum.

$t_{ef} = 215$ mm.

$\therefore$ Max $h \times L = 2025(215)^2 \times 10^{-6}$

$= 94\ m^2$.

actual $h \times L = \left(\frac{7.13 + 6.81}{2}\right)(6) = 42\ m^2$

$< 94\ m^2$.

$50\ t_{ef} = 50(215) \times 10^{-3} = 10.75\ m$

$> 6m, 6.81m, 7.13m$.

By inspection, the above panel is adequate in flexural and shear strength, as there is no structurally significant load applied to it.

Design of Band Beams.

From page 49, lateral loading on band beam = 0.59 kN/m.

$\Rightarrow$ Max. moment $= (0.59)(7.5)^2/8$

$= 4$ kNm.

By inspection, a 400 x 215 dp. Band Beam, reinforced with 4 No. T12 bars and R10 links @ 300 mm c/c is adequate.

SPECIFICATION OF WORKS

PROPOSED INDUSTRIAL DEVELOPMENT

AT

BALLYMOUNT ROAD UPPER

FOR

LARNWOOD LIMITED

INTEGRATED DEVELOPMENT SERVICES,
146 LOWER DRUMCONDRA ROAD,
DRUMCONDRA,
DUBLIN, 9.

TEL. No. 01-370936.
FAX. No. 01-369303.

I N D E X

S E C T I O N 1.

GENERAL

Generally

The work consists of the construction of a warehouse and offices at Greenhills Road, Tallaght Industrial Estate.

Construction

The warehouse and offices will be within the main structural shell consisting of a plastic coated metal deck insulated roof with 10% double skin rooflights, 1% smoke vents, all on galvanised purlins.

Walls are to be plastic coated metal cladding insulated on galvanised sheeting rails all over 2400mm high cavity wall with block inner leaf and concrete brick outer leaf.

The offices will be constructed with 'Breton' or similar precast concrete units at first floor level.

The windows are to be anodised aluminium.

Water Main

A 100mm diameter water main will be provided with hydrants to local authority requirements.

S E C T I O N 2.

PRELIMINARIES

Terms

I.S. means Irish Standard

B.S. means British Standard.

C.P. means British Standard Code of Practice.

Where reference is made to the foregoing publications, the edition current at the designated date shall apply.

"As indicated elsewhere" or similar wording means as indicated on the drawings or in the Particular Specification.

Statutory Obligations

Comply with all statutory regulations for the safety, health and welfare of the workmen employed on the Site. Comply with the relevant building Bye Laws and with any conditions imposed by the Planning Permission and the Building Bye-Law Approval; serve statutory notices.

Quality of Work

Execute the works in a sound and workmanlike manner, using good quality materials and employing experienced workmen. Use all proprietary products in accordance with manufacturers instructions.

The Contractor may make reasonable variations in the design of the Works, provided that such will not alter substantially the quality, value, appearance or usefullness of the works.

Specification Alternatives

Where the Specification allows a choice of materials, such choice shall be at the discretion of the Contractor.

Programme

Prepare a programme in bar-chart form for the whole of the Works. Up-date the programme from time to time as circumstances require.

Temporary Works

Provide temporary facilities such as site huts, stores, toilet accommodation, scaffolding, hardstandings, fencing etc; also temporary connections to services; remove on completion.

Setting Out

Establish a master bench mark on site for the duration of the Contract.

Set out the works in accordance with the drawings. Use dimensions figured on drawings for setting out; do not scale the drawings.

Supervision

Provide all necessary supervision for the construction of the works.

Cleaning

Remove rubbish from the works as it accumulates. On completion, remove stains and splashes, touch up any damaged paintwork and leave the works clean and tidy and ready for occupation.

Practical Completion

The Client's attention is drawn to the necessity for maintaining adequate heat and ventilation in the building, to prevent deterioration of the fabric.

S E C T I O N 3.

EXCAVATION AND EARTHWORKS

Strip Site

Strip topsoil over area of buildings and deposit on site for subsequent re-use; remove surplus from site.

Excavation

Excavate, level and grade over area of buildings as required to produce formation level.

Excavate trenches and bases as shown on drawings.

Support sides of excavations as necessary and in accordance with statutory requirements.

Backfilling

Backfill around foundations and rising walls with suitable material either arising from excavations or imported.

Disposal of Surplus Spoil

Spread and level surplus soil over site as required to make up levels, remove the balance from site.

Disposal of Water

Keep excavations free from all water except sping and running water.

Hardcore

Hardcore shall consist of gravel filling or broken stone containing not more than 5% of clay or organic material.

Hardcore shall be placed in layers not exceeding 250mm thick, each layer thoroughly compacted.

S E C T I O N 4.

CONCRETE WORK

MATERIALS FOR CONCRETE

Concrete Mixed Off Site

Readymixed concrete will generally be used, complying with B.S. 1926. Each load shall be accompanied by a delivery docket, showing consignee, date of delivery, quantity and grade of concrete.

Concrete Mixed on Site

Cement shall comply with I.S. 1 or B.S. 12 for Ordinary Portland Cement. It shall be stored in dry weathertight structures and used in the order of delivery.

Aggregates shall comply with I.S. 5 or B.S. 882. Aggregates of different grades shall be stored in separate stock piles.

Water shall be clean and free from harmful matter.

Concrete mixing on site shall follow the recommendations contained CP 110, Clause 6.7.4.

Grades of Concrete

The concrete mixes shall be designed to produce concrete complying the characteristics tabulated below.

The characteristic strength is that determined from test cubes at 28 days.

Grade	Characteristic Strength	Max Agg. Size	Min. Cement Content
N7		20 or 40mm	110 kg/m^3
N20	20N3mm^2	20mm	280 Kg/m^3
N25	25N/mm^2	20mm	280 Kg/m^3
N30	30N/mm^2	20mm	330 Kg/m^3

Concrete Usage

Unless otherwise indicated, the grade of concrete to be used shall be in accordance with the following table:-

Grade	Usage
N 7	Drain beds, blinding, haunching, leanmix paving.
N20	Foundations.
N25	Other reinforced concrete work.
N30	Where specially required.

Testing

Concrete to be tested as required by CP. 100 Part 1, Clause 6.8.

Curing Concrete

Protect concrete from wind, direct sunlight, rain and running water during its initial hardening period. Cover as necessary with polythene sheets, with an absorbent material which is kept damp or with a curing compound.

Curing agent to be ChemCure S or equal

Concreting in Cold Weather

Take special precautions where necessary to prevent frost damage to concrete, for a period of 3 days after pouring. Aggregates, water, formwork and reinforcement must be free from snow, ice and frost.

Construction of Internal Ground Floor Slabs in Factory Area

Provide ground floor slabs to a thickness of 150mm, reinforced with mesh ref. C283 and with underlay of 1,000 guage polythene sheeting.

Cast slab in bays not more than 18m long and 5m wide, using plain butt joints next adjoining bays. Provide treated fibreboard expansion joint filler (unsealed) between floor slab and perimeter walls. Joints to be dowelled to Structural Engineers detail.

REINFORCEMENT

Materials

Reinforcement shall consist of:-

Hot rolled mild steel round bars complying with bs 4449.
or Hot rolled high yield deformed bars complying with BS 4449.
or Cold worked steel bars complying with BS 4461.
or Steel fabric complying with BS 4483.
All to be free from loose rust, loose mill scale, oil, grease or other deleterious matter.

Workmanship

Cut and bend reinforcement in accordance with CP 110, Clause 7.2.
Fix reinforcement in accordance with CP110, Clause 7.3.

FORMWORK

General

Follow the recommendations of CP 110, Clause 6.11.3 in regard to

6.11.3.1 Design and construction.
6.11.3.2 Form lining.
6.11.3.3 Cleaning and treatment of forms
6.11.3.4 Projecting reinforcement, fixing devices.

Striking Formwork

Strike formwork only when the concrete is sufficiently mature to resist damage from the removal and for beam soffits and slabs not until the concrete has reached a strength of 14N/mm².

SURFACE FINISHES

Finishes to Internal Floor Slabs

Finish slabs with a power float to produce a hard dense finish. Do not use floor sealers unless elsewhere indicated.

Finishes to Concrete Generally

Provide type A finish to concrete hidden from view in the finished building.

Provide type B finish to concrete exposed to view in the finished building.

Provide other finishes only as indicated elsewhere.

Finishes type A and type B shall be as defined in CP 110, Clause 6.10.6, but may include the use of plywood or proprietary panel type formwork as well as timber boards.

PRECAST CILL, LINTOLS AND COPINGS

Generally

Where applicable, the foregoing clauses in this section refer also to precast concrete.

Cills

Cills shall be rebated, weathered and throated, with a minimum wallhold of 100mm each end.

Lintols

Lintols may be of normal precast type or may be prestressed to comply with BS 1239. They shall have a minimum bearing of 200mm each end.

Copings

Copings shall be either feather-edged or saddle-backed as detailed, with throating each side.

Workmanship

Provide necessary reinforcement in precast units, both for handling and structural pruposes.

Provide fine trowelled finish to exposed faces of units, and clean sharp arrisses.

Cure all units for at least 7 days before use. Hoist, bed and neatly point in mortar.

S E C T I O N 5.

BRICKWORK AND BLOCKWORK

MATERIALS

Concrete Blocks

Both solid and hollow blocks shall comply with I.S. 20.

Concrete Facing Bricks

Concrete facing bricks shall comply with B.S. 1180 type A (ii).

Clay Bricks

Not included.

Mortars

Cement mortar shall be composed of 1 part cement to I.S. 1 to 6 parts clean pit or river sand and incorporating a plasticiser. Readymix sand-lime mortar shall comply with B.S. 4721, in teh proportions of 1 part lime to 6 parts sand. It shall be guaged with 15% of cement by volume immediately before use.

Damp Proof Course

Bitumen damp proof course with hessian base shall comply with I.S. 57 type A.

Polythene damp proof course shall comply with I.S. 57.

The Contractor may use either of the above in the works.

Wall Ties

Wall ties shall comply with B.S. 1243: 1978 (amended) and shall be of the vertical twist type.

the ties may be galvanised or stainless steel. If galvanised then they must be galvanised in accordance with B.S. 729 with a coating weight of not less than 940 grams/m^2. If stainless steel, then this must be austenitic.

WORKMANSHIP

Mortar Mixes

Use cement mortar for walling below damp course. Walling above d.p.c. may be in cement mortar or in gauged sand-lime mortar at the Contractor's discretion. Mortar for brickwork shall not be tinted unless so indicated on drawings. In this case the pigments shall comply with B.S. 1014.

Laying Generally

Do not lay bricks or blocks while the air temperature is below 4°C on a falling thermometer or below 2°C on a rising thermometer. All materials shall be free of snow, frost and ice.

Keep perpends and quoins plumb and square, provide proper bond, use bats only to obtain bond.

Lay and bond bricks and blocks on a full bed of mortar and with joints fully filled.

Joints for brick and block shall be approx. 10mm thick, with such variations as may be required to suit storey height.

Fair Faced Blockwork

Build fair faced blockwork with standard (non-special) blocks and with joints as previously specified. Point as the work proceeds with neat 'bucket handle' joint, all to show a plumb, evenly textured face.

Facing Bricks

Use concrete facings unless otherwise indicated.

Lay facing bricks in stretcher bond with half brick lap and point with a neat 'bucket handle' joint as the work proceeds. Mix bricks from various batches to avoid contrast between adjoining lifts.

Cavities

Keep cavities and ties free from mortar and debris.

Form weep holes at abour 900mm intervals in vertical joints at base of cavity.

Close cavities at jambs by returning the inner block leaf across the cavity with neatly cut blocks.

Set wall ties firmly in mortar joints, with a minimum embedment of 50mm in each leaf and spaced as tabulated below. Provide extra ties at openings, at all control joints and at external angles with a vertical spacing of 225mm.

TABLE 1. SPACING OF TIES

Leaf Thickness	Cavity Width	Spacing of ties horiz-ontally	Vertically	Number of ties per sq. metre.
90 or more	50-75	900	450	2.5
90 or more	75-100	750	450	3.0
90 or more	100-150	450	450	4.9

Damp Proof Courses

Lay damp proof courses to the full thickness of walls, on a full bed of mortar. Lap 150mm at joinings and the full width at angles and junctions.

Set damp proof course on all external walls not less than 150mm above the external finished level.

Provide damp proof course under copings and cappings, also under cills, turned up at back and ends of same.

Provide vertical damp proof course at jambs of openings in cavity walls.

Control Joints

Provide vertical control joints where shown on drawings, nominally 10mm wide . Seal externally with one pack poly-sulphide sealant; prime surfaces and provide polethylene foam backing.

Generally, panel lengths shall not exceed twice their heights, with maximum 7600mm centres externally and 12000mm internally.

SECTION 6.

ROOFING AND WALL CLADDING

Roof Cladding - Materials

The roof is to be clad using the Tegral 32/19 system (or similar) with p.v.c. plastisol coated TMF outer sheet 0.7mm thick with a 32mm deep profile hot dip galvanised to B.S. 2989, 1975, the inner lining sheet is to be TMF 19, 0.45mmthick hot dip galvanised to B.S. 2989, 1975, with a white polyester enamel finish 60mm thick glassfibre insulation to be provided between the sheets with galvanised 'Z' section spacer battens, all on steel purlins hot dip galvanised to B.S. 729.

Rooflights are to be double skin to match profiles of inner and outer metal sheets.

Rooflights are to be approx. 10% of warehouse floor area (excluding first floor office area).

Automatic smoke vents to be provided with an area of 1% of floor area of warehouse (excluding office area).

Roof Cladding - Workmanship

The roofing is to be laid in accordance with the manufacturers instructions with all appropriate fixing accessories, insulation, mastic jointing, flashings etc.

Wall Cladding - Materials

The walls are to be clad with the Tegral 32/19 system (or similar) as described under Roof Cladding - Materials above except that the outer sheet will be 0.55mm thick as recommended. The perimeter wall slong gride line 1 will have 1 hr. fire rating as required by the Fire Officer and shall be constructed using the Tegral 32/19 system in accordance with the method recommended.

Flashings and drips shall be p.v.c. plastisol coated metal to match the cladding.

Fixings shall be as recommended by the manufacturer.

WALL Cladding - Workmanship

The wall cladding is to be fixed in accordance with the manufacturers instructions including all appropriate flashings, drips, cover pieces, etc. Bolts shall be fitted with matching plastic caps.

Raingoods

Rainpipes and fittings shall be standard p.v.c. system, to the sizes shown on the drawings. Provide all necessary bends, swannecks etc.

S E C T I O N 7.

WOODWORK

General

All timber to be free from disease, and suitably seasoned.

Unless otherwise indicated, all carcassing timber shall be in whitewood and all joinery timber shall be in redwood.

Dimensions

Dimensions given for unwrot timbers and for sheet materials are finished sizes.

Dimensions given for wrot timbers shall be subject to an allowance of 3.2mm for each wrot face, unless stated to be finished dimensions.

Whitewood

Whitewood shall be that known to the trade as "Better Quality European Whitewood", unsorted, grades 1 to 5.

Redwood

Redwood shall be that known to the trade as "Best Quality European Redwood", unsorted, grades 1 to 5.

Hardwood

Hardwood shall be of Iroko, or similar quality hardwood, kiln dried.

Plywood

Plywood generally shall have type W.B.P. bonding, that for internal flush doors shall have type INT bonding. Plywoods shall have Birch or Gaboon facing.

Blockboard

Blockboard shall comply with B.S. 3444 grade 2, with type INT bonding.

Doors

Internal flush doors shall comply with I.S. 48 and shall be hollow core type, of standard sizes. They shall be lipped with softwood on 2 long edges.

External flush doors shall comply with I.S. 48. They shall be of semi-solid core construction, size 813 x 2032 x 44mm thick. They shall be hardwood lipped all round.

Fire resisting doors and frames shall be as tested to B.S. 476 and to the ratings indicated elsewhere.

Windows

Internal timber windows shall be as indicated. Window boards shall be of plywood with hardwood lipping.

Skirtings

Skirtings shall be ex. 100 x 19mm redwood with rounded top edge.

Handrail

This shall be hardwood, ex. 50 x 50mm with rounded tops and grooved for core rail where necessary.

Pipe Boxings

Pipe boxings where shown on the drawings shall be of timber framework covered with 12mm plywood or with plasterboard. R.W.P.'s and S.V.P.'s to be wrapped in glass fibre with boxing.

Preservative

Where timber is described as "treated" it shall be brush treated with Protim or equal wood preservative.

Ends cut on site shall be similarly treated.

WORKMANSHIP

General

Frame up joinery work in accordance with B.S. 1186, Part 2.

Knot and prime joinery to be painted, before delivery to site.

Seal joints externally between masonry and timber frames with one pack polysulphide sealant; prime surfaces and provide polyethylene foam backing. Joints to be about 10mm square.

S E C T I O N 8.

METALWORK

Materials

Mild steel shall comply with B.S. 4360.

Hot rolled sections shall comply with B.S. 4 Part 1; hot rolled hollow sections shall comply with Part 2.

Galvanised work shall comply with B.S. 729.

Workmanship

Execute all smithing and bending soundly and neatly, taking care not to overheat.

Wire brush and prime all metalwork which is to be painted, with one coat redoxide or equal primer at works before delivery to site.

Matwells

Matwells shall be of aluminium angle size 38 x 38 x 3mm thick with mitred and welded corners and fitted with brush mats.

Matwells to single doors shall suit mats size 760 x 460mm.

Handraills and Balustrades

These shall be of mild steel.

Core rails shall be size 30 x 5mm, countersunk drilled at 900mm centres.

Standards shall be 32mm diameter, to finish 900 high over pitch line or 1200mm high over landings and with ends trouted into holes in concrete 40mm diameter x 100xx deep.

Roller Shutter Doors

These shall be chain operated by endless hand chain incorporating chain drive, spur or worm gear, with curtains of interlocking 19 guage galvanized mild steel laths, galvanized guides of ample depth securely fastened to jambs, and with galvanized angles forming bottom rail. Coil casings are not provided.

Galvanizing shall be to B.S. 2989.

Aluminium Windows

These shall be factory assembled including glazing and fitted on site, all in accordance with B.S. 4873.

Finish to be natural anodised to B.S. 4873.

Seal joints externally between masonry and windows with one-pack polysulphide sealant; prime surfaces and provide polyethylene foam backing. Joints to be about 10mm square.

S E C T I O N 9.

PLUMBING

PLUMBING MATERIALS

Sanitary Fittings

W.C. suites shall be equal to Armitage Shanks Magnia low level white V.C. set, with cistern and overflow and black plastic seat, with one no Uniregal low level suite in first floor toilet. Wash basins shall be equal to Armitage Shanks Portman white V.C. basins size 400 x 350 with pair of Sanbra Fyffe No. 5301 pillar taps, waste outlet with plug and chain, bottle trap and all necessary brackets.

Urinal bowls shall be equal to Armitage Shanks Sanura white V.C. bowl with waste, white V.C. auto cistern, drip tap, polished stainless steel flushpipes and sparges with necessary brackets.

Sink unit shall be a standard malamine faced chipboard cupboard unit complete with stainless steel sink having single bowl and drainer, pair of Sanbra Fyffe No. 5301 pillar taps, waste outlet with plug and chain, also trap. Unit to be about 920 x 450mm on plan.

Polyethylene Pipes

Polyethylene pipes for cold water 19mm rising main services shall comply with I.S. 134 normal guage. Fittings shall be compression type to comply with I.S. 239.

Copper Pipes

Copper tubes for hot and cold services shall comply with I.S. 238 for half hard light guage tubes. Fittings shall be compression type of comply with I.S. 239.

Cold water supplies shall be in copper. Hot water services and all piping to hot water heaters shall be in copper.

Supply to sink in Tea Room shall be taken from the rising main.

Discharge Pipes

Discharge pipes and fittings shall be of unplasticised p.v.c.

Those not exceeding 55mm dia. shall comply with B.S. 5255 and shall have solvent welded joints.

Those over 55mm dia. shall comply with B.S. 4514 and shall have O-ring joints.

Storage Tanks

Galvanised cold water storage tank to I.S. 9, 16G, shall be 200 gallon capacity located as indicated on the drawings, and shall be complete with ball valve, overflow and cover, mounted on plywood base on 75 x 75 ms. framing and with 38mm Ø overflow.

Stop-Valves

Stop-valves shall comply with B.S. 1010.

S E C T I O N 10.

FLOOR, WALL & CEILING FINISHES

PLASTERING

Materials

Cement shall be normal Portland cement to I.S. 1.

Sand shall comply to I.S. 5.

Hydrated lime shall comply with I.S. 8.

Plasterboards and dri-linings shall be equal to the products of Gypsum Industries Ltd. Thicknesses shall be 12.7mm for wall linings and 9.5mm for ceiling linings.

Gypsum plasters shall be "Gyplite" or equal.

Expanded metal lathing shall be "plain expanded" type to comply with B.S. 1369 and galvanised.

Workmanship - Internal

Execute internal plastering in accordance with the manufacturers instructions, in either 2 coats of Gyplite plaster or in dri-lining at the Contractors discretion.

Provide protection to vertical arrisses liable to damage, using galvanised angle bead for wet plaster or flex-corner tape for dri-lining.

Provide galvanised strip beads between plastered block work and concrete columns, or at movement joints.

WALL TILING

Materials

Glazed ceramic wall tiles and fittings shall comply with B.S. 1281. They shall be size 150 x 150mm and white in colour unless otherwise indicated.

Workmanship

Execute wall tiling in accordance with C.P. 212 Part 1.

Provide tiled splashback to each washbasin, size 600 x 450mm.

FLOOR TILING

Materials

Vinyl asbestos floor tiles shall comply with B.S. 3260 and shall be of single colour, size 300 x 300 x 2.5mm thick. Tiles to be Armstrong Accoflex.

Office carpet, where specified, is to be Tretford Cord carpet to selected colours.

Workmanship

Lay Armstrong Accoflex vinyl asbestos floor tiles in accordance with C.P. 203.

If necessary, level up concrete floors under vinyl asbestos tiling with self-levelling compound.

Tretford carpet is to be laid and fixed with adhesive in accordance with the manufacturers instructions.

SUSPENDED CEILINGS

Materials

Suspended ceilings shall be of the lay-in grid type with minaboard mineral fibre tiles 15mm thick. Lay-in grid tiles shall be 600 x 1200mm in white enamelled exposed suspended grid system. All as manufactured by Armstrong World Industries Ltd.

S E C T I O N 111.

GLAZING

Glass and Putty

Glass shall comply with the appropriate section of B.S. 952 and shall be of O.Q. quality.

Putty for glazing to softwood shall comply with B.S. 544; that for glazing to steel shall be metal casement putty. Non-hardening glazing compound shall be used for glazing to hardwood. Glaze tape instead of putty or compound may be used for glazing to internal doors.

Types of Glass

All glass shall be clear unless otherwise indicated.

Obscure glass shall be from group 1.

Georgian wired cast glass shall be used in glazed fire doors.

Workmanship

Execute all glazing in accordance with B.S. 6262.

Fix softwood glazing beads with pins.

Mirrors

These shall be of 6mm thick mirror glass with stove enamelled backing and with polished edges.

Provide mirror size 450 x 300 over each wash basin; twice drilled and plugged and screwed with C.P. dome headed screws

S E C T I O N 12.

PAINTING

MATERIALS

General

Materials generally shall be as manufactured by Messrs. Walpamur Harrington Goodlass Wall, Berger, or other approved firm.

"Sadolins" shall be as manufactured by Sadolins (U.K.) Limited.

"Artex" shall be manufactured by Gypsum Industries Limited.

Primers and undercoats shall be those recommended by the makers for the particular application.

The choice of colour is limited to 2 for each type of paint.

WORKMANSHIP

General

Execute all paintwork in accordance with the manufacturers instructions.

Preparation

Ensure that all surfaces are smooth; stop or fill all pits, crevices and grain, rub down all nibs and irregularites.

Ensure that all surfaces are clean, dry and free from oil or grease. Wipe down all surfaces before painting and also as necessary between coats.

Paint on Blockwork or Concrete

Do not paint blockwork or concrete surfaces unless otherwise indicated.

Where indicated, paint block walls and concrete surfaces with emulsion paint in 3 coats applied by brush or roller, or in 2 coats applied by spray.

Where concrete soffits are indicated as stippled, apply one coat of appropriate sealer and one coat of "Artex" or equal with stippled finish.

Paint on Internal Plasterwork

Apply 3 coats emulsion paint on plastered walls.

Paint on Wood

Knot, prime, stop and apply 3 coats of oil paint on all surfaces of softwood joinery exposed to view, unless otherwise indicated.

Clear Finish on Hardwood

Internally, apply 3 coats of one pack polyurethane varnish.

Paint on Shop Treated Structural Steelwork

Touch up damaged areas of shop applied zinc phosphate primer and apply one coat of high build micaceous iron oxide zinc phosphate (either grey or light grey in colour).

Choice of colour, by means of alternative paint systems is available at extra cost.

Paint on Galvanized Metalwork

Do not paint galvanised metalwork.

Paint on Metalwork (excluding Pipework)

Leave non-ferrous metalwork unpainted unless otherwise indicated, also internal ferrous metalwork hidden from view.

Prime ferrous metalwork exposed to view (or touch up works priming) and apply tow coats oil paint.

Paint on Pipework

Etch or prime as required and apply 2 coats oil paint to all radiators and pipework fixed to painted or tiled backgrounds.

S E C T I O N 13.

DRAINAGE

MATERIALS

Pipes and Fittings

Vitrified clay pipes and fittings shall comply with I.S. 106. Those of 100 and 150mm diameters shall have polypropylene couplings, those over 150mm diameter shall be spigot and socket type with flixible joints.

P.V.C. pipes and couplings shall be "Wavinsewer" or equal.

Concrete pipes shall comply with I.S. 6, with spigot and socket flexible ring joints.

Asbestos cement pipes and fittings shall comply with B.S. 3656. Pipes not exceeding 225 diameter shall be class H, larger pipes shall be class M.

Material for Pipe Bedding and Surrounds

Granular bedding shall be crushed stone or gravel 20mm down to 5mm in size, or coarse sand, or sand and gravel ex. quarry in which :-

(a) Not more than 10% by weight is retained on a 20mm sieve.

(b) All material passes a 40mm sieve.

Manhole Covers

Manhole covers and frames shall be cast iron solid top type, size about 600 x 600mm and shall comply with B.S. 497. Types and weights shall be as below:-

Light duty - grade C, weight about 38Kg.
Medium duty - grade B, weight about 100Kg.
Heavy duty - grade A, weight about 175Kg.

Road Gullies

These shall be either:

(a) Cast iron Corporation pattern gullies.

(b) Masonry pits fitted with Co. Council Pattern gratings.

Armstrong Junctions and Gullies

These shall be of stoneware or p.v.c.

Armstrong junctions shall have cast iron plain covers size 275 x 275.

Gullies shall have galvanized gratings 150mm square.

WORKMANSHIP

Excavation

Excavate trenches to even grades. Remove soft spots in trench bottoms and replace with compacted granular material.

Concrete Bedding

Provide concrete bedding to a minimum thickness of 10mm under all pipes.

After laying and testing of pipes fill remainder of trench with ordinary spoil, well compacted. The first layer, to 300mm over pipe crown, shall be free from stones and other hard object liable to damage the pipe.

Concrete Encasings and Backfilling

This clause refers to pipes laid.

(a) Under roadways where the finished cover is less than 900mm.

(b) Under buildings at any depth.

Provide concrete bedding; after laying and testing of pipes provide concrete surrounds. Thickness shall be as below:

- 100mm for pipes not exceeding 225mm diameter.
- 150mm for larger pipes and for pipes of any diameter under buildings.

Fill remainder of trench with granular material well compacted.

Pipe Types and Laying

Lay and joint pipes in accordance with the makers instructions and to the levels indicated on drawings.

Manholes

Construct manholes in accordance with Contractors Standard manhole drawing. If required by Local Authority, provide interceptor in last manhole before public sewer.

Provide heavy duty covers to manholes in roadways.

Provide medium duty covers to manholes in footpaths or grassed areas next to same.

Provide light duty covers to manholes inaccessible to wheeled vehicles.

Finish insides of foul manholes with cement and sand rendering.

Provide fair face to blockwork inside surface water manholes.

Provide half-round invert channels with necessary curved channels, tapers and branch channel bends.

Bench up manhole bottoms in concrete, and finish smooth in trowelled cement and sand; all to proper slopes and with all angles rounded.

Provide galvanized step irons or galvanized ladders as required by standard manhole drawing.

Sundry Fittings

Provide Armstrong junctions, gully traps and road gullies as indicated on drawings and joint to drains.

Encase Armstrong junctions and gully traps in concrete.

Testing

Test drains in convenient lengths before backfilling under a head of water not less than 300mm.

Remedy defects.

S E C T I O N 14.

SITEWORKS

Hot Rolled Asphalt

Hot rolled asphalt shall comply with B.S. 594 table 4 Schedule 1A and shall hve a 55% stone content with a p.s.v. of not less than 59.

Hardcore

Hardcore under pavings taking vehicles shall comply with Clause 803 of M.O.T. Specification for Road and Bridge Works.

Hardcore under other pavings shall be as described under "Excavation" section.

Precast Units

Road kerbs shall be half-batter type, size 125 x 250mm and shall comply with I.S. 146.

Ducting

Underground ducts shall be of p.v.c. equal to "Wavin-duct".

Water Supplies

For rising mains see "plumbing" section.

Pipes and fittings for watermains shall be of hard p.v.c. to comply with I.S. 123 Class C.

Hydrants shall comply with B.S. 750 and shall have 75mm bayonet lug outlets.

Sluice valves shall comply with B.S. 750.

Underground Chambers

These shall be constructed in accordance with Contractors standard details.

Hydrant covers and frames shall be Dublin Corporation pattern, marked either "H" or "Beal Tuile".

Sluice valve surface boxes shall be Dublin Corporation pattern, with hinged lid about 100mm square marked "S.V.".

Stopvalve covers and frames shall be flanged heavy pattern, with hinged horse shoe lid marked "Uisce".

Road Markings

Markings on paved areas shall be of 100mm wide thermo-plastic compound to comply with B.S. 3262.

WORKMANSHIP

Grade Site

Strip topsoil over paved areas and grade and trim over site to produce correct levels and falls; remove surplus spoil from site.

Paved Areas

Provide paved areas and kerbing as shown on drawings.

Provide hardcore under all paved areas and thoroughly compact with a 10 ton roller to a minimum thickness of 150mm.

Set road kerbs on concrete (20N) foundations size 300 x 150 thick ; bed and point in cement mortar and haunch at rear in concrete.

Grassed Areas

Provide topsoil, to a thickness of at least 100mm over grassed areas indicated on drawings. Rake to an even grade, free from large stones.

Sow No. 2 Grass Seed at 50 grammes per sq. m. and provide first cut.

Ducting

Provide ducting as indicated on drawing for electricity and telephone services, with a finished cover of not less than 700mm.

Water Supplies

Provide water mains and rising mains as indicated on drawings, with a finished cover of not less than 700mm Connect to existing supplies, provide fittings indicated on drawings and construct chambers and manholes for same, also all trenching and concrete anchor blocks required.

Test watermains and rising mains, leave all watertight and in good working order.

Road Markings

Provide white road markings where shown on drawings, executed in accordance with B.S. 3262.

S E C T I O N 15.

MECHANICAL SERVICES

Scope of Contract

The work consists of the design, installation and commissioning, complete of the mechanical services.

The mechanical services generally comprises the following:

1 Low pressure hot water heating in the offices.

2 Warm Air Unit Heater(s) in the warehouse.

3 Oil storage tank and associated pipework.

Type of Heaters

Warehouse - Oil fired warm air floor mounted unit(s).

Offices - Radiators.

Vibration

The mechanical services installation shall be designed to ensure that neither air nor structure borne vibration create problems to building or personnel.

Standards

The complete installation shall be designed and installed in accordance with the provisions of the I.H.V.E. Guide and the standards of the H.V.C.A. and relevant Local Authority Regulations.

MATERIALS AND WORKMANSHIP

Office Heating

The heating for the offices and toilets shall be to a l.p.h.w. radiator system supplied form a boiler located in the boilerhouse. Distribution pipes shall be surface mounted on both ground and first floor levels.

General control of the system shall be by a weather compensated thermostatic control. The maximum water temperature in the system shall be 82°C.

Boiler

The boiler shall be cast iron sectional type complete with smoke hood, flue cleaning doors, etc. It shall be gastight and watertight and installed and tested in accordance with manufacturers recommendations.

Include for the supply of a 7 day 24 hr. spring reserve time clock, with night thermostatic control. The clock will be fitted and wired by the electrical contractor. Include insulated flue with all necessary supports, inspection hatches etc. Roof flashing over prepared upstand to be included.

Pipes

All pipework shall be black mild steel medium quality (blue bard) to B.S. 1387 for l.p.h.w.

Join concealed pipework by welding. All pipes in boilerhouse and warehouse area shall be insulated.

Expansion in pipework to be provided for as necessary.

Pipework supports shall be provided to control the movement and adequately support the pipes as recommended by H.V.C.A.

Valves

Provide isolating valves as necessary with all valves up to 50mm dia. of closed lockshield gunmetal or bronze fullway gate valves with ends screwed B.S.P.T. All valves over 75mm dia. shall be cast iron gate valves to B.S. 3464 with flanged connections.

Radiators

All radiators and skirting convectors shall be as manufactured be Veha Ltd. or equal, each fitted with hand wheel and lock shield valves plated gunmetal easy clean type.

Pumps

All pumps shall be of slow rotational speed and quiet in operation with isolating valves and union.

Insulation

Provide insulation to all pipes, tanks etc. which could be subjected to frost, condensation or heat loss. Insulation to pipework shall be rigid preformed glass fibre section with factory canvas and shall be secured with bands at 450mm centres.

Water Heaters

Provide and fix 2 no. electric water heaters, 1 no. 60 litre pressure type and 1 no. 7 litre under sink type, both of Dimplex manufacture or equal. Isolator and time clocks shall be provided and fitted by electrical contractor.

Oil Storage Tank and Supply Pipework

A 1000 gallon fuel oil storage tank complete with inspection hatch (lockable), valves (lockable), fuel guage, filler point, cradle etc. to be provided. Tank to be constructed to B.S. 799, Part 1 1962.

The supply pipework from the tank to the warm air heaters and boiler shall be in A.B.S. Plastic laid underground and in accordance with the manufacturers recommendations. Fire valves to be fitted to the pipework at the boiler and unit heaters.

Warehouse Heating

The warehouse shall be heated by oil fired warm air floor mounted unit heater(s). The heater(s) shall be provided complete with insulated flue (with cleaning door, draught stabiliser, cowl, flashing to prepared roof upstands), 24 hour 7 day spring reserve time clock, frost stat thermostat etc.

Drawing and Schedule of Fittings

The contractor shall submit with his tender a drawing showing the pipe runs, and radiator sizes and locations and the following schedule:

1 Radiator — Manufacturer and Type.

2 Skirting Convector - Manufacturer and Type.

3 Boiler - Manufacturer and Type.

4. Warm Air Heaters - Manufacturer and Type.

Painting

Allow for removal of radiators to facilitate painting and later refix.

Testing and Commissioning

Test the completed installation and leave all water-tight and in good working order. Allow for instructing Clients staff in the use and operation of the system.

Provide full maintenance manual complete with all manufacturers installation and maintenance instructions for all items of equipment, together with a list of the Irish suppliers and agents.

S E C T I O N 16.

ELECTRICAL SERVICES

Scope of Contract

The work covered by the Contract shall comprise the complete design, installation and commissioning of the electrical services.

The electrical services generally comprise the following:

1. Lighting.
2. Motive Power and General Services.
3. L.V. Switch and Fuseboard.

MATERIALS

L.T. Switchboards

Distribution switch board shall be flush mounted metal clad consumer unit complete with all necessary MCB's, ELCB's and main isolating switches, busbars etc:- M.K. Sentry range or equal.

Additions to the main board shall match existing equiment.

P.V.C. cables installed in conduit and in trunking shall be 600/1000 volt standard P.V.C. insulated copper conductors to comply with B.S. 6004. No cables smaller than 1.5m² shall be used.

P.V.C. insulated armoured cable shall be 600/1000 volt grade copper conductors, p.v.c. insulated, p.v.c. bedded, wire armoured and p.v.c. sheathed, installed as recommended by the manufacturers. Cables shall be terminated with brass compression glands complete with p.v.c. shrouds.

Conduit

All conduit and conduit fittings shall be galvanized heavy guage mild steel and shall comply with B.S. 4568, Parts 1 and 2, Class B, screwed. Galvanizing shall comply with B.S. 729, Parts 1 & 2.

Flexible conduit and fittings shall comply with B.S. 731.

Trunking

Galvanized trunking shall comply with B.S. 2989.

Outlet Accessories

Outlet accessories shall be as manufactured by M.K. Electrical Ltd., or equal and shall be metal clad. Sockets shall be one or two gang type, 13 amp single pole switched.

Light Fittings

Warehouse -	2450mm Twin batten type 125W. fluorescents with reflector.
Offices -	1500mm Twin or single (as indicated on drawings) 65W, fluorescents. Surface mounted, fitted with prismatic diffuser.
Toilets -	1500mm Single 65W, fluorescent surface mounted, prismatic diffuser, 100W, corrosian resistant fitting with opal glass sphere.

Emergency Light Fittings

Warehouse

Over fire escape doors the fittings are to be self-contained non-maintained 8W., 3 hour duration, with EXIT lettering in white on green background with LED indicator and test button. At high level in the warehouse are self-contained, non-maintained 3 hour duration quartz-haloquen fittings, with 2 x 20W twin adjusted flood lights.

Offices

Fittings to be 4W. self contained, non-maintained, of polycarbonate construction with opal diffuser.

Time Clock

Time clock to be 24 hour dial with spring reserve and day omitting device.

WORKMANSHIP

Standards

The work is to be designed and executed by the electrical sub-contractor to the satisfaction of the E.S.B. and in strick accordance with the current editions of the following:-

a. "The Electro-Technical Council of Ireland's National Rules for Electric Installations" Parts 1 & 2 and appendices.

b. "Regulations for the electrical equipment of buildings" Published by the Institute of Electrical Engineers (where applicable).

c. Factory Electrical Regulations SI No. 3 of 1972 and E.S.B. directives on metering (latest edition).

e. The emergency Light to B. S. 5266.

Supply cables

Provide supply cables from the main board to the distribution board.

Main L.V. Switchboard

Provide all necessary switch and fuse gear on main board.

Distribution Boards

Provide sub-distribution board in the offices for lighting and general services. Position of the sub-distribution board is shown on the drawings.

Labelling

Provide circuit lists inside all distribution boards together with clearly marked schematic diagrams heat sealed and mounted adjacent to the distribution board.

Provide at the main board a schematic diagram showing the whole electrical installation. Diagram to be not less than 800 x 560mm and to be heat sealed and mounted on wall.

All switch and fuse gear to be clearly marked with Ivorine lables giving the following information:

Main Switches: Service (lighting, power) etc.
Area served.
Phase (red etc. where applicable).

Distribution Service (main, or sub-lighting etc.)
Area served.
Phase (red etc. where applicable).
Phase buttons will be used.

These labels will be permanently secured to the covers of the switches and distribution boards.

Earthing

Provide earthing to the whole of the electrical installation and to all equipment in conformity with the National Rules for Electrical Installation and to the requirement of the E.S.B.

Lighting Installation

Provide light fittings as shown on drawings.

Provide all internal and external light fittings, tubes, lamps, diffusers and external light fittings including conduit, wiring and cabling.

Conduit is to be concealed in the office areas and surface mounted in the warehouse.

In the ground floor office areas conceal conduit in holes in precast concrete slabs or in plastered walls and use flush mount accessories.

The conduit in the precast concrete slabs is to be fed into the holes from the perimeter of the slab.

In the first floor conduit to be concealed above suspended ceiling.

Provide separate lighting circuits as indicated on the drawings. Provide two-way switching for lighting circuits as indicated on the drawing.

In general mount switches 1400mm over floor level.

Emergency Lighting

Provide emergency light fittings to B.S. 5266.

General Services

Provide service sockets in the locations shown on the drawings. Sockets to be complete with all conduit, wiring and cabling. All sockets to be protected by ELCB's.

Mount sockets generally 450mm above floor level except in tea room where socket is to be mounted over counter level. Flush sockets shall be used throughout the offices.

BoilerHouse

Provide supply to and connection of the following items to be provided by heating contractor: water pump, frost stat, thermostat, time clock, isolating switches.

Water Heaters

Provide supply to and connection of water heaters to be provided by heating contractor. Switches to be fitted with pilot lamp.

Warm Air Heaters

Provide supply to and connection of oil fired floor mounted warm air heater(s), time clocks and thermostats.

Supply and fit isolators. Time clocks and thermostats to be supplied by heating contractor.

SECTION 17.

INDEX

1. PREAMBLE

1.0 DEFINITION OF TERMS

1.0.1 The Engineer shall mean John Moylan & Associates.

1.0.2 The Steelwork Contractor shall mean the steelwork firm appointed to design, supply, fabricate, deliver and erect the structural steelwork as shown on the contract drawings and as directed in this Specification.

1.0.3 The project is being executed as three separate main contracts as follows:

a) Building works contract.
b) Structural steelwork contract.
c) Cladding contract.

1.1 DESCRIPTION OF WORK

1.1.1 The steelwork contract includes the design, supply fabrication, delivery to the site and erection of the structural steelwork as shown on the steelwork contract drawing and as described in this Specification. This includes all holes, drilling for fixing of patent glazing where applicable connections, stiffners, supports, bases, bolts, brackets etc., all to the satisfaction of the Engineer. The Steelwork Contractor shall co-ordinate his work with that of the building contractor and cladding contractor.

1.2 PLANT

1.2.1 The Steelwork Contractor shall provide all equipment necessary for the handling, erection and completion of the steelwork.

1.3 DESIGN

1.3.1 The structural steelwork is to be designed in accordance with B.S. 449 Part 2: 1969 specification for "The Use of Structural Steel in Building".

1.3.2 The Engineer will supply the Steelwork Contractor with the drawings that will show working dimensions and other necessary particulars, but the contractor is to check these dimensions on site.

1.4 PROGRAMME

1.4.1 On his appointment the Steelwork Contractor shall produce a programme for the production of workshop and erection drawings. The Steelwork Contractor shall be required to agree with the Engineer a final date for submission of these drawings for approval.

1.5 WEIGHTS

1.5.1 All weights and variations or otherwise will be based on the listed weights or members and no allowance made for rolling margins. All steel sections shall be of "full profile" with no

appreciable loss of material through corrosion or deficient rolling. If it is found that any steel weights less than 97.5% of the listed weights the steelwork contractor shall replace it with a satisfactory section.

1.6 QUALITY OF STEELWORK

1.6.1 The quality of the materials, fabrication, and erection of the steelwork in this contract shall comply entirely with the requirements set in the following British Standard and all other Standards therein referred to, except for all caluses dealing with the training and certification of welders. The date of issue of each standard shall be that listed below, or the most recent date of issue. All amendments to the Standards shall be deemed to be parts of the relevant Standards:

BS 4 Part 1	: 1962	Structural Steel Sections.
BS 4 Part 2	: 1965	Ditto.
BS 449	: 1959	Use of Structural Steel in Building.
BS 639	: 1964	Covered Electrodes.
BS 709	: 1971	Methods of testing fusion welded joints and weld metal in steel.
BS 938	: 1962	Metal Arc Welding of Tubes.
BS 968	: 1962	High Yield Stress Steel.
BS 1719	: 1963	Classification of covered Electrodes.
BS 1768	: 1963	Unified Precision Hexagon Bolts & Nuts.
BS 1775	: 1964	Steel Tubes for Structural Engineering Purposes.
BS 1856	: 1964	Metal Arc Welding of Mild Steel.
BS 2451	: 1963	Chilled irong shot and grit.
BS 2521 & 2523	: 1966	Lead based priming paints.
BS 2642	: 1955	Metal Arc Welding of Steel to BS 968.
BS 2708	: 1956	Unified Black Square and Hexagon Bolts & Nuts.
BS 2994	: 1958	Cold rolled steel sections.
BS 3139	1959	High Strength Friction Grip Bolts.
BS 3294	: 1960	Use of High Strength Friction Grip Bolts.
BS 3410	: 1961	Metal Washers.
BS 3692	: 1967	I SO Metric precision hexagonal bolts, screws and nuts.
BS 4190	: 1967	I SO metric black hexagon bolts, screws and nuts.
BS 4232	: 1967	Surface finish of blast cleaned steel for painting.
BS 4360	: 1972	Weldable Structural Steels.
BS 4395	:	High strength friction grip bolts and associated nuts and washers for structural engineering.
		Part 1 : 1969 General Grade.
		Part 2 : 1969 Higher Grade bolts & nuts and general grade washers.
		Part 3 1973 Higher Grade bolts (waisted Shank) nuts and general grade washers.

The Steelwork Contractor shall keep a copy of each of the above standards in his shop for reference.

2. MATERIALS

2.0 STEEL

2.0.1 The steel for this contract is to be mild steel, grade 43C, in accordance with BS 4360 : 1972 "Specification for Weldable Structural Steels".

2.1 BOLTS

2.1.1 Unless specified otherwise, all bolts and nuts shall be ISO metric black hexagon and conform to the requirements of BS 4190 : 1967 "ISO Metric Black Hexagon Bolts, Screws and Nuts".

2.2 TEST CERTIFICATES

2.2.1 Manufacturer's test certificates for all steel used for the work shall be supplied to the Engineer. Copies of rolling mill orders shall also be provided.

2.3 HIGH STRENGTH FRICTION GRIP BOLTS

2.3.1 Where high strength friction grip bolts are used, they shall be of the load indicating bolt type or have load indicating washers and the torque method or part turn method of tightening shall not be allowed. Reference must be made to the Manufacturer's instructions on the method of tightening and assessing the value of the applied load. The Engineer's approval must be obtained for the type of friction grip bolt to be used. The areas of metal directly under the washers must be clean and free of any paint or similar material. Matching surfances of connections made with friction grip bolts must be thoroughly cleaned and be free from any paint primer or other foreign matter.

3. FABRICATION

3.0 FABRICATION DRAWINGS

3.0.1 The Steelwork Contractor will be required to prepare his own shop details in accordance with BS 449 : Part 2 : 1969. These drawings shall be supplied in duplicate to the Engineer for approval before fabrication.

3.0.2 Should these shop details be insufficient or unsatisfactory the Engineer may require fresh details to be submitted.

3.0.2 On receiving the Engineer's approval in writing of such detailed drawings, two further copies are to be supplied. Details are to be submitted at least five working days before approval is required and no work is to be put in hand until such approval has been obtained.

3.1 CORRECTNESS OF DIMENSIONS

3.1.1 The Steelwork Contractor will be held responsible for the correctness of dimensions and details, fitting and workmanship and for the strength of all connections, notwithstanding the approval of the Engineer of the detailed drawings, and for all parts of the various structures coming together correctly for assembling in position.

3.1.2 In event of any connection being found unsatisfactory before or after erection or due to errors arising in fabrication, the Steelwork Contractor shall submit to the Engineer his proposals as to the method to be adopted in making good. The Steelwork Contractor shall abideby the Engineer's decision and in the event of replacements being required, the Steelwork Contractor shall be responsible for all costs involved.

3.2 STIFFENERS

3.2.1 Where specified, fitted stiffeners shall be accurately ground over their full bearing faces to fit tightly the angle or section stiffened.

3.3 SUB-LETTING

3.3.1 The Steelwork Contractor shall not sub-let any fabrication or erection without the permission of the Engineer.

3.4 IDENTIFICATION

3.4.1 All steelwork delivered to site are to be clearly marked with their numbers, together with the number of the members onto which they frame at both ends.

3.5 CAMBER

3.5.1 In the absence of any specified camber, all lattice girders and beams os spans greater than seven metres shall have an upward camber of 0.1% of the span at midspan.

4. WORKMANSHIP

4.0 GENERAL

4.0.1 The workmanship throughout the work shall be to the standards of BS 449 : Part 2.

4.1 BOLTS

4.1.1 All threads on bolts shall be clean and the nuts shall closely fit the bolts so that they can only just be fitted with washers under the nuts. Tampered washers shall be used on tapered sections and flanges to ensure true bearing of the bolt head or nut. Two clear threads shall show beyond the nut on a fully tightened bolt.

4.2 CUTTING

4.2.1 Thermal cutting by hand will be permitted only for wall ends of beams and filler joists and for notching.

4.3 DRILLING

4.3.1 All holes drilled shall be in compliance with BS 449 : Part 2.

4.3.2 Generally holes, shall be drilled with a maximum of 2mm allowance for black bolts or high strength friction grip bolts.

4.3.3 For close Tolerance Bolts with holes not drilled in one operation the procedure shall be:-

1. Holes to be aligned with dia. equal to nominal size of hole - 0 + 0.15mm.
2. Ream first hole, fit close tolerance bolt, and tighten before reaming second hole.
3. Repeat for each hole.
4. Re-tighten all bolts after last bolt is fitted.

4.3.4 Where hollow sections are drilled, spacer tubes must be welded in position to permit through bolting.

4.4 EXAMINATION AND TESTING

4.4.1 The Engineer or his representative shall at all reasonable times be permitted access to the steelwork contractor's works for purposes of progressing and examination and testing of welded structural components.

4.4.2 The Steelwork Contractor when required shall provide and send sample pieces, carriage paid, to such testing stations as may be directed. Sample pieces shall be 500 x 100mm for plates or as that as practicable and 500mm long of full section for structural shapes, rods, etc. The sample pieces shall be selected by the Engineer and despatched to the testing station where test pieces will be made and tested.

4.4.3 If non-destructive tests are to be carried out on welded joints the Steelwork Contractor shall provide facilities for the Engineer or his representative to carry out these tests.

4.4.4 The Steelwork Contractor shall be held responsible for the costs and fees involved in the testing of welds which are found to be unsatisfactory.

4.4.5 The Employer shall be held responsible for the costs and fees involved in the testing of welds which are found to be satisfactory.

4.4.6 All areas of defective welding shall be cut out and made good to the entire satisfaction of the Engineer and all remedial measures shall be borne by the Steelwork Contractor. The remedial work shall be deemed to include radio-graphical or other suitable examination to verify the acceptance of the repair.

5. WELDING

5.0 DESIGN

5.0.1 The design of all welds shall comply with the requirements of BS : 499 : 1969.

5.1 WORKMANSHIP

5.1.1 The welding of all mild steel sections and plates shall be carried out to the requirements of BS 5135 metal arc welding of carbon and carbon manganese steels.

5.1.2 The welding of all structural hollow section shall be carried out to the requirements of BS 5135 metal arc welding of carbon and carbon manganese steels.

5.1.3 Evidence of qualification of welders will be required by the Engineers and in cases where recent test certificates or other acceptable proof is not available. the Engineer will require welder approval tests to be carried out in accordance with BS 4872 "Fusion Welding of Steel".

The test shall be carried out under the supervision of the Engineer and to his satisfaction. The extent of qualification thereby attained shall be in conformity with the recommendation of BS 449 Part 2 1969.

TOLERANCES

Tolerances for erected steelwork shall be as follows;

1.	Position of first erected column	± 10mm
2.	Linear dimensions: up to 8 m	± 10mm
	from 8 m to 15 m	± 15mm
	from 15 m to 25 m	± 20mm
	over 25 m	± 25mm

6. ERECTION

6.0 GENERAL

6.0.1 The method of transport, handling and erection of materials shall be to the satisfaction of the Engineer and in accordance with the drawings or as directed. These operations shall be carried out in such a manner as will not injure, overstress or disfigure any part of the structure. Any member injured, overstressed or damaged in any way shall be rectified as directed by the Engineer.

6.0.2 Site joints and connections shall not be finally bolted until sufficient of the structure is properly plumbed, levelled and aligned and no straining into position will be allowed subsequently.

6.0.3 The Steelwork Contractor is to take all necessary precautions to ensure the stability and safety of the steelwork structure during erection and shall maintain any special temporary guying or other supports until the structure is completed. The Steelwork Contractor shall be entirely responsible for any accidents which may arise from lack of suitable precautions.

6.0.4 The Steelwork Contractor will be held responsible for any damage to existing work or buildings or their contents, roads, walls, etc. adjoining or upon the site, arising form the off-loading and erection of steelwork.

6.1 TOLERANCES

6.1.1 Tolerances for erected steelwork shall be as follows:

1.	Position of first erected column	± 10mm
2.	Linear dimensions; up to 8m	± 10mm
	from 8m to 15m	± 15mm
	from 15m to 25m	± 20mm
	over 25m	± 25mm
3.	Plumb of columns in 30m height	± 15mm
4.	Level of base of first erected column	± 5mm
5.	Level of beam at junction with column measured from transferred bench mark	± 15mm
6.	Level of beam at junction with column measured from transferred bench mark of storey in which beam is located	± 10mm

6.1 TOLERANCES CONT'D.

7. Levels of upper or lower surfaces of two or more beams meeting at a column

8. Difference in level of ends of a beam:

up to 8m long

from 8m to 15m long

from 15m to 25m long

over 25m long

6.2 BRACING

Bracing is provided to stabilise the completed building. The Steel Contractor shall be responsible for the provision of any extra steelwork considered necessary for the alignment and temporary stability of the steelwork. The cost of this additional steelwork should be included in the contract price.

6.3 HOLDING DOWN BOLTS

The Steelwork Contractor is to supply to the Building Contractor all the necessary holding down bolts or anchorage devices for the Building Contractor to cast into the foundations. The Steelwork Contractor must satisfy himself prior to erection that the foundations have been properly formed and, in particular, that the holding down bolts have been accurately set and have the full amount of play required.

7. SPECIFICATION FOR CORROSION PROTECTION SYSTEM TO STRUCTURAL STEELWORK

7.1 PREPARATION

Shot blast to Swedish Standard ISSo55900 to give surface quality Sa $2\frac{1}{2}$ and/or BS4232 Second Quality. Remove all traces of loose rust, grit etc, by compressed air hose or careful clean dry brushing. Inspect for laminations and remove by careful grinding leaving a smooth surface. Dust off and within 2 hours of shot-blast apply 'Blast Primer'.

7.2 BLAST PRIMER

Apply by airless spray:-

1-coat 2-pack Epoxy Zinc Rich Primer to a D.F.T. of 20 microns. (This D.F.T. accords to BS 5493; 1977 for 'blast primers'). Allow to dry. Then fabricate as necessary.

7.3 PREPARATION AND SPOT-PRIMING AFTER FABRICATION

After fabrication carefully remove all weld flux and spatter, rough edges, etc. by scraping, chipping and grinding to a smooth surface. Remove any unsound 'scorched' primer around weld areas; also, all dust, dirt, grease, etc. (Wash with White Spirit where necessary). Allow to dry overnight.

7.4 SITE-HOLDING PRIMER

Apply by airless spray to the clean dry surface:-

1-coat 2-pack Epoxy High Build Zinc Phosphate Primer, to a dry film thickness of 50 microns. Allow 7 days to achieve maximum through hardness before despatch to site.

7.5 SITE TREATMENT

PREPARATION AND SPOT-PRIMING AFTER ERECTION

After erection all damaged areas (including boltheads etc.) must be thoroughly prepared and carefully spot-primed with primer. Allow to dry overnight.

DESIGN
OF
STRUCTURAL STEELWORK
FOR
INDUSTRIAL DEVELOPMENT
AT
BALLYMOUNT ROAD UPPER.

CONTENTS.

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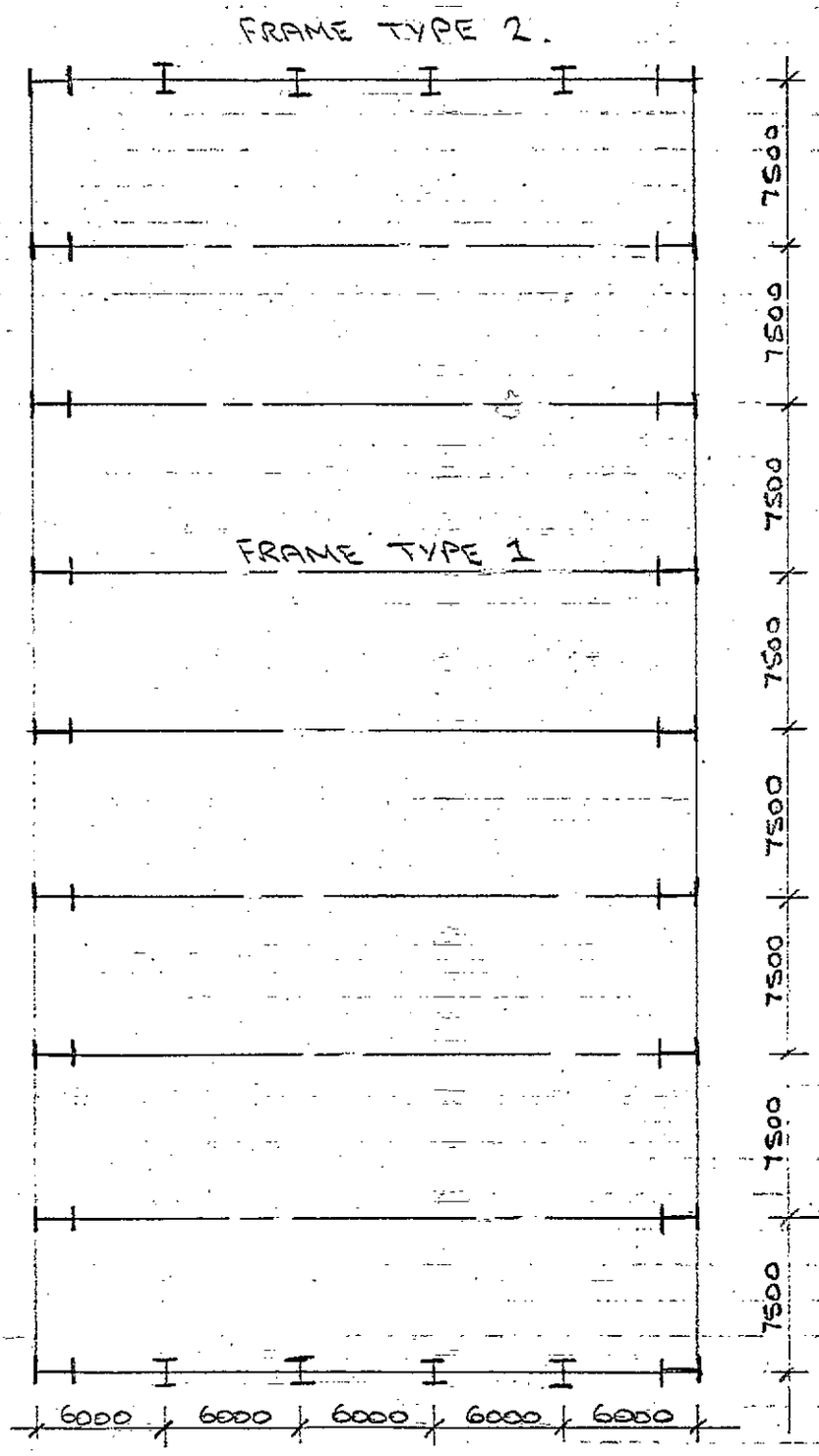


PLAN OF DEVELOPMENT

LOADING :-

1) G_k (Dead Load) -

a) Double skin insulated metal deck. - 0.3 kN/m²

b) self wt of steel - 0.3 kN/m²

c) services - 0.2 kN/m²

∴ Total G_k = 0.8 kN/m²

2) Q_k (Imposed Load) -

0.75 kN/m²

3) Wind Loading -

CP3: Chapter V Part 2

V = Basic Wind Speed

= 44 m/s.

V_s = Design wind speed

$= S_1 S_2 S_3 V$.

S_1 = Topography factor = 1.0

S_3 = Statistical factor = 1.0

S_2 = ?

Suburban Area .... Ground Roughness (3)

Class C. (greatest horizontal dimension exceeds 50m)

Table 3.

for $h = 3m$, $S_2 = 0.55$ $\therefore V_s = (0.55)(44) = 24.2$ m/s.

$h = 5m$, $S_2 = 0.6$ $\therefore V_s = (0.6)(44) = 26.4$ m/s.

$h = 9.15$, $S_2 = 0.675$ $\therefore V_s = (0.675)(44) = 29.7$ m/s.

Table 4

now,

q = dynamic pressure of wind

$= KV_s^2$, where $K = 0.613$

so, for $h = 3m$, $q = (0.613)(24.2)^2 = 359\ N/m^2$.

$h = 5m$, $q = (0.613)(26.4)^2 = 427\ N/m^2$.

$h = 9.15m$, $q = (0.613)(29.7)^2 = 540\ N/m^2$.

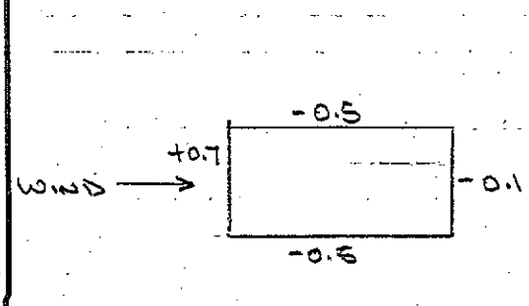
Pressure Coefficients:

a) External (C_{pe}) –

$h/w = \frac{9.15}{30} = 0.305$, $l/w = \frac{60}{30} = 2$.

so, $h/w < 1/2$ and $3/2 < l/w < 4$

Table 7.



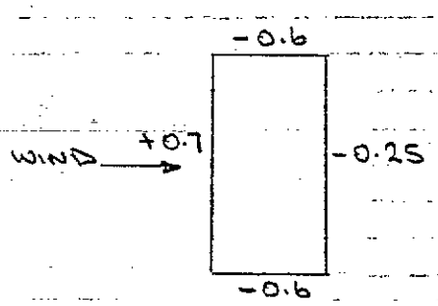
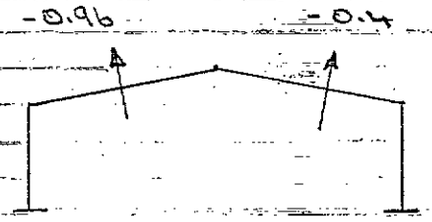


Table 8. for wind $\alpha = 0°$, roof angle = 6°

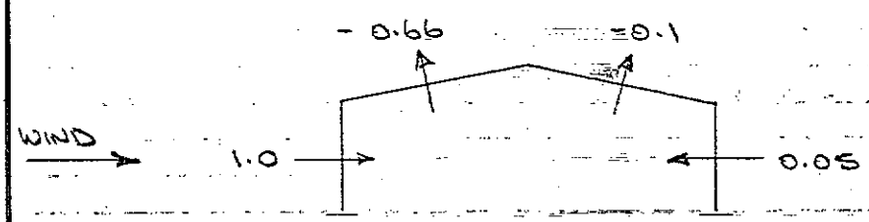


Appendix E. b) Internal Coefficient (C_{pi}) -

$C_{pi} = +0.2$ (or) -0.3

Use -0.3 as this suction promotes sway.

Combine internal and external coefficients :-



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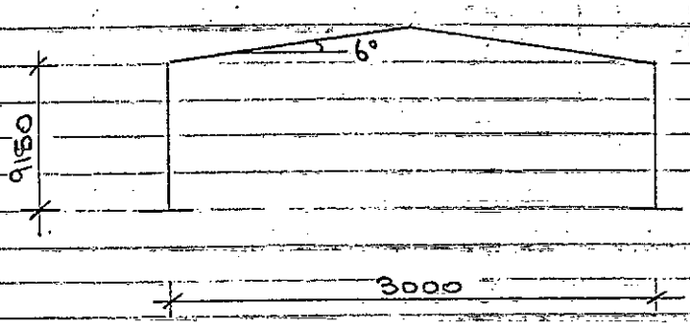
Design of Frame Type 1.

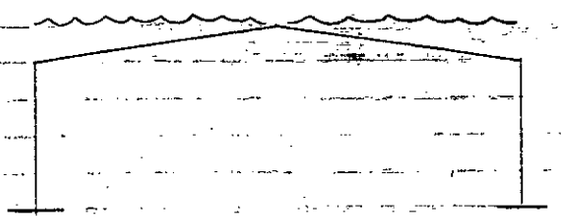


Spacing of 7.5m centre to centre.

Load Cases :-

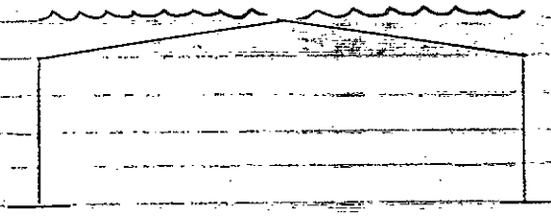
LOAD CASE 1 = DEAD

(0.8)(7.5) = 6 kN/m.

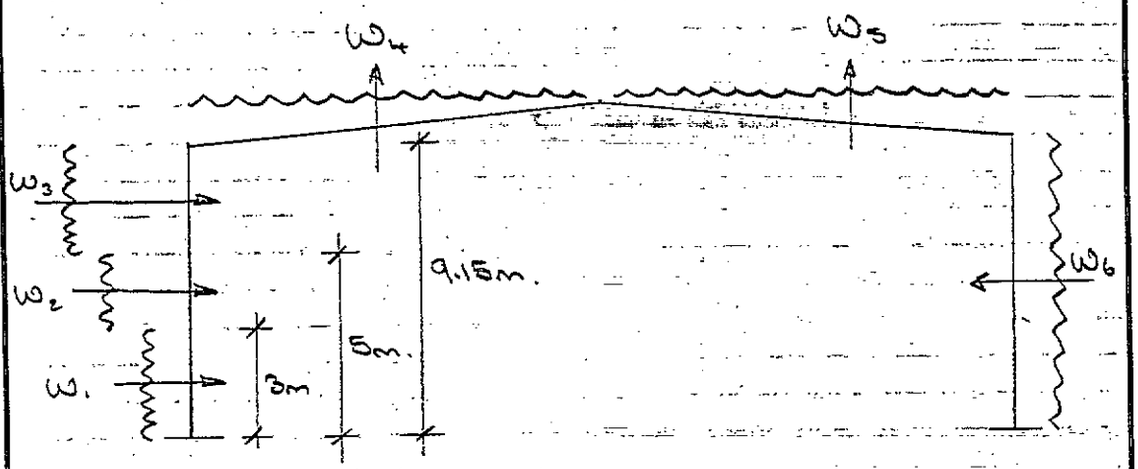


LOAD CASE 2 = Imposed

(0.75)(7.5) = 5.63 kN/m.



LOAD CASE 3. - Wind.



Where,

$W_1 = (1.0)(7.5)(0.359) = 2.7$ kN/m.

$W_2 = (1.0)(7.5)(0.427) = 3.2$ kN/m.

$W_3 = (1.0)(7.5)(0.54) = 4.1$ kN/m.

$W_4 = (0.66)(7.5)(0.54) = 2.7$ kN/m.

$W_5 = (0.1)(7.5)(0.54) = 0.41$ kN/m.

$W_6 = (0.05)(7.5)(0.54) = 0.2$ kN/m (very small - so ignore).

For Design purposes, use two combinations,

Load Combinations :-

1) Load Combination 1 - Dead + Imposed.

2) Load Combination 2 - Dead + Wind.

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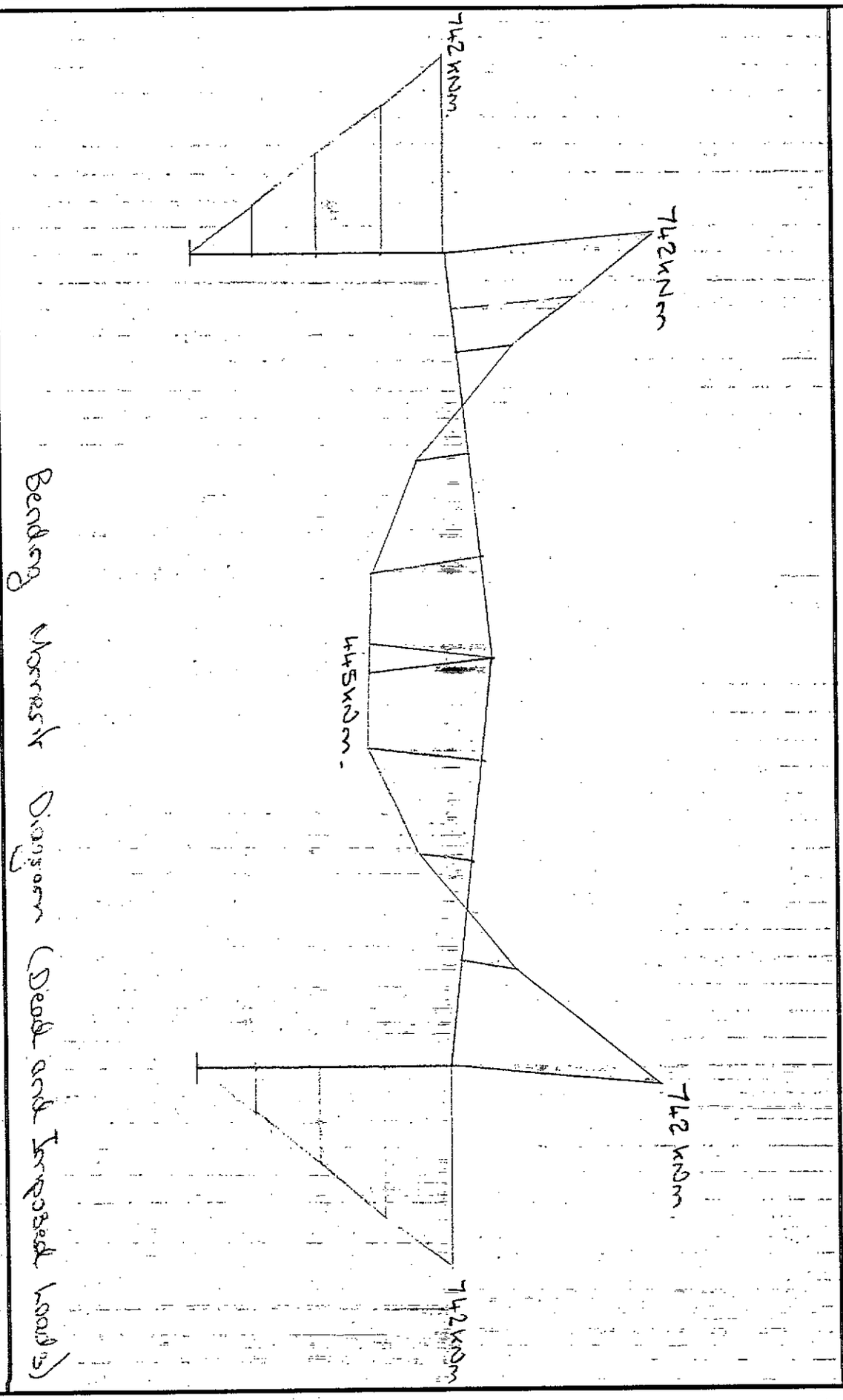

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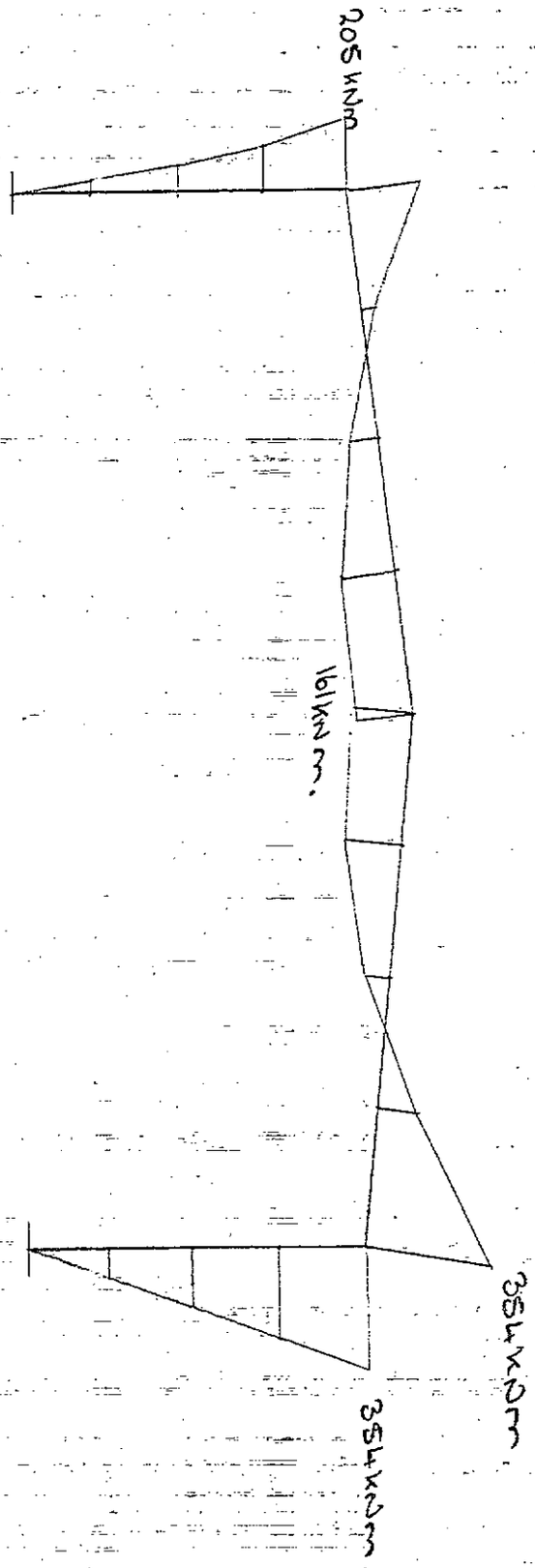


Bending Moment Diagram (Dead and Wind Loads)

Design of Columns:

Maximum moment = 741.81 kNm
Axial load = 175 kN
} From Load Combination Dead + Imposed see Appendix A

Provide restraint to compression flange.

Bending.

So, $P_{bc} = 165\ N/mm^2$.

$$Z_{req} = M/P_{bc} = \frac{741.81 \times 10^6}{165 \times 10^3} = 4496\ cm^2.$$

$\Rightarrow$ use a $610 \times 305 \times 179$ kG UB.
($Z = 4911\ cm^2$).

Comp. stress f_c is very small ($f_c = 7.7 N/mm^2$)

Design of Rafters:

Use a Haunch - 2m long.

Maximum Moment = 445 kNm
Axial load = 99 kN
} From Load Combination Dead + Imposed see Appendix A.

Compression flange is restrained every 1.2m from purlins
$\therefore P_{bc} = 165\ N/mm^2$.

Bending

$$Z_{req} = \frac{445 \times 10^6}{165 \times 10^3} = 2697 \text{ cm}^3$$

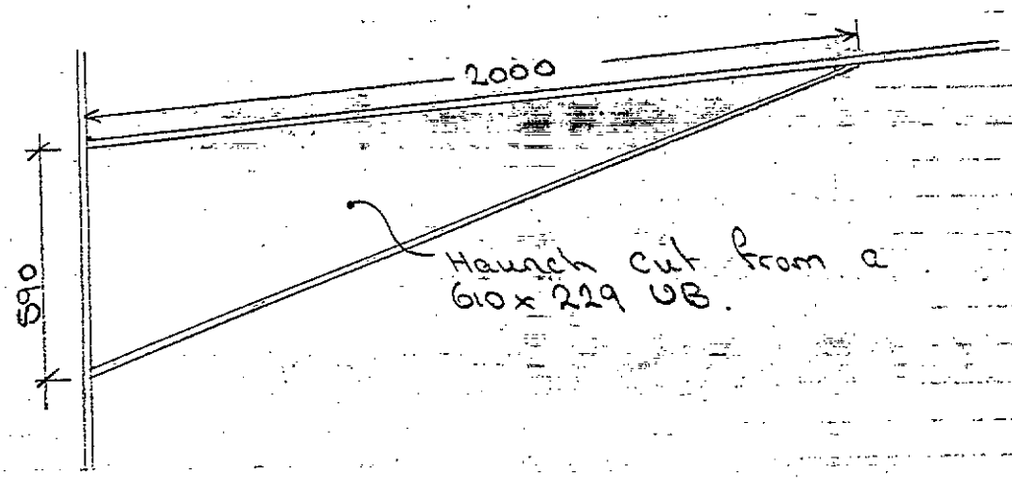
$\Rightarrow$ use a $610 \times 229 \times 125$ kg UB

($Z = 98579 \text{ cm}^3$)

Comp. stress $f_c = 6.2 \text{ N/mm}^2$

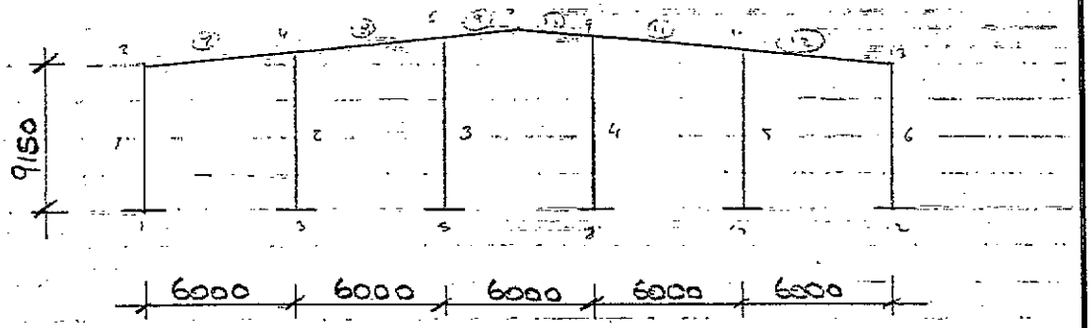
By inspection, this section is adequate.

Haunch



By inspection, the above haunch appears adequate for the applied moments.

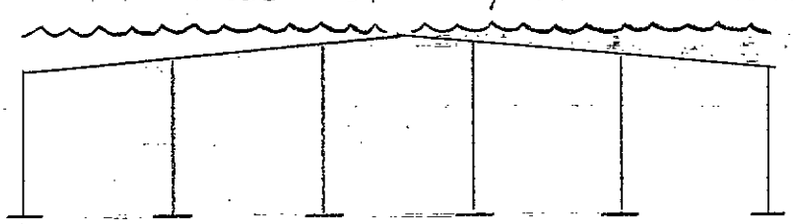
Design of Frame Type 2.



Load Cases :-

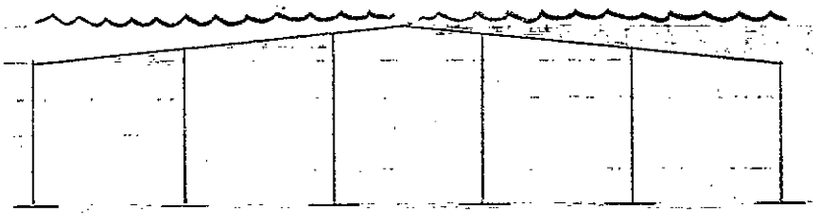
Load Case 1 = Dead.

(0.8X7.5/2) = 3 kN/m.

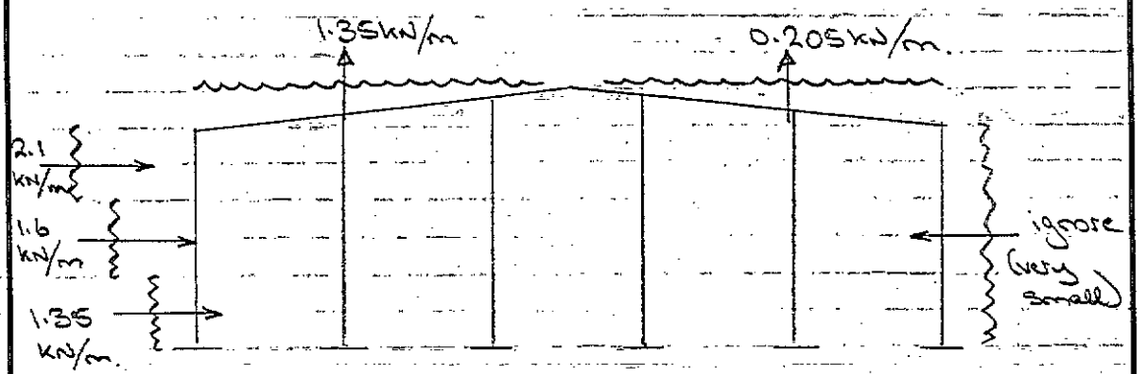


LOAD CASE 2 - Imposed.

(0.75X7.5/2) = 2.81 kN/m.



LOAD CASE 3 - WIND.



Again for Design Purposes, use the following combinations.

LOAD COMBINATIONS :-

1) LOAD COMBINATION 1 - Dead + Imposed.

2) LOAD COMBINATION 2 - Dead + WIND.

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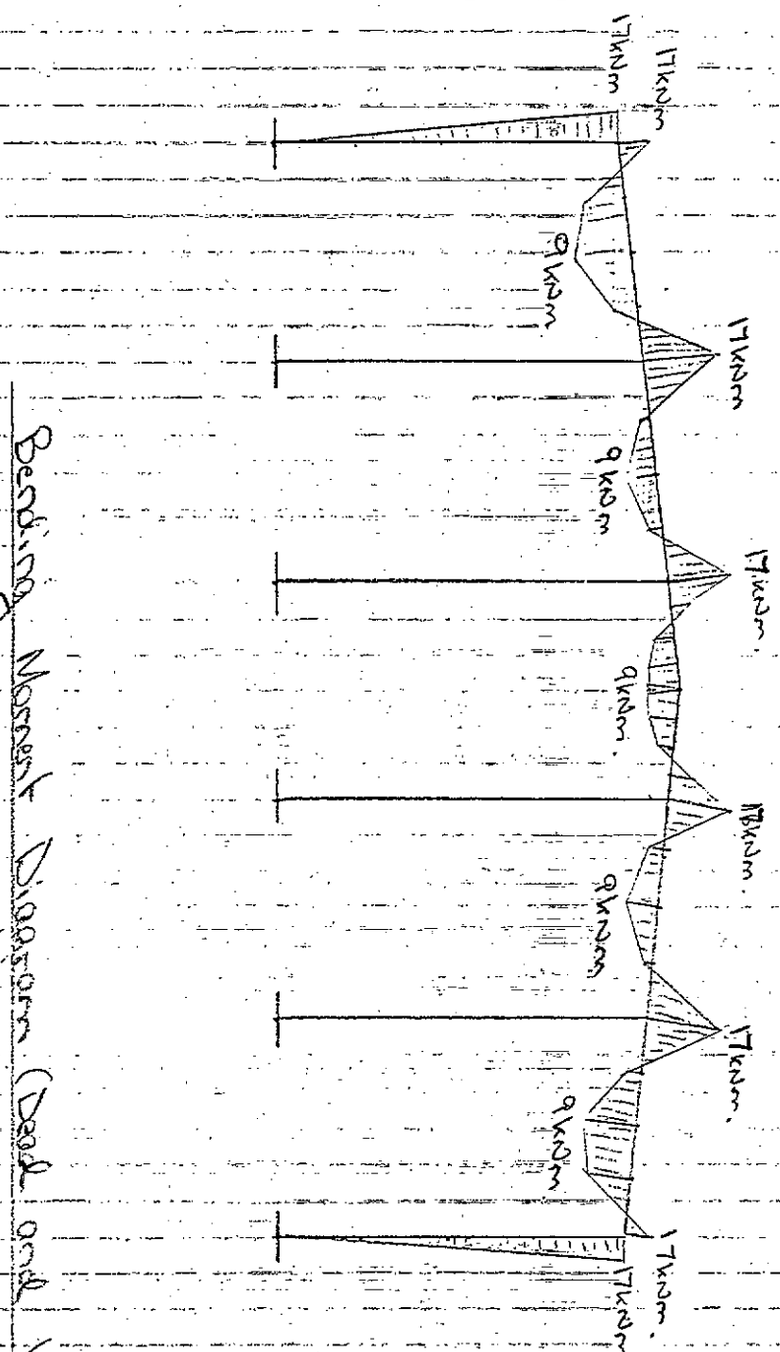

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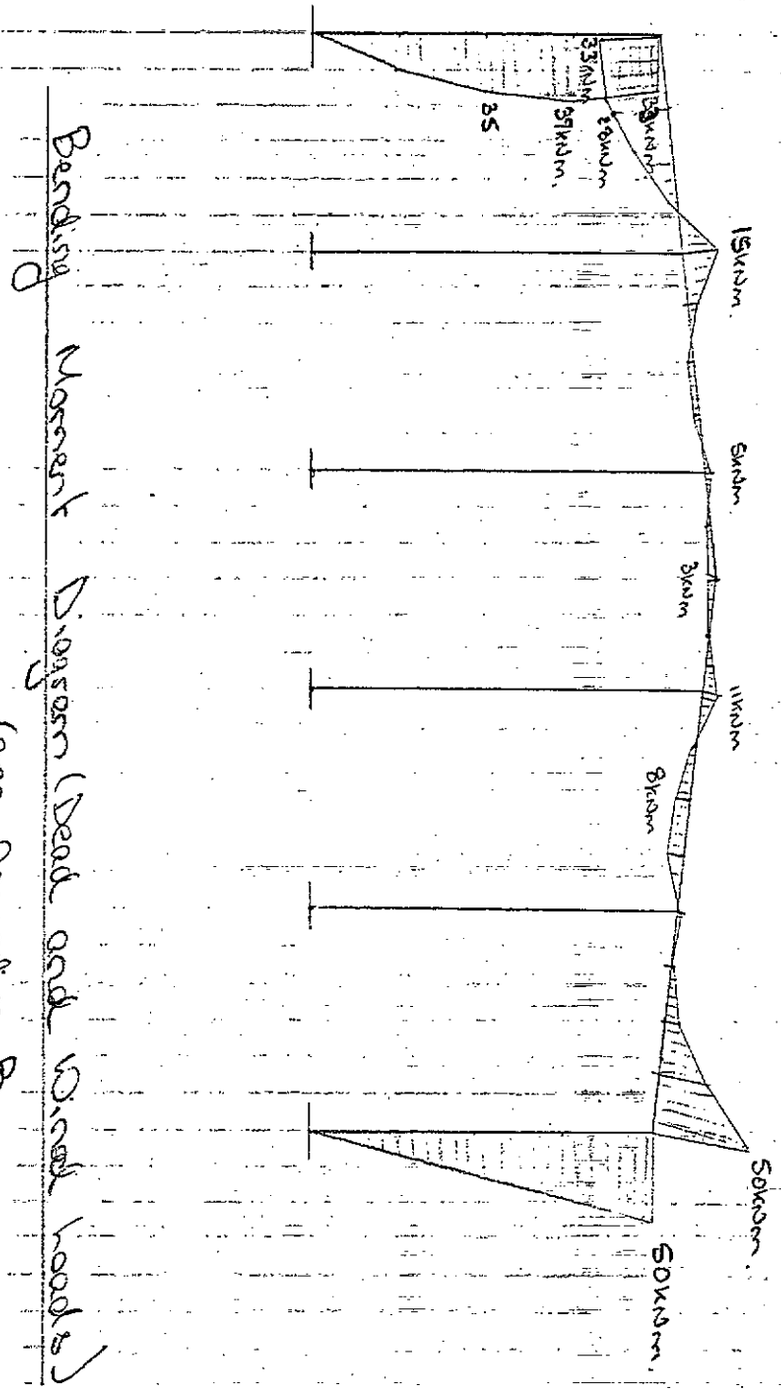
Designed VF | Checked | Date Feb '91

SHEET NO. 14



DESIGN OF EXTERNAL COLUMN

Max. Moment = 50 kNm. } From LOAD COMBINATION DEAD AND WIND
Axial load = 18 kN. } SEE APPENDIX B.

Provide restraint to comp. flg.

Bending

So, P_{bc} = 165 N/mm².

$$Z_{req} = \frac{50 \times 10^6}{165 \times 10^3} = 303 \text{ cm}^3.$$

=> use a 610 x 305 x 179 KG UB.
(Z = 4911.0 cm³).

comp. stress f_c = 3.5 N/mm². (very small so section adequate in comp.)

Design of Rafters.

Use a Haunch - 2m long.

Max Moment = 28 kNm.

Axial load = 5 kNm.

l = 2800 mm.

using a 254 x 146 x 31 KG UB.

$$l/r_{yy} = \frac{2800}{33.5} = 84, \quad D/T = 29.1$$

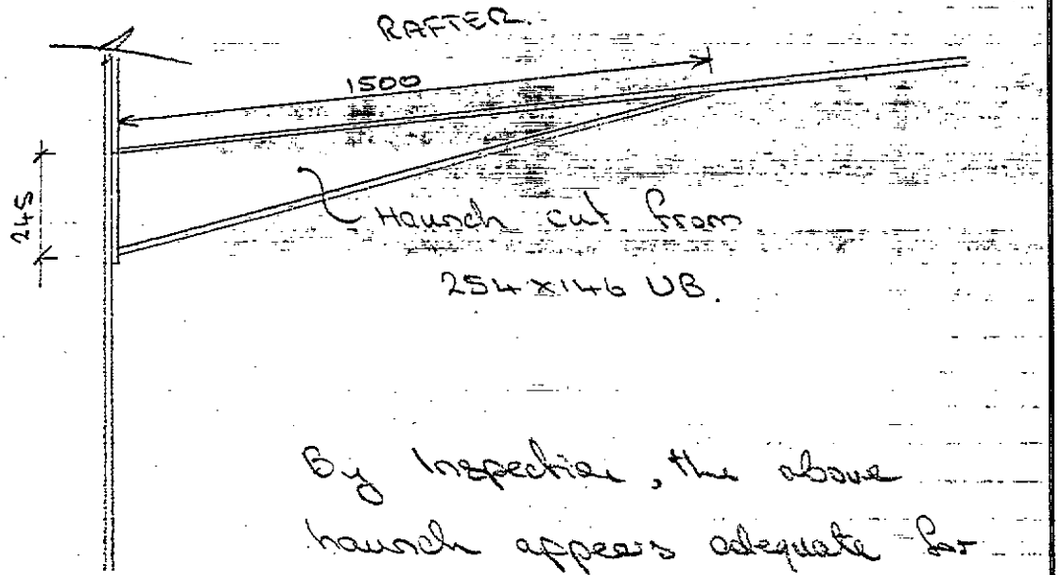
=> P_{bc} = 165 N/mm².

$$f_{bc} = \frac{28 \times 10^6}{353.1 \times 10^3} = 80 \text{ N/mm}^2$$

$\Rightarrow$ adequate in bending.

By inspection, this section appears adequate in compression.

Haunch

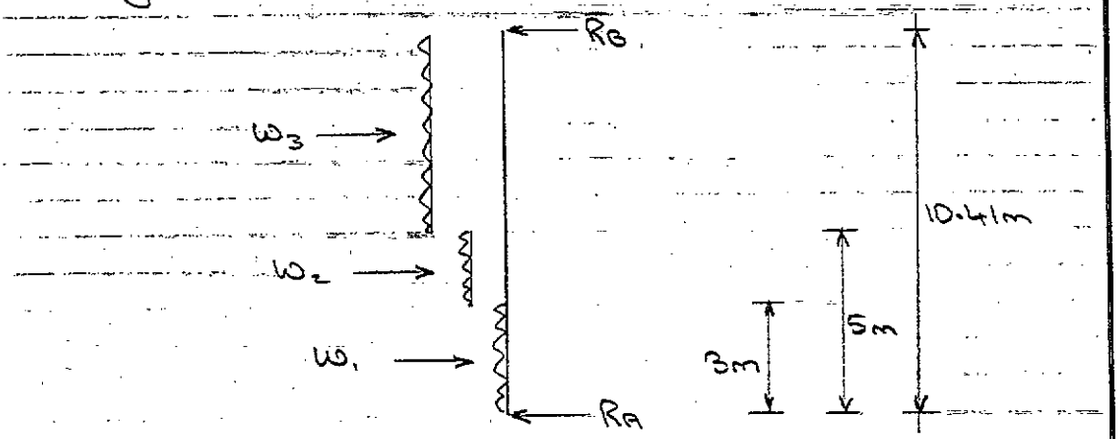


By inspection, the above haunch appears adequate for the applied moments.

Design of Gable Stanchions

most critical stanchion :- 10.41 m high.

loading :-



$w_1 = (0.359)(1.0)(6) = 2.154$ kN/m.

$w_2 = (0.427)(1.0)(6) = 2.562$ kN/m.

$w_3 = (0.565)(1.0)(6) = 3.39$ kN/m.

Reactions.

$R_A(10.41) = (2.154)(3)(8.91) + (2.562)(2)(6.41) + (3.39)(5.41)(2.705)$

$\Rightarrow R_A = 13.45$ kN.

$\therefore R_B = 16.48$ kN.

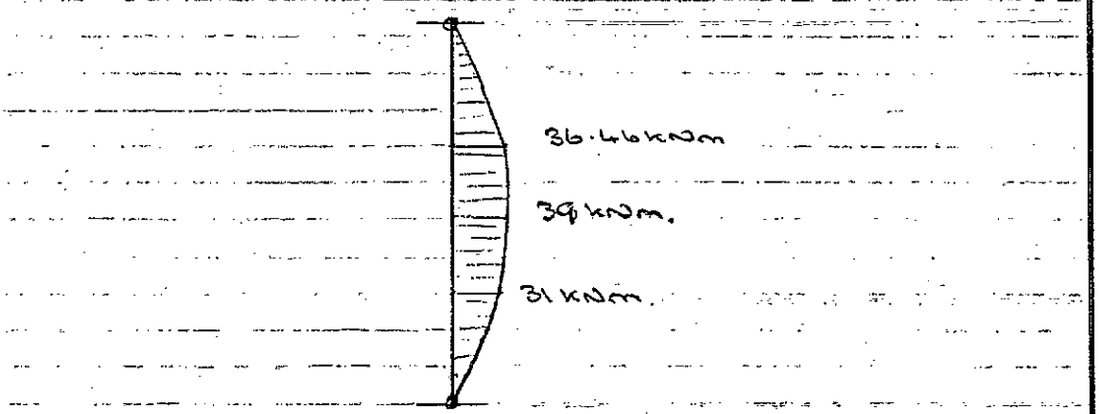
Moments.

at 3m, B.M. $= (13.45)(3) - (2.154)(3)(3/2) = 31$ kNm.

at 5m, BM $= (13.45)(5) - (2.154)(3)(5.5) - (2.562)(2)(1) = 39$ kNm.

at 7m, BM $= 36.46$ kNm.

Bending Moment Diagram.



The comp flange of the stanchion is restrained every 1.4m (sheeting rails)

=> using a 254 x 146 x 31 kg UB.

$$l/r_{yy} = \frac{1400}{33.5} = 42$$

$$D/T = 29.1$$

$$\Rightarrow P_{bc} = 165\ N/mm^2.$$

now, $$f_{bc} = \frac{39.0 \times 10^3}{353.1 \times 10^3} = 110\ N/mm^2$$

=> Section chosen is adequate in Bending.

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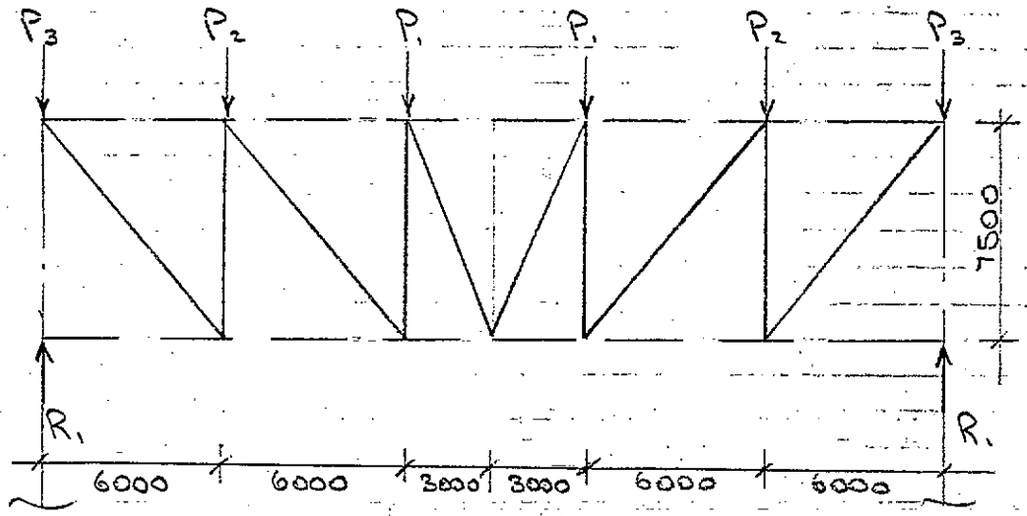
Design of Roof Bracing.



Loading :-

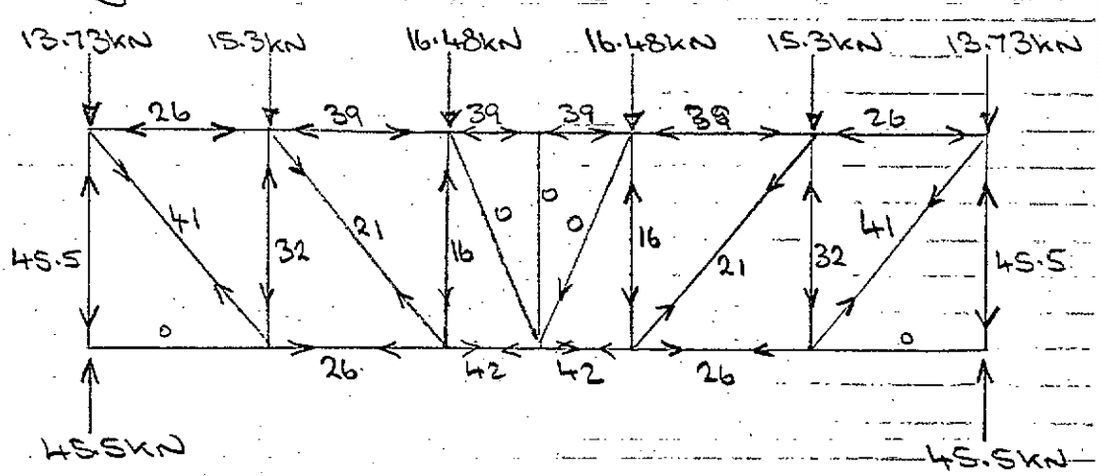
P_1 = 16.48 kN (see page 17).

P_2 = 15.3 kN.

P_3 = 13.73 kN.

$\therefore R_1 = R_2 = 91/2 = 45.5$ kN.

Analysis.



Design of Internal Ties.

Max. Tensile force = 41 kN.

using a 70 x 70 x 6 angle.

$$f_t = \frac{41 \times 10^3}{8.13 \times 10^2} = 50 \text{ N/mm}^2$$

now,

$P_t = 155 \text{ N/mm}^2$.

$\Rightarrow$ adequate.

Design of Internal Chords.

Max. comp. force = 32 N/mm².

using a 114.3 Ø x 3.6 mm C.H.S.

$$l/r = \frac{0.85(7500)}{39.2} = 163$$

$\therefore P_c = 35 \text{ N/mm}^2$.

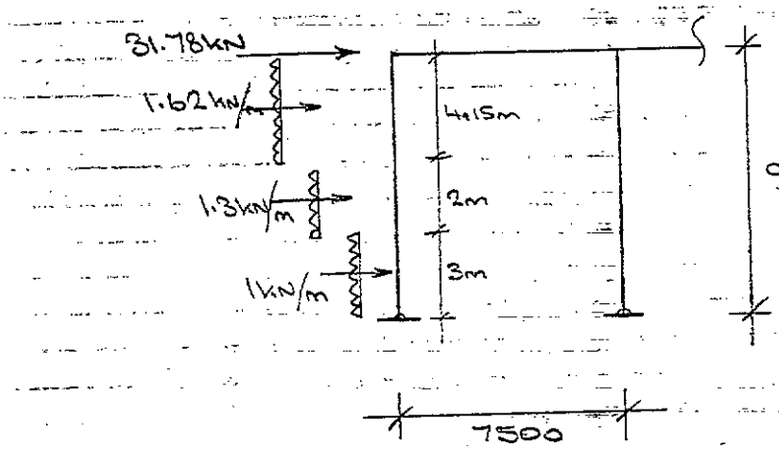
now, $f_c = \frac{32 \times 10^3}{12.5 \times 10^2} = 26 \text{ N/mm}^2$

$\Rightarrow$ adequate.

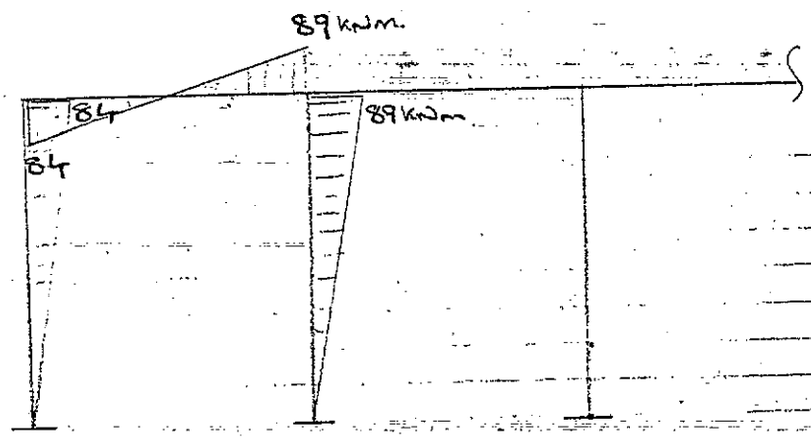
By Inspection,
The portal rafters appear adequate in Tension and compression.

Design of Wind Portals. (see Appendix C)

Loading.



Bending Moment Diagram. (see Appendix C.)



1) Design of Column. (see Appendix C)

Max Moment = 89 kNm.

Axial load = 23 + 90 = 113 kN.
WIND DEAD.

using as already designed a
610 × 305 × 179 kG UB

say $P_c = 155$ N/mm²

$\Rightarrow P_{bc} = 165$ N/mm²,

now, $f_{bc} = \frac{89 \times 10^6}{743.3 \times 10^3} = 120$ N/mm²

and

$f_c = \frac{98 \times 10^3}{227 \times 10^2} = 4.3$ N/mm²

$\Rightarrow$ section adequate.

2) Design of Rafter

Max. Moment = 89 kNm.

Axial load = 30 kN

$$l = \frac{7500}{2} = 3750$$

using a 305 x 165 x 46 kG UB.

$$l/r_{xx} = \frac{3750}{39} = 96 \qquad D/T = 26$$

$\Rightarrow P_{bc} = 163 \text{ N/mm}^2$., $P_c = 84 \text{ N/mm}^2$

now, $f_{bc} = \frac{89 \times 10^6}{647.9 \times 10^3} = 138 \text{ N/mm}^2$.

$$f_c = \frac{30 \times 10^3}{58.9 \times 10^2} = 5 \text{ N/mm}^2.$$

$\Rightarrow$ section adequate

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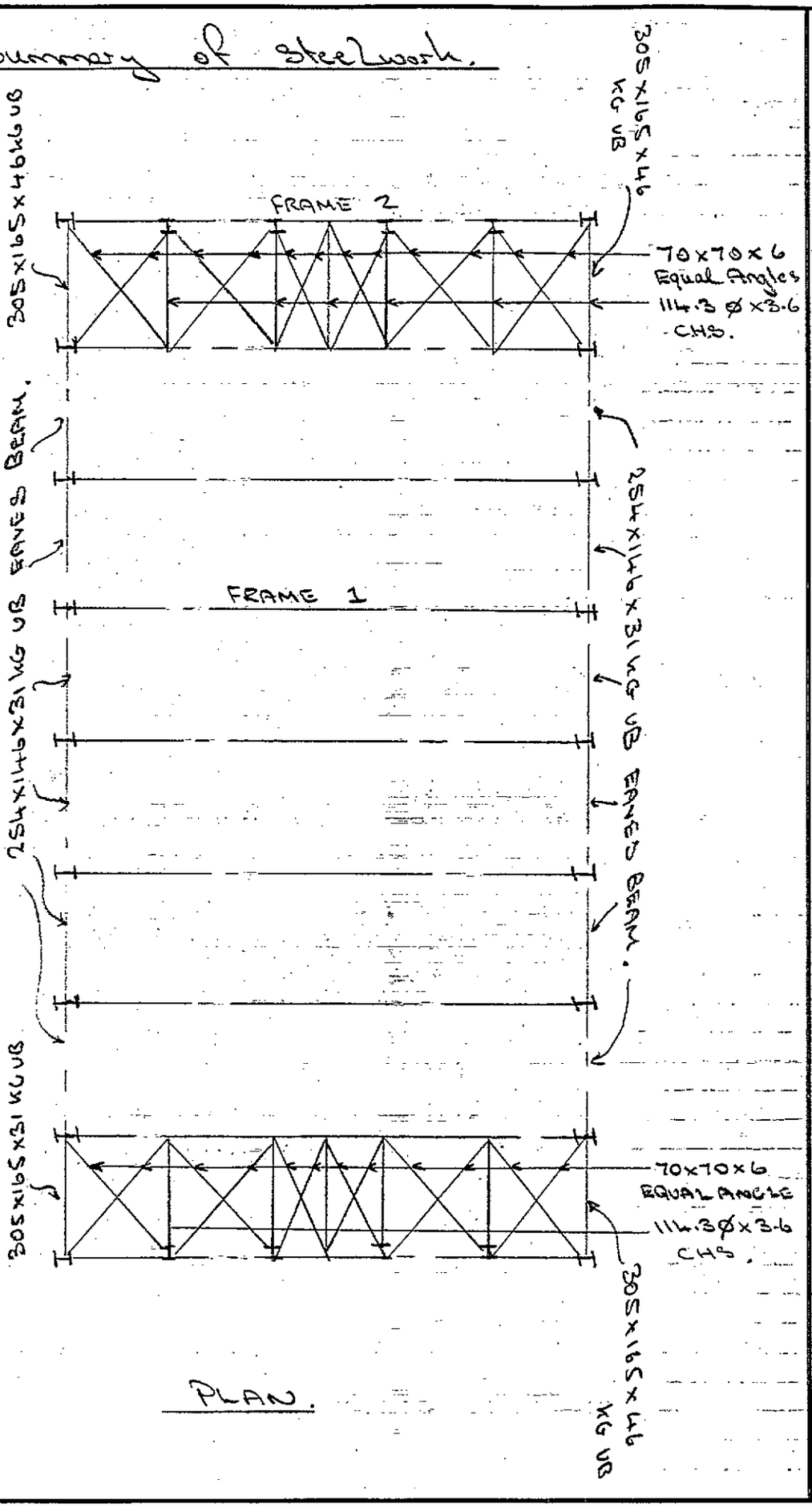
⇒ Summary of steelwork.



PLAN.

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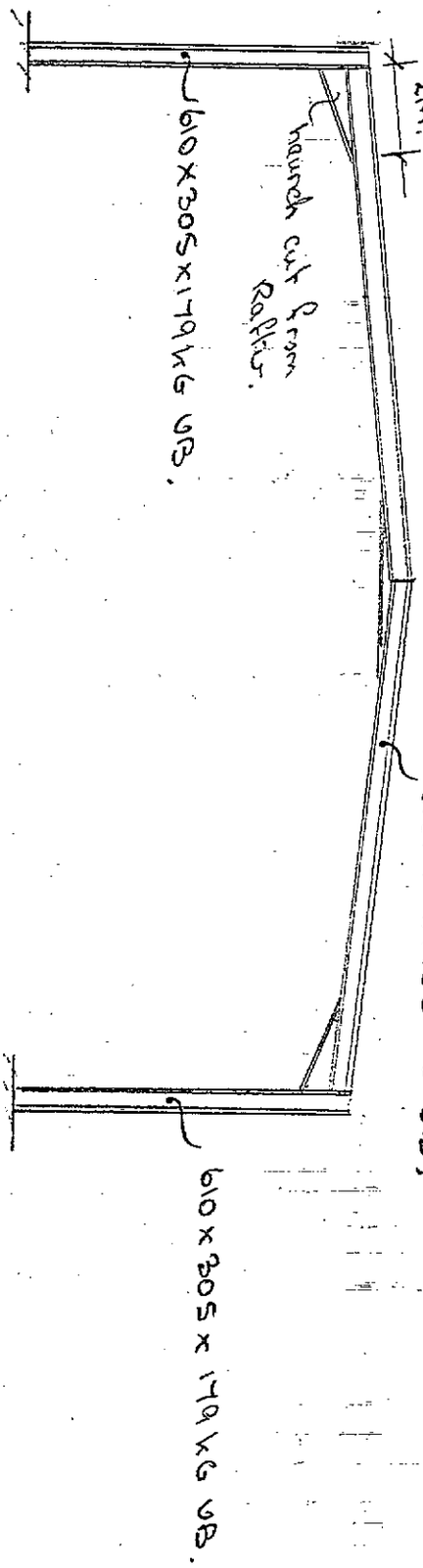


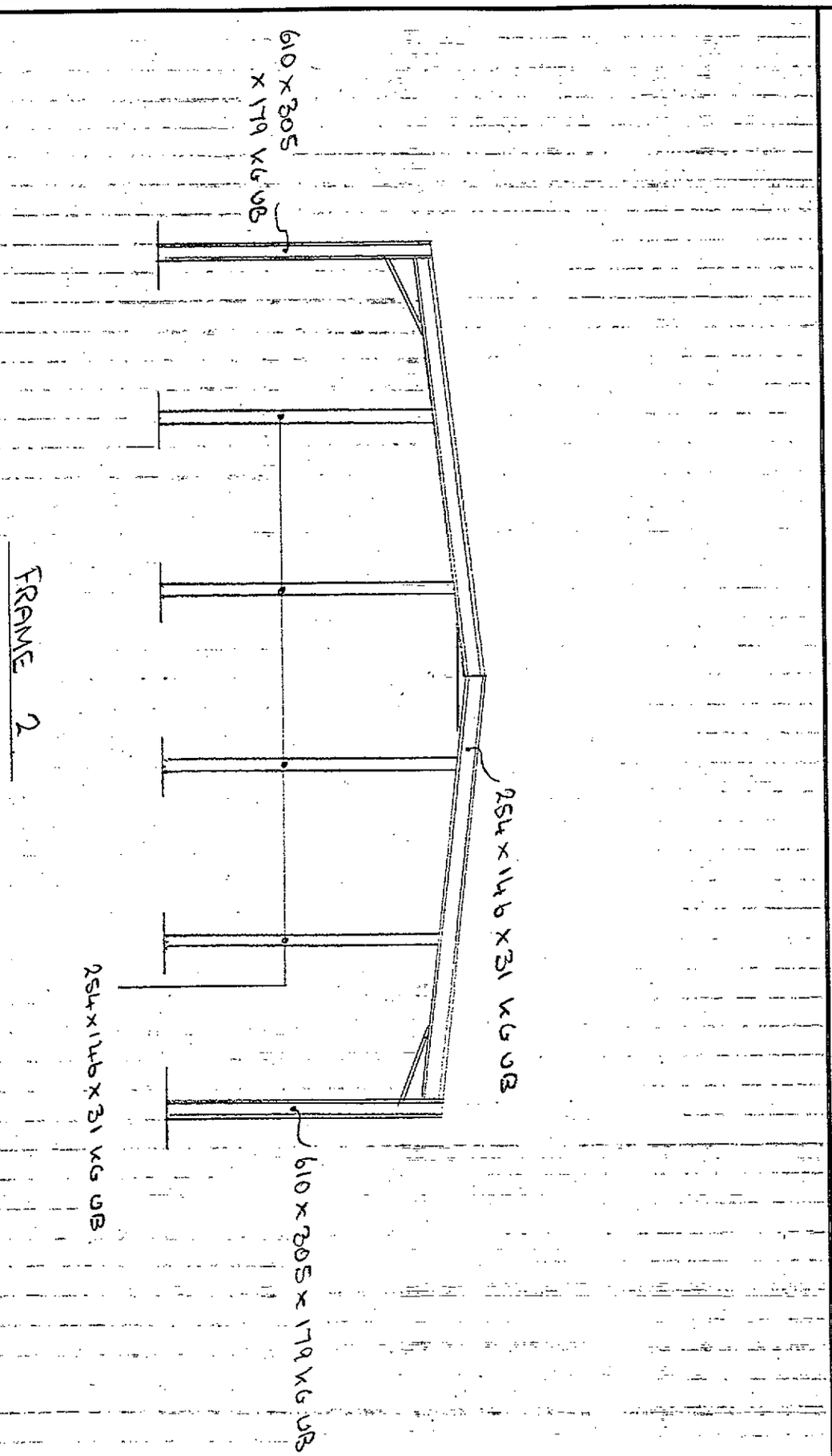
FRAME 1.

HORGAN LYNCH & PARTNERS
CONSULTING ENGINEERS
CALCULATION SHEET

JOB:- Industrial Dev. at Ballymount Rd Upr.

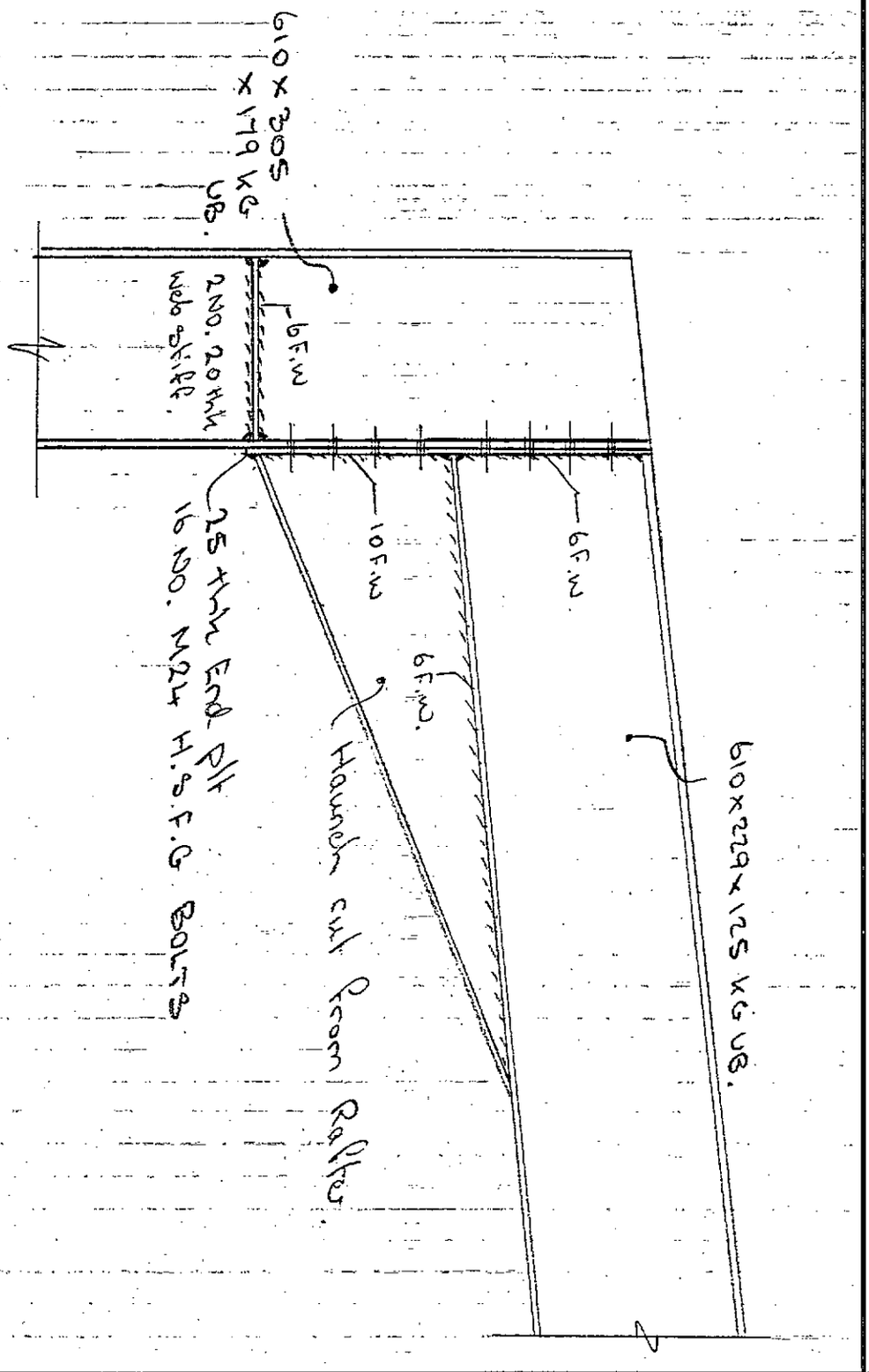
Designed	Checked	Date	
VE		Feb '91	

SHEET NO. 26



Design of Connections.

1) Haunch detail of Frame 1.



Bolt Design.

Moment = 742 kNm.

Shear = 175 kN.

Bolt $I_{xx} = 2(88.2^2 + 223^2 + 358^2 + 493^2 + 683^2 + 822^2 + 961^2 + 1100^2)$

$= 7408830.5\ mm^4.$

$\Rightarrow$ Max. Tension/bolt $= \frac{742 \times 10^3 \times 1100}{7408830.5}$

$= 110$ kN/bolt.

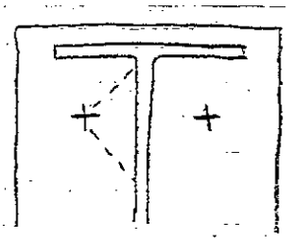
Shear/bolt $= 175/16 = 10.9$ kN/bolt.

use M24 H.S.F.G. Bolts;

(allowable shear/bolt = 66.5 kN/bolt

allowable tension/bolt = 124.2kN/bolt)

Weld and End plt design.



$77 + \frac{139}{2} = 146.5$ mm

$\frac{140 - 12.1}{2} - 16.5 = 46$ mm.

$\Rightarrow$ moment = $110 \times 46/2 = 2530$ kNmm.
(Double curvature)

$Z = bt^2/6 = 147/6\, t^2 = 25t^2$

$\Rightarrow t_{req} = \sqrt{\frac{2530 \times 10^3}{165 \times 25}} = 24.7$ mm

$\Rightarrow$ use 25 thk End plt.

Tension load (kN)/mm weld = $110/146.5 = 0.75$ kN/mm.

Shear load (kN)/mm weld = $175/2(571 \times 2)$

$= 0.077$ kN/mm.

$\Rightarrow$ combined kN/mm = $\sqrt{(0.75)^2 + (0.077)^2}$

$= 0.754$ kN/mm.

$\Rightarrow$ use 10 F.W.

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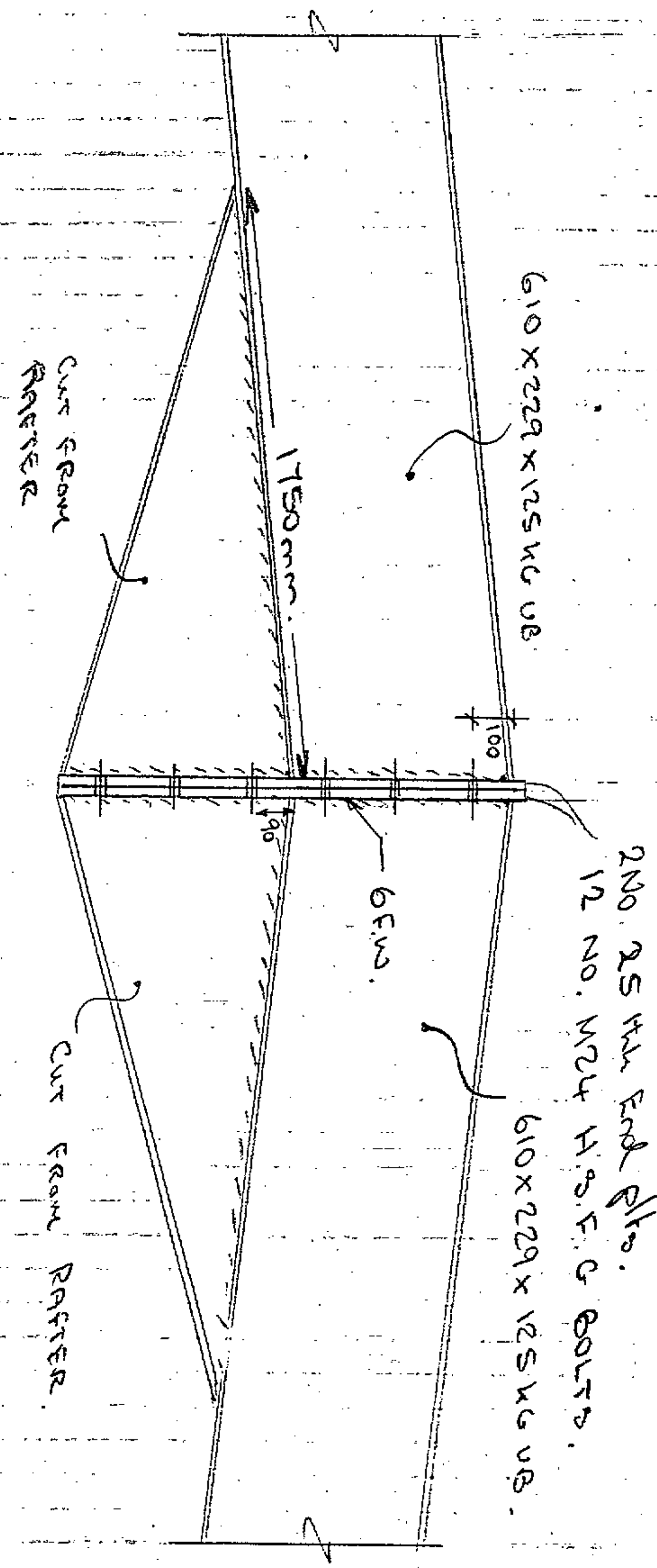
	Designed NF / Checked / Date Feb '91	

2) Apex Detail of Frame 1



Bolt Design.

Max. Moment = 445 kNm.

Axial load = 87 kN.

Bolt $I_{xx} = 2(90.2^2 + 295.70^2 + 501.2^2 + 701^2 + 901.7^2 + 1102.4^2)$

$= 5733051.2\ mm^4$

$\Rightarrow$ Max. Tension/bolt $= \frac{445 \times 1102.4 \times 10^3}{5733051.2}$

$= 86$ kN

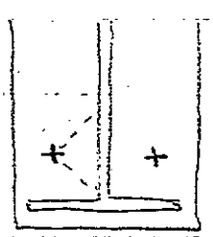
Max shear/bolt $= 87/12 = 7.3$ kN/bolt

$\Rightarrow$ Use M24 H.S.F.G Bolts.

Calculated shear = 66.5 kN

allowable tension = 124.2 kN

Weld and End plt design.



100 + 80.4 = 180.4mm

$\frac{140 - 11.9}{2} - 12.7 = 51$ mm

$\Rightarrow M = (86 \times 51/2) = 2193 kN_{mm}$ (Double curvature).

$Z = bt^2/6 = 180.4\,t^2/6 = 30t^2$

$\Rightarrow t_{req} = \sqrt{\frac{2193 \times 10^3}{165 \times 30}} = 21\ mm.$

$\Rightarrow$ use 25 thk end pl.

Tensile load (kN)/mm weld

$= 86/180.4 = 0.477\ kN/mm.$

Shear load (kN)/mm weld

$= 87/2(1143.6) = 0.04\ kN/mm.$

Combined kN/mm weld $= \sqrt{0.477^2 + 0.04^2}$

$= 0.4787\ kN/mm.$

$\Rightarrow$ use 6 F.W.

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CALCULATION SHEET

JOB:- Industrial Dev. at Cally road Rd Upgs.

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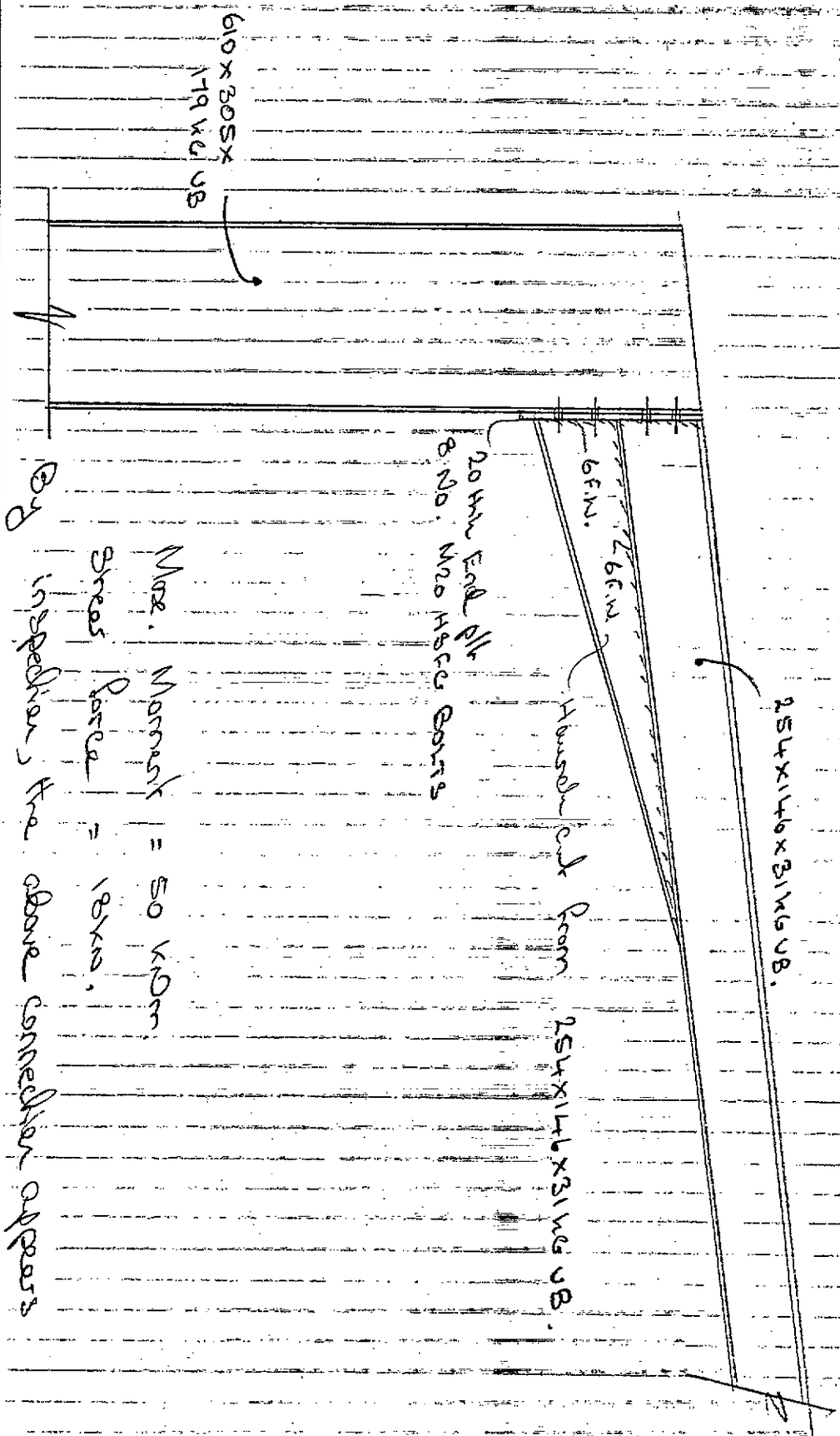
SHEET NO. 33

3) Haunch Detail of Frame 2



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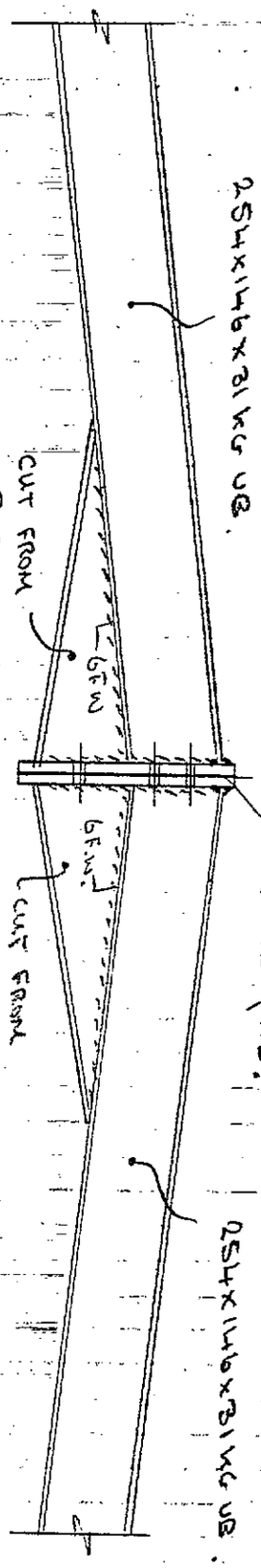
CALCULATION SHEET

JOB:- Industrial Dev. at Ballymount Rd Upr.

Designed NF | Checked | Date Feb '91

SHEET NO. 34

4) Apex Detail of Frame 2.



G 20. M20 H.S.F.G Bolts.

M = 9 kNm.

Shear = minimal.

By inspection, the above connection appears adequate.

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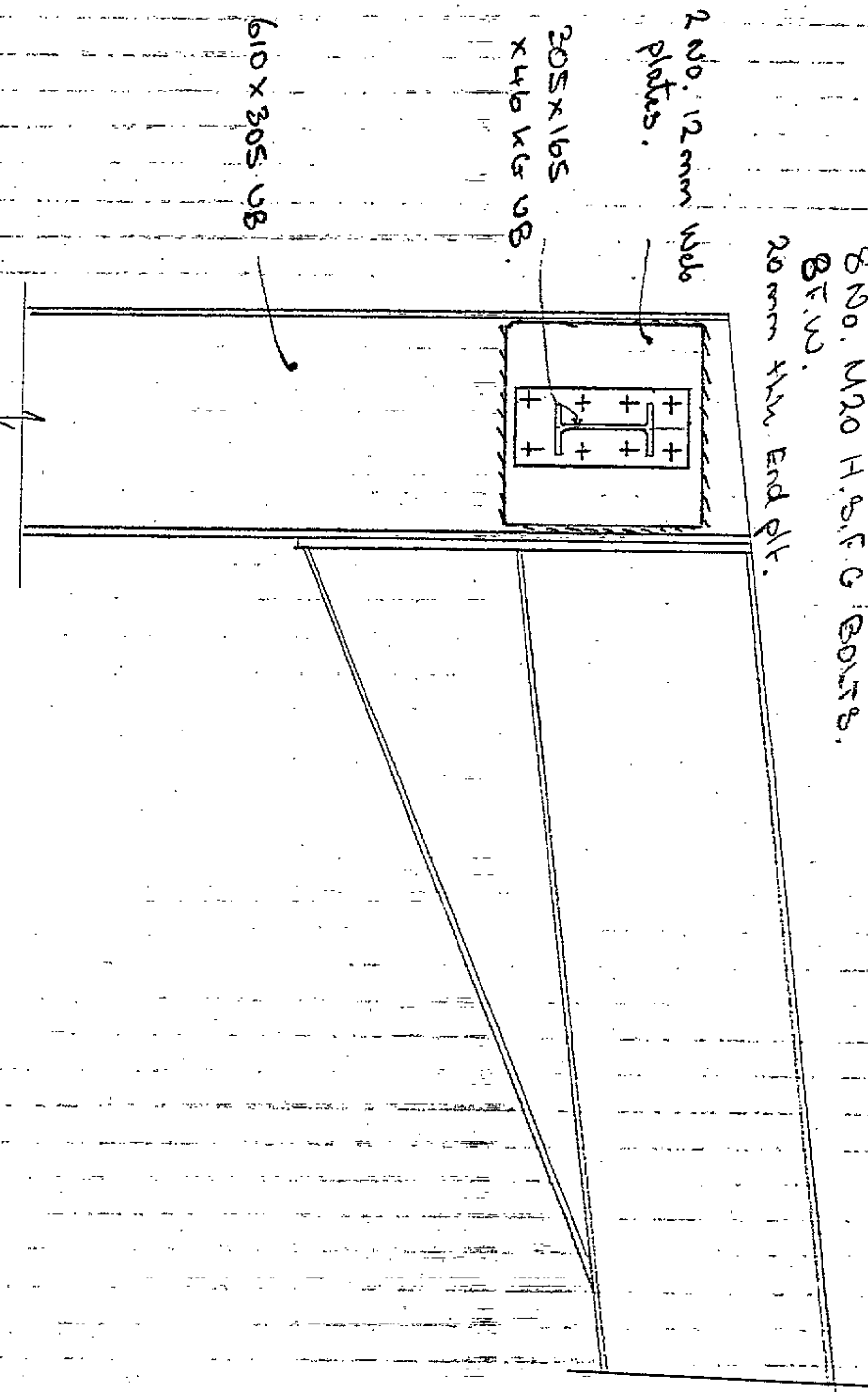
CALCULATION SHEET

JOB:- Industrial Dev. at Ballymount Rd. Upr.

Designed: NF | Checked: | Date: Feb '91

SHEET NO. 35

5) Eaves Beam connection to column.
(Wind Portal - moment connection)



By inspection the above connection appears adequate ✓

(This particular connection is only necessary at the two end bays. ie 8 type connections)

Design of Purlins.

Loading :- Dead + Imposed

= 0.8 + 0.75 = 1.55 kN/m².

Since,

span = 7.5m and spacing = 1.4m

=> use 254/200 multibeam purlin.

(capacity = 1.74 kN/m².)

Design of Sheeting Rails.

Loading :-

greatest wind pressure

= 0.540 kN/m².

Since,

span = 7.5m and spacing = 1.4m.

=> use. R165/157 multibeam sheeting rail.

(capacity = 0.87 kN/m²).

Design of Foundations

1) Design of Footings to Main Portals.

Max. Reaction = 175.41 kN
(Load Combination Dead + Imposed)

Bearing Pressure of soil = 150 kN/m².

assume wt of pad and plinth = 25kN

⇒ area of Pad reqd

$$= \frac{175+25}{150} = 1.33\ m^2.$$

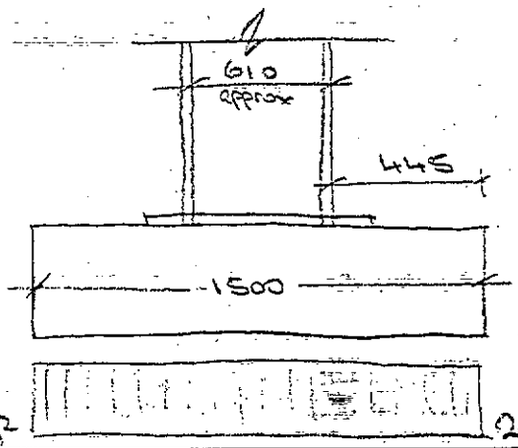
⇒ use a 1.5m x 1m x 0.45m deep pad.

1.5m x 1m x 0.45m deep pad.

Design loading = 1.5(200) = 300 kN.

⇒ Design Pressure = $\frac{300}{1.5 \times 1} = 200$

Moment



Moment at Column Face

$= (200 \times 0.445 \times \frac{0.445}{2})(1)$

$= 19.8$ kNm.

$d = 450 - 40 - 6 = 404$ mm.

$b = 1000$ mm.

$f_{cu} = 30$ N/mm^2.

$\Rightarrow K = \frac{19.8 \times 10^6}{1000 \times 404^2 \times 30} = 0.004$

< 0.156

$\Rightarrow z = \left[0.5 + \sqrt{0.25 - \frac{0.004}{0.9}}\right] d = 0.99d$

$\therefore z = 0.95d = 383.8$ mm.

now,

$A_{sreq} = \frac{19.8 \times 10^6}{0.87 \times 460 \times 383.8} = 129$ mm^2

$A_{smin} = \frac{0.13(1000)(450)}{100} = 585$ mm^2

$\Rightarrow$ use T12 @ 175 c/c. in both directions

($A_{s\,prov} = 646$ mm^2)

T12 @ 175 c/c. in both directions

Punching Shear.

(a) at 0° face.

Punching shear = $300 - 200(0.61)(0.229)$

= 272 kN.

Critical Perimeter = $2(0.61) + 2(0.229)$

= 1.678 m.

$$\Rightarrow v = \frac{272 \times 10^3}{1.678 \times 404 \times 10^3} = 0.4 \text{ N/mm}^2.$$

$$< 0.8\sqrt{30} = 4.38 \text{ N/mm}^2$$

(b) at critical perimeter

$$U = 2[(1.5)(404)] + 610] + 2[(1.5)(404)] + 229$$

$$= 1822 + 12241$$

which is greater than the actual perimeter.

$\Rightarrow$ adequate in punching shear.

Flexural Shear

a) at column face.

$$V = 200(0.445)(1) = 89 \text{ kN}.$$

$$\Rightarrow v = \frac{89 \times 10^3}{1000 \times 404} = 0.22 \text{ N/mm}^2.$$

now, $v_c = 0.8\sqrt{f_{cu}} = 4.38$ N/mm²

$\Rightarrow v < v_c \Rightarrow$ adequate.

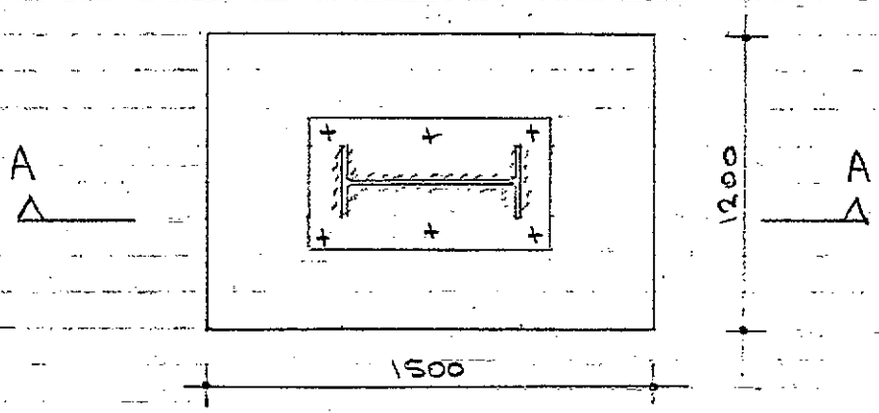
b) at d from column face.

$V = (200)(0.041)(1) = 8.2$ kN.

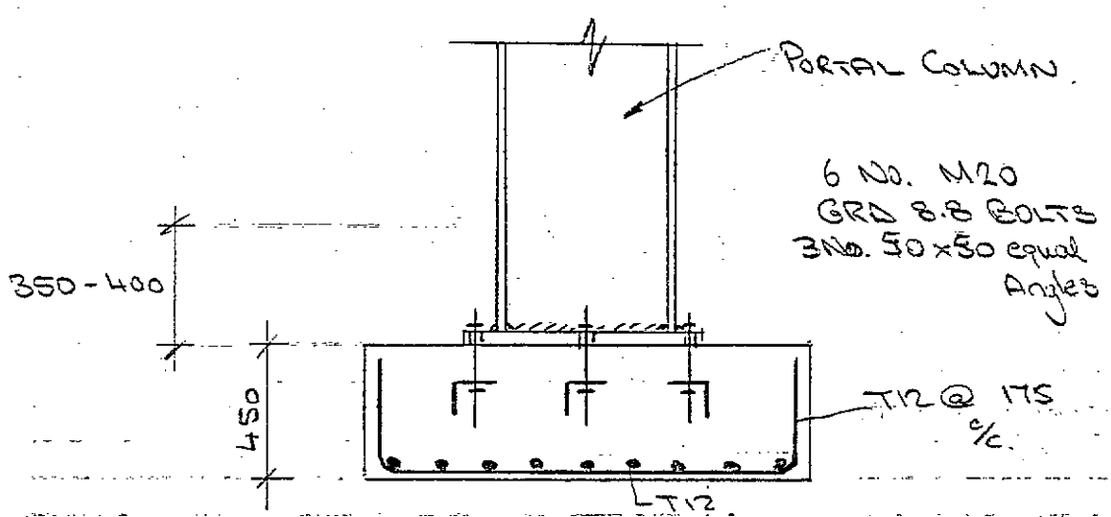
$\Rightarrow v = \frac{8.2 \times 10^3}{1000 \times 402} = 0.02$ N/mm²

By inspection,
adequate to resist shear.

Foundations - Detail For Portal Columns



PLAN



SECTION A-A.

2) Design of Strip Footings for Internal Partition 215 Block WALLS (Between Units).

LOADING :-

215 SOLID WALL = (0.215)(12)(21.6) = 56 kN/m.
(12m high approx)

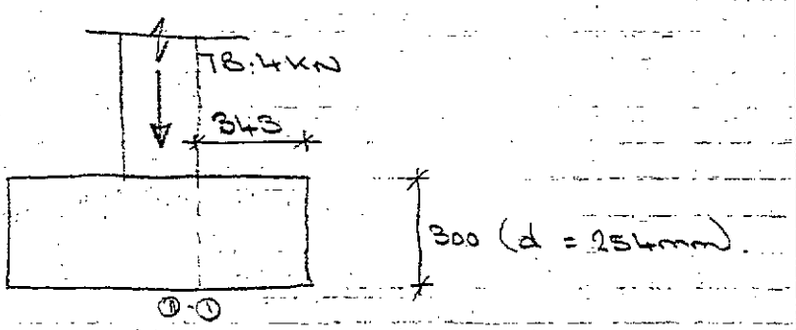
Design loading = 1.4(56)
= 78.4 kN/m.

Assume bearing pressure of
soil = 150 kN/m²

Assume wt of footing = 8 kN/m.

⇒ width of Footing Reqd = $\frac{78.4+8}{150}$ = 0.58m

say 900 mm.



Design Bearing = $\frac{78.4}{0.8}$ = 98 kN/m²

$M_{①-①}$ = 98(0.343)(0.343)/2 = 6.0 kNm.

$k = 0.003 < 0.156$

$\Rightarrow z = 0.95d = 241$ mm.

$A_{s\,req} = 63$ mm²/m.

$A_{s\,min} = \frac{0.13(1000)(300)}{100} = 390$ mm²/m.

$\Rightarrow$ use T12 @ 300 c/c in both directions.

T12 @ 300 c/c in both directions

By inspection, this strip is adequate in shear.

By inspection, the external wall strip is a 900mm wide strip, 300mm deep, reinforced with T12 @ 300 c/c in both directions.

3) Design of Strip Footing for 215 Block wall in offices.

LOADING.

G_k -

215 SOLID BLOCK WALL (4m high) - (4)(0.215)(21.6) = 19 kN/m.

Precast slab - (2.68)(6)(½) = 8 kN/m.

Services - (0.2)(6)(½) = 0.6 kN/m.

Q_k -

precast slab - (5)(6/2) = 15 kN/m.

⇒ Total load = 42.6 kN/m.

As the internal Partitions, footing of 900 mm wide x 300 mm deep is adequate here.

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CALCULATION SHEET

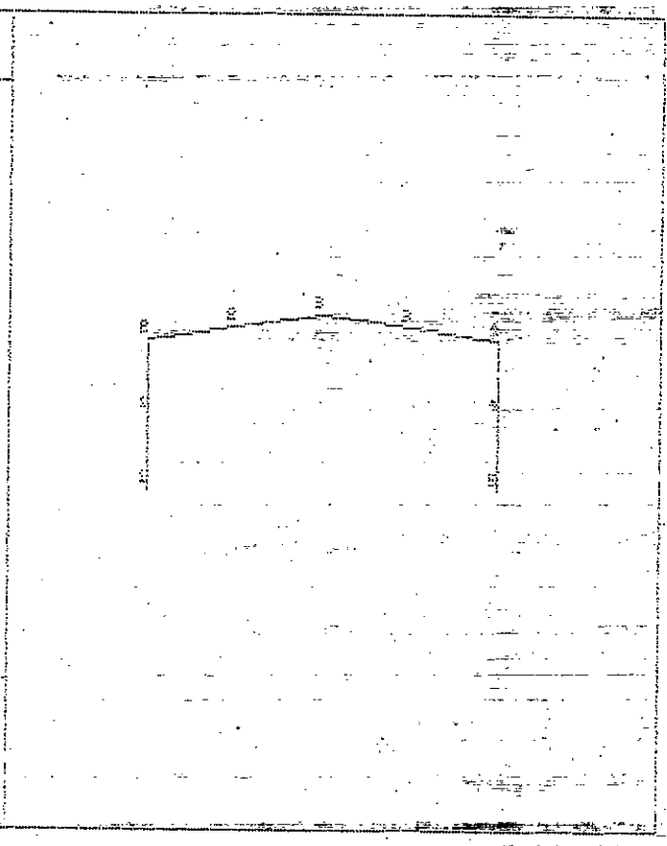
JOB:-

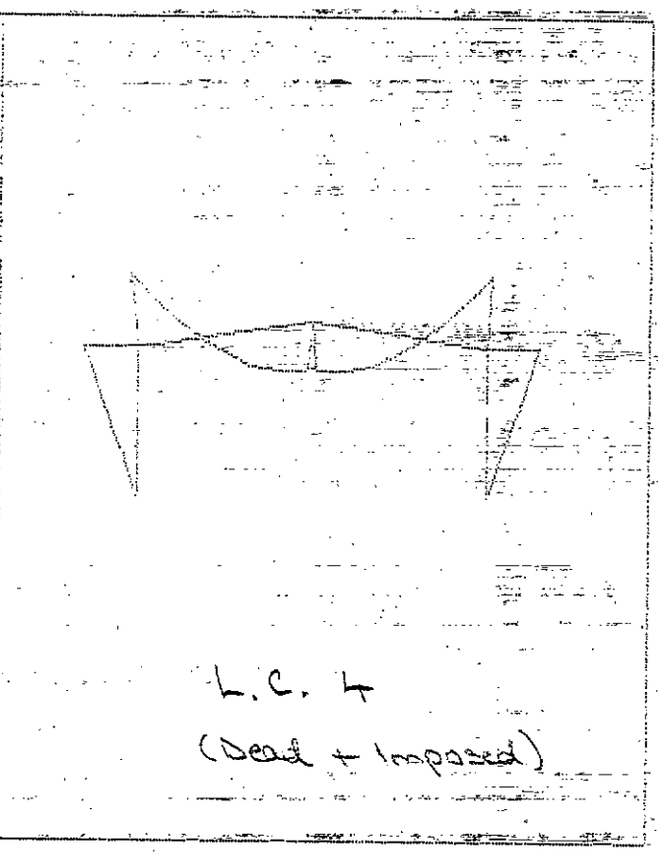
Designed	Checked	Date	

SHEET NO.

APPENDIX A

FRAME TYPE 1.



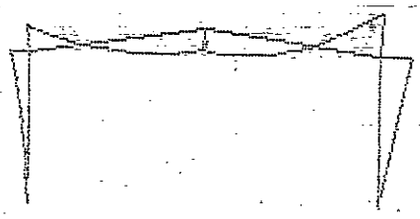


L.C. 4

(Dead + Imposed)

STAADPL

For HELP



L.C. 5

(Dead + Wind)

Y

Z X

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*****************************************************
*                                                   *
*           S T A A D - III                         *
*          REVISION 11.0c (VERSION II LEVEL 0)      *
*          PROPRIETARY PROGRAM OF                   *
*          RESEARCH ENGINEERS, INC.                 *
*          DATE=    MAR  5, 1991                    *
*          TIME=    17:14: 2                        *
*                                                   *
*****************************************************
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```
STAAD PLANE
UNIT METER KNS
JOINT COORDINATES
    1      .000      .000      .000
    2      .000     9.150      .000
    3    15.000    10.727      .000
    4    30.000     9.150      .000
    5    30.000      .000      .000
MEMBER INCIDENCES
    1    1    2
    2    2    3
    3    3    4
    4    4    5
UNIT CM KNS
MEMBER PROPERTIES
1 4 PRISMATIC AX 227.9 IZ 151681
2 3 PRISMATIC AX 159.6 IZ 98579
SUPPORTS
1 5 PINNED
CONSTANTS
E 21000 ALL
UNIT METER KNS
LOAD 1 (DEAD)
MEMBER LOAD
2 3 UNI GY -6
LOAD 2 (IMPOSED)
MEMBER LOAD
2 3 UNI GY -5.63
LOAD 3 (WIND)
MEMBER LOAD
1 UNI GX 2.7 0.3
1 UNI GX 3.2 3 5
1 UNI GX 4.1 5 9.15
2 UNI GY 2.7
3 UNI GY 0.41
4 UNI GX -0.2
LOAD COMBINATION 4 DEAD + IMPOSED
1 1 2 1
LOAD COMBINATION 5 DEAD + WIND
1 1 3 1
PERFORM ANALYSIS
++ PROCESSING MEMBER/ELEMENT INFORMATION.

++ PERFORMING BAND-WIDTH REDUCTION.
```

ORIGINAL BAND-WIDTH = 1
REDUCED BAND-WIDTH = 1

+ CHECKING LOAD DATA.
+ PROCESSING SUPPORT CONDITION.
+ PROCESSING AND SETTING UP LOAD VECTOR.

+ PROCESSING ELEMENT STIFFNESS MATRIX. 17:14:15
+ PROCESSING GLOBAL STIFFNESS MATRIX. 17:14:15
+ PROCESSING TRIANGULAR FACTORIZATION. 17:14:16
+ CALCULATING JOINT DISPLACEMENTS. 17:14:16
+ CALCULATING ELEMENT FORCES. 17:14:17

42. PRINT ANALYSIS RESULTS.

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	1	.00000	.00000	.00000	.00000	.00000	.00269
	2	.00000	.00000	.00000	.00000	.00000	-.00252
	3	.00000	.00000	.00000	.00000	.00000	-.00337
	4	.00000	.00000	.00000	.00000	.00000	.00521
	5	.00000	.00000	.00000	.00000	.00000	-.00068
2	1	-.78647	-.01730	.00000	.00000	.00000	-.00279
	2	-.73797	-.01623	.00000	.00000	.00000	-.00262
	3	1.99137	.00709	.00000	.00000	.00000	-.00012
	4	-1.52444	-.03354	.00000	.00000	.00000	-.00541
	5	1.20490	-.01021	.00000	.00000	.00000	-.00291
	1	.00000	-7.69670	.00000	.00000	.00000	.00000
	2	.00000	-7.22207	.00000	.00000	.00000	.00000
	3	1.75599	2.26277	.00000	.00000	.00000	.00012
	4	-.00000	-14.91876	.00000	.00000	.00000	.00000
	5	1.75598	-5.43393	.00000	.00000	.00000	.00012
4	1	.78647	-.01730	.00000	.00000	-.00000	.00279
	2	.73797	-.01623	.00000	.00000	.00000	.00262
	3	1.51958	.00188	.00000	.00000	.00000	-.00193
	4	1.52443	-.03354	.00000	.00000	.00000	.00541
	5	2.30605	-.01542	.00000	.00000	.00000	.00084
	1	.00000	.00000	.00000	.00000	.00000	-.00269
	2	.00000	.00000	.00000	.00000	.00000	-.00252
	3	.00000	.00000	.00000	.00000	.00000	-.00151
	4	.00000	.00000	.00000	.00000	.00000	-.00521
	5	.00000	.00000	.00000	.00000	.00000	-.00419

SUPPORT REACTIONS -UNIT KNS METE STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
	1	41.67	-90.50	.00	.00	.00	.00
	2	39.10	84.92	.00	.00	.00	.00
	3	-39.67	-37.08	.00	.00	.00	.00
	4	80.77	175.41	.00	.00	.00	.00
	5	8.00	53.42	.00	.00	.00	.00
	1	-41.67	90.50	.00	.00	.00	.00
	2	-39.10	84.92	.00	.00	.00	.00
	3	3.99	-9.83	.00	.00	.00	.00
	4	-80.77	175.41	.00	.00	.00	.00
	5	-37.68	80.67	.00	.00	.00	.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KNS METE

MB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	1	1	90.50	-41.67	.00	.00	.00	.00
		2	-90.50	41.67	.00	.00	.00	-381.29
	2	1	84.92	-39.10	.00	.00	.00	.00
		2	-84.92	39.10	.00	.00	.00	-357.78
	3	1	-37.08	33.67	.00	.00	.00	.00
		2	37.08	-2.16	.00	.00	.00	177.87
	4	1	175.41	-80.77	.00	.00	.00	.00
		2	-175.41	80.77	.00	.00	.00	-739.07
	5	1	53.42	-8.00	.00	.00	.00	.00
		2	-53.42	39.51	.00	.00	.00	-203.42
2	1	2	50.90	85.64	.00	.00	.00	381.29
		3	-41.44	4.36	.00	.00	.00	231.71
	2	2	47.77	80.36	.00	.00	.00	357.78
		3	-38.89	4.09	.00	.00	.00	217.42
	3	2	-6.02	-36.65	.00	.00	.00	-177.87
		3	1.76	-3.85	.00	.00	.00	-49.51
	4	2	98.67	166.00	.00	.00	.00	739.07
		3	-80.33	8.45	.00	.00	.00	449.14
	5	2	44.88	48.99	.00	.00	.00	203.42
		3	-39.68	.51	.00	.00	.00	162.20
3	1	3	41.44	4.36	.00	.00	.00	-231.71
		4	-50.90	85.64	.00	.00	.00	-381.29
	2	3	38.89	4.09	.00	.00	.00	-217.42
		4	-47.77	80.36	.00	.00	.00	-357.78
	3	3	-2.53	-3.40	.00	.00	.00	69.51
		4	3.17	-9.55	.00	.00	.00	28.11
	4	3	80.33	-8.45	.00	.00	.00	-449.14
		4	-98.67	164.00	.00	.00	.00	-739.07
	5	3	38.92	-7.75	.00	.00	.00	-162.20
		4	-47.73	76.10	.00	.00	.00	-353.18
4	1	4	90.50	41.67	.00	.00	.00	381.29
		5	-90.50	-41.67	.00	.00	.00	.00
	2	4	84.92	39.10	.00	.00	.00	357.78
		5	-84.92	-39.10	.00	.00	.00	.00
	3	4	-9.83	-2.16	.00	.00	.00	-28.11
		5	9.83	5.99	.00	.00	.00	.00
	4	4	175.41	80.77	.00	.00	.00	739.07
		5	-175.41	-80.77	.00	.00	.00	.00
	5	4	80.67	39.51	.00	.00	.00	353.18
		5	-80.67	-57.68	.00	.00	.00	.00

********** END OF LATEST ANALYSIS RESULT **********

4. SECTION 0 0.25 0.5 0.75 1 MEMB 1 2 3 4

STAAD PLANE -- PAGE NO. 5

44. PRINT SECTION FORCES

MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE -- KNS METE

MB	LOAD	SEC	SHEAR-Y	SHEAR-Z	MOM-Y	MOM-Z
1	1	.25	-41.67	.00	.00	95.32
		.50	-41.67	.00	.00	190.65
		.75	-41.67	.00	.00	285.97
	2	.25	-39.10	.00	.00	89.44
		.50	-39.10	.00	.00	178.89
		.75	-39.10	.00	.00	268.33
	3	.25	27.50	.00	.00	-67.96
		.50	20.53	.00	.00	-125.17
		.75	11.54	.00	.00	-162.21
	4	.25	-80.77	.00	.00	184.77
		.50	-80.77	.00	.00	369.54
		.75	-80.77	.00	.00	554.30
	5	.25	-14.18	.00	.00	85.34
		.50	-21.14	.00	.00	63.47
		.75	-30.14	.00	.00	123.76
2	1	.25	63.14	.00	.00	-100.78
		.50	40.64	.00	.00	-94.89
		.75	18.14	.00	.00	-205.72
	2	.25	59.25	.00	.00	94.57
		.50	38.14	.00	.00	-89.04
		.75	17.02	.00	.00	-193.04
	3	.25	-24.53	.00	.00	-58.76
		.50	-16.40	.00	.00	22.17
		.75	-6.28	.00	.00	54.93
	4	.25	122.39	.00	.00	195.35
		.50	78.78	.00	.00	-183.93
		.75	35.17	.00	.00	-398.76
	5	.25	36.62	.00	.00	42.02
		.50	24.24	.00	.00	-72.72
		.75	11.87	.00	.00	-140.79
3	1	.25	-18.14	.00	.00	-205.72
		.50	-40.64	.00	.00	-94.89
		.75	-63.14	.00	.00	100.78
	2	.25	-17.02	.00	.00	-193.03
		.50	-38.14	.00	.00	-89.04
		.75	-59.25	.00	.00	94.57
	3	.25	4.93	.00	.00	-53.80
		.50	6.47	.00	.00	32.29
		.75	8.01	.00	.00	4.99
	4	.25	-35.17	.00	.00	-398.76
		.50	-78.78	.00	.00	-183.93
		.75	-122.39	.00	.00	195.35
	5	.25	-13.21	.00	.00	-151.92
		.50	-34.17	.00	.00	-62.60
		.75	-55.13	.00	.00	105.77

MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE -- KNS METE

MB	LOAD	SEC	SHEAR-Y	SHEAR-Z	MOM-Y	MOM-Z
4	1	.25	41.67	.00	.00	285.97
		.50	41.67	.00	.00	190.65
		.75	41.67	.00	.00	95.32
	2	.25	39.10	.00	.00	268.33
		.50	39.10	.00	.00	178.89
		.75	39.10	.00	.00	89.44
	3	.25	-2.61	.00	.00	-22.65
		.50	-3.07	.00	.00	-16.15
		.75	-8.53	.00	.00	-8.60
	4	.25	80.77	.00	.00	554.30
		.50	80.77	.00	.00	369.54
		.75	80.77	.00	.00	184.77
	5	.25	39.06	.00	.00	263.82
		.50	38.60	.00	.00	174.50
		.75	38.14	.00	.00	86.73

********** END OF LATEST ANALYSIS RESULT **********

45. PLOT DISPLACEMENT FILE
46. PLOT BENDING FILE
47. FINISH

********** END OF STAAD-III **********

****** DATE= MAR 5,1991 TIME= 17:14:29 ******

HORGAN LYNCH & PARTNERS
CONSULTING ENGINEERS
CALCULATION SHEET

JOB:-

Designed	Checked	Date	

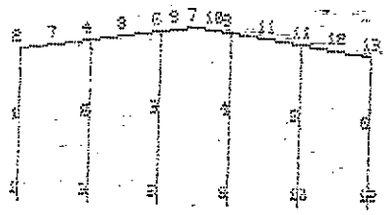
SHEET NO.

APPENDIX B

FRAME TYPE 2

STAADPL

for HELP

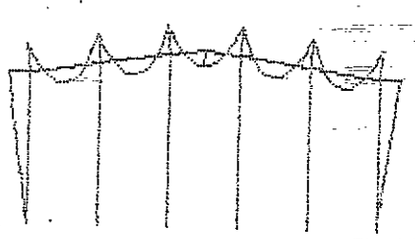


Y

Z X

STAADPL

for HELP



L.C. 4

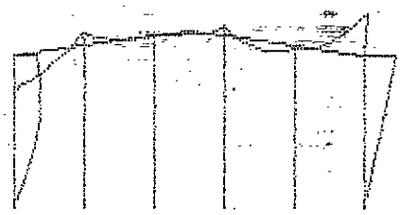
(Dead and Imposed)

Y

Z X

STAADPL

for HELP



L.C 5

Dead and Wind.

Y

Z X


```
*************************************************
*                                               *
*           S T A A D - III                     *
*           REVISION 11.0c(VERSION 11 LEVEL 0)  *
*           PROPRIETARY PROGRAM OF              *
*           RESEARCH ENGINEERS,INC.             *
*           DATE=    MAR  5, 1991               *
*           TIME=    22:29:43                   *
*                                               *
*************************************************
```

```
 1. STAAD PLANE
 2. UNIT METER KNS
 3. JOINT COORDINATES
 4.     1        .000      .000      .000
 5.     2        .000     9.150      .000
 6.     3       6.000      .000      .000
 7.     4       6.000     9.781      .000
 8.     5      12.000      .000      .000
 9.     6      12.000    10.411      .000
10.     7      15.000    10.727      .000
11.     8      18.000      .000      .000
12.     9      18.000    10.411      .000
13.    10      24.000      .000      .000
14.    11      24.000     9.781      .000
15.    12      30.000      .000      .000
16.    13      30.000     9.150      .000
17. MEMBER INCIDENCES
18.     1     1     2
19.     2     3     4
20.     3     5     6
21.     4     8     9
22.     5    10    11
```

```
23.      6    12    13
24.      7     2     4
25.      8     4     6
26.      9     6     7
27.     10     7     9
28.     11     9    11
29.     12    11    13
30. UNIT CM KNS
31. MEMBER PROPERTIES
32. 1 6 PRISMATIC AX 227.9 IZ 151631
33. 2 3 4 5 PRISMATIC AX 40.0 IZ 449
34. 7 8 9 10 11 12 PRISMATIC AX 40.0 IZ 4439
35. MEMBER RELEASES
36. 2 3 4 5 END MZ
37. SUPPORTS
38. 1 3 5 8 10 12 PINNED
39. CONSTANTS
40. E 21000 ALL
41. UNIT METER KNS
42. LOAD 1 (DEAD)
43. MEMBER LOAD
44. 7 8 9 10 11 12 UNI GY -3
45. LOAD 2 (IMPOSED)
46. MEMBER LOAD
47. 7 8 9 10 11 12 UNI GY -2.81
48. LOAD 3 (WIND)
```



```
49. MEMBER LOAD
50. 1 UNI GX 1.35 0 3
51. 1 UNI GX 1.6 3.5
52. 1 UNI GX 2.1 5 9.15
```

53. 7 8 9 UNI GY 1.35
54. 10 11 12 UNI GY 0.205
55. LOAD COMBINATION 4 DEAD + IMPOSED
56. 1 1 2.1
57. LOAD COMBINATION 5 DEAD + WIND
58. 1 1.3 1
59. PERFORM ANALYSIS

++ PROCESSING MEMBER/ELEMENT INFORMATION.

++ PERFORMING BAND-WIDTH REDUCTION.

ORIGINAL BAND-WIDTH = 2
REDUCED BAND-WIDTH = 2

++ CHECKING LOAD DATA.
++ PROCESSING SUPPORT CONDITION.
++ PROCESSING AND SETTING UP LOAD VECTOR.

++ PROCESSING ELEMENT STIFFNESS MATRIX. 22:29:59
++ PROCESSING GLOBAL STIFFNESS MATRIX. 22:30: 0
++ PROCESSING TRIANGULAR FACTORIZATION. 22:30: 1
++ CALCULATING JOINT DISPLACEMENTS. 22:30: 1
++ CALCULATING ELEMENT FORCES. 22:30: 2

60. PRINT ANALYSIS RESULTS

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	1	.00000	.00000	.00000	.00000	.00000	.00005
	2	.00000	.00000	.00000	.00000	.00000	.00005
	3	.00000	.00000	.00000	.00000	.00000	-.00809
	4	.00000	.00000	.00000	.00000	.00000	-.00011
	5	.00000	.00000	.00000	.00000	.00000	-.00803
2	1	-.01125	-.00174	.00000	.00000	.00000	-.00007
	2	-.01054	-.00163	.00000	.00000	.00000	-.00007
	3	7.05900	-.00224	.00000	.00000	.00000	-.00713
	4	-.02179	-.00338	.00000	.00000	.00000	-.00014
	5	7.04775	.00049	.00000	.00000	.00000	-.00720
3	1	.00000	.00000	.00000	.00000	.00000	.00001
	2	.00000	.00000	.00000	.00000	.00000	.00001
	3	.00000	.00000	.00000	.00000	.00000	-.00722
	4	.00000	.00000	.00000	.00000	.00000	.00002
	5	.00000	.00000	.00000	.00000	.00000	-.00720
4	1	-.00991	-.02113	.00000	.00000	.00000	-.00001
	2	-.00928	-.01979	.00000	.00000	.00000	-.00001
	3	7.05707	-.00255	.00000	.00000	.00000	.00189
	4	-.01920	-.04092	.00000	.00000	.00000	-.00002
	5	7.04716	-.02368	.00000	.00000	.00000	-.00188
5	1	.00000	.00000	.00000	.00000	.00000	.00001
	2	.00000	.00000	.00000	.00000	.00000	.00001
	3	.00000	.00000	.00000	.00000	.00000	-.00677
	4	.00000	.00000	.00000	.00000	.00000	.00002
	5	.00000	.00000	.00000	.00000	.00000	-.00676
6	1	-.01050	-.02229	.00000	.00000	.00000	.00002
	2	-.00983	-.02088	.00000	.00000	.00000	.00002
	3	7.05209	.01428	.00000	.00000	.00000	-.00037
	4	-.02033	-.04316	.00000	.00000	.00000	.00004
	5	7.04160	-.00800	.00000	.00000	.00000	-.00035
7	1	.00000	-.12689	.00000	.00000	.00000	.00000
	2	.00000	-.11885	.00000	.00000	.00000	.00000
	3	7.04605	.05831	.00000	.00000	.00000	.00015
	4	.00001	-.24573	.00000	.00000	.00000	.00000
	5	7.04606	-.06857	.00000	.00000	.00000	.00015
8	1	.00000	.00000	.00000	.00000	.00000	-.00001
	2	.00000	.00000	.00000	.00000	.00000	-.00001
	3	.00000	.00000	.00000	.00000	.00000	.00676
	4	.00000	.00000	.00000	.00000	.00000	-.00002
	5	.00000	.00000	.00000	.00000	.00000	-.00677
9	1	.01050	-.02229	.00000	.00000	.00000	-.00002
	2	.00984	-.02088	.00000	.00000	.00000	-.00002
	3	7.03825	-.00139	.00000	.00000	.00000	-.00054
	4	.02034	-.04316	.00000	.00000	.00000	-.00004
	5	7.04875	-.02368	.00000	.00000	.00000	-.00056
10	1	.00000	.00000	.00000	.00000	.00000	-.00001
	2	.00000	.00000	.00000	.00000	.00000	-.00001
	3	.00000	.00000	.00000	.00000	.00000	-.00719

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	4	.00000	.00000	.00000	.00000	.00000	-.00002
	5	.00000	-.00000	.00000	.00000	.00000	-.00720
11	1	.00992	-.02113	.00000	.00000	.00000	.00001
	2	.00929	-.01979	.00000	.00000	.00000	.00001
	3	7.03693	.01345	.00000	.00000	.00000	.00196
	4	.01921	-.04092	.00000	.00000	.00000	.00002
	5	7.04685	-.00767	.00000	.00000	.00000	.00198
12	1	.00000	.00000	.00000	.00000	.00000	-.00005
	2	.00000	.00000	.00000	.00000	.00000	-.00005
	3	.00000	-.00000	.00000	.00000	.00000	-.00787
	4	.00000	-.00000	.00000	-.00000	.00000	-.00011
	5	.00000	-.00000	.00000	-.00000	.00000	-.00792
13	1	.01126	-.00174	.00000	.00000	.00000	.00007
	2	.01054	-.00163	.00000	.00000	.00000	.00007
	3	7.03169	-.00153	.00000	.00000	.00000	-.00732
	4	.02180	-.00338	.00000	.00000	.00000	.00014
	5	7.04295	-.00328	.00000	.00000	.00000	-.00725

SUPPORT REACTIONS. -UNIT KNS METE STRUCTURE TYPE = PLANE

MEMBER	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	1	.97	9.12	.00	.00	.00	.00
	2	.91	8.54	.00	.00	.00	.00
	3	-11.78	-11.70	.00	.00	.00	.00
	4	1.88	17.66	.00	.00	.00	.00
	5	-10.81	-2.58	.00	.00	.00	.00
3	1	.00	18.15	.00	.00	.00	.00
	2	.00	17.00	.00	.00	.00	.00
	3	.00	-2.19	.00	.00	.00	.00
	4	.00	35.14	.00	.00	.00	.00
	5	.00	20.34	.00	.00	.00	.00
5	1	.00	17.98	.00	.00	.00	.00
	2	.00	16.84	.00	.00	.00	.00
	3	.00	-11.52	.00	.00	.00	.00
	4	.00	34.82	.00	.00	.00	.00
	5	.00	6.46	.00	.00	.00	.00
8	1	.00	17.98	.00	.00	.00	.00
	2	.00	16.84	.00	.00	.00	.00
	3	.00	-1.13	.00	.00	.00	.00
	4	.00	34.82	.00	.00	.00	.00
	5	.00	19.11	.00	.00	.00	.00
10	1	.00	18.15	.00	.00	.00	.00
	2	.00	17.00	.00	.00	.00	.00
	3	.00	-11.56	.00	.00	.00	.00
	4	.00	35.14	.00	.00	.00	.00
	5	.00	6.59	.00	.00	.00	.00
12	1	-.97	9.12	.00	.00	.00	.00
	2	-.91	8.54	.00	.00	.00	.00
	3	-4.19	8.02	.00	.00	.00	.00
	4	-1.88	17.66	.00	.00	.00	.00
	5	-5.15	17.14	.00	.00	.00	.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KNS METE

MB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	1	1	9.12	-.97	.00	.00	.00	.00
		2	-9.12	.97	.00	.00	.00	-3.85
	2	1	8.54	-.91	.00	.00	.00	.00
		2	-8.54	.91	.00	.00	.00	-8.30
	3	1	-11.70	11.78	.00	.00	.00	.00
		2	11.70	4.19	.00	.00	.00	42.29
	4	1	17.66	-1.88	.00	.00	.00	.00
		2	-17.66	1.88	.00	.00	.00	-17.16
	5	1	-2.58	10.81	.00	.00	.00	.00
		2	2.58	5.15	.00	.00	.00	33.37
2	1	3	18.15	.00	.00	.00	.00	.00
		4	-18.15	.00	.00	.00	.00	.00
	2	3	17.00	.00	.00	.00	.00	.00
		4	-17.00	.00	.00	.00	.00	.00
	3	3	2.19	.00	.00	.00	.00	.00
		4	-2.19	.00	.00	.00	.00	.00
	4	3	35.14	.00	.00	.00	.00	.00
		4	-35.14	.00	.00	.00	.00	.00
	5	3	20.34	.00	.00	.00	.00	.00
		4	-20.34	.00	.00	.00	.00	.00
3	1	5	17.98	.00	.00	.00	.00	.00
		6	-17.98	.00	.00	.00	.00	.00
	2	5	16.84	.00	.00	.00	.00	.00
		6	-16.84	.00	.00	.00	.00	.00
	3	5	-11.52	.00	.00	.00	.00	.00
		6	11.52	.00	.00	.00	.00	.00
	4	5	34.82	.00	.00	.00	.00	.00
		6	-34.82	.00	.00	.00	.00	.00
	5	5	6.46	.00	.00	.00	.00	.00
		6	-6.46	.00	.00	.00	.00	.00
4	1	8	17.98	.00	.00	.00	.00	.00
		9	-17.98	.00	.00	.00	.00	.00
	2	8	16.84	.00	.00	.00	.00	.00
		9	-16.84	.00	.00	.00	.00	.00
	3	8	1.13	.00	.00	.00	.00	.00
		9	-1.13	.00	.00	.00	.00	.00
	4	8	34.82	.00	.00	.00	.00	.00
		9	-34.82	.00	.00	.00	.00	.00
	5	8	19.11	.00	.00	.00	.00	.00
		9	-19.11	.00	.00	.00	.00	.00
5	1	10	18.15	.00	.00	.00	.00	.00
		11	-18.15	.00	.00	.00	.00	.00
	2	10	17.00	.00	.00	.00	.00	.00
		11	-17.00	.00	.00	.00	.00	.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

M	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	3	10	-11.56	.00	.00	.00	.00	.00
		11	11.56	.00	.00	.00	.00	.00
	4	10	35.14	.00	.00	.00	.00	.00
		11	-35.14	.00	.00	.00	.00	.00
	5	10	6.59	.00	.00	.00	.00	.00
		11	-6.59	.00	.00	.00	.00	.00
6	1	12	-9.12	.97	.00	.00	.00	.00
		13	-9.12	-.97	.00	.00	.00	8.86
	2	12	-8.54	.91	.00	.00	.00	.00
		13	-8.54	-.91	.00	.00	.00	8.30
	3	12	-8.02	4.19	.00	.00	.00	.00
		13	-8.02	-4.19	.00	.00	.00	38.31
	4	12	-17.66	1.88	.00	.00	.00	.00
		13	-17.66	-1.88	.00	.00	.00	17.16
	5	12	17.14	5.15	.00	.00	.00	.00
		13	-17.14	-5.15	.00	.00	.00	-47.17
7	1	8	1.92	8.97	.00	.00	.00	8.86
		4	-.02	9.03	.00	.00	.00	-9.05
	2	2	1.80	8.40	.00	.00	.00	8.30
		4	-.02	8.46	.00	.00	.00	-8.48
	3	2	2.94	-12.08	.00	.00	.00	-42.23
		4	-3.79	3.98	.00	.00	.00	-6.21
	4	2	8.71	17.39	.00	.00	.00	17.16
		4	-.05	17.49	.00	.00	.00	-17.58
	5	2	4.86	-3.11	.00	.00	.00	-33.37
		4	-3.81	13.01	.00	.00	.00	-15.26
8	1	4	1.92	9.02	.00	.00	.00	9.05
		6	-.03	8.98	.00	.00	.00	-8.95
	2	4	1.80	8.44	.00	.00	.00	8.48
		6	-.03	8.42	.00	.00	.00	-8.39
	3	4	4.02	-1.80	.00	.00	.00	6.21
		6	-4.87	-6.30	.00	.00	.00	7.37
	4	4	3.72	17.46	.00	.00	.00	17.53
		6	-.06	17.40	.00	.00	.00	-17.34
	5	4	5.94	7.22	.00	.00	.00	15.26
		6	-4.90	2.68	.00	.00	.00	-1.59
9	1	6	1.91	8.90	.00	.00	.00	8.95
		7	-.96	.10	.00	.00	.00	4.31
	2	6	1.79	8.33	.00	.00	.00	8.39
		7	-.90	.10	.00	.00	.00	4.04
	3	6	3.67	-5.16	.00	.00	.00	-7.37
		7	-4.09	1.11	.00	.00	.00	-2.10
	4	6	3.70	17.23	.00	.00	.00	17.34
		7	-1.87	.20	.00	.00	.00	8.36
	5	6	-5.58	3.74	.00	.00	.00	1.59
		7	-5.06	1.21	.00	.00	.00	2.22

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
10	1	7	.96	.10	.00	.00	.00	-4.31
		9	-1.91	8.90	.00	.00	.00	-8.95
	2	7	.90	.10	.00	.00	.00	-4.04
		9	-1.79	8.63	.00	.00	.00	-8.39
	3	7	4.23	-.24	.00	.00	.00	2.10
		9	-4.17	-.88	.00	.00	.00	-1.88
	4	7	1.87	.20	.00	.00	.00	-8.38
		9	-3.70	17.23	.00	.00	.00	-17.34
	5	7	5.20	-.13	.00	.00	.00	-2.22
		9	-6.08	8.52	.00	.00	.00	-10.84
11	1	9	.03	8.98	.00	.00	.00	8.95
		11	-1.92	9.02	.00	.00	.00	-9.05
	2	9	.03	8.42	.00	.00	.00	8.39
		11	-1.80	8.44	.00	.00	.00	-8.48
	3	9	4.05	1.50	.00	.00	.00	1.88
		11	-3.92	-2.73	.00	.00	.00	10.86
	4	9	.06	17.40	.00	.00	.00	17.34
		11	-3.72	17.46	.00	.00	.00	-17.59
	5	9	4.08	10.48	.00	.00	.00	10.84
		11	-5.84	6.29	.00	.00	.00	1.81
12	1	11	.02	9.03	.00	.00	.00	9.05
		13	-1.92	8.97	.00	.00	.00	-8.86
	2	11	.02	8.46	.00	.00	.00	8.48
		13	-1.80	8.40	.00	.00	.00	-8.30
	3	11	5.13	-8.76	.00	.00	.00	-10.86
		13	-5.00	7.53	.00	.00	.00	-88.31
	4	11	.05	17.49	.00	.00	.00	17.53
		13	-3.71	17.37	.00	.00	.00	-17.16
	5	11	5.16	.27	.00	.00	.00	-1.81
		13	-6.92	16.50	.00	.00	.00	-47.17

********** END OF LATEST ANALYSIS RESULT **********

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61. SECTION 0 0.25 0.5 0.75 1 MEMB 1 TO 12
62. PRINT SECTION FORCES
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MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE -- KNS METE

MB	LOAD	SEC	SHEAR-Y	SHEAR-Z	MOM-Y	MOM-Z
1	1	.25	-.97	.00	.00	2.26
		.50	-.97	.00	.00	4.43
		.75	-.97	.00	.00	6.65
	2	.25	-.91	.00	.00	2.08
		.50	-.91	.00	.00	4.15
		.75	-.91	.00	.00	6.23
	3	.25	8.69	.00	.00	-23.41
		.50	5.21	.00	.00	-39.45
		.75	.62	.00	.00	-46.31
	4	.25	-1.88	.00	.00	4.29
		.50	-1.88	.00	.00	8.58
		.75	-1.88	.00	.00	12.87
	5	.25	7.72	.00	.00	-21.20
		.50	4.24	.00	.00	-35.02
		.75	-.35	.00	.00	-39.66
2	1	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	2	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	3	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	4	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	5	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
3	1	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	2	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	3	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	4	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	5	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00

MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE -- KNS METE

MB	LOAD	SEC	SHEAR-Y	SHEAR-Z	MOM-Y	MOM-Z
4	1	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	2	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	3	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	4	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	5	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
5	1	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	2	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	3	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	4	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
	5	.25	.00	.00	.00	.00
		.50	.00	.00	.00	.00
		.75	.00	.00	.00	.00
6	1	.25	.97	.00	.00	-2.22
		.50	.97	.00	.00	-4.43
		.75	.97	.00	.00	-6.65
	2	.25	.91	.00	.00	-2.08
		.50	.91	.00	.00	-4.15
		.75	.91	.00	.00	-6.23
	3	.25	4.19	.00	.00	-9.58
		.50	4.19	.00	.00	-18.15
		.75	4.19	.00	.00	-28.73
	4	.25	1.88	.00	.00	-4.29
		.50	1.88	.00	.00	-8.58
		.75	1.88	.00	.00	-12.87
	5	.25	5.15	.00	.00	-11.79
		.50	5.15	.00	.00	-23.58
		.75	5.15	.00	.00	-35.38

MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE -- KNS METE

MEMB	LOAD	SEC	SHEAR-Y	SHEAR-Z	MOM-Y	MOM-Z
7	1	.25	4.47	.00	.00	-1.27
		.50	-.03	.00	.00	-4.62
		.75	-4.53	.00	.00	-1.18
	2	.25	-4.19	.00	.00	-1.19
		.50	-.03	.00	.00	-4.33
		.75	-4.24	.00	.00	-1.10
	3	.25	-10.05	.00	.00	-25.54
		.50	58.03	.00	.00	-11.90
		.75	-6.00	.00	.00	-1.32
	4	.25	-8.65	.00	.00	-2.46
		.50	-.06	.00	.00	-8.94
		.75	-8.78	.00	.00	-2.28
	5	.25	-5.58	.00	.00	-26.81
		.50	-8.06	.00	.00	-16.52
		.75	-10.53	.00	.00	-2.50
8	1	.25	-4.52	.00	.00	-1.15
		.50	-.02	.00	.00	-4.57
		.75	-4.48	.00	.00	-1.20
	2	.25	4.23	.00	.00	-1.08
		.50	.01	.00	.00	-4.28
		.75	-4.20	.00	.00	-1.13
	3	.25	.22	.00	.00	-7.39
		.50	2.25	.00	.00	5.53
		.75	4.27	.00	.00	.61
	4	.25	8.75	.00	.00	-2.24
		.50	.03	.00	.00	-8.85
		.75	-8.68	.00	.00	-2.33
	5	.25	4.74	.00	.00	6.24
		.50	2.27	.00	.00	.96
		.75	-.21	.00	.00	-5.59
9	1	.25	6.65	.00	.00	3.09
		.50	4.40	.00	.00	-1.07
		.75	2.15	.00	.00	-3.54
	2	.25	6.23	.00	.00	2.90
		.50	4.12	.00	.00	-1.01
		.75	2.01	.00	.00	-3.32
	3	.25	4.15	.00	.00	-3.85
		.50	3.14	.00	.00	-1.11
		.75	2.13	.00	.00	.88
	4	.25	12.88	.00	.00	5.99
		.50	8.52	.00	.00	-2.08
		.75	4.16	.00	.00	-6.86
	5	.25	2.50	.00	.00	-.76
		.50	1.26	.00	.00	-2.18
		.75	.02	.00	.00	-2.66

MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE - KNS METE

MB	LOAD	SEC	SHEAR-Y	SHEAR-Z	MOM-Y	MOM-Z
	1	.25	-2.15	.00	.00	-3.54
		.50	-4.40	.00	.00	-1.07
		.75	-6.65	.00	.00	3.09
	2	.25	-2.01	.00	.00	-3.32
		.50	-4.12	.00	.00	-1.01
		.75	-6.23	.00	.00	2.90
	3	.25	.08	.00	.00	2.22
		.50	.07	.00	.00	2.28
		.75	.23	.00	.00	2.11
	4	.25	-4.16	.00	.00	-6.86
		.50	-8.52	.00	.00	-2.08
		.75	-12.88	.00	.00	5.99
	5	.25	-2.23	.00	.00	-1.32
		.50	-4.33	.00	.00	1.15
		.75	-6.42	.00	.00	5.20
1	1	.25	4.48	.00	.00	-1.20
		.50	-.02	.00	.00	-4.57
		.75	-4.52	.00	.00	-1.15
	2	.25	4.20	.00	.00	-1.13
		.50	-.01	.00	.00	-4.28
		.75	-4.23	.00	.00	-1.08
	3	.25	1.80	.00	.00	-.61
		.50	2.11	.00	.00	-3.56
		.75	2.42	.00	.00	-6.98
	4	.25	-8.68	.00	.00	-2.53
		.50	-.03	.00	.00	-8.85
		.75	-8.75	.00	.00	-2.24
	5	.25	6.29	.00	.00	-1.81
		.50	2.10	.00	.00	-8.13
		.75	-2.10	.00	.00	-8.13
2	1	.25	4.53	.00	.00	-1.18
		.50	.03	.00	.00	-4.32
		.75	-4.47	.00	.00	-1.27
	2	.25	4.24	.00	.00	-1.10
		.50	.03	.00	.00	-4.33
		.75	-4.19	.00	.00	-1.19
	3	.25	-8.46	.00	.00	2.13
		.50	-8.15	.00	.00	14.65
		.75	-7.84	.00	.00	26.71
	4	.25	-8.78	.00	.00	-2.28
		.50	-.06	.00	.00	-8.94
		.75	-8.65	.00	.00	-2.46
	5	.25	-3.93	.00	.00	.95
		.50	-8.12	.00	.00	10.03
		.75	-12.31	.00	.00	25.44

MEMBER FORCES AT INTERMEDIATE SECTIONS

ALL UNITS ARE -- KNS METE

EMB LOAD SEC SHEAR-Y SHEAR-Z MOM-Y MOM-Z

********** END OF LATEST ANACYSIS RESULT **********

63. PLOT DISPLACEMENT FILE
64. PLOT BENDING FILE
65. FINISH

********** END OF STAAD-III **********

****** DATE= MAR 5,1991 TIME= 22:30:23 ******

****
* CALL RESEARCH ENGINEERS(EUROPE) LTD ON 01-763-1393 *
* TELEX: 929181 FAX:01-763-1379 *
* 29 LANSDOWNE COURT, BRIGHTON ROAD, PURLEY,CR2 2BD UK *
****

HORGAN LYNCH & PARTNERS
CONSULTING ENGINEERS
CALCULATION SHEET

JOB:-

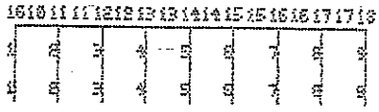
Designed	Checked	Date	

SHEET NO.

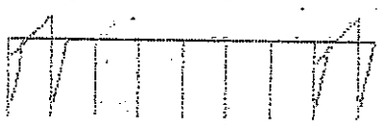
APPENDIX C.

WIND PORTAL

STAADPL



STAADPL



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    ****************************************************
    *                                                  *
    *              S T A A D - III                     *
    *              REVISION 11.0c(VERSION 11 LEVEL 0)  *
    *              PROPRIETARY PROGRAM OF              *
    *              RESEARCH ENGINEERS,INC.             *
    *              DATE=    MAR  5, 1991               *
    *              TIME=    22:20:49                   *
    *                                                  *
    ****************************************************

  1. STAAD PLANE
  2. UNIT METER KNS
  3. JOINT COORDINATES
  4.    1      .000      .000      .000
  5.    2     7.500      .000      .000
  6.    3    15.000      .000      .000
  7.    4    22.500      .000      .000
  8.    5    30.000      .000      .000
  9.    6    37.500      .000      .000
 10.    7    45.000      .000      .000
 11.    8    52.500      .000      .000
 12.    9    60.000      .000      .000
 13.   10      .000     9.150      .000
 14.   11     7.500     9.150      .000
 15.   12    15.000     9.150      .000
 16.   13    22.500     9.150      .000
 17.   14    30.000     9.150      .000
 18.   15    37.500     9.150      .000
 19.   16    45.000     9.150      .000
 20.   17    52.500     9.150      .000
 21.   18    60.000     9.150      .000
 22. MEMBER INCIDENCES
 23.    1    1   10
 24.    2    2   11
 25.    3    3   12
 26.    4    4   13
 27.    5    5   14
 28.    6    6   15
 29.    7    7   16
 30.    8    8   17
 31.    9    9   18
 32.   10   10   11
 33.   11   11   12
 34.   12   12   13
 35.   13   13   14
 36.   14   14   15
 37.   15   15   16
 38.   16   16   17
 39.   17   17   18
 40. UNIT CM KNS
 41. MEMBER PROPERTIES
 42. 1 TO 9 PRISMATIC AX 227.9 IZ 11412
 43. 10 TO 17 PRISMATIC AX 51.5 IZ 8523
 44. MEMBER RELEASES
 45. 3 4 5 6 7 END MZ
 46. 11 TO 16 START MZ
 47. 11 TO 16 END MZ
 48. SUPPORTS
```

```
49. 1 2 3 4 5 6 7 8 9 PINNED
50. CONSTANTS
51. E 21000 ALL
52. UNIT METER KNS
53. LOAD 1 (WIND)
54. MEMBER LOAD
55. 1 UNI GX 1.0 3
56. 1 UNI GX 1.3 3.5
57. 1 UNI GX 1.62.5 9.15
58. JOINT LOAD
59. 10 FX 31.78
60. PERFORM ANALYSIS
++ PROCESSING MEMBER/ELEMENT INFORMATION.

++ PERFORMING BAND-WIDTH REDUCTION.

   ORIGINAL BAND-WIDTH =  9
   REDUCED  BAND-WIDTH =  2


++ CHECKING LOAD DATA.
++ PROCESSING SUPPORT CONDITION.
++ PROCESSING AND SETTING UP LOAD VECTOR.

++ PROCESSING ELEMENT STIFFNESS MATRIX.          22:24:  1
++ PROCESSING GLOBAL STIFFNESS MATRIX.           22:24:  2
++ PROCESSING TRIANGULAR FACTORIZATION.          22:24:  3
++ CALCULATING JOINT DISPLACEMENTS.              22:24:  3
++ CALCULATING ELEMENT FORCES.                   22:24:  4

1. PRINT ANALYSIS RESULTS
```

JOINT DISPLACEMENT (CM RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	1	.00000	.00000	.00000	.00000	.00000	-.02503
2	1	.00000	.00000	.00000	.00000	.00000	-.02359
3	1	.00000	.00000	.00000	.00000	.00000	-.01791
4	1	.00000	.00000	.00000	.00000	.00000	-.01790
5	1	.00000	.00000	.00000	.00000	.00000	-.01788
6	1	.00000	.00000	.00000	.00000	.00000	-.01787
7	1	.00000	.00000	.00000	.00000	.00000	-.01785
8	1	.00000	.00000	.00000	.00000	.00000	-.02359
9	1	.00000	.00000	.00000	.00000	.00000	-.02358
10	1	16.42210	.00440	.00000	.00000	.00000	-.00546
11	1	16.40165	-.00440	.00000	.00000	.00000	-.00660
12	1	16.38795	.00000	.00000	.00000	.00000	.00000
13	1	16.37425	.00000	.00000	.00000	.00000	.00000
14	1	16.36054	.00000	.00000	.00000	.00000	.00000
15	1	16.34684	.00000	.00000	.00000	.00000	.00000
16	1	16.33313	.00000	.00000	.00000	.00000	.00000
17	1	16.31943	-.00461	.00000	.00000	.00000	-.00633
18	1	16.31258	-.00461	.00000	.00000	.00000	-.00632

SUPPORT REACTIONS -UNIT KNS METE STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	1	-14.62	-22.99	.00	.00	.00	.00
2	1	-9.72	22.99	.00	.00	.00	.00
3	1	.00	.00	.00	.00	.00	.00
4	1	.00	.00	.00	.00	.00	.00
5	1	.00	.00	.00	.00	.00	.00
6	1	.00	.00	.00	.00	.00	.00
7	1	.00	.00	.00	.00	.00	.00
8	1	-9.88	-24.11	.00	.00	.00	.00
9	1	-9.88	24.11	.00	.00	.00	.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE - KNS METE

ITEMS	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	1	1	-22.99	14.62	.00	.00	.00	.00
		10	22.99	-2.30	.00	.00	.00	83.49
	1	2	22.99	9.72	.00	.00	.00	.00
		11	-22.99	-9.72	.00	.00	.00	-88.95
	1	3	.00	.00	.00	.00	.00	.00
		12	.00	.00	.00	.00	.00	.00
	1	4	.00	.00	.00	.00	.00	.00
		13	.00	.00	.00	.00	.00	.00
	1	5	.00	.00	.00	.00	.00	.00
		14	.00	.00	.00	.00	.00	.00
	1	6	.00	.00	.00	.00	.00	.00
		15	.00	.00	.00	.00	.00	.00
7	1	7	.00	.00	.00	.00	.00	.00
		16	.00	.00	.00	.00	.00	.00
8	1	8	-24.11	9.88	.00	.00	.00	.00
		17	24.11	-9.88	.00	.00	.00	90.42
9	1	9	24.11	9.88	.00	.00	.00	.00
		18	-24.11	-9.88	.00	.00	.00	90.39
10	1	10	29.48	-22.99	.00	.00	.00	-83.49
		11	-29.48	22.99	.00	.00	.00	-88.95
11	1	11	19.76	.00	.00	.00	.00	.00
		12	-19.76	.00	.00	.00	.00	.00
12	1	12	19.76	.00	.00	.00	.00	.00
		13	-19.76	.00	.00	.00	.00	.00
13	1	13	19.76	.00	.00	.00	.00	.00
		14	-19.76	.00	.00	.00	.00	.00
14	1	14	19.76	.00	.00	.00	.00	.00
		15	-19.76	.00	.00	.00	.00	.00
15	1	15	19.76	.00	.00	.00	.00	.00
		16	-19.76	.00	.00	.00	.00	.00
16	1	16	19.76	.00	.00	.00	.00	.00
		17	-19.76	.00	.00	.00	.00	.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KNS METE

MEMB	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
17	1	17	9.88	-24.11	.00	.00	.00	-90.42
		18	-9.88	-24.11	.00	.00	.00	-90.39

********** END OF LATEST ANALYSIS RESULT **********

62. PLOT DISPLACEMENT FILE
63. PLOT BENDING FILE
64. FINISH

********** END OF STAAD-III **********

****** DATE= MAR 5,1991 TIME= 22:24:12 ******

****
* CALL RESEARCH ENGINEERS(EUROPE) LTD ON 01-763-1393 *
* TELEX: 929181 FAX:01-763-1379 *
* 19 LANSDOWNE COURT, BRIGHTON ROAD, PURLEY,CR2 2BD UK *
****

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/ 1335 /91 Date of Decision : 28TH March 1991 98

Register Reference : 91A/0142 Date Received : 8th February 1991

Applicant : Larnwood Ltd,

Development : 1824 sq. metre of light industrial development including manufacturing and warehousing uses

Location : Ballymount Road Upper, Ballymount Little

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.

Subject to the Conditions on the attached Numbered Pages.

NUMBER OF CONDITIONS:- ...14...ATTACHED.

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

Date:.....28/3/91.....

Integrated Development Services
Limited,
146 Lower Drumcondra Road,
Dublin 9.

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/0142
Decision Order No. P/ 1335 /91
Page No: 0002

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 Act, 1878-1964.

03 That the requirements of the Chief Fire Officer be ascertained and strictly adhered to in the development.
REASON: In the interest of safety and the avoidance of fire hazard.

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

05 That the water supply and drainage arrangements, including the disposal of surface water, be in accordance with the requirements of the County Council.
REASON: In order to comply with the Sanitary Services Acts, 1978 - 1964.

06 That no industrial effluent be permitted without prior approval from Planning Authority.
REASON: In the interest of health.

07 That off-street car parking facilities and parking for trucks be provided in accordance with the Development Plan Standards, and that all car parking spaces be clearly marked out and lined on site prior to commencement of use.

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

08 That the area between the building and roads must not be used for truck parking or other storage or display purpose, but must be reserved for car parking and landscaping as shown on lodged plans.
REASON: In the interest of the proper planning and development of the area.

09 That the applicants shall carry out the development to the satisfaction of the Dublin County Council's Roads Department in respect of: (a) the proposed internal layout to render it suitable for the circulation of Heavy Goods Vehicles within the site, (b) the proposed entrance layout

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

and gates which shall open in an inwards direction only.
REASON: In the interest of public safety and of the proper planning and development of the area.

10 A financial contribution in the sum of £10,000 shall be paid by the developer to Dublin County Council towards the cost of road improvements and traffic management proposals on Ballymount Road Upper. 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.

11 That details of landscaping and boundary treatment be submitted to and approved in writing by Planning Authority and work theron completed prior to occupation of units.
REASON: In the interest of amenity.

12 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.

13 That the proposed units shall not be used for direct retailing or supermarket trading without the prior approval of the Planning Authority, or An Bord Pleanala.

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

14 Prior to commencement of development details of all external finishes to be agreed with the Planning Authority.

14 REASON: In the interests of visual amenity.

RECEIPT CODE

COMHAIRLE CHONTAE ÁTHA CLIATH

DUBLIN COUNTY COUNCIL
46/49 UPPER O'CONNELL STREET
DUBLIN 1.

Issue of this receipt is not an acknowledgement that the fee tendered is the prescribed application fee.

PAID BY — CASH ✓ CHEQUE M.O. B.L. I.T.

N 54579

Balance

£3192.00

Received this 5th day of March 19 91

from Darnwood Ltd.,
c/o 146 LR Drumcondra Rd.,
D.9

the sum of three thousand one hundred and ninety two Pounds

Pence, being balance of

planning fee on 91A/0112

Class 4

Noeleen Deane Cashier

S. CAREY
Principal Officer

Integrated Development Services Ltd.

Property Acquisition and Development Consultants.

146 Lower Drumcondra Road, Dublin 9, Ireland. Telephone: (01) 370936, 379362, 360033. Fax: (01) 369303.

Dublin County Council,
Planning Department,
Block 2,
Irish Life Centre,
Lower Abbey St.,
Dublin, 1.

4th March, 1991.

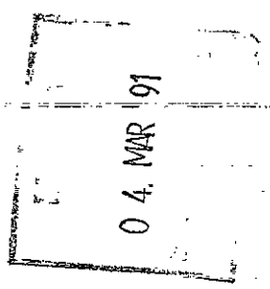
RE; 1824 SQ.M. OF INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPPER.
REGISTER REFERENCE ; 91A/0142.

Dear Sir,

Further to your letter of 19th February 1991 enclosed please find cheque in the amount of £3,192.00 being the correct Planning fee.

Yours faithfully,

KEVIN J. HAMELL
for INTEGRATED DEVELOPMENT SERVICES.



ENCL.

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/0142 Date : 12th February 1991

Our Ref.

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS 1963 TO 1990

Your Ref.

Date

Dear Sir/Madam,

DEVELOPMENT : 1824 sq. metre of light industrial development including manufacturing and warehousing uses

LOCATION : Ballymount Road Upper, Ballymount Little

APPLICANT : Larnwood Ltd,

APP. TYPE : PERMISSION

With reference to above, I acknowledge receipt of your application received on 8th February 1991.

Yours faithfully,

.....

PRINCIPAL OFFICER

Integrated Development Services
Limited,
146 Lower Drumcondra Road,
Dublin 9.

RECEIPT CODE

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

Issue of this receipt is not an acknowledgment that the fee recorded is the proper application fee.

N 31228

PAID BY
CASH
CHEQUE ✓
M.O.
B.L.
I.T.

£ 40.00

Received this 11th day of February 1991

from Integrated Dev. Services Ltd
146 Lower Drumcondra Rd.
D. 9.

the sum of forty Pounds

Pence, being fee for

site application at Ballymount Rd. Upr.

Nolan - Deane

Cashier

S. CAREY
Principal Officer

Class 4

Dublin County Council
Comhairle Chontae Atha 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 BALLYMOUNT ROAD UPPER, BALLYMOUNT LITTLE.
(If none, give description sufficient to identify) BYE LAW APPLICATION.

3. Name of applicant (Principal not Agent) LARNWOOD LIMITED
Address c/o 146 LOWER DRUMCONDRA ROAD, DUBLIN, 9. Tel. No. 370936

4. Name and address of person or firm responsible for preparation of drawings INTEGRATED DEVELOPMENT SERVICES LIMITED, 146 LOWER DRUMCONDRA ROAD, DUBLIN, 9. Tel No. 370936

5. Name and address to which notifications should be sent AS 4 ABOVE

FEE PAID £40 DATE 6/2/91
RECEIPT NO. N 31228

6. Brief description of proposed development 1824 SQ.M. OF LIGHT INDUSTRIAL ADVANCE UNITS DEVELOPMENT TO INCLUDE FOR MANUFACTURING AND WAREHOUSING.

7. Method of drainage EXISTING SEWERS 8. Source of Water Supply EXISTING WATERMAIN

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. LIGHT INDUSTRIAL / ANCILLARY OFFICES
(b) Proposed use of each floor AS (a)

10. Does the proposal involve demolition, partial demolition or change of use of any habitable house or part thereof? NO

Irish Lres 6/2/91

11. (a) Area of Site 12350 Sq. m.
(b) Floor area of proposed development 1824 Sq. m.
(c) Floor area of buildings proposed to be retained within site c. 2900 Sq. m.

CO. DUBLIN Larnwood Ltd. seeks permission to erect 1824 sq. metre of light industrial development including manufacturing and warehousing uses at Ballymount Road Upper, Ballymount Little

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

13. Are you now applying also for an approval under the Building Bye Laws?
Yes [ ] No [✓] Place ✓ in appropriate box. BYE LAW APPLICATION WILL FOLLOW

14. Please state the extent to which the Draft Building Regulations have been taken in account in your proposal:
SEE LATER BYE LAW APPLICATION

15. List of documents enclosed with application. SEE LETTER OF APPLICATION

RECEIVED 6 FEB 1991 Reg. Sec.

16. Gross floor space of proposed development (See back) 1824 Sq. m.
No of dwellings proposed (if any) NONE Class(es) of Development 4
Fee Payable £3,192.00 Basis of Calculation 1824 x £1.75
If a reduced fee is tendered details of previous relevant payment should be given
£40.00 enclosed - CLIENTS CHEQUE FOR BALANCE TO FOLLOW.

Signature of Applicant (or his Agent) [signature] Date 5TH FEBRUARY, 1991

P

FOR OFFICE USE ONLY

Application Type
Register Reference 91A/0142
Amount Received £ 22-1 2.20.4
Receipt No
Date

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.

Integrated Development Services Ltd.

Property Acquisition and Development Consultants.
146 Lower Drumcondra Road, Dublin 9, Ireland. Telephone: (01) 370936, 379362, 360033. Fax: (01) 369303.

Dublin Co. Council,
Planning Department,
Irish Life Centre,
Lower Abbey St.,
Dublin, 1.

5th February, 1991.

RE; 1824 SQ.M. OF INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPPER.

Dear Sirs,

On behalf of Larnwood Ltd. we wish to apply for planning permission to construct the above.

We enclose;

1 No. Copy;
- Newspaper advertisement Irish Press 6/2/91.
- Cheque in the amount of ~~IR£3,192.00~~. 40 Cheque to follow.
- Completed application form.

4 No. Copies;
- Specification.
- Drawing No. 91021/1 ; Site Location Map.
- Drawing No. 91021/2 ; Site Plan indicating Demolition.
- Drawing No. 91021/3 ; Site Layout Plan.
- Drawing No. 91021/4 ; Ground Floor Plan.
- Drawing No. 91021/5 ; Elevations and Sections.

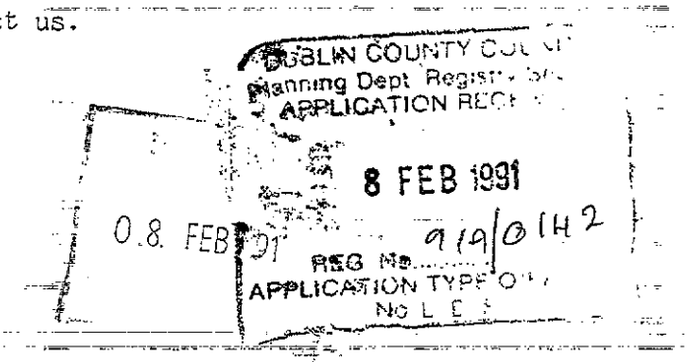
This application shows four units but depending on market forces it may well be that the internal party walls may be omitted to suit.

The proposed use is light industrial to include for warehousing and manufacturing uses.

A detailed Building Bye Law appliction will be submitted shortly.

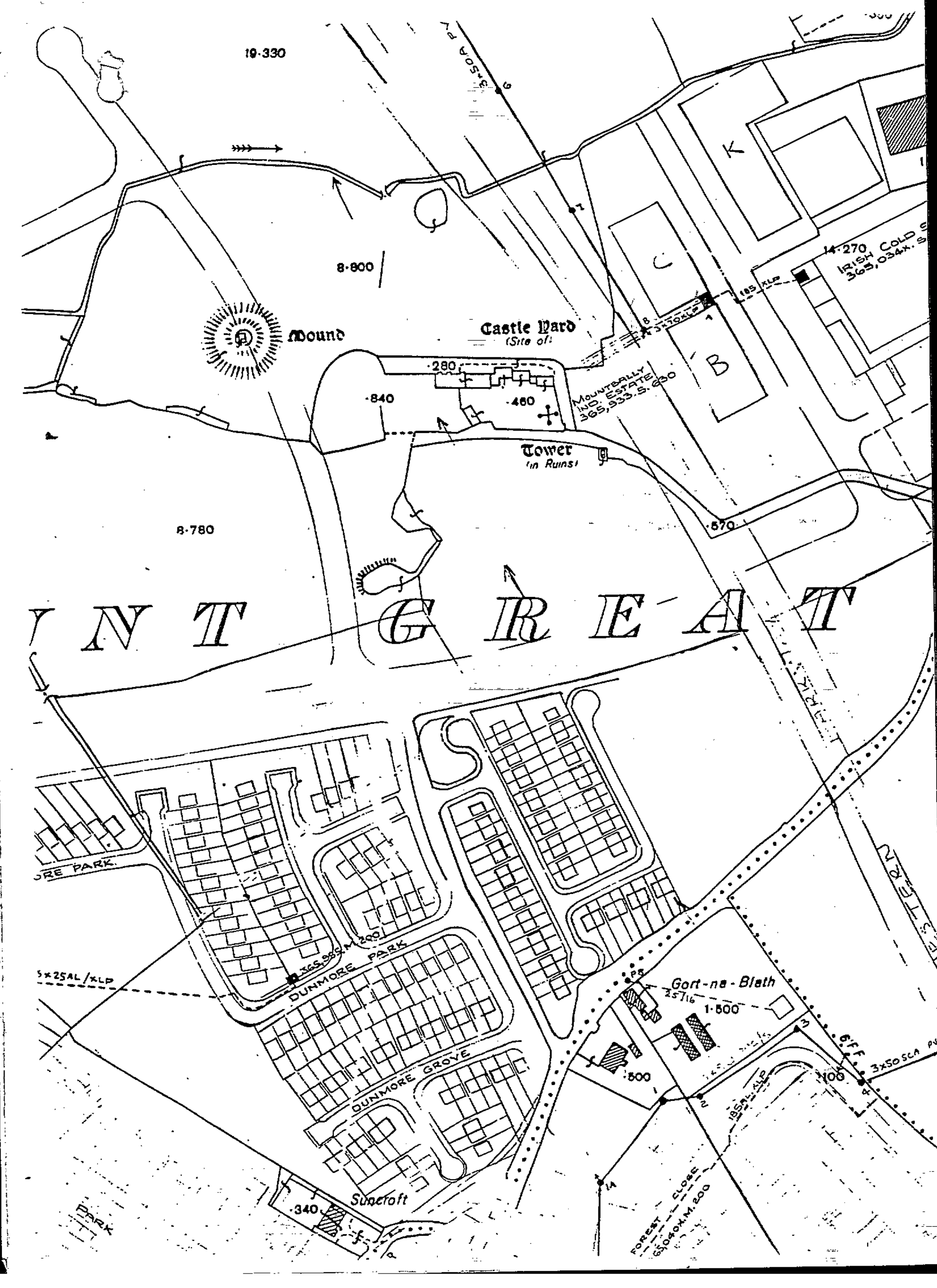
If you have any queries please contact us.

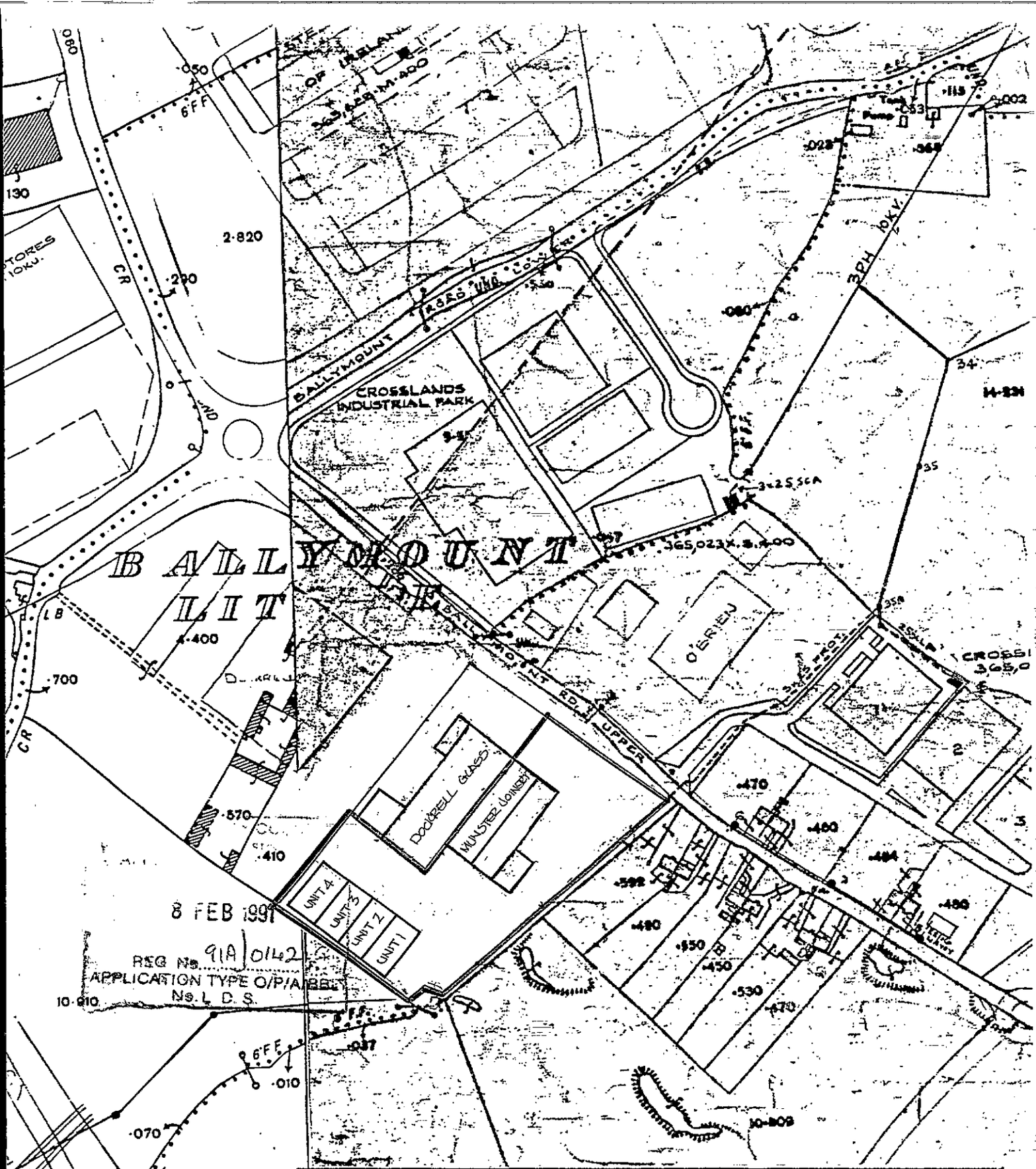
Yours faithfully,



KEVIN J. HAMELL
for INTEGRATED DEVELOPMENT SERVICES.

ENCLS.


19·330
8·800
Mound
Castle Yard
(Site of)
·280
·840
·460
Tower
(in Ruins)
Mountbally Ind. Estate 365,933.5.630
K
C
B
14·270
Irish Cold S
365,034x.S
185 XLP
·570
8·780
INT GREAT
Dunmore Park
365,955 M 200
Dunmore Grove
Gort-na-Blath
1·500
·500
3x50 SCA
185AL XLP
Forest Close
365,040 x M.200
Suncroft
·340
Park
3x50A PV
5x25AL/XLP



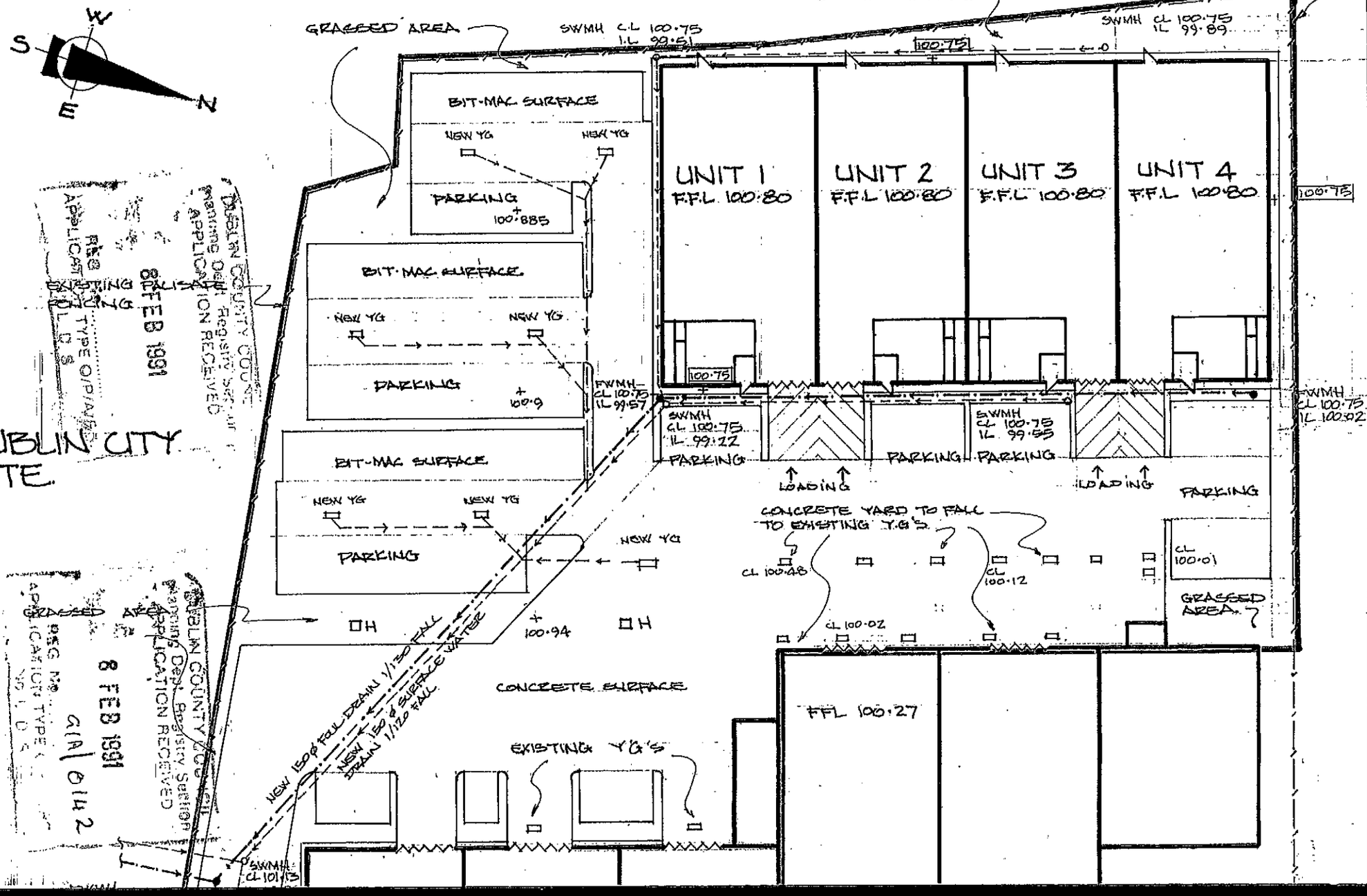
INTEGRATED DEVELOPMENT SERVICES.
146 LOWER DRUMCONDRA ROAD D.9. PH 370936.

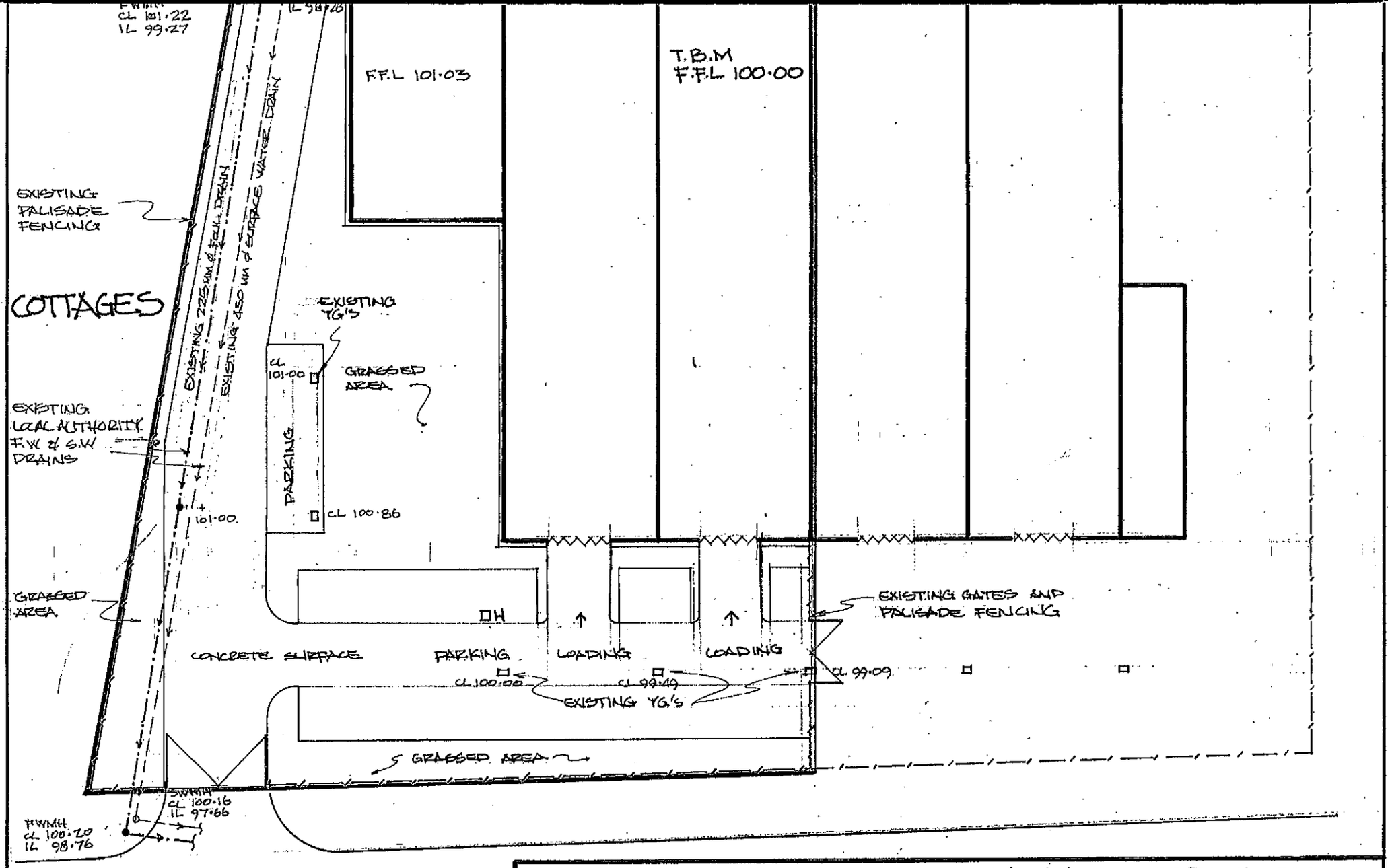
SITE LOCATION MAP FOR NEW INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPR. FOR LARNWOOD LTD.

DATE	SCALE	DRG. TITLE	DRG. No.
FEB 91	1:2500	SITE LOCATION MAP	9102/1

NOTE: ALL LEVELS TO BE CHECKED ON SITE BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

WATERMAIN LAYOUT TO BE DISCUSSED WITH LOCAL AUTHORITY WATERWORKS DEPT.





SITE PLAN 1:500

NEW S.W DRAIN

NEW F.W. DRAIN

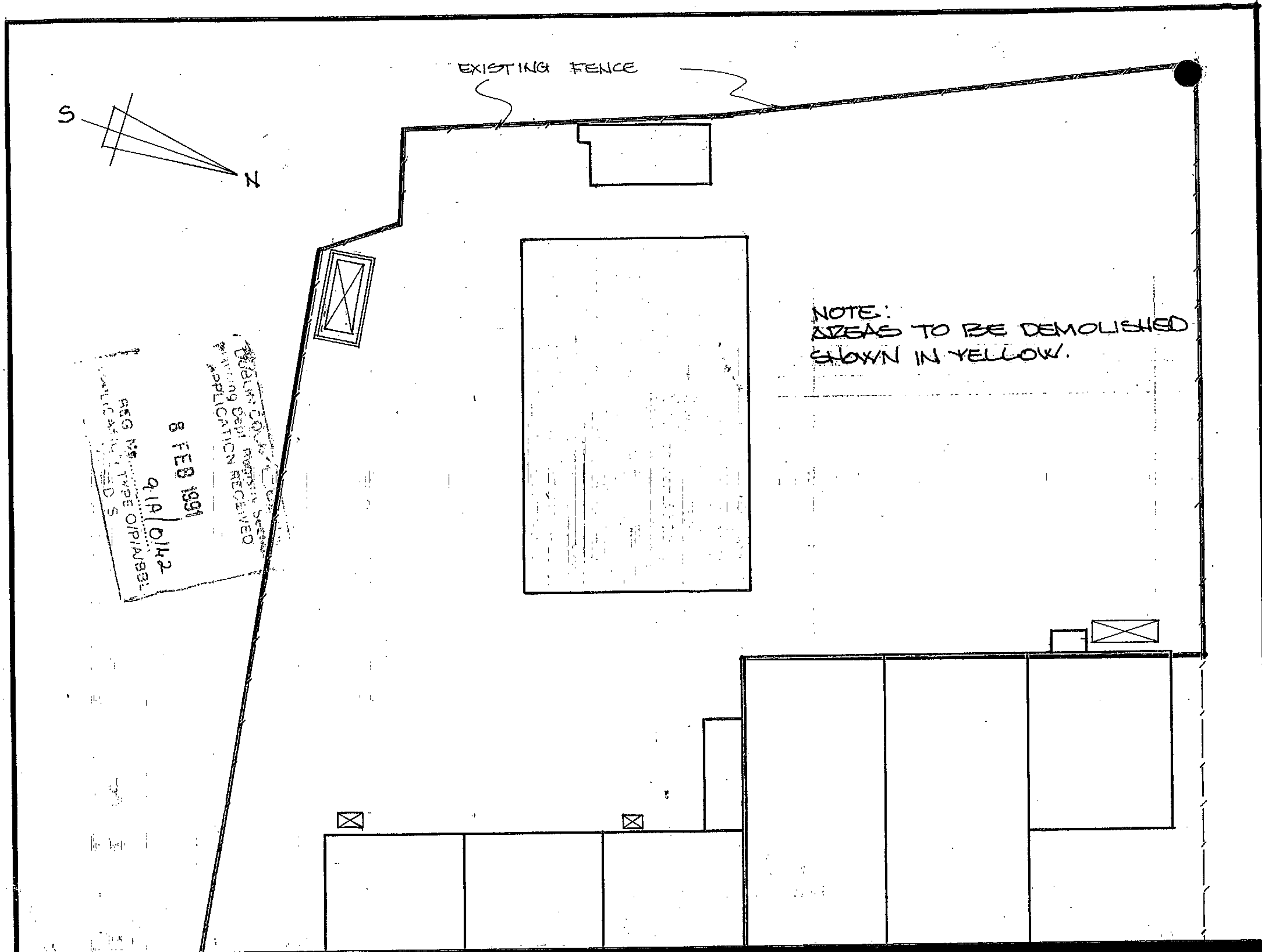
000·00 NEW LEVELS

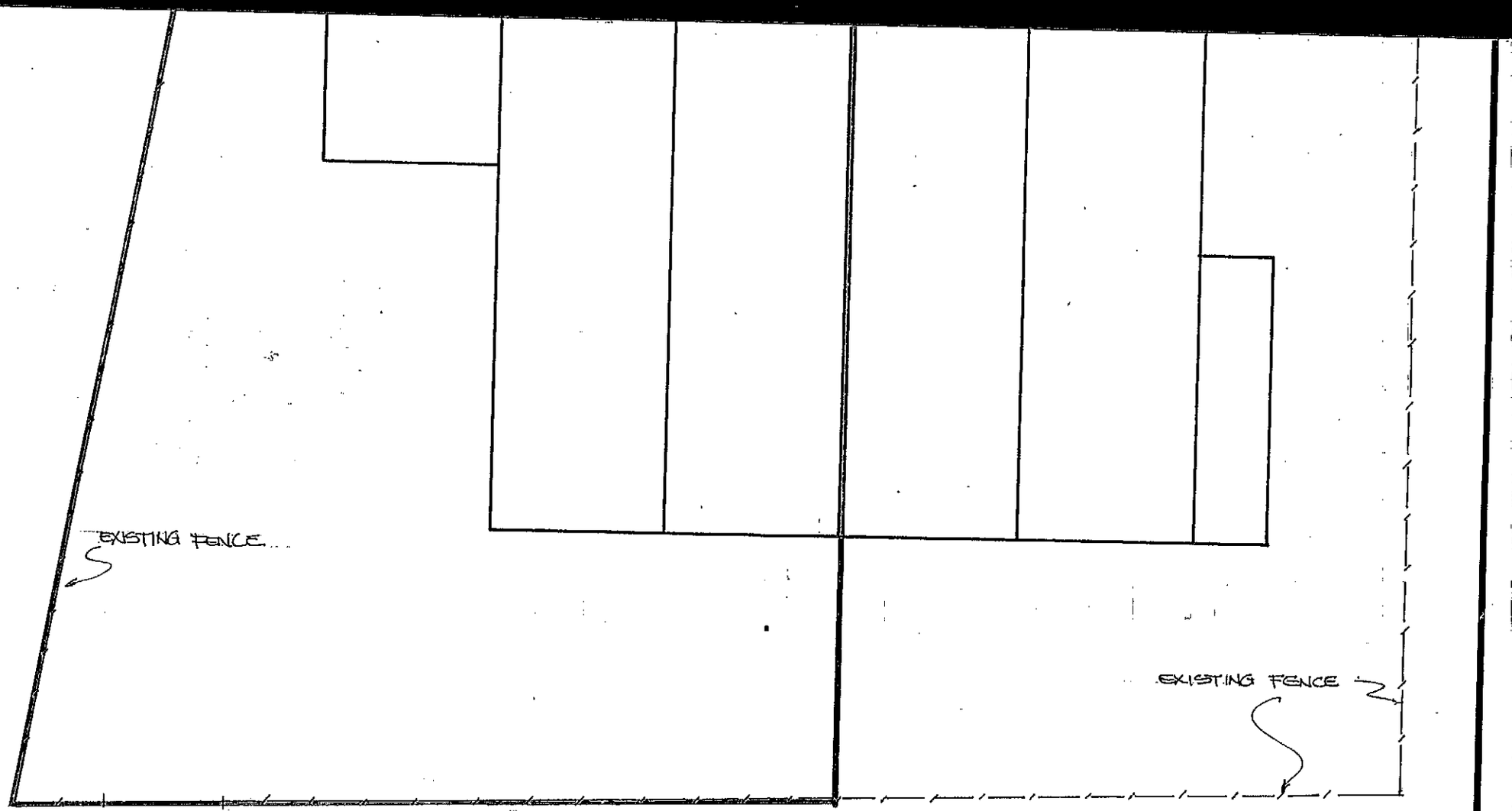
INTEGRATED DEVELOPMENT SERVICES

146 LOWER DRUMCONDRA ROAD DUBLIN 9. PH 370936/379362

SITE LAYOUT PLAN FOR NEW INDUSTRIAL DEVELOPMENT AT BALLYMOUNT ROAD UPPER, FOR LARNWOOD LIMITED.

DATE:	SCALE	DRG. TITLE	DRG N°	REVISION
FEB 91	1:500	SITE LAYOUT PLAN	91021/3	





SITE PLAN 1:500
SURVEY

INTEGRATED DEVELOPMENT SERVICES 146 LOWER DRUMCONDRA ROAD DUBLIN 9.		
SITE PLAN : BALLYMOUNT COMPLEX		
SCALE 1:500	DATE 15/11/90	DEG. Nº 91021./2

PROPOSED INDUSTRIAL DEVELOPMENT

AT BALLYMOUNT ROAD UPPER

for

LARNWOOD LIMITED.

SPECIFICATION OF WORKS

INTEGRATED DEVELOPMENT SERVICES LTD.
146 LOWER DRUMCONDRA ROAD,
DRUMCONDRA,
DUBLIN, 9.

TEL. NO. 01-370936.

I N D E X

S E C T I O N 1.

GENERAL

Generally

The work consists of the construction of proposed industrial development at Ballymount Road Upper.

Construction

The warehouse and offices will be within the main structural shell consisting of a plastic coated metal deck insulated roof with 10% double skin rooflights, 1% smoke vents, all on galvanised purlins.

Walls are to be plastic coated metal cladding insulated on galvanised sheeting rails all over 2400mm high cavity wall with block inner leaf and concrete brick outer leaf.

The offices will be constructed with 'Breton' or similar precast concrete units at first floor level.

The windows are to be anodised aluminium.

Water Main

A 100mm diameter water main will be provided with hydrants to local authority requirements.

S E C T I O N 2.

PRELIMINARIES

Terms

I.S. means Irish Standard

B.S. means British Standard.

C.P. means British Standard Code of Practice.

Where reference is made to the foregoing publications, the edition current at the designated date shall apply.

"As indicated elsewhere" or similar wording means as indicated on the drawings or in the Particular Specification.

Statutory Obligations

Comply with all statutory regulations for the safety, health and welfare of the workmen employed on the Site. Comply with the relevant building Bye Laws and with any conditions imposed by the Planning Permission and the Building Bye-Law Approval; serve statutory notices.

Quality of Work

Execute the works in a sound and workmanlike manner, using good quality materials and employing experienced workmen. Use all proprietary products in accordance with manufacturers instructions.

The Contractor may make reasonable variations in the design of the Works, provided that such will not alter substantially the quality, value, appearance or usefullness of the works.

Specification Alternatives

Where the Specification allows a choice of materials, such choice shall be at the discretion of the Contractor.

Programme

Prepare a programme in bar-chart form for the whole of the Works. Up-date the programme from time to time as circumstances require.

Temporary Works

Provide temporary facilities such as site huts, stores, toilet accommodation, scaffolding, hardstandings, fencing etc; also temporary connections to services; remove on completion.

Setting Out

Establish a master bench mark on site for the duration of the Contract.

Set out the works in accordance with the drawings. Use dimensions figured on drawings for setting out; do not scale the drawings.

Supervision

Provide all necessary supervision for the construction of the works.

Cleaning

Remove rubbish from the works as it accumulates. On completion, remove stains and splashes, touch up any damaged paintwork and leave the works clean and tidy and ready for occupation.

Practical Completion

The Client's attention is drawn to the necessity for maintaining adequate heat and ventilation in the building, to prevent deterioration of the fabric.

S E C T I O N 3.

EXCAVATION AND EARTHWORKS

Strip Site

Strip topsoil over area of buildings and deposit on site for subsequent re-use; remove surplus from site.

Excavation

Excavate, level and grade over area of buildings as required to produce formation level.

Excavate trenches and bases as shown on drawings.

Support sides of excavations as necessary and in accordance with statutory requirements.

Backfilling

Backfill around foundations and rising walls with suitable material either arising from excavations or imported.

Disposal of Surplus Spoil

Spread and level surplus soil over site as required to make up levels, remove the balance from site.

Disposal of Water

Keep excavations free from all water except sping and running water.

Hardcore

Hardcore shall consist of gravel filling or broken stone containing not more than 5% of clay or organic material.

Hardcore shall be placed in layers not exceeding 250mm thick, each layer thoroughly compacted.

S E C T I O N 4.

CONCRETE WORK

MATERIALS FOR CONCRETE

Concrete Mixed Off Site

Readymixed concrete will generally be used, complying with B.S. 1926. Each load shall be accompanied by a delivery docket, showing consignee, date of delivery, quantity and grade of concrete.

Concrete Mixed on Site

Cement shall comply with I.S. 1 or B.S. 12 for Ordinary Portland Cement. It shall be stored in dry weathertight structures and used in the order of delivery.

Aggregates shall comply with I.S. 5 or B.S. 882. Aggregates of different grades shall be stored in separate stock piles.

Water shall be clean and free from harmful matter.

Concrete mixing on site shall follow the recommendations contained CP 110, Clause 6.7.4.

Grades of Concrete

The concrete mixes shall be designed to produce concrete complying the characteristics tabulated below.

The characteristic strength is that determined from test cubes at 28 days.

Grade	Characteristic Strength	Max Agg. Size	Min. Cement Content
N7	-	20 or 40mm	110 kg/m^3
N20	20N3mm^2	20mm	280 Kg/m^3
N25	25N/mm^2	20mm	280 Kg/m^3
N30	30N/mm^2	20mm	330 Kg/m^3

Concrete Usage

Unless otherwise indicated, the grade of concrete to be used shall be in accordance with the following table:-

Grade	Usage
N 7	Drain beds, blinding, haunching, leanmix paving.
N20	Foundations.
N25	Other reinforced concrete work.
N30	Where specially required.

Testing

Concrete to be tested as required by CP. 100 Part 1, Clause 6.8.

Curing Concrete

Protect concrete from wind, direct sunlight, rain and running water during its initial hardening period. Cover as necessary with polythene sheets, with an absorbent material which is kept damp or with a curing compound.

Curing agent to be ChemCure S or equal

Concreting in Cold Weather

Take special precautions where necessary to prevent frost damage to concrete, for a period of 3 days after pouring. Aggregates, water, formwork and reinforcement must be free from snow, ice and frost.

Construction of Internal Ground Floor Slabs in Factory Area

Provide ground floor slabs to a thickness of 150mm, reinforced with mesh ref. C283 and with underlay of 1,000 guage polythene sheeting.

Cast slab in bays not more than 18m long and 5m wide, using plain butt joints next adjoining bays. Provide treated fibreboard expansion joint filler (unsealed) between floor slab and perimeter walls. Joints to be dowelled to Structural Engineers detail.

REINFORCEMENT

Materials

Reinforcement shall consist of:-

Hot rolled mild steel round bars complying with bs 4449.
or Hot rolled high yield deformed bars complying with BS 4449.
or Cold worked steel bars complying with BS 4461.
or Steel fabric complying with BS 4483.
All to be free from loose rust, loose mill scale, oil, grease or other deleterious matter.

Workmanship

Cut and bend reinforcement in accordance with CP 110, Clause 7.2.
Fix reinforcement in accordance with CP110, Clause 7.3.

FORMWORK

General

Follow the recommendations of CP 110, Clause 6.11.3 in regard to

6.11.3.1	Design and construction.
6.11.3.2	Form lining.
6.11.3.3	Cleaning and treatment of forms
6.11.3.4	Projecting reinforcement, fixing devices.

Striking Formwork

Strike formwork only when the concrete is sufficiently mature to resist damage from the removal and for beam soffits and slabs not until the concrete has reached a strength of 14N/mm².

SURFACE FINISHES

Finishes to Internal Floor Slabs

Finish slabs with a power float to produce a hard dense finish. Do not use floor sealers unless elsewhere indicated.

Finishes to Concrete Generally

Provide type A finish to concrete hidden from view in the finished building.

Provide type B finish to concrete exposed to view in the finished building.

Provide other finishes only as indicated elsewhere.

Finishes type A and type B shall be as defined in CP 110, Clause 6.10.6, but may include the use of plywood or proprietary panel type formwork as well as timber boards.

PRECAST CILL, LINTOLS AND COPINGS

Generally

Where applicable, the foregoing clauses in this section refer also to precast concrete.

Cills

Cills shall be rebated, weathered and throated, with a minimum wallhold of 100mm each end.

Lintols

Lintols may be of normal precast type or may be prestressed to comply with BS 1239. They shall have a minimum bearing of 200mm each end.

Copings

Copings shall be either feather-edged or saddle-backed as detailed, with throating each side.

Workmanship

Provide necessary reinforcement in precast units, both for handling and structural pruposes.

Provide fine trowelled finish to exposed faces of units, and clean sharp arrisses.

Cure all units for at least 7 days before use. Hoist, bed and neatly point in mortar.

S E C T I O N 5.

BRICKWORK AND BLOCKWORK

MATERIALS

Concrete Blocks

Both solid and hollow blocks shall comply with I.S. 20.

Concrete Facing Bricks

Concrete facing bricks shall comply with B.S. 1180 type A (ii).

Clay Bricks

Bricks to comply with both I.S.91 (1983) and B.S. 3921 (1985) standards.

Mortars

Cement mortar shall be composed of 1 part cement to I.S. 1 to 6 parts clean pit or river sand and incorporating a plasticiser. Readymix sand-lime mortar shall comply with B.S. 4721, in teh proportions of 1 part lime to 6 parts sand. It shall be guaged with 15% of cement by volume immediately before use.

Damp Proof Course

Bitumen damp proof course with hessian base shall comply with I.S. 57 type A.

Polythene damp proof course shall comply with I.S. 57.

The Contractor may use either of the above in the works.

Wall Ties

Wall ties shall comply with B.S. 1243: 1978 (amended) and shall be of the vertical twist type.

the ties may be galvanised or stainless steel. If galvanised then they must be galvanised in accordance with B.S. 729 with a coating weight of not less than 940 grams/m^2. If stainless steel, then this must be austenitic.

WORKMANSHIP

Mortar Mixes

Use cement mortar for walling below damp course. Walling above d.p.c. may be in cement mortar or in gauged sand-lime mortar at the Contractor's discretion. Mortar for brickwork shall not be tinted unless so indicated on drawings. In this case the pigments shall comply with B.S. 1014.

Laying Generally

Do not lay bricks or blocks while the air temperature is below 4°C on a falling thermometer or below 2°C on a rising thermometer. All materials shall be free of snow, frost and ice.

Keep perpends and quoins plumb and square, provide proper bond, use bats only to obtain bond.

Lay and bond bricks and blocks on a full bed of mortar and with joints fully filled.

Joints for brick and block shall be approx. 10mm thick, with such variations as may be required to suit storey height.

Fair Faced Blockwork

Build fair faced blockwork with standard (non-special) blocks and with joints as previously specified. Point as the work proceeds with neat 'bucket handle' joint, all to show a plumb, evenly textured face.

Facing Bricks

Use concrete facings unless otherwise indicated.

Lay facing bricks in stretcher bond with half brick lap and point with a neat 'bucket handle' joint as the work proceeds. Mix bricks from various batches to avoid contrast between adjoining lifts.

Cavities

Keep cavities and ties free from mortar and debris.

Form weep holes at abour 900mm intervals in vertical joints at base of cavity.

Close cavities at jambs by returning the inner block leaf across the cavity with neatly cut blocks.

Set wall ties firmly in mortar joints, with a minimum embedment of 50mm in each leaf and spaced as tabulated below. Provide extra ties at openings, at all control joints and at external angles with a vertical spacing of 225mm.

TABLE 1. SPACING OF TIES

Leaf Thickness	Cavity Width	Spacing of ties horizontally	Vertically	Number of ties per sq. metre.
90 or more	50-75	900	450	2.5
90 or more	75-100	750	450	3.0
90 or more	100-150	450	450	4.9

Damp Proof Courses

Lay damp proof courses to the full thickness of walls, on a full bed of mortar. Lap 150mm at joinings and the full width at angles and junctions.

Set damp proof course on all external walls not less than 150mm above the external finished level.

Provide damp proof course under copings and cappings, also under cills, turned up at back and ends of same.

Provide vertical damp proof course at jambs of openings in cavity walls.

Control Joints

Provide vertical control joints where shown on drawings, nominally 10mm wide. Seal externally with one pack polysulphide sealant; prime surfaces and provide polethylene foam backing.

Generally, panel lengths shall not exceed twice their heights, with maximum 7600mm centres externally and 12000mm internally.

S E C T I O N 6.

ROOFING AND WALL CLADDING

Roof Cladding - Materials

The roof is to be clad using the Tegral 32/19 system (or similar) with p.v.c. plastisol coated TMF outer sheet 0.7mm thick with a 32mm deep profile hot dip galvanised to B.S. 2989, 1975, the inner lining sheet is to be TMF 19, 0.45mmthick hot dip galvanised to B.S. 2989, 1975, with a white polyester enamel finish 60mm thick glassfibre insulation to be provided between the sheets with galvanised 'Z' section spacer battens, all on steel purlins hot dip galvanised to B.S. 729.

Rooflights are to be double skin to match profiles of inner and outer metal sheets.

Rooflights are to be approx. 10% of warehouse floor area (excluding first floor office area).

Automatic smoke vents to be provided with an area of 1% of floor area of warehouse (excluding office area).

Roof Cladding - Workmanship

The roofing is to be laid in accordance with the manufacturers instructions with all appropriate fixing accessories, insulation, mastic jointing, flashings etc.

Wall Cladding - Materials

The walls are to be clad with the Tegral 32/19 system (or similar) as described under Roof Cladding - Materials above except that the outer sheet will be 0.55mm thick as recommended. The perimeter wall slong gride line 1 will have 1 hr. fire rating as required by the Fire Officer and shall be constructed using the Tegral 32/19 system in accordance with the method recommended.

Flashings and drips shall be p.v.c. plastisol coated metal to match the cladding.

Fixings shall be as recommended by the manufacturer.

WALL Cladding - Workmanship

The wall cladding is to be fixed in accordance with the manufacturers instructions including all appropriate flashings, drips, cover pieces, etc. Bolts shall be fitted with matching plastic caps.

Raingoods

Rainpipes and fittings shall be standard p.v.c. system, to the sizes shown on the drawings. Provide all necessary bends, swannecks etc.

S E C T I O N 7.

WOODWORK

General

All timber to be free from disease, and suitably seasoned.

Unless otherwise indicated, all carcassing timber shall be in whitewood and all joinery timber shall be in redwood.

Dimensions

Dimensions given for unwrot timbers and for sheet materials are finished sizes.

Dimensions given for wrot timbers shall be subject to an allowance of 3.2mm for each wrot face, unless stated to be finished dimensions.

Whitewood

Whitewood shall be that known to the trade as "Better Quality European Whitewood", unsorted, grades 1 to 5.

Redwood

Redwood shall be that known to the trade as "Best Quality European Redwood", unsorted, grades 1 to 5.

Hardwood

Hardwood shall be of Iroko, or similar quality hardwood, kiln dried.

Plywood

Plywood generally shall have type W.B.P. bonding, that for internal flush doors shall have type INT bonding. Plywoods shall have Birch or Gaboon facing.

Blockboard

Blockboard shall comply with B.S. 3444 grade 2, with type INT bonding.

Doors

Internal flush doors shall comply with I.S. 48 and shall be hollow core type, of standard sizes. They shall be lipped with softwood on 2 long edges.

External flush doors shall comply with I.S. 48. They shall be of semi-solid core construction, size 813 x 2032 x 44mm thick. They shall be hardwood lipped all round.

Fire resisting doors and frames shall be as tested to B.S. 476 and to the ratings indicated elsewhere.

Windows

Internal timber windows shall be as indicated. Window boards shall be of plywood with hardwood lipping.

Skirtings

Skirtings shall be ex. 100 x 19mm redwood with rounded top edge.

Handrail

This shall be hardwood, ex. 50 x 50mm with rounded tops and grooved for core rail where necessary.

Pipe Boxings

Pipe boxings where shown on the drawings shall be of timber framework covered with 12mm plywood or with plasterboard. R.W.P.'s and S.V.P.'s to be wrapped in glass fibre with boxing.

Preservative

Where timber is described as "treated" it shall be brush treated with Protim or equal wood preservative.

Ends cut on site shall be similarly treated.

WORKMANSHIP

General

Frame up joinery work in accordance with B.S. 1186, Part 2.

Knot and prime joinery to be painted, before delivery to site.

Seal joints externally between masonry and timber frames with one pack polysulphide sealant; prime surfaces and provide polyethylene foam backing. Joints to be about 10mm square.

S E C T I O N 8.

METALWORK

Materials

Mild steel shall comply with B.S. 4360.

Hot rolled sections shall comply with B.S. 4 Part 1; hot rolled hollow sections shall comply with Part 2.

Galvanised work shall comply with B.S. 729.

Workmanship

Execute all smithing and bending soundly and neatly, taking care not to overheat.

Wire brush and prime all metalwork which is to be painted, with one coat redoxide or equal primer at works before delivery to site.

Matwells

Matwells shall be of aluminium angle size 38 x 38 x 3mm thick with mitred and welded corners and fitted with brush mats.

Matwells to single doors shall suit mats size 760 x 460mm.

Handraills and Balustrades

These shall be of mild steel.

Core rails shall be size 30 x 5mm, countersunk drilled at 900mm centres.

Standards shall be 32mm diameter, to finish 900 high over pitch line or 1200mm high over landings and with ends trouted into holes in concrete 40mm diameter x 100xx deep.

Roller Shutter Doors

These shall be chain operated by endless hand chain incorporating chain drive, spur or worm gear, with curtains of interlocking 19 guage galvanized mild steel laths, galvanized guides of ample depth securely fastened to jambs, and with galvanized angles forming bottom rail. Coil casings are not provided.

Galvanizing shall be to B.S. 2989.

Aluminium Windows

These shall be factory assembled including glazing and fitted on site, all in accordance with B.S. 4873.

Finish to be natural anodised to B.S. 4873.

Seal joints externally between masonry and windows with one-pack polysulphide sealant; prime surfaces and provide polyethylene foam backing. Joints to be about 10mm square.

S E C T I O N 9.

PLUMBING

PLUMBING MATERIALS

Sanitary Fittings

W.C. suites shall be equal to Armitage Shanks Magnia low level white V.C. set, with cistern and overflow and black plastic seat, with one no Uniregal low level suite in first floor toilet. Wash basins shall be equal to Armitage Shanks Portman white V.C. basins size 400 x 350 with pair of Sanbra Fyffe No. 5301 pillar taps, waste outlet with plug and chain, bottle trap and all necessary brackets.

Urinal bowls shall be equal to Armitage Shanks Sanura white V.C. bowl with waste, white V.C. auto cistern, drip tap, polished stainless steel flushpipes and sparges with necessary brackets.

Sink unit shall be a standard malamine faced chipboard cupboard unit complete with stainless steel sink having single bowl and drainer, pair of Sanbra Fyffe No. 5301 pillar taps, waste outlet with plug and chain, also trap. Unit to be about 920 x 450mm on plan.

Polyethylene Pipes

Polyethylene pipes for cold water 19mm rising main services shall comply with I.S. 134 normal guage. Fittings shall be compression type to comply with I.S. 239.

Copper Pipes

Copper tubes for hot and cold services shall comply with I.S. 238 for half hard light guage tubes. Fittings shall be compression type of comply with I.S. 239.

Cold water supplies shall be in copper. Hot water services and all piping to hot water heaters shall be in copper.

Supply to sink in Tea Room shall be taken from the rising main.

Discharge Pipes

Discharge pipes and fittings shall be of unplasticised p.v.c.

Those not exceeding 55mm dia. shall comply with B.S. 5255 and shall have solvent welded joints.

Those over 55mm dia. shall comply with B.S. 4514 and shall have O-ring joints.

Storage Tanks

Galvanised cold water storage tank to I.S. 9, 16G, shall be 200 gallon capacity located as indicated on the drawings, and shall be complete with ball valve, overflow and cover, mounted on plywood base on 75 x 75 ms. framing and with 38mm Ø overflow.

Stop-Valves

Stop-valves shall comply with B.S. 1010.

S E C T I O N 10.

FLOOR, WALL & CEILING FINISHES

PLASTERING

Materials

Cement shall be normal Portland cement to I.S. 1.

Sand shall comply to I.S. 5.

Hydrated lime shall comply with I.S. 8.

Plasterboards and dri-linings shall be equal to the products of Gypsum Industries Ltd. Thicknesses shall be 12.7mm for wall linings and 9.5mm for ceiling linings.

Gypsum plasters shall be "Gyplite" or equal.

Expanded metal lathing shall be "plain expanded" type to comply with B.S. 1369 and galvanised.

Workmanship - Internal

Execute internal plastering in accordance with the manufacturers instructions, in either 2 coats of Gyplite plaster or in dri-lining at the Contractors discretion.

Provide protection to vertical arrisses liable to damage, using galvanised angle bead for wet plaster or flex-corner tape for dri-lining.

Provide galvanised strip beads between plastered block work and concrete columns, or at movement joints.

WALL TILING

Materials

Glazed ceramic wall tiles and fittings shall comply with B.S. 1281. They shall be size 150 x 150mm and white in colour unless otherwise indicated.

Workmanship

Execute wall tiling in accordance with C.P. 212 Part 1.

Provide tiled splashback to each washbasin, size 600 x 450mm.

FLOOR TILING

Materials

Vinyl asbestos floor tiles shall comply with B.S. 3260 and shall be of single colour, size 300 x 300 x 2.5mm thick. Tiles to be Armstrong Accoflex.

Office carpet, where specified, is to be Tretford Cord carpet to selected colours.

Workmanship

Lay Armstrong Accoflex vinyl asbestos floor tiles in accordance with C.P. 203.

If necessary, level up concrete floors under vinyl asbestos tiling with self-levelling compound.

Tretford carpet is to be laid and fixed with adhesive in accordance with the manufacturers instructions.

SUSPENDED CEILINGS

Materials

Suspended ceilings shall be of the lay-in grid type with minaboard mineral fibre tiles 15mm thick. Lay-in grid tiles shall be 600 x 1200mm in white enamelled exposed suspended grid system. All as manufactured by Armstrong World Industries Ltd.

S E C T I O N 111.

GLAZING

Glass and Putty

Glass shall comply with the appropriate section of B.S. 952 and shall be of O.Q. quality.

Putty for glazing to softwood shall comply with B.S. 544; that for glazing to steel shall be metal casement putty. Non-hardening glazing compound shall be used for glazing to hardwood. Glaze tape instead of putty or compound may be used for glazing to internal doors.

Types of Glass

All glass shall be clear unless otherwise indicated.

Obscure glass shall be from group 1.

Georgian wired cast glass shall be used in glazed fire doors.

Workmanship

Execute all glazing in accordance with B.S. 6262.

Fix softwood glazing beads with pins.

Mirrors

These shall be of 6mm thick mirror glass with stove enamelled backing and with polished edges.

Provide mirror size 450 x 300 over each wash basin; twice drilled and plugged and screwed with C.P. dome headed screws

S E C T I O N 12.

PAINTING

MATERIALS

General

Materials generally shall be as manufactured by Messrs. Walpamur Harrington Goodlass Wall, Berger, or other approved firm.

"Sadolins" shall be as manufactured by Sadolins (U.K.) Limited.

"Artex" shall be manufactured by Gypsum Industries Limited.

Primers and undercoats shall be those recommended by the makers for the particular application.

The choice of colour is limited to 2 for each type of paint.

WORKMANSHIP

General

Execute all paintwork in accordance with the manufacturers instructions.

Preparation

Ensure that all surfaces are smooth; stop or fill all pits, crevices and grain, rub down all nibs and irregularites.

Ensure that all surfaces are clean, dry and free from oil or grease. Wipe down all surfaces before painting and also as necessary between coats.

Paint on Blockwork or Concrete

Do not paint blockwork or concrete surfaces unless otherwise indicated.

Where indicated, paint block walls and concrete surfaces with emulsion paint in 3 coats applied by brush or roller, or in 2 coats applied by spray.

Where concrete soffits are indicated as stippled, apply one coat of appropriate sealer and one coat of "Artex" or equal with stippled finish.

Paint on Internal Plasterwork

Apply 3 coats emulsion paint on plastered walls.

Paint on Wood

Knot, prime, stop and apply 3 coats of oil paint on all surfaces of softwood joinery exposed to view, unless otherwise indicated.

Clear Finish on Hardwood

Internally, apply 3 coats of one pack polyurethane varnish.

Paint on Shop Treated Structural Steelwork

Touch up damaged areas of shop applied zinc phosphate primer and apply one coat of high build micaceous iron oxide zinc phosphate (either grey or light grey in colour).

Choice of colour, by means of alternative paint systems is available at extra cost.

Paint on Galvanized Metalwork

Do not paint galvanised metalwork.

Paint on Metalwork (excluding Pipework)

Leave non-ferrous metalwork unpainted unless otherwise indicated, also internal ferrous metalwork hidden from view.

Prime ferrous metalwork exposed to view (or touch up works priming) and apply tow coats oil paint.

Paint on Pipework

Etch or prime as required and apply 2 coats oil paint to all radiators and pipework fixed to painted or tiled backgrounds.

S E C T I O N 13.

DRAINAGE

MATERIALS

Pipes and Fittings

Vitrified clay pipes and fittings shall comply with I.S. 106. Those of 100 and 150mm diameters shall have polypropylene couplings, those over 150mm diameter shall be spigot and socket type with flixible joints.

P.V.C. pipes and couplings shall be "Wavinsewer" or equal.

Concrete pipes shall comply with I.S. 6, with spigot and socket flexible ring joints.

Asbestos cement pipes and fittings shall comply with B.S. 3656. Pipes not exceeding 225 diameter shall be class H, larger pipes shall be class M.

Material for Pipe Bedding and Surrounds

Granular bedding shall be crushed stone or gravel 20mm down to 5mm in size, or coarse sand, or sand and gravel ex. quarry in which :-

(a) Not more than 10% by weight is retained on a 20mm sieve.

(b) All material passes a 40mm sieve.

Manhole Covers

Manhole covers and frames shall be cast iron solid top type, size about 600 x 600mm and shall comply with B.S. 497. Types and weights shall be as below:-

Light duty - grade C, weight about 38Kg.
Medium duty - grade B, weight about 100Kg.
Heavy duty - grade A, weight about 175Kg.

Road Gullies

These shall be either:

(a) Cast iron Corporation pattern gullies.

(b) Masonry pits fitted with Co. Council Pattern gratings.

Armstrong Junctions and Gullies

These shall be of stoneware or p.v.c.

Armstrong junctions shall have cast iron plain covers size 275 x 275.

Gullies shall have galvanized gratings 150mm square.

WORKMANSHIP

Excavation

Excavate trenches to even grades. Remove soft spots in trench bottoms and replace with compacted granular material.

Concrete Bedding

Provide concrete bedding to a minimum thickness of 10mm under all pipes.

After laying and testing of pipes fill remainder of trench with ordinary spoil, well compacted. The first layer, to 300mm over pipe crown, shall be free from stones and other hard object liable to damage the pipe.

Concrete Encasings and Backfilling

This clause refers to pipes laid.

(a) Under roadways where the finished cover is less than 900mm.

(b) Under buildings at any depth.

Provide concrete bedding; after laying and testing of pipes provide concrete surrounds. Thickness shall be as below:

- 100mm for pipes not exceeding 225mm diameter.
- 150mm for larger pipes and for pipes of any diameter under buildings.

Fill remainder of trench with granular material well compacted.

Pipe Types and Laying

Lay and joint pipes in accordance with the makers instructions and to the levels indicated on drawings.

Manholes

Construct manholes in accordance with Contractors Standard manhole drawing. If required by Local Authority, provide interceptor in last manhole before public sewer.

Provide heavy duty covers to manholes in roadways.

Provide medium duty covers to manholes in footpaths or grassed areas next to same.

Provide light duty covers to manholes inaccessible to wheeled vehicles.

Finish insides of foul manholes with cement and sand rendering.

Provide fair face to blockwork inside surface water manholes.

Provide half-round invert channels with necessary curved channels, tapers and branch channel bends.

Bench up manhole bottoms in concrete, and finish smooth in trowelled cement and sand; all to proper slopes and with all angles rounded.

Provide galvanized step irons or galvanized ladders as required by standard manhole drawing.

Sundry Fittings

Provide Armstrong junctions, gully traps and road gullies as indicated on drawings and joint to drains.

Encase Armstrong junctions and gully traps in concrete.

Testing

Test drains in convenient lengths before backfilling under a head of water not less than 300mm.

Remedy defects.

S E C T I O N 14.

SITEWORKS

Hot Rolled Asphalt

Hot rolled asphalt shall comply with B.S. 594 table 4 Schedule 1A and shall hve a 55% stone content with a p.s.v. of not less than 59.

Hardcore

Hardcore under pavings taking vehicles shall comply with Clause 803 of M.O.T. Specification for Road and Bridge Works.

Hardcore under other pavings shall be as described under "Excavation" section.

Precast Units

Road kerbs shall be half-batter type, size 125 x 250mm and shall comply with I.S. 146.

Ducting

Underground ducts shall be of p.v.c. equal to "Wavin-duct".

Water Supplies

For rising mains see "plumbing" section.

Pipes and fittings for watermains shall be of hard p.v.c. to comply with I.S. 123 Class C.

Hydrants shall comply with B.S. 750 and shall have 75mm bayonet lug outlets.

Sluice valves shall comply with B.S. 750.

Underground Chambers

These shall be constructed in accordance with Contractors standard details.

Hydrant covers and frames shall be Dublin Corporation pattern, marked either "H" or "Beal Tuile".

Sluice valve surface boxes shall be Dublin Corporation pattern, with hinged lid about 100mm square marked "S.V.".

Stopvalve covers and frames shall be flanged heavy pattern, with hinged horse shoe lid marked "Uisce".

Road Markings

Markings on paved areas shall be of 100mm wide thermo-plastic compound to comply with B.S. 3262.

WORKMANSHIP

Grade Site

Strip topsoil over paved areas and grade and trim over site to produce correct levels and falls; remove surplus spoil from site.

Paved Areas

Provide paved areas and kerbing as shown on drawings.

Provide hardcore under all paved areas and thoroughly compact with a 10 ton roller to a minimum thickness of 150mm.

Set road kerbs on concrete (20N) foundations size 300 x 150 thick ; bed and point in cement mortar and haunch at rear in concrete.

Grassed Areas

Provide topsoil, to a thickness of at least 100mm over grassed areas indicated on drawings. Rake to an even grade, free from large stones.

Sow No. 2 Grass Seed at 50 grammes per sq. m. and provide first cut.

Ducting

Provide ducting as indicated on drawing for electricity and telephone services, with a finished cover of not less than 700mm.

Water Supplies

Provide water mains and rising mains as indicated on drawings, with a finished cover of not less than 700mm Connect to existing supplies, provide fittings indicated on drawings and construct chambers and manholes for same, also all trenching and concrete anchor blocks required.

Test watermains and rising mains, leave all watertight and in good working order.

Road Markings

Provide white road markings where shown on drawings, executed in accordance with B.S. 3262.

S E C T I O N 15.

MECHANICAL SERVICES

Scope of Contract

The work consists of the design, installation and commissioning, complete of the mechanical services.

The mechanical services generally comprises the following:

1 Low pressure hot water heating in the offices.

2 Warm Air Unit Heater(s) in the warehouse.

3 Oil storage tank and associated pipework.

Type of Heaters

Warehouse - Oil fired warm air floor mounted unit(s).

Offices - Radiators.

Vibration

The mechanical services installation shall be designed to ensure that neither air nor structure borne vibration create problems to building or personnel.

Standards

The complete installation shall be designed and installed in accordance with the provisions of the I.H.V.E. Guide and the standards of the H.V.C.A. and relevant Local Authority Regulations.

MATERIALS AND WORKMANSHIP

Office Heating

The heating for the offices and toilets shall be to a l.p.h.w. radiator system supplied form a boiler located in the boilerhouse. Distribution pipes shall be surface mounted on both ground and first floor levels.

General control of the system shall be by a weather compensated thermostatic control. The maximum water temperature in the system shall be 82°C.

Boiler

The boiler shall be cast iron sectional type complete with smoke hood, flue cleaning doors, etc. It shall be gastight and watertight and installed and tested in accordance with manufacturers recommendations.

Include for the supply of a 7 day 24 hr. spring reserve time clock, with night thermostatic control. The clock will be fitted and wired by the electrical contractor. Include insulated flue with all necessary supports, inspection hatches etc. Roof flashing over prepared upstand to be included.

Pipes

All pipework shall be black mild steel medium quality (blue bard) to B.S. 1387 for l.p.h.w.

Join concealed pipework by welding. All pipes in boilerhouse and warehouse area shall be insulated.

Expansion in pipework to be provided for as necessary.

Pipework supports shall be provided to control the movement and adequately support the pipes as recommended by H.V.C.A.

Valves

Provide isolating valves as necessary with all valves up to 50mm dia. of closed lockshield gunmetal or bronze fullway gate valves with ends screwed B.S.P.T. All valves over 75mm dia. shall be cast iron gate valves to B.S. 3464 with flanged connections.

Radiators

All radiators and skirting convectors shall be as manufactured be Veha Ltd. or equal, each fitted with hand wheel and lock shield valves plated gunmetal easy clean type.

Pumps

All pumps shall be of slow rotational speed and quiet in operation with isolating valves and union.

Insulation

Provide insulation to all pipes, tanks etc. which could be subjected to frost, condensation or heat loss. Insulation to pipework shall be rigid preformed glass fibre section with factory canvas and shall be secured with bands at 450mm centres.

Water Heaters

Provide and fix 2 no. electric water heaters, 1 no. 60 litre pressure type and 1 no. 7 litre under sink type, both of Dimplex manufacture or equal. Isolator and time clocks shall be provided and fitted by electrical contractor.

Oil Storage Tank and Supply Pipework

A 1000 gallon fuel oil storage tank complete with inspection hatch (lockable), valves (lockable), fuel guage, filler point, cradle etc. to be provided. Tank to be constructed to B.S. 799, Part 1 1962.

The supply pipework from the tank to the warm air heaters and boiler shall be in A.B.S. Plastic laid underground and in accordance with the manufacturers recommendations. Fire valves to be fitted to the pipework at the boiler and unit heaters.

Warehouse Heating

The warehouse shall be heated by oil fired warm air floor mounted unit heater(s). The heater(s) shall be provided complete with insulated flue (with cleaning door, draught stabiliser, cowl, flashing to prepared roof upstands), 24 hour 7 day spring reserve time clock, frost stat thermostat etc.

Drawing and Schedule of Fittings

The contractor shall submit with his tender a drawing showing the pipe runs, and radiator sizes and locations and the following schedule:

1 Radiator - Manufacturer and Type.
2 Skirting Convector - Manufacturer and Type.
3 Boiler - Manufacturer and Type.
4. Warm Air Heaters - Manufacturer and Type.

Painting

Allow for removal of radiators to facilitate painting and later refix.

Testing and Commissioning

Test the completed installation and leave all water-tight and in good working order. Allow for instructing Clients staff in the use and operation of the system.

Provide full maintenance manual complete with all manufacturers installation and maintenance instructions for all items of equipment, together with a list of the Irish suppliers and agents.

S E C T I O N 16.

ELECTRICAL SERVICES

Scope of Contract

The work covered by the Contract shall comprise the complete design, installation and commissioning of the electrical services.

The electrical services generally comprise the following:

1. Lighting.
2. Motive Power and General Services.
3. L.V. Switch and Fuseboard.

MATERIALS

L.T. Switchboards

Distribution switch board shall be flush mounted metal clad consumer unit complete with all necessary MCB's, ELCB's and main isolating switches, busbars etc:- M.K. Sentry range or equal.

Additions to the main board shall match existing equiment.

P.V.C. cables installed in conduit and in trunking shall be 600/1000 volt standard P.V.C. insulated copper conductors to comply with B.S. 6004. No cables smaller than 1.5m² shall be used.

P.V.C. insulated armoured cable shall be 600/1000 volt grade copper conductors, p.v.c. insulated, p.v.c. bedded, wire armoured and p.v.c. sheathed, installed as recommended by the manufacturers. Cables shall be terminated with brass compression glands complete with p.v.c. shrouds.

Conduit

All conduit and conduit fittings shall be galvanized heavy guage mild steel and shall comply with B.S. 4568, Parts 1 and 2, Class B, screwed. Galvanizing shall comply with B.S. 729, Parts 1 & 2.

Flexible conduit and fittings shall comply with B.S. 731.

Trunking

Galvanized trunking shall comply with B.S. 2989.

Outlet Accessories

Outlet accessories shall be as manufactured by M.K. Electrical Ltd., or equal and shall be metal clad. Sockets shall be one or two gang type, 13 amp single pole switched.

Light- Fittings

Warehouse	-	2450mm Twin batten type 125W. fluorescents with reflector.
Offices	-	1500mm Twin or single (as indicated on drawings) 65W, fluorescents. Surface mounted, fitted with prismatic diffuser.
Toilets	-	1500mm Single 65W, fluorescent surface mounted, prismatic diffuser, 100W, corrosian resistant fitting with opal glass sphere.

Emergency Light Fittings

Warehouse

Over fire escape doors the fittings are to be self-contained non-maintained 8W., 3 hour duration, with EXIT lettering in white on green background with LED indicator and test button. At high level in the warehouse are self-contained, non-maintained 3 hour duration quartz-haloquen fittings, with 2 x 20W twin adjusted flood lights.

Offices

Fittings to be 4W. self contained, non-maintained, of polycarbonate construction with opal diffuser.

Time Clock

Time clock to be 24 hour dial with spring reserve and day omitting device.

WORKMANSHIP

Standards

The work is to be designed and executed by the electrical sub-contractor to the satisfaction of the E.S.B. and in strick accordance with the current editions of the following:-

a. "The Electro-Technical Council of Ireland's National Rules for Electric Installations" Parts 1 & 2 and appendices.

b. "Regulations for the electrical equipment of buildings" Published by the Institute of Electrical Engineers (where applicable).

c. Factory Electrical Regulations SI No. 3 of 1972 and E.S.B. directives on metering (latest edition).

e. The emergency Light to B. S. 5266.

Supply cables

Provide supply cables from the main board to the distribution board.

Main L.V. Switchboard

Provide all necessary switch and fuse gear on main board.

Distribution Boards

Provide sub-distribution board in the offices for lighting and general services. Position of the sub-distribution board is shown on the drawings.

Labelling

Provide circuit lists inside all distribution boards together with clearly marked schematic diagrams heat sealed and mounted adjacent to the distribution board.

Provide at the main board a schematic diagram showing the whole electrical installation. Diagram to be not less than 800 x 560mm and to be heat sealed and mounted on wall.

All switch and fuse gear to be clearly marked with Ivorine lables giving the following information:

Main Switches: Service (lighting, power) etc.
Area served.
Phase (red etc. where applicable).

Distribution Service (main, or sub-lighting etc.)
Area served.
Phase (red etc. where applicable).
Phase buttons will be used.

These labels will be permanently secured to the covers of the switches and distribution boards.

Earthing

Provide earthing to the whole of the electrical installation and to all equipment in conformity with the National Rules for Electrical Installation and to the requirement of the E.S.B.

Lighting Installation

Provide light fittings as shown on drawings.

Provide all internal and external light fittings, tubes, lamps, diffusers and external light fittings including conduit, wiring and cabling.

Conduit is to be concealed in the office areas and surface mounted in the warehouse.

In the ground floor office areas conceal conduit in holes in precast concrete slabs or in plastered walls and use flush mount accessories.

The conduit in the precast concrete slabs is to be fed into the holes from the perimeter of the slab.

In the first floor conduit to be concealed above suspended ceiling.

Provide separate lighting circuits as indicated on the drawings. Provide two-way switching for lighting circuits as indicated on the drawing.

In general mount switches 1400mm over floor level.

Emergency Lighting

Provide emergency light fittings to B.S. 5266.

General Services

Provide service sockets in the locations shown on the drawings. Sockets to be complete with all conduit, wiring and cabling. All sockets to be protected by ELCB's.

Mount sockets generally 450mm above floor level except in tea room where socket is to be mounted over counter level. Flush sockets shall be used throughout the offices.

BoilerHouse

Provide supply to and connection of the following items to be provided by heating contractor: water pump, frost stat, thermostat, time clock, isolating switches.

Water Heaters

Provide supply to and connection of water heaters to be provided by heating contractor. Switches to be fitted with pilot lamp.

Warm Air Heaters

Provide supply to and connection of oil fired floor mounted warm air heater(s), time clocks and thermostats.

Supply and fit isolators. Time clocks and thermostats to be supplied by heating contractor.

S E C T I O N 17.

INDEX

1. PREAMBLE

1.0 DEFINITION OF TERMS

1.0.1 The Engineer shall mean John Moylan & Associates.

1.0.2 The Steelwork Contractor shall mean the steelwork firm appointed to design, supply, fabricate, deliver and erect the structural steelwork as shown on the contract drawings and as directed in this Specification.

1.0.3 The project is being executed as three separate main contracts as follows:

a) Building works contract.
b) Structural steelwork contract.
c) Cladding contract.

1.1 DESCRIPTION OF WORK

1.1.1 The steelwork contract includes the design, supply fabrication, delivery to the site and erection of the structural steelwork as shown on the steelwork contract drawing and as described in this Specification. This includes all holes, drilling for fixing of patent glazing where applicable connections, stiffners, supports, bases, bolts, brackets etc., all to the satisfaction of the Engineer. The Steelwork Contractor shall co-ordinate his work with that of the building contractor and cladding contractor.

1.2 PLANT

1.2.1 The Steelwork Contractor shall provide all equipment necessary for the handling, erection and completion of the steelwork.

1.3 DESIGN

1.3.1 The structural steelwork is to be designed in accordance with B.S. 449 Part 2: 1969 specification for "The Use of Structural Steel in Building".

1.3.2 The Engineer will supply the Steelwork Contractor with the drawings that will show working dimensions and other necessary particulars, but the contractor is to check these dimensions on site.

1.4 PROGRAMME

1.4.1 On his appointment the Steelwork Contractor shall produce a programme for the production of workshop and erection drawings. The Steelwork Contractor shall be required to agree with the Engineer a final date for submission of these drawings for approval.

1.5 WEIGHTS

1.5.1 All weights and variations or otherwise will be based on the listed weights or members and no allowance made for rolling margins. All steel sections shall be of "full profile" with no

appreciable loss of material through corrosion or deficient rolling. If it is found that any steel weights less than 97.5% of the listed weights the steelwork contractor shall replace it with a satisfactory section.

1.6 QUALITY OF STEELWORK

1.6.1 The quality of the materials, fabrication, and erection of the steelwork in this contract shall comply entirely with the requirements set in the following British Standard and all other Standards therein referred to, except for all caluses dealing with the training and certification of welders. The date of issue of each standard shall be that listed below, or the most recent date of issue. All amendments to the Standards shall be deemed to be parts of the relevant Standards:

BS 4 Part 1	: 1962	Structural Steel Sections.
BS 4 Part 2	: 1965	Ditto.
BS 449	: 1959	Use of Structural Steel in Building.
BS 639	: 1964	Covered Electrodes.
BS 709	: 1971	Methods of testing fusion welded joints and weld metal in steel.
BS 938	: 1962	Metal Arc Welding of Tubes.
BS 968	: 1962	High Yield Stress Steel.
BS 1719	: 1963	Classification of covered Electrodes.
BS 1768	: 1963	Unified Precision Hexagon Bolts & Nuts.
BS 1775	: 1964	Steel Tubes for Structural Engineering Purposes.
BS 1856	: 1964	Metal Arc Welding of Mild Steel.
BS 2451	: 1963	Chilled irong shot and grit.
BS 2521 & 2523	: 1966	Lead based priming paints.
BS 2642	: 1955	Metal Arc Welding of Steel to BS 968.
BS 2708	: 1956	Unified Black Square and Hexagon Bolts & Nuts.
BS 2994	: 1958	Cold rolled steel sections.
BS 3139	1959	High Strength Friction Grip Bolts.
BS 3294	: 1960	Use of High Strength Friction Grip Bolts.
BS 3410	: 1961	Metal Washers.
BS 3692	: 1967	I SO Metric precision hexagonal bolts, screws and nuts.
BS 4190	: 1967	I SO metric black hexagon bolts, screws and nuts.
BS 4232	: 1967	Surface finish of blast cleaned steel for painting.
BS 4360	: 1972	Weldable Structural Steels.
BS 4395	:	High strength friction grip bolts and associated nuts and washers for structural engineering.
		Part 1 : 1969 General Grade.
		Part 2 : 1969 Higher Grade bolts & nuts and general grade washers.
		Part 3 1973 Higher Grade bolts (waisted Shank) nuts and general grade washers.

The Steelwork Contractor shall keep a copy of each of the above standards in his shop for reference.

2. MATERIALS

2.0 STEEL

2.0.1 The steel for this contract is to be mild steel, grade 43C, in accordance with BS 4360 : 1972 "Specification for Weldable Structural Steels".

2.1 BOLTS

2.1.1 Unless specified otherwise, all bolts and nuts shall be ISO metric black hexagon and conform to the requirements of BS 4190 : 1967 "ISO Metric Black Hexagon Bolts, Screws and Nuts".

2.2 TEST CERTIFICATES

2.2.1 Manufacturer's test certificates for all steel used for the work shall be supplied to the Engineer. Copies of rolling mill orders shall also be provided.

2.3 HIGH STRENGTH FRICTION GRIP BOLTS

2.3.1 Where high strength friction grip bolts are used, they shall be of the load indicating bolt type or have load indicating washers and the torque method or part turn method of tightening shall not be allowed. Reference must be made to the Manufacturer's instructions on the method of tightening and assessing the value of the applied load. The Engineer's approval must be obtained for the type of friction grip bolt to be used. The areas of metal directly under the washers must be clean and free of any paint or similar material. Matching surfances of connections made with friction grip bolts must be thoroughly cleaned and be free from any paint primer or other foreign matter.

3. FABRICATION

3.0 FABRICATION DRAWINGS

3.0.1 The Steelwork Contractor will be required to prepare his own shop details in accordance with BS 449 : Part 2 : 1969. These drawings shall be supplied in duplicate to the Engineer for approval before fabrication.

3.0.2 Should these shop details be insufficient or unsatisfactory the Engineer may require fresh details to be submitted.

3.0.2 On receiving the Engineer's approval in writing of such detailed drawings, two further copies are to be supplied. Details are to be submitted at least five working days before approval is required and no work is to be put in hand until such approval has been obtained.

3.1 CORRECTNESS OF DIMENSIONS

3.1.1 The Steelwork Contractor will be held responsible for the correctness of dimensions and details, fitting and workmanship and for the strength of all connections, notwithstanding the approval of the Engineer of the detailed drawings, and for all parts of the various structures coming together correctly for assembling in position.

3.1.2 In event of any connection being found unsatisfactory before or after erection or due to errors arising in fabrication, the Steelwork Contractor shall submit to the Engineer his proposals as to the method to be adopted in making good. The Steelwork Contractor shall abideby the Engineer's decision and in the event of replacements being required, the Steelwork Contractor shall be responsible for all costs involved.

3.2 STIFFENERS

3.2.1 Where specified, fitted stiffeners shall be accurately ground over their full bearing faces to fit tightly the angle or section stiffened.

3.3 SUB-LETTING

3.3.1 The Steelwork Contractor shall not sub-let any fabrication or erection without the permission of the Engineer.

3.4 IDENTIFICATION

3.4.1 All steelwork delivered to site are to be clearly marked with their numbers, together with the number of the members onto which they frame at both ends.

3.5 CAMBER

3.5.1 In the absence of any specified camber, all lattice girders and beams os spans greater than seven metres shall have an upward camber of 0.1% of the span at midspan.

4. WORKMANSHIP

4.0 GENERAL

4.0.1 The workmanship throughout the work shall be to the standards of BS 449 : Part 2.

4.1 BOLTS

4.1.1 All threads on bolts shall be clean and the nuts shall closely fit the bolts so that they can only just be fitted with washers under the nuts. Tampered washers shall be used on tapered sections and flanges to ensure true bearing of the bolt head or nut. Two clear threads shall show beyond the nut on a fully tightened bolt.

4.2 CUTTING

4.2.1 Thermal cutting by hand will be permitted only for wall ends of beams and filler joists and for notching.

4.3 DRILLING

4.3.1 All holes drilled shall be in compliance with BS 449 : Part 2.

4.3.2 Generally holes, shall be drilled with a maximum of 2mm allowance for black bolts or high strength friction grip bolts.

4.3.3 For close Tolerance Bolts with holes not drilled in one operation the procedure shall be:-

1. Holes to be aligned with dia. equal to nominal size of hole - 0 + 0.15mm.
2. Ream first hole, fit close tolerance bolt, and tighten before reaming second hole.
3. Repeat for each hole.
4. Re-tighten all bolts after last bolt is fitted.

4.3.4 Where hollow sections are drilled, spacer tubes must be welded in position to permit through bolting.

4.4 EXAMINATION AND TESTING

4.4.1 The Engineer or his representative shall at all reasonable times be permitted access to the steelwork contractor's works for purposes of progressing and examination and testing of welded structural components.

4.4.2 The Steelwork Contractor when required shall provide and send sample pieces, carriage paid, to such testing stations as may be directed. Sample pieces shall be 500 x 100mm for plates or as that as practicable and 500mm long of full section for structural shapes, rods, etc. The sample pieces shall be selected by the Engineer and despatched to the testing station where test pieces will be made and tested.

4.4.3 If non-destructive tests are to be carried out on welded joints the Steelwork Contractor shall provide facilities for the Engineer or his representative to carry out these tests.

4.4.4 The Steelwork Contractor shall be held responsible for the costs and fees involved in the testing of welds which are found to be unsatisfactory.

4.4.5 The Employer shall be held responsible for the costs and fees involved in the testing of welds which are found to be satisfactory.

4.4.6 All areas of defective welding shall be cut out and made good to the entire satisfaction of the Engineer and all remedial measures shall be borne by the Steelwork Contractor. The remedial work shall be deemed to include radio-graphical or other suitable examination to verify the acceptance of the repair.

5. WELDING

5.0 DESIGN

5.0.1 The design of all welds shall comply with the requirements of BS : 499 : 1969.

5.1 WORKMANSHIP

5.1.1 The welding of all mild steel sections and plates shall be carried out to the requirements of BS 5135 metal arc welding of carbon and carbon manganese steels.

5.1.2 The welding of all structural hollow section shall be carried out to the requirements of BS 5135 metal arc welding of carbon and carbon manganese steels.

5.1.3 Evidence of qualification of welders will be required by the Engineers and in cases where recent test certificates or other acceptable proof is not available the Engineer will require welder approval tests to be carried out in accordance with BS 4872 "Fusion Welding of Steel".

The test shall be carried out under the supervision of the Engineer and to his satisfaction. The extent of qualification thereby attained shall be in conformity with the recommendation of BS 449 Part 2 1969.

TOLERANCES

Tolerances for erected steelwork shall be as follows;

1.	Position of first erected column	± 10mm
2.	Linear dimensions: up to 8 m	± 10mm
	from 8 m to 15 m	± 15mm
	from 15 m to 25 m	± 20mm
	over 25 m	± 25mm

6. ERECTION

6.0 GENERAL

6.0.1 The method of transport, handling and erection of materials shall be to the satisfaction of the Engineer and in accordance with the drawings or as directed. These operations shall be carried out in such a manner as will not injure, overstress or disfigure any part of the structure. Any member injured, overstressed or damaged in any way shall be rectified as directed by the Engineer.

6.0.2 Site joints and connections shall not be finally bolted until sufficient of the structure is properly plumbed, levelled and aligned and no straining into position will be allowed subsequently.

6.0.3 The Steelwork Contractor is to take all necessary precautions to ensure the stability and safety of the steelwork structure during erection and shall maintain any special temporary guying or other supports until the structure is completed. The Steelwork Contractor shall be entirely responsible for any accidents which may arise from lack of suitable precautions.

6.0.4 The Steelwork Contractor will be held responsible for any damage to existing work or buildings or their contents, roads, walls, etc. adjoining or upon the site, arising form the off-loading and erection of steelwork.

6.1 TOLERANCES

6.1.1 Tolerances for erected steelwork shall be as follows:

1.	Position of first erected column	± 10mm
2.	Linear dimensions; up to 8m	± 10mm
	from 8m to 15m	± 15mm
	from 15m to 25m	± 20mm
	over 25m	± 25mm
3.	Plumb of columns in 30m height	± 15mm
4.	Level of base of first erected column	± 5mm
5.	Level of beam at junction with column measured from transferred bench mark	± 15mm
6.	Level of beam at junction with column measured from transferred bench mark of storey in which beam is located	± 10mm

6.1 TOLERANCES CONT'D.

7. Levels of upper or lower surfaces of two or more beams meeting at a column

8. Difference in level of ends of a beam:

up to 8m long

from 8m to 15m long

from 15m to 25m long

over 25m long

6.2 BRACING

Bracing is provided to stabilise the completed building. The Steel Contractor shall be responsible for the provision of any extra steelwork considered necessary for the alignment and temporary stability of the steelwork. The cost of this additional steelwork should be included in the contract price.

6.3 HOLDING DOWN BOLTS

The Steelwork Contractor is to supply to the Building Contractor all the necessary holding down bolts or anchorage devices for the Building Contractor to cast into the foundations. The Steelwork Contractor must satisfy himself prior to erection that the foundations have been properly formed and, in particular, that the holding down bolts have been accurately set and have the full amount of play required.

7. SPECIFICATION FOR CORROSION PROTECTION SYSTEM TO STRUCTURAL STEELWORK

7.1 PREPARATION

Shot blast to Swedish Standard ISSo55900 to give surface quality Sa 2½ and/or BS4232 Second Quality. Remove all traces of loose rust, grit etc, by compressed air hose or careful clean dry brushing. Inspect for laminations and remove by careful grinding leaving a smooth surface. Dust off and within 2 hours of shot-blast apply 'Blast Primer'.

7.2 BLAST PRIMER

Apply by airless spray:-

1-coat 2-pack Epoxy Zinc Rich Primer to a D.F.T. of 20 microns. (This D.F.T. accords to BS 5493; 1977 for 'blast primers'). Allow to dry. Then fabricate as necessary.

7.3 PREPARATION AND SPOT-PRIMING AFTER FABRICATION

After fabrication carefully remove all weld flux and spatter, rough edges, etc. by scraping, chipping and grinding to a smooth surface. Remove any unsound 'scorched' primer around weld areas; also, all dust, dirt, grease, etc. (Wash with White Spirit where necessary). Allow to dry overnight.

7.4 SITE-HOLDING PRIMER

Apply by airless spray to the clean dry surface:-

1-coat 2-pack Epoxy High Build Zinc Phosphate Primer, to a dry film thickness of 50 microns. Allow 7 days to achieve maximum through hardness before despatch to site.

7.5 SITE TREATMENT

PREPARATION AND SPOT-PRIMING AFTER ERECTION

After erection all damaged areas (including boltheads etc.) must be thoroughly prepared and carefully spot-primed with primer. Allow to dry overnight.